CYCLOPÆDIA:

OR, AN

UNIVERSAL DICTIONARY

OF

ARTS AND SCIENCES.

CONTAINING
An EXPLANATION of the TERMS, and an ACCOUNT
OF THE SEVERAL SUBJECTS,

IN THE

LIBERAL AND MECHANICAL ARTS,

AND THE

SCIENCES, HUMAN and DIVINE.

Intended as a COURSE of ANCIENT and MODERN LEARNING.

By E. CHAMBERS, F.R.S.

Floriferis ut apes in ſaltibus omnia libant,
Omnia nos— LUCRET.

WITH THE

SUPPLEMENT,

AND

MODERN IMPROVEMENTS,

Incorporated in one ALPHABET.

By ABRAHAM REES, D.D.

IN FOUR VOLUMES.

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D.

D, The fourth letter in the alphabet, and the third conſonant.

The letter *D* is the fourth in the Hebrew, Chaldee, Samaritan, Syriac, Greek, and Latin alphabets; in the five firſt of which languages it has the ſame name, though ſomewhat differently ſpoken, e. gr. in Hebrew, Samaritan, and Chaldee, *Daleth*; in Syriac *Dolath*; and in Greek *Delta*.

The Arabians have three *D's* in their language, the firſt called *Dal*, which is the eighth of the twenty-eight letters; the ſecond, called *Dhſal*, is only diſtinguiſhed from the former by having a point added over it; though its ſound is much the ſame with that of the Z: the third, which is their ſeventeenth letter, is called *Da*, and pronounced like our *D*, though in form it reſembles the Arabic *Ta*, the difference being a point added at the top.

The form of our *D* is the ſame with that of the Latins; as appears from all the ancient medals and inſcriptions. And the Latin *D* is no other than the Greek Δ, rounded a little, by making it quicker, and at two ſtrokes. The Δ of the Greeks, again, is borrowed from the ancient character of the Hebrew *Daleth*; which form it ſtill retains on the Samaritan coins, as is ſhewn by the Jeſuit Souciet, in his Diſſertation on the Samaritan Medals. All the alteration the Greeks have made in it, is the making it ſtoop a little, and taking away a little line. Nor would it be difficult to ſhew, that the Syriac *Dolath*, and the Arabic *Dal*, are both borrowed from the ancient Hebrew, as well as the ד *Daleth* of the modern, or Chaldee Hebrew.

Some indeed will have it, that the Greek Δ, *Delta*, is borrowed from the Egyptians, who made their *D* of three ſtars diſpoſed in a triangle; which was a hieroglyphic that among them denoted God, the ſovereign Being, as if they had had ſome notion of a Trinity: but this ſurmiſe is weakly ſupported.

Grammarians generally rank *D* among the lingual letters, as ſuppoſing the tongue to have the principal ſhare in the pronunciation thereof; though the abbot de Dangeau ſeems to have reaſon in making it a palatal letter. It has one uniform ſound, nearly approaching to that of T, but formed by a ſtronger appulſe of the tongue to the upper part of the mouth.

D is alſo a numeral letter ſignifying *five hundred*, which ariſes hence, that in the Gothic characters the *D* is half the M, or CIↃ, which ſignifies a thouſand. Hence the verſe:

Litera D *velut* A *Quingentos ſignificabit.*

A daſh added at the top of the $\overline{\text{D}}$, denotes it to ſtand for *five thouſand*.

D uſed in abbreviation has various ſignifications: thus *D* ſtands for doctor, and M. D. doctor of medicine, D. T. doctor of theology, D. D. doctor of divinity, or *dono dedit*; D. D. D. is uſed for *dat*, *dicat*, *dedicat*; and D. D. D. D. for *dignum deo donum dedit*.

Among Roman writers, *D* ſtands for *divus*, *decimus*, *devotus*, *diebus*, and *diutius*.

DM in the Roman epitaphs ſignifies *diis manibus*, but on other occaſions *deo magno*, or *diis magnis*; *DN* denoted *dominus noſter*, a title given by the Romans to their emperors.

D on the French coins is the mark of the city of Lyons.

D, in the chemical alphabet, ſignifies vitriol.

D, in the *Italian Muſic*, intimates, that in thorough baſſes, the treble or deſcant ought to play alone; as T does the tenor, and B the baſs.

DC, in the *Italian Muſic*, an abbreviation of *da capo*, i. e. from the head or beginning: theſe words or letters are commonly met with at the end of rondeaus, or ſuch airs and tunes as end with the firſt ſtrain, and intimate that the ſong is to be begun again, and ended with the firſt part.

DAALDER. See DOLLAR and COIN.

DAB, in *Ichthyology*, a name given by the Engliſh to a ſmall fiſh of the PLEURONECTES kind, called by authors the *paſſer aſper* and *limanda*.

It is a flat fiſh, ſuperior in goodneſs to the common plaiſe, but inferior in ſize, covered with ſmall ſcales, rough at their extremities, and edged as it were with teeth: the eyes are on the right ſide, and are placed very cloſe together. It is generally of an uniform brown colour on the upper ſide, though ſometimes ſhaded with a darker; the lower part of the body is white. The lateral line is incurvated at the beginning, and then proceeds ſtrait to the tail. It is in beſt ſeaſon in February, March, and April; ſpawns in May and June, and becomes flabby during the reſt of ſummer. The *ſmear-dab* reſembles the former; its back is covered with ſmall ſmooth ſcales, of a light brown colour, and ſpotted with yellow; the belly is white, and marked with five large duſky ſpots. It is equally good with the common *dab*. Pennant.

It is caught in the Mediterranean and Engliſh ſeas.

DABUH, a name given by the Arabs to the HYÆNA.

DACE, in *Ichthyology*, the Engliſh name for the fiſh called by authors the *leuciſcus*. According to the new ſyſtem of Artedi, this is a ſpecies of the cyprinus; and it is called by ſome *albicula*.

It is diſtinguiſhed from other fiſhes by its reſembling the chub in ſize, but that it is ſmaller and whiter, and has a ſmaller head in proportion to its body. Its length is ſeldom more than ten inches. It has no teeth in its jaws, but like the reſt of the leather-mouthed fiſhes has them in the throat. It is very common in our rivers, and is a remarkably lively fiſh. They ſpawn in February, and the males at that time are ſpotted and ſcabby, as in the rudd, &c. and are in higheſt ſeaſon for the table in April and May; but they are never a very well-taſted fiſh, or much eſteemed.

This fiſh gives the expert angler great diverſion. The *dace* will bite at any fly; but he is more than ordinarily fond of the ſtone-caddis, or May-fly, which is plentiful in the latter end of April, and the whole month of May. In warm weather this fiſh very ſeldom refuſes a fly at the top of the water; but at other times he muſt have the bait ſunk to within about three inches of the bottom.

The winter fiſhing for *dace* requires a very different bait: this is a white maggot with a reddiſh head, which is the produce of the eggs of the beetle, and is turned up with the plough in great abundance. A parcel of theſe put in any veſſel, with the earth they were taken in, will keep many months, and are an excellent bait.

Small *dace* may be put into a glaſs jar with freſh water, and there preſerved alive for a long time, if the water be properly changed. They have been obſerved to eat nothing but the animalcula in the water. They will grow very tame by degrees. Phil. Tranſ. Nº 487. p. 23. ſeq.

DACOLITHUS, in *Zoology*, a name given by many to a ſmall fiſh, a ſpecies of the loach, and diſtinguiſhed by the name of *cobitis barbatulea aculeata* by Ray and others. It is a very ſmall fiſh, ſeldom exceeding two, or at the utmoſt three inches in length. Its head is broader and flatter than the reſt of the body; its back is of a duſky brown, ſpotted with black, and its belly yellow. It has two beards on each ſide of the upper jaw; and on the coverings of the gills has, on each ſide, two prickles, or a double-pointed ſharp hook, by means of which it moves itſelf about among the ſtones. This fiſh loves ſhallow waters with a ſtony bottom, and ſpawns in May and June. Willughby.

There is another ſpecies of this fiſh, which has ten beards about its mouth, and otherwiſe reſembles this. There is an opinion that they ſwallow little ſtones, and they have hence the German name ſignifying ſtone-ſwallowers, or ſtone-biters.

DACRYODES, in *Medicine*, a term applied to ulcers, which are continually yielding a putrid matter.

The word is formed from δακρυ, *tear*, and ειδος, *form*; denoting the ulcers to weep, or ſhed ſomewhat like tears.

DACRYON. See Tears.

DACTYL, Dactylus, a foot in the Latin and Greek poetry, conſiſting of a long ſyllable, followed by two ſhort ones: as *cārmĭnĕ*.

Some ſay it is derived from δακτυλος, a *finger*, becauſe it is divided into three joints, the firſt of which is longer than the other two.

The *dactyl* is ſaid to have been the invention of Dionyſius or Bacchus, who delivered oracles in this meaſure at Delphos, before Apollo. The Greeks call it ϖολιτικος.

The *dactyl* and ſpondee are the moſt conſiderable of the poetical feet; as being the meaſures uſed in heroic verſe, by Homer, Virgil, &c. Theſe two are of equal time, but not equal motion. The ſpondee has an even, ſtrong, and ſteady pace, like a trot: the *dactyl* reſembles the nimbler ſtrokes of a gallop.

Dactylus was alſo a ſort of dance among the ancient Greeks, chiefly performed, as Heſychius obſerves, by the athletæ.

Dactyls alſo denote the fruit of the palm-tree, more uſually called *dates*.

DACTYLETHRA, or Dactylithra, *Digitale*, among the *Ancient Phyſicians*, a medicine uſed to provoke vomiting. It was a ſort of topical application, and is deſcribed at large by Oribaſius.

DACTYLI, in *Antiquity*, a name attributed to the firſt prieſts of the goddeſs Cybele; who were particularly called *Dactyli Idæi*, on account of the goddeſs herſelf, who was ſtyled *Cybele Idæa*, becauſe principally honoured on mount Ida in Phrygia. The name *Dactyli* is ſuppoſed to have been given them on this occaſion: that to prevent Saturn from hearing the cries of Jupiter, whom Cybele had committed to their cuſtody, they uſed to ſing verſes of their own invention, which by their unequal meaſures ſeemed to reſemble the foot called *dactylos*.—This is the account of the grammarian Diomedes.

One Sophocles, quoted by Strabo, lib. x. ſpeaks differently. According to him they were called *Dactyli*, from the Greek word δακτυλος, *finger*, becauſe their number was at firſt equal to that of the fingers of the hand, viz. ten; five of them boys, and as many girls. He adds, that it is to them we owe the invention of iron, and the manner of working it, with divers other uſeful things. Others make their numbers more, and others leſs, than ten. Some, again, make them natives of Phrygia, near the foot of mount Ida; and others bring them from other places.

However, all the authors Strabo had ſeen, he ſays, agreed, that they were the firſt who wrought in iron; that they had been miniſters of the mother of the gods, or Cybele; and that they dwelt at the foot of mount Ida: and they probably derived their knowlege of forging metals from the fuſion of minerals at the burning of mount Ida.

It is alſo conjectured by ſome authors, not that the Curetes and Corybantes were the ſame with the *Dactyli Idæi*, but that the Curetes and Corybantes were their poſterity; that a hundred men, born in Crete, were firſt called *Dactyli Idæi*; that each of theſe had nine children, who were the Curetes; and that each of the Curetes had ten children, who were alſo called *Dactyli Idæi*. They were Cyclopians.

Strabo only gives us the names of four of the *Dactyli Idæi*, which are Salaminus, Damnanæus, Hercules, and Acmon.

DACTYLIC, ſomething that has a relation to *dactyls*.

Anciently, there were *dactylic*, as well as ſpondaic flutes, *tibiæ dactylicæ*. The *dactylic* flutes conſiſted of unequal intervals; as the *dactylic* foot does of unequal meaſures.

Dactylic *verſes* are hexameter verſes, ending in a *dactyl* inſtead of a ſpondee; as ſpondaic verſes are thoſe which have a ſpondee in the fifth foot inſtead of a *dactyl*.

An inſtance of a *dactylic* verſe we have in Virg. Æn. lib. vi. 33.

> *Bis patriæ cecidere manus: quin protinus omnia*
> *Perlegerent oculis*——

DACTYLIOMANCY, Dactyliomantia, a ſort of divination performed by means of a ring.

The word is compoſed of the Greek δακτυλιος, *ring*, of δακτυλος, *finger*; and μαντεια, *divination*.

Dactyliomancy conſiſted principally in holding a ring, ſuſpended by a fine thread, over a round table, on the edge whereof were made divers marks with the twenty-four letters of the alphabet. The ring in ſhaking, or vibrating over the table, ſtopped over certain of the letters, which, being joined together, compoſed the anſwer required.

But the operation was preceded and accompanied by ſeveral ſuperſtitious ceremonies; for firſt the ring was to be conſecrated with a great deal of myſtery: the perſon who held it was to be clad in linen garments, to the very ſhoes; his head was to be ſhaved all round; and in his hand he was to hold vervain. And before he proceeded on any thing, the gods were firſt to be appeaſed by a formulary of prayers, &c. Ammianus Marcellinus gives the proceſs at large in his twenty-ninth book.

DACTYLIS, in *Botany*. See *Cock's-foot* Grass.

DACTYLONOMY, Dactylonomia, from δακτυλος, *finger*, and νομος, *law*, the art of accounting, or numbering, by the fingers.

The rule is this: the left thumb is reckoned 1, the index 2, and ſo on to the right thumb, which is the tenth, and of conſequence is denoted by the cypher 0.

DACTYLUS, in *Ichthyology*, a name uſed by many authors for the ſolen or razor-fiſh, ſuppoſed to be the *dactylus* of Pliny, to which he attributes a quality of being luminous in the dark: but Mr. Reaumur has obſerved, that the common ſolen or razor-fiſh has no ſuch quality; but that the *pholas*, or, as the French call it, the *dail*, has: and therefore it follows either that the *pholas* is the *dactylus* of Pliny, or elſe that this author has attributed to one ſpecies of fiſh what is the peculiar property of another.

The ſhell of this creature is not at all luminous, but only its body and juices; and in this it is no way allied to ſome kinds of fiſh, which are known to have the quality of ſhining in the dark, ſince thoſe never ſhine till they are in a ſtate of decay, and in part rotten; whereas theſe have their luminous quality at all times, even when juſt taken out of the ſea. The glow-worm has only a part of its body luminous, but the *pholas* is luminous all over, and is equally ſo in every part: and when the fiſh is taken whole out of the ſhell, and laid in a dark place, every part of its ſurface ſhines with a very bright light. Neither is the light peculiar to the external ſurface of the fiſh, but common to the whole body: for if it be wounded tranſverſely, or longitudinally, the cut parts are equally luminous with the other ſurfaces.

The *pholas* is therefore a true natural phoſphorus, and, like the artificial phoſphorus of urine, it renders every thing luminous that it is rubbed againſt.

Mr. Reaumur obſerved of this fiſh, that when freſh caught it abounds with water, and that this water naturally drops away in the handling it; and, according to Pliny's juſt obſervation, theſe very drops of water are luminous.

The light which this fiſh gives to bodies that touch it, is not of any long continuance, but remains only while they are wet. Mr. Reaumur obſerved, that the light upon his fingers grew fainter and fainter by degrees as they dried; and that on dipping them in water to waſh them, it brightened up again. This author was thus encouraged to attempt ſome way of keeping the fiſh, ſo as to make it a phoſphorus ready for uſe at pleaſure; but this did not ſucceed to his wiſhes.

In the ſummer months, the fiſh may be kept ſeveral days freſh, and with their luminous property; but as they begin to decay, they gradually loſe it. It ſeems alſo, that there being ſome dead ones among the living, would make them loſe their luminous quality, even in that which is their beſt ſtate. It is well known, that the PHOLAS lives in holes within ſtones, from whence it cannot get out; and Mr. Reaumur cauſing ſome of theſe ſtones to be taken up, in which, on breaking, there appeared to be ſome dead ones, and ſome alive, found that the living fiſh from theſe ſtones had not their luminous property, which ſeemed as it were extinguiſhed by the dead and ſtinking ones. Mem. Acad. des Scienc. ann. 1723.

DACTYLUS *Idæus*, in *Natural Hiſtory*, a name given by many authors to the BELEMNITES; ſuppoſed erroneouſly by many, to be the *lyncurius* of the ancients. For other meanings of the word, ſee DACTYLI.

DADO, in *Architecture*, is by ſome writers uſed for that part in the middle of the pedeſtal of a column between its baſe and cornice. It is of a cubic form, whence it is alſo denominated *dye*.

DADUCHI, in *Antiquity*, prieſts of Ceres.

That goddeſs, having loſt her daughter Proſerpine, ſay mythologiſts, began to make ſearch for her at the beginning of the night. In order to do this in the dark, ſhe lighted a torch, and thus ſet forth on her travels throughout the world: for which reaſon it is, that ſhe is always ſeen repreſented with a lighted torch in her hand.

On this account, and in commemoration of this pretended exploit, it became a cuſtom for the prieſts, at the feaſts and ſacrifices of this goddeſs, to run about in the temple, with torches, after this manner; one of them took a lighted torch from off the altar, and holding it with his hand, ran with it to a certain part of the temple, where he gave it to another, ſaying to him, *Tibi trado:* this ſecond ran after the like manner, to another part of the temple, and gave it to the third, and ſo of the reſt.

From this ceremony the prieſts became denominated *daduchi*, δαδȣχοι, q. d. *torch-bearers*; from δας, an unctuous and reſinous wood, as pine, fir, &c. whereof the ancients made torches; and εχω, *I have*, *I hold*.

The Athenians alſo gave the name *daduchus* to the high-prieſt of Hercules.

DÆDALA, in *Antiquity*, two feſtivals in Bœotia, one of which was obſerved by the Platæans at Alalcomenus, where was the largeſt grove in all Bœotia. Here they aſſembled, and expoſing to the open air pieces of ſodden fleſh, carefully obſerved whither the crows that came to feed upon them took their flight, and then hewed down all thoſe trees on which any of them alighted, and formed them into ſtatues, which by the ancient Greeks were called *dædala*, δαιδαλα.

The other ſolemnity was by far the greateſt and moſt remarkable of the two, being celebrated only once in ſixty years. For the ceremonies obſerved in it, ſee Pott. Archæol. Græc. lib. ii. cap. 20.

DÆDIS, among the Greeks, a ſolemn feſtival that laſted three days, during all which time δαδες, or *torches*, were kept burning, which gave occaſion to the name. Pott. Archæol. Græc. lib. ii. cap. 20.

DÆMON, Δαιμων, a name the ancients gave to certain ſpirits, or genii, which they ſay appeared to men, either to do them ſervice, or to hurt them.

The Greek word, δαιμων, is derived (according to Plato, in his Cratylus, p. 398. ed. Serrani, vol. i.) from δαημων, *knowing*, or *intelligent*; but according to others from δαιομαι, *to diſtribute*. See the Scholiaſt on Homer, Il. i. ver. 222. Either of theſe derivations agrees with the office aſcribed to *dæmons* by the ancient heathens, as the ſpirits intruſted with the *inſpection* and *government* of mankind. For, according to the philoſophers, *dæmons* held a middle rank between the celeſtial gods and men on earth, and carried on all intercourſe between them; conveying the addreſſes of men to the gods, and the divine benefits to men. Plutarch. de Defect. Orac. p. 415, et ſeq. Platon. Sympoſ. p. 202. tom. iii. ed. Serrani. Apuleius de Deo Socrat. p. 674. 677. ed. Delph. Iamblichus de Myſter. Auguſt. de Civ. Dei.

It was the opinion of many, that the celeſtial divinities did not themſelves interpoſe in human affairs, but committed the entire adminiſtration of the government of this lower world to theſe ſubaltern deities. *Neque enim pro majeſtate deum cœleſtium fuerit, hæc curare.* Apuleius de Deo Socratis, p. 677. *Cuncta cœleſtium voluntate, numine & authoritate, ſed dæmonum obſequio, & operâ, & miniſterio fieri arbitrandum eſt.* Id. p. 675. Hence they became the objects of divine worſhip. *If idols are nothing*, ſays Celſus, (apud Origen. cont. Celſ. lib. viii. p. 393.) *what harm can there be to join in the public feſtivals? If they are* dæmons, *then it is certain that they are gods, in whom we are to confide, and to whom we ſhould offer ſacrifices and prayers, to render them propitious.*

Several of the heathen philoſophers held, that there were ſeveral kinds of *dæmons*; that ſome of them were ſpiritual ſubſtances of a more noble origin than the human race, and that others had once been men. Apuleius de Deo Socratis, p. 684. 690. Ammonius apud Plutarch. de Defect. Orac. p. 431. tom. ii. ed. 1624. Plato in Timæo, p. 41, 42. 69. 71. 75.

But thoſe *dæmons* that were the more immediate objects of the eſtabliſhed worſhip amongſt the ancient nations were *human ſpirits*, ſuch as were believed to become *dæmons* or deities after their departure from their bodies. Plutarch teaches (Vit. Romul. p. 36. ed. Paris) *that according to a divine nature and juſtice, the ſouls of virtuous men are advanced to the rank of* dæmons; *and that from* dæmons, *if they are properly purified, they are exalted into gods, not by any political inſtitution, but according to right reaſon.* The ſame author ſays in another place (De Iſ. & Oſir. p. 361.) *that Iſis and Oſiris were, for their virtue, changed from good* dæmons *into gods, as were Hercules and Bacchus afterwards, receiving the united honours both of gods and* dæmons. Heſiod, and other poets, who have recorded the ancient hiſtory or traditions, on which the public faith and worſhip were founded, aſſert, that the men of the golden age, who were ſuppoſed to be very good, became *dæmons* after death, and diſpenſers of good things to mankind.

Though *dæmon* is often uſed in a general ſenſe, as equivalent to a *deity*; and is accordingly applied to *fate* or *fortune*, or whatever elſe was regarded as a god, yet thoſe *dæmons* who were the more immediate objects of divine worſhip amongſt the heathens, were human ſpirits; as is ſhewn in Farmer on Miracles, chap. iii. ſect. 2.

The word *dæmon* is uſed indifferently in a good and in a bad ſenſe. In the former ſenſe it was very commonly uſed amongſt the ancient heathens. *We muſt not*, ſays Menander, *think any* dæmon *to be evil, hurtful to a good life, but every god to be good.* Nevertheleſs, thoſe are certainly miſtaken who affirm, that *dæmon* never ſignifies an evil being till after the times of Chriſt. Pythagoras held *dæmons* who ſent diſeaſes to men and cattle, Diogen. Laert. Vit. Pythagor. p. 514. ed. Amſtel. Zaleucus, in his preface to his Laws (apud Stobæum, Serm. 42.) ſuppoſes that an evil *dæmon* might be preſent with a man, *to influence him to injuſtice.* The *dæmons* of Empedocles were evil ſpirits, and exiles from heaven. Plutarch Περι τȣ μη δειν δανειζεσθαι. And in his life of Dion (p. 958.) he ſays, *It was the opinion of the ancients, that evil and miſchievous* dæmons, *out of envy and hatred to good men, oppoſe whatever they do.* Scarce did any opinion more generally prevail in ancient times than this, viz. that as the departed ſouls of good men became good *dæmons*, ſo the departed ſouls of bad men became evil *dæmons*. See Chalcid. in Platon. Tim. cap. 135. p. 330.

It has been generally thought, that by *dæmons* we are to underſtand *devils*, in the Septuagint verſion of the Old Teſtament; but it has been ſhewn, that the word is in that verſion certainly applied to the ghoſts of ſuch dead men as the heathens deified, in Deut. xxxii 17. Pſ. cvi. 37. What is offered on this head by Mr. Farmer, in his Eſſay on the Dæmoniacs of the New Teſtament, is much confirmed by what occurs in Sir Iſaac Newton's Chronology, p. 160, 161. That *dæmon* often bears the ſame meaning in the New Teſtament, and particulary in Acts xvii. 18. 1 Cor. x. 21. 1 Tim. iv. 1. Rev. ix. 13. is ſhewn at large by Mr. Joſeph Mede (Works, p. 623, et ſeq.) That the word is applied always to human ſpirits in the New Teſtament, Mr. Farmer has attempted to ſhew in the forementioned Eſſay, p. 208, et ſeq. As to the meaning of the word *dæmon* in the fathers of the Chriſtian church, it is uſed by them in the ſame ſenſe as it was by the heathen philoſophers, eſpecially the latter Platoniſts; that is, ſometimes for departed human ſpirits, and at other times for ſuch ſpirits as had never inhabited human bodies. In the fathers indeed the word is more commonly taken in an evil ſenſe, than in the ancient philoſophers. Beſides the two forementioned kinds of *dæmons*, the fathers, as well as the ancient philoſophers, held a third, viz. ſuch as ſprang from the congreſs of ſuperior beings with the daughters of men. In the theology of the fathers, theſe were the worſt kind of *dæmons*. Tertullian's Apology, cap. 22. Lactantius, Div. Inſtitut. lib. ii. cap. 15.

Different orders of *dæmons* had different ſtations and employments aſſigned them by the ancients. Good *dæmons* were conſidered as the authors of good to mankind; evil *dæmons* brought innumerable evils both upon men and beaſts. Amongſt evil *dæmons* there was a great diſtinction with reſpect to the offices aſſigned them; ſome compelled men to wickedneſs, others ſtimulated them to madneſs. See DÆMONIAC.

DÆMONIAC, Δαιμονιζομενος, one poſſeſſed by a dæmon. *Dæmoniacs*, or (if we may be allowed the expreſſion) *dæmonized perſons*, were ſuch as were thought to have a dæmon or dæmons *inſpiring* and *actuating* them, ſuſpending the faculties of their minds, and governing the members of their bodies. The dæmons were ſuppoſed to inform the bodies of the poſſeſſed, in the ſame manner that their own ſouls did at all other times. Hence it came to paſs, that every thing ſaid or done by the *dæmoniacs*, was often aſcribed to the indwelling dæmons. Plato (apud Clem. Alex. Strom. i. p. 405. Oxon.) affirms, that *dæmoniacs do not uſe their own dialect or tongue, but that of the dæmons who have entered into them.* And Lucian, when ſtating the common opinion concerning perſons thought to be poſſeſſed, ſays, *The patient is ſilent, the dæmon returns the anſwer to the queſtions that are aſked.* Accordingly we find in the New Teſtament, that what was ſaid and done by the *dæmoniacs* themſelves, is (in conformity to the vulgar language) very often referred to the dæmons by whom they were ſuppoſed to be inſpired and actuated. And *dæmoniacs* having been educated in the common opinion concerning the nature and reality of poſſeſſions, did (as it is natural to ſuppoſe they would) frequently fancy themſelves to be poſſeſſed by dæmons, or that they were dæmons themſelves, and ſpoke and acted in conformity to the apprehended ſentiments and inclinations of thoſe ſpirits. Hence their dread of Chriſt's power, and their treaties and expoſtulations with him. See Farmer's Letters in anſwer to Dr. Worthington, p. 98, and p. 139.

The peculiar ſymptoms of the *dæmoniacs* were certain kinds of inſanity, ſuch as the ancients could not account for by natural cauſes, and ſeemed to argue the ſeizure of the underſtanding by a malevolent dæmon, who inſtigated the unhappy patient to every thing that was extravagant and injurious to himſelf and others. Among the Greeks, the Latins, the Jews, and other eaſtern people, none were thought to be poſſeſſed whoſe underſtandings were not diſturbed. Amongſt the primitive Chriſtians alſo, reputed *dæmoniacs* were all mad, melancholy, or epileptic perſons; and ſuch likewiſe were all the *dæmoniacs* of the New Teſtament; as is ſhewn by Dr. Sykes in his Inquiry, and Farther Inquiry concerning this ſubject, and by Mr. Farmer in his Eſſay upon it, chap. i. ſect. 5, 6. Both theſe writers have alſo taken much pains to ſhew, that the dæmons to whom poſſeſſions were referred by the ancients, were conſidered as human ſpirits. Joſephus ſays in expreſs terms, that dæmons are *the ſpirits of wicked men, who enter the living, and kill thoſe who receive no help.* De Bello Jud. lib. vii. cap. 6. ſect. 3. And Juſtin Martyr affirms (Apol. I. al. ii. p. 65. Pariſ. 1620) *that thoſe perſons who are ſeized and thrown down by the ſouls of the deceaſed, are ſuch as all men agree in calling* dæmoniacs *and mad.*

In the tranſlation of the New Teſtament in vulgar uſe, we frequently read of perſons *having* or *being poſſeſſed by a devil* or *devils*, and of Chriſt's *caſting out devils.* But the Scripture never deſcribes more than one evil ſpirit by the word devil; and never repreſents any perſons as poſſeſſed by the *devil*, or by *devils*, not even in a ſingle inſtance, notwithſtanding the great frequency with which the evangeliſts ſpeak on the ſubject of poſſeſſions. In all the inſtances in which the term devils occurs in the Engliſh tranſlation of the New Teſtament, the original word is *dæmons* (δαιμονες, δαιμονια, δαιμονιζομενοι) and not that from whence comes the Engliſh word *devil* (διαϐολος). As poſſeſſing dæmons were in the age of the Goſpel univerſally regarded as human ſpirits, it is very reaſonable to ſuppoſe that the ſacred writers employ the term dæmon in reference to poſſeſſions, in the ſame ſenſe in which all other perſons did; eſpecially as they have given us no notice of their uſing the word in a new or peculiar ſenſe, and have even themſelves certainly uſed it on other occaſions to deſcribe ſuch dead men as the ſuperſtition of the heathens deified, and corrupt Chriſtians have propoſed as objects of worſhip. 1 Cor. x. 20, 21. 1 Tim. iv. 1. Rev. ix. 20.

Whether there ever were any real *dæmoniacs*, is a queſtion that will be conſidered under the article DÆMONIACAL *poſſeſſion.*

In the Romiſh church, there is a particular office for the exorciſm of *dæmoniacs.*

DÆMONIACS are alſo a party or branch of the Anabaptiſts, whoſe diſtinguiſhing tenet it is, that the devils ſhall be ſaved at the end of the world.

DÆMONIACAL *poſſeſſion.* In the ages of ignorance and ſuperſtition, the credulous part of mankind were eaſily perſuaded to believe, that maniacs and epileptics were really poſſeſſed by dæmons: but thoſe who conſulted their reaſon, and gained an inſight into nature, pronounced what commonly paſſed for *dæmoniacal poſſeſſions*, to be mere natural diſorders. The divine Hippocrates wrote his book Περι Ιηρης νουσου, to ſhew that the epilepſy has nothing in it ſupernatural, more than any other diſtemper; and to expoſe the ignorance and impiety of thoſe who aſcribed it to the immediate agency of the gods, and accordingly undertook to cure it by expiations and charms. Amongſt many other conſiderations which he has urged to prove that epileptical diſtempers owe their riſe to natural cauſes, he obſerves, (De Morbo Sacro, p. 307. ed. Foeſii) *that goats are remarkably ſubject to the epilepſy; and, on diſſecting the head, the brain is found to be overcharged with a rheum of a very bad ſmell; a plain proof*, he adds, *that the animal is diſeaſed, not poſſeſſed by a deity.*

Indeed the doctrine of *dæmoniacal poſſeſſions* is ſo manifeſtly repugnant to the perfections of God, and to that fixed order of cauſes and effects which we diſcover in every part of nature, and particularly in the human ſyſtem, that few perhaps in this enlightened age would appear in its defence, were it not for an apprehenſion that it is ſupported by the authority of revelation. Various expreſſions uſed by Chriſt and his apoſtles are thought by ſome to aſſert or imply the reality of poſſeſſions. We are told, that the people brought to Jeſus were ſuch as were *poſſeſſed and vexed with unclean* ſpirits; and that he *caſt out ſpirits with his word.* But perhaps theſe learned writers do not ſufficiently conſider, that the reality of poſſeſſions and diſpoſſeſſions was never taught by Chriſt and his apoſtles as a doctrine; and that they could not, with propriety, interpoſe their authority in eſtabliſhing the reality of poſſeſſions, conſidered as the ſecret cauſe of thoſe diſorders imputed to them: for the miraculous cure of theſe diſorders being a part of that evidence which was deſigned for the conviction of unbelievers, we are to judge of the nature of the miracle in queſtion by reaſon alone, not by an authority which cannot be admitted previous to its performance. Beſides, as poſſeſſion by dæmons was anciently thought to produce ſome maniacal diſorder; and the expulſion or departure of dæmons was thought to effect a removal of the diſorder, or a recovery of the underſtanding; it hence came to paſs that poſſeſſions and diſpoſſeſſions were in common life uſed to expreſs thoſe outward and ſenſible ſymptoms they were thought to produce, or the *diſorder* and *cure* of reputed *dæmoniacs.* It is very common to give to an effect the name of the cauſe to which it is aſcribed. And whenever the ſuppoſed cauſe or author of any thing is put for the thing itſelf, the cauſe or author is not included. When Ceres, for example, ſtands for corn, and Bacchus for wine; corn and wine alone are intended. In like manner *dæmoniacal* poſſeſſion was uſed merely to expreſs madneſs, without taking the cauſe into the account. Joſephus (Bell. Jud. lib. ii. cap. 13. ſect. 4.) ſays, concerning certain demagogues, that *they perſuaded the multitude to be poſſeſſed by dæmons*, when his whole meaning was, "That the people were worked up into *a* "*phrenſy* by the artifices and eloquence of their leaders." Thus, amongſt the moderns, *lunacy*, which at firſt denoted that peculiar kind of phrenſy over which the moon was ſuppoſed to have an influence, is now uſed for phrenſy in general. Nor are the evangeliſts to be blamed for deſcribing the diſorder and cure of *dæmoniacs* in the popular language, that is, by poſſeſſions and diſpoſſeſſions; inaſmuch as they might adopt the popular language on this ſubject (as they certainly have done on other ſubjects, and all other perſons daily do) without deſigning to eſtabliſh the doctrine on which it was originally founded.

Did we not conſider how far prejudice is capable of perverting the underſtanding, it muſt ſeem incredible, that Chriſtians ſhould form their judgment of the ſentiments of the ſacred writers concerning poſſeſſions by their deſcriptions of *dæmoniacs*, rather than by their profeſſed doctrine concerning dæmons. If what all the prophets of God, under both Teſtaments, have taught us concerning the utter inability of dæmons or heathen deities to do either good or harm to mankind; if this doctrine be true, there never was, nor can be, a real *dæmoniac.*

DÆSION, in *Chronology*, the Macedonian name for the Athenian month ANTHESTERION, which was the ſixth of their year, and anſwered to the latter part of our November, and beginning of December. See MONTH.

DAFFODIL, in *Botany.* See NARCISSUS.

DAFFODIL *Lilly.* See AMARYLLIS.

DAFFODIL, *Sea*, *Pancratium*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flowers are incloſed in an oblong ſpatha, or ſheath, and have a funnel-ſhaped cylindrical nectarium of one leaf, ſpreading open at the top, with ſix ſpear-ſhaped petals, which are inſerted on the outſide of the nectarium, and ſix long ſtamina inſerted in the brim of the nectarium, terminated by oblong proſtrate ſummits. They have a three-cornered obtuſe germen ſituated under the flower, ſupporting a long ſlender ſtyle, crowned by an obtuſe ſtigma. The germen afterwards becomes a roundiſh three-cornered capſule with three cells, filled with globular ſeeds. There are nine ſpecies. Miller.

DAGON, in *Mythology*, an idol of the Philiſtines, repreſented under the figure of a man without thighs, with his body ending in the tail of a fiſh bending up backward; and covered with ſcales from the reins to the lower part of the belly. *Dagon* ſignifies *fiſh* in Hebrew. Encycl.

DAGYSA, a marine animal with which the ſea abounds, not twenty leagues from the coaſt of Spain, firſt diſcovered by Mr. Banks and Dr. Solander, who to this new *genus* of marine animals gave the name of *dagyſa*, from the likeneſs of one *ſpecies* of them to a gem. It is of an angular figure, about three inches long, and one thick, with a hollow paſſing quite through it, and a brown ſpot on one end, which they conjectured to be its ſtomach; four of theſe adhered together by their ſides, when they were taken, and were thought at firſt to be one animal; but on being put in a glaſs of water they ſoon ſeparated, and ſwam about briſkly. Several ſpecimens of them were taken, adhering together, ſometimes to the length of a yard or more, and ſhining in the water with very beautiful colours. But the colours of the CARCINIUM *opalinum*, were ſtill more beautiful and vivid.

DAILE, in a ſhip, the trough wherein the water runs over the decks.

DAILY, in *Aſtronomy*. See DIURNAL.

DAIRI, or DAIRO, in the *Hiſtory of Japan*, is the ſovereign pontiff of the Japanneſe; or, according to Kæmpfer, the hereditary eccleſiaſtical monarch of Japan. In effect, the empire of Japan is at preſent under two ſovereigns, viz. an eccleſiaſtical one, called the *dairo*, and a ſecular one, who bears the title of *kubo*. The laſt is the emperor, and the former the oracle of the religion of the country.

DAIRY, or DAIRY-*houſe*, in *Rural Architecture*, a building where milk, butter, cheeſe, whey, &c. are made or kept. See MILK, BUTTER, &c.

DAIS. See DEIS.

DAIS, in *Botany*, a genus of the *decandria monogynia* claſs: the characters of which are, that it has a four-leaved involucrum, the corolla is divided into five parts, and the fruit is a ſingle-ſeeded berry.

DAISY, in *Botany*, *Bellis*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: it hath a radiated diſcous flower, compoſed of many hermaphrodite flowers in the diſk, and female flowers, which form the border or rays, included in a common empalement. The hermaphrodite flowers have an oval germen, attended by five ſhort ſtamina; the germen afterward becomes a ſingle naked ſeed, placed vertically. There are three ſpecies; the firſt of which is the common *daiſy*, which grows naturally in paſtures; the ſecond is a native of the Alps; the third is the garden *daiſy*, of which there are ſeveral varieties. The garden *daiſy* flowers in April and May, when they make a pretty variety, being intermixed with plants of the ſame growth: they ſhould be planted in a ſhady border, and a loamy ſoil without dung, in which they may be preſerved without varying, provided the roots are tranſplanted and parted every autumn; which, with keeping them from weeds, is all the culture they require.

The common little *daiſy* has the reputation of being a very eminent medicine of the tribe of vulneraries. The roots and leaves are preſcribed, freſh gathered, both externally and internally, in bruiſes and in wounds. They make a ſort of cataplaſm of the whole plant, bruiſed, in ſome parts of the kingdom, which they apply to the part, and give the juice internally at the ſame time. The ladies have an opinion alſo, that the roots of this plant have a power of ſtopping the growth of animals, and with this intent give a decoction of them in milk to the puppies of their favourite breed, to keep them ſmall. The two ſpecies of *bellis* uſed in medicine are, the *bellis major*, called alſo *leucanthemum vulgare*, in Engliſh *ox-eye daiſy*; and the *bellis minor*, called alſo *conſolida minima*, or *ſymphytum minus*, of moſt repute for phyſical virtues, being eſteemed a good attenuant, reſolvent, healer, cooler, and aſtringent, efficacious againſt intumeſcences of the blood, hæmorrhages, &c.

Foreign diſpenſatory-writers deſcribe a water, ſyrup, conſerve, eſſence, tincture, extract, and fixed ſalt, prepared from this plant.

DAISY, *blue*, or *Globe* DAISY, *Globularia*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: it has a flower compoſed of many florets, which are included in one common ſcaly empalement; and each floret is tubulous, and cut into four parts at the top. They have four ſtamina, terminated by diſtinct ſummits; and in the bottom of the tube is ſituated an oval germen, which becomes an oval ſeed, ſitting in the common empalement. There are ſix ſpecies.

This plant is to be found in the gardens of the curious, and is a vulnerary.

DAISY, *great*, in *Botany*. See CHAMOMILE.

DAISY, *middle*. See LEOPARD's *Bane*.

DAISY, *ox-eye*. See *Corn* MARYGOLD.

DAKER *hen*, in *Zoology*, the Engliſh name for the *ortygometra*, a bird of the gallinaceous kind, ſomewhat reſembling the quail, and called by the Italians the king of the quails, *re delle quaglie*. It is larger than the quail, and is common in Ireland, and in ſome of the northern counties of England. Ray.

DAKIR, in our ſtatutes, is uſed for the twentieth part of a laſt of hides.

According to the ſtatute of 51 Hen. III. *De compoſitione ponderum & menſurarum*, a *laſt* of hides conſiſts of twenty *dakirs*, and every *dakir* of ten hides. But by 1 Jac. cap. 33. one *laſt* of hides or ſkins is twelve dozen. See DICKER.

DALEA, in *Botany*. See PSORALIA.

DALECHAMPIA, ſo called in honour of Jacobus Dalechamp, a curious botaniſt, a genus of the *monoecia monadelphia* claſs. Its characters are theſe: it hath male and female flowers on the ſame plant; the male flowers have no petals, but many ſtamina. The female flowers have a roundiſh three-cornered germen, which afterward becomes a round three-cornered capſule, having three cells, each containing one roundiſh ſeed. We have but one ſpecies of this plant in England, which is a native of Jamaica. Miller.

DALMATICA, a garment with large open ſleeves, worn at firſt only by biſhops, though ſince made a diſtinction of degrees: it is ſo called, becauſe it came originally from Dalmatia.

DALUS, in *Antiquity*, a certain meaſure of land: whence comes *dali*. The *dali prati* have been eſteemed ſuch narrow ſlips of paſture, as are left between the plowed furrows in arable land; which, in ſome parts of England, are called *doles*. The word is applied in Welſh to low meadows by a river ſide.

DAM, a boundary or confinement, as to *dam* up, or *dam* out: *infra damnum ſuum*, within the bounds or limits of his own property or juriſdiction. Bract. lib. ii. c. 37.

DAMAGE, is generally taken for any hurt, or hindrance, that a man receives in his eſtate; but more particularly for a part of what the jurors are to inquire of, in paſſing verdict for the plaintiff, or defendant, in a civil action, be it perſonal or real. After verdict given of the principal cauſe, they are aſked their conſciences touching coſts and *damages*, which contain the hindrances that the plaintiff or demandant hath ſuffered by means of the wrong done him by the defendant or tenant.

DAMAGE has two ſignifications; the one proper and general, the other ſtrict and relative. *Proper*, as it is in caſes where *damages* are founded on the ſtatute of 2 Hen. IV. cap. 1. and 8 Hen. VI. cap. 9. where coſts are included within the word *damages*. *Damage* then, in its proper ſignification, is ſaid *à demendo*, when, by diminution, a thing becomes worſe; and in this ſenſe coſts of ſuit are *damages* to the plaintiff, as by them his ſubſtance is diminiſhed.

Relative is when the plaintiff declares the wrong done him to the *damage* of ſuch a ſum. This is to be taken relatively, for the wrong which paſſed before the writ brought; and is aſſeſſed by reaſon of the treſpaſs aforeſaid; and cannot extend to the COSTS of ſuit, which are future, and of another nature.

DAMAGE-*cleer*, *Damna Clericorum*, was a fee aſſeſſed out of all *damages* exceeding five marks, and recovered in the courts of common pleas, king's bench, and exchequer, which the plaintiff was obliged to pay as a gratuity to the prothonotaries and his clerks, for drawing ſpecial writs and pleadings; but is aboliſhed by ſtat. 17 Car. II. cap. 6.

DAMAGE *feſant*, or *faiſant*, is when a ſtranger's beaſts are doing hurt, or ſpoiling the graſs, corn, woods, &c. of another man, without his leave or licence.

In this caſe, the party whom they *damage* may diſtrain, and impound them, both by night, and by day; though in other caſes, as for rent, ſervices, &c. none may diſtrain in the night.

DAMASCUS *ſteel*, a very fine kind of ſteel, made in ſome parts of the Levant, and particularly at Damaſcus, remarkable for its excellent temper; and uſed chiefly in the making of ſword-blades.

Some authors aſſure us it comes from the kingdom of Golconda in the Eaſt Indies; where the method of tempering with alum, which the Europeans have never been able to imitate, was firſt invented.

DAMASK, a ſort of ſilken ſtuff, having ſome parts raiſed above the ground, repreſenting flowers or other figures.

Damaſks ſhould be of dreſſed ſilks, both in warp and woof. It has its name from its being originally brought from Damaſcus, in Syria.

There is alſo a ſtuff in France called the caffart *damaſk*, made in imitation of the true *damaſk*, having the woof of hair, coarſe ſilk, thread, wool, or cotton. Some have the warp of ſilk, and the woof of thread; others are all thread, or all wool.

DAMASK is alſo a kind of wrought linen, made in Flanders, ſo called, becauſe its large flowers reſemble thoſe of *damaſks*. It is chiefly uſed for tables: a table-cloth, and a dozen of napkins, are called a *damaſk-ſervice*.

DAMASKEENING, the art, or act, of adorning iron, ſteel, &c. by making inciſions therein, and filling them up with gold or ſilver wire; chiefly uſed in enriching ſword-blades, guards and gripes, locks of piſtols, &c.

Its name ſhews the place of its origin; or, at leaſt, the place where it has been practiſed in the greateſt perfection, viz. the city of Damaſcus in Syria: though M. Felibien attributes the perfection of the art to his countryman Curſinet, who wrought under the reign of king Henry IV.

Damaſkeening is partly moſaic work, partly engraving, and partly carving; as moſaic work, it conſiſts of pieces inlayed; as engraving, the metal is indented, or cut in *creux*; and as carving, gold and ſilver are wrought therein in *relievo*.

There are two ways of *damaſkeening*: in the firſt, which is the moſt beautiful, the artiſts cut into the metal with a graver, and other tools proper for engraving on ſteel; and afterwards fill up the inciſions, or notches, with a pretty thick ſilver or gold wire. In the other, which is only ſuperficial, they content themſelves to make hatches, or ſtrokes, acroſs the iron, &c. with a cutting-knife, ſuch as is uſed in making of ſmall files. As to the firſt, it is neceſſary the gravings, or inciſions, be made in the dove-tail form; that the gold or ſilver wire, which is thruſt forcibly into them, may adhere the more ſtrongly. As to the ſecond, which is the more uſual, the method is thus: having heated the ſteel till it changes to a violet, or blue colour, they hatch it over and acroſs with the knife; then draw the deſign, or ornament, intended, on this hatching, with a fine braſs point, or bodkin. This done, they take fine gold wire, and conducting or chaſing it according to the figures already deſigned, they ſink it carefully into the hatches of the metal with a copper tool.

DAMASSIN, a kind of damaſk, with gold and ſilver flowers, made in warp and woof, of wrought, and not raw ſilk.

DAMASSONIUM, in *Botany*. See *Star-headed water* PLANTAIN.

DAMASQUITTE, a kind of ſtuff made at Venice, of which there are two ſorts; one with gold, the other with ſilk: the pieces are eighteen ells long.

DAMATER, in *Mythology*, the ſurname of Ceres.

DAMATRIUS, in *Ancient Chronology*, the Bœotian name of the Athenian month *Pyanepſion*, which was the fifth of their year, and correſponded to the latter part of our October, and beginning of November. See PYANEPSION and MONTH.

DAME was formerly a title of honour, and is ſtill uſed in the Engliſh law to denote a lady; but in common acceptation it ſignifies the miſtreſs of a family of the lower rank in the country.

DAME'S *Violet*. See VIOLET.

DAMELOPRE, a kind of BILANDER uſed in Holland, for conveying merchandize from one canal to another, and contrived for commodious paſſage under the bridges.

DAMIANISTS, a branch of the ancient Acephalous Severites; who agreed with the Catholics in admitting the fourth council; but diſowned any diſtinction of perſons in the Godhead, and profeſſed one ſingle nature incapable of any difference; and yet they called God, the Father, Son, and Holy Ghoſt. On which account the Severitæ Petritæ, another branch of Acephali, uſed to call them Sabellianiſts, and ſometimes Tetraditæ. Thus much we learn from Nicephorus Calliſtus, lib. xviii. cap. 49. They took their name from *Damianus*, a biſhop of Alexandria, who was originally their leader, in the ſixth century.

DAMIER, in *Conchyliology*, the name given by French naturaliſts to that elegant ſpecies of voluta, the ſpots of which ſtand in a checquered order, and reſemble the marks of a draught or cheſs board, that being the common ſignification of the word *damier*. See VOLUTA.

DAMNATA *terra*, in *Chemiſtry*, the ſame with CAPUT *mortuum*.

DAMPS, in *Natural Hiſtory*, are noxious ſteams, or exhalations, frequently found in cloſe, ſubterraneous places, particularly mines, pits, and wells. In the German and Saxon languages the word *damp* ſignifies vapour and exhalation.

Damps, with reſpect to their nature and effects, may be diſtinguiſhed into two kinds: the *firſt* is heavier than common air, and therefore chiefly lies at the bottom of pits and mines. It extinguiſhes flame, precipitates the lime of lime-water, and is noxious, and often fatal to animals, and on this account called the *choke-damp*. It is a ſpecies of *fixed* AIR, and has been deſcribed by modern writers under that name. It reſembles thoſe uninflammable vapours, that are produced by the combuſtion of inflammable bodies, as charcoal, and by fermenting and effervescing ſubſtances. This *damp* is ſometimes viſible, and appears in form of a fog, as in a cavern near Pyrmont; and it hangs ſo near the ſurface, that a perſon may ſtand upright, without any other inconvenience than an uncommon heat of his lower extremities, but he cannot without danger bend down his head. Many inſtances occur of the fatal effects of this kind of *damp*. Some perſons, digging in a cellar at Paris, were found dead, ſtiff as ſtatues, with open eyes, and in the poſture of digging. Several others were ſucceſſively deſtroyed at Chartres, by going down into a cellar where a baker had been accuſtomed to throw hot embers from his oven; and one, who was inſtantly killed upon being let down into it, was opened; his lungs were found ſpotted with black marks; his inteſtines ſwoln, red, and inflamed; and the muſcles of his legs, thighs, and arms, ſeemed to be ſeparated from each other, and from the adjacent parts. This caſe was ſo ſingular, that it drew the attention of the magiſtrate and phyſician, who found that the embers had not been properly extinguiſhed, and that they had raiſed a malignant vapour from the ſalt-petre, with which the cellars in that neighbourhood abound. A quantity of water was thrown in to extinguiſh the fire, and lay the vapour, and thus the danger was removed. Hiſt. de l'Academie des Scienc. 1701. 1710. and Connor's Diſſert. Med. Phyſ.

Miners try the ſalubrity of the air in pits where they work, by carrying down with them a lighted candle; they ſoon diſcover the effects of the noxious vapour in its diminiſhing, and gradually extinguiſhing the flame; however they remain ſafely for ſeveral hours in pits where a candle cannot burn; but when the *damp* is ſo ſtrong, that not only the flame of the candle, but alſo the redneſs of the burning wick is extinguiſhed, they never venture to remain a minute, knowing that ſuch a degree of *damp* will be ſoon fatal to animal life.

The *ſecond* kind of noxious vapour, though leſs dangerous than the former, is called the *fulminating*, or *fire-damp*; becauſe, when touched by the flame of a candle, it takes fire, and explodes like gunpowder. This is chiefly found in coal-mines, and ſometimes in lead-mines, as in thoſe of Mendip-hills. It is lighter than common air, and therefore floats near the roofs of ſubterraneous places; and miners, when it is accidentally inflamed, or when they deſignedly ſet fire to it, in order to deſtroy it, lie flat on the ground, and thus eſcape injury. This inflammable vapour may probably be produced by the decompoſition of pyritous matters, with which moſt mines, and eſpecially coal-mines, abound.

In ſome of the coal-pits in the neighbourhood of Mendip-hills, fire-*damps* almoſt continually happen, ſo that great numbers have been killed, maimed, and burnt by them. The colliers however continue their work notwithſtanding, only uſing the caution of renewing their air very quick, and uſing no candles in their work but thoſe of a ſingle wick, and of ſixty or ſeventy to the pound; which notwithſtanding will give as good a light there, as others of ten or twelve to the pound in other places. They always have the caution to place even theſe behind them, and never preſent them to the breaſt of the work. When any perſon is burnt by theſe *damps*, they preſently betake themſelves to a good fire, and ſending for a large quantity of cows milk, they bathe the burnt places with this while warm; and afterwards the places will heal by the common cooling ointments, and healing plaſters.

The German miners think themſelves not qualified for their buſineſs, if they are not able to make their weather, as they expreſs it; that is, to cure their *damps*. Theſe are of various kinds in their mines; ſome ſo ſtrong that they ſuffocate the workmen; others leſs violent, and only making them faint, without doing them any further hurt, unleſs they are ſo imprudent as to continue a long time in the place. The common way of curing the *damp* is by letting the air in and out, and cauſing a circulation in it. Phil. Tranſ. abr. vol ii. p. 373. 382.

The pernicious *damps* in mines ſhew abundantly, that nature affords us inflammable air in ſome caſes; and we have found by experiments that art can do the ſame, and that very probably on the ſame principles with the natural. Sir James Lowther having collected the air of ſome of theſe *damps* in bladders, preſerved it ſo well, that, when brought up to London, it would take fire at the flame of a candle, on being let out by the orifice of a piece of tobacco pipe.

It is well known to all that are verſed in chemical experiments, that moſt metals emit a great quantity of ſulphureous vapours during the efferveſcence they undergo in the time of their ſolutions in their reſpective menſtruums. On this principle many have produced an inflammable air by art, like the natural one. It is obſerved that iron, while under ſolution with oil of vitriol, emits a very great quantity of theſe vapours, which are very ſubtile, and not eaſily condenſed. This vapour being received into bladders, in the ſame manner with the natural air of Sir James Lowther, took fire in the ſame manner, on being let out in a ſmall ſtream, and anſwered all the phænomena of the natural kind. See AIR *fixed*, and AIR *inflammable*.

There is a vapour called the *peas-bloom damp*, on account of its ſmell. It always comes in the ſummer-time, and hath never been known to be mortal. The miners in the Peak of Derby fancy that it ariſes there from the multitude of red trefoil flowers, called by them honeyſuckles, with which the lime-ſtone meadows of the Peak much abound; the ſmell of this gives timely notice to get out of the way.

DAMSEL, DAMOISEL, or DAMOISEAU, an appellation anciently given to all young people of genteel or noble extraction of either ſex, e. gr. to the ſons and daughters of knights, barons, and even of kings.

Thus, in hiſtory, we read of the *damſel* Pepin, *damſel* Louis le Gros, *damſel* Richard, prince of Wales.

Paſquier will have the word a diminutive of *dam*, an ancient name for lord; as in ſome authors we read *Dam* Dieu for Lord God; *dam* chevalier, &c. Though in its feminine ſenſe he takes it to come from *dame.*—Others derive the word from *domicellus*, or *domnicellus*, a diminutive of *domnus*, *quaſi parvus dominus*: accordingly, Du-Cange obſerves, that it has been ſometimes written *domenger*.

They who hold the ſignory of Commercy, M. de la Roque tells us, anciently held it in the title of *damoiſeau*: and M. de Marca aſſures us, that the nobleſſe of Bern is ſtill divided into three bodies, or claſſes; the barons, the cavers, and the *damſels*, *domicellos*, called in that country *domengers*.

The kings of Denmark and Sweden have the ſame title, as appears from Pontanus's Hiſt. of Denmark, lib. vii. and viii. and Henry of Upſal's Hiſt. of Suec. lib. iii.

From the ſons of kings, the appellation paſſed to thoſe of great lords and barons; and, at length, to thoſe of gentlemen who were not yet knights.

DAMSEL, at preſent, is applied to all maids, or girls, not yet married; provided they be not of the loweſt claſs of people.

DAMSEL is ſometimes alſo applied to a kind of utenſil put in beds, to warm old men's feet.

It conſiſts of a hot iron incloſed in a hollow cylinder, which is wrapped round with linen cloth, and keeps its warmth a long time. Some call it a *nun*.

DAMSON *tree*, in *Botany*. See CHRYSOPHYLLUM and PRUNUS.

DANAE, or DANACE, δαναη, or δανακη, in *Antiquity*, a coin current among the barbarians, being ſomewhat more than the OBOLUS. This they put into the mouths of dead people, to pay for their paſſage over the river Acheron.

DANAIDES, in the *Ancient Mythology*, the daughters of Danais, or Danaus, eleventh king of Argos, and brother of Ægyptus.

They were fifty in number, and were eſpouſed to the fifty ſons of their uncle Ægyptus.

Danaus, fearing the accompliſhment of an oracle, which had foretold, that he ſhould be expelled his kingdom by a ſon-in-law, perſuaded his daughters to murder, each of them, her huſband, the firſt night; which they performed, all but Hypermneſtra, who ſpared her huſband Lynceus.

In vengeance for this crime of the forty-nine *Danaides*, the poets have condemned them to hell, to be continually employed in filling a caſk perforated at bottom.

The *Danaides* are ſometimes alſo called *Belides*, from their father, who was the ſon of the Egyptian Belius. Hyginus has preſerved the names of forty-ſeven of them.

DANCE, an agreeable motion of the body, adjuſted by art, to the meaſures of a piece of muſic, either ſung or played.

The word is French, *dance*, formed of the German *dantz*, or *tantz*, which ſignifies the ſame thing. Bochart derives it from the Arabic *tanza*, and Guichart from the Hebrew דוצ, *douts*, which have all the ſame ſignification. Salmaſius derives the French *danſer*, to *dance*, from the Latin *denſare*, *to thicken*; as holding it a practice among the ancient fullers to leap and *dance* as they fulled their cloaths.

Some diſtinguiſh the *high dance*, conſiſting of capers, gambades, &c. from the *low dance*, which is the *terra a terra*, or cloſe to the ground.

In the carrouſal of king Louis XIII. there were *dances* of horſes. The invention of ſuch *dances* is attributed to the Sybarites.

Dancing has always been in uſe among all nations, both civilized and barbarous; though held in eſteem among ſome, and in contempt among others. Of itſelf, no doubt, *dancing* is harmleſs. There is a time, ſays the preacher, to *dance*; and ſometimes it is even made an act of religion. Thus David *danced* before the ark, to honour God, and expreſs his exceſs of joy for its return into the city of Sion. The daughters of Shiloh are likewiſe ſaid to have *danced* in a yearly feaſt of the Lord. Judges, ch. xxi. And we find many references to this practice in the religious ſolemnities of the Jews. From them it paſſed to the Egyptians, and afterwards to the Greeks and Romans, with whom it was a principal part of the worſhip of their falſe gods. It afterwards was adopted in many pagan nations; and Chriſtians in popiſh countries celebrated certain feſtivals, particularly thoſe of the ſacrament, and paſſion of our Lord, with *dancing*. Socrates learnt to *dance* of Aſpaſia. And the people of Crete and Sparta went to the attack *dancing*. On the other hand, Cicero reproaches Galbinius, a conſular man, with having *danced*. Tiberius expelled the *dancers* out of Rome; and Domitian excluded ſeveral members from the ſenate, for having *danced*. Caſtor and Pollux are ſaid to be the firſt who taught the art of *dancing*; and that to the Lacedæmonians: though others attribute the invention to Minerva, who, they ſay, *danced* for joy after the defeat of the giants.

The ancients had three kinds of *dances*, called *bacchic*; the firſt grave, called *emmelia*, anſwering to our *low dances* and pavanes. The ſecond gay, called *cordax*, anſwering to our courants, galliards, gavots, and vaults. The third, called *ſiccinis*, was a mixture of gravity and gaiety. Neoptolemus, ſon of Achilles, taught the Cretans a new ſort of *dance*, called *Pyrricha*, or the *armed dance*, to be uſed in going to war: though, according to mythologiſts, the Curetes firſt invented this *dance*, to amuſe and divert the infant Jupiter, and to drown his cries with the noiſe and claſh of their ſwords, beating againſt their bucklers.

Diodorus Siculus, in the fourth of his Bibliotheca, aſſures us, that Cybele, daughter of Menoes, king of Phrygia, and Dindymenis his wife, invented divers things, and, among others, the flageolot of ſeveral pipes, *dancing*, the tabor, and the cymbal. Numa, it is certain, inſtituted a ſort of *dance* for the ſalii, prieſts of Mars, who made uſe of weapons therein. From theſe *dances* were compoſed another ſort, called *ſaltatio mimicorum*, or the *buffoons dance*; wherein the *dancers* were dreſſed in little corſlets, with gilt morions, and had bells on their legs, and ſwords and bucklers in their hands. Lucian has an expreſs treatiſe, and Julius Pollux a chapter, on this head; Athenæus, Cælius Rhodiginus, and Scaliger, alſo make mention of this *dance*.

It is not many years ago, ſince Thoinot Arbeau, a *dancing*-maſter of Paris, gave an orcheſography, wherein all the ſteps and motions of a *dance* are written, or noted down; as the ſounds of a ſong are ſcored in muſic. Though the famous Beauchamp had ſome pretenſions to be the inventor of this ſecret, and accordingly procured an arret in his favour.

Dancing is uſually an effect and indication of joy among moſt nations: though M. Palleprat aſſures us, that there are people in South America, who *dance* to ſhew their ſorrow; and it likewiſe made a part of the funeral ſolemnities of the ancients.

DANCE *of St. Vitus*. See VITUS.

DANCE, *Country*. See COUNTRY-*Dance*.

DANCER, *Rope*, *Schoenobates*. Groddeck, profeſſor of philoſophy at Dantzic, has publiſhed a diſſertation on *rope-dancers*, De Funambulis; full of learning, and an uncommon knowlege of antiquity. He defines a *rope-dancer*, a perſon who walks on a thick rope faſtened to two oppoſite poſts; which is preciſely what is expreſſed by the Latin word *funambulus*. But our *rope-dancers* do more; for they not only walk, but *dance* and leap upon the rope.

The ancients, it is certain, had their *rope-dancers* as well as we: witneſs the Greek words, *neurobates*, and *ſchœnobates*, as well as the Latin *funambulus*, which every where occur. They had likewiſe the cremnobates and oribates, that is, people who walked on the brinks of precipices. Nay more, Suetonius in Galba, cap. 6. Seneca in his eighty-fifth epiſtle, and Pliny, lib. viii. cap. 2. make mention of elephants that were taught to walk on the rope.

Mr. Groddeck, coming from the hiſtorical to the moral conſideration, maintains, that the profeſſion of a *rope-dancer* is not lawful; that the profeſſors are infamous, and their art of no uſe to ſociety; that they expoſe their bodies to very great dangers; and that they ought not to be tolerated in a well-regulated ſtate. But, coming afterwards to temper the ſeverity of his morals, he allows that there are ſometimes reaſons for admitting them; that the people muſt have ſhews; that one of the ſecrets of government is to furniſh them therewith, &c.

The ancient *rope-dancers* had four ſeveral ways of exerciſing their art; the firſt vaulted, or turned round the rope, like a wheel round its axis, and there hung by the heels, or the neck. The ſecond flew, or ſlid, from above, downwards, reſting on their ſtomachs with the arms and legs extended. The third ran along a rope ſtretched in a right line, or up and down. Laſtly, the fourth not only walked on a rope, but made ſurpriſing leaps and turns thereon.

Dancers, in *Eccleſiaſtical Hiſtory*, a ſect that ſprung up in Aix-la-Chapelle in 1373, and ſpread through Flanders. Perſons of both ſexes were ſuddenly ſeized with *dancing* fits, and continued them, with extreme violence, till they were quite exhauſted; and at theſe times they pretended to receive wonderful viſions. The French prophets, or convulſioniſts, in later times, and ſome wild methodiſts in our own country, reſembled theſe more ancient religious *dancers*.

DANCETTE′, in *Heraldry*, is when the out-line of any bordure, or ordinary, is indented very largely; the largeneſs of the indentures being the only thing that diſtinguiſhes it from indented.

There is alſo a bearing of a bend, called *double dancetté*; thus, he beareth azure, a bend double *dancetté* argent.

DANCHE, or *Denché*, in *Heraldry*, the ſame with indented; or, as others will have it, with *dancetté*.

DANCRETA, in *Botany*, a name given by the people of Guinea to a plant which they uſe in diſorders of the head, boiling it in water, and uſing the decoction in the way of a fomentation. It is a ſpecies of bindweed, and is called by Petiver *convolvulus quinque foliis Guineenſis foliis non ſerratis*, or the five-leaved Guinea bindweed, with leaves not ferrated. Caſpar Bauhine, in his Prodromus, deſcribes a ſpecies of bindweed growing in Egypt, which exactly agrees with this in all particulars, except that it is finely ſerrated all round the edges of the leaves. Phil. Tranſ. N° 292.

DANDELION, *Dens Leonis*, or *Leontodon*, in *Botany*, the name of a genus of plants of the *ſyngeneſia polygamia æqualis* claſs, the characters of which are theſe: the flower is of the ſemi-floſculous kind, and the petals it is compoſed of are placed on the embryo ſeeds, and ſurrounded by the cup. The embryos finally become ſeeds winged with down, which are affixed to the thalamus, but expand their downy ends into a globular head, and the ſtalks are uſually hollow, and not branched.

Miller gives no characters of this genus; and only obſerves, that they grow naturally in the fields, that they are a troubleſome weed, which ſhould be deſtroyed before the ſeeds ripen, as by reaſon of their down they are wafted by the wind to a great diſtance; and that the roots are gathered by ſome people, and blanched in their gardens, for a ſallad herb.

The common ſpecies of this plant has much the ſame virtues with the common endive, but in a greater degree: the roots eaten in ſpring are eſteemed of great ſervice in obſtructions in the liver and ſpleen. Its more immediate ſenſible operation is to looſen the belly, promote the urinary diſcharge, and render the water high-coloured, without exciting any particular heat.

DANE-*wort*, or *dwarf-elder*. See **Elder** and **Ebulus**.

DANEGELT, or *Dane-geld*, from *Dane* and *gelt*, ſignifying in Dutch, *money*, an annual tax laid on our anceſtors, firſt of 1*s.* afterwards 2*s.* for every hide of land through the realm, for maintaining ſuch a number of forces as were thought ſufficient to clear the Britiſh ſeas of Daniſh pirates, which heretofore greatly annoyed our coaſts.

It was firſt impoſed as a ſtanding yearly tax on the whole nation, under king Ethelred, A. D. 991. That prince, ſays Camden, Britan. 142, much diſtreſſed by the continual invaſions of the Danes, to procure his peace, was compelled to charge his people with heavy taxes, called *danegelt*. At firſt they paid 10,000*l.* then 16,000*l.* then 24,000*l.* after that 36,000*l.* and laſtly, 48,000*l.* *per annum.*

Ethelred, in 1008, made a vigorous effort to free his people from this infamous tribute, by a general tax on all the land of the kingdom, for fitting out a fleet, which might effectually guard againſt the Danes. Lord Lyttleton's Hiſtory, &c. vol. iii. p. 65.

Edward the Confeſſor remitted this tax: William I. and II. aſſumed it occaſionally. In the reign of Henry I. it was accounted among the king's ſtanding revenues; it was levied by king Stephen, and paid in the 1ſt, 2d, 20th, and 21ſt years of Henry II. Soon after the name was loſt. No church or church land paid a penny to the *danegelt*; becauſe, as is ſet forth in an ancient Saxon law, the people of England placed more confidence in the prayers of the church, than in any military defence they could make. Camd. ap. Magn. Brit. p. 68.

DANELAGE. See **Law**.

DANGCANGHAC, in *Natural Hiſtory*, the name given by the people of the Philippine iſlands to the heron. The Spaniards call it *gazza*. It is the ſame ſpecies with that ſo common in Europe. See **Heron**.

DANGERIA, in *Antiquity*, a payment in money made by foreſt tenants, that they might have liberty to plough and ſow in time of **pannage**.

DANIEL, or *Book of* **Daniel**, a canonical book of the Old Teſtament, ſo denominated from its author Daniel, who was a very extraordinary perſon, and was favoured of God, and honoured of men, beyond any who lived in his time. His prophecies concerning the coming of the Meſſiah, and the other great events of after-times, are ſo clear and explicit, that, as St. Jerom tells us, Porphyry objected to them, that thoſe which related to the kings of Syria and Egypt, chap. xi. muſt have been written after the times of Antiochus Epiphanes; whereas this prophecy was tranſlated into Greek a hundred years before his time, and the tranſlation was in the hands of the Egyptians, who had no great kindneſs for the Jews, and their religion. And thoſe prophecies foretelling the ſucceſſes of Alexander, chap. viii. 5. xi. 3. were ſhewn to Alexander by the Jews, in conſequence of which they obtained ſeveral privileges from him. Ant. lib. xi. c. 8.

The ſtyle of Daniel is not ſo lofty and figurative as that of the other prophets; it is clear and conciſe, and his narrations and deſcriptions ſimple and natural: in ſhort, he writes more like a hiſtorian than a prophet.

The Jews do not reckon Daniel among the prophets; part of his book, that is, from the fourth verſe of his ſecond chapter, to the end of the ſeventh chapter, was originally written in the Chaldee language; the reaſon of which was, that in that part he treats of the Chaldean or Babyloniſh affairs: all the reſt of the book is in Hebrew. The ſix firſt chapters of the book of Daniel are a hiſtory of the kings of Babylon, and what befel the Jews under their government. In the ſix laſt he is altogether prophetical, foretelling not only what ſhould happen to his own church and nation, but events in which foreign princes and kingdoms were concerned.

DANK, in *Commerce*, a piece of ſilver current in Perſia, and in ſome parts of Arabia, weighing the ſixteenth part of a drachm. It is alſo a weight uſed by the Arabians to weigh jewels and drugs.

DANTELLE′, in *Heraldry*, the ſame with *danché*, or rather with *dancetté*, viz. a large open indenture. See **Dancette′**.

DANTZIGERS, or **Prussians**, in *Eccleſiaſtical Hiſtory*, a ſect of the refined **Anabaptists** (ſee **Flemingians**), ſo called, on account of their adopting the manners and diſcipline of the Pruſſians.

DAPHNE, Δαφνη, in *Antiquity*, a kind of divination, taken from the crackling of laurel leaves thrown into the fire.

Daphne, in *Botany*. See **Spurge**-*laurel*.

DAPHNELÆON, in *Medicine*, Δαφνελαιον (from δαφνη, the *bay-tree*, and ελαιον, *oil*), *laurinum*, or oil of bay. This is prepared of the berries, when full ripe and ready to fall off, by boiling them in water; by which they tranſmit through their huſks a fat ſubſtance, which after compreſſing the berries with the hand, is taken off with ſhells. Some, after they have inſpiſſated oil of unripe olives with cyperus, juncus oderatus, and calamus, caſt therein the tender leaves of the bay, and boil them together; and others add the berries, until it ſmells ſufficiently ſtrong; and ſometimes ſtyrax and myrrh are mixed with them. The mountainous and broad-leaved bay is the fitteſt for the preparation of this oil, which is beſt in its kind when recent, of a green colour, very bitter, and acrimonious.

Laurinum has heating and mollifying virtues, opens the mouths of the veſſels (αναϛοματικὴν), and removes laſſitudes. It is beneficial in all nervous diſorders, pains and diſtillations of the ears; and is inferior to no other remedy in diſtempers of the kidneys, contracted from cold, the parts being anointed with it: but taken inwardly, it excites a nauſea.

DAPHNEPHORIA, Δαφνηφορια, in *Antiquity*, a novennial feſtival, celebrated by the Bœotians in honour of Apollo. For the ceremonies uſed at this ſolemnity, ſee Pott. Archæol.

DAPHNIUS *lapis*, in *Natural Hiſtory*, the name of a ſtone, the veins of which repreſent the grain of the wood of the bay-tree; and which was probably formed of the wood of that tree, impregnated with ſtony matter, in the manner of the other foſſile woods.

DAPHNOMANCY, from δαφνη, *laurel*, and μαντεια, *divination*; a kind of divination practiſed by throwing branches of laurel into the fire: the crackling of them was deemed a favourable omen; the contrary, otherwiſe. The leaves of laurel were alſo chewed, in order to communicate the gift of prophecy.

DAPIFER, the dignity or office of grand maſter, or grand ſewer, of a king's or prince's houſehold.

The word is pure Latin, compounded of *daps*, *dapis*, *a diſh of meat ſerved on the table*, and *fero*, *I bear*: ſo that *dapifer* literally ſignifies a *diſh-carrier*, or an officer who ſerves the meats upon the table.

The title of *dapifer* was given by the emperor of Conſtantinople to the czar of Ruſſia, as a teſtimony of favour. In France, the like office was inſtituted by Charlemagne, under the title of *dapiferat*, and *ſenechauſſée*; to which was affixed the ſuperintendance over all the officers of the houſehold.

In England, the office of *dapifer* was leſs eminent; being found in ſeveral of our ancient charters named one of the laſt of the officers of the houſehold.

The dignity of *dapifer* is ſtill ſubſiſting in Germany. Till the year 1623, the elector Palatine was *dapifer*, or grand ſewer of the empire: ſince that time, the elector of Bavaria has aſſumed the title of *arch-dapifer* of the empire. His office is, at the coronation of an emperor, to carry the firſt diſh of meat to table on horſeback.

The ſeveral functions of a *dapifer* occaſioned the ancients to give him divers names: as, ἐλειατρος, and *eleator*, *dipnocletor*, *convocator*, *trapezopæus*, *architriclinus*, *proguſta*, *prægustator*, *domeſticus*, *megadomeſticus*, *œconomus*, *majordomus*, *ſeneſchallus*, *ſchalus*, *gaſtaldus*, *aſſeſſor*, *præfectus* or *præpoſitus menſæ*, *princeps coquorum*, *&* *magirus*.

DAPIFERAT, Dapiferatus, the office of dapifer.

DAPPLE *bay*, in the *Manege*, is uſed for a horſe which has marks of a dark bay colour. Such are alſo called *bays à mirroir*.

Dapple *black*, in the *Manege*, a black horſe, having ſpots or marks blacker and more ſhining than the reſt of his ſkin.

DAPSILES *coronæ*, among the Romans, a kind of crowns or garlands worn by the women, which covered their faces, and ſerved as a veil.

DARANI, in the *Materia Medica*, a word uſed by ſome of the old writers to expreſs the *ſal ammoniac* of thoſe times, which was the ſame with our *ſal gemmæ*.

DARAPTI, in *Logic*, a mode of ſyllogiſm in the third figure, wherein the major and minor are univerſal affirmative propoſitions, and the concluſion a particular affirmative. E. gr.

DA *Every truly religious man is virtuous.*
RA *Every truly religious man is hated by the world.*
PTI *Therefore, ſome virtuous men are hated by the world.*

DARDANARIUS, *Uſurer*, *Monopoliſt*; a name anciently attributed to ſuch as cauſed a ſcarcity, and dearneſs of proviſions, particularly corn, by buying and hoarding it up, to raiſe its value, and ſell it again at an extravagant rate.

The name *Dardanarius* was given from one Dardanus, who is ſaid to have made a practice of ſpoiling and deſtroying the fruits of the earth by a ſort of ſorcery. Hof. Lex. in voc.

The ſame people are alſo called *æruſcatores*, *directarii*, *ſitocapeli*, *annonæ flagellatores*, and *ſeplaſiarii*.

DARE. See Dace, and Fishing.

DARIC, in *Antiquity*, a famous piece of gold, firſt coined by Darius the Mede about 538 years before Chriſt; probably during his ſtay at Babylon, out of the vaſt quantity of gold which had been accumulated in the treaſury. From thence it was diſperſed over the Eaſt, and alſo into Greece; ſo that the Perſian *daric*, which was alſo called *ſtater*, was the gold coin beſt known in Athens in ancient times. According to Dr. Bernard, it weighed two grains more than one of our guineas; but as it was very fine, and contained little alloy, it may be reckoned worth about twenty-five ſhillings of our money. Plutarch informs us, that the *darics* were ſtamped on one ſide with an archer cloathed in a long robe, and crowned with a ſpiked crown, holding a bow in his left hand, and an arrow in his right; and on the other ſide with the effigies of Darius. All the other pieces of gold of the ſame weight and value, that were coined by the ſucceeding kings both of the Perſian and Macedonian race, were called *darics*, from Darius, in whoſe reign this coin commenced. Of theſe there were whole *darics* and half *darics*: and they are called in thoſe parts of Scripture written after the Babyloniſh captivity, *adarkonim*; and by the Talmudiſts, *darkonoth*. Greaves ſays that the *daric* is ſtill found in Perſia; but it is certainly very ſcarce, and perhaps of doubtful antiquity. Suidas in Δαρεικος. Bernard de Ponder. &c. p. 171. Prideaux's Conn. vol. i. p. 182, &c.

DARII, in *Logic*, a mode of ſyllogiſms in the firſt figure, wherein the major propoſition is an univerſal affirmative, and the minor and concluſion particular affirmatives. E. gr.

DA *They who ſpeak well of every body have many friends.*
RI *Some ſpeak well of every one.*
I *Therefore ſome have many friends.*

DARK *chamber*. See Camera *obſcura*.

Dark *tent*, a portable *camera obſcura*, made not unlike a deſk, and fitted with optic glaſſes, to take proſpects of landſcapes, buildings, fortifications, &c. See Camera *obſcura*.

DARNEL. See Grass.

DARREIN, in *Law*, a corruption of the French *dernier*, *laſt*, and uſed in the like ſenſe: as, *darrein* continuance (ſee Continuance); *darrein* preſentment (ſee Assise *darrein preſentment*).

DARSINI, in the *Materia Medica of the Ancients*, a name given by ſome to cinnamon. It is generally uſed by Avicenna, Serapion, and the reſt of the Arabian phyſicians.

DARSIS, in *Medical Writers*, is uſed for an excoriation of the ſkin. Blancard.

DART, in *Aſtronomy* and *Geometry*. See Sagitta.

DARTOS, or Dartus, in *Anatomy*, the inner coat of the ſcrotum, compoſed of a great number of muſcular, or fleſhy fibres; whence ſome conſider it as a cutaneous muſcle. Dr. Hunter ſays no ſuch muſcle can be found, and Albinus takes no notice of it in his tables.

The word is pure Greek, δαρτος, *excoriatus*, *pelle nudatus*, of δερω, *excorio*; probably becauſe it lies cloſe under the ſkin, or from its excoriated appearance.

It is by means hereof that the ſcrotum is contracted, or corrugated, which is eſteemed a ſign of health.

The *dartos* was anciently taken to be a continuation of the *panniculus carnoſus*, but miſtakenly. It has ſeveral veins and arteries. It inveſts the teſticles, and extending itſelf between them, ſeparates them from each other. It is placed between two cellular membranes, which communicate with each other. See Scrotum.

DARU, in *Botany*, a name given by Avicenna and Serapion to a ſpecies of turpentine-tree, which the latter author calls the lentiſk. This grew up to a very large tree, and bore a much larger and more beautiful fruit than the common turpentine-tree.

DASYMMA, a ſuperficial inequality of the inner part of the eye-lids, accompanied with a redneſs. Blancard derives it from δασυς, *hirſutus*.

DASYPUS, in *Zoology*, belongs to the order of brutes and claſs of *mammalia* in the Linnæan ſyſtem. This genus has many grinding teeth, but no cutting nor canine teeth. The ſeveral varieties are diſtinguiſhed by the number of bands which encompaſs it, and reach from the back to the edges of the belly. Accordingly, Linnæus enumerates the ſingle-banded, the three-banded, the four, ſix, ſeven, and nine-banded *daſypus*. See farther under Armadillo.

DASYS, Δασυς, denſe, thick, cloſe, rough, in Prorrhet. and Coac. is an epithet for a tongue condenſed, contracted, and exaſperated with heat and dryneſs, as it happens in phrenſies. James's Med. Dict.

DATA, in *Mathematics*, certain things, or quantities, ſuppoſed to be given, or known, in order, from them, to find out other things or quantities, which are unknown, or ſought for. A problem, or queſtion, generally conſiſts of two parts; *data* and *quæſita*.

Euclid has an expreſs treatiſe of *data*; wherein he uſes the word for ſuch ſpaces, lines, and angles, as are given in magnitude; or to which we can aſſign others equal.

From the primary uſe of the word *data* in mathematics, it has been tranſplanted into other arts; as philoſophy, medicine, &c. where it expreſſes any quantity, which, for the ſake of a preſent calculation, is taken for granted to be ſuch, without requiring an immediate proof for its certainty; called alſo the *given* quantity, number, or power. And hence alſo ſuch things as are known, from whence either in natural philoſophy, the animal mechaniſm, or the operation of medicines, we come to the knowlege of others unknown, are now frequently in phyſical writers called *data*.

DATE, an addition, or appendage, in writings, acts, inſtruments, letters, &c. expreſſing the day, and month of the year, when the act, or letter, was paſſed or ſigned; together with the place where the ſame was done.

The word is formed from the Latin *datum*, *given*, the participle of *do, I give.* The Latins uſually ſay *dabam, I gave.*

In writings of importance the *date* ſhould be written in words at length; *dated* or given at London this twenty-ſixth day of March, in the year of our Lord one thouſand ſeven hundred and fifty. In letters, the *date* is uſually in figures; London, March the 26th, 1750.

An *ante-date* is a falſe *date*, prior to the real time when the inſtrument was paſſed, or ſigned.

A *poſt-date*, is that poſterior to the real time, &c.

Our ancient deeds had no *dates*, but only the month and year, to ſignify that they were not made in haſte, or in the ſpace of a day, but upon longer and more mature deliberation. The king's grants began with theſe words, *Præſentibus & futuris, &c.* but the grants of private perſons with *Omnibus præſentes literas inſpecturis, &c.*

A deed is good, though it mentions no *date*, or hath a falſe *date*; or even if it hath an impoſſible *date*, as the 30th of February; provided the real day of its being *dated* or given, that is, delivered, can be proved. Blackſt. Com. vol. ii. p. 304.

DATE, *Dactylus*, the fruit of the palm-tree. See PALM-*tree.*

The word is formed of *dacte*, and that of *dactylus*, *finger*; as being round and oblong, reſembling a finger's end.

This fruit is gathered in autumn, before it is ripe; and bears a near reſemblance to our bullace; being of a green colour, and very ſharp and aſtringent. When ripe, it becomes ruddy, having a hard, longiſh ſtone, cloven at bottom, and encompaſſed with a thin white pellicle, or ſkin.

The huſk, or covering of the *date*, called by the ancients *elate*, or *ſpatha*, when the fruit is in its growth, is variable; having as many changes of colour as the fig has.

Some *dates* are black, ſome white, ſome brown; ſome again are round like apples, and very big. Ordinarily they are oblong, fleſhy, yellow, ſomewhat bigger than the thumb's end, and ſome are very agreeable to the taſte. Some are no bigger than a chich-pea, and others as big as a pomgranate. The beſt are thoſe called *royal dates.* There is alſo another ſort called *caryotæ*, which are very good. Some of them have ſtones, and others none.

Dates are principally uſed in medicine: their qualities are, to ſoften the aſperities of the gullet, to ſtrengthen the *fœtus* in the womb, to aſſuage all immoderate fluxes of the belly, and to eaſe diſorders of the reins and bladder. Their bad property is, that they digeſt difficultly, cauſe pains in the head, and produce a thick melancholic blood. Theſe effects ariſe from the principles they contain, which are, a moderate ſhare of oil, and a deal of phlegm, and eſſential ſalt. The oil and phlegm render them moiſtening and nutritious, good againſt acrimonies of the breaſt, to aſſuage coughs, &c. and the phlegm and ſalt render them deterſive and aſtringent, and good againſt diſeaſes of the throat. As for the reſt, they are a heavy food, full of earthy juice, and occaſion obſtructions in the *viſcera*; for which reaſon, people who eat great quantities of *dates* become ſcorbutic, and loſe their teeth betimes.

Our *dates* are brought us from Egypt, Syria, Africa, and the Indies. Among the Egyptians and Africans, they make a principal article of food. They never come to full maturity in Italy, or the moſt ſouthern parts of Spain; and yet there are tolerable *dates* in Provence; which do not keep, but breed worms. The beſt come from Tunis and Perſia.

DATE *plum.* See *Indian Date* PLUM.

DATISCA, in *Botany*. See *Baſtard* HEMP.

DATISI, in *Logic*, a mode of ſyllogiſms in the third figure, wherein the major is an univerſal affirmative, and the minor and concluſion are particular affirmative propoſitions. E. gr.

DA *All God's friends are kings.*
TI *Some of God's friends are poor.*
SI *Therefore, ſome poor are kings.*

DATIVE, in *Grammar*, the third caſe in the declenſion of nouns; expreſſing the ſtate, or relation, of a thing, to whoſe profit or loſs ſome other thing is referred.

It is called *dative*, becauſe uſually governed by a verb implying ſomething to be given to ſome perſon. As, *commodare Socrati, to lend to Socrates*; *utilis reipublicæ, uſeful to the commonwealth*; *pernicioſus eccleſiæ, pernicious to the church*; *viſum eſt Platoni, it ſeemed to Plato*, &c.

In Engliſh, where we have properly no CASES, this relation is expreſſed by the ſign *to*, or *for*.

DATURA, in *Botany*, a name given by many authors to the plant more uſually called *ſtramonium*, or the *thorn-apple.* See THORN-*apple.*

DAVACA *terræ*, a portion of land in Scotland ſo called; *& apud priſcos Scotos,* DAWACH of land, *quod continet quatuor aratra terræ, quorum unum quodque trahitur octo bobus.*

DAUCI *ſemen*, in the *Materia Medica*, the name of a ſeed uſed in many of the officinal preparations. The plant which produces it is a ſort of *myrrhis*, or chervil, called *daucus Creticus*, or candy carrot, by the old authors; but by the moderns, *myrrhis annua ſemine ſtriato, villoſo, imano.*

This ſeed being hairy, has very frequently little animalcules and duſt hanging to it; and this fault grows worſe, the longer it is kept, as the animals continue to eat the ſeed, and their excrements become mixed with it in large quantities. It ought therefore to be choſen new, plump and full, and very clean. See SPIGNEL.

It expels wind, and is good againſt colics, pains of the womb, and in hyſterical complaints.

DAUCUS. See CARROT.

DAUGHTERS, among the *Ancients*, were more frequently expoſed than ſons, as requiring greater charge to educate and ſettle them in the world. See EXPOSING *of Children.*

Thoſe who had no legitimate ſons were obliged, by the Athenian laws, to leave their eſtates to their daughters, who were confined to marry their neareſt relations, otherwiſe to forfeit their inheritance; as we find to have been practiſed likewiſe among the Jews, many of whoſe laws ſeem to have been tranſcribed by Solon.

If an heireſs happened to be married before her father's death, this did not hinder the neareſt relation to claim the inheritance, and even to take the woman from her huſband; which is ſaid to have been a common caſe. Potter, Archæol. Græc. lib. iv. c. 15. tom. ii. p. 441. See SON.

The *ſons* and *daughters* of the king of England are called the *ſons* and *daughters* of England; becauſe all the ſubjects of England have a ſpecial intereſt in them. See PRINCE.

DAVIDISTS, DAVIDICI, or DAVID GEORGIANS, a ſect of heretics, the adherents of David George, a native of Delft, who, in 1525, began to preach a new doctrine; publiſhing himſelf to be the true meſſiah; and that he was ſent thither to fill heaven, which was quite empty for want of people to deſerve it. He is likewiſe ſaid to have denied the exiſtence of angels, good and evil, of heaven and hell, and to have rejected the doctrine of a future judgment. He rejected marriage, with the Adamites; held, with Manes, that the ſoul was not defiled by ſin; and laughed at the ſelf-denial ſo much recommended by Jeſus Chriſt. Such were his principal errors. He made his eſcape from Delft, and retired firſt into Friſeland, and then to Baſil, where he changed his name, aſſuming that of John Bruck, and died in 1556.

He left ſome diſciples behind him, to whom he promiſed, that he would riſe again at the end of three years. Nor was he altogether a falſe prophet herein; for the magiſtrates of that city, being informed, at the three years end, of what he had taught, ordered him to be dug up, and burnt, together with his writings, by the common hangman.

There are ſtill ſome remains of this ridiculous ſect in Holſtein, Frieſland, and other countries; whoſe temper and conduct ſeem to diſcredit the exaggerated account which ſome writers have given of their founder. He was probably a deluded fanatic and myſtic.

DAVIS's *Quadrant.* See BACK-STAFF.

DAVIT, a piece of timber in a ſhip, having a notch at one end; in which, by a ſtrap, hangs a block, called the fiſh-block: the uſe of this is to hale up the fluke of the anchor, and to faſten it at the ſhip's bow or loof. This *davit* may be ſhifted from one ſide of the ſhip to the other, as occaſion ſerves.

There is a ſmall *davit* in the ſhip's boat, which is ſet over her head with a ſheever, into which is brought the buoy-rope to weigh the anchor: it ſtands in the carlings in the boat's bow.

DAUPHIN, DOLPHIN, in *Aſtronomy*. See DELPHINUS.

DAUPHIN is a title given to the eldeſt ſon of France, and preſumptive heir of the crown; on account of the province of Dauphiné, which in 1343 was given to Philip de Valois, on this condition, by Humbert, *dauphin* of the Viennois.

The *dauphin*, in his letters patent, ſtyles himſelf, "By "the grace of God, eldeſt ſon of France, and *dauphin* of "Viennois."

DAUPHIN was anciently the title, or appellation, of the prince of Viennois in France.

Moſt authors, who have ſought the origin of the name *dauphin*, and *Dauphiné*, ſeem to have given too much looſe to conjecture. Du-Cheſne is of opinion, that it was the grandſon of Guy the Fat who firſt bore the name of *dauphin*. Chorier obſerves, that William, canon of Notre Dame at Grenoble, who has wrote the life of Margaret, daughter of Stephen, earl of Burgundy, married with Guy, ſon of Guy the Fat, calls the latter ſimply Guy the Old, and the former always count *Dauphin*; and adds, that no record, no monument, ever attributes the title of *dauphin* to Guy the Fat, or any of his predeceſſors: ſo that it muſt neceſſarily have taken its riſe in his ſon, all whoſe ſucceſſors ſo conſtantly aſſumed it, that it became the proper name of the family. He died in 1142, in the flower of his youth; ſo that it muſt be about the year 1120, that the title commenced; and without doubt, adds he, on ſome illuſtrious occaſion. He obſerves farther, that this prince was of a military diſpoſition, and delighted in nothing but war; and again, that it was the cuſtom of the cavaliers to deck their caſks, coats of arms, and the houſing of their horſes, with ſome figure, or device, peculiar to themſelves, whereby they were diſtinguiſhed from all others engaged in the ſame combat or tournament. From all theſe circumſtances he conjectures, that this Guy choſe the *dolphin* for his ſignature; that this was the creſt of his helmet; and that he bore it on his coat in ſome notable tournament, or battle, wherein he diſtinguiſhed himſelf. And this, Chorier makes no doubt, is the real origin of the appellation. Nothing was more common, in thoſe times, than to make proper names become the names of families, or dignities. Witneſs the Ademars, Arthauds, Aynards, Atlemans, Berengers, and infinite others; who all owe their names to ſome one of their anceſtors, from whom it has been tranſmitted throughout the family.

The ſeigneurs, or lords, of Auvergne, have likewiſe borne the appellation of *dauphin*; but the *dauphins* of Auvergne had it not till a good while after thoſe of the Viennois, and even received it from them. The manner was this: Guy VIII. *dauphin* of Viennois, had by his wife Margaret, daughter of Stephen, earl of Burgundy, a ſon and two daughters. The ſon was Guy IX. his ſucceſſor. Beatrix, one of the daughters, was married to the count d'Auvergne, who, according to Blondel, was William V. or rather, as Chorier and others hold, Robert VI. father of William V. This prince loſt the greateſt part of the county Auvergne, which was taken from him by his uncle William, aſſiſted by Louis the Young; and was only left maſter of the little canton whereof Vodable is the capital. He had a ſon whom he called *Dauphin*, on account of Guy, or Guigues, his uncle by the mother's ſide. From his time his ſucceſſors, holding the ſame petty canton of Auvergne, ſtyled themſelves *dauphins* of Auvergne, and bore a *dolphin* for their arms.

Dauphin, in *Conchyliology*, the name of a ſpecies of ſhell-fiſh. It is one of the round-mouthed ſnails, or *cochlæ lunares*; and is ornamented with rows of indented eminences, on all the turns of the ſhell.

Dauphins, or **Delphins**, in *Literary Hiſtory*, a name given to the commentators on the ancient Latin authors, who were employed by order of Louis XIV. of France, for the benefit of the prince, under the care and direction of M. de Montauſier his governor, Boſſuet and Huet his preceptors. They were thirty-nine in number.

DAWEL-*coronde*, in the language of the Ceyloneſe, drum-cinnamon. This is called in Low Dutch, *trommel caneel*. The reaſon of the name is, that the wood of the tree which affords this ſpecies, when dried, is light and tough, and is uſed to make drums of. The bark is taken off while the tree is growing, and is of a pale colour. It is a very bad kind of cinnamon, and is very rarely ſold as ſuch; but the natives uſe it in medicine.

DAY, a diviſion of time, deduced from the appearance and diſappearance of the ſun.

The *day* is of two kinds; *artificial*, and *natural*.

Day, *artificial*, which ſeems to be that primarily meant by the word *day*, is the time of light; determined by the ſun's riſing and ſetting.

This is properly defined, the ſtay of the ſun above the horizon: in oppoſition to which, the time of darkneſs, or the ſun's ſtay below the horizon, from ſetting to riſing again, is called *night*.

Day, *natural*, is the ſpace of time wherein the ſun performs one revolution round the earth; or, more juſtly, the time wherein the earth makes a rotation on its axis; which the Greeks more properly expreſs by *νυχθημερον*, *nychthemeron*, q. d. *night-day*. This is either *aſtronomical* or *civil*. The *aſtronomical day* begins at noon, when the ſun's center is on the meridian, and is reckoned twenty-four hours to the following noon.

The epocha, or beginning of the *civil day*, is the term from which one *day* begins, and in which the preceding *day* concludes. The fixing of this term is of ſome importance. It is certain, that, for the more commodious diſtinguiſhing of *days*, it ought to be fixed in ſome moment of time wherein the ſun is in ſome diſtinguiſhable part of the heavens. The moſt eligible, therefore, ſhould be the moments wherein the ſun paſſes either the horizon, or the meridian. In effect, as there is no moment can be more accurately determined by obſervation, than that in which the ſun paſſes through the upper meridian; if regard be had to the exactneſs of the meaſure, the noon-tide has the beſt pretenſions; the riſing and ſetting of the ſun being diſturbed by the refractions; beſide that, the horizon is ſeldom clear of clouds. But yet, as the *artificial day* does begin with the ſun's riſe, and ends with the ſetting; and, beſides, the ſun's paſſing the horizon is a thing eaſily obſerved; the riſing or ſetting of the ſun ſhould appear the moſt commodious, though not moſt accurate, epoch or beginning of the *civil day*.

As, then, there are not wanting reaſons for beginning the *natural day*, both from the ſun's paſſing the meridian, and the eaſtern and weſtern ſide of the horizon; it is no wonder, that different nations ſhould begin their *day* differently.

Accordingly, 1ſt, The ancient Babylonians, Perſians, Syrians, and moſt other eaſtern nations, with the preſent inhabitants of the Balearic iſlands, the Greeks, &c. begin their *day* with the ſun's riſing. 2dly, The ancient Athenians and Jews, with the Auſtrians, Bohemians, Marcomanni, Sileſians, modern Italians, and Chineſe, reckon it from the ſun's ſetting. 3dly, The ancient Umbri and Arabians, with the modern aſtronomers, at noon. And, 4thly, The Egyptians and Romans, with the modern Engliſh, French, Dutch, Germans, Spaniards, and Portugueſe, at midnight.

The *day* is divided into hours; and the week, month, &c. into *days*. For the origin of the Engliſh names of the *days* of the week, ſee Week.

As to the different length of the *day* in different climates, it has been a matter of ſome controverſy among aſtronomers, whether or no the *natural days* be all equally long throughout the year; and, if not, what is their difference? A profeſſor of mathematics at Seville, in a memoir in the Philoſophical Tranſactions, aſſerts, from a continued ſeries of obſervations for three years, that they are all equal. Mr. Flamſtead, in the ſame Tranſactions, refutes the opinion; and ſhews, that one *day*, when the ſun is in the equinoctial, is ſhorter than when he is in the tropics, by forty ſeconds; and that fourteen tropical *days* are longer than ſo many equinoctial ones, by one ſixth of an hour, or ten minutes. This inequality of the *days*, flows from two ſeveral principles: the one, the eccentricity of the earth's orbit; the other, the obliquity of the ecliptic with regard to the equator, which is the meaſure of time. As theſe two cauſes happen to be combined, the length of the *day* is varied. See Equation *of time*.

Day, in *Law*, is frequently uſed for the *day* of appearance in court, either originally, or upon aſſignation.

We ſay, He had a *day* by the rolls; i. e. he had a *day* of appearance aſſigned him.

If a fact be done in the night, you muſt ſay in law proceedings, *in nocte ejuſdem diei*.

There are ſeveral return *days* in the terms; and if either of them happen upon a Sunday, the day following is taken inſtead of it; for Sunday is *dies non juridicus*: and ſo is Aſcenſion day in Eaſter term, St. John the Baptiſt in Trinity term, All Saints and All Souls in Michaelmas term, and the Purification of the Virgin Mary in Hilary term. 2 Inſt. 264.

Day-*coal*, in *Natural Hiſtory*, a name given by the miners of England, and the common people who live in coal countries, to that ſeam or ſtratum of the coal which lies uppermoſt in the earth. The ſame vein or ſtratum of coal uſually runs a great way through the country, and dips and riſes in the earth in different places; ſo that this upper ſtratum, or *day-coal*, is in the various parts of the ſame ſtratum, ſometimes near the ſurface, and ſometimes at many fathoms deep. The ſubterranean fires found in ſome of our coal countries principally feed on this coal, and are nearer, or farther from the ſurface, as it riſes or ſinks. Phil. Tranſ. Nº 130.

Day-*light*, in *Law*. In reſpect to *day-light*, before ſun-riſing, and after ſun-ſetting, is accounted part of the *day* by common law; as to robberies committed in the *day*-time, when the hundred is liable. 7 Rep. 6.

The law regularly rejects all fractions and diviſions of a *day*, for the uncertainty. 5 Rep. 1. 1 Inſt. 135.

Day-*lily*, in *Botany*. See Lily.

Day's *work*, in *Sea Language*, denotes the reckoning or account of the ſhip's courſe, during twenty-four hours, or between noon and noon, according to the rules of trigonometry. See Dead-*reckoning*.

Days *in bank*, are *days* ſet down by ſtatute, or order of the court, when writs ſhall be returned, or when the party ſhall appear on the writ ſerved.

To be diſmiſſed *without day*, *ſine die*, is to be finally diſcharged the court.

DAYS *of prefixion*, in the *Exchequer*. See REMEMBRANCER.

DAYS *of grace*, in *Commerce*, are a number of days allowed by cuſtom for the payment of a bill of exchange, after the ſame becomes due; i. e. after the time it was accepted for is expired.

In England, three *days of grace* are allowed: ſo that a bill accepted, in order to be paid, e. gr. ten *days* after ſight, is not to be paid till thirteen *days*. Throughout France, they allow ten *days of grace*; as many at Dantzic; eight at Naples; ſix at Venice, Amſterdam, Rotterdam, and Antwerp; four at Francfort; five at Leipſic; twelve at Hamburgh; ſix in Portugal; fourteen in Spain; thirty in Genoa, &c. Note, Sundays and holidays are included in the number of *days of grace*.

DAYS-*man* is uſed in ſome parts of England for an arbitrator or judge: and it has been obſerved that the word *day* ſignifies judgment.

DAYS, *Fiſh*. See ABSTINENCE.

DAYS, *Dog*, *Dies caniculares*. See CANICULAR.

DAYS, *Critical*, *Dies critici*. See CRITICAL *days*.

DAYS, *Intercalary*, or *additional*. See INTERCALARY *days*.

D'AYENA, in *Botany*, *monier*. Its characters are theſe: the flowers ariſe from the wings of the ſtalk; they have a five-leaved empalement, and five heart-ſhaped petals. It hath five ſtamina inſerted in a ſhort nectarium; and a five-cornered germen, ſituated at the bottom of the nectarium, which afterward becomes a roundiſh five-cornered capſule having five cells, each having one kidney-ſhaped ſeed. There is but one ſpecies known, a native of Peru; which is named from M. Le Duc D'Ayena, a great lover of botany, and who has a noble garden at St. Germains.

DAZE, in *Natural Hiſtory*, a name given by our miners to a ſort of glittering ſtone, which often occurs in their works; and, as it is an unprofitable ſubſtance, is one of thoſe things which they call weeds. The word *daze* takes in, with them, every ſtone that is hard and glittering; and therefore it comprehends the whole genus of the *telaugia*, or ſtony nodules, which have flakes of talc in their ſubſtance: theſe, according to the colour of the ſtony matter they are bedded in, and their own colour, give the names of *black daze*, *white*, *red*, and *yellow daze* to theſe ſtones.

Theſe *dazes* are generally of the poorer part of the vein. The ſhoad-ſtones are many of them of this nature, and the ends of the veins degenerate again into them. Phil. Tranſ. N° 69.

DEACON, *Diaconus*, a perſon in the loweſt degree of holy orders, whoſe buſineſs is to baptize, read in the church, and aſſiſt at the celebration of the euchariſt.

The word is formed from the Latin *diaconus*; of the Greek διακονος, *miniſter*, *ſervant*.

Deacons were firſt inſtituted, ſeven in number, by the apoſtles, Acts, chap. vi. which number was retained a long time in ſeveral churches. Grotius apprehends that the order of *deacons* in the Chriſtian church correſponded to that of *eleemoſynaries* in the Jewiſh ſynagogue. Their office was, to ſerve in the agapæ, and to diſtribute the bread and wine to the communicants, and diſpenſe the alms. Tertullian informs us, that the deacons preached, and, in the abſence of the biſhop and preſbyters, conferred the ſacrament of baptiſm. De Bapt. p. 602.

By the ancient canons, marriage was not incompatible with the ſtate and miniſtry of a *deacon*; but it is now a long time that the Romiſh church has prohibited their marrying; and the pope only grants them diſpenſations for very important cauſes; and, after this diſpenſation, they loſe the rank and functions of their order, and return to a lay ſtate.

At Rome, under pope Sylveſter, they had only one *deacon*; then ſeven were appointed; then fourteen; and, at laſt, eighteen; who were called *cardinal deacons*, to diſtinguiſh them from thoſe of other churches.

Their office was, to take care of the temporalities of the church, to look to the rents and charities, and provide for the neceſſities of the eccleſiaſtics, and even of the pope. The collecting of the rents, alms, &c. belonged to the *ſubdeacons*; the *deacons* were the depoſitaries and diſtributers. Having thus the management of the revenues of the church in their hands, their authority grew apace, as the riches of the church increaſed. Thoſe of Rome, as being miniſters of the firſt church, preceded all others, and even at length took place of the prieſts themſelves. Doubtleſs, it was the avarice of the prieſts that made them give place to the *deacons*, who had the diſpoſal of the money.

The *deacons* rehearſed certain prayers at the holy office, which were thence denominated *diaconical*.

They took care that the people at church behaved themſelves with due modeſty and reſpect. They were not allowed to teach publicly; at leaſt not in the preſence of a biſhop or prieſt. They only inſtructed the catechumens, and prepared them for baptiſm. The doors of the church were likewiſe in their cuſtody; though, in after-times, that charge was committed to the *ſubdeacons*.

The office of a *deacon*, in the church of England, according to the form of ordination, is to baptize, preach, and aſſiſt in the adminiſtration of the Lord's ſupper; and, in ſhort, to perform all the other offices in the liturgy, which a prieſt can do, except that of conſecrating the elements of the Lord's ſupper, and pronouncing the abſolution. No perſon can be ordained a *deacon* under the age of twenty-three years, unleſs by a faculty or diſpenſation obtained from the archbiſhop of Canterbury: and in order to this, he muſt be provided with a title to a cure, or be a fellow or chaplain in ſome college in Cambridge or Oxford, or a maſter of arts of five years ſtanding, living at his own charge in either of the univerſities, or be admitted by the biſhop who ordains him to ſome benefice or curacy then void. Otherwiſe the ordaining biſhop ſhall maintain him, till he is preferred to ſome eccleſiaſtical living. And by ſtat. 13 and 14 Car. II. c. 4. no perſon is capable of being admitted to any benefice or eccleſiaſtical promotion, till he be ordained a prieſt; nor is a *deacon* capable of a DONATIVE, but is only allowed to uſe his orders as a chaplain to ſome family, a curate to ſome prieſt, or a lecturer without a title.

DEACONESS, *Diaconiſſa*, an office in uſe in the primitive church, though now laid aſide. St. Paul makes mention thereof in his Epiſtle to the Romans: and the younger Pliny, in a letter to Trajan, tells that prince, that he had ordered two *deaconeſſes*, whom he calls *miniſtræ*, to be tortured.

Deaconeſs was a title given to certain devout women, who conſecrated themſelves to the ſervice of the church, and rendered thoſe offices to the women, which men could not decently do: as in baptiſm, for inſtance, which was conferred, by immerſion, on women as well as men.

They were likewiſe to look to the doors on the ſide the women were on, who were ſeparated from the men, according to the cuſtom of thoſe times. They had the care and inſpection of the poor, ſick, &c. And in times of perſecution, when a *deacon* could not be ſent to the women, to exhort and fortify them, a *deaconeſs* was ſent. See Balſamon on the eleventh canon of the council of Laodicea; and the Apoſtolical Conſtitutions, lib. ii. cap. 57. To ſay nothing of the epiſtle of Ignatius to the people of Antioch; where, what is ſaid of *deaconeſſes*, is ſuppoſed to be an interpolation.

The council of Nice ranks *deaconeſſes* among the clergy: though ſome hold, that their ordination was not ſacramental, but a mere eccleſiaſtical ceremony. However, it gave them a pre-eminence above the reſt of their ſex; for which reaſon the council of Laodicea forbad the ordaining of any more for the future. The office of *deaconeſſes* expired in the Weſtern church about the twelfth century, and in the Eaſtern about the thirteenth.

Atto of Verceil, in his eighth letter, gives the reaſon of their being aboliſhed: he obſerves, that in the firſt ages the miniſtry of women was neceſſary, in order to the more eaſy inſtructing of other women, and recovering them from paganiſm; and that they likewiſe ſerved for the more decent adminiſtration of baptiſm to the ſame: but that it was not then neceſſary, becauſe none but children were baptized; and it might now be added, becauſe baptiſm is only conferred by ſprinkling.

The number of *deaconeſſes* does not ſeem to have been fixed: the emperor Heraclius, in his letter to Sergius patriarch of Conſtantinople, orders that in the great church of Conſtantinople there be forty *deaconeſſes*; whereas there were only ſix in that of the Mother of God, in the quarter of the Blachernœ.

DEACONRY, *Diaconate*, the order or miniſtry of a *deacon*, or *deaconeſs*. See DEACON, and DEACONESS.

DEACONRY, *Diaconia*, is alſo a name ſtill reſerved to the chapels and oratories in Rome, under the direction of the ſeveral deacons, in their reſpective regions or quarters.

To the *deaconries* were annexed a ſort of hoſpitals, or boards for the diſtribution of alms, governed by the regionary deacons, called cardinal deacons, of whom there were ſeven, anſwering to the ſeven regions, their chief being called the arch-deacon.

The hoſpital adjoining to the church of the *deaconry*, had an adminiſtrator for the temporal concerns, called the *father of the deaconry*, who was ſometimes a prieſt, and ſometimes a layman.

At preſent there are fourteen of theſe *deaconries* or hoſpitals at Rome, which are reſerved to the cardinals. Du-Cange gives us their names: as the *deaconry* of St. Maria in the Broad-way, the *deaconry* of St. Euſtachio near the Pantheon, &c.

DEAD-*beat*, in *Horology*, is a general term for a particular conſtruction of pallets; firſt applied by Mr. Graham to clocks, to prevent the retrograde motion of the wheels, and to remedy the imperfections ariſing from the recoil of the common pallets. The principle of this eſcapement is the ſame as the horizontal wheel in watches, and what the French call *echapement à repos*. See PALLET.

DEAD-*lights*, are wooden ports made to faſten in the cabin windows, to prevent the waves from breaking into the ſhip in a high ſea.

DEAD-*men's eyes*, in a ſhip, are a kind of blocks, having many holes in them, but no ſheevers; and through them the lanniers or laniards go, which make faſt the ſhrouds to the chains. Sometimes the main-ſtays of a ſhip are ſet taught in *dead-men's eyes*; but moſt great ſhips uſe double blocks. The crowfeet reeve through the *dead-men's eyes*.

DEAD-*nettle*, ſtinking or yellow. See NETTLE.

DEAD-*nettles*, in *Botany*. See ARCHANGEL.

DEAD-*pledge*. See MORTGAGE.

DEAD-*reckoning*, at ſea, is that eſtimation, judgment, or conjecture, which the ſeamen make of the place where a ſhip is, by keeping an account of her way by the log, by knowing the courſe they have ſteered by the compaſs, and by rectifying all, with allowance for drift, lee-way, &c. according to the ſhip's trim: ſo that this reckoning is without any obſervation of the ſun, moon, or ſtars, and is to be rectified as often as any good obſervation can be had. See LOG.

DEAD-*riſing*, a term in a ſhip for that part of her bottom, through her whole length, where the floor timber is terminated upon the lower futtock.

DEAD-*ropes*, in a ſhip, are ſuch as are not running, i. e. which do not run in any block.

DEAD-*tops*, a diſeaſe incident to young trees; and cured by cutting off the dead parts, cloſe to the next good twig or ſhoot, and claying them over as in grafting.

DEAD-*water*, is the eddy water juſt behind the ſtern of a ſhip. It is ſo called, becauſe it does not paſs away ſo ſwiftly, as the water running by her ſides doth.

If a ſhip have a great eddy following her ſtern, they ſay, ſhe makes much *dead-water*.

DEAD-*wood*, in *Naval Architecture*, a name given by ſhipwrights to certain blocks of timber laid upon the keel, particularly at the extremities afore and abaft, where theſe pieces are placed upon one another to a conſiderable height, becauſe the ſhip is there ſo narrow, as not to admit of the two half-timbers, which are therefore ſcored into the *dead-wood*, where the angle of the floor timbers greatly diminiſhes, as approaching the ſtern and ſtern-poſt. The *dead-wood* afore and abaft is equal in depth to two thirds of the depth of the keel, and as broad as it can be, without exceeding the breadth of the keel.

DEAD-*work*, denotes all that part of a ſhip, which is above water when ſhe is laden.

DEADLY *carrot*. See THAPSIA.

DEADLY *feud*, in our *Law Books*, a profeſſion of irreconcilable enmity till a perſon is revenged by the death of his enemy.

The word *feud* is derived from the German *fehd*, which, as Hottoman obſerves, ſignifies, *modo bellum, modo capitales inimicitias*. See FEUD.

Such enmity and revenge was allowed by our ancient laws in the time of the Saxons; viz. If any man was killed, and a pecuniary ſatisfaction were not made to the kindred, it was lawful for them to take up arms, and revenge themſelves on the murderer; which was called *deadly feud*. And this, probably, was the original of an appeal.

DEADLY *nightſhade*, in *Botany*. See NIGHTSHADE.

DEADS, in *Mining*, is uſed to expreſs that part of the ſhelf or faſt ground which contains no ore; but which encloſes the vein or bed of the ore, like a wall on every ſide. The drifts which they ſink for the tin ore in Cornwall, are generally about three feet over, and about ſeven feet high; ſo that a man may conveniently ſtand upright at work, and manage his tools. In caſe the vein itſelf is not broad enough to allow this, as in many places it is not half a foot over, then they pick down the ſtrata that encloſe it, ſo as to make an opening of the ſame breadth. This work they call *breaking up the deads*. Phil. Tranſ. N° 69.

This word is alſo uſed for ſuch parcels of common looſe mould or earth, lying above the ſhelf, as uſually contain the *ſhoad*, which they find when they are training a load.

In the Mendip lead-mines, when a vein of ore breaks off abruptly in an earth, they call it a *deading-bed*; and earth without ore, they call *dead earth*.

DEAFFORESTED, in our *Law Books*, the being diſcharged from being foreſt; or freed and exempted from foreſt-laws. See FOREST.

Johannes Dei gratia, &c. archiepiſcopis, epiſcopis, &c. ſciatis nos omnino deafforeſtaſſe *foreſtam de Brewood de omnibus, quæ ad foreſtam et foreſtarios pertinent. Quare volumus et firmiter præcipimus, quod prædicta foreſta, et homines in illa manentes, et hæredes eorum ſint* deafforeſtati *in perpetuum.*

DEAFNESS, the ſtate of a perſon who wants the ſenſe of hearing: or a diſeaſe of the ear, which prevents its due reception of ſounds.

Deafneſs generally ariſes either from an obſtruction, or a compreſſion, of the auditory nerve; or from ſome collection of matter in the cavities of the inner ear; or elſe from the auditory paſſage being ſtopped up by ſome hardened excrement; or, laſtly, from ſome excreſcence, as a ſwelling of the glands, or ſome foreign body introduced within it.

As to the prognoſtics, thoſe who are born *deaf* are rarely cured; a real *deafneſs* is hard to remedy; a *deafneſs* in acute diſeaſes, with crude urine, foretels a delirium: but when the ſigns of coction are good, it portends a critical hæmorrhage. With regard to the cure, if the obſtruction be in the external cavity of the ear, it is diſcernible by the ſight. If there is occaſion to ſyringe the ear, a decoction of ſage and roſemary flowers will be proper, with equal parts of water and white wine: but great caution is to be uſed. Some pump the head with warm Bath waters: ſome ſay the eggs of ants bruiſed, and put into the ear, with the juice of an onion, cures the moſt inveterate *deafneſs*: others affirm that a ſalivation will ſometimes perform a cure. A critical *deafneſs* will ceaſe of itſelf. Etmuller recommends amber and muſk; and hardneſs of hearing has been often cured by putting a grain or two of muſk into the ear with cotton. Hoffman ſays *deafneſs* ſometimes ariſes from a ſlackneſs of the auditory nerves, which often happens from too great humidity, which if neglected will terminate in perpetual and incurable *deafneſs*: but may be diſperſed if taken in time, by proper cephalics and ſudorifics. Some for this purpoſe recommend equal parts of ſpirit of lavender and Hungary water, which ſhould be dropped warm into the ear. Lindanus adviſes the gall of an eel, mixed with ſpirit of wine; and others the fumes of ſulphur, conveyed into the ear with a pipe or funnel: but regard muſt always be had to the cauſe, if diſcoverable. Heiſter informs us, that medicinal waters drank in the ſummer-time freely, are the beſt means as preſervatives, and for curing diſorders in the ears; and that they often perform more than any other remedy whatever.

Deafneſs ariſing from cold of the head may be cured by keeping the head warm, eſpecially at night; by taking gentle purges, keeping the feet warm, and bathing them frequently in luke-warm water at bed-time.

Thoſe born *deaf* are alſo dumb, as not being able to learn any language, at leaſt in the common way. However, as the eyes, in ſome meaſure, ſerve them for ears, they may underſtand what is ſaid by obſerving the motion of the lips, tongue, &c. of the ſpeaker; and even accuſtom themſelves to move their own, as they ſee other people do; and by this means learn to ſpeak.

Thus it was that Dr. Wallis taught two young gentlemen, born *deaf*, to know what was ſaid to them, and to return pertinent anſwers. Digby gives us another inſtance of the ſame, within his own knowlege. And there was a Swiſs phyſician formerly living at Amſterdam, one Joh. Conrad Amman, who effected the ſame in ſeveral children born *deaf*, with ſurpriſing ſucceſs. He has reduced his ſcheme to a fixed art, or method, which he has publiſhed in his Surdens Loquens, Amſtelod. 1692. and De Loquela, ibid. 1700.

In the Philoſoph. Tranſact. N° 312. we have an account by Mr. Waller, R. S. Sec. of a man and his ſiſter, each about fifty years old, born in the ſame town with Mr. Waller, who had neither of them the leaſt ſenſe of hearing; yet both of them knew, by the motion of the lips only, whatever was ſaid to them, and would anſwer pertinently to the queſtion propoſed. It ſeems they could both hear and ſpeak when children, but loſt their ſenſe afterwards; whence they retained their ſpeech, which, though uncouth, was yet intelligible.

Such another inſtance is that of Mr. Goddy's daughter, miniſter of St. Gervais in Geneva, related by biſhop Burnet. At two years old they perceived ſhe had in great part loſt her hearing; and ever after, though ſhe heard great noiſes, yet ſhe could hear nothing of what was ſaid to her. But by obſerving the motions of the mouths and lips of others, ſhe had acquired ſo many words, that out of theſe ſhe had formed a ſort of jargon, in which ſhe could hold converſation whole days with thoſe that could ſpeak her language. She knew nothing that was ſaid to her, unleſs ſhe ſaw the motion of their mouths that ſpoke to her; ſo that, in the night, they were obliged to light candles to ſpeak to her. One thing will appear the ſtrangeſt part of the whole narration:

tion: ſhe had a ſiſter, with whom ſhe had practiſed her language more than with any body elſe; and in the night, by laying her hand on her ſiſter's mouth, ſhe could perceive by that what ſhe ſaid, and ſo could diſcourſe with her in the dark. Burn. Let. iv. p. 248.

It is obſervable that *deaf* perſons, and ſeveral others thick of hearing, hear better and more eaſily, if a loud noiſe be raiſed at the time when you ſpeak to them; which is owing, no doubt, to the greater tenſion of the ear-drum, on that occaſion. Dr. Willis mentions a *deaf* woman, who, if a drum were beat in the room, could hear any thing very clearly; ſo that her huſband hired a drummer for a ſervant, that by his means he might hold converſation with his wife. The ſame author mentions another, who, living near a ſteeple, could always hear very well, if there was a ringing of three or four bells; but never elſe.

Dr. Buchner relates an extraordinary method of making *deaf* perſons to hear, by applying thin ſlips of wood, about ſix feet long, an inch broad, and as thick as the back of a knife, at one end to the upper teeth of the ſpeaker, and at the other to the upper teeth of the *deaf* perſon. Many trials were made to aſcertain the fact, and the voice was found perceptible and diſtinct. This method, he obſerves, may be adapted to all perſons afflicted with *deafneſs*, provided the auditory nerves are not injured or deſtroyed at their origin. See Buchner's Eaſy and practicable Method to enable deaf Perſons to hear, tranſlated from the German, 1770.

DEAL, a well-known kind of wood, of great uſe.

A very good method of ſeaſoning planks of *deal* and fir, is to throw them into ſalt-water as ſoon as they are ſawed, and keep them there three or four days, frequently turning them. In this caſe they will be rendered much harder, by drying afterwards in the air and ſun; but neither this nor any other means yet known, will preſerve them from ſhrinking.

Deals called Bulgendorp *deals*, the hundred containing ſix ſcore, pay on importation 3*l.* 8*s.* $8\frac{40}{100}$*d.* and drawback 3*l.* 3*s.* the rate 12*l.* Meabro *deals*, ſix ſcore, pay 1*l.* 2*s.* $10\frac{80}{100}$*d.* and drawback 1*l.* 1*s.* the rate 4*l.* Norway *deals*, ſix ſcore, pay 1*l.* 8*s.* $7\frac{1}{2}$*d.* and drawback 1*l.* 6*s.* 3*d.* the rate 5*l.* Spruce deals, ſix ſcore, pay 4*l.* 5*s.* $10\frac{1}{2}$*d.* and drawback 3*l.* 18*s.* 9*d.* the rate 15*l.* *Deals* from Ruſſia, and all other countries not particularly rated, exceeding twenty feet in length, pay 4*l.* 5*s.* $10\frac{1}{2}$*d.* and drawback 3*l.* 18*s.* 9*d.* the rate 15*l.* *Deals* from Sweden or any other country, of twenty feet in length or under, not otherwiſe rated, the hundred and twenty, pay 1*l.* 8*s.* $7\frac{1}{2}$*d.* and drawback 1*l.* 6*s.* 3*d.* the rate 5*l.*

Rods of *deal* expand laterally, or croſs the grain, in moiſt weather, and contract again in dry; and thence have been found to make an uſeful hygrometer. Phil. Tranſ. N° 480. p. 184. See HYGROMETER.

DEAN, a prime dignitary in moſt cathedral and collegiate churches; being uſually the preſident of the chapter.

He is called *dean*, *decanus*, of the Greek δεκα, *ten*, as being ſuppoſed to preſide over ten canons or prebendaries, at leaſt.

Canoniſts diſtinguiſh betweeen *deans* of cathedral, and thoſe of collegiate churches. The firſt, with their chapter, are regularly ſubject to the juriſdiction of the biſhop. As to *deans* of collegiate churches, they have uſually the contentious juriſdiction in themſelves, that is, they exerciſe juriſdiction over their canons in all civil, or criminal matters; though ſometimes this belongs to them in common with the chapter.

In England, as there are two foundations of cathedral and collegiate churches, the old and the new (the latter being thoſe founded by Henry the Eighth on the ſuppreſſion of the abbots and priors, when their convents were turned into *dean* and chapter); ſo there are two ways of creating the *deans*. Thoſe of the old foundation, as the *deans* of St. Paul's, York, &c. are raiſed to their dignity much like a biſhop; the prince firſt ſending out his conge d'eſlire to the chapter; the chapter then chooſing, the king yielding his royal aſſent, and the biſhop confirming him, and giving his mandate to inſtal him. Thoſe of the new foundation, as the *deans* of Canterbury, Durham, Ely, Norwich, Wincheſter, &c. are donative, and are inſtalled by a ſhorter courſe; only by the king's letters patent, without either election or confirmation. There are ſome cathedral churches, which never had a *dean*; as that of St. David and Landaff, where the biſhop is the head of the chapter, and in his abſence the archdeacon.

Conſtantine, we are told, erected an office of nine hundred and fifty perſons at Conſtantinople, taken out of divers trades and profeſſions, whom he exempted from all impoſitions, and beſtowed them on the cathedral church, to render the offices of burial *gratis* to the defunct, particularly to the poor. Theſe he called *decani*, and *lecticarii*, probably becauſe they were divided by tens; each whereof had a bier, or litter, to carry the bodies in. It is ſuppoſed to be theſe, who, under Conſtantius, began to be called *copiatæ*; i. e. clerks deſtined for labour; for they are uſually ranked among the clerks, and even before the chantors. By a law of the year 357, it appears, that there were ſome of theſe *copiatæ* at Rome.

DEAN is alſo a title applied among us to divers perſons that are the chief of ſome peculiar churches, or chapels: as, the *dean* of the King's chapel, who has no juriſdiction; of the ARCHES; of Battel, founded by William I. who hath juriſdiction within the liberty of Battel, is preſentable by the duke of Montagu, and inſtituted and inducted by the biſhop of Chicheſter, but not ſubject to his viſitation; of Bocking, who hath a court and juriſdiction to hold plea of all eccleſiaſtical matters ariſing in ſeveral pariſhes within his peculiar, and is conſtituted by commiſſion from the archbiſhop of Canterbury, like the *dean* of Arches. There are alſo *deputy deans* and *commendatory deans*, who cannot confirm any grants, &c.

DEAN, *Rural*, or *Urban* **DEAN**, was formerly an eccleſiaſtical perſon, who had a diſtrict of ten churches, or pariſhes, either in the country or city, within which he exerciſed juriſdiction. Theſe *rural deans* were ſometimes called *archipreſbyteri*; and at firſt they were, both in order and authority, above the archdeacons. They were at firſt elected by the clergy, and by their votes depoſed; but afterwards they were appointed, and removed, at the diſcretion of the biſhop; and hence they were called *decani temporarii*, to diſtinguiſh them from the cathedral *deans*, who were called *decani perpetui*. They ſeem to have been deputies of the biſhop, ſtationed round his dioceſe, the better to inſpect the conduct of the parochial clergy, and therefore armed with an inferior degree of judicial and coercive authority.

We meet with *rural deans* as early as the ninth century. Hincmar, in a capitular to his archdeacons, reſerves the right of electing them to himſelf; and only allows it to the archdeacons, in caſe he be abſent, and by proviſion only. Some take the *rural deans* to hold the rank and place of the *chorepiſcopi*. Be this as it will, it is certain, they are very ancient in France, Germany, and England; though, till the end of the ſixteenth century, they were unknown in Italy; becauſe the biſhopricks being there exceeding ſmall, they were not needed. St. Charles Borromeo is ſaid to have firſt introduced them there. Their office is now wholly extinguiſhed in England, the authority which they had being executed by the archdeacons and chancellors of biſhops.

DEAN, in the ancient monaſteries, was a ſuperior eſtabliſhed under the abbot, to eaſe him in taking care of ten monks; whence he was called *decanus*, in imitation of thoſe officers called by the ſame name among the Romans, who had ten ſoldiers under them.

The monaſteries being now leſs populous than they were in ancient times, the abbot, or prior, does not ſtand in ſo much need of being eaſed; ſo that theſe *deans* are, in general, ſet aſide.

DEAN *and Chapter*. Anciently, biſhops did not ordinarily tranſact matters of moment *ſine conſilio preſbyterorum principalium*, who were then called *ſenatores eccleſiæ*, and colleagues of the biſhops; repreſented, in ſome meaſure, by our chapters of cathedrals, wherein the *dean* and ſome of the prebends are, upon the biſhop's ſummons, to aſſiſt him in ordinations, deprivations, condemnations, excommunications, and other weighty concerns of the church. See CHAPTER.

DEARTICULATION, in *Anatomy*. See DIARTHROSIS.

DEATH, *Mors*, is generally conſidered as the ſeparation of the ſoul from the body; in which ſenſe it ſtands oppoſed to life, which conſiſts in the union thereof.

Phyſicians have uſually defined *death* by a total ſtoppage of the circulation of the blood; and a ceſſation of the animal and vital functions conſequent thereon; as reſpiration, ſenſation, &c.

An animal body, by the actions inſeparable from life, undergoes a continual change: in time, its ſmalleſt fibres become rigid; its minute veſſels grow into ſolid fibres no longer pervious to the fluids; its greater veſſels grow hard and narrow; and every thing becomes contracted, cloſed, and bound up; whence the dryneſs, immobility, and extenuation, obſerved in old age. By ſuch means, the offices of the minuter veſſels are deſtroyed, and the humours ſtagnate, harden, and at length coaleſce with the ſolids: thus are the ſubtileſt fluids in the body intercepted and loſt, the concoction weakened, and the reparation prevented; only the coarſer juices continue to run ſlowly through the greater veſſels, to the preſervation of life, after many of the animal functions are deſtroyed. At length, in the proceſs of theſe changes, *death* itſelf becomes inevitable, as the neceſſary conſequence of life.

But it is rare, that life is thus long protracted, or that *death* ſucceeds merely from the decays and impairments of old age: diſeaſes in a long and horrid train, uſually precipitate diſſolution.

It is generally taught, that the life of thoſe animals, which we call perfect, conſiſts in a continued flux and reflux of blood, nervous juice, and air, to and from the principal organs; and that a man may be reckoned *dead* when he no longer breathes, and his heart and arteries have left off all circulation and pulſation. Even Lanciſi, the beſt author on this ſubject, ſays, that without a ſmall degree of reſpiration, and ſome little motion and trembling of the heart, there is no life. In conſequence of this ſyſtem, the general practice is, that as ſoon as theſe ſymptoms of life are gone, all hopes and endeavours to maintain the ſmall remains of life are laid aſide.

But Dr. Stevenſon does not admit this doctrine, being of opinion, that after the motion of the heart, arteries, and lungs ceaſes, there often remains a ſmall degree of vital principle, deſerving attention. After a full ſtop of all thoſe organic motions on which life is ſaid to depend, the juices frequently retain ſo much of the animal proceſs, as frequently ſerves to keep up warmth for a long time; which, with proper cheriſhing, might perhaps reſtore life entirely. Every age and country affords inſtances of ſurpriſing recoveries after lying long for *dead*. From the number of thoſe preſerved by lucky accidents, we may conclude a far greater number might have been preſerved by timely pains and ſkill. Med. Eſſ. Edinb. vol. v. art. 77.

This ingenious author hopes, from his theory, that one who from all the above mentioned motions ceaſing, may with propriety be called *dead*, may recover, and be properly ſaid to come to life again.

His theory is, that the cauſe of animal heat, or of the inteſtine motion which had been going on proſperouſly, while the progreſſive motion of the fluids in the veſſels continued, is now checked; yet ſtill proceeds in a lower manner, perhaps like the beginning of fermentation or putrefaction. By this degree of the animal proceſs, the maſs of fluids, particularly in the great reſervoir of venous blood, the heart, rarefying, preſſing every way, and being reſiſted by the valves, ſwells ſo as to fill the flaccid right auricle of the heart, which had been ſome time empty; and thus ſtimulating its fibres, which were at reſt, puts them into motion again; as we ſee the heart, after being taken out of the body, by being pricked, or having warm water thrown on it, beats afreſh, though it has been for ſome time motionleſs. The right auricle being thus filled, and ſtimulated into a contraction, fills the ventricle; which being irritated, likewiſe contracts and empties itſelf into the pulmonary artery; whereby the circulation begins where it left off, and life is reſtored, if the organs and juices are in a fit diſpoſition for it, as they perhaps are much oftener than is imagined.

From hence it ſeems, that *death* does not inevitably attend an entire organic reſt of what we call the fluids of the body; nay, that one cannot be called *dead* till the energy of the blood is ſo far gone, that, though aſſiſted by all poſſible means, it can never be again able to fill, and ſtimulate into contraction, the right *ſinus venoſus* and auricle of the heart.

See a remarkable caſe, in ſupport of this opinion, in Med. Eſſ. Edinb. vol. v. art. 55. See DROWNING.

The learned Winſlow has given us a treatiſe upon the uncertainty of the ſigns of *death*.

The law diſtinguiſhes between natural and civil *death*: the former is the actual termination of life; the latter, when a perſon is not actually *dead*, but adjudged ſo by law. Thus, if a perſon for whoſe life an eſtate is granted remains beyond ſea, or is otherwiſe abſent ſeven years, and no proof be made of his being alive, or becomes a profeſſed monk, he ſhall be accounted naturally *dead*. However, the latter diſability, ſince the Reformation, is held to be aboliſhed.

DEATH, *appeal of*. See APPEAL.

DEATH-*watch*, in *Zoology*, the Engliſh name of the *pediculus* of old wood, a ſpecies of the *termes*, belonging to the order of *aptera* and claſs of inſects in the Linnæan ſyſtem. It is nearly of the ſize of the common louſe; and the noiſe, reſembling the beating of a watch, is made by the male or female, when wooing each other. This ticking noiſe the populace have long taken for a preſage of *death*, in the family where it is heard: whence it is alſo called *pediculus fatidicus, mortiſaga, pulſatorius*, &c.

There are two kinds of *death-watches*: of the firſt we have a good account in the Philoſophical Tranſactions, by Mr. Allen. It is a ſmall beetle, five ſixteenths of an inch long, of a dark brown colour, ſpotted; having pellucid wings under the vaginæ, a large cap, or helmet, on the head, and two antennæ proceeding from beneath the eyes. The part with which it beats, he obſerved, was the extreme edge of the face, which he chooſes to call the upper lip; the mouth being protracted by this bony part, and lying underneath, out of view. Its figure, as it appears in a microſcope, ſee repreſented in *Tab. Nat. Hiſt. fig.* 2.

This account is confirmed by Mr. Derham, with this difference, that, inſtead of ticking with the upper lip, he obſerved the inſect to draw back its mouth, and beat with its forehead. That author had two *death-watches*, a male and female, which he kept alive in a box, ſeveral months; and could bring one of them to beat whenever he pleaſed, by imitating its beating: and by this ticking noiſe he could frequently invite the male to get up upon the other, in the way of coition. When the male found he got up in vain, he would get off again, beat very eagerly, and then up again: whence the ingenious author concludes thoſe pulſations to be the way whereby thoſe inſects woo one another, and find out, and invite each other to copulation.

The ſecond kind of *death-watch* is an inſect in appearance quite different from the firſt. The former only beats ſeven or eight ſtrokes at a time, and quicker: the latter will beat ſome hours together, without intermiſſion; and his ſtrokes are more leiſurely, and like the beat of a watch. This latter is a ſmall greyiſh inſect, much like a louſe when viewed with the naked eye. Its figure, as magnified, is ſeen in *Tab. Nat. Hiſt. fig.* 1. The ticking, as in the other, is a wooing act.

This inſect is at firſt a minute white egg, much ſmaller than the nits of lice; though the inſect is near as big as a louſe. In March it is hatched, and creeps about with its ſhell on. When it firſt leaves its ſhell, it is even ſmaller than its egg; though that be ſcarce diſcernible without a microſcope. In this ſtate it is ſomewhat like the mites in cheeſe: from this ſmall ſtate they grow gradually to their mature or perfect ſize: when they become like the old one, they at firſt run about much more ſwiftly than before. Phil. Tranſ. abr. vol. v. p. 26, &c.

DE BENE ESSE, a Latin phraſe uſed in our law-books. To take, or do, a thing *de bene eſſe*, is to accept, or allow it as well done for the preſent; but when it comes to be more fully examined, or tried, to ſtand or fall, to be allowed or diſallowed, according to the merit, or well-being, of the thing in its own nature; or, as we ſay, *Valeat quantum valere poteſt*.

Thus, in chancery, upon motion to have one of the leſs principal defendants in a cauſe examined as a witneſs, the court (not then thoroughly examining the juſtice of it, or not hearing what may be objected on the other ſide) often orders ſuch a defendant to be examined *de bene eſſe*, i. e. that his depoſitions ſhall be allowed, or ſuppreſſed, at the hearing of the cauſe upon a full debate of the matter, as the court ſhall think fit; but for the preſent they have a well-being, or conditional allowance. Thus alſo in common law, the judges often take bail *de bene eſſe*, to be allowed or rejected upon the approbation or exception of the plaintiff's attorney.

DEBENTURE, a kind of writing in the nature of a bond, firſt given in 1649, to charge the commonwealth to ſecure the ſoldier-creditor, or his aſſigns, the ſum due, upon auditing the accounts of his arrears.

The word is now alſo uſed in the exchequer, and in the king's houſhold, where *debentures* are uſually given to the ſervants for the payment of their wages, board-wages, and the like.

Debenture is mentioned in the act of oblivion, 12 Car. II. cap. 2. and ſince the late Revolution, has been uſed in many acts of parliament, eſpecially in that which relates to the forfeited eſtates in Ireland, out of which the ſoldiers *debentures* are appointed to be ſatisfied, 11 W. III.

DEBENTURE, in *Commerce*, a term uſed at the cuſtom-houſe, when the exporter of any merchandiſe is entitled to any bounty or drawback, by act of parliament, on the exportation; in which caſe this *debenture* is a peculiar certificate ſigned by the officers of the cuſtoms, which entitles the trader to the receipt of ſuch bounty or drawback.

All merchandiſe that are deſigned to be taken on board for that voyage, being entered and ſhipped, and the ſhip being regularly cleared out, and ſailed out of port on her intended voyage, *debentures* may be made out from the exporter's entries, in order to obtain the drawbacks, allowances, bounties, or premiums; which *debentures* for foreign goods are to be paid within one month after demand: and in making out theſe *debentures*, it muſt be obſerved, that every piece of vellum, parchment, or paper, containing any *debenture* for drawing back cuſtoms or duties, muſt, before writing, be ſtamped, and pay a duty of eight pence.

The form of *debentures* vary, according to the merchandiſe exported. In the execution of *debentures* for tobacco, it muſt be particularly obſerved, 1. that *debentures* for the ſame quantity may be made in one or more parchments; 2. that the exporter's oath muſt be printed, ſpecifying whether he acts for himſelf, or by commiſſion; 3. if exported to any other foreign ports than thoſe of Ireland, the word Ireland muſt be added to the oath after Great Britain; 4. that as no tobacco may be conſumed in ſhips of war in Europe, but what has paid full duties, and been manufactured in Great Britain, no drawback is to be allowed for any tobacco exported in men of war; 5. that eight pounds of tobacco *per* hogſhead of 350 pounds or more, allowed for draught at importation, muſt not be deducted on exportation; 6. that *debentures* for tobacco exported to Ireland, muſt not be paid till a certificate be produced, teſtifying the landing thereof; 7. that no perſons may ſwear to the exportation, but ſuch as are permitted to ſwear to *debentures* for other goods. In *debentures* for all other foreign goods, no perſon may be admitted to ſwear to the exportation, but the true exporter, either as a proprietor, or who being employed by commiſſion, is concerned in the direction of the voyage. All kinds of *debentures*, before delivered or paid to the exporters, are entered into a ſeparate book kept for that purpoſe by the collector or comptroller of the cuſtoms. See Bounty.

DEBET, among *Merchants*, ſignifies the ſums due to them for goods ſold on credit, for which they have charged their journal or ledger. It is more particularly underſtood of the remainder of debts, part of which has been paid on account.

Debet, among *Book-keepers*, is uſed to expreſs the left-hand page of the ledger, to which are carried all articles ſupplied or paid, on the ſubject of an account.

Debet & Detinet, in *Law*, are Latin words uſed in the bringing writs and actions: and an action ſhall always be in the *debet & detinet*, when he who makes a bargain or contract, or lends money to another, or he to whom a bond is made, bringeth the action againſt him who is bounden, or party to the contract and bargain, or unto the lending the money, &c. But if a man ſells to another a horſe, &c. if he brings debt for the horſe, the writ muſt be in the *detinet* only. New. Nat. Br. 265.

Debet & Solet, are alſo formal words made uſe of in writs; and ſome writs have theſe words in them, which ought not to be omitted. Likewiſe, according to the diverſity of the caſe, both *debet & ſolet* are uſed, or *debet* alone: as a *quod permittat* may be in the *debet & ſolet*, or in the *debet* only, as the demandant claims. And if a perſon ſues to recover any right, whereof his anceſtor was diſſeiſed, by the tenant or his anceſtor, then he uſeth the word *debet* alone in his writ, becauſe his anceſtor only was diſſeiſed, and the eſtate diſcontinued: but if he ſue for any thing that is now firſt of all denied him, then he uſeth *debet & ſolet*, becauſe his anceſtor before him and he himſelf uſually enjoyed the thing ſued for, until the preſent refuſal of the tenant. Reg. Orig. 140. The writ of *ſecta molendini* is a writ of right in the *debet & ſolet*, &c. F. N. B. 98.

DEBILITY, in a *Medicinal Senſe*, is a relaxation of the ſolids, which often induces weakneſs and fainting.

DEBRUIZED, or **Debruised**, in *Heraldry*, is when we would intimate the grievous reſtraint of any animal, which is debarred its natural freedom by any of the ordinaries being laid over it.

Thus when a pale, &c. is borne upon a beaſt in an eſcutcheon, the beaſt is ſaid to be *debruiſed* by the pale.

DEBT, a thing due to another, whether it conſiſt of money, goods, or ſervices.

The legal acceptation of *debt* is a ſum of money due by certain and expreſs agreement: as, by a bond for a determinate ſum; a bill or note; a ſpecial bargain; or a rent reſerved on a leaſe, that is fixed and unalterable. The non-payment of theſe is an injury, for which the proper remedy is by action of debt, to compel the performance of the contract, and recover the ſpecific ſum that is due. Actions of *debt* are now ſeldom brought but upon ſpecial contracts under ſeal, in which the ſum due is clearly and preciſely expreſſed. The form of the writ of *debt* is ſometimes in the *debet & detinet*, and ſometimes in the *detinet* only.

By our law, *debts* due to the king are to be ſatisfied in the firſt place in all caſes of executorſhip, and adminiſtratorſhip; and till the king's *debt* be ſatisfied, he may protect the debtor from the arreſt of any other creditor.

At the common law, *debt* lies not for rent upon a leaſe for life, though it doth on a leaſe for years; but the remedy is aſſiſe, if the plaintiff have ſeiſin, or by diſtreſs. 3 Rep. 65. But by ſtat. 8 Anne, c. 17. any perſon having rent in arrear, upon any leaſe for life or lives, may bring action of *debt* for ſuch rent, as where rent is due on a leaſe for years. Action of *debt* will lie againſt a leſſee, for rent due after the aſſignment of the leaſe; for the perſonal privity of contract remains, notwithſtanding the privity of eſtate is gone. 3 Rep. 22. But after the death of the leſſee, it is then a real contract, and runs with the land. Cro. Eliz. 555.

We meet with divers kinds of *debts: active debts*, are thoſe whereof a perſon is creditor; *paſſive debts*, thoſe whereof he is debtor. There are alſo *real debts*, *perſonal debts*, and *mixed debts*.

It behoves an executor or adminiſtrator to pay regard to the priority of *debts* in diſcharging them; otherwiſe, on deficiency of aſſets, he muſt anſwer thoſe of a higher nature out of his own eſtate: ſuch are funeral charges, and expence of proving the will; *debts* to the king on record or ſpecialty; *debts*, which by particular ſtatutes are to be preferred to all others, as forfeiture for not burying in woollen, money due on poor's rates, letters to the poſt-office, and ſome others; *debts* of record, as judgments, ſtatutes, and recognizances; *debts* due on ſpecial contracts, as for rent, on bonds, covenants, &c. under ſeal; and laſtly, *debts* on ſimple contracts, as notes and verbal promiſes, and ſervants wages.

Debt, *Chirographary*, in the *French Law*, is that due by virtue of a note, or writing under one's hand, and not proved in judicature.

Debt, *Hypothecary*, is that due in virtue of ſome contract, or judgment.

Debt, *Prædiatory*, is that ariſing from an alienation of lands, &c. the whole purchaſe whereof has not been paid.

Debt, *Privileged*, is that which muſt be ſatisfied before all others; as, the king's tax, &c.

Debt, *National*. See Fund.

DEBTEE *Executor*. If a perſon debtor to another makes his creditor or *debtee* his executor, or if ſuch creditor obtain letters of adminiſtration to his debtor, he may retain ſufficient to pay himſelf before any other creditors whoſe debts are of equal degree. Blackſt Com. vol iii. p. 18.

DEBTOR, a perſon who owes ſomething to another: in oppoſition to creditor, which is he to whom it is owing.

DECACHORDON, in *Antiquity*, a muſical inſtrument of ten ſtrings, called by the Hebrews *haſur*, reſembling our harp, of a triangular figure, with a hollow belly, and ſounding from the lower part.

DECACTIS, in *Natural Hiſtory*, a name given by ſome to a kind of ſtar-fiſh, of the branched, or aſtrophyte kind, whoſe rays are ten in number, where they firſt part from the body, and each ſoon branches out into a number more.

DECADARCHUS, Δεκαδαρχος, among the Greeks, a commander of a party of ten men.

DECADE, a word uſed by ſome old writers for the number ten; and *decades*, for an enumeration by tens: the word is formed from the Latin *decas*, which is derived from a Greek word of the ſame import. The word has been more peculiarly appropriated to the number of books, q. d. *decades*, into which the Roman Hiſtory of Titus Livius is divided. Hence alſo came *decadal* arithmetic, the Decameron of Boccacio, &c.

DECAGON, a plain figure in geometry, having ten ſides and angles.

If all the ſides and angles be equal, it is called a regular *decagon*, and may be inſcribed in a circle.

The ſides of a regular *decagon* are, in power and length, equal to the greateſt ſegment of an hexagon inſcribed in the ſame circle, and cut according to extreme and mean proportion. See Extreme *and mean proportion*.

A fortification conſiſting of ten baſtions, is ſometimes called a *decagon*.

DECALITRON, among the *Ancients*, a piece of money uſed by the people of Ægina, Corinth, and Syracuſe, in value equal to $16\frac{2}{3}$ oboli of Athens.

DECALOGUE, the Ten Commandments of God, engraven on two tables of ſtone, and given to Moſes.

The word is Greek, compoſed of δεκα, *ten*, and λογος, *word*, q. d. *ten words*. Accordingly, the Jews call them עשרה דבורים, *the ten words*, which appellation is very ancient.

The Samaritans, both in their text and verſion, add after the ſeventeenth verſe of the twentieth chapter of Exodus, and after the twenty-firſt verſe of the fifth chapter of Deuteronomy, an eleventh commandment, to build an altar on mount Gerizzim, &c. But it is apparently an interpolation, to authoriſe their having a temple and an altar on that mountain; and to diſcredit, if poſſible, the temple at Jeruſalem, and the worſhip there performed. It muſt be added, however, that, though all, both Jews and Chriſtians, agree in the number of Ten Commandments,

ments, there is ſome difference as to the manner of dividing them.

The Talmudiſts, and Poſtellus after them, in his treatiſe De Phœnicum Literis, ſay, that the *Decalogue*, or Ten Commandments, were engraven quite through the tables which God gave to Moſes; but that nevertheleſs the middle of the ם *Mem* final, and of the ס *Samech*, remained miraculouſly ſuſpended without adhering to any thing. See the Diſſertation on the Samaritan Medals, printed at Paris in 1715. They add, that the *Decalogue* was written in letters of light, i. e. in luminous ſhining letters.

The *Decalogue* was originally delivered in two tables; one of which contains our duty to God, expreſſed in the four firſt commandments; and the ſecond, our duty to our neighbour, enforced in the ſix laſt. The church of Rome, for a very obvious reaſon, hath omitted the ſecond commandment in many of her books; and in order to preſerve the number complete, divided the laſt into two.

DECAMERIS, a term ſignifying a tenth part; uſed by Mr. Sauveur, and ſome other authors, to mark and meaſure the intervals of ſounds.

The word is formed of δεκα, *ten*, and μερις, *part.*

In Mr. Sauveur's ſyſtem, the *decameris* is the tenth part of the heptameris, which he makes the ſeventh part of the meris; and this is the forty-third part of the octave: ſo that the *decameris* is $\frac{1}{3010}$ of an octave. See Mem. Acad. Scienc. 1701, and 1707.

DECAMERON, from δεκα, *ten*, and ημερα, *day*; a work containing the actions or converſations of ten days. Boccacio's Decameron conſiſts of one hundred novels related in ten days.

DECAMP. When an army raiſes its camp, or breaks up from the place where it lay before, they ſay it is *decamped.*

DECAMYRON, in the *Medicinal Writings of the Ancients*, the name of a malagma or cataplaſm, conſiſting of ten different kinds of aromatics: theſe were the Indian leaf, maſtic, euphorbium, ſpikenard, adarce, ſtorax, pepper, ointment of nard, opobalſamum, and wax.

DECANDRIA, in *Botany*, the tenth claſs of plants, with hermaphrodite flowers, and ten ſtamina, or male parts in each. See *Tab. of Botany*, *Linnæan Syſtem.*

The word is formed of the Greek δεκας, *ten*, and ανηρ, *male.*

Of this claſs of plants there are five orders; viz. the *monogynia*, containing fifty-three genera; the *digynia*, comprehending twelve genera; the *trigynia*, eleven; the *pentagynia*, fourteen; and the *decagynia*, two genera.

DECANTATION, in *Chemiſtry*, the act of pouring off a liquor from the fæces, &c. by gently inclining the lip, or *canthus* of the veſſel; whence the word is derived. See CANTHUS.

DECANUS, among the Romans, an officer who had ten other officers, or perſons, under his charge; whence our Engliſh dean.

DECANUS, in *Aſtrology*, a title given to the god who preſided at any birth, ὁ ὡροσκοπος. See ASTROLOGY.

DECAPITE', in *Heraldry*. See DEFFAIT.

DECAPROTI, DECEMPRIMI, among the *Ancients*, were officers who gathered the tributes, or taxes.

The word comes from δεκα, *ten*, and πρωτος, *firſt*; probably becauſe the ten firſt, or principal perſons of each community, were choſen to make the levies.

The *decaproti* were obliged to pay for the dead; or, to anſwer to the emperor for the quota of ſuch as died, out of their own eſtates. Cicero, in his oration for Roſcius, calls them *decemprimi.*

DECASMUS, Δεκασμος, in *Antiquity*, the name of an action or proceſs among the Athenians, which was brought againſt any perſon who offered a bribe. They thought it not enough to puniſh the perſon receiving a bribe, but that the perſon who offered it ought to be puniſhed likewiſe. Pott. Archæol. Græc. lib. i. c. 23.

DECASTYLE, in the *Ancient Architecture*, a building with an ordonnance of ten columns in front. The temple of Jupiter Olympius was *decaſtyle.*

The word is formed of δεκα, and στυλος, *column.*

DECEIT, *Deceptio*, or *Dolus*, in *Law*, is uſed for any ſubtile, wily ſhift, or trick; to which may be referred all manner of craft, ſubtilty, guile, fraud, ſleight, cunning, covin, colluſion, and practice uſed to deceive another by any means.

Deceit is an offence both by common law and by ſtatute. All practices of defrauding, or endeavouring to defraud, another of his right, are puniſhable by fine and impriſonment, ſometimes pillory, &c. and there is a writ called *deceptione* that lies for one who receives injury, or damage, &c.

A writ of *deceit* lies againſt attornies, for loſſes ſuſtained by their default; alſo againſt bakers, brewers, and other artificers, for not ſelling good commodities, or refuſing to perform a bargain: in all which caſes they are by ſtatute liable to penalties in proportion to their offence.

DECEIVED, in the *Manege*, is uſed when a horſe upon a demi-volt of one or two treads, working, for inſtance, to the right, and not having yet finiſhed above half the demi-volt, is preſſed one time or motion forwards with the inner leg, and then is put to a repriſe upon the left, in the ſame cadence with which he began. He thus regains the place where the demi-volt had been begun to the right, and works to the left. A horſe may in this manner be *deceived* on any hand. Guillet, Gen. Dict. p. i. in voc.

DECEMBER, the laſt month of the year; wherein the ſun enters the tropic of Capricorn, and makes the winter ſolſtice.

In Romulus's year, *December* was the tenth month; whence the name, viz. from *decem*, *ten:* for the Romans began their year in March.

The month of *December* was under the protection of Veſta: Romulus aſſigned it thirty days; Numa reduced it to twenty-nine; which Julius Cæſar increaſed to thirty-one.

Under the reign of Commodus, this month was called, by way of flattery, *Amazonius*, in honour of a courteſan, whom that prince paſſionately loved, and had got painted like an *Amazon*; but it only kept the name during that emperor's life.

At the latter end of this month they had the *Juveniles ludi*, and the country people kept the feaſt of the goddeſs Vacuna in the fields, having then gathered in their fruits, and ſown their corn; whence ſeems to be derived our popular feſtival called *harveſt-home.*

DECEMPEDA, Δεκαπους, *ten-feet rod*; an inſtrument uſed by the ancients in meaſuring.

The *decempeda* was a rule, or rod, divided into ten feet; whence its name, from *decem*, *ten*, and *pes*, *pedis*, *foot.*

The foot was ſubdivided into twelve inches; and each inch into ten digits.

The *decempeda* was uſed both in meaſuring of land, like the chain among us; and by architects, to give the proper dimenſions and proportions to the parts of their buildings, which uſe it ſtill retains. Horace, lib. ii. od. 15. blaming the magnificence and delicacy of the buildings of his time, obſerves, that it was otherwiſe in the times of Romulus and Cato; that in the houſes of private perſons there were not then known any porticoes meaſured out with the *decempeda*, nor turned to the north to take the cool air.

DECEM-TALES, in *Law*, a writ that iſſues directed to the ſheriff, whereby he is commanded to make a ſupply of jurymen, when a ſufficient number does not appear on a trial at bar.

DECEMVIRI, an order of annual magiſtrates among the Romans, created with a ſovereign power to draw up and make laws for the people; thus called, becauſe their number was ten.

To the *decemviri* was given all the legiſlative authority ever enjoyed by the kings, and after them by the conſuls. One among them had all the enſigns and honours of the function; and the reſt had the like in their turn, during the year of their *decemvirate.*

The *decemviri* were thoſe who drew up the laws of the Twelve Tables, called thence *leges decemvirales*, which for a conſiderable time were the whole of the Roman law.

In the year 302, the conſuls Appius Claudius Craſſinius, and T. Genucius Augurinus, being obliged to abdicate, the firſt *decemviri* were created; in the year following, ten new ones were appointed to ſucceed them; and in the year 304, another ſet were to have been choſen, but that the people roſe, made them lay down, and reſumed the conſuls. The exceſſive debauchery of Appius Claudius Craſſinius, one of the conſuls, who was firſt obliged to abdicate, and who had been choſen firſt *decemvir* three times, was the principal cauſe of all this. Cicero De Finib. lib. i. Livy, lib. iii. Halicarnaſſeus, lib. x. and Florus, lib. i. c. 24. relate the hiſtory.

The *decemviral* adminiſtration, however, it is to be obſerved, had not its firſt riſe at the time when the authority of the conſuls was devolved into the hands of the *decemviri:* for, during the interregnum that enſued after the death of Romulus, the management of affairs, which the ſenate then took upon them, is called by Halicarnaſſeus, lib. ii. *decemviral*, becauſe the ſenators, divided into tens, commanded each in their turn: that is, one of each ten, for five days ſucceſſively, having the faſces, lictors, &c. like the kings.

There were alſo military *decemviri*; and on divers emergencies, *decemviri* were created to manage and regulate certain affairs, after the ſame manner as boards of commiſſioners are appointed among us. Thus we find *decemviri* for conducting colonies; *decemviri* to prepare and preſide at feaſts in honour of the gods; *decemviri* to take care of the ſacrifices; and *decemviri* to keep the Sibyls books.

Sometimes, in lieu of *decemviri*, they only created *ſeptemviri*, or *triumviri*, or *duumviri*, &c.

DECENNALIA, in *Antiquity*, feaſts which the Roman emperors held every tenth year of their reign, with ſacrifices, games, largeſſes to the people, &c.

Auguſtus was the author of this cuſtom, which was afterwards imitated by his ſucceſſors.

At the ſame time they likewiſe offered VOWS for the emperor, and the perpetuity of his empire, called *vota decennalia*.

From the time of Antoninus Pius, we find theſe ceremonies marked on medals. PRIMI DECENNALES. SECUNDI DECENNALES. VOTA SOL. DECEN. II. VOTA SVSCEP. DECENN. III.

Theſe vows muſt have been made at the beginning of every tenth year; for on a medal of Pertinax, who ſcarce reigned four months, we find VOTA DECENN. & VOTIS DECENNALIBUS.

Struvius is of opinion, that theſe vows took place of thoſe which the cenſor uſed to make in the times of the republic, for the proſperity and preſervation thereof. In effect, they were not only made in behalf of the prince, but alſo of the ſtate, as may be obſerved from Dion. lib. viii. and Pliny the younger, lib. x. ep. 101.

Auguſtus's aim in eſtabliſhing the *decennalia*, was to preſerve the empire, and the ſovereign power, without offence or reſtraint to the people. For, during the celebration of this feaſt, that prince uſed to ſurrender up all his authority into the hands of the people, who, filled with joy, and charmed with the goodneſs of Auguſtus, immediately delivered it to him back again.

DECENNARY, *Decennaria*, the limits or compaſs of ten *friburghs*. See DECINERS, and TITHING.

DECEPTIONE, in *Law*, a writ which properly lies for one that receives harm or damage, by him that does any thing deceitfully in the name of another.

This writ is either *original* or *judicial*. Old. Nat. Br. fol. 50. Fitz. Nat. Br. fol. 95. See Reg. of Writs, fol. 112. and Reg. Judicial.

DECIDUOUS, in the general, expreſſes a thing apt and ready to fall.

In ſome plants, the perianthium or calyx is *deciduous* with the flower, that is, falls off from the plant with it; in others, not.

In ſome, the leaves are *deciduous*, or fall off in autumn; in others, they remain all the winter.

DECIES *tantum*, a writ that lies againſt a juror, who hath taken money for giving his verdict.

It is ſo called from its effect, which is to recover ten times as much as he took.

It alſo lies againſt embracers that procure ſuch an inqueſt. See EMBRACEOR.

DECIL, *Decilis*, in *Aſtronomy*, an aſpect or poſition of two planets, when they are diſtant from each other a tenth part of the zodiac, i. e. thirty-ſix degrees. This is one of the new aſpects invented by Kepler.

DECIMAL *arithmetic*, the art of computing by *decimal* fractions, firſt invented by Johannes Regiomontanus, about the year 1464, and uſed by him in the conſtruction of his tables of ſines; who thus introduced *decimal* parts in the room of SEXAGESIMALS. They were alſo uſed by Ramus, in his Arithmetic, written in 1550; and before his time by our countryman Bucklæus, and about the ſame time by Record. But the firſt perſon who wrote an expreſs treatiſe on *decimals*, was Stevinus, about the year 1582.

DECIMAL *fractions*, are thoſe whoſe denominator is 1, with one or more cyphers; as, 10, 100, 1000, 10000, &c. Thus, $\frac{5}{10}$, $\frac{6}{100}$, $\frac{7}{1000}$, &c. are *decimal fractions*.

In the writing of *decimal fractions* we uſually omit the denominator, as only conſiſting of unity with cyphers annexed; and in lieu thereof, a point, or comma, called the *ſeparatrix*, is prefixed to the numerator. Thus, $\frac{5}{10}$ is written ,5; $\frac{46}{100}$, ,46. So ,125 expreſſes a hundred and twenty-five parts of any thing ſuppoſed to be divided into a thouſand parts.

As cyphers on the right hand of integers do increaſe their value *decimally*; as 2, 20, 200, &c. ſo, when ſet on the left hand of *decimal fractions*, they decreaſe the value *decimally*; as, 5, 05, 005, &c. when ſet on the left hand of integers, or on the right hand of *decimals*, they ſignify nothing, but only to fill up places; thus, ,5000 denotes only five tenths, and 0005. is only five units.

To reduce any vulgar fraction, as ſuppoſe $\frac{5}{8}$, to a *decimal fraction* of the ſame value; add cyphers at pleaſure to the numerator, and divide by the denominator: as thus,

8)5000(

.625

And therefore $\frac{625}{1000}$, or ,625, is a *decimal* of the ſame value with the former fraction $\frac{5}{8}$.

Some vulgar fractions can never be reduced into *decimals* without defect; as $\frac{1}{3}$, &c. in thoſe caſes, the greater number of places the *decimals* are continued to, the more is the defect diminiſhed, in a tenfold proportion. Thus, $\frac{1}{3}$ expreſſed in *decimals* is ,333333 *ad infinitum*.

Such *decimals* are very properly called circulating *decimals*, becauſe of the continual return of the ſame figures; and they may be called indeterminate or infinite *decimals*, by way of diſtinction from thoſe where the reduction leaves no remainder, and which are therefore called finite or determinate *decimals*. See REPETENDS.

By the rule above given, the parts of any integer may be eaſily reduced into *decimals*. Thus, 5*s.* is $\frac{5}{20}$, or ,25 of a pound ſterling; 6*d.* is $\frac{6}{240}$, or $\frac{1}{40}$, i. e. ,025 of a pound; and 5*s.* 6*d.* is ,25+,025=,275*l.* Or the *decimal* of a mixed number may be readily obtained by reducing the number of the loweſt ſpecies to the *decimal* of the next above; add to this the number of that ſpecies, if there be any, and reduce the ſum to the next higher ſpecies, adding to the number found the number of that ſpecies given in the queſtion; and thus proceed till you arrive at the propoſed integer: 4*s.* 7*d.* 3*f.* are equal to ,2322916*l.* for 3*f.* is $\frac{3}{4}$, or ,75*d.* to which add 7*d.* and 7,75 is equal to $\frac{7,75}{12}$, or ,645833 &c. *s.* to which add 4*s.* and 4,645833 &c. is equal to $\frac{4,645833}{20}$, or ,23229166 &c. *l.* The ſame proceſs may be eaſily applied to the *decimal* parts of any other integer, as weights, meaſures, and time.

The common operations in *decimals* are performed as in the vulgar rules, regard being had only to the particular notation, to diſtinguiſh the integral from the fractional part of a ſum.

In Addition and Subtraction of DECIMALS; the points being all placed under each other, the figures are to be added, and ſubtracted, as in common arithmetic; and when the operation is done, ſo many figures of the ſum, or the remainder, are to be noted for *decimals*, as there are places of *decimals* in the greateſt given numbers. An example will make this clear.

Addition of *Decimals*.

,43791	59 ,271
,792	15 ,040
,6124	3 ,791
,053	12 ,009
,10	7 ,5
,2	
2,19531	97 ,611

Subtraction.

From	67 ,9
Take	29 ,8754
Rem.	38 ,0246
From	25 ,1462
Take	13 ,07
Rem.	12 ,0762

For Multiplication of DECIMALS, obſerve to cut off juſt ſo many *decimal* parts from the product as there are *decimals* in both factors. The work is the ſame as in integers. Thus,

Multiplication of *Decimals*.

,1472	,365	3,650
,175	,122	621
7360	730	3 650
10304	730	73 00
1472	365	2190 0
,0257600	,044530	2266,650

Note. In the firſt and ſecond examples, the products only amount to ſix and five places; for which reaſon cyphers are prefixed, to make up the number of *decimal* places in the two factors reſpectively.

Hence, to multiply a *decimal* by unit with any number of cyphers, is only to remove the ſeparatrix ſo many places to the right as there are cyphers annexed.

In Diviſion of DECIMALS, proceed in all reſpects as in dividing of integers; and, when the operation is done, mark as many places in the quotient for *decimals*, as, with the number of *decimals* in the diviſor, are equal to the *decimal* places of the dividend.

```
,22),8030(3,65        22)8,030(,365
      66                  6 6
     ———                 ————
     143                  1 43
     132                  1 32
     ———                 ————
    .110                  1 10
     110                  1 10
     ———                 ————
     ..0                  . . 0

22),8030(,0365        73,2)83,219(1,13
    66                     73 2
    ———                   ————
    143                   100 1
    132                    73 2
    ———                   ————
     110                   26 99
     110                   21 96
     ———                  —————
     ...                    5 03
```

Hence, to divide a *decimal* by unit with any number of cyphers, is only to remove the ſeparatrix ſo many places to the left as there are cyphers annexed.

But there are certain caſes in diviſion of *decimals*, which require ſome farther management: as, firſt, where the diviſor is a *decimal fraction*, and the dividend is an integer; add, or annex, as many or rather more cyphers to the dividend, than there are places in the diviſor: thus, ,365)22,0000(60,2. For there being three places of *decimals* in the diviſor, and four in the dividend, there will be but one in the quotient. Secondly, Where the diviſor is a mixed number, and the dividend a whole number, add at leaſt as many cyphers to the dividend, as there are places in the diviſor: thus, 3,65)22,0000(6,02. Thirdly, Wherever the diviſor is bigger than the dividend, annex cyphers to the latter: thus, 36,5)22,0000(,602.

For the Valuation of DECIMALS; multiply the given *decimal* by the number of parts contained in the propoſed integer, proceeding from the higher to the lower if there be a remainder, and you will have the value required at the left of the ſeparatrix. Thus, ,785 *l.* is equal to 15 *s.* 8 *d.* 1,6 *f.*

```
    ,785              ,78 of a yard = 2 feet,
     20                        4,08 inches.
   ——————
s. 15,700             ,78
       12               3
   ——————             ————
d.  8,400          f. 2,34
        4               12
   ——————             ————
f.  1,600         in. 4,08
```

DECIMAL *ſcales*, in the general, denote any ſcales divided *decimally*; but particularly certain ſcales of money, weights, and meaſures, made from tables ſo called, to expedite *decimal* arithmetic, by ſhewing by inſpection the *decimal fraction* of any part of money, weight, or meaſure. See SCALE.

DECIMATION, a puniſhment which the Romans uſed to inflict on the ſoldiers who had quitted their poſt, raiſed a mutiny in the camp, behaved themſelves cowardly in the fight, or otherwiſe failed in their duty; for which every tenth man was put to death as an example to the reſt.

The manner of *decimating* was thus: the general aſſembled the whole camp; then the tribune brought to him thoſe that were guilty, and impeached, and reproached them with their cowardly actions, and baſeneſs, in the preſence of the whole army; then putting their names into an urn, or a helmet, as many were drawn out as made the tenth part of the whole number, and theſe were put to the ſword, and the others ſaved.

This was called *decimare*, a word of the ancient Roman militia, who, to puniſh whole legions, when they had failed in their duty, ſometimes alſo made every tenth ſoldier draw lots, and put him to death for an example to the others.

As the Romans had their *decimatio*, they had alſo the *viceſimatio*, and even *centeſimatio*, when only the twentieth or hundredth man ſuffered by lot.

This practice has been occaſionally recurred to in modern times: as, particularly, in France, for the puniſhment of the garriſon of Treves in 1675, who capitulated and ſurrendered that place in oppoſition to the remonſtrance of the Marſhal de Crequi, who commanded there.

DECIMÆ. See TYTHES.

DECIMIS *ſolvendis pro poſſeſſionibus alienigenarum*, a writ, yet extant in the regiſter, which lay againſt thoſe that had farmed the priors aliens lands of the king, for the rector of the pariſh, to recover his tithe of them. Reg. of Writs, fol. 179.

DECINERS, DECENNIERS, or DOZINERS, derived from the French *dizeine*, i. e. *decas*, *ten*; in the ancient monuments of our law, are ſuch as were wont to have the overſight and check of the friburghs, for maintenance of the king's peace; the limits of whoſe juriſdiction were called *decenna*, and *dozein*.

They ſeem to have had very large authority in the Saxon times; taking cognizance of cauſes within their circuit, and redreſſing wrongs by way of judgment. Thus Briton, "We will that all thoſe who are fourteen years old "ſhall make oath, that they will be ſufficient and loyal "to us; and neither be felons, nor aſſenting to felons: "and we will, that all profeſs themſelves of this or that "*dozein*, and make or offer ſurety of their behaviour by "thoſe or thoſe *doziners*, except religious perſons, clerks, "knights eldeſt ſons, and women."

A *dozein* now ſeems to be no other than a leet: for in leets only this oath is adminiſtered by the ſteward, and taken by ſuch as are twelve years old and upwards.

DECIPHERING, or DECYPHERING, the art, or act, of finding the alphabet of a *cipher*, or of explaining a letter written in CIPHER.

Every language has peculiar rules of *deciphering*; which depend, not only on the form of its characters, but likewiſe on the place, order, combination, frequency, and number of the letters. The general theory of this art may be comprized in the following propoſitions: one word is to be compared with another, in order to obſerve both their reſemblance and their difference: no word can be without a vowel: a word of one letter is always a vowel, or a conſonant with an apoſtrophe: the vowels recur much more frequently than the conſonants: double vowels may be pronounced at the beginning of a word, but not double conſonants; and double characters in this place are always vowels: ſhort words of two or three letters have two or three vowels, or one or two conſonants; and in words of this kind the vowels are moſt eaſily diſcovered: when double conſonants are preceded by a ſingle letter, that letter is a vowel: one vowel is often joined with another in words abounding with diphthongs: the conſonant, that always precedes or follows double conſonants, is one of the liquids *l*, *m*, *n*, *r*: the conſonant *q* is always followed by the vowel *u*, though *u* may be joined with other letters. When two different characters occur, the latter of which is often joined with various letters, and the former never found either by itſelf, or followed by any other letter, thoſe two are *qu*; which letters are almoſt always followed by a vowel: one vowel and one conſonant recur more frequently than others. The particular theory of *deciphering* depends on the peculiar ſtructure of different languages to which it is applied. The curious, who deſire farther information on this ſubject, may conſult the Art of *Deciphering* deduced from principles, and explained by examples in the German, Dutch, Latin, Engliſh, French, Italian, and Greek languages, by David Arnold Conradus, in the twelfth volume of the Gentleman's Mag. for 1742. See alſo M. s'Graveſande Introd. ad Philoſophiam, cap. xxxv. Leyden, 1737.

B. Porta publiſhed a treatiſe on this ſubject; and a collection of letters written in cipher, and *deciphered* by Dr. Wallis, are now in the Library of Oxford.

DECK *of a ſhip*, from *decker*, Dan. *to cover*; a kind of planked floor, connecting the ſides, and ſerving as different platforms to ſupport the artillery, to lodge the men, and to preſerve the cargo in merchant-veſſels.

A ſhip is ſaid to have two or three *decks*, when it contains two or three ſtories. Ships of the firſt and ſecond rates are furniſhed with three whole *decks*, reaching from the ſtem to the ſtern, beſides a fore-caſtle and a quarter-*deck*, which extends from the ſtern to the main-maſt. There is alſo another *deck* above the hinder part of the quarter-*deck*, called the poop, and ſerving as a roof for the captain's cabin or couch. Inferior ſhips of the line of battle have two *decks* and a half; and frigates, ſloops, &c. have one gun-*deck* and a half, with a ſpare *deck* below to lodge the crew. The frame of the lower *deck* is ſtronger than that of the others, becauſe ſhips are broader at the lower *deck* than at the next above it, and it alſo bears the heavieſt cannon.

The *decks* are formed and ſuſtained by the BEAMS, the CLAMPS, the WATER-WAYS, the CARLINGS, the LEDGES, the KNEES, and two rows of ſmall pillars, called STANCHIONS.

DECK, *Fluſh*, is one that lies even in a right line, fore and aft, from ſtem to ſtern.

The ſeamen ſay, *a deck lies cambring*, when it doth not lie level, but higher in the middle than at either end. A cambered *deck* is by no means proper for a man of war. Alſo, if the ſhip's keel be bent in the middle upwards (which may happen from her lying a-ground on a place, where neither her aft nor fore-part touch it, and from many other reaſons taken from her make), they ſay, *ſhe is camber-keeled.*

Deck, *Half*, is a ſpace under the quarter-*deck* of a ſhip of war, between the foremoſt bulk-head of the ſteerage, and the fore-part of the quarter-*deck*. In the Northumberland colliers, the ſteerage is called the *half-deck*, and is uſually the habitation of the ſhip's crew.

Deck, a *Rope*, is that made of cordages interwoven, and ſtretched over a veſſel that has no *deck*, through which it is eaſy to annoy the enemy who comes to board her, and has leaped thereon. Theſe are little uſed but in merchant-veſſels, to defend them from the corſairs.

DECLAMATION, a diſcourſe or ſpeech made in public, in the tone and manner of an oration.

Among the Greeks, *declamation* was the art of ſpeaking indifferently on all ſubjects, and on all ſides of a queſtion; of making a thing appear juſt that was unjuſt; and of triumphing over the beſt and ſoundeſt reaſons.

Such ſort of *declamations*, M. de St. Evremond obſerves, were fit only to corrupt the mind, by accuſtoming men to cultivate their imagination rather than to form their judgment, and to ſeek for veriſimilitudes to impoſe upon, rather than ſolid reaſons to convince, the underſtanding.

It is ſaid that a certain orator, named Plotius Gallus, firſt introduced the uſe of *declamations* at Rome. In this way Cicero formed himſelf for eloquence. The term frequently occurs both in Horace and Juvenal.

Among us, *declamation* is reſtrained to certain exerciſes, which ſcholars perform, to teach them to ſpeak in public.

We ſay, a *declamation* againſt Hannibal, againſt Pyrrhus, the *declamation* of Quintilian, &c.

In the colleges of the Jeſuits, *declamations* are little theatrical or dramatic performances, conſiſting of a few ſcenes not divided into acts, rehearſed by the ſtudents by way of exerciſe, and to form them for ſpeaking in public. Such *declamations* are the moſt uſeful exerciſes performed in the colleges.

DECLARATION, in the *Cuſtom-Houſe and Commerce of France*, contains a particular account or invoice of what is contained in the bales or caſes, brought to the officer for entrance inward or outward.

Declaration, in *Law*, the act of ſhewing in writing the cauſe of complaint of the demandant, or plaintiff, againſt the defendant, where he is ſuppoſed to have received ſome wrong.

This ought to be plain and certain, both becauſe it impeacheth the defendant, and alſo compels him to anſwer thereto. It muſt alſo ſet forth the plaintiff's and defendant's names, the nature and cauſe of the action, &c. and the damage received. See **Count.**

Declaration *of fidelity*, is uſed for a confeſſion, which the Quakers, who ſcruple taking the oaths of ſupremacy, &c. are obliged to make and ſubſcribe in lieu thereof.

Its tenor is a ſolemn promiſe to be true and faithful to king George; with a deteſtation and horror of that damnable poſition, that princes excommunicated by the pope, or any other power, may be depoſed or murdered; and a *declaration*, that no foreign prince, or power, has any right, juriſdiction, or authority, in this kingdom.

There is alſo a *declaration* againſt tranſubſtantiation made and ſubſcribed by thoſe who qualify for offices; 25 Car. II. c. 2. and a *declaration* againſt popery to be made and ſubſcribed by the members of both houſes of parliament, by diſſenters qualified according to the toleration act, &c. &c. in which they renounce tranſubſtantiation, the invocation of ſaints and of the Virgin Mary, and the ſacrifice of the maſs, and every kind of evaſion and mental reſervation, as well as diſpenſation or abſolution. 30 Car. II. ſtat. 2. c. 1.

Declarations, *Clerk of the*. See **Clerk.**

DECLARATORY *part of a Law*, is that by which the rights to be obſerved, and the wrongs to be avoided, are clearly defined and laid down. This depends not ſo much on the law of revelation or of nature, as on the wiſdom and will of the legiſlator.

Declaratory *part of a Statute*, is that which relates to obſolete or diſputable cuſtoms; in which caſe the parliament has thought proper, *in perpetuum rei teſtimonium*, and for avoiding all doubts and difficulties, to *declare* what the common law is and ever hath been.

DECLENSION, in *Grammar*, the inflexion of a noun, according to its diverſe caſes. See **Case, Nominative,** &c.

Mr. Harris obſerves, that the Peripatetics likened the noun in its primary and original form, to a perpendicular line; and the variations from the nominative were conſidered as if that line *fell* from its perpendicular to an oblique poſition: and hence theſe variations were called πτωσεις, *caſus*, *caſes* or *fallings*. Grammarians were thus led to call the method of enumerating the various caſes of a noun, κλισις, *declinatio*, *a declenſion*; becauſe it was a ſort of progreſſive deſcent from the noun's upright form, through its various declining forms. Hermes, p. 277, 278.

The *declenſion* of nouns is a different thing in the modern languages, which have not properly any caſes, from what it is in the ancient Greek and Latin, which have.

Declenſion, in languages wherein the nouns admit of changes, whether in the beginning, middle, or end, is properly the expreſſing or reciting all thoſe changes in a certain order, and by certain degrees, called *caſes*.

In languages wherein the nouns do not admit of changes in the ſame number, *declenſion* is the expreſſing of the different ſtates or habitudes a noun is in, and the different relations it has: which difference of relations is marked by particles called *articles*; as, *a*, *the*, *of*, *to*, *from*, &c.

Declension *of a diſeaſe*, is when it is paſt its height, and the ſymptoms abate.

DECLINATION, in *Aſtronomy*, the diſtance of the ſun, a ſtar, planet, or other point of the ſphere of the world, from the equator, either northward or ſouthward. It is the ſame with **latitude** in geography.

Declination is either *real* or *apparent*, according as the real or apparent place of the point is conſidered.

The *declination* is an arch of a great circle, as GS (*Tab. Aſtronomy, fig.* 4.), intercepted between a given point, as S, and the equator AQ, and perpendicular to the ſame. Conſequently, the circle, by whoſe arch the *declination* GS is meaſured, paſſes through the poles of the world. The *declination* of a ſtar, &c. is found by firſt obſerving the altitude of the pole, as PR (*fig.* 5.). This ſubtracted from 90° gives the height of the equator AH. Then, the meridian altitude of the ſtar HD being obſerved, if it be greater than the altitude of the equator AH, the latter ſubtracted from the former leaves the *declination* northward AD: or, if the altitude of the ſtar HT be leſs than that of the equator HA, the former ſubtracted from the latter leaves the *declination* ſouthward TA.

E. gr. Tycho at Uraniſbourg obſerved the meridian altitude of the Cauda Leonis:

	HD	50°	59′	0″
Altitude of equat.	HA	34	5	20
Declinat. therefore,	AD	16	53	40

If the ſtar be in the quadrant ZR, then the leaſt altitude MR ſubtracted from the altitude of the pole PR leaves the diſtance from the pole PM; which ſubtracted again from the quadrant PQ, leaves the *declination* MQ. E. gr. M. Couplet obſerved PM 2° 18′ 50″, which ſubtracted from 90° leaves MQ 87° 41′ 10″. And by this method are conſtructed the tables of *declination* of the fixed ſtars given us by Ricciolus and Dechales.

In the conſtruction of tables of *declination* of the ſun, planets, and ſtars, regard ſhould be had to **refraction, aberration, nutation,** and **parallax.**

By comparing the ancient obſervations with the modern, it appears, that the *declination* of the fixed ſtars is variable; and that differently, in different ſtars. For in ſome it increaſes, and in others decreaſes, and that in different quantities.

It has been greatly diſputed among the later mathematicians, whether or no the *declination* and the obliquity of the ecliptic be variable. See **Ecliptic,** and **Obliquity.**

A TABLE SHEWING THE SUN's PLACE AND DECLINATION.

January.

Days.	Sun's Pl.			Sun's Dec.		
	S.	°	′		°	′
1	♑	11	5	S.	23	1
2		12	6		22	56
3		13	8		22	50
4		14	9		22	44
5		15	10		22	37
6		16	11		22	30
7		17	12		22	22
8		18	13		22	14
9		19	14		22	6
10		20	16		21	57
11		21	17		21	48
12		22	18		21	38
13		23	19		21	28
14		24	20		21	17
15		25	21		21	6
16		26	22		20	55
17		27	24		20	43
18		28	25		20	31
19		29	26		20	18
20	♒	0	27		20	5
21		1	28		19	52
22		2	29		19	39
23		3	30		19	24
24		4	31		19	11
25		5	32		18	55
26		6	33		18	40
27		7	34		18	25
28		8	35		18	9
29		9	35		17	53
30		10	36		17	37
31		11	37		17	20

February.

1	♒	12	38	S.	17	3
2		13	39		16	45
3		14	40		16	28
4		15	41		16	10
5		16	41		15	52
6		17	42		15	33
7		18	43		15	15
8		19	43		14	56
9		20	44		14	36
10		21	45		14	17
11		22	45		13	57
12		23	46		13	37
13		24	46		13	17
14		25	47		12	57
15		26	47		12	37
16		27	48		12	16
17		28	48		11	55
18		29	48		11	34
19	♓	0	49		11	12
20		1	49		10	51
21		2	50		10	29
22		3	50		10	7
23		4	50		9	45
24		5	51		9	23
25		6	51		9	1
26		7	51		9	38
27		8	51		8	16
28		9	51		8	53

N. ſignifies North Decl. and S. South Decl.

March.

1	♓	10	52	S.	7	30
2		11	52		7	7
3		12	52		6	45
4		13	52		6	21
5		14	52		5	58
6		15	52		5	35
7		16	51		5	12
8		17	51		4	49
9		18	51		4	25
10		19	51		4	2
11		20	51		3	38
12		21	50		3	15
13		22	50		2	51
14		23	50		2	27
15		24	49		2	4
16		25	49		1	40
17		26	49		1	16
18		27	48		0	53
19		28	48		0	29
20		29	47		0	5
21	♈	0	47	N.	0	19
22		1	46		0	42
23		2	46		1	6
24		3	45		1	30
25		4	44		1	53
26		5	43		2	16
27		6	43		2	40
28		7	42		3	4
29		8	41		3	27
30		9	40		3	50
31		10	39		4	13

April.

Days.	Sun's Pl.			Sun's Dec.		
	S.	°	′		°	′
1	♈	11	38	N.	4	37
2		12	37		5	0
3		13	36		5	23
4		14	35		5	45
5		15	34		6	8
6		16	33		6	31
7		17	31		6	53
8		18	30		7	16
9		19	29		7	38
10		20	28		8	1
11		21	27		8	23
12		22	25		8	44
13		23	24		9	6
14		24	23		9	28
15		25	21		9	49
16		26	20		10	11
17		27	18		10	32
18		28	17		10	53
19		29	15		11	14
20	♉	0	14		11	34
21		1	12		11	55
22		2	11		12	15
23		3	9		12	35
24		4	7		12	55
25		5	6		13	15
26		6	4		13	34
27		7	2		13	54
28		8	0		14	12
29		8	59		14	31
30		9	57		14	50

May.

1	♉	10	55	N.	15	8
2		11	53		15	26
3		12	51		15	43
4		13	49		16	1
5		14	47		16	18
6		15	45		16	35
7		16	43		16	52
8		17	41		17	8
9		18	39		17	24
10		19	36		17	40
11		20	34		17	55
12		21	32		18	11
13		22	30		18	26
14		23	28		18	40
15		24	25		18	55
16		25	23		19	9
17		26	21		19	22
18		27	19		19	36
19		28	16		19	49
20		29	14		20	1
21	♊	0	11		20	14
22		1	9		20	26
23		2	7		20	37
24		3	4		20	49
25		4	2		21	0
26		4	59		21	10
27		5	57		21	20
28		6	54		21	30
29		7	52		21	40
30		8	49		21	49
31		9	47		21	58

June.

1	♊	10	44	N.	22	6
2		11	41		22	14
3		12	39		22	21
4		13	36		22	28
5		14	34		22	35
6		15	31		22	42
7		16	28		22	47
8		17	26		22	53
9		18	23		22	58
10		19	20		23	3
11		20	18		23	8
12		21	15		23	12
13		22	12		23	15
14		23	9		23	18
15		24	7		23	21
16		25	4		23	23
17		26	1		23	25
18		26	58		23	26
19		27	56		23	28
20		28	53		23	29
21		29	50		23	29
22	♋	0	47		23	29
23		1	45		23	28
24		2	42		23	27
25		3	39		23	26
26		4	36		23	24
27		5	33		23	22
28		6	31		23	19
29		7	28		23	16
30		8	25		23	13

July.

Days.	Sun's Pl.			Sun's Dec.		
	S.	°	′		°	′
1	♋	9	22	N.	23	9
2		10	19		23	5
3		11	16		23	0
4		12	14		22	55
5		13	11		22	50
6		14	8		22	44
7		15	5		22	38
8		16	1		22	31
9		16	59		22	24
10		17	56		22	17
11		18	54		22	9
12		19	51		22	1
13		20	49		21	52
14		21	46		21	43
15		22	43		21	34
16		23	40		21	24
17		24	38		21	14
18		25	35		21	4
19		26	32		20	53
20		27	29		20	42
21		28	27		20	30
22		29	24		20	19
23	♌	0	21		20	7
24		1	19		19	54
25		2	16		19	41
26		3	13		19	28
27		4	11		19	15
28		5	8		19	1
29		6	6		18	47
30		7	3		18	33
31		8	0		18	18

Auguſt.

1	♌	8	58	N.	18	3
2		9	55		17	48
3		10	53		17	32
4		11	50		17	16
5		12	48		17	0
6		13	45		16	44
7		14	43		16	27
8		15	41		16	10
9		16	38		15	53
10		17	36		15	35
11		18	33		15	18
12		19	31		15	0
13		20	29		14	41
14		21	26		14	23
15		22	24		14	4
16		23	22		13	45
17		24	20		13	26
18		25	17		13	7
19		26	15		12	47
20		27	13		12	28
21		28	11		12	8
22		29	9		11	47
23	♍	0	7		11	27
24		1	5		11	7
25		2	3		10	46
26		3	1		10	25
27		3	59		10	4
28		4	57		9	43
29		5	55		9	22
30		6	53		9	0
31		7	51		8	38

September.

1	♍	8	49	N.	8	17
2		9	47		7	55
3		10	46		7	32
4		11	44		7	10
5		12	42		6	48
6		13	40		6	26
7		14	39		6	3
8		15	37		5	41
9		16	35		5	18
10		17	34		4	55
11		18	32		4	32
12		19	31		4	9
13		20	29		3	47
14		21	28		3	23
15		22	26		3	0
16		23	25		2	37
17		24	24		2	14
18		25	22		1	51
19		26	21		1	27
20		27	20		1	4
21		28	19		0	40
22		29	17		0	17
23	♎	0	16	S.	0	7
24		1	15		0	30
25		2	14		0	53
26		3	13		1	17
27		4	12		1	40
28		5	11		2	4
29		6	10		2	27
30		7	9		2	51

October.

Days.	Sun's Pl.			Sun's Dec.		
	S.	°	′		°	′
1	♎	8	8	S.	3	14
2		9	7		3	37
3		10	7		4	1
4		11	6		4	24
5		12	5		4	47
6		13	4		5	10
7		14	4		5	33
8		15	3		5	56
9		16	3		6	20
10		17	2		6	42
11		18	1		7	5
12		19	1		7	28
13		20	0		7	50
14		21	0		8	13
15		22	0		8	35
16		23	0		8	57
17		23	59		9	19
18		24	59		9	41
19		25	59		10	3
20		26	58		10	25
21		27	58		10	46
22		28	58		11	8
23		29	58		11	29
24	♏	0	58		11	50
25		1	58		12	11
26		2	58		12	31
27		3	58		12	52
28		4	58		13	12
29		5	58		13	32
30		6	58		13	52
31		7	58		14	11

November.

1	♏	8	58	S.	14	31
2		9	58		14	50
3		10	59		15	9
4		11	59		15	28
5		12	59		15	46
6		13	59		16	4
7		15	0		16	22
8		16	0		16	39
9		17	0		16	57
10		18	1		17	14
11		19	1		17	30
12		20	2		17	47
13		21	2		18	3
14		22	3		18	19
15		23	4		18	34
16		24	4		18	49
17		25	5		19	4
18		26	5		19	19
19		27	6		19	33
20		28	7		19	47
21		29	7		20	0
22	♐	0	8		20	13
23		1	9		20	26
24		2	10		20	38
25		3	11		20	50
26		4	11		21	1
27		5	12		21	12
28		6	13		21	23
29		7	14		21	33
30		8	15		21	43

December.

1	♐	9	16	S.	21	53
2		10	17		22	2
3		11	18		22	11
4		12	19		22	19
5		13	20		22	27
6		14	22		22	34
7		15	23		22	41
8		16	24		22	47
9		17	25		22	53
10		18	26		22	59
11		19	27		23	4
12		20	28		23	8
13		21	29		23	12
14		22	30		23	16
15		23	31		23	19
16		24	32		23	22
17		25	33		23	25
18		26	34		23	21
19		27	35		23	28
20		28	36		23	29
21		29	37		23	29
22	♑	0	38		23	29
23		1	39		23	28
24		2	40		23	27
25		3	42		23	26
26		4	43		23	24
27		5	44		23	21
28		6	45		23	19
29		7	46		23	15
30		8	48		23	11
31		9	49		23	7

This table was calculated by Mr. Ferguſon for the noon of every day of the ſecond year after leap-year, on the meridian of Greenwich; which is a mean between thoſe of leap-year itſelf and the firſt and third years after. See a table of *declination*, &c. annually publiſhed in the *Nautical* Almanack.

Declination, *Circle of*, is a great circle of the ſphere paſſing through the poles of the world; and on which the *declination* of a ſtar is meaſured: ſuch is P D G K, paſſing through the poles P and K, *fig.* 4.

Declination, *Parallax of*, is an arch of the circle of *declination*, whereby the parallax of the altitude increaſes or diminiſhes the *declination* of a ſtar.

Declination, *Refraction of the*, an arch of the circle of *declination*, whereby the *declination* of a ſtar is increaſed or diminiſhed by means of the refraction.

Declination *of the needle*, or *compaſs*, is its variation from the true meridian.

Declination *of a vertical plane*, or *wall*, in *Dialling*, is an arch of the horizon, comprehended either between the plane, and the prime vertical circle, if you account it from eaſt to weſt; or between the meridian and the plane, if you account it from north to ſouth.

There are many ways given by authors for finding the *declination* of planes: the moſt practicable way is by a *declinator*.

DECLINATOR, or **Declinatory**, an inſtrument in dialling, whereby the declination, inclination, and reclination of planes is determined.

Its ſtructure is as follows: on a ſquare wooden board A B C D (*Tab. Dialling*, *fig.* 1.) deſcribe a ſemicircle A E D, and divide the two quadrants thereof A E and E D into 90 degrees each, beginning from E, as in the figure. Then, having fixed a pin in the center F, fit a wooden ruler H I upon the ſame, moveable thereon, with a box and needle K, as ſhewn under Compass.

Now, to apply this, in taking the *declination* of a plane: apply the ſide A D of the inſtrument to the plane propoſed, as M N (*fig.* 2.); and move the ruler F G, with the compaſs G, this way and that, about the center F, till the needle reſt upon the line of the magnetical meridian of the place. Now, if the ruler in this ſituation cut the quadrant in E, the plane is either northern or ſouthern: but if it cut between D and E, the plane declines to the weſt; or, if between A and E, to the eaſt by the quantity of the angle G F E.

The ſame inſtrument will alſo ſerve to take the inclinations and reclinations of planes. To this end, inſtead of the ruler and needle, a thread with a plumbet is fitted on a pin in the center F: then the ſide B C of the *declinator* A B C D, being applied to the propoſed plane, as I L (*fig.* 3.), if the plumb-line F G cut the ſemicircle A E D in the point E, the plane is horizontal: or if it cut the quadrant E D in any point at G, then will E F G be the angle of inclination: laſtly, if applying the ſide A B to the plane, the plumbet cut E, the plane is vertical. Hence, if the quantity of the angle of inclination be compared with the elevation of the pole, and equator, it is eaſily known whether the plane be inclined, or reclined. See Inclination, and Reclination.

DECLINATORY *Plea*, in *Law*. See *Benefit of* Clergy.

DECLINERS, or **Declining** *dials*, are thoſe which cut either the plane of the prime vertical circle, or the plane of the horizon, obliquely.

If we conceive the plane of the prime vertical circle to revolve a little upon a right line drawn from zenith to nadir, the plane will become declining; nor will it be any longer cut at right angles by the meridian, but by ſome vertical circle paſſing through the intermediate points. After the like manner a horizontal plane will be brought to decline, if revolving on the meridian line, one part of it be raiſed a little towards the zenith, and the other depreſſed towards the nadir.

The uſe of declining vertical dials is very frequent, becauſe the walls of houſes whereon dials are commonly drawn, do generally decline from the cardinal points. Incliners and recliners, and eſpecially deincliners, are very rare. See Dial.

DECLIVIS, in *Anatomy*, a muſcle of the abdomen, called alſo *obliquus deſcendens*. See Obliquus *deſcendens*.

DECLIVITY. See Acclivity.

DECOCTION, the act of boiling any ſubſtance in water, to extract the virtues out of the ſame for ſome medicinal purpoſe; or the water itſelf, in which the ſubſtance has been boiled.

Decoction is moſtly employed about balſamics, detergents, and cathartics; for it is not ſo proper for cephalics, &c. as it exhales the more volatile parts, in which the virtues of all thoſe ingredients conſiſt. The harder bodies, as woods, dried roots, &c. require moſt boiling; but herbs and ſeeds need only be ſcalded. All thoſe *decoctions* which are reſtringent, and moſt of the cathartics, may for the greater elegance be clarified: but all ſuch as are emollient, and intended to conſiſt of the ſoft and mucilaginous parts of ſimples, are by no means to be ſo managed.

M. Boulduc aſſures us from his own experience, that the infuſions of vegetable purgatives act better, and produce better effects, than their *decoctions*; which he attributes to this, that the pureſt and moſt active principles of thoſe bodies are diſſipated and evaporated by a boiling heat. Memoires de l' Academie Royale des Sciences, an. 1710. And M. Baumè, in his Elements of Pharmacy, obſerves, that the infuſion of Peruvian bark made without heat contains more of its principles than the *decoction*: becauſe heat ſeparates and precipitates a conſiderable quantity of reſinous ſubſtance, of which the bark conſiſts: and it is obſerved in general, that *decoction* ought not to be employed but when abſolutely neceſſary, or when the ſame principles and the ſame quantity of theſe principles cannot be obtained by an infuſion without heat.

DECOLLATION, *beheading*, a term frequently uſed in the phraſe, *decollation* of St. John Baptiſt, which denotes a painting, wherein is repreſented the Baptiſt's head, ſtruck off from his trunk; or, the feaſt held in honour of that martyr.

DECOMPOSITE *Leaf*, in *Botany*. See Leaf.

DECOMPOSITION, in *Chemiſtry* and *Pharmacy*, the ſame with analyſis or reſolution; viz. the reduction of a body into its principles, or component parts.

Decomposition is ſometimes taken for any ſort of reſolution, or ſeparation of parts; but, in propriety, *decompoſition* is a chemical proceſs, in order to a ſeparation of the heterogeneities, or impurities, from any matter.

Tradition, founded on repeated experiments, is a much ſurer way of arriving at the knowlege of the properties of a plant, than any chemical analyſis, or *decompoſition* of its principles. See Medicine.

Decomposition is uſed by Boyle, Newton, and other Engliſh authors, to ſignify the compoſition or junction of two or more bodies, which were previouſly compounded of other parts.

DECORATION, in *Architecture*, any thing that adorns and enriches a building, church, triumphal arch, or the like, either without-ſide, or within.

The orders of architecture contribute greatly to the *decoration*; but then the ſeveral parts of thoſe orders muſt have their juſt proportions, characters, and ornaments; otherwiſe the fineſt order will bring confuſion rather than richneſs.

Decorations in churches are paintings, vaſes, feſtoons, &c. occaſionally applied to the walls; but that with ſo much ſkill, as not to take off any thing from the form of the architecture: as is much practiſed in Italy, at the ſolemn feaſts.

Decoration is more properly applied to the ſcenes of theatres, which muſt be frequently changed, conformably to the ſubject.

The ancients had two kinds of *decorations* for their theatres: the firſt, called *verſatiles*, having three ſides, or faces, which were turned ſucceſſively to the ſpectators; the other, called *ductiles*, ſhewing a new *decoration* by drawing, or ſliding another before it.

This latter ſort is ſtill uſed, and apparently with much greater ſucceſs than among the ancients, who were obliged to draw a curtain whenever they made a change in the *decoration*; whereas on our ſtage the change is made in a moment, and almoſt without being perceived.

DECORTICATION, the act of peeling, or unhuſking roots, ſeeds, fruits, branches, &c. or of freeing them from their barks, rinds, huſks, or ſhells.

DECORUM, *Decor*, in *Architecture*, denotes the ſuitableneſs of a building, and of the ſeveral parts and ornaments thereof, to the place and occaſion.

Vitruvius is very ſevere in this point; and gives expreſs rules for appropriating, or ſuiting the ſeveral orders to their natural characters: ſo, e. gr. as that a Corinthian column may not be ſet at the entrance of a priſon, or gatehouſe; nor a Tuſcan, in the portico of a temple; as ſome have done among us, in breach of *decorum*. Even in the diſpoſition of the offices of our ordinary houſes, we find grievous offences againſt *decorum*; the kitchen being often where the parlour ſhould be, and that in the firſt and beſt ſtory, which ſhould have been condemned to the loweſt, and worſt.

DECOUPLÉ, in *Heraldry*, the ſame as uncoupled, i. e. parted, or ſevered.

Thus, a chevron *decouplé* is a chevron wanting ſo much towards the point, that the two ends ſtand at a diſtance from each other.

DECOURS,
DECRESSANT, } in *Heraldry*. See Decrement.

DECOY, a place made fit for catching of wild fowl.

Hence alſo a *decoy-duck* is one that flies abroad, and lights into company of wild ones, and, being become acquainted with them, by her allurement draws them into the *decoy* place, where they become a prey. See Fowl.

The *decoy* is uſually made where there is a large pond, ſurrounded with wood, and behind it a marſhy and uncultivated country, where the wild-fowl may ſecurely ſleep during the day-time. The *decoy* conſiſts of ſeveral pipes, as they are called, which lead up a narrow ditch, that cloſes at laſt with a funnel-net. Over theſe pipes, which become narrower from the firſt entrance, is fixed a continued arch of netting, ſuſpended on hoops. There is uſually a pipe or ditch for almoſt every wind that can blow, as the wild-fowl are determined by this circumſtance which pipe to chuſe; and the *decoy*-man always keeps on the leeward ſide of the ducks to prevent his effluvia from reaching their ſagacious noſtrils. Skreens made of reeds are placed at certain diſtances along each pipe, in ſuch a manner, that it is impoſſible for the wild-fowl to ſee the *decoy*-man, before they have paſſed towards the end of the pipe where the net is fixed. In the evening, when the wild-fowl begin to feed, the *decoy* riſes, and the noiſe of their wings, in their flight, may be heard at a great diſtance. The riſing of the *decoy* is in Somerſetſhire called *rodding*. The *decoy*-ducks are fed with hemp-ſeed, which is thrown in ſmall quantities over the ſkreens, to bring them forwards into the pipes, and to allure the wild-fowl to follow. They are ſo trained as to lead the way, after hearing the whiſtle of the *decoy*-man, and enticed by the hemp-ſeed, and to dive under water, whilſt the wild-fowl fly on, and are taken in the net. When they are in ſuch a ſleepy ſtate as not to follow the *decoy*-ducks, a ſmall dog is made to paſs between the ſkreens, approaching gradually nearer and nearer to the purſe-net; which draws the attention of the wild-fowl, and makes them to advance forward; at length the *decoy*-man appears behind a ſkreen, and drives them into the net.

The general ſeaſon for catching wild-fowl in *decoys* is from the latter end of October till February. The act of 10 Geo. II. cap. 32. forbids taking them from June 1 to Oct. 1. under a penalty of five ſhillings for every bird deſtroyed within that time. The Lincolnſhire *decoys*, which principally ſupply the London markets, are rented from 5*l.* to 20*l.* a year. Pennant's Zoology, vol. ii. p. 594. 8vo. 1776.

Decoy, in *Sea Language*, denotes a ſtratagem employed by a ſmall ſhip of war to betray a veſſel of inferior force into a purſuit, till ſhe comes within gun-ſhot. The ſtem and ſides are painted ſo as to diſguiſe the ſhip, and the emblems and ornaments of the nation to which the ſtrangers belong, are aſſumed. When the adverſary is allured to chaſe, the *decoy* is continued by ſpreading a great ſail, as if ſhe endeavoured to eſcape; but her courſe is retarded by an artful alteration of her trim. The *decoy* is alſo performed for eluding the chace of a ſhip of ſuperior force in a dark night, by throwing out a lighted caſk of pitch, which will burn for a conſiderable time, and miſguide the enemy. When the caſk is thrown out, the courſe of the eſcaping ſhip is changed.

DECREE, Decretum, an order, or reſolve, made by a ſuperior power, for the regulation of an inferior.

The commerce between ſoul and body, F. Malebranche obſerves, has no other vinculum, or connexion, but the efficacy of the divine *decrees*. Second cauſes only execute the *decrees* of Providence.

The doctrine of the Calviniſts has been charged with implying that God concurs to ſin by a poſitive *decree*; in that, if crimes were not ordained by an antecedent *decree*, God could not foreſee the events.

Decrees of councils are the laws made by them to regulate the doctrine and policy of the church.

Decree was originally uſed by the lawyers for any thing ordained by the prince, upon cognizance of a cauſe.

But the canoniſts now reſtrain the word *decree* to the ordinances of popes, which form the firſt part of the canon-*law*; as the name canon is to what is ordained by councils.

Decrees in chancery are the determinations or ſentences of the lord chancellor, upon full hearing, and weighing the merits of the cauſe. See Chancery.

DECREMENT, or Decressant, in *Heraldry*, denotes the wane, or decreaſe of the moon, when ſhe is receding from the full towards the new.

In this ſtate ſhe is called, in blazon, a *moon-decreſſant*, or *en decours*; ſince to call it a creſcent, would be improper, as that term denotes an increaſe. The moon looking to the left ſide of the eſcutcheon, is always ſuppoſed to be *decreſſant*: when ſhe faces the right ſhe is creſcent, or in her growth.

Decrement, *equal, of life*. See Complement *of life*.

DECREPITATION, in *Chemiſtry*, the operation of drying and calcining ſalts over the fire, continued till ſuch time as they ceaſe to crackle.

Decrepitation is alſo applied to the noiſe or crackling of the ſalts during the operation.

The deſign of this operation is to free the ſalt of its ſuperfluous moiſture: but the ſalt is hereby rendered ſo porous, and apt to imbibe moiſture, that unleſs it be kept very cloſe afterwards, it ſoon moiſtens again.

DECREPITUDE, in *Medicine*, the conſequence of the infirmities of old age; which by degrees leads to death. See Death.

DECTA, in *Botany*, a name uſed by ſome authors for the garden-beet.

DECRETAL, a reſcript, or letter of a pope, whereby ſome point or queſtion in the eccleſiaſtical law is ſolved, or determined.

The *decretals, literæ decretales*, compoſe the ſecond part of the canon-*law*.

All the *decretals* attributed to the popes before Siricius, in 318, are evidently ſuppoſititious. They are ſuppoſed by ſome the ſpurious offspring of Iſidore, archbiſhop of Seville, by reaſon the collection thereof bears the name of Iſidore Peccator, or Mercator. They were firſt publiſhed by Riculph biſhop of Mentz, in the ninth century.

Pope Gregory IX. in the thirteenth century, procured a compilation to be made of all the *decretals* or pontifical conſtitutions of his predeceſſors, in five books, by Frier Raimond, a Dominican, his chaplain; which is the only collection authorized by the holy ſee to be read in ſchools.

DECUBITUS, in *Medicine*, the manner of lying or repoſing in bed.

Every phyſician knows that the principal indications of the ſtrength or weakneſs of the motive faculty are taken from the *decubiture*; and indeed we may with very good reaſon judge of the ſtate of that faculty, by the *decubiture* itſelf; in the conſideration of which too many circumſtances enter for us to particularize.

DECUMANNI *Dentes*, a term uſed by the Latin writers on heraldry to expreſs that ſort of line in arms, which we call danſette, or dancetté. See Dancette.

It is a kind of indented line, but is very large, and has very few teeth, commonly no more than three. It is ſuppoſed to have been in its origin no other than the letter M, with its two lengs extended from one ſide of the field to the other.

DECURRENT *leaf*, in *Botany*. See Leaf.

DECUPLE, in *Arithmetic*, a term of relation, or proportion, implying a thing to be ten times as much as another.

DECURIO, the chief, or commander of a *decury*, both in the Roman army, and in the college, or aſſembly of the people. See Decury.

Decurio *municipalis* was a name given to the ſenators of the Roman colonies.

They were called *decuriones*, becauſe their court, or company, always conſiſted of ten perſons. See Decury.

By means hereof, the cities of Italy, at leaſt ſuch as had colonies, had a ſhare, under Auguſtus, in the election of the Roman magiſtrates; the *decuriones*, or ſenators, of thoſe cities, having ſuffrages therein, which they ſent, ſealed up, to Rome, a little before the election.

Decurio was alſo a name given to certain prieſts, intended, as it ſhould ſeem, for ſome particular ſacrifices, or other religious ceremonies; or for the ſacrifices of private families and houſes, as Struvius conjectures, who thence derives their name.

Be the origin of the name what it will, we have an inſcription in Gruter, which confirms what we have ſaid of their function: ANCHIALVS. CVB. AED. Q. TER. IN. AEDE. DECVRIO. ADLECTVS. EX. CONSENSV. DECVRIONVM. FAMILIAE. VOLVNTATE. Which proves that there was a *decurio* in the houſe of a private perſon, Q. Terentius.

DECURSIO, in Roman *Antiquity*. See Campicursio.

DECURY, ten perſons ranged under one chief, or leader, called the *decurio*.

The Roman cavalry was divided into *decuries*.

Romulus divided the whole Roman people into three tribes; over each of which he appointed a tribune: each tribe he ſubdivided into ten centuries, with centurions at their heads; and each century he ſubdivided farther into ten *decuries*, over each of which a *decurio* commanded.

DECUSSATION, in *Geometry, Optics*, and *Anatomy*, the points wherein two lines, rays, or nerves, croſs, or interſect each other: or the action itſelf of croſſing.

The optic nerves of both eyes are commonly ſuppoſed to *decuſſate* before they reach the brain; to which *decuſſation* many authors attribute it, that we ſee ſingle with two eyes; though others deny this *decuſſation*.

The rays of light *decuſſate* in the cryſtalline, before they reach the retina.

There are divers muſcles, membranes, &c. that *decuſſate*; their fibres running over each other at greater or leſſer angles, and by that means giving both ſtrength, and conveniency of motion, in different ways.

DECUSSIS, a Roman coin, which had different values. At firſt it was worth ten *as*, under Fabius ſixteen, and under Auguſtus twelve.

DECUSSORIUM, a ſurgeon's inſtrument, wherewith the *dura mater* is preſſed down in trepanning, to ſecure it from damage in the operation.

DEDI, in *Conveyances*, imports a warranty given to the feoffee, and his heirs. See WARRANTY.

DEDICATION, the act of conſecrating a temple, altar, ſtatue, place, &c. to the honour of ſome deity. See TEMPLE, ALTAR, CHURCH, &c.

The uſe of *dedications* is very ancient, both among the worſhippers of the true God, and among the heathens: the Hebrews call it חנכה, *bhanuchab*, *initiation*; which the Greek tranſlators render εγκαινια, and εγκαινισμος, *renewing*.

In the Scripture we meet with *dedications* of the tabernacle, of altars, of the firſt and ſecond temple, and even of the houſes of private perſons; Numb. vii. 10, 11. 84. 88. Deut. xx. 5. 1 Kings viii. 63. 2 Chron. vii. 5. 9. Ezra vi. 16, 17. 1 Eſdr. vii. 7. Pſalm xxx. 1 Heb. ix. 18. There are alſo *dedications* of veſſels, and garments of the prieſts and Levites, and even of the men themſelves.

Under the Chriſtian diſpenſation, we call the like ceremonies *conſecrations*, *benedictions*, *ordinations*, &c. and not *dedications*, which is only applied to places, as to a church; and is properly the conſecration thereof, performed by a biſhop, with a number of ceremonies preſcribed by the church. See CONSECRATION.

The Chriſtians, finding themſelves at liberty under Conſtantine, in lieu of their ruinous churches, built new ones in every place; and *dedicated* them with a great deal of ſolemnity. The *dedication* was uſually performed in a ſynod; at leaſt they aſſembled a number of biſhops, to aſſiſt at the ſervice. We have the deſcription of thoſe of the churches at Jeruſalem and Tyre, in Euſebius, and many others in later writers.

In the Sacramentary of Gelaſius, the *dedication* of the baptiſtery is delivered ſeparately from that of the church, which was performed with leſs ceremony than at preſent.

The *Feaſt of the Dedication*, or, rather, the feaſt-day of the ſaint and patron of a church, called, in our law-books, &c. *dedicatio*, was celebrated not only by the inhabitants of the place, but by thoſe of all the neighbouring villages, who uſually reſorted thither; and ſuch aſſemblies were authorized by the king.—*Ad dedicationes, ad ſynodos, &c. venientes ſit ſumma pax.*

The cuſtom is ſtill retained, in divers places, under the name of *feaſts*, *wakes*, or *vigils*.

The Jews celebrated the anniverſary of the *dedication* of their temple every year, for eight days; this was firſt enjoined by Judas Maccabæus, and the whole ſynagogue, in the year of the Syro-Macedonian æra 148, i. e. 165 years before Chriſt, on occaſion of the victory obtained by the Maccabees over the Greeks. It begun every year on the twenty-fifth day of Ciſleu, and was continued to the eighth day, during all which time they illuminated their houſes, by ſetting up candles at every man's door, whence it was called the feaſt of lights. This feſtival Chriſt honoured with his preſence at Jeruſalem. John x. 22. Leo of Modena ſays, that they begun with one lamp, and added to the number, according to the day of the feaſt; ſo that on the laſt day they had eight lamps in their houſes.

The heathens had alſo *dedications* of temples, altars, and images, of their gods, &c. Nebuchadnezzar had a ſolemn *dedication* of his ſtatue, Daniel iii. 2. Pilate *dedicated* gilt bucklers, at Jeruſalem, to Tiberius; Philo de Legat. Petronius would have *dedicated* a ſtatue to the emperor in the ſame city, ibid. p. 791. Tacitus, Hiſt. lib. iv. cap. 53. mentions the *dedication* of the Capitol, upon rebuilding it by Veſpaſian, &c.

Theſe *dedications* were performed with ſacrifices proper to the deity they were offered to; but they were never practiſed without public permiſſion. Among the Greeks, it does not appear who gave that permiſſion; but among the Romans, it was always the magiſtrate.

The heathens had ſimilar anniverſaries with the Jews, as that of the *dedication* of the temple of Parthenope, mentioned by Lycophron.

The heathen temples were *dedicated* with many ceremonies, the principal of which were the following. The pontiffs and people encompaſſed the temple with garlands and feſtoons of flowers; the veſtal virgins, holding branches of olive-trees in their hands, ſprinkled the outſide of the temple with the luſtral water; then the perſon who conſecrated, being the prætor, cenſor, &c. drew near the gate with a pontiff at his ſide, who directed him in pronouncing the words of conſecration: after which they ſacrificed a beaſt in the court of the temple, and anointed the ſtatue of the deity to whom it was *dedicated* with oil, and laid it on a pillow rubbed with oil. An inſcription was afterwards made on ſome part of the temple, according to the name of the perſon who performed the office, and the year of *dedication*, which they annually obſerved by a ſacrifice, or ſome other ſolemnity.

DEDICATION, in *Literature*, is an addreſs prefixed to a book, ſoliciting patronage, or teſtifying reſpect for the perſon to whom it is made. The *dedication* of the fourth part of Mr. Edwards's Hiſtory of Birds, is curious: *To* GOD! *the* ONE *eternal! the incomprehenſible! the omnipreſent! omniſcient and Almighty Creator of all things that exiſt! from orbs immeaſurably great, to the minuteſt points of matter, this* ATOM *is dedicated and devoted, with all poſſible gratitude, humiliation, and worſhip, and the higheſt adoration both of body and mind, by his moſt reſigned, low, and humble creature*, G. E.

DEDIMUS *poteſtatem*, in *Law*, a writ whereby commiſſion is given to one, or more, private perſons, to aſſiſt for the expedition of ſome act belonging to a judge.

The civilians call it *delegatio*: it is granted moſt commonly upon ſuggeſtion, that the party, who is to do ſomething before a judge, or in a court, is ſo weak that he cannot travel.

Its uſe is various: as, to take a perſonal anſwer to a bill in chancery; to examine witneſſes, or to levy a fine, &c.

DEDUCTION, in *Commerce*, a ſubtracting, or retrenching, a little ſum paid, from a greater remaining to pay.

DEDUCTION, in *Logic* and *Science*, denotes a proceſs or chain of reaſoning, whereby from principles ſuppoſed and allowed, we arrive at the truth of any propoſition. See REASONING.

DEDUCTOR, in *Antiquity*, a client, who, beſides the ordinary ceremony of ſaluting his patron every morning, was likewiſe obliged to attend him on public occaſions. Pitiſc. Lex. Antiq. in voc.

DEDUTTIONE, in the *Italian Muſic*, the name which Guido Aretine gave to the riſe of the voice, in pronouncing the ſyllables *ut*, *re*, *mi*, *fa*, *ſol*, *la*: *quia per has deducitur vox.* On the contrary, when the voice deſcended by *la*, *ſol*, *fa*, *mi*, *re*, *ut*, he called it *Reduttione*, *quia per has reducitur vox.*

DEDUCTIVE *evidence*, in *Ethics*, is derived either from the invariable properties or relations of general ideas, or from the actual, though perhaps variable, connexions ſubſiſting among things. The former is called *demonſtrative*, and the latter *moral*. Theſe differ from one another with reſpect to their ſubject; with reſpect to their nature, as the one admits of degrees and contrariety of proofs, which the other does not, and as the former is ſimple, ariſing from a coherent ſeries of proofs mutually and eſſentially connected, and the latter is generally complicated, being compoſed of a number of independent proofs. Campbell's Hiſt. Rhet. vol. i. book i. chap. 5.

DEED, *Factum*, in *Law*, ſo called, κατ' εξοχην, by way of eminence, becauſe it is the moſt ſolemn and authentic act which a man can poſſibly perform, with reſpect to his property, is an inſtrument written on paper, or parchment, the validity of which conſiſts in the following particulars: proper parties to contract with one another, and a proper ſubject matter to be contracted for; a good and ſufficient conſideration; writing on paper or parchment duly ſtamped; ſufficient and legal words properly diſpoſed; reading, if deſired, before the execution; ſealing; and by ſtat. 29 Car. II. cap. 3. in many caſes ſigning alſo; and DELIVERY; and which comprehends a contract, or bargain, between party and party.

If a *deed* wants any of the forementioned requiſites, it is void *ab initio*; and it may be alſo avoided by matter *ex poſt facto*; as by raſure, interlining, or alteration in any material part, without a memorandum made at the time of execution and atteſtation; by breaking off or defacing the ſeal; by delivering it up to be cancelled; by the diſagreement of ſuch whoſe concurrence is neceſſary; and by the judgment and decree of a court of judicature.

Of theſe there are two ſorts; *deeds indented*, and *deeds poll*; which denominations ariſe from the form and faſhion thereof; the one being cut in and out in the top, or ſide, called *indented*; *inſtar dentium*, in acute angles, but at preſent in a waving line; and the other *plain*, or *polled*.

A *deed indented*, or an indenture, conſiſts of two parts, or more (for there are *tripartite*, *quadripartite*, *ſeptempartite*, &c. *deeds*); wherein it is expreſſed, that the parties thereto have to every part thereof interchangeably ſet their ſeveral ſeals. The cauſe of their indenting is, that whereas the ſeveral parties have each of them one, the indenture may make it appear, that they belong to one and

and the ſame contract by their tallying. See INDENTURE.

A *deed poll*, or *polled*, anciently called *charta decima parte*, or *charta ſimplex*, is a plain *deed*, without indenting; uſed when the vendor, for example, only ſeals, and there is no need for the vendee's ſealing a counter-part, becauſe the nature of the contract is ſuch, that it requires no covenant from the vendee.

DEED, *date of a*. See DATE.

DEEMSTERS, or DEMSTERS. All controverſies in the iſle of Man are decided, without proceſs, writings, or any charges, by certain judges, choſen yearly from among themſelves, called *deemſters*. This inſtitution they are ſuppoſed to owe to the ancient Druids.

The word is formed from the Saxon *dema*, *judge*, or *umpire*.

There are two *deemſters* for each diviſion of the iſland: in ancient court-rolls they are called *juſticiarii domini regis*. They ſit as judges in all courts, either for life, or property; and with the advice of the twenty-four keys, declare what is law in uncommon emergencies.

DEEP-*ſea line*, or DIP-*ſea line*, in the *Sea-Language*, a ſmall line uſed for ſounding, when a ſhip is in very *deep* water at ſea.

At the end of this line is a piece of lead, called the *deep-ſea lead*, at the bottom of which is a coat of white tallow, to bring up ſtones, gravel, ſhells, or the like, from the bottom; in order to learn the differences of the ground; which being entered, from time to time, in the ſeamen's books, by comparing of obſervations, enable them to gueſs, by their ſoundings, &c. what coaſts they are on, though they cannot ſee land.

DEEP-*waiſted*, in *Naval Architecture*, denotes the ſtructure of a ſhip's deck, when the quarter-deck and fore-caſtle are elevated from four to ſix feet above the level of the upper-deck, ſo as to leave a vacant ſpace, called the WAIST, on the middle of the upper-deck.

DEER, *Cervus*, in *Natural Hiſtory*, the name of a genus of animals, the characters of which are, that the horns fall off every year, that they are ſolid and branched, and that the animal has eight cutting teeth in the lower-jaw, and none in the upper.

The word *cervus*, uſed alone, is underſtood by authors to mean the ſtag, or *red deer*, the others being all diſtinguiſhed by their ſeveral adjectives; the common *fallow-deer* being called *cervus platyceros*, or the broad horned *deer*. Ray.

In the Linnæan ſyſtem, the ſeveral ſpecies of *deer* are claſſed under the genus *cervus*, in the order of *pecora*. The *red deer* is called *cervus elaphus*; the *fallow-deer*, *cervus dama*; the *roe-deer*, *cervus capreolus*; and the *rein-deer*, *tarandus*.

The *common deer* is more preſerved in England than in any other part of the world, and carries its diſtinction from the *red deer*, in its ſize, and in the falcated figure of its horns. See STAG.

They are ſaid to have been introduced here by king James I. out of Norway, who firſt brought them into Scotland, and from thence into his chaces of Enfield and Epping. They are ſcarcely known in France, but are ſometimes found in the north of Europe. In Spain they are extremely large: they are met with in Greece, the Holy Land, and China; but in every country, except our own, are in a ſtate of nature, unconfined by man.

We keep ſeveral ſpecies of theſe, however, and may perhaps increaſe them in ſome ſort to many more, as they are a very ſalacious animal, and will be apt to mingle one ſpecies with another. The principal kinds we know at preſent, are, 1. The *Spaniſh deer*, which is almoſt as large as the *red deer*, but has a very ſlender neck, and is of a deep duſky colour; the tail in this ſpecies alſo is longer than in ours, and is black all over, not white next the body. 2. The *mottled deer*, which are beautifully variegated with black, white, and tawney. 3. The *Virginia deer*, which are larger and ſtronger than ours, and have thicker necks, and are of a grey or aſh-colour, rather than tawney, and remarkable for the largeneſs of their penis and ſcrotum. 4. A ſpecies which have their hinder hoofs marked with white on the outſide; the ears and tails of theſe are long, their horns branched, and their forehead a little depreſſed or hollow between the eyes. Theſe will eat bread, fruits, and any thing that is offered them, and are often beautifully variegated; many of them have black variegations, and a black liſt down their back, with a ſeries of white ſpots on each ſide; others are ſo beautifully marked with white ſpots and other variegations, as to equal the zebra in beauty: theſe they call *menaled deer*. Ray.

The method of hunting *deer* in the iſland of Ceylon is very particular. The huntſmen go out in the night, and only two uſually go together; the one of theſe carries upon his head an earthen veſſel, in which there is ſome fire burning and flaming: the ingredients are generally ſmall ſticks cut into pieces, and common roſin; of this the other man carries a ſupply about him to repleniſh the pot when it becomes low. The perſon who has the fire upon his head carries in one hand a ſtaff, on which there are fixed eight bells, and the larger theſe are the better. This man goes firſt into the woods, and the other follows cloſe behind with a ſpear in his hand. As ſoon as the *deer* hears the noiſe of the bells, he turns towards the place whence the ſound comes, and ſeeing the fire he eagerly runs up to it, and ſtands gazing at a ſmall diſtance; the ſecond man has then nothing to do but to kill him with the ſpear, for he ſees neither of them.

Not only *deer* but elks, and even hares are thus taken; for they gaze at the fire, and never ſee the men. The profits of this ſort of hunting are very large, without any danger; for though there are great numbers of tygers, elephants, and wild boars in theſe woods, the huntſmen are in no danger of them while the fire burns, for they all run away from it. Phil. Tranſ. N° 278. p. 1094.

As the *fallow-deer* lives entirely on vegetables and water, its ſalts are not highly exalted; nor is it much inclined to an alkaline putrefaction, on account of its aliment. But the habitual exerciſe of the animal in ſome degree exalts and volatilizes the ſalts. The veniſon of a *deer* killed when cool, differs very much from that of one killed when heated with exerciſe: the fibres of the firſt are harder, the fleſh more tough, and conſequently leſs eaſily diſſolvable in the ſtomach. The ſecond is more tender, more eaſily diſſolvable, but has a greater tendency to an alkaline putrefaction; which, however, may in a great degree be prevented, by ſuffering the *deer* to bleed plentifully when killed, as the Jews were directed to do, with reſpect to all ſorts of beaſts and fowls. Lev. xvii. 13.

Upon the whole, however, veniſon is eſteemed with juſtice an excellent aliment. The recent blood of a *fallow-deer* drank immediately from the vein, is ſaid to remove dizzineſs from the head: the gall is ſaid to be deterſive, to cure dimneſs of ſight, and take away films of the eyes: the liver is recommended againſt a diarrhœa; the horns are uſed exactly with the ſame intentions as thoſe of the ſtag; and the fat or ſuet agrees exactly with that of the ſame animal. James.

DEER, *African*. See COU-DOU.

DEER, *mooſe*. See MOOSE-*deer*.

DEER, *rein*, in *Zoology*, an animal very common in all the northern nations, and called by ſome authors *tarandus* and *machlis*. It is of the ſhape of a ſtag, but its body is thicker, and its whole make much more robuſt and ſtrong. The breaſt is thick, covered with very long hairs. The legs very hairy, and the hoofs moveable; for the creature expands and opens them in going; it is an extremely ſwift, as well as ſtrong animal; its horns are very long, and finely branched, and particularly run out immediately from the forehead into two fingered branches; in the middle there is a little branch, like the joints in the ſtalks of ſome plants; and thence again they are divided into broad fingered ſegments. They differ from the horns of the elk in their length, and from thoſe of the ſtag or red *deer* in their breadth, and from both, in the multitude of branches, and in their colour, which is white. The lower branches, which fall very near the forehead, are ſaid to be uſed by the creature to break the ice, when the waters are frozen over, that he may get drink. It feeds on ſhrubs and plants, and on the moſs, which it finds on the earth, and upon the barks of trees. It is of prodigious uſe, as a beaſt of carriage, to the Laplanders, and almoſt all the other nations far north. Scheffer alleges, from Tornæus, that the *rein-deer*, though a cloven-footed animal, and plainly of the *deer*-kind, does not chew the cud. This, however, is wholly diſbelieved by the more accurate naturaliſts. Ray.

Its horns and hoofs are of uſe in ſpaſmodic affections.

DEER, *roe*, *Capreolus*, in *Zoology*, a ſpecies of *deer*, diſtinguiſhed by Pliny under the name of *caprea*.

Its Latin names are extremely improper, ſince it has not the leaſt reſemblance or analogy to the goat-kind in any reſpect. It is properly of the *deer* kind, but differs from all the other ſpecies in the ſmallneſs of its ſize, and ſhortneſs of its horns. The horns in this ſpecies are not palmated or compreſſed, as in moſt of the *deers*, but are rounded, and ſerve very aptly for the making knife-hafts, and other ſuch things. Ray.

Theſe animals do not keep in herds like other *deer*, but only in families; they bring two fawns at a time, which are tender, and difficult to be reared, and which the female is obliged to conceal from the buck while they are very young. The fleſh is reckoned delicate food.

This ſpecies no longer exiſts in any part of Great Britain, except in the Scottiſh Highlands. In France they are more frequent; they are alſo found in Italy, Sweden, and Norway, and alſo in Siberia. Pennant's Britiſh Zoology, vol. i. p. 49, &c.

Deer-*field*, a park, or place, where *deer* are kept.

Deer-*hays*, engines, or great nets, made of cords, to catch *deer*. Anno 19 Hen. VII. cap. 11.

Deer-*ſtealers*, in *Law*. There are ſeveral ſtatutes for the puniſhment of *deer-ſtealers*; as 3 Jac. I. cap. 13—13 Car. II. cap. 10—3 and 4 W. and M. cap. 10—5 Geo. I. cap. 15 and 28—9 Geo. I. cap. 22—10 Geo. II. cap. 32. See Black *Act*.

Deer's-*weed*, in *Botany*, &c. See Dyer's *Weed*.

DE ESSENDO *quietum de tolonio*, a writ that lies for thoſe who are by privilege freed from the payment of toll. See Nat. Br. fol. 226.

DE EXPENSIS *militum*, a writ commanding the ſheriff to levy four ſhillings per day, to defray the expences of a knight of the ſhire attending in parliament. See Knight.

There is a like writ *de expenſis civium & burgenſium*, to levy two ſhillings per day for every citizen and burgeſs in parliament. 23 Hen. VI. cap. 11. See Burgess.

DE FACTO, ſomething actually in fact, or exiſting: in contradiſtinction to *de jure*, where a thing is only ſo in juſtice, or equity, but not in fact.

After the Revolution, the retainers to the abdicated king inſiſted much on the difference between a king *de jure*, and *de facto*, or a prince in actual but not legal poſſeſſion of the crown, and another who had the right, but not the poſſeſſion. The nonjurors ſtill hold the pretender for king *de jure*; and only allow king George for king *de facto*.

DEFALCATION, from the French *defalquer*, *to diminiſh*, denotes the deduction or ſubtraction of a ſmall ſum, in matters of account, from a large one.

DEFAMATION, in *Law*, is when a perſon ſpeaks ſcandalous words of another, or of a magiſtrate, &c. whereby they are injured in their reputation; for which the party offending ſhall be puniſhed, according to the nature and quality of his offence: ſometimes by action on the caſe at common law, ſometimes by ſtatute, and ſometimes by eccleſiaſtical law. But *defamation* is properly puniſhed by the ſpiritual courts; in which courts it ought to have three incidents: firſt, it is to concern matters ſpiritual, and determinable in the eccleſiaſtical courts; as for calling a man heretic, ſchiſmatic, adulterer, fornicator, &c. Secondly, that it be a matter ſpiritual only; for if the *defamation* concern any thing determinable at the common law, the eccleſiaſtical judges ſhall not have conuſance thereof. And thirdly, though ſuch *defamation* be merely ſpiritual, yet he that is defamed cannot ſue for damages in the eccleſiaſtical courts, but the ſuit ought to be only for puniſhment of the fault by way of penance. Terms de Ley, 224, 225.

DEFAMATORY, a term chiefly uſed in the phraſe *defamatory* libel, ſignifying a writing intended to ſcandalize, or diſcredit a perſon, &c.

By the Roman law, and the ancient ordonnances of France, the authors of *defamatory* libels were puniſhed with death. See Balduin. Comment. ad Leges de Libellis famoſis.

But the hiſtorian tells us, that cardinal Ximenes was inſenſible to all *defamatory* libels: he found it but reaſonable to leave inferiors the liberty of venting their grief by writings, which only live while the perſon is offended at them, and loſe all their ſpirit and malignity when deſpiſed, or diſregarded.

DEFAULT, in *Law*, non-appearance, or an omiſſion of what a perſon ought to do, particularly before a court of juſtice, at a day aſſigned; for which judgment may be given againſt the *defaulter*.

Jurors making default in their appearance for trying of cauſes ſhall loſe and forfeit iſſues, unleſs they have a reaſonable excuſe proved by witneſſes.

DEFEASANCE, in *Law*, (from the French *defaire*, *to defeat*) ſignifies a condition relating to a deed, which being performed the deed is defeated, and rendered void, as if it had never been made. The difference between a common condition and a *defeaſance* is, that the condition is annexed to, or inſerted in, the deed; and a *defeaſance* is a deed by itſelf, concluded and agreed on between the parties, and having relation to another deed. To make a good *defeaſance* it muſt be, 1. by deed; for there cannot be a *defeaſance* of a deed without a deed; and a writing under hand doth not imply it to be a deed. 2. It muſt recite the deed it relates to, or at leaſt the moſt material part thereof. 3. It is to be made between the ſame perſons who were parties to the firſt deed. 4. It muſt be made at the time, or after, the firſt deed, and not before. 5. It ought to be made of a thing *defeaſible*. 1 Inſt. 236. 3 Lev. 234.

DEFECATE, or Defæcate, a term applied to ſome body that is purged and cleared of fæces, or impurities.

Diſtillations, and other chemical operations, are intended to ſeparate the moſt pure and ſubtile parts from the fæces, or lees. See Clarification.

DEFECTION, the act of abandoning, or relinquiſhing, of a party, or an intereſt, a perſon had been engaged in.

The word is formed of the Latin *deficio*, *to fail of*.

DEFECTIVE, or Deficient, *Nouns*, in *Grammar*, are ſuch as want either a whole number, or a particular caſe, or are totally indeclinable.

The term *defective* is alſo applied to a verb that has not all its moods and tenſes.

Defective *third*, in *Muſic*. See Diminished *third*, and Deficient.

DEFENCE, in *Sieges*, is uſed for any thing that ſerves to preſerve or ſcreen the ſoldiers, or the place. See Fortification.

The parapets, flanks, caſemates, ravelins, and outworks, that cover the place, are called the *defences*, or covers, of the place: and when the cannon has beat down, or ruined, theſe works, ſo that the men cannot fight under covert, the *defences* of the city are ſaid to be demoliſhed.

Defence, *line of*, is that which flanks a baſtion, being drawn from the flank oppoſite thereto.

The line of *defence* ſhould not exceed a muſket-ſhot, i. e. 120 fathoms, or 720 feet, or 60 Rhinland perches: indeed Melder allows 65; Scheiter 70; the counts De Pagan, and Vauban, 75.

Line of Defence *greater*, or *fichant*, is a right line, as EC (*Tab. Fortif. fig.* 1.) drawn from the point, or vertex, of the baſtion C, to the concourſe E of the oppoſite flank LE, with the curtin EA.

Line of Deeence *leſſer*, called alſo *raſant*, and *flanquant*, is the face of the baſtion continued to the curtin; as CI.

Defence, in *Old Law-Books*, is ſometimes uſed for prohibition.

Thus, in Rot. Parl. 21 Edw. III. cries and *defence* were made throughout England, i. e. proclamation and prohibition. *Salmones ponantur in* defenſo. Stat. Weſt. 2. cap. 47. Salmons are by that act prohibited to be taken at certain times. *Uſurarios* defendit *rex Eduardus*, *ne remaverent in regno*. LL. Edu. Confeſſ. cap. 37. In the ſtatutes of Edward I. we have one, intituled, *Statutum de* defenſione *portandi arma*, &c. and it is *defended* by law, to diſtrain on the high-way.

This ſenſe of the word was probably borrowed from the French, in which language it is ſo applied.

Defence, in its true legal ſenſe, denotes an oppoſing or denial of the truth or validity of the complaint, anſwering to the *conteſtatio litis* of the civilians. It is a general aſſertion, which the defendant makes immediately after the count or declaration, that the plaintiff hath no ground of action; which aſſertion is afterwards extended and maintained in his plea.

Defence-*month* is more uſually called *Fence-month*. See Fence-*month*.

Defences, in *Heraldry*, are the weapons of any beaſt; as, the horns of a ſtag, the tuſks of a wild boar, &c.

DEFEND, *Defendere*, in our *Ancient Laws* and *Statutes*, ſignifies to prohibit or forbid. See Defence. 5 Rich. II. cap. 7. In which ſenſe alſo Chaucer uſes it, in the following paſſage:

> *Where can you ſay in any manner, age,*
> *That ever God defended marriage.*

See alſo Milton's Parad. Loſt, book ii. line 86.

DEFENDANT, a term in *Law*, ſignifying him who is ſued in an action perſonal; as tenant is he who is ſued in an action real.

DEFENDEMUS, in *Law*, a term uſed in feoffments and donations; having this force, that it binds the donor and his heirs to *defend* the donee, if any man go about to lay any incumbrance on the thing given, other than is contained in the deed of donation. See Warranty.

DEFENDER *of the Faith*, (*Fidei Defenſor*) is a peculiar title belonging to the king of England; as *Catholicus* to the king of Spain; and *Chriſtianiſſimus* to the king of France, &c. Theſe titles were given by the popes of Rome; and that of *fidei defenſor* was firſt conferred by Leo X. on king Henry VIII. for writing againſt Martin Luther; and the bull for it bears date *quinto idus Octob.* 1521. It was afterwards confirmed by Clement VII. Lord Herbert's Hiſt. Henry VIII. 105. But the pope, on Henry's ſuppreſſing the houſes of religion, at the time of the Reformation, not only deprived him of his title, but depoſed him from his crown alſo: though in the thirty-fifth year of his reign, his title, &c. was confirmed by parliament; and hath continued to be uſed by all ſucceeding kings to this day. Lex Conſtitutionis, 47, 48. Chamberlayne ſays, the title belonged to the kings of England before that time; and for proof hereof appeals to ſeveral charters granted to the univerſity of Oxford, So that pope Leo's bull was only a renovation of an ancient right. Preſ. ſtat. lib. i. cap. 2.

Defendere *unica manu*, to wage law, by denying the accuſation upon oath. *Et ſi forte foriſfactor ille factum negaverit, & foreſtarius ſolus ſit ſine teſte, ille debet ſe* defendere unica manu *ad unicam vocem rationabili die data in curia abbatis, & ſi unicum teſtem vel plures habuerit, debet ſe defendere ſexta manu, &c.* Charta facta inter W. de Bray, mil. & Abb. & Convent. de Oſeney, ſine dat. See Manus.

DEFENDERS were anciently notable dignitaries, both in church and ſtate; whoſe buſineſs was, to look to the preſervation of the public weal, and to protect the poor and helpleſs, and to maintain the intereſts and cauſes of churches, and religious houſes.

The council of Chalcedon, can. 2. calls the *defender* of a church, ἐκδικος. Codin. De Officiis Aulæ Conſt. makes mention of *defenders* of the palace; ſo does Bollandus, Act. S. Januar. tom. i. p. 501. There was alſo a *defender* of the kingdom, *defenſor regni*; *defenders* of cities, *defenſores civitatum*; *defenders* of the people, *defenſores plebis*; of the poor, fatherleſs, widows, &c.

About the year 420, each patriarchal church began to have its *defender*; which cuſtom was afterwards introduced into other churches, and continued to later days under other names; as thoſe of *advocate*, and *advouee*. See Advocate, and Advouee.

In the year 407, we find the council of Carthage aſking the emperor for *defenders*, of the number of *ſcholaſtici*, i. e. advocates who were in office; and that it might be allowed them to enter, and to ſearch the cabinets and papers of the judges, and other civil magiſtrates, whenever it ſhould be found neceſſary for the intereſt of the church.

DEFENDING, in *Fortification*, is ordinarily ſynonymous with flanking.

Thus, we ſay, the flank *defends* the curtin, and the oppoſite face of the baſtion; this demilune flanks, or *defends*, the horn, or crown work. The ancient fortifications are eaſily taken; there being nothing to *defend*, that is, to flank them.

When they ſay, the flank *defends* the curtin, they mean, not only that it is aſide of the curtin, but, alſo, that it prevents the approaches: that is, ſuch as are poſted on the flank of a baſtion, can ſee any that comes to attack the curtin; and can ſhoot them, or prevent their approaching it.

Inner **Defending-*Angle*** is the angle CIE (*Tab. Fortification, fig.* 1.) made by the leſſer line of *defence* with the curtin.

Outer **Defending-*Angle*** is the angle COF, formed by the two leſſer lines of *defence* CO, and FO.

The lines, or ſides, of the rampart, or wall, are *defended* by muſquets, or carbines; as more eaſy, cheap, and commodious, than cannons.

DEFENSITIVE, in *Medicine* and *Chirurgery*, denotes a bandage, plaſter, or the like; uſed in the cure of a wound, to moderate the violence of the pain, the flux of blood, and the acceſs, or impreſſion, of the external air.

The cauterization performed, the wound is covered with lint, and the eye with a *defenſitive*, and a triangular compreſs. For the firſt dreſſing of the entorſe, M. Dionis uſed a little *defenſitive* made of the white of an egg, oleum roſatum, and alum-powder.

DEFENSO, that part of any open field or place, that was allotted for corn and hay, and upon which there was no common or feeding, was anciently ſaid to be *in defenſo*: ſo of any meadow ground, that was laid in for hay only. It was likewiſe the ſame of a wood, where part was encloſed and fenced up, to ſecure the growth of the underwood from the injury of cattle.

DEFENSOR. See Advocate.

DEFERENT, Deferens, in *Anatomy*, is applied to certain veſſels of the body, appointed for the conveyance of humours from one place to another.

Vaſa **Deferentia** are two white ſolid flatted tubes, one lying on the right ſide, and the other on the left; from the epididymis, of which they are continuations; each of them runs up in the cellular vagina of the ſpermatic veſſels, as high as the openings in the abdominal muſcles, the blood-veſſels lying forward, and the *vas deferens* behind them. Theſe veſſels convey the ſeed as faſt as it is ſecreted and prepared in the teſticles, &c. into the *veſiculæ ſeminales*; there to be depoſited till an emiſſion is required. See *Tab. Anat.* (*Splanch.*) *fig.* 1. *lit. t t. fig.* 8 *lit. n n. fig.* 15. *lit. a a.*

The paſſage of the *vaſa deferentia* into the *veſiculæ ſeminales* is very particular. Theſe canals are incurvated behind the bladder, and their contracted extremities unite at that place. They unite in an angle, and run between the contiguous extremities of the *veſiculæ*; and this union is ſo cloſe, that the adhering portions ſeem only to form one middle ſeptum, between two ſmall tubes; each of which is formed partly by the extremity of one *vas deferens*, and partly by that of the neighbouring *veſicula*.

Some call them the *ejaculatory veſſels*. They are white, nervous, and round; ſituate partly in the ſcrotum, and partly in the abdomen.

Deferent, or **Deferens**, in the *Ancient Aſtronomy*, a circle invented to account for the eccentricity, perigee, and apogee, of the planets.

As the planets are found differently diſtant from the earth, at different times; it was ſuppoſed, that their proper motion was performed in a circle, or ellipſis, which is not concentric with the earth; and this eccentric circle, or ellipſis, they called the *deferent*: becauſe, paſſing through the center of the planet, it ſeemed to ſupport or ſuſtain it in its orbit.

The *deferents* are ſuppoſed differently inclined to the ecliptic, but none more than eight degrees, excepting that of the ſun, which is in the plane of the equator itſelf, and is cut differently by the *deferents* of the other planets in two places, called *nodes*.

In the Ptolemiac ſyſtem, the ſame *deferent* is alſo called the *deferent of the epicycle*; becauſe it traverſes the center of the epicycle, and ſeems to ſuſtain it.

DEFAIT, or **Decapite'**, a term uſed, by the French heralds, to denote a beaſt whoſe head is cut off ſmooth: in which it differs from eraſed; where the head is, as it were, torn off, and the neck left ragged.

DEFICIENT *interval*, in *Muſic*, is uſed for an interval leſs than the true by a comma. See Interval.

Deficient *numbers*, are ſuch whoſe parts, added together, make leſs than the integer, whoſe parts they are. See Number.

Such, e. gr. is 8; whoſe quota parts are 1, 2, and 4; which, together, only make 7. See Abundant *Number*.

Deficient *hyperbola* is a curve of that denomination, having only one aſymptote, and two hyperbolic legs running out infinitely towards the ſide of the aſymptote, but contrary ways. See Curve.

DEFILE, in *Fortification*, a narrow paſs, or way, through which a company of horſe, or foot, can paſs only in file, by making a ſmall front; ſo that the enemy may take an opportunity to ſtop their march, and to charge them with ſo much the more advantage, becauſe the front and rear cannot reciprocally come to the relief of one another.

The word is formed from the French *defile*, *to unthread*, or *unſtring*.

The term *defile* is alſo applied to narrow paſſages, guarded on each ſide by mountains, &c.

To **Defile**, to go off file by file. See File.

The army began to *defile* on the left, and was forced to *defile* at each end of the field, on account of the moraſſes, and the woods.

DEFINITE, in *Grammar*, is applied to an article that has a preciſe, determinate ſignification.

Such are, the article *the* in Engliſh, *le* and *la* in French, &c. which fix and aſcertain the noun they belong to, to ſome particular; as, *the* king, *le* roy: whereas, in the quality *of* king, *de* roy, the articles *of*, and *de*, mark nothing preciſe; and are therefore called *indefinite*.

DEFINITION, in *Logic*, an enumeration of the chief ſimple ideas, whereof a compound idea conſiſts; in order to aſcertain, or explain, its nature and character.

The ſchoolmen give very imperfect notions of *definition*. Some define it the firſt notion, or conception, that ariſes of a thing, whereby it is diſtinguiſhed from every other, and from which all the other things, that we conceive of it, are deduced: but the uſual *definition* of it is, *oratio explicans quid res eſt*, a diſcourſe explaining what a thing is: that is, as ſome further explain it, a diſcourſe ſetting forth thoſe attributes which circumſcribe and determine the nature of a thing. For to explain, is only to propoſe the parts ſeparately, and expreſly, which were before propoſed conjunctly and implicitly; ſo that every explication has regard to ſome whole. Hence, according to the diverſe kinds of parts in any thing, viz. phyſical parts, metaphyſical parts, &c. ariſe ſo many different kinds of *definitions* of the ſame thing: thus, man is either *defined* an animal, conſiſting of ſoul and body; or, a reaſonable animal, &c.

Definitions are of two kinds; the one *nominal*, or, *of the name*: the other *real*, or, *of the thing*.

Definition *of the name*, or *nominal* **Definition**, is that which explains the ſenſe or ſignification appropriated to a word: or, as Wolfius more accurately conſiders it, it is an enumeration of certain marks, or characters, ſufficient to diſtinguiſh the thing *defined* from any other thing; ſo as to leave it out of doubt, what the ſubject is that is intended, or denoted by the name. This is what is meant by *definition* in mathematics.

Such is the *definition* of a ſquare, when it is ſaid to be a quadrilateral, equilateral, rectangular figure.

By *definition of the name*, is either meant a declaration of the ideas and characters appropriated to the word in the common uſage of the language; or the peculiar ideas, &c. which the ſpeaker thinks fit to denote by that word, i. e. the ſpecial ſenſe wherein he propoſes to uſe it, in his future diſcourſe. For it may be obſerved, that the ſignificancy of any word depends entirely on our will; and we may affix what idea we pleaſe to a ſound, which itſelf ſignifies nothing at all.

The *definition* of the name, therefore, in the ſecond ſenſe, is merely arbitrary, and ought never to be called in queſtion; only it is to be minded, that we keep inviolably to the ſame ſignification. Hence, a *definition* comes to ſtand, or to be made uſe of, as an undoubted, or ſelf-evident maxim; as it frequently does, and particularly among geometricians, who, above all other people, make uſe of ſuch *definitions*.

Not that we mean, that after having *defined* a thing ſo and ſo, there is nothing in our idea affixed to the *defined* term, but muſt be granted to the thing itſelf: thus, if any one ſhould *define* heat to be a quality in certain bodies, like that which we feel upon the application of fire, or hot bodies; no man could find fault with the *definition*, as far as it expreſſes what he means by the word heat; but this does not hinder us from denying, that there is any thing in the body that warms us, like what we feel in ourſelves.

DEFINITION *of the thing*, or *real* **DEFINITION**, is properly an enumeration of the principal attributes of a thing, in order to convey or explain its nature.

Thus, a circle is *defined* a figure, whoſe circumference is every where equidiſtant from its center.

Wolfius *defines* a *real definition* to be a diſtinct notion explaining the geneſis of a thing; that is, the manner wherein the thing is made, or done: ſuch is that of a circle, whereby it is ſaid to be formed by the motion of a right line round a fixed point. On which footing, what was before inſtanced as a *real definition* of a circle, amounts to no more than a nominal one.

This notion of a *real definition* is very ſtrict and juſt; and affords a ſufficient diſtinction between a *real* and a *nominal* one. But though it has the advantages of analogy, diſtinctneſs, and conveniency, on its ſide; yet, being only itſelf a *nominal definition*, i. e. a *definition* of the term *real definition*, we muſt conſider it in that light, that is, an idea fixed arbitrarily to that word, and which the author always denotes by that word in the courſe of his book. But, in effect, it is not the uſual ſenſe, or acceptation of the term; which is much leſs convenient and diſtinct. And it is to that uſual acceptation we are here chiefly to have regard.

Definitions are alſo divided into *accurate* and *inaccurate*; the firſt make what we ſtrictly call a *definition*; the ſecond, we diſtinguiſh under the name of *deſcription*.

Of the parts enumerated in a *definition*, ſome are common to other things beſide the thing *defined*; others are peculiar thereto: the firſt are called the *genus*, or *kind*; and the ſecond, the *difference*.—Thus, in the former *definition* of a circle, by a figure whoſe circumference is every where equidiſtant from its center; the word *figure* is the *kind*, as being a name common to all other figures, as well as the circle: the reſt are the *difference*, which ſpecify, or diſtinguiſh this figure from every other figure.

And hence ariſes that rule of F. de Colonia, for the making of a *definition*. “Take, ſays he, ſomething that “is common to the thing *defined* with other things, and “add to it ſomething that is proper, or peculiar to the “thing; i. e. join the genus and ſpecific difference, and “you will have a *definition*.” Thus, e. gr. rhetoric is *defined* the art of ſpeaking well; for that it is an art, is common to it with ſeveral other things; but that it is the art of ſpeaking well, is peculiar to it alone.

There are five common rules of a good *definition*. 1. That it be clear, and more eaſy and obvious than the thing *defined*. 2. That it be univerſal, or adequate to the thing *defined*; that is, it muſt agree to all the ſpecies or individuals included under the ſame idea. 3. That it be proper or peculiar to the thing *defined*. The two ordinary defects of *definitions* are, not to agree either to the whole thing, or the ſole thing defined: *neque omni, neque ſoli*: than which nothing is more common, even among the beſt and juſteſt authors. 4. That it be ſhort. And 5. That neither the thing defined, nor a mere ſynonymous name, make any part of the *definition*.

Lord Bacon obſerves of Ariſtotle's *definitions* in the general, that they are very much like that, whereby man ſhould be *defined* an animal that tills the ground. Nor was his maſter Plato leſs exceptionable. The joke put upon him on that account is famous: Plato, it ſeems, had *defined* man, *animal bipes & implume, a two-footed animal without feathers*. Upon which, Diogenes the Cynic, a great derider of the Academics, threw a cock ſtripped of his feathers, and quite naked, into the middle of Plato's ſchool; crying, “Here is Plato's man.”

Our *definitions* of ſubſtances, it muſt be added, are very defective: and as for individuals, we have no *definitions* at all. The ideas of ſubſtances are compounded of the various ſimple ideas jointly impreſſed when they preſent themſelves; and all we can do to *define* them, is only to enumerate thoſe ſeveral ſenſible ideas, as colour, denſity, malleability, weight, &c. Thus, gold is *defined* by ſuch a peculiar colour, gravity, &c. Yet ſuch *definitions* may raiſe an idea clear enough of that ſubſtance in the mind of one who has ſeparately received, by his ſenſes, all the ſimple ideas that are in the compoſition of the complex idea *defined*; though the intimate nature and eſſence of ſubſtance is unknown, and conſequently cannot be *defined*.

It follows, that it is only the modes, or attributes, that can be explained by what we properly call a *definition*.

DEFINITION, in *Rhetoric*, is one of the common places, and is defined by Tully, a ſhort comprehenſive explanation of a thing.

The *definitions* of the orator, it muſt be obſerved, differ much from thoſe of the logician and philoſopher: theſe latter *define* a thing cloſely and dryly by genus and difference; e. gr. man is a reaſonable animal, &c.

The orators take a larger compaſs, and *define* things more ornamentally from the places of rhetoric, thus: man is a curious work of an Almighty Creator, framed after his own image, endued with reaſon, and born for immortality. But this rhetorical *definition*, in ſtrictneſs, comes nearer to the nature of a deſcription, than an accurate *definition*.

DEFINITIVE is applied to ſomewhat that terminates or decides a queſtion, or proceſs. Thus we ſay

The houſe of lords have paſſed a *definitive* ſentence in ſuch a cauſe: the church has given a *definitive* judgment on ſuch an article of faith.

The word ſtands in oppoſition to *proviſional*, and INTERLOCUTORY.

DEFINITIVE *pronoun*, in *Grammar*. See DEMONSTRATIVE.

DEFINITOR, a term uſed in ſeveral religious orders, for an aſſeſſor, or counſellor of a general, or ſuperior, in certain monaſteries.

In moſt orders of religious, the *definitor* takes place after the ſuperior of the convent he lives in, when in the convent itſelf; but out of the convent, the *definitor's* place is before his own ſuperior.

Definitors are alſo ſubject, in the convent they reſide in, to the immediate ſuperior of the convent, as to things relating to the monaſtic diſcipline, but in nothing elſe.

DEFLAGRATION, in *Chemiſtry*, the kindling, or ſetting fire to a ſalt, a mineral, or other matter, either alone, or mixed for that purpoſe, with a ſulphureous one, in order to purify it. As is done in the preparing of Æthiops mineral by fire, or ſal prunellæ, &c.

The word is formed of the Latin *de*, and *flagrare*, *to burn*.

This ſhort proceſs has been often recommended to the world as of great uſe in trying the ſtrength of brandies, and other vinous ſpirits, and has been greatly improved in this reſpect by Mr. Geoffroy.

The common way of trying ſpirits by *deflagration*, is to meaſure out any quantity of it, then to heat it, and ſet it on fire; if after it will no longer burn, the remainder is half as much as the quantity meaſured out for the trial was, then the ſpirit tried is found to conſiſt of half water, and half totally inflammable ſpirit; that is, it is exactly what we underſtand by the term perfect proof, and according as the remainder is more or leſs than half the original quantity, it is ſo much below or ſo much above proof, or the due ſtrength of brandy.

This method is much more certain than that by the crown of bubbles, which ariſes upon ſhaking the ſpirit in a vial. M. Geoffroy's method is thus: take a cylindric veſſel two inches high, and as much in diameter, conſiſting of thin plate ſilver, that metal being much leſs liable to ruſt than copper; this veſſel muſt be fitted with a little rectangular gage exactly graduated into lines, half lines, &c. then the veſſel being ſet level upon a copper caſe made to contain it, a quantity of the brandy to be examined is poured in, to the height of ſixteen lines. This height is to be exactly hit by pouring in more than enough at firſt, and then with a ſmall tube ſucking out what is ſuperfluous; then the veſſel being heated a little, ſo as juſt to make the liquor fume, it is to be ſet on fire, and left to go out of itſelf. At the inſtant when the flame expires the gage is plunged perpendicularly into the veſſel, and the lines and quarters exactly noted, which the liquor wants of its former height: this difference gives the preciſe quantity of pure ſpirit, or alcohol, originally contained in the liquor. Mem. Acad. Paris. 1718.

DEFLECTION, the turning any thing aſide from its former courſe, by ſome adventitious or external cauſe.

The word is often applied to the tendency of a ſhip from her true courſe, by reaſon of currents, &c. which divert her, and turn her out of her right way.

DEFLECTION *of the rays of light*, is a property which Dr. Hook obſerved in 1674-5, and read an account of before the Royal Society, March 18, the ſame year. He ſays, he found it different both from reflexion, and refraction; and that it was made towards the ſurface of the opacous body perpendicularly.

This is the ſame property which Sir Iſaac Newton calls INFLECTION. It is called by others DIFFRACTION.

DEFLORATION, or DEFLOWERING, the act of violating, or taking away a woman's virginity.

Death, or marriage, are decreed by the civil law in caſe of *defloration*. Many anatomiſts make the hymen a real proof of virginity, perſuaded that where it is not found, the girl muſt have been *deflowered*. See HYMEN.

The ancients had ſo much reſpect for virgins, that they would not put them to death, till they had firſt procured them to be *deflowered*. On the contrary, the natives of the coaſt of Malabar hold virginity in ſo little eſtimation, that they pay ſtrangers to come and *deflower* their brides. Among the Scots, it was a privilege of the lords of the manor, that they ſhould have the firſt night's lodging with their tenants wives. King Malcolm III. allowed the tenants to redeem this ſervice at a certain rate, called *Marcheta*, conſiſting of a certain number of cows. Buchanan ſays, it was redeemed with half a mark of ſilver. The ſame cuſtom had place alſo in Wales, Flanders, Frieſland, and ſome parts of Germany. See BOROUGH-ENGLISH.

By the cuſtom of Anjou and Maine, a maid, after twenty-five years of age, may ſuffer herſelf to be *deflowered*, without being diſinherited for it by her father.

Du-Cange quotes an arret of the nineteenth of March, 1409, obtained by the inhabitants of Abbeville, againſt the biſhop of Amiens, for taking money to diſpenſe with an injunction he had made, not to ſuffer them to conſummate their marriage the three firſt nights; the injunction being founded on a canon of the fourth council of Carthage, which decrees the ſame, out of reverence of the matrimonial benediction.

DEFLUVIUM, is uſed to expreſs a diſtemper in trees, whereby they loſe their bark; it is thought to be cauſed by a ſharp humour, that diſſolves the glue whereby the bark is faſtened to the wood, and ſometimes by too much drought.

DEFLUXION, or FLUXION, a falling, or flowing of ſome humour to any part of the body; as of rheum on the trachea, and œſophagus, in a catarrh.

The word is formed from the Latin *defluo, I flow down*, the humours falling upon ſome part, where they are gathered together.

Defluxions on the lungs are of dangerous conſequence. See CATARRH, and PHTHISIS.

Defluxions on the eyes produce a weakneſs of ſight, and frequently blindneſs. See EYE.

DEFORCEMENT, in *Law*, a with-holding lands, or tenements, by force, from the right owner.

DEFORCEMENT, in the law of Scotland, is uſed for the reſiſting, or offering violence to the officers of the law, while they are actually employed in the exerciſe of their functions, by putting its orders and ſentences in execution; whether they be officers of the ſupreme courts of juſtice, as heralds, purſuivants, meſſengers, macers; or of inferior courts, as mayors.

The puniſhment of this crime is confiſcation of moveables, joined with ſome arbitrary puniſhment; as fine, impriſonment, baniſhment, or corporal pains, according to the degrees of violence, and other circumſtances which aggravate the crime: beſides, the party aggrieved may have an action of damages, to be highly taxed out of the firſt and readieſt of the offender's eſcheat, or other eſtate. See Bayne's Criminal Law.

Deforcing of officers of the cuſtom-houſe, is provided againſt by the ſame ſtatutes as in England.

DEFORCEOR, or DEFORCIANT, one that caſts out another from his lands, or tenements, by mere *force*.

Deforcer differs from *diſſeiſer*, in that a man may diſſeiſe without *force*: and that a man may *deforce* another who never was in poſſeſſion; as where ſeveral perſons have a right to lands, as common heirs, and one entering firſt keeps out the reſt. See DISSEISOR.

Deforcer alſo differs from *intruder*, in that a man becomes *intruder* by a wrongful entry only into lands void of a poſſeſſor; whereas a *deforcer* holds out the rightful heir. See INTRUSION.

DEFORMITY is immediately oppoſed to BEAUTY, and denotes the want of that uniformity, ſymmetry, and variety, neceſſary to conſtitute beauty. Accordingly, Dr. Hutcheſon defines it by the abſence of beauty, or a deficiency in the beauty expected in any ſpecies. *Deformity* and beauty may be conſidered either as natural or moral. Theſe are both referred by the above mentioned ingenious writer to an internal SENSE, and our perceptions of them, as he ſuppoſes, ariſe from an original, arbitrary ſtructure of our own minds, by which certain objects, when obſerved, are rendered the occaſions of certain ſenſations and affections.

That many objects give no pleaſure to our ſenſe, is obvious. Many are certainly void of beauty; but then, ſays this author, there is no form which ſeems neceſſarily diſagreeable of itſelf, when we dread no other evil from it, and compare it with nothing better of the kind. Many objects are naturally diſpleaſing, and diſtaſteful to our external ſenſes, as well as others pleaſing, and agreeable; as ſmells, taſtes, and ſome ſeparate ſounds: but with regard to our ſenſe of beauty, no compoſition of objects which give not unpleaſant ſimple ideas, ſeems poſitively unpleaſant, or painful of itſelf, had we never obſerved any thing better of the ſame kind.

Had there been a ſpecies of the form which we now denominate ugly, or *deformed*, and had we never ſeen or expected greater beauty, we ſhould have received no diſguſt from it; though the pleaſure would not have been ſo great in this form as in thoſe we now admire. Our ſenſe of beauty ſeems deſigned to give us poſitive pleaſure; but not poſitive pain, or diſguſt, any farther than what ariſes from diſappointment.

There are, indeed, many faces which, at firſt view, are apt to raiſe diſlike. But this is generally not from any poſitive *deformity*, but either from want of expected beauty, or from the carrying ſome natural indications of morally bad diſpoſitions, which we all acquire a faculty of diſcerning in countenances, airs, and geſtures. That this is not occaſioned by any form poſitively diſguſting, appears hence, that if upon long acquaintance we are ſure of finding ſweetneſs of temper, humanity, and chearfulneſs, though the bodily form continues, it ſhall give us no diſguſt. There are horrors raiſed by ſome objects, which are only the effect of fear for ourſelves, or compaſſion towards others, when either reaſon, or ſome fooliſh aſſociation of ideas, makes us apprehend danger, and not the effect of any thing in the form itſelf. For we find, that moſt of thoſe objects, which excite horror at firſt, when experience, or reaſon, has removed the fear, may become the occaſion of pleaſure.

The caſual conjunction of ideas gives us diſguſt, where there is nothing diſagreeable in the form itſelf. And this, in effect, is the cauſe of moſt of our fantaſtic averſions to the figures of diverſe animals, &c. Thus ſerpents of all kinds, and many inſects, really beautiful enough, are beheld with averſion by many people, who have got ſome accidental ideas of miſchief aſſociated to them. A ſimilar reaſoning is applied to our perception of moral beauty and *deformity*. Inquiry into the original of our Ideas of Beauty and Virtue, paſſim.

But it is more juſt to diſtinguiſh between the ſentiments of delight or diſguſt, excited in us by beautiful or *deformed* objects, which are effects of ſome *cauſes*, and the natural and real qualities of the perceived objects by which they are produced. There are objects, ſays an excellent writer, which have a natural aptitude to pleaſe or offend, or between which and the contemplating mind there is a neceſſary congruity or incongruity; and though the actual perception of the underſtanding, and conſequent feeling of the heart, in contemplating the actions and affections of moral agents may exiſt in very different degrees, on account of the incidental obſtructions, ariſing from bodily indiſpoſition, mental prejudices and biaſſes, and the aſſociation of ideas; yet, to every rational mind properly diſpoſed, morally good actions muſt for ever be acceptable, and can never of themſelves offend; and morally evil actions muſt for ever be diſagreeable, and can never of themſelves pleaſe. What is right in actions and characters is beautiful and amiable, and gives pleaſure; what is wrong is *deformed* and odious, and excites diſguſt: right and pleaſure, wrong and pain, are as diſtinct as cauſe and effect. It is no leſs abſurd to maintain, that the perception of virtue is nothing diſtinct from the reception of the pleaſure reſulting from it, than to infer, with ſome metaphyſicians, that ſolidity, extenſion, and figure, are only particular modes of ſenſation, becauſe attended, whenever they are perceived, with ſome ſenſations of ſight or touch. Thus does this author ſhew, that moral beauty and *deformity* are real qualities of certain actions; in which conſiſts their aptitude to pleaſe or diſguſt. With reſpect to natural beauty, he obſerves, that uniformity amidſt variety pleaſes, becauſe of the *natures* of variety and uniformity, which are ſuch, that whenever united, they are adapted to pleaſe every free, unbiaſſed mind that diſcerns them. He accounts for the pleaſure they afford, without referring them to an arbitrary, internal ſenſe, by the following circumſtances that attend them. They are more eaſily comprehended by the mind: order and ſymmetry give things their ſtability and ſtrength, and ſubſerviency to any valuable purpoſe; regularity and order evidence art and deſign. Diſorder and confuſion, whence *deformity* ariſes, denote only the negation of regularity and order; or any arrangement and diſpoſition of things, which are not according to a law, rule, or plan, and prove not deſign. Theſe are not poſitively diſpleaſing; except where we previouſly expected order, or where impotence or want of ſkill appear, and the contriver has either failed of his deſign, or executed it ill. See on this ſubject Dr. Price's Review of the principal Queſtions and Difficulties in Morals, ch. ii. paſſim. See an admirable Eſſay on bodily *Deformity*, by Mr. Hay, in the Fugitive Pieces, vol. i. p. 93, &c.

DEFOSSION, *Defoſſio*, the puniſhment of burying alive, inflicted, among the Romans, on Veſtal virgins guilty of incontinency. It is alſo a cuſtom among the Hungarians to inflict this puniſhment on women convicted of adultery. Heretics alſo were puniſhed in this manner. See BURIAL.

DEFTARDAR, or DEFTERDAR, the treaſurer of the revenues of the Turkiſh empire. See TREASURER.

The word is compounded, firſt, of *defter*, a Turkiſh name for a book, regiſter, memoir, &c. which Meninſki derives from the Greek διφθερα, the ſkin or parchment anciently wrote on. The ſecond word, whereof *deftardar* is compounded, is *dar*, a Turkiſh and Perſian word, ſignifying *keeping*, or *holding*, q. d. book-keeper of the monies received and expended.

Meninſki calls him *ſupremus theſaurarius*, *high treaſurer*; and *præſes cameræ*, *preſident of the exchequer*. Caſtellus makes him the keeper, and comptroller of the books of receipts and payments.

The *deftardar*, or, as Vigenere calls him, *dephterderi*, has in his charge the rolls and accounts of the militia, and the treaſury: he receives all the grand ſignior's revenues, pays his forces, and furniſhes the expences of all public affairs: in which, his office differs from that of the chaznadar, who is treaſurer of the ſeraglio or court, as the *deftardar* is of the ſtate.

Ricaut makes a *deftardar*, whom he calls *teftardar*, in each beglerbeglic, or government. Vigenere aſſures us, there are but two, the one for Europe, and the other for Aſia; the firſt reſides at Conſtantinople, and has under him two general commiſſioners, or deputies, one for Hungary, Tranſylvania, Walachia, Croatia, Servia, Bulgaria, Boſnia, &c. the other for Greece and the Morea, with the iſlands of the Archipelago.

Each of theſe has under him as many ſub-commiſſioners, or agents, as there are ſangiackats in his province; which ſub-commiſſioners have as many clerks as there are ſabaſſi's in their ſangiackat, to keep the account of the timariots in their diſtricts. The *deftarder* of Aſia has two general deputies, the one for Anatolia; the other for Syria, Arabia, and Egypt: theſe have likewiſe their ſubagents, clerks, &c. as thoſe of Europe.

DEGENERATION, the act of failing, or declining from a more perfect, or valuable kind, ſtate, or condition, to an inferior or worſe.

It is a great diſpute among the naturaliſts, whether or no animals, plants, &c. be capable of degenerating into other ſpecies? The affirmative is urged by many, as a ſtrong objection againſt the plant being contained in the ſeed, and that doctrine of generation wherein that is ſuppoſed to be ſo.

But our lateſt and beſt naturaliſts maintain the opinion of ſuch a *degeneration*, or tranſmutation, to be erroneous, and a chimera: not but they allow, that a plant, by being tranſplanted to an improper ſoil, or ſun, may be depraved; ſo as a Dutch roſe, of an hundred leaves, may only produce another roſe, far ſhort thereof in number of leaves, colour, ſmell, &c. Such a depravation is poſſible, and frequently happens; but a ſpecific transformation ſeems out of the power of nature; a new form ever ſuppoſing a new *generation*, which again ſuppoſes a corruption of the former kind.

DEGLUTITION, in *Medicine*, the act of ſwallowing the food.

Deglutition is performed, in the firſt place, by means of the tongue, driving the aliment into the œſophagus, or gullet; and then, by the contraction of the ſphincter, and the fleſhy fibres of the ſame œſophagus, which, leſſening the bore, or aperture thereof, protrude the contents downwards into the ſtomach, in our eating.

Deglutition ſucceeds *maſtication*, and is followed by *concoction*.

A difficulty of ſwallowing may be occaſioned by ulcers of the œſophagus, by a ſchirrhous bronchocele, by a thickening of the mucus in the œſophagus, by indurations of the œſophagus, by a fungus in it, by a ſacculus formed by ſome hard ſubſtance lodged in it, and weakening its coats, and by ſpaſms.

Dr. Duncan, in his Medical Caſes, 1778, mentions the caſe of a difficult *deglutition*, ſuppoſed to ariſe from a venereal infection, in which electrical ſparks, applied to the fauces, were of very conſiderable ſervice, and by degrees removed the complaint.

DEGRADATION, in our law-books called *diſgradation*, and *depoſition*, the act of depriving, or ſtripping a perſon for ever of a dignity, or degree of honour; and taking away the title, badge, and privileges thereof.

The *degradations* of a peer, a prieſt, a knight, a gentleman, an officer, &c. are performed with divers ceremonies. That which anciently obtained in *degrading* a perſon from his nobility, is very curious. It was practiſed in the time of Francis I. upon captain Fangel, who had in a cowardly manner given up Fontarabia, whereof he was governor.

On this occaſion, twenty or thirty cavaliers, without blemiſh or reproach, were aſſembled; before whom the gentleman was accuſed of treaſon, and breach of faith, by a king at arms. Two ſcaffolds were erected; the one for the judges, heralds, and purſuivants; and the other for the guilty cavalier, who was armed at all points, and his ſhield placed on a ſtake before him, reverſed with the point upwards. On one ſide aſſiſted twelve prieſts, in ſurplices, who ſung the vigils of the dead. At the cloſe of each pſalm they made a pauſe, during which the officers of arms ſtripped the condemned of ſome piece of his armour, beginning with the helmet, and proceeding thus, till he was quite diſarmed; which done, they broke his ſhield in three pieces with a hammer. Then the king at arms emptied a baſon of hot water on the criminal's head; and the judges, putting on mourning habits, went to the church. This done, the *degraded* was drawn from off the ſcaffold, with a rope tied under his armpits, laid on a bier, and covered with mortuary cloaths; the prieſt ſinging ſome of the prayers for the dead; and then he was delivered to the civil judge, and the executioner of juſtice.

For a more domeſtic inſtance: Sir Andrew Harcla, earl of Carliſle, being attainted and convicted of treaſon, 18 Edw. II. *coram rege*; after judgment was pronounced on him, his ſword was broken over his head, and his ſpurs hewn off his heels; Sir Antony Lucy, the judge, ſaying to him, "Andrew, now art thou no knight, but a knave."

By ſtat. 13 Car. II. William lord Monſon, Sir Henry Mildmay, and others, were *degraded* from all titles of honour, dignities, and pre-eminences, and prohibited to bear, or uſe, the title of lord, knight, eſquire, or gentleman, or any coat of arms, for ever afterwards.

It has been maintained that the king may *degrade* a peer; but it appears from later authorities, that he cannot be degraded but by act of parliament.

As to eccleſiaſtics, we have an inſtance of *degradation* before condemnation to death, in the eighth century, at Conſtantinople. It is in the perſon of the patriarch Conſtantine, whom Conſtantine Copronymus cauſed to be executed. He was made to aſcend the ambo; and the patriarch Nicetas ſent ſome of his biſhops to ſtrip him of the pallium, and anathematized him: then they made him go out of the church backwards.

But we have a much later inſtance in our own hiſtory: when Cranmer, archbiſhop of Canterbury, was *degraded*, by order of queen Mary, they dreſſed him in epiſcopal robes, made only of canvas, put the mitre on his head, and the paſtoral ſtaff in his hand; and in this attire ſhewed him to the people. Which done, they ſtripped him again, piece by piece.

At preſent, they do not ſtand ſo much on the ceremony of *degradation*, in order to the putting a prieſt to death; by reaſon of the delays and difficulties that it would occaſion. Pope Boniface pronounced, that ſix biſhops were required to *degrade* a prieſt; but the difficulty of aſſembling ſo many biſhops, rendered the puniſhment frequently impracticable.

With us, a prieſt, after having been delivered to his ordinary, if he cannot purge himſelf of the crime laid at his door, his gown, and other robes, are ſtripped over his ears by the common hangman; by which he is declared diveſted of his orders.

It is decided, however, that *degradation* does not efface the prieſtly character.

Degradation only ſeems to differ from depoſition in a few ignominious ceremonies, which cuſtom has added thereto. Accordingly, in the buſineſs of Arnoul, archbiſhop of Rheims, ſentenced in the council of Orleans, in 991, it was deliberated, what form they ſhould follow in the depoſition; whether that of the canons, that is, ſimple depoſition; or that of cuſtom, viz. *degradation*. And it was declared, that he ſhould ſurrender the ring, paſtoral ſtaff, and pallium; but that his robes ſhould not be torn off.

In effect, the canons preſcribe no more than a mere reading of the ſentence. It is the reſt, therefore, added thereto by cuſtom, viz. the ſtripping off the ornaments, and the tearing the pontifical veſtments, that properly conſtitutes *degradation*.

DEGRADATION, in *Painting*, expreſſes the leſſening, and rendering dim and confuſed the appearance of diſtant objects in a landſcape, ſo that they ſhall appear there, as they would do to an eye placed at that diſtance from them. See PERSPECTIVE.

DEGRADED, in *Heraldry*. A croſs *degraded*, is a croſs marked, or divided into ſteps at each end, diminiſhing as they aſcend towards the middle, or center; by the French called *perronnée*. See CROSS.

DEGREE, in *Algebra*, is uſed in ſpeaking of equations. If the index of the higheſt power of the unknown quantity is 2, it is of the ſecond degree, &c.

DEGREE *of fire*, in *Chemiſtry*. See FIRE and HEAT.

DEGREE, in *Geometry*, an arc of a circle, including a three hundred and ſixtieth part thereof.

Every circle, great and ſmall, is ſuppoſed to be divided into 360 parts, called *degrees*: the *degree* is ſubdivided into 60 leſſer parts, called minutes: the minute into 60 others, called ſeconds: the ſecond into 60 thirds, &c. It follows, that the *degrees*, minutes, &c. of greater circles, are greater than thoſe of leſs.

The ſubdiviſions of *degrees* are fractions, whoſe denominators proceed in a ſexagecuple ratio; that is, a firſt minute is $= \frac{1}{60}$, a ſecond $= \frac{1}{3600}$, a third $= \frac{1}{216000}$, &c. But theſe denominators being troubleſome, their logarithms are ſubſtituted in common uſe, as indices thereof. Thus a *degree*, as being the integer, or unit, is denoted by 0, a firſt minute, or prime, by 1; a ſecond by 2, or ″; a third by 3, or ‴, &c. Accordingly, 3 *degrees*, 25 minutes, 16 thirds, are written 3°, 25′, 16‴.

But though the ancient Egyptians, to whom this diviſion is uſually aſcribed, did, by means hereof, free aſtronomical calculations from fractions; ſince ſexageſimal fractions may be managed as integers; and were very happy in the choice of ſuch a number of *degrees* in the circle, as admitted of a juſt diviſion, by 2, 3, 4, 5, 6, 8, and 9; yet Stevinus, Oughtred, Wallis, &c. with good reaſon, wiſh the ſexageſimal fractions ſet aſide, and decimals taken in their room; or that the *degree* were ſubdivided into 100 equal parts, and each of theſe again into 100, &c. For in decimals there is no occaſion for reducing leſſer fractions into greater, or greater into leſſer; which is a tedious article in ſexageſimals. Stevinus even holds, that this diviſion of the circle which he contends for, obtained in the wiſe age, *in ſæculo ſapienti*. Stevin. Coſmog. lib. i. def. 6.

The magnitude or quantity of angles is accounted in *degrees*; becauſe the curvature of the circle being uniform in all its parts, equal angles at the center are ſubtended by equal arcs, and by ſimilar arcs in peripheries of different diameters. Thus we ſay, an angle of 90 *degrees*, of 70 *degrees*, 50 minutes; of 25 *degrees*, 15 minutes, 45 ſeconds.

Such a ſtar is mounted ſo many *degrees* above the horizon, or declines ſo many *degrees* from the equator.

Such a town is ſituate in ſo many *degrees* of longitude and latitude.

A ſign includes 30 *degrees* of the ecliptic.

DEGREE *of latitude* is on the ſuppoſition of the ſphericity of the earth, the 360th part of the meridian; or more generally it is that ſpace through which an obſerver muſt move on the meridian, in order to increaſe or diminiſh the diſtance of a ſtar from the zenith by one *degree*. See LATITUDE.

The quantity of a *degree* of a meridian, or other great circle, on the ſurface of the earth, is variouſly determined by various obſervers: the methods too made uſe of are various. See EARTH.

Ptolemy fixes the *degree* at $68\frac{2}{3}$ Arabic miles, accounting $7\frac{1}{2}$ ſtadia to a mile. The Arabs themſelves, who made an exact computation of the diameter of the earth, by meaſuring the diſtance of two places under the ſame meridian, in the plains of Senna, by order of Almamon, only make 56 miles. Kepler, determining the ſemidiameter of the earth by the diſtance of two mountains, makes a *degree* 13 German miles; but his method is far from being accurate. Snellius, ſeeking the diameter of the earth, from the diſtance of two parallels of the equator, finds the quantity of a *degree*, by one method, to be 57064 Paris toiſes, or 342384 feet; and by another method, 57057 toiſes, or 342342 feet. The mean between which two numbers, M. Picart found by menſuration, in 1669, from Amiens to Malvoiſin, the moſt ſure, and he makes the quantity of a *degree* 57060 toiſes, or 342360 feet, which, reduced to other meaſures, gives the quantity of a *degree* of a great circle, in

Engliſh miles of 50000 feet each	$73\frac{7}{100}$
Florentine miles of 3000 braccios	$63\frac{7}{80}$
Common French leagues of 2282 toiſes	25
Rhinland perches of 12 feet	29556

However, M. Caſſini, at the command of the king of France, in the year 1700, repeated the ſame labour, and meaſuring the ſpace of 6 *degrees*, 18 minutes, from the obſervatory at Paris, along the meridian to the city of Collioure in Rouſſillon, that the greatneſs of the interval might diminiſh the error, found the quantity of a *degree* to be 57292 toiſes, or 343742 Paris feet, amounting to 365184 Engliſh feet. On which footing, the quantity of a minute of a *degree* of a great circle of the earth is 5710 Paris feet, and that of a ſecond, 95 feet.

With which account pretty nearly agrees that of our countryman Mr. Norwood, who, about the year 1635, meaſured the diſtance between London and York, and found it 905751 Engliſh feet; and finding the difference of latitudes 2° 28′, determined the quantity of one *degree* to be 367196 Engliſh feet, or 57300 Paris toiſes, or 69 Engliſh miles, 288 yards. See Newt. Princ. Phil. Nat. Math. prop. 19. p. 378. and Hiſt. Acad. R. Scienc. anno 1700. p. 153.

M. Caſſini, the ſon, completed the work of meaſuring the whole arc of the meridian through France, in 1718. For this purpoſe he divided the meridian of France into two arcs, which he meaſured ſeparately. The one from Paris to Collioure had given him 57097 toiſes to a *degree*; the other from Paris to Dunkirk 56960; and the whole arc from Dunkirk to Collioure 57060, the ſame as M. Picart's. M. Muſchenbroek, in 1700, reſolving to correct the errors of Snellius, found by particular obſervations, that the *degree* between Alcmaer and Berg-op-zoom contained 57033 toiſes. Meſſrs. Maupertuis, Clairaut, Camus, le Monnier, and Outheir of France, were deputed on a northern expedition, and began their operations, aſſiſted by M. Celſus, an eminent aſtronomer of Sweden, in Swediſh Lapland, in July, 1736, and finiſhed them by the end of the following May. They obtained the meaſure of a *degree*, the middle point of which was in lat. 66° 20′ N. and found it to be 57438,9 toiſes, when reduced to the level of the ſea. Another company of gentlemen was about the ſame time ordered to the ſouth, viz. Meſſrs. Godin, Bouguer, and la Condamine of France, to whom were joined Don Jorge Juan, and Don Antonio de Ulloa of Spain. They left Europe in 1735, and began their operations in the province of Quito in Peru, about October, 1736, and finiſhed them, after many interruptions, about eight years after. The Spaniſh gentlemen publiſhed a ſeparate account, and aſſign for the meaſure of a *degree* of the meridian at the equator 56767,8 toiſes. M. Bouguer makes it 56753 toiſes, when reduced to the level of the ſea; and M. de la Condamine ſtates it at 56749 toiſes.

M. de la Caille, being at the Cape of Good Hope in 1752, found the length of a *degree* of the meridian in latitude 33° 18′ ½ S. to be 57037 toiſes. In 1755, father Boſcovich found the length of a *degree* in latitude 43° N. to be 56972 toiſes, as meaſured between Rome and Rimini, in Italy. In the year 1740, Meſſrs. Caſſini and de la Caille again examined the former meaſures in France, and, after making all the neceſſary corrections, found the meaſure of a *degree*, the middle of which is in 49° 22′ N. to be 57074 toiſes; and in the latitude of 45°, 57050 toiſes. From theſe meaſures it appears that the earth is not a ſphere, but an oblate ſpheroid. See *Figure of the* EARTH. See Maupertuis's Figure of the Earth, &c. 8vo. 1738.

The method of meaſuring a *degree* of the terreſtrial meridian is to meaſure a certain diſtance upon it by a ſeries of triangles, whoſe angles may be meaſured by actual obſervation, connected with a baſe, whoſe length may be taken by an actual ſurvey, and then to obſerve the different altitudes of the ſame ſtar at the two extremities of that diſtance. By this means the length of the arc may be compared with its amplitude, or the number of minutes and ſeconds which it contains.

DEGREE *of longitude*, is the ſpace between two meridians;

the quantity of which is variable according to the latitude.

Theſe expreſſions are borrowed from the ancients, who were acquainted with a very large extent of earth, from eaſt to weſt, which they accounted the length, and a much leſs from north to ſouth, which paſſed with them for the breadth, of the earth. See Longitude.

The quantity of a *degree* of a great circle, with the diſtance of any other parallel from the equator, being given, the quantity of a *degree* in that parallel is found by this canon: as the whole ſine, or radius, is to the coſine of the diſtance of the parallel from the equator; ſo is the quantity of a *degree* of the equator to the quantity of a *degree* of the parallel.

Suppoſe, e. gr. the latitude of the parallel 51°, and a *degree* of the equator 69 miles.

Log. of whole ſine	100000000
Coſine of 51°	97988718
Log. 69°	18388491
Log. required —	16377209

The number correſponding to which in the tables is $43\frac{42}{100}$, nearly; which being multiplied by 5280, the number of feet in a mile, gives the number of Engliſh feet in a *degree* in that parallel. On which foundation (ſuppoſing M. Caſſini's proportion of 365184 Engliſh feet, or 69 miles, 864 feet to 1 *degree* of a great circle) is calculated the following table, exhibiting the quantity of a *degree* of longitude in each parallel of latitude.

Deg. of lat.	Engliſh ſtat. miles of 5280 feet.		Deg. of lat.	Engliſh ſtat. miles of 5280 feet.	
Equ.	69	864			
1	69	808	46	48	338
2	69	641	47	47	994
3	69	363	48	46	1575
4	68	5254	49	45	2082
5	68	4739	50	44	2515
6	68	4143	51	43	2777
7	68	3422	52	42	3069
8	68	2590	53	41	3293
9	68	1648	54	40	3449
10	68	595	55	39	3540
11	67	4714	56	38	3568
12	67	3443	57	37	3533
13	67	2064	58	36	3438
14	67	576	59	35	3283
15	66	4260	60	34	3072
16	66	2557	61	33	2804
17	66	747	62	32	2483
18	65	4110	63	31	2110
19	65	2088	64	30	1686
20	64	5240	65	29	1213
21	64	3008	66	28	743
22	64	672	67	27	128
23	63	3513	68	25	4800
24	63	972	69	24	4150
25	62	3609	70	23	3460
26	62	865	71	22	2732
27	61	3301	72	21	1968
28	61	358	73	20	1169
29	60	2597	74	19	338
30	59	4738	75	17	4756
31	59	1503	76	16	3866
32	58	3453	77	15	2948
33	58	29	78	14	2006
34	57	1791	79	13	1043
35	56	3461	80	12	53
36	55	5040	81	10	4327
37	55	1248	82	9	3303
38	54	2648	83	8	2264
39	53	3961	84	7	1212
40	52	5187	85	6	147
41	52	1147	86	4	3454
42	51	2204	87	3	3272
43	50	3178	88	2	2184
44	49	4071	89	1	1093
45	48	4884	90		0

Degree, in *Civil* and *Canon Law*, denotes an interval in cognation or kinſhip, whereby proximity and remoteneſs of blood are computed.

Degrees are the intervals whereby it is known what perſons are neareſt to the ſtock or root. Or they are the diſtances of one perſon from another in the line of conſanguinity or affinity, reckoned from ſome common parent or anceſtor. See Consanguinity.

We ſay, the ſecond *degree*, the third *degree*; Gregory the Great was the firſt who prohibited marriage to the ſeventh *degree*; which reſtriction was long obſerved: the ſecond council of Lateran, under Innocent III. reſtrained the prohibition to the fourth *degree* incluſive, that is, to couſin germans children. See Marriage.

In computing *degrees* of conſanguinity, the rule of the civil law is univerſal, either in the direct, or collateral, otherwiſe called the oblique line: *Quot ſunt generationes tot ſunt gradus.* Every generation in the direct line conſtitutes a different *degree*, reckoning either upwards or downwards; and this method of computation univerſally obtains, as well in the civil and canon, as in the common law. But in the canon law, the rule is different for the oblique line; and here a diſtinction is made between the *equal*, and *unequal* oblique line.

In the firſt caſe the rule is, *Quot gradibus perſonæ cognatæ diſtant a communi ſtipite, tot gradibus inter ſe diſtant.* In the other caſe the rule is, *Quot gradibus perſona remotior diſtat a communi ſtipite tot gradibus perſonæ diſtant inter ſe.* Or, generally, in whatſoever *degree* two perſons, or the moſt remote of them, are diſtant from the common anceſtor, that is the *degree* in which they are related to each other. Thus, Titius and his brother are related in the firſt *degree*, becauſe from the father to each of them is counted only one; Titius and his nephew are related in the ſecond *degree*; for the nephew is two *degrees* removed from the common anceſtor; viz. his own grandfather, the father of Titius. This rule of computation is adopted by our law; though the civilians count upwards, from either of the perſons related to the common ſtock, and then downwards again to the other, reckoning a *degree* for each perſon both aſcending and deſcending.

Degree, in *Medicine*, denotes a certain pitch, or intenſeneſs, of the elementary qualities.

The *degrees* uſually allowed are four, anſwering to the number of the Peripatetic elements.

In the ſchool philoſophy, the ſame qualities are divided into eight: the laſt, or higheſt *degree* of intenſion, is called *ut octo*.

They ſay, a thing is cold in the ſecond *degree*, pepper is hot in the third *degree*, &c.

Fire was held hot in the eighth *degree*, and dry in the fourth *degree*.

Degrees, in *Muſic*, are the little intervals whereof the concords, or harmonic intervals, are compoſed. See Interval, and Concord.

The muſical *degrees* are three; the greater tone, the leſſer tone, and the ſemi-tone.

The primary cauſe of the invention of *degrees*, or intervals, leſs than concords, and whereby the concords are divided, and, as it were, graduated, Deſcartes judges to have been this: that if the voice were always to proceed by harmonical intervals, there would be too great a diſproportion, or inequality, in the intenſeneſs thereof, which would weary both the ſinger and the hearer.

Thus, ſuppoſing A and B the diſtance of a greater third; if the voice were immediately to aſcend from A to B, then becauſe B, being acuter, ſtrikes the ear with more force than A, leſt that diſproportion ſhould prove uneaſy, another ſound, C, is put between them; by which, as by a ſtep, or *degree*, we may aſcend more eaſily, and with leſs unequal force in raiſing the voice.

Hence it appears, ſays that author, that the *degrees* are only certain mediums contrived to be put betwixt the extremes of the concords, for moderating their inequality, but which of themſelves have not ſweetneſs enough to ſatisfy the ear, and are of uſe only with regard to the concords. So that when the voice has moved one *degree*, the ear is not yet ſatisfied till we come to another, which therefore muſt be a concord with the firſt ſound.

The ſubſtance of what is here alleged amounts to this: that by a fit diviſion of the concording intervals, into leſſer ones, the voice will paſs ſmoothly from one note to another, and the hearer be prepared for a more exquiſite reliſh of the perfect intervals, whoſe extremes are the proper points in which the ear finds the expected reſt and pleaſure.

Such is the end, and office, of the *degrees*, or leſſer intervals. Now there are only three, that experience recommends as agreeable, whoſe ratios are 8 : 9, called the greater tone; 9 : 10, called the leſſer tone; and 15 : 16, called the *ſemi-tone*. By theſe alone a ſound can move upwards or downwards ſucceſſively, from one extreme of a concord to another, and produce true melody: and, by means of theſe, ſeveral voices are alſo capable of the neceſſary variety in paſſing from concord to concord. As to the original of theſe *degrees*, they ariſe out of the ſimple concords, and are equal to their differences. Thus, 8 : 9, is the difference of a fifth and fourth; 9 : 10, is the difference of a leſſer third and fourth; or of a fifth and greater ſixth; and 15:16, the difference of a greater third and fourth, or of a fifth and leſſer ſixth.

DEGREES, *for the uſe of*, in the conſtruction of the ſcale of muſic, ſee SCALE.

DEGREE, in *Univerſities*, denotes a quality conferred on the ſtudents, or members of them, as a teſtimony of their proficiency in the arts or faculties; and entitling them to certain privileges, precedencies, &c.

The *degrees* are much the ſame in the ſeveral univerſities: but the laws of them, and the diſcipline or exerciſe previous to their being obtained, differ. The *degrees* are, *bachelor*, *maſter*, and *doctor*; inſtead of the ſecond, in ſome foreign univerſities, they have *licentiate*.

In each faculty there are but two *degrees*, viz. *bachelor* and *doctor*, which were anciently called *bachelor* and *maſter*: nor do the arts admit of more than two, which ſtill retain the denomination of the ancient *degrees*, viz. *bachelor* and *maſter*. At Oxford, *degrees* of maſter and doctor are only conferred once a year, viz. on Monday after the ſeventh of July; when a ſolemn act is held for the purpoſe. See ACT.

The expences of a *degree* of doctor in any of the faculties, in treats and ſet fees, uſually amount to 100*l.* and that of a maſter of arts, to 20 or 30*l.*

The *degree* of bachelor is only conferred in Lent.

To take the *degree* of bachelor of arts, four years are required, and three more for maſter of arts. See BACHELOR.

At Cambridge, matters are nearly on the ſame footing, only the diſcipline is ſomewhat more ſevere, and the exerciſes more difficult. The commencement, which anſwers to the act of Oxford, is the Monday before the firſt Tueſday in July. The *degrees* of bachelor are taken up in Lent, beginning on Aſh-Wedneſday.

The *degree* of maſter of arts is not given till above three years after that of bachelor; during which time, the candidate is obliged, three ſeveral times, to maintain two philoſophical queſtions in the public ſchools, and to anſwer the objections raiſed againſt him by a maſter of arts. He muſt alſo keep two acts in the bachelors ſchool, and declaim one.

For the DEGREE *of doctor*, ſee DOCTOR.

DEICIDE, DEICIDA, from *Deus*, *God*, and *cædo*, *I kill*, a term only uſed, by ſome writers, in ſpeaking of the condemnation, and execution, of the Saviour of the world, by Pontius Pilate, and the Jews.

Some have objected to the propriety of the term, ſince Chriſt ſuffered and died, not as God, but as man.

DEJECTION, from *dejicio*, *I throw off*, in *Medicine*, properly ſignifies the act of ejecting, or evacuating the excrements, by means of the periſtaltic motion of the guts.

In which ſenſe it comes to the ſignification of *excretion*.

DEJECTION is alſo, and that more ordinarily, applied to the excrements themſelves, thus evacuated; in which ſenſe it is of the ſame import with *ſtool*.

Viſcid, glutinous, or, as ſome call them, *unguinous dejections*, frequent in ſcorbutic diſeaſes, indicate a colliquation of the ſolids of the body.

Among the ſeveral circumſtances from which life and death are prognoſticated, ſtools are none of the leaſt conſiderable. Whether the nature of ſtools in general be good or bad, may be diſcovered, firſt, from their degree of concoction or crudity; ſecondly, from the particular times in which they appear; thirdly, from their ſubſtance; fourthly, from the quantity in which they are diſcharged; fifthly, from the time during which they continue, or the time when they ceaſe; ſixthly, from the advantages with which they are attended, and the eaſe or freedom from pain with which the patient diſcharges them; and in the ſeventh and laſt place, from the train of good or bad ſigns, from which prognoſtics by ſtools derive their certainty.

DEJECTION, in *Aſtrology*, is applied to the planets, when in their detriment, as aſtrologers ſpeak, i. e. when they have loſt their force, or influence, as is pretended, by reaſon of their being in oppoſition to ſome others, which check and counteract them.

Or, it is uſed when a planet is in a ſign oppoſite to that wherein it has its greateſt effect, or influence, which is called its exaltation. Thus, the ſign Aries being the exaltation of the ſun, the ſign Libra is its *dejection*. See EXALTATION.

DEJECTORIA denote purging medicines.

DEIFICATION, in the *Pagan Theology*, the act, or ceremony, of *deifying* their emperors, i. e. of placing them among the gods, and decreeing divine honours to be rendered them. See GOD, and CONSECRATION.

The *deification* is the ſame with APOTHEOSIS.

DEINCLINERS, or DEINCLINING *dials*, are ſuch as both decline, and incline or recline, at the ſame time.

Suppoſe, for inſtance, a plane to cut the prime vertical circle at an angle of 30 degrees, and the horizontal plane under an angle of 24 degrees, the elevation of the pole being 52 degrees; a dial, drawn on this plane, is called a *deincliner*. See DIAL.

DEIPARA, Θεοτοκος. See MOTHER *of God*.

DEIS, or DAGUS, the chief table in a monaſtery. *Solus in refectorio prandebit ſupremus habens vaſtellum, priore prandente ad magnam menſam quam* deis *vulgariter appellamus*.

It is thus called from a cloth called *dais*, with which the tables of kings were covered.

DEISM, the doctrine, or belief, of the *Deiſts*.

Deiſm, from Θεος, *God*, may properly be uſed to denote natural religion, as comprehending thoſe truths which have a real foundation in reaſon and nature; and in this ſenſe it is ſo far from being oppoſite to Chriſtianity, that it is one great deſign of the Goſpel to illuſtrate and enforce it. Thus ſome of the deiſtical writers have affected to uſe it; but *deiſm* more preciſely ſignifies that ſyſtem of religion, relating both to doctrine and practice, which every man is to diſcover for himſelf by the mere force of natural reaſon, independent of all revelation, and excluſive of it; and this religion Dr. Tindal, and others, pretend is ſo perfect, as to be incapable of receiving any addition or improvement, even from divine revelation.

DEISTS, a claſs of people, known alſo under the denomination of *Free-thinkers*, whoſe diſtinguiſhing character it is, not to profeſs any particular form, or ſyſtem, of religion; but only to acknowlege the exiſtence of a God, and to follow the light and law of nature, rejecting revelation, and oppoſing Chriſtianity.

This name ſeems to have been firſt aſſumed, as the denomination of a party, about the middle of the ſixteenth century, by ſome gentlemen in France and Italy, who were deſirous of thus diſguiſing their oppoſition to Chriſtianity by a more honourable appellation than that of atheiſts. Viret, an eminent reformer, mentions certain perſons, in his epiſtle dedicatory, prefixed to the ſecond tome of his Inſtruction Chretienne, publiſhed in 1563, who called themſelves by a new name, that of *Deiſts*. Theſe, he tells us, profeſſed to believe in God, but ſhewed no regard to Jeſus Chriſt, and conſidered the doctrine of the apoſtles and evangeliſts as fables and dreams. He adds, that they laughed at all religion, though they outwardly conformed to the religion of thoſe with whom they lived, or whom they wiſhed to pleaſe, or feared to offend. Some, he obſerves, profeſſed to believe the immortality of the ſoul; others denied both this doctrine, and that of Providence. Many of them were conſidered as perſons of acute and ſubtil genius, and took pains in diſſeminating their notions. See Bayle's Dict. art. VIRET. vol. v. or Leland's View of the Deiſtical Writers, vol. i. p. 2.

The *Deiſts* hold, that, conſidering the multiplicity of religions, the numerous pretences to revelation, and the precarious arguments generally advanced in proof thereof, the beſt and ſureſt way is, to return to the ſimplicity of nature, and the belief of one God; which is the only truth agreed to by all nations.

They complain, that the freedom of thinking and reaſoning is oppreſſed under the yoke of religion; and that the minds of men are ridden, and tyrannized, by the neceſſity impoſed on them of believing inconceivable myſteries; and contend, that nothing ſhould be required to be aſſented to, or believed, but what their reaſon clearly conceives.

The diſtinguiſhing character of modern *Deiſts* is, that they reject all revealed religion, and diſcard all pretences to it, as the effects of impoſture or enthuſiaſm. They profeſs a regard for natural religion, though they are far from being agreed in their notions concerning it. They are claſſed by ſome of their own writers into mortal and immortal *Deiſts*: the latter acknowleging a future ſtate, and the former denying it, or repreſenting it as very uncertain. Oracles of Reaſon, p. 99.

Dr. Clarke diſtinguiſhes four ſorts of *Deiſts*. 1. Thoſe who pretend to believe the exiſtence of an eternal, infinite, independent, intelligent Being, who made the world, without concerning himſelf in the government of it. 2. Thoſe who believe the being and natural providence of God, but deny the difference of actions, as morally good or evil, reſolving it into the arbitrary conſtitution of human laws; and therefore they ſuppoſe that God takes no notice of them. With reſpect to both theſe claſſes, he obſerves, that their opinion can conſiſtently terminate in nothing but downright atheiſm. 3. Thoſe who having right apprehenſions concerning the nature, attributes, and all-governing providence of God, ſeem alſo to have ſome notion of his moral perfections, though they conſider them as tranſcendent, and ſuch in nature and degree, that we can form no true judgment, nor argue with any certainty concerning them: but they deny the immortality of human ſouls, alleging, that men periſh at death, and that the preſent life is the whole of human exiſtence. 4. Thoſe who believe the exiſtence, perfections, and providence of God, the obligations of natural religion, and a ſtate of future retribution, on the evidence of the light of nature, without a divine revelation: ſuch as theſe, he ſays, are the only true *Deiſts*, but their principles, he apprehends, ſhould lead them to embrace Chriſtianity; and therefore he concludes, that there is now no conſiſtent ſcheme of *Deiſm* in the world. Evidence of Nat. and Rev. Religion, p. 12. 27.

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This *delegation* differs from transferring, or tranſlation, becauſe three perſons intervene in a *delegation*, viz. the creditor, the debtor, and a third, who himſelf is indebted to the debtor, and on whom the debtor transfers the obligation he was under to pay the creditor, *delegating* him, as it were, for that purpoſe. But, in a ſimple transfer, it is enough the transferrer and the transferree be preſent.

DELETERIOUS (from δηλεω, *noceo*, *I hurt*), a term ſometimes uſed among naturaliſts, for ſuch things as are of a pernicious and poiſonous nature. See POISON.

DELF, a quarry, or mine, where ſtone or coal is dug. From the Saxon word *delfan*, *to delve*, or *dig*.

DELF *of coal*, denotes coal lying in veins under-ground, before it is dug up.

DELF, or **DELVE** *of coals*, is alſo a certain quantity, dug out of a mine, or pit. See COAL.

DELF is alſo uſed, in *Heraldry*, for one of the abatements of honour; being a ſquare in the middle of the eſcutcheon.

A *delf* tenne was anciently due to him that receded from his own challenge, or any way departed from his parole, or word. If there be two, or more, *delfs* in an eſcutcheon, it is then no longer an abatement: ſo alſo, if it be of metal, or charged upon; it then becomes a charge of perfect bearing.

DELF-*ware*, a kind of pottery of baked earth, covered with an enamel, or white glazing, which gives it the appearance and neatneſs of porcelain. The baſis of this pottery is clay; and the kinds of clay chiefly uſed are the blue and green, with an addition of marle or ſand, in order to leſſen the contraction of the clay, to render it leſs compact, and to afford a better ground for the enamel. Red clay is alſo added, which, on account of its ferruginous matter, binds and gives a greater ſolidity. The proportions of theſe ingredients vary in different works, according to the different qualities of the earths employed. Three parts of blue clay, two of red clay, and five parts of marle, form the compoſition uſed in ſeveral manufactories. Veſſels formed of theſe materials muſt be dried very gently, to avoid cracking. They are then to be placed in a furnace to receive a ſlight baking, and they are laſtly to be covered with an enamel or glazing, which is done by pouring upon the veſſels thus prepared, the enamel, which has been ground very fine, and diluted with water. The glazing, which is nothing but white enamel, ought to be ſo opake as not to ſhew the ware under it. The enamels for *delf-ware* are compoſed of ſand or flints, vitrifying ſalts, calx of lead, and calx of tin. The vitrification of ſand is effected by ſomewhat leſs than an equal part of alkaline ſalt, or twice its weight of calx of lead, and one part of calx of tin, which is deſigned for giving a white opake colour to the maſs, is to be added to three or four parts of all the other ingredients taken together. M. D'Antic recommends for the white enamel uſed in glazing a mixture of a hundred pounds of calx of lead, with about a ſeventh part of that quantity of calx of tin for common *delf*, or a fourth part of calx of tin for the fineſt *delf*; a hundred, or a hundred and ten pounds of fine ſand; and about twenty or thirty pounds of ſea-ſalt, or ſalt of glaſs. To make this enamel, lead and tin are calcined together with a ſtrong fire, and the ſand is alſo to be made into a fritt with the ſalt or aſhes. The whole, being well mixed and ground together, is placed under the furnace, where it is melted and vitrified during the baking of the ware. Then it is to be ground in a mill, and applied as above directed. Dict. of Chem. Eng. edit. 1777. See ENAMEL, GLAZING, and PORCELAIN.

DELIA, Δηλια, in *Antiquity*, a quinquennial feſtival in the iſland of Delos, inſtituted by Theſeus in honour of Venus. Pott. Archæol. Græc. lib. ii. cap. 20.

DELIA, in *Antiquity*, feaſts celebrated by the Athenians, in honour of Apollo, ſurnamed *Delius*.

The principal ceremony in this feaſt, was an embaſſy, or rather a pilgrimage, to Apollo of Delos, performed every five years, by a certain number of citizens, deputed for that purpoſe, and called *Deliaſtæ*, Δηλιαςαι, or *Theori*, Θεωροι, q. d. the *ſeers*; and the firſt perſon of the embaſſy, or deputation, *Architheorous*, Αρχιθεωρος. To him were added four more of the family of the *Ceryci*, prieſts deſcended from Mercury, who reſided all the year at Delos, to aſſiſt in the temple. The whole deputation ſet out in five veſſels, carrying with them every thing neceſſary for the feaſt, and the ſacrifices.

The *Deliaſts*, who went abroad, were crowned with laurel. At their arrival, they immediately offered a ſacrifice to Apollo: and, after the ſacrifice, a number of young maids danced round the altar, a dance called in Greek Γερανος, wherein, by their various motions, and directions, they repreſented the turnings and windings of a labyrinth. When the *Deliaſts* returned to Athens, the people went out to meet them, and received them with all the joy and acclamation imaginable. They never laid aſide their crown till their commiſſion was fully completed; and then they conſecrated it to ſome god in his temple.

The whole time of their going and returning, with all the ceremonies of their embaſſy, was called the *Delia*; during which time no criminal might be executed, which was a peculiar privilege of this feaſt, not allowed to any other, not even thoſe of Jupiter. Thus, Plutarch obſerves, that it was a day conſecrated to Jupiter, when Phocion was made to take the poiſon to which he was condemned; whereas they waited thirty days to give it to Socrates, by reaſon of the *Delia*.

According to Thucydides, the *Delia* were firſt inſtituted in the ſixth year of the Peloponneſian war, after the

Athenians had extirpated the iſle of Delos, removed all the tombs out of it, and ordained, that nobody ſhould either be born or die in it; but that all the ſick people ſhould be removed into a little iſland, called Rhenia: though the Ionians, and the neighbouring iſlanders of Ionia, had long before that time held a ſort of *Delia*; that is, feaſts and games, like thoſe which the Athenians celebrated afterwards.

DELIAC, Deliacus, among the *Ancients*, denoted a poulterer; or a perſon who ſold fowls, fatted capons, &c.

The traders in this way were called *Deliaci*; the people of the iſle of Delos firſt practiſed this occupation. They alſo ſold eggs, as appears from Cicero, in his Academic Queſtions, lib. iv. Pliny, lib. x. cap. 30. and Columella, lib. viii. cap. 8. likewiſe mention the *Deliaci*.

DELIACAL *problem*, *problema* Deliacum, a famous problem among the ancients, concerning the duplication of the cube. See Duplication.

DELIAS, Δηλιας, in *Antiquity*, the name of the ſhip in which the Delian proceſſion was annually made by the Athenians. See Delia.

DELIBAMENTA, in *Antiquity*, a libation offered to the infernal gods, which was always poured downwards; hence this act was expreſſed by the word *defundere*.

DELIBERATIVE, is applied to that kind, or branch, of rhetoric employed in proving a thing, or convincing an aſſembly thereof, in order to oblige them to put it in execution.

The *deliberative* kind was much in vogue among the Greeks and Romans, when the orators harangued the people.

To have a *deliberative* voice in the aſſembly, is when a perſon has a right to give his advice, and his vote, therein. In councils, the biſhops have *deliberative* voices; thoſe beneath them have only conſultative voices.

DELICT, in the *Law of Scotland*, is uſed to expreſs an offence of an inferior degree to a crime, to be puniſhed only by the effect of a civil action, for reparation of private damage.

DELIGATION, *Deligatio*, that part of ſurgery which relates to the binding up of wounds, ulcers, broken bones, &c.

That bandages are very uſeful, and even neceſſary, for curing the diſorders of the human body, is evident not only from the teſtimony of Hippocrates, Galen, and other eminent phyſicians; but alſo from this, that there can ſcarcely be any operation in ſurgery performed ſucceſsfully without their aſſiſtance. For ſhould a ſurgeon perform an operation with the greateſt judgment and care, but miſcarry in the application of the bandage, all his endeavours would be to no purpoſe: and more eſpecially in the treatment of wounds, fractures, luxations, and amputations. And we often find that in fractures and luxations, after a proper reduction of the parts, the cure depends more on a ſkilful application of the bandage, to the part affected, than on the medicines. In the caſe of violent hæmorrhages, a proper application of the bandage and compreſſes, proves the moſt effectual and ſpeedy remedy, as muſt be acknowleged by every one who has any ſkill in ſurgery: not to mention, that the making and applying a bandage after a genteel and ready manner, is juſtly reckoned among the good qualifications of a ſurgeon; as it gains him the eſteem of the ſpectators, and the confidence of the patient, which is of great influence in forwarding the cure: for both the one and the other judge of a ſurgeon's abilities by his performance on ſuch occaſions. See Bandage.

DELILERS, a kind of Turkiſh huſſars, collected from Servia, Bulgaria, and Croatia. They are violent and furious, whence their name, and diſorderly in their attack, which ſome have aſcribed to their belief of predeſtination. Encycl.

DELIMA, in *Botany*, a genus of the *polyandria monogynia* claſs. This genus has no corolla, the calyx is five-leaved, and the fruit is a double-ſeeded berry.

DELINEATING. See Designing.

DELINQUENT, a perſon who has committed ſome fault, or offence.

It is the buſineſs of a magiſtrate to be ſevere in puniſhing *delinquents*.

DELIQUESCENCE, in *Chemiſtry*, denotes the property which certain bodies poſſeſs of attracting moiſture from the air, and of thereby becoming liquid. It is peculiar to ſaline ſubſtances, or bodies containing them, and reſults from their affinity with water. See Deliquium.

DELIQUIUM, or Deliquium *animi*, from *delinquo*, *I ſwoon*, a ſwooning, or fainting away; called alſo ſyncope, lipothymia, lipopſychia, eclyſis, and aſphyxia.

Deliquium, from *deliqueſco*, *to be diſſolved*, in *Chemiſtry*, is the diſſolution, or melting, of a ſalt, or calx, by ſuſpending it in a moiſt cellar.

Salt of tartar, or any fixed alkali, ſet in a cellar, or other cool moiſt place, and in an open veſſel, reſolves, or runs, into a kind of liquor, called by the chemiſts oil of tartar *per deliquium*.

Deliquium is alſo uſed, in ſome authors, for a diſtillation by means of fire. See Distillation.

DELIRIUM, light-headedneſs, in *Medicine*, a ſymptom frequent in fevers, cauſed by internal inflammations, wounds, &c. whereby the mind is diſordered to a degree of folly, or even phrenſy.

Some derive the word from *de*, and *lira*; which, among the ancients, ſignified a furrow drawn in a right line; whence *delirare*, *a recto aberrare*.

Deliriums alſo frequently ariſe from immoderate loſſes of blood, whereby the brain is too much weakened; from the ſtings of venomous beaſts; from the ſeed, or menſes, being retained in the womb; from the rotting of a gangrened member, &c.

A diſorder in the diaphragm commonly produces a *delirium*.

There are various ſpecies and degrees of *deliriums*. In ſome the patient is fierce and outrageous; in others more mild and eaſy, offering no violence to any body, but only indulging idle, ridiculous diſcourſe; ſome laugh and ſing; others cry and are ſullen, &c.

As it is good for a patient under all diſorders of the body, to have his mind untouched, or to have all his actions under the command of the ruling faculty, as at other times; ſo, on the contrary, to be in any manner delirious, or to be deprived in whole or in part of the uſe of his reaſon, is a bad prognoſtic; and in acute diſeaſes often portends death. James.

DELIVERY, *Parturition*, or *child-birth*, the bringing forth of a perfect fœtus, or child, out of its mother's womb; whether it be living or dead. See Foetus, Birth, &c.

To a natural *delivery*, according to the phyſicians, are required three conditions: firſt, that both the mother and the child ſtrive alike, the one to *deliver*, and the other to be *delivered*: the ſecond, that it come into the world head foremoſt, which is its natural poſture: and the third, that it be quick and eaſy, without ill accidents.

When the child preſents its feet foremoſt, or comes acroſs or double, it is no natural *delivery*; and the Latins call ſuch children *agrippæ*, q. d. *ægre parti*.

A *legitimate delivery* is that which happens at the juſt term, i. e. in the tenth lunar month; and an *illegitimate*, that which comes either ſooner, or later; as in the eighth, or after the tenth. Hoffman ſays, that the uſual time of geſtation is nine ſolar months. Junker is of opinion, that the natural time of *delivery* is in the fortieth week, from the firſt ſuppreſſion of the menſes, or the twentieth, or twenty-firſt, from the time when the motion of the fœtus is firſt perceived; and he adds, that it is a good omen if the time of *delivery* be at or near that of the uſual diſcharge of the menſes in a ſtate of health.

Women are indeed *delivered* at ſeven, eight, nine, ten, and eleven months, and not later: though there are ſome phyſicians who hold, that a *delivery* may be regular in the fourteenth month.

It has been obſerved, that *deliveries* are more happy in the ſeventh month than in the eighth, i. e. that the child is eaſier ſaved, and more frequently lives, when it comes in the ſeventh than when in the eighth month.

Monſ. Peyſonnel, a phyſician of Lyons, has a Latin treatiſe expreſly *on the term of delivery*; wherein he undertakes to reconcile all the apparent contradictions of Hippocrates, with reſpect to it. He holds, that the ſhorteſt term of a *legitimate* birth, according to Hippocrates, is a hundred and eighty-two days, or ſix complete months; and the longeſt two hundred and eighty days, or nine months, and ten days; and that the children who come earlier, or later, than thoſe terms, do not live, or are not *legitimate*.

Delivery, *ſymptoms*, *cauſes*, *and proceſs of*. Beſides the more deciſive ſymptoms of approaching *delivery*, women in theſe circumſtances are ſubject to pains, which are called falſe and ſpurious. They exhauſt the ſtrength of the patient without promoting the birth: pains of this kind may be diſtinguiſhed from true labour pains, by their being of a flatulent kind, and running ſometimes tranſverſely acroſs the abdomen, and ſometimes upwards from it towards the breaſt; they are uſually owing to coſtiveneſs, a purging, or a plethora. If the *os tincæ* is ſhut during theſe pains, it may be concluded that they are falſe; and if the patient is coſtive, a clyſter ſhould be adminiſtered; if a purging attends them, gentle opiates will relieve; and if a plethora, bleeding will be proper. Some have recommended ſtimulating cordials; but others have obſerved, that true labour pains are beſt promoted by opium. The true ſymptoms of approaching *delivery*, and the proceſs of it, are as follow. Some days before the labour commences, the contents of the belly ſink, and its ſize is apparently diminiſhed: ſoon after pains are felt, which are at firſt ſlight, and return at deny the immortality of human ſouls, alleging, that men periſh at death, and that the preſent life is the whole of human exiſtence. 4. Thoſe who believe the exiſtence, perfections, and providence of God, the obligations of natural religion, and a ſtate of future retribution, on the evidence of the light of nature, without a divine revelation: ſuch as theſe, he ſays, are the only true *Deiſts*, but their principles, he apprehends, ſhould lead them to embrace Chriſtianity; and therefore he concludes, that there is now no conſiſtent ſcheme of *Deiſm* in the world. Evidence of Nat. and Rev. Religion, p. 12. 27.

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DELEGATION, a commiſſion extraordinary given a judge to take cognizance of and determine ſome cauſe, which ordinarily does not come before him.

In the civil law, *delegation* alſo denotes a ſort of ſurrender, whereby a perſon ſubſtitutes another debtor in his place. See Ulpian. l. 11. ff. *de novationibus & delegationibus*.

This *delegation* differs from transferring, or tranſlation, becauſe three perſons intervene in a *delegation*, viz. the creditor, the debtor, and a third, who himſelf is indebted to the debtor, and on whom the debtor transfers the obligation he was under to pay the creditor, *delegating* him, as it were, for that purpoſe. But, in a ſimple transfer, it is enough the transferrer and the transferree be preſent.

DELETERIOUS (from δηλεω, *noceo*, *I hurt*), a term ſometimes uſed among naturaliſts, for ſuch things as are of a pernicious and poiſonous nature. See POISON.

DELF, a quarry, or mine, where ſtone or coal is dug. From the Saxon word *delfan*, *to delve*, or *dig*.

DELF *of coal*, denotes coal lying in veins under-ground, before it is dug up.

DELF, or **DELVE** *of coals*, is alſo a certain quantity, dug out of a mine, or pit. See COAL.

DELF is alſo uſed, in *Heraldry*, for one of the abatements of honour; being a ſquare in the middle of the eſcutcheon.

A *delf* tenne was anciently due to him that receded from his own challenge, or any way departed from his parole, or word. If there be two, or more, *delfs* in an eſcutcheon, it is then no longer an abatement: ſo alſo, if it be of metal, or charged upon; it then becomes a charge of perfect bearing.

DELF-*ware*, a kind of pottery of baked earth, covered with an enamel, or white glazing, which gives it the appearance and neatneſs of porcelain. The baſis of this pottery is clay; and the kinds of clay chiefly uſed are the blue and green, with an addition of marle or ſand, in order to leſſen the contraction of the clay, to render it leſs compact, and to afford a better ground for the enamel. Red clay is alſo added, which, on account of its ferruginous matter, binds and gives a greater ſolidity. The proportions of theſe ingredients vary in different works, according to the different qualities of the earths employed. Three parts of blue clay, two of red clay, and five parts of marle, form the compoſition uſed in ſeveral manufactories. Veſſels formed of theſe materials muſt be dried very gently, to avoid cracking. They are then to be placed in a furnace to receive a ſlight baking, and they are laſtly to be covered with an enamel or glazing, which is done by pouring upon the veſſels thus prepared, the enamel, which has been ground very fine, and diluted with water. The glazing, which is nothing but white enamel, ought to be ſo opake as not to ſhew the ware under it. The enamels for *delf-ware* are compoſed of ſand or flints, vitrifying ſalts, calx of lead, and calx of tin. The vitrification of ſand is effected by ſomewhat leſs than an equal part of alkaline ſalt, or twice its weight of calx of lead, and one part of calx of tin, which is deſigned for giving a white opake colour to the maſs, is to be added to three or four parts of all the other ingredients taken together. M. D'Antic recommends for the white enamel uſed in glazing a mixture of a hundred pounds of calx of lead, with about a ſeventh part of that quantity of calx of tin for common *delf*, or a fourth part of calx of tin for the fineſt *delf*; a hundred, or a hundred and ten pounds of fine ſand; and about twenty or thirty pounds of ſea-ſalt, or ſalt of glaſs. To make this enamel, lead and tin are calcined together with a ſtrong fire, and the ſand is alſo to be made into a fritt with the ſalt or aſhes. The whole, being well mixed and ground together, is placed under the furnace, where it is melted and vitrified during the baking of the ware. Then it is to be ground in a mill, and applied as above directed. Dict. of Chem. Eng. edit. 1777. See ENAMEL, GLAZING, and PORCELAIN.

DELIA, Δηλια, in *Antiquity*, a quinquennial feſtival in the iſland of Delos, inſtituted by Theſeus in honour of Venus. Pott. Archæol. Græc. lib. ii. cap. 20.

DELIA, in *Antiquity*, feaſts celebrated by the Athenians, in honour of Apollo, ſurnamed *Delius*.

The principal ceremony in this feaſt, was an embaſſy, or rather a pilgrimage, to Apollo of Delos, performed every five years, by a certain number of citizens, deputed for that purpoſe, and called *Deliaſtæ*, Δηλιαςαι, or *Theori*, Θεωροι, q. d. the *ſeers*; and the firſt perſon of the embaſſy, or deputation, *Architheorous*, Αρχιθεωρος. To him were added four more of the family of the *Ceryci*, prieſts deſcended from Mercury, who reſided all the year at Delos, to aſſiſt in the temple. The whole deputation ſet out in five veſſels, carrying with them every thing neceſſary for the feaſt, and the ſacrifices.

The *Deliaſts*, who went abroad, were crowned with laurel. At their arrival, they immediately offered a ſacrifice to Apollo: and, after the ſacrifice, a number of young maids danced round the altar, a dance called in Greek Γερανος, wherein, by their various motions, and directions, they repreſented the turnings and windings of a labyrinth. When the *Deliaſts* returned to Athens, the people went out to meet them, and received them with all the joy and acclamation imaginable. They never laid aſide their crown till their commiſſion was fully completed; and then they conſecrated it to ſome god in his temple.

The whole time of their going and returning, with all the ceremonies of their embaſſy, was called the *Delia*; during which time no criminal might be executed, which was a peculiar privilege of this feaſt, not allowed to any other, not even thoſe of Jupiter. Thus, Plutarch obſerves, that it was a day conſecrated to Jupiter, when Phocion was made to take the poiſon to which he was condemned; whereas they waited thirty days to give it to Socrates, by reaſon of the *Delia*.

According to Thucydides, the *Delia* were firſt inſtituted in the ſixth year of the Peloponneſian war, after the

Athenians had extirpated the iſle of Delos, removed all the tombs out of it, and ordained, that nobody ſhould either be born or die in it; but that all the ſick people ſhould be removed into a little iſland, called Rhenia: though the Ionians, and the neighbouring iſlanders of Ionia, had long before that time held a ſort of *Delia*; that is, feaſts and games, like thoſe which the Athenians celebrated afterwards.

DELIAC, DELIACUS, among the *Ancients*, denoted a poulterer; or a perſon who ſold fowls, fatted capons, &c.

The traders in this way were called *Deliaci*; the people of the iſle of Delos firſt practiſed this occupation. They alſo ſold eggs, as appears from Cicero, in his Academic Queſtions, lib. iv. Pliny, lib. x. cap. 30. and Columella, lib. viii. cap. 8. likewiſe mention the *Deliaci*.

DELIACAL *problem, problema* DELIACUM, a famous problem among the ancients, concerning the duplication of the cube. See DUPLICATION.

DELIAS, Δηλιας, in *Antiquity*, the name of the ſhip in which the Delian proceſſion was annually made by the Athenians. See DELIA.

DELIBAMENTA, in *Antiquity*, a libation offered to the infernal gods, which was always poured downwards; hence this act was expreſſed by the word *defundere*.

DELIBERATIVE, is applied to that kind, or branch, of rhetoric employed in proving a thing, or convincing an aſſembly thereof, in order to oblige them to put it in execution.

The *deliberative* kind was much in vogue among the Greeks and Romans, when the orators harangued the people.

To have a *deliberative* voice in the aſſembly, is when a perſon has a right to give his advice, and his vote, therein. In councils, the biſhops have *deliberative* voices; thoſe beneath them have only conſultative voices.

DELICT, in the *Law of Scotland*, is uſed to expreſs an offence of an inferior degree to a crime, to be puniſhed only by the effect of a civil action, for reparation of private damage.

DELIGATION, *Deligatio*, that part of ſurgery which relates to the binding up of wounds, ulcers, broken bones, &c.

That bandages are very uſeful, and even neceſſary, for curing the diſorders of the human body, is evident not only from the teſtimony of Hippocrates, Galen, and other eminent phyſicians; but alſo from this, that there can ſcarcely be any operation in ſurgery performed ſucceſsfully without their aſſiſtance. For ſhould a ſurgeon perform an operation with the greateſt judgment and care, but miſcarry in the application of the bandage, all his endeavours would be to no purpoſe: and more eſpecially in the treatment of wounds, fractures, luxations, and amputations. And we often find that in fractures and luxations, after a proper reduction of the parts, the cure depends more on a ſkilful application of the bandage, to the part affected, than on the medicines. In the caſe of violent hæmorrhages, a proper application of the bandage and compreſſes, proves the moſt effectual and ſpeedy remedy, as muſt be acknowleged by every one who has any ſkill in ſurgery: not to mention, that the making and applying a bandage after a genteel and ready manner, is juſtly reckoned among the good qualifications of a ſurgeon; as it gains him the eſteem of the ſpectators, and the confidence of the patient, which is of great influence in forwarding the cure: for both the one and the other judge of a ſurgeon's abilities by his performance on ſuch occaſions. See BANDAGE.

DELILERS, a kind of Turkiſh huſſars, collected from Servia, Bulgaria, and Croatia. They are violent and furious, whence their name, and diſorderly in their attack, which ſome have aſcribed to their belief of predeſtination. Encycl.

DELIMA, in *Botany*, a genus of the *polyandria monogynia* claſs. This genus has no corolla, the calyx is five-leaved, and the fruit is a double-ſeeded berry.

DELINEATING. See DESIGNING.

DELINQUENT, a perſon who has committed ſome fault, or offence.

It is the buſineſs of a magiſtrate to be ſevere in puniſhing *delinquents*.

DELIQUESCENCE, in *Chemiſtry*, denotes the property which certain bodies poſſeſs of attracting moiſture from the air, and of thereby becoming liquid. It is peculiar to ſaline ſubſtances, or bodies containing them, and reſults from their AFFINITY with water. See DELIQUIUM.

DELIQUIUM, or DELIQUIUM *animi*, from *delinquo, I ſwoon*, a ſwooning, or fainting away; called alſo ſyncope, lipothymia, lipopſychia, eclyſis, and aſphyxia.

DELIQUIUM, from *deliqueſco, to be diſſolved*, in *Chemiſtry*, is the diſſolution, or melting, of a ſalt, or calx, by ſuſpending it in a moiſt cellar.

Salt of tartar, or any fixed alkali, ſet in a cellar, or other cool moiſt place, and in an open veſſel, reſolves, or runs, into a kind of liquor, called by the chemiſts oil of tartar *per deliquium*.

DELIQUIUM is alſo uſed, in ſome authors, for a diſtillation by means of fire. See DISTILLATION.

DELIRIUM, light-headedneſs, in *Medicine*, a ſymptom frequent in fevers, cauſed by internal inflammations, wounds, &c. whereby the mind is diſordered to a degree of folly, or even phrenſy.

Some derive the word from *de*, and *lira*; which, among the ancients, ſignified a furrow drawn in a right line; whence *delirare, a recto aberrare*.

Deliriums alſo frequently ariſe from immoderate loſſes of blood, whereby the brain is too much weakened; from the ſtings of venomous beaſts; from the ſeed, or menſes, being retained in the womb; from the rotting of a gangrened member, &c.

A diſorder in the diaphragm commonly produces a *delirium*.

There are various ſpecies and degrees of *deliriums*. In ſome the patient is fierce and outrageous; in others more mild and eaſy, offering no violence to any body, but only indulging idle, ridiculous diſcourſe; ſome laugh and ſing; others cry and are ſullen, &c.

As it is good for a patient under all diſorders of the body, to have his mind untouched, or to have all his actions under the command of the ruling faculty, as at other times; ſo, on the contrary, to be in any manner delirious, or to be deprived in whole or in part of the uſe of his reaſon, is a bad prognoſtic; and in acute diſeaſes often portends death. James.

DELIVERY, *Parturition*, or *child-birth*, the bringing forth of a perfect fœtus, or child, out of its mother's womb; whether it be living or dead. See FOETUS, BIRTH, &c.

To a natural *delivery*, according to the phyſicians, are required three conditions: firſt, that both the mother and the child ſtrive alike, the one to *deliver*, and the other to be *delivered*: the ſecond, that it come into the world head foremoſt, which is its natural poſture: and the third, that it be quick and eaſy, without ill accidents.

When the child preſents its feet foremoſt, or comes acroſs or double, it is no natural *delivery*; and the Latins call ſuch children *agrippæ*, q. d. *ægre parti*.

A *legitimate delivery* is that which happens at the juſt term, i. e. in the tenth lunar month; and an *illegitimate*, that which comes either ſooner, or later; as in the eighth, or after the tenth. Hoffman ſays, that the uſual time of geſtation is nine ſolar months. Junker is of opinion, that the natural time of *delivery* is in the fortieth week, from the firſt ſuppreſſion of the menſes, or the twentieth, or twenty-firſt, from the time when the motion of the fœtus is firſt perceived; and he adds, that it is a good omen if the time of *delivery* be at or near that of the uſual diſcharge of the menſes in a ſtate of health. Women are indeed *delivered* at ſeven, eight, nine, ten, and eleven months, and not later: though there are ſome phyſicians who hold, that a *delivery* may be regular in the fourteenth month.

It has been obſerved, that *deliveries* are more happy in the ſeventh month than in the eighth, i. e. that the child is eaſier ſaved, and more frequently lives, when it comes in the ſeventh than when in the eighth month.

Monſ. Peyſſonel, a phyſician of Lyons, has a Latin treatiſe expreſsly *on the term of delivery*; wherein he undertakes to reconcile all the apparent contradictions of Hippocrates, with reſpect to it. He holds, that the ſhorteſt term of a *legitimate* birth, according to Hippocrates, is a hundred and eighty-two days, or ſix complete months; and the longeſt two hundred and eighty days, or nine months, and ten days; and that the children who come earlier, or later, than thoſe terms, do not live, or are not *legitimate*.

DELIVERY, *ſymptoms, cauſes, and proceſs of.* Beſides the more deciſive ſymptoms of approaching *delivery*, women in theſe circumſtances are ſubject to pains, which are called falſe and ſpurious. They exhauſt the ſtrength of the patient without promoting the birth: pains of this kind may be diſtinguiſhed from true labour pains, by their being of a flatulent kind, and running ſometimes tranſverſely acroſs the abdomen, and ſometimes upwards from it towards the breaſt; they are uſually owing to coſtiveneſs, a purging, or a plethora. If the *os tincæ* is ſhut during theſe pains, it may be concluded that they are falſe; and if the patient is coſtive, a clyſter ſhould be adminiſtered; if a purging attends them, gentle opiates will relieve; and if a plethora, bleeding will be proper. Some have recommended ſtimulating cordials; but others have obſerved, that true labour pains are beſt promoted by opium. The true ſymptoms of approaching *delivery*, and the proceſs of it, are as follow. Some days before the labour commences, the contents of the belly ſink, and its ſize is apparently diminiſhed: ſoon after pains are felt, which are at firſt ſlight, and return at conſiderable intervals; in conſequence of theſe the uterus begins to contract, and a mucous matter is diſcharged from the vagina; then the pains return quicker, continue longer, and are more ſevere; the pulſe is affected, the ſkin becomes hotter, the face reddens, and a general agitation follows; the mucus is tinged with blood; the *os tincæ* opens, and its edges grow thin; the membranes protrude with the waters, dilating and widening the orifice. The child, at the inſtant of pain, is raiſed by the compreſſed waters from the *os internum* towards the fundus, whilſt the uterus itſelf deſcends by degrees into the inferior baſin. When the pain ceaſes each time, the womb riſes, the tumor formed by the membranes diſappears, the *os tincæ* is relaxed, and the diameter diminiſhed; the child falls upon the lower part of the womb, and may be eaſily diſtinguiſhed, as well as the part that preſents itſelf to the paſſage, through the relaxed membranes. Towards the end of labour, the pains ſucceed more rapidly, and with greater violence; at firſt they uſually begin in the ſmall of the back, and terminate about the pudenda, but now they begin in the *regio umbilicalis*, and die away towards the fundament, where they commonly leave a ſenſibility of weight. The tumor formed by the waters diſtending the membranes below the mouth of the womb, dilates the parts, till at length it burſts, and diſcharges the waters. If the child's head preſents fairly, it ſtops the diſcharge of the waters. Sometimes the ſame effort which burſts the membranes, expels the infant, and terminates labour. At other times, the interval is long before the *delivery* of the child. The head of the child, having paſſed the *os internum*, enters the vagina, which widens in proportion as it ſhortens; the perinæum is much ſtretched, and the frenulum ſometimes torn in the paſſage; the nymphæ are obliterated, and the labia pudendi turned inward, and confounded in the general diſtenſion. At length the head forces the *os externum*, and the body readily follows, with the reſt of the waters mixed with blood. In this laſt period the woman trembles, and is convulſed, but is ſoon relieved by the expulſion of the child; ſome time after which, returning efforts are exerted for the excluſion of the PLACENTA.

The proximate cauſe of *delivery* is the contraction and compreſſion of the womb, which is muſcular and reticulated, formed of fibres running parallel on its inner ſurface from the fundus to the neck, of others croſſing theſe diagonally, and of others again horizontally interlaced, and cloſely wove towards the fundus; and the irritation which the womb ſuffers at the end of pregnancy from the increaſed bulk of the fœtus, and the conſequent dilatation of the uterine fibres beyond their limited dimenſions, is the remote cauſe of *delivery*. For a recital of the principal circumſtances attending *delivery* in caſes of difficult and preternatural labour, ſee LABOUR.

In order to *delivery* in a natural labour, the moſt convenient poſture both for the woman and her aſſiſtant, is that of lying on her left-ſide upon a bed, with the knees drawn up towards the belly. The perſon who aſſiſts on this occaſion ſhould be attentive and patient, and watch every opportunity of aiding the efforts of nature, without forcing them. Whenever he examines the patient by touch, in order to know the ſtate of the uterus, he ſhould convey a ſmall portion of ſome oily matter, as ſoft pomatum, &c. into the vagina, to anoint the mouth of the uterus, that it may dilate itſelf with greater eaſe and expedition. When the infant preſents itſelf for birth, he may gently draw it forward, obſerving that it is not in any part entangled by the navel-ſtring. When it is brought alive into the world, it ſhould be laid on its ſide, that it may breathe more freely, and have its face kept out of the waters, &c. diſcharged, during the *delivery*. If after the *delivery* of one child, the uterus is much diſtended, and the operator upon touch finds another ſet of membranes, he may conclude that another child remains in the uterus; he ſhould therefore tie the navel-ſtring of the firſt in two places, and wait for pains coming on to deliver the next, unleſs it preſents itſelf in a bad poſition, in which caſe it ſhould be brought away by the feet. But if after the *delivery* of one child, the uterus is contracted into a firm hard ball above the *os pubis*, he may infer that there is not another, and proceed to bring away the ſecundines. When the infant is diſengaged from the navel-ſtring, which now hangs out of the vagina, the operator ſhould twiſt it about two or three fingers of his left-hand, then paſſing his right-hand up the vagina, he muſt, with his thumb and fore-finger, hold the navel-ſtring as near the ſecundines as he poſſibly can; and if on drawing the navel-ſtring gently, he perceives the after-birth advancing gradually, there is hope that he may ſoon bring it away. If, on the contrary, he perceives, that it does not in the leaſt yield to his attempts, it adheres too ſtrongly to the uterus; in this caſe he muſt draw the navel-ſtring ſometimes to the right, and ſometimes to the left, in order gradually to diſengage the ſecundines. But this muſt be done gently, and without the leaſt violence. If, through inadvertence and precipitation, the navel-ſtring ſhould be pulled with violence, it might be broke, which would render the extraction of the after-birth very difficult; or the ſecundines being forcibly ſeparated from the uterus might occaſion an hæmorrhage, in conſequence of a rupture of the veſſels of the womb, or it might bring along with it the bottom of the womb; a falling down of which often occaſions the death of the mother. See SECUNDINE.

As ſoon as the woman is delivered, the parts of generation ſhould be covered with a moderately warm cloth, conſiſting of ſeveral folds. She is to be kept warm in bed, and left for ſome time in a ſtate of repoſe. James, and Motherby's Med. Dict. See LABOUR, LYING-IN, PREGNANCY, &c. &c.

Bartholine has compoſed a book, De Inſolitis Partus Viis, on the extraordinary paſſages of the fœtus; where he gives divers inſtances of very extraordinary *deliveries*. Some have been delivered by the navel, and others by the anus. See Salmuth, Obſ. 94. Cent. 3. Phil. Tranſ. N° 416. p. 435.

In the year 1686, at Leckerkerck, eight or ten leagues from the Hague, the wife of one Chriſtian Claes was *delivered* of five children: the firſt was a boy, who lived two months; ſeventeen hours afterwards came a ſecond ſon, who was dead; twenty-four hours afterwards a third ſon was born, who lived about two hours; in twenty-four hours more ſhe had a fourth, dead: laſtly, ſhe died in bringing forth the fifth, who died alſo in the birth.

DELIVERY, in *Law*, is an eſſential requiſite of a valid DEED, which is done by the party himſelf, or his attorney, lawfully authorized, and expreſſed in the atteſtation. This *delivery* is either abſolute, i. e. to the party or granter himſelf; or conditional, to a third perſon to hold, till ſome conditions be performed on the part of the granter.

DELPHIN, in *Literary Hiſtory*. See DAUPHINS.

DELPHINIA, in *Antiquity*, feaſts which the inhabitants of Egina celebrated in honour of Apollo, ſurnamed Delphinius, ſo called, as it is pretended, becauſe he aſſumed the form of a dolphin to conduct Caſtalius and his colony from the iſle of Crete to the *Sinus Criſſæus Delphinium*, one of the courts of judicature of the Athenians; ſo called from the proximity of the place, where they held their aſſemblies, to the temple of Apollo Delphinius.

DELPHINIUM, in *Botany*. See LARKSPUR.

DELPHINUS, the *Dolphin*, in *Aſtronomy*, a conſtellation of the northern hemiſphere; whoſe ſtars, according to Ptolemy, are 10; according to Tycho, as many; according to Hevelius 14; and, according to Mr. Flamſteed, 18. The longitudes, latitudes, magnitudes, &c. whereof, are as follow:

Names and ſituations of the ſtars.	Bayer's Cha.	Signs.	Longitud.			Latitude. N.			Magnitude.
			°	′	″	°	′	″	
		♒	8	49	50	28	54	38	6
Firſt of three in the tail	ι		9	44	27	29	6	21	3
Between the tail and the preceding rhombus	η		10	30	6	30	42	6	6
That immediately preced. the tail	ζ		11	27	4	32	10	27	5
North of the following in the tail	ι		11	00	18	28	51	3	6
5.									
Preced. ſouth in the rhombus	β		12	1	14	31	56	52	3
South of the follow. in the tail	κ		10	54	6	27	31	40	6
Between the tail and the hind rhombus	θ		11	54	5	30	38	14	6
North of preced. in the rhombus	α		13	3	24	33	2	58	3
			13	2	25	31	39	48	6
10.									
South in the hind rhombus	δ		13	48	7	31	58	12	3.4
North of the following	γ		15	3	41	32	44	32	3
			11	54	12	23	00	5	5
Informes following the *Dolphin* towards *equuleus*			13	00	33	24	37	30	6
			14	28	25	29	7	5	6
15.									
			16	7	40	28	40	19	6
			16	31	5	29	46	35	6
		♒	16	15	57	26	49	5	6

DELPHINUS, in *Ichthyology*. See DOLPHIN.

DELPHOS, in *Antiquity*, now called Caſtri, the capital of Phocis in Achaia; anciently much celebrated for its temple, and oracle of Apollo. This temple was a magnificent ſtructure, enriched with innumerable gifts; in it was the dark cave Pythium, where the prieſteſs, named PYTHIA, ſitting on a tripos, or three-legged ſtool, pretended to receive the inſpiration of the god, ſwelling, foaming, and raving, like one diſtracted. The anſwers were always ambiguous, and ſo myſterious, that it was difficult to underſtand them; yet were they plainer than others; for Hermes the philoſopher ſays, that thoſe who did not underſtand the anſwers given at Dodona, came hither for an explanation. *Delphos* ſtands in the middle of Greece, and was by the ancients called the navel of the earth; the poets ſaying, that Jupiter let fly two eagles, the one from the eaſt, and the other from the weſt, that he might diſcover the middle; and that thoſe eagles met at this place. At preſent the town of Caſtri does not conſiſt of above two hundred houſes, and thoſe very ill built. It ſtands between Salena and Livadia, about ten miles diſtant from the latter, on the ſouth ſide of mount Parnaſſus, ſo famous in antiquity, and ſacred to the Muſes and Apollo.

DELTOIDES, in *Anatomy*, a triangular muſcle of the ſhoulder; thus called from the Greek *delta*, Δ, and *ειδος*, *form*. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 21. *fig.* 6. *n.* 10. It ariſes exactly oppoſite to the trapezius, from one third part of the clavicula, from the acromium, and ſpine of the ſcapula, and is inſerted tendinous into the middle of the os humeri, which bone it lifts up directly; and it aſſiſts, with the ſupra-ſpinatus, and coracobrachialis, in all the actions of the humerus, except the depreſſion; it being convenient, that the arm ſhould be raiſed and ſuſtained, in order to its moving on any ſide.

DELTOIDE *leaf*, among *Botaniſts*. See LEAF.

DELTOTON, a conſtellation, the ſame as the Northern Triangle, which ſee.

DELUBRUM, in *Roman Antiquity*, a temple with a large ſpace of conſecrated ground round it. See TEMPLE.

DELUGE, DILUVIUM, in *Natural Hiſtory*, a flood, or inundation, of water, covering the earth, either in the whole, or part.

We meet with divers accounts of *deluges* in ancient hiſtory, both ſacred and profane: that which happened in Greece, in the time of Deucalion, called *diluvium Deucalioneum*, is famous: this *deluge* only overflowed Theſſaly. Its date is fixed to the year before Chriſt 1529, being the third year before the Iſraelites coming out of Egypt, according to the computation of Petavius, Rat. Temp. part i. lib. i. cap. 7.

The *deluge* of Ogyges happened near three hundred years before that of Deucalion, 1020 years before the firſt Olympiad, and 1796 before Jeſus Chriſt, according to the ſame author, Rat. Temp. par. i. lib. i. cap. 4. par. ii. lib. ii. cap. 5. This only ravaged Attica.

Theſe two *deluges* are frequently mentioned, in ancient Greek authors, under the denomination of *cataclyſmus prior*, and *poſterior*.

Of the like kind were thoſe inundations in the Netherlands, which, in 1727, overwhelmed and covered with ſea all that part now called the Gulf Dollart in the United Netherlands; and in 1421, all that part between Brabant and Holland.

But the moſt memorable *deluge* is that which we particularly, by way of eminence, call the *deluge*, or the *univerſal deluge*, or *Noah's flood*; recorded in Scripture as a general inundation ſent by God to puniſh the corruption of the world, at that time, by deſtroying every thing (Noah, and his family, and what was ſhut up with him in the ark, only excepted) from the face of the earth.

This flood makes one of the moſt conſiderable epochas in chronology. Its hiſtory is given by Moſes, Gen. ch. vi. and vii. Its time is fixed, by the beſt chronologers, to the year from the creation 1656, anſwering to the year before Chriſt 2293. From this flood, the ſtate of the world is divided into *diluvian*, and *antediluvian*.

The *deluge* has been, and remains, a ſubject of much inquiry and diſpute among naturaliſts, critics, &c. The points chiefly controverted may be reduced to three: firſt, its extent; viz. whether it were *general*, or *partial*; ſecondly, its natural cauſe; and, thirdly, its effects.

1. The immenſe quantity of water, requiſite to furniſh an univerſal *deluge*, has occaſioned ſeveral authors to ſuſpect it only partial. An univerſal *deluge*, they think, had been unneceſſary, conſidering the end for which it was brought; viz. to extirpate the wicked inhabitants. The world was then but new, and the people not very many; the holy Scriptures making only eight generations from Adam to Noah. It was but a ſmall part of the earth that could be yet inhabited: the country about the Euphrates, which is ſuppoſed to have been the ſcene of the firſt antediluvian inhabitants, was ſufficient to bear them all. Now Providence, ſay they, which ever acts wiſely, and frugally, would never have diſproportioned the means to the end, ſo far as to overflow the whole globe, only to drown a little corner of it. They add, that, in the Scripture-language, the *whole earth* expreſſes no more than *all the inhabitants*; and on this principle advance, that an overflowing of the Euphrates and Tigris, with a vehement rain, &c. might anſwer all the phænomena of the *deluge*.

But the *deluge* was univerſal. God declared to Noah, Gen. vi. 17. that he was reſolved to deſtroy every thing that had breath under heaven, or had life on the earth, by a flood of waters: ſuch was the menace; ſuch the execution. The waters, Moſes aſſures us, covered the whole earth, buried all the mountains, and were no leſs than fifteen cubits above the higheſt of them: every thing periſhed therein; birds, beaſts, men, and all that had life, excepting Noah, and thoſe with him in the ark, Gen. vii. 19, &c. Can an univerſal *deluge* be more clearly expreſſed? If the *deluge* had only been partial, there had been no neceſſity to ſpend an hundred years in the building of an ark, and ſhutting up all the ſorts of animals therein, in order to re-ſtock the world: they had been eaſily and readily brought from thoſe parts of the world not overflowed, into thoſe that were; at leaſt, all the birds would never have been deſtroyed, as Moſes ſays they were, ſo long as they had wings to bear them to thoſe parts where the flood did not reach. If the waters had only overflowed the neighbourhood of the Euphrates and Tigris, they could not be fifteen cubits above the higheſt mountains; they could not have riſen to that height, but they muſt ſpread themſelves, by the laws of gravity, over the reſt of the earth: unleſs, perhaps, they had been retained there by a miracle; and, in that caſe, Moſes, no doubt, would have related the miracle, as he did that of the waters of the Red ſea, and the river Jordan, which were ſuſtained in a heap, to give paſſage to the Iſraelites, Exod. xiv. 22. and Joſh. iii. 16 Add, that, in regions far remote from the Euphrates and Tigris, viz. in Italy, France, Switzerland, Germany, England, &c. there are frequently found, in places many ſcores of leagues from any ſea, and even in the tops of high mountains, whole trees ſunk deep under-ground; as alſo teeth and bones of animals, fiſhes entire, ſea-ſhells, ears of corn, &c. petrified; which the beſt naturaliſts are agreed could never have come there but by the *deluge*; to which may be added the almoſt univerſal traditions of this great event in all countries of the globe.

2. The *deluge* allowed univerſal, the philoſophers are ſolicitous to find water to effect it.

Moſes brings it from two ſources: *the fountains of the great deep were broken up*; *and the windows of heaven were opened.* Dr. Burnet, in his Telluris Theoria ſacra, ſhews, that all the waters in the ocean were not near enough to cover the earth fifteen cubits above the tops of the higheſt mountains. According to his computation, no leſs than eight oceans were required. Suppoſing the ſea, therefore, drained quite dry, and all the clouds of the atmoſphere diſſolved into rain, we ſhould ſtill want much the greateſt part of the water of a *deluge*.

To get clear of this embarraſſment, many of our beſt naturaliſts, as Steno, Burnet, Woodward, Scheuchzer, &c. adopt Des Cartes' ſyſtem of the formation of the earth. That philoſopher will have the primitive world to have been perfectly round and equal, without mountains, or vales; and accounts for its formation on mechanical principles, by ſuppoſing it at firſt in the condition of a thick turbid fluid, replete with diverſe heterogeneous matters, which, ſubſiding by ſlow degrees, formed themſelves into different concentric ſtrata, or beds, by the laws of gravity; and thus, at length, left a dry, ſolid earth. Dr. Burnet improves on this theory: he ſuppoſes the primitive earth to have been no more than an orbicular cruſt, inveſting the face of the abyſs, or deep, which grew chinky, clave, burſt, and fell down into the water, and ſo drowned its inhabitants.

The ſame theoriſt adds, that by this cataſtrophe, the globe of earth was not only ſhaken, and broken in a thouſand places, but the violence of the ſhock it then underwent ſhifted its ſituation; ſo that the earth, which before was placed directly under the zodiac, became thenceforth oblique to the ſame. Whence aroſe the difference of ſeaſons, which the antediluvian earth was not expoſed to.

Dr. Burnet's hypotheſis is very elegantly recited; but it not only contradicts the phyſical principles of nature, but is alſo utterly inconſiſtent with the ſacred text above cited, which expreſly mentions mountains as the ſtandard of the height of the water; or with that other paſſage, Gen. viii. 22. where God, promiſing not to bring any more *deluges*, but that every thing ſhould be reſtored to its ancient ſtate, ſays, that *ſeed-time and harveſt, and cold and heat, and ſummer and winter, and day and night, ſhall ceaſe no more.* See Keil's Exam. of the Theory of the Earth.

Other authors, ſuppoſing a ſufficient fund of water in the abyſs, or ſea, are only concerned for an expedient to bring it forth: accordingly, ſome, as Mr. Ray, &c. have recourſe to a ſhifting of the earth's center, which, drawing after it the water out of its channel, overwhelmed the ſeveral parts of the earth ſucceſſively. But this could only occaſion a partial deluge in that part of the globe towards which the center of gravity was tranſlated: nor can the poſſibility of ſuch a tranſlation be allowed, ſince the center of gravity is the neceſſary reſult of the materials compoſing our globe, and not alterable whilſt the parts remained in the ſame poſition.

Dr. Hook's opinion of the compreſſion of a ſhell of earth into a prolate ſpheroid, thereby preſſing out the water of an abyſs under the earth, may very well account for the waters overflowing two oppoſite zones of the globe; but the middle zone being by much the greater part of the earth's ſurface, muſt by this means be raiſed higher from the center, and conſequently ariſe more out of the water than before.

Dr. Halley aſcribes the *deluge* to the ſhock of a comet, or ſome other ſuch tranſient body, whereby the polar and diurnal rotation of the globe would be inſtantly changed. The great agitation that muſt have been occaſioned by it in the ſea, he obſerves, would be ſufficient to account for all thoſe ſtrange appearances of heaping vaſt quantities of earth and high cliffs upon beds of ſhells, which were once the bottom of the ſea, and raiſing up mountains where none were before. Such a ſhock as this impelling the ſolid parts, would occaſion the waters, and all fluid ſubſtances that were unconfined, as the ſea is, to run violently with an impetus towards that part of the globe where the blow was received, and that with force ſufficient to take with it the very bottom of the ocean, and remove it to the land. In this caſe, it is much more difficult to ſay, how Noah and his family could be preſerved, than how all other creatures were deſtroyed: ſuch a ſhock would change the length of the day and year, by altering the axis of the globe, according to the obliquity of the incidence of the ſtroke. It is objected to this ſyſtem, that ſuch a ſhock muſt have brought on the *deluge* inſtantaneouſly, and not gradually, as it is ſaid to have happened. Phil. Tranſ. N° 383. p. 120, or abr. vol. vii. p. 1, &c.

The inquiſitive Mr. Whiſton, in his New Theory of the Earth, has a very ingenious hypotheſis, ſimilar to that ſuggeſted by Dr. Halley, with reſpect to the primary cauſe of the *deluge*, but much more largely applied and explained. He ſhews, from ſeveral remarkable coincidences, that a comet, deſcending in the plane of the ecliptic towards its perihelion, paſſed juſt before the earth on the firſt day of the *deluge*; the conſequences whereof would be, firſt, that this comet, when it came below the moon, would raiſe a prodigious, vaſt, and ſtrong tide, both in the ſmall ſeas, which, according to his hypotheſis, were in the antediluvian earth, for he allows no great ocean there, as in ours; and alſo in the abyſs, which was under the upper cruſt of the earth; and that this tide would riſe, and increaſe all the time of the approach of the comet towards the earth; and would be at its greateſt height when the comet was at its leaſt diſtance from it. By the force of which tide, as alſo by the attraction of the comet, he judges, that the abyſs muſt put on an elliptic figure, whoſe ſurface being conſiderably larger than the former ſpherical one, the outward cruſt of the earth, incumbent on the abyſs, muſt accommodate itſelf to that figure, which it could not do while it remained ſolid, and conjoined together. He concludes, therefore, that it muſt of neceſſity be extended, and at laſt broke, by the violence of the ſaid tides, and attraction; out of which, the included water iſſuing, was a great means of the *deluge*; this anſwering to what Moſes ſpeaks of the *fountains of the great deep being broken open.* Again, the ſame comet, he ſhews, in its deſcent towards the ſun, muſt have paſſed ſo cloſe by the body of the earth as to involve it in its atmoſphere, and tail, for a conſiderable time; and of conſequence, it muſt have left a vaſt quantity of its vapours, both expanded and condenſed, on its ſurface; a great part of which, being afterwards rarefied by the ſolar heat, would be drawn up again into the atmoſphere, and afterwards return again in violent rains; and this he takes to be what Moſes intimates *by the windows of heaven being opened*; and particularly by the *forty days rain.* For as to the following rain, which, with this, made the whole time of raining a hundred and fifty days, Mr. Whiſton attributes it to the earth coming a ſecond time within the atmoſphere of the comet, as the comet was on its return from the ſun. Laſtly, to remove this vaſt orb of waters again, he ſuppoſes a mighty wind to have ariſen, which dried up ſome, and forced the reſt into the abyſs again through the clefts by which it came up: only a good quantity remained in the alveus of the great ocean, now firſt made, and in leſſer ſeas, lakes, &c.

To the credit of this theory, it muſt be obſerved, that it was at firſt only propoſed hypothetically: that is, the author only ſuppoſed ſuch a comet, merely as it would account well, and philoſophically, for the phenomena of the *deluge*; without any aſſurance, that there really was any comet ſo near the earth at that time; and the hypotheſis pleaſed even under ſuch circumſtances: but, upon further conſideration, he has ſince, he thinks, proved, that there actually was a comet near the earth at that time, or 28th November, in the 2365th year of the Julian period, or the 2349th year before Chriſt, to which time he aſſigns the beginning of the *deluge*, viz. the ſame great comet which appeared again in 1680. The author no longer, therefore, looks upon it as an hypotheſis, but has republiſhed it in a particular tract, intituled, The Cauſe of the Deluge demonſtrated.

3. But the great difficulty ſtill remains. The orderly ſtrata, or layers of the earth, with the exuviæ, or remains of fiſhes, as their teeth, bones, ſhells, &c. both marine, and fluviatile, found in the bodies even of the moſt ſolid ſtrata, and in flints, marbles, &c. are not yet accounted for. Thoſe who adhere to Des Cartes' ſyſtem, as Steno, &c. take the finding of the part of terreſtrial, and aquatic animals, branches of trees, leaves, &c. in the beds, or ſtrata of ſtone, to be a direct proof of the primitive fluidity of the earth. But then they are obliged to have recourſe to a ſecond formation of ſtrata, much later than the firſt; becauſe at the time of the firſt there was neither plant, nor animal, in being. Steno, therefore, maintains ſecond formations, occaſioned at different times by extraordinary inundations, earthquakes, volcanos, &c. But Burnet, Woodward, Scheuchzer, &c. chooſe rather to attribute a ſecond general formation to the *deluge*; without excluding, however, the particular ones of Steno. But the great objection againſt this ſyſtem of fluidity, is mountains; for the whole globe being liquid, whence ſhould ſuch inequalities ariſe? Mr. Scheuchzer, rather than part with a ſyſtem which ſeems ſo promiſing, gives into the opinion of thoſe who hold, that, after the *deluge*, God, to remit the waters into their ſubterranean reſervoirs, broke, and diſplaced, with his own almighty hand, a great number of ſtrata, that were before horizontal, and raiſed them above the ſurface of the earth; whence it is, that the ſtrata in mountains, though concentrical, are never horizontal. Hiſt. de l'Acad. 1708. p. 32.

Dr. Woodward, taking the ſeveral ſtrata for the ſediments of a *deluge*, and conſidering the circumſtances of thoſe fiſhes, ſhells, and other exuviæ, found in them, draws ſeveral inferences, which very much illuſtrate the effects of the *deluge*. As, firſt, that theſe marine bodies, and other ſpoils of ſalt-water fiſhes, were borne forth out of the ſea, by the univerſal *deluge*; and, on the return of the water back again, were left behind upon the land. Secondly, that while the flood covered the globe, all the ſolid matters, as ſtones, metals, minerals, and foſſils, were totally diſſolved, and the coheſion of their corpuſcles deſtroyed; and that their corpuſcles, with thoſe of the leſs ſolid bodies, as earth, fleſh of animals, and vegetables, were ſuſtained promiſcuouſly in the water, and made one common maſs. Thirdly, that all the maſs, thus ſuſtained, was at length precipitated to the bottom; and that according to the laws of gravity, the heavieſt ſettled firſt, and the reſt in order. And that the matters, thus ſubſiding, conſtituted the ſeveral ſtrata of ſtone, earth, coal, &c. Fourthly, that theſe ſtrata were originally all parallel, even, and regular, and rendered the ſurface of the earth perfectly ſpherical; and that the whole maſs of water lay upon them, and conſtituted a fluid ſphere encompaſſing the globe. Fifthly, that after ſome time, by the force of an agent ſeated within the earth, theſe ſtrata were broken on all ſides of the globe, and their ſituation varied; being elevated in ſome places, and depreſſed in others; whence mountains, valleys, grottos, &c. with the channel of the ſea, iſlands, &c. In one word, the whole terraqueous globe was put, by this diſruption, and diſlocation of the ſtrata, into the condition we now behold it in. Sixthly, that upon the diſruption of the ſtrata, and the depreſſion of ſome, and elevation of other parts, which happened towards the end of the *deluge*, the maſs of water fell back again into the depreſſed, and loweſt parts of the earth, into lakes, and other cavities, and the channel of the ocean, and through the fiſſures, whereby this communicates with the abyſs, which it filled till it came to an equilibrium with the ocean. Nat. Hiſt. of Earth, p. 1. and 2.

But of all the ſyſtems yet advanced, there ſeems none better calculated to ſolve the phenomena of theſe petrified exuviæ, than that of M. de la Pryme. The antediluvian world, according to this author, had an external ſea, as well as land, with mountains, rivers, &c. and the *deluge* was effected by breaking the ſubterraneous caverns, and pillars thereof, with dreadful earthquakes, and cauſing the ſame to be for the moſt part, if not wholly, abſorbed and ſwallowed up, and covered by the ſeas that we now have. Laſtly, this earth of ours aroſe out of the bottom of the antediluvian ſea, and in its room; juſt as many iſlands are ſwallowed down, and others thruſt up in their ſtead.

From this ſyſtem, which is very agreeable to Scripture, the great difficulties that clog all the other ſyſtems, ſeem eaſily ſolved. It is no longer a wonder, that ſhells, and ſhell-fiſh, and the bones of fiſhes, and four-footed creatures, with fruits, &c. ſhould be found in beds and quarries, in mountains and valleys, and the very bowels of the earth: for here they bred in the antediluvian ſea; thither they were elevated with the hills and mountains, in the time of the *deluge*; and there they fell into, were abſorbed, and buried in chaſms, and holes, and clefts, that would neceſſarily happen in the extruſion of the earth. Phil. Tranſ. N° 266.

Mr. King has more lately adopted an hypotheſis reſembling this laſt. He aſcribes the *deluge* to ſubterraneous fires found within the bowels of the earth, which, at the appointed time, burſt forth with great violence under the ſea, and raiſed up the bottom of the ocean, ſo as to pour out the waters over the face of what was before dry land, which by that means became the ſea, and has ſince continued, and that which was before the bottom of the ſea became dry land. An earthquake thus occaſioned will account, he ſuppoſes, for the acceſs of the *deluge*, and the confuſed diſpoſition of marine productions in the poſt-diluvian earth. Phil. Tranſ. vol. lvii. p. 44, &c.

M. Buffon recites the principal hypotheſes relating to the univerſal *deluge*, in his Hiſt. Nat. tom. i.

Deluge *of Deucalion*. See Deucalion.

DELVIN, in *Natural Hiſtory*, a name ſometimes given by the miners in Cornwall to that ſort of talcy ſtone or ſlate, which they more generally call *killas*; but in ſome places, as at Lowancowiggan, they uſe it as the name of a coarſe, but very hard ſtone, in which the ore lies. The ore is tin, and is conſiderably rich there, but the hardneſs of this ſtone makes it difficult to be got out.

DEMAIN, or Demesne, in its popular ſenſe, denotes the lord's manor-place, with the lands thereto belonging; which he and his anceſtors have from time to time kept in their own manual occupation. See Manor.

Demain, or Demesne, in a law-ſenſe, ſignifies, according to Hottoman, *patrimonium domini*, the *lord's patrimony*; called alſo *domain*, and by the civilians, *dominicum.*

The ſame author proveth thoſe lands to be *demain*, which a man holdeth originally of himſelf; and thoſe to be *feodum*, which he holdeth of a ſuperior lord.

In England, no common perſon has any *demain*, ſimply underſtood; for all depends either mediately, or immediately, on the crown. When a man, therefore, in pleading, would ſignify his land to be his own, he ſaith, that he is or was ſeiſed thereof in his *domain*, as of fee; whereby he means, that although his land be to him and his heirs for ever, yet it is no true *demain*, but depends upon a ſuperior lord, and he holdeth by ſervice, or rent in lieu of ſervice, or by both ſervice and rent.

Demain is ſometimes alſo taken, more largely, for lands and tenements held for life, &c. and ſometimes more ſtrictly for ſuch only as are generally held in fee.

Demain is ſometimes again uſed for a diſtinction between thoſe lands that the lord of a manor has in his own hands, or in the hands of his leſſee, demiſed upon a rent, for a term of years, or life; and ſuch other lands, pertaining to the ſaid manor, which belong to the free, or copyholders.

The reaſon why the copy-hold is accounted *demain*, is, becauſe they, who are tenants to it, are judged in law to have no other right but at the will of the lord; ſo that it is reputed ſtill, after a ſort, to be in the lord's hands; and yet in common ſpeech that is ordinarily called *demain*, which is, neither free, nor copy-free.

Demain, again, is uſed in a more ſpecial ſignification, in oppoſition to *frank-fee*.

Thus, thoſe lands, which were in the poſſeſſion of Edward the Confeſſor, are called *ancient demain*; and all others are called *frank-fee*; and the tenants who hold any of thoſe former lands, are called *tenants in ancient demain*; and the others, *tenants in frank-fee*, and alſo, *tenants at common law*. The reaſon is, becauſe tenants in *ancient demain* cannot be ſued out of the lord's court.

DEMAND, in its proper ſenſe, denotes a calling for, or requiring one's due.

Demand, in *Law*, has a more ſpecial ſignification, as contradiſtinguiſhed from *plaint*: for all civil actions are purſued, either by *demands* or plaints; according to which the purſuer is called either *demandant*, or *plaintiff*; viz. in real actions, *demandant*; and in perſonal actions, *plaintiff*.

Where the party purſuing is called *demandant*, the party purſued is called *tenant*; and where the former is called *plaintiff*, the latter is termed *defendant*.

There are two kinds of *demands*: the one in *deed*, *de facto*, as in every precipe; the other in *law*, *de jure*; ſuch is entry in land, diſtreſs for rent, &c.

If a man releaſe another from *all demands*, it is the beſt releaſe the releaſee can have, and ſhall redound moſt to his advantage. A releaſe of facts is more large than of quarrels or actions; and a releaſe of *demands* more large and beneficial than either: by a releaſe of all *demands* to the diſſeiſor, the right of entry into the land, and all contained therein, is releaſed; and he that releaſeth all *demands*, excludes himſelf from all actions, entries, and ſeizures. But it is no bar to a writ of error to releaſe an outlawry.

DEMANDANT, *Petens*, he who is actor, or plaintiff, in a real action; thus called, becauſe he *demands* lands, &c.

DEMARCHUS, in *Antiquity*, the chief of a region, or diſtrict, in the country of Attica.

The Athenians divided their country into certain regions, or diſtricts, which they called δημοι, i. e. *people*; and eſtabliſhed a magiſtrate at the head of each, under the denomination of δημαρχος, *demarchos*, of δημος, and αρχη, *rule*, *government*.

It was alſo an appellation given to the chief magiſtrate of the city Neapolis.

DEMEMBRE', in *Heraldry*, is when an animal is *diſmembered*, i. e. the limbs cut off its body.

DEMESNE. See Demain.

DEMETRIA, Δημητρια, in *Antiquity*, a feſtival in honour of Ceres, called by the Greeks *demeter*, δημητηρ, of δη, i. e. γη, *earth*, and μητηρ, *mother*. It was uſual on this occaſion for the worſhippers to laſh themſelves with whips made of the bark of trees, and called μυροπτοι. Pott. Archæol. Græc. tom. i. lib. ii. cap. 20. p. 379.

Demetria was likewiſe the name of another feſtival celebrated by the Athenians in honour of Demetrius Poliorcetes, and was the ſame with that afterwards called *Dionyſia*. Pott. loc. cit.

DEMI, a word of the ſame uſe and effect in the French language with *ſemi*, in the Latin and Engliſh; being formed from *dimidium*; and uſed, in compoſition with other words, to ſignify *half*.

In words borrowed from the Latins, we uſe *ſemi*; and in thoſe from the French, we retain their *demi*. See Semi.

Demi, or Demy, in *Heraldry*, ſignifies the *half* of a thing; as, a *demy lion*, &c.

Colombiere has what he calls *croix & demy*, a croſs and a half; being a ſhaft croſſed in the upper-part like the Calvary croſs, and having but one arm at the lower-part.

Demi-Air, or Demi-Volt, in *Horſemanſhip*, is one of the ſeven artificial motions of a horſe; being an air, in which his fore-parts are more raiſed than in terra à terra but the motion of the horſe's legs is more quick in the latter than in the *demi-volt*.

Demi-Bastion, is a kind of fortification, that has only one face, and one flank. See Bastion.

Demi-Cannon, a piece of ordnance, uſually about ſix inches bore, 5400 pounds weight, ten or eleven feet long, and carrying a ſhot of 30 or 32 pound weight.

It carries point-blank 150 paces; its charge of powder is 14 pound weight.

There are alſo two ſizes of *demi-cannon* above this, which are ſomething larger: as, the *ordinary demi-cannon*, which is ſix inches $\frac{1}{6}$ bore, twelve feet long, weighs 5600 pounds; its charge of powder 17 pounds 8 ounces, carries a ſhot ſix inches and a half diameter, and whoſe weight is 32 pounds: this piece ſhoots point-blank 162 paces.

Demi-cannon of the largeſt ſize, is ſix inches $\frac{6}{8}$ bore, twelve feet long, 6000 pounds weight; its charge is 18 pounds of powder, and it carries 180 paces. See Cannon, and Ordnance.

Demi-Cross, an inſtrument uſed by the Dutch to take the ſun's altitude, or that of a ſtar at ſea; but inſtead of which we uſe the croſs ſtaff or fore-ſtaff. See *Tab.* II. *Aſtronomy*, *fig.* 67.

The ſtaff A G is graduated eaſily, being only a line of whole tangents, whoſe radius is EB, the length of the croſs-piece, or tranſom. It hath three vanes; a horizontal vane, as A; a ſight vane, as H; and the ſhade vane, as E.

When the vanes are on the ſtaff and croſs-piece, to take the ſun's altitude, hold the inſtrument with the tranſom as upright as you can, and looking through the ſight vane, as H, look for the horizon through the ſlit in the horizon vane, and then ſlide the croſs-piece or tranſom to and fro, till you make the ſhade of the vane at E to fall at the ſame time upon the ſlit of the horizon vane, and alſo at A; then are the degrees cut on the ſtaff, by the edge of the croſs-piece, the ſun's altitude required.

But to take the height of a ſtar, you muſt remove the horizon vane A, and put it on the end G, and transfer the ſight vane H to A; then holding up the inſtrument as before, looking through the ſight vane, ſee for the horizon through the horizon vane, and for the ſtar by the ſhade vane, ſliding the tranſom to and fro, till the horizon and ſtar are both ſeen by their reſpective vanes, and then the tranſom will cut the degrees of the ſtars altitude on the ſtaff, allowing about eight or ten minutes for your height above the level of the water, as muſt be done in all ſuch caſes.

Demi-Culverin, is a piece of ordnance commonly $4\frac{1}{2}$ inches bore, ten feet long, 2700 pounds weight; its charge is 7 pounds 4 ounces of powder; and it carries a ſhot of 10 pounds 11 ounces, and ſhoots point-blank 175 paces.

Demi-culverin of the leaſt ſize, is $4\frac{1}{4}$ inches bore, ten feet long, 2000 pounds weight; it carries a ball of 4 inches diameter, its charge is 6 pounds 4 ounces of powder, and its level range is 174 paces.

Demi-culverin of the largeſt ſort, is 4 inches $\frac{6}{8}$ bore, ten feet long; its charge of powder is 8 pounds and 8 ounces; the ball is $4\frac{1}{2}$ inches diameter, weighs 12 pounds 11 ounces; and the point-blank ſhoots 178 paces. See Cannon, and Ordnance.

Demi-Ditone, in *Muſic*, is uſed by ſome for a third minor.

Demi-God, &c. See God, Hero, &c.

Demi-Gorge, in *Fortification*, is half the gorge, or entrance, into the baſtion; not taken directly from angle to angle, where the baſtion joins to the curtin, but from the angle of the flank to the center of the baſtion; or the angle the two curtins would make, were they thus protracted to meet in the baſtion.

Demi-Haque. See Harquebuss.

Demi-Lune, *Half-Moon*, in *Fortification*, an outwork, as EFGHK (*Tab. Fortif. fig.* 3.) conſiſting of two faces, and two little flanks; frequently built before the angle of a baſtion, and ſometimes alſo before the curtin, though now much diſuſed. The gorge terminates in a creſcent or half-moon, whence the denomination *demi-lune*. See Ravelin.

Demi-Quaver, is a note in muſic, two of which are equal to the quaver.

Demi-Semi-Quaver. See Quaver.

Demi-Sextile. See Semi-Sextile.

DEMISE, in *Law*, is applied to an eſtate either in fee-ſimple, fee-tail, or for term of life, or years; and ſo it is commonly taken in many writs.

The king's death is, in law, termed, the *demiſe* of the king.

Demise *of the king* does not diſcontinue any writ or proceſs. Vid. Stat. 1 Ed. VI. cap. 7. ſect. 1, 2, 3.

Nor does it determine any commiſſion civil or military, or great office of ſtate, but they ſhall continue in force for ſix months after the ſovereign's *demiſe*, unleſs made void by the next ſucceſſor. Stat. 7 & 8 Will. III. cap. 27. ſect. 21. 1 Ann. ſtat. 1. cap. 8. 6 Ann. cap. 7. ſect. 8.

Neither is a parliament thereby determined till after ſix months. 7 & 8 Will. III. cap. 15.

Nor is a defendant, who hath pleaded to an information, obliged to plead to it again. But he may plead again upon requeſt made to the court, within five months after the *demiſe*. 4 & 5 Will. & Mar. cap. 18. ſect. 7.

Demise, and **Redemise**, denote a conveyance where there are mutual leaſes made from one to another of the ſame land, or ſomething out of it.

DEMI-VILLS. See Vill.

DEMIURGE, Δημιȣργος, from δημιος, which denotes a *public ſervant*, and εργον, *work*, in the *Mythology of the Eaſtern Philoſophers*, was one of the Æons, employed by the ſupreme Deity in the creation of the world. The character they give him is a compound of ſhining qualities, and inſupportable arrogance; and his exceſſive luſt of empire effaces his talents and virtues. He is repreſented as claiming dominion over the new world he has formed, as his ſovereign right; and, excluding totally the ſupreme Deity from all concernment in it, he demands from mankind, for himſelf and his aſſociates, divine honours.

DEMOCRACY, a form of government, wherein the ſovereignty, or ſupreme authority, is lodged in the people, who exerciſe the ſame by perſons of their own order, deputed for that purpoſe.

The word is formed of the Greek δημος, *people*, and κρατειν, *to command, govern.*

The moſt flouriſhing *democracies* were thoſe of Rome and Athens; the modern republics, as Venice, and the United Provinces, are rather ariſtocracies than *democracies*. The government of Baſil, however, is a *democracy*; and ſo are ſome of the free cities in Germany.

In a *democracy*, where the right of making laws reſides in the people at large, public virtue, or goodneſs of intention, is more likely to be found than either of the other qualities of government; and therefore it uſually poſſeſſes a conſiderable degree of patriotiſm and public ſpirit. *Democracies* are uſually the beſt calculated to direct the end of a law; aristocracies to invent the means by which that end ſhall be obtained; and monarchies to carry thoſe means into execution. See Republic.

DEMOISELLE, the *dancing-bird*, a long-legged and long-necked bird of the crane kind, a native of Numidia. It is remarkable for its jumping or dancing in its walk. It has the ſame kind of plication in the wind-pipe with the common crane. See *Tab. of Birds*, N° 12. Phil. Tranſ. vol. lvi. p. 211.

DEMON. See Dæmon.

DEMONIAC. See Dæmoniac.

DEMONIACAL *poſſeſſion*. See Dæmoniacal *poſſeſſion*.

DEMONIUS *lapis*, in *Natural Hiſtory*, a name given to a ſtone famous among the writers of the middle ages for a number of imaginary virtues, ſuch as rendering people victorious over their enemies, and the like. All the deſcription they have left us of it is, that it was variegated with two colours laid in lines ſo as to repreſent a rainbow. It was probably an agate.

DEMONSTRABLE, a term uſed in the ſchools, to ſignify ſomewhat that may be clearly and evidently proved.

It is *demonſtrable*, that the ſide of a ſquare is incommenſurable with the diagonal.

DEMONSTRATION, in *Logic*, a ſyllogiſm in form, containing a clear and irrefragable proof of the truth of a propoſition.

A *demonſtration* is a convincing argument, the two firſt propoſitions whereof are certain, clear, and evident; whence of neceſſity ariſes an infallible concluſion.

A *demonſtration* uſually conſiſts of three parts: *explication*, *preparation*, and *concluſion*.

The *explication* is the laying down of the things ſuppoſed to be given or granted; from which the *demonſtration* is to be made.

The *preparation* is ſomething to be previouſly done, according to the nature of the *demonſtration* intended.

The *concluſion* is a propoſition that concludes the thing to be *demonſtrated*, fully perſuading, and convincing the mind.

The method of *demonſtrating* things in mathematics is the ſame with that of drawing concluſions from principles in logics. In effect, the *demonſtrations* of mathematicians, are no other than ſeries of enthymemes; every thing is concluded by force of ſyllogiſm, only omitting the premiſes, which either occur of their own accord, or are recollected by means of quotations. To have the *demonſtration* perfect, the premiſes of the ſyllogiſms ſhould be proved by new ſyllogiſms, till at length you arrive at a ſyllogiſm, wherein the premiſes are either definitions, or identic propoſitions.

Indeed it might be *demonſtrated*, that there cannot be a genuine *demonſtration*, i. e. ſuch a one as ſhall give full conviction, unleſs the thoughts be directed therein according to the rules of ſyllogiſm. Clavius, it is well known, reſolved the *demonſtration* of the firſt propoſition of Euclid into ſyllogiſm: Herlinus, and Daſipodius, *demonſtrated* the whole ſix firſt books of Euclid, and Heniſchus, all arithmetic, in the ſyllogiſtic form.

Yet people, and even mathematicians, uſually imagine, that mathematical *demonſtrations* are conducted in a manner far remote from the laws of ſyllogiſm; ſo far are they from allowing that thoſe derive all their force and conviction from theſe. But we have men of the firſt rank on our ſide the queſtion. M. Leibnitz, for inſtance, declares that *demonſtration* to be firm and valid, which is in the form preſcribed by logic; and Dr. Wallis confeſſes, that what is propoſed to be proved in mathematics, is deduced by means of one, or more ſyllogiſms: the great Huygens, too, obſerves, that paralogiſms frequently happen in mathematics, through want of obſerving the ſyllogiſtic form. See Syllogism.

Problems conſiſt of three parts: a *propoſition*, *reſolution*, and *demonſtration*.

In the *propoſition* is indicated the thing to be done.

In the *reſolution*, the ſeveral ſteps are orderly rehearſed, whereby the thing propoſed is performed.

Laſtly, in the *demonſtration* it is ſhewed, that the things enjoined by the reſolution being done, that which was required in the propoſition is effected. As often, therefore, as a problem is to be *demonſtrated*, it is converted into a theorem; the reſolution being the hypotheſis, and the propoſition the theſis: for the general tenor of all problems to be *demonſtrated* is this; that the thing preſcribed in the reſolution being performed, the thing required is done.

The ſchoolmen make two kinds of *demonſtration*: the one τȣ διοτι, or *propter quod*; wherein an effect is proved by the next cauſe. As when it is proved, that the moon is eclipſed, becauſe the earth is then between the ſun and moon. The ſecond τȣ ὅτι, or *quia*; wherein the cauſe is proved from a remote effect: as when it is proved, that fire is hot, becauſe it burns; or that plants do not breathe, becauſe they are not animals; or that there is a God, from the works of creation. The former is called *demonſtration à priori*, and the latter *demonſtration à poſteriori*.

DEMONSTRATION, *affirmative*, is that which, proceeding by affirmative and evident propoſitions, dependent on each other, ends in the thing to be *demonſtrated*.

DEMONSTRATION, *apagogical*. See APAGOGICAL.

DEMONSTRATION, *geometrical*, is that framed of reaſonings drawn from the elements of geometry.

DEMONSTRATION, *mechanical*, is that, the reaſonings whereof are drawn from the rules of mechanics.

DEMONSTRATION *à priori*, is that whereby an effect is proved from a cauſe, either a next, or remote one; or a concluſion proved by ſomething previous, whether it be a cauſe, or only an antecedent.

DEMONSTRATION *à poſteriori*, is that whereby either a cauſe is proved from an effect, or a concluſion is proved by ſomething poſterior; whether it be an effect, or only a conſequent.

DEMONSTRATIVE, in *Rhetoric*, one of the genera, or kinds, of eloquence; being that which obtains in the compoſing of panegyrics, invectives, &c.

Rhetoric is divided into three kinds; *deliberative*, *demonſtrative*, and *judiciary*. See RHETORIC.

DEMONSTRATIVE, in *Grammar*, is applied to pronouns which ſerve to ſhew, point out, or indicate a thing: as, *this*, *that*, *thoſe*, &c.

They are alſo called definitive, becauſe they define and limit the extent of the common name, or general term, to which they either refer, or are joined.

DEMONSTRATIVE *evidence*. See DEDUCTIVE, and EVIDENCE.

DEMULCENTS, *Demulcentia*, in *Pharmacy*, are medicines which render the acrimonious humours mild. This they do by obtunding or ſheathing their ſharp particles.

They are diſtributed into general and ſpecific; the former including thoſe which pertain to all kinds of acrids indiſcriminately; and the latter ſuch as obtund only a particular kind of acrimony. See EMOLLIENTS.

DEMURRAGE, in *Traffic*, an allowance made to the maſter of a ſhip, by the merchants, for ſtaying in a port longer than the time firſt appointed for his departure.

DEMURRER, in *Law*, a kind of pauſe or ſtop, put to the proceeding of any action, upon ſome difficult point, which muſt be determined by the court, before any further progreſs can be had in it.

In every action, the controverſy is either as to fact, or as to law: the firſt, decided by the jury; the ſecond, by the judge. Now, if any thing turn up in the cauſe ſo rare and difficult, that the judge cannot pronounce upon it, a *demurrer*, or ſtop, is made, and time taken, either for the court to conſider and agree of it among themſelves, or otherwiſe for the judges to meet in the exchequer chamber; there, after hearing counſel on both ſides, to determine what is law. For this purpoſe a *demurrer* book is made up, containing all the proceedings at length, which are afterwards entered on record, and copies thereof, called paper books, are delivered to the judges to peruſe.—This *demurrer* is expreſſed, in our records, by *moratur in lege*.

In common law, the defendant ſometimes *demurreth* to the plaintiff's count, or declaration; and ſometimes the plaintiff *demurreth* to the defendant's plea, by averring, that it is not a ſufficient plea in law, &c.

In chancery, the defendant *demurreth* to the plaintiff's bill, averring it to be defective in ſuch and ſuch a point; and demands the judgment of the court thereupon, whether he ſhall not be compelled to make any farther or other anſwer thereunto.

DEMURRER *to evidence* takes place, when a record, or other matter, is produced in evidence, concerning the legal conſequences, of which there ariſes a doubt or queſtion in law; in which caſe the adverſe party may, if he pleaſes, *demur* to the whole evidence. This draws the queſtion of law from the cognizance of the jury, to be decided by the court. But this kind of *demurrer* is now ſeldom uſed.

DEMURRER *to indictments* is incident to criminal caſes, as well as civil, when the fact as alleged is allowed to be true, but the priſoner joins iſſue upon ſome point of law in the indictment; by which he inſiſts that the fact, as ſtated, does not amount to the crime charged.

Some have held, that if, on *demurrer*, the point of law be adjudged againſt the priſoner, he ſhall have judgment and execution, as if convicted by verdict: but this is denied by others, who maintain, that in ſuch caſe he ſhall be directed and received to plead the general iſſue, not guilty, after a *demurrer* determined againſt him. However, upon this doubt, *demurrers* to indictments are ſeldom uſed; ſince the ſame advantages may be taken upon a plea of not guilty; or, afterwards, in arreſt of judgment, when the verdict has eſtabliſhed the fact. Blackſt. Comm. vol. iv. p. 328.

DEMY *Sangue*. See HALF *Blood*.

DEN, a ſyllable added to the names of places, and ſhews their ſituation to be in a valley, or near woods, as Tenterden, Biddenden, &c.

The word is Saxon *den*, i. e. *vallis*, or *locus ſylveſtris*.

DEN and *ſtrond*, &c. in *Law*, was a liberty for ſhips or veſſels to run or come aſhore. King Edward I. by charter, granted this privilege to the barons of the cinque ports.

DENARIATUS *terræ*, in *Ancient Law-Books*, as much land as is worth a penny by the year. See FARDING-*deal*.

Sibylla Barthelot tenet unam acram, & 5 denariatos terræ in eodem tenemento. Du-Cange.

DENARIUS, in *Antiquity*, the Roman penny; a ſilver coin equivalent to, from ſix to eight pence half-penny ſterling. See COIN.

The Romans having, for a long time, uſed braſs money, which they call *as*, quaſi *æs*; or *libra* and *ponda*, becauſe it was a pound weight, began in the year of Rome 485, to coin ſilver; and coined firſt the *denarius*, which was marked with the letter X, becauſe it was worth ten aſſes, and divided into two quinarii, marked with V, which were ſubdivided into two ſeſtertia, marked with theſe three letters, IIS. Afterwards, about the year 537, the ſilver *denarius* was made to paſs for ſixteen aſſes, the quinarius for eight, and the ſeſterce for four; though in the pay of the army, the ſoldier always received a ſilver *denarius* for ten aſſes. Pliny. Nat. Hiſt. lib. xxxiii. cap. 3. Livy, lib. xv.

The moſt ancient *denarii* have on one ſide the head of a woman in a helmet, with the inſcription ROMA, and the mark of the *denarius* X or 𐆖, and ſome few XVI, and a biga or quadriga on the other; whence they are denominated bigati and quadrigati. The next to theſe in antiquity have the head of Roma, or ſome other deity, on one ſide, and on the reverſe the name of the mint-maſter, with hiſtorical or emblematical figures. Many of theſe have the mark X or 𐆖, which remained long after the *denarius* paſſed for ſixteen aſſes. A third ſort have the head of a conſul or general on one ſide, with an hiſtorical or emblematical reverſe: few of theſe have the mark X or 𐆖 upon them. Theſe three ſorts are called conſular *denarii*, becauſe they were ſtruck during the republican government by conſuls. The imperial *denarii* have commonly the head of the reigning emperor, with his names and titles on one ſide, and ſome emblematical figures on the reverſe, with ſuitable inſcription. The Romans did not uſe the *denarius* for a weight, as the Greeks did their drachm, till the Greek phyſicians coming to Rome, and finding the two coins nearly equal, preſcribed by it, as they had been uſed to do by the drachm in their own country.

We are informed both by Celſus and Pliny, that eighty-four *denarii* were coined out of the pound of ſilver; and therefore by determining the true weight of the Roman pound, we ſhall obtain that of the *denarius*, which depended upon it. Celſus de Medicina, lib. v. cap. 17. Pliny, Nat. Hiſt. lib. xxxiii. cap. 9.

If we take 5040 troy grains for the weight of the Roman pound, as determined from the gold coins, the conſular *denarius* of 84 in the pound will weigh juſt 60 troy grains. Mr. Raper took the mean weight of forty-ſix of the faireſt *denarii* in the Britiſh Muſeum, and found it to be 60,95 troy grains; but as ſome of theſe were imperfect, he found the mean of twenty perfect *denarii* to amount to 60,92: and he queſtions whether the *denarii* of above ſixty-three grains ever paſſed as current coin. The weight of the *denarius* was diminiſhed under the emperors; and Greaves found, by examining many imperial *denarii*, that from Auguſtus's time to Veſpaſian they continually almoſt decreaſed, till, from being the ſeventh part of the Roman ounce, they came now to be the eighth part; and ninety-ſix were coined out of the Roman libra, whereas under the conſuls they coined only eighty-four. Under Severus and Gordianus they recovered their weight, but with a conſiderable mixture of allay. J. Caſpar Eiſenſchmid of Straſburg, in a book De Ponderibus & Menſuris veterum, &c. publiſhed in 1708, informs us, that he found the weight of the imperial *denarius* from Nero to Sept. Severus, to be to the conſular *denarius* in the proportion of 7 to 8.

In order to determine the value of the conſular *denarius* of 60 troy grains of fine ſilver, we are to conſider, that ſixty-two Engliſh ſhillings are coined out of eleven ounces two penny weight, troy, of fine ſilver, and eighteen penny weight allay; and therefore the troy grain of fine ſilver is worth $\frac{62}{111}$ths of a farthing; and ſixty grains, or the *denarius*, worth ſomewhat more than eight pence farthing and a half ſterling; and the as, or ſixteenth part of the *denarius*, a little more than a half-penny. Phil. Tranſ. vol. lxi. part ii. art. 48.

Others, as Greaves, and after him Arbuthnot, have made the conſular *denarius* the ſeventh part of an ounce in weight, a little more than ſixty-two grains, allowing 5256 troy grains to the Roman pound, and its value, allowing eight Engliſh grains to the ſilver penny, 7¾*d.* of our money; and the imperial *denarius* the eighth part of an ounce, and worth about 6½*d.* ſterling.

M. Tillemont obſerves, that the *denarius* was held ſufficient to keep a perſon handſomely for a day; and, upon the whole, ſeems to intimate, that it was equal to twelve French ſous, or eleven Engliſh pence: but this eſtimate errs in exceſs more than the preceding does in defect.

The *denarius* continued to be the current ſilver money of the empire, till Conſtantine ſubſtituted the milliarenſis in its ſtead. See Greaves's Diſcourſe of the *Denarius*, in his works, by Dr. Birch, vol. i. p. 235. and Arbuthnot on Coins, p. 15. See MILLIARENSIS and POUND.

DENARIUS is alſo uſed, in our *Law-Books*, for an Engliſh penny.

Denarius Angliæ, qui nominatur ſterlingus, rotundus ſine tonſura, ponderabit 32 *grana frumenti in medio ſpicæ*; *&* 20 *denarii facient unciam*; *&* 12 *unciæ facient libram.* Stat. Ed. I. De menſuris.

DENARIUS *Dei* denotes *earneſt-money*; called alſo *argentum Dei*, by the French *deniers de Dieu*, and in ſome parts of our country *arles.*

Ita quod neuter mercatorum ab illo contractu poſſit diſcedere, vel reſilire poſtquam denarius Dei *inter perſonas contrahentes datus fuerit & receptus.* Charti Eduardi I.

DENARIUS *tertius comitatus*, denoted a third part of the profits of county courts. When thoſe courts had ſuperior juriſdiction, before other courts were erected, two parts of the fines, and other profits belonging to them, were reſerved to the king, and a third part to the earl of the county. Paroch. Ant. 418.

DENARII *de caritate* were cuſtomary oblations made to cathedral churches charged upon pariſh prieſts; though at firſt they were but a gift of charity for maintaining and adorning the biſhop's ſee.

DENARIUS *St. Petri.* See PETER-PENCE.

DENATES, in *Antiquity*, domeſtic gods, more frequently called PENATES.

DENCHE', **DENCHEA**, or **ENDENCHE'**, in *Heraldry.* See DANCHE'.

DENDRITIS, or **DENDRACHATES**, in *Natural Hiſtory*, a ſort of ſlate or agate, whereon are ſeen trees, ſhrubs, and other ruſtic figures; repreſented, in miniature, in blackiſh or yellowiſh figures; now called Mochoa ſtones.

Some rank the *dendritis* in the claſs of entrochi, which they wrongly call ſtone plants: but againſt this it is urged, firſt, that the branches of trees, &c. repreſented on the *dendritis*, are never confounded together, nor ſhoot acroſs each other, as thoſe of entrochi are uſually found to do.

Secondly, that the fire ſtrips the *dendritis* of all its figures, without deſtroying the ſtone, or reducing it to aſhes; which does not hold of any entrochus. See *Tab. Foſſils, Claſs* 5.

Their true hiſtory is no more than this: the ſtone, or ſlate, on which the *dendritæ* moſt frequently occur, is ſubject, like our common flints, to imperceptible cracks and flaws, into which the ſteams and effluvia from minerals, and other foſſile bodies, continually pervading the whole ſtructure of the earth, find their way, and perhaps in ſome caſes water itſelf has been at ſome time in them: either water or theſe vapours, we well know, may be naturally enough tinged with black, or capable of leaving a black tinge on the ſurfaces of the bodies they have long remained on; and theſe finding their way into the natural cracks or ſmall crevices of the ſtone, have from the ſides of theſe inſinuated themſelves farther and farther into the maſs, and run into branched figures; or the water wherever included has, as the maſs of the ſtone ſhrunk and contracted in the drying, ſpread and diffuſed itſelf into the various detached figures we ſee; for all the delineations we find in theſe ſtones may be referred either to theſe looſe detached figures or cloudy ſpots, or to thoſe which evidently ariſe from the ſides of ſome long cracks or fiſſures.

That water is continually to this day getting into theſe natural crevices of ſtone, and diffuſing itſelf beyond their natural limits in irregular, and often in beautifully branched figures, we ſee in many of our gravel-pits, where many of the larger flints and pebbles being ſtruck eaſily fall to pieces at theſe crevices, the ſides of which are always either wet, or plainly marked with waters having been once there; and if from theſe we trace the leſſer cracks, we ſhall uſually find numbers of figures imperfectly reſembling the delineations in the agates, and the very ſame often alſo on their ſurfaces, merely the effect of mineral effluvia.

From hence it appears, that the figures of the *dendritis* are accidental; and the effect of a colour applied on the ſtone not artificially, but by nature. Two poliſhed marbles being applied on each other, with oil between, upon parting them again, the oil running into certain tracks, its impreſſion exhibits divers figures like thoſe on the *dendritis*; the ramification always beginning on the ſide on which the marbles are begun to be ſeparated. So that it appears, the figures of the *dendritis* are formed by ſome bituminous, vitriolic, ferruginous, or cupreous exhalation, inſinuating between the beds, or ſtrata, of the ſtones; and, accordingly, we actually find, that the *dendritis* being expoſed to the fire, yields a bituminous ſmell; and other experiments prove the exiſtence of the other mineral principles.

In ſome *dendritis*, the figures, or ſignatures, penetrate quite through; in others they go but to the middle; and, in others, not ſo deep.

On the ſurfaces of the natural crevices of our ſeptariæ, or ludus Helmontii of the harder kinds, we often alſo meet with what authors call *dendritæ*, or fuliginous delineations of trees, which are of the very ſame kind with thoſe of this agate, and are ſo far from being inferior to them in beauty, that they even greatly excel them; nay, ſo low and poor a ſubſtance as common chalk is not without them, but is frequently found beautifully marked with branches, trees, ſtars, and a thouſand other figures like thoſe formed by pulling aſunder two levigating ſtones with the fine matter between them, or the ſhooting of ſalts in chemical veſſels, or the figures of hoar-froſt on our windows. Da Coſta's Hiſt. of Foſſ. p. 178. Hill's Hiſt. of Foſſ. p. 473. See AGAT.

DENDRANATOMY, from δενδρον, *tree*, and ανατομη, *anatomy*, a term uſed by Malpighi, and others, to expreſs the diſſection of the ligneous parts of trees and ſhrubs, in order to the examination of their ſtructure and uſes. Galen has uſed the ſame word, and taken ſome pains to diſcover ſome of the ſubjects of theſe reſearches. There is a very remarkable analogy between the parts of ſome trees, and thoſe of peculiar parts of animal bodies; and Malpighi has, with great juſtice, uſed the comparative anatomy of trees, to explain, by the formation of the galls, and other preternatural tumors on them, the puſtules and other unnatural fleſhy excreſcences on animal bodies.

DENDROMETER, from δενδρον, *a tree*, and μετρεω, *I meaſure*, an inſtrument lately invented by Meſſrs. Duncombe and Whittel, for which they obtained a patent, ſo called from its uſe in meaſuring trees. This inſtrument (*Tab.* II. *Surveying*, *fig.* 39.) conſiſts of a ſemicircle A, divided into two quadrants, and graduated from the middle; upon the diameter B there hangs a plummet L for fixing the inſtrument in a vertical poſition; there is alſo a chord D parallel to the diameter, and a radius E, paſſing at right angles through the diameter and chord. From a point on the radius hangs an altimeter C, between the chord and diameter, to which is fixed a ſmall ſemicircle G, and a ſcrew, to confine it in any poſition. The altimeter, which is contrived to form the ſame angle with the radius of the inſtrument as the tree forms with the horizon, is divided from its center both ways into forty equal parts; and theſe parts are again ſubdivided into halves and quarters. Upon the ſmall ſemicircle G, on which is accounted the quantity of the angle made by the altimeter and radius, are expreſſed degrees from 60 to 120, being 30 on each quadrant. The radius is numbered with the ſame ſcale of diviſions as the altimeter. There is alſo a nonius to the ſmall ſemicircle, which ſhews the quantity of an angle to every five minutes. On the back of the inſtrument the ſtock M (*fig.* 40.) of the ſliding-piece is confined to the axis N, which moves concentrically parallel to the elevation index F (*fig.* 39.) on the oppoſite ſide, to which it is fixed. This index is numbered by a ſcale of equal diviſions with the altimeter and radius: at the end of the index is a nonius, by which the angles of elevation above, or of depreſſion below the horizon, meaſured upon the ſemicircle of the inſtrument, are determined to every five minutes. There is alſo a groove in the radius, that ſlides acroſs the axis by means of a ſcrew I, working between the chord and ſemicircle of the inſtrument; and this ſcrew is turned by the key O. Upon the ſtock M (*fig.* 40.) is a ſliding piece P, that always acts at right angles with the altimeter, by means of a groove in the latter. To the ſhank of the ſliding piece is affixed a moveable limb Q, which forms the ſame angle with the altimeter as the bough forms with the body, or trunk of the tree. This limb may be of any convenient length, divided into equal parts of the ſame ſcale with all the foregoing diviſions. At the extremity of the fixed axis, on a center, an index R, with teleſcopic ſights, works horizontally upon the moveable limb of the ſliding piece. Upon this horizontal index R may be fixed a ſmall quadrant T, deſcribed with any convenient radius from the center on which the index moves, and divided into 90 degrees, beginning at a right line drawn from the center at right angles with the fiducial edge of the ſaid index; and upon the extremity of the axis is a nonius, whereby to determine the quantity of an angle upon the quadrant to every five minutes. There are alſo two ſmall circular arches S, S, ſerving to keep the ſights in a parallel poſition, each containing an equal number of degrees. Upon theſe arches is meaſured the angle, ſubtending a ſide equal to the difference of the altitudes of the obſerved objects above the plane of the horizon, and whoſe baſe is the neareſt diſtance between the perpendiculars, in which theſe objects are ſituated. The *dendrometer* is fitted to a theodolite, and may be uſed either with or without it, as occaſion requires.

The principal uſe of this inſtrument is for meaſuring the length and diameter of any tree, perpendicular or oblique, to an horizontal plane, or in any ſituation of the plane on which it reſts, or of any figure, whether regular or irregular, and alſo the length and diameter of the boughs, by mere inſpection; and the inventors of it have calculated tables, annexed to their account of the inſtrument itſelf, by the help of which the quantity of timber in any tree is obtained without calculation, or the uſe of the ſliding rule. The inſtrument is rectified by ſetting it in a perpendicular poſition, by means of the plummet, and ſcrewing it to the ſtaff; then the altimeter is placed in the exact poſition of the tree, whether perpendicular, reclining, or inclining, and ſcrewed faſt. If the tree ſtands on level ground, the horizontal diſtance from the tree to the axis of the inſtrument is meaſured with a tape line, and the radius is moved with the key, till that diſtance be cut upon it by the inſide of the diameter: but if the ground be ſlanting, the diſtance from the tree to the inſtrument is meaſured, and the elevation index is moved, till the point of the tree from which the diſtance was meaſured is ſeen through the ſights, and there ſcrewed faſt; and the radius is moved backwards or forwards with the key, till this diſtance is cut upon the elevation index by the perpendicular line of the altimeter; and the horizontal line will be marked upon the radius by the inſide of the diameter. In order to obtain the length of the tree, the elevation index is firſt moved downwards, till the bottom of the tree cut by the horizontal wires is obſerved through the ſights, and the feet and inches marked by the index upon the altimeter below the point of ſight, or horizontal line, are noted down: then the index is moved upwards, till the part to which you would meaſure, cut by the horizontal wires, is ſeen, and the feet and inches marked on the altimeter above the point of ſight, are noted: theſe two quantities added together give the exact length of the tree, which is inſerted in a field-book. For the girth of the tree, the circumference in that part where the horizontal diſtance was taken, is meaſured with the tape line; and a ſixth part of this circumference is added to the diſtance on the radius, which was before cut by the inſide of the diameter, becauſe the tape-line, in taking the diſtance, cannot be applied to the center of the body of the tree; then the elevation index is lowered to that part of the tree, of which the diameter is to be taken and ſcrewed faſt. Set the moveable limb of the ſliding piece quite ſtrait, and the edge of the horizontal index upon the firſt diviſion of it. Turn the whole inſtrument about to the left hand, till you ſee, through the ſights, the left ſide of the tree cut exactly by the perpendicular wires; then, the inſtrument being fixed, move the ſights only upon the ſliding piece, till you ſee the right ſide of the tree cut alſo by the perpendicular wires; and you will find the true diameter marked by the horizontal index upon the ſliding piece, which is to be entered in a diſtinct column of the field-book.

For the boughs: let the diſtance on the radius be now reduced to its former quantity, and the elevation index moved upwards, till the bough is ſeen through the ſights, and ſcrewed faſt: ſet the moveable part of the ſliding piece in a poſition parallel to the bough, and the edge of the horizontal index on the firſt diviſion of it. Turn the whole inſtrument about, till you ſee, through the ſights, the ſhoot of the bough, cloſe to the trunk cut by the perpendicular wires; then move the ſights, till you ſee the other end of the bough cut by the ſaid wires, and note the feet and inches marked by the horizontal index on the moveable limb of the ſliding piece, which will give the true length of the bough, to be inſerted in the field-book. And the girth of the bough may be obtained, by directing the ſights to that part of it, whoſe girth is deſired; then by moving the elevation index downwards, till you ſee the under-ſide of the bough cut by the horizontal wires; and there noting the feet and inches marked by the ſaid index on the altimeter: after which, let the elevation index be moved upwards, till the upper-ſide of the bough cut by the horizontal wires is ſeen; the feet and inches marked upon the altimeter are to be noted as before: the former quantity ſubtracted from the latter will give the true diameter of the bough, which is entered in the field-book. The true ſolidity both of the body of the tree, and of the boughs, may be found from the diameter and lengths in tables calculated for this purpoſe.

The *dendrometer*, fitted to a theodolite, may be applied to meaſuring the heights and diſtances of objects, acceſſible or inacceſſible, whether ſituated in planes parallel, or oblique, to the plane in which the inſtrument is placed. It may be alſo uſed for taking all angles, whether vertical, horizontal, or oblique, in any poſition of the planes in which they are formed; and thus for facilitating the practical operations of engineering, land-ſurveying, levelling, mining, &c. and for performing the various caſes of plane trigonometry, without calculation; of which the inventors have ſubjoined to their account of this inſtrument many examples. See a Treatiſe upon the *Dendrometer*.

DENDROPHORIA, in *Antiquity*, the carrying of one, or more, trees, in ceremony, through a city, at certain feaſts, and in honour of certain deities.

The word is formed of δενδρον, *tree*, and φερω, *I bear*.

The *dendrophoria* was performed at the ſacrifices of Bacchus, Cybele, and the god Sylvanus. Arnobius, lib. v. makes mention of that performed in the ſacrifices of the mother of the gods. It conſiſted in carrying a pine in proceſſion through the city; which pine was afterwards planted in memory of that under which Atys, the favourite of this goddeſs, mutilated himſelf. The branches of this tree they crowned, in memory of Cybele's doing the ſame; and they covered its trunk with wool, becauſe the goddeſs covered Atys's breaſt with the ſame matter.

The perſons who performed the office of carrying the tree were called *dendrophori*.

In the Roman hiſtory we find mention made of a company, or college of *dendrophori*, who attended the army; and the critics have laboured much to aſſign their office. Some hold, that they hewed and faſhioned the wood for the tents: others, that they provided the wood neceſſary for the military works, machines of war, &c. Salmaſius, in his notes on the Life of Caracalla by Spartian, owns this to be the general opinion of all the learned men of his time; but aſſures us, that they were all miſtaken, and that the *dendrophori* of the army were the ſame with thoſe of the feaſts and ſacrifices.

DENEB, an Arabic term, ſignifying *tail*; uſed by aſtronomers as a denomination of ſeveral fixed ſtars.

Thus *deneb elecet* ſignifies the bright ſtar in the lion's tail; *deneb adigege*, that in the ſwan's tail, &c.

DENEB, or **ALDENEB** *alchail*, in the *Writings of the Arabian Phyſicians*, the name of the equiſetum or horſe-tail: there is, however, no great dependence to be had on what authors ſay of this plant.

DENIER, the French penny; a ſmall copper coin; twelve whereof make a ſol, or French ſhilling.

The French *denier* is now about the twenty-third part of the Engliſh penny. It is ſubdivided into two mailles, and the maille into two oboles. Anciently *denier* was a general name for all ſort of monies in France; as nummus for thoſe in Rome. Thus, a piece of gold money was called *denier d'or*; ſilver money, *denier d'argent*: after the ſame manner as the Romans ſaid *nummus aureus*, and *nummus argenteus*.

There were two kinds of *deniers*; the one Tournois, the other Pariſis; whereof the latter was worth a fourth part more than the former, and was called *monnoye royale*, or *forte monnoye*, and ſometimes *denier d'or*, and *denier à valeur d'or*. See MONEY, &c.

There are at preſent in France ſeveral little copper pieces, which having no proper name, are diſtinguiſhed only by their value in *deniers*: ſuch are the pieces of 36. 30. 24. 18. 12. 6. 4. and 2 *deniers*. The pieces of 4 and 2 *deniers* were coined at Straſburg for currency, in the province of Alſace, purſuant to the declaration of Sept. 6, 1695. Thoſe of ſix *deniers* were coined in the mints of Aix, Montpelier, Rochelle, Bourdeaux, and Nantz, by the edict of 1709, and are little current. Poſt. Dict. Comm.

DENIZEN, from the Britiſh *dinaſddyn*, *man of the city*, or *dineſydd*, *free of the city*, in *Law*, an alien enfranchiſed in England by the king's letters-patent, and donation;

and thereby enabled, in many reſpects, to do as the king's native ſubjects do; namely, to purchaſe, poſſeſs, and deviſe lands, &c.

Denizenſhip is a right inferior to naturalization by parliament: for a ſtranger naturalized may inherit lands by deſcent, which a *denizen* cannot. Neither can his iſſue born *before denization*, inherit to him; but his iſſue born after may. No *denizen* can be of the privy-council, or either houſe of parliament, or have any office of truſt civil or military, or be capable of any grant from the crown. Stat. 12 Will. III. cap. 2.

Add, that, in the charter, whereby a perſon is made a *denizen*, there is uſually ſome clauſe or other, which abridges him of that full benefit which natural ſubjects enjoy.

When a man is thus enfranchiſed, he is ſaid to be, *ad fidem regis Angliæ*, or, *under the king's protection*; till ſuch time his goods might be ſeized to the king's uſe.

DENOMINATION, from *denomino*, of *de* and *nomen*, a *name*, a name impoſed on any thing, uſually expreſſing ſome quality predominant therein.

Hence, as the qualities and forms of things are of two kinds, viz. internal and external, *denomination* becomes twofold.

Denomination, *internal*, is that founded on the intrinſic form: thus Peter is *denominated* learned, on account of his learning, which is ſomething internal.

Denomination, *external*, is that founded, or ariſing from the external form. Thus, a wall is ſaid to be ſeen, and known, from the viſion and cognition employed upon it; and thus Peter is *denominated* honoured, by reaſon of honour, which is not in the perſon honoured, but in him that honours.

DENOMINATOR, in *Arithmetic*, a term only uſed in ſpeaking of fractions, or broken numbers. See Fraction.

The *denominator of a fraction* is the number or letter below the line; ſhewing into how many parts the integer is ſuppoſed to be divided by the fraction.

Thus in the fraction $\frac{7}{12}$ ſeven twelfths, the number 12 is the *denominator*, and ſhews, that the integer is here divided into 12 parts. So in the fraction $\frac{a}{b}$, *b* is the *denominator*.

The *denominator* always repreſents an integer.

The number above the line, 7, is called the *numerator*.

Denominator *of a ratio* is the quotient ariſing from the diviſion of the antecedent by the conſequent.

Thus 6 is the *denominator* of the ratio 30 : 5, becauſe 5) 30 (6. The *denominator* is what we otherwiſe call the *exponent* of the ratio.

DE NON *reſidentia clerici regis*, in *Law*, the name of an ancient writ, the form whereof ſee 2 Inſt. fol. 624. for excuſing a parſon employed in the king's ſervice for nonreſidence.

DENS *canis*, in *Botany*. See Dog's *Tooth*.

DENSHIRING *of land*, in *Agriculture*, is the caſting parings of earth, turf, and ſtubble, into heaps, which when dried are burnt to aſhes, for a compoſt on poor barren land. This method of improvement is uſed, on taking in and encloſing common waſte grounds. In many parts of England this is called burn-beating; but in Staffordſhire, and other counties, they term it *denſhiring* of land. See Burning *of land*.

DENSITY, *Denſitas*, that property, or habitude of bodies, whereby they contain ſuch a quantity of matter, under ſuch a bulk.

Accordingly, a body that contains more matter than another, under the ſame bulk, is ſaid to be *denſer* than the other.

Denſity ſtands in oppoſition to *rarity*.

Hence, ſince the maſs is proportional to the gravity, a *denſer* body is ſpecifically heavier than a rarer; and a ſpecifically heavier is *denſer* than a ſpecifically lighter.

The *denſities*, and bulks of bodies, are the two great points, whereon all mechanics, or laws of motion, turn: it is an axiom, that bodies of the ſame *denſity* contain equal maſſes under equal bulks. If the bulks of two bodies be equal, their *denſities* are as their maſſes: conſequently, the *denſities* of equal bodies are as their gravities. If two bodies have the ſame *denſity*, their maſſes are as their bulks: and hence, the gravities of bodies of the ſame *denſity* are in the ratio of their bulks. The maſſes of two bodies are in a ratio compounded of their *denſities* and bulks; conſequently, their gravities are in the ſame ratio; and if their maſſes or gravities be equal, their *denſities* are reciprocally as their bulks. The *denſities* of any two bodies are in a ratio compounded of the direct ratio of their maſſes, and the reciprocal one of their bulks. Thus, let D repreſent the *denſity*, M the magnitude or bulk, and Q the maſs or weight of one body; and *d*, *m*, *q*, thoſe reſpectively of another: then we ſhall have $D = \frac{Q}{M}$ and $d = \frac{q}{m}$, and therefore $D : d :: \frac{Q}{M} : \frac{q}{m}$; and $DMq = Qmd$; whence the preceding propoſitions may be eaſily deduced.

The Peripatetics define *denſity* a ſecondary quality, whereby a body is full of itſelf; its parts cohering without any interſtice. So that the form of *denſity* conſiſts in the immediate coherence of parts. Hence Porphyry in his Predicaments defines a *denſe* body, that whoſe parts are placed ſo near each other, that no other body can come between them; as gold.

The efficient cauſe of *denſity* they uſually attribute to cold. Scaliger, and ſome others, attribute it to moiſture. Many of the moderns take the ſmallneſs of the parts of bodies, to contribute much to their *denſity*; as by this means the pores are left the ſmaller: though it is added, that the *denſity* of bodies does not only depend on the ſmallneſs of the pores, but alſo on their fewneſs; ſo far are we from having any body abſolutely *denſe* in the ſenſe of the ancients, that gold itſelf, the *denſeſt* and heavieſt of all natural bodies, Sir Iſaac Newton obſerves, contains a great deal more pore, or vacuity, than ſubſtance.

When the preſſures of two liquids are equal, the quantities of matter in columns which have equal baſes do not differ; wherefore the bulks, that is, the height of the columns, are inverſely as the *denſities*; whence may be deduced a method of comparing them together. For if in communicating tubes there be different fluids, and they remain at reſt, their preſſures are equal; and by meaſuring their altitudes, the ratio of their *denſities* is found.

The *denſities* of liquids are alſo compared together by immerging a ſolid into them: for if a ſolid lighter than the liquids to be compared together, be immerſed ſucceſſively into different liquids, the immerſed parts will be inverſely as the *denſities* of the liquids. For, becauſe the ſame ſolid is made uſe of, the portions of the different liquors, which in every caſe would fill the ſpace taken up by the immerſed parts, are of the ſame weight; therefore the bulks of thoſe portions, that is, the immerſed parts themſelves, are inverſely as the *denſities*.

Density *of the air* is a property that has much employed the later philoſophers, ſince the diſcovery of the Torricellian experiment, and the air-pump.

It is demonſtrated, that in the ſame veſſel, or even in veſſels communicating with each other, at the ſame diſtance from the center, the air has every where the ſame *denſity*. The *denſity* of the air always increaſes in proportion to the compreſſion, or the compreſſing powers.

And hence, the lower air is always *denſer* than the upper; yet the *denſity* of the lower air is not proportional to the weight of the atmoſphere, by reaſon of heat and cold, which make conſiderable alterations as to rarity and *denſity*.

If the air be rendered *denſer*, the weight of bodies therein is diminiſhed; and if rarer, increaſed; becauſe bodies loſe more in heavier than in lighter mediums.

And hence, if the *denſity* of the air be ſenſibly altered, bodies, equally heavy in a lighter air, if their ſpecific gravities be conſiderably different, will have their equilibrium taken away in a *denſer* air, and the ſpecifically heavier will preponderate; which is the foundation of the Manometer, an inſtrument for meaſuring the alterations in the *denſity* of the air.

Density *of the planets*; in homogeneous, unequal, ſpherical bodies, the gravities on their ſurfaces are as their diameters, if the *denſities* are equal. But if the bodies be equal, the gravities will be as the *denſities*. Therefore in bodies of unequal bulks and *denſities*, the gravity will be in a compound ratio of the diameters and *denſities*; conſequently the *denſities* will be as the gravities divided by the diameters, and therefore in the ſeveral bodies as follows, viz.

	In the Sun.	Jupiter.	Saturn.	Earth.	Moon.
	10000	9385	6567	39539	48911
Or	25½	19	15	100	123½

As it is not likely that theſe bodies are homogeneal, the *denſities* here determined are not ſuppoſed to be true; but rather the mean *denſities*, or ſuch as the bodies would have if they were homogeneal, and of the ſame maſs of matter and magnitude.

DENTAL, Dentalis, from *dens*, a *tooth*, is applied to certain letters, in the pronunciation whereof the teeth have a principal ſhare.

Grammarians, and eſpecially the Hebrew ones, diſtinguiſh the letters into *dental*, *labial*, *guttural*, *lingual*, *palatal*, &c.

DENTALIS, or Dentalium, is a kind of univalve ſhell, which the apothecaries are ordered to pulverize, and uſe in ſeveral medicaments, as an alkali.

The genuine *dentalis*, deſcribed by M. Tourneſort, is of a tubular, or conical form, about three inches long; of a ſhining, greeniſh-white colour; hollow, light, and divided lengthwiſe by parallel lines running from top to bottom. It is about the thickneſs of a quill; and bears ſome reſemblance to a dog's tooth, whence its name.

The *dentalium* is a genus of the *teſtacea* worms, in the Linnæan ſyſtem. It is very ſcarce; and therefore, in lieu of it, they uſually ſubſtitute a ſhell of divers colours found among the ſand when the ſea is withdrawn; but not channelled, or fluted like the *dentalis*.

Dr. Liſter, in the Philoſophical Tranſactions, makes mention of two ſpecies of *dentalia*; the firſt commonly enough found about the iſland of Guernſey, &c. being a long, ſlender, white pipe, a little bending and tapering, and open at both ends; the other properly called *entalium*, longer and thicker than the former; and beſides, ſtreaked with ridges; whence the Italian term *intaglia*. See *Tab. of Foſſils, Claſs* 9. See ENTALIUM.

There are two principal kinds of them, the one ſmooth, the others ſtriated. Of the ſmooth kind, ſome are all over white, others are tipped with red at the end; and of the ſtriated ones, ſome are altogether white, others are green, and in ſome the ſtriæ are more prominent, in others fainter, eſpecially in the leſſer ones. See *Tab. of Shells*, N° 4.

This ſhell is alſo called *dentalium* and *ſyringites*. Taken inwardly, it is uſed as an alkali to ſweeten acids, to ſtop a looſeneſs of the belly, and for ſpitting of blood. It is alſo uſed externally as a drier.

DENTALIUM. See the preceding article.

DENTARIA, in *Botany*. See TOOTH-WORT.

DENTATED *Leaf*, in *Botany*. See LEAF.

DENTED, *indented*, *toothed*. See INDENTED.

DENTED *verge*, among *Botaniſts*, is applied to ſuch leaves of plants as are notched, or jagged about the edge or rim: of theſe ſome are *fine-dented*; others *large*, or *deep dented*, i. e. cut into the leaf. See LEAF.

DENTED *wheel*, *rota* DENTATA. See WHEEL.

DENTES, in *Anatomy*. See TEETH.

DENTEX, in *Zoology*, the name of a ſea-fiſh, caught in great plenty in the Mediterranean, and common in the markets of Italy.

It is a well-taſted fiſh, and is caught of five, or ſix, and ſometimes ten pound weight: it is ſomewhat broad and flat in its ſhape, yet conſiderably thick and long. Its head is flatted, its ſnout very long, and its back ridged and ſharp; its back and ſides are of a duſky yellowiſh green colour, and ſometimes, in the full grown fiſh, purpliſh, always ſpotted with very bright blue and black ſpots; the back and gill-fins have each a black ſpot near their origin, and their belly-fins are yellow.

The teeth are diſpoſed in a ſingle row in each jaw, and there are at diſtances four, which are longer and broader than the reſt, and look like the canine teeth of men, or of quadrupeds: it is from theſe that it has its name, and theſe as well as the reſt of the teeth are in this fiſh covered with lips, as in quadrupeds; its tail is forked, and its ſcales are very large. Geſner.

DENTICLES, or DENTILS, in *Architecture*, an ornament in corniches, bearing ſome reſemblance to teeth; particularly affected in the Ionic and Corinthian orders; and of late alſo in the Doric.

They are cut on a little ſquare member, properly called *denticulus*; and the notches, or ornaments themſelves, *dentils*; by the Italians, *dentelli*, and *denticoli*, from *dens*, *tooth*, as having the appearance of a ſet of teeth.

Anciently *dentils* were ſcarce ever uſed but in the Ionic cornich; yet we find them in the remains of the theatre of Marcellus; and this is an argument with ſome, that Vitruvius had not the direction of that building. Vitruvius preſcribes the breadth of each *dentil*, or tooth, to be half its height; and the metopa, or interval between each two, he orders to be two-thirds of the breadth of the *dentil*, lib. iii. cap. 4.

The ſame author, cap. ii. of his fourth book, obſerves, that the Greeks never uſed *dentils* underneath modillions, becauſe modillions repreſent purlins, and *dentils* repreſent ends of rafters, which can never be placed underneath purlins.

The Romans were not ſo ſcrupulous as to this decorum; excepting in the Pantheon, where there are no *dentils* under the modillions, neither in the portico, nor in the inſide of the building.

DENTICULI *Elephantis*, in the *Hiſtory of Shells*, a name given by many authors to the *dentale*, a ſmall ſhell of the tubulus marinus kind, which is ſomewhat bent and pointed at one end, and in ſome meaſure repreſents the elephant's tuſk. See DENTALIS.

DENTIFORMIS *proceſſus*, the ſame as *pyrenoides*. See PYRENOIDES.

DENTRIFICE, from *dens*, a *tooth*, and *frico*, *I rub*, in *Medicine*, *tooth-powder*; a remedy to rub the teeth, in order to cleanſe, or faſten them.

There are *dentrifices* of divers kinds and forms; ſome in form of a powder, compoſed of corals, pumice-ſtone, ſalt, alum, egg-ſhells, crabs-claws, hartſhorn, cuttle-bone, tartar vitriolated, &c. Others in form of an electary, conſiſting of the ſame powders, mixed up with honey.

There are others, prepared with roots boiled with alum, and dried in the oven. Others in form of a liquor, drawn by diſtillations from drying herbs, and aſtringent medicines.

The Dutch hold butter the beſt *dentrifice*, to keep the teeth white and ſound; and the Spaniards, urine.

The generality of operators for the teeth allow acids, ſuch as ſpirit of vitriol, &c. to be the readieſt of all *dentrifices*, to take off the foulneſs and yellowneſs of the teeth; but though they allow that theſe render them white, for the preſent, they diſcountenance a frequent uſe of them, as wearing away too much of the teeth, and injuring the gums.

Tachenius attacks ſpirit of vitriol even in a ſtronger manner, and affirms that it cannot anſwer the firſt purpoſe of making the teeth white: he alleges, that the mixture of ſpirit of vitriol, with any white alkali, produces a yellowiſh colour, not a white one. It is evident, that our ſweat, and all other matter, tranſpiring through the pores, is of an alkaline nature, and there continually tranſpires through the gums ſomething of this kind, which lodging itſelf upon the teeth, muſt needs mix with the remains of the ſpirit of vitriol left on them in the cleaning; and, by that means, the whiteneſs at firſt given will gradually go off; and the yellow, which is the natural reſult of an alkali, with ſpirit of vitriol, will appear in its place. Tachenii Hippocrat. Chym.

DENTIL, in *Architecture*. See DENTICLE.

DENTILLARIA, in *Botany*, a name by which ſome authors call the *plumbago*, or LEADWORT.

DENTISCALPRA, from *dens*, *tooth*, and *ſcalprum*, *ſcraping inſtrument*, in *Surgery*, an inſtrument for ſcouring yellow, livid, or black teeth; to which being applied near the gums, it ſcrapes off the foul morbid cruſt. Some of theſe inſtruments are furniſhed with narrow points; others with broader, and with edges; and ſome again are falciform; but all of them adapted to one and the ſame handle.

DENTITION, *Dentitio*, the act of breeding, or cutting the teeth.

The time of *dentition* is uſually from about the ſixth or ſeventh month to the age of twenty. The *inciſores* come firſt; then the *canini*; after them the *molares*: ſo that at the end of the ſecond year, in general, a child is furniſhed with ten teeth in each jaw, called the milk-teeth: this is the firſt *dentition*. Theſe generally laſt till the ſixth or ſeventh year, when they fall ſucceſſively without any conſiderable pain, and are ſucceeded by others, till the fourteenth or fifteenth year. The ſeventh year is uſually the period of the ſecond *dentition*: it often happens at this period, ſays an ingenious dentiſt, Mr. Magenis, that the roots of the milk-teeth are too firmly fixed, to give way to the progreſſive growth of the ſucceeding ones, which are in a ſoft feeble ſtate, and incapable of forcing their way in a proper order. In this caſe the new teeth become indented, and otherwiſe deformed; and by forcing their way on either ſide of the milk-teeth, form a double row, and aſſume the appearance of ſupernumerary teeth: and beſides, the root of the milk-tooth is ſometimes united in the ſocket with the root of the adult tooth, thus forming one root with two diſtinct teeth in the crown; in conſequence of which, the partitions of the ſockets are immoderately diſtended and weakened, and become incapable of retaining the ſtamina in their diſtinct alveoli or ſockets. It will therefore require peculiar attention, to determine when an extraction of the milk-teeth is neceſſary, whether they be faſt or looſe in their ſockets, in order to inſure a quicker growth, and a beautiful arrangement of the ſucceeding ſet. This ſecond *dentition* produces the four firſt great *dentes molares*, one at either extremity of both jaws: and from the tenth to the fifteenth year a third *dentition* happens, which furniſhes four other great *molares*, one cloſe by each of the former. The *molares* of the ſeventh year are ſubject to a caries and early decay, which is ſometimes attended with violent inflammations, tumours, and ulcerations of the gums. When theſe ſymptoms appear, and before the ulcer corrodes deeply, it will be neceſſary to extract the tooth, which will commonly remove theſe dreadful ſymptoms. It has been obſerved, that in ſome caſes the increaſed ſize of the *molares* forces and diſtends the lower jaw beyond its proper place, ſo that the lower teeth project as they approach the upper ones; and a timely extraction of the two great grinders in the lower jaw, whether they are decayed or not, has been recommended for preventing this deformity. About the twentieth year comes the laſt *dentition*, which gives the four extreme *dentes molores*, called *dentes ſapientiæ*, becauſe they come after puberty.

Dentition, Hippocrates obſerves, is uſually preceded with an itching of the gums, and with convulſions, fevers, and looſeneſs; eſpecially when the canine teeth are cut. Moſt of theſe ſymptoms Dr. Liſter, on this paſſage of Hippocrates, obſerves, happen to birds upon moulting, or caſting their feathers; on which occaſion alſo they become mute, and ſullen.

The germen, or ſeed of the tooth, ſays Dolæus, is a tender mucous matter, like the white of an egg, contained in the cells, or alveoli, of the jaw-bone, which grows harder and bigger every day, till it be fit to break through the gum. In this rupture the poor child is afflicted with terrible ſymptoms, inflammations of the jaws, gripes, waking, inquietude, terrors, dejections, vomiting, ſalivation, epilepſy, abſceſſes, and frequently death.

There are two terms, or periods of *dentition*; the one, when the tooth makes its firſt endeavour to get out of the maxillary bone, and wherein the outer and upper part of the gum uſes to be encompaſſed with a whitiſh circle; the other, when the tooth, conſiderably enlarged in bulk, renders the gum tumid, and ſtrives with all its force to break its way through the ſame. The remedies againſt the ſymptoms of *dentition* are abſorbents, and gentle purgatives.

If the fever be high, bleeding will be neceſſary: though this is an evacuation which children bear the worſt of any. Sydenham ſays, that in fevers occaſioned by *dentition*, he never found any remedy ſo effectual, as two, three, or four drops of ſpirits of hartſhorn in a ſpoonful of ſimple water, given every four hours. It may be given from five drops to fifteen or twenty, according to the age of the child; and when coſtiveneſs does not forbid it, three or four drops of laudanum may be added to each doſe. In convulſion fits, a bliſtering plaſter may be applied betwixt the ſhoulders, or one behind each ear. A ſmall Burgundy pitch plaſter between the ſhoulders has been ſometimes applied, when children are cutting their teeth; and has been found to eaſe the tickling cough which attends teething. The gums may be rubbed with a little fine honey three or four times a day: and children ſhould be always ſupplied with ſomething that will yield a little to the preſſure of their gums, as a cruſt of bread, a wax-candle, a bit of liquorice-root, &c. Cutting the gums is ſeldom of any uſe; however, in obſtinate caſes it ought to be tried. The food of children ſhould at this time be light, and their nerves braced by ſufficient exerciſe without doors, the uſe of the cold bath, &c. With theſe precautions, there would be little occaſion for teething necklaces, and other abſurd amulets, which are often worn, under the notion of aiding *dentition*.

DENUDATION, from *de*, and *nudus*, *naked*. See Exfoliation.

DENUNCIATION, *Denunciatio*, a ſolemn publication, or promulgation of any thing.

All veſſels of enemies are lawful prize after *denunciation*, or proclamation of war.

The deſign of the *denunciation* of excommunicated perſons is, that the ſentence may be the more fully executed; that the perſons may be known, the entrance into the church refuſed them, and that other people may be warned not to have any communication with them.

DEOBSTRUENTS, from *de*, and *obſtruo*, *I obſtruct*, are ſuch medicines as open obſtructions.

There is ſomething further intimated by *deobſtruent* than by *detergent*: for a medicine may be *deobſtruent*, that is not in the ſtricteſt ſenſe *detergent*: as, in effect, are moſt of thoſe which are made of metalline ſubſtances, ſuch as ſteel and mercury; which obtain the appellation *deobſtruents* from their acting by their natural weight, whereby they increaſe the momentum of the circulating fluid, and make it ſtrike againſt the ſecretory outlets with greater force; becauſe the momentum, or *vis percuſſionis*, of all projectiles, of which kind is a circulating fluid, is as their ſolidities, ſuppoſing their velocities equal. The more, therefore, the animal fluids are ſaturated with denſe and ſolid particles, with the greater force they diſtend the veſſels, and the more eaſily break through, where the ſtructure favours their eſcape; and upon that account are medicines which add to theſe qualities in the fluids called *deobſtruents*.

DEODAND, in our *Cuſtoms*, a thing given, or forfeited, as it were, to God, for the pacification of his wrath in a caſe of miſadventure, whereby a man or woman comes to a violent end, without the fault of any reaſonable creature. As, if a horſe ſtrike his keeper, and kill him; if a man, in driving a cart, falls ſo that the cart-wheel runs over him, and preſſes him to death; if one be felling a tree, and gives warning to the ſtanders by, to take care of themſelves, yet a man is killed by the fall thereof: in the firſt place, the horſe; in the ſecond, the cart-wheel, or the cart and horſes; and in the third, the tree, is *Deo dandus*, *to be given to God*, that is, to the king, to be diſtributed to the poor by his almoner, for expiation of this unhappy event; though effected by unreaſonable creatures, or inanimate ſubſtances.

Omnia quæ movent ad mortem ſunt deodanda.

What moves to death
Is *deodand*.

This law ſeems to be an imitation of that in Exodus, chap. xxi. *If an ox gore a man, or a woman, with his horn, ſo as they die, the ox ſhall be ſtoned to death, and his fleſh not be eat; ſo ſhall his owner be innocent.*

Fleta ſays, the *deodand* is to be ſold, and the price diſtributed to the poor, for the ſoul of the king, his anceſtors, and all faithful people departed this life.

It was originally deſigned, in the ſuperſtitious times of popery, as an expiation for the ſouls of ſuch as were ſnatched away by death; and was given to the church in order to procure the ſoul of ſuch deceaſed perſon to be prayed out of purgatory.

DE ONERANDO *pro rata portionis*, in the law of England, a writ that lies where one is diſtrained for a rent that is to be paid proportionably by others: thus, if a man holds ten acres of land, by fealty and ten ſhillings rent, of the king; and aliens, one acre to one, and another to another, in fee; and afterwards the ſheriff diſtrains only one of them for the rent; he that is ſo diſtrained may have this writ for his relief.

DEOPPILATIVE, from *de*, and *oppilo*, *I obſtruct*, a remedy proper to ſoften, reſolve, and remove obſtructions. See Obstruction.

Deoppilatives are the ſame with what we otherwiſe call *deobſtruents*. See Deobstruent.

DEOSCULATION, *Deoſculatio*, in *Antiquity*, one of the moſt ancient forms of adoration. See Adoration.

DEPART, a method of refining, or ſeparating gold from ſilver by means of *aqua fortis*.

There are three ways of refining gold: the firſt by antimony; the ſecond by ſublimate; and the third, which is the moſt uſual, by *aqua fortis*. The two former, ſee under Refining.

For the operation of the *depart*, they take at the rate of one pound of impure gold, and two or three of ſilver; theſe they fuſe together in a crucible, and, when fuſed, caſt them into cold water, where they become divided into grains of the bigneſs of peas. Theſe grains taken out, and dried by the fire, are put in a *departing* veſſel, which is a ſtone matraſs, and to the metal are added four pounds of *aqua fortis*. Then taking the veſſel, they ſet it on the coals, and in about an hour's ſpace the refining is done. For, upon opening the veſſel, they find nothing appear therein but the *aqua fortis*, and the gold reduced into a calx, or ſand; the ſilver being all diſſolved, and imbibed by the liquor.

To raiſe the gold to its due fineneſs, they uſually give it the *aqua fortis* again and again; uſing for the firſt time half a pound, and for the ſecond a quarter of a pound of the water, to eight ounces of metal. If the third water be found good and clear, the operation is ended: and the calx of the gold, being waſhed in repeated waters, is melted down again in a crucible, firſt by a gentle, and afterwards a vehement fire, to be caſt into ingots, or wedges.

It muſt be added, that the ſilver, with the impurities of the gold, is ſo thoroughly incorporated with the water, that to the eye there does not appear any thing beſide the pure liquid; yet is not this ſilver loſt. To recover it again out of the menſtruum, they divide their ſtock of *aqua fortis* into ſeveral ſtone veſſels, which they fill up with ſpring water, obſerving to put ſeven or eight times as much of this, as that. This done, in each veſſel they put a quantity of copper; and leaving the whole for twenty-four hours, at the end thereof they find the ſpirits of the *aqua fortis* have quitted the ſilver, and are with the copper, leaving the former in form of a calx, or incorporated aſhes at bottom. This calx, being dried, is melted into an ingot, with a little ſaltpetre.

To huſband the *aqua fortis*, and make it ſerve again for a ſecond operation, they diſtil it in an earthen, or glaſs alembic; and when the diſtillation is about a third over, change the recipient. The water of the firſt recipient ſerves for the firſt operation of *departing*, and the reſt for the ſubſequent ones.

If the *aqua fortis*, having quitted the ſilver, and being united with the copper, be then filtrated, it is called *aqua ſecunda*; in which if you ſteep an iron plate ſome hours, you will have another *departure*: for the menſtruum will let go the copper, and prey on the iron, leaving the copper in powder on the iron plate. And filtrating this diſſolution, you may get the iron out of it, by laying in it a piece of *lapis calaminaris*; for the iron in that caſe will *depart* to the bottom, and the calamine be diſſolved. And if you again filtrate this water, and pour on it the liquor of fixed nitre, you will have another *depart*, the calamine precipitating to the bottom. And laſtly, filtrating this water, as before, and evaporating part of it, you will have cryſtals of ſaltpetre. See Assaying, and Quartation.

DEPARTERS *of gold and ſilver*. See Depart, and Finers.

DEPARTMENT, in *Juriſprudence*, ſignifies diſtribution, diviſion, or allotment of certain employments among ſeveral perſons. Thus the great officers of ſtate, &c. have each their ſeveral *departments*: and the buſineſs of the ſecretaries of ſtate in particular, is generally divided into two partitions; the one officiating for the ſouthern, the other for the northern *department*: though ſometimes another is added on particular occaſions.

Department, in *Architecture*, that part of an edifice, deſtined for ſome peculiar purpoſe: as in a palace, the *department* of the kitchen, of the ſtables, &c.

DEPARTURE, or Departer, in *Law*, a term properly applied to a perſon, who firſt pleading one thing in bar of an action, and that being replied to, waves it, and inſiſts on ſomething different from his firſt plea.

Or, it may be applied to a plaintiff, who in his replication ſhews a new matter different from that in his declaration.

So if a man plead a general agreement in bar, and in his rejoinder allege a ſpecial one, it ſhall be adjudged a *departure* in pleading. The defendant hereupon demurreth, becauſe it was a *departure* from the declaration. Coke, part ii. fol. 147.

Departure *in deſpite of the court*, is when the tenant, or defendant, after appearing to the action brought againſt him, and having a day over in the ſame term, does not appear at the day, but makes a default. This is a *departure in deſpite of the court*; and therefore he ſhall be condemned.

The *departure* is always on the part of the tenant, or defendant; and its entry is, *Quod prædictus A, licet ſolemniter exactus, non revenit, ſed in contemptum curiæ receſſit.*

Departure, in *Navigation*, is the eaſting, or weſting of a ſhip, with reſpect to the meridian from which it *departed* or ſailed. Or, it is the difference of longitude, either eaſt or weſt, between the preſent meridian the ſhip is under, and that where the laſt reckoning or obſervation was made.

This *departure*, any where but under the equator, muſt be accounted according to the number of miles in a degree proper to the parallel the ſhip is under.

DEPESTA, in *Antiquity*, a wine veſſel, which the Sabines, on any feſtival day, ſet on the table of their gods.

DEPHLEGMATION, in *Chemiſtry*, is the act of purifying, or clearing a fluid of its phlegm, or water.

This is performed either by Evaporation, or by diſtilling the ſpirit, or other fluid, again and again; by which means the ſpirituous part riſes, and leaves the phlegm, or water, behind. When the ſpirit is thus diſengaged of all its phlegm, or, at leaſt, as much as it can be, it is called a *dephlegmated ſpirit*.

Dephlegmation is alſo called Concentration, particularly when acids are the ſubject.

DEPILATORY, in *Medicine*, a plaſter, or medicine, applied on any hairy place, in order to bring off the hair.

The word is formed of the particle *de*, and *pilus*, *hair*.

Depilatories are principally compoſed of lime and orpiment, which is very cauſtic, and even a dangerous mineral.

DEPONENT, *Deponens*, in the Latin *Grammar*, a term applied to verbs which have active ſignifications, but paſſive terminations, or conjugations, and want one of their participles paſſive.

Such is *minor*, *I threaten*, which has for participles *minans*, *minaturus*, and *minatus*, but no *minandus*, which ſhould be the participle paſſive.

They are called *deponents*, as having depoſited, or laid aſide, their paſſive ſignification.

Deponent, in a legal ſenſe, a perſon who makes a depoſition or affidavit.

DEPOPULATION, the act of waſting, deſtroying, deſolating, or unpeopling a place. Coke, Inſtit. part iii. fol. 204.

DEPOPULATORES *agrorum*, in our *Statutes*, ſuch as depopulate or diſpeople lands.

It appears by the ſtatute 4 Hen. IV. c. 2. that theſe were great offenders by the ancient law, and that the appeal or indictment againſt them ought not to be in a general, but in a ſpecial manner. They got their name of *depopulatores agrorum*, becauſe by proſtrating or decaying the houſes and habitations of the king's people, they depopulate towns. Coke, 3 Inſt. fol. 204.

DEPORTATION, from *deporto*, *I carry away*, a ſort of baniſhment in uſe among the Romans, whereby ſome iſland, or other place, was allotted to a criminal for the place of his abode; with a prohibition from ſtirring out of the ſame on pain of death.

Ulpian makes this difference between *deportation* and *relegation*: that the former confined the party to one certain place for ever; whereas relegation was frequently revoked, and allowed the exile a little more liberty.

By *deportation* a perſon loſt the rights of a Roman citizen.

DEPOSIT, *Depoſitum*, a thing put into the hands of another, to be kept gratis.

The civilians divide *depoſitum* into *ſimple* and *judiciary*.

Deposit, *Judiciary*, is that whoſe property is conteſted between ſeveral perſons, and depoſited in the hands of ſome third perſon, by decree of a judge.

Deposit, *Simple*, is either voluntary, or neceſſary Neceſſary is that done in caſe of hoſtility, ſhipwreck, fire, &c.

Innholders are reſponſible for the baggage brought to them, as being a *neceſſary depoſit*.

DEPOSITARY, in the French law, a perſon entruſted as keeper, or guardian of any thing.

Ordinary depoſitaries are not to warrant the thing left with them, in caſe it be loſt, or ſtolen. They are only to anſwer for a fraud, or breach of faith; not for negligence. But a *neceſſary depoſitary*, as an innkeeper, is accountable for a theft or robbery, if there have been any negligence in the caſe: and by the Engliſh law, even whether there were any negligence or not.

DEPOSITIO, in *Grammar*, is a name which the Latins gave to the final cadence, which terminates as it were the meaſure of the verſe. The Greeks called it ἀποθεσιν and καταλεξιν. Hence ariſeth the diſtinction of verſe into four ſpecies, viz. *acatalectic*, *catalectic*, *brachycatalectic*, and *hypercatalectic*.

DEPOSITION, *Depoſitio*, among the *Ancients*, a ceremony obſerved immediately upon a perſon's expiring, and was a ſolemn manner of laying the corpſe upon the ground. See Burial.

Deposition, in *Law*, a teſtimony given in court by a witneſs upon oath.

In chancery, *depoſition* is a teſtimony ſet down in writing, by way of anſwer to the interrogatories exhibited in chancery, where ſuch witneſs is called *deponent*.

Deposition is alſo uſed for the ſequeſtering, or depriving a perſon of his dignity and office.

This *depoſition* only differs from abdication, in that the latter is ſuppoſed voluntary, and the act of the dignitary, or officer himſelf; and the former of compulſion, being the act of a ſuperior power, whoſe authority extends thereto. Some ſay the *depoſition*, and ſome the abdication, of king James II.

Depoſition does not differ from deprivation: we ſay indifferently, a *depoſed*, or deprived biſhop, official, &c.

Depoſition differs from ſuſpenſion, in that it abſolutely and for ever ſtrips or diveſts a prieſt, &c. of all dignity, office, &c. whereas ſuſpenſion only prohibits, or reſtrains, the exerciſe thereof.

Depoſition only differs from degradation, in that the latter is more formal, and attended with more circumſtances, than the former; but in effect and ſubſtance they are the ſame; thoſe additional circumſtances being only matter of ſhew, firſt ſet on foot out of zeal and indignation, and kept up by cuſtom, but not warranted by the laws or canons. See Degradation.

DEPOT, in *Military Language*, denotes a particular place at the tail of the trenches, out of the reach of the cannon of the place, where the troops commonly aſſemble, that are ordered either to attack the outworks, or to ſupport the troops in the trenches, when there is reaſon to imagine that the beſieged intend to make a vigorous attack.

Depot alſo ſignifies a temporary magazine for forage, faſcines, gabions, tools, &c. neceſſary for the ſupport of an army, or for carrying on a ſiege.

DEPRECATION, from *deprecor*, *I intreat*, in *Rhetoric*, a figure whereby the orator invokes the aid or aſſiſtance of ſome one; or prays for ſome great evil or puniſhment to befal him who ſpeaks falſely, either himſelf, or his adverſary.

DEPRECATORY, or Deprecative, in *Theology*, a term applied to the manner of performing ſome ceremonies in the form of prayer.

Among the Greeks, the form of abſolution is *deprecatory*; being conceived in theſe terms, *May God abſolve you!* whereas in the Latin, and even in ſome of the reformed churches, it is in the declarative form, *I abſolve you.*

DEPRESSED *Leaf*, in *Botany*. See Leaf.

DEPRESSION *of equations*. See Equation.

Depression *of the pole*. So many degrees as you ſail, or travel from the pole towards the equator, ſo many you are ſaid to *depreſs* the pole, becauſe it becomes, reſpectively, ſo much lower, or nearer to the horizon.

Depression *of the viſible horizon*, denotes its ſinking or dipping below the true horizontal plane; whether cauſed by ſome variation of the atmoſphere, or by the different height of the obſerver's eye above the ſurface of the ſea. Thus, let aSf (*Tab.* II. *Surveying*, *fig.* 38.) be the ſurface of the ſea, ES the height of the eye above that ſurface, and AF the obſerver's horizon: then the eye looking along Ea for the horizon, which dips below the true one by the arc Aa, perceives the apparent altitude aB of an object, leſſened by the arc Aa; but if the obſerver has his back towards the object B, then looking along the line Ef, the apparent horizon now becoming the line fEc, and dipping below the true one by the arc Ff or Ac; it is plain the apparent altitude cB is too little, and muſt be augmented by the arc $Ac = Ff$. The *depreſſion* or dip of the horizon may be eaſily computed: thus, let C be the earth's center, E the eye, and the tangent Ef meeting the ſurface in f, where the ſky and water ſeem to meet; then CfE is a triangle, right-angled at f; wherein are known $Cf = CS = 20899059$ feet, the earth's ſemidiameter, and $CE = (CS+SE)$ the height of the eye added to the earth's radius: then as CE : rad. :: Cf : ſine $\angle CEf$, whoſe complement is the angle FEf, the dip ſought. The following table ſhews the *depreſſion* or dip of the horizon of the ſea for different heights of the eye, from one to a hundred feet.

Elevation of the eye above the ſea, in feet.	Depreſſion of the horizon of the ſea.	Elevation, &c. Feet.	Depreſſion, &c.
	′ ″		′ ″
1	0 57	22	4 28
2	1 21	24	4 40
3	1 39	26	4 52
4	1 55	28	5 3
5	2 8	30	5 14
6	2 20	35	5 39
7	2 31	40	6 2
8	2 42	45	6 24
9	2 52	50	6 44
10	3 1	60	7 23
12	3 18	70	7 59
14	3 34	80	8 32
16	3 49	90	9 3
18	4 3	100	9 33
20	4 16		

See Robertſon's Elem. of Navigation, book ix. p. 391. and Tables requiſite to be uſed with the Nautical Ephemeris, p. 14. See Levelling.

Depression *of the ſun*, or *of a ſtar*, is its diſtance from the horizon, below it, meaſured by an arch of the vertical *circle*, intercepted between it and the horizon.

DEPRESSOR, in *Anatomy*, a name common to divers muſcles, from their office in lowering, or bringing down, the parts they are faſtened to.

Depressor *alæ naſi*, in *Anatomy*, a name given by Albinus to a muſcle of the face, called by Cowper *conſtrictor alæ naſi*, and *depreſſor labii ſuperioris*.

Depressor *anguli oris*, in *Anatomy*, a name given by Albinus to the muſcle called by others *depreſſor labiorum communis*; which ſee.

Depressor *labii ſuperioris*, is a muſcle called alſo *conſtrictor alæ naſi*. See Constrictores *naſi*.

Depressor *labii inferioris proprius*, or *quadratus*, a muſcle placed between the *depreſſores labiorum communes*, on the part called the *chin*. It appears to be but one muſcle, aſcending with a twofold order of fleſhy fibres, and terminating in the lower lip. Its office is ſhewn by its name; it depreſſes the lower lip. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 6.

Depressor *labiorum communis*, by ſome called *depreſſor labii ſuperioris*, and *triangularis*, is common to both lips. It ariſes with a broad origin from the lower margin of the under jaw, by the ſide of the chin, and is inſerted with a narrow tail into each lip near their coalition; ſerving to draw them obliquely down. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 7.

Depressor *maxillæ inferioris*. See Digastricus and Biventer.

Depressores *oculi*, a pair of muſcles ſpringing from each corner of the eye, and anſwered by another pair of like figure and ſtructure in the lower eye-lid. Theſe are often conſidered together by anatomiſts as one orbicular muſcle; the fibres environing the eye-lids, and being inſerted into them, not unlike the ſphincters of other parts.

DEPRIMENS, in *Anatomy*, the ſame with Depressor.

Deprimens *biventer*, in *Anatomy*, a name given by Spigelius, and others, to one of the muſcles of the lower jaw, called by others *digaſtricus ſive biventer*; and, by Albinus, *biventer maxillæ inferioris*.

Deprimens *humerum rotundus*, in *Anatomy*, a name given by Spigelius, and others, to a muſcle called by others the *teres major*, and *rotundus major*.

Deprimens *oculi*, in *Anatomy*, a name given by Riolanus, and others, to one of the muſcles of the eye, called the *humilis*, and *rectus inferior* by others. It is the *depreſſor oculi* of Cowper and of Albinus, being one of his four *recti*.

Deprimens *quintus*, in *Anatomy*, a name given by Spigelius, and ſome others, to the muſcle called the Ceratoglossum.

DEPRIVATION, in the *Canon Law*, the act of bereaving, diveſting, or taking away a ſpiritual promotion, or dignity: as when a biſhop, vicar, prebend, or the like, is depoſed, or *deprived* of his preferment, for ſome matter, or fault, in fact, or in law. See Deposition.

Deprivation is of two kinds; *à beneficio*, *&* *ab officio*.

Deprivation *à beneficio* is, when for ſome great crime a miniſter is wholly and for ever deprived of his living, or preferment: which differs from ſuſpenſion, in that the latter is only temporary.

Deprivation *ab officio*, is when a miniſter is for ever deprived of his orders: which is the ſame, in reality, with what we otherwiſe call *depoſition* and *degradation*; and is uſually for ſome heinous crime deſerving death, and is performed by the biſhop in a ſolemn manner. See Degradation.

DEPTH, in *Geometry*, &c. See Altitude, Elevation, &c.

Depth *of a ſail*, denotes the extent of any ſquare or oblong sail from the head-rope to the foot-rope; or the length of the after-leech of any boom-ſail or ſtay-ſail.

Depth *of a ſquadron*, or *battalion*, is the number of men in a file, or the number of ranks. Infantry is now generally drawn up three deep, and in the defence of a breaſt-work only two deep. The cavalry is commonly drawn up three deep, and ſometimes only two deep. See Rank.

DEPURATION, from *depurgo*, *I purify*, in *Pharmacy*, the ſame as clarification, or purification; viz. the purging a body of all the lees, fæces, and other craſs, coarſe, and excrementitious parts contained therein.

Fermentation ſerves to *depurate* liquors: ſyrups, juices, &c. are *depurated* by paſſing them through the *manica Hippocratis*, or ſtraining-bag. See Clarification.

DEPURATORIA *Febris*, in *Medicine*, a fever thus called by the illuſtrious Sydenham, which prevailed much in the years 1661, 2, 3, 4. This, ſays he, ſeems to be the only one, as far as I could hitherto obſerve, in which nature regulated all the ſymptoms in ſuch a manner, as to fit the febrile matter, prepared by proper concoction, for expulſion in a certain time, either by a copious ſweat or a freer perſpiration; and upon this account I call it the *depuratory fever*: and in reality, continues he, I am inclined to believe, that this is the capital and primary fever of nature, as well with reſpect to the regular method which nature uſes in promoting and accompliſhing the digeſtion of the morbific matter at the appointed time, as alſo becauſe it occurs more frequently than other fevers. It ſeems alſo reaſonable to think, that the neceſſary and excellent rules left us by Hippocrates and other ancient phyſicians, are adapted to this primary fever; by means of which it is to be regulated in ſuch a manner, that the febrile matter may be prepared to make a proper criſis by ſweat.

DEPUTATION, from *deputare*, *to depute*, a miſſion of certain ſelect perſons out of a company, or body, to a prince, or aſſembly, to treat of matters in their name, or to proſecute ſome affair therein.

Deputations are more or leſs ſolemn, according to the quality of thoſe who ſend them, and the buſineſs they are ſent upon.

Deputation is not properly applied where a ſingle perſon ſends another with ſuch commiſſion; but only where a body are concerned. The parliament *deputed* the ſpeaker, and ſix members, to preſent their addreſs to his majeſty. The chapter *deputed* two canons to ſolicit their affair in council.

DEPUTY, a perſon ſent, or *deputed*, by ſome community, in their name and behalf.

The ſeveral provinces of the French dominions ſend *deputies* to the king every year, to preſent him the cayer des etats: there are always three *deputies*, one from each order. It is the *deputy* of the firſt order that makes the compliment to the king. In the cities of Turky there are always *deputies* to treat with the grand ſignior's officers,

cers, as to taxes, and other concerns. Theſe *deputies* are three or four of the richeſt and moſt conſiderable among the burghers.

DEPUTY is alſo frequently uſed among us for an office, or employ, not a dignity; and ſtands indifferently for a vice, or lieutenant.

DEPUTY, in *Law*, is one who exerciſes an office in another's right: and the forfeiture or miſdemeanor of ſuch *deputy* ſhall cauſe the perſon whom he repreſents to loſe his office. A principal officer may not appoint a *deputy* in all caſes, unleſs the grant of the office will juſtify him in ſo doing; but when an office deſcends to an infant, ideot, &c. he may make a *deputy* of courſe. A ſuperior officer muſt anſwer for his *deputy* in civil actions, but not in criminal caſes. Judges have no power to hold their courts by *deputy*: recorders, however, may do it. Coroners cannot appoint *deputies*, becauſe theirs is a judicial office of truſt, annexed to their perſons. Sheriffs, ſtewards of a court, bailiffs of a liberty, and conſtables, are allowed to appoint *deputies*.

DEPUTATUS, among the *Ancients*, was applied, firſt, to armourers, or workmen employed in the making of armour in the forges, &c. And ſecondly, to a ſort of active people, who followed the army, and in engagements were truſted to bring off, and take care of the wounded.

DEPUTATUS, Δεπουτατος, was alſo an inferior officer in the church of Conſtantinople, whoſe buſineſs was to call perſons of condition the patriarch had a mind to ſpeak with, and to keep off the crowd where that prelate walked.

This *deputy* appears to have been a ſort of uſher, or tipſtaff; but he had likewiſe the care of the ſacred veſtments, in which he approached the office of a ſacriſtan.

DE QUIBUS *ſur diſſeiſin*, in *Law*, a writ of entry. See Fitzherb. Nat. Brev. fol. 191.

DER, a ſyllable frequently prefixed to the names of places in England. It is ſaid to ſignify that ſuch were formerly places where wild beaſts herded together, ſo called from the Saxon *deop*, *fera*, unleſs the ſituation was near ſome river.

DERBY-*neck*. See BRONCHOCELE.

DERDER, in the *Materia Medica of the Ancients*, a name uſed by Avicenna and Serapion, to expreſs the common elm, whoſe bark they uſed on many occaſions.

DEREFELD, in our *Old Writers*, is uſed for a park, q. d. a field of deer.

DEREIGNMENT, or **DERAIGNMENT**, in *Law*. The ſubſtantive *dereinment*, is ſometimes uſed in the ſame ſenſe with the French *deſrayer* or *deſranger*; that is, to diſplace or ſet out of order. Thus we find *deraignment* or departure out of religion, ann. 31 Hen. VIII. c. 6. and 5 and 6 Edw. VI. c. 13. Thus alſo we meet with *dereinment* or diſcharge of their profeſſion, 33 Hen. VIII. cap. 29. which is ſaid of thoſe religious men, who forſook their orders or profeſſion. See Kitchin, fol. 152. The leſſee enters into religion, and afterwards is *deraigned*. And Briton, c. 21. uſes *ſemonenſe deſrenable*, for a ſummons that may be challenged as defective, or not lawfully made. Skene, De Verb. Signific. Verbo *diſrationare*, makes it ſignify what we call waging and making of law.

DERELICTS, from *de*, and *relinquo*, *I leave*, in the *Civil Law*, are ſuch goods as are wilfully thrown away, or relinquiſhed by the owner.

DERELICT is alſo applied to ſuch lands, as the ſea receding from, leaves dry, and fit for cultivation.

If they are left by a gradual receſs of the ſea, they are adjudged to belong to the owner of the adjoining lands: but when an iſland is formed in the ſea, or a large quantity of new land appears, ſuch *derelict* lands belong to the king.

DERELSIDE, in *Botany*, a name by which ſome authors have called the tamarind-tree. Alpin. Egypt. p. 328.

DE REVOCATIONE *parliamenti*, the name of a writ for recalling a parliament. Thus in 5 Edw. III. the parliament being ſummoned, was recalled by ſuch a writ before it met. Vide Pryn's Animad. on the 4 Inſt. f. 44.

DEREYN, or **DARAIGN**, *diſrationare* vel *dirationare*, in our *Old Laws*, is generally uſed for the act of proving: thus we find *dirationabit jus ſuum hæres propinquior*. Glanv. lib. ii. c. 6. And, *dirationavit terram illam in curia mea.* Id. lib. ii. c. 20. Bracton uſes it in the ſame ſenſe, *Habeo ſufficientem diſratiocinationem & probationem*, lib. iv. tract. 6. c. 16. And ſo he makes uſe of *diſrationare*, lib. iv. c. 22. And we find to *dereyn the warranty* in Old Nat. Br. fol. 146. To *deraign* that right, 3 Edw. I. c. 4. and Weſtmin. tom. ii. c. 5. When the parſon of any church is diſturbed to demand tithes in the next pariſh, by a writ of *indicavit*, the patron ſhall have a writ to demand the advowſon of the tithes, being in demand; and when it is *deraigned*, then ſhall the plea paſs in the court Chriſtian, as far forth as it is *deraigned* in the king's court.

DERIVATIO, in *Rhetoric*, is a figure in which words that are *derived* from the ſame root come together in the ſame ſentence. The figure is repeated in the following example: *He wiſhed rather to die a preſent death, than to live a miſerable life.*

DERIVATION, from *de*, and *rivus*, *a ſtream*, in *Grammar*, the affinity one word has with another, by having been originally formed from it.

DERIVATION, in *Medicine*, the act of diverting a humour which flows on ſome noble part, and drawing it to ſome other neighbouring part, where it is leſs dangerous.

Thus, in defluctions upon the eyes, or teeth, they apply a bliſter behind the neck, to draw the matter thither: and in a quinſy, they preſcribe bleeding in the *ranulæ*, or veins under the tongue, to divert the humour from falling on the throat.

DERIVATION. See ANGLE.

DERIVATIVE, in *Grammar*, a word which takes its origin from another word, called its *primitive*.

Such is the word *derivative* itſelf, which takes its origin from the primitive *rivus*, a rivulet, or channel, out of which leſſer ſtreams are drawn; and thus *manhood*, *deity*, *lawyer*, &c. are *derived* from *man*, *deus*, *law*, &c.

DERIVATIVE or *ſecondary Conveyances*, in *Law*, are thoſe which preſuppoſe ſome other conveyance precedent, and only ſerve to enlarge, confirm, alter, reſtrain, reſtore, or transfer the intereſt granted by ſuch original conveyance. Theſe are *releaſe*, *confirmation*, *ſurrender*, *aſſignment*, and *defeazance*.

DERMA, in *Anatomy*, the *cutis*, or ſkin of an animal; or the tegument inveſting the whole body immediately under the cuticle, or ſcarf-ſkin.

The word comes from the Greek δερειν, *to flay*, or *excoriate*.

The *derma* conſiſts of two parts; the *corpus reticulare*, and *papillæ pyramidales*. See SKIN.

DERMESTES, in *Zoology*, a genus of inſects of the order of the *coleopteræ*, the antennæ of which are of a clavated figure, and perfoliated tranſverſely. There are ſeveral ſpecies of this genus, confounded by ſome with beetles, or *ſcarabæi*.

DERNIER *reſſort*. See RESSORT.

Whatever power is committed by the king to any other, the *dernier reſſort* is ſtill remaining in himſelf; ſo that he may ſit in court, and take cognizance of all cauſes: except in treaſons, and other caſes, where he himſelf is a party.

DEROGATION, from *derogo*, an act contrary to the preceding one, and that annuls, deſtroys, and revokes it, either in whole, or part.

Derogations, in general terms, are not regarded in judicature; they muſt be in ſpecific, and in formal terms.

A new law imports a *derogation* of a former one: a ſecond teſtament is a *derogation* of a firſt.

DEROGATORY, a clauſe importing *derogation*.

By the French law, if a perſon own himſelf indebted in a certain ſum; notwithſtanding any quittance he has obtained for the ſame, the act is *derogatory*.

DERVIS, or **DERVICH**, a name given to a ſort of monks among the Turks, who lead a very auſtere life, and profeſs extreme poverty; though they are allowed to marry.

The word is originally Perſian, דרויש, ſignifying a *beggar*, or perſon who has nothing: and becauſe the religious, and particularly the followers of Mevelava, profeſs not to poſſeſs any thing, they call both the religious in general, and the Mevelavites in particular, *Derviſes*, or *Derviches*.

The *Derviſes*, called alſo *Mevelavites*, are a Mahometan order of religious; the chief, or founder whereof, was one Mevelava. They are now very numerous. Their chief monaſtery is that near Cogna in Natolia, where the general makes his reſidence, and where all the aſſemblies of the order are held; the other houſes being all dependent on this, by a privilege granted to this monaſtery under Ottoman I.

The *Derviſes* affect a great deal of modeſty, patience, humility, and charity. They always go bare-legged, and open-breaſted, and frequently burn themſelves with hot irons, to inure themſelves to patience. They always faſt on Wedneſdays, eating nothing on thoſe days till after ſun-ſet. Tueſdays and Fridays they hold meetings, at which the ſuperior of the houſe preſides. One of them plays all the while on a flute, and the reſt dance, turning their bodies round and round with the greateſt ſwiftneſs imaginable. Long cuſtom to this exerciſe from their youth has brought them to ſuch a habitude, that it does not diſcompoſe them at all. This practice they obſerve with great ſtrictneſs, in memory of Mevelava their patriarch's turning miraculouſly round, as they pretend, for the ſpace of four days, without any food or refreſhment; his companion Hamſa playing all the while on the flute: after which he fell into an extaſy, and therein received wonderful revelations for the eſtabliſhment of his order. They believe the flute an inſtrument conſecrated by Jacob, and the ſhepherds of the Old Teſtament, becauſe they ſang the praiſes of God upon them. They profeſs poverty, chaſtity, and obedience, and really obſerve them while they remain *Derviſes*; but if they chooſe to go out, and marry, they are always allowed.

The generality of *Derviſes* are mountebanks: ſome apply themſelves to legerdemain, poſtures, &c. to amuſe the people; others give into ſorcery and magic: but all of them, contrary to Mahomet's precept, are ſaid to drink wine, brandy, and other ſtrong liquors, to give them the degree of gaiety their order requires.

Beſide their great ſaint Mevelava, there are particular ſaints honoured in ſome particular monaſteries: as Kiderle, greatly revered in the monaſteries of Egypt, and held by ſome to be St. George; and by others, with more probability, the prophet Elias.

The *Derviſes* are great travellers; and, under pretence of preaching, and propagating their faith, are continually paſſing from one place to another: on which account they have been frequently uſed as ſpies.

There are alſo *Derviſes* in Perſia, called in that country *Abdals*, q. d. *ſervants of God*. They lead a very penurious, auſtere life, and preach the Alcoran in the ſtreets, coffee-houſes, and wherever they can meet with auditors. The Perſian *Derviſes* retail little but fables to the people, and are in the utmoſt contempt among the men of ſenſe, and letters.

There are in Egypt two or three kinds: thoſe that are in convents, are in a manner of the religious order, and live retired; though there are of theſe ſome who travel and return again to their convents. Some take this character, and yet live with their families, and exerciſe their trades: of this kind are the dancing *Derviſes* at Damaſcus, who go once or twice a week to a little uninhabited convent, and perform their extraordinary exerciſes; theſe alſo ſeem to be a good people: but there is a third ſort of them who travel about the country, and beg, or rather oblige people to give, for whenever they ſound their horn ſomething muſt be given them. The people of theſe orders, in Egypt, wear an octagonal badge, of a greeniſh white alabaſter, at their girdles, and a high ſtiff cap without any thing round it. Pococke's Egypt, p. 178.

DESART, or **DESERT**, a wild, uncultivated, uninhabited place or country: as the *deſarts* of Lybia, of the Thebaid, &c. Geographers uſe the word in the general for all countries little, or not at all, inhabited. In Scripture, we find ſeveral places in the Holy Land, or places adjoining thereto, called *deſarts*. The *Deſart*, or wilderneſs, abſolutely ſo called, is that part of Arabia on the ſouth of the Holy Land, wherein the Iſraelites wandered, from the time of their evacuating Egypt to their entry into the Promiſed Land. The *Deſart* of Beerſheba was that part of the *Deſart* juſt mentioned, which bordered on the Holy Land, running towards the Mediterranean. The *Deſart* of Idumæa is Idumæa itſelf, a barren, mountainous country. The *Deſarts* of Betharen, Bethſaida, Cadeſh, Damaſcus, Dibon, Engeddi, Edom, Gibeon, Horeb, Jazer, Juda, Moab, Pharan, Sin, Sinai, Zur, Zin, &c. are ſo many dry, uncultivated, and in general mountainous places, like our downs, &c. where there are few or no habitations or inhabitants; whence the Hebrews call them by antiphraſis מדבר, which properly ſignifies *human word*, or *ſpeech*, becauſe there is none heard there.

DESART, in *Cookery*. See DESSERT.

DESCANT, from *de*, and *cantus*, *ſong*, in *Muſic*, originally ſignified an extemporaneous ſong, which was no ſooner uttered than loſt; but it was afterwards applied to the art of compoſing in ſeveral parts.

Deſcant is threefold; viz. *plain*, *figurative*, and *double*.

DESCANT, *Plain*, is the ground-work or foundation of muſical compoſition, and conſiſts altogether in the orderly placing of many concords; anſwering to ſimple COUNTERPOINT.

DESCANT, *Figurative*, or *florid*, is that wherein diſcords are concerned as well, though not ſo much, as concords. This may be well termed the ornamental or rhetorical part of muſic; becauſe that in this are introduced all the varieties of points, figures, ſyncopes, diverſities of meaſures, and whatſoever elſe is capable of adorning the compoſition.

DESCANT, *Double*, is when the parts are ſo contrived, that the treble may be made the baſs; and, on the contrary, the baſs the treble.

DESCENDANT, in *Genealogy*, a term relative to *aſcendant*, and applied to a perſon who is born or iſſued from ſome other referred to. Thus, mankind are ſaid to be *deſcendants* of Adam. The *deſcendants* from the brothers of the maid of Orleans are confirmed in their exemption from all taxes and impoſts, by a regulation of the year 1634. See DESCENT.

DESCENDENS *obliquus*, in *Anatomy*, a name given by Fabricius, and others, to the muſcle, called by Albinus *obliquus externus abdominis*.

DESCENDING, ſomething that falls, or moves, from above, downwards.

There are *aſcending* and *deſcending* ſtars; and *aſcending* and *deſcending* degrees.

There are alſo *aſcending* and *deſcending* veins ſpringing out of the *cava*; and *aſcending* and *deſcending* arteries riſing out of the *aorta*.

DESCENDING *latitude*, is the latitude of a planet in its return from the nodes to the equator.

DESCENSION, in *Aſtronomy*, is either *right* or *oblique*.

DESCENSION, *Right*, *of a ſtar*, or *ſign*, is a point, or arch, of the equator, which *deſcends* with the ſtar, or ſign, below the horizon, in a right ſphere.

DESCENSION, *Oblique*, is a point, or arch, of the equator, which *deſcends* at the ſame time with a ſtar, or ſign, below the horizon, in an oblique ſphere.

Deſcenſions, both *right* and *oblique*, are accounted from the firſt point of Aries, or the vernal interſection, according to the order of the ſigns; that is, from weſt to eaſt. And, as they are unequal, when it happens that they anſwer to equal arches of the ecliptic, as, e. gr. to the twelve ſigns of the zodiac, it follows, that ſometimes a greater part of the equator riſes, or *deſcends*, with a ſign, in which caſe the ſign is ſaid to aſcend, or *deſcend*, rightly: and ſometimes again, a leſs part of the equator riſes, or ſets, with the ſame ſign; in which caſe it is ſaid to aſcend and *deſcend* obliquely. See ASCENSION.

DESCENSION, *Refraction of the*. See REFRACTION.

DESCENSIONAL *difference*, is the difference between the right and oblique deſcenſion of the ſame ſtar, or point of the heavens, &c.

DESCENT, in *Chemiſtry*. The ſeparating mercury from its ore by *deſcent*, is performed in the following manner: take two earthen pots, with orifices of equal diameter; adapt an iron plate to the orifice of one of the two pots, in ſuch a manner that it may reſt upon the brink of it, but not jut out too much all round: let this have ſeveral holes bored here and there in it, but not near its bottom; pour into this pure water, to about two inches high, then ſhut it with the iron plate; put upon this plate a ſmaller veſſel, containing the ore of mercury; then cloſe theſe veſſels, with the ſecond pot inverted, ſtopping the joint well with lute; bury the inferior pot in aſhes, and put about the whole a moderate fire, continue it till the upper veſſel is ſlightly red hot, and the mercury will be driven into the lower, in fumes, which will be condenſed by the water into running quickſilver. Cramer's Art of Aſſaying, p. 352.

DESCENT *into a ditch*, in *Fortification*, is a deep trench, or ſap cut through the eſplanade, and under the covert-way; covered above with planks and hurdles, and loaded with earth againſt artificial fires. See MOAT.

In wet ditches the *deſcent* is made even to the ſurface of the water: in dry ditches, it is carried to the bottom of the moat, where traverſes are made to lodge and ſecure the miners.

DESCENT, in *Genealogy* and *Heraldry*, the order, or ſucceſſion, of *deſcendants* in a line, or family.

We ſay, one *deſcent*, two *deſcents*, &c. A gentleman is of perfect blood who has four *deſcents* of gentility, both by his father's and mother's ſide, i. e. whoſe great grandfather, grandfather, and father, on both ſides, were all gentlemen.

DESCENT is alſo uſed, in *Heraldry*, to expreſs the coming down of any thing from above.

Thus, a *lion en deſcent* is a lion with his head towards one of the baſe points, and his heels towards one of the corners of the chief; as if he were leaping from ſome high place.

DESCENT, or **DISCENT**, in *Law*, the order, or manner, wherein lands and tenements are derived to any man from his anceſtors: and this is by cuſtom, ſtatute, or common law. By cuſtom, as in GAVELKIND or BOROUGH *Engliſh*; by ſtatute, as in FEE-TAIL; and by common law, when a perſon has lands of inheritance in fee-ſimple, and dies without diſpoſing them; in which caſe the land deſcends in courſe to the eldeſt ſon and heir.

Thus, to *make his deſcent* from his anceſtors, is to ſhew how, and by what particular degrees, the land in queſtion came to a perſon from his anceſtors. See CONSANGUINITY.

Deſcent, in common law, is either *lineal*, or *collateral*.

DESCENT, *Lineal*, is that conveyed down, in a right line, from the grandfather to the father, and from the father to the ſon, from the ſon to the grandſon, &c.

Descent, *Collateral*, is that ſpringing out of the ſide of the line, or blood; as from a man to his brother, nephew, or the like.

Judge Blackſtone has collected and illuſtrated the following rules or canons of inheritance, according to which eſtates are tranſmitted from the anceſtor to the heir. "Inheritances ſhall lineally deſcend to the iſſue of the "perſon laſt actually ſeiſed *in infinitum*; but ſhall never "lineally aſcend." The affirmative part of this rule has been almoſt univerſally adopted by all nations: but the negative part, whereby parents and all lineal anceſtors are excluded from ſucceeding to the inheritance of their offspring, is peculiar to our laws, and thoſe of the ſame original: for, by the Jewiſh law, on failure of iſſue the father ſucceeded to the ſon, in excluſion of brethren, unleſs one of them married the widow, and raiſed up ſeed to his brother. And, by the laws of Rome, the children or lineal deſcendants were firſt preferred; and, on failure of theſe, the father and mother or lineal aſcendants ſucceeded together with the brethren and ſiſters; though by the law of the Twelve Tables, the mother was originally excluded, on account of her ſex. This rule was introduced into our law at the ſame time with, and in conſequence of, feodal tenures: and though the right of ſucceſſion in the aſcending line was reſtored by Henry I. it was ſoon diſuſed; for it was laid down as an eſtabliſhed law in Glanvil's time, under Henry II. *hæreditas nunquam aſcendit*; and this maxim has been invariable ever ſince. Another rule of inheritance is, "that the male iſſue ſhall be admitted before the female." This preference of males to females is entirely agreeable to the law of ſucceſſion among the Jews, and alſo among the ſtates of Greece, or at leaſt among the Athenians; but was totally unknown to the laws of Rome, now extant, which allow brethren and ſiſters to ſucceed to equal portions of the inheritance. It was derived to us from the feodal law, and admitted on the principle, that no female could ſucceed to a proper feud, becauſe they were incapable of military ſervice. However, according to our law, though daughters are excluded by ſons, they ſucceed before any collateral relations. A third rule of *deſcent* is, "that where there are two or more males in "equal degree, the eldeſt only ſhall inherit; but the fe-"males all together." The Greeks, Romans, Britons, Saxons, and even originally the feudiſts, divided the lands equally; but when the emperors began to create honorary feuds, or titles of nobility, it was found neceſſary to make them impartible, or *feuda individua*, and deſcendible to the eldeſt ſon alone: in conſequence of which, the eldeſt male began univerſally to ſucceed to the whole of the lands in all military tenures; and in this condition the feodal conſtitution was eſtabliſhed in England by William the Conqueror. The fourth rule of *deſcent* is, "that the lineal deſcendants, *in infinitum*, "of any perſon deceaſed, ſhall repreſent their anceſtor, "or ſtand in the ſame place as the perſon himſelf would "have done, had he been living." Thus the child, grand-child, or great-grand-child, male or female, of the eldeſt ſon ſucceeds before the younger ſon, and ſo *in infinitum*; and theſe repreſentatives ſhall take neither more nor leſs, but juſt ſo much as their principals would have done. This is called a ſucceſſion *in ſtirpes*, according to the roots; ſince all the branches inherit the ſame ſhare that their root, whom they repreſent, would have done. The Jewiſh ſucceſſion was directed in the ſame manner; but the Roman ſomewhat different. This rule was indiſputably ſettled in the time of king Henry III. and has continued ever ſince. A fifth rule is, "that, on failure "of lineal deſcendants, or iſſue, of the perſon laſt ſeiſed, "the inheritance ſhall deſcend to the blood of the firſt "purchaſer; ſubject to the preceding rules." This rule was entirely unknown among the Jews, Greeks, and Romans; but the law of Normandy is the ſame with ours in this reſpect; both being derived from the ſame feodal origin. The ſixth rule is, "that the collateral "heir of the perſon laſt ſeiſed muſt be his next collateral "kinſman of the *whole* **blood**." The laſt rule of *deſcent* is, "that in collateral inheritances the male ſtocks ſhall "be preferred to the female; that is, kindred derived "from the blood of the male anceſtors ſhall be admitted "before thoſe from the blood of the female; unleſs "where the lands have, in fact, deſcended from a fe-"male." This is warranted by the examples of the Hebrew, Athenian, and Roman laws; and alſo of the cuſtomary law of Normandy. See farther on this ſubject Blackſt. Com. vol. ii. chap. 14, paſſim.

If one dies ſeiſed of land, wherein another has a right to enter, and it *deſcends* to his heir; ſuch *deſcent* ſhall take away the other's right of entry, and put him to his action for recovery thereof. Stat. 32 Hen. VIII.

Descent, *fall*, in *Mechanics*, &c. is the motion, or tendency, of a body towards the center of the earth, either directly or obliquely.

It is to be here obſerved, firſt, that a body cannot *deſcend*, unleſs it can divide and ſeparate the medium; which it cannot do, unleſs it be ſpecifically heavier than the medium. For ſince bodies cannot penetrate each other, one muſt give way before the other can move: and again, though a medium, e. gr. water, be diviſible, yet, if it be ſpecifically heavier than another, e. gr. wood, it is only heavier as it contains more particles of matter in the ſame bulk, all which have an impulſe downwards; and, conſequently, in water there is a greater impulſe than in the ſame bulk of wood.

Secondly, The *deſcending* body loſes as much of its weight, as is the weight of the medium, with the force of its coheſion.

And, therefore, a body ſpecifically heavier *deſcends* in a fluid medium ſpecifically lighter (e. gr. the air) with a force equal to the exceſs of the weight of the body above an equal bulk of the medium: for a body only *deſcends* in a medium with the force remaining, after a part has been ſpent in overcoming the reſiſtance of the medium; and this reſiſtance is equal to the weight of an equal bulk of the medium; conſequently, the body only falls with the exceſs of its weight above that of an equal bulk of the medium.

Hence, the power that ſuſtains a body in a ſpecifically lighter medium, is equal to the exceſs of the abſolute weight of the body above an equal bulk of the medium. Thus, $47\frac{1}{3}$ pounds of copper in water loſe $5\frac{1}{3}$ of their weight. A power, therefore, of 42 pounds is able to ſuſtain them.

Thirdly, If two bodies have the ſame ſpecific gravity, the leſs the bulk of the *deſcending* body is, the more of its gravity does it loſe, and the ſlower does it *deſcend*, in the ſame medium. For, though the proportion of the ſpecific gravity of the body to that of the fluid be ſtill the ſame in a greater or leſſer bulk, yet the leſs the body, the more the ſurface, in proportion to the maſs; and the more the ſurface, the more the friction of reſiſtance.

Fourthly, If the ſpecific gravities of two bodies are different, that which has the greateſt ſpecific gravity will *deſcend* with greater velocity in the air or other reſiſting medium, than the other. Thus a ball of lead *deſcends* ſwifter than a feather, becauſe it loſes leſs of its weight, though in vacuo they both fall with equal velocity.

The cauſe of this *deſcent*, or tendency downwards, has been greatly controverted. There are two oppoſite hypotheſes advanced; the one holding it to proceed from an internal, and the other from an external principle: the firſt maintained by the **Peripatetics** and **Epicureans**, and by the **Newtonians**; and the latter by the **Cartesians** and **Gassendists**. See alſo **Acceleration**.

Laws of the **Descent** *of bodies*. 1. Heavy bodies, in an unreſiſting medium, fall with an uniformly accelerated motion. See the *laws of uniformly accelerated motion*, under the articles **Acceleration** and **Motion**.

In ſuppoſing heavy bodies to *deſcend* in an unreſiſting medium, we conceive them free of all external impediments, from what cauſe ſoever. So that we even ſet aſide that oblique impulſe, given to bodies while in falling, by the rotation of the earth, though this produces no ſenſible irregularity in a little diſtance. Galileo, who firſt diſcovered the *law of the deſcent* of heavy bodies by reaſoning, afterwards confirmed the ſame by experiments; the reſult of which, repeated often both by him and ſince his time, was, that the ſpaces of *deſcent* were as the ſquares of the times.

Grimaldi and Riccioli made experiments to the ſame effect, though in a different manner, by letting fall a number of balls, weighing eight ounces a-piece, from the tops of ſeveral towers, and meaſuring the times of falling by a pendulum. Ricciol. Almag. Nov. tom. i. lib. ii. cap. 21. prop. 4. Theſe experiments are exhibited in the following table.

Vibrations of the Pendulum.	Time.		Space at the end of the Time.	Space deſcended each Time.
	″	‴	Rom. Foot.	Rom. Foot.
5	0	50	10	10
10	1	40	40	30
15	2	30	90	50
20	3	20	160	70
25	4	10	250	90
6	1	0	15	15
12	2	0	60	45
18	3	0	135	75
24	4	0	240	105

Since, then, the experiments of Riccioli, made in ſuch conſiderable diſtances, agree ſo well with the theory, it is ſcarce worth taking notice of what is urged to the contrary by Dechales, in his Mund. Math. who writes, that he had found by experiment, that heavy bodies, in half a ſecond of time, *deſcend* 4¼ feet; in two, 16¼; in three, 36; in four, 60; in five, 90; in ſix, 123. It is ſufficient, that he deduces the irregularity from the reſiſtance of the air, which we ſuppoſe out of the queſtion.

2. If a heavy body *deſcend*, in an unreſiſting medium, through an interval not over-large, the ſpace it deſcribes, is the ſubduple of that which it would deſcribe, in the ſame time with the velocity acquired at the end of the fall.

3. The time wherein a body falls from a given height being given, to determine the ſpaces it fell in the ſeveral parts of that time.

Suppoſe the given altitude $= a$, the time $= t$, and the ſpace it fell in one part of time x: then

$$1 : x = t^2 : a$$
$$t^2 x = a$$
$$x = \frac{a}{t^2}.$$

Therefore the ſpace paſſed over in the firſt part of time is $\frac{a}{t^2}$; conſequently, that paſſed over in the ſecond time $= \frac{3a}{t^2}$; that in the third $= \frac{5a}{t^2}$, &c. See ACCELERATION, *art.* 3.

E. gr. In the experiments of Riccioli, above delivered, the ball fell 240 feet in four ſeconds. Therefore the ſpace fallen the firſt ſecond was $= 240 \div 16 = 15$. The ſpace in the ſecond was $= 15 \times 3 = 45$. That in the third $= 15 \times 5 = 75$. And that in the fourth $15 \times 7 = 105$.

4. The time wherein a body falls through a given ſpace being given; to determine the time wherein it will fall through any other given ſpace, in the ſame medium.

Since the ſpaces are as the ſquares of the times, to the ſpace which the body falls in the given time, the ſpace in the queſtion, and the ſquare of the given time, find a fourth proportional, which will be the ſquare of the time ſought. The ſquare root, therefore, being extracted therefrom, the problem is ſolved.

For example; one of Riccioli's balls, in four minutes time, falling 240 feet, it is inquired in what time it would fall 135 feet? The anſwer will be found $= \surd(135 \times 16 \div 240) = \surd(135 \div 15) = \surd 9 = 3$.

5. The ſpace a body falls in a given time being given; to determine the ſpace through which it will fall in any other given time.

To the ſquare of the time wherein the body falls through the given ſpace, the ſquare of the time wherein it ſhould fall through the ſpace required, and the given ſpace, ſeek a fourth proportional; this will be the ſpace required.

For inſtance, Riccioli's ball falling 60 feet in 2 ſeconds, it is aſked what ſpace it will fall through in 4 ſeconds? The anſwer is, $16 \times 60 \div 4 = 4 \times 60 = 240$. Wolf. Elem. Math. tom. ii. p. 14, &c.

For the *Laws of the* DESCENT *of bodies on inclined planes*, ſee *Inclined* PLANE.

For the *Laws of* DESCENT *in cycloids*, ſee CYCLOID, and PENDULUM.

DESCENT, *Line of ſwifteſt*, is that which a body falling by the action of gravity, deſcribes in the ſhorteſt time; which is proved by geometricians to be the cycloid.

DESCRIBENT, is a term in *Geometry*, expreſſing ſome line or ſurface, which by its motion produces a plane figure, or a ſolid.

DESCRIPTION, in *Logic*, an imperfect, or inaccurate definition of a thing, giving a ſort of knowlege thereof from ſome accidents and circumſtances peculiar to it, which determine it enough to give an idea that may diſtinguiſh it from other things; but without explaining its nature or eſſence.

Grammarians content themſelves with *deſcriptions*: philoſophers require definitions of things. See DEFINITION.

A *deſcription* is an enumeration of divers attributes of a thing, moſt of which are only accidental: as, when a perſon is *deſcribed* by his deeds, his ſayings, his writings, his honours, &c. A *deſcription*, as to its outward appearance, reſembles a *definition*, and is even convertible with the thing deſcribed; but does not explain it. For, inſtead of bringing ſeveral things eſſential to the thing deſcribed, it only brings a number of accidents belonging thereto. E. gr. Peter is the tall young man who lives on the green, wears black cloaths, frequents the college, courts N——, &c. where it is evident, we do not give any explication of Peter, as not bringing things that are in Peter, but only circumſtances of things about him, tall, young, living, wearing, frequenting, courting, &c. A *deſcription*, therefore, is no proper anſwer to the queſtion, *quid eſt*, what is he? but to that, *quis eſt*, who is he?

Deſcriptions, in effect, are principally uſed for ſingulars, or individuals; for things of the ſame ſpecies do not differ in eſſence, but only as to *hic*, and *ille*, which difference contains nothing very notable, or diſtinguiſhable. But individuals, of the ſame kind, differ much in accidents; e. gr. George is a king, and William a citizen; Charles is a male, and Anne a female; Henry is wiſe, and John a blockhead, &c. Thus, a *deſcription* is an accumulation of accidents, whereby things are notably diſtinguiſhed from each other, though they ſcarce differ at all in eſſence.

Some authors call a *deſcription* a quaſi-definition, as, body is a thing diviſible, moveable, ſolid, extended, &c. which only falls ſhort of a definition in this, that, inſtead of the form or eſſence of a thing, it gives one or more properties ariſing from the form or eſſence.

DESCRIPTION, in *Geometry*. To *deſcribe* a circle, ellipſis, parabola, &c. is to conſtruct, or form thoſe figures, with rules, compaſſes, &c.

DESCRIPTION, in *Poetry* and *Rhetoric*, is a figure, which, by the aid of imagery and argument, exhibits ſuch a ſtrong and lively repreſentation of a ſubject, as gives a diſtinct view and ſatisfactory notion of it to the reader or hearer; and whilſt it convinces the mind, it moves and ſways the paſſions. This figure is principally uſed by poets, not only with a deſign to move the paſſions, but to pleaſe the fancy. Hiſtorians alſo *deſcribe* things, places and perſons; and orators produce the greateſt effect by *deſcription*. The *deſcription* of a perſon is called a character.

DESERTER, from *deſero*, *I forſake*, in *War*, a ſoldier on the muſter-roll, who quits the ſervice without leave, or liſts himſelf under another officer, into a different regiment.

All ſoldiers found half a league from a garriſon, or army, going towards an enemy's country, or quarter, without a paſs, are deemed and treated as *deſerters*.

A *deſerter* is, by the articles of war, puniſhable by death, and after conviction is hanged at the head of the regiment he formerly belonged to, with his crime written on his breaſt; and is ſuffered to hang until the army leave that camp, for a terror to others.

For the manner of puniſhing *deſerters* among the ancients, ſee TRANSFUGA.

The ancient church excommunicated *deſerters*, as having violated their oath.

By the ancient laws of this kingdom, *deſertion* was deemed felony; but it is now puniſhed by courts martial, under the annual acts againſt mutiny and *deſertion*.

DESHABILLE, a French term, naturalized of late. It properly ſignifies a night-gown, and other neceſſaries, made uſe of in dreſſing or undreſſing. Mr. —— is not to be ſpoken with, he is yet in his *deſhabille*, i. e. undreſſed, or in his night-gown.

The word is compounded of the privative *de*, and *s'habiller*, *to dreſs one's ſelf*.

DESHACHE, Fr. from *de*, and *hacher*, *to cut*, in *Heraldry*, is when a beaſt has its limbs ſeparated from the body, ſo as they ſtill remain on the eſcutcheon, with only a ſmall ſeparation from their natural places.

DESIDERATUM, from *deſidero*, *I deſire*, is uſed to ſignify deſirable improvements in any art or ſcience, as yet unattained. Thus, it is a *deſideratum* with the blackſmith, to render iron fuſible, by a gentle heat, and yet preſerve it hard enough for ordinary uſes; with the glaſs-man and looking-glaſs-maker, to render glaſs malleable; with the clock-maker, to bring pendulums to be uſeful where there are irregular motions; with the braſier and copperſmith, to make malleable ſolder; with the ſhipwright, to build veſſels that will ſail under water; with the diver, to procure manageable inſtruments for conveying freſh air to the bottom of the ſea ſufficient for reſpiration, and the burning of lights; with the aſſay-maſter, to melt or copel ores, or metals, immediately without the uſe of bellows or furnace; and with the carvers and joiners, to faſhion wood in moulds like plaiſter of Paris, or burnt alabaſter, &c. And though, as Mr. Boyle obſerves, the obtaining of theſe *deſiderata* may be thought chimerical, yet it is proper they ſhould be propoſed; for although perfection may not be attainable, yet approaches to it may be made, and arts thereby improved. Vide Boyle's Works abr. vol. i. p. 129, 136.

In ſhort, all arts and ſciences have their defects, and it is not at firſt to be gueſſed, for how many of theſe remedies may be found, by means of chemical and philoſophical reſearches properly directed.

If a proper number of perſons duly qualified for making experiments, and improving from them, would ſet about each his particular ſhare of the neceſſary experiments, and communicate the reſult of all their proceſſes to one another, the buſineſs of chemical and philoſophical experiments would be much better directed in regard to future ſtudents, and many of the *deſiderata* in the art probably ſupplied.

DESIGN, from *deſigno, I mark out*, the plan, or repreſentation, of the order, general diſtribution, and conſtruction, of a painting, poem, book, building, or the like.

The painter has ſhewn the firſt *deſign* of his piece, in which the figures are well diſpoſed. The *deſign* of that poem, or book, is artfully laid. Claudian never ſees his whole *deſign* together: when he compoſes a part, he thinks of nothing elſe, and works up every member, as if it were ſeparate from all the reſt.

In building, we uſe the term ICHNOGRAPHY, when by *deſign* is only meant the plan of a building, or a flat figure drawn on paper. ORTHOGRAPHY, when ſome face, or ſide, of the building is raiſed from the ground. And SCENOGRAPHY, when both front and ſides are ſeen in perſpective.

DESIGN, in *Weaving Manufactories*, expreſſes the figures wherewith the workman enriches his ſtuff, or ſilk; and which he copies after ſome painter or draughtſman.

In undertaking ſuch kinds of figured ſtuffs, it is neceſſary, that, before the firſt ſtroke of the ſhuttle, the whole *deſign* be repreſented on the threads of the warp; we do not mean in colours, but with an infinite number of little packthreads, which, being diſpoſed ſo as to raiſe the threads of the warp, let the workman ſee, from time to time, what kind of ſilk is to be put in the eye of the ſhuttle, for woof.

This method of preparing the work, is called *reading the deſign*, or reading the figure, which is performed after the following manner. A paper is provided, conſiderably broader than the ſtuff, and of a length proportionate to that which is intended to be repreſented thereon. This they divide lengthwiſe, by as many black lines as there are intended to be threads in the warp; and croſs theſe lines by others drawn breadthwiſe, which, with the former, make little equal ſquares. On the paper thus ſquared, the painter *deſigns* his figures, and heightens them with colours, as he thinks fit. When the *deſign* is finiſhed, a workman reads it, while another lays it on the ſimblot.

Now, to read the *deſign*, is to tell the perſon who manages the loom, the number of ſquares, or threads, compriſed in the ſpace he is reading; intimating, at the ſame time, whether it is ground or figure.

To put what is read on the ſimblot, is to faſten little ſtrings to the ſeveral packthreads which are to raiſe the threads named. And thus they continue to do till the whole *deſign* is read.

Every piece being compoſed of ſeveral repetitions of the ſame *deſign*, when the whole *deſign* is drawn, the drawer, to re-begin, as I may ſay, the *deſign* afreſh, has nothing to do, but to raiſe the little ſtrings, with ſlip-knots, to the top of the ſimblot, which he had let down to the bottom; and this he is to repeat as often as is neceſſary, till the whole be manufactured.

The ribband-weavers have likewiſe a *deſign*, but much more ſimple than that now deſcribed: it is drawn on paper, with lines and ſquares, repreſenting the threads of the warp, and woof. But in lieu of lines, whereof the figures of the former conſiſt, theſe only conſiſt of points or dots, placed in certain of the little ſquares formed by the interſection of the lines; theſe points mark the threads of the warp that are to be raiſed, and the ſpaces left blank denote the threads that are to keep their ſituation. The reſt is managed as in the former.

DESIGN is particularly uſed, in *Painting*, for the firſt idea of a large work, drawn roughly, and in little, with intention to be executed, and finiſhed in large.

In this ſenſe, the *deſign* is the ſimple contour, or outlines, of the figures, or things intended to be repreſented, or the lines that terminate and circumſcribe them.

Such a *deſign* is ſometimes drawn in crayons, or ink, without any ſhadows at all: ſometimes it is hatched, that is, the ſhadows are expreſſed by ſenſible lines, uſually drawn acroſs each other with the pen, crayon, or graver. Sometimes, again, the ſhadows are done with the crayon rubbed, ſo that there do not appear any lines; ſometimes the grain, or ſtrokes of the crayon, appear, as not being rubbed; ſometimes the *deſign* is waſhed, that is, the ſhadows are done with a pencil in Indian ink, or ſome other liquor; and ſometimes the *deſign* is coloured, that is, colours are laid on much like thoſe intended for the grand work.

The qualities, or conditions, required in a *deſign*, are correctneſs, good taſte, elegance, character, diverſity, expreſſion, and perſpective.

Correctneſs depends principally on the juſtneſs of the proportions, and a knowlege of anatomy. Taſte is an idea or manner of deſigning, which ariſes either from the complexion, and natural diſpoſition, or from education, one's maſter, ſtudies, &c. Elegance gives the figures a kind of delicacy which ſtrikes people of judgment, and a certain agreeableneſs, which pleaſes every body. The character, is what is peculiar to each thing, in which there muſt be a diverſity; inaſmuch as every thing has its peculiar character to diſtinguiſh it. The expreſſion, is the repreſentation of an object according to its character, and the ſeveral circumſtances it is ſuppoſed to be in. The perſpective, is the repreſentation of the parts of a painting, or figure, according to the ſituation they are in, with reſpect to the point of ſight.

The *deſign*, or draught, is a part of the greateſt import and extent in painting: it is acquired chiefly by habit and application, rules being of leſs avail here than in any of the other branches of the art, as colouring, clair-obſcure, expreſſion, &c.

The principal rules that regard the *deſign* are, that novices accuſtom themſelves to copy good originals at firſt ſight; not to uſe ſquares in drawing, for fear of ſtinting and confining their judgment; to ſtay till they can *deſign* well after the life, before they begin the practice of perſpective rules; in *deſigning* after the life, to learn to adjuſt the bigneſs of their figures to the viſual angle, and the diſtance of the eye from the model, or object; to mark out all the parts of the *deſign*, before they begin to ſhadow; to make their contours in great pieces, without taking notice of the little muſcles, and other breaks; to make themſelves maſters of the rules of perſpective; to obſerve every ſtroke, as to its perpendicular, parallel, and diſtance; and particularly ſo to compare, and oppoſe the parts that meet upon and traverſe the perpendicular, as to form a kind of ſquare in the mind, which is the great, and almoſt the only rule of *deſigning* juſtly; to have a regard, not only to the model, but alſo to the part already deſigned, there being no ſuch thing as *deſigning* with ſtrict juſtneſs, but by comparing and proportioning every part to the firſt.

The reſt relates to perſpective: as, that thoſe objects be ſeen at one view, whoſe rays meet in a point; that the eye and object be always conceived as immoveable; that the ſpace, or medium between them, be conceived tranſparent; and that the eye, object, and picture, be at a juſt diſtance, which is uſually double the bigneſs of the ſubject, or picture. See DESIGNING, and PERSPECTIVE.

DESIGNATION, the act of marking or indicating, and making a thing known. The *deſignation* of ſuch an eſtate is made by the tenants, butments, and boundings. Among the Romans, there were *deſignations* of the conſuls and other magiſtrates, ſome time before their election.

DESIGNATOR, a Roman officer, who aſſigned and marked each perſon his place and rank in public ceremonies, ſhews, proceſſions, &c.

The word is formed from the verb *deſignare, to deſign.*

The *deſignator* was a kind of marſhal, or maſter of the ceremonies, who regulated the ſeats, march, order, &c. There were *deſignators* at funeral ſolemnities, and at the games, theatres, and ſhews, who not only aſſigned every one his place, but alſo led him to it; as appears from the prologue to the Pœnulus of Plautus.

Much of the ſame nature were the *agonothetæ* of the Greeks.

DESIGNING, the art of delineating, or drawing the appearance of natural objects, by lines, on a plain.

To deſign, according to the rules of mathematics, makes the object of perſpective.

To deſign by the *camera obſcura*; ſee CAMERA *obſcura*.

Mechanical method of DESIGNING *objects*. Provide a ſquare piece of glaſs, fitted into a frame, A B D C (*Tab. Perſpective, fig.* 1.); and waſh and ſmear it over with water, wherein a little gum has been diſſolved. When it is well dried again, turn it towards the object or objects to be deſigned, ſo as that the whole thereof may be ſeen through a dioptra, or ſight G H, fixed thereto: then proceed to work, and, applying the eye to the ſight, with a pen and ink draw every thing on the glaſs, as you ſee it appear thereon: or the outlines of the objects may be drawn with black colour in drying oil. Having finiſhed the draught, lay a fair moiſt paper thereon; and, preſſing it pretty tight down, the whole will be transferred from the glaſs to the paper. This method is very good, eaſy, and exact, and deſerves to be more uſed by painters. Some have uſed a piece of tiffany or fine lawn; and others, paper made tranſparent by means of oil of turpentine, inſtead of the glaſs: and the outlines of the object are traced out by a crayon, formed of white or red chalk, charcoal, or any proper ſubſtance. If tiffany or lawn be uſed, they muſt be carefully laid on paper or vellum, and ſtruck in every part with ſome flat body; by which means, the matter of the crayon will be tranſferred from the old to the new ground; and the impreſſion ſhould be overtraced with a black lead pencil. The ſketch on tranſparent paper may be tranſmitted to any ground, by puncturing it with holes near each other in the lines of the drawing, then fixing it on the ground, and duſting over it black lead, or any other coloured matter finely powdered, and tied up in a fine linen cloth. This duſt will mark the ſketch on the new ground, ſo that it may be over-traced by any kind of pencil or crayon.

The eye may be aſſiſted in *deſigning* from nature by means of a plane divided into ſquares, which is formed by drawing croſs lines parallel to each other on a tiffany or lawn framed; or on tranſparent paper or glaſs. This may be done with common writing ink, or in any other way that will render the lines viſible; and the divided plane muſt be placed before the ſight-board, as already directed. The ground, on which the ſketch is to be taken, muſt be alſo formed into an equal number of ſquares; and the objects, thus ſeen through the ſquares of the tranſparent plane, will be eaſily diſpoſed in their proper ſituation; and formed of a juſt magnitude, by placing them in the correſpondent ſquare of the ground: or, a frame may be prepared of a proper ſize, and the area of it divided into ſquares, by threads of a moderate thickneſs. A portable machine may be eaſily contrived for ſupporting the frame of the tranſparent plane, and the ſight-board: this machine may be conſtructed by joining three legs together, in the manner of the ſurveyor's inſtruments, in a block; and fixing the frame, by means of a ſliding foot into the ſame box, that it may be raiſed higher or lower. The ſight-board muſt have a foot likewiſe, by which it may be raiſed higher or lower; though this muſt not be fixed into the block, but into a ſliding piece, which muſt paſs through the block horizontally; ſo that the foot of the ſight-board being fixed into it at right angles, the board may be brought nearer to, or drawn farther from the tranſparent plane at pleaſure.

The following apparatus was uſed by Sir Chriſtopher Wren for the purpoſe of *deſigning*. A is a ſmall ſight with a ſhort arm B (ſee *Tab. Perſpective, fig.* 2.) which may be turned round about, and moved up and down on the ſmall cylinder CD which is ſcrewed into ED at D: this piece ED moving round about the center E, by which means the ſight may be removed either towards E or F. EF is a ruler faſtened on the two rulers GG, which rulers ſerve both to keep the ſquare frame SSSS perpendicular, and, by ſliding through the ſquare holes TT, to ſtay the ſight, either nearer to or farther from the ſaid frame; on which frame is ſtuck on with a little wax the paper OOOO, on which the picture is to be drawn by the pen I. This pen I is ſo fixed, by a ſmall braſs handle V, to the ruler HH, that the point I may be kept very firm, ſo as always to touch the paper. HH is a ruler, that is always moved horizontally, or parallel to itſelf, by means of the ſmall ſtrings *aaa*, *bbb*; at the end of this ruler is ſtuck a ſmall pin, whoſe head P is the ſight, which is to be moved up and down on the outlines of any object. The two ſtrings *aaa*, *bbb*, are exactly of an equal length. Two ends of them are faſtened into a ſmall leaden weight which is moved in a ſocket on the back-ſide of the frame, and ſerves exactly to counterpoiſe the ruler HH: the other two ends are faſtened to two ſmall pins HH, after they have rolled about the ſmall pullies MM, LL, KK; by means of which pullies, if the pen I be taken hold of and moved up and down the paper, the ſtrings moving very eaſily, the ruler will always remain in an horizontal poſition. When the inſtrument is uſed, it is ſet upon a table, and the ſight A is fixed at any height above the table, and at any diſtance from the frame SSSS, at pleaſure. Then the deſigner, looking through the ſight A, and holding the pen I in his hand, moves the head of the pin P up and down over the outlines of the object, and the point I will deſcribe, on the paper OOOO, the ſhape of the object ſo traced.

DESION, in *Chronology*, the Macedonian name of the Athenian month Antheſterion. See ANTHESTERION.

DE SON TORT *demeſne*, in our *Law*, words of form, uſed in an action of treſpaſs by way of reply to the defendant's plea. Thus, if A. ſues B. in ſuch an action; B. anſwers for himſelf, that he did that which it calls a treſpaſs by the command of C. his maſter. A. replies that B. did it *de ſon tort demeſne, ſans ce que C. luy commande modo et forma*; that is, B. did it of his own wrong, without C.'s commanding him in ſuch manner and form.

DESPOT, a title or quality given to the princes of Walachia, Servia, and ſome of the neighbouring countries.

The word, in its firſt origin, ſignified the ſame with the Latin *herus*, and the Engliſh *maſter*: but, in time, it underwent the ſame fate on medals, as, among the Latins, Cæſar did with regard to Auguſtus; ΒΑϹΙΛΕΥϹ anſwering to Auguſtus, and ΔΕϹΠΟΤΗϹ, *deſpotes*, to Cæſar. See CÆSAR.

Thus, Nicephorus, having ordered his ſon Stauracius to be crowned, the ſon, out of reſpect, would only take the name ΔΕϹΠΟΤΗϹ, leaving to his father that of ΒΑϹΙΛΕΥϹ. For it is to be noted, that it was juſt about the time that the emperors began to ceaſe to uſe Latin inſcriptions.

This delicacy, however, did not laſt long; for the following emperors preferred the quality of ΔΕϹΠΟΤΗϹ, to that of ΒΑϹΙΛΕΥϹ, particularly Conſtantine, Michael Ducas, Nicephorus Botoniates, Romanus Diogenes, the Comneni, and ſome others.

In imitation of the princes, the princeſſes likewiſe aſſumed the title of ΔΕϹΠΟΙΝΑ.

It was the emperor Alexius, ſurnamed the Angel, that created the dignity of *deſpot*, and made it the firſt after that of emperor, above that of Auguſtus, or Sebaſtocrator, and Cæſar. See AUGUST.

The *deſpots* were uſually the emperors ſons, or ſons in law, and their colleagues, or copartners in the empire, as well as their preſumptive heirs. The *deſpots*, that were ſons of the emperors, had more privileges and authority than thoſe that were only ſons-in-law. Codin. p. 38. deſcribes the habit and ornaments of the *deſpot*. See the notes of father Goar on that author.

Under the ſucceſſors of Conſtantine the Great, the title *deſpot of Sparta* was given to the emperor's ſon, or brother, who had the city of Sparta, or Lacedæmon, by way of apannage.

DESPOTISM, or DESPOTIC *government*, a form of government wherein the prince is abſolute and arbitrary, doing whatever he liſts, without being checked by any other power. Such are moſt of the eaſtern governments; as thoſe of the mogul, grand ſignior, ſophi of Perſia, &c.

DESPOUILLE, Fr. in *Heraldry*, is the whole caſe, ſkin, or ſlough of a beaſt, with the head, feet, tail, and all appurtenances, ſo that being filled, or ſtuffed, it looks like the entire creature.

DESPUMATION, of *de*, priv. and *ſpuma*, *froth*, the clarification of any liquor, by throwing up its foulneſs in a froth, and taking that off.

DESQUAMATION, from *de*, and *ſquamo*, *I ſcale*, expreſſes the flaking or ſcaling of carious bones. See EXFOLIATION.

DESSERT, or DESART, Fr. the laſt ſervice brought on the tables of people of quality, when the meats are all taken off. The *deſſert* conſiſts of fruits, paſtry-works, confections, &c.

DESSICATIVE, or DESICCATIVE, from *deſicco*, *I dry up*, in *Medicine*, a remedy that has the virtue of drying up ſuperfluous moiſture; uſed to ſkin over old ſores, &c. We ſay, a *deſiccative* unguent, &c.

Pimpinella is held deterſive, *deſiccative*, and vulnerary. Lemery.

DESTILLATION, or DISTILLATION, in *Chemiſtry*. See DISTILLATION.

DESTINIES, in *Mythology*. See PARCÆ.

DESTINY, from *deſtino*, *I order*, the order, diſpoſition, or chain of ſecond cauſes appointed by Providence; and importing, or carrying with it, a neceſſity of event.

According to many of the heathen philoſophers, *deſtiny* was a ſecret and inviſible power, or virtue, which, with incomprehenſible wiſdom, conducted what to us appears irregular and fortuitous. This amounts to what we call God.

The Stoics, by *deſtiny*, underſtood a certain concatenation of things, which, from all eternity follow each other of abſolute neceſſity, there being no power able to interrupt their connexion. This anſwers, in a great degree, to our idea of Providence.

But the Stoics made even the gods themſelves ſubject to the neceſſity of this *deſtiny*. The truth is, the Stoics rather define what the word *deſtiny* ſhould ſignify, than what it did ſignify in common language; for they had no diſtinct idea of this power, to which they attributed thoſe events. They had only a vague, confuſed idea of I know not what chimera, or unknown cauſe, to which they referred that invariable diſpoſition, and the eternal concatenation of all things. There is no real being that the name *deſtiny* can agree to. The heathen philoſophers, who had framed a notion thereof, ſuppoſed it to exiſt, without knowing preciſely what they meant by it. But men, not daring on the one ſide to impute to Providence the evils and misfortunes that befel them, as they imagined, undeſervedly; and, on the other ſide, not being willing to allow that it was their own fault, formed this phantom of *deſtiny*, to bear the weight of all the evil.

DESTRUCTION, paſſively taken, is the corruption or annihilation of ſomething before exiſting. Se Corruption.

A thing paſſes from *eſſe* to *non eſſe*, either by corruption, when nothing of the ſubſtance is loſt, but only the accidents, viz. the diſpoſition of parts; or, by annihilation, when both ſubſtance and accidents are loſt.

DESUDATION, from *deſudo*, *I ſweat much*, expreſſes a profuſe and inordinate ſweating, followed by the irruption of SUDAMINA, or heat-pimples.

DESULTOR, from *deſilio*, *I vault*, in *Antiquity*, a vaulter, or leaper, who jumped off one horſe upon another.

Among the Scythians, Indians, and Numidians, the cavaliers, or horſemen, who ſerved in the wars, were very expert *deſultores*; that is, they always carried with them at leaſt two horſes, and when that they were mounted on grew weary, or wanted breath, they leaped, with great agility and addreſs, upon the other which they led in their hand.

The Greeks and Romans borrowed the ſame practice from thoſe barbarous nations; but they only uſed it in their games, races, and funeral ſolemnities; and never, that we read of, in war. The *deſultores*, therefore, were, among the people of Aſia and Africa, ſoldiers; but, among the Romans, &c. they were no more than tumblers and poſture-maſters. Euſtathius, on Homer's Iliad, lib. iv. aſſures us, that, inſtead of two, they had ſometimes four or ſix horſes, all a-breaſt, and would jump from the firſt to the fourth, or ſixth, which was the maſter-piece of their art.

DETACHED *Pieces*, in *Fortification*, are demi-lunes, ravelins, horn and crown-works, and even baſtions, when ſeparated, or at a diſtance from the body of the place.

In *Painting*, the figures are ſaid to be well *detached*, or looſened, when they ſtand free, and diſengaged from each other, are no where confounded together, but ſtand out with a ſtrong relievo from the ground, and from each other.

DETACHMENT, from the French *detacher*, *to port from*, a military term, ſignifying a certain number of ſoldiers, taken out of ſeveral regiments or companies equally, to be employed in ſome particular enterprize; as, to form a kind of flying camp, to relieve a party already engaged in battle, to join a ſeparate army, to aſſiſt at the ſiege of a place, or to enter into ſome garriſon. The number depends on the dignity of the officer in command; thus, two thouſand or three thouſand men form a *detachment* for a general officer, eight hundred for a colonel, five hundred for a lieutenant-colonel, two or three hundred for a major, eighty or a hundred for a captain, forty for a lieutenant or enſign, twelve for a ſerjeant, and ſix for a corporal.

Detachment *of a fleet or ſquadron*, a certain number of ſhips choſen by an admiral or commodore from the reſt of the fleet, and charged to execute ſome particular ſervice.

DETAINER, in *Law*. See Forcible *entry*.

DETENTION, from *detineo*, *I detain*, the poſſeſſion, or holding, of lands, or the like, from ſome other claimant.

The word is chiefly uſed in an ill ſenſe, for an unjuſt with-holding, &c.

The canons condemn a perſon who has intruded into a benefice, to make reſtitution of all the fruits thereof, during the time of his unjuſt *detention*.

DETENTS, in a clock, are thoſe ſtops which, by being lifted up or let fall down, lock and unlock the CLOCK in ſtriking.

Detent-*wheel*, or Hoop-*wheel*, in a clock, that wheel which has a hoop almoſt round it, wherein there is a vacancy, at which the CLOCK locks.

DETERGENT, from *detergo*, *I cleanſe*, in *Medicine*, is applied to remedies that cleanſe, and carry off viſcid and glutinous humours.

The plant buckthorn deterges, and conſolidates wounds. Rhaponticum is aperitive, and good againſt the gravel and ſtone; it alſo deterges, and expels poiſon.

Detergents are not only ſoftening and adheſive, but alſo, by a peculiar activity, or diſpoſition to motion, joined with a ſuitable configuration of parts, are apt to abrade, and carry along with them, ſuch particles as they lay hold of in their paſſage. All medicines of this intention are ſuppoſed to cleanſe and heal, that is, incarnate, or fill up with new fleſh, all ulcerations and foulneſſes occaſioned thereby, whether internal or external. To do this, in all internal caſes eſpecially, the medicine muſt be ſuppoſed to maintain its primary properties, until it arrives at the place of action; and there it does what entitles it to the appellation of a *detergent*, and a vulnerary: firſt, by its adheſive quality, which conſiſts in the comparative largeneſs of ſurface, and flexibility of its component parts, by which it readily falls into contact with, and adheres to, the ſlough of ulcerous exſudations, which, by their looſe ſituations, are eaſily carried along with the medicine; and when ſuch matter is ſo carried away, which is the cleanſing and deterging part, what was inſtrumental in this office, will afterwards ſtick and adhere to the cutaneous filaments, until, by their addition, and the protruſion of proper nouriſhment, *ab interno*, to the ſame place, the waſte is made up, that is, the ulcer is healed. Quincy.

After the like manner is the operation of *detergents* to be accounted for in external application. By the warmth of their parts they rarefy, and by their adheſive quality they join with, and take off along with them, in every dreſſing, what is thrown upon the place to which they are applied, until a more convenient matter is brought thither by the circulating juices, which they aſſiſt in adhering to, and incarnating the eroded cavities. Only this may be taken notice of, that internally, whatſoever of this kind is mixed with the animal fluids, by the known laws of circulation, will be firſt ſeparated, and left behind; for all thoſe parts which are ſpecifically heavieſt, will move neareſt the axis of the canals, becauſe their moments are the greateſt, and will carry them, as near as can be, in ſtrait lines; but the lighter parts will always be driven to the ſides, where they ſooneſt meet with outlets to get quite off, or are ſtruck into ſuch cavities as we are here ſpeaking of, in which they adhere, and make part of the ſubſtance.

This is underſtood of the milder ſort of *detergents*; and it is eaſy to conceive from hence, how an increaſe of thoſe qualities of activity and adheſion conjointly, may make a medicine ariſe to the greateſt efficacy in this reſpect. And it is upon this foot that all thoſe medicines operate which are given to cleanſe obſtructions, or foulneſſes, in any of the *viſcera*, or paſſages; and which may be increaſed in efficacy ſo far, as to fetch off even the membranes, and part of the capillary veſſels.

Many *detergents* are of the genus of balſamics; and ſome only differ in their degree of ſubtilty and efficacy, from what are called vulneraries.

The principal ſimples in this claſs are the leaves of wormwood, garlic, leeks, capers, ſcurvygraſs, fumitory, liverwort, tanſy, and vervain; bitter almonds, figs, jujebs, raiſins, dates, juniper-berries; gum ammoniac, balſam of Capivi, balm of Gilead, tacamahaca; turpentines; barberries, liquorice, turmeric, madder, ſpermaceti, mummy, ſulphur, ſalt, mercury, and native cinnabar. Theſe the reader will find particularly deſcribed under their proper articles.

The pectoral *detergents* are the beſt of all medicines in the decline of an hæmorrhage by the mouth, in which blood has been voided clear from the lungs: in this caſe they never fail to reſolve any grumes that may remain in the part; and at the ſame time, wonderfully reſtore the due tone of the *viſcera*. The moſt proper on this occaſion are decoctions of daiſy-leaves, ground-ivy, ſpeedwell, and the ſmall nettle, with powders of nitre, and dried goat's blood, and a mixture of an ounce of crab's eyes in a pint of white wine.

They are given in conſumptions in many caſes, and the moſt proper on this occaſion are the ſaline ones, with the common abſorbents, ſaturated with acids.

DETERIORATION, an act whereby a thing is impaired or rendered worſe.

When the *deterioration* of a commodity, ſeized by an officer, ariſes from the fault of the keeper, he is anſwerable for the ſame.

J. Frederic Mayer, profeſſor at Leipſic, printed a treatiſe of *deterioration*, in the year 1695, under the title of Tractatus de Deterioratione.

DETERMINATE *Number*. See Number.

Determinate *Problem*, is that which has but one, or at leaſt but a certain number of ſolutions, in contradiſtinction to an indeterminate problem, which admits of infinite ſolutions.

Such, e. gr. is the problem, To deſcribe an iſoſceles triangle on a given line, whoſe angles at the baſe ſhall be double that at the vertex: which has only one ſolution; as that which follows has two, viz. To find an iſoſceles triangle, whoſe area and perimeter are given.

A *determinate* problem may either be ſimple or linear, plane, ſolid or ſurſolid.

DETERMINATION, in *Phyſics*, the diſpoſition or tendency of a body towards one way, rather than another.

Heavy bodies have a *determination* towards the center of the earth.

Determination is alſo uſed for the action whereby a cauſe or agent is limited, or reſtrained, to act, or not act, in this or in that manner.

Determinations, ſay the ſchoolmen, proceed either from an efficient cauſe; in which caſe the *determination* is called effective; as, when an artiſt determines an inſtrument to a certain action; or from the form, as that determines the indifferency of the matter; and thus our ſenſes are ſaid to be *determinations* to have ideas upon the preſence of external objects.

Or the *determination* is from the matter or ſubject that receives the action; and thus the heating of fire upon clay *determines* it to harden, upon wax to ſoften, &c. Or it is from the object; as when we ſay, colour *determines* the viſual power: or, laſtly, it is from the end, as the end *determines* the deſire.

Determinations, again, are either moral or phyſical. A *moral determination* is that proceeding from a cauſe which operates morally, i. e. by commanding, perſuading, or adviſing, ſome effect. This is the only kind of influence or *determination*, which is conſiſtent with man's free, *moral* agency; or indeed with any agency at all.

Phyſical determination, is an act whereby God excites and applies a ſecond cauſe to act, antecedently to all operation of the creature. Such a *determination* the Thomiſts and Dominicans maintain neceſſary to all the actions of every creature. The Jeſuits, on the contrary, deny that God thus *determines* even ſecond cauſes; and hold, that God exerts no influence on ſecond cauſes, but only with the ſecond cauſe on the action. And thus they exclude a phyſical *determination*, both from natural cauſes, as ſuppoſing them already *determined* by nature to act; ſo that there needs no other external *determination* from God to the ſeveral actions; and from free cauſes, as ſuppoſing ſuch a predetermination contrary to our natural liberty.

A *determination* to be pleaſed with certain forms, or ideas, an ingenious author calls an *internal ſenſe*; and a *determination* to be pleaſed with virtuous actions, characters, manners, &c. a *moral* SENSE.

DETERMINATIVE *Propoſition*, in *Logic*. See COMPLEX *Propoſition*.

DETERRATION, from *de*, and *terra*, is uſed to ſignify a removal of the earth, ſand, &c. from the mountains and higher grounds, down into the valleys and lower parts. This is occaſioned by rains, which waſh the earthy matter down by degrees; but this cannot be very conſiderable, or much raiſe the ſurface of the earth, as ſome have imagined, becauſe a good part of it is ſunk into the clefts and caverns of the rocks and mountains, a great quantity is borne down into rivers, and thence into the ſea, and the richer and finer part helps to compoſe the bodies of plants and vegetables.

DETERSIVES, in *Medicine*, the ſame with DETERGENT.

A clyſter is a *deterſive* medicine, which cleanſes the lower venter. *Deterſive* unguents are alſo called *mundificatives*. The leaves and ſummits of the ſtrawberry are *deterſive* and aſtringent.

DETERSOR, from *detergo*, *I clear away*, in *Antiquity*, a ſervant whoſe buſineſs it was to attend at dinner, and wipe the table. Pitiſc.

DETERSORUM, in *Antiquity*, a name given to the common waſh, which was bean-meal, called *lomentum*, or the meal of a ſort of pulſe called *lupines*: this laſt they called *ſmegma*.

The ancients, when they bathed, uſed various waſhes for cleanſing the ſkin; but *natrum*, and this thin froth, called in Greek *aphronitron*, were moſt common.

DETINUE, a writ which lies againſt a man who, having goods, or chattels, delivered to keep, refuſes to redeliver them.

Detinue anſwers, in great meaſure, to the *actio depoſiti* of the civilians. He takes his *action of detinue*, to recover the thing *detained*; not the damages ſuſtained by the *detinue*. For this reaſon this action is ſeldom brought: actions of trover and converſion being uſed inſtead of actions of *detinue*.

DETINUE *of charters*. A man may have *detinue* for deeds and charters concerning land: but if they concern the freehold, it muſt be in C. B. and no other court. Action of *detinue* lies for charters which make the title of lands: and the heir may have *detinue* of charters, although he hath not the land. If my father be diſſeiſed, and dieth, I ſhall have *detinue* for the charters, notwithſtanding I have not the land: but the executors ſhall not have the action for them. New Nat. Br. 308.

DETINUE *of goods in frank marriage*, is on a divorce betwixt a man and his wife; after which the wife ſhall have this writ of *detinue* for the goods given with her in marriage. Mich. 35 Eliz. 1. New Nat. Br. 308.

DETONATION, in *Chemiſtry*, the noiſe which ſome minerals, and other bodies, make, when they begin to heat in crucibles; by the volatile parts ruſhing out with impetuoſity, and the humidity eſcaping.

The word is formed of *de*, and *tono*, *I thunder*.

Detonation is much the ſame with *decrepitation*; only its action is more forcible, and the noiſe is greater. Such are the exploſions of gunpowder, fulminating gold, and fulminating powder: but as nitre is the cauſe of moſt exploſions, the word *detonation* has been appropriated to the inflammation of the acid of this ſalt with bodies containing phlogiſton; and it is frequently given to thoſe inflammations of nitrous acid with ſulphur, coals, and metals, which are not accompanied with exploſion.

Detonation takes away the impure volatile ſulphur from bodies.

DETONATION denotes the act, or operation, of expelling the impure, volatile, and ſulphureous part, out of antimony; and leaving behind the fixed and internal parts. This is chiefly performed by means of ſaltpetre, &c. See ANTIMONY.

DETONATION *of nitre*, conſiſts in the inſtantaneous inflammation and decompoſition of the acid of nitre, when it immediately touches combuſtible bodies, the phlogiſton of which is ignited, or when the acid is ignited. This is effected by applying the nitre to a red-hot combuſtible body, or by making the acid itſelf red-hot, and applying a combuſtible body to it in that ſtate. During the *detonation*, a conſiderable ſmoke ariſes, containing no acid. See CLYSSUS *of nitre*. What remains in the crucible, after the nitrous acid is thus burnt, is the fixed alkali, which was the baſis of the nitre. Mr. Macquer conjectures that the *detonation* of nitre cannot take place, unleſs a combination be previouſly formed betwixt its acid and the phlogiſton of the combuſtible ſubſtance uſed in the operation; that this combination is entirely ſimilar to that of vitriolic acid with phlogiſton, when ſulphur is formed; and that, in the preſent inſtance, a nitrous ſulphur is formed, infinitely more combuſtible than the vitriolic ſulphur, and even ſo combuſtible, that it cannot exiſt an inſtant without being entirely burnt; and on this account, it is inflamed with extreme rapidity and violence as ſoon as it is formed. He alleges a number of facts to eſtabliſh this conjecture; from which he alſo infers, that nitrous acid, whilſt diſengaged from any baſis, is incapable of *detonation*; and that the ſtrength or weakneſs of the *detonation* depends on the greater or leſs adheſion of the nitrous acid with its baſis. He obſerves that there is a very conſiderable difference in the phenomena of their combuſtion, between the vitriolic and nitrous ſulphur: the former burns very weakly; produces a flame which is very little luminous; requires for the continuance of its burning a conſtant ſupply of new air; and its acid undergoes no change by this combuſtion. Nitrous ſulphur, on the contrary, appears incapable of exiſting an inſtant without burning: its vivid, dazzling flame, accompanied with noiſe, reſembles the flame of a fire ſtrongly actuated by a blaſt of air; it needs not the contact of external air; it burns with the ſame violence and rapidity in cloſe veſſels; no obſtacle is capable of containing it; and if it be confined, it burſts with a terrible noiſe the ſides of the containing veſſels; and after its combuſtion no trace is to be found of its acid. In order to account for this difference, he adopts the opinion of Stahl, who conſiders the nitrous acid as compoſed of a watery and an earthy principle, as well as all other acids; and beſides theſe, of a third principle, which is phlogiſton, in ſuch a quantity as to aſſume all the properties, and particularly the inflammability, eſſential to its nature. Thus he accounts for the deſtruction or total decompoſition of the acid in nitrous ſulphur when it is inflamed. The exploſion accompanying the *detonation* of nitre proceeds from a great and ſudden dilatation of ſome very expanſible body: this body Stahl and Macquer ſuppoſe to be the water of the nitre, or rather of its acid; which acquires in the operation the properties of air. But others, with greater reaſon, maintain, that this elaſtic fluid is not the water of the nitre rarefied and converted into air; becauſe the water of the nitre is only rarefied by the heat of the deflagration, and is afterwards condenſed by cold, forming the water called CLYSSUS *of nitre*. Beſides, the elaſtic fluid thus produced is permanent, and not condenſible into a liquid. Mr. Robins found, by accurate experiments, that the fluid produced by firing gunpowder, when confined within a ſpace equal to that of the gunpowder which was fired, and reduced to the heat of the atmoſphere, was capable of ſuſtaining a preſſure equal to 244 times the preſſure of the atmoſphere; and that the elaſtic force of the fluid was increaſed probably about four times by the heat produced by the firing of the powder; and conſequently, that it is thereby rendered capable, at the inſtant of exploſion, of ſuſtaining a preſſure nearly equal to a thouſand times the preſſure of the atmoſphere. Dr. Prieſtley conteſts the opinion advanced by Stahl, and adopted by Macquer and other chemiſts, that the nitrous acid is deſtroyed and utterly decompoſed, in the proceſs of *detonation*: he ſuppoſes, that, though the common properties of the acid, as combined with water, diſappear, it is only in conſequence of its combination with ſome earthy or inflammable matter, with which it forms ſome of the many ſpecies of air, into the compoſition of which this wonderful acid enters. Dict. of Chemiſtry. Robins's

New Principles of Gunnery, prop. 4 and 6, in his Tracts, vol. i. p. 68—72. Prieſtley's Exper. &c. on Air, vol. ii. p. 61.

DETRAHENS *quadratus*, in *Anatomy*, a name given by ſome authors, particularly Spigelius, to a muſcle, called by the generality of anatomiſts the *platyſma myodes*; and, by Albinus, *latiſſimus colli*. Douglas calls it alſo *quadratus genæ*.

DETRANCHE', among the *French Heralds*, ſignifies a line bendwiſe, which does not come from the very dexter angle, but either from ſome part of the upper edge, and thence falling athwart, or diagonally; or from part of the dexter ſide. They ſay, *tranché*, *detranché*, and *retranché*; to denote, that there are two diagonal lines, making two partitions in the eſcutcheon, and coming from the angles, and a third from ſome of the other parts above mentioned. See TRANCHE'.

DEVASTAVIT, or DEVASTAVERUNT *bona teſtatoris*, is a writ that lies againſt executors or adminiſtrators, for paying debts upon ſimple contract, and legacies, before debts on bonds and ſpecialties, &c. for in this caſe they are as liable to action, as if they had ſquandered away the goods of the deceaſed, or converted them to their own uſe; and are compellable to pay ſuch debts by ſpecialty out of their own goods, to the value of what they ſo paid illegally. Dyer, 232. But if an executor pays debts upon ſimple contract, before he hath any notice of bonds, it is no *devaſtavit*; and regularly this notice is by an action commenced againſt him: for the law doth not oblige him to take notice of it himſelf, nor of a judgment againſt his teſtator; becauſe he is not privy to acts done either by or againſt him. 1 Mod. 175. 3 Lev. 115.

DEUCALION, in *Mythology*, was the ſon of Prometheus, who married Pyrrha, the daughter of Epimetheus. Some have ſuppoſed that *Deucalion*, whom the Greeks have repreſented under a variety of characters, and concerning whom their poets have given many fabulous accounts, was the ſame with the patriarch Noah; and that *Deucalion*'s flood in Theſſaly, as well as that of Ogyges in Attica, and of Prometheus in Egypt, were the ſame with that of Noah, recorded in Scripture. Diodorus Siculus expreſsly ſays, that in the deluge which happened in the time of *Deucalion*, almoſt all fleſh died. Apollodorus having mentioned *Deucalion* *εν-λαρνακι*, *conſigned to an ark*, takes notice, upon his quitting it, of his offering up an immediate ſacrifice, *Δϊι φυξιω*, *to the God who delivered him*. As he was the father of all mankind, the ancients have given him great dignity and univerſal monarchy; though ſometimes he is reduced to a petty king of Theſſaly. Apollonius Rhodius makes him a native of Greece, and the ſon of Prometheus. We may learn, however, from their confuſed hiſtory, that the perſon repreſented was the firſt of men, through whom religious rites were renewed, cities built, and civil polity eſtabliſhed in the world: none of which circumſtances are applicable to any king of Greece. Philo aſſures us, that the Grecians call the perſon *Deucalion*, but the Chaldæans ſtyle him Noe, in whoſe time there happened the great eruption of waters. But as Lucian has given us the moſt particular hiſtory of the deluge, and that which comes neareſt to the account given by Moſes; and as he was a native of Samoſata, a city of Commagene upon the Euphrates, a part of the world where memorials of the deluge were particularly preſerved, and where an obvious reference to that hiſtory may be obſerved in the rites and worſhip of the country, we ſhall terminate this article with an extract of what he ſays on the ſubject.

Having deſcribed Noah under the name of *Deucalion*, he ſays, that the preſent race of mankind are different from thoſe who firſt exiſted; for thoſe of the antediluvian world were all deſtroyed. The preſent world is peopled from the ſons of *Deucalion*; having increaſed to ſo great a number from one perſon. In reſpect to the former brood, they were men of violence, and lawleſs in their dealings. They regarded not oaths, nor obſerved the rites of hoſpitality, nor ſhewed mercy to thoſe who ſued for it. On this account they were doomed to deſtruction; and for this purpoſe there was a mighty eruption of waters from the earth, attended with heavy ſhowers from above; ſo that the rivers ſwelled, and the ſea overflowed, till the whole earth was covered with a flood, and all fleſh drowned. *Deucalion* alone was preſerved to repeople the world. This mercy was ſhewn to him on account of his juſtice and piety. His preſervation was effected in this manner: he put all his family, both his ſons and their wives, into a vaſt ark which he had provided, and he went into it himſelf. At the ſame time animals of every ſpecies, boars, horſes, lions, ſerpents, whatever lived upon the face of the earth, followed him by pairs; all which he received into the ark, and experienced no evil from them; for there prevailed a wonderful harmony throughout by the immediate influence of the Deity. Thus were they wafted with him, as long as the flood endured.

After this he proceeds to mention that, upon the diſappearing of the waters, *Deucalion* went forth from the ark, and raiſed an altar to God. Diod. Sic. lib. i. p. 10. Apollod. lib. i. p. 20. Apollon. Rhod. lib. iii. v. 1085. Philo Jud. de Præmio & Pœna, vol. ii. p. 412. Lucian de Deâ Syriâ, vol. ii. p. 882.

Dr. Bryant produces a variety of monuments, that bear an obvious reference to the deluge, in the gentile hiſtory, beſides this account of *Deucalion* and his flood. Analyſis of Ancient Mythology, vol. ii. p. 193—250.

DEVENERUNT, a writ anciently directed to the eſcheator, on the death of the heir of a tenant of the king holding *in capite*, within age, and in the king's cuſtody; commanding the eſcheator to enquire, upon the oaths of good and lawful men, what lands and tenements, by the death of the tenant, come to the king. This writ is now diſuſed.

DEVEST, *Deveſtire*, in *Feudal Writers*, is uſed for the oppoſite to inveſting. *Inveſtire* ſignifies *poſſeſſionem feudi tradere*. On the contrary, *diveſtire* is *poſſeſſionem auferre*. Feud. lib. i. c. 7. Cowel.

DEVIATION, in the *Old Aſtronomy*, a motion of the deferent, or eccentric, whereby it advances to, or recedes from, the ecliptic. See DEFERENT.

The greateſt *deviation* of a planet is equal to the inclination of its orbit to the plane of the ecliptic. See INCLINATION *of a planet*.

DEVICE, in *Painting*. See DEVISE.

DEVIL, *Diabolus*, an evil angel; one of thoſe celeſtial ſpirits caſt down from heaven, for pretending to equal himſelf with God.

The word is formed from the French *diable*, of the Latin *diabolus*, which comes from the Greek *διαϐολος*, *accuſer*, or *calumniator*; or from the ancient Britiſh *diafol*.

The Ethiopians paint the *devil* white, to be even with the Europeans, who paint him black. Ludolph.

We find no mention of the word *devil* in the Old Teſtament; but only of Satan: nor do we meet with the word *devil*, in any heathen authors, in the ſignification attached to it among Chriſtians; that is, as a creature revolted from God: their theology went no farther than to evil genii, or dæmons, who haraſſed and perſecuted mankind. Thus the Chaldæans believed both a good principle, and an evil principle, which was an enemy of mankind. See DÆMONS, and DÆMONIACS.

The relations we have of the religion of the Americans, aſſure us of ſome idolatrous nations, who worſhip the *devil*; but the term *devil* muſt not be here taken in the common ſenſe: thoſe people have an idea of two collateral independent beings; one whereof is good, and the other evil. And they place the earth under the guidance and direction of that evil being, which our authors, with ſome impropriety, call the *devil*.

DEVIL, *Sea*, *Diabolus marinus*, in *Ichthyology*, the name of an ugly and ſtrangely ill-ſhaped fiſh, of the ray kind. Its noſe or ſnout is bifid, and runs out into two horns; and its ſides are both terminated by thin fins: its ſkin toward the head is variegated with duſky ſpots. It grows to a very conſiderable ſize, being ſometimes caught of ſix or ſeven feet long. Ray's Ichthyogr. Append. p. 5. See *Tab. of Fiſh*, N° 6.

DEVIL *in a buſh*, in *Botany*, *Nigella*. See FENNEL-*flower*.

DEVIL's *bit*. See SCABIOUS.

DEVIL's *bit*, *Yellow*, *Leontodon*. See DANDELION.

DEVINCTION, *Devinctio*, in *Antiquity*, was uſed to ſignify a love-charm or incantation to gain the affection of a perſon beloved.

It was done by tying knots, and differed little from what was called *obligatio* or *catadeſmus*. Virgil, in his eighth Eclogue, deſcribes it thus:

> *Necte tribus nodis ternos, Amarylli, colores:*
> *Necte, Amarylli, modo; & Veneris, dic, vincula necto.*

DEVISE, or DEVICE, in *Heraldry*, a name common to all figures, ciphers, characters, rebuſes, mottoes, &c. which, by their alluſion to the names of perſons, or families, denote their qualities, nobility, or the like.

Deviſe, in this ſenſe, is of a much older ſtanding than heraldry itſelf; being that which gave the firſt riſe to armories. Thus, the eagle was the *deviſe* of the Roman empire; S. P. Q. R. was the *deviſe* of the Roman people, and ſtill continues to be what they call *the eſcutcheon of the city of Rome*.

The firſt *deviſes* were mere letters diſtributed on the borders of the liveries, houſings, and banners, and at length on the ſhields. Thus the K was the *deviſe* of the French kings of the name of Charles, from Charles V. to Charles IX.

There were alſo *deviſes* by rebuſes, equivocals, or alluſions, both to names and arms. The dukes of Guiſe took for their *deviſe* an A in an O, to ſignify, *chacun A ſon tour*, every one in his turn: and the houſe of Seneſai, *in virtute & honore ſeneſces:* ſome, that had towers in their arms, *turris mea Deus*, &c.

There are alſo enigmatical *deviſes:* as that of the Golden Fleece, with *Autre n'aurai*; intimating, that Philip the Good, who inſtituted that order, renounced every other woman, but Iſabella of Portugal, whom he then married.

Deviſes ſometimes contain entire proverbs: as that of Cæſar Borgia, *aut Cæſar, aut nihil.*

The word *deviſe* is formed from the Latin *dividere*, and was applied to the things juſt mentioned, as well as thoſe hereafter mentioned; becauſe they ſerved to divide, ſeparate, and diſtinguiſh perſons, parties, &c.

Father Menetrier obſerves, that there are as many different kinds of *deviſes*, as there are different manners of diſtinguiſhing one another, or as there are ſimple figures, or words, capable of expreſſing qualities, offices, virtues, actions, &c. of perſons; and of notifying, or diſtinguiſhing them from others.

Deviſe is now taken, in a more reſtrained ſenſe, for an emblem; or a repreſentation of ſome natural body, with a motto, or ſentence, applied in a figurative ſenſe to the advantage of ſome perſon.

Father Bouhours gives an accurate explication of the word *deviſe*, in an extract inſerted in the Memoires de Trevoux. A *deviſe*, ſays he, is a compoſition, or aſſemblage, of figures drawn from nature and art, called the *body*; and of a few words adapted to the figure, called the *ſoul:* ſuch a compound, adds he, we make uſe of to denote our thought, or intention, by compariſon: for the eſſence of the *deviſe* conſiſts in a compariſon taken from nature, or art, and founded on a metaphor.

This he illuſtrates in the following inſtance: a young nobleman, of great courage and ambition, bore, for his *deviſe*, in the laſt carouſal at the court of France, a rocket mounted in the air, with this Italian motto, *poco duri, purche m'inalzi*; *may I laſt but a ſhort time, provided I mount high:* which may be explained thus; as the rocket riſes a great pitch, though it only endures a little while, ſo it does not concern me to live long, provided I attain to glory and eminence; which is a juſt compariſon.

On this footing, a *deviſe*, to define it rightly, is, a painted metaphor; or, rather, an enigma inverted: for, whereas enigmas repreſent nature, or art, by the events of hiſtory, and the adventures of fables; a *deviſe* is, a repreſentation of human qualities by natural, or artificial bodies.

Thus, to expreſs the character of Louis XIV. a ſun was painted; which yet, luminous as it is, has more power than luſtre: and the better to determine the ſenſe of the painting to this ſignification, the Caſtilian motto is added; *Mas virtud que luz.* The perſonal merit of Mary, queen of Scots, was repreſented by a pomgranate, with theſe words; *Mon prix n'eſt pas de ma couronne:* and the talent of an apoſtolical perſon, who became all things to all men, by a looking-glaſs, with thoſe words of St. Paul, *Omnibus omnia.*

Deviſes are uſed on coins, counters, ſeals, ſhields, triumphal arches, artificial fire-works, and other ſolemnities. They are a ſort of images, very pertinently and artfully repreſenting the enterpriſes and intrigues of war, love, piety, ſtudy, fortune, &c.

The French have diſtinguiſhed themſelves in this way, eſpecially ſince the time of cardinal Mazarin, who had a wonderful fancy for *deviſes.*

The Italians have reduced the making of *deviſes* into an art, and laid down laws and rules for this purpoſe. Some of the principal are, 1. That there be nothing monſtrous, or extravagant, in the figures; and nothing contrary to the nature of things, or to the common opinion of mankind. 2. That figures be not joined which have no affinity, or relation, to each other; the metaphor being to be founded on ſomething real, and not on hazard, or imagination, excepting ſome whimſical combinations eſtabliſhed in mythology, which cuſtom, and the authority of the poets, have made paſs for natural. 3. That the human body be never taken into *deviſes*; as this would be to compare a man with himſelf. 4. That there be a ſort of unity in the figures which compoſe the body: we do not mean, that there muſt only be a ſimple figure; but that, if there be ſeveral, they muſt have a relation and ſubordination to each other, ſo that there be one principal figure whereon all the reſt depend: though ſtill the fewer figures there are in the body of the *deviſe*, and the leſs they are confuſed, the more perfect and elegant is the *deviſe.* 5. The motto, which is to animate the figure, muſt agree ſo accurately thereto, as that it could not ſerve for any other. 6. No[illegible]ing is to be named that appears to the eye, and which the bare inſpection might notify. 7. The motto is not to have a complete ſenſe of itſelf; for, being to make a compound with the figure, it muſt only be a part, and, conſequently, muſt not ſignify the whole. If the words alone have a complete ſignification, you have a full and diſtinct notion independently of the figure; whereas the ſignification ſhould reſult from both. 8. The ſhorter the motto, the more beautiful; and a ſuſpenſion of the ſenſe, which leaves ſomewhat to gueſs, is one of the principal graces of the *deviſe.* Laſtly, It is accounted a happineſs, where the words of a poet are applied in a ſenſe which he never dreamed of, and yet ſo pertinently, that it ſhould ſeem they had been intended for the ſame.

Deviſe, or **Diviſe**, in *Common Law*, the act whereby a teſtator gives, or bequeaths, his lands, or goods, by his laſt will, in writing. Though, in ſtrictneſs, a *deviſe* of goods is more properly termed a bequeſt.

He who makes the *deviſe*, is called the *deviſor*; and he, to whom it is made, the *deviſee.*

The words of a will the law interprets in a larger, and more favourable ſenſe, than thoſe of a deed: for if land be *deviſed* to a man to have to him for ever, or to have to him, and his aſſigns; in thoſe caſes, the *deviſee* ſhall have a fee-ſimple: yet if given in the ſame manner by feoffment, he ſhall have but an eſtate for life.

So, if one *deviſe* land to an infant in his mother's belly, it is a good and valid *deviſe*; though it is otherwiſe by feoffment, grant, or gift. For, in thoſe caſes, there ought to be one of ability to receive preſently; otherwiſe it is void. See Deed, and Will.

Deviſe, *Executory.* See Executory *deviſe.*

DEUNX, a diviſion of the Roman libra, or pound, containing eleven ounces; or eleven twelfths of any thing. See As.

DEVOIRS *of Calais*, in our *Old Statutes*, cuſtoms due to the king for merchandize brought to, or carried out of Calais, when our ſtaple was there. 34 Edw. III. c. 18. and 2 Rich. II. ſtat. 1. c. 3.

Devoir is French, ſignifying *duty.*

DEVOLVED, ſomething acquired by right of *devolution.*

Such a right is *devolved* to the crown: ſuch an eſtate *devolved* on M—— by the death of N——.

The word is alſo uſed for a right, acquired by a ſuperior, of conferring a benefice, when the inferior, and ordinary collator, has neglected to confer, or has conferred it on an unqualified perſon.

If a patron neglects to preſent to a benefice in ſix months, the preſentation lapſes, or *devolves*, upon the biſhop, from thence to the primate, and from thence to the king.

DEVOLUTION, in the *French Law*, a right acquired by deſcent, or ſucceſſion, from degree to degree.

Devolution, in general, is an impediment provided by the cuſtoms of ſeveral provinces, whereby the huſband who ſurvives his wife, or the wife ſurviving her huſband, is prohibited to alienate the real and immoveable effects of the deceaſed, and obliged to preſerve them for the children iſſued from that marriage; ſo that they may ſucceed thereto in excluſion of thoſe born of a ſecond marriage.

DEVOTION, of *devoto*, from *devoveo*, *I conſecrate*, a ſincere, ardent worſhip of God.

Monſ. Jurieu defines *devotion*, a ſoftening and yielding heart, with an inward conſolation, which the ſouls of believers feel in the exerciſes of piety.

Under the name of *devotions* are uſually underſtood certain religious practices, which a perſon makes it a rule to diſcharge regularly: and with reaſon, if this exactitude be founded on ſolid piety; otherwiſe it is vanity, or ſuperſtition.

Devotion, among the Romans, was a ſort of ſacrifice, or ceremony, whereby they conſecrated themſelves to the ſervice of ſome perſon.

The ancients had a notion, that the life of one might be redeemed by the death of another: and hence were thoſe *devotions* ſo frequent for the lives of the emperors.

The *devotion* of Decius, who, after devoting himſelf to his country, threw himſelf into the hands of his enemies, and was killed, is ſaid to have gained the Romans the victory.

But *devotion* to any particular perſon was not known till Auguſtus. The day after the title Auguſtus had been given Octavius, Pacuvius, a tribune of the people, began to ſay, he would devote and conſecrate himſelf to him, as was practiſed among the barbarous nations, to obey him even at the expence of life, if he were commanded. His example was immediately followed by all the reſt; and it came at length to be eſtabliſhed into a cuſtom, never to go to ſalute the emperor, without declaring, they were devoted to him. Auguſtus, though ſeeming to oppoſe this vile and infamous flattery, yet rewarded the author.

Cornelius Nepos uſes the word *devotion* for a kind of puniſhment, conſiſting of direful curſes and marks of infamy. See Accursed, and Execration.

DEVOURING, in *Heraldry.* When fiſhes are borne in an eſcutcheon, in a feeding poſture, the heralds denominate it *devouring*; becauſe fiſhes ſwallow all their food whole.

DEUTEROCANONICAL, in the *School Theology*, an appellation given to certain books of Holy Scripture, which were added to the canon after the reſt; either becauſe they were not wrote till after the compilation of the canon, or becauſe of ſome diſputes as to their canonical authority.

The word is Greek; being compounded of δευτερος, *ſecond*, and κανονικος, *canonical.*

The Jews, it is certain, acknowlege ſeveral books in their canon, which were put there later than the reſt. They ſay, that, under Ezra, a great aſſembly of their doctors, which they call, by way of eminence, the *great ſynagogue*, made the collection of the ſacred books, which we now have in the Hebrew Old Teſtament: and they agree, that they put books therein which had not been ſo before the Babyloniſh captivity. Such are thoſe of Daniel, Ezekiel, Haggai, &c. and thoſe of Ezra and Nehemiah.

And the Romiſh church has ſince added others to the canon, that were not, nor could be, in the canon of the Jews; becauſe ſome of them were not compoſed till after that canon was formed. Such is the book of Eccleſiaſticus; with ſeveral of the apocryphal books, as that of the Maccabees, Wiſdom, &c. Others were added ſtill later, becauſe their canonical authority had not been yet examined; and, till ſuch examen, and judgment, they might be ſet aſide, at pleaſure.

But ſince that church has pronounced as to the canonical authority of theſe books, there is no more room now for her members to doubt of them, than there was for the Jews to doubt of thoſe of the canon of Ezra: and the *deuterocanonical* books are, with them, as canonical as the protocanonical; the only difference between them conſiſting in this, that the canonical authority of the one was not generally known, examined, and ſettled, ſo ſoon as that of the others.

The *deuterocanonical* books, in the modern canon, are, the book of Eſther, either the whole, or at leaſt the ſeven laſt chapters of it; the epiſtle to the Hebrews; that of James; and that of Jude; the ſecond of St. Peter; the ſecond and third of St. John; and the Revelation. The *deuterocanonical* parts of books are, the hymn of the three children; the prayer of Azariah; the hiſtories of Suſanna, of Bel, and the dragon; the laſt chapter of St. Mark; the bloody ſweat, and the appearance of the angel, related in St. Luke, chap. xxii. and the hiſtory of the adulterous woman in St. John, chap. viii. See Canon.

DEUTERONOMY, one of the ſacred books of the Old Teſtament; being the fifth book of the LAW, and the laſt of thoſe written by Moſes; cloſing, according to the computation of Uſher, the hiſtory of 2552½ years, from the beginning of the world to the death of Moſes.

The word is Greek; compounded of δευτερος, *ſecond*, and νομος, *law.*

It does not appear that Moſes made any diviſion of what he wrote, into books; or that he gave different names and titles to the different parts of his work; nor do the Jews, even at this day, diſtinguiſh them in the copies they uſe in the ſynagogues, but write them all running as one ſingle work, without any other diſtinction beſide that of little and great paraſches. 'It is true, in the other copies, uſed by private perſons, they are divided into five parts, as among us; but they give them no other name, but the firſt word wherewith each diviſion begins; much as we do in quoting a decree, or chapter, of the canon law.

Thus, the firſt part of Moſes's work they call בראשית *Bereſchit*, becauſe beginning with that word; the ſecond they call ואלה שמות *Veelleh Schemoth*; the third, ויקרא *Vajickra*; the fourth, וידבר *Vajiedabber*; and the fifth, הדברים אלה *Elleh Haddebarim*; which is one of the firſt words thereof. This cuſtom is very ancient among the rabbins, as appears from the ancient commentaries on thoſe books, called בראשית רבה *Bereſchit Rabba*, ואלח שמות ראה *Veelleh Schemoth Rabba*, &c. and from the *Prologus galeatus* of St. Jerom. The Greeks, when they firſt tranſlated the law, gave the five parts, into which it was divided, the names of Geneſis, Exodus, Leviticus, Numbers, and *Deuteronomy.* Accordingly, the names are Greek, excepting that of Leviticus, which is Hebrew; and they expreſs what is contained in thoſe books, or at leaſt the moſt remarkable things contained therein: which is the uſual Greek manner of giving titles.

The book of *Deuteronomy* was ſo called, becauſe this laſt part of the work of Moſes comprehends a repetition, or recapitulation, which that legiſlator made to the Iſraelites, before his death, of the law he had before delivered to them at large: and hence *Deuteronomy* is ſtill called, by the rabbins, משנה *Miſchneh*, *repetition*; משנה תורה *Repetition of the law*, *ſecond law*: they likewiſe call it ספ־תוכחות *the Books of Reprimands*; on account of the twenty-eighth chapter, which is full of bleſſings, promiſed to ſuch as keep the law; and of curſes, threatened to ſuch as tranſgreſs it.

The book of *Deuteronomy* was written in the fortieth year after the delivery from Egypt, in the country of the Moabites beyond Jordan; Moſes being then in the 120th year of his age. It contains, in Hebrew, eleven paraſches, though only ten in the editions of the rabbins at Venice; twenty chapters, and 955 verſes. In the Greek, Latin, and other verſions, it contains thirty-four chapters: the laſt was not written by Moſes. Some ſay, it was added by Joſhua, immediately after Moſes's death: others will have it added by Ezra, which is the moſt probable opinion; who likewiſe made ſome interpolations in the book itſelf, as chap. ii. ver. 12. chap. iii. 11, and 14.

DEUTEROPOTMI, Δευτεροποτμοι, from δευτερος, *ſecundus*, and ποτμος, *fortuna*, or *mors*, among the Athenians, a deſignation given to ſuch who had been thought dead, and, after the celebration of the funeral rites, unexpectedly recovered. It was unlawful for the *deuteropotmi* to enter into the temple of the Eumenides, or to be admitted to the holy rites, till after they were purified by being let through the lap of a woman's gown, that they might ſeem to be new born. Pott. Archæol. Græc. tom. i. lib. ii. cap. 4. p. 223.

DEUTEROSIS, the Greek name by which the Jews called their MISCHNAH, or ſecond law. *Deuteroſis* in Greek has the ſame ſignification almoſt as *miſchnah* in Hebrew; both ſignify an iteration. Euſebius accuſes the Jews with corrupting the true ſenſe of Scripture with the trifling explanations of their *deuteroſes.* Calmet, Dict. Bibl. in voc.

DEVUIDER, in the *Manege*, is applied to a horſe, that upon working upon *volts* makes his ſhoulders go too faſt for the croupe to follow; ſo that inſtead of going upon two treads, as he ought, he endeavours to go only upon one. This comes from the reſiſtance he makes in defending againſt the heels; or from the fault of the horſeman, who is too haſty with his hand. See Haste.

DEW, *ros*, a thin, light, inſenſible miſt, or rain, aſcending with a ſlow motion, and falling while the ſun is below the horizon.

Cauſabon derives the word from the Greek δευω, *I moiſten.*

Naturaliſts uſually rank *dew* among the number of meteors of the watery kind. Some define it a vapour liquified, and let fall in drops; others, a vapour having a like relation to froſt, as rain has to ſnow, &c. Among the diſſertations of Monſ. Huet, is a letter to ſhew that *dew* does not fall, but riſes. M. Gerſten likewiſe adopted the ſame opinion. To us, *dew* appears only to differ from rain as more, and leſs. Its origin, and matter, no doubt, is from the vapours, and exhalations of the earth and water, raiſed as ſhewn under the article Evaporation, where the theory of its aſcent and precipitation is particularly explained.

M. du Fay made ſeveral experiments, firſt with glaſſes, and then with pieces of cloth, faſtened to two ladders, joined at top, and ſpreading wide at bottom, and reaching about thirty-two feet high, in order to evince the aſcent of *dew*; and he found that the lower bodies, with their under ſurfaces, were wetted before thoſe that were placed higher, or their upper ſurfaces. Both M. du Fay, and M. Muſchenbroek, expoſed ſeveral different ſubſtances to the ſame *dew*, and found that they received and charged themſelves with it in a very different manner; ſome more, others leſs, and ſome even not at all. The drops affixed themſelves, by a kind of election, to glaſs and cryſtals, but not to metals. Mercury was expoſed in a china plate; and the *dew* run in ſtreams on the edges of the plate, while the leaſt drop did not appear on the mercury. Muſchenbroek has obſerved, that bodies of different colours attract the *dew* differently, and that this difference of attractive force depends on the ſtructure and ſize of the coloured bodies. Mem. Acad. Sc. 1736. and Muſchenbroek, &c. ubi infra.

From the principles propoſed and illuſtrated, under the article EVAPORATION, the ſeveral phænomena of *dews* are eaſily accounted for. Hence, e. gr. it is, that *dews* are more copious in the ſpring, than in the other ſeaſons; there being then a greater ſtock of vapour in readineſs, through the ſmall expence thereof in the winter's cold and froſt, than at other times. Hence, what Pliny relates of Egypt, that it abounds in *dews* throughout all the heats of ſummer; for the air there being too hot to conſtipate the vapours in the day-time, they never gather into clouds, and hence they have no rain; but we know, that in climates where the days are exceſſive hot, the nights are remarkably cold; ſo that the vapours raiſed after ſun-ſet are readily condenſed into *dews.*

The quantity and quality of the aſcending *dew* in particular places depends on a variety of circumſtances, as the ſituation, the nature of the ſoil, the ſtate of the air, and the ſeaſon of the year. Chemiſts, in analyſing it, have found that it is a kind of chaos of various ſubſtances: ſome *dew* has afforded a liquor, by diſtillation, which ſtruck the colours of the rainbow on glaſs, ſo ſtrong, as not to be effected by friction, alkaline lixiviums, or aqua regia: it alſo burnt like ſpirits of wine. Other diſtilled *dew*, having been digeſted with a gentle heat for eight days, and then rectified ſix times over, till it was exceeding ſubtile, is ſaid to have broke three glaſſes ſucceſſively; though it ſtill remained perfectly inſipid. It is natural to conclude, from the different ſubſtances which are combined with *dew*, that it muſt be either ſalutary or injurious both to plants and animals.

It is not eaſy to aſcertain the quantity of *dew* that ariſes every night, or in the whole year, becauſe of the winds which diſperſe it, the rains which carry it down, and other inconveniencies: but it riſes in greater abundance after rain than after dry weather, and in warm countries than in cold. There are ſome places in which *dew* is obſerved only to aſcend, and not to fall; and others in which it is carried upwards in greater plenty than downwards, being diſperſed by the winds.

Dr. Hales made ſome experiments, in order to determine the quantity of *dew* that falls in the night: for this purpoſe, Aug. 15. 7. P.M. he filled two glazed earthen pans, three inches deep and twelve inches diameter in ſurface, with moiſt earth: and he obſerves, that the moiſter the earth, the more *dew* falls on it in a night; and that more than a double quantity of *dew* falls on a ſurface of water, than on an equal ſurface of moiſt earth. Theſe pans increaſed in weight by the night's *dew*, 180 grains; and decreaſed in weight by the evaporation of the day, 1 ounce, 282 grains: ſo that 540 grains more are evaporated from the earth every 24 hours in ſummer, than the *dew* that falls in the night; i. e. in 21 days near 26 ounces from a circular area of a foot diameter. If 180 grains of *dew*, falling in a night on ſuch an area, which is equal to 113 ſquare inches, be equally ſpread on the ſurface, its depth will be $\frac{1}{159}$th part of an inch, $= \frac{180}{113 \times 254}$. He likewiſe found the depth of *dew* in a winter's night to be the $\frac{1}{90}$th part of an inch. If therefore we allow 159 nights for the extent of the ſummer's *dew*, it will in that time ariſe to one inch depth; and reckoning the remaining 206 nights for the extent of the winter's *dew*, it will produce 2,28 inches depth; and the *dew* of the whole year will amount to 3,28 inches depth. But the quantity, which evaporated in a fair ſummer's day from the ſame ſurface, being 1 ounce and 282 grains, gives $\frac{1}{40}$th part of an inch depth for evaporation, which is four times as much as fell at night. Dr. Hales obſerves that the evaporation of a winter's day is nearly the ſame as in a ſummer's day; the earth's greater moiſture in winter anſwering to the ſun's greater heat in ſummer. Hales's Vegetable Statics, vol. i. p. 52, &c. ed. 4th. See EVAPORATION.

Signior Beccaria made ſeveral experiments to demonſtrate the exiſtence of the electricity that is produced by *dew.* He obſerves in general, that ſuch electricity took place in clear and dry weather, during which no ſtrong wind prevailed; and that it depends on the quantity of the *dew*, as the electricity of the rain depends on the quantity of rain. He has ſometimes found it to begin before ſunſet; at other times not till eleven o'clock at night. Artificial Electricity, Eng. ed. Appendix, Letter iii. p. 466.

The *dew* of plants is probably only the moiſture that continually exhales through the orifices of their veſſels, and not a vapour collected by their leaves: for this *dew* is expired by each plant, according to the peculiar ſtructure of its veſſels, and the ſituation of their orifices. Plants likewiſe that have been ſhut up in veſſels, and covered by glaſſes, have collected a greater quantity of *dew* in the night, than thoſe that ſtood in the open air; and farther, the drops are gathered in thoſe parts, where the orifices of the veſſels are manifeſtly open, and not all over the leaves, and not in the upper or lower leaves only, which would be the caſe if they aroſe from ambient vapour, but in all the leaves, without diſtinction. The oily or honey *dew*, which is ſometimes exhaled in ſummer by trees and herbs, and which has been found to ſettle on the oak, aſh, &c. is of this kind. Muſchenbroek Introd. ad Philoſ. Nat. vol. ii. p. 987. 995. ed. 1772. See *Perſpiration of* PLANTS.

Subſtances of a very different kind from the uſual and natural manner of the *dew*, have ſometimes fallen in that form. Our Philoſophical Tranſactions give an account, that in the year 1695, there fell in Ireland, in ſeveral parts of the provinces of Leinſter and Munſter, for a conſiderable part of the winter and ſpring, a fatty ſubſtance, reſembling butter inſtead of the common *dew*; it was of a clammy texture, and dark yellow colour; and was, from its great reſemblance, generally called *dew-butter* by the country people. It always fell in the night, and chiefly in the mooriſh low grounds, and was found hanging on the tops of the graſs, and on the thatch of the houſes of the poor people. It was ſeldom obſerved to fall twice in the ſame place, and uſually wherever it fell it lay a fortnight upon the ground before it changed colour, but after that it gradually dried up, and became black. The cattle fed in the fields where it lay, as well as in others, and received no hurt from it: it fell in pieces of the bigneſs of ones finger-end, but they were diſperſed ſcatteringly about, and it had an offenſive ſmell, like that of a church-yard. There were in the ſame places very ſtinking fogs during the winter, and ſome people ſuppoſed this no other than a ſediment or collection of the heavier matter of thoſe fogs. It would not keep very long, but it never bred worms. The country people willing to have ſome good of it, tried it on their children's ſore heads, and it always cured them. Phil. Tranſ. N° 220. p. 222.

Dews, *cryſtalline*, a term uſed by ſome modern writers, to expreſs certain *dews*, or ſteams; which, in their fall upon the earth, become, as they ſay, cryſtal.

Whatever the cryſtals are, which authors ſeem to ſuppoſe to have been generated in this manner, it is very certain, that they have in reality another origin; and theſe are only the accounts of ignorant and inconſiderate people. Phil. Tranſ. N° 129.

Dew, *May*. The dew that falls in the beginning of ſummer, particularly in this month, has great virtues attributed to it by many authors, when newly gathered and clean filtered. It is not of a watery appearance, or colourleſs, but is yellowiſh, and much reſembles the urine of a healthful perſon. It is uſed for whitening linen and wax. The common methods of putrifying water have no effect on *dew.* Several quantities of it have been placed in digeſtion with different degrees of heat, from that of dung to that of a ſand-furnace, but no putrefaction was brought on it, though continued two months together; the heat, in whatever degree, ſerving to purify it, not to hurt it. The ſummer-ſun, for all the hot months together, has no more effect on it. It only ſends out a green vegetable matter of the conferva kind, which floats on the ſurface, and adheres to the ſides of the veſſel, and the whole quantity of the liquor remains as pure as before.

Though theſe common methods of putrefaction do not take place in this fluid, a much more ſimple proceſs will. If a quantity of it be put into an open wooden veſſel, and ſet in a cool ſhady place, with a canvas ſtretched over it to keep out duſt and inſects, it will in three or four weeks putrify and ſtink, and depoſite a large quantity of a black and thick mud. The manner of the formation of this ſediment is this: a ſmall quantity of a foul matter firſt ſeparates itſelf from the liquor, and floats at the top in form of a ſkin or film; this ſoon after precipitates itſelf to the bottom, and another ſucceeds in its place at the top, which is ſoon after precipitated in the ſame manner. Thus the mud is a congeries of theſe films one on another. If a quantity of *dew* be put into a long and narrow glaſs-veſſel, theſe films, inſtead of ſinking as ſoon as formed, will combine one with another at the top, and form a thick ſcum, which may be taken off with a ſpoon, and is very different from the black mud, ſeparated to the bottom in the former experiment, being a white and thick ſlime: if a quantity of this be put into a drinking-glaſs, or other ſuch veſſel, and the water drained from it, it will ſomewhat ſhrink in twelve hours ſtanding, and will become ſo ſolid as to take the form of the glaſs, and may be ſhook out; it then reſembles a lump of boiled white ſtarch, but is ſomewhat more tranſparent.

We have, in the Philoſophical Tranſactions, very odd accounts of productions of the animal kingdom, in the ſame *dew*; which might puzzle any one not verſed in experiments of this kind with other fluids. In one of the veſſels of this *dew* were found millipedes, differing from the common kind in ſome particulars; theſe were the common water millipedes: and in another, a quantity of green matter, probably a conferva, with numerous eulæ of inſects inhabiting it; for in a few days there were produced from this a vaſt number of flies. Another quantity of the *dew*, ſet in an open glaſs, was found after ſome days filled with the eulæ of the common gnat, and the flies were hatched from theſe. Phil. Tranſ. N° 3.

It is eaſy for a bad philoſopher to infer from theſe accounts

counts the equivocal generation of theſe creatures in the water; but the inſight we have had into the wonders of nature in the inſect world are ſuch, that at preſent we know their generation to be in many ſpecies, particularly in the gnat and fly kinds, from the eggs of their parents depoſited in water, or any watery fluids, and that common ditch-water will at any time do what the *dew* does in this experiment.

There is a ſpirit drawn from *May dew*, which has wonderful virtues attributed to it. The method of collecting and preparing it is preſcribed by Hanneman, phyſician at Kiel. The *dew* is to be gathered in clean linen cloths, expoſed to the ſun in cloſe phials; then diſtilled, and the ſpirit thrown upon the caput mortuum; this is to be repeated till the earth unite with the ſpirit, and become liquid; which happens about the ſeventh or eighth cohobation, or diſtillation. By ſuch means you gain a very red odoriferous ſpirit. Stolterſoht, a phyſician of Lubec, thinks *May dew* ſhould be gathered in glaſs-plates, eſpecially in ſtill weather, and before ſun-riſe. And Etmuller is of the ſame opinion. It might likewiſe be collected with a glaſs funnel, expoſed to the air, having a crooked neck to bring the *dew* into a phial in a chamber. See Phil. Tranſ. N° 3. Hoffman, and others.

It is apparently from the preparation of this *dew*, that the brothers of the Roſycroſs took their denomination.

Dew, in *Chemiſtry*, a name formerly given to the phlegm, that roſe firſt in the diſtillation of ſeveral ſubſtances. Thus, the *dew* of vitriol, and the *dew* of honey, were watery liquors, which roſe firſt when theſe ſubſtances were diſtilled.

Dew, *orange*. See Orange.

Dew, *ſun*. See Sun-*dew*.

Dew, *earth of*. See Earth.

Dew-*born*, in the *Management of Cattle*, an exceſſive ſwelling of the body, proceeding from the greedineſs of a beaſt to feed, when put into rank paſture.

This ſwelling is often ſo great that the creature runs the utmoſt hazard of burſting; in which caſe it ſhould be made to ſtir much, and purge well; but the proper cure is to bleed the creature in the tail, then putting a nutmeg into an egg, to thruſt it down the creature's throat, ſhell and all; after which, by walking him up and down, he will ſoon recover.

Dew-*lap*, the fleſh that hangs down from the throat of oxen.

DEWBERRY-*buſh*. See Raspberry.

DEX, a name uſed by many Greek writers, for a worm or maggot, hatched of the egg of a beetle, and remarkable for its eroding wood. It is alſo called thrips and enxylon. The old Greeks uſed the pieces of wood eroded by it in various directions as ſeals. See Thrips.

DEXTANS, in *Antiquity*. See As.

DEXTER, in *Heraldry*, is applied to the *right* ſide, as *ſiniſter* is to the *left*.

Dexter-*baſe*, is the right ſide of the baſe.

Dexter-*chief*, the angle on the right hand of the chief.

Dexter-*point*. See Point.

The word is pure Latin, ſignifying right-handed; whence the word *dexterity* for addreſs and ability in the performing of any thing.

DEXTRARIUS, is underſtood of one who takes the right-hand of another; and the word *dextrarii* has been uſed for light horſes, or horſes for the great ſaddle; from the French *deſtrier*, a horſe for ſervice.

DEXTROCHERE, or **Destrochere**, in *Heraldry*, is applied to the right-arm, painted in a ſhield, ſometimes naked, ſometimes cloathed, or adorned with a bracelet, and ſometimes armed, or holding ſome moveable, or member uſed in the arms.

The word is formed from the Latin *dextrocherium*, which ſignifies a bracelet worn on the right wriſt, mentioned in the Acts of the Martyrdom of St. Agnes, and the Life of the emperor Maximus.

The *dextrochere* is ſometimes placed as the creſt.

DEY, the title of the ſovereign of Algiers, under the protection of the grand ſeignor. A prince under this title was appointed by the ſultan, at the requeſt of the Turkiſh ſoldiers, in the year 1710. The term *dey*, in the Turkiſh language, ſignifies *an uncle* by the mother's ſide; and the reaſon of the denomination is this: that the Turkiſh military conſider the grand ſeignior as their father, the republic as their mother, by which they are nouriſhed and maintained, and the *dey* as the brother of the republic, and conſequently the uncle of all who are under his dominion. Beſides the age, experience, and valour, which are neceſſary qualifications of a perſon to be elected, he muſt alſo be a native Turk, and have made the voyage to Mecca. He has no guards, nor conſiderable retinue; he preſides at the divan, and is moſt diſtinguiſhed by the reſpect and ſubmiſſion which are paid him.

DIA, Δια, the beginning of divers terms in medicine, chirurgery, pharmacy, &c. Where theſe three letters commence the name of a remedy, unguent, plaſter, cataplaſm, &c. they ſignify compoſition and mixture; as in *diapaſma*, *diachylon*, &c.

Dia is likewiſe the beginning of many terms in the other arts; as, *diameter*, *dialogue*, &c. on all which occaſions, *dia*, which is an inſeparable particle, or prepoſition, is borrowed from the Greek δια, *ex*, or *cum*; which begins the ſame words in the Greek.

Indeed we have words wherein *dia* is no prepoſition borrowed from a foreign language; though it is poſſible, the words themſelves may: as in *diamant*, *dial*, &c.

Dia, in *Mythology*, a goddeſs among the Romans, probably the ſame with Cybele.

DIABATHRA, in *Antiquity*, a kind of ſhoe worn by the Grecian women. Pitiſc. Lex. Ant. in voc.

DIABE, in *Zoology*, the name of a prickly ſea-fiſh of the orbis or globe-fiſh kind, and in all things reſembling the hiſtrix or porcupine-fiſh, except that its ſpines or prickles are all fixed into its ſkin by three inſertions.

DIABETES, Διαϐητης, in *Medicine*, a haſty and profuſe evacuation of the drink by the urinary paſſages; accompanied with an ardent thirſt, and leanneſs of the whole body.

The word is derived from the Greek διαϐαινειν, *to pervade*, or *paſs quick*.

The drink, thus diſcharged, is uſually a little altered from what it was when taken down, and turned chylous, and milky; but ſometimes not at all.

The *diabetes* ſeems owing to a too great laxity of the fibres of the arteries of the kidneys; or too great a quantity of ſharp ſalts in the blood, which diſſolve the maſs of blood, or diſunite the parts thereof; ſo that the ſeroſity is eaſily ſeparated from the thicker parts.

According to Quincy, the evident, and moſt common cauſe of the *diabetes* is the too great uſe of ſpirituous liquors, wherewith the ſerum becomes ſo impregnated, that it will not attract, and join with the cruor, or globules of the blood, but runs off through the kidneys ſweet, or inſipid.

It happens moſt frequently to thoſe who, without due exerciſe, indulge themſelves with drinking vinous liquors, and then quench their thirſt ariſing from thence by too great a quantity of ſuch as are cooling.

In this diſeaſe the urine is thin and pellucid, and has no ſediment, and is of a ſweetiſh taſte; though caſes have occurred, in which it has not had this taſte; the quantity voided is always very great; and if the patients endeavour to retain it, they are afflicted with ſwellings about the loins, and a ſenſation of weight and preſſure in the hypochondria. It is attended with thirſt, a hectic heat, a weak but quick pulſe, and a gradual waſting of the fleſh.

Perſons ſubject to the diabetes. It is a very rare diſeaſe, and ſeems to have been ſo in other ages as well as in later times. Galen expreſly ſays, that he never met with more than two perſons who had it; the people affected with it are uſually ſuch as have diſorders of the viſcera in general; and it is often but a ſymptomatic affection, ariſing from an improper treatment of perſons in fevers.

Prognoſtics in it. It is always a very terrible diſeaſe, but the longer ſtanding it is of, the more difficult it is to be cured; it is not, however, ſuddenly of fatal conſequence, but the people uſually live ſome time with it, though they in the end generally die tabid, after having been afflicted with it for a length of time.

Method of cure. The infarctions of the viſcera, which are the occaſion of this, are firſt to be regarded, and are to be attacked with ſuch aperients as are not ſtrongly diuretic; of this kind are decoctions of the roots of dandelion, ſuccory, polypody, and the like, and of the capillary herbs. Pills alſo are to be taken, made of ammoniacum, and the other reſolvent gums, with the bitter extracts; and interchangeably with theſe the digeſtive neutral ſalts, ſuch as tartarum vitriolatum, and the like. During this courſe, the febrile heat, which always attends this diſtemper, is to be taken off by the vegetable acids, ſuch as ſorrel and purſlain, and tincture of roſes made in the uſual way. Some recommend the teſtaceous powders, in general; and others are peculiarly laviſh in the praiſes of craw-fiſh, reduced to powder whole, after baking them in an oven. The great diſcharge of urine is to be leſſened, in the mean time, by gentle laxatives now and then given, ſuch as infuſions of ſenna, rhubarb, and the like; and finally, if the diſeaſe goes off, or remits conſiderably of its violence, the chalybeates, and other reſtoratives, are to be given, to reſtore the parts to their due ſtate. It is a common error to give aſtringents in a *diabetes*; for, if they take effect, they too violently conſtringe the viſcera, and bring on pains and ſwellings in the loins, and not rarely an aſcites and death itſelf in the end.

Perſons ſubject to this diſeaſe ſhould be extremely careful of themſelves in their regimen; they ſhould avoid all hot things, and beware of themſelves that they do not fall into violent paſſions; they ſhould feed principally on emulſive and gelatinous diet, to make up for the waſte of fleſh that always attends this diſeaſe. Junker's Conſp. Med. p. 540.

The bark, lime-water, Briſtol-water, and antimonials combined with the *tinctura thebaica*, have been recommended and uſed for the cure of this diſorder. Moderate exerciſe, and friction of the body, are uſeful.

Dr. Morgan thinks the tincture of cantharides may almoſt be abſolutely depended on for ſtopping the immediate flow of urine in the *diabetes*. The way he prepares his tincture is, by infuſing half an ounce of cantharides upon a pound of the elixir vitrioli; of which tincture, from fifteen to thirty or forty drops, may be given twice or thrice a day in Briſtol hot-well water. Mechan. Pract. of Phyſ. p. 114.

Dr. Jurin found the chalybeate waters acidulated with the oil of ſulphur, very ſucceſsful in this diſtemper. Med. Eſſ. Edinb. abr. vol. ii. p. 469.

Alum-poſſet drink is alſo ſaid to be an effectual cure for a *diabetes*. Ibid.

According to Dr. Mead, the *diabetes* is a diſeaſe of the liver, and not of the ſecretory veſſels of the kidneys, as has been generally thought. See Monit. & Pract. Medic. cap. ix. ſect. 2. and Mechanic Account of Poiſons, Eſſay 1. ed. 4.

The doctor recommends the following medicine as efficacious in this diſtemper: take four pints of milk, boil it a little, and turn it with three drachms of alum; four ounces of this ſhould be taken three times a day at leaſt.

Dr. Brockleſby attributes great efficacy, in a caſe where he was concerned, to alum whey, made by boiling from fifty to thirty grains of powdered roche alum, in a ſufficient quantity of new milk from the cow, to afford a full pint of whey; half of which was drunk by the patient every night and morning, for ſix weeks. Med. Obſ. vol. iii. p. 279.

Dr. Dobſon of Liverpool made ſeveral experiments, in order to aſcertain the nature of this diſeaſe; and he conſiders it as a ſpecies of imperfect digeſtion or aſſimilation, and to be more a diſeaſe of the ſyſtem in general, than either of the liver or kidneys. On this ſyſtem he accounts for the different taſte of the urine in different ſubjects, the emaciating effects of this diſeaſe, the acid ſweats, and the ſenſation of hunger that attend it. From hence he infers, that the obvious indications of cure are, to ſtrengthen the digeſtive powers, to promote a due ſanguification, and to eſtabliſh a perfect aſſimilation through the whole œconomy. Med. Obſ. vol. v. art. 27.

There is another kind of *diabetes*, wherein the perſon affected renders a great deal more by urine than he drinks, nay, ſometimes more than he both eats and drinks. Some phyſicians attribute this exceſſive quantity of liquor to the air he reſpires, which, they ſuppoſe, becomes converted into water; or, at leaſt, the water in the air reſpired is here abſorbed, and collected. But others, with more probability, attribute it to a colliquation of the blood, fat, and even the ſolid parts of the body.

DIABETES, in *Hydraulics*, is applied to a ſiphon, the two legs or branches whereof are incloſed in one another; as in the glaſs deſcribed by Hero, which runs itſelf quite empty, without being inverted, as ſoon as the water is arrived at the height of the upper branch of the ſiphon.

DIABOLUS *marinus*. See *Sea* DEVIL.

DIABOTANUM, from δια and βοτανη, *herb*, in *Pharmacy* and *Chirurgery*, denotes a plaſter of herbs, wherewith wens, &c. are reſolved and diſcuſſed. The *diabotanum* is ſovereign for the hydatides.

DIABROSIS, in *Medicine*, a ſolution of the continuity of a part, cauſed by ſharp, corroſive humours, gnawing and devouring the ſame.

The word is Greek, compounded of δια, *per, through*; and βρωσκειν, *to eat*.

DIACARTHAMI, in *Pharmacy*, an electary, compoſed of turbith, manna, ſcammony, hermodactyls, and other purgatives; with the addition of the pulp of the ſeed of the *carthamus*, which gives it the denomination.

Diacarthami chiefly purges *pituita*. It was formerly preſcribed in diſeaſes of the brain, and frequently mixed in medicines along with other purgatives, but is now wholly out of uſe.

DIACARYON, or DIANUCUM, in *Pharmacy*. See DIANUCUM.

The word is formed from δια, and καρυα, *walnut*.

Galen is ſaid to have prepared his *diacaryon* with the juice of walnuts, mixed with as much honey as ſufficed to render it an agreeable compoſition.

DIACAUSTIC *curve*, or *cauſtic* by REFRACTION, is a ſpecies of cauſtic curves, whoſe geneſis may be thus conceived.

Imagine an infinite number of rays, as BA, BM, BD, &c. (*Tab. Geom. fig.* 20.) iſſuing from the ſame luminous point, B, to be refracted from, or to the perpendicular MC, in the curve AMD; and ſo, as that CE, the ſines of the angles of incidence CME be always to CG, the ſines of the refracted angles CMG, in a given ratio: then the curve line, which touches all the refracted rays, is called the *diacauſtic*.

DIACELTATESSON, in *Chemiſtry*, a name given by Van Helmont, to a purging preparation, procured from the fixed flowers of antimony, in the following manner: take eighteen grains of the fixed diaphoretic flowers of antimony, ſixteen grains of roſin of ſcammony, and ſeven grains of cream of tartar, make all together into a powder. Or take nine grains of the fixed antimony, nine grains of roſin of ſcammony, and three grains of cream of tartar; make them into a fine powder. The former is the largeſt doſe for a grown perſon, and the latter the leaſt; they are to be taken without any acid; and if they operate too violently, the violence may be ſtopped by taking any thing acid: it is to be given in intermittents, ſo as to finiſh its operation immediately before the coming on of the fit: it is ſaid by the author always to cure quartans before the fourth doſe, and all intermittent and continued fevers.

Boerhaave obſerves, that he had often given it with good effects, but never with that great ſucceſs which the author aſcribes to it; who ſays, that it radically cures the gout and fevers, heals ulcers of the larynx, œſophagus, and bladder, and purges the body when in perfect health, but not otherwiſe. This candid writer obſerves, that Helmont ſeems always to have carried the virtues of his medicines by a ſubtilty of reaſoning, beyond what will be found warrantable of them from experience. Boerh. Chem. part ii. p. 338.

DIACENTROS, from δια, *through*, and κεντρον, *center*, is uſed by Kepler to ſignify the ſhorteſt diameter of the elliptical orbit of any planet; probably becauſe it paſſed through the center, and not through the focus, which diſtinguiſhes it from the longer diameter.

DIACHALASIS, from διαχαλαω, *to be relaxed*, in the *Medicinal Works of the Ancients*, a term uſed to expreſs a ſolution of continuity in the bones of the cranium at the ſutures; that is, when the bones recede from their mutual indentation, an accident that frequently happens from large wounds in the head.

DIACHALCITIS, in *Chirurgery* and *Pharmacy*, a plaſter which formerly uſed to be applied after the amputation of a cancer, and on many other occaſions.

The *emplaſtrum diachalcitidis* is compoſed of oil, axungia, and chalcitis; from the laſt of which drugs it derives its name.

DIACHRISTA, from δια and χριω, *I anoint*, a name given by the ancient writers in medicine to certain compoſitions, whoſe uſe was to be applied to the fauces, uvula, palate, and tongue, for the abſterſion of phlegm.

DIACHYLON, in *Pharmacy*, a name given to divers plaſters, on account of the mucilages mixed therein, which are viſcid juices, called by the Greeks χυλοι, drawn from certain plants. See MUCILAGE.

DIACHYLON, *white*, or *ſimple*, ſhould be compounded of common oil, litharge of gold, and mucilages drawn from marſhmallow roots, fenugreek, and aniſe-ſeeds. It is proper to ſoften, digeſt, ripen, and reſolve.

The *diachylon*, called *ireatum*, has for its baſis the common white *diachylon*, with a pound of which, an ounce of powder of iris is mixed. This plaſter digeſts, incides, and ripens with more force than the ſimple *diachylon*.

There is alſo the *great diachylon*, *diachylon magnum*, compoſed of litharge of gold, oils of orris, camomile, and dill, turpentine, reſin of the pine, yellow wax, and mucilages of line and fenugreek, with new figs, raiſins of Damaſcus, ichthyocolla, juices of orris, ſquills, and hyſſop.

This *diachylon* ſoftens ſchirrhuſes, and reſolves and diſſipates tumours. It is called *the great*, not only on account of its extraordinary virtues, but alſo becauſe compounded of a greater number of ingredients than the reſt.

The DIACHYLON *gummatum*, or *diachylon cum gummi*, is the *great diachylon*, with the addition of gum ammoniac, galbanum, and ſagapenum, diſſolved with wine, and boiled to the conſiſtence of honey. This plaſter is the moſt powerful of all for digeſting, ripening, and reſolving.

DIACODIUM, in *Pharmacy*, a ſyrup prepared from poppy-heads; called alſo the *ſyrupus de meconio*.

The word is formed from the Greek δια, *per*, and κωδεια, *poppy-heads*.

The ancients had two kinds: *ſimple*, and *compound*.

DIACODIUM, *the ſimple*, was a kind of opiate, made of the juice expreſſed from the heads of white poppies, and boiled up with ſugar. See OPIATE.

It was preſcribed to ſoften ſharp, ſerous humours, to appeaſe coughs, and to provoke ſleep. This preparation was of great uſe among the ancients; but it is now laid aſide, ſince it has been found, that the ſyrup made of an infuſion of white poppy-heads, which is what we now call *diacodium*, produces the ſame effect.

Diacodium, *compound*, was made of the *ſimple*, with the addition of the troches of hamec, hypocyſtis, myrrh, ſaffron, and balauſtines. It was uſed to ſtop and ſoften catarrhs, hæmorrhoids, and fluxes of the belly.

DIACODUS, in *Natural Hiſtory*, a name given by ſome to the *diadochos*, a kind of beryl or ſapphire, of which many fabulous things are aſſerted.

DIACOLOCYNTHUS, in *Pharmacy*, δια κολοκυνθιδων, from κολοκυνθις, *colocynth*; a remedy, of which colocynth is a principal ingredient. See Colocynth.

DIACONICON, *Sacriſty*, a place adjoining to the ancient churches, where the ſacred veſtments, with the veſſels, relics, and other ornaments of the altar, were preſerved, anſwering to our veſtry.

The word is Greek, formed from διακονεω, *I ſerve*, *I miniſter*, becauſe here was kept every thing belonging to divine ſervice. It was alſo called ἀσπαςικον, and in Latin *ſalutatorium*; becauſe it was here that the biſhop received and ſaluted ſtrangers. Sometimes, too, it was called μητατωριον, or μιτατωριον, *menſa*, on account of the tables kept therein, for diſpoſing the ſacred ornaments on; or rather from μητατον, a ſort of inn, or houſe, for the lodging of ſoldiers.

DIACONISSA, and Diaconate. See Deacon, and Deaconry.

DIACOPE, Διακοπη, from δια and κοπτω, *I cut off*, in *Grammar*, the ſame with what is otherwiſe called tmesis.

Diacope, in *Surgery*, denotes a deep cut or wound; or the act of cutting off any part.

DIACORALLIUM, in *Medicine*, a preparation of coral in the London diſpenſatory.

DIACOUSTICS, or Diaphonics, the conſideration of the properties of ſound refracted in paſſing through different mediums; that is, out of a denſer into a more ſubtile, or out of a more ſubtile into a denſer medium. See Sound.

The word is formed from the Greek δια, *per*, *through*, which intimates a paſſage; and ακουω, *I hear*, q. d. the conſideration of the paſſage of the ſounds we hear.

DIACRII, in *Antiquity*, was the name of a party or faction at Athens.

That city, we read, was divided into two parties: the one favourers of an oligarchy, who would only have a few perſons employed in the government. The other conſiſted of ſuch as were for a democratical, or popular government, wherein the whole people ſhould have a ſhare. The firſt were called *diacrii*, and the latter *pediaci*; the latter inhabiting the lower, and the former the ακρον, or upper quarter, or part of the city.

The laws of Solon imported, that Piſiſtratus ſhould be chief of the *diacrii*; though the ſcholiaſt, on Ariſtophanes's comedy, The Waſps, affirms, that Pandion diſtributed the quarter of the *diacrii* among his ſons, and put Lycus at their head.

DIACTORE, in *Mythology*, a ſurname of Mercury; derived from διαγω, *I attend*, becauſe Mercury was the meſſenger of the gods.

DIACYDONITES, in *Pharmacy*, is applied to things and remedies, wherein quinces are a principal ingredient.

The word comes from δια, and κυδωνιον, *quince*.

Confectio diacydonites, or *diacydonium*, is marmalade, a confection of quinces, or wherein quinces have a chief ſhare.

DIADELPHIA, in *Botany*, the ſeventeenth claſs of plants with hermaphrodite flowers, whoſe ſtamina, by the conjunction of their filaments, are formed into two bodies, the one ſtanding above the piſtil, and the other ſurrounding it. The lower part of this laſt is membranaceous, of a cylindric figure, and ſplit lengthwiſe on its oppoſite ſide; but the upper half terminates in nine ſubulate, or awl-ſhaped parts, of which the intermediate are alternately longer and ſhorter by pairs. The upper filament is awl-ſhaped, and like a briſtle, and covers the ſlit of the cylindraceous filament incumbent on it. The antheræ are ten; the piſtil is ſingle; the germen oblong and roundiſh; the ſtyle ſubulate and filiform; the ſtigma downy, of the length of the ſtyle, and placed immediately under the antheræ; the calyx is a monophyllous, campanulate, and withering perianthium; the papilionaceous corolla unequal, and its petals have diſtinct names, as *vexillum*, the ſtandard, covering the reſt; *alæ*, the wings, which are two equal petals, one at each ſide of the flower, under the *vexillum*; and *carina*, the keel, which is the loweſt petal, often bipartite, placed under the *vexillum* and between the *alæ*; the pericarpium is an oblong, compreſſed, bivalve legumen, with a longitudinal future both above and below; the ſeeds are few, roundiſh, ſmooth, fleſhy, and pendulous, in a ſmall, ſhort, proper receptacle, thinner towards the baſe, and obtuſe at the diſk that faſtens them.

The word is formed of the Greek δις, *twice*, and αδελφος, *brother*. Among the plants of this claſs are the fumitory, milk-wort, broom, &c. See *Tab. of Botany*, *Claſs* 17.

This is a perfect natural claſs of plants, and is the moſt remarkable of all others in the ſtructure of the flower. The common ſituation of the flower is an obliquely pendulous direction, or in an acute angle from a perpendicular line. The former ſyſtematiſts in botany, as Linnæus obſerves, took great notice of the pod in this claſs of plants, and thought it the principal ſubject of diſtinction; but he very judiciouſly makes it but of very little conſequence, and will not allow it ſufficient to diſtinguiſh the genera one from another: but the cup, which had always before his time been diſregarded, he eſteems a very eſſential part of the plant, and ſufficiently certain to erect the different genera upon in many caſes. Some of the old writers had been uſed to take the leaves into their marks, by which to diſtinguiſh genera of this claſs; but Linnæus wholly excludes this part of a plant from this office. Magnol has obſerved, that the carina of the *diadelphia*, or papilionaceous flowers, is dipetalous, and is compoſed of two diſtinct oblong petals; the lower edges of which join ſo nicely and cloſely together, that they ſeem only one; and are not joined in their ſubſtance, but only in their ſituation. Linnæus has ſtrictly examined this, and finds that the author is ſo far right, that this is really the caſe in many of the papilionaceous flowers, but not in all: ſome not only appearing to have, but really and certainly having a carina compoſed of only one petal.

The conſideration of the ſtigma is of more conſequence in this than in moſt other flowers, and even more than that of any other part of the fructification in this. The ſeeds of all the plants of this claſs are eatable, excepting in a very few particulars; their leaves alſo are a grateful food to cattle. Lin. Gen. Plant. p. 377.

Of this claſs there are four orders, viz. the *pentandria*, comprehending one genus; the *hexandria*, two; the *octandria*, two; and the *decandria*, forty-nine.

DIADEM, Διαδημα, in *Antiquity*, a head-band, or fillet, worn by kings as a badge of their royalty; while the crown was left to the gods.

The word comes from the Latin *diadema*, of the Greek διαδημα, *a little band encompaſſing the head*, of the verb διαδεω, *cingo*, *I gird*.

The *diadem* was a ſort of ribbon, or fillet, woven of ſilk, thread, or wool, more or leſs broad. It was tied round the temples, and forehead; the two ends being knotted behind, and let fall on the neck.

It was uſually white, and quite plain, though ſometimes embroidered with gold, and ſet with pearls, and precious ſtones. In later times it likewiſe came to be twiſted round crowns, laurels, &c. and even appears to have been worn on divers parts of the body: thus Phavorinus obſerves, that Pompey was ſuſpected of aſpiring to the royalty, becauſe of his wearing a white garter, which was no other than a ligature for an ulcer he had on his leg, but which the people miſtook for a *diadem*.

Pliny, lib. vii. cap. 5. obſerves, that Bacchus was the firſt inventor of the *diadem*. Athenæus aſſures us, that the topers, and good fellows, firſt made uſe of it, to preſerve themſelves from the fumes of wine, by tying it tight round their heads; and that it long afterwards came to be a royal ornament.

The *diadem* remained a long time the peculiar badge of kings; at length it was aſſumed by the Roman emperors, as the mark of imperial dignity.

Authors are not agreed about the time when the Roman emperors firſt aſſumed the *diadem*. Some refer it to Caligula, others to Aurelian, and others to Conſtantine the Great. The younger Victor ſays, poſitively, that Aurelian took the *diadem*, which no emperor had dared to do before him. For though it ſhould ſeem from the ſame writer, that Caligula had done the like, yet Suetonius aſſures us, he had it only in view, and that he never executed it. Heliogabalus, indeed, took a *diadem*; but it was only in the palace he wore it, and never appeared with it in public. Jornandes even goes as low as Diocleſian for the introduction of the *diadem*; but it is certain, there is a medal of Aurelian, with a crown like one of our ducal crowns, which is ſuſtained by a border of pearls, that bears a very great affinity to a *diadem*. And the authors, who have explained that medal, are all agreed that it is one. Mr. Spanheim alſo allows Aurelian to have taken it: his ſucceſſors imitated him therein; and yet the ornament did not become common till the time of Conſtantine. After him the empreſſes were allowed to wear it; accordingly we find them repreſente therewith on medals; though till that time we have no inſtance either of crown, or *diadem*, on a woman's head, in all the Roman empire.

An author of the fifth century, quoted by Bollandus, pretends that Conſtantine firſt wore the *diadem*, and that he only took it to bind his hair, and keep it in order. But this is not very probable; and it is certain, that at leaſt ſome emperors had worn it before him, as Aurelian, and Carinus.

Euſebius gives it to Conſtantius Chlorus, when only Cæſar; which is confirmed by one of his medals, wherein he is repreſented with a *diadem*, adorned with rays; though even after Conſtantine, when the *diadem* was become the uſual ornament of the Auguſti, it was not always given to the Cæſars. Indeed, we ſee it on ſome of the medals of Julian, while only Cæſar; though it is pretty certain, he did not wear it till he became Auguſtus. Du-Cange will not aſſert, that Conſtantine firſt took the *diadem*; but only, that he firſt made it into a kind of caſk, or cloſe crown, as is ſeen in ſome of his medals, and thoſe of his ſucceſſors.

DIADEM, in *Heraldry*, is applied to certain circles, or rims, ſerving to bind or incloſe the crowns of ſovereign princes; and to bear the globe, and croſs, or the fleurs-de-lys, for their creſt.

The crowns of ſovereigns differ in this, that ſome are bound with a greater, and ſome with a leſs, number of *diadems*.

Prelates likewiſe appear to have anciently worn a ſort of *diadem*: thus Baronius writes, that St. James the apoſtle wore a gold plate on his forehead, as a mark of his epiſcopal dignity.

In blazoning, the bandage about the heads of Moors, on ſhields, is ſometimes alſo called *diadem*.

DIADOCHUS, in *Natural Hiſtory*, the name given by the ancients to a gem, approaching to the nature of the beryl, or aqua-marina, probably a pale ſapphire; for they had no peculiar generical name for that gem, but called the beautiful deep-coloured ones only ſky blue beryls, berylli aeroides. The writers of the middle age have given ſtrange accounts of the magical virtues of this ſtone, ſuch as its calling up ſpirits, and many other the like things, on being thrown into water: they ſaid, however, that if it happened by any accident to touch a dead body it loſt all its virtue.

DIADROME, from διa and δρομος, *curſus*, is ſometimes uſed for the vibration, motion, or ſwing of a pendulum.

DIÆRESIS, in *Surgery*, the operation of dividing and ſeparating parts, whoſe union and continuity were an obſtacle to the cure; or which were joined and conglutinated contrary to the order of nature.

The word, in its original Greek, διαρεσις, ſignifies *diviſion*.

There are five ways of performing the *diæreſis*, viz. by cutting, pricking, tearing, drawing, and burning.

DIÆRESIS is alſo uſed, in *Medicine*, for the deſtroying or conſuming of the veſſels, or canals, of an animal body; when, from ſome cutting, or corroding humour, certain paſſages are made, which naturally ought not to have been; or certain natural paſſages are dilated beyond their ordinary dimenſions; ſo that the juices, which ſhould have been contained therein, extravaſate, or run out.

DIÆRESIS, in *Grammar*, is a figure whereby a diphthong is divided into two ſyllables: as *aulæ* into *aulai*, *pictæ* into *pictai*, *aquæ* into *aquai*.

DIÆRESIS is alſo uſed, in a general ſenſe, for any diviſion of one ſyllable into two: as in that verſe of Tibullus, *Stamina non ulli diſſolüenda deo*, for *diſſolvenda*.

This is uſually noted by two points placed over a letter, to ſhew that it is to be ſounded by itſelf, and not joined with any other ſo as to make it a diphthong: thus *aëra*, by the points over the *e*, is diſtinguiſhed from *æra*.

It is alſo a kind of metaplaſm, or addition to a word, by dividing one ſyllable into two: as *aulae*, by a *diæreſis*, is a word of three ſyllables, inſtead of *aulæ*. See TMESIS.

DIÆTETÆ, Διαιτηται, from διαιταω, *I arbitrate*, among the Athenians, were of two ſorts, the cleroti and dialacterii. The former were a kind of public arbitrators, choſen by lot, to determine all cauſes exceeding ten drachms within their own tribe. Their office was annual, at the expiration of which they were obliged to give up their accounts; and if it was proved, that they refuſed to give judgment, or to have been corrupted, they were puniſhed with infamy. Their ſentence, however, was not final, an appeal lying from it to the ſuperior courts.

The *dialacterii*, on the contrary, were private arbitrators, from whoſe ſentence there lay no appeal; and accordingly they always took an oath to adminiſter juſtice without partiality, which the *cleroti* did not. Potter's Archæol. Græc. lib. i. cap. 22. tom. i. p. 122, ſeq.

DIAGLAUCIUM, a name given by the old writers on medicine to a ſort of collyrium, in which the juice of the glaucium, or yellow poppy, was a principal ingredient. It was uſed for beginning lippitudes and ophthalmies.

DIAGLYPHICE, from διαγλυφω, *I engrave*, the art of ENGRAVING, cutting, or otherwiſe working, hollow or concave figures, in metals; ſuch as ſeals, intaglios, matrices, or coins for medals, &c. See SCULPTURE.

DIAGNOSTIC, in *Medicine*, a term applied to thoſe ſigns, or ſymptoms, which indicate, or diſcover, the preſent ſtate of a diſeaſe, its nature, and cauſe.

The word is compounded of the Greek δια, *per*, *through*, or *by*; and γινωσκω, *I know*.

The phyſicians have *diagnoſtic*, as well as *prognoſtic* ſigns; the firſt, with regard to the preſent ſtate of the diſeaſe, and the patient; and the ſecond to the future.

DIAGONAL, in *Geometry*, a right line drawn acroſs a parallelogram, or other quadrilateral figure, from the vertex of one angle to that of another.

Such is the line PN (*Tab. Geometry*, *fig.* 21.) drawn from the angle P, to N.

Some authors call it *diameter*, and others the *diametral* of the figure.

It is demonſtrated, 1. That every *diagonal* divides a parallelogram into two equal parts. 2. Two *diagonals*, drawn in any parallelogram, biſect each other. 3. The *diagonal* of a ſquare is incommenſurable with one of its ſides.

Add, 4. A very noble theorem in elementary geometry, firſt demonſtrated by Mr. Lagny, in the Memoires de l'Academie Royale de Sciences, an. 1706, is, that the ſum of the ſquares of the two *diagonals* of every parallelogram is equal to the ſum of the ſquares of the four ſides.

It is evident, at firſt ſight, that the famed 47th propoſition of Euclid, ſo richly worth the hecatomb it coſt the author, is only a particular caſe of this propoſition: for if the parallelogram be rectangled, it follows of courſe, that the two *diagonals* are equal; and, of conſequence, that the ſquare of a *diagonal*, or, which is the ſame thing, the ſquare of the hypothenuſe of a right angle, is equal to the ſquares of the two ſides. If a parallelogram be oblique-angled, and, of conſequence, the two *diagonals* unequal, as is the more uſual caſe, the propoſition becomes of more extenſive uſe.

The demonſtration, in oblique-angled parallelograms, is thus: ſuppoſe the oblique-angled parallelogram ABCD (*Tab. Geometry*, *fig.* 22.) whereof BD is the greater *diagonal*, and AC the leſſer: from the point A, of the obtuſe angle DAB, let fall a perpendicular AE, to the ſide CD; and from the point B another perpendicular BF to the ſide DC. Then are the triangles ADE, BCF equal, and ſimilar, as AD is equal to BC, and the angle ADE, BCF, as well as AED, BFC, are alſo equal; conſequently, DE is equal to CF. Now, by Euclid, prop. 12. lib. ii. in the obtuſe-angled triangle BDC, the ſquare of the ſide BD is equal to the ſum of the ſquares of BC, and CD, together with double the rectangle of CF by CD; and by the 13th, lib. ii. in the triangle DAC, the ſquare of the ſide AC is equal to the ſum of the ſquares of AD, and CD, abating double the rectangle of the ſame CD, by DE, equal to CF. Conſequently, the former exceſs preciſely compenſating this defect, the ſum of the ſquares of the two *diagonals* is equal to the ſum of the ſquares of the four ſides. Q. E. D.

Hence, in every rhombus, or lozenge, knowing one ſide, and a *diagonal*; the other *diagonal* will likewiſe be known: for, as the four ſides are equal, ſubtracting the ſquare of the given *diagonal* from quadruple, the ſquare of the given ſide, the remainder is the ſquare of the *diagonal* required.

The propoſition is likewiſe of great uſe in the theory of compound motions; for, in an oblique-angled parallelogram, the greater *diagonal* being the ſubtenſe of an obtuſe, and the leſſer of an acute angle, which is the complement of the former, the greater will be the greater, and the leſs the leſs, as the obtuſe angle is the greater; ſo that if the obtuſe angle be conceived to increaſe till it be infinitely great, with regard to the acute one; or, which amounts to the ſame thing, if the two contiguous ſides of the parallelogram be extended directly, end to end, in a right line, the great *diagonal* becomes the ſum of the two ſides, and the leſſer one, nothing. Now, two contiguous ſides of a parallelogram being known, together with the angle they include, it is eaſy to find the ſubtenſe of that angle, i. e. one of the *diagonals* of the parallelogram, in numbers; which done, Mr. de Lagny's propoſition gives the other. Which ſecond *diagonal*, thus found, is the line that would be deſcribed by a body impelled at the ſame time by two forces, which ſhould have the ſame ratio to each other as the contiguous ſides have, and act in thoſe two directions; which *diagonal* the body would deſcribe in the ſame time, as it would have deſcribed either of the contiguous ſides in, if only impelled by the force correſponding thereto. This is one of the great uſes of the propoſition; for the ratio of two forces, and the angle they make, being given, it is frequently neceſſary to determine, in numbers, the line a body, impelled by two forces, would deſcribe in a certain time. See COMPOSITION *of Motion*.

All the ſides of a rectilinear figure, as AB, BC, CD, DE, EA (*fig.* 23.) and the angles O, and Y, being given, to find the *diagonals*.

In the triangle ABE, the ſides AB, and AE, being given, and the angle O, the angle A is eaſily found by trigonometry; and, from this, the *diagonal* BE. And, after the like manner, the triangle BCD is reſolved, and the *diagonal* BD found.

Since ICHNOGRAPHIES, or plans, are beſt taken, by having all the ſides and *diagonals*, the uſe of this problem, in planimetry, is of ſome importance; eſpecially to ſuch as are willing to have their work accurate, though at the expence of calculation.

DIAGONAL *ſcale*. See PLOTTING-*ſcale*, and SCALE.

DIAGRAM, from διαγραφω, *I deſcribe*, in *Geometry*, &c. a ſcheme for the explanation, or demonſtration, of any figure, or the properties thereto belonging.

DIAGRAM, or DIAGRAMMA, in the *Ancient Muſic*, was what we call the *ſcale*, or GAMMUT, in the modern.

The extent of the *diagramma*, which they alſo called *ſyſtema perfectum*, was a diſdiapaſon, or two octaves in the ratio 1 : 4. In that ſpace they had eighteen chords, though theſe had not all different ſounds.

To explain it, they repreſent to us eighteen chords, or ſtrings, of an inſtrument, as the lyre, ſuppoſed to be tuned according to the proportions in any of the genera; viz. DIATONIC, ENHARMONIC, or CHROMATIC.

As the lyre was improved, and more chords added to it, ſo was the *diagramma*: by ſuch means it came from 4 chords to 7, then 8, then 10, then 14, and at laſt 18. See Malcolm's Treatiſe on Muſic, p. 519.

Guido Aretine improved this ſcale, or *diagram*, very greatly: finding it of too ſmall extent, he added five more chords, or notes, to it; laid them all down on a ſtaff of five lines; and, inſtead of the long Greek names, named all his notes by Gregory's ſeven letters. See NOTE.

The firſt, or loweſt, note of his ſcale, he marked Γ, and called *gamma*; whence the whole ſcale came to be denominated.

We ſhall here inſert the whole *diagram*, or Greek ſcale, with the correſponding letters of our modern notation.

Hyperbolæon Tetrachord	Nete Hyperbolæon	a a		
	Paranete Hyperbolæon	g		
	Trite Hyperbolæon	f		
	Nete Diezeugmenon	e		
Diezeugmenon Tetrachord	Paranete Diezeugmenon	d	Nete Synemmenon	Synemmenon Tetrachord
	Trite Diezeugmenon	c	Paranete Synemmenon	
	Paramese	b ♮		
Meſon Tetrachord		b♭	Trite Synemmenon	
	Meſe	a	Meſe	
	Lichanos Meſon	G		
	Parypate Meſon	F		
	Hypate Meſon	E		
Hypaton Tetrachord	Lichanos Hypaton	D		
	Parypate Hypaton	C		
	Hypate Hypaton	B♮		
	Proſlambanomenos	A		

It is to be obſerved, that this *diagram* only repreſents the diatonic genus; and therefore, after the names *lychanos hypaton*, and *lychanos meſon*, ſome add *diatonos*, to diſtinguiſh them from the lichanoi of the chromatic or harmonic genera. Wallis, Append. ad Ptolem. Harm. p. 157. See LICHANUS.

The tetrachords in this *diagram* are conjunct or disjunct. The conjunct have a common note, chord, or ſound. Thus the hypate meſon, which is the laſt of the hypaton tetrachord, is the firſt of the meſon. The meſe alſo is the laſt chord of the meſon, and the firſt of the ſynemmenon tetrachord. So likewiſe the nete diezeugmenon is the laſt chord of the diezeugmenon, and the firſt of the hyperbolæon tetrachord. The disjunct tetrachords are thoſe which are ſeparated by a tone. Thus the meſon and diezeugmenon tetrachords are ſeparated by the tone between the meſe and parameſe: ſo likewiſe the ſynemmenon and hyperbolæan tetrachords are ſeparated by the tone between the nete ſynemmenon, and the nete diezeugmenon.

Some of the names of the chords in this *diagram* being placed nearer to each other than the reſt, ſignify that there is only a ſemi-tone between them. Thus, between the hypate hypaton and the parypate hypaton, or between the meſe and the trite ſynemmenon, or between the parameſe and trite diezeugmenon, the interval is no more than a ſemi-tone.

It has been obſerved by Dr. Pepuſch, that the ancients conſidered a deſcending as well as an aſcending ſcale; the former proceeding from acute to grave preciſely by the ſame intervals, as the latter did from grave to acute, and the ſame name ſerved for both. But the proſlambanomenos, and the reſt of the names, correſpond to different notes of our ſcale. An example of one octave will explain the learned author's meaning.

Aſcending	Deſcending
A — Proſlambanomenos	g
B — Hypate hypaton	f
C — Parypate hypaton	e
D — Lichanos hypaton	d
E — Hypate meſon	c
F — Parypate meſon	b
G — Lichanos meſon	a
a — Meſe	G

The intervals here, both aſcending and deſcending, are the ſame, and in the ſame order, viz. tone, ſemi-tone, tone, tone, ſemi-tone, tone, tone. So that the one ſcale is preciſely the reverſe of the other. This diſtinction of an aſcending and a deſcending ſcale, is ſaid to be conducive to the variety and perfection of melody, though little underſtood by modern compoſers. Phil. Tranſ. N° 481. p. 369.

The eighteen names of the ſcale of the ancients do not ſeem to ſignify ſo many diſtinct ſounds, eſpecially in the diatonic genus, where the paranete ſynemmenon and the trite diezeugmenon, as alſo the nete ſynemmenon, and the paranete diezeugmenon, are reputed to coincide. Nor do the eighteen chords ſeem perfectly diſtinct in any of the other genera, except in the enharmonic. Wallis's Append. ad Ptolem. Harm. p. 158. See ENHARMONIC and SCALE.

DIAGRYDIUM, in *Pharmacy*, is ſcammony prepared, or corrected, for medicinal uſe.

The preparation is ordinarily performed by baking the SCAMMONY in a quince. Others make it to receive the fumes of lighted ſulphur, whence it is called, *ſulphurated*, or *diagrydium ſulphuratum*. Some incorporate it with a quantity of ſpirit of vitriol roſatum, ſufficient to make a ſort of liquid paſte, which is afterwards ſet to dry in the ſun, or by a gentle fire. And this preparation they call *diagrydium roſatum*. The end of all theſe preparations is to correct the ſcammony; but the generality of authors now are of opinion, it has nothing that needs correction, and that it may be uſed in its natural ſtate.

DIAH, or DIAT, a name given by the Arabs to the puniſhment of retaliation. By the Mahometan law, a brother, or the next relation of a murdered perſon, ought to take part againſt the murderer, and demand his blood in reparation for that which he has ſhed. Before the time of Mahomet, the Arabs had a cuſtom of putting a freeman of their priſoners to death, in lieu of every ſlave they loſt in battle, and a man for every woman that was killed. But Mahomet regulated the laws of repriſal; directing in the Alcoran, by the *diat*, that a freeman ſhould be required for a freeman, and a ſlave for a ſlave. The Turks, probably in conſequence of this law, formerly maſſacred almoſt all their priſoners of war, but they now content themſelves with enſlaving and ſelling them. Encyclop.

DIAHEXAPLA, from δια and εξαπλοος, *ſix-fold*, among *Farriers*, a drink made for horſes, denominated from the ſix ingredients it conſiſts of; viz. birth-wort, gentian-roots, juniper-berries, bay-berries, myrrh, and ivory-ſhavings. It is eſteemed a good ſtomachic, and cures bites of venomous beaſts, colds, conſumptions, &c.

DIAION, in the *Ancient Writers of Medicine*, the name of a compoſition made into the form of troches, of which violet flowers were one of the principal ingredients. The compoſition is deſcribed at large by Myrepſus.

DIAL, or *Sun*-DIAL, an inſtrument ſerving to meaſure time, by means of the ſhadow of the ſun.

The word is formed from *dies*, *day*, becauſe indicating the hour of the day. See HOUR.

The ancients alſo call it *ſciathericum*, from its doing it by the ſhadow.

DIAL is more accurately defined, a draught, or deſcription, of certain lines on a plane, or ſurface, of a body given, ſo contrived, as that the ſhadow of a ſtyle, or ray, of the ſun, paſſed through a hole therein, ſhall touch certain points at certain hours.

The antiquity of *dials* is beyond doubt. Some attribute their invention to Anaximenes Mileſius; and others to Thales. Vitruvius mentions one made by the ancient Chaldee hiſtorian Beroſus, on a reclining plane, almoſt parallel to the equinoctial. Ariſtarchus Samius invented the hemiſpherical *dial*. And there were at the ſame time ſome ſpherical ones, with a needle for a gnomon. The diſcus of Ariſtarchus was an horizontal dial, with its limb raiſed up all around, to prevent the ſhadow ſtretching too far.

But it was late before the Romans became acquainted with *dials*. The firſt ſun *dial* at Rome was ſet up by Papyrius Curſor, about the year of the city 460, before which time, ſays Pliny, there is no mention of any account of time but by the ſun's riſing and ſetting: the firſt *dial* was ſet up at or near the temple of Quirinus, but it went ill: about thirty years after, M. Valerius Meſſala being conſul, brought out of Sicily another *dial*, which he ſet up on a pillar near the roſtrum; but for want of its being made for that latitude, it could not go true. They made uſe of it ninety-nine years; till Martius Philippus ſet up another more exact.

But there ſeem to have been dials among the Jews much earlier than any of theſe. Witneſs the *dial* of Ahaz, who began to reign four hundred years before Alexander, and within twelve years of the building of Rome; mentioned by Iſaiah, chap. xxxviii. ver. 8.

The diverſity of *ſun-dials* ariſes from the different ſituation of the planes, and the different figure of the ſurfaces whereon they are deſcribed; whence they become denominated *equinoctial*, *horizontal*, *vertical*, *polar*, *direct*, *erect*, *declining*, *inclining*, *reclining*, *cylindrical*, &c. For the general principles of their conſtruction, ſee DIALLING.

Dials are ſometimes diſtinguiſhed into *primary*, and *ſecondary*.

DIALS, *primary*, are thoſe either drawn on the plane of the horizon, called *horizontal dials*; or, perpendicular thereto, on the planes either of the meridian, or prime vertical, called *vertical dials*: to which number are alſo uſually added, thoſe drawn on the polar and equinoctial planes, though neither horizontal, nor vertical.

DIAL, *equinoctial*, is that deſcribed on an equinoctial plane, or a plane repreſenting that of the equinoctial.

A plane oblique to the horizon, either hangs over towards it, and makes an acute angle with the plane of the horizon, or it falls off backwards from it, and makes an obtuſe angle therewith. This latter is called a *reclining plane*; which, if it recline back at an angle equal to the complement of the latitude of the place, then it lies in the plane of the equinoctial; and a *dial* drawn thereon, is denominated an *equinoctial dial*.

Equinoctial dials are uſually diſtinguiſhed into *upper*, which look towards the zenith; and *lower*, which reſpect the nadir.

Now, as the ſun only illumines the upper ſurface of an equinoctial plane, while he is in our hemiſphere, or on the northern ſide of the equator, an *upper equinoctial dial* will only ſhew the hour, during the ſpring and ſummer ſeaſon.

And again, as the ſun only illumines the lower ſurface of an equinoctial plane, while he is in the ſouthern hemiſphere, or on the other ſide of the equator; a *lower equinoctial dial* will only ſhew the hour in autumn and winter.

To have an *equinoctial dial*, therefore, that ſhall ſerve all the year round, the *upper* and *lower* muſt be joined together; that is, it muſt be drawn on each ſide of the plane.

And, ſince the ſun ſhines on one ſide or on the other of an equinoctial plane the whole day, ſuch a *dial* will ſhew all the hours of an artificial day.

To deſcribe an equinoctial DIAL *geometrically*.—The *equinoctial* is the firſt, eaſieſt, and moſt natural, of all *dials*: but the neceſſity of drawing it double, prevents it being much in uſe. However, as its ſtructure ſhews the reaſon of the other kinds, and as it even furniſhes a good mechanical method of drawing all the other kinds of *dials*, it ſhall be here laid down.

Firſt, then, to deſcribe an upper *equinoctial dial*: from a center C (*Tab. Dialling*, *fig.* 4.) deſcribe a circle ABDE, and by two diameters AD, and BE, interſecting each other at right angles, divide it into quadrants AB, BD, DE, and EA. Subdivide each quadrant into ſix equal parts, by the right lines C I, C II, C III, &c. which lines will be hour lines. Through the center C drive a ſtyle, or pin, perpendicular to the plane ABDE.

The *dial* thus deſcribed being raiſed ſo as to be in the plane of the equator, the line C XII, in the plane of the meridian, and the point A looking towards the ſouth, the ſhadow of the ſtyle will ſhew the hours both of the forenoon and afternoon.

For horary circles include arches of the equator of fifteen degrees each; conſequently, the plane ABDE being ſuppoſed in the plane of the equator, the horary circles will likewiſe include arches of 15 degrees of the circle ABDE. Wherefore, ſince the angles XII C XI, XI C X, X C IX, &c. are each here ſuppoſed 15 degrees, the lines C XII, C XI, C X, C IX, &c. are interſections of horary circles with the plane of the equinoctial.

Again, ſince the ſtyle paſſing through the center C repreſents the axis of the world; its diſtance from the center of the earth being inconſiderable, and it being the common diameter of the horary circles, its ſhadow will cover the hour-line C XII, when the ſun is in the meridian, or circle of 12 o'clock; C XI, when in the circle of 11 o'clock; C X, when in the circle of 10 o'clock, &c.

Secondly, to deſcribe a lower *equinoctial dial*: the method is the ſame as that for the *upper dial*, already deſcribed; except that no hour-lines are to be drawn beyond that of 6 o'clock.

Thirdly, to deſcribe an univerſal *equinoctial dial*: join two metal, or ivory planes, ABCD, and CDEF (*fig.* 5.) ſo as to be moveable at the joint. On the upper ſurface of the plane ABCD, deſcribe an *upper equinoctial dial*, and upon the lower a *lower*, as already directed; and through the center I drive a ſtyle. In the plane DEFC cut a box, and put a magnetical needle G therein; fit on the ſame plane a braſs quadrant nicely graduated, and paſſing through a hole cut in the plane ABCD. Now, ſince this may be ſo placed, by means of the needle, as that the line I 12 ſhall be in the plane of the meridian; and, by means of the quadrant, may be ſo raiſed, as that the angle BCF ſhall be equal to the elevation, or the equator; it well ſerve as a *dial* in any part of the world. When the ſun is in the equator, theſe *dials* can be of no uſe.

The beſt univerſal *dial* is that of Mr. Pardie, of which the following deſcription is given by Mr. Ferguſon. This *dial*

dial conſiſts of three principal parts: the firſt is called the horizontal plane A (*fig.* 6.) becauſe in practice it muſt be parallel to the horizon: in this plane is fixed an upright pin, which enters into the edge of the ſecond part BD, called the meridional plane, which is made of two pieces, the loweſt whereof, B, is called the quadrant, becauſe it contains a quarter of a circle divided into 90 degrees; in which part, near B, the pin enters. The other piece is a ſemicircle D, adjuſted to the quadrant, and turning in it by a groove, for raiſing or depreſſing the diameter EF of the ſemicircle, which diameter is called the axis of the inſtrument. The third piece is a circle G, divided on both ſides into twenty-four equal parts, which are the hours. This circle is put on the meridional plane, ſo that the axis EF may be perpendicular to the circle; and the point C be the common center of the circle, ſemicircle, and quadrant. The ſtrait edge of the ſemicircle is chamfered on both ſides to a ſharp edge, which paſſes through the center of the circle. On one ſide of the chamfered part, the firſt ſix months of the year are laid down, according to the ſun's declination for their reſpective days, and on the other ſide the laſt ſix months. And againſt the days on which the ſun enters the ſigns, there are ſtrait lines drawn upon the ſemicircle, with the characters of the ſigns marked upon them. There is a black line drawn along the middle of the upright edge of the quadrant, over which hangs a thread H, with its plummet I, for levelling the inſtrument. From the 23d of September to the 20th of March, the upper ſurface of the circle muſt touch both the center C of the ſemicircle, and the line of ♈ and ♎; and from the 20th of March to the 23d of September, the lower ſurface of the circle muſt touch that center and line. In order to find the time of the day by this *dial*, it muſt be ſet on a level place in ſun-ſhine, and adjuſted by the levelling ſcrews *k* and *l*, till the plumb-line hangs over the black line upon the edge of the quadrant, and parallel to the ſaid edge; then move the ſemicircle in the quadrant, till the line of ♈ and ♎ (where the circle touches) comes to the latitude of the place in the quadrant; and turn the whole meridional plane BD, with its circle G, upon the horizontal plane A, till the edge of the ſhadow of the circle falls preciſely on the day of the month in the ſemicircle; and then the meridional plane will be due north and ſouth, the axis EF will be parallel to the axis of the world, and will caſt a ſhadow upon the true time of the day, among the hours on the circle, which is now in the plane of the equinoctial. The upper ſurface of the circle will ſerve from the 20th of March to the 23d of September; and the lower for the reſt of the year.

The months and ſigns are laid down on the ſemicircle in the following method. Draw the right line ACB (*fig.* 7.) equal to the diameter of the ſemicircle ADB, and croſs it in the middle at right angles with the line ECD, equal in length to ADB; then EC will be the radius of the circle FCG, which is the ſame as that of the ſemicircle. Upon E, as a center, deſcribe the circle FCG, on which ſet off the arcs C *h* and C *i*, each equal to $23\frac{1}{2}$ degrees, and graduate them accordingly, for the ſun's declination. Then, laying the edge of a ruler over the center E, and alſo over the ſun's declination for every fifth day of each month, as found in tables of declination, mark the points on the diameter AB of the ſemicircle from *a* to *g*, which are cut by the ruler; and here place the days of the months, anſwering to the ſun's declination. Set one foot of the compaſſes in C, and extending the other to *a* or *g*, deſcribe the ſemicircle *a b c d e f g*; divide this into ſix equal parts, and through the points of diviſion draw right lines parallel to CD, for the beginning of the ſines (of which one half are on one ſide of the ſemicircle, and the other half on the other) and ſet the characters of the ſigns to their proper lines. Ferguſon's Lectures, &c. Lect. 10.

DIAL, *horizontal*, is that deſcribed on an horizontal plane, or a plane parallel to the horizon.

Since the ſun may illumine an horizontal plane at all times of the year, while he is above the horizon; an *horizontal dial* may ſhew all the hours of the artificial day throughout the year: ſo that a more perfect *dial* than this kind cannot be required.

To deſcribe an horizontal DIAL *geometrically.* Draw a meridian line AB (*fig.* 8.) on the given immoveable plane; or aſſume it, at pleaſure, on a moveable one. See MERIDIAN *line*.

From a point taken at pleaſure, as C, erect a perpendicular CD, and make the angle CAD equal to the elevation of the pole. In D make another angle CDE, equal likewiſe to the elevation of the pole, and draw the right line DE meeting AB in E. Then make EB equal to ED, and from the center B, with the radius EB, deſcribe a quadrant EBF, which divide into ſix equal parts. Through E draw the right line GH, cutting AB at right angles. From the center B, through the ſeveral ſubdiviſions of the quadrant EF, draw right lines B *a*, B *b*, B *c*, B *d*, BH, meeting the line GH, in the points *a*, *b*, *c*, *d*, H. From E upon the right line EG ſet off the intervals E *a*, E *b*, &c. viz. E *a* from E to *e*, E *b* from E to *f*, E *c* from E to *g*, &c. From the center A deſcribe a little circle, and applying a little ruler to A, and the ſeveral points of diviſion *a*, *b*, *c*, *d*, H, and *e*, *f*, *g* *h*, G, draw the lines A XI, A X, A IX, A VIII, A VII, and A I, A II, A III, A IV, A V. Through A draw a right line VI, VI, perpendicular to AB. Continue the right line A VII, beyond the little circle to VII, A VIII to VIII, A V to V, and A IV to IV. Round the whole ſcheme draw a ſquare, circle, or oval figure. And laſtly, in A fix an index, making an angle DAC, with the meridian AB, equal to the elevation of the pole; or in C erect a perpendicular ſtyle equal to CD; or at AE fix a triangular plate, ADE, perpendicular to the plane of the *dial*. In this caſe, the lines A XI, A X, A IX, &c. are the hour-lines of the forenoon; and A I, A II, A III, &c. thoſe of the afternoon; and the ſhadows of any of the gnomons, or ſtyles, above mentioned, at the ſeveral hours, will fall on the reſpective hour-lines.

To deſcribe an horizontal DIAL *trigonometrically* In large *dials*, where the utmoſt accuracy is required, geometrical lines are beſt ſet aſide; and, in lieu thereof, the lines of the *dial* are to be determined by trigonometrical calculation. M. Clapies, in the Memoires de l'Academie Royale des Sciences, anno 1707, has done the world good ſervice herein; having rendered the calculation of the hour-lines, which before had been operoſe enough, exceedingly eaſy and expeditious: his canons, or analogies, we ſhall lay down under the reſpective kinds of *dials*. And, firſt, for an *horizontal dial*; the elevation of the pole of the place being given, to find the angles, which the hour-lines make with the meridian in the center of the *dial*. The analogy, or canon, is thus: as the whole ſine is to the ſine of the elevation of the pole of the place, ſo is the tangent of the ſun's diſtance from the meridian, for the hour required, to the tangent of the angle required: that is, as the ſide AC (*fig.* 9.) is to DC, ſo is the tangent of FDC to the tangent FC, of the angle FAC. See TANGENT, &c.

To deſcribe an horizontal DIAL *by the terreſtrial globe.* Let a common globe of twelve inches diameter, upon which are uſually drawn twenty-four meridian ſemicircles, be elevated to the latitude of any given place, and turned about until any one of theſe meridians cuts the horizon in the north point, where the hour of XII is ſuppoſed to be marked; the reſt of the meridians will cut the horizon at the reſpective diſtances of all the other hours from XII. Let theſe points of diſtance be marked on the horizon, the globe be removed, and a flat board or plate, even with the ſurface of the horizon, put into its place: then ſtrait lines drawn from the center of the board to theſe points will be the hour lines of an *horizontal dial* for that latitude; and the gnomon will be in the ſituation of the axis of the globe, or make an angle with the plane of the *dial* equal to the latitude of the place. If the globe be elevated to the complement of the latitude of the given place, and you proceed as above, you will have a *direct ſouth dial*: obſerving, that the gnomon makes an angle with the *dial* plane equal to the co-latitude of the place, and that the hours on the *dial* muſt be ſet the contrary way to that on the horizontal. If the globe has more than twenty-four meridian ſemicircles, the proceſs is ſomewhat different. Elevate the pole to the latitude 51° ½ N. e. gr. of London, and bring the firſt meridian, or that of London on the Engliſh globe, to the north: ſet the hour index to the uppermoſt XII on the horary circle; then turn the globe weſtward, till the index points ſucceſſively to I, II, III, IV, V, and VI in the afternoon; or until 15, 30 45, 60, 75, and 90 degrees of the equator paſs under the brazen meridian; and the firſt meridian will mark the following degrees on the horizon from the north towards the eaſt, viz. $11\frac{2}{3}$, $24\frac{1}{4}$, $38\frac{1}{12}$, $53\frac{1}{2}$, $71\frac{1}{15}$, and 90; which are the reſpective diſtances of the above hours from XII on the plane of the horizon.

In order to transfer theſe and the reſt of the hours to an horizontal plane, draw the parallel right lines *a c* and *b d* (*fig.* 10.) upon that plane, at a diſtance equal to the thickneſs of the gnomon; and the ſpace between them will be the meridian or twelve o'clock line on the *dial*. At right angles to this meridian, draw *g h*, and on *a* and *b* as centers, with the ſame radius of any length, deſcribe the quadrants *g e* and *f h*, and graduate them. The center of the plane C, and the centers of theſe quadrants *a* and *b* are at a little diſtance from each other, in order to enlarge the hour diſtances about noon. Lay a ruler on the center *b*, and on the ſeveral diſtances already found, viz. $11\frac{2}{3}$, $24\frac{1}{4}$, &c. in the quadrant *f h*, and draw the reſpective afternoon hour lines to I, II,

&c. As the ſun riſes about four in the morning, on the longeſt days in London, continue the hour lines of IIII and V in the afternoon through the center *b* to the oppoſite ſide of the *dial*. Then lay the ruler on the center *a* through the ſame diſtances, reſpectively, in the quadrant *eg*, draw the forenoon hour lines of XI, X, &c. and as the ſun does not ſet before eight in the evening on the longeſt days, continue the hour lines of VII and VIII through the center *a* to the other ſide. Through $51\frac{1}{2}$ degrees of either quadrant from its center draw the right line *a g*, which will be the hypothenuſe or axis of the gnomon *a g i*; and from *g* let fall a perpendicular to the meridian *a i*; and a plate ſimilar to the triangle *a g i* ſet up between *a c* and *b d* will have its hypothenuſe *ag* parallel to the axis of the world, when the *dial* is truly ſet, and will caſt a ſhadow on the hour of the day. A line of chords will ſuperſede the neceſſity of graduating the quadrants. An *erect ſouth dial* (*Tab.* II. *fig.* 15.) is conſtructed in the ſame manner, obſerving the rule already given with reſpect to the elevation of the pole, and of the gnomon, and the poſition of the hours. Ferguſon's Lect. Lect. 10.

To deſcribe an horizontal DIAL *mechanically, by the* DIALLING *ſcales.* Draw a double meridian line *a b*, *c d* (*fig.* 11.) on the horizontal plane, and croſs it at right angles by the ſix o'clock line *f e*; take the latitude of the place with the compaſſes, in the ſcale of latitudes, and ſet that extent from *c* to *e*, and from *a* to *f*, on the ſix o'clock line; then, taking the whole ſix hours between the points of the compaſſes in the ſcale of hours; with that extent ſet one foot in the point *e*, and let the other foot fall where it will upon the meridian line *c d*, and at *d*. Do the ſame from *f* to *b*, and draw the right lines *e d* and *f b*, each of which will be equal in length to the whole ſcale of hours. When this is done, ſet one foot of the compaſſes in the beginning of the ſcale at XII, and extending the other to each hour on the ſcale, lay off theſe extents from *d* to *e* for the afternoon hours, and from *b* to *f* for thoſe of the forenoon; and thus the lines *d e* and *b f* will be divided in the ſame manner as the hour ſcale is divided, at 1, 2, 3, 4, 5, and 6; on which the quarters may alſo be laid down, if required. Then, laying a ruler on the point *c*, draw the firſt five hours in the afternoon from that point through the dots at the numeral figures 1, 2, 3, 4, 5, on the line *d e*, and continue the lines of IIII and V through the center *c* to the other ſide of the *dial* for the like hours of the morning: then lay the ruler on the point *a*, and draw the laſt five hours in the forenoon through the dots 5, 4, 3, 2, 1, on the line *f b*; and continue the hour lines of VII and VIII through the center *a* to the other ſide, for the like hours of the evening; ſet the hours to the reſpective lines, and make the gnomon in the manner already directed for the *horizontal dial*.

An *erect ſouth dial* may be made, by taking the co-latitude of the place from the ſcale of latitudes, and proceeding in all reſpects for the hour lines, as in the *horizontal dial*; only reverſing the hours, as in *fig.* 15. and making the angle of the ſtile's height equal to the co-latitude.

An *horizontal dial* may be eaſily deſcribed with only a line of chords, or a graduated quadrant of a circle. With any opening of the compaſſes, as ZL (*fig.* 12.) deſcribe the two ſemicircles L F *k* and L Q *k*, on the centers Z and z, where the ſix o'clock hour line croſſes the double meridian line, and divide each ſemicircle into twelve equal parts, beginning at L; then connect the diviſions, which are equidiſtant from L, by the parallel lines KM, IN, HO, GP, and FQ. Draw VZ for the hypothenuſe of the ſtyle, making the angle VZE equal to the latitude of the place; and continue the line VZ to R. Draw the line R *r* parallel to the ſix o'clock line, and ſet off the diſtance *a*K from Z to Y, the diſtance *b*I from Z to X, *c*H from Z to W, *d*G from z to T, and *e*F from Z to S. Then draw the lines S *s*, T *t*, W *w*, X *x*, and Y *y*, each parallel to R *r*. Set off the diſtance *y*Y from *a* to 11, and from *f* to 1; the diſtance *x*X from *h* to 10, and from *g* to 2; *w*W from *c* to 9, and from *h* to 3; *t*T from *d* to 8, and from *i* to 4; *s*S from *e* to 7, and from *n* to 5. Then laying a ruler to the center z, draw the forenoon hour lines through the points 11, 10, 9, 8, 7; and laying it to the center z, draw the afternoon lines through the points 1, 2, 3, 4, 5; continuing the forenoon lines of VII and VIII through Z, to the oppoſite ſide of the *dial*, for the like afternoon hours; and the afternoon lines IIII and V through z for the like morning hours. Set the hours to the lines, and erect the ſtile, and the *dial* is complete. A *ſouth dial* may be conſtructed in the ſame manner, by drawing the line VZ to make an angle with the meridian ZL equal to the co-latitude of the place, &c. reverſing the hours, as in *fig.* 15. Ferguſon, ubi ſupra.

DIAL, *vertical*, is that drawn on the plane of a vertical circle. See VERTICAL.

Of theſe there are ſeveral varieties, according to the vertical pitched upon. The verticals chiefly uſed, are the prime vertical, and the meridian; from which reſpectively ariſe, *ſouth*, *north*, *eaſt*, and *weſt dials*.

Dials which reſpect the cardinal points of the horizon, are particularly called *direct dials*. See DIRECT.

If any other vertical be choſen, the *dial* is ſaid to decline. Further, if the circle, whoſe plane is uſed, be perpendicular to the horizon, as is ſuppoſed to be the caſe in all thoſe now mentioned, the *dials* are particularly denominated *erect*. E. gr. *erect ſouth*, *erect north*, &c. Otherwiſe, the plane being oblique to the horizon, they are ſaid either to *incline*, or *recline*.

DIAL, *ſouth*, or, more particularly, an *erect direct ſouth* DIAL, is that deſcribed on the ſurface of the prime vertical circle looking towards the ſouth.

Since the ſun then illumines the plane of the prime vertical looking to the ſouth, when, in its progreſs, he paſſes from the prime vertical to the meridian, or returns back from this to that; in which he is employed ſix hours before, and ſix after noon; a *ſouth dial* ſhews the hours from ſix in the morning to ſix at night.

DIAL, *to draw a vertical ſouth.* On the plane of the prime vertical looking ſouthwards, draw a meridian line AB (*fig.* 13.) and taking the interval AC, at pleaſure, for the magnitude of the future *dial*, in C erect a perpendicular of an indefinite length CD, and making an angle CAD equal to the elevation of the equator; draw a right line AD meeting the perpendicular CD in D. Then in the point D make the angle CDE likewiſe equal to the elevation of the equator, and draw the right line DE cutting the meridian in E. Through E draw the right line GH, cutting the meridian AB at right angles. Take EB equal to ED, and with this radius deſcribe a quadrant EF. The reſt is performed as in an *horizontal dial*, except that the hours of the afternoon are to be written on the right hand, and thoſe of the forenoon on the left; as may be conceived from the figure. Laſtly, in the point A fix an oblique ſtyle, in an angle equal to the elevation of the equator; or in C erect a perpendicular ſtyle, equal to CD; or, laſtly, a triangular plate ADE, upon AE, ſo as to be perpendicular to the plane of the *dial*.

Then will the ſhadow of any of theſe indexes touch the ſeveral hour lines at their reſpective hours.

DIAL, *north*, or *erect direct north* DIAL, is that deſcribed on the ſurface of the prime vertical looking northward.

Since the ſun only illumines this ſurface while he advances from the eaſt to the prime vertical, and proceeds from the ſame vertical to the weſt; and ſince he is in the prime vertical at ſix o'clock in the morning, and at ſix in the evening; a *north dial* ſhews the hours before ſix in the morning, and thoſe after ſix in the evening. And hence, as in autumn and winter-time, the ſun does not riſe before ſix, and ſets before ſix in the evening, a *north dial* is of no uſe all that time; but this being joined with a *ſouth dial* ſupplies the defects thereof.

DIAL, *to deſcribe a vertical north.* Draw a meridian line EB, (*Tab.* II. *fig.* 14.) and from A deſcribe a little circle at pleaſure. At A make the angle DAC equal to the elevation of the equator, and from the point C, taken at pleaſure, erect a perpendicular CD, meeting AD in D. Make another angle, CDE, likewiſe equal to the elevation of the equator, and draw likewiſe a line DE, meeting AE in E; then take IB equal to ED, and through I draw GH, cutting AB at right angles; and from the center B, with the radius IB, deſcribe a quadrant, which divide into ſix equal parts: through the two extreme diviſions draw lines from the center B, viz. B *h*, and BG, meeting GH in *h* and G, and make I *d* equal to I *h*, and IH equal to IG; then applying a ruler to A and *h*, and G, and again to A and *d*, and H, draw the right lines AV, AIV, AVII, and AVIII. Laſtly, in A fix an oblique index AD, making an angle DAE, with a meridian line in the plane of the meridian, equal to the elevation of the equator; or a perpendicular index in C, equal to CD; or, inſtead of an index, a triangular plate EDA, on the meridian line EA, perpendicu- to the plane of the *dial*.

Then will A IV, A V, A VI, be the hours of the forenoon; and A VI, A VII, and A VIII, thoſe of the afternoon; and, accordingly, will be pointed out by the ſhadow of the ſeveral indexes. Or thus: in a *ſouth dial* (*fig.* 13.) if the hour lines IV and V, as alſo VII and VIII, be continued beyond the line VI A VI; and the triangle ADE turned about its pole A, till AE fall directly on A XII produced; it is evident, a *north dial* is hereby had, only obſerving what has been ſaid about writing the hours.

To draw a vertical north or *ſouth* DIAL *trigonometrically.* Theſe only differ from the *horizontal dial*, in that the angle CAB is equal to the complement of the elevation of the pole of the place; ſo that the ſame analogy ſerves as for the horizontal one; only making the ſecond term the complement of the elevation of the pole of the place. For the method of deſcribing this *dial* by a globe, and by DIALLING *ſcales*, ſee *Horizontal* DIAL.

DIAL, *eaſt*, or *erect direct eaſt* DIAL, is that drawn on the plane of the meridian, looking to the eaſt.

Since the ſun only illumines the plane of the meridian looking eaſtward, before noon, an *eaſt dial* can only ſhew the hours till twelve o'clock.

DIAL, *to deſcribe an eaſt.* On the eaſtern ſide of the plane of the meridian draw a right line AB (*Tab.* II. *fig.* 16.) parallel to the horizon, and to this join AK, making with it an angle KAB, equal to the elevation of the equator: then, with the radius DE, deſcribe a circle, and through the center D draw EC perpendicular to AK, by which means the circle will be divided into four quadrants. Each of theſe quadrants ſubdivide into ſix equal parts. And from the center D through the ſeveral diviſions draw the right lines D IV, D V, D VI, D VII, D VIII, D IX, D X, D XI. Laſtly, in D erect a ſtyle equal to the radius DE, perpendicular to the plane; or, on two little pieces perpendicularly fixed in EC, and equal to the ſame radius DE, fit an iron rod, parallel to EC.

Thus will each index at the ſeveral hours project a ſhadow to the reſpective hour lines IV IV, V V, VI VI, &c.

DIAL, *weſt*, or *erect direct weſt* DIAL, is that deſcribed on the weſtern ſide of the meridian.

As the ſun only illumines that ſide of the plane of the meridian looking to the weſt, after noon, a *weſt dial* can only ſhew the hours from noon to night.

This, therefore, joined with an *eaſt dial*, ſhews all hours of the day.

DIAL, *to draw a weſt.* The conſtruction is perfectly the ſame as that of an *eaſt dial*, only that its ſituation is inverted, and the hours are written accordingly.

DIAL, *polar*, is that deſcribed on a plane paſſing through the poles of the world, and the eaſt and weſt points of the horizon. It is of two kinds; the firſt looking up towards the zenith, and called *upper*; the latter down to the nadir, called *lower*.

The *polar dial*, therefore, is inclined to the horizon in an angle equal to the elevation of the pole.

Since the polar plane POQS (*fig.* 17.) paſſes through the eaſt and weſt points O and S, a quadrant of the equator is intercepted between it and the meridian; conſequently the upper ſurface is illumined by the ſun from ſix in the morning to ſix at night; and the lower, from the ſun's riſe to ſix in the morning, and from ſix in the evening to ſun-ſet. A *lower polar dial*, therefore, ſhews the hour of the morning from ſun-riſe to ſix o'clock, and that of the evening, from ſix to ſun-ſet; and an *upper*, the hours from ſix in the morning to ſix in the evening.

DIAL, *to draw an upper polar.* Draw a right line AB (*fig.* 18.) parallel to the horizon; and if the plane be immoveable, find the meridian line CE. Divide CE into two equal parts, and through C draw a right line FG parallel to AB. Then, from the center D, with the interval DE, deſcribe a quadrant, which divide into ſix equal parts; and from the ſame center D, through the ſeveral points of diviſion, draw right lines, D I, D II, D III, D IV, D V; and the intervals E I, E II, E III, E IV, E V, ſet off the contrary way, viz. E XI, X, IX, VIII, and VII. From the points V, IV, III, II, I, &c. raiſe perpendiculars meeting the line FG in the correſpondent points. Laſtly, in D erect a perpendicular ſtyle equal to DE, or on two equal pieces, E and C, fix a croſs iron rod.

Then will XII XII, I I, II II, III III, &c. be hour-lines, to be pointed out at the proper times by the ſhadow of the indices.

DIAL, *an upper polar*, only differs in ſituation, and the manner of writing the hours, from *eaſt* and *weſt dials*, joined together in the line of ſix o'clock.

DIAL, *a lower polar*, is had by putting out the hours of the forenoon, IX, X, and XI, and thoſe of the afternoon I, II, and III, with the noon-hour XII itſelf; and only leaving the hours VII and VIII of the morning, and IV and V in the evening.

To make three DIALS *on three different planes, ſo that they may all ſhew the time of the day by one gnomon.* On the flat board ABC (*fig.* 19.) deſcribe an horizontal *dial*, with its gnomon FGH, the edge of the ſhadow of which ſhews the time of the day. To this horizontal board join the upright board EDC, touching the edge GH of the gnomon: then making the top of the gnomon at G the center of the vertical ſouth *dial*, deſcribe it on the board EDC. Beſides, on a circular plate IK deſcribe an equinoctial *dial*, and by a ſlit *cd* in the XII o'clock line, from the edge to the center, put it on the gnomon FG as far as the ſlit will admit. The ſame gnomon will ſhew the ſame hour on each of theſe *dials*.

To draw all the primary DIALS *on the ſame block, or poſt.*

1. Let the plane ABCD (*fig.* 20.) in the proper poſition of the block, be ſuppoſed horizontal; and thereon deſcribe an *horizontal dial*. See *Horizontal* DIAL.

2. Draw the right lines EM and FL parallel to DC, which, accordingly, in the proper poſition of the block, will be parallel to the horizon: then let the plane BNMC make an angle with EM, equal to the elevation of the pole CME; and thereon deſcribe an *upper polar dial*.

3. Let the oppoſite plane, ADE, make with EM an angle, DEM, equal to the elevation of the equator; and on this draw an *upper equinoctial dial*.

4. Let the plane, KLHI, make with FL an angle HLF, equal to the elevation of the equator; and on this inſcribe a *lower equinoctial dial*.

5. Let the oppoſite plane, FG, make with FL an angle GFL, equal to the elevation of the pole; and here draw a *lower polar dial*.

6. Let the plane MNKL, and the oppoſite one, EF, be perpendicular to FL; and on that draw a *ſouth dial*, and on this a *north dial*.

7. On the plane EMLF deſcribe a *weſt dial*; and on the oppoſite plane an *eaſt dial*.

If, then, the block be ſo placed, as that the plane, MNKL, looks to the ſouth, and the plane of the meridian biſect it in the line of 12 o'clock in the *horizontal dial* ABCD, and *ſouth dial* MNKL, all the hours of the day will be indicated by ſeveral planes at once.

DIALS, *ſecondary*, are all thoſe drawn on the planes of other circles, beſide the horizon, prime vertical, equinoctial, and polar circles: or thoſe which, either decline, incline, recline, or deincline.

DIALS, *declining*, are erect or vertical *dials*, which decline from any of the cardinal points; or they are ſuch as cut either the plane of the prime vertical, or of the horizon, at oblique angles.

The uſe of *declining dials* is very frequent; as the walls of houſes, whereon *dials* are uſually drawn, commonly deviate from the cardinal points.

Of *declining dials* there are ſeveral kinds, which are denominated from the cardinal points, which they ſeem moſt to reſpect, but from which they have a real declination; *decliners from the ſouth*, and *from the north*, and even *from the zenith.*

To draw a vertical declining DIAL *trigonometrically.*

1. The declination of the plane, and the elevation of the pole of the place, being given; to find the angle formed in the center of the *dial*, by the meridian and ſubſtyle.

Canon. As the whole ſine is to the tangent of the complement of the height of the pole of the place GF (*fig.* 21.) ſo is the ſine of the angle of the declination of the plane GFD, to the tangent GD, of the angle required GAD.

2. The declination of the plane being given, and the elevation of the pole of the place, to find the angle formed in the center of a *vertical declining dial*, by the ſubſtyle and axis.

Canon. As the whole ſine is to the ſine of the complement of the elevation of the pole GF; ſo is the ſine of the complement of the declination of the plane DGF, to the ſide DF, the ſine of the angle DAB required.

3. The declination of the plane, and the elevation of the pole, given; to find the difference of longitudes, that is, the arch of the equator, comprehended between the meridian of the place, and the meridian of the plane.

Canon. As the whole ſine is to the ſine of the height of the pole of the place, ſo is the tangent of the complement of the declination of the plane, to the tangent of the complement of the difference of longitudes.

4. The angle of the difference of longitudes, and that of the axis, with the ſubſtyle, being given; to find the angles formed in the center of a *vertical declining dial*, between the ſubſtyle and hour-lines.

This problem admits of three caſes; for the hour-lines, whoſe angles are ſought, may be either, 1. Between the meridian and ſubſtyle; or, 2. Beyond the ſubſtyle; or, 3. On that ſide the meridian where the ſubſtyle is not. In the two firſt caſes, the difference is to be taken between the ſun's diſtance from the meridian that hour, and the angle of the difference of longitudes found by the laſt problem; and in the third caſe, the ſum of thoſe two angles is to be taken, and the following canon uſed.

Canon. As the whole ſine is to the ſine of the angle between the axis and ſubſtyle, ſo is the tangent of the difference of the ſun's diſtance from the meridian, and the difference of longitudes, or of the ſum of thoſe two angles, to the tangent of the angle required.

5. The angle formed by the ſubſtyle, with the hour-lines, and that of the ſubſtyle, with the meridian, given; to find the angles formed between the meridian and hour-lines in the center of *vertical declining dials*.

1. The angles of the hour-lines between the meridian and ſubſtyle are found by ſubtracting the angle formed by the ſubſtyle, with the hour-line, from the angle formed by the ſubſtyle, with the meridian.

2. The angles beyond the ſubſtyle, and on the ſide op-

poſite to that of the meridian, are found by adding thoſe two angles.

3. Thoſe on the other ſide the meridian are found by taking their difference.

To deſcribe a vertical DIAL, *declining from the ſouth to the eaſt* or *weſt, geometrically.* Find the declination of the plane, as already taught, under the article DECLINATOR. Then draw upon a paper an *horizontal dial*, ſuppoſing the line of contingency of the horizontal with the equinoctial plane to be GH (*fig.* 22.) through the point E, wherein the meridian line AE cuts the ſame, draw a right line IK, making with GH an angle HEK, equal to the declination of the given plane. Thus, as GH repreſents the interſection of the prime vertical with the horizon, IK will be the interſection of the inclining plane, and the horizon; whence we alſo conceive, that the part IE muſt be raiſed above GE, in caſe the given plane decline to the weſt; or it muſt be depreſſed below the ſame GE, in caſe it decline to the eaſt. Draw a right line parallel to the horizon on the given plane, or wall, to anſwer to IK; and, aſſuming a point therein anſwering to E, ſet off from the right line IK on the paper the ſeveral horary diſtances E 1, E 2, E 3, &c. Then from the point E erect a perpendicular EC, equal to the diſtance of the center of the *horizontal dial*, from its line of contingency. Draw lines thence to the ſeveral points of the hour-lines E 1, E 2, E 3, &c. let fall a perpendicular AD, from the center of the *horizontal dial* A, to the line of contingency IK, and transfer the diſtance ED, from the point E upon the wall: then will CD be the ſubſtylar line.

Wherefore joining AD and DC at right angles, the hypothenuſe AC will be an oblique index, to be faſtened on the wall in the point C, according to the angle DCA.

To conſtruct a vertical DIAL, *declining from the ſouth towards the eaſt or weſt, by the globe.* Elevate the pole to the latitude of the place, and ſcrew the quadrant of altitude to the zenith. If the *dial* declines towards the eaſt, count the degrees of declination in the horizon from the eaſt point towards the north, and bring the lower end of the quadrant to that degree of declination, at which the reckoning ends. Then bring any meridian, (e. gr. the firſt meridian) directly under the graduated edge of the upper part of the braſen meridian, and ſet the hour index to XII at noon. Turn the globe eaſtward on its axis, the quadrant of altitude being kept to the degree of declination in the horizon, and obſerve the degrees cut by the firſt meridian in the quadrant of altitude, counted from the zenith, as the hour index comes to XI, X, IX, &c. in the forenoon; and the degrees, then cut in the quadrant by the firſt meridian, are the reſpective diſtances of the forenoon hours from XII on the plane of the *dial*. For the afternoon hours, turn the quadrant of altitude round the zenith till it comes to the degree in the horizon oppoſite to that where it was placed before, or as far from the weſt point towards the ſouth, as it was at firſt from the eaſt towards the north; and turn the globe weſtward on its axis, till the firſt meridian comes to the brazen meridian, and the hour index to XII; then turning the globe weſtward to the afternoon hours I, II, III, &c. the firſt meridian will cut the quadrant of altitude in the reſpective number of degrees from the zenith, that each of theſe hours is from XII on the *dial*; and the limit of this *dial* will be determined by the hour index, when the firſt meridian goes off the quadrant at the horizon, both in the forenoon and afternoon. Lay down theſe hour diſtances on the *dial* plane, either by dividing a ſemicircle into two quadrants, beginning at the hour-line of XII, or by the line of chords, as directed under *horizontal* DIAL. As the SUBSTYLE makes an angle with the meridian line in this kind of *dials*, falling among the forenoon hour-lines in an eaſt decliner, and among thoſe of the afternoon in a *dial* declining towards the weſt, its diſtance may be found in the former, by counting the degrees of the declination of the *dial* in the horizon from the eaſt point towards the north, and bringing the lower end of the quadrant of altitude to that degree of declination where the reckoning ends; then turn the globe till the firſt meridian cuts the horizon in the like number of degrees, counted from the ſouth point toward the eaſt; and the quadrant and firſt meridian will croſs one another at right angles, and the number of degrees of the quadrant, intercepted between the firſt meridian and the zenith, is equal to the diſtance of the ſubſtyle line from the 12 o'clock line; and the number of degrees of the firſt meridian, which are intercepted between the quadrant and the north pole, is equal to the elevation of the ſtyle above the plane of the *dial*. If the *dial* declines weſtward from the ſouth, count that declination from the eaſt point of the horizon towards the ſouth, and bring the quadrant of altitude to the degree in the horizon at which the reckoning ends; both for finding the forenoon hours, and diſtance of the ſubſtyle from the meridian; and for the afternoon hours bring the quadrant to the oppoſite degree in the horizon, as far from the weſt towards the north; and then proceed as above. A north *dial* declining eaſt or weſt by the ſame number of degrees may be eaſily had from the former, by only extending the hour-lines, ſtyle, and ſubſtyle, quite through the center; for thus the ſouth-eaſt decliner will produce the north-weſt decliner, and the ſouth-weſt decliner the north-eaſt decliner. Ferguſon, lib. cit.

To draw a vertical DIAL, *declining from the north towards the eaſt and weſt.* Take the declination of the plane, as already taught: then, as *north dials* are only *ſouth dials* inverted, draw a *vertical dial* declining from the ſouth, and invert it in ſuch a manner, as that the center C looks to the horizon, and the point E to the zenith; and the hours on the right hand ſet off towards the left, and contrarywiſe, omitting all hour-lines, which in ſuch a plane cannot be ſhewn.

For the practice the beſt way is, after drawing a ſouth decliner upon paper, to prick the ſeveral points thereof through with a pin; then applying the face of the paper to the wall, the back-ſide thereof will ſhew you all the points neceſſary for the *north declining dial*.

DIALS, *inclined*, are thoſe drawn on planes not erect, but inclining, or leaning forward towards the ſouth, or ſouthern ſide of the horizon, in an angle, either greater or leſs than the equinoctial plane.

Such an inclined plane may be conceived by ſuppoſing one part of the plane of the equator lifted up towards the zenith, and the other depreſſed toward the nadir; and thus to revolve upon a line drawn from the eaſt to the weſt points of the horizon.

DIAL, *to draw an inclined.* 1. The inclination of the plane, as DC (*fig.* 23.) being found by a declinator, as taught under DECLINATOR; if it fall between the equinoctial plane CE, and the vertical one CB, in ſuch manner, as that the angle of inclination DCA is greater than the elevation of the equator ECA; on the upper ſide draw a *north dial*, and on the lower a *ſouth dial*, to an elevation of the equator, which is equal to the aggregate of the elevation of the equator of the given place, and the complement of the inclination to a quadrant.

2. If the inclined plane CF fall between the horizontal one CA, and the equinoctial CE, ſo as that the angle of inclination FCA, is leſs than the elevation of the equator ECA, deſcribe an *horizontal dial* to an elevation of the pole, equal to the aggregate of the elevation of the pole of the given place, and the inclination of the plane.

Dials, thus inclined, are drawn after the ſame manner as *primary dials*; except, that the index in the former caſe muſt be fitted under the angle ADC, and in the latter, under the angle DFC; and that the diſtance of the center of the *dial* from the line of contingency, in the former caſe is DC, and in the latter FC.

DIALS, *reclining*, are thoſe drawn on planes not erect, but reclined, or leaning backwards from the zenith towards the north, in an angle greater or leſſer than the polar plane. A *reclined* plane may be conceived by ſuppoſing one part of the polar plane raiſed towards the zenith, and the other depreſſed towards the nadir; and thus revolving about a line drawn from eaſt to weſt. To find the reclination of a plane, ſee RECLINATION.

DIAL, *to draw a reclining.* 1. If the *reclined* plane HC fall between the vertical plane BC, and the polar plane IC, ſo as that the angle of reclination BCH is leſs than the diſtance of the pole from the zenith BCI, deſcribe two vertical *ſouth* and *north dials* to an elevation of the equator, equal to the difference between the elevation of the equator of the given place, and the angle of reclination.

2. If the reclined plane, as KC, fall between the polar plane IC, and the horizontal one CL, ſo as that the angle of reclination BCK is greater than the diſtance of the pole from the zenith ICB, deſcribe an *horizontal dial* thereon to an elevation of the pole, equal to the difference between the angle of reclination, and the elevation of the equator of the given place.

To draw inclining and reclining DIALS *trigonometrically.* The inclination or reclination of the plane, and the elevation of the pole, being known, to find the angles made in the center of an *inclining* or *reclining dial*, by the meridian and hour-lines.

Such *dial* is properly an *horizontal dial*, for a latitude equal to the particular elevation of the pole on the plane of the *dial*. Its angles, therefore, are found by the canon laid down for *horizontal dials*.

As to the elevation of the pole on the *dial* plane, it is thus found: the plane being inclined, either its inclination is greater than the elevation of the pole of the place, or leſs; or it is equal thereto. In the two firſt caſes, for upper *ſouth*, or lower *north dials*, the particular elevation of the pole on the plane is had by taking the difference between the elevation of the pole of the place, and the inclination of the plane; and in the latter caſe, the *dial* is a *polar dial*, wherein the hour-lines will be parallel, by reaſon that the plane being placed on the axis of the world, neither of the poles can be repreſented thereon.

For upper *north* and lower *ſouth dials*. 1. If the inclination be greater than the complement of the elevation, the complement of the inclination muſt be added to the complement of the elevation. 2. If it be leſs, the inclination muſt be added to the elevation. 3. If it be equal, the *dial* will be an *equinoctial dial*, wherein the angles at the center will be equal to the ſun's diſtance from the meridian.

DIALS, *deinclined*, are thoſe which both *decline* and *incline*, or *recline*. See DECLINERS.

The uſe of *inclined*, *reclined*, and eſpecially *deinclined dials*, is very rare; the geometrical and trigonometrical conſtruction of theſe laſt, therefore, as being ſomewhat intricate, we here chooſe to omit, and refer ſuch as may have a fancy for ſuch a *dial*, to an univerſal mechanical method of drawing all kinds of *dials* here ſubjoined.

An eaſy method to deſcribe a DIAL *on any kind of plane, by means of an equinoctial* DIAL, *or circle.* Suppoſe, e. gr. a *dial* required on an horizontal plane: if the plane be immoveable, as ABDC (*Tab.* II. *fig.* 24.) find a meridian line GF; or, if moveable, aſſume the meridian at pleaſure. Then, by means of the triangle EKF, whoſe baſe is applied on the meridian line, raiſe the equinoctial *dial* H, till the index GI becomes parallel to the axis of the world (which is had, if the angle KEF be equal to the elevation of the pole), and the 12 o'clock line on the *dial* hang over the meridian line of the plane, or the baſe of the triangle. If, then, in the night-time, a lighted candle be ſucceſſively applied to the axis GI, ſo as the ſhadow of the index, or ſtyle GI, fall upon one hour-line after another; the ſame ſhadow will mark out the ſeveral hour-lines on the plane ABCD.

Noting the points, therefore, on the ſhadow, draw lines through them to G; then an index being fixed in G, according to the angle IGF, its ſhadow will point out the ſeveral hours by the light of the ſun.

If a *dial* were required on a vertical plane, having raiſed the equinoctial circle, as above directed, puſh forward the index GI, till the tip thereof, I, touch the plane.

If the plane be *inclined* to the horizon, the elevation of the pole ſhould be found on the ſame; and the angle of the triangle KEF ſhould be made equal thereto.

See a new method of conſtructing ſun-*dials*, for any given latitude, without the aſſiſtance of dialling ſcales, or logarithmic calculations, by Mr. Ferguſon, in the Phil. Tranſ. vol. lvii. for 1767. art. 36. and in his Select Exerciſes, p. 95.

Note, Beſide the ſeveral ſpecies of *dials* above mentioned, which are ſaid to be *with centers*, there are others, called *dials without centers*. See CENTER *of a Dial*.

DIALS *without centers*, are thoſe whoſe hour-lines do really converge, but ſo ſlowly, that the center towards which they converge cannot be expreſſed on the given plane.

DIALS, *horizontal*, *without centers* are to be made for places, the elevation of whoſe pole is either very ſmall, or very great.

DIALS, *vertical*, *without centers*, are for places, the elevation of whoſe pole is very great.

DIALS, *for the furniture of*. See FURNITURE.

DIAL, *quadrantal*. See *Horodictical* QUADRANT.

DIAL, *reflecting*. See REFLECTING *Dial*.

DIAL, *cylindric*, is repreſented in *Tab.* III. *fig.* 27. This *dial* may be delineated on paper, and then paſted round a cylinder of wood, and it will ſhew the time of the day, the ſun's place in the ecliptic, and his altitude at any time of obſervation. Draw the right line *a* AB (*fig.* 28.) parallel to the top of the paper, and with any opening of the compaſſes on the center *a* deſcribe the quadrant AE, and graduate it. Draw the right line AC at right angles to *a* AB, and touching the quadrant AE at the point A. From the center *a* draw right lines through as many degrees of the quadrant as are equal to the ſun's altitude at noon, on the longeſt day of the year, at the place for which the *dial* is to ſerve; which altitude at London is nearly 62 degrees; continue theſe right lines till they meet the tangent line AC; and from the points of concourſe, draw ſtrait lines acroſs the paper, parallel to the firſt right line AB, and theſe will be the parallels of the ſun's altitude, in whole degrees, from ſun-riſe to ſun-ſet, on all the days of the year. Theſe parallels of altitude muſt be drawn out to the right line BD, which muſt be parallel to AC, and as far from it as is equal to the intended circumference of the cylinder on which the paper is to be paſted. Divide the ſpace between the right lines AC and BD, at top and bottom, into twelve equal parts, for the twelve ſigns of the ecliptic; and from one mark to the oppoſite one, draw right lines parallel to AC and BD; and place the characters of the twelve ſigns in the twelve ſpaces, at the bottom, beginning with ♑ Capricorn, and ending with ♓ Piſces. Theſe ſpaces ſhould likewiſe be divided by parallel lines into halves and quarters. At the top of the *dial* make a ſcale of the months and days of the year, ſo that the days may ſtand over the ſun's place, found in an Ephemeris, for each of them in the ſigns of the ecliptic. Compute the ſun's altitude for every hour, in the latitude of your place, or take it from a table, ſuch as that ſubjoined, when he is in the beginning, middle, and end of each ſign of the ecliptic; and in the upright parallel lines, at the beginning and middle of each ſign, make marks for theſe altitudes among the horizontal parallels, reckoning downward in the order of the numeral figures at the right hand, anſwering to the like diviſions of the quadrant at the left. Through theſe marks draw the curve hour-lines, and ſet the hours to them, as in the figure, reckoning the forenoon hours downward, and the afternoon hours upward. The ſun's altitude may alſo be taken and laid down for the half hours and quarters. Then cut off the paper at the left-hand, on which the quadrant was drawn, cloſe by the right line AC, and all the paper at the right-hand cloſe by the right line BD, and cut it alſo cloſe by the top and bottom horizontal lines, and it will be fit for paſſing round the cylinder. This cylinder (*fig.* 27.) is hollow, for holding the ſtyle DE, when it is not uſed. The ſtyle muſt ſtand out, perpendicular to the ſide of the cylinder, juſt over the right line AB (*fig.* 28.) where the parallels of altitude begin, and its length or diſtance of the point *e* from the cylinder muſt be equal to the radius *a* A of the quadrant AE (*fig.* 28.) When this *dial* is uſed, the horizontal foot BC is placed on a level table, or hung by the ring F, where the ſun ſhines, and the horizontal top AD, which is made moveable, is turned till the ſtyle ſtands juſt over the day of the month. Then the cylinder is turned round, till the ſhadow of the ſtyle falls upon it, parallel to the upright lines which divide the ſigns; or till the ſhadow is parallel to a ſuppoſed axis in the middle of the cylinder; and then the point, or loweſt end of the ſhadow, will fall upon the time of the day, as it is before or after noon, among the curve hour-lines, and will ſhew the ſun's altitude at that time, among the croſs parallels of altitude, encompaſſing round the cylinder; and it will alſo ſhew in what ſign of the ecliptic the ſun is at that time, and the degree may be nearly eſtimated by the eye. Ferguſon.

A TABLE ſhewing what altitude the Sun ſhall have at every hour, half, and quarter of the day, at his entrance into every one of the twelve Signs.

Calculated for the latitude of London, 51 deg. 32 min.

Hours and Quarters	♋ Cancer ♋		Leo ♊ ♌ Gemini		Virgo ♉ ♍ Taurus		Libra ♈ ♎ Aries		Scorpio ♓ ♏ Piſces		Sagitt. ♒ ♐ Aquar.		♑ Capric. ♑	
	⊙ Alt.		⊙ Alt.		⊙ Alt.		⊙ Alt.		⊙ Alt.		⊙ Alt.		⊙ Alt.	
	D.	M.	D.	M.	D.	M.	D.	M	D.	M.	D.	M.	D.	M.
XII.	61	59	58	41	49	59	38	28	26	57	18	15	14	57
1	61	49	58	34	49	52	38	22	26	52	18	10	14	52
2	61	23	58	8	49	32	38	01	26	37	17	56	14	50
3	60	40	57	27	48	57	37	36	26	12	17	34	14	18
XI. I.	59	42	56	33	48	10	36	56	25	37	17	03	13	48
1	58	29	55	25	47	11	36	05	24	53	16	24	13	09
2	57	04	54	06	46	01	35	04	24	01	15	36	12	23
3	55	29	52	34	44	40	33	55	22	59	14	19	11	29
X. II.	53	45	50	55	43	11	32	36	21	49	13	36	10	28
1	51	53	49	07	41	32	31	08	20	31	12	24	9	19
2	49	54	47	12	39	47	29	34	19	06	11	06	8	03
3	47	51	45	13	37	57	27	53	17	36	9	42	6	41
IX. III.	45	42	34	07	35	59	26	05	15	57	8	11	5	13
1	43	31	40	58	33	57	24	12	14	13	6	34	3	39
2	41	16	38	45	31	49	22	15	12	23	4	51	1	59
3	38	59	36	30	29	40	20	13	10	30	3	05	0	15
VIII. IV.	36	41	34	14	27	28	18	08	8	32	1	13		
1	34	23	31	56	25	13	15	58	6	31				
2	32	04	29	37	22	56	13	46	4	25				
3	29	43	27	16	20	37	11	32	2	16				
VII. V.	27	23	24	56	18	18	9	17	0	05				
1	25	04	22	37	15	59	6	58						
2	22	46	20	17	13	39	4	39						
3	20	28	17	57	11	16	2	20						
VI.	18	12	15	42	9	00	0	00						
1	15	58	14	00	6	44								
2	13	46	11	13	4	24								
3	11	37	9	01	2	08								
V. VII.	9	30	6	52										
1	7	25	4	46										
2	5	24	2	42										
3	3	27	0	43										
IV. VIII.	1	34												

When the ſun is in the equinoctial, and has no declination, his altitude may be eaſily found by the following proportion. As radius is to the coſine of the latitude, ſo is the coſine of the hour from noon to the ſine of the altitude: but if he has north or ſouth declination, ſay, as radius is to the ſine of the declination, ſo is the ſine of the latitude to the ſine of the ſun's altitude at ſix o'clock. For the ſun's altitude at other hours the two following proportions muſt be uſed, viz. 1. As the coſine of the hour from the meridian to radius, ſo is the tangent of the latitude to the tangent of a fourth arc, from which the declination is to be ſubtracted, when north, and to which it is to be added, when ſouth, for a fifth arc. The ſupplement of the ſun's declination, added to the fourth arc, muſt be uſed for this fifth arc, when they exceed a quadrant, in finding the altitudes before and after ſix.

2. As the ſine of the fourth arc is to the coſine of the fifth arc, ſo is the ſine of the latitude of the place to the ſign of the altitude for the given hour and declination.

The altitude in the middle of a ſign may either be had by taking the arithmetic mean between the next greateſt and leaſt, or by computation, in the manner above directed. Leybourn's Dialling, Tract vi. p. 23, &c.

To find the altitude by the globe, ſee GLOBE.

DIAL, *portable, on a card*, is repreſented in *fig*. 29. and may be eaſily conſtructed. Draw the occult line AB (*fig*. 30.) parallel to the top of the card, and croſs it at right angles with the ſix o'clock line ECD; then upon C, as a center, with the radius CA, deſcribe the ſemicircle AEL, and divide it into twelve equal parts, beginning at A, as A *r*, A *s*, &c. and from theſe points of diviſion draw the hour-lines *r*, *s*, *t*, *u*, *v*, *w*, and *x*, all parallel to the ſix o'clock line EC. If each part of the ſemicircle be ſubdivided into four equal parts, they will give the half-hour lines and quarters, as in *fig*. 29. Draw the right line ASD *o*, making the angle SAB equal to the latitude of your place. Upon the center A deſcribe the arc RST, and ſet off upon it the arcs SR and ST, each equal to 23½ degrees, for the ſun's greateſt declination, and divide them into 23½ equal parts, as in *fig*. 29. Through the interſection D of the lines ECD and AD *o*, draw the right line FDG at right angles to AD *o*. Lay a ruler to the points A and R, and draw the line ARF through 23½ degrees of ſouth declination in the arc SR; and then laying the ruler to the points A and T, draw the line ATG through 23½ degrees of north declination in the arc ST; ſo ſhall the lines ARF and ATG cut the line FDG in the proper length for the ſcale of months. Upon the center D, with the radius DF, deſcribe the ſemicircle F *o* G, which divide into ſix equal parts F *m*, *m n*, *n o*, &c. and from theſe points of diviſion draw the right lines *m h*, *n i*, *p k*, and *q l*, each parallel to *o* D. Then ſetting one foot of the compaſſes in the point F, extend the other to A, and deſcribe the arc A *z* H for the tropic of ♑; with the ſame extent, ſetting one foot in G, deſcribe the arc AEO for the tropic of ♋. Next ſetting one foot in the point *h*, and extending the other to A, deſcribe the arc ACI for the beginnings of the ſigns ♒ and ♐; and with the ſame extent, ſetting one foot in the point *l*, deſcribe the arc AN for the beginnings of the ſigns ♊ and ♌. Set one foot in the point *i*, and having extended the other to A, deſcribe the arc AK for the beginnings of the ſigns ♓ and ♏; and with the ſame extent ſet one foot in *k*, and deſcribe the arc AM for the beginnings of the ſigns ♉ and ♍. Then, ſetting one foot in the point D, and extending the other to A, deſcribe the curve AL for the beginnings of ♈ and ♎; and the ſigns will be finiſhed. This done, lay a ruler from the point A over the ſun's DECLINATION in the arc RST, found by a table, for every fifth day of the year; and where the ruler cuts the line FDG, make marks, and place the days of the months right againſt theſe marks, as in *fig*. 29. Laſtly, draw the ſhadow line PQ parallel to the occult line AB; make the gnomon, and ſet the hours to their reſpective lines, as in *fig*. 29. and the *dial* will be finiſhed.

The lines *a d*, *a b*, and *b c*, of the gnomon, muſt be cut quite througſt the card; and as the end *a b* of the gnomon is raiſed occaſionally above the plane of the *dial*, it turns upon the uncut line *c d* as on a hinge. The dotted line AB muſt be ſlit quite through the card, and the thread C muſt be put through the ſlit, and have a knot tied behind, to keep it from being eaſily drawn out. On the other end of this thread is a ſmall plummet D, and on the middle of it a ſmall bead for ſhewing the hour of the day.

To rectify this *dial*, ſet the thread in the ſlit right againſt the day of the month, and ſtretch the thread from the day of the month over the angular point, where the curve lines meet at XII; then ſhift the bead to that point on the thread, and the *dial* will be rectified.

To find the hour of the day, raiſe the gnomon, and hold the edge of the *dial* next the gnomon towards the ſun, ſo that the uppermoſt edge of the ſhadow of the gnomon may juſt cover the ſhadow-line; and the bead then playing freely on the face of the *dial*, by the weight of the plummet, will ſhew the time of the day among the hour-lines, in the forenoon or afternoon.

To find the time of ſun-riſing and ſetting, move the thread among the hour-lines, until it either covers ſome one of them, or lies parallel betwixt any two; and then it will cut the time of ſun-riſing among the forenoon hours, and of ſun-ſetting among the afternoon hours for that day of the year to which the thread is ſet in the ſcale of months.

To find the ſun's declination, ſtretch the thread from the day of the month over the angular point at XII, and it will cut the ſun's declination, as it is north or ſouth, for that day, in the proper ſcale.

To find on what day the ſun enters the ſigns; when the bead, as above rectified, moves along any of the curve lines which have the ſigns of the zodiac marked upon them, the ſun enters thoſe ſigns on the days pointed out by the thread in the ſcale of months.

DIAL, *univerſal, on a plain croſs*, is repreſented by *fig*. 31. and is moveable on a joint C, for elevating it to any given latitude on the quadrant C *o* 90, as it ſtands upon the horizontal board A. The arms of the croſs ſtand at right angles to the middle part; and the top of it, from *a* to *n*, is of equal length with either of the arms *n e* or *m k*.

This *dial* is rectified, by ſetting the middle line *t u* to the latitude of the place on the quadrant, the board A level, and the point N northward by the needle; thus, the plane of the croſs will be parallel to the plane of the equator. Then, from III o'clock in the morning till VI, the upper edge *k l* of the arm *i o* will caſt a ſhadow on the time of the day on the ſide of the arm *c m*; from VI till IX, the lower edge *i* of the arm *i o* will caſt a ſhadow on the hours on the ſide *o q*. From IX in the morning to XII at noon, the edge *a b* of the top part *a n* will caſt a ſhadow on the hours on the arm *n e f*; from XII to III in the afternoon, the edge *c d* of the top part will caſt a ſhadow on the hours on the arm *k l m*; from III to VI in the evening, the edge *g h* will caſt a ſhadow on the hours on the part *p q*; and from VI till IX, the ſhadow of the edge *e f* will ſhew the time on the top part *a n*. The breadth of each part *a b*, *e f*, &c. muſt be ſo great, as never to let the ſhadow fall quite without the part or arm on which the hours are marked, when the ſun is at his greateſt declination from the equator.

To determine the breadth of the ſides of the arms which contain the hours, ſo as to be in juſt proportion to their length; make an angle ABC (*fig*. 32.) of 23½ degrees, which is equal to the ſun's greateſt declination; and ſuppoſe the length of each arm, from the ſide of the long middle part, and alſo the length of the top part above the arms, to be equal to B *d*. Then, as the edges of the ſhadow, from each of the arms, will be parallel to B *e*, making an angle of 23½ degrees with the ſide B *d* of the arm, when the ſun's declination is 23½°; it is plain, that if the length of the arm be B *d*, the leaſt breadth that it can have, to keep the edge B *e* of the ſhadow B *e g d* from going off the ſide of the arm *d e* before it comes to the end of it *e d*, muſt be equal to *e d* or *d* B. But, in order to keep the ſhadow within the quarter diviſions of the hours, when it comes near the end of the arm, the breadth of it ſhould be ſtill greater, ſo as to be almoſt doubled, on account of the diſtance between the tips of the arms.

The hours may be placed on the arms, by laying down the croſs *a b c d* (*fig*. 33.) on a ſheet of paper; and with a black-lead pencil, held cloſe to it, drawing its ſhape and ſize on the paper. Then take the length *a e* in the compaſſes, and with one foot in the corner *a*, deſcribe with the other the quadrant *e f*. Divide this arc into ſix equal parts, and through the points of diviſion draw right lines *a g*, *a h*, &c. continuing three of them to the arm *c e*, which are all that can fall upon it; and they will meet the arm in thoſe points through which the lines that divide the hours from each other, as in *fig*. 31. are to be drawn right acroſs it. Divide each arm, for the three hours contained in it, in the ſame manner; and ſet the hours to their proper places, on the ſides of the arms, as they are marked in *fig*. 33. Each of the hour ſpaces ſhould be divided into four equal parts, for the half hours and quarters, in the quadrant *e f*; and right lines ſhould be drawn through theſe diviſion-marks in the quadrant, to the arms of the croſs, in order to determine the places thereon, where the ſubdiviſions of the hours muſt be marked.

This is a very ſimple kind of univerſal *dial*; it is eaſily made, and has a pretty uncommon appearance in a garden. Ferguſon.

Dials, *refracted*, are ſuch as ſhew the hour by means of ſome *refracting* tranſparent fluid.

If a pin or ſtick be ſet up, or any point be aſſigned in a concave bowl or diſh, for the center of the *dial*, let an horizontal *dial* be applied over the ſame, aſſigning the meridian line on the edges of the bowl, and marking out the reſt of the hour-lines alſo on the edges of the bowl; take away the horizontal *dial*, and elevate a ſtring or thread from the end of the ſaid pin over the meridian line, as much as is the latitude or elevation of the pole of the place: then, by bringing the thread to caſt a ſhadow on any hour-point formerly marked out on the edges of the bowl, by a candle or the like, that ſhade in the bowl is the true hour-line; and if the bowl be full of water, &c. when this is done, it will never ſhew the true hour by the ſhadow of the top of the pin but when it is filled again with the ſame liquor.

Dial, *ring*, is a kind of *dial*, uſually ſmall and portable, conſiſting of a braſs ring or rim, ſeldom exceeding two inches in diameter, and one third of an inch in breadth. In a point of this rim there is a hole, through which the ſun-beams being received, make a lucid ſpeck on the concavity of the oppoſite ſemicircle, which gives the hour of the day in the diviſions marked therein.

Theſe diviſions are made by deſcribing a circle (*Tab.* IV. *fig.* 34.) to repreſent the ring, and drawing an horizontal chord EF; with this as radius deſcribe the quadrant FD, and graduate it; and through the ſeveral degrees which mark the ſun's altitude for every hour at the time of the equinox, draw lines from F to the oppoſite part of the circle, and there ſet the correſponding figures. Thus the XII o'clock line will paſs through 38° 38′, the co-latitude of the place; the XI and I line through 36° 56′; the X and II through 32° 36′; the IX and III through 26° 5′; the VIII and IV through 18° 8′; and the VII and V through 9° 17′. This may be eaſily calculated by the globe; or ſee the preceding table.

But it only holds good about the times of the equinox. To have the dial perform throughout the whole year, the hole is made moveable, and the ſigns of the zodiac, or the days of the month, are marked on the convex ſide of the ring, by taking, e. g. ET and E*t* (*fig.* 34.) on each ſide of E equal to double the ſun's declination when he enters any particular ſign, as Taurus or Piſces; and there marking the character of the ſaid ſign, or correſponding month, and ſo for all the others; and by means of theſe the *dial* is rectified for the time. It is evident, from a view of the figure, that E XII ♉ is = F E XII = the altitude of the ſun in the equinox; but T XII E is equal to the ſun's declination in Taurus, becauſe it is an angle in the circumference ſtanding upon an arc, which is double the declination; and therefore T XII ♉ is equal to the meridian altitude when the ſun enters Taurus; and a ray paſſing through the hole at T will mark the XII o'clock hour of that day; but this *dial* will not point out the other hours exactly; becauſe T III *d* exceeds E III *d*, the equinoctial hour by the angle of declination; and ſo of the reſt. Some have contrived to remedy this inconvenience, by making the concave ſurface of the ring wider, and deſcribing upon it ſeven circles, the middle one to repreſent the equinoctial, and the extremes the tropics; and in theſe circles they have marked the forenoon and afternoon hours from a table of altitudes.

To uſe it, put the moveable hole to the day of the month, or the degree of the zodiac the ſun is in; then ſuſpending it by the little ring, turn it towards the ſun, till his rays, as before, point out the hour among the diviſions on the inſide.

Univerſal or *aſtronomical Ring*-**Dial**, is a ring-*dial* which ſerves to find the hour of the day in any part of the earth; whereas the former is confined to a certain latitude. Its figure ſee repreſented in *Table* IV. *of Dialling*, *fig.* 35.

It conſiſts of two rings or flat circles, from two to ſix inches in diameter, and their breadth, &c. proportionable. The outward ring A repreſents the meridian of any place you are at, and contains two diviſions of 90° each, diametrically oppoſite to one another, ſerving the one from the equator to the north, the other to the ſouth pole. The inner ring repreſents the equator, and turns exactly within the outer, by means of two pivots in each ring at the hour of XII.

Acroſs the two circles goes a thin reglet or bridge, with a curſor C, that ſlides along the middle of the bridge. In the curſor is a little hole for the ſun to ſhine through. The middle of this bridge is conceived as the axis of the world, and the extremities as the poles; and on the one ſide are drawn the ſigns of the zodiac, and on the other the days of the month. On the edge of the meridian ſlides a piece, to which is fitted a ring to ſuſpend the inſtrument by.

In this *dial*, the diviſions on the axis are the tangents of the angles of the ſun's declination, adapted to the ſemidiameter of the equator as radius, and placed on either ſide of the center: but inſtead of laying them down from a line of tangents, a ſcale of equal parts may be made, whereof 1000 ſhould anſwer exactly to the length of the ſemi-axis, from the center to the inſide of the equinoctial ring; and then 434 of theſe parts may be laid down toward each end from the center, which would limit all diviſions on the axis, becauſe 434 is the natural tangent of 23° 29′. And thus, by a nonius fixed to the ſliding-piece, and taking the ſun's declination from an ephemeris, and the tangent of that declination from the table of natural tangents, the ſlider might be always ſet true within two minutes of a degree. And this ſcale of 434 equal parts might be placed right againſt the 23½° of the ſun's declination, on the axis, inſtead of the ſun's place, which is there of little uſe. For then the ſlider might be ſet in the uſual way, to the day of the month, for common uſe; but to the natural tangent of the declination, when great accuracy is required.

Uſe of the univerſal Ring-**Dial**. Place the line *a* (on the middle of the ſliding-piece) over the degree of latitude of the place (e. gr. 51½° for London) put the line which croſſes the hole of the curſor to the degree of the ſign, or day of the month. Open the inſtrument ſo as that the two rings be at right angles to each other, and ſuſpend it by the ring H, that the axis of the *dial*, repreſented by the middle of the bridge, may be parallel to the axis of the world. Then turn the flat ſide of the bridge towards the ſun, ſo that his rays, ſtriking through the little hole in the middle of the curſor, may fall exactly on a line drawn round the middle of the concave ſurface of the inner ring; in which caſe the bright ſpot ſhews the hour of the day in the ſaid concave ſurface of the ring.

Note, The hour of XII is not ſhewn by this *dial*, becauſe the outer circle being then in the plane of the meridian, hinders the ſun's rays from falling on the inner; nor will this *dial* ſhew the hour when the ſun is in the equinoctial, becauſe his rays then fall parallel to the plane of the inner circle.

Nocturnal, or *Night*-**Dial**, is that which ſhews the hours of the night.

Of this there are two kinds; *lunar*, and *ſiderial*.

Moon-**Dial**, or *Lunar* **Dial**, is that which ſhews the hour of the night by means of the light, or ſhadow, of the moon, projected thereon from an index.

To deſcribe a Moon-**Dial**. Suppoſe, e. gr. an horizontal *moon-dial* required: draw, firſt, an horizontal *ſun-dial*; then erect two perpendiculars, AB and CD (*Tab.* II. *fig.* 25.) to the line of XII o'clock; and, dividing the interval GF into twelve equal parts, through the ſeveral points of diviſion draw lines parallel thereto: now, appropriating the firſt line CD to the day of the new moon, and the ſecond to the day when the moon comes an hour later to the meridian than the ſun; their interſections with the hour-lines will give points, through which to draw a curve line XII XII for the meridian-line of the moon. After the like manner determine the other hour-lines I I, II II, III III, &c. which the ſhadow of the moon, projected from the ſtyle of the *dial*, interſects at the reſpective hours; then blot out the hour-lines of the *ſun-dial*, together with the perpendiculars whereby the lunar hours were drawn, and divide the interval GF, by other parallel lines, into fifteen equal parts, anſwering to the fifteen days between new and full moon: laſtly, to theſe lines write the ſeveral days of the moon's age.

Now, the moon's age being learnt from a calendar, the interſection of the line of the moon's age with the lunar hour-lines, will give the hour of the night.

After the ſame manner may any other *ſun-dial* be converted into a *moon-dial*.

To draw a portable Moon-**Dial**. On a plane, that may be raiſed according to the elevation of the equator, deſcribe a circle AB (*fig.* 26.) and divide its circumference into 29½ equal parts: from the ſame center C deſcribe another moveable circle DE, which divide into twenty-four equal parts, or hours; in the center C erect an index, as for an equinoctial *dial*.

This *dial* being duly placed, after the manner of an equinoctial *dial*, and the XII o'clock line brought to the day of the moon's age; the ſhadow of the index will give the hour.

To uſe a ſolar as a Lunar-**Dial**, i. e. *to find the hour of the night by a* ſun-dial. Obſerve the hour which the ſhadow of the index points at by moon-light; find the moon's age in the calendar, and multiply the number of days by ¾, the product is the number of hours to be added to the hour ſhewn by the ſhadow, to give the hour required:

quired: the reaſon of which is, that the moon comes to the ſame horary circle later than the ſun by about three quarters of an hour every day; and at the time of new moon the ſolar and lunar hour coincide.

DIALS, *placing of*. Having prepared the plane on which the *dial* is to reſt, the hour may be found with tolerable accuracy by a large equinoctial ring-*dial*, to which a watch is to be ſet; and then the *dial* may be fixed by the watch at leiſure. But in order to have the time more exactly, the ſun's altitude ſhould be taken by a good quadrant, and the preciſe time of obſervation noted by a clock or watch: then the time ſhould be computed for the obſerved altitude, and the watch ſet to agree with that time. Otherwiſe, take two equal altitudes of the ſun in the ſame day in ſummer; one between ſeven and ten in the morning, the other between two and five in the afternoon; mark the moments of the two obſervations by a clock or watch; and if the watch ſhews the obſervations to be at equal diſtances from noon, it agrees exactly with the ſun; if not, the watch muſt be corrected by half the difference of the forenoon and afternoon intervals; and then the dial may be ſet true by the watch. To find a meridian line, ſee MERIDIAN.

It is neceſſary to obſerve, that if a *dial* be made according to the ſtrict rules of calculation, and truly ſet at the inſtant, when the ſun is on the meridian, it will be a minute too faſt in the forenoon, and as much too ſlow in the afternoon, by the ſhadow of the ſtyle; becauſe the edge of the ſhadow that ſhews the time is even with the foremoſt edge of the ſun in the forenoon, and with his hindmoſt edge in the afternoon, on the *dial*; whereas the ſun's center determines the time in the (ſuppoſed) hour circles of the heaven; and as the ſun is half a degree in breadth, he takes two minutes to move through a ſpace equal to his breadth; and there will be two minutes at noon in which the ſhadow will have no motion at all on the *dial*. It likewiſe appears, that if the *dial* be ſet true by the ſun in the forenoon, it will be two minutes too ſlow in the afternoon; and *vice verſâ*. The way of remedying this error, is to ſet every hour and minute diviſion on the *dial* one minute nearer XII than the calculation requires. Ferguſon's Tables and Tracts, p. 73, &c.

DIAL-*planes*, plain ſuperficies, upon which the hour-lines of *dials* are drawn. See DIAL.

DIAL, *ſiderial*. See NOCTURNAL.

DIAL, *tide*. See TIDE-*Dial*.

DIALECT, Διαλεκτος, from διαγελεσθαι, *to diſcourſe*, the peculiar language of ſome province, or part, of a nation, formed by corruption of the general, or national language.

Homer could ſpeak five different languages in one verſe, i. e. five *dialects*; viz. the Attic, Ionic, Æolic, the Doric, and the common *dialect* of the Greeks.

The Attic *dialect* is more particularly uſed by Xenophon and Thucydides; the Ionic by Herodotus and Hippocrates; the Doric by Pindar and Theocritus; the Æolic by Sappho and Alcea, and often by the two former writers.

The Bologneſe, Bergamaſque, Tuſcan, &c. are the *dialects* of the Italian; the Gaſcon, and Picard, are *dialects* of the French.

In Great Britain, almoſt every county has a *dialect* of its own; all differing conſiderably in pronunciation, accent, and tone, though the language be the ſame.

The method which the Gileadites took to prove the Ephraimites, by the pronunciation of *ſhibboleth*, with *ſchin* or *ſamech*, is well known. Judges xii. 6.

DIALECTICA, **DIALECTICS**, Διαλεκτικη, the art of reaſoning and diſputing juſtly.

The word comes from the Greek διαλεγομαι, *I diſcourſe*; formed of δια, and λεγω, *dico*, *I ſay*.

Zeno Eleates was the firſt who diſcovered the natural ſeries of principles and concluſions obſerved in reaſoning, and formed an art thereof, in form of a dialogue; which, for this reaſon, was called *dialectica*.

The *dialectica* of the ancients is uſually divided into ſeveral kinds: the firſt was the *Eleatica*, that of Zeno Eleates, which was threefold; viz. *conſecutionum*, *colloquutionum*, and *contentionum*. The firſt conſiſting of rules for deducing, or drawing, concluſions; the ſecond, the art of dialogue; which became of ſuch univerſal uſe in philoſophy, that all reaſoning was called *interrogation*: then, ſyllogiſm being laid aſide, the philoſophers did all by dialogue; it lying on the reſpondent to conclude and argue from the ſeveral conceſſions made. The laſt part of Zeno's *Dialectics*, Εριϛικη, was contentious; or the art of diſputing, and contradicting: though ſome, particularly Laertius, aſcribe this part to Protagoras, a diſciple of Zeno.

The ſecond is the *Dialectica Megarica*, whoſe author is Euclid, not the mathematician, but another, of Megara. He gave much into the method of Zeno, and Protagoras; though there are two things appropriated to him: the firſt, that he impugned the demonſtrations of others, not by aſſumptions, but concluſions; continually making illations, and proceeding from conſequence to conſequence; the ſecond, that he ſet aſide all arguments drawn from compariſons, of ſimilitude, as invalid.

He was ſucceeded by Eubulides, from whom the ſophiſtic way of reaſoning is ſaid to be derived. In his time the art is deſcribed as manifold: mentiens, fallens, electra, obvelata, arcevalis, cornuta, and calva. See SOPHISM.

The third is the *Dialectics* of Plato, which he propoſes as a kind of analyſis, to direct the human mind, by dividing, defining, and bringing things to the firſt truth; where being arrived, and ſtopping there a little, it applies itſelf to explain ſenſible things; but with a view to return to the firſt truth, where alone it can reſt. Such is the idea of Plato's analyſis.

The fourth is Ariſtotle's *Dialectics*, containing the doctrine of ſimple words, delivered in his book of Prædicaments; the doctrine of propoſitions, in his book De Interpretatione; and that of the ſeveral kinds of ſyllogiſm, in his books of Analytics, Topics, and Elenchuſes.

The fifth is the *Dialectics* of the Stoics, which they call a part of philoſophy, and divide into rhetoric, and *dialectic*; to which ſome add the definitive, whereby things are juſtly defined; comprehending, likewiſe, the canons, or criterions, of truth.

The Stoics, before they come to treat of ſyllogiſms, have two principal places; the one, about the ſignification of words; the other, about the thing ſignified. On occaſion of the firſt, they conſider abundance of things belonging to the grammarians province: what, and how many letters; what is a word, diction, ſpeech, &c. On occaſion of the latter, they conſider things themſelves, not as without the mind, but as in it, received in it by means of the ſenſes. Accordingly, they firſt teach, that *nil ſit in intellectu, quod non prius fuerit in ſenſu*; whatever is in the mind, came thither by the ſenſes; and that, *aut incurſione ſui*, as Plato, who meets the ſight; *aut ſimilitudine*, as Cæſar by his effigy; *aut proportione*, either by enlarging, as a giant; or by diminiſhing, as a pygmy; *aut tranſlatione*, as a Cyclops; *aut compoſitione*, as a Centaur; *aut contrario*, as death; *aut privatione*, as a blind man.

The ſixth is Epicurus's *Dialectics*. For though he ſeems to have deſpiſed *dialectic*, he cultivated it with vigour: he was only averſe to that of the Stoics, who, he thought, attributed too much to it; as pronouncing him alone wiſe, who was well verſed in *dialectics*. For this reaſon, Epicurus, ſeeming to ſet aſide the common *dialectics*, had recourſe to another way; viz. to certain canons, which he ſubſtituted in their ſtead, the collection whereof he called Canonica; and as all queſtions in philoſophy are either *de re*, or *de voce*, he gave ſeparate rules for each. See EPICUREANS.

DIALECTICAL *arguments*, in *Logic*, are ſuch as are only probable, and do not convince, or determine, the mind abſolutely to either ſide of the queſtion.

DIALIA, in *Antiquity*, ſacrifices performed by the *flamen dialis*, or prieſt of Jupiter.

It was not, however, of ſuch abſolute neceſſity, that the *dialia* ſhould be performed by the *flamen dialis*; but that others might officiate. We find in Tacitus, Annal. lib. ii. cap. 58. that if he were ſick, or detained by any other public employ, the pontifices took his place.

DIALIS, in *Antiquity*, a Latin term, ſignifying ſomewhat that belongs to Jupiter.

The word is formed from Διος, the genitive of Ζευς, *Jupiter*.

DIALIS, *Flamen*. See FLAMEN.

DIALITHA, from δια and λιθος, *gem*, in the *Writings of the Ancients*, a word uſed to expreſs the elegant ornaments of the Greeks and Romans, compoſed of gold and gems. They alſo called theſe *lithocolia*, cemented ſtones or gems; the gold being, in this caſe, as a cement, to hold the ſtones together. They wore bracelets, and other ornamental things about their habits, thus made; and their cups and table-furniture for magnificent treats were of this kind. The green ſtones were found to ſucceed beſt of all in theſe things; and the emerald and greeniſh topaz, or, as we call it, chryſolite, were moſt in eſteem for this purpoſe. This uſe of the ſtone explains what Pliny very often ſays of them in his deſcription: *Nihil jucundius aurum decet: nothing becomes gold better*. This he ſays of the green topaz or chryſolite; and this, and many other like paſſages, have greatly perplexed the critics who did not hit upon this explication. The Latins called theſe *dialitha*, *lithocolla*, and *aurum gemmatum*; and thus Martial, where he ſays *miratur Scythicas virentis auri flammas Jupiter*, alludes to cups of gold, ornamented with Scythian gems, that is, emeralds.

DIALIUM, in *Botany*, a genus of the *diandria monogynia* claſs; the corolla has five petals, and there is no calyx. There is only one ſpecies.

DIALLACTERII, among the Athenians. See Diætetæ.

DIALLELOS, Διαλληλος, in *Rhetoric*, a figure, wherein the words and meaning of a ſentence are inverted, as *doctis diſertior, diſertis doctior*. Voſſ. Rhet. lib. v. p. 405.

DIALLING, the art of drawing ſun, moon, and ſtar-dials, on any given plane, or on the ſurface of any given body. See Dial.

The Greeks and Latins call this art *gnomonica*, and *ſciatherica*, becauſe it diſtinguiſhes the hours by the ſhadow of a gnomon. Some call it *photo-ſciatherica*, becauſe the hours are ſometimes ſhewn by the light of the ſun. Laſtly, others call it *horologiography*.

Dialling is wholly founded on the firſt motion of the heavenly bodies, and chiefly the ſun; or rather on the diurnal rotation of the earth; ſo that the elements of ſpherics, and the ſpherical aſtronomy, ſhould be maſtered, before a perſon advances to the doctrine of *dialling*: the doctrine, or theory, we ſay; for, as to the practice, or the operations themſelves diſtinct from the demonſtrations, nothing is more eaſy and obvious.

The principles of *dialling* may be eaſily deduced from the method, already illuſtrated, of conſtructing *dials* by the globe. Or, they may be farther explained, by ſuppoſing the whole earth *a*P*cp* (*Tab.* IV. *fig.* 36.) to be tranſparent and hollow, like a ſphere of glaſs, and its equator to be divided into twenty-four equal parts by ſo many meridian ſemicircles *a*, *b*, *c*, *d*, *e*, *f*, *g*, &c. one of which is the geographical meridian of any given place, as London, which is ſuppoſed to be at the point *a*; and if the hour of XII were marked at the equator, both upon that meridian and the oppoſite one, and all the reſt of the hours in order on the other meridians, thoſe meridians would be the hour circles of London: becauſe, as the ſun appears to move round the earth, which is in the center of the viſible heavens, in twenty-four hours, he will paſs from one meridian to another in an hour. Then, if the ſphere had an opake axis, as PE*p*, terminating in the poles P and *p*, the ſhadow of the axis, which is in the ſame plane with the ſun and with each meridian, would fall upon every particular meridian and hour, when the ſun came to the plane of the oppoſite meridian, and would conſequently ſhew the time at London, and at all other places on the ſame meridian. If this ſphere was cut through the middle by a ſolid plane ABCD in the rational horizon of London, one half of the axis EP would be above the plane, and the other half below it; and if ſtrait lines were drawn from the center of the plane to thoſe points where its circumference is cut by the hour circles of the ſphere, thoſe lines would be the hour lines of an horizontal dial for London; for the ſhadow of the axis would fall upon each particular hour line of the dial, when it fell upon the like hour circle of the ſphere. If the plane which cuts the ſphere be upright, as AFCG (*fig.* 37.) touching the given place, e. g. London, at F, and directly facing the meridian of London, it will then become the plane of an erect direct ſouth dial; and if right lines be drawn from its center E, to thoſe points of its circumference where the hour circles of the ſphere cut it, theſe will be the hour lines of a vertical or direct ſouth dial for London, to which the hours are to be ſet in the figure, contrary to thoſe on an horizontal dial; and the lower half E*p* of the axis will caſt a ſhadow on the hour of the day in this dial, at the ſame time that it would fall upon the like hour circle of the ſphere, if the dial plane was not in the way. If the plane, ſtill facing the meridian, be made to incline, or recline, any given number of degrees, the hour circles of the ſphere will ſtill cut the edge of the plane in thoſe points to which the hour lines muſt be drawn ſtrait from the center; and the axis of the ſphere will caſt a ſhadow on theſe lines at the reſpective hours. The like will ſtill hold, if the plane be made to decline by any given number of degrees from the meridian towards the eaſt or weſt; provided the declination be leſs than 90 degrees, or the reclination be leſs than the co-latitude of the place; and the axis of the ſphere will be the gnomon: otherwiſe, the axis will have no elevation above the plane of the dial, and cannot be a gnomon.

Thus it appears, that the plane of every dial repreſents the plane of ſome great circle on the earth, and the gnomon the earth's axis; the vertex of a right gnomon the center of the earth or viſible heavens; and the plane of the dial is juſt as far from this center as from the vertex of this ſtile. The earth itſelf, compared with its diſtance from the ſun, is conſidered as a point; and therefore, if a ſmall ſphere of glaſs be placed upon any part of the earth's ſurface, ſo that its axis be parallel to the axis of the earth, and the ſphere hath ſuch lines upon it, and ſuch planes within it, as above deſcribed; it will ſhew the hours of the day as truly as if it were placed at the earth's center, and the ſhell of the earth were as tranſparent as glaſs. Ferguſon, ubi ſupra.

The firſt profeſſed writer on *dialling*, is Clavius; who demonſtrates all, both the theory, and the operations, after the rigid manner of the ancient mathematicians; but ſo intricately, that probably no body ever read them at all: Dechales, Ozanam, and Schottus, give much eaſier in their Courſes, and Wolfius in his Elements. M. Picard has given a new method of making large dials, by calculating the hour lines; and M. de la Hire, in his Dialling, printed in 1683, a geometrical method of drawing hour lines from certain points, determined by obſervation. Eberhardus Walperus, in 1625, publiſhed his Dialling, wherein he lays down a method of drawing the primary dials on a very eaſy foundation. The ſame foundation is deſcribed at length by Sebaſtian Munſter, in his Rudimenta Mathematica, publiſhed in 1651. Sturmius, in 1672, publiſhed a new edition of Walperus's Dialling, with the addition of a whole ſecond part, about inclining, and declining dials, &c. In 1708, the ſame work, with Sturmius's additions, was republiſhed with the addition of a fourth part, containing Picard's, and De la Hire's methods of drawing large dials, which makes much the beſt, and fulleſt book on the ſubject. Peterſon, Michael, and Muller, have each written on *dialling*, in the German tongue; Coetſius, in his Horologiographia Plana, printed in 1689; Gauppenius, in his Gnomonica Mechanica; Leybourn, in his Dialling, fol. and Bion, in his Uſe of Mathematical Inſtruments. We have a treatiſe by Mr. Deparcieux, in 1740. Mr. Ferguſon has alſo written on this ſubject in his Lectures on Mechanics.

Dialling *Cylinder*, *Univerſal*, is repreſented by *fig.* 38. ABCD is a glaſs cylindrical tube, cloſed at both ends with braſs plates, in the centers of which a wire or axis EFG is fixed. The tube is either fixed to an horizontal board H, ſo that its axis may make an angle with the board equal to that which the earth's axis makes with the horizon of any given place, and be parallel to the axis of the world; or it may be made to move on a joint, and elevated for any particular latitude. The twenty-four hour lines are drawn with a diamond on the outſide of the glaſs, equidiſtant from each other and parallel to the axis. The XII next B ſtands for midnight, and the XII next the board H for noon. When the axis of this inſtrument is elevated according to the latitude, and the board ſet level, with the line HN in the plane of the meridian, and the end N towards the north; the axis EFG will ſerve as a gnomon or ſtile, and caſt a ſhadow on the hour of the day among the parallel hour lines, when the ſun ſhines on the inſtrument. As the plate AD at the top is parallel to the equator, and the axis EFG perpendicular to it, right lines drawn from the center to the extremes of the parallels will be the hour lines of an equinoctial dial, and the axis will be the ſtile. An horizontal plate *ef* put down into the tube, with lines drawn from the center to the ſeveral parallels cutting its edge, will be an horizontal dial for the given latitude; and a vertical plate *gc*, fronting the meridian and touching the tube with its edge, with lines drawn from its center to the parallels, will be a vertical ſouth dial: the axis of the inſtrument ſerving in both caſes for the ſtile of the dial: and if a plate be placed within the tube, ſo as to decline, incline, or recline, by any given number of degrees, and lines be drawn, as above, a declining, inclining, or reclining dial will be formed for the given latitude. If the axis with the ſeveral plates fixed to it be drawn out of the tube, and ſet up in ſunſhine in the ſame poſition as they were in the tube, AD will be an equinoctial dial, *ef* an horizontal dial, and *gc* a vertical ſouth dial; and the time of the day will be ſhewn by the axis EFG. If the cylinder were wood, inſtead of glaſs, and the parallel lines drawn upon it in the ſame manner, it would ſerve to facilitate the operation of making theſe ſeveral dials. The upper plate with lines drawn to the ſeveral interſections of the parallels, which appears obliquely in *fig.* 38. would be an equinoctial dial as in *fig.* 39. and the axis perpendicular to it be its ſtile. An horizontal dial for the latitude of the elevation of the axis might be made, by drawing out the axis and cutting the cylinder, as at *efgh*, parallel to the horizontal board H; the ſection would be elliptic, as in *fig.* 40. A circle might be deſcribed on the center, and lines drawn to the diviſions of the ellipſe would be the hour lines; and the wire put in its place again, as E, would be the ſtile. If this cylinder were cut by a plane perpendicular to the horizontal board H, or to the line SHN, beginning at *g*, the plane of the ſection would be elliptic, as in *fig.* 41. and lines drawn to the points of interſection of the parallels on its edge would be the hour lines of a vertical direct ſouth dial, which might be made of any ſhape, either circular or ſquare; and F the axis of the cylinder would be its ſtile. Thus alſo inclining, declining, or reclining dials might be eaſily conſtructed, for any given latitude. Ferguſon, ubi ſupra.

DIALLING *Globe*, is an inſtrument made of braſs, or wood, with a plane fitted to the horizon, and an index; particularly contrived to draw all ſorts of dials, and to give a clear exhibition of the principles of that art.

DIALLING *Lines*, or *Scales*, are graduated lines, placed on rules, or the edges of quadrants, and other inſtruments, to expedite the conſtruction of dials.

The principal of theſe lines are, 1. A ſcale of ſix hours, which is only a double tangent, or two lines of tangents each of 45 degrees, joined together in the middle, and equal to the whole line of ſines, with the declination ſet againſt the meridian altitudes in the latitude of London, ſuppoſe, or any place for which it is made: the radius of which line of ſines is equal to the *dialling ſcale* of ſix hours. 2. A line of latitudes, which is fitted to the hour ſcale, and is made by this canon: as the radius is to the chord of 90 degrees; ſo are the tangents of each reſpective degree of the line of latitudes, to the tangents of other arches: and then the natural ſines of thoſe arches are the numbers, which, taken from a diagonal ſcale of equal parts, will graduate the diviſions of the line of latitude to any radius. The line of hours and latitudes is generally for pricking down all dials with centers. For the method of conſtructing theſe ſcales, see SCALE.

DIALLING *Sphere*, is an inſtrument made of braſs, with ſeveral ſemicircles ſliding over one another, on a moving horizon, to demonſtrate the nature of the doctrine of ſpherical triangles, and to give a true idea of the drawing of dials on all manner of planes.

DIALLING, in a *Mine*, called alſo *Plumbing*, is the uſing of a compaſs (which they call *dial*), and a long line, to know which way the load, or vein of ore inclines, or where to ſhift an air-ſhaft, or bring an adit to a deſired place. See MINE, and PLUMBING.

DIALOGISM, Διαλογισμος, in *Rhetoric*, is uſed for the ſoliloquy of perſons deliberating with themſelves. We have an inſtance of it in Virgil, where Dido ſays,

> *En quid agam? rurſuſne procos irriſa priores*
> *Experiar? &c.*

In which ſenſe, it is diſtinguiſhed from dialogue. Voſſ. Rhet. lib. v. p. 355. See DIALOGUE.

DIALOGISM is alſo taken in a more extenſive ſenſe for diſcourſe in general, whether held by a perſon alone, or in company.

DIALOGUE, a converſation of two, or more perſons, real or feigned, either by word of mouth, or in writing. The word is formed from the Latin *dialogus*, of the Greek διαλογος, which ſignifies the ſame.

Dialogue is greatly recommended by many authors, and is the moſt ancient form of writing; and that wherein the firſt authors wrote moſt of their pieces. The archbiſhop of Cambray gives a fine account of the advantages of *dialogue*, at the head of his paſtoral inſtruction. The ſacred writers, and the fathers Athanaſius, Baſil, Chryſoſtom, &c. have uſed this mode of inſtruction.

Antiquity made uſe of *dialogue*, not only on humorous, and comical ſubjects, as Lucian did, but alſo on the moſt ſerious and abſtract: ſuch are the *Dialogues* of Plato, and thoſe of Cicero, which turn altogether on ſubjects of philoſophy, or politics. Among the moderns, the principal dialogiſts are M. de Fenelon, archbiſhop of Cambray; M. Paſchal, in his Provincial Letters; F. Bouhours, in his Entretiens d'Ariſte, & d'Eugene; M. Fontenelle, in his Dialogues of the Dead, and Plurality of Worlds; Addiſon, Hurd, and Lord Lyttelton.

A *dialogue* conſiſts of two parts, an introduction and the body of the diſcourſe. The introduction acquaints us with the place, time, perſons, and occaſion of the converſation. However, the introduction ought not to be too long and tedious. Mr. Addiſon complains of this fault: for though, as he ſays, ſome of the fineſt treatiſes of the moſt polite Latin and Greek writers are in *dialogue*, as many very valuable pieces of French, Italian, and Engliſh appear in the ſame dreſs; yet in ſome of them there is ſo much time taken up in ceremony, that before they enter on their ſubject, the *dialogue* is half over. Dial. II. of Med. ap. init. As to the body of the diſcourſe, care ſhould be taken, to keep up a juſtneſs of character in the perſons that are introduced through the whole of the *dialogue*: and the characters ſhould be ſo diſcriminated, that it may be known from the words themſelves, who is the ſpeaker. The principal ſpeaker ſhould appear to be a perſon of great ſenſe and wiſdom, and intimate acquaintance with the ſubject; and he ſhould be capable of fairly anſwering every queſtion that may be aſked, and every objection that may be ſtarted. In the whole diſcourſe, all wrangling, peeviſhneſs, and obſtinacy ſhould be avoided; and nothing appear but good humour and good breeding, with a readineſs to ſubmit to conviction, as evidence preſents itſelf. Cicero has given us two characters of this kind in Craſſus and Antony; from whom Mr. Addiſon ſeems to have taken his Philander and Cynthio, in his Dialogues on the Uſefulneſs of Ancient Medals. If younger perſons are introduced, they ſhould rather inquire than diſpute; and neither be too long nor too frequent in the queſtions they propoſe. Sulpitius and Cotta are made to ſuſtain this character by Cicero, and Eugenius by Mr. Addiſon. A perſon of humour may alſo be introduced to enliven the diſcourſe, as Cæſar by Cicero, and Cynthio by Mr. Addiſon. With regard to the ſubject of a *dialogue*, all the arguments ſhould at leaſt appear probable, and nothing be advanced, which may ſeem weak or trivial. Short and pleaſant digreſſions are allowed, but they ſhould not interrupt the thread of the diſcourſe, and break the union of the parts and conſtant reference to the main end, which are eſſential to a *dialogue*. The time allowed for a *dialogue* has been various: Cicero allows two days for his three *dialogues* concerning an orator; but Mr. Addiſon extends his to three days, allowing a day for each. The method of compoſing *dialogues* has likewiſe been various: ſometimes a writer relates a diſcourſe, by way of narrative, which paſſed between other perſons; ſuch are the *dialogues* of Cicero and of Mr. Addiſon laſt mentioned: at other times the ſpeakers are introduced in perſon; Cicero's *Dialogues* of Old Age, of Friendſhip, and of the Parts of Oratory, are written in this manner. Plato and Lucian generally chooſe this method. As for the ſtile of a *dialogue*, the low STILE is the proper character, in which they ſhould generally be written. Ward's Orat. vol. ii. p. 221, &c.

DIALOGUE, in *Muſic*, is a compoſition for at leaſt two voices, or two inſtruments, which anſwer each other; and which frequently uniting at the cloſe, make a trio with the thorough-baſs.

Such are many of the ſcenes in the Italian and French operas.

DIALTHÆA, in *Pharmacy*, an unguent, thus called from its baſis, which is root of the *althæa*, or marſhmallow.

It conſiſts of mucilages drawn from that root, and from linſeed and fenugreek ſeed. The other ingredients are common oil, wax, reſin, and turpentine.

It is eſteemed proper to ſoften, and diſſolve; aſſuage pains of the ſide, ſoften calluſes, and ſtrengthen the nerves. It is applied by rubbing it on the part affected.

DIALYSIS, in *Grammar*, a character, conſiſting of two points ·· placed over two vowels of a word, which would otherwiſe make a diphthong; but are hereby parted into two ſyllables: as in *Moſaïc*. See DIÆRESIS.

DIAMARGARITON, in *Pharmacy*, a medicine denominated from pearls, called, in Latin, *margaritæ*; which are a principal ingredient therein.

There are two kinds; the *hot*, and the *cold*: but both are diſuſed at this time.

DIAMARGARITON, *Hot*, is a powder compoſed of pearls, pellitory, ginger, nutmeg, cinnamon, and divers other hot ingredients. It is reputed hyſteric; it ſtrengthens the womb, promotes the menſes, and aſſiſts digeſtion.

DIAMARGARITON, *Cold*, is a ſolid electary, compoſed of pearls ground fine, and white ſugar diſſolved in roſe water, or that of bugloſs, and boiled to a conſiſtence. It ſtrengthens the ſtomach, moderates the too abundant acids, ſtops the ſpitting of blood, and looſeneſs of the belly.

DIAMARGARITON, *Compound cold*, is a powder made of pearls, red roſes, flowers of nenuphar, and violet, lignum aloes, red and citron ſantal, tormentil root, ſeeds of melon, endive, &c. It is cardiac and ſtrengthening, facilitates reſpiration, and corrects malignant humours.

DIAMARTYRIA, Διαμαρτυρια, in *Antiquity*, a proteſtation that the deceaſed perſon had left an heir, made to hinder the relations from entering upon the eſtate. Potter, Archæol. Græc. tom. i. lib. i. cap. 24. p. 128.

DIAMASTIGOSIS, in *Antiquity*. It was a cuſtom among the Lacedæmonians, for the children of the moſt diſtinguiſhed families to ſlaſh and tear each others bodies with rods before the altars of the gods; the fathers and mothers, who were preſent at the ſpectacle, animating and exciting them all the while, not to give the leaſt ſign of pain, or concern. This practice they called *diamaſtigoſis*, a Greek term, derived from διαμαστιγοω, *I whip, ſcourge*. The deſign hereof, apparently, was no other than to harden their youth, and inure them betimes to blows, wounds, &c. that they might deſpiſe them when they came to war.

DIAMBRÆ *ſpecies*, in the *Materia Medica*, the name of two medicines in the London Diſpenſatory, the one called *ſpecies diambræ ſine odoratis*, the other, *ſpecies di-*

ambræ cum odoratis, from the ambergriſe in their compoſition. The *ſpecies diambræ* without perfumes, is originally a preſcription of Meſue, and exactly tranſcribed from him into their firſt Diſpenſatory. This is eſteemed a great cephalic and cordial, and is frequently preſcribed in nervous decays, from apoplexies, epilepſies, palſies, and old age. It ſtrengthens the ſtomach in particular, raiſes the ſpirit, and warms the blood to a very great degree; it is thereby a provoker to venery, but more as a ſtimulus than by ſupplying any freſh recruits, or augmenting the ability. Its doſe is from ten grains to half a dram. James.

DIAMETER, from διὰ, and μετρεῖν, *to meaſure*, in *Geometry*, a right line paſſing through the center of a circle, and terminated on each ſide by the circumference thereof.

Or, *diameter* may be defined a chord paſſing through the center of a circle. Such is the line A E (*Tab. Geometry, fig.* 24.) paſſing through the center C. Hence the *diameter* is the greateſt of all chords.

Half a *diameter*, as C D, drawn from the center C to the circumference, is called the *ſemidiameter*, or *radius*.

The *diameter* divides the circumference into equal parts. And hence we have a method of deſcribing a ſemicircle upon any line; aſſuming a point therein for the center.

To find the ratio of the DIAMETER *to the circumference.* This has been greatly ſought for by the mathematicians; and no wonder; inaſmuch as if this were juſtly given, the quadrature of the circle were atchieved.

Archimedes firſt propoſed a method of finding it, by regular polygons inſcribed in a circle, till arriving at a ſide ſubtending an exceeding ſmall arch, and then ſeeking a ſide of a ſimilar polygon circumſcribed; each of theſe being multiplied by the number of ſides of the polygon, give the perimeter of the polygon both inſcribed, and circumſcribed. In which caſe the ratio of the *diameter* to the circumference of the circle, is greater than that of the ſame *diameter* to the perimeter of the circumſcribed polygon, but leſs than that of the *diameter* to the perimeter of the polygon inſcribed. The difference between both gives the ratio of the *diameter* to the circumference in numbers nearly true.

That celebrated author, as already obſerved, by polygons of 96 ſides, found the ratio of the *diameter* to the circumference to be as 7 to 22; viz. ſuppoſing the *diameter* 1, the perimeter of the inſcribed polygon is found $3\frac{10}{71}$, and that of the circumſcribed $3\frac{1}{7}$.

After his example, later authors have found out ratios yet nearer truth; Wolſius finds it as 10000000000000000 to 31415926535897932; but none ſpent ſo much time on it as Van Ceulen, who, after immenſe pains, found that ſuppoſing the *diameter* 1, the circumference is leſs than 3.14159265358979323846264338387950, and yet greater than the ſame number with only the laſt figure 0 changed into 1. Mr. A. Sharp doubled Van Ceulen's numbers; and this is ſo near the truth, that the *diameter* of the earth being given, we might from thence compute the number of ſands equal to the ſolid content of the earth ſo near as not to differ one grain of ſand from the truth. Mr. Machin carried them to one hundred places: thus the circumference of a circle whoſe *diameter* is 1, will be 3.141592653589793238462643383879502884197169399375105820974944592307816405286208998628 0348253421170679.

But as ſuch prolix numbers are too unwieldy for practice, many of our preſent practical geometricians aſſume the *diameter* to be to the circumference as 100 to 314; or in greater circles as 10000 to 31415; in which proportion Ptolemy, Vieta, and Huygens, agree with Van Ceulen. Ad. Metius gives us the ratio 113 to 355, which is the moſt accurate of all thoſe expreſſed in ſmall numbers; as not erring 3 in 10000000. Thoſe in common uſe are Archimedes's, Metius's, or the proportion of 1 to 3.14159.

The DIAMETER *of a circle being given, to find the circumference, and area; and the circumference being given, to find the* diameter. The ratio of the *diameter* to the circumference being had, as in the laſt article, that of the circumference to the *diameter* is had likewiſe. Then the circumference, being multiplied into the fourth part of the *diameter*, gives the area of the circle. Thus, if the *diameter* be 100, the circumference will be 314, and the area of the circle 7850. But the ſquare of the *diameter* is 10000: therefore, this is to the area of the circle as 10000 to 7850, that is, as 1000 to 785 nearly.

The area of the circle being given, to find the DIAMETER. To 785, 1000, and the given area of the circle 246176, find a fourth proportional, viz. 3113600, which is the ſquare of the *diameter*. Out of this extract the ſquare root, and it is the *diameter* itſelf.

DIAMETER *of a conic ſection*, is a right line, as A D (*Tab. Conics, fig.* 5.), biſecting all the ordinates M M, &c. in P, &c. See CONIC.

This, when it cuts the ſaid lines at right angles, is more particularly called the *axis of the curve*, or *ſection*.

DIAMETER, *Tranſverſe*, is a right line, as A B (*Tab. Conics, fig.* 6. N° 2.), which being continued each way between two curves, biſects parallel right lines between the ſame, as M M.

DIAMETER, *Conjugate*, is a right line, biſecting lines drawn parallel to the tranſverſe *diameter*. See CONJUGATE.

DIAMETER *of a ſphere*, is the *diameter* of the ſemicircle by whoſe rotation the ſphere is generated; called alſo the *axis of the ſphere*.

DIAMETER *of gravity*, is a right line paſſing through the center of gravity.

DIAMETER, in *Aſtronomy*. The *diameters* of the heavenly bodies are either *apparent*, i. e. ſuch as they appear to the eye; or *real*, i. e. ſuch as they are in themſelves.

The *apparent diameters* meaſured with a micrometer, are found different, in different circumſtances and parts of their orbits. Theſe are the angles under which the *diameters* of the planets are ſeen from the earth; and they are equal to the real *diameters* divided by the diſtance from the earth: or, as theſe angles are very ſmall, the *diameters* may be taken for arcs of a circle deſcribed on the eye as a center, with a radius equal to the diſtance of the planets; and they are ſaid to conſiſt of as many minutes and ſeconds as thoſe angles conſiſt of: therefore the *apparent diameters* of a planet are in the inverſe ratio of their real diſtances. The ſun's vertical *diameter* is found by taking the height of the upper and lower edge of his diſk, when he is in or near the meridian; the height of each edge muſt be corrected by proper allowances for parallax and refraction, and the difference between the true height of the upper and lower edge is the true *diameter*. The ſun's *apparent diameter* may be determined by obſerving with a good clock the time which the ſun's diſk takes in paſſing through the plane of the meridian, or ſome other hour circle. If the ſun is in or near the equator, the following proportion may be uſed; viz. as the time between the ſun's leaving the meridian or any other hour circle and returning to it again, is to 360 degrees, ſo is the time of the ſun's tranſit to the number of minutes and ſeconds of a degree contained in his *apparent diameter*. If the ſun is in a parallel at ſome diſtance from the equator, his *diameter* meaſures a greater number of minutes and ſeconds in that parallel than it would do in a great circle, and takes up proportionally more time in paſſing over the meridian; in which caſe ſay, as the whole ſine is to the coſine of the ſun's declination, ſo is the time of the ſun's paſſing the meridian reduced to minutes and ſeconds of a degree, to the arc of a great circle which meaſures the ſun's apparent horizontal *diameter*. See TRANSIT.

The ſun's *apparent diameter* may alſo be taken by the projection of his image in a dark room.

There are ſeveral ways of finding the *apparent diameters* of the planets: but the moſt certain method is that with the MICROMETER.

	Greateſt.			Mean.			Leaſt.		
Apparent Diameter *of the Sun*,	′	″	‴	′	″	‴	′	″	‴
according to Ariſtarchus and Archimedes,	30	0	0	30	0	0	30	0	0
Ptolemy,	33	20	0	32	18	0	31	20	0
Albatennius,	33	40	0	32	28	0	31	20	0
Regiomontanus,	34	0	0	32	27	0	31	0	0
Copernicus,	33	54	0	32	44	0	31	40	0
Tycho,	32	0	0	31	0	0	30	0	0
Kepler,	31	4	0	30	30	0	30	0	0
Ricciolus,	32	8	0	31	40	0	31	0	0
Joh. Dom. Caſſini,	32	46	0	32	13	0	31	40	0
Gaſcoigne,	32	50	0	—	—	—	31	40	0
Flamſteed,	32	48	0	—	—	—	31	30	0
Mouton,	32	32	0	—	—	—	30	29	0
De la Hire,	32	44	0	32	11	0	31	38	0
Louville,	32	37	7	32	4	36	31	32	50
M. Caſſini F.	32	37	30	32	5	0	31	32	30
Monnier,	—	—	—	32	5	0	—	—	—
Short,	32	33	0	—	—	—	31	28	0
Apparent Diameter *of the Moon*,									
according to Ptolemy,	35	20	0	—	—	—	31	20	0
In the Conjunct. Tycho,	28	48	0	—	—	—	25	36	0
In the Oppoſ.	36	0	0	—	—	—	32	0	0
Kepler,	32	44	0	—	—	—	30	0	0
De la Hire,	33	30	0	—	—	—	29	30	0
In Syzygy, Sir I. Newton,	—	—	—	31	30	0	—	—	—
In Quadrature,	—	—	—	31	3	0	—	—	—
Full, in Perigee, Mouton,	33	29	0	—	—	—	—	—	—
In Syzygy, Monnier,	—	—	—	31	30	0	—	—	—
In Quadrature,	—	—	—	31	0	0	—	—	—

	Greateſt.			Mean.			Leaſt.		
	′	″	‴	′	″	‴	′	″	‴
Apparent Diameter *of Saturn*, according to Albatennius,	—	—	—	1	44	28	—	—	—
Alfraganus,	—	—	—	1	44	28	—	—	—
Tycho,	2	12	0	1	50	0	1	34	0
Hevelius,	0	19	0	0	16	0	0	14	0
Hortenſius,	0	42	40	0	37	0	0	31	0
Kepler,	0	30	0	—	—	—	—	—	—
Ricciolus,	1	12	0	0	57	0	0	46	0
Huygens,	—	—	—	—	—	—	0	30	0
Flamſteed,	0	25	0	—	—	—	—	—	—
Sir I. Newton, from the obſervations of Pound,	—	—	—	0	16	0	—	—	—
Monnier,	—	—	—	0	16	0	—	—	—
Saturn's Ring, according to Huygens,	—	—	—	1	4	0	1	8	0
Sir I. Newton, from the obſervations of Pound,	—	—	—	0	40	0	—	—	—
Monnier,	—	—	—	0	42	0	—	—	—
Apparent Diameter *of Jupiter*, according to Albatennius and Alfraganus,	—	—	—	2	36	40	—	—	—
Tycho,	3	59	0	2	45	0	2	14	0
Hevelius,	0	24	0	0	18	0	0	14	0
Hortenſius,	1	1	40	0	50	0	0	38	30
Kepler,	0	50	0	—	—	—	—	—	—
Ricciolus,	1	8	46	0	49	46	0	38	18
Huygens,	—	—	—	—	—	—	1	4	0
Flamſteed,	0	54	0	—	—	—	—	—	—
Sir I. Newton, from the obſervations of Pound,	—	—	—	0	37	15	—	—	—
Monnier,	—	—	—	0	37	0	—	—	—
Apparent Diameter *of Mars*, according to Albatennius and Alfraganus,	—	—	—	1	34	0	—	—	—
Tycho,	6	46	0	1	40	0	0	57	0
Hevelius,	0	20	0	0	5	0	0	2	0
Hortenſius,	1	4	0	0	36	0	0	9	0
Kepler,	6	30	0	—	—	—	—	—	—
Ricciolus,	1	32	0	0	22	0	0	10	6
Huygens,	—	—	—	—	—	—	0	30	0
Flamſteed,	0	33	0	—	—	—	—	—	—
Monnier,	—	—	—	—	—	—	0	26	0
Apparent Diameter *of Venus*, according to Albatennius,	3	8	0	—	—	—	—	—	—
Alfraganus,	1	34	0	—	—	—	—	—	—
Tycho,	4	40	0	3	15	0	1	52	0
Hevelius,	1	5	0	0	16	0	0	9	0
Hortenſius,	1	40	0	0	53	0	0	15	20
Kepler,	7	6	0	—	—	—	—	—	—
Ricciolus,	4	8	0	1	4	12	0	33	30
Huygens,	—	—	—	—	—	—	1	25	0
Flamſteed,	1	12	0	—	—	—	—	—	—
Horrox,	1	18	30	—	—	—	—	—	—
Crabtree,	1	9	0	—	—	—	—	—	—
Monnier,	—	—	—	1	17	0	—	—	—
By the tranſit of 1761,	—	—	—	0	58	0	—	—	—
By the tranſit of 1769,	—	—	—	0	59	0	—	—	—
Apparent Diameter *of Mercury*, according to Albatennius,	—	—	—	2	5	20	—	—	—
Alfraganus,	—	—	—	1	15	12	—	—	—
Tycho,	3	57	0	2	10	0	1	29	0
Hevelius,	0	11	0	0	6	0	0	4	0
Hortenſius,	0	28	0	0	19	0	0	10	0
Ricciolus,	0	25	12	0	13	48	0	9	20
Bradley,	0	10	45	—	—	—	—	—	—
Monnier,	—	—	—	—	—	—	0	10	0

The great difference between Tycho, and the other two aſtronomers, Hevelius and Huygens, is owing to this, that Tycho, in imitation of the ancients, meaſured the *diameters*, as they appeared to the naked eye; whereas they uſed teleſcopes, whereby a deal of ſpurious luſtre, which otherwiſe makes them appear bigger than they are, is taken off: nevertheleſs, the *diameters* of the planets meaſured by Huygens's method are ſomewhat bigger than they ought to be, becauſe the rays of light are inflected as they paſs by the edges of ſolid bodies, to which his method of obſerving was liable. On the other hand, Flamſtead's micrometer inflected the rays the contrary way, and gave their *apparent diameters* too ſmall; and therefore Whiſton choſe the mean between the meaſures of Huygens and Flamſtead.

The mean *diameters* of the planets as ſeen from the ſun are as follow: viz. that of Mercury, 20″; of Venus, 30″; of the Earth, 17″; of the Moon, 6″; of Mars, 11″; of Jupiter, 37″; and of Saturn, 16″. See PARALLAX.

The following table ſhews the *apparent diameters* of the ſun at different times of the year.

	′	″		′	″
January 1.	32	38.4	July 1.	31	33.8
7.	32	38.2	7.	31	34.0
13.	32	37.6	13.	31	34.4
19.	32	36.4	19.	31	34.2
25.	32	35.2	25.	31	36.2
February 1.	32	33.0	Auguſt 1.	31	38.0
7.	32	31.2	7.	31	38.8
13.	32	28.8	13.	31	41.8
19.	32	26.2	19.	31	44.2
25.	32	23.4	25.	31	46.6
March 1.	32	21.4	September 1.	31	49.8
7.	32	18.4	7.	31	52.8
13.	32	15.4	13.	31	55.8
19.	32	12.0	19.	31	58.8
25.	32	8.6	25.	32	2.2
April 1.	32	4.6	October 1.	32	5.6
7.	32	1.4	7.	32	8.8
13.	31	58.2	13.	32	12.0
19.	31	55.0	19.	32	15.4
25.	31	52.0	25.	32	18.8
May 1.	31	49.2	November 1.	32	22.2
7.	31	46.4	7.	32	25.2
13.	31	44.0	13.	32	27.6
19.	31	41.6	19.	32	30.0
25.	31	39.6	25.	32	32.2
June 1.	31	37.6	December 1.	32	34.2
7.	31	36.2	7.	32	35.8
13.	31	35.2	13.	32	37.0
19.	31	34.4	19	32	38.0
25.	31	34.0	25.	32	38.4

For the true *diameters* of the ſun, and planets, and their proportion to each other, ſee PLANETS, and SEMI-DIAMETER.

DIAMETER *of a column*, is its thickneſs juſt above the baſe. From this the module is taken, which meaſures all the other parts of the column.

DIAMETER *of the diminution*, is that taken from the top of the ſhaft. See DIMINUTION.

DIAMETER *of the ſwelling*, is that taken at the height of one third from the baſe.

DIAMNES, a word uſed by Johannes Anglicus, and ſome other authors, for an involuntary diſcharge of urine.

DIAMOND, in *Natural Hiſtory*, by the ancients called *adamant*, a precious ſtone, the firſt in rank, value, hardneſs, and luſtre, of all gems.

The goodneſs of *diamonds* conſiſts in their water, or colour, luſtre, and weight. The moſt perfect colour is the white. Their defects are veins, flaws, ſpecks of red or black ſand, and a bluiſh or yellowiſh caſt.

Some chemical writers have maintained, that *diamonds* are refractory in the fire, and even apyrous: nevertheleſs, experiments have been made, which prove that they are capable of being diſſipated, not only by the collected heat of the ſun, but alſo by the heat of a furnace. A *diamond*, by expoſure to a concave ſpeculum, the diameter of which was forty inches, was reduced to an eighth part of its weight, Phil. Tranſ. Nº 386.; and in ſome experiments made on precious ſtones, by order of the grand duke of Tuſcany, with a burning lens, the diameter of which was two thirds of a Florentine ell, near the focus of which was placed another ſmaller lens, it appeared, that a *diamond* weighing thirty grains, expoſed during thirty ſeconds, loſt its colour, luſtre, and tranſparency, and became of an opake white. In five minutes, bubbles appeared on its ſurface; ſoon afterwards it burſt into pieces, which were diſſipated; and the ſmall fragment which remained was capable of being cruſhed into fine powder by the preſſure of the blade of a knife. No addition of glaſs, flints, ſulphur, metals, or ſalt of tartar prevented this diſſipation, or occaſioned any degree of fuſion. Experiments were alſo made by order of the emperor Francis I. on precious ſtones, from which we find, that *diamonds* were entirely diſſipated by having been expoſed in crucibles to a violent fire of a furnace during twenty-four hours: and when they were expoſed during two hours only at a time, they were obſerved firſt to loſe their poliſh, then to ſplit into thin plates, and laſtly, to be totally diſſipated. M. D'Arcet has found, that *diamonds* may not only be perfectly diſſipated by being expoſed, in porcelain crucibles cloſe, or covered with perforated lids, to the long and intenſe heat of a porcelain furnace; but that they may be totally volatiliſed with a much inferior degree of heat, by expoſing them in a coppel under the muffle of an aſſay furnace. He obſerved in this experiment, that the diſſipation was gradual, and that it was effected by a kind of exfoliation: M. Macquer, who repeated the experiment, further obſerved,

ſerved, that, before the diſſipation began, the *diamonds* were by the fire rendered brilliant and ſhining, with a kind of phoſphoric light. In order to determine whether *diamonds* were diſſipated by evaporation or combuſtion, Meſſrs. Lavoiſier, Macquer, and Cadet expoſed them to an intenſe heat in an earthen retort, during ſeveral hours, without any other effect than the loſs of their poliſh, and about one ſeventh diminution of their weight.

M. Mitouard put *diamonds* in a tobacco-pipe filled with pounded charcoal, and accurately cloſed with lute; and in order further to ſecure them from the acceſs of air or flame, he placed the tobacco-pipe in a crucible to which another crucible was inverted and carefully luted: the reſult was, that the *diamonds*, thus expoſed to the moſt intenſe heat, were not altered or diminiſhed; which he aſcribes not merely to the excluſion of air, but to ſome peculiar property of the charcoal; and he was confirmed in this opinion by finding, that they were not ſo well preſerved by powder of chalk, or of calcined hartſhorn. M. Cadet expoſed *diamonds* in covered and luted crucibles to the violent heat of a forge during two hours; by which operation they loſt only one ſixteenth part of their weight; and he concludes, that the deſtruction of them by fire in open veſſels is not a true volatilization, as M. D'Arcet imagines, but merely an exfoliation, cauſed by the fire expanding the air contained between the thin plates of which the ſtones conſiſt, and that by this exfoliation, the plates are reduced to ſo fine a powder as to eſcape obſervation. M. Lavoiſier has lately made ſome curious experiments on *diamonds* with Tchirnhauſen's great BURNING *lens*; from which he infers, that the *diamond* is a ſubſtance properly combuſtible, even in a moderate degree of heat; that, like other combuſtible bodies, it exhibits a black coaly matter at its ſurface; that when its combuſtion is prevented, through the want of air, it becomes almoſt as fixed in the fire as charcoal; but that in expoſing it to the extremeſt degree of heat, it is capable of being reduced in part into an incoercible vapour, or a kind of GAS, poſſeſſing the properties of that which is produced from effervеſcent and fermenting mixtures, and in metallic reductions. He alſo found, that when a *diamond* was expoſed to the focus of the lens *in vacuo*, its tranſparence was not diminiſhed; but that it was at length reduced into elaſtic or aerial vapours. Dict. Chem. Eng. ed. 1777, and Hiſt. Acad. Sc. an. 1772. Mem. 1. and 2.

In Europe, the lapidaries examine the goodneſs of their rough *diamonds*, their water, points, &c. by day-light: in the Indies, they do it by night; in order to which, a hole is made in the wall a foot ſquare, and therein a lamp is placed, with a thick wick, by the light whereof they judge of the ſtone, holding it in their fingers.

The water called *cœleſtis* is the worſt of all, and yet is ſomewhat difficult to diſcover in a rough *diamond*. The only infallible way is to examine it in the ſhade of ſome tufted tree.

The *diamond* becomes luminous in the dark by expoſure during a certain time to the rays of the ſun, by heating it in a crucible, by plunging it in boiling water, or by rubbing it with a piece of glaſs. It alſo acquires an electrical property by friction, and attracts light bodies. Dr. Wall has applied theſe properties as *criteria* for diſtinguiſhing *diamonds* from other precious ſtones; but they are not peculiar to *diamonds*, and therefore an inſufficient teſt. Phil. Tranſ. vol. iv. part 2. p. 277. See GAS, PHOSPHORUS, TOURMALIN, &c.

The *diamond* is by ſome reckoned poiſonous; others will not admit it into the liſt of poiſons. The accounts in favour of *diamonds* are more numerous, as well as more credible, than thoſe which would make us believe them to be of a poiſonous nature.

Diamonds are found in the Eaſt Indies, principally in the kingdoms of Golconda, Viſapour, Bengal, and the iſland of Borneo. There are four mines, or rather two mines and two rivers, whence *diamonds* are drawn. The mines are, 1. That of Raolconda, in the province of Carnatica, five leagues from Golconda, and eight or nine from Viſapour. It has been diſcovered about 250 years. 2. That of Gani, or Coulour, ſeven days journey from Golconda, eaſtwardly. It was diſcovered about 170 years ago by a peaſant; who, digging in the ground, found a natural fragment of twenty-five carats. 3. That of Soumelpour, a large town in the kingdom of Bengal, near the *diamond*-mine: this is the moſt ancient of them all. It ſhould rather be called that of Goual, which is the name of the river, in the ſand whereof theſe ſtones are found. Laſtly, the fourth mine, or rather the ſecond river, is that of Succudan, in the iſland of Borneo.

DIAMOND-*mine of Raolconda.* In the neighbourhood of this mine the earth is ſandy, and full of rocks, and copſe: in theſe rocks are found ſeveral little veins, of half, and ſometimes a whole inch broad, out of which the miners, with a kind of hooked irons, draw the ſand, or earth, wherein the *diamonds* are; breaking the rocks when the vein terminates, that the track may be found again, and continued. When a ſufficient quantity of earth, or ſand, is drawn forth, they waſh it two or three times, to ſeparate the ſtones therefrom: the miners work quite naked, except for a thin linen cloth before them; and, beſides this precaution, they have likewiſe inſpectors, to prevent their concealing of ſtones: which, however, in ſpite of all this care, they frequently find means to do, by watching opportunities, when they are not obſerved, and ſwallowing them down.

DIAMOND-*mine of Gani, or Coulour.* In this mine are found a great number of ſtones from ten to forty carats, and even more; and it was there that the famous *diamond* of Aureng-Zeb, the great mogul, which, before it was cut, weighed 793 carats, was found. The ſtones of this mine are not very clear; their water is uſually tinged with the quality of the ſoil; being black, where that is marſhy; red, where it partakes of red; and ſometimes green, and yellow, if the ground happen to be of thoſe colours. Another defect, of ſome conſequence, is, a kind of greaſineſs appearing on theſe *diamonds*, when cut, which takes off part of their luſtre. There are uſually no leſs than ſixty thouſand perſons, men, women, and children, at work in this mine.

When the miners have found a place where they intend to dig, they level another, ſomewhat bigger, in the neighbourhood thereof, and incloſe it with walls about two feet high, only leaving apertures, from ſpace to ſpace, to give paſſage to the water: after a few ſuperſtitious ceremonies, and a kind of feaſt, which the maſter of the mine makes for the workmen, to encourage them, every one goes to his buſineſs, the men digging the earth in the place firſt diſcovered, and the women and children carrying it off into the other, walled round. They dig twelve or fourteen feet deep, and till ſuch time as they find water; then they ceaſe digging: and the water, thus found, ſerves to waſh the earth two or three times; after which, it is let out at an aperture reſerved for that purpoſe. This earth being well waſhed, and well dried, they ſift it in a kind of open ſieve, or riddle, much as we do corn in Europe; then they thraſh it, and ſift it afreſh; and, laſtly, they ſearch it well with the hands, to find the *diamonds*. They work naked here, as in the mine of Raolconda, and are watched, after the like manner, by inſpectors.

DIAMOND-*mine of Soumelpour, or river Goual.* Soumelpour is a large town built all of earth, and covered with branches of cacao-trees: the river Goual runs by the foot thereof, in its paſſing from the high mountains, towards the ſouth, to the Ganges, where it loſes its name. It is from this river that are brought all our fine *diamond*-points, or ſparks, called *natural ſparks*. They never begin to ſeek for *diamonds* in this river till after the great rains are over, that is, after the month of December; and they uſually even wait till the water is grown clear, which is not before January: the ſeaſon at hand, eight or ten thouſand perſons, of all ages, and both ſexes, come out of Soumelpour, and the neighbouring villages. The moſt experienced among them ſearch and examine the ſand of the river; going up it from Soumelpour to the very mountain whence it ſprings. A great ſign that there are *diamonds* near, is, the finding of thoſe ſtones which we Europeans call thunder-ſtones. When all the ſand of the river, which at that time is very low, has been well examined, they proceed to take up that wherein they judge *diamonds* likely to be found; which is done, after the following manner: they dam the place round with ſtones, earth, and faſcines; and, lading out the water, dig about two feet deep: the ſand, thus got, is carried into a place walled round on the bank of the river. The reſt is performed after the ſame manner as at Coulour, and the workmen are watched with equal ſtrictneſs.

DIAMOND-*mine in the iſland of Borneo, or river of Succudan.* We are but little acquainted with this mine; the prince who reigns in that part of the iſland not allowing ſtrangers to have any commerce in theſe ſtones: though there are very fine ones to be bought at Batavia, brought thither by ſtealth. They were anciently imagined to be ſofter than thoſe of the other mines; but experience ſhews, they are in no reſpect inferior to them.

Beſide theſe four *diamond-mines*, there have been two others diſcovered; one of them between Coulour and Raolconda, and the other in the province of Carnatica: but they were both cloſed up almoſt as ſoon as diſcovered: that of Carnatica, becauſe the water of the *diamonds* was always either black, or yellow; and the other, on account of their cracking, and flying in pieces when cut and ground.

Diamond-mines were diſcovered about the year 1728 in the Braſils belonging to the king of Portugal, who in the year 1740 let them to a company at Rio Janeiro, for a certain ſtipulated annual rent, which is ſaid to be 130,000 cruſades, on condition that the ſaid company employ no more than ſix hundred ſlaves in working them; ſince which time the value of *diamonds* is diminiſhed.

The *diamond*, we have already obſerved, is the hardeſt of all precious ſtones. It can only be cut, and ground, by itſelf, and its own ſubſtance. To bring it to that perfection which augments its price ſo conſiderably, they begin by rubbing ſeveral againſt each other, while rough; after having firſt glued them to the ends of two wooden blocks, thick enough to be held in the hand: it is the powder thus rubbed off the ſtones, and received in a little box for the purpoſe, that ſerves to grind and poliſh the others.

Diamonds are cut and poliſhed by means of a mill, which turns a wheel of ſoft iron ſprinkled over with *diamond*-duſt mixed with oil of olives: the ſame duſt, well ground, and diluted with water and vinegar, is uſed in the ſawing of *diamonds*; which is performed with an iron or braſs wire, as fine as a hair: ſometimes, in lieu of ſawing the *diamonds*, they cleave them, eſpecially if there be any viſible plates in them; but the Europeans are not uſually daring or expert enough, to run the riſque of cleaving, for fear of breaking.

Diamond, *Rough*, is that not yet cut, but juſt as it comes out of the mine.

A *rough diamond* muſt be choſen uniform, of a good ſhape, tranſparent, not quite white, and free of flaws and ſhivers. *Rough diamonds* are more commonly found of a ſix-pointed figure than of any other; and theſe are called *ſix-pointed rough diamonds*, the figure of which is compoſed of two ſquare pyramids, joined at their baſes. Hence the whole figure is compoſed of eight triangular faces, or planes, four of which meet in a point above the baſe, and four below it, in another point. The diſtance of theſe two points is the axis of the figure.

There are others flat, cubical, or rounded: the former are the beſt and hardeſt; the latter ſort are ſofter, and more liable to have their forms altered by attrition.

Diamonds are ſaid to conſiſt of laminæ or plates, and probably have ſome uniform texture; becauſe lapidaries find that they may be poliſhed much more eaſily in one than in any other direction.

Black, rugged, dirty, flawey, veiny ſtones, and all ſuch as are not fit for cutting, they uſe to pound in a ſteel mortar made for that purpoſe; and, when pulveriſed, they ſerve to ſaw, cut, and poliſh the reſt. Shivers are occaſioned, in *diamonds*, by this; that the miners, to get them more eaſily out of the vein, which winds between two rocks, are often forced to break the rocks with huge iron wedges, which ſhakes and fills the ſtone with cracks and ſhivers. The ancients had two miſtaken notions, with regard to the *diamond:* the firſt, that it became ſoft, by ſteeping it in hot goat's blood; and the ſecond, that it was malleable, or bore the hammer. Experience ſhews us the contrary: there being nothing capable of mollifying the hardneſs of this ſtone; though its hardneſs be not ſuch, that it will endure being ſtruck at pleaſure with the hammer.

Diamond, *Brilliant*, is that cut in faces both at the top, and bottom; and whoſe table, or principal face at the top is flat.

To make a complete *ſquare brilliant*, if the rough *diamond* be not found to be of the figure here deſcribed, it muſt be made ſo. And if the work be perfectly executed, the length of the axis will be equal to the ſide of the ſquare baſe of the pyramid. Jewellers then form the table and collet, by dividing the block or length of the axis into eighteen parts. They take $\frac{5}{18}$ from the upper part, and $\frac{1}{18}$ from the lower. This gives a plane at $\frac{4}{18}$ diſtance, from the girdle for the table; and a ſmaller plane at $\frac{8}{18}$ diſtance, for the collet; the breadth of which will be $\frac{1}{5}$ of the breadth of the table. In this ſtate the ſtone is ſaid to be a *complete ſquare table diamond.*

The *brilliant* is an improvement on the table *diamond*, and was introduced within the laſt century, according to Mr. Jeffries.

To render a *brilliant* perfect, each corner of the above deſcribed table *diamond* muſt be ſhortened by $\frac{1}{20}$ of its diagonal. The corner ribs of the upper ſides muſt be flattened, or run towards the center of the table $\frac{1}{6}$ leſs than the ſides. The lower part which terminates in the girdle, muſt be $\frac{1}{8}$ of one ſide of the girdle; and each corner rib of the under ſides muſt be flattened at the top, to anſwer the above flattening at the girdle, and at bottom muſt be $\frac{1}{4}$ of each ſide of the collet.

The parts of the ſmall work which complete the *brilliant*, or the ſtar and ſkill facets, are of a triangular figure. Both of theſe partake equally of the depth of the upper ſides from the table to the girdle, and meet in the middle of each ſide of the table and girdle, as alſo at the corners. Thus they produce regular lozenges on the four upper ſides and corners of the ſtone. The triangular facets, on the under ſides, joining to the girdle, muſt be half as deep again as the above facets to anſwer to the collet part.

The ſtone here deſcribed is ſaid to be a *full-ſubſtanced brilliant.*

If the ſtone be thicker than in the proportion here mentioned, it is ſaid to be an *over-weighted brilliant.*

If the thickneſs be leſs than in this due proportion, it is called a *ſpread brilliant.*

The beauty of *brilliants* is diminiſhed by their being either over-weighted or ſpread. The true proportion of the axis or depth of the ſtone to its ſide, is as 2 to 3.

Brilliants are diſtinguiſhed into ſquare, round, oval, and drops, from the figure of their reſpective girdles.

Diamond, *Roſe*, is that quite flat underneath, but its upper part cut in diverſe little faces, uſually triangles, the uppermoſt whereof terminate in a point. In *roſe diamonds*, the depth of the ſtone from the baſe to the point muſt be half the breadth of the diameter of the baſe of the ſtone. The diameter of the crown muſt be three fifths of the diameter of the baſe. The perpendicular from the baſe to the crown muſt be three fifths of the depth of the ſtone. The lozenges, which appear in all circular *roſe diamonds*, will be equally divided, by the ribs that form the crown; and the upper angles, or facets, will terminate in the extreme point of the ſtone, and the lower in the baſe or girdle.

The taſte which now prevails of converting *roſe diamonds* into brilliants, is condemned by Mr. Jeffries; unleſs the *roſe diamonds* be over-weighted. He thinks, that the diſplay of beauty in *roſe diamonds*, is often preferable to that of brilliants. See his Treatiſe on Diamonds, p. 32, 35.

Diamond, *Table*, is that which has a large ſquare face at the top, encompaſſed with four leſſer.

Diamonds, *Complexions of*. The fineſt *diamonds* are thoſe of a complexion like that of a drop of the cleareſt rock-water: and if ſuch ſtones be of a regular form, and truly made, as alſo free from ſtains, fouls, ſpots, ſpecks, flaws, and croſs veins, they will have the higheſt luſtre of any, and be eſteemed the moſt perfect.

If *diamonds* be tinctured yellow, blue, green, or red, in a high degree, they are next in eſteem. But if they partake of theſe colours only in a low degree, it greatly ſinks their value.

There are other complexions of *diamonds*, ſuch as the brown, and thoſe of a dark hue; the firſt ſometimes reſemble the browneſt ſugar-candy, and the latter duſky iron. A black tinge in *diamonds* is conſidered as an imperfection, though, when the *diamond* is cut, a black ſoil placed under it improves its beauty; for the *roſe diamonds*, the collet or ſocket in which the ſtone is ſet, is ſpecked with ivory black in little dots; and for *brilliants*, it is all over blacked. Dr. Lewis mentions a black *diamond* cut and ſet in a ring, which at a diſtance looks uniformly black, but, on cloſer examination, appears in ſome parts tranſparent, and in others charged with foulneſs, on which the black hue depends. Commerce of Arts, p. 1637.

The *firſt water* in *diamonds* means the greateſt purity and perfection of their complexion, which ought to be that of the cleareſt drop of water.

When *diamonds* fall ſhort in this perfection, they are ſaid to be of the *ſecond* or *third water*, &c. till the ſtone may be properly called a coloured one: for it would be an impropriety to ſpeak of a *diamond* imperfectly coloured, or having other defects, as a ſtone of a *bad water* only.

Diamonds, *Magnitude of*. The moſt remarkable *diamonds* for ſize now known, are, that known in France under the name of *grand ſancy*, by corruption of *cent ſix*, which is one of the crown jewels, weighing 106 carats; governor Pitt's *diamond*, purchaſed by the late duke of Orleans for Louis the XV. king of France, weighing 136$\frac{3}{4}$ carats, and ſaid to be bought for 125,000*l.* the *diamond* of the great duke of Tuſcany, which weighs 139$\frac{1}{2}$ carats; that of the great Mogul, weighing 279$\frac{9}{16}$ carats; and one mentioned by Mr. Jeffries, in a merchant's hands, weighing 242$\frac{1}{16}$ carats.

Diamonds, *Valuation of*. The following is a rate, or manner of eſtimating the value of *diamonds*, drawn up by a perſon well verſed in ſuch matters; and which, for its curioſity, as well as the uſe it may be of to perſons who deal in precious ſtones, we judge, will not be unacceptable.

Table of DIAMONDS.

Dutch Cut.

	Lib.	Sh.		Lib.	Sh. ſterl.
A *Diamond* weighing 1 grain, is worth from	1	0	to	1	1
1½ - -	1	16	to	1	17
2 - -	2	15	to	3	0
2½ - -	3	12	to	3	15
3 - -	4	15	to	5	0
4 - -	7	17	to	8	0
5 - -	15	0	to	15	15
6 - -	22	0	to	25	0
7 - -	30	0	to	34	0
8 - -	42	0	to	45	0
9 - -	60	0	——		——
10 - -	75	0	——		——
12 - -	112	0	to	120	0
15 - -	187	0	to	220	0
19 - -	330	0	to	380	0
24 - -	450	0	——		——
30 - -	700	0	to	735	0
40 - -	1500	0	to	1800	0
50 - -	3500	0	to	4500	0
60 - -	4500	0	to	5620	0

Antwerp Cut.

	Lib.	Sh.		Lib.	Sh. ſterl.
A *Diamond* weighing 1 grain, is worth from	0	15	to	0	18
1½ - -	1	6	to	1	10
2 - -	2	2	to	2	5
3 - -	3	12	to	3	15
4 - -	6	0	to	6	7
5 - -	10	10	to	11	5
6 - -	13	10	to	15	0
7 - -	18	15	to	22	10
8 - -	24	0	to	26	0
9 - -	33	15	——		——
10 - -	37	0	to	40	0
12 - -	55	0	to	58	0
15 - -	112	0	to	130	0
18 - -	247	0	——		——
24 - -	315	0	——		——
40 - -	900	0	to	970	0
50 - -	2200	0	to	2300	0
60 - -	3500	0	to	4500	0

Mr. Jeffries lays down the following rule for the valuation of *diamonds* of all weights. He firſt ſuppoſes the value of a rough *diamond* to be ſettled at 2*l.* *per* carat, at a medium; then to find the value of *diamonds* of greater weights, multiply the ſquare of their weight by 2, and the product is the value required. E. g. To find the value of a rough *diamond* of two carats, 2×2=4, the ſquare of the weight, which multiplied by 2, gives 8*l.* the true value of a rough *diamond* of two carats. For finding the value of manufactured *diamonds*, he ſuppoſes half their weight to be loſt in the manufacturing them; and therefore to find their value we muſt multiply the ſquare of double their weight by 2, which will give their true value in pounds: thus, to find the value of a wrought *diamond* weighing two carats; we firſt find the ſquare of double the weight, viz. 4×4 = 16, then 16×2 = 32. So that the true value of a manufactured *diamond* of two carats is 32*l.*

By this rule Mr. Jeffries has conſtructed tables of the price of *diamonds* from 1 to 100 carats.

According to Mr. Jeffries's rule, that the value of *diamonds* is in the duplicate ratio of their weights, and that a manufactured *diamond* of one carat is worth at a medium 8*l.* the great mogul's *diamond* muſt be valued at above 624962*l.* this being the value of a *diamond* of 279½ carats.

It muſt be obſerved, however, that defects in the water, or ſhape, red or black ſpots, ſhivers, and other failings, frequently found in theſe ſtones, reduce the price by one third, and ſometimes more.

When *diamonds* are fouled with a yellow or brown colour, it is a common practice among jewellers to put them in a fierce fire; this diveſts them of their colours, without doing them the leaſt ſenſible injury. Du-Fay, in Mem. Acad. Paris, 1735.

As to brilliant *diamonds* of very ſmall cut, the price is always leſs by one third, than that of *diamonds* of a larger cut, though the weights be the ſame: the reaſon is, that the latter ſhew themſelves a great deal more when ſet in their collets, than the former.

DIAMONDS, *Specific gravity of.* Mr. Boyle has given us the obſervation of a perſon much converſant in *diamonds*, that ſome of thoſe gems in their rough ſtate were much heavier than others of the ſame bigneſs, eſpecially if they were cloudy or foul; and Mr. Boyle mentions one that weighed 8 grains and $\frac{8}{10}$, which being carefully weighed in water, according to the rules of hydroſtatics, proved to an equal bulk of that liquor, as $2\frac{22}{23}$ to 1. So that as far as could be judged by that experiment, a *diamond* weighs not thrice ſo much as water; and yet in his table of ſpecific gravities, that of a *diamond* is ſaid to be to water as 3400 to 1000, that is, as $3\frac{2}{5}$ to 1; and therefore, according to theſe two accounts, there ſhould be ſome *diamonds* whoſe ſpecific gravity differs nearly $\frac{1}{8}$ from that of others. But this is a much greater difference than can be expected in two bodies of the ſame ſpecies, and indeed on an accurate trial does not prove to be the caſe in *diamonds.*

It is certain that there may be ſome difference in theſe trials, from the nature and temper of the water uſed in the experiments; ſome waters, as that of pumps or wells, being heavier than rain or diſtilled water; and the heat or coldneſs of the water may alſo make ſome variation: this, however, is much leſs than might be expected; careful experiments having proved, that the ſpecific gravity of any body will not differ above $\frac{1}{200}$ at moſt, on account of the difference of the water in quality and temper taken together; whereas the heavieſt and lighteſt of the *diamonds* in Mr. Boyle's and theſe experiments differ about one thirty-fifth part, which is about ſix times as much as $\frac{1}{200}$.

Mr. Ellicot, who made theſe experiments, has drawn out a table of their ſeveral differences, which is done with great care and accuracy, and taking in all the common varieties in *diamonds*, may ſerve as a general rule of their mean gravity and differences.

		In air. Grains.	In water. Grains.	Specific gravity.
	Water - -	——	——	1000
N° 1.	A Brazil *diamond*, fine water, and rough coat, -	92,425	66,16	3518
2.	Ditto, fine water, rough coat, - -	88,21	63,16	3521
3.	Ditto, fine bright coat,	10,025	7,170	3511
4.	Ditto, fine bright coat,	9,560	6,830	3501
5.	An Eaſt India *diamond*, pale blue, - -	26,485	18,945	3512
6.	Ditto, bright yellow,	23,33	16,71	3524
7.	Ditto, very fine water, bright coat, -	20,66	14,8	3525
8.	Ditto, very bad water, honey-comb coat, -	20,38	14,59	3519
9.	Ditto, very hard bluiſh caſt,	22,5	16,1	3515
10.	Ditto, very ſoft, good water,	22,615	16,2	3525
11.	Ditto, a large red foulneſs in it, - -	25,48	18,23	3514
12.	Ditto, ſoft, bad water,	29,525	21,140	3521
13.	Ditto, ſoft, brown coat,	26,535	18,99	3516
14.	Ditto, very deep green coat,	25,25	18,08	3521

The mean ſpecific gravity of the Brazil *diamonds* appears to be - - - 3513
The mean of the Eaſt India *diamonds* - 3519
The mean of both - - - 3517

Therefore, if any thing determinate is to be ſaid, as to the ſpecific gravity of the *diamond*, it is, that it is to water as 3517 to 1000. Phil. Tranſact. vol. xliii. for 1745. art. 19. p. 472.

Attempts have been made to produce *artificial diamonds*, but with no great ſucceſs.

The *factitious diamonds* made in France, called *temple diamonds*, on account of the Temple at Paris, where the beſt of them are made, fall vaſtly ſhort of the genuine ones; accordingly they are but little valued, though the conſumption thereof is pretty conſiderable for the habits of the actors on the ſtage, &c. See PASTES.

DIAMONDS, *Corniſh*, in *Natural Hiſtory*, a name given in England to all the ſpecies of cryſtals, which are compoſed of a column, terminated at each end by a pyramid. The name takes in two genera of cryſtal, of each of which there are ſeveral ſpecies. Dr. Hill has determined this to be the true figure of perfect cryſtal, and accounts all thoſe which are affixed by one end to ſome ſolid body, and terminated at the other by a pyramid, to be mutilated or imperfect cryſtals. The ſame author, according to the length or thickneſs of the intermediate column, has divided theſe bodies into two genera, the firſt the macroteloſtyla, the other the brachyteloſtyla. See MACROTELOSTYLA and BRACHYTELOSTYLA.

DIAMOND is an inſtrument of conſiderable uſe in the glaſs manufactory, for ſquaring the large plates, or pieces; and among glaziers, for cutting their glaſs. Theſe *diamonds* are differently fitted up. That uſed for looking-glaſſes, and other large pieces, is ſet in an iron ferril two inches long, and a quarter of an inch in diameter. The reſt of the cavity of the ferril is filled with melted lead, which keeps the *diamond* firm in its place. The glaziers have a handle of box, or ebony, fitted into the ferril to hold it by. In the former there is a little piece of box croſſing the ferril, in form of a little plane, covered at bottom with a thin copper-plate.

DIAMOND, in *Heraldry*, is uſed to expreſs the black colour in the atchievements of noblemen.

Gwillim diſlikes the way of blazoning the coats of peers by precious ſtones, inſtead of metals, or colour. But the Engliſh practice allows it. See COLOUR.

DIAMOND-*cutter*. See LAPIDARY.

DIAMOND-*glaſs*. See GLASS.

DIAMOND-*powder* is of great uſe for grinding hard ſubſtances. And Mr. Boyle obſerves, that though it be much dearer than emery, yet it makes ſo great diſpatch, and the tools employed laſt ſo much longer, as greatly to over-balance the cheapneſs of the emery.

DIAMORUM, Διαμωρον, a compoſition in pharmacy, of which there are two kinds; *ſimple*, and *compound*.

DIAMORUM, *Simple*, is the common ſyrup of mulberries, made of the juice of that fruit, boiled up with ſugar. It is good againſt diſeaſes of the throat, and to ſtop dyſenteries.

There is alſo a ſort of *ſimple diamorum* made of mulberry juice and honey, otherwiſe called *mulberry rob*.

DIAMORUM, *Compound*, is made with mulberry juice, verjuice, myrrh, and ſaffron. It is uſed to deterge phlegm from the ſtomach and breaſt, and to eaſe reſpiration.

DIANA, in *Mythology*, the daughter of Jupiter and Latona, and twin ſiſter to Apollo. She is ſaid to have been born firſt, and to have aſſiſted her mother in the delivery of Apollo. The ſufferings of Latona on this occaſion, gave *Diana* an averſion to marriage, though not to gallantry. She is accuſed of having loved and beſtowed her favours on Endymion, Pan, and Priapus. She was the goddeſs of the woods on earth, Luna in heaven, and Hecate in hell.

The moſt known character of this goddeſs is that of her preſiding over woods, and delighting in hunting. Accordingly the *Diana venatrix*, or goddeſs of the chace, is frequently repreſented in ancient ſtatues, and deſcribed by the Roman poets, as running, with her veſt ſhortened and girt about her, and yet flying back with the wind: ſhe is tall of ſtature; and her face, though ſo very handſome, is ſomewhat manly: her legs are bare, well-ſhaped, and ſtrong: her feet are ſometimes bare, and ſometimes adorned with a ſort of buſkin: ſhe often has her quiver on her ſhoulder; and ſometimes holds a javelin, but more uſually her bow in her right hand. The ſtatues of *Diana* were frequent in the woods, where ſhe is repreſented as hunting, bathing, and reſting herſelf after fatigue. *Diana* has been ſometimes repreſented with three bodies, and hence called the triple, three-headed, and three-bodied *Diana*. Her diſtinguiſhing name, under this triple appearance, is Hecate or Trivia; under which character of the infernal *Diana* ſhe was invoked in enchantments, and repreſented as a Fury, holding inſtruments of terror in her hands, and graſping cords, ſwords, ſerpents or flaming torches. When ſhe is repreſented as the intelligencer that preſides over the moon, ſhe appears in a car, drawn by ſtags, or by does, but more commonly by horſes of a perfectly white colour, with a lunar crown or creſcent on her forehead. Spence's Polymetis, p. 100, 102, 104.

She had many temples dedicated to her, of which that at Epheſus was the moſt celebrated, and eſteemed one of the wonders of the world. It was burned by Eroſtratus, or Eratoraſtus, to perpetuate his name by the action, on the day in which Alexander was born, A. M. 3648.

Apollo and *Diana* were names for the ſun and moon, and had each of them lances given them, in alluſion to the projection of their rays.

DIANA's *Tree*, *Arbor Dianæ*. See ARBOR.

DIANDRIA, in *Botany*, the ſecond claſs of plants, which have hermaphrodite flowers, with two ſtamina or male parts in each.

The word is formed of the Greek δις, *twice*, and ανηρ, *male*.

Of this claſs of plants, which comprehends three orders, viz. the *monogynia*, *digynia*, and *trigynia*, are the jeſſamine, phillyrea, olive, roſemary, &c. See *Tab. of Botany*, *Claſs* 2.

DIANTHERA, in *Botany*, a genus of the *diandria monogynia* claſs. The characters are theſe: the flower hath a permanent empalement of one leaf, which is tubulous, and cut at the top into five equal parts: the flower is of the grinning kind, having one petal with a ſhort tube; the upper lip is reflexed and bifid; the lower is divided into three parts, the middle being the broadeſt: it hath two ſhort ſlender ſtamina, adhering to the back of the petal, one of which has a twin ſummit, the other is a little taller. It hath an oblong germen ſupporting a ſlender ſtyle of the length of the ſtamina, crowned by an obtuſe ſtigma. The empalement afterward becomes a capſule with two cells, opening with two valves, which are alternately compreſſed at the top and bottom, and open with an elaſticity, caſting a ſingle ſeed out of each cell. This plant grows naturally in Virginia, and other parts of North America.

DIANTHON, from δια, and ανθος, *flower*, in *Medicine*, an antidote deſcribed by Myrepſus, from which the *ſpecies dianthus* in the London diſpenſatory was probably taken. It is thus made:

℞ Flor. roriſm. ℥i. roſar. n. & rad. glych. āā ʒvi. caryoph. arom. ſpic. nard. nuc. moſch. rad. galangal. cort. cinnamon. rad. zedoar. lign. aloes. ſem. card. min. ſem. anethi, aniſi, & macis āā ℈iv. M.

This compoſition is recommended in the cachexy.

DIANTHUS, in *Botany*, a genus of the *decandria digynia* claſs; the clove July flower, carnation, and pink. The generical characters are theſe: the flower hath a cylindrical empalement of one leaf, ſcaly below, with five petals, whoſe tails are as long as the empalement; but their upper part is broad, plain, and ſpread open. It hath ten ſtamina; in the center is ſituated an oval germen, which afterward becomes a cylindrical capſule with one cell, opening in four parts at the top, filled with compreſſed angular ſeeds. There are twelve ſpecies. See CARNATION, PINK, &c.

DIANUCUM, in *Pharmacy*, a kind of rob, made of the juice of green walnuts, and ſugar, boiled together by a moderate fire, to the conſiſtence of honey.

The word is formed from *dia*, and *nux*, *nucis*, *nut*.

It is good to ſtrengthen the ſtomach, promote ſweat, and reſiſt poiſon.

DIAPALMA, in *Pharmacy*, a deſiccative, or drying plaſter, ſaid to be ſo denominated from the wood of the palm-tree, whereof the ſpatula is to be made, that is to ſtir it while boiling. It is compoſed of common oil, hog's fat, and litharge of gold. It is good to dry, reſolve, deterge, and cicatrize; and is the plaſter moſt uſed for wounds and ulcers.

DIAPASMA, a common name for all powders ſprinkled on the body; whether as perfumes or otherwiſe.

The word comes from the Greek διαπασσειν, *inſpergere*, *to ſprinkle*.

DIAPASON, from δια, *by*, and πας, *all*, in *Muſic*, a muſical interval, otherwiſe called *octave*: ſo called, becauſe it contains all the poſſible diverſities of ſound.

The *diapaſon* is the firſt, and moſt perfect of the concords: if conſidered *ſimply*, it is but one harmonical interval; though if conſidered *diatonically*, by tones, and ſemi-tones, it contains ſeven degrees, viz. three greater tones, two leſſer tones, and two greater ſemi-tones.

The interval of a *diapaſon*, that is, the proportion of its grave ſound to its acute, is as 2 to 1.

The ancients had ſeven variations, ſchemes, figures, or ſpecies of the *diapaſon*, ariſing from the various poſitions of the tones and ſemi-tones in the ſcale.

The firſt ſpecies of the *diapaſon*, was from the hypate hypaton to the parameſe; or from B ♮ to b ♮ of our notation. It was called *myxolydian*.

The ſecond, called *lydian*, from the parypate hypaton to the trite diezeugmenon, or from C to c.

The third, called *phrygian*, from the lichanos hypaton to the paranete diezeugmenon, or from D to d.

The fourth, called *dorian*, from the hypate meſon to the nete diezeugmenon, or from E to e.

The fifth, named *hypolydian*, from the parypate meſon to the trite hyperbolæon, or from F to f.

The ſixth, called *hypophrygian*, from the lichanos meſon to the paranete hyperbolæon, or from G to g.

The ſeventh, named *hypodorian*, *common*, and *locrian*, from the meſe to the nete hyperbolæon, or from the proſlambanomenos to the meſe, that is, from our a to aa, or from A to a. Euclid. Introd. Harm. p. 15, ſeq. Bacchius, p. 18. Edit. Meibom. See DIAGRAM.

DIAPASON *diateſſaron*. The Pythagoreans did not admit this interval as a conſonance or concord; for this reaſon, that its ratio 8 : 3 was neither multiple nor ſuperparticular. But Ptolemy contends for its being a good concord, for this reaſon, that the *diapaſon* added to any concord, produces a concord. Ariſtoxenus herein agrees with him. Vide Wallis's Append. ad Ptolem. Harm. p. 155.

DIAPASON, among *Muſical Inſtrument-Makers*, is a kind of rule, or ſcale, whereby they adjuſt the pipes of their organs, and cut the holes of their flutes, hautboys, &c. in due proportion, for performing the tones, ſemi-tones, and concords, juſtly.

A ſquare being divided into eight equal parallelograms; the points wherein a diagonal interſects all theſe parallelograms, expreſs all the uſual intervals in muſic: and on this principle it is, that the *diapaſon* is founded.

There is a particular kind of *diapaſon* for trumpets; ſerving

ing as a ſtandard, or meaſure, for the different magnitudes they muſt have to perform the four parts of muſic. There is another for ſackbuts, and ſerpents, ſhewing how far they are to be lengthened, or ſhortened, to riſe or fall from one tone or interval to another.

The bell-founders have likewiſe a *diapaſon*, or ſcale, ſerving to regulate the ſize, thickneſs, weight, &c. of their bells.

Diapason is alſo the name of two ſtops of an organ, viz. the open and ſtopped.

DIAPASONDIAEX, in *Muſic*, a kind of compound concord; whereof there are two ſorts: the *greater*, which is in the ratio of 10 to 3; and the *leſs*, in that of 16 to 5.

DIAPASONDIAPENTE, in *Muſic*, a compound conſonance, in a triple ratio of 9 to 3.

The *diapaſondiapente* is a ſymphony made when the voice proceeds from the firſt to the twelfth tone. The word is properly a term in the Greek muſic: we ſhould now call it a *twelfth*.

DIAPASONDIATESSARON, in *Muſic*, a compound concord, in the ratio of 8 to 3.

The *diapaſondiateſſaron* is a ſymphony wherein the voice proceeds from the firſt tone to the eleventh. This the moderns would rather call an *eleventh*.

DIAPASONDITONE, in *Muſic*, a compound concord, in the proportion of 10 to 4, or 5 to 2.

DIAPASONSEMIDITONE, a compound concord, whoſe terms are in the proportion of 12 to 5.

DIAPEDESIS, Διαπηδησις, in *Medicine*, an ouſing of blood through the coats of the veins, or arteries; occaſioned either by the blood's becoming too much diſſolved, or attenuated; or by the pores of the veſſels becoming too patent, and open.

The word is compounded of δια, *through*, and πηδαω, *I leap*.

There are ſome able phyſicians who deny there can be any ſuch tenuity of blood, as that it ſhall exude through the veſſels, without any aperture made therein.

DIAPENSIA, in *Botany*, a genus of the *pentandria monogynia* claſs: the corolla is monopetalous and ſalver-ſhaped; the calyx has five leaves imbricated with three ſmall ones; the ſtamina are laid on the tube of the corolla, and the capſule has three cells.

DIAPENTE, in the *Ancient Muſic*, an interval making the ſecond of the perfect concords; anſwering to what in the modern muſic we more uſually call a *perfect fifth*.

The word is formed of δια, and πεντε, *five*.

The *diapente* is a ſimple concord; yet, if conſidered diatonically, it contains four terms, viz. two greater tones, a leſſer tone, and a greater ſemi-tone. The *diapente* is the greater part of the diapaſon, or octave, harmonically divided. It is produced when the voice paſſes from its firſt tone to its fifth.

Diapente is alſo uſed, in *Pharmacy*, for a compound of five ſeveral drugs, or ingredients.

Diapente, among *Farriers*, a drink made for horſes, of gentian, round birthwort, barberries, myrrh, and ivory ſhavings, of each a like quantity, which are to be pounded ſeparately, and finely ſearced: this powder, to the quantity of two or three ſpoonfuls, is mixed with a pint and a half of muſcadine, or ſack, or, for want of either, with ſtrong ale or beer, and given in fevers, the cough, glanders, ſurfeits, inflammations, yellows, &c. It is ſaid to purify the blood from all foulneſſes, as well as to reſtrain the overflowing of the gall, working of the ſpleen, &c.

DIAPER, a ſort of linen cloth wrought with flowers and other figures.

DIAPERED, in *Heraldry*. See Diapre.

DIAPHANOUS, in *Philoſophy*, a thing tranſparent, or that gives paſſage to the rays of light; as water, air, glaſs, talc, fine porcelain, &c. See Transparency.

The word is formed of δια, *through*, and φαινω, *I ſhew*.

DIAPHANEITY, in the ſchools, the quality of a tranſparent body; or that which denominates it ſuch. See Transparency.

DIAPHŒNIC, *Diaphœnicum*, in *Pharmacy*, a ſoft, purgative electary; thus called from the dates, which make its baſis; the palm-tree, whoſe fruit they are, being called by the Greeks φοινιξ. See Date.

The other ingredients are, penidies, almonds, turbith, ginger, white pepper, mace, cinnamon, rice, fennel, carrot-ſeeds, and honey.

The *electarium diaphœnicum* purges chiefly ſeroſities, and excites the menſes. It is alſo uſed in dropſies, lethargies, apoplexies, and palſies.

DIAPHONICS, from δια, *through*, and φωνη, *ſound*, is ſometimes uſed for the ſcience of refracted ſound, as it paſſes through different mediums.

DIAPHORESIS, Διαφορησις, from διαφερω, *I diſſipate*, in *Medicine*, includes all diſcharges through the ſkin; both ſenſible, and inſenſible: whence *diaphoretic*, &c. See Perspiration.

DIAPHORETIC, in *Medicine*, is applied to remedies that promote the expulſion of humours by inſenſible perſpiration.

Diaphoretic is much of the ſame import as *ſudorific*: except that the latter promotes ſenſible, and the former inſenſible perſpiration. Their only difference, therefore, is in the degree of activity.

Diaphoretic *antimony*, or *mineral diaphoretic*, is a preparation of antimony, the proceſs whereof ſee under Antimony.

DIAPHRAGM, *Diaphragma*, in *Anatomy*, a part, popularly called the *midriff*, and by anatomiſts, *ſeptum tranſverſum*. It is a nervous muſcle, ſeparating the breaſt, or thorax, from the abdomen, or lower venter; and ſerving as a partition between the natural, and the vital parts as they are called.

It was Plato, as Galen informs us, that firſt called it *diaphragm*, from the verb διαφραττειν, *to ſeparate*, or *be between two*. Till his time it had been called φρενες, *underſtanding*; from a notion, that an inflammation of this part produced phrenſy: which is not at all warranted by experience, no more than that other tradition, that a tranſverſe ſection of the *diaphragm* with a ſword, cauſes the patient to die laughing.

Its figure is round, reſembling a ray-fiſh, or thornback. It is a double and digaſtric muſcle, conſiſting of two circles, which are both muſcular; of two arteries; and two veins, called *phrenicæ*; and ſeveral branches of nerves. The firſt, or ſuperior circle, called the great muſcle of the *diaphragm*, is fleſhy in its circumference, and tendinous and aponeurotic in the middle; it ariſes from the ſternum, and the ends of the laſt ribs, by radiated fibres: the ſecond, or inferior, called the ſmall muſcle of the *diaphragm*, is thicker than the other, of leſs extent, and of an oblong form; it comes from the vertebræ of the loins by two tendons, called *cruræ*. The upper is covered at the top with a membrane derived from the *pleura*; and the lower is lined at bottom with another from the *peritonæum*.

Its ſituation is oblique, being extended from the *cartilago xiphoides*, by the extremes of the ribs, to the region of the loins. It is pierced in the tendinous part with a round opening for the paſſage of the *vena cava*, which being incapable of contractions, occaſions no interruption to the circulation; and in its fleſhy part for the *œſophagus*, and with another forked opening, partly fleſhy and partly tendinous, for the *aorta*; and between the productions of the inferior circle paſs the *aorta*, which lies in the interſtice between its two *crura*, thoracic duct, and *vena azygos*. In its natural diſpoſition it is convex on the upper ſide towards the breaſt, and concave on the lower towards the belly. Hence it has two motions; the one of contraction, the other of relaxation.

By the contraction, or ſwelling of the fibres, the *diaphragm* becomes flat on each ſide; the conſequence of which is, that the cavity of the breaſt is enlarged, to give liberty for the lungs to receive the air in inſpiration; and the cavity of the abdomen is leſſened, and, conſequently, the ſtomach and inteſtines preſſed, for the diſtribution of the chyle. In its relaxation, whereby it reſumes its natural ſituation, the cavity of the breaſt is diminiſhed, and the lungs preſſed for the expulſion of the air in expiration. See Respiration.

On the *diaphragm*, alſo, in great meaſure, depend the actions of coughing, ſneezing, yawning, laughing, the hiccough, &c. between which motions there is ſome connexion cauſed by the communication of the nerves of different parts, which meet in the *diaphragm*.

Dr. Hook obſerves, that an animal may be kept alive, without thorax, or *diaphragm*, by blowing air into the lungs with a bellows; of which he had made the experiment.

Mr. Senac has given us a new deſcription of the ſtructure of the *diaphragm*, with remarks on the action of this muſcle. See Mem. Acad. Scienc. 1729.

Diaphragm is uſed for the *ſeptum ſcroti*. See Scrotum.

Diaphragm is alſo a general name, given to all partitions, or ſeparations between two parts of a thing; as the little perforated partitions in the tubes of long teleſcopes.

DIAPHRAGMATIC, is applied to the arteries, veins, and nerves, diſtributed through the *diaphragm*.

They are alſo called *phrenic*, or *phrenetic*.

DIAPHTHORA, from διαφθειρειν, *to corrupt*, is uſed by Galen and Boerhaave to denote the corruption of the aliments in the ſtomach, and by Hippocrates for the corruption of the fœtus in the womb, and abortion.

DIAPORESIS, Διαπορησις, in *Rhetoric*, is uſed to expreſs the heſitation or uncertainty of the ſpeaker.

We have an example in Homer, where Ulyſſes going to relate his ſufferings to Alcinous, begins thus:

> Τι πρωτον, τι δ᾽ ἔπειτα, τι δ᾽ ὑστατιον καταλεξω?
> *Quid primum, quid deinde, quid poſtremo alloquar?*

This figure is moſt naturally placed in the exordium or introduction to a diſcourſe. See DOUBTING.

DIAPRE', or DIAPERED, in *Heraldry*, a dividing of a field into planes, or compartments, in the manner of fret-work; and filling it with variety of figures.

This chiefly obtains on bordures, which are *diapered*, or fretted over, and the frets charged with things proper to bordures; as in *Tab. Herald. fig.* 18.

DIAPRUNUM, in *Pharmacy*, a ſoft, purgative electary, thus called from the pulp of Damaſcus prunes, which make its baſe.

Diaprunum is either *ſimple* or *compound*.

DIAPRUNUM, *Simple*, or *lenitive*, conſiſts of the pulp aforementioned, with caſſia, tamarinds, rhubarb, red roſes, violet ſeeds, ſaunders wood, both red and citron, ſcrapings of ivory, liquorice juice, and the four cold ſeeds. It is good to prepare, and ſoften the humours.

DIAPRUNUM, *Compound*, or *ſolutive*, is only the ſimple, with the addition of half an ounce of ſcammony to every pound of the electary, to render it more purgative.

DIARRHODON, Διαῤῥοδον, in *Pharmacy*, a name given to divers compoſitions, wherein roſes are a principal ingredient.

The word is formed of δια, and ῥοδον, *roſe*.

DIARRHODON *Abbatis*, is a cordial powder, ſo denominated from an abbot who invented it. It conſiſts of red roſes, red and citron ſaunders, lignum aloes, cinnamon, rhaponticum, ſpikenard, ivory, hartſhorn, ſaffron, maſtich, pearls, ambergriſe, muſk, &c. It is uſed to ſtrengthen the heart, ſtomach, and liver, to aſſiſt in digeſtion, and to prevent vomiting.

There are alſo *Trochiſci* DIARRHODON, compoſed of red roſes, ſhavings of ivory, the ſaunders, liquorice, maſtich, ſaffron, camphor, and roſe-water. They are good to fortify the heart, ſtomach, and liver, and to ſtop dyſenteries, and other fluxes of the belly.

DIARRHODON, *Pilulæ*, are compoſed of aloes, trochiſci *diarrhodon*, wormwood leaves, maſtich, and rock-ſalt. They firſt purge, then fortify the ſtomach, promote digeſtion, and prevent a ſtinking breath. But all theſe compoſitions are out of uſe at preſent.

DIARRHOEA, Διαῤῥοια, in *Medicine*, a looſeneſs, or flux of the belly; or a profuſe evacuation of liquid excrements by ſtool.

The word is formed of the Greek δια, *through*, and ῥεειν, *to flow*.

The word, in the general, is uſed for any kind of flux of the belly; but properly for that wherein the humour, or excrement, flows out either pure, or mixed, with or without pain, in a fluid ſtate.

The *diarrhœa*, looſeneſs, or purging of the bowels, as it is uſually called by us, is properly an increaſed periſtaltic motion of the guts, by means of which nature attempts to throw off a mucous or bilious matter lodged in too great a quantity in the *primæ viæ*, and diſturbing her regular operations.

Diarrhœas are of divers kinds, diſtinguiſhed by the diverſity of the excrements; ſome being bilious, ſome ſerous, ſome pituitous, and ſome purulent.

The purulent always ariſe from ſome abſceſs burſt in the body; the reſt either from morbid humours irritating the inteſtines, and expreſſing the juices out of the adjacent parts; or from a laxneſs of the inteſtinal fibres; or an extraordinary fermentation in the blood, whereby it diſcharges its excrements into the inteſtines.

If this diſorder is attended with pain, it is ſometimes called a colic. When the evacuations are fluid, but partly indigeſted, it is called *cœliaca paſſio*. When the aliment is carried through the bowels, and ejected in an indigeſted ſtate, or nearly ſo, it is called *lienteria*; all which are only different degrees of the ſame diſorder.

DIARRHOEA, *Signs of a.* The ſigns which precede a *diarrhœa* of any kind are uſually a tenſive pain and rumbling, and noiſe in the abdomen, and pungent acute pains, particularly about the region of the navel. The appetite is uſually very bad in the beginning of a *diarrhœa*, and in its future ſtages the ſtrength fails; and the longer it continues, the worſe ſymptoms it brings on: a teneſmus is one common complaint, and the head is weakened and aches at times; and, finally, an internal heat is felt, which is a very bad ſymptom, and threatens miſchiefs of various kinds.

DIARRHOEAS, *Perſons moſt ſubject to.* The ſimple *diarrhœa*, in which a mucous and ſerous matter is voided, is principally a diſeaſe incident to people of phlegmatic habits, whoſe ſtools are generally watery. When this kind of *diarrhœa* obſerves any regular period, it is a ſign of a ſanguine temperament in the perſon. The bilious *diarrhœas* are moſt frequent with perſons of choleric habits; and the critical *diarrhœas* in fevers uſually happen to perſons of a ſanguine one. Perſons of tender and delicate conſtitutions, if they walk about a room when hot with their feet naked, are uſually affected afterwards with a ſimple *diarrhœa*.

DIARRHOEAS, *Cauſes of.* The immediate cauſe is irritation in the inteſtines. Among the principal cauſes of this preternatural irritation, may be reckoned the ſudden repreſſion of ſweats in a morning, while the perſon is in bed: it is a ſtanding obſervation, that ſuch as perſpire but little, are ever ſubject to a *diarrhœa*; and on the contrary, people who perſpire much are commonly coſtive.

Crude foods, and ſuch as are difficult of digeſtion, often throw people into *diarrhœas*, as alſo over-fat meats, eſpecially if perſons drink much after them; and nothing ſo frequently as the free eating of ſummer-fruits, eſpecially if the perſon chance to ſwallow a quantity of any thing liquid ſoon after them.

Feculent or fermenting liquors will alſo do it, and ſometimes the drinking cold liquors in a large quantity, or even the external cold; but in this caſe the tender habit of the patient is as much to be accuſed as any thing.

The cauſe of a lienteric *diarrhœa* is principally the cicatrizing of the bowels after their eroſion in a dyſentery, in which the lacteal veſſels have been alſo injured. The cœliac *diarrhœa* is uſually laid upon a fault in the ſtomach; but it is as often owing to an obſtruction of the lacteal veſſels, as to a weakneſs of that organ. The choleric *diarrhœa* is uſually occaſioned by an effuſion of a larger portion than uſual of bile into the inteſtines, and this is often occaſioned by a violent fit of paſſion in the perſon. Junker's Conſp. Med. p. 553.

Baglivi mentions *diarrhœas* as one uſual great effect of grief; as likewiſe of immoderate anger; without which a fever would, in theſe caſes, be produced.

DIARRHOEAS, *Prognoſtics in.* All *diarrhœas* are diſeaſes of the greateſt conſequence when improperly treated, or raſhly and ſuddenly ſtopped by opiates and aſtringents. On the contrary, the whole courſe of a ſimple *diarrhœa*, if nature be left to herſelf, is attended with no danger. When the moſt ſimple, and, in itſelf, innocent *diarrhœa* is treated in that manner, the conſequences are violent and pungent pains in the abdomen; and, in old people eſpecially, a tranſlation of the matter which nature would have carrried off by that ſoft way, to the head and breaſt; whence vertigoes and ſuffocative catarrhs are often brought on, and the perſons die ſuddenly, and as it is ſuppoſed of apoplexies. The danger of ſtopping a bilious *diarrhœa* is ſtill greater, for the frequent conſequence of this is a cauſus or other violent fever of that kind; but the greateſt danger of all attends the ſtopping of a critical *diarrhœa*. The ſymptomatic *diarrhœas* in the ſmall-pox, meaſles, and purple fevers are often of fatal conſequence. Periodic *diarrhœas*, if nature be left to herſelf, are always ſalutary. The ſimple lienteric and cœliac *diarrhœas* uſually give way eaſily to medicines; and the choleric are of no dangerous conſequence, unleſs they are attended with a fever. Finally, it is to be obſerved, that any *diarrhœa* continuing an immoderate time, will by degrees waſte the ſtrength, and throw the patient into a ſlow fever and an atrophy.

DIARRHOEAS, *Method of curing.* In a ſimple *diarrhœa*, the firſt intention is to incide and attenuate the mucous matter, and then to abſterge it by digeſtive, reſolvent, and colliquating medicines; ſuch are the bitters and aromatics, with ſome of the acrid ones, as the roots of gentian, arum and zedoary, together with ginger, galingals, and the aromatic ſeeds. Theſe may be aſſiſted by the digeſtive ſalts, as cream of tartar, *arcanum duplicatum*, and vitriolated tartar, with the fixed ſalts of wormwood, and the like. To theſe may be added occaſionally the digeſtive and attenuating gums, as ammoniacum, and the like; and in ſome caſes it is proper to reduce the vicious matter into a ſort of pulpy conſiſtence. This is to be done by the abſorbents, as crabs-eyes, and the like. When there is a quantity of a bilious matter mixed with this, the admixture of ſmall doſes of nitre with the other medicines is of great effect; and when the peccant matter is by this means prepared for evacuation, nature is to be aſſiſted in her attempt to throw it off by this proper paſſage, by ſmall doſes of gently laxative medicines, ſuch as rhubarb, and the like. After this, if the motion of the bowels doth not abate and come to its uſual ſtandard on their being thus eaſed of their load, theſe ſymptoms are to be taken off by gentle aſtringents. For though theſe motions were no way to be impeded, when nature meant them for the throwing off what offended her, and were ſalutary in that ſtate; yet when they remain after the end is obtained, they are to be conſidered as a diſeaſe. The medicines proper on this occaſion are dried quinces, the abſorbent powders, ſuch as red coral, and the like, gentle opiates, and the aſtringent ſyrups of cinnamon, and the like; and finally, the cure is to be completed by reſtoring the bowels to their due tone by gentle chalybeates.

Putrid *diarrhœas*, which often occur in the laſt ſtage of malignant fevers, have been checked, and in ſome caſes removed, by injecting clyſters of *fixed* AIR every two or three hours, and by ſupplying the patient plentifully with water impregnated with this air. Prieſtley on Air, Appendix, containing Obſervations of Dr. Percival, p. 304, &c.

The lienteric and cœliac *diarrhœas* require the ſame method of treatment with the ſimple, except that in the lienteric a vomit in the beginning is uſually very proper: but in the cœliac, when there is an obſtruction of the lacteal veſſels, a vomit has no uſe; but the reſolvents, aperients, and laxatives alone are to be depended upon.

Periodic *diarrhœas* are to be treated in this manner like the ſimple ones, and nature is to be aſſiſted, not checked, in her operations in them. In theſe caſes a medicated wine prepared with rhubarb, gentian, zedoary, and black hellebore, is a very valuable medicine. When worms are ſuſpected to be in the caſe, as they very frequently are, the uſual anthelmintics are to be joined to the medicines before directed.

The critical and ſemicritical, as well as ſymptomatic *diarrhœas* in fevers, are to be treated as directed under the fevers to which they belong; and the icteric *diarrhœa*, in which the ſtools are white as in the jaundice, is to be treated as the jaundice. See FEVER, INFANT, WORMS, &c.

In the cure of *diarrhœas*, from whatever cauſe they ariſe, the ſtomach muſt be corroborated, and ſudorifics are to be mixed with abſorbents. The patient is to drink ſparingly. His common drink may be the white decoction, or camomile tea, and his diet preparations of rice. Quince and wine burnt with aromatics is good. Wainwright obſerves, that a flannel ſhirt contributes much to the cure of an habitual *diarrhœa*.

DIARTHROSIS, in *Anatomy*, a kind of articulation, or juncture of the bones, which being pretty lax, affords room for a manifeſt motion. See ARTICULATION.

The word comes from δια, and αρθρον, *juncture*, *aſſemblage*.

It is oppoſed to ſynarthroſis, wherein the articulation is ſo cloſe, that there is no ſenſible motion at all.

In the *diarthroſis*, or moveable articulations of the bones, the pieces are really ſeparated, and the parts in which they touch are each of them covered by a ſmooth cartilage, by means of which they eaſily ſlide over one another; whereas in the ſynarthroſis, or immoveable articulation, the pieces are joined together in ſuch a manner, that the parts in which they touch have nothing particular in their ſurface, and cannot ſlide upon one another.

The *diarthroſis* is either manifeſt with large motion, or obſcure with ſmall motion. The former kind of *diarthroſis* is of three kinds: 1. When the head of the bone is big, and long, and the cavity that receives it, deep; it is called *enarthroſis*, or orbicular *diarthroſis*: ſuch is that of the thigh, with the hip. 2. When the head of the bone is flat, and the cavity that receives it, ſuperficial; it is called *arthrodia*, and planiform *diarthroſis*: ſuch is that of the jaws, with the bones of the temples. 3. When two bones receive each other reciprocally, and are moveable in each other; it is called *ginglymus*, and alternative or reciprocal *diarthroſis*: thus the cubitus receives the radius, at the ſame time that the radius receives the cubitus.

DIARTHROSIS *ſynarthroidalis*, called alſo *amphiarthroſis*, is a kind of neutral, or dubious articulation; being neither abſolutely *diarthroſis*, as not having a manifeſt motion; nor abſolutely *ſynarthroſis*, as not being quite immoveable.

Thus the articulations of the ribs with the *vertebræ*, and thoſe of the bones of the *carpus*, and *tarſus*, among each other, are *ſynarthroidal diarthroſes*.

DIARY, a term ſometimes uſed for a journal, or day-book, containing an account of every day's proceedings. Thus we ſay *diaries* of the weather, &c.

DIARY *fever*, is a fever of one day. See EPHEMERA.

DIASCHISM, *Diaſchiſma*, in *Muſic*, the difference between the comma and enharmonic dieſis. This is expreſſed by the ratio $\frac{2048}{2025}$.

Mr. Euler has taken this term in the ſenſe here mentioned. Others call it the leſſer comma. The octave contains 61 *diaſchiſms* nearly. Tentam. Nov. Theor. Muſic. p. 107 & 112. See COMMA.

DIASCORDIUM, in *Pharmacy*, a kind of electary, firſt deſcribed by Fracaſtorius, and denominated from *ſcordium*, which is a chief ingredient therein. It is alſo called *confectio Fracaſtorii*.

The other ingredients are red roſes, bole, ſtorax, cinnamon, caſſia lignea, dittany, tormentil roots, biſtort, gentian, galbanum, amber, terra ſigillata, opium, long pepper, ginger, mel roſatum, and Malmſey wine.

It is an aſtringent, and is uſed againſt malignant fevers, the plague, worms, the colic, and to provoke ſleep, and reſiſt putrefaction.

DIASEBESTEN, in *Pharmacy*, a ſoft, purgative electary, whereof ſebeſtens are the baſis.

The other ingredients are prunes, tamarinds, juices of iris, anguria, and mercurialis, penidies, ſimple diaprunum, violet-ſeed, the four cold ſeeds, and diagrydium.

It is good in intermitting and continued fevers, appeaſes thirſt, promotes ſleep, and expels the morbid humours by urine.

DIASENNA, in *Pharmacy*, a ſoft, purgative electary, thus called from *ſenna*, which is its baſe.

The other ingredients are ſugar-candy, cinnamon, lapis lazuli, ſilk, cloves, galanga minor, black pepper, nardus Indica, ſeed of baſilicum, flowers of cloves, cardamoms, ſaffron ginger, zedoary, roſemary flowers, long pepper, lapis Armenus, and honey.

Diaſenna eaſes and comforts the melancholic and ſplenetic; and is good againſt all diſeaſes ariſing from an atra bilis.

DIASIA, Διασια, in *Antiquity*, a feſtival at Athens in honour of Jupiter, ſurnamed Μειλιχιος, i. e. *the propitious*. Pott. Archæol. lib. ii. cap. 20.

DIASTASIS, from διϊϛημι, *I ſet apart*, a word uſed by the writers in medicine in many different ſenſes. It is frequently uſed as a name for that ſeparation of the bones, when they naturally recede from one another. Sometimes it is uſed as the term for an interſtice, as that between the *ulna* and *radius*, or between the *tibia* and *fibula*. Sometimes it is put for a diſtenſion of the muſcles in convulſions; and, when applied to the ſtomach, it is made to ſignify an inclination to vomit.

DIASTEM, *Diaſtema*, in *Muſic*, a name the ancients gave to a ſimple interval, in contradiſtinction to a compound interval, which they called a *ſyſtem*.

Ariſtoxenus enumerates many differences of intervals: ſuch as greater, or leſs; conſonant, or diſſonant; compounded, or uncompounded; related to one genus, or to another; laſtly, rational or irrational. Ariſtox. ap. Wallis. Append. ad Ptolem. Harmon. p 154.

Muſicians divide intervals into two kinds: one of them called *ſyſtem*, which is to contain at leaſt two intervals in any kind of muſic whatever; but many contain more.

The other, called *diaſtem*, is a mere, or ſingle interval; the proper ſignification of the Greek διαϛημα, being *interval*.

DIASTOLE, in *Anatomy*, expreſſes that motion of the heart, and arteries, whereby thoſe parts dilate, or diſtend themſelves: the other oppoſite motion being called the *ſyſtole* of the heart, and arteries; wherein they contract themſelves. See ARTERY, and HEART.

The word is Greek, formed from the verb διαϛελλειν, *to ſeparate, open, dilate*.

The *diaſtole* of the heart is properly the receſs of the parietes of the two ventricles from each other; or the enlargement of their cavities, and diminution of their lengths, and their approximation to a ſpherical form.

The *diaſtole*, or dilatation of the heart, ariſes from the blood being brought, by the veins, into its ventricles; and that of the arteries, from the blood being thrown into their cavities by the contraction of the heart. So that the *diaſtole* of the heart, and arteries, is not effected at the ſame time; the *diaſtole* of the heart happening when the arteries are contracted, and that of the arteries when the heart is contracted.

What we call the beating of the pulſe is only the *diaſtole* of the arteries.

The lungs and breaſt have likewiſe their ſyſtole and *diaſtole*; ſo has the brain.

The true cauſe of the *diaſtole* of the heart was not well accounted for before Dr. Drake: that the heart is a muſcle, is made evident beyond all doubt by Dr. Lower; and that the motion of all muſcles conſiſts in conſtriction, is not to be doubted. By ſuch means the ſyſtole is eaſily accounted for.

But inaſmuch as the heart has no antagoniſt muſcle, the *diaſtole* has puzzled men of the greateſt genius. Dr. Lower unhappily attributes it to a motion of reſtitution. *A nullo enim cordis motu, niſi tenſionem ejus remittente, & ab irruente ſanguine*, diaſtole, *ejus libratis vicibus ſuccedit*. De Corde, p. 75.

Mr. Cowper accounts for the *diaſtole* from the analogy the heart of an animal bears to the pendulums of thoſe artificial automata, clocks and watches: its motion, he ſays, is performed like that of other muſcles, the blood doing the office of a pondus, or weight.

Both theſe notions Dr. Drake refutes; and with great reaſon and probability maintains the weight of the atmoſphere to be the pondus, or counterpoiſe, to the con-the ferril to hold it by. In the former there is a little piece of box croſſing the ferril, in form of a little plane, covered at bottom with a thin copper-plate.

Diamond, in *Heraldry*, is uſed to expreſs the black colour in the atchievements of noblemen.

Gwillim diſlikes the way of blazoning the coats of peers by precious ſtones, inſtead of metals, or colour. But the Engliſh practice allows it. See Colour.

Diamond-*cutter*. See Lapidary.

Diamond-*glaſs*. See Glass.

Diamond-*powder* is of great uſe for grinding hard ſubſtances. And Mr. Boyle obſerves, that though it be much dearer than emery, yet it makes ſo great diſpatch, and the tools employed laſt ſo much longer, as greatly to over-balance the cheapneſs of the emery.

DIAMORUM, Διαμωρον, a compoſition in pharmacy, of which there are two kinds; *ſimple*, and *compound*.

Diamorum, *Simple*, is the common ſyrup of mulberries, made of the juice of that fruit, boiled up with ſugar. It is good againſt diſeaſes of the throat, and to ſtop dyſenteries.

There is alſo a ſort of *ſimple diamorum* made of mulberry juice and honey, otherwiſe called *mulberry rob*.

Diamorum, *Compound*, is made with mulberry juice, verjuice, myrrh, and ſaffron. It is uſed to deterge phlegm from the ſtomach and breaſt, and to eaſe reſpiration.

DIANA, in *Mythology*, the daughter of Jupiter and Latona, and twin ſiſter to Apollo. She is ſaid to have been born firſt, and to have aſſiſted her mother in the delivery of Apollo. The ſufferings of Latona on this occaſion, gave *Diana* an averſion to marriage, though not to gallantry. She is accuſed of having loved and beſtowed her favours on Endymion, Pan, and Priapus. She was the goddeſs of the woods on earth, Luna in heaven, and Hecate in hell.

The moſt known character of this goddeſs is that of her preſiding over woods, and delighting in hunting. Accordingly the *Diana venatrix*, or goddeſs of the chace, is frequently repreſented in ancient ſtatues, and deſcribed by the Roman poets, as running, with her veſt ſhortened and girt about her, and yet flying back with the wind: ſhe is tall of ſtature; and her face, though ſo very handſome, is ſomewhat manly: her legs are bare, well-ſhaped, and ſtrong: her feet are ſometimes bare, and ſometimes adorned with a ſort of buſkin: ſhe often has her quiver on her ſhoulder; and ſometimes holds a javelin, but more uſually her bow in her right hand. The ſtatues of *Diana* were frequent in the woods, where ſhe is repreſented as hunting, bathing, and reſting herſelf after fatigue. *Diana* has been ſometimes repreſented with three bodies, and hence called the triple, three-headed, and three-bodied *Diana*. Her diſtinguiſhing name, under this triple appearance, is Hecate or Trivia; under which character of the infernal *Diana* ſhe was invoked in enchantments, and repreſented as a Fury, holding inſtruments of terror in her hands, and graſping cords, ſwords, ſerpents or flaming torches. When ſhe is repreſented as the intelligencer that preſides over the moon, ſhe appears in a car, drawn by ſtags, or by does, but more commonly by horſes of a perfectly white colour, with a lunar crown or creſcent on her forehead. Spence's Polymetis, p. 100, 102, 104.

She had many temples dedicated to her, of which that at Epheſus was the moſt celebrated, and eſteemed one of the wonders of the world. It was burned by Eroſtratus, or Eratoraſtus, to perpetuate his name by the action, on the day in which Alexander was born, A. M. 3648.

Apollo and *Diana* were names for the ſun and moon, and had each of them lances given them, in alluſion to the projection of their rays.

Diana's *Tree*, *Arbor Dianæ*. See Arbor.

DIANDRIA, in *Botany*, the ſecond claſs of plants, which have hermaphrodite flowers, with two ſtamina or male parts in each.

The word is formed of the Greek δις, *twice*, and ανηρ, *male*.

Of this claſs of plants, which comprehends three orders, viz. the *monogynia*, *digynia*, and *trigynia*, are the jeſſamine, phillyrea, olive, roſemary, &c. See *Tab. of Botany*, *Claſs* 2.

DIANTHERA, in *Botany*, a genus of the *diandria monogynia* claſs. The characters are theſe: the flower hath a permanent empalement of one leaf, which is tubulous, and cut at the top into five equal parts: the flower is of the grinning kind, having one petal with a ſhort tube; the upper lip is reflexed and bifid; the lower is divided into three parts, the middle being the broadeſt: it hath two ſhort ſlender ſtamina, adhering to the back of the petal, one of which has a twin ſummit, the other is a little taller. It hath an oblong germen ſupporting a ſlender ſtyle of the length of the ſtamina, crowned by an obtuſe ſtigma. The empalement afterward becomes a capſule with two cells, opening with two valves, which are alternately compreſſed at the top and bottom, and open with an elaſticity, caſting a ſingle ſeed out of each cell. This plant grows naturally in Virginia, and other parts of North America.

DIANTHON, from δια, and ανθος, *flower*, in *Medicine*, an antidote deſcribed by Myrepſus, from which the *ſpecies dianthus* in the London diſpenſatory was probably taken. It is thus made:

℞ Flor. roriſm. ℥i. roſar. n. & rad. glych. āā ʒvi. caryoph. arom. ſpic. nard. nuc. moſch. rad. galangal. cort. cinnamon. rad. zedoar. lign. aloes. ſem. card. min. ſem. anethi, aniſi, & macis āā ℈iv. M.

This compoſition is recommended in the cachexy.

DIANTHUS, in *Botany*, a genus of the *decandria digynia* claſs; the clove July flower, carnation, and pink. The generical characters are theſe: the flower hath a cylindrical empalement of one leaf, ſcaly below, with five petals, whoſe tails are as long as the empalement; but their upper part is broad, plain, and ſpread open. It hath ten ſtamina; in the center is ſituated an oval germen, which afterward becomes a cylindrical capſule with one cell, opening in four parts at the top, filled with compreſſed angular ſeeds. There are twelve ſpecies. See Carnation, Pink, &c.

DIANUCUM, in *Pharmacy*, a kind of rob, made of the juice of green walnuts, and ſugar, boiled together by a moderate fire, to the conſiſtence of honey.

The word is formed from *dia*, and *nux*, *nucis*, *nut*.

It is good to ſtrengthen the ſtomach, promote ſweat, and reſiſt poiſon.

DIAPALMA, in *Pharmacy*, a deſiccative, or drying plaſter, ſaid to be ſo denominated from the wood of the palm-tree, whereof the ſpatula is to be made, that is to ſtir it while boiling. It is compoſed of common oil, hog's fat, and litharge of gold. It is good to dry, reſolve, deterge, and cicatrize; and is the plaſter moſt uſed for wounds and ulcers.

DIAPASMA, a common name for all powders ſprinkled on the body; whether as perfumes or otherwiſe.

The word comes from the Greek διαπασσειν, *inſpergere*, *to ſprinkle*.

DIAPASON, from δια, *by*, and πας, *all*, in *Muſic*, a muſical interval, otherwiſe called *octave*: ſo called, becauſe it contains all the poſſible diverſities of ſound.

The *diapaſon* is the firſt, and moſt perfect of the concords: if conſidered *ſimply*, it is but one harmonical interval; though if conſidered *diatonically*, by tones, and ſemi-tones, it contains ſeven degrees, viz. three greater tones, two leſſer tones, and two greater ſemi-tones.

The interval of a *diapaſon*, that is, the proportion of its grave ſound to its acute, is as 2 to 1.

The ancients had ſeven variations, ſchemes, figures, or ſpecies of the *diapaſon*, ariſing from the various poſitions of the tones and ſemi-tones in the ſcale.

The firſt ſpecies of the *diapaſon*, was from the hypate hypaton to the parameſe; or from B ♮ to b ♮ of our notation. It was called *myxolydian*.

The ſecond, called *lydian*, from the parypate hypaton to the trite diezeugmenon, or from C to c.

The third, called *phrygian*, from the lichanos hypaton to the paranete diezeugmenon, or from D to d.

The fourth, called *dorian*, from the hypate meſon to the nete diezeugmenon, or from E to e.

The fifth, named *hypolydian*, from the parypate meſon to the trite hyperbolæon, or from F to f.

The ſixth, called *hypophrygian*, from the lichanos meſon to the paranete hyperbolæon, or from G to g.

The ſeventh, named *hypodorian*, *common*, and *locrian*, from the meſe to the nete hyperbolæon, or from the proſlambanomenos to the meſe, that is, from our a to aa, or from A to a. Euclid. Introd. Harm. p. 15, ſeq. Bacchius, p. 18. Edit. Meibom. See Diagram.

Diapason *diateſſaron*. The Pythagoreans did not admit this interval as a conſonance or concord; for this reaſon, that its ratio 8 : 3 was neither multiple nor ſuperparticular. But Ptolemy contends for its being a good concord, for this reaſon, that the *diapaſon* added to any concord, produces a concord. Ariſtoxenus herein agrees with him. Vide Wallis's Append. ad Ptolem. Harm. p. 155.

Diapason, among *Muſical Inſtrument-Makers*, is a kind of rule, or ſcale, whereby they adjuſt the pipes of their organs, and cut the holes of their flutes, hautboys, &c. in due proportion, for performing the tones, ſemi-tones, and concords, juſtly.

A ſquare being divided into eight equal parallelograms; the points wherein a diagonal interſects all theſe parallelograms, expreſs all the uſual intervals in muſic: and on this principle it is, that the *diapaſon* is founded.

There is a particular kind of *diapaſon* for trumpets; ſerving

ing as a ſtandard, or meaſure, for the different magnitudes they muſt have to perform the four parts of muſic. There is another for ſackbuts, and ſerpents, ſhewing how far they are to be lengthened, or ſhortened, to riſe or fall from one tone or interval to another.

The bell-founders have likewiſe a *diapaſon*, or ſcale, ſerving to regulate the ſize, thickneſs, weight, &c. of their bells.

Diapason is alſo the name of two ſtops of an organ, viz. the open and ſtopped.

DIAPASONDIAEX, in *Muſic*, a kind of compound concord; whereof there are two ſorts: the *greater*, which is in the ratio of 10 to 3; and the *leſs*, in that of 16 to 5.

DIAPASONDIAPENTE, in *Muſic*, a compound conſonance, in a triple ratio of 9 to 3.

The *diapaſondiapente* is a ſymphony made when the voice proceeds from the firſt to the twelfth tone. The word is properly a term in the Greek muſic: we ſhould now call it a *twelfth*.

DIAPASONDIATESSARON, in *Muſic*, a compound concord, in the ratio of 8 to 3.

The *diapaſondiateſſaron* is a ſymphony wherein the voice proceeds from the firſt tone to the eleventh. This the moderns would rather call an *eleventh*.

DIAPASONDITONE, in *Muſic*, a compound concord, in the proportion of 10 to 4, or 5 to 2.

DIAPASONSEMIDITONE, a compound concord, whoſe terms are in the proportion of 12 to 5.

DIAPEDESIS, Διαπηδησις, in *Medicine*, an ouſing of blood through the coats of the veins, or arteries; occaſioned either by the blood's becoming too much diſſolved, or attenuated; or by the pores of the veſſels becoming too patent, and open.

The word is compounded of δια, *through*, and πηδαω, *I leap*.

There are ſome able phyſicians who deny there can be any ſuch tenuity of blood, as that it ſhall exude through the veſſels, without any aperture made therein.

DIAPENSIA, in *Botany*, a genus of the *pentandria monogynia* claſs: the corolla is monopetalous and ſalver-ſhaped; the calyx has five leaves imbricated with three ſmall ones; the ſtamina are laid on the tube of the corolla, and the capſule has three cells.

DIAPENTE, in the *Ancient Muſic*, an interval making the ſecond of the perfect concords; anſwering to what in the modern muſic we more uſually call a *perfect fifth*.

The word is formed of δια, and πεντε, *five*.

The *diapente* is a ſimple concord; yet, if conſidered diatonically, it contains four terms, viz. two greater tones, a leſſer tone, and a greater ſemi-tone. The *diapente* is the greater part of the diapaſon, or octave, harmonically divided. It is produced when the voice paſſes from its firſt tone to its fifth.

Diapente is alſo uſed, in *Pharmacy*, for a compound of five ſeveral drugs, or ingredients.

Diapente, among *Farriers*, a drink made for horſes, of gentian, round birthwort, barberries, myrrh, and ivory ſhavings, of each a like quantity, which are to be pounded ſeparately, and finely ſearced: this powder, to the quantity of two or three ſpoonfuls, is mixed with a pint and a half of muſcadine, or ſack, or, for want of either, with ſtrong ale or beer, and given in fevers, the cough, glanders, ſurfeits, inflammations, yellows, &c. It is ſaid to purify the blood from all foulneſſes, as well as to reſtrain the overflowing of the gall, working of the ſpleen, &c.

DIAPER, a ſort of linen cloth wrought with flowers and other figures.

DIAPERED, in *Heraldry*. See Diapre.

DIAPHANOUS, in *Philoſophy*, a thing tranſparent, or that gives paſſage to the rays of light; as water, air, glaſs, talc, fine porcelain, &c. See Transparency.

The word is formed of δια, *through*, and φαινω, *I ſhew*.

DIAPHANEITY, in the ſchools, the quality of a tranſparent body; or that which denominates it ſuch. See Transparency.

DIAPHŒNIC, *Diaphœnicum*, in *Pharmacy*, a ſoft, purgative electary; thus called from the dates, which make its baſis; the palm-tree, whoſe fruit they are, being called by the Greeks φοινιξ. See Date.

The other ingredients are, penidies, almonds, turbith, ginger, white pepper, mace, cinnamon, riee, fennel, carrot-ſeeds, and honey.

The *electarium diaphœnicum* purges chiefly ſeroſities, and excites the menſes. It is alſo uſed in dropſies, lethargies, apoplexies, and palſies.

DIAPHONICS, from δια, *through*, and φωνη, *ſound*, is ſometimes uſed for the ſcience of refracted ſound, as it paſſes through different mediums.

DIAPHORESIS, Διαφορησις, from διαφερω, *I diſſipate*, in *Medicine*, includes all diſcharges through the ſkin; both ſenſible, and inſenſible: whence *diaphoretic*, &c. See Perspiration.

DIAPHORETIC, in *Medicine*, is applied to remedies that promote the expulſion of humours by inſenſible perſpiration.

Diaphoretic is much of the ſame import as *ſudorific*: except that the latter promotes ſenſible, and the former inſenſible perſpiration. Their only difference, therefore, is in the degree of activity.

Diaphoretic *antimony*, or *mineral diaphoretic*, is a preparation of antimony, the proceſs whereof ſee under Antimony.

DIAPHRAGM, *Diaphragma*, in *Anatomy*, a part, popularly called the *midriff*, and by anatomiſts, *ſeptum tranſverſum*. It is a nervous muſcle, ſeparating the breaſt, or thorax, from the abdomen, or lower venter; and ſerving as a partition between the natural, and the vital parts as they are called.

It was Plato, as Galen informs us, that firſt called it *diaphragm*, from the verb διαφραττειν, *to ſeparate*, or *be between two*. Till his time it had been called φρενες, *underſtanding*; from a notion, that an inflammation of this part produced phrenſy: which is not at all warranted by experience, no more than that other tradition, that a tranſverſe ſection of the *diaphragm* with a ſword, cauſes the patient to die laughing.

Its figure is round, reſembling a ray-fiſh, or thornback. It is a double and digaſtric muſcle, conſiſting of two circles, which are both muſcular; of two arteries; and two veins, called *phrenicæ*; and ſeveral branches of nerves. The firſt, or ſuperior circle, called the great muſcle of the *diaphragm*, is fleſhy in its circumference, and tendinous and aponeurotic in the middle; it ariſes from the ſternum, and the ends of the laſt ribs, by radiated fibres: the ſecond, or inferior, called the ſmall muſcle of the *diaphragm*, is thicker than the other, of leſs extent, and of an oblong form; it comes from the vertebræ of the loins by two tendons, called *cruræ*. The upper is covered at the top with a membrane derived from the *pleura*; and the lower is lined at bottom with another from the *peritonæum*.

Its ſituation is oblique, being extended from the *cartilago xiphoides*, by the extremes of the ribs, to the region of the loins. It is pierced in the tendinous part with a round opening for the paſſage of the *vena cava*, which being incapable of contractions, occaſions no interruption to the circulation; and in its fleſhy part for the *æſophagus*, and with another forked opening, partly fleſhy and partly tendinous, for the *aorta*; and between the productions of the inferior circle paſs the *aorta*, which lies in the interſtice between its two *crura*, thoracic duct, and *vena azygos*. In its natural diſpoſition it is convex on the upper ſide towards the breaſt, and concave on the lower towards the belly. Hence it has two motions; the one of contraction, the other of relaxation.

By the contraction, or ſwelling of the fibres, the *diaphragm* becomes flat on each ſide; the conſequence of which is, that the cavity of the breaſt is enlarged, to give liberty for the lungs to receive the air in inſpiration; and the cavity of the abdomen is leſſened, and, conſequently, the ſtomach and inteſtines preſſed, for the diſtribution of the chyle. In its relaxation, whereby it reſumes its natural ſituation, the cavity of the breaſt is diminiſhed, and the lungs preſſed for the expulſion of the air in expiration. See Respiration.

On the *diaphragm*, alſo, in great meaſure, depend the actions of coughing, ſneezing, yawning, laughing, the hiccough, &c. between which motions there is ſome connexion cauſed by the communication of the nerves of different parts, which meet in the *diaphragm*.

Dr. Hook obſerves, that an animal may be kept alive, without thorax, or *diaphragm*, by blowing air into the lungs with a bellows; of which he had made the experiment.

Mr. Senac has given us a new deſcription of the ſtructure of the *diaphragm*, with remarks on the action of this muſcle. See Mem. Acad. Scienc. 1729.

Diaphragm is uſed for the *ſeptum ſcroti*. See Scrotum.

Diaphragm is alſo a general name, given to all partitions, or ſeparations between two parts of a thing; as the little perforated partitions in the tubes of long teleſcopes.

DIAPHRAGMATIC, is applied to the arteries, veins, and nerves, diſtributed through the *diaphragm*.

They are alſo called *phrenic*, or *phrenetic*.

DIAPHTHORA, from διαφθειρειν, *to corrupt*, is uſed by Galen and Boerhaave to denote the corruption of the aliments in the ſtomach, and by Hippocrates for the corruption of the fœtus in the womb, and abortion.

DIAPORESIS, Διαπορησις, in *Rhetoric*, is uſed to expreſs the heſitation or uncertainty of the ſpeaker.

We have an example in Homer, where Ulyſſes going to relate his ſufferings to Alcinous, begins thus:

> Τι πρωτον, τι δ' ἔπειτα, τι δ' ὕστατιον καταλεξω?
> *Quid primum, quid deinde, quid poſtremo alloquar?*

This figure is moſt naturally placed in the exordium or introduction to a diſcourſe. See DOUBTING.

DIAPRE', or **DIAPERED**, in *Heraldry*, a dividing of a field into planes, or compartments, in the manner of fretwork; and filling it with variety of figures.

This chiefly obtains on bordures, which are *diapered*, or fretted over, and the frets charged with things proper to bordures; as in *Tab. Herald. fig.* 18.

DIAPRUNUM, in *Pharmacy*, a ſoft, purgative electary, thus called from the pulp of Damaſcus prunes, which make its baſe.

Diaprunum is either *ſimple* or *compound*.

DIAPRUNUM, *Simple*, or *lenitive*, conſiſts of the pulp aforementioned, with caſſia, tamarinds, rhubarb, red roſes, violet ſeeds, ſaunders wood, both red and citron, ſcrapings of ivory, liquorice juice, and the four cold ſeeds. It is good to prepare, and ſoften the humours.

DIAPRUNUM, *Compound*, or *ſolutive*, is only the ſimple, with the addition of half an ounce of ſcammony to every pound of the electary, to render it more purgative.

DIARRHODON, Διάῤῥοδον, in *Pharmacy*, a name given to divers compoſitions, wherein roſes are a principal ingredient.

The word is formed of δια, and ῥόδον, *roſe*.

DIARRHODON *Abbatis*, is a cordial powder, ſo denominated from an abbot who invented it. It conſiſts of red roſes, red and citron ſaunders, lignum aloes, cinnamon, rhaponticum, ſpikenard, ivory, hartſhorn, ſaffron, maſtich, pearls, ambergriſe, muſk, &c. It is uſed to ſtrengthen the heart, ſtomach, and liver, to aſſiſt in digeſtion, and to prevent vomiting.

There are alſo *Trochiſci* DIARRHODON, compoſed of red roſes, ſhavings of ivory, the ſaunders, liquorice, maſtich, ſaffron, camphor, and roſe-water. They are good to fortify the heart, ſtomach, and liver, and to ſtop dyſenteries, and other fluxes of the belly.

DIARRHODON, *Pilulæ*, are compoſed of aloes, trochiſci *diarrhodon*, wormwood leaves, maſtich, and rock-ſalt. They firſt purge, then fortify the ſtomach, promote digeſtion, and prevent a ſtinking breath. But all theſe compoſitions are out of uſe at preſent.

DIARRHOEA, Διάῤῥοια, in *Medicine*, a looſeneſs, or flux of the belly; or a profuſe evacuation of liquid excrements by ſtool.

The word is formed of the Greek δια, *through*, and ῥέειν, *to flow*.

The word, in the general, is uſed for any kind of flux of the belly; but properly for that wherein the humour, or excrement, flows out either pure, or mixed, with or without pain, in a fluid ſtate.

The *diarrhœa*, looſeneſs, or purging of the bowels, as it is uſually called by us, is properly an increaſed periſtaltic motion of the guts, by means of which nature attempts to throw off a mucous or bilious matter lodged in too great a quantity in the *primæ viæ*, and diſturbing her regular operations.

Diarrhœas are of divers kinds, diſtinguiſhed by the diverſity of the excrements; ſome being bilious, ſome ſerous, ſome pituitous, and ſome purulent.

The purulent always ariſe from ſome abſceſs burſt in the body; the reſt either from morbid humours irritating the inteſtines, and expreſſing the juices out of the adjacent parts; or from a laxneſs of the inteſtinal fibres; or an extraordinary fermentation in the blood, whereby it diſcharges its excrements into the inteſtines.

If this diſorder is attended with pain, it is ſometimes called a colic. When the evacuations are fluid, but partly indigeſted, it is called *cœliaca paſſio*. When the aliment is carried through the bowels, and ejected in an indigeſted ſtate, or nearly ſo, it is called *lienteria*; all which are only different degrees of the ſame diſorder.

DIARRHOEA, *Signs of a*. The ſigns which precede a *diarrhœa* of any kind are uſually a tenſive pain and rumbling, and noiſe in the abdomen, and pungent acute pains, particularly about the region of the navel. The appetite is uſually very bad in the beginning of a *diarrhœa*, and in its future ſtages the ſtrength fails; and the longer it continues, the worſe ſymptoms it brings on: a teneſmus is one common complaint, and the head is weakened and aches at times; and, finally, an internal heat is felt, which is a very bad ſymptom, and threatens miſchiefs of various kinds.

DIARRHOEAS, *Perſons moſt ſubject to*. The ſimple *diarrhœa*, in which a mucous and ſerous matter is voided, is principally a diſeaſe incident to people of phlegmatic habits, whoſe ſtools are generally watery. When this kind of *diarrhœa* obſerves any regular period, it is a ſign of a ſanguine temperament in the perſon. The bilious *diarrhœas* are moſt frequent with perſons of choleric habits; and the critical *diarrhœas* in fevers uſually happen to perſons of a ſanguine one. Perſons of tender and delicate conſtitutions, if they walk about a room when hot with their feet naked, are uſually affected afterwards with a ſimple *diarrhœa*.

DIARRHOEAS, *Cauſes of*. The immediate cauſe is irritation in the inteſtines. Among the principal cauſes of this preternatural irritation, may be reckoned the ſudden repreſſion of ſweats in a morning, while the perſon is in bed: it is a ſtanding obſervation, that ſuch as perſpire but little, are ever ſubject to a *diarrhœa*; and on the contrary, people who perſpire much are commonly coſtive.

Crude foods, and ſuch as are difficult of digeſtion, often throw people into *diarrhœas*, as alſo over-fat meats, eſpecially if perſons drink much after them; and nothing ſo frequently as the free eating of ſummer-fruits, eſpecially if the perſon chance to ſwallow a quantity of any thing liquid ſoon after them.

Feculent or fermenting liquors will alſo do it, and ſometimes the drinking cold liquors in a large quantity, or even the external cold; but in this caſe the tender habit of the patient is as much to be accuſed as any thing.

The cauſe of a lienteric *diarrhœa* is principally the cicatrizing of the bowels after their eroſion in a dyſentery, in which the lacteal veſſels have been alſo injured. The cœliac *diarrhœa* is uſually laid upon a fault in the ſtomach; but it is as often owing to an obſtruction of the lacteal veſſels, as to a weakneſs of that organ. The choleric *diarrhœa* is uſually occaſioned by an effuſion of a larger portion than uſual of bile into the inteſtines, and this is often occaſioned by a violent fit of paſſion in the perſon. Junker's Conſp. Med. p. 553.

Baglivi mentions *diarrhœas* as one uſual great effect of grief; as likewiſe of immoderate anger; without which a fever would, in theſe caſes, be produced.

DIARRHOEAS, *Prognoſtics in*. All *diarrhœas* are diſeaſes of the greateſt conſequence when improperly treated, or raſhly and ſuddenly ſtopped by opiates and aſtringents. On the contrary, the whole courſe of a ſimple *diarrhœa*, if nature be left to herſelf, is attended with no danger. When the moſt ſimple, and, in itſelf, innocent *diarrhœa* is treated in that manner, the conſequences are violent and pungent pains in the abdomen; and, in old people eſpecially, a tranſlation of the matter which nature would have carrried off by that ſoft way, to the head and breaſt; whence vertigoes and ſuffocative catarrhs are often brought on, and the perſons die ſuddenly, and as it is ſuppoſed of apoplexies. The danger of ſtopping a bilious *diarrhœa* is ſtill greater, for the frequent conſequence of this is a cauſus or other violent fever of that kind; but the greateſt danger of all attends the ſtopping of a critical *diarrhœa*. The ſymptomatic *diarrhœas* in the ſmall-pox, meaſles, and purple fevers are often of fatal conſequence. Periodic *diarrhœas*, if nature be left to herſelf, are always ſalutary. The ſimple lienteric and cœliac *diarrhœas* uſually give way eaſily to medicines; and the choleric are of no dangerous conſequence, unleſs they are attended with a fever. Finally, it is to be obſerved, that any *diarrhœa* continuing an immoderate time, will by degrees waſte the ſtrength, and throw the patient into a ſlow fever and an atrophy.

DIARRHOEAS, *Method of curing*. In a ſimple *diarrhœa*, the firſt intention is to incide and attenuate the mucous matter, and then to abſterge it by digeſtive, reſolvent, and colliquating medicines; ſuch are the bitters and aromatics, with ſome of the acrid ones, as the roots of gentian, arum and zedoary, together with ginger, galingals, and the aromatic ſeeds. Theſe may be aſſiſted by the digeſtive ſalts, as cream of tartar, *arcanum duplicatum*, and vitriolated tartar, with the fixed ſalts of wormwood, and the like. To theſe may be added occaſionally the digeſtive and attenuating gums, as ammoniacum, and the like; and in ſome caſes it is proper to reduce the vicious matter into a ſort of pulpy conſiſtence. This is to be done by the abſorbents, as crabs-eyes, and the like. When there is a quantity of a bilious matter mixed with this, the admixture of ſmall doſes of nitre with the other medicines is of great effect; and when the peccant matter is by this means prepared for evacuation, nature is to be aſſiſted in her attempt to throw it off by this proper paſſage, by ſmall doſes of gently laxative medicines, ſuch as rhubarb, and the like. After this, if the motion of the bowels doth not abate and come to its uſual ſtandard on their being thus eaſed of their load, theſe ſymptoms are to be taken off by gentle aſtringents. For though theſe motions were no way to be impeded, when nature meant them for the throwing off what offended her, and were ſalutary in that ſtate; yet when they remain after the end is obtained, they are to be conſidered as a diſeaſe. The medicines proper on this occaſion are dried quinces, the abſorbent powders, ſuch as red coral, and the like, gentle opiates, and the aſtringent ſyrups of cinnamon, and the like; and finally, the cure is to be completed by reſtoring the bowels to their due tone by gentle chalybeates.

Putrid *diarrhœas*, which often occur in the laſt ſtage of malignant fevers, have been checked, and in ſome caſes removed, by injecting clyſters of *fixed* AIR every two or three hours, and by ſupplying the patient plentifully with water impregnated with this air. Prieſtley on Air, Appendix, containing Obſervations of Dr. Percival, p. 304, &c.

The lienteric and cœliac *diarrhœas* require the ſame method of treatment with the ſimple, except that in the lienteric a vomit in the beginning is uſually very proper: but in the cœliac, when there is an obſtruction of the lacteal veſſels, a vomit has no uſe; but the reſolvents, aperients, and laxatives alone are to be depended upon.

Periodic *diarrhœas* are to be treated in this manner like the ſimple ones, and nature is to be aſſiſted, not checked, in her operations in them. In theſe caſes a medicated wine prepared with rhubarb, gentian, zedoary, and black hellebore, is a very valuable medicine. When worms are ſuſpected to be in the caſe, as they very frequently are, the uſual anthelmintics are to be joined to the medicines before directed.

The critical and ſemicritical, as well as ſymptomatic *diarrhœas* in fevers, are to be treated as directed under the fevers to which they belong; and the icteric *diarrhœa*, in which the ſtools are white as in the jaundice, is to be treated as the jaundice. See FEVER, INFANT, WORMS, &c.

In the cure of *diarrhœas*, from whatever cauſe they ariſe, the ſtomach muſt be corroborated, and ſudorifics are to be mixed with abſorbents. The patient is to drink ſparingly. His common drink may be the white decoction, or camomile tea, and his diet preparations of rice. Quince and wine burnt with aromatics is good. Wainwright obſerves, that a flannel ſhirt contributes much to the cure of an habitual *diarrhœa*.

DIARTHROSIS, in *Anatomy*, a kind of articulation, or juncture of the bones, which being pretty lax, affords room for a manifeſt motion. See ARTICULATION.

The word comes from δια, and αρθρον, *juncture*, *aſſemblage*.

It is oppoſed to ſynarthroſis, wherein the articulation is ſo cloſe, that there is no ſenſible motion at all.

In the *diarthroſis*, or moveable articulations of the bones, the pieces are really ſeparated, and the parts in which they touch are each of them covered by a ſmooth cartilage, by means of which they eaſily ſlide over one another; whereas in the ſynarthroſis, or immoveable articulation, the pieces are joined together in ſuch a manner, that the parts in which they touch have nothing particular in their ſurface, and cannot ſlide upon one another.

The *diarthroſis* is either manifeſt with large motion, or obſcure with ſmall motion. The former kind of *diarthroſis* is of three kinds: 1. When the head of the bone is big, and long, and the cavity that receives it, deep; it is called *enarthroſis*, or orbicular *diarthroſis*: ſuch is that of the thigh, with the hip. 2. When the head of the bone is flat, and the cavity that receives it, ſuperficial; it is called *arthrodia*, and planiform *diarthroſis*: ſuch is that of the jaws, with the bones of the temples. 3. When two bones receive each other reciprocally, and are moveable in each other; it is called *ginglymus*, and alternative or reciprocal *diarthroſis*: thus the cubitus receives the radius, at the ſame time that the radius receives the cubitus.

DIARTHROSIS *ſynarthroidalis*, called alſo *amphiarthroſis*, is a kind of neutral, or dubious articulation; being neither abſolutely *diarthroſis*, as not having a manifeſt motion; nor abſolutely *ſynarthroſis*, as not being quite immoveable.

Thus the articulations of the ribs with the *vertebræ*, and thoſe of the bones of the *carpus*, and *tarſus*, among each other, are *ſynarthroidal diarthroſes*.

DIARY, a term ſometimes uſed for a journal, or day-book, containing an account of every day's proceedings. Thus we ſay *diaries* of the weather, &c.

DIARY *fever*, is a fever of one day. See EPHEMERA.

DIASCHISM, *Diaſchiſma*, in *Muſic*, the difference between the comma and enharmonic dieſis. This is expreſſed by the ratio $\frac{2048}{2025}$.

Mr. Euler has taken this term in the ſenſe here mentioned. Others call it the leſſer comma. The octave contains 61 *diaſchiſms* nearly. Tentam. Nov. Theor. Muſic. p. 107 & 112. See COMMA.

DIASCORDIUM, in *Pharmacy*, a kind of electary, firſt deſcribed by Fracaſtorius, and denominated from *ſcordium*, which is a chief ingredient therein. It is alſo called *confectio Fracaſtorii*.

The other ingredients are red roſes, bole, ſtorax, cinnamon, caſſia lignea, dittany, tormentil roots, biſtort, gentian, galbanum, amber, terra ſigillata, opium, long pepper, ginger, mel roſatum, and Malmſey wine.

It is an aſtringent, and is uſed againſt malignant fevers, the plague, worms, the colic, and to provoke ſleep, and reſiſt putrefaction.

DIASEBESTEN, in *Pharmacy*, a ſoft, purgative electary, whereof ſebeſtens are the baſis.

The other ingredients are prunes, tamarinds, juices of iris, anguria, and mercurialis, penidies, ſimple diaprunum, violet-ſeed, the four cold ſeeds, and diagrydium.

It is good in intermitting and continued fevers, appeaſes thirſt, promotes ſleep, and expels the morbid humours by urine.

DIASENNA, in *Pharmacy*, a ſoft, purgative electary, thus called from *ſenna*, which is its baſe.

The other ingredients are ſugar-candy, cinnamon, lapis lazuli, ſilk, cloves, galanga minor, black pepper, nardus Indica, ſeed of baſilicum, flowers of cloves, cardamoms, ſaffron ginger, zedoary, roſemary flowers, long pepper, lapis Armenus, and honey.

Diaſenna eaſes and comforts the melancholic and ſplenetic; and is good againſt all diſeaſes ariſing from an atra bilis.

DIASIA, Διασια, in *Antiquity*, a feſtival at Athens in honour of Jupiter, ſurnamed Μειλιχιος, i. e. *the propitious*. Pott. Archæol. lib. ii. cap. 20.

DIASTASIS, from διιςημι, *I ſet apart*, a word uſed by the writers in medicine in many different ſenſes. It is frequently uſed as a name for that ſeparation of the bones, when they naturally recede from one another. Sometimes it is uſed as the term for an interſtice, as that between the *ulna* and *radius*, or between the *tibia* and *fibula*. Sometimes it is put for a diſtenſion of the muſcles in convulſions; and, when applied to the ſtomach, it is made to ſignify an inclination to vomit.

DIASTEM, *Diaſtema*, in *Muſic*, a name the ancients gave to a ſimple interval, in contradiſtinction to a compound interval, which they called a *ſyſtem*.

Ariſtoxenus enumerates many differences of intervals: ſuch as greater, or leſs; conſonant, or diſſonant; compounded, or uncompounded; related to one genus, or to another; laſtly, rational or irrational. Ariſtox. ap. Wallis. Append. ad Ptolem. Harmon. p 154.

Muſicians divide intervals into two kinds: one of them called *ſyſtem*, which is to contain at leaſt two intervals in any kind of muſic whatever; but many contain more.

The other, called *diaſtem*, is a mere, or ſingle interval; the proper ſignification of the Greek διαςημα, being *interval*.

DIASTOLE, in *Anatomy*, expreſſes that motion of the heart, and arteries, whereby thoſe parts dilate, or diſtend themſelves: the other oppoſite motion being called the *ſyſtole* of the heart, and arteries; wherein they contract themſelves. See ARTERY, and HEART.

The word is Greek, formed from the verb διαςελλειν, *to ſeparate, open, dilate*.

The *diaſtole* of the heart is properly the receſs of the parietes of the two ventricles from each other; or the enlargement of their cavities, and diminution of their lengths, and their approximation to a ſpherical form.

The *diaſtole*, or dilatation of the heart, ariſes from the blood being brought, by the veins, into its ventricles; and that of the arteries, from the blood being thrown into their cavities by the contraction of the heart. So that the *diaſtole* of the heart, and arteries, is not effected at the ſame time; the *diaſtole* of the heart happening when the arteries are contracted, and that of the arteries when the heart is contracted.

What we call the beating of the pulſe is only the *diaſtole* of the arteries.

The lungs and breaſt have likewiſe their ſyſtole and *diaſtole*; ſo has the brain.

The true cauſe of the *diaſtole* of the heart was not well accounted for before Dr. Drake: that the heart is a muſcle, is made evident beyond all doubt by Dr. Lower; and that the motion of all muſcles conſiſts in conſtriction, is not to be doubted. By ſuch means the ſyſtole is eaſily accounted for.

But inaſmuch as the heart has no antagoniſt muſcle, the *diaſtole* has puzzled men of the greateſt genius. Dr. Lower unhappily attributes it to a motion of reſtitution. *A nullo enim cordis motu, niſi tenſionem ejus remittente, & ab irruente ſanguine*, diaſtole, *ejus libratis vicibus ſuccedit*. De Corde, p. 75.

Mr. Cowper accounts for the *diaſtole* from the analogy the heart of an animal bears to the pendulums of thoſe artificial automata, clocks and watches: its motion, he ſays, is performed like that of other muſcles, the blood doing the office of a pondus, or weight.

Both theſe notions Dr. Drake refutes; and with great reaſon and probability maintains the weight of the atmoſphere to be the pondus, or counterpoiſe, to the contractile force of the heart. He has found that reſpiration has an effect upon the heart in this ſenſe which had not been underſtood before. The ſyſtole being the proper motion of the heart, a ſtate of contraction by means of that ſyſtole muſt needs be its natural ſtate, and conſequently no motion of reſtitution natural, and without external violence it could have no *diaſtole* at all.

This will appear more plain, if we conſider the circumſtances of the heart, and its motion as a muſcle, with reſpect to other muſcles. That contraction is the proper action and natural ſtate of all muſcles, is evident from experience as well as from reaſon: for if any muſcle be freed from the power of its antagoniſt, it is immediately contracted; and is not, by any action of the will or ſpirits, to be reduced to a ſtate of dilatation: thus, if the *muſculi flexores* of any joint be divided, the *extenſores* of that joint, the oppoſite muſcles to the *flexores*, being freed from the contrary action of their antagoniſts, will exert themſelves; the joint will be extended without the conſent of the will, and it will continue in that poſture: and, on the other hand, if the extenſors are divided, the contractors will of themſelves exert their force, and the limb will be contracted without the conſent of the will, and it will continue in this poſture. It is very evident from all this, that the muſcles of the human body have no reſtitutionary power of their own, but that all power of this kind in them is derived from the action of their antagoniſts, by which they are balanced: thus likewiſe the ſphincters of the *gula*, *anus*, and *veſica*, having no proper antagoniſts, are always in a ſtate of contraction, and ſuffer nothing to paſs through them, but what is forced on by the action of other ſtronger muſcles; which, though not properly antagoniſts to theſe, yet, on all neceſſary occaſions, perform the office of ſuch.

The heart is a ſolitary muſcle: it has no antagoniſt, and is not under the direction of the will: as it performs alſo no voluntary motion, it in all things approaches more to the nature of the ſphincter muſcles, than to any kind beſides; but, in its conſtant actions of contraction and dilatation, it differs exceedingly from all the muſcles of the body. This reciprocal motion of the heart has given the learned abundance of trouble, who finding nothing peculiar in the ſtructure which ſhould occaſion it, nor any antagoniſt whoſe relation ſhould produce it, have been extremely perplexed to find out the cauſe of it.

Lower having proved the heart a muſcle, and eſtabliſhed the manner of its muſcular motion, takes notice of no farther aſſiſtance that it receives for the performing this, than what it has from the brain, by means of the eighth pair of nerves. Borelli, in his Animal Oeconomy, computes the motive power of the heart to be equal to, at leaſt, that of a weight of three thouſand pounds. The obſtacles to the motion of the blood, through the arteries, he eſteems equivalent to one hundred and eighty thouſand pounds, which is ſixty times as much as he rates the force of the heart at; then deducting forty-five thouſand pounds, for the adventitious help of the muſcular elaſtic coat of the arteries, he leaves the heart, with the full force of three thouſand pounds, to overcome the reſiſtance of a hundred and thirty-five thouſand pounds; that is, with one, to remove forty-five. This ſtupendous effect, he ſatisfies himſelf with aſcribing to the energy of percuſſion; but, had he proceeded in his calculation to the veins, which he allows to contain conſtantly a quantity of blood quadruple to the contents of the arteries, and to which this energy of percuſſion does not either reach at all, or but very languidly, he might probably have ſeen a neceſſity of ſome other expedient, to remove ſo inſuperable a difficulty.

But not to inſiſt regularly on the exactneſs of this computation, we may allow a much greater deduction than would be juſtifiable, without leſſening the difficulty. Dr. Lower, notwithſtanding the care and ſagacity with which he examined this ſubject, ſeems to have overlooked ſomething of very great moment, in the explication of the action of the heart; for, though it ſhould be granted, that the muſcular fibres of the heart, acted by the nerves, are the immediate inſtruments of its ſyſtole or contraction, yet it muſt not be denied that the intercoſtal muſcles and diaphragm are of great ſervice, to aid and facilitate this contraction, by opening a paſſage for the blood through the lungs, which denied, would be an invincible obſtacle: neither do the lungs promote the motions of the heart in that way only, but the manner in which they aſſiſt the heart in its contraction, will appear manifeſtly, if we conſider the different poſture, ſituation, and capacity of the blood veſſels of the lungs, in the ſeveral times of elevation and depreſſion of the *coſtæ*.

The pulmonary artery riſes from the right ventricle of the heart, and runs in one trunk, till it comes to the *aſpera arteria*, where it is divided, and ſends a branch along with each diviſion of the *aſpera arteria*; according to all the minuteſt ſubdiviſions of which, it is alſo ſubdivided, accompanying all the *bronchi* in their paſſage through the lungs.

The pulmonary vein, which empties itſelf into the left ventricle of the heart, ſpreads itſelf on the *aſpera arteria* and *bronchi*, and continues its progreſs in the ſame manner in which the artery does. The neceſſary conſequence of this diſpoſition is, that this artery and vein, being co-extended with, and faſtened to the *bronchi*, muſt needs ſuffer ſuch alteration of ſuperficial dimenſions, as the *bronchi* do in the elevation and depreſſion of the *coſtæ*; while the ribs are in a ſtate of depreſſion, whether before commerce with the external air, or after the annular cartilages of the *bronchi* ſink into one another, and by that means their dimenſions are exceedingly contracted; in conformity to this condition of the *bronchi*, the pulmonary artery and vein muſt likewiſe either by means of their muſcular coats, contract themſelves to the ſame dimenſions, or lie in folds or corrugations, which is much leſs probable.

On the other hand, when the ribs are elevated, and the diaphragm bears downward, the air ruſhing into the lungs, ſhoots out the cartilaginous rings, and divaricates the branches of the *tracheæ*, and by them extends and divaricates the ſeveral diviſions of the pulmonary artery and veins, and thereby lengthens and enlarges their cavities. This enlargement of their cavities is very conſiderable, not only upon the ſcore of the addition which they receive in length thereby, but alſo on account of their divarication; for whereas, when the ribs are depreſſed, and the lungs ſubſide, the blood-veſſels are not only contracted, but their branches, which are exceeding numerous, approach one another, and lie in juxta poſition, by which their cavities are very much compreſſed and ſtraitened: when the ribs are elevated, and the lungs turgid with air, not only the fibres, by which their coats in the oppoſite ſtate were contracted, are extended, but thoſe innumerable veſſels, which lying before in lines almoſt contiguous to one another, compreſſed each other, making an acute angle at their junctures, are divaricated and ſeparated from each other, and make an obtuſe one, whereby their channels are widened.

Thus a paſſage is opened for the blood from the right ventricle of the heart to the left, through the lungs, to which it could not otherwiſe paſs; and the oppoſition, which the blood contained in that ventricle muſt otherwiſe have had made to its conſtriction, is taken off, and the ſyſtole thereby facilitated: nor is this all, for the *diaſtole* being cauſed, as is certainly and demonſtrably the caſe, by the force of the blood ruſhing into the ventricles, this ampliation and extenſion of the pulmonary artery is a ſort of check or counterpoiſe to it, and prevents an endeavour towards two contrary actions at once, which would neceſſarily fruſtrate both: for the heart being a ſpringy and compreſſible body, whoſe proper action, which is contraction, depends upon the influx of certain fluids into its fibres and ſubſtance; and containing beſide a fluid in its ventricles, or great cavities, in one of which is the mouth of this artery, the action of this veſſel muſt in a great meaſure reſemble that of a ſyringe, whoſe extremity is immerſed in water; the enlargement or expanſion of the channels of the artery, anſwering to the drawing of the embolus, as the conſtrictive motion of the muſcle of the heart, does to the preſſure of the atmoſphere on the ſurface of the water, the one making way for the fluid, and the other forcing it to flow where the reſiſtance is leaſt. In this ſenſe we may allow a ſort of attraction to the pulmonary artery, depending wholly upon the action of the intercoſtal muſcles, and diaphragm, which we muſt therefore confeſs to be very ſerviceable and inſtrumental in promoting the ſyſtole of the heart. Phil. Tranſ. Nº 281. p. 1222. See HEART.

It has long been known, that the *dura mater* has a ſyſtole and *diaſtole*, exactly correſponding to thoſe of the heart. But its cauſe was not ſo well known. Dr. Ridley, in the Philoſoph. Tranſact. Abr. vol. v. p. 199, &c. having bored a hole in the upper part of the *bregma* of a dog, firſt perceived the alternate vibrations of the *dura mater*; then, continuing the hole to the brain, he found both by his eyes, and even afterwards by touch, very ſenſibly, that there was a like briſk ſyſtole and *diaſtole* of the brain. M. De la Mure, in 1752, made ſeveral experiments with dogs, both living and dead, in order to inveſtigate the cauſe of this motion of the brain; from which he infers, that the true cauſe is the reflux of the blood towards the brain, and that this reflux is owing to the preſſure of the lungs on the veins of the *thorax*, in reſpiration. Encycl. See **BRAIN**, and **DURA** *mater*.

DIASTOLE, in *Grammar*, a figure whereby a ſyllable naturally ſhort is made long.

Thus it is that Virgil begins a verſe with the word *Italus*, the firſt ſyllable whereof is naturally ſhort.

DIASTYLE, from δια, and ϛυλος, *a pillar*, in the *Ancient Architecture*, an edifice, where the columns ſtand at ſuch a diſtance from one another, that three diameters, or ſix modules, are allowed for the intercolumniation. See *Tab. Archit. fig.* 40. D. in the plan of the Baſilic.

DIASYRMUS, Διασυρμος, from δια, and συρω, *I draw*, in *Rhetoric*, a figure whereby we ſhortly anſwer, or rather evade, a thing which it would be tedious to reply to in form.

E. gr. *What matters it to reply to an argument foreign to the purpoſe?*

DIATESSARON, in *Pharmacy*, a ſort of theriaca, thus called becauſe it conſiſted of four ingredients, which are roots of ariſtolochia, and gentian, bay-berries, and myrrh.

The word is Greek, compounded of δια, and τεσσαρα, *four*, q. d. *a compoſition of four drugs.*

It is alſo called *theriaca pauperum*, becauſe made at a very eaſy expence, and in a ſhort time. It is good againſt ſtingings of venomous beaſts, epilepſies, convulſions, colics, to ſtrengthen the ſtomach, and promote the menſes.

DIATESSARON, in the *Ancient Muſic*, a concord, or harmonical interval, compoſed of one greater tone, one leſſer, and one greater ſemi-tone; its proportion being as 4 to 3.

In the modern muſic, it is called a *perfect fourth.*

Many muſical writers have rejected the *diateſſaron* from the claſs of conſonances. Others have retained it as a ſecondary or imperfect concord; urging that it is only a concord when the harmony conſiſts of two parts, but not by itſelf; and that if it were a perfect conſonance, the replicate of it would be a conſonance likewiſe; whereas the ear can hardly endure it. Thus they ſay, whenever a ſound is a perfect conſonance with its uniſon, the replicate of that ſound will alſo be a conſonance, as is the caſe with the diapente and diapaſon, whoſe replicates, viz. the 15th and the 12th, which are the diapaſon and diapente compounded, are not leſs grateful to the ear than the radical ſounds themſelves: but the diapaſon and diateſſaron compounded in the 11th, do not make a conſonance. See Hawkins's Hiſt. Muſ. vol. ii. p. 192. and vol. iii. p. 134.

DIATHESIS, from διατιθημι, *I diſpoſe*, a term uſed by ſome writers in the ſame ſenſe with conſtitution; and by others for a diſpoſition of the blood to a faulty ſtate.

DIATONIC, from δια, and τονος, *tone*, an epithet given to the common muſic, as it proceeds by tones, or degrees, both aſcending and deſcending.

Authors divide the genera or kinds of muſic into *diatonic*, *chromatic*, and *enharmonic*.

The *diatonic* genus was by the ancients divided into two ſpecies; the *molle*, and the *intenſum*. The laſt is in daily practice. It is commonly ſaid to conſiſt of two tones and a ſemi-tone: but, to ſpeak exactly, it conſiſts of a ſemi-tone major, a tone minor, and a tone major.

We find it accurately defined by Didymus, in Ptolemy's Harmonics publiſhed by Dr. Wallis. Vide Wallis, Oper. vol. iii. p. 92. The numbers by which Didymus expreſſes its intervals, are, $\frac{9}{8} \times \frac{10}{9} \times \frac{16}{15} = \frac{4}{3}$. Ptolemy, indeed, makes the *diatonicum intenſum* to be expreſſed by $\frac{10}{9} \times \frac{9}{8} \times \frac{16}{15} = \frac{4}{3}$; but it is plain, this is only tranſpoſing the tones major and minor, which makes no eſſential difference, nor is it ſufficient to conſtitute a new ſpecies. But the firſt of the before mentioned ſpecies, the *diatonicum molle*, has not, till lately, been accurately defined by any author. Its component intervals, according to Dr. Pepuſch, are, the ſemi-tone major, an interval compoſed of two ſemi-tones minor, and the complement of theſe two to the fourth; which complement is equal to a tone major, and an enharmonic dieſis.

Beſides the two ſpecies of the *diatonic* mentioned by Ariſtoxenus and Euclid, Ptolemy, and other ancient muſicians, have left us ſeveral different *diatonic* diviſions of the tetrachord; ſuch are the *diatonic* of Archytas, of Eratoſthenes, and of Didymus, which laſt agrees perfectly with the truth of muſical proportions. Ptolemy himſelf gives us no leſs than five different *diatonics*, by the names of *molle*, *tonicum*, *ditonicum*, *intenſum*, *æquabile*. See GENUS.

But, except one (the *intenſum*) they are all inconſiſtent with the true theory of muſic; which admits of no numbers, or proportions, but 2, 3, and 5, and ſuch as ariſe from theſe primes. Indeed, Ptolemy's tetrachords are ſo miſ-tuned, that Salinas has charged him with having had no ear. Vide Phil. Tranſ. Nº 481.

Diatonic muſic only allows of three degrees; the greater and leſſer tone, and the greater ſemi-tone.

Hence *diatonic* muſic appears the moſt natural, and of conſequence is the moſt ancient.

In the *diatonic* muſic there is a tone between every two notes, except between *mi* and *fa*, and *ſi* and *ut*, where there is only a greater ſemi-tone.

DIATONUM, Διατονον, in the *Ancient Muſic*, is uſed for the diatonic genus. See DIATONIC.

DIATRÆTA, a word uſed by Pliny, and other of the ancient Romans, to expreſs a ſort of cups and vaſes, which were of great value, and only ſeen at the tables of the great. They were pellucid and colourleſs, and cut into various forms, and were often engraved upon with figures expreſſive of the deeds of honour of the family who poſſeſſed them. The firſt *diatrætæ* were made of pure cryſtal of the rock, and the working of theſe rendered them very expenſive; but afterwards they were made of common white glaſs, and ſunk greatly in their price and value. The ancients were very nice in their diſtinctions of the ſeveral kinds of cryſtal. They termed the pureſt and fineſt of all *acentatum*, and the others, which were ſubject to blemiſhes and foulneſſes of ſeveral kinds, they called by names expreſſive of them. There was nothing they ſo much feared in the pieces they ſelected for this work, as what they called an over-hardneſs, that is, a brittleneſs, which made the veſſel often fly under the engraver's tool, after it had been formed into ſhape at a great expence: for this reaſon they were cautious of uſing the very brighteſt and cleareſt maſſes; for they often found thoſe ſucceed beſt, which had ſome of thoſe flaws which we call hairs in them. Theſe they thought the tougheſt pieces of cryſtal, and theſe flaws they eaſily concealed among the ſtrokes of their work. See NUBES, and SAL.

DIATRAGACANTH, in *Pharmacy*, is a name applied to certain powders, whereof gum tragacanth is the baſe. There are two kinds, *cold* and *hot*.

Powder of *cold diatragacanth* is compoſed of the gums tragacanth and Arabic, liquorice, ſtarch, white poppy-ſeed, and the four great cold ſeeds. It is good to thicken and ſoften the too ſharp, and ſubtile ſerous humours falling on the breaſt, to aſſuage coughs, and to promote ſpitting.

Powder of *hot diatragacanth* is compoſed of gum tragacanth, cinnamon, hyſſop, almonds, linſeed, fenugreek, liquorice, and ginger. It is good againſt aſthmas, to promote expectoration, ſtrengthen the ſtomach, and aſſiſt digeſtion.

DIATRIBE, from διατριβω, *I delay*, denotes a continued diſcourſe.

DIATYPOSIS, Διατυπωσις, in *Rhetoric*, the lively deſcription of a thing, ſetting it, as it were, before the eyes of the audience. Thus Cicero, vii. in Ver. *Ipſe inflammatus ſcelere & furore, in forum venit; ardebant oculi; toto ex ore crudelitas eminebat, &c.*

DIAUGOPHRAGMIA, in *Natural Hiſtory*, a genus of *ſeptariæ*, whoſe ſepta are of ſpar, with an admixture of cryſtal, which being ſometimes alſo mixed among the matter of the tali, renders the whole more bright and gloſſy. See SEPTARIÆ.

Of this genus we have the following ſpecies: 1. The ferrugineous red *diaugophragmium*, with browniſh yellow partitions. 2. The browniſh yellow *diaugophragmium*, with whitiſh partitions. 3. The bluiſh white *diaugophragmium*, with ſtraw-coloured partitions. Vide Hill, Hiſt. Foſſ. p. 522.

DIAULION, from δια, and αυλος, *a flute*, in *Antiquity*, a deſignation given to a performance on the ancient ſtage with the flute alone.

DIAULODROMI, Διαυλοδρομοι, from διαυλος, and δρομος, *courſe*, in *Antiquity*, thoſe racers who turned round the meta, or goal, and finiſhed their courſe at the carcer, or place of ſtarting. The *diaulodromi* always took a ſhort breathing or reſt, when they arrived at the meta, before they ſet out again for the carcer.

DIAULOS, from δις, *twice*, and αυλη, *ſtation*, in *Antiquity*, the name of a particular kind of race, wherein the racers always returned to the place from whence they ſtarted, and were called DIAULODROMI.

DIAULOS is alſo uſed to ſignify a diſtance of two ſtadia.

DIAZEUCTIC, from διαζευγνυμι, *I disjoin*, or *ſeſquioctave tone*, in the *Ancient Greek Muſic*, was that which disjoined two fourths, one on each ſide of it, and which, being joined to either, made a fifth.

This in their muſic was from *meſe* to *parameſe*; that is, in ours, from A to B: ſuppoſing *mi* to ſtand in B *ſub mi*. They allowed to this *diazeuctic* tone, which is our tone major or *la*, *mi*, the proportion of 9 to 8, as being the unalterable difference of diapente and diateſſaron.

DIBBLE, from *dipſel*, Du. *a ſharp point*, among *Gardeners*, the name of the ſetting-ſtick, or tool, wherewith they ſet plants; ordinarily made of the handle of an old ſpade.

DICA, in *Law*, a tally for accounts, by the number of tallies, cuts, or notches.

DICE, among *Gameſters*, certain cubical pieces of bone or ivory, marked with dots on each of their faces, from one to ſix, according to the number of their ſides.

Sharpers have ſeveral ways of falſifying *dice*: 1. by ſticking a hog's briſtle in them, ſo as to make them run high or low as they pleaſe: 2. by drilling and loading them with quickſilver; which trick is diſcovered by holding them gently between two diagonal corners; when if falſe, the heavy ſide will turn always downward: 3. by filing and rounding them. But all theſe methods fall far ſhort of the arts of the *dice*-makers, ſome of whom are ſo dextrous, that ſharping gameſters will give any money for ſuch *dice*.

Dice pay a large ſtamp-duty, and are prohibited to be imported.

Dice-*marle*, in *Huſbandry*. See Marle.

DICERATION, in the *Writers of Medicine*, a name given to a collyrium mentioned by Celſus, and thus named from κεϱας, *a horn*, burnt hartſhorn being a principal ingredient in it.

DICHORÆUS, in *Poetry*, the foot of a Latin verſe conſiſting of four ſyllables; of which the firſt is long, the next ſhort, the third long, and the laſt ſhort. It is a double *choræus*, as *cōmprŏbārĕ*.

DICHOTOMY, *biſection*, a term uſed by aſtronomers for that phaſis, or appearance of the moon, wherein ſhe is biſected, or ſhews juſt half her diſk, or circle; or when ſhe is in the beginning of her firſt and laſt quarter.

The word is Greek, formed of διχοτομεω, *I biſect*, or *cut into two*; of δις, *twice*, and τεμνω, *I cut*.

The time of the moon's *dichotomy* is of conſiderable uſe in fixing the ſun's diſtance from the earth. But it is very difficult to fix the preciſe moment when the moon is biſected, or in her true *dichotomy*. Obſervation informs us, that when ſhe is thirty minutes diſtant from the quadratures, ſhe appears biſected; but ſhe appears ſo too in the quadratures themſelves, and ſome time afterwards, as Ricciolus acknowleges in his Almageſt. So that ſhe appears *dichotomized* at leaſt for the ſpace of a whole hour: in which time any moment may be taken for the true point of the *dichotomy*, as well as any other. But the infinite number of moments of time give an infinite diverſity of diſtances. The moment in which the true *dichotomy* happens being thus uncertain; but it being granted withal, that it happens before the quadrature; Ricciolus takes the middle point between the quadrature, and the time when it is firſt dubious, whether the moon be *dichotomized*, or not, for the true *dichotomy*. Keil.

Dichotomy, in *Botany*, a term uſed to expreſs that diviſion of the branches which we ſee in miſletoe, and in the greater part of the ſea-fucuſes, in which each branch is divided into two.

DICHOTOPHYLLUM, in *Botany*, the name by which Dillenius, and ſeveral others, call the *hydroceratophyllum* of Vaillant; and ſome other writers, a genus of plants charactered by Linnæus in his Genera Plantarum under the name of CERATOPHYLLUM.

DICKER, or Dicre, *Dicra*, in our *Old Writers*, a quantity of leather conſiſting of ten hides.

Some derive the word from the Greek δεκα, *ten*.

We find the word *dicra* applied to other things beſides leather; thus, *Civitas Glouceſtriæ reddebat* xxxvi dicras *ferri*; which is interpreted thirty-ſix *dickers* of iron, ten bars to the *dicre*. Gale's Hiſt. Brit. 766. ap. Blount.

DICROTUS, in *Natural Hiſtory*, a word uſed by the ancients to expreſs the deer or ſtag when in its third year's growth. It was called *nebus* by the ancient Greeks in the firſt year, *puttolea* in the ſecond, *dicrota* in the third, and in the fourth and all its life afterwards *ceraſtes*.

Dicrotus, from δις, *twice*, and κϱεω, *I ſtrike*, in the *Medicinal Writings of the Ancients*, the epithet given to a peculiar ſort of pulſe, which Dr. Nihill calls very properly in Engliſh the rebounding pulſe. In this kind of pulſe the artery beats as it were double; and it is eſteemed a certain ſign of a future critical hæmorrhage by the noſe. When the rebounding pulſe is perceived at about every thirtieth pulſation, the hæmorrhage uſually follows in about four days after; when it recurs at every ſixteenth pulſation, the hæmorrhage generally follows in three days; when at every eighth pulſation, it is to be expected in two days and a half; and, finally, when it recurs at every fourth, third, or ſecond pulſation, or is continual in every one, the hæmorrhage is to be expected within four and twenty hours. Sometimes nature runs regularly through all the before mentioned progreſſions of this critical pulſe from its firſt appearance at every thirtieth ſtroke, to the ſingle pulſation; and in this caſe the hæmorrhage is ſeen gradually approaching, and happens regularly as expected: but ſometimes ſhe haſtens or delays it; and then the pulſe ſhifting in its indications, it cannot be judged of with any certainty. When the artery rebounds upon the finger with great celerity, and very briſkly follows the firſt ſtroke, the hæmorrhage is juſt at hand, and will appear on the patient's blowing his noſe.

The quantity of the hæmorrhage may be gueſſed from the ſtrength of the rebound in the pulſe, and as the blood diſcharges itſelf, this ſymptom in the pulſe gradually goes off: and if after the hæmorrhage it ſhould be perceived again, it is a ſign of another criſis of the ſame kind. Finally, when the rebounding of the artery is more evident in one wriſt than in the other, the blood uſually flows in the greateſt violence from that ſide of the noſe, or that noſtril which is on the ſame ſide with the hand in the artery of which the rebounding has been moſt violent.

DICTAMNUS, in *Botany*. See Dittany.

DICTATE, *Dictamen*, in the *Schools*, a ſuggeſtion, motion, or ſentiment of a man's conſcience. See Conscience.

A good action becomes evil, if done contrary to the *dictates* of one's own conſcience.

Dictate, *Dictata*, is likewiſe uſed in the *Schools* for a leſſon, or exerciſe, wherein the maſter reading, or ſpeaking ſomething, the ſcholars take it down in writing after him. Here the act of the maſter is likewiſe called *dictating*.

DICTATOR, a Roman magiſtrate, created by the ſenate, or people, on ſome extraordinary and eminent occaſion, to command, with ſovereign authority, for a certain time, ordinarily limited to ſix months; though the office was ſometimes continued to twelve.

Recourſe was never had to ſuch an officer, but in dangerous and difficult times; as in ſudden wars, popular factions, &c. He had abſolute and monarchic power while his dictature laſted: and ſome will even have it, his power went beyond that of the kings. He was arbiter of peace and war, and had command of life and death, without any appeals lying to the people. Twenty-four axes were borne before him, whereas only twelve before the conſuls.

The origin of this office was unknown even in Livy's time: though ſome ancient authors ſpeak of T. Largius Flavus as the firſt *dictator*, who was appointed in the year of Rome 259. *Sed nec anno, nec quibus conſulibus—nec quis primum dictator creatus ſit, ſatis conſtat: apud veterrimos tamen auctores, T. Lartium dictatorem primum, Sp. Caſſium magiſtrum equitum creatos invenio. Conſulares legere.* Liv. lib. ii.

Sylla was the firſt perpetual *dictator*, and Cæſar the next. After Cæſar, there were no more *dictators*. The firſt *dictator* choſen from among the people was Marcus Rutilius, in 399.

Dionyſius Halicarnaſſeus derives the word *ab edicendo*, becauſe they ordained and appointed what they pleaſed. But Varro will have the word taken hence, that the conſul named him, which the Latins call *dicere*, lib. iv. De Lingua Latina. Dictator *quod a conſule dicebatur, cujus dicto audientes omnes eſſent*.

DICTION, the phraſe, elocution, or ſtyle of a writer, or ſpeaker.

The *diction* or language of an orator ſhould be pure, proper to the ſubject, rich without affectation, ſtrong and cloſe without dryneſs, and ſuitable to the perſon, time, place, and audience.

The *diction* of tragedy is accounted the fourth of the eſſential parts thereof: it is of the leaſt importance of any; yet muſt peculiar care be taken herein to make every paſſion ſpeak its proper language.

DICTIONARY, a collection, or catalogue of all the words of a language, or art, with their ſignifications: ranged in the order of the alphabet.

What the Latins, and we after them, call *dictionary*, the Greeks call *lexicon*.

For the proper character, nature, office, &c. of a *dictionary*, ſee the preface to this work. See alſo Vocabulary.

The moſt ancient *dictionaries* for the Latin tongue, are, that called Papias, compiled by Solomon, abbot of St. Gall, biſhop of Conſtance, who lived about the year 1409; another made in 1469, called Gemma Vocabulorum; a third in 1502, called Gemma Gemmarum; and a fourth by Dionyſius Neſtor, a Cordelier.

The moſt celebrated old Latin *dictionary* is that of Ambroſe Calepine, a hermit of St. Auguſtine at Bergamo, and ſon of the count of Calepin. Conrad Geſner is ſaid to have augmented this with four thouſand words. Paulus Manutius increaſed it ſtill more; and Paſſerat after him: and yet Matthias Martinius made two volumes of their omiſſions.

There is another noted Latin *dictionary* of Criſpinus: to ſay nothing of Cowper, Holyoake, Gouldman, Littleton, Cole, Ainſworth, and many others of leſs conſideration.

For the Greek, we have thoſe of Henry Stephens, and

Scapula, Schrevelius, and Hedericus: for the Spaniſh, thoſe of Covarruvias, and Delpino: for the Italian, thoſe of the Academy della Cruſca, Veneroni, and Baretti: for the French, thoſe of Nicod, Fa. Monet, Fa. Gaudin, Furetiere, Richelet, Trevoux, that of the French academy, Boyer, and Chambaud: for the Engliſh, we had ſcarce any worth the mentioning (unleſs, perhaps, thoſe of Lloyd, Philips, Kerſey, and Bailey), before the publication of that very complete and accurate one by Johnſon.

Junius has a *dictionary*, or alphabet, of the Gothic, Runic, and Anglo-Saxon. There is another in the Malayan, which is a dead language, famous throughout the Eaſt Indies, where it ſtands inſtead of the Latin among us.

There are alſo hiſtorical and geographical *dictionaries*: as that of Charles Stephens, which is tranſlated into French, and augmented by Moreri: another of Hofmann, printed at Baſil in 1677, in two volumes folio; which were followed by a continuation of as many volumes, in 1683: another of Mr. Bayle, under the title of Hiſtorical and Critical *dictionary*, firſt printed at Rotterdam in 1697, in two large volumes, now making five in Engliſh: a Philoſophical *dictionary*, by Mr. Chauvin of Berlin: beſides ſeveral law *dictionaries*, as Jacob's; phyſical *dictionaries*, as James's; family *dictionaries*; *dictionaries* of arts, as the Encyclopedie, &c. of *commerce*, as Savary's by Poſtlethwaite, &c.

DICTORES, in our *Old Writers*, is uſed for an arbitrator.

DICTUM, in our *Old Writers*, is uſed for an arbitrament or award.

DICTUM *de Kenelworth*, an edict or award between king Henry the III. and thoſe barons who had been in arms againſt him. It was ſo called becauſe made at Kenelworth caſtle in Warwickſhire, anno 51 Hen. III. It contained a compoſition of five years rent for the lands of thoſe who had forfeited them in that rebellion.

DICTYMNIA, or DICTYNNIA, in *Mythology*, were feaſts celebrated at Lacedæmon and in Crete, in honour of Diana *Dictymnia* or *Dictynnia*, or of a nymph taken for her, who, having plunged herſelf into the ſea, to eſcape the paſſion of Minos, was caught in a fiſherman's net or δικτυον, whence the name.

DIDACTIC, in the *Schools*, ſignifies the manner of ſpeaking, or writing, adapted to teach or explain the nature of things.

The word is formed from the Greek *διδασκω*, *doceo*, *I teach*.

There are many words that are only uſed in the *didactic*, and dogmatic way: and there are many works, ancient and modern, both in proſe and verſe, written after this method: ſuch are the Georgics of Virgil, Lucretius's poem De Rerum Natura, and Pope's Eſſays on Criticiſm and on Man, &c. &c.

DIDAPPER, in *Ornithology*. See DOB-*chick*.

DIDAR, among the Arabian authors, the name of the elm.

DIDELPHIS, the name by which Linnæus calls the animal called philander by other writers. This creature, in that author's ſyſtem of zoology, is alſo a diſtinct genus of animals, of the order of *feræ*, and claſs of *mammalia*; the characters of which are, that they have ten upper fore-teeth, and eight lower, with the two intermediate very ſhort; the laniarii are long, and the molares denticulated: they have alſo a ſmall bag or pouch under the belly. See OPOSSUM.

DIDRACHM, from *δις*, *double*, and *δραχμα*. See DRACHM.

DIDYMI, Διδυμοι, the ſame with *gemelli*, or *twins*.

DIDYNAMIA, in *Botany*, the fourteenth claſs of plants, whoſe flowers have two of their male parts or ſtamina of greater efficacy in the action of impregnation of the ſeeds than the other two: they are known by the efficacious ſtamina being always much longer than the others. See *Tab. of Botany*, *Claſs* 14.

The word is formed of the Greek *δις*, *twice*, and *δυναμις*, *power* or *efficacy*. Of this claſs of plants are baum, thyme, lavender, baſil, &c.

Linnæus divides this claſs of plants into two orders: the firſt the *gymnoſpermia*, and the ſecond the *angioſpermia*. The firſt of theſe comprehends the labiated plants of Tournefort, and the verticillate plants of Mr. Ray's method; and the other, the perſonated plants of Tournefort.

The *gymnoſpermia*, or verticillate plants, are diſtinguiſhed from the reſt, by having the ſeeds four in number, excepting phryma, which is monoſpermous; and ſtanding naked in the cup: and the ſtigma divided into two ſegments, the lower of which is crooked. This order contains thirty-four genera, diſtinguiſhed into ſuch as have the calyx quinquifid and nearly equal, of which there are twenty; and ſuch as have the calyx bilabiate, of which there are fourteen.

The ANGIOSPERMIA, or perſonated plants, are diſtinguiſhed from the others, by always having a ſeed-veſſel of ſome form, though very various; and, by the ſtigma being obtuſe and various.

Of the firſt kind, or gymnoſpermia, are the galeopſis and ballota, with the like; and, of the ſecond kind, or angioſpermia, are the antirrhinum, &c.

DIE. See DYE.

DIEBEL, in *Ichthyology*, a name given by Kentman and others to the chub or capito. It is properly a ſpecies of the cyprinus. See CAPITO and CYPRINUS.

DIELCYSTINDA, among the *Ancients*, a kind of exerciſe performed by boys, who being divided into two parties or ſides, each endeavoured to draw the other over to their ſide, and the party which prevailed gained the victory.

DIEM *clauſit extremum*, a writ iſſued out of chancery to the eſcheator of the county, upon the death of any of the king's tenants *in capite*, to enquire by a jury of what lands he died ſeiſed, and of what value, and who was the next heir to him.

DIEMERES, in the *Ancient Muſic*, a word uſed ſometimes alone, and ſometimes joined with the word *phorbeia*. It expreſſed a ſort of bandage, uſed by the ancients, to tie up the lower lip in playing on the pipe. The other kind of *phorbeia* conſiſted only of one perpendicular piece, which went down the cheek, and one tranſverſe one which covered the whole mouth, but had a hole cut into it to admit the mouth-piece of the pipe. See PHORBEIA.

DIER. See DYER.

DIERVILLA, in *Botany*. Its characters are theſe: the flower is of one leaf, cut into five parts at the top: it hath five ſtamina, which are equal with the petal; at the bottom of the flower is ſituated an oval germen, which afterward becomes a pyramidal berry divided into four cells, which contain ſmall round ſeeds. There is but one known ſpecies, which is a native of the northern parts of America.

This, in the Linnæan ſyſtem, is a ſpecies of the LONICERA.

DIES. See DAY.

DIES, in *Common Law*. There are two kinds of *days*: *juridici*, & *non juridici*.

DIES *juridici*, or *faſti*, are all days wherein juſtice is adminiſtered in court.

DIES *non juridici*, or *nefaſti*, are all Sundays in the year: and in Eaſter term, the feaſt of the Aſcenſion of our Lord: in Trinity term, the Nativity of St. John the Baptiſt: in Michaelmas term, the feaſt of All Saints, and All Souls: and in Hilary term, the Purification of the Bleſſed Virgin.

The ſame diſtinction holds not only as to legal proceedings in court, &c. but alſo as to contracts.

DIES, in ſome *Ancient Authors*, is alſo uſed for daily proviſion. *Et reddebat dimidium diem mellis*, q. d. *as much honey as ſerved the king's family half a day*.

DIES *datus*, is a day, or time of reſpite given to the tenant, or defendant, by the court.

DIES *Marchiæ*, was a day of congreſs or meeting of the Engliſh and Scotch, appointed annually to be held on the *marches* or borders, to adjuſt all differences between them, and preſerve the articles of peace.

DIESIS, from *διημι*, *I divide*, in *Muſic*, a diviſion of a tone, leſſer than a ſemi-tone; or an interval conſiſting of a leſſer, or imperfect ſemi-tone.

The *dieſis* is the ſmalleſt, and ſofteſt change, or inflexion, of the voice imaginable. It is alſo called a *feint*, and is expreſſed by a St. Andrew's croſs, or ſaltier.

Ariſtotle calls *dieſes* the elements of voice, as letters are thoſe of diſcourſe. Indeed, Ariſtotle's *dieſes* were apparently different from ours: and we find Vitruvius expreſsly making the *dieſis* a fourth part of the tone. But the Pythagoreans, who are held the inventors of the name *dieſis*, did not make it ſo ſmall: they only divided the tone into two unequal parts, and called the leſſer, *dieſis*, or *limma*, expreſſing the interval $\frac{256}{243}$, which we call the leſſer ſemi-tone; and the greater, which we call the greater ſemi-tone, they called *apotome*.

But in after-times, when the tone came to be divided into three and four parts, the name *dieſis* was retained to them all. And hence thoſe different accounts, which we meet with in authors, of the quantity of the *dieſis*.

DIESIS, *Enharmonical*, is the difference between a greater and leſſer ſemi-tone. See TONE, GENUS, DEGREE, SCALE, &c.

Dieſes are divided into three kinds: the *leſſer enharmonical dieſis*, or *ſimple dieſis*, denoted by a ſingle croſs, raiſes the note following by two commas, or about $\frac{1}{4}$ of a tone. The logarithm or meaſure of the octave $\frac{2}{1}$ being 1,000,000, the meaſure of the *dieſis* $\frac{128}{125}$ will be 0,034215. Hence 29 *dieſes* will be nearly equal to the octave. See INTERVAL.

The *chromatic*, or *double dieſis*, denoted by a double croſs, raiſes the following note by a leſſer ſemi-tone, or about four commas; which is the common *dieſis*. The ratio of this dieſis is $\frac{25}{24}$.

The *greater enharmonical dieſis*, denoted by a triple croſs, raiſes the note by ſix or ſeven commas, or about $\frac{3}{4}$ of a tone. None but the *double dieſis* is uſed in muſic. A flat is frequently uſed to take away the *dieſis*, and a *dieſis* to take away a flat.

When ſemi-tones are placed where regular tones ſhould be, or a tone where there ſhould be a ſemi-tone: it is called a *dieſis*, or *feint*.

Diesis, among the *Modern Muſicians*, denotes thoſe ſigns or characters which are uſed to expreſs the ſeveral degrees whereby a ſound may be elevated above, or depreſſed below its natural ſituation: and it either affects the note before which it is placed, or the whole KEY. See SHARP.

DIESPITER, in *Antiquity*, a name given to Jupiter.

Some authors will have it the ſame with *Dios pater*, *Jupiter father*; Jupiter being called in Greek Ζεὺς, or Δεὺς, whence the oblique caſe Διὸς, &c. Others hold *Dieſpiter* to ſignify *Diei pater*, *father of the day*. St. Auguſtin derives the name from *dies*, *day*, and *partus*, *production*, *bringing forth*; it being Jupiter that brings forth the day. Of which ſentiment were Servius, and Macrobius; the former adding, that in the language of the Oſci they called him *Lucentius*, as *Dieſpiter* in Latin.

Struvius, Antiq. Rom. Synt. C. I. ſeems to intimate, that *Dieſpiter* ſignified *Pluto*: but, if that be his meaning, he is apparently miſtaken. For both in Cicero, and in the inſcription he quotes from Gruter, xxi. 8. we have only *Dis pater*, and not *Dieſpiter*.

DIET, *Diæta*, in *Medicine*, &c. a regimen, or courſe of living, proper in regard to health.

The word *diet*, in this ſenſe, comes from *diæta*, which ſignified anciently a *banqueting-room*; and at length an *aſſembly of the ſtates*, becauſe the Germans held moſt of their councils at table.

The word is formed from the Greek Διαιτα, which ſignifies *regimen*, or *rule of life*, preſcribed by phyſicians. And as the phyſicians uſually order a ſpare, ſcanty proportion, leſs than is uſually taken; *diet* has with many paſſed into a name for this retrenchment, or diminution of the ordinary quantity of food, whether it be by advice of a phyſician, or by a perſon's own choice; provided it be to remove, or prevent, ſome diſorder.

Judge Blackſtone obſerves, that, as to exceſs in *diet*, there remains one ancient ſtatute unrepealed, viz. 10 Edw. III. ſtat. 3. which ordains that no man ſhall be ſerved, at dinner or ſupper, with more than two courſes, except upon ſome great holidays there ſpecified, in which he may be ſerved with three. Comm. vol. iv. p. 171.

A *ſpare diet* is a ſovereign remedy againſt all diſeaſes ariſing from repletion.

It is founded on this, that nature ought not to be buſied and diſtracted in the concocting of food, but left wholly to her work of digeſting and expelling the morbific matter.

For the advantages of a *ſpare ſimple diet*, ſee ABSTINENCE.

As no ſubſtance is abſolutely and of its own nature, either ſalutary or noxious, but derives either the one or the other quality from its particular relation to the human body; ſo it is certain that the effects of the non-naturals muſt bear a direct proportion to the different conſtitutions of thoſe who uſe them: ſince in theſe, their conſequences muſt vary, and prove either of the ſalutary or noxious kind, according to the different cauſes which concur to produce them.

Hence it is obvious, that the phyſician acts a prepoſterous and unaccountable part, who to every one preſcribes the ſame method of living; or thinks, that what contributes to the health of one, will without diſtinction or reſerve prove ſalutary to all. For we are ſufficiently taught by daily experience, that all ſubſtances are not equally adapted to all patients; and that what one may bear without being ſenſible of any bad effects, may to another prove prejudicial, and even fatal. Time itſelf has a conſiderable influence in determining the ſalutary or noxious effects of aliments; ſince ſome ſubſtances may ſafely, and without any bad conſequence, be uſed at one ſeaſon, which at another may contribute not a little to the deſtruction of health.

At different ſeaſons of the year different regimens are to be uſed, becauſe a change in the ſtate of the atmoſphere induces a proportionable alteration in animal bodies.

In the winter, the fibres, in conſequence of the increaſed elaſticity of the air, are ſtronger, and better qualified for performing their ſeveral motions, and aſſiſting the concoction of the aliments; for which reaſon we can far better bear aliments of difficult digeſtion in that ſeaſon, than in any other. As during winter tranſpiration is in ſome meaſure obſtructed, the cutaneous ducts being braced up by the cold air, the uſe of rich wines, and ſtrong ales, becomes highly proper. It is alſo expedient to make frequent uſe of warm broths and infuſions; and care is always to be taken, that the perſpiration bear a proportion to the quantity of aliment uſed.

In the ſpring, ſomething is to be retrenched from the quantity of our aliments, and the liquor we uſually drink is ſomewhat to be enlarged.

In the autumn the ſame phænomena are to be obſerved as in the ſpring; becauſe the inclemency of the air is the ſame, and the changes of the weather equally ſudden and frequent; by which means perſpiration, which is abſolutely neceſſary for health, is eaſily obſtructed; and becauſe at this ſeaſon the equinoctial happens, diſeaſes are to be prevented by what we call preſervative cures.

During the ſummer, health is moſt effectually preſerved by vegetables, and draughts of diluting liquors; but we are to abſtain from ſuch aliments as are heavy, and of difficult digeſtion, from wine and brandy.

The *diet* ſhould alſo be adapted to different conſtitutions. Perſons, whoſe ſolids are weak and relaxed, ſhould avoid all viſcid food, or ſuch things as are hard of digeſtion. Their *diet*, however, ought to be ſolid, and they ſhould uſe much exerciſe in the open air. Thoſe who abound with blood ſhould uſe ſparingly every thing that is highly nouriſhing, as fat meat, rich wines, ſtrong ale, &c. Their food ſhould conſiſt moſtly of bread, and other vegetables, and their drink ought to be water, whey, or ſmall beer. Fat people ſhould abſtain from oily, nouriſhing *diet*, and they ought frequently to uſe raddiſh, garlic, and ſpices, in order to promote perſpiration and urine. Their drink ſhould be water, coffee, tea, and the like; and they ought to take much exerciſe, and little ſleep. The courſe of the lean ſhould be oppoſite to this. Thoſe who are troubled with acidities ſhould live much on fleſh meats; and thoſe who are afflicted with hot alkaline eructations ſhould chiefly uſe acid vegetables. Thoſe who are ſubject to the gout, low ſpirits, hypochondriac, or hyſteric diſorders, ſhould avoid all flatulent food, every thing viſcid and hard of digeſtion, all ſalted or ſmoke-dried proviſions, and whatever is apt to turn ſour on their ſtomachs. Their food ſhould be light, ſpare, cool, and of an opening nature.

The *diet* ſhould alſo be adapted to the manner of life, and age, as well as to the ſeaſon and conſtitution; thoſe whoſe buſineſs or profeſſion leads them to a ſedentary life ſhould be more ſparing as to the quantity, and more attentive to the quality of their *diet*, than thoſe that are accuſtomed to much exerciſe; they ought to be particularly cautious in the uſe of every thing that is ſour, windy, rancid, and hard of digeſtion. Particular diſeaſes ſhould likewiſe make us avoid any thing that has a tendency to increaſe them. Gouty perſons ſhould not uſe rich wines, ſtrong ſoups, nor acids. Perſons ſubject to the gravel ſhould ſhun all auſtere and aſtringent aliments, and the ſcorbutic ſhould not indulge too much in animal food. The food in early life ſhould be light, but nouriſhing, and frequently uſed; food that is ſolid, with a ſufficient degree of tenacity, is moſt proper for the ſtate of manhood; and the *diet* of the later period of life ſhould reſemble that of the firſt. At every period of life, gluttony and faſting ſhould be equally avoided; both the one and the other deſtroys the powers of digeſtion; and the frequent repetition of aliments is not only neceſſary for repairing the continual waſte of our bodies, but likewiſe to keep the humours ſound and ſweet. It ſhould be remarked, however, by way of caution, that one meal of fleſh meat in the twenty-four hours is ſufficient. The quantity of animal food conſumed by the Engliſh is generally pernicious, becauſe it produces but little of that air which is antiſeptic: hence they are ſubject to the ſcurvy, and its numerous train of conſequences, indigeſtion, low ſpirits, hypochondriaciſm, &c. whereas if vegetables and milk, whoſe antiſeptic quality, ariſing from the *gas* or air which they plentifully afford, is now generally allowed, were more uſed in *diet*, we ſhould have leſs ſcurvy, and likewiſe fewer putrid and inflammatory fevers. See PUTREFACTION and SCURVY.

Different ſexes alſo require a different *diet* and regimen. Women are weaker than men, and for that reaſon require a *diet* and regimen peculiar to themſelves; they are of a ſpungy and lax habit, and for the moſt part addicted to indolence and pleaſure, drink little, have bodies of a highly delicate and ſenſible nature, much inclined to ſpaſms, and convulſive motions, and diſpoſed to generate a redundance of blood. Beſide, at certain ſtated times, they have a regular evacuation by the veins of the uterus; and in conſequence of theſe circumſtances it is neceſſary that women, rather than men, ſhould obſerve a regimen and method of living, peculiarly and accurately adapted to their habit and conſtitution.

Pregnant women are alſo to have a regimen peculiar to them.

themſelves directed for them, leſt the mother herſelf or the *fœtus* ſhould ſuſtain any injury; for the infant included in the *uterus* is as it were a part of the mother's body. James, from Hoffman; and Buchan's Domeſtic Medicine, chap. iii.

Dr. Cheyne ſhews, how one may ſupply the place of medicines by *diet:* any one, ſays he, may in effect loſe a pound of blood, take a purge, or a ſweat, by dropping the great meal, or abſtaining from animal food, and ſtrong liquors, for four or five days, in chronical caſes, as effectually as by opening a vein, ſwallowing a doſe of pills, or taking a ſudorific bolus. He adviſes, therefore, all gentlemen of a ſedentary life, and of learned profeſſions, to uſe as much abſtinence as poſſibly they can, conſiſtently with the preſervation of their ſtrength, and the freedom of ſpirits. This they ought to have recourſe to, as ſoon as they find any heavineſs, inquietudes, reſtleſs nights, or averſion to application; either by leſſening one half their uſual quantity of animal food, and ſtrong liquors, till ſuch time as they regain their wonted freedom; or by living a due time wholly on vegetable *diets*, as ſago, rice, pudding, and the like; and drinking only wine and water. See Disease.

One great reaſon why leproſies, hot ſcurvies, dyſenteries, plagues, peſtilential fevers, and the like diſtempers, formerly ſo frequent in London, are now ſo rare, is the change that has been made in the *diet* of the inhabitants. Hopped beer, wine, and ſpirituous liquors coming into general uſe, have been a great means of ſuppreſſing putrid diſeaſes; greens and fruit are likewiſe more univerſally eat, and ſalted meats make a much leſs part of *diet* than formerly: to which may be added the more general conſumption of tea and ſugar.

A vegetable *diet* is moſt proper for ſcorbutic and hectical perſons, and does very well with people who have much exerciſe; but in other circumſtances, a mixed *diet* of vegetable and animal ſubſtances, ſuch as is commonly uſed, ſeems beſt calculated to nouriſh and preſerve the body from decay.

Irregularities in *diet* are commonly, though unjuſtly, ſuppoſed to have the greateſt ſhare in producing military diſeaſes. Were this the caſe, the changes in the weather and ſeaſons would not ſo remarkably affect their health; the ſobereſt and moſt regular corps would not be ſo ſickly; different nations in the ſame camp, living variouſly, would not be afflicted with the ſame diſtempers; nor would there be ſuch an inequality in the numbers of the ſick in different years, were the greateſt part of diſeaſes owing ſolely to *diet*.

Againſt exceſs, the moſt common error in *diet*, the ſmallneſs of a ſoldier's pay is a ſufficient ſecurity: in regard to them, therefore, the danger lies on the other hand; for, when all are not obliged to eat in meſſes, ſome will be apt to lay out their pay upon ſtrong liquors, and to ſquander away in one day what is but barely a maintenance for a week; but, on the ſuppoſition that every man contributes his ſhare to a meſs, we may be aſſured there can be no errors in *diet* of any conſequence, whilſt almoſt the whole pay is ſpent upon common food. As to the abuſe of ſpirits and fruit, ſoldiers are generally blamed without any foundation; ſpirits being rather beneficial than hurtful to them, ſo often expoſed to the extremes of heat and cold, to moiſt and bad air, long marches, wet cloaths, and ſcanty proviſions; and as to fruit, a few diſorderly men may rob orchards, which is the only way they can come at fruit, but the camp diſeaſes are incident to the moſt regular equally with them.

A fundamental rule in regard to the *diet* of ſoldiers, is to oblige them to eat in meſſes, by which means their pay will be laid out upon wholeſome food. The greateſt impediment to meſſing are the wives and children, who muſt often be maintained on the ſoldier's pay; in which circumſtances it is not improper food, but the want of it, that may endanger a ſoldier's health.

The meſſing being eſtabliſhed, there remains only to ſee that the men be well ſupplied with bread, and that the markets be ſo regulated that the traders may have encouragement to come to the camp, and the meſſes have good proviſions at a moderate price; and particularly vegetables, which, during the hot weather, ought to make a great part of the *diet*. In eſtabliſhing the meſſes, ſome regulations might be made with regard to an allowance of ſpirits, either by ſtoppages on the pay or otherwiſe. This is already practiſed in the navy, and probably for the ſame reaſons that make ſpirits neceſſary for ſoldiers; ſince in ſhips men are liable to diſtempers from moiſt and corrupted air.

As to the *diet* of officers, their chief rule, in ſickly times, is to eat moderately, avoiding all ſurfeits and indigeſtion, and uſing wine in moderation. Pringle's Obſ. on the Diſeaſes of the Army. See Food.

Diet-*drinks*, a form of phyſic, including all the medicated wines, wheys, and ales, uſed in chronic caſes. They require a courſe or continuance to anſwer any intention of moment. In acute caſes they are of no uſe; but where the diſorder of a conſtitution is gradually to be gained upon, much help may be had from them.

Diet, or **Dyet**, is alſo uſed for an aſſembly of the ſtates, or circles of the empire, or Poland, to deliberate and concert meaſures for the public good.

The general *diet* of the empire is ordinarily held at Ratiſbon. It conſiſts of the emperor in perſon, or by his repreſentative or commiſſary; the nine electors, three of whom are eccleſiaſtic, and the other ſix ſecular, forming the electoral college; the eccleſiaſtical princes, viz. archbiſhops, biſhops, abbots, and abbeſſes, and the ſecular princes, forming the ſecond college; and the repreſentatives of the imperial cities, who conſtitute the third college, and are divided into two benches, viz. that of Suabia and of the Rhine. This *diet* has been uſually ſummoned by the emperor, but there are ſome caſes in which the electors have ſummoned it without his conſent, or requeſted him to ſummon it. In the abſence of the emperor, the right of convocation belongs to the king of the Romans. The *diet* makes laws, raiſes taxes, determines differences between the ſeveral princes and ſtates, and relieves the ſubjects from the oppreſſions of their ſovereigns. The *diets* of the empire were originally the ſame with the aſſemblies of March and May, held by the kings of France: they met, at leaſt, once a year; and every freeman had a right to be preſent. Theſe were aſſemblies, in which the monarch deliberated with his ſubjects, concerning their common intereſt: but when the princes, dignified eccleſiaſtics, and barons, acquired territorial and independent juriſdiction, the *diet* became an aſſembly of the ſeparate ſtates, which formed the confederacy of which the emperor was the head. Robertſon's Hiſt. Charles V. vol. i. p. 462.

The term *diet* is alſo applied to the aſſembly of electors for the choice of an emperor or king of the Romans: this is uſually held at Frankfort on the Main.

The general *diet* of Poland is by the laws only to be held every two years; but preſſing occaſions convene them every year: the laws alſo confine their ſitting to fifteen days, but they frequently protract it to ſix weeks. The uſual place is at Warſaw, the capital of the kingdom: though it has been often held at other places: in effect, as by the laws every third *diet* is to be convened at Grodno, in Lithuania; whenever, for particular reaſons, it is judged meet to change the order, and hold it elſewhere, the nobility of the grand duchy muſt conſent to it. It is the king who fixes the time, and ſummons it by circular letters ſent to all the palatines. In an interregnum, the archbiſhop of Geſna calls the *diet*.

The ſeveral particular *diets*, which are held ſix weeks before the general one, ſend three deputies each, choſen out of the members thereof.

In Poland there are likewiſe *diets* on horſeback, held in the champagne, or country: ſuch are thoſe wherein they chooſe their king. They are called *poſpolites*.

There are likewiſe *diets* held in Switzerland; *diets* of the proteſtant cantons; *diets* of the catholic cantons; and general *diets*. The firſt aſſemble at Araw, and are convoked by the canton of Zurich; the ſecond at Lucern, convoked by the canton of that name; the third, compoſed of the deputies of all the cantons, both proteſtant and catholic, is held twice a year, at the end of June, and the beginning of December, and meets at Baden. It is the canton of Zurich which has the right of convening it.

DIETA, in our *Old Law Books*, denotes a day's journey. *Omnis rationabilis* dieta *conſtat ex viginti milliaribus*. Fleta.

DETETIC, *Diætetica*, that part of phyſic which conſiders the way of living, with relation to food, ſuitable to particular caſes. See Diet.

DIEU & *mon droit*, q. d. *God and my right*, the motto of the arms of England, firſt given by king Richard I. to intimate, that he held not his empire in vaſſalage of any mortal.

It was afterwards taken up by Edward III. when he firſt claimed the crown of France; and was continued, without interruption, to the time of king William III. who uſed the motto *Je maintiendray*; though he commanded the former to be retained on the great ſeal. The ſame is to be underſtood of the late queen Anne, who uſed the motto, *Semper eadem*; which had been before uſed by queen Elizabeth.

Dieu *ſon act*, in *Law*, are words often uſed in our old law: and it is a maxim in law, that the act of God ſhall prejudice no man. Therefore if a houſe be blown down by a tempeſt, thunder, or lightning, the leſſee or tenant for life or years, ſhall be excuſed in waſte. Likewiſe he hath by the law a ſpecial intereſt to take timber to build the houſe again for his habitation. 4 Rep. 63. 11

Rep. 82. So when the condition of a bond conſiſts of two parts in the disjunctive, and both are poſſible at the time of the obligation made, and afterward one of them becomes impoſſible by the act of God, the obligor is not bound to perform the other part. 5 Rep. 22. And where a perſon is bound to appear in court at a certain day, if before the day he dieth, the obligation is ſaved, &c. See Bond.

DIEXAHÆDRIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek δὶς, *twice*, ἓξ, *ſix*, and ἕδρα, *ſide*. The bodies of this genus are ſpars, compoſed of twice ſix planes, being formed of two hexædral pyramids, joined baſe to baſe, without any intermediate column. Of this genus there are only two known ſpecies: 1. One with long, narrow, and ſharp-pointed pyramids, found in Lamb's-cave on Mendip-hills: and, 2. One with long, broad, and obtuſe pyramids: this is found in the mine of Goſſelar in Saxony, and in many of the mines of the Hartz Foreſt. Hill's Hiſt. of Foſſils, p. 213.

DIEXODUS, Διέξοδος, in *Rhetoric*, is uſed for digreſſion.

DIFF, is the name of an inſtrument of muſic among the Arabs, ſerving chiefly to beat time to the voice: it is a hoop, ſometimes with pieces of braſs fixed to it to make a jingling, over which a piece of parchment is diſtended. It is beat with the fingers, and is the true *tympanum* of the ancients. Ruſſell's Hiſt. of Aleppo, p. 94.

DIFFAMATORY. See Defamatory.

DIFFARREATION, among the Romans, a ceremony whereby the divorce of their prieſts was ſolemnized.

The word comes from the prepoſition *dis*; which is uſed, in compoſition, for *diviſion*, or *ſeparation*; and *farreatio*, *a ceremony with wheat*, of *far*, *wheat*.

Diffarreation was properly the diſſolving of marriages contracted by confarreation; which were thoſe of the pontifices, or prieſts. Feſtus ſays, it was performed with a wheaten cake. Vigenere will have confarreation and *diffarreation* to be the ſame thing.

DIFFERENCE, in *Logic*, an eſſential attribute belonging to ſome ſpecies, and not found in the genus; being the idea that defines the ſpecies.

Thus, body and ſpirit are the two ſpecies of ſubſtance, which in their ideas include ſomething more than is included in the idea of ſubſtance. In body, for inſtance, is found impenetrability, and extenſion; in ſpirit, a power of thinking, and reaſoning: ſo that the *difference* of body is impenetrable extenſion, and the *difference* of ſpirit is cogitation.

Difference, in *Mathematics*, the exceſs of one quantity above another.

When a leſs quantity is ſubtracted from a greater, what remains is called the *difference*.

It was a fundamental principle among the ancient geometers, that the *difference* of any two unequal quantities, by which the greater exceeds the leſſer, may be added to itſelf, till it ſhall exceed any propoſed finite quantity of the ſame kind. This principle ſeems inconſiſtent with the ſuppoſition of an infinitely ſmall quantity or *difference*, which added to itſelf any number of times, is never to be ſuppoſed to become equal to any finite quantity whatſoever; which is the foundation of the modern method of infiniteſimals. However, this laſt may, with proper caution, be made uſeful and accurate.

Difference *of longitude* of two places, is an arch of the equator intercepted between the meridians of the places.

Difference, *Aſcenſional*, in *Aſtronomy*. See Ascensional.

Differences, in *Heraldry*, certain additaments to coat-armour; whereby ſomething is altered, or added, to diſtinguiſh the younger families from the elder, or to ſhew how far they are removed from the principal houſe.

They are called, in Latin, *diminutiones*, and *diſcernicula armorum*; and, by the French, *briſures*.

Of theſe *differences* Sylv. Morgan gives us nine, which obtain principally among us: viz. the *label*, which denotes the firſt and eldeſt ſon; the *creſcent*, the ſecond; the *mullet*, the third; the *martlet*, the fourth; the *annulet*, the fifth; the *fleur de lis*, the ſixth; the *roſe*, the ſeventh; the *croſs-moline*, the eighth; and the *eight-foil*, the ninth. See each under its proper article.

Again, as the firſt *differences* are ſingle for the ſons of the firſt houſe, or deſcent; the ſons of the younger houſes are differed by combining, or putting the ſaid *differences* upon each other. As the firſt *differences* are, the *label*, *creſcent*, &c. for the firſt houſe; the *difference* for the ſecond houſe is the *label* on a *creſcent*, for the firſt of that houſe, during his father's life only; for the ſecond, a *creſcent* charged with a creſcent; for the third brother of the ſecond houſe, a *mullet* on a *creſcent*, &c.

Siſters, except of the blood-royal, have no other mark of *difference* in their coats of arms beſides the form of the eſcutcheon. See Lozenge.

The original of *differences* is controverted. Camden will have them to have begun about the time of king Richard I. Paradin aſſigns *differences* worn as early as the year 870. The preſident Fauchet obſerves *differences* to have been hereditary in the French families before the time of Louis le Gros, who came to the crown in the year 1110. Moreau refers them to the time of St. Louis; and Lallonette, Belleforeſt, &c. to that of Philip Auguſtus. The occaſion of their riſe is well accounted for by Colombiere.

All nations, ſays he, prefer the eldeſt brothers to the younger; whence thoſe, in a direct line, ſucceeding to their fathers, and becoming maſters of their lands, took on them their coat-armour, without any change, or alteration; and tranſmitted the ſame again to their eldeſt ſons; the younger brothers, or baſtards, not being allowed to bear the ſame arms, without ſome additional mark, to diſtinguiſh them from the elder. Hence ſome heralds, he goes on, have endeavoured to confine them to certain fixed and determinate figures, for diſtinguiſhing the ſecond from the firſt, the third from the ſecond, and ſo on to the ſixth; aſſigning the ſecond a *label*, the third a *bordure*, the fourth an *orle*, the fifth a *battoon*, and the ſixth a *bend* or *cottice*.

And the deſcendents of theſe to bear double *differences*, or *differences* charged on one another; viz. the eldeſt ſon of the ſecond ſon to retain his paternal coat, with the *difference* of the *label* of three points; the ſecond, the *label* of four points; the third, ſuch a *label* on a chief; the fourth, a *label* charged with certain figures, as *eaglets*, *lioncels*, *martlets*, *creſcents*, *roſes*, &c. And, for the ſame reaſon, the ſecond ſon of the third ſon ſhall bear a *bordure* engrailed; the third, a *bordure* charged with *bezants*, or *tourteaux*, &c.

But the ſame author judges the fixing any certain invariable *differences* at all an abuſe; becauſe they may happen not to be agreeable to the paternal coat, but very much deface and blemiſh it. He adds, that many other figures, beſide thoſe above mentioned, may be uſed as *differences*; as ſhells, bezants, cinquefoils, and a thouſand more. Some younger families have made the *difference* in their arms by only diminiſhing the ordinaries, or changing the poſture; and others, by only changing the metal, or colour.

It muſt be added, that the *difference* may be of metal on metal, or colour on colour; which, in other caſes, is falſe heraldry.

Differences, *Ancient*. See Bordures.

DIFFERENTIAL, *Differentiale*, in the *Higher Geometry*, an infinitely ſmall quantity, or a particle of quantity ſo ſmall as to be leſs than any aſſignable one.

It is called a *differential*, or *differential quantity*, becauſe frequently conſidered as the difference of two quantities; and, as ſuch, it is the foundation of the *differential calculus*. Sir Iſaac Newton, and the Engliſh, call it a *moment*, as being conſidered as the momentary increaſe of quantity.

Mr. Leibnitz, and others, call it alſo an *infiniteſimal*. See Infinitesimal.

Differential *of the firſt, ſecond, &c. degree.* See Differentio-Differential.

Differential *calculus*, or *method*, is a method of differencing quantities; that is, of finding a *differential*, or infinitely ſmall quantity, which, taken an infinite number of times, is equal to a given quantity. See Calculus, and Fluxions.

Differentio-Differential *Calculus*, is a method of differencing *differential* quantities.

As the ſign of a *differential* is the letter d; that of a *differential* of dx is ddx, and the *differential* of ddx, $dddx$, or d^2x, d^3x, &c. or $\ddot{x}$, $\dddot{x}$, &c.

Thus we have powers, or degrees, of *differentials*.

The *differential* of an ordinary quantity, is called a *differential of the firſt power*, or *degree*; as dx.

Differential *of the ſecond power*, or *degree*, is an infiniteſimal of a *differential* quantity of the firſt degree; as ddx, or $dxdx$, or dx^2, $dxdy$, &c.

Differential *of the third degree*, is an infiniteſimal of a *differential* quantity of the ſecond degree; as $dddx$, dx^3, $dxdydz$, and ſo on.

The *powers of differentials*, as dx^2, are differenced after the ſame manner, as the powers of ordinary quantities: and, again, as compound *differentials* either multiply, or divide, each other, or are powers of *differentials* of the firſt degree; *differentials* are differenced after the ſame manner as ordinary quantities; and, therefore, the *differentio-differential calculus* is the ſame, in effect, with the *differential*.

Differential, in the *Doctrine of Logarithms*. Kepler calls the logarithms of tangents, *differentiales*; which we uſually call *artificial tangents*. See Logarithm, Meso-Logarithm, and Tangent.

Differential *equation* is uſed by ſome mathematicians for an equation involving infiniteſimal differences, or fluxions. Thus the equation $3x^2\,dx - 2ax\,dx + ay\,dx - 3y^2\,dy + ax\,dy = 0$ in the foreign notation, or $3xx\dot{x} - 2ax\dot{x} + ay\dot{x} - 3y^2\dot{y} + ax\dot{y} = 0$ in the Engliſh notation, is called a *differential equation.* But theſe equations ſhould, conſiſtently with the Engliſh, or Sir Iſaac Newton's notation, be rather called fluxional equations. Hence ſome of our mathematicians have applied the term *differential equation* in another ſenſe, to certain equations defining the nature of ſerieſes. See SERIES.

DIFFERENTIAL *method*, in *Mathematics*, an appellation given to a method of deſcribing a curve of the parabolic kind through any given number of points.

This method is given by Sir Iſaac Newton in the fifth lemma of the third book of his Principles. He diſtinguiſhes two caſes of this problem; the firſt, when the ordinates drawn from the given points to any line given in poſition, are at equal diſtances from each other; and the ſecond, when theſe ordinates are not at equal diſtances. He has given a ſolution of both caſes, but without demonſtration in that place, which has ſince been ſupplied by himſelf and others. See his Methodus Differentialis, publiſhed with other tracts of the ſame author, by Mr. Jones, London, 1711; and Stirling's explanation of the Newtonian *differential method* in the Phil. Tranſ. N° 362. Cotes, De Methodo Differentiali Newtoniana, in his works publiſhed by Dr. Smith; Herman. Phoronomia; and Le Seur and Jacquier, in their Comment on Sir Iſaac's Principles.

Where it is to be obſerved, that the methods there demonſtrated by ſome of theſe authors extend to the deſcription of any algebraic curve through a given number of points, which Sir Iſaac, writing to Mr. Leibnitz, mentions as a problem of the greateſt uſe.

By this method, ſome terms of a ſeries being given, and ſuppoſed to be placed at given intervals, any intermediate term may be found nearly; and this therefore gives a method for interpolations. Newt. Method. Differ. prop. 5.

Any curvilinear figure may alſo be ſquared nearly, of which ſome ordinates may be found. Newt. ibid. prop. 6.

And this method may be extended to the conſtruction of mathematical tables by interpolation. Ibid. in Schol. p. 100.

The ſucceſſive differences of the ordinates of parabolic curves, becoming ultimately equal, and the intermediate ordinate required being determined according to Sir Iſaac's rules, by theſe differences of the ordinates, is the reaſon of this method being called the *differential method.*

To be a little more particular.

The firſt caſe of Sir Iſaac's problem amounts to this: a ſeries of numbers, placed at equal intervals being given, to find any intermediate number of that ſeries when its interval from the firſt term of the ſeries is given.

Subtract every term of the ſeries from the next following, and let the remainders be called firſt differences; then ſubtract each difference from the next following, and let theſe remainders be called ſecond differences; again, let each ſecond difference be ſubtracted from the next following, and let theſe remainders be called third differences, and ſo on: then if A be the firſt term of the ſeries, d' the firſt of the firſt differences, d'' the firſt of the ſecond differences, d''' the firſt of the third differences, &c. and if x be the interval between the firſt term of the ſeries and any term ſought, E, that is, let the number of terms from A to E, both incluſive, be $= x + 1$, then will the term ſought,

$$E = A + \frac{xd'}{1} + \frac{x.\overline{x-1}}{1.2}d'' + \frac{x.\overline{x-1}.\overline{x-2}}{1.2.3}d''' + \frac{x.\overline{x-1}}{1}\,\frac{\overline{x-2}.\overline{x-3}}{2.3.4}d'''' +, \&c.$$

which ſeries differs from the Newtonian in this, that the quantities $\frac{d''}{1.2}$, $\frac{d'''}{1.2.3}$, $\frac{d''''}{1.2.3.4}$ here uſed, ſignify the ſame with d'', d''', uſed by Sir Iſaac.

Hence, if the differences of any order become equal, that is, if any of the quantities d'', d''', d'''', become $= 0$, we ſhall have a finite expreſſion for E, the term ſought; it being evident, that the ſeries muſt terminate when any of the differences d'', d''', &c. become $= 0$.

It is alſo evident that the coefficients $\frac{x}{1}$, $\frac{x.\overline{x-1}}{1.2}$, &c. of the differences, are the unciæ of the binomial theorem.

A method may be deduced from the foregoing expreſſion, of finding the ſums of the terms of ſuch a ſeries. For if we imagine a new ſeries, whereof the firſt term ſhall be $= 0$, the ſecond $= A$, the third $= A + B$, the fourth $= A + B + C$, the fifth $= A + B + C + D$, and ſo on, it is plain that the aſſigning one term of this ſeries is finding the ſum of all the terms A, B, C, D, &c. Now ſince thoſe terms are the differences of the ſums 0, A, A + B, A + B + C, A + B + C + D, and that, by the ſuppoſition, ſome of the differences of A, B, C, D, &c. are $= 0$; it follows that ſome of the differences of the ſums will alſo be $= 0$; and that whereas in the ſeries $A + xd' + \frac{x.\overline{x-1}}{1.2}d''$, &c. whereby a term was aſſigned, A repreſented the firſt term, d' the firſt of the firſt differences, and that x repreſented the interval between the firſt term, and the laſt, we are to write 0 inſtead of A, A inſtead of d', d' inſtead of d'', d'' inſtead of d''', &c. and $x+1$ inſtead of x; which being done, the ſeries expreſſing the ſums will be

$$0 + \overline{x+1}.A + \frac{\overline{x+1}.x}{1.2}d' + \frac{\overline{x+1}.x.\overline{x-1}}{1.2.3}d'' +, \&c. \text{ or } \overline{x+1} \times \overline{A + \frac{x}{2}d' + \frac{x.\overline{x-1}}{2.3}d'' + \frac{x.\overline{x-1}.\overline{x-2}}{2.3.4}d'''}, \&c.$$

Or again, if the real number of terms of the lines be called z, that is, if $z = x + 1$, or $z - 1 = x$, we ſhall have the ſum of the ſeries

$$= z \times \overline{A + \frac{z-1}{2}d' + \frac{\overline{z-1}.\overline{z-2}}{2.3}d'' + \frac{\overline{z-1}.\overline{z-2}.\overline{z-3}}{2.3.4}d''' +}, \&c.$$

See De Moivre, Doct. of Chances, p. 59, 60. Miſc. Analyt. p. 153.

For inſtance, let it be required to find the ſum of a ſeries of the ſquares of the natural numbers $1 + 4 + 9 + 16 + 25 + 36$. Then, $A = 1\ d'$

$$\begin{array}{llll}
4 & 3\,d'' & & \\
 & & 2\,d''' & \\
9 & 5 & & 0 \\
16 & 7 & & 0 \\
 & & 2 & \\
25 & 9 & & 0 \\
 & & 2 & \\
36 & 11 & &
\end{array}$$

The ſum conſequently will be,

$$= z \times \overline{1 + \frac{z-1}{2} \times 3 + \frac{\overline{z-1}.\overline{z-2}}{2.3} \times 2}$$

$$= z \times 1 + \frac{3z-3}{2} + \frac{zz-3z+2}{3}$$

$$= z \times \frac{6-9+9z+2zz-6z+4}{6}$$

$$= z \times \frac{1+3z+2zz}{6} = \frac{z.\overline{1+z}.\overline{1+2z}}{6} = \frac{6.7.13}{6} = 91.$$

This eaſy example will be ſufficient to ſhew the applications of this rule. Thoſe who are deſirous of ſeeing its uſe in queſtions of chance, may conſult Mr. De Moivre's Doctrine of Chances, p. 59, ſeq. Various other inſtances of the uſe of this rule in finding ſums of progreſſions of figurate members, &c. may be ſeen in Miſc. Analyt. p. 154, ſeq.

As to the *differential method*, it is to be obſerved, that though Sir Iſaac and others have treated it as a method of deſcribing an algebraic curve, at leaſt of the parabolic kind, through any number of given points; yet the conſideration of curves is not at all eſſential, though it may help the imagination. The deſcription of a parabolic curve through given points, is the ſame problem as the aſſigning of quantities from their given differences, which may always be done by algebra, and by the reſolution of ſimple equations. See Mr. Stirling's Methodus Differentialis, p. 97. This ingenious author has treated fully of the *differential method*, and ſhewn its uſe in the ſolution of ſome very difficult problems. See SERIES.

DIFFERENTIAL *ſcale*, in *Algebra*, is uſed for the ſcale of relation ſubtracted from unity. See *Recurring* SERIES.

DIFFORM, *Difformis*, from *forma*, *ſhape*, is a word uſed in oppoſition to *uniform*; and ſignifies, that there is no regularity in the form, or appearance, of a thing.

The botaniſts uſe it as a diſtinction of the flowers of ſeveral ſpecies of plants.

DIFFRACTION, in *Optics*, a term firſt uſed by Grimaldi the Jeſuit, to denote that property of the rays of light, which others have called INFLECTION; the diſcovery of which ſome attribute to Grimaldi, and others to Dr. Hook.

DIFFUSE, DIFFUSIVE, is chiefly uſed for a prolix manner of writing, &c.

A dictionary cannot well be too *diffuſive:* for a man is never too much informed of the word he wanted; and he is not obliged to read that part of the explication which does not concern him.

A *diffuſive* ſtyle is proper for diſcourſes in the demonſtrative kind. Demoſthenes is cloſe, and conciſe; Cicero, on the contrary, is *diffuſive.*

DIFFUSION, from *diffundo, I pour out, I dilate*, the act whereby a body is ſpread, or ſtretched out, ſo as to take up more ſpace.

The ſchoolmen make three kinds of *diffuſion:* the firſt, that whereby a pure quality is *diffuſed*; as cold, force, &c. This they diſtinguiſh into *equal*, whereby equal portions, or degrees, of the quality are diſtributed upon equal parts of the medium; thus, when a direct motion is impreſſed on a moveable, all the parts of the moveable receive an equal impetus; and *unequal*, when unequal degrees of the quality are diſtributed on different parts of the ſubject; thus it is, that force is impreſſed on a lever, and cold propagated through a medium.

The ſecond kind of *diffuſion* is that performed by the motion of bodies: ſuch is the *diffuſion* of light, ſound, ſmell, magnetic, electric virtues, &c.

The third is performed partly by the motion of corpuſcles, and partly by the *diffuſion* of a quality; and thus they hold fire to be *diffuſed.*

But the modern philoſophers reject the notion of qualities, and their *diffuſion.* According to them, there is no other *diffuſion*, but that of corporeal ſubſtance, emitted in minute effluvia, or particles, into a kind of atmoſphere all around the body; which *diffuſion* of corpuſcles ſome call *atmoſpherical*, as being ſuppoſed to be terminated by a circle, whereof the *diffuſing* body is the center. Every body, it is now proved, has its ſphere of activity, or *diffuſion*, within which the particles, or corpuſcles, torn from it, and flying away, have a ſenſible effect; as we ſee in odorous, ſonorous, &c. bodies. See Quality; where the phyſical law of the *diffuſion* of qualities is laid down.

DIGAMMA. See F.

DIGAMY, the ſame with *bigamy.* See Bigamy.

DIGASTRICUS, in *Anatomy*, a muſcle of the lower-jaw, thus called, as having a double belly. See *Tab. Anat.* (*Myol.*) *fig.* 2. N° 2.

The word is formed from δις, *twice*, and γαςηρ, *belly.* See Biventer.

The *digaſtric* muſcles, according to Mr. Monro, do not ſolely pull the lower-jaw down, but ſerve to draw up the os hyoides, and parts annexed to it, in deglutition. We have an account of the ſituation and uſes of theſe muſcles, by this learned profeſſor, in the Med. Eſſ. Edinb vol. i. art. 11.

DIGEST, Digestum, a collection of the Roman laws, ranged and *digeſted* under proper titles, by order of the emperor Juſtinian.

That prince gave his chancellor Tribonianus a commiſſion for this purpoſe; who, in conſequence thereof, choſe ſixteen juriſconſulti, or lawyers, to work upon the ſame. Theſe, accordingly, took out the beſt and fineſt deciſions from the two thouſand volumes of the ancient juriſconſulti, and reduced them all into one body; which was publiſhed in the year 533, under the name of the *Digeſt.* To this the emperor gave the force of a law, by a letter at the head of the work, which ſerves it as a preface.

The *Digeſt* makes the firſt part of the Roman law, and the firſt volume of the corpus, or body, of the civil *law*, contained in fifty books.

It was tranſlated into Greek under the ſame emperor, and called Pandecta. See Pandects.

Cujas ſays, that *Digeſt* is a common name for all books diſpoſed in a good order and œconomy; and hence it is, that Tertullian calls the Goſpel of St. Luke, a *Digeſt.*

Hence alſo abridgments of the common law are denominated *digeſts* of the numerous caſes, arguments, readings, pleadings, &c. diſperſed in the Year-books, and other reports and books of law, reduced under proper heads, or common places. The firſt was that of Statham, which comes as low as Henry VI. That of Fitzherbert was publiſhed in 1516; Brook's in 1573, of which Hughes's, publiſhed in 1663, is a ſequel. Rolls, Danvers, and Nelſon, have alſo publiſhed *Digeſts* or abridgments of this kind, including the caſes of later days; to which may be added the New Abridgment, and Viner's Abridgment.

DIGESTION, in *Medicine*, that change of the food, taken in at the mouth, which it undergoes in the ſtomach, in order to afford fit matter to compoſe, or increaſe, an animal, till it arrives at its deſtined bulk; and to repair the loſs of thoſe particles which the body, in its natural ſtate, neceſſarily undergoes.

The operation of *digeſtion* ſucceeds to maſtication, and deglutition.

It includes chylification, and is ſucceeded by ſanguification, and nutrition.

The cauſe, manner, and means, of *digeſtion*, have been infinitely controverted: it would be tedious to enter into all the ſyſtems, and hypotheſes that have been framed by philoſophers and phyſicians, to account for this important operation. Some contend, that it is done by a kind of elixation, or boiling, of the ſolid and groſſer parts of the food in the liquid, by the heat of the ſtomach, and of the adjacent parts, the liver, ſpleen, &c. Others will have it done by attrition; as if the ſtomach by thoſe repeated motions, which are the effects of reſpiration, rubbed or ground off the minuter particles from the groſſer matters; and agitating, and driving the reſt againſt each other, attenuated, and diſſolved them. Others think, the bilious juice; others the ſpirits, &c. chiefly concerned in the affair.

Others will have the food diſſolved by a menſtruum, or diſſolvent: but theſe are greatly divided as to the nature and origin of this menſtruum; ſome ſuppoſing it an acid, furniſhed by the glands of the ſtomach; others a nitro-aereous ſpirit, which, by penetrating the maſs of food, breaks the connexion of the moſt ſolid parts; and others, a ſaline juice, which divides and volatilizes the parts of the food.

Others, again, ſuppoſe *digeſtion* to be performed by means of a ferment, or leaven; which, mixing with the aliment, excites an inteſtine motion in the parts thereof, by whoſe mutual colliſions, the parts are attenuated and diſſolved.

But theſe, too, differ in their opinions of this ferment; ſome taking it to be the remains of the food laſt *digeſted*, which, by its continuance in the ſtomach, has contracted an acid quality, which renders it a ferment: others take the ferment, or principles of fermentation, to be contained in the aliment itſelf; which, when incloſed in the ſtomach, and heated thereby, being put in motion, enters on its office of fermentation: but theſe, too, are divided; ſome taking it to be the ſpirituous part; and ſome the air in foods.

Others ſuppoſe the matter of this ferment ſupplied by the glands of the ſtomach: and laſtly, others contend for the ſaliva, and make that the ferment ſerving principally for the *digeſtion* of the food.

All theſe ſyſtems are now reduced to three principal ones; which we ſtill find explained, and defended in the ſeveral later writings on that ſubject: the firſt holding *digeſtion* to be performed by fermentation; the ſecond by trituration; and the third by fermentation and trituration together.

The firſt opinion was for a long time the only one. The retainers of it hold, that the food, after it is received into the ſtomach, is there impregnated with certain menſtruous juices, which being aſſiſted by the natural heat of the ſtomach, raiſe a fermentation in the foods, which diſſolves, attenuates, and converts them into chyle, which is a liquor in a ſtate of actual fermentation.

This was, originally, the ſyſtem of the ancients; who, though they only expreſs themſelves in general terms, as diſſolving, ſoftening, ſubduing, concreting qualities, &c. yet ſeem to have the notion of what we call *fermentation.* Thus Empedocles and Hippocrates teach, that *digeſtion* is performed by a putrefaction of the foods, after the like manner as the ſame Empedocles holds water to be converted by putrefaction into wine. Hippocrates and Ariſtotle uſe the term *concoction*, which we likewiſe find in Erotian, Plutarch, and Actuarius, to expreſs the manner of fruits ripening, the muſt changing into wine, and paſte riſing. Hippocrates expreſly names *effervеſcence* and *fermentation*, De Veteri Medicina, cap. 5. and Galen likewiſe, L. de Conſuetudine, cap. 2. And in another place he aſſerts, that a certain ſerous juice of the ſtomach concurs with the bile and ſpirits to effect *digeſtion.* To ſay nothing of Cicero, who, according to the prevailing opinion of his time, attributes *digeſtion* to the heat of the ſtomach. Lib. ii. De Nat. Deor.

Van Helmont, in his Treatiſe De Flatibus, has applied the doctrine of *fixed* air, now more generally underſtood, to the explication of the phænomena of *digeſtion*; and Hoffman alſo, in his chapter De Alimentorum Solutione & Salivæ Uſu; and the three ſucceeding ones inſiſt much on the complete change which the aliment undergoes in the firſt paſſages, and makes *digeſtion* a mere fermentatory proceſs.

The juices, or ferments in the ſtomach, to whoſe action *digeſtion* is ſuppoſed owing, are, the ſaliva, bile, and pancreatic juice. This is ſo true, that in certain voracious animals, which eat, and *digeſt* faſt, particularly wolves, oſtriches, and porcupines, the bile diſcharges itſelf immediately into the cavity of the ſtomach; and we have obſerved a diſpoſition analogous thereto in a man that had been a great eater.

There are only three marks to know the fermentation of dough and muſt by: firſt, in that the dough riſes and ſwells; and the muſt bubbles and rarefies; ſecondly, in that the bread and wine made by theſe fermentations have different taſtes and qualities from thoſe the flour and muſt had before; thirdly, in that the bread and wine, by diſtillation, yield principles that differ in many reſpects from thoſe drawn from flour and muſt. Now, all theſe characters are found in the change made in the food by *digeſtion*.

Sir John Pringle made ſeveral curious experiments, in order to aſcertain the fermentative quality of animal and vegetable ſubſtances. Bread and water remained for ſeveral days in a heated furnace, without any fermentation; but two drams of freſh meat being added to double the former quantity of bread, and water in proportion, the mixture began to ferment in a few hours, and continued to do ſo about two days. The fermentation was generally ſo ſtrong, that if the cakes had not frequently given way, the phials muſt have burſt. The bread and fleſh, which at firſt lay at the bottom, ſoon roſe to the top, and conſtantly, as the air elapſed, let fall ſome particles, that had been buoyed up by the fluid; thus a ſediment was formed reſembling lees, whilſt the lighteſt part, or flowers, remained on the ſurface; but the fermentation continuing, theſe alſo ſubſided; and the acid taſte and ſmell of the liquors, after the action ceaſed, was a farther proof of the preceding fermentation. This change was the more extraordinary, becauſe, when the motion began, the mixture was tending to corruption, and in a few hours afterwards became actually offenſive; but the next day the putrid ſmell abated and went off, before the fermentation ceaſed.

From this and ſeveral other experiments of the ſame kind, Sir John infers, that moſt animal ſubſtances tending to putrefaction are endowed with a power of raiſing a fermentation in the *farinacea*, and even of renewing that action in ſuch as have undergone it before. It appears alſo plain by his experiments, that there is ſomewhat generated, or ſet free, during the firſt ſtage of the fermentation of animal and vegetable mixture, which hath a power of correcting putrefaction. The effect of fermentation is evidently to change putrid ſubſtances into a ſtate of acidity, which they not only retain, but become ſtill more and more acid. It is obſerved, indeed, that the acid ariſing from fermentation has ſomething of an auſtere and ſaltiſh taſte, but without any offenſive ſmell. Now, conſidering how much air is generated by fermentation, it may ſeem ſtrange that the ſame materials, uſed as food, ſhould make ſo little diſturbance in the body; and the difficulty would be the greater, did the SALIVA, as ſome ſuppoſe, promote both fermentation and putrefaction.

From this theory of fermentation, the doctor accounts for the acidity of the ſtomach; a diſorder to which many people are ſubject; ſince not only a ſtrong, but an auſtere acid, may be produced from the food of thoſe who live on fleſh, bread, and water only, as often as the ſtomach is relaxed, or in any way diſabled from conveying the whole aliment into the inteſtines; for what is left, having time to undergo a complete fermentation, is thereby changed into a harſh ſort of vinegar. See HEART-*burn*.

It is farther obſerved, that ſpirits, wines, acids, bitters, aromatics, and the hotter antiſcorbutic plants, retard alimentary fermentation, by their power of correcting putrefaction. However they may have their ſeveral uſes; ſome for checking immoderate fermentation, when, by reaſon of a putrid effluvia, or defect of it, the aliment may ferment too violently; and others, again, for bracing the ſtomach, and fitting it for expelling its contents in due time. All theſe facts correſpond with *digeſtion*; for the moſt nouriſhing and digeſtible food to people in health, conſiſts in a due mixture of animal and vegetable ſubſtances with water. Scorbutic or putrid habits require acids, wine, or other antiſeptics. And acids abounding in the ſtomach are corrected by abſorbents; and, in a want of a natural heat, and a debility of the ſtomach, wines, bitters, and warm and acid ſubſtances, become neceſſary. Obſ. on Diſeaſes of the Army. Appendix.

Fermentations have been uſually ſuppoſed to generate great heat, and efferveſcence has been uſed as a ſynonymous term, by which to expreſs it. Nevertheleſs many of the moſt violent of them are attended with a very conſiderable cold inſtead of heat. Thus water poured into ſpirit of wine produces heat, in proportion to the water: but the eſſential vegetable oil, which is particularly diſpoſed to take fire, mixed with ſpirit of wine, produces cold; and water has no effect with theſe oils. Mem. Acad. Par. 1727.

Several of Sir John Pringle's experiments have been repeated by Dr. Macbride, to which he has added others of the ſame kind. The following mixtures were prepared, viz. bread and water, about four ounces; bread and boiled mutton, beat up thin, with the requiſite quantity of water, in all about four ounces; this was called the ſimple fermentative mixture: four ounces of this mixture, with two drams of freſh lemon juice; four ounces of the ſame beat up with an ounce of ſpinage; the ſame quantity of the mixture with an ounce of green water-creſſes; and four ounces, with two drams of a very fœtid liquor, that lay about putrid mutton: theſe ſeveral mixtures were placed in a moderate degree of heat, on the top of a ſand furnace, which required a continual fire for three or four days. The bread and water diſcovered no fermentation for fifty-four hours; but at the end of four days it became perceptibly acid. In the other five mixtures, an inteſtine motion was evident in three or four hours; the ſolid part ſoon roſe to the top; bubbles of air, and a thick ſcum, formed on the ſurface; a vapour, with ſome degree of pungency, and which extinguiſhed fire, now began to diſcharge itſelf; and when the motion became very briſk, little pieces of the ſolid matter fell every moment to the bottom of the phials; and when it ceaſed, as it did in the four laſt, in fifty-four hours, and in the firſt in four days, the mixtures were clear and perfectly ſweet.

From theſe and many other experiments, both of a ſimilar nature, and on the great quantity of fixed air which is ſeparated from animal ſubſtances, during their putrefaction, Dr. Macbride was led to conclude, that on the preſence of an elaſtic fluid, or fixed air, in fleſh, depends its coheſion and ſoundneſs; that in proportion as the fixed air is ſeparated from it by fermentation, its texture is deſtroyed, its conſtituent parts become diſunited, and ſeparate to reunite in a different manner, and to form new combinations different from the former. See PUTREFACTION.

Having likewiſe found, that all the alimentary mixtures, which we commonly uſe, are ſuſceptible of fermentation in a ſhort time; that animal and vegetable ſubſtances, when mixed, have a greater aptitude to ferment, than either of theſe ſubſtances poſſeſs ſeparately; and that from all the alimentary mixtures, which he has tried, he always ſeparated a conſiderable quantity of fixed air: he applied theſe different diſcoveries to explain the phænomena, and to eſtabliſh the moſt plauſible and rational theory of *digeſtion*. See the cloſe of the article, and CHYLE. See alſo *Fixed* AIR, and SCURVY.

Haller denies that any kind of fermentation takes place in the ſtomach, in order to *digeſtion*; and ſeems to attribute the greateſt effects, in order to the diſſolution of our aliment, to the ſeparation of the air therein contained, and the action of the bile.

The ſecond ſyſtem was invented, or at leaſt renewed, in the preſent age; and has been maintained with much zeal and vivacity, as is commonly the caſe in any thing that has the appearance of novelty. Thoſe who eſpouſe this opinion, contend, that it is a mere continual attrition, or grinding, that breaks, attenuates, and reduces the food, and with the addition of a proper fluid, forms it into that whitiſh ſubſtance, called *chyle*; much as corn is ground between the ſtones of a mill. Which opinion ſeems to be confirmed by ſomething obſerved in birds; their gizzard, or crop, is compoſed of two ſtrong, ſolid, compact muſcles, which rubbing againſt each other, and being aſſiſted by little angular ſtones, or grains of ſand, ſwallowed by the birds, break and grind the dry food thoſe animals live on; and when the ſand is grown ſmooth, they caſt them off with the other excrements, and ſwallow freſh grains.

The experiments of the Florentine academy, repeated by Redi and Borelli, favour the ſame opinion. Hollow particles of glaſs, which they gave to chickens, ducks, and turkeys, were found reduced to a fine powder.

This ſentiment is thus explained by an able aſſertor thereof, M. Hecquet, in his treatiſe of *digeſtion*. Every thing in the body is vaſcular; conſequently, every thing therein is hollow; every thing therein lives after its manner; conſequently, every thing is in motion; animal life being nothing but motion, and conſequently, all the veſſels are in motion. Now the parts of a body, that are to move, will move moſt readily towards thoſe ſides, where they find the leaſt reſiſtance. But the place of the leaſt reſiſtance in tubes is the cavity; conſequently, the motion of the parts of veſſels is towards their axes. The parts of veſſels that are to move, are the parietes, or ſides, becauſe flexible and elaſtic; and this motion can only be effected by an approximation of thoſe parts; conſequently, the motion of the veſſels conſiſts in an approximation of their parietes: it is, therefore, a ſort of contraction, preſſion, or coarctation. Hence, as all the parts of the body are only veſſels, they all undergo a ſyſtole, preſſion, or contraction.

Farther, all theſe veſſels contain juices in their cavities; and, therefore, all the juices, or liquids in the body, are continually compreſſed. This preſſion is the action of an elaſtic force; conſequently, the preſſion will be ſuch as is the force, and, therefore, alternative: conſequently, it is a pulſe, or palpitation; and therefore the juices are continually beaten. Now, theſe juices are exceedingly diviſible; and conſequently they are continually attenuated and divided; and a diviſion effected by a pulſation, or beating, is a trituration; and conſequently, the juices in the body are continually triturated, or ground. The reaſon why the compreſſive force ſhould be alternative, is, that the membranes, which compoſe the veſſels, conſiſt of two plans, or ſeries of fibres; the one longitudinal, the other circular, cutting the longitudinal, at right angles: the longitudinal are tendinous, and elaſtic; the circular are muſcular, or motive, like ſphincters, which compreſs: the circular are over the longitudinal, and embrace, or gird them round; the former, we have already obſerved, are elaſtic; and their elaſticity oppoſes the compreſſion of the latter. From this oppoſition, or reſiſtance, ariſes a reciprocal action, and re-action, which is the alternative grinding force required.

To ſuch as account for *digeſtion* from a ferment, thoſe philoſophers object, that *digeſtion* is a diſſolution; that to prepare the matters for this diſſolution, they muſt be ſoftened; that the proper effect of acid ferments, is to gnaw, or tear the hardeſt matters, and to harden the ſofter, to thicken the fluid, fix the fat, and coagulate the milky; conſequently, that an acid ferment ſhould rather impede, than promote, *digeſtion*. Add, that, beſide the force to grind the juices, and the veſſels to compreſs them, there are likewiſe liquors to dilute and temper them; viz. the ſaliva, and ſtomach-liquor; and mineral matters, which the ſtomach-liquor cannot diſſolve, are found to be worn and poliſhed, after having ſtayed ſome time in the ſtomach. Now, poliſhing is the effect of triture, or grinding, not of corroſion; accordingly we find pelotoons, or balls of hairs, or threads, in the ſtomachs of cattle, very ſmooth and ſhining, and far from having any marks of corroſion.

The authors who are for the trituration, require three things for *digeſtion* to proceed: a liquor, to wet and dilute the food, which they find in the ſaliva and ſtomach-liquor; a veſſel, which is the ſtomach; and a moving power to grind, which they imagine to have found in the muſcles of the ſtomach, diaphragm, and abdomen. The moving force in the muſcles of the ſtomach they maintain to be equivalent to the weight of 248235 pounds; and the force of the ſtomach, alone, to a weight of 12951 pounds; a power more than equal to that of one of the heavieſt mill-ſtones. See Traité de la Digeſtion, par M. Hecquet.

Borelli, on the footing of the equilibrium of fluids, has demonſtrated, that the force of the flexor of the laſt articulation of the thumb is equal to 3720 pounds; whence Pitcairn deduces, that the force of the fibres of the ſtomach is equal to 12951, and that of the diaphragm, and muſcles of the lower venter, to 248235 pounds. His way of eſtimating is this: the flexor only weighs 122 grains, and yet may ſuſtain 3720 pounds; conſequently, the fibres of the ſtomach, weighing 8 ounces, and the diaphragm, with the muſcles of the lower venter, weighing together 8223 grains, have the force above mentioned. But this argumentation ſeems founded on a miſtake: for it is not in virtue of its weight of 122 grains, that the flexor muſcle is equivalent to 3720 pounds; beſides that it would follow, hence, that the heavier the muſcles of the ſtomach, diaphragm, and abdomen, are, the more force they would have; and, conſequently, the more eaſy and expedite would the *digeſtion* be; which is falſe.

The patrons of this ſyſtem compare the brain to the arbor, or ſcrew, of a preſs; the heart, to a piſton; the lungs, to bellows; the mouth, to a mill-ſtone, or a peſtle; the ſtomach, to a preſs; and the inteſtines, to a receiver, or vat. They contend, that Caſtellus, a phyſician of Meſſina, was the firſt of the moderns who expreſly eſpouſed the ſyſtem of ferments; and that he was followed by Van Helmont, and Willis.

But even the partiſans of trituration are not perfectly agreed among themſelves: Pitcairn will have it performed by a total contraction of the ſtomach; and M. Hecquet by a ſucceſſive periſtaltic, or vermicular, contraction.

Aſtruc, in his treatiſe De la Cauſe de la Digeſtion, refutes this ſyſtem of trituration at large. He makes a ſtrong oppoſition to the calculus which raiſes the moving force of the ſtomach, &c. ſo very high; the contraction of the fibres of the ſtomach, to compreſs the food, he ſhews, cannot exceed three ounces; and it is even *gratis* that he allows ſo much; that of the diaphragm, and abdomen, he computes at about four pounds. He obſerves, that Pitcairn, ſurpriſed, in all probability, with what he had aſſerted of this force, durſt not purſue the proportion whereon his calculus was founded; and according to which, one of the forces would have been found equivalent to 117088 pounds, and the other to 250734; which, together, make 367822 pounds.

The diaphragm, in its motion, has two powers; the one direct, which is that whereby its muſcles draw from the center towards the circumference; the other lateral, whereby it reſts, or preſſes, on the ſtomach; the latter is very ſmall, in compariſon of the former. Now what ſeems to have deceived Pitcairn and Hecquet, is, their taking the direct for the lateral force; the contraction of the fibres, for their preſſure on the ſtomach; and the ſame overſight they are guilty of in the muſcles of the abdomen, whoſe preſſure againſt the abdomen is only lateral. Add, that there are voracious animals without any diaphragm at all; as fiſhes, which reſpire through their gills; and others, that have only a ſingle membrane; as birds, in whom the muſcles of the lower venter are very ſmall and feeble, and in a ſituation that incapacitates them from acting at all on the ſtomach.

The membranes of the ſtomach being very ſoft, and having only a ſlender motion, ſeem very unfit for the office of a mill-ſtone. It is true, in certain fowls the ſtomach conſiſts of a cloſe, compact, fleſhy muſcle, exceeding ſtrong, ſo as to break little ſtones, and bits of glaſs; but to this it is urged, that it is no *digeſtion*, which in theſe animals is effected in the inteſtines; and the ſtructure of our ſtomach, compared with the gizzard, or crop, of granivorous birds, does, on the contrary, furniſh a very cogent argument againſt trituration. The gizzard is provided, on the outſide, with four fleſhy muſcles, the tendons whereof meet in two oppoſite joints; the inſide is lined with a hard, thick, cartilaginous membrane, eſpecially in the places where the tendons meet: by this mechaniſm, nature plainly intimates the office of the gizzard to be the grinding of the grain by the friction of its parietes, or ſides: whereas the membrane in the ſtomach of a man is exceedingly thin and fine, furniſhed with few fleſhy fibres, covered with a tender, ſenſible kind of villi; and the ſtomach itſelf is of a great capacity; and the ſtomach in rapacious birds, who devour huge pieces of raw fleſh without chewing, is ſtill a finer membrane. Laſtly, on the foot of the ſyſtem of trituration there ſeems no accounting for hunger, nauſeas, indigeſtions, crudities, &c.

In the ſyſtem of trituration it ſeems impoſſible to explain why certain things eaſy to grind, e. gr. cabbage-leaves, cannot be *digeſted* in certain ſtomachs; which yet find no difficulty in *digeſting* more hard and ſolid meats, as beef and mutton; whereas the difference of diſſolvents gives a natural and eaſy ſolution. Hydropic people continue to *digeſt*, notwithſtanding the fibres of the ſtomach, as well as the reſt of the body, are extremely relaxed, through the redundance of moiſture; and the total, prompt change of nature induced in foods, can be the effect of nothing elſe but fermentation; which even diſcovers itſelf by belches, &c. while it goes on. The iron, needles, pins, &c. ſometimes found undiſſolved in the ſtomach, are no objection to the ſyſtem of fermentation; it being notorious, that no diſſolvent diſſolves all bodies.

In birds, which feed on grain, the fermentation is manifeſt; firſt in the crop, where the grain is prepared for *digeſtion*, by being macerated in a liquor like the ſaliva; and afterwards in the gizzard, where the *digeſtion* is perfected by a diſſolvent poured into it by a conglomerate gland. But the thing is ſtill more apparent in ruminating animals, which are provided with four ſtomachs; the two firſt whereof, though formed of a nervous membrane, make but little alteration in the aliment, for want of a ferment, or menſtruum; ſo that it requires to be chewed again, and only becomes well *digeſted* in the fourth ſtomach, whither a diſſolvent is poured from a conglomerate gland.

The partiſans of the third opinion allow it inconteſtable, that there are acids in the ſtomach which mix with the foods, and act on them; and they hold, likewiſe, that their action is aided and promoted by the motion of the ſyſtole and diaſtole in the viſcera: they add, that the acids produce a fermentation, and the oſcillatory motion of the viſcera a trituration; and that thus *digeſtion* is the effect of fermentation, and trituration at the ſame time.

The doctrine of trituration was firſt propoſed in the time of Hippocrates. An opinion was entertained by ſome phyſicians of thoſe times, that the ſtomach was only the receptacle of the ſolid or dry foods; that theſe, after having been diluted, and broken in the mouth, were again broken more perfectly in the ſtomach; and that, by this means alone, they were converted into chyle; but that the drink, by reaſon of its liquidity, not being ſubject to be broken, went to the lungs, and not to the ſtomach, where, on account of its abundance, it would rather have prejudiced the *digeſtion* than have aided it. Hippocrates, we read, in the fourth book of diſeaſes, vigorouſly oppoſed an opinion ſo contrary both to reaſon and experience; and he was the more zealous in his oppoſition, becauſe, as he informs us, the opinion had gained many partiſans. However, it ſoon gave way to the reaſoning of Hippocrates, and the ſyſtem of trituration ſunk with it. But Eraſiſtratus revived it; and the doctrine, after having been ſupported for ſome time, fell into oblivion. Within the laſt century ſeveral have again endeavoured to recover it.

Dr. Pitcairn, M. de Reaumur, and many others, have eſpouſed it. M. de Reaumur made many experiments both on granivorous and carnivorous birds, from which it appeared that the former digeſt their food by trituration, and the latter by ſolution in a proper fluid. Thoſe that have gizzards were made to ſwallow ſhort tubes of glaſs and tin; and when the fowls were killed, the tubes of glaſs were found ſplit aſunder lengthwiſe, and thoſe of tin, either grooved from end to end, or flatted, or unrolled. But in order to ſhew that this was done by the operation of grinding, without the aid of a diſſolvent, M. Reaumur caſt leaden tubes in moulds, whoſe ſhape could not be altered, and into theſe, left open at both ends, he introduced grains of barley, and bits of beef; and theſe, after remaining ſeveral hours, at different times, in the gizzards of fowls, were taken out, without any ſenſible alteration. In order to determine the mode of *digeſtion* in the ſtomachs of carnivorous birds, which are membranous, he caught a young buzzard, and made him ſwallow a tin tube, which might have been ſqueezed together by the preſſure of a finger and thumb; but after twenty-four hours he threw it up, without any the leaſt apparent mark of friction; whence he concluded, that the bird's ſtomach had little, if any, force of trituration. Having filled the tube with fleſh, and fixed a proper quantity to each end, the buzzard was made to ſwallow it, and in twenty-four hours diſgorged it, without the leaſt injury to the thread meſhes at the ends; but the meat was covered with a kind of paſte, and reduced to an eighth part of the original quantity. Other experiments were renewed with meat and bones, ſome of which were wholly diſſolved, and others conſiderably reduced in quantity. Grain was tried in the ſame manner, without any viſible change; the proper food of carnivorous birds being fleſh.

Mr. John Hunter has lately made ſeveral experiments on the *digeſtion* of the ſtomach after death. Having obſerved that animals, or parts of animals, poſſeſſed of the living principle, when taken into the ſtomach, are not in the leaſt affected by the powers of that viſcus, whilſt the living principle remains; he ſhews, that the ſtomach, when deprived of the living principle, is itſelf capable of being digeſted either by the digeſtive powers of other ſtomachs, or by the remains of that power which it had of digeſting other things. And hence it happens, that the ſtomachs of dead bodies are found diſſolved at their greater extremity, from their own natural digeſtive powers, and not in conſequence of any diſeaſe; appearances of this kind being moſt frequent in thoſe who have died violent deaths. This digeſtive power of the ſtomach was farther evinced in fiſh, which ſwallow their food whole, and ſwallow fiſh much larger than the digeſting part of the ſtomach can contain; the part lodged in the ſtomach was found more or leſs diſſolved, whilſt the part left in the œſophagus remained perfectly ſound; and the digeſting part of the ſtomach was itſelf, in many caſes, actually diſſolved.

From ſeveral facts of this kind, Mr. Hunter inferred, that the ſtomach, being dead, was no longer capable of reſiſting the powers of that menſtruum, which itſelf had formed for the *digeſtion* of its contents; and that *digeſtion* is performed not by any mechanical power, nor contractions of the ſtomach nor heart, but by ſomething ſecreted in the coats of the ſtomach, which is thrown into its cavity, and here animaliſes the food, or aſſimilates it to the nature of the blood. Mr. Hunter has found in the ſtomachs of all animals, to which his obſervations or experiments have extended, an acid, but not a ſtrong one, in the juices contained in that viſcus in a natural ſtate. Phil. Tranſ. vol. lxii. art. 32. p. 447, &c.

Some ſuppoſe *digeſtion* owing to gentle heat and motion; by which the texture of the alimentary ſubſtance is changed in the bodies of animals; and then the conſtituent ſolid parts are endued with peculiar attractive powers of certain magnitudes, by which they draw out of the fluids moving through them, like parts in certain quantities, and thereby preſerve their forms and juſt magnitudes. See Dr. Bryan Robinſon of the Animal Oeconomy.

Be it as it will with each of the three ſyſtems, thus much we may venture to lay down from them all, as the real proceſs of *digeſtion*; the end of this operation being to prepare the foods, ſo as that they may ſerve for nutrition, thoſe foods muſt be conſidered from the time the man takes them in; till, being converted into chyle, they mix with the blood, which conveys them into all parts of the body: the foods, then, we take, are either crude, as oyſters, fruits, certain pulſe, &c. or dreſſed, as fleſh and fiſh, which are roaſted, boiled, fried, &c. and ſeaſoned a thouſand divers ways with ſalt, pepper, and other ſpices, vinegar, wine, &c. This is done to heighten and enrich the taſte, as much as to aſſiſt *digeſtion*.

Farther, there are ſome foods we ſwallow without chewing, as liquids; and others, which we break and comminute by chewing, as bread, fleſh, &c. It is of theſe laſt we ſhall here ſpeak, as undergoing more preparations, and more changes to fit them for nutrition, than the others.

The food, then, is firſt broke and divided by the teeth, and, at the ſame time, moiſtened with a liquor ſupplied by the ſalival glands, and thus is formed into a kind of paſte.

Thus prepared, it is paſſed through the œſophagus into the ſtomach, there to ferment. This fermentation is cauſed, 1. By the ſalival and gaſtric juice, which is a ferment, and has the ſame effect on the aliment, that leaven, or yeaſt, has on paſte. 2. By the heat of the ſtomach, viſcera of the abdomen, and even excrements; which here have nearly the ſame effect on foods, as a dunghill has on matters laid by the chemiſts to *digeſt* therein. 3. By the remains of foods left adhering in the rugæ, or folds of the ſtomach, and there turned ſour and acrimonious. 4. By the agitation ariſing from the periſtaltic motion, the compreſſion of the muſcles of the abdomen and diaphragm, and the continual pulſation of the neighbouring blood-veſſels. 5. By the liquor which the repeated compreſſion of thoſe muſcles occaſions to drip from the glands of the ſtomach. And, 6. According to the ſentiment of ſome modern phyſicians, by the air itſelf; which, being mixed, and embarraſſed in the aliments, dilates by the heat of the ſtomach, and ſeparates the parts of the foods. This air, which once adhered to the ſubſtances compoſing our food, in a fixed ſtate, does, in the moment of extrication, reſume its elaſticity, and thus deſtroys the union of their minute particles. This elaſtic air is probably abſorbed again by the alimentary mixtures, and reduced to a fixed or non-elaſtic ſtate, before the chyle enters the lacteals; though Dr. Black maintains, that the alimentary ſubſtances carry their fixed air into the blood, without throwing it off into an elaſtic ſtate, during *digeſtion*; and he is ſo far from believing that the aliment naturally ferments in the ſtomach, that he looks on ſuch fermentation, when it does happen, to be the cauſe of many, and very dangerous diſeaſes. Theſe cauſes all contribute to attenuate and divide the food, ſo as to convert it into a cineritious matter, called CHYLE.

From the ſtomach the chyle deſcends into the duodenum, and through the long tract of the ſmaller inteſtines, where it is further perfected by the pancreatic juice, and the bile, which thin it, precipitate its groſſer parts, and render it more fluid; and chiefly by the fermenting motion which ſtill continues; the chyle, thus perfected and attenuated, enters the lacteal veins, fully charged with the ſubtle, active, antiſeptic ſpirit, called *fixed* AIR, which convey it into the receptaculum chyli, where it is further diluted by the lympha, which is brought hither in abundance; hence it ariſes into the thoracic duct, and enters the ſubclavian vein; where, being taken up by the aſcending cava, it is poured into the right ventricle of the heart. The chyle, thus mixing with the blood, communicates its inteſtine motion to it, and thus prevents the natural tendency of the fluids to putrefaction; and the blood, by its volatile and exalted parts, together with the ſaline and nitrous parts of the air, ſubtilizes, and gives it its laſt perfection. Then the *digeſtion* is finiſhed; and the foods being, by ſo many changes, rendered the immediate matter of nutrition, are carried by the blood into all parts of the body, to repair and fill the vacancies of ſuch as are continually diſſipating and exhaling, or even to add new ones.

As to the groſſer parts of the foods, ſeparated from the chyle by the bile and pancreatic juice, they aſſume the colour of excrements, from the bile; and their rank ſmell they derive from the coarſer ſulphurs thereof, and from the ſour and putrid ferments, that are lodged in the cœcum, which, in a very ſhort time, correct the alimentary remains into their own nature. Theſe ſulphurs, and ſalts of the excrements, together with their putreſcent quality, ſerve, after they have paſſed through the inteſtines, and are arrived at the laſt, which is the rectum, to vellicate the muſcles thereof, and diſpoſe them to relax, and thus to appriſe nature of a neceſſity to diſcharge.

In particular caſes, however, as in thoſe of weak and relaxed habits, of pregnant women, whoſe ſtomachs, and great part of the ſmaller inteſtines, are thrown out of their natural ſituation, and of perſons who lead ſedentary lives, the food is often detained ſo long in the firſt paſſages, as to paſs on to the ſecond or acetous ſtage of alimentary fermentation; and then it produceth a very auſtere acid, which, not being admitted by the lacteals, accumulates, and occaſions ſour eructations, heart-burning, vomiting, griping, or looſeneſs, according to its quantity, degree of ſtrength, and place where lodged. This ſour acrimony precipitates the alimentary mixture through the firſt ſtage of fermentation to the ſecond, and prevents the food from yielding a nutritious chyle, which appears from the paleneſs and languid diſpoſition of thoſe who are much afflicted with ſourneſs in the ſtomach. This circumſtance ſuggeſts one reaſon, why exerciſe, which agitates the viſcera, and prevents the too long ſtay of the aliment in the firſt paſſages, and the aromatic gums and bitters, together with chalybeats, whoſe qualities are ſtrengthening and ſtimulating, prove ſo very ſerviceable in all theſe caſes. But if the aliment, either from its own very putreſcent nature, or from its too long ſtay within the confines of the ſmaller inteſtines, ſhould proceed to the third, or putrefactive ſtage of fermentation, it will become ſo offenſive, as to occaſion immediate efforts for throwing it off, or end in dangerous diſeaſes, and even death. Macbride's Eſſays, p. 20, &c.

The ſeparation of the urine from the blood may be eſteemed a part of perfect *digeſtion*; the deſign of ſuch ſeparation being to render the blood more pure and balſamic; and, of conſequence, more fit for nutrition; which the ſalts, with which the urine abounds, greatly prevented. This ſeparation is thus performed: the branches of the emulgent arteries, which terminate in the glands, whereof the ſubſtance of the kidneys is compoſed, carry the blood thither; where a ſeroſity is ſeparated from the blood, by means of the pores in the glands of the kidneys; thoſe pores repreſenting the holes in a ſieve, which only let paſs ſuch things as are of a leſs diameter than themſelves. This ſeroſity, called urine, is diſcharged hence into ſeveral little tubes, which joining in a kind of pyramids, yield their humour into the pelvis, whence it runs through the ureters into the bladder.

DIGESTION, in *Chemiſtry*, is a preparation of plants, minerals, metals, or other bodies, by putting them, with ſome proper fluid, in a veſſel, and heating them gradually over a gentle fire, like the heat of an animal body.

Digeſtion is ordinarily confounded with maceration; but the two things differ, in that there is heat required to *digeſtion*; whereas maceration is done in the cold.

Digeſtion is uſually performed with the addition of ſome menſtruum ſuitable to the matter: thus roſes and poppies heads are put to digeſt in oil, or water, to make unguents, or ſyrups; calcined lead, and ceruſs, are digeſted in diſtilled vinegar, to make the magiſtery thereof, or the ſal Saturni. Hence Dr. Freind defines *digeſtion*, to be the ſolution of bodies, made by menſtruums, with the aſſiſtance of fire.

The uſe of *digeſtion* in pharmacy, is to extract the more volatile particles, and mix them intimately with the menſtruum. To this end a gentle fire is commonly uſed, that the corpuſcles, which are moſt volatile, may ſeparate, as it were, of their own accord; for a fierce fire forces out the fæces, as well as the finer particles; and if it does not abate the ſtrength of the liquor, as is often the caſe, it will not fail of ſpoiling its clearneſs.

In ſome caſes *digeſtion* is uſed to produce a change in a ſingle body, as in merc. precip. per ſe; in others to promote ſolutions, or other combinations; as of well-calcined, dry fixed alkali, with rectified ſpirit of wine, which digeſted together in a matraſs, with a gentle ſand-bath heat, becomes an alkaline tincture of a yellow reddiſh colour, called tincture of ſalt of tartar. CIRCULATION is a mode of *digeſtion*. The veſſels generally uſed for this purpoſe are matraſſes, or Florence flaſks, either of which may be eaſily converted into circulatory veſſels. The operation is generally performed in a ſand-bath, by which the degrees of heat may be regulated according to the intention of the operator. This heat ſhould never riſe ſo as to make the matter boil. *Digeſtion* is uſed for making tinctures, wines, elixirs, &c.

The chemiſts of late years have too much given into the more elaborate and forced proceſſes, and neglected the more natural and eaſy ones. Among theſe latter is *digeſtion*; a proceſs ſo eaſy, that it requires ſcarce any quality in the operator but patience, and yet will do ſuch things as all the elaborate proceſſes of that art can never arrive at without it. There is ſcarce a proceſs that has more puzzled the chemiſts of an age or two ago, than the volatilizing ſalt of tartar; yet Langelot aſſures us, that after uſing all the caution in the common proceſſes that an earneſt deſire of ſucceſs could inſpire him with, he failed in them all; till trying the effect of a long *digeſtion*, he ſucceeded ſo well in the firſt attempt, that he converted almoſt the whole ſalt into a pure white volatile ſubſtance, leaving only a few inſipid earthy fæces behind.

Another great uſe of *digeſtion* is the duly preparing the eſſences of mineral ſulphurs; the ſtony ſea-plants, which greatly reſemble the nature of foſſils, are alſo better treated by this proceſs than by any other. Tartariſed ſpirit of wine, receives a very high tincture from red coral, after a long *digeſtion*, in any diſtilled vegetable oil, though it will not in the common way be at all coloured by it. Phil. Tranſ. Nº 87. See CORAL.

DIGESTION, in *Surgery*, expreſſes a diſpoſition in abſceſſes to ripen, and come to ſuppuration.

Tumours, ariſing on the parotides of children, are of eaſy *digeſtion*: they ripen in a little time. Dionis.

DIGESTION is alſo uſed for maturation, or that ſtate of a diſeaſe wherein the morbific matter is ſo changed in bulk, figure, coheſion, mobility, &c. by the uſe of proper medicines, or even by the force of nature, as to be leſs noxious and hurtful, and, conſequently, to abate the violence of the diſtemper.

The Greeks call it ϖεπασμος. The matter of the diſeaſe ſo far *digeſted*, as to become next a-kin to ſalubrious, or healthy matter, is ſaid to be *reſolved*.

DIGESTIVE *faculty*. The ancient philoſophers admitted a *digeſtive faculty*, or *quality*, in the human body; as not knowing how otherwiſe to account for the act of *digeſtion*.

DIGESTIVE is alſo uſed, in *Medicine*, for ſuch remedies as ſtrengthen and increaſe the tone of the ſtomach, and aſſiſt in the *digeſtion* of foods. To this claſs belong all ſtomachics and ſtrengtheners, or corroborants.

DIGESTIVE, in *Surgery*, denotes a ſort of unguent, plaſter, or the like, that ripens and prepares the matter of wounds, &c. for ſuppuration.

The common *digeſtive* is compoſed of turpentine, yolk of eggs, oil of St. John's wort, unguentum baſilicum, and tincture of aloes.

The wound muſt be dreſſed the firſt day with a *digeſtive*, to bring it to ſuppuration.

DIGESTOR, or **DIGESTER**, an artificial means, or inſtrument, ſerving to *digeſt*, or diſſolve meats out of the ſtomach, by a way analogous to that of animal digeſtion.

Mr. Leigh, in the Philoſophical Tranſactions, gives us an artificial *digeſter*, to illuſtrate the natural one: it is prepared from ſpirit of ſulphur, ſpirit of hartſhorn, the chyle of a dog, and its ſaliva. A piece of veal, mutton, beef, or the like, of the bigneſs of a nut, being put in a dram of this preparation, and ſet on a *digeſting* furnace two hours, it drew from the fleſh a juice, that had the colour and taſte of chyle, and left the meat light, dry, and inſipid.

Dr. Havers prepares a *digeſtor* of oil of turpentine, mixed with oil of vitriol; in which, raw fleſh, and crumbs of bread being put, and the whole committed for four hours to *digeſt* in balneo Mariæ, the meat is found diſſolved, and the whole together forms a thickiſh pulp: hence, thoſe authors, each of them, conclude the food in the ſtomach to be *digeſted* by ſome ſuch menſtruums.

But the moſt celebrated *digeſtor*, is an inſtrument of that name, invented by Papin, the effect whereof bears a more near reſemblance to the operation of the ſtomach. It is a ſort of veſſel, wherein meat being put, together with ſo much water as ſerves exactly to fill it, a lid is ſcrewed cloſe on, ſo as to admit of no external air. Then, by the application of two or three lighted charcoals, or even a ſingle ſmall lamp-flame, the meat is in a few minutes (ſix or eight) reduced into a perfect pulp, or rather liquor. By a little increaſe of the fire, or the addition of a few minutes in time, the hardeſt bones themſelves are brought into a pulp or jelly. The effect is accounted for from the ſtrict cloſure of the engine, which excluding the intruſion, or eſcape, of air, the ſuccuſions occaſioned by the expanſions and oſcillations of the air included in the fleſh, are equable and ſtrong, and ſo reſolve the whole into one ſeemingly homogeneous body, and mix the aqueous, ſaline, oleous, and other particles, ſo ſtrongly together, as ſcarce to ſeparate, but while hot, to appear one liquor, and when cold, jelly of a ſtrength proportionate to the quantity of fleſh, or bones, diſſolved in the water.

This experiment ſeems to hold a cloſe analogy with the operation of the ſtomach. For though the ſtomach doth not ordinarily diſſolve, either ſo ſtrongly, or ſo quick; yet in proportion to its heat and conſtruction, Dr. Drake takes it to do the ſame thing; thereby breaking, and reſolving into ſmall, the bodies which it included, ſo mixed, *inter minima*, with its humours. Theſe, thus reduced into a fluor, and intimately mixed with the liquids of the drink, and juices of the ſtomach, compoſe that lacteſcent liquor, called *chyle*, or *chyme*. See CHYLE.

DIGGING, in *Mineralogy*, a term appropriated by the miners to expreſs that penetrating into the earth, where they have the ore before them, and every ſtroke of the tools turns to account.

They appropriated the word to this ſenſe, expreſſing the random openings, which they make in ſearch of mines, by the word *hatching*, or *eſſay-hatching*. See the article TRAINING *of mines*.

When the eſſay-hatches have been opened ſo long, that the orifice of the mine or load is found, the opening which has led to it, loſes its name of eſſay-hatch, and is called a ſhaft or metal-hatch; this is to be ſunk down about a fathom, and then they leave a ſquare ſpace, called a *ſhamble*, and ſo continue ſinking from caſt to caſt; that is, as high as a man can conveniently throw up the ore with a ſhovel, till the load is found to grow ſmall, or elſe to degenerate into ſome unprofitable ſubſtance, or weed, as they metaphorically expreſs it. The degeneracy of the ore is ſoon perceived, by the finding mundic or marcaſite growing more plentiful among it. This is a ſulphureous mineral, of a yellow, whitiſh, or greeniſh colour, and is very troubleſome to the Corniſh miners. The other unprofitable ſubſtances found in the place of the ore, or mixed in large quantities with it, where it degenerates, are daze, which is white, black, or yellowiſh; *iron-mould*, which is black or ruſty; *caul*, which is red; *gliſter*, which is blood-red, or black, is alſo another degeneracy of the ore. Theſe are the common names given by the miners to various foſſils, and theſe are the marks by which they know the vein is almoſt exhauſted in that part, and will not long be worth *digging*.

In this caſe, they begin to drive either eaſt or weſt, as the goodneſs of the land, or the convenience of the hill, unite. The drift or opening, on this occaſion, is three foot over, and ſeven foot high, ſo that a man may conveniently ſtand and work; but in caſe the land is not broad enough of itſelf, as ſome are ſcarce half a foot, then they break down the deads firſt on the north ſide of the land, for the greater conveniency of the right arm in working, and then they begin to rip the load itſelf. By the term deads, they mean that part of the ſhelf, which contains no metal, but incloſes the load or vein as a wall between two rocks.

The inſtruments commonly uſed in mines with us, and that ſerve for ripping the lands, are the *beele*, or, as it is called in Cornwall, the *tubber*. This is an inſtrument of eight or ten pounds weight, well ſteeled and ſharpened at each end, ending in a point each way, and having a hole in the middle; this will laſt half a year, but muſt be new ſharpened every fortnight. The ſecond inſtrument is a *ſledge*; this is uſually made from ten to twenty pounds weight; and will laſt ſeven years, if new ordered once in three or four months. Beſide theſe, they have *gadds* or wedges; theſe are of about two pounds weight; they are made four-ſquare, and well ſteeled at the point, and they muſt have ladders and wheel-barrows to carry the deads and the ore out of the adits to the ſhambles. The general proportion of the workmen in Cornwall, is this: two ſhovel-men and three beele-men in a drift; theſe are as many as the drift will contain without ſtanding in one another's way. The beele-men rip the deads and the ore, and the ſhovel-men carry it off and land it, by caſting it up from one of the ſhambles to another all the way up. In ſome places they ſave the trouble of this caſting it to the ſhambles by a winder and two buckets: theſe are ſo contrived, that one goes up as the other comes down, and they are filled and emptied with great eaſe. Phil. Tranſ. N° 69.

DIGIT, DIGITUS, in *Anatomy*. See FINGER.

DIGIT, in *Aſtronomy*, is the meaſure whereby we eſtimate eclipſes; amounting to the twelfth part of the diameter of the luminary eclipſed.

The diameter of the body, or diſk, of the ſun or moon, is divided into twelve parts, called *digits*; and an eclipſe is ſaid to be of ten *digits*, when ten of thoſe parts are hid.

Theſe *digits*, Wolfius, and ſome others, call *digiti ecliptici*.

DIGIT, in *Arithmetic*, ſignifies an integer, or number, under ten; as 1, 2, 3, 4, 5, 6, 7, 8, 9.

DIGIT is alſo a meaſure taken from the breadth of the finger. A *digit* is properly three-fourths of an inch, and equivalent to four grains of barley, laid breadth-wiſe, ſo as to touch each other.

DIGITALIS, in *Botany*. See FOX-*Glove*.

DIGITATED *Leaf*, among *Botaniſts*. See LEAF.

DIGITUS *Veneris*, *Venus's finger*, in *Botany*, a name by which ſome authors have called the nymphæa, or water-lily.

DIGLYPH, from δις, *twice*, and γλυφω, *I engrave*, a kind of imperfect triglyph, conſole, or the like, with only two channels, or engravings, inſtead of three. See TRIGLYPH.

DIGNITARY, in the *Canon Law*, a perſon who holds a *dignity*, that is, a benefice, which gives him ſome pre-eminence in the choir, above mere prieſts and canons. Such is a dean, and archdeacon; though the word is now abuſively applied to a mere prebendary, or canon.

Dignities are ſometimes ſimple, ſometimes with cure of ſouls, and ſometimes with juriſdiction and adminiſtration of ſacred things. The canoniſts even define *dignity*, *adminiſtratio cum juriſdictione & poteſtate conjuncta*. If the *dignity* have no contentious, or exterior juriſdiction, it is a ſimple parſonage, and only gives pre-eminence. See BENEFICE, PARSONAGE, &c.

Of *dignities*, including prebends, Camden reckons in England, 544 in number.

DIGNITY, a quality that denotes a man (*dignus*) *worthy*.

DIGNITY, in its moſt uſual acceptation, ſignifies honour and authority, reputation, &c. and *dignity* may be divided into ſuperior and inferior; as the titles of duke, earl, baron, &c. are the higheſt names of *dignity*; and thoſe of baronet, knight, ſerjeant at law, &c. the loweſt. Nobility only can give ſo high a name of *dignity*, as to ſupply the want of a ſurname in legal proceedings; and as the omiſſion of a name of *dignity* may be pleaded in abatement of a writ, &c. ſo it may be where a peer who has more than one name of *dignity*, is not named by the moſt noble. 2 Hawk. P. C. 185. 230. No temporal *dignity* of any foreign nation can give a man a higher title than that of eſquire. 2 Inſt. 667.

DIGNITY, in *Oratory*, is one of the three parts of general ELOCUTION; and conſiſts in the right uſe of TROPES and FIGURES. See COMPOSITION and ELEGANCE.

DIGRESSION, in *Oratory*, is defined by Quintilian, agreeably to the etymology of the word, to be, a going off from the ſubject we are upon to ſome different thing, which, however, may be of ſervice to it. Inſt. Or. lib. iv. cap. 3.

Digreſſion is not a neceſſary part of a diſcourſe, though it may ſometimes be convenient on ſeveral accounts; as where a ſubject is of itſelf flat and dry, and requires cloſe attention; in this caſe it is of uſe to relieve the mind by ſomething agreeable and entertaining. But as it ſhould never be introduced without ſufficient reaſon, it ſhould never be too frequent, nor too long. Ward's Or. vol. i. p. 283, &c.

DIGYNIA, in the Linnæan ſyſtem of *Botany*, an order of plants, or a ſubdiviſion in moſt of the claſſes eſtabliſhed by Linnæus, denoting that the plants have two ſtyles. The term is derived from δις, *double*, and γυνη, *wiſe*. See FRUCTIFICATION, and SEXUAL *Syſtem*. See *Tab.* II. *of Botany*.

DIHELIOS, from δια, *through*, and ἥλιος, *ſun*, in the *Elliptical Aſtronomy*, a name which Kepler gives to that ordinate of the ellipſis, which paſſes through the focus, wherein the ſun is ſuppoſed to be placed.

DII *Patrii*, among the Romans, were the three ſupreme deities, Jupiter, Juno, and Minerva. They were firſt received over all the Eaſt, and afterwards, ſucceſſively, in Greece and Italy. They are deſcribed as *indigites* by Virgil, Georg. i. ver. 499. and as *noſtri* by Juvenal, Sat. iii. ver. 145.

DIJAMBUS, in *Poetry*, the foot of a Latin verſe of four ſyllables; it is compounded of two *iambics*, as *ſĕvērĭ ās*.

DIIPOLIA, Διιπολεια, in *Antiquity*, an Athenian feſtival, celebrated in honour of Jupiter Polieus, or protector of the city. For the ceremonies obſerved at this ſolemnity, ſee Potter's Archæol. Græc. lib. ii. c. 20. tom. i. p. 381.

DIKE, a *ditch*, or *drain*, made for the paſſage of waters.

The word ſeems formed from the verb, *to dig*; though others chooſe to derive it from the Dutch, *diik*, a *dam*, *ſea-bank*, or *wall*.

DIKE, or DYKE, alſo denotes a work of ſtone, timber, or faſcines, raiſed to oppoſe the entrance, or paſſage of the waters of the ſea, a river, lake, or the like.

The word comes from the Flemiſh *dyk*, or *diik*, a heap of earth to bound, or ſtem the water. Junius and Menage take the Flemiſh to have borrowed their word from the Greek τειχος, *wall*. Guichard derives it from the Hebrew *daghah*.

Theſe *dikes* are uſually elevations of earth, with hurdles or ſtakes, ſtones, and other matters.

The *dike* of Rochelle is made with veſſels faſtened to the bottom. The *dikes* of Holland are frequently broke through, and large tracts of land are then drowned.

DILAPIDATION, a waſteful deſtroying, or letting buildings, eſpecially parſonage houſes, run to ruin and decay, for want of neceſſary reparation.

An action lies for *dilapidations*, either in the ſpiritual court by the canon law, or in the courts of common law; and it may be brought by the ſucceſſor againſt the predeceſſor, if living, or, if dead, againſt his executors.

The money recovered for *dilapidation*, by 14 Eliz. 11. muſt be employed in the repair of the ſame houſes, within two years, on penalty of forfeiting double the value to the crown.

DILATATION, in *Phyſics*, a motion of the parts of a body, whereby it expands, or opens itſelf ſo as to occupy a greater ſpace.

The generality of authors confound *dilatation* with rarefaction; but the more accurate, eſpecially foreigners, diſtinguiſh between them; defining *dilatation* to be the expanſion of a body, into a greater bulk, by its own elaſtic power; and rarefaction, the like expanſion produced by means of heat.

The moderns have obſerved, that bodies, which, after being compreſſed, and again left at liberty, reſtore themſelves perfectly, do endeavour to *dilate* themſelves with the ſame force whereby they are compreſſed; and accordingly, they ſuſtain a force, and raiſe a weight equal to that whereby they are compreſſed.

Again, bodies, in *dilating* by their elaſtic power, exert a greater force at the beginning of their *dilatation*, than towards the end; as being at firſt more compreſſed; and the greater the compreſſion, the greater the elaſtic power, and endeavour to *dilate*. So that theſe three, the compreſſing power, the compreſſion, and the elaſtic power, are always equal.

Again, the motion, whereby compreſſed bodies reſtore themſelves, is uſually accelerated: thus, when compreſſed air begins to reſtore itſelf, and *dilate* into a greater ſpace, it is ſtill compreſſed; and, conſequently, a new impetus is impreſſed thereon, from the *dilatative* cauſe; and the former remaining, with the increaſe of the cauſe, the effect, that is, the motion and velocity, muſt be increaſed likewiſe: thus an arrow ſhot from a bow does not quit the ſtring, till after that be perfectly reſtored to its natural ſtate; nor does the arrow move a whit ſwifter than the ſtring; and if the ſtring, before it have perfectly reſtored itſelf to its right line, be ſtopped, the arrow will not go its full length; which is a proof, that it is continually acquiring a new impetus from the ſtring. And ſince projectiles, at the beginning of their motion, are little or nothing retarded, but rather accelerated, it is evident, that the motion of a ſtring reſtoring itſelf, is likewiſe accelerated. Indeed, it may happen, that where the compreſſion is only partial, the motion of *dilatation* ſhall not be accelerated, but retarded; as is evident in the compreſſion of a ſpunge, ſoft bread, gawze, &c.

DILATATION, in *Medicine*, &c. denotes the laying open any orifice, or the lips of a wound wider; or the extenſion of any veſſel, or the like.

This is done by an inſtrument called a *dilatatorium*.

DILATATOR *poſticus urethræ*, in *Anatomy*, a name given by Heiſter and ſome others, to what is ſuppoſed to be a peculiar muſcle by many, and called alſo *levator ſextus ani*, and by ſome other names, though it is really only a proceſs of the ſphincter ani running into the perinæum. See SPHINCTER.

DILATATORES *alæ naſi*, in *Anatomy*, a pair of muſcles common to the *alæ naſi*, and upper lip.

They ariſe thin, broad, and fleſhy, from the cheek-bones under the orbits of the eyes, and deſcend obliquely with a two-fold order of fleſhy fibres in each muſcle; which partly terminate in the upper lip, and partly in the *alæ naſi*. They draw the *alæ* from each other, and widen the external openings of the noſtrils.

DILATORY *pleas*, in *Law*, are ſuch as are put in merely for delay; and there may be a demurrer to a *dilatory plea*, or the defendant ſhall be ordered to plead better, &c. 6 Mod. The truth of *dilatory pleas* is to be made out by affidavit of the fact, &c. by ſtat. 4 and 5 Anne. See PLEA.

DILE, in *Botany*, a name by which ſome authors have called the iſatis or woad. Ger. Emac. Ind. 2.

DILEMMA, Διλημμα, in *Logic*, an argument conſiſting of two, or more propoſitions, ſo diſpoſed, that grant which you will of them, you will be preſſed by the concluſion.

The word is formed from the Greek δις, *bis*, *twice*, and λημμα, *ſumptio*.

A *dilemma* is an argument conſiſting of two contrary parts, or ſides, either of which catches the adverſary. And hence it is alſo called *ſyllogiſmus cornutus*, a *horned ſyllogiſm*, its horns being ſo diſpoſed, that if you avoid the one, you run upon the other.

It is alſo called *crocodilinus*, by reaſon that as the crocodile leads ſuch as follow it, into the water, and purſues ſuch as fly it, to deſtroy them; ſo, whatever the adverſary either affirms, or denies, in this kind of ſyllogiſm, is turned to his diſadvantage.

For an example: A philoſopher once diſſuaded a man from marrying, by this argument: Either the woman you marry will be handſome, or ugly; if handſome, ſhe will give you jealouſy; if ugly, diſpleaſure.

Cicero uſes this fine *dilemma*, to prove, that all pain is to be borne with patience: *omnis dolor aut eſt vehemens, aut levis; ſi levis, facile feretur; ſi vehemens, certe brevis futurus eſt.*

The ſame orator, by another *dilemma*, proves that no meſſengers ſhall be ſent to Anthony: *legatos decernitis; ſi ut deprecentur, contemnet: ſi ut imperetis, non audiet.*

Nor muſt we here omit that beautiful *dilemma* of Tertullian, whereby he clears the Chriſtians, and accuſes Trajan, who had forbad the ſeeking them out, and yet ordered them to be puniſhed when found: *O ſententiam neceſſitate confuſam! negat inquirendos, ut innocentes; & mandat puniendos, ut nocentes: parcit & ſævit, diſſimulat & animadvertit! quid temetipſum cenſura circumvenis? ſi damnas, cur non & inquiris? ſi non inquiris, cur non & abſolvis?*

For a *dilemma* to be legitimate, there are two things required: 1. A full enumeration of parts; thus that of Ariſtippus above mentioned, whereby he diſſuades from marriage, is invalid, as being defective in the enumeration; there being a middle degree, or form, between *handſome* and *ugly*.

2. That the *dilemma* preſs the adverſary alone, and that the perſon who makes it be not liable to have it retorted upon him. This was the caſe in that celebrated *dilemma* of the ſophiſt Protagoras, which the areopagites, with all their wiſdom, were not able to reſolve.

A youth named Evathlus, engaged with Protagoras, to learn dialectics, upon condition, that he ſhould pay him a large ſum of money, the firſt cauſe he pleaded, in caſe he gained the ſame. Evathlus, when fully inſtructed, refuſing to pay the condition, Protagoras brings his action, arguing thus: You muſt pay the money, however the cauſe go; for if I gain, you muſt pay in conſequence of the ſentence, as being caſt in the cauſe; and if you gain it, you muſt pay in purſuance of our covenant. Nay, retorts Evalthus, which way ſoever the cauſe go, you will have nothing: for if I prevail, the ſentence gives it, that nothing is due to you; and if I loſe, then there is nothing due by the covenant.

After the like manner, an ancient prieſteſs diſſuading her ſon from haranguing the people, by this *dilemma*, *nam ſi injuſta ſuaſeris*, ſays ſhe, *habebis Deos iratos: ſin vero juſta, iratos habebis homines:* the youth thus returned the *dilemma* on his mother: *imo*, ſays he, *expedit ad populum verba facere, nam ſi juſta dixero, Dii me amabunt; ſi injuſta, homines.*

DILICTUM, a term uſed by Agricola, to expreſs a brine, made by pouring water upon ſand, ſtones, earth, &c. that had been before ſtrongly impregnated with ſea-ſalt; from this brine, a ſalt, for the uſe of the table, was made by evaporation in his time, and is ſtill ſo in many parts of the world. At Junthall, in Germany, they have a ſalt work of this kind, where they make at the rate of eight hundred loaves of ſalt in a week, each loaf weighing four hundred weight.

DILIGENZA, in the *Italian Muſic*, is uſed for a ſoft or ſweet manner of ſinging or playing.

DILL, *Anethum*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it is an umbelliferous plant, with many umbels, which are uniform; the flowers have five ſpear-ſhaped petals; under the flower is ſituated the germen, which afterward becomes two compreſſed ſeeds, having borders. We have but one ſpecies of this plant, which is the common *dill*.

This plant both in root, ſtalk, and leaf, very much reſembles common fennel, excepting that it ſeldom grows ſo tall, or is ſo much branched; the whole plant is of a very ſtrong ſcent, leſs pleaſant than fennel. It flowers and ſeeds in July and Auguſt; the leaves and ſeeds are uſed.

The officinal preparations of this plant, are, a water, oil, and aſhes; for which, ſee ANETHUM.

DILLENIA, in *Botany*, the name of a genus of plants, of the *polyandria polygynia* claſs; the characters of which are theſe: the perianthium is compoſed of five leaves, which are large, roundiſh, hollow, and of a coriaceous texture, and remain when the flower is fallen; the flower is compoſed of five roundiſh hollow petals; theſe alſo are large, and of a coriaceous texture. The ſtamina are numerous filaments forming a ſort of globe, the antheræ are oblong and erect. The germina are about twenty in number; they are of an oval oblong figure, and pointed; they are ſomewhat compreſſed, and adhere together by their inner ſurfaces; there are no ſtyles. The ſtigmata are large and pointed, and are diſpoſed in form of a ſtar; the fruit is roundiſh, and is covered with a number of capſules, divided by ſo many furrows. The ſeeds are numerous and ſmall.

DILUTE. To *dilute* a body, is to render it liquid; or, if it were liquid before, to render it more ſo, by the addition of a thinner thereto.

Thoſe things thus added, are called *diluents*, or *dilutors*; ſuch are common wheys, ptiſans, and juleps, which in reſpect of the blood in a ſtate of viſcidity are thinner, and therefore are ſaid to thin, or *dilute* it. Flour muſt be well *diluted*, to make it into paſte. Oker is *diluted* with oil, to paint beams, doors, &c.

DIMACHÆ, from δις, *double*, and μαχω, *I fight*, in *Antiquity*, a kind of horſemen, firſt inſtituted by Alexander. Their armour was lighter than that of the infantry, and at the ſame time heavier than that uſed by horſemen, ſo that they could act as horſe or foot as occaſion required.

DIMACHÆRUS, Διμαχαιρος, from δις, and μαχαιρα, *ſword*, in *Antiquity*, a gladiator who fought with two ſwords.

DIMETER. See IAMBIC.

DIMENSION, the extenſion of a body, conſidered as meaſurable.

Hence, as we conceive a body extended, and meaſurable in length, breadth, and depth, we conceive a *trine dimenſion*, viz. length, breadth, and thickneſs. The firſt called a *line*, the ſecond a *ſurface*, the third a *ſolid*.

DIMENSION is particularly uſed with regard to the powers of the roots, or values of the unknown quantities of equations, which are called the *dimenſions* of thoſe roots. See EQUATION and ROOT.

Thus in a ſimple equation, the unknown quantity is only of one *dimenſion*, as $x=a+b$. In a quadratic equation it is of two *dimenſions*, as $x^2=a^2+b^2$. In a cubic, of three, as $x^3=a^3-b^3$, &c.

DIMETIENT, in *Geometry*, is ſometimes uſed for *diameter*.

DIMINISHED *interval*. See INTERVAL.

DIMINISHED *ſecond* is a ſemitone major, leſſened by a ſemitone minor. See INTERVAL and SECOND.

DIMINISHED *third*, by ſome called *defective third*, is properly a *third* minor leſſened by a ſemitone minor. But among practical muſicians, it commonly ſignifies an interval equal to two ſemitones major And this they confound with the former; but there is a difference between them, equal to the difference between a tone-major and minor, that is, a comma. The firſt mentioned of theſe *diminiſhed thirds* will be expreſſed by $\frac{144}{125}=\frac{6}{5}:\frac{25}{24}$, and is equal to the tone-major and enharmonic dieſis; for $\frac{144}{125}=\frac{9}{8}\times\frac{128}{125}$. The ſecond *diminiſhed third* will be expreſſed by $\frac{256}{225}=\frac{16}{15}\times\frac{16}{15}$, which is a comma leſs than the former. See the table in the article INTERVAL.

DIMINISHED *fourth*. See the table in the article INTERVAL.

The *diminiſhed fourth* often occurs in practice, as from C to G ♮ deſcending; and ſometimes, though more rarely, from G ♮ to C aſcending.

DIMINISHED *fifth*, in *Muſic*, is leſs than the true *fifth* by a ſemitone minor, and is therefore equal to two leſſer *thirds*.

Practitioners often confound the *diminiſhed fifth* with the ſemi-diapente, or falſe *fifth*, which is a comma leſs. See INTERVAL.

DIMINISHED *ſixth*. This interval, according to Ozanam, contains two tones and three ſemitones major; or a *fourth* and *diminiſhed third*; or a *diminiſhed fourth* and *third* minor. Thus from C ♮ to A ♭ is a *diminiſhed ſixth*.

But as there are two *diminiſhed thirds*, ſo there may be as many *diminiſhed ſixths*; theſe being the complements of the former to the octave. One of theſe *diminiſhed ſixths* will be expreſſed by $\frac{1024}{675}=\frac{4}{3}\times\frac{256}{225}$, and this is a ſemitone major more than the ſemi-diapente; the other *diminiſhed ſixth* will be $\frac{576}{375}=\frac{4}{3}\times\frac{144}{125}$, which is a ſemitone minor leſs than the flat *ſixth*. Practitioners confound theſe two; and, in effect, in temperate ſcales they coincide, as do all other intervals differing only by a comma. See TEMPERAMENT.

DIMINISHED *ſeventh* is of two kinds, differing by a comma. See the table in the article INTERVAL.

That *diminiſhed ſeventh*, which is the complement of the ſuperfluous ſecond to the octave, is the only one in uſe. It is a ſemitone major more than the ſixth minor, as from C ♮ to B ♭.

DIMINISHED *octave*, is a ſemi-tone minor, leſs than the *octave*, as from C to *c* ♭. It occurs ſometimes in the baſſes of inſtrumental pieces of muſic. See INTERVAL.

DIMINUTION, in *Architecture*, a contraction of the upper part of a column, whereby its diameter is made leſs than that of the lower part. See *Tab. Archit. fig.* 36.

To attain thoſe two important points in architecture, ſtrength, and the appearance of ſtrength, all architects have made their columns leſſer above than below, which is called their *diminution*. Some have likewiſe made them a little bigger towards the middle than at the bottom, which is called their ſwelling. The Gothic architects, indeed, obſerve neither *diminution* nor ſwelling; their columns are perfectly cylindrical; for which reaſon they are properly called pillars, in contradiſtinction to columns.

The *diminution* generally commences from one third of the height of the column. Some make it begin from the very baſis, and hold tapering to the capital; but that has not ſo good an effect. Vitruvius would have the *diminution* of columns differ according to their height, and not according to their diameter: thus, a column of fifteen feet high, he diminiſhes a ſixth part of its diameter; and another of fifty feet only an eighth part; but we do not find this rule obſerved in the antique. The difference of orders, M. Perrault obſerves, does not infer a difference of *diminution*, there being ſmall and great *diminutions* in different works of the ſame order; excepting, however, the Tuſcan, which Vitruvius diminiſhes by a fourth part, though Vignola only makes it a fifth, and the Trajan column a ninth. The *diminutions* are very differently adjuſted in the different antique buildings, as well as by the different modern authors. For the method of diminiſhing a column, ſee COLUMN.

DIMINUTION, in *Heraldry*, a term uſed by Latin writers for what we more uſually call *differences*, and the French *briſures*. See DIFFERENCE.

DIMINUTION, in *Law*, is where the plaintiff or defendant in a writ of error alleges to the court, that part of the record remains in the inferior court not certified, and therefore prays that it may be certified by certiorari. *Diminution* cannot be alleged of what is fully certified, but of ſomething that is wanting, as the want of an original, or a warrant of attorney.

DIMINUTION, in *Muſic*, is when there are a number of words which are to make tones, and ſeveral haſty motions in the ſpace of a cadence; ſeveral quavers, and ſemi-quavers, correſponding to a crotchet, or minim.

DIMINUTION, in *Rhetoric*, the augmenting and exaggerating what you have to ſay, by an expreſſion that ſeems to weaken and diminiſh it.

As, for inſtance, when a man ſays, with a certain tone, This woman is not ugly; meaning, ſhe is very handſome.

Some authors take *diminution* in a ſtricter ſenſe, viz. for ſaying leſs than a man really means; as, You are not, indeed, to be commended; where a greater reproach is ſecretly meant.

DIMINUTIVE, in *Grammar*, a word formed from ſome other, to ſoften or diminiſh the force and effect thereof; or to ſignify a thing that is little in its kind.

Thus cellule is a diminutive of cell; globule, of globe; hillock, of hill, &c.

The Italians abound in *diminutives*, every author being at liberty to make as many as he pleaſes. The French are a good deal more reſerved in that reſpect, though their old authors were every whit as licentious as the Italians, witneſs Belleau, &c.

In Engliſh we have very few; not that, as ſome have ſaid of the French, our language is hard, and incapable of the ſofteſt expreſſions, but becauſe we lay all our tenderneſs in our ſentiments; or rather, our language is tender, like a perſon of diſcretion, who always ſpeaks ſenſe, even in ſpeaking of his paſſion.

In Latin, Italian, Engliſh, and moſt other tongues, *diminutives* are formed from primitives, by the addition of a few letters, or ſyllables: in French, the caſe is frequently otherwiſe, the *diminutive* being ſometimes ſhorter than the primitive, ſometimes of the ſame length.

They have a pleaſing effect in that celebrated addreſs of Adrian to his departing ſoul, which begins,

Animula, vagula, blandula
Hoſpes comeſque corporis, &c.

Some grammarians call *at leaſt* a *diminutive* conjunction, as ſerving to leſſen or diminiſh the force of what went before.

DIMISSORY *Letters*, *Literæ Dimiſſoriæ*, in the *Canon Law*, a letter given by a biſhop to a candidate for holy orders, having a title in his dioceſe, directed to ſome other biſhop, and giving leave for the bearer to be ordained by him.

When a perſon produces letters of ordination, or tonſure, conferred by any other than his own dioceſan, he muſt at the ſame time produce the letters *dimiſſory* given by his own biſhop, on pain of nullity.

Letters dimiſſory cannot be given by the chapter, *ſede vacante*; this being deemed an act of voluntary juriſdiction, which ought to be reſerved to the ſucceſſor.

DIMNESS *of ſight*, in *Farriery*, a diſorder in horſes, proceeding from blood-ſhotten eyes. If the ball of the eye be ſound, the cure is effected by keeping the horſe warm, with a hood of linen cloth fitted to his head, and anointing the eye-lids twice a day with a compoſition of ſugar-candy, honey, and white roſe-water. In two or three days the eyes will be well, after which the creature ſhould be blooded.

In this diſorder the bladders on any part of the eye ought by no means to be clipped, or meddled with. See Sight.

DIMŒRITÆ, a name given to the Apollinariſts, who at firſt held, that the Word only aſſumed a human body, without taking a reaſonable ſoul like ours; but being at length convinced by formal texts of Scripture, they allowed, that he did aſſume a ſoul, but without underſtanding; the Word ſupplying the want of that faculty.

From this way of ſeparating the underſtanding from the ſoul, they became denominated *dimœrites*, q. d. *dividers*, *ſeparaters*, of δια, and μοιραω, *I divide*.

DIMORPHOTHECA, in *Botany*, a name given by Vaillant to a genus of plants, which Linnæus makes the ſame with the calendula. See Marygold.

DING, in *Commerce*, a name which the Siameſe give in general to all ſorts of weights.

DINNAGE. See Dunnage.

DINNER, the great meal, or that taken about the middle of the day.

The word is formed from the French *diſner*, which Du-Cange derives from the barbarous Latin *diſnare*. Henry Stephens derives it from the Greek δειπνειν; and will have it wrote *dipner*. Menage deduces it from the Italian *deſinare*, *to dine*; and that from the Latin *deſinere*, *to leave off work*.

The grand Tartar, emperor of China, after he has *dined*, makes publication by his heralds, that he gives leave for all the other kings and potentates of the earth, to go to *dinner*; as if they waited for his leave.

In the general, it is agreed to be the moſt ſalutary to make a ſpare ſupper, and to eat the more plentifully at *dinner*, eſpecially for tender, valetudinary people. This is the ſentiment of the Schola Salernitana.

> *Ex magna cœna ſtomacho fit maxima pœna:*
> *Ut ſis nocte levis, ſit tibi cœna brevis.*

Yet Bernardinus Paternus, an eminent Italian phyſician, maintains the contrary, in a treatiſe expreſly on the ſubject.

The Romans, we are aſſured, never minded *dinner*; but deferred their good cheer to the evening, which they made their grand meal.

DINUS, in *Medicine*, according to ſome, is the name of a diſeaſe, called more uſually *vertigo*. See Vertigo.

DIOCALLIA, in *Botany*, a name by which Apuleius and ſome other authors have called the common ſweet chamomile.

DIOCESE, or Diocess, the circuit, or extent, of the juriſdiction of a biſhop. See Bishop.

The word is formed from the Greek διοικησις, *government*, *adminiſtration*, formed of διοικεω, which the ancient gloſſaries render *adminiſtro*, *moderor*, *ordino*: hence διοικησις της πολεως, the *adminiſtration*, or *government of a city*.

Diocese is alſo uſed, in *Ancient Authors*, &c. for the province of a metropolitan. See Province, and Metropolitan.

Diocæſis, Διοικησις, was originally a civil government, or prefecture, compoſed of divers provinces.

The firſt diviſion of the empire into *dioceſes* is ordinarily aſcribed to Conſtantine, who diſtributed the whole Roman ſtate into four, viz. the *dioceſe* of Italy, the *dioceſe* of Illyria, that of the Eaſt, and that of Africa. And yet, long time before Conſtantine, Strabo, who wrote under Tiberius, takes notice, lib. xiii. p. 432, that the Romans had divided Aſia into *dioceſes*, and complains of the confuſion ſuch a diviſion occaſioned in geography, Aſia being no longer divided by people, but by *dioceſes*, each whereof had a tribunal, or court, where juſtice was adminiſtered. Conſtantine, then, was only the inſtitutor of thoſe large *dioceſes*, which comprehended ſeveral metropoles and governments; the former *dioceſes* only comprehending one juriſdiction, or diſtrict, or the country that had reſort to one judge, as appears from this paſſage in Strabo, and, before Strabo, from Cicero himſelf, lib. iii. Epiſt. ad Famil. Ep. 9. and lib. xiii. Ep. 67. Thus, at firſt, a province included divers *dioceſes*, and afterwards a *dioceſe* came to compriſe divers provinces. In after-times the Roman empire became divided into thirteen *dioceſes*, or prefectures; though, including Rome, and the ſub-urbicary regions, there were fourteen. Theſe fourteen *dioceſes* comprehended a hundred and twenty provinces; each province had a proconſul, who reſided in the capital, or metropolis; and each *dioceſe* of the empire had a conſul, who reſided in the principal city of the diſtrict.

On this civil conſtitution, the eccleſiaſtical one was afterwards regulated; each *dioceſe* had an eccleſiaſtical vicar, or primate, who judged finally of all the concerns of the church within his territory.

At preſent there is ſome farther alteration; for *dioceſe* does not now ſignify an aſſemblage of divers provinces, but is limited to a ſingle province, under a metropolitan, or even to the ſingle juriſdiction of a biſhop. England, with regard to its eccleſiaſtical ſtate, is divided into two provinces, viz. Canterbury and York; the former province contains twenty-one *dioceſes*, and the latter three, beſides the biſhoprick of the iſle of Man, which was annexed to the province of York by Henry VIII. Every *dioceſe* is divided into archdeaconries, of which there are ſixty in all; and each archdeaconry into rural deanries, and every deanry into pariſhes.

Gul. Brito affirms *dioceſe* to be properly the territory and extent of a baptiſmal, or parochial church; whence divers authors uſe the word to ſignify a ſimple pariſh.

DIOCLEIA, Διοκλεια, in *Antiquity*, a ſolemnity kept in the ſpring at Megara, in memory of the Athenian hero Diocles, who died in the defence of the youth he loved. Pott. Archæol. Græc. lib. ii. cap. 20.

DIOCLESIAN *Epocha*. See Epocha.

DIOCTAHÆDRIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek δις, *twice*, οκτω, *eight*, and ἑδρα, a *ſide*. The bodies of this genus are ſpars compoſed of twice eight planes, or two octangular pyramids joined baſe to baſe, without any intermediate column. Hill's Hiſt. of Foſſ. p. 211.

DIODIA, in *Botany*, the name of a genus of plants, of the *tetrandria monogynia* claſs, the characters of which are theſe: the perianthium conſiſts of two leaves, of an oval figure, equal in ſize, and placed upon the germen; theſe remain when the flower is fallen. The flower is of the one-leaved labiated kind; its tube is ſlender and longer than the cup; its upper lip is erect and bifid, and the lower lip is expanded, and divided into two-pointed ſegments. The ſtamina are four filaments of the thickneſs of a briſtle; and two of theſe, which are oppoſite to one another, are ſomewhat ſhorter than the others; the antheræ are oblong, and verſatile; the germen of the piſtil is roundiſh, but in ſome degree four-cornered; this ſtands under the cup of the flower; the ſtyle is capillary, and of the length of the ſtamina, and the ſtigma is bifid; the fruit is a capſule, of an oval figure, with four corners, ſo as to appear ſquare, and is crowned with the cup grown larger; this is compoſed of two valves, and contains two cells; the ſeeds are double, of an oval oblong figure, and convex on one ſide, and plain on the other.

DIOECESIS, Διοικησις, among the Romans, a præfecture of ſeveral provinces joined together, under the ſame governor, called *præfectus*. See Præfect and Diocese.

DIOECIA, in *Botany*, a claſs of plants which have the male and female plants, not in the ſame, but in different flowers, and thoſe not on the ſame individual, but on different plants of the ſame ſpecies; either of which, though they are called the male and female plants, from their thus carrying the ſeparate male and female flowers, might have ariſen from the ſame ſeed. This claſs comprehends fourteen orders. See *Tab. of Botany*.

The word is formed of the Greek δις, *twice*, and οικος, *habitation*.

Among the plants of this claſs are the willow, miſletoe, hemp, ſpinach, &c.

It is a curious obſervation, that there are no ſeparate male and female plants in the claſſes of the aſperifoliate or ſtellate plants, nor in the umbelliferous claſs, or that of the didynamia, tetradynamia, monadelphia, diadelphia, or ſyngeneſia. The reaſon of which appears very evidently, from an obſervation of the conduct of the fructification in thoſe claſſes. Linnæi Gen. Plant. p. 470.

DIOMEDIA, in *Ornithology*, a genus of *anſeres*, in the Linnæan ſyſtem, with a ſtrait bill, the upper mandible hooked at the end, and the lower truncated; including the albatroſs and Magellanic gooſe.

DIOMEDIS *Avis*, in *Zoology*, the name of a bird of the web-footed kind, with a ſlender beak, hooked at the end, and with its hinder toe not connected by the membrane that joins the reſt. It is of the ſize of a common hen, but its neck and legs are much longer; its colour is a duſky, and ſomewhat greyiſh brown, and under the belly there is more or leſs white; its beak is of a fine red, or in ſome of a yellowiſh colour, with a black end. It is found in the Inſula Diomedea, now called Tremiti, in the Adriatic Sea, and is ſaid to be peculiar to that place.

DIONE, in *Mythology*, a ſea-nymph, the daughter of Ocean and Thetis, and the mother of Venus by Jupiter.

DIONYSIA, or Dionysiaca, ſolemn feaſts, held among the ancients, in honour of Bacchus.

The word is formed from the Greek Διονυσια, of Διονυσος, *Bacchus*; and that of Διος, the genitive of Ζευς, *Jupiter*, and *Nyſa*, a city in Egypt, on the frontiers of Arabia, where Bacchus is ſaid to have been educated by the nymphs.

The *Dionyſia* are the ſame with what are otherwiſe called *Orgia*, and by the Romans Bacchanalia and Liberalia.

There were divers feſtivals under the denomination of Διονυσια, *Dionyſia*; but the chief were two, viz. 1. The ancient αρχαιωτερα, probably the ſame with μεγαλα, or the greater *Dionyſia*, ſometimes alſo called, by way of eminence, Διονυσια, without any other addition, as being the moſt celebrated of all Bacchus's feſtivals at Athens, where it was held, in the month of Elaphebolion. 2. The new Νεωτερα, probably the ſame with μικρα, or the leſſer *Dionyſia*, held in autumn, as a ſort of preparation to the greater. Some will have this the ſame with Διονυσια ληναια, ſo called from ληνος, a *wine-preſs*, and place it in the month Lenæon.

DIONYSIACA, in *Antiquity*, was a deſignation given to plays and all manner of ſports acted on the ſtage; becauſe play-houſes were dedicated to Dionyſius, i. e. Bacchus and Venus, as being the deities of ſports and pleaſure. Potter, Archæol. Græc. lib. i. cap. viii. tom. i. p. 41.

DIONYSIAN, or *Victorian Period*. See PERIOD.

DIONYSIAS *Lapis*, in *Natural Hiſtory*, the name of a ſtone deſcribed by Pliny, and ſome other of the ancients, as a black ſtone, variegated with red ſpots. It is not now known what ſtone was intended by it. Plin. lib. xxxvii. cap. 10.

DIOPHANTINE *Problems*, in *Mathematics*, certain queſtions relating to ſquare and cube numbers, and right-angled triangles, &c. the nature of which was determined by Diophantus, a mathematician of Alexandria, who is believed to have lived about the third century. We have his works, which were publiſhed with notes at Paris, in 1621, by Bachet de Meziriac; and another edition in 1670, with obſervations on every queſtion, by M. Fermat.

In theſe queſtions it is endeavoured to find commenſurable numbers to anſwer indeterminate problems; which bring out an infinite number of incommenſurable quantities. For example, it is propoſed to find a right-angled triangle, whoſe ſides x, y, z, are expreſſed by commenſurable numbers; it is known that $x^2+y^2=z^2$, z being the ſuppoſed hypothenuſe. But it is poſſible to aſſume x and y ſo, that z will be incommenſurable; for if $x=1$, and $y=2$, $z=\sqrt{5}$.

The art of reſolving ſuch problems conſiſts in ſo managing the unknown quantity or quantities in ſuch a manner, that the ſquare or higher power may vaniſh out of the equation, and then by means of the unknown quantity in its firſt dimenſion, the equation may be reſolved without having recourſe to incommenſurables; e. gr. let it be ſuppoſed to find x, y, z, the ſides of a right-angled triangle, ſuch as will give $x^2+y^2=z^2$. Suppoſe $z=x+u$, then $x^2+y^2=x^2+2xu+u^2$; out of which equation x^2 vaniſhes, and $x=\frac{y^2-u^2}{2u}$: then aſſuming y and u equal to any numbers at pleaſure, the ſides of the triangle will be y, $\frac{y^2-u^2}{2u}$, and the hypothenuſe $x+u=\frac{y^2+u^2}{2u}$; if $y=3$, and $u=1$, then $\frac{y^2-u^2}{2u}=4$, and $x+u=5$. It is evident that this problem admits of an infinite number of ſolutions.

For the reſolution of ſuch kind of problems, ſee Saunderſon's Algebra, vol. ii. book 6.

DIOPTER, or DIOPTRA, in *Writers of Aſtronomy*, is frequently uſed for the hole, or index, pierced in the pinnula, or ſight of an alhidade. See SIGHTS.

DIOPTRA, among the *Ancients*, an inſtrument invented by Hipparchus, which ſerved for ſeveral uſes, as to level water; to take the height of towers, or places at a diſtance; to determine the places, magnitudes, and diſtances of the ſtars.

DIOPTRA, among *Surgeons*, denotes an inſtrument whereby to dilate the matrix, or anus, and inſpect any ulcers therein; called alſo SPECULUM *matricis*, and *dilatatorium*.

DIOPTRICS, the doctrine of refracted viſion, called alſo *anaclaſtics*.

The word is originally Greek, formed of δια, *per, through*, and οπτομαι, *I ſee*.

Dioptrics is properly the third branch of optics, its office being to conſider, and explain the effects of light refracted by paſſing through different mediums, as air, water, glaſs, &c. and eſpecially lenſes.

The laws of *dioptrics* ſee delivered under the articles REFRACTION, LENS, &c. and the application thereof, in the conſtruction of teleſcopes, microſcopes, and other *dioptrical* inſtruments, under the articles TELESCOPE, and MICROSCOPE.

DIORTHOSIS, διορθωσις, in *Surgery*, an operation, by which crooked or diſtorted members are made even, and reſtored to their primitive and regular ſhape.

DIOSCOREA, in *Botany*, a genus of the *dioecia hexandria* claſs. Its characters are theſe: it hath male and female flowers in different plants; the male flowers have a perianthium cut into ſix parts, and have no petals, but have ſix ſhort hairy ſtamina; the female flowers have the ſame perianthium, have no petals, but have a three cornered germen. The perianthium becomes afterward a triangular capſule with three cells, opening with three valves, containing two compreſſed bordered ſeeds in each. There are five ſpecies, natives of warm climates; which will not thrive here but in the bark ſtove. The YAM, or *yammes*, is one ſpecies of this plant.

DIOSCURIA, διοσκουρια, from Διος, *Jupiter*, and κουροι, *infants*, in *Antiquity*, a feſtival in honour of the Διοσκουροι, or Caſtor and Pollux, who were reputed to be the ſons of Jupiter. It was obſerved by the Cyrenæans, but more eſpecially by the Spartans, whoſe country was honoured by the birth of theſe heroes. The ſolemnity was full of mirth, being a time wherein they ſhared plentifully of the gifts of Bacchus, and diverted themſelves with ſports, of which wreſtling matches always made a part. Potter, Archæol. Græc. lib. ii. cap. 2 tom. i. p. 384.

DIOSMA, in *Botany*, *African Spiræa*, a genus of the *pentandria monogynia* claſs. The characters are theſe: the flower hath a permanent empalement, which is divided into four acute ſegments, which are plain at the baſe; it hath five obtuſe petals, which ſpread open, and are as long as the empalement; it hath five ſtamina, terminated by oval, erect ſummits, and a five-pointed hollow nectarium, ſitting on the germen, from which ariſes a ſingle ſtyle, crowned by an obſolete ſtigma; the germen afterward becomes a fruit compoſed of five compreſſed capſules, which open lengthways, each incloſing one ſmooth oblong ſeed. The ſeveral ſpecies of theſe plants grow naturally at the Cape of Good Hope.

DIOSPOROS, in *Botany*, a name given by ſome of the ancients to the lithoſpermum or gromwell. Some chooſe to write it *dioſpyros*, but this ſeems erroneous; the plain derivation of the word being from the Greek Διος σπορος, *the ſeed of Jupiter*. It ſeems to have obtained this name from its beauty and hardneſs. Pliny, lib. xxvi.

DIOSPYROS, in *Botany*, the name by which Linnæus calls the guiacana of Tournefort and others. See *Indian Date* PLUM.

DIOTA, among *Chemiſts*, a term uſed for a circulating or DOUBLE *veſſel*.

DIOXIA, διοξεια, in *Muſic*, a name ſometimes given by the ancients to the DIAPENTE.

DIP *of the horizon*. See DEPRESSION.

DIPHRIS, a ſtone mentioned by the ancient writers; and ſaid, by Pliny, to be of two kinds, the one black, the other white; and that theſe carried each of them the mark of one of the ſexes, deſcribed by a line of the oppoſite colours; they were therefore called the male and female; the white was called the male, and had the character of the male ſex figured in a black line; the other the female, and had the marks of that ſex deſcribed by a white one. We know no ſuch ſtones at this time.

DIPHRYGES, or DIPHRYX, in the *Ancient Pharmacy*, the ſcoria, or calx of melted copper gathered in the furnace, when the metal was run out.

The word is formed from the Greek δις, *twice*; and φρυγειν, *to roaſt*.

Dioſcorides diſtinguiſhes three very different kinds of *diphryges*; one made of a kind of clay, or bole, dried in the ſun; another made of marcaſite, or pyrites, burnt; and a third that of the fæces of copper.

The beſt *diphryges* is what taſtes of copper, is æruginous, aſtringent, and vehemently drying upon the tongue; qualities of which burnt oker, though ſold for *diphryges*, is deſtitute.

It is an aſtringent, a potent cleanſer, abſterſive, and drier, repreſſes excreſcences of fleſh, induces malignant and ſpreading ulcers to cicatrize; and mixed with turpentine or cerate, diſcuſſes an abſceſs. Dioſcorides, lib. v. cap. 120.

DIPHTHERA, διφθερα, among the *Ancients*, a garment made of ſkins, and worn only by ſhepherds and country-labourers.

DIPHTHONG, διφθογγος, in *Grammar*, a double vowel, or the union, or mixture, of two vowels pronounced together, ſo as only to make one ſyllable: as (1) the Latin *ae*, or *æ*; *oe*, or *œ*; (2) the Greek αι, ει; (3) the Engliſh *ai*, *au*, &c. See VOWEL, and SYLLABLE.

The word is Greek, and is compounded of δις, *twice*; and φθογγος, *ſound*.

Ae anſwers to *ai*, the proper; and *æ*, the improper *diphthong* of the Greeks; e. g. Αινειας, *Æneas*; σφαιρα, *ſphæra*, &c. And, on the contrary, the Romans, when they had occaſion to divide their *ae*, changed it into the Greek, *ai*; e. g. *aulai*, for *aulæ*, &c.

Ai, by ſome is made a Latin *diphthong*, as in *aio*, *Caius*, &c. But in *ais*, and *ait*, *i* manifeſtly belongs to the latter ſyllable; and the Greeks write not γαι οι, but γα ιος; whence it ſeems plain, that *ai*, in the Latin tongue, is not a *diphthong*, as in the Greek.

The Latins pronounced the two vowels in their *diphthongs* much as we do, with this exception, that the two were not heard equally, but the one was ſomewhat weaker than the other; though the diviſion was made with all the delicacy imaginable; among us moſt of the Latin *diphthongs* are loſt in the pronunciation; their *æ* and *œ* are only ſpoken as *e's*; ſo alſo the Engliſh *ea*, *oa*, &c. though wrote with two characters, are pronounced as ſimple ſounds.

In Engliſh, French, and divers other languages, one may diſtinguiſh *diphthongs* with regard to the eye, from *diphthongs* with regard to the ear.

A *diphthong* with regard to the eye, is formed of two vowels, meeting in the ſame ſyllable, whether the particular ſound of each of them be heard in the pronunciation, or whether the ſound of one of them be drowned; or, laſtly, whether a new ſound, different from either of them, reſult from both. In the two latter caſes, it is with ſome impropriety that we call them *diphthongs*: the firſt, only, are real *diphthongs*, as being ſuch both to the eye and ear.

Diphthongs, with regard to the ear, are either formed of two vowels, meeting in the ſame ſyllable, whoſe ſounds are ſeverally heard; or of three vowels, in the ſame ſyllable, which only afford two ſounds in the pronunciation.

On this laſt occaſion, *diphthongs*, with regard to the ear, are triphthongs with regard to the eye.

Engliſh *diphthongs*, with regard both to the eye and ear, called *proper diphthongs*, are *ai*, as in *fair*; *au*, in *laud*; *ee*, in *bleed*; *oi*, in *void*; *oo*, in *food*; and *ou*, in *houſe*.

Engliſh *improper diphthongs*, or *diphthongs* with regard to the eye, are *aa*, pronounced only like *a*, as in *Aaron*; *ea*, like *a*, as in *ſwear*, *heart*; or like *e*, as *already*; or like *ee*, as *veal*; *eo*, like *e*, in *feoffee*; or like *o*, as in *George*; *eu*, or *ew*, like *u*, as *Deuteronomy*; *ie*, like *e*, as *cieling*, *field*; *ei*, like *a*, in *feign*; or like *e*, in *deceit*; *oa*, as in *cloak*, *doat*; *oe*, as in *doe*, *oeconomy*; *ue*, as in *gueſs*; and *ui*, as in *guile*, *recruit*.

DIPHYES, from δις, and φυειν, *to generate*, in *Natural Hiſtory*, a name given by ſome authors to a kind of ſtone, which repreſents both the male and female parts of generation of the human ſpecies; and owes its figures merely to the accidental conformation of the hinge and protuberances of a ſhell, in which it has been formed. We have a ſpecies of chama, whoſe external form at the mouth repreſents the female pudenda; but the figure of this ſtone is owing to the internal ſhape of the ſhell in which it has been caſt. This is an unknown ſpecies of concha anomia, which has ſuch ridges on one ſhell, and ſuch cavities in the other, that the ſtone caſt or moulded in it, has on one ſide the figure of the female pudenda, and on the other the male; it is uſually of a duſky brown colour, and of a ferrugineous ſubſtance. As the ſame ſhell may, however, have received in different places different ſubſtances into its cavity, all which would neceſſarily be of this form, we hear, among authors, of ſome black, and ſome white ſtones of this kind. Authors have treated of this ſtone in a very idle and fabulous manner; but this is its true hiſtory.

DIPLASIASMUS, from διπλασιαζω, of διπλοος, *double*, in *Medicine*, a reduplication of diſeaſes.

Diplasiasmus is alſo uſed for two muſcles of the arm, which ſerve to turn it about.

DIPLOE, from διπλοος, *double*, in *Anatomy*, a ſpongy, medullary ſubſtance, ſeparating the two tables of the cranium, and together with them conſtituting the ſkull.

The ſubſtance of the *diploe* being ſpongious, eaſily imbibes the blood; and is found ſeparated into an infinite number of little cells, of different magnitudes, which receive little branches of arteries from the brain, and give paſſage to the little veins that proceed to the ſinuſes of the dura mater.

DIPLOIS, διπλοις, in *Antiquity*, a double *pallium*, or cloak, worn chiefly by the Cynics.

DIPLOMA, from διπλοος, *double*, an inſtrument given by ſome colleges and ſocieties, on taking a degree, or paſſing examination, as a proof of qualification for any advancement to title, or pre-eminence, or introduction to the exerciſe of a profeſſion.

Diploma, in *Chemiſtry*, denotes a double veſſel. Thus when one veſſel is put into another, the ingredients in the firſt, and the fire under the laſt, the chemiſts call it boiling *in diplomate*.

DIPONDIUS, in the *Scripture Language*, is uſed by St. Luke, to ſignify a certain coin, which was of very little value. Our tranſlation of the paſſage is, *Are not two ſparrows ſold for two farthings?* In St. Matthew, who relates the ſame thing, we read, *Are not two ſparrows ſold for a farthing?* The Greek reads *aſſarion* inſtead of *as*. Now *aſſarion*, as ſome ſay, was worth half an *as*, that is to ſay, four French deniers and $\frac{1}{8}$; and, according to others, two deniers and $\frac{5}{16}$. *Dipondius* ſeems rather to ſignify half an *as*. Calmet, Diction. Bibl. Luke xii. 6. Matt. x. 29.

Dr. Arbuthnot differs in opinion from the author laſt quoted. He ſays, that this coin was at firſt *libralis*, or of a pound weight; and even when diminiſhed it retained the name of *libella*. So that *dipondius* denotes two aſſes.

DIPPING, in *Mineralogy*, a term uſed to expreſs the deviation of the veins of ore, from that regular and ſtrait line in which they uſually run. A great deal of the ſkill of the miners conſiſts in the underſtanding this *dipping* of the veins, and knowing how to manage in it. In Cornwall they have this general rule to guide them in this reſpect: moſt of their tin-loads, which run from eaſt to weſt, conſtantly dip towards the north. Sometimes they underlie; that is, they ſlope down towards the north three foot in eight, perpendicular. This muſt carefully be obſerved by the miners, that they may exactly know where to make their air-ſhafts when occaſion requires; yet, in the higher mountains of Dartmaer, there are ſome conſiderable loads, which run north and ſouth; theſe always underlie toward the eaſt.

Four or five loads may run nearly parallel to each other in the ſame hill; and yet, which is rare, they may meet all together in one hatch, as it were a knot, which well tins the place, and ſo ſeparate again, and keep their former diſtances. Phil. Tranſ. N° 69.

Dipping-*Needle*, or *Inclinatory Needle*, a magnetical needle, ſo hung, as that, inſtead of playing horizontally, and pointing out north and ſouth, one end *dips*, or inclines to the horizon, and the other points to a certain degree of elevation above it.

Or a *dipping-needle* may be defined, with Mr. Whiſton, to be a long, ſtrait piece of ſteel, repreſented (*Tab. Navigation*, *fig.* 7.) every way equally poiſed on its center, and afterwards touched with a load-ſtone; but ſo contrived, as not to play on the point of a pin, as does the common horizontal-needle, but to ſwing in a vertical plane, about an axis parallel to the horizon; and this in order to diſcover the exact tendency of the power of magnetiſm.

Mr. Nairne, an ingenious inſtrument-maker in London, made a *dipping-needle* in 1772 for the board of longitude, which was uſed in the voyage towards the north-pole. This is repreſented *Tab. Navigation*, *fig.* 8. The needle AA is twelve inches long, and its axis, the ends BB of which are made of gold alloyed with copper, reſts on friction wheels CCCC, of four inches diameter, each end on two friction wheels; which wheels are balanced with great care. The ends of the axes of the friction wheels, are likewiſe of gold alloyed with copper, and moved in ſmall holes made in bell-metal; and oppoſite to the ends of the axes of the needle, and the friction wheels, are flat agates, ſet in at DDD, finely poliſhed. The magnetic needle vibrates within a circle of bell-metal, EEE, divided into degrees and half degrees; and a line, paſſing through the middle of the needle to the ends, points to the diviſions. The needle of this inſtrument was balanced before it was made magnetical; but by means of a croſs, the ends of which are FFFF, (contrived by the reverend Mr. Mitchell) fixed on the axis of the needle, on the arms of which are cut very fine ſcrews to receive ſmall buttons, that may be ſcrewed nearer or farther from the axis, the needle may be adjuſted both ways to a great nicety, after being made magnetical, by reverſing the poles, and changing the ſides of the needle. GG are two levels, by which the line of 0 degrees of the inſtrument is ſet horizontal; by means of the four adjuſting ſcrews LLLL; H is the perpendicular axis, by which the inſtrument may be turned, that the divided face of the circle may front the eaſt or weſt; to this axis is fixed an index I, which points to an oppoſite line on the horizontal plate K, when the inſtrument is turned half round; MMMM are ſcrews which hold the glaſs cover to keep the needle from being diſturbed by the wind. When this needle is conſtructed for ſea, it is ſuſpended by an univerſal joint on a triangular ſtand, and adjuſted vertically by a plumb-line and button above the divided circle and the dove-tail work at the upper 90; and the diviſions on the circle are adjuſted ſo as to be perpendicular to the horizon by the ſame plumb-line, and an adjoining ſcrew; and when it is adjuſted, a pointer annexed to a ſcrew, which ſerves to move the divided circle, is fixed at the loweſt 90. Whenever the inſtrument is uſed to find the *dip*, it muſt be ſo placed that the needle may vibrate exactly in the magnetic meridian. Phil. Tranſ. vol. lxii. art. 35. Phipps's Voyage, &c. Appendix, p. 119. See alſo the deſcription of a new *dipping-needle*, by Mr. Lorimer, of Penſacola, in the Phil. Tranſ. vol. lxv. part i. p. 82.

The inventor of the *dipping-needle*, Mr. Whiſton obſerves, was, without all queſtion, an Engliſhman, Robert Norman by name, a compaſs-maker at Wapping, about the year 1576; this is not only teſtified by his own account, in his New Attractive, but was allowed by Dr. Gilbert, and other writers of that time. The occaſion of the diſcovery he himſelf relates, viz. that it being his cuſtom to finiſh, and hang the needles of his compaſſes, before he touched them, he always found that, immediately after the touch, the north-point would bend, or decline downward, under the horizon; inſomuch that, to balance the needle again, he was always forced to put a piece of wax on the ſouth-end, as a counter-poiſe.

The conſtancy of this effect led him, at length, to obſerve the preciſe quantity of the *dip*, or to meaſure the greateſt angle which the needle would make with the horizon.

This, in the year 1576, he found at London to be 71° 50′. It is not abſolutely certain whether the *dip* varies, as well as the horizontal direction, in the ſame place. Mr. Graham made a great number of experiments with the *dipping-needle* in 1723, and found the *dip* to be between 74 and 75 degrees. Mr. Nairne, in 1772, found it to be ſomewhat above 72°. The trifling difference between the firſt obſervations of Mr. Norman, and the laſt of Mr. Nairne, would lead us to imagine that the *dip* was unalterable; but Mr. Graham, who was a very accurate obſerver, makes the difference more conſiderable. Phil. Tranſ. abr. vol. vii. p. 280. and Phil. Tranſ. vol. lxii. art. 35.

It is certain, however, from a great number of experiments and obſervations, that the *dip* is variable in different latitudes, and that it increaſes in going northward. It appears from a table of obſervations made with the marine *dipping-needle*, already deſcribed, in a voyage towards the north-pole, in 1773, that in lat. 60° 18′, the *dip* was 75°; in lat. 70° 45′, it was 77° 52′; in lat. 80° 12′, it was 81° 52′; and in lat. 80° 27′, 82° 2½′. Phipps's Voyage, &c. p. 122. See alſo the obſervations of Mr. Hutchins, made in Hudſon's Bay and Straits. Phil. Tranſ. vol. lxv. part i. art. 14.

Burrows, Gilbert, Ridley, Bond, &c. endeavoured to apply this diſcovery of the *dip* to the finding of the latitude; and the laſt author, going farther, likewiſe propoſed the finding of the longitude thereby; but for want of obſervations and experiments, he could go no length. Mr. Whiſton, being furniſhed with the farther obſervations of colonel Windham, Dr. Halley, Mr. Pound, Mr. Cunningham, Pere Noel, Pere Feuille, and his own, has improved very much on the doctrine and uſe of the *dipping-needle*; brought it to more certain rules; and endeavoured, in good earneſt, to find the longitude thereby. In order to this, he obſerves, 1ſt, That the true tendency of the north or ſouth end of every magnetic needle, is not to that point of the horizon, to which the horizontal needle points, but towards another, directly under it, in the ſame vertical, and in different degrees under it, in different ages, and at different places.

2dly, That the power by which an horizontal needle is governed, and all our navigation ordinarily directed, is proved to be but one quarter of the power by which the *dipping-needle* is moved; which ſhould render the latter far the more effectual and accurate inſtrument.

3dly, That a *dipping-needle*, a foot long, will plainly ſhew an alteration of the angle of inclination, in theſe parts of the world, in half a quarter of a degree, or 7½ geographical miles; i. e. ſuppoſing that diſtance taken along, or near a meridian; and a needle of four feet, in two or three miles.

4thly, A *dipping-needle*, four feet long, in theſe parts of the world, will ſhew an equal alteration along a parallel; as one of a foot long will ſhew along a meridian; i. e. this will, with equal exactneſs, ſhew the longitude, as that the latitude.

This depends on the poſition of the lines of equal *dip*, in theſe parts of the world, which are found to lie about fourteen or fifteen degrees from the parallels.

Hence he argues, that as we can have needles of five, ſix, ſeven, eight, or more feet long, which will move with ſtrength ſufficient for exact obſervation; and ſince microſcopes may be applied to the viewing the ſmalleſt diviſions of degrees on the limb of the inſtrument, it is evident, the longitude at land may be found thereby to leſs than four miles.

And as there have been many obſervations made at ſea, with the ſame inſtrument, by Noel, Feuille, &c. which have determined the *dip* uſually within a degree, ſometimes within ½ or ⅓ of a degree, and this with ſmall needles, of five or ſix, or at the moſt nine inches long; it is evident, the longitude may be found, even at ſea, to leſs than half a quarter of a degree. Thus much premiſed, the obſervation itſelf follows.

To find the longitude, or latitude, by the Dipping-Needle. If the lines of equal *dip*, below the horizon, be drawn on maps, or ſea-charts, from good obſervations, it will be eaſy, from the longitude known, to find the latitude; and from the latitude known, to find the longitude, either at ſea or land.

Suppoſe, e. gr. you were travelling, or ſailing along the meridian of London, and found the angle of *dip*, with a needle of one foot, to be 75°, the chart will ſhew, that this meridian, and the line of *dip*, meet in the latitude of 53° 11′; which, therefore, is the latitude ſought. See Latitude.

Or, ſuppoſe you were travelling, or ſailing along the parallel of London, i. e. in 51° 32′ north latitude, and you find the angle of *dip* to be 74°. This parallel, and the line of this *dip*, will meet in the map in 1° 46′ of eaſt longitude, from London; which is, therefore, the longitude ſought.

DIPSACUS, in *Botany*. See Teasel.

Dipsacus, in *Medicine*, according to ſome, is the ſame with a diabetes. See Diabetes.

DIPSAS, a ſort of ſerpent, the biting whereof produces ſuch a thirſt as proves mortal; whence it is called *dipſas*, which in Greek ſignifies *thirſty*. In Latin it is called *ſitula*, a *pail*. Moſes ſpeaks of it in Deut. viii. 15.

The Hebrew word *tzimaon* anſwers very well to the Greek *dipſas*, and expreſſes the thirſt occaſioned by the biting of this ſerpent. Some by the Hebrew *tzimaon* underſtand a deſart or dry place.

DIPTERA, from δις, and πτερον, *wing*, in *Zoology*, an order of inſects, which have only two wings, and under each wing a ſtyle or oblong body, terminated by a protuberance or head, and called a balancer.

DIPTERE, or Dipteron, in the *Ancient Architecture*, a temple ſurrounded with a double row of columns, which form a ſort of porticos, called wings, or iſles.

The word is Greek, formed from δις, *twice*; and πτερον, *ala*, *wing*.

DIPTOTES, from δις and πτωτος, of πιπτω, *cado*, in *Grammar*, a kind of irregular nouns, having only two caſes; as *fors*, *forte*.

DIPTYCHA, in *Antiquity*, a public regiſter, wherein were written the names of the conſuls, and other magiſtrates, among the heathens, and of biſhops, and defunct as well as ſurviving brethren, among the Chriſtians.

The word *diptycha* is formed from the Greek διπτυχον, or διπτυχα, and that from διπτυξ, a maſculine noun derived from πτυσσω, *I fold*, or *plait*. From its future πτυξω is formed πτυξ, a *fold*, or *plait*, to which adding δις, *twice*, we have διπτυξ, in the genitive διπτυχος, whence the nominative neuter διπτυχον, q. d. *a book folded in two leaves*; though there were ſome in three, and others in four or five leaves. An ingenious author imagines this name to have been firſt given them to diſtinguiſh them from the books that were rolled, called *volumina*. See Volume, and Book.

It is certain there were profane *diptycha* in the Greek empire, as well as ſacred ones in the Greek church. The former were the matricula, or regiſter, wherein the names of the magiſtrates were entered; in which ſenſe *diptycha* is a term in the Greek chancery.

Diptycha, *ſacred*. The word is plural; *diptycha* being a double catalogue, in one whereof were written the names of the living, and in the other thoſe of the dead, which were to be rehearſed during the office. We meet with ſomething not unlike the *ſacred diptychs* of the Greeks, in the canon of the maſs, according to the Latin uſage; where the people are enjoined to pray once for the living, and once for the dead; ſeveral ſaints are invoked in different times, &c.

In theſe *diptycha* were entered the names of biſhops, who had governed their flocks aright; and theſe were never expunged out of the ſame, unleſs they were convicted of hereſy, or ſome other groſs crime. In the *diptycha* were likewiſe entered the names of ſuch as had done any ſignal ſervice to the church, whether they were living or dead, and mention was made of them in the celebration of the liturgy.

Caſaubon, in his obſervations on Athenæus, lib. vi. cap. 14. ſuppoſes the Chriſtians to have borrowed the cuſtom of writing names in a book, and rehearſing them at maſs, from the heathens, who entered the names of perſons they would do any ſignal honour to, in the verſes of the Salii; as was done to Germanicus and Verus, ſons of the emperor Marcus Aurelius, and long time before, during the age of the republic, to Mamurcus Veturius, and Lucia Volumnia, as we are told by Tacitus, lib. ii. Spartian, Ovid, Feſtus, Plutarch, &c. But Fa. Roſweyd does not approve this notion of Caſaubon. The pretended St. Dionyſius, a very ancient author, ſays the contrary, and aſſerts the firſt eſtabliſhment of this uſage to have been founded on Scripture, 2 Tim. ii. 19. Pſalm cxvi. 15. Roſweyd adds Eccleſiaſtic. xliv. 1. and takes theſe to have been the paſſages the ancient church had a view to, rather than the Salian verſes.

The *profane diptycha* were frequently ſent as preſents to princes, &c. on which occaſion they were finely gilt, and embelliſhed; as appears from Symmachus, lib. ii. ep. 81. Thoſe preſented were uſually of ivory. The firſt law, De Expenſ. Ludor. C. Theod. forbids all magiſtrates below conſuls to make preſents of *diptycha* of ivory in the public ceremonies.

DIPYRENON, from δις, and πυρην, a *berry*, in *Surgery*, the name of a probe, with a double button at the end, reſembling two ſmall berries growing together.

DIRÆ, in *Mythology*. See Furies.

DIRCA, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe: the flower is tubulous, and has no empalement; it has eight ſtamina, which are longer than the tube; the flower is ſucceeded by a berry with one cell, including a ſingle ſeed. There is but one ſort of this genus, called by the French *bois de plumb*, *lead-wood*; and by the Engliſh in America leather-wood, from its lightneſs. It is a low ſhrub in this country, ſeldom riſing above four or five feet high; and is very nearly allied to the mezereon.

DIRECT, in *Arithmetic*. The *Rule of Three* Direct is that oppoſite to the inverſe. See Rule *of proportion*.

Direct, in *Aſtronomy*. We conſider the planets in three ſtates; viz. *direct*, *ſtationary*, and *retrograde*. See Planet.

They are ſaid to be *direct*, when they appear to move forward, according to the ſucceſſion of the ſigns; and *retrograde*, when they go the contrary way.

Direct, in *Matters of Genealogy*, is underſtood of the principal line, or the line of aſcendants and deſcendants; in contradiſtinction to the collateral line.

Thus the houſe of Bourbon is ſaid to deſcend in a *direct* line from St. Louis. The heirs in a *direct* line always precede thoſe in the collateral lines.

A very good hiſtorian uſes the phraſe Direct *ſpeech*, or *harangue*, when he introduces any one ſpeaking, or haranguing of himſelf: when the hiſtorian ſpeaks, and only rehearſes the chief points of what was delivered by the ſpeaker, it is called an *indirect ſpeech*.

Direct $\left\{\begin{array}{l}\textit{Erect}\\ \textit{Eaſt}\\ \textit{Weſt}\end{array}\right\}$ *dials*, are thoſe whoſe planes lie directly open to the eaſt, or weſt points of the heavens, or parallel to the meridian of the place. See Dial.

Direct *ſouth*, or *north* $\left\{\begin{array}{l}\textit{Inclining}\\ \textit{Reclining}\end{array}\right\}$ *dials*. See Dial.

Direct, in *Muſic*, is a mark ſet at the end of a ſtaff, eſpecially at the foot of a page upon that line or ſpace where the firſt note of the next ſtaff is ſet.

Direct, in *Optics*. *Direct viſion* is that performed by *direct* rays; in contradiſtinction to viſion by refracted, or reflected rays.

Direct viſion is the ſubject of optics, which preſcribes the laws and rules thereof. See Vision.

Direct *rays* are thoſe which paſs in right lines from the luminary to the eye, without being turned out of their rectilinear direction by any intermediate body, either opaque or pellucid. See Ray.

Direct *ſphere*. See Right *ſphere*.

DIRECTION, in *Aſtronomy*, the motion, and other phænomena, of a planet, when *direct*. See Planet.

Direction, in *Aſtrology*, is a kind of calculus, whereby they pretend to find the time wherein any notable accident ſhall befal the perſon whoſe horoſcope is drawn.

For inſtance, having eſtabliſhed the ſun, moon, or aſcendent, as maſters, or ſignificators of life; and Mars, or Saturn, as promiſers, or portenders, of death; the *direction* is a calculation of the time wherein the ſignificator ſhall meet the portender.

The ſignificator they likewiſe call *apheta*, or giver of life; and the promiſer, *anereta*, *promiſſor*, or giver of death.

They work the *directions* of all the principal points of the heavens, and ſtars, as the aſcendant, mid-heaven, ſun, moon, and part of fortune. The like is done for the planets, and fixed ſtars; but all differently, according to the different authors.

Direction, *line of*, in *Gunnery*, was formerly marked on guns with a ſlit or cavity at the breech, and a button at the muzzle, ſo that they were directed in the ſame manner as fowling-pieces are; but as the platforms on which the cart carriages reſt are never laid ſo exactly level, but that one wheel is always higher than another, this line of *direction* muſt be falſe, and has, therefore, in modern practice been laid aſide; and the center-line of a piece is found every time it is fired, by a plummet, or inſtrument, which Mr. Muller complains of as a tedious and uncertain method; and he recommends reſuming the line of *direction*, as more expeditious, and more certain than the common practice. Syſtem of Math. vol. v. p. 90, and 230.

Direction, or *Line of* Direction, in *Mechanics*, is particularly uſed for a line paſſing from the center of the earth through the center of gravity of a body, and the ſupport or fulcrum that bears it.

A man muſt neceſſarily fall down as ſoon as the center of his gravity is out of the *line of direction*.

Direction, *line of*, in *Mechanics*, alſo denotes that wherein a body moves, or endeavours to proceed.

Direction, *angle of*, in *Mechanics*, is that comprehended between the lines of *direction* of two conſpiring powers.

Direction, *quantity of*, in *Mechanics*, is uſed for the product of the velocity of the common center of gravity in a ſyſtem of bodies, by the ſum of their maſſes.

In the colliſion of bodies, the quantity of direction is the ſame before and after the impulſe. Bernouilli, Diſcours ſur le Movement. Oper. tom. iii. p. 32, and 56.

Direction *chamber*, in *Commerce*. See Chamber.

Direction *of the load-ſtone*, that property whereby the magnet, or a needle touched by it, always preſents one of its ends towards one of the poles of the world, and the oppoſite end to the other pole.

The attractive property of the magnet was known long before its *directive*; and the *directive* long before the inclinatory.

Direction, *magnetical*, is alſo uſed in the general for the tendency, or turning of our earth, and all magnetical bodies, to certain points.

The *direction* of a load-ſtone denotes its POLARITY.

The ſituation of the earth, we know, is ſuch, that its axis is in the axis of the univerſe; and therefore its poles, and cardinal points, exactly correſpond to thoſe thereof. This ſituation ſome account for hence, that it is the moſt commodious with regard to the aſpects and influences of the heavenly bodies, and renders it the fitteſt habitation for man. Others hold this poſition of the earth an effect of a magnetic virtue; and ſuppoſe a celeſtial pole, endued with a like magnetic virtue; which, extending as far as our earth, draws the correſpondent part thereof, the pole, towards itſelf.

Direction, *number of*, in *Chronology*. See Number.

DIRECTLY. In *Geometry*, we ſay, two lines lie *directly* againſt each other, when they are parts of the ſame right line.

In *Mechanics*, a body is ſaid to ſtrike, or impinge *directly* againſt another, if it ſtrike in a right line perpendicular to the point of contact.

A ſphere, particularly, ſtrikes *directly* againſt another when the line of *direction* paſſes through both their centers. See Percussion.

DIRECTOR, in *Commercial Polity*, a perſon who has the management of the affairs of a trading company: thus we ſay, the *directors* of the India COMPANY, South-ſea COMPANY, &c. See Bank.

Directors *of Creditors*, in the *Commercial Policy of France*, are perſons of ability and property, choſen by votes of the creditors, to inſpect and examine the debtor's affairs, and to procure as far as poſſible, by common methods of juſtice, the payment of each perſon's debt. See Assignees.

Directors-*general* of the five great farms of the GABELS and AIDS, &c. in France, are chief commiſſioners, who have the direction of theſe farms, each in the diſtricts appointed by the general farmers.

Director, in *Surgery*, a grooved probe, to direct the edge of the knife or ſciſſars in opening ſinuſes or fiſtulas, that, by this means, the ſubjacent veſſels, nerves, and tendons, may remain unhurt. Sometimes one end is made in form of a ſpoon, to contain powders to ſprinkle upon wounds or ulcers. Sometimes alſo it is forked at the end to divide the frænum of the tongue. See *Tab.* III. *Surgery*, *fig.* 33. Heiſter's Surg. Introd. ſect. 36.

Director *penis*, in *Anatomy*, a muſcle of the penis, called more uſually *erector*. See *Tab. Anat.* (*Splanch.*) *fig.* 15. *lit. e e.* See Erector.

DIRECTORY *of public worſhip*, was drawn up by the aſſembly of divines at Weſtminſter, purſuant to an ordinance which paſſed the houſe of lords in 1644, repealing the ſtatutes of Edward VI. and of Elizabeth, for uniformity in the common prayer. This *directory* ſet aſide the uſe of the Liturgy, and allowed of no church-muſic beſides that of ſinging the Pſalms.

DIRECTRIX, in *Geometry*. See Dirigent.

Directrix *of the parabola*. See Conic *Sections*.

DIRIBITORES, among the Romans, officers appointed to diſtribute tablets to the people at the *Comitia*. See Comitia.

DIRIGENT, a term in *Geometry*, expreſſing the line of motion, along which a deſcribent line, or ſurface, is carried in the geneſis of any plane, or ſolid figure.

Thus, if the line AB (*Tab.* II. *Geometry*, *fig.* 33.) move parallel to itſelf, and along the line AC, ſo that the point A always keeps in the line AC, a parallelogram, as ABCD, will be formed, of which the ſide AB is the deſcribent, and the line AC the *dirigent*. So alſo, if the ſurface ABCD be ſuppoſed to be carried along the line CE, in a poſition always parallel to itſelf in its firſt ſituation, the ſolid ADEH will be formed, where the ſurface AD is the deſcribent, and the line CE is the *dirigent*.

DIRITTA, in the *Italian Muſic*, a term intimating that the piece is to be played or ſung in conjoint degrees. Thus, *contrapunto alla diritta*, according to Angelo Berardi, is when one is obliged to raiſe or fall the voice by the ſame degrees, i. e. by an equal number aſcending or deſcending, without making a leap, even of the interval of a third. Broſſ. Dict. Muſ. in voc.

DIS, an inſeparable particle prefixed to divers words; the effect whereof is, either to give them a ſignification contrary to what the ſimple words had: as in *diſgrace*, *diſparity*, *diſproportion*, &c. or to intimate a ſeparation, detachment, diſtribution, &c. as in *diſcerning*, *diſcourſing*, *diſtracting*, *diſpoſing*, &c.

DISABILITY, in *Law*, is when a man is made incapable to inherit lands, or take any benefit, which otherwiſe he might do; which may happen four ways; viz. by the act of the anceſtor; by the act of the party; by the act of law; and by the act of God.

DISABILITY *by the act of the anceſtor*, is where a man is attainted of treaſon, or felony; by which attainder his blood is corrupted, and thereby himſelf and his children are *diſabled* to inherit.

DISABILITY *by the act of the party himſelf*, is where a man binds himſelf by obligation, that, upon a ſurrender of a leaſe, he will grant a new eſtate to the leſſee; and afterwards he grants the reverſion to another, which puts it out of his power to perform it.

DISABILITY *by the act of the law*, is when a man, by the ſole act of law, without any thing by him done, is rendered incapable of the benefit of the law: as, an alien born; ſo that if a man born out of the king's liegeance, will ſue an action, the tenant, or defendant, may ſay, he was born in ſuch a country out of the king's liegeance, and demand judgment, if he ſhall be anſwered; for the law is our birth-right, to which an alien is a ſtranger, and therefore *diſabled* from taking any benefit thereby.

DISABILITY *by the act of God*, is when the party is *non compos mentis*, or *non ſanæ memoriæ*, which ſo *diſables* him, that in all caſes, where he gives, or paſſes any thing, or eſtate, from him, after his death it may be annulled, and voided.

There are alſo other *diſabilities* by the common law, as of idiocy, infancy, and coverture, for making of grants, &c. and by ſtatute, as papiſts are *diſabled* for making any preſentation to a church, &c. and officers not taking the oaths for holding offices.

DISABLED, in *Sea Language*, is applied to a ſhip, when by the loſs of her maſts, yards, or rigging, or other damage, ſhe is rendered incapable of proſecuting her voyage, without great difficulty and danger.

DISAFFORESTED. See DEAFFORESTED.

DISARM, in the *Manege*. To *diſarm* the lips of a horſe, is to keep them ſubject, and out from above the bars, when they are ſo large as to cover them, and prevent the true preſſure or *appui* of the mouth, by bearing up the bit, and ſo hindering the horſe to feel the effects of it upon the bars.

DISARMING, the act of depriving a perſon of the uſe or poſſeſſion of arms. See ARMS.

On the concluſion of a peace, it is uſual for both ſides to *diſarm*. We have divers laws for *diſarming* papiſts, and all recuſants. Under king George I. a law was made for *diſarming* the Highlanders; none of whom, except peers, or gentlemen of 400*l.* *per ann.* are to wear any arms in the field, on the road, or at market. 1 Geo. I. ſtat. 2. cap. 54.

The game law has, in effect, diſarmed all the common people of England, having under 100*l.* a year in landed eſtate, except the ſervants of lords of manors. Yet, by the ancient policy of England, the whole nation was obliged to bear arms.

DISBOSCATION, *Diſboſcatio*, a turning wood-ground into arable or paſture, an aſſarting. See ASSART.

DISBURDENING *of trees*, in *Gardening*, the taking off leaves and fruits when too numerous, that thoſe left may grow the larger.

DISC, or **DISK**, **DISCUS**, in *Antiquity*, a kind of round quoit, or a piece of ſtone, or metal, about a foot over, uſed by the ancients in their exerciſes.

The *diſcus* of the ancients was flat and round, reſembling the apparent figure of the ſun. The exerciſe of the *diſcus* was one of thoſe practiſed in the ſolemnities of their public games: it conſiſted in pitching, or throwing a *diſcus* either upward, or ſtrait forward; and he who threw it higheſt, or fartheſt, bore away the prize.

Thoſe who practiſed at this game were called *diſcoboli*, i. e. *throwers of the diſcus*.

The poets tell us, that Hyacinth, a favourite of Apollo, playing at the *diſcus* with that god, was killed by a blow of Apollo's *diſcus*, which his rival Zephyrus diverted from its courſe, and caſt on the boy's head.

The *diſcus* was thrown by means of a little cord made of hair, as appears from Claudian, lib. ii. in Eutrop. carm. 20. ver. 359, & ſeq. Ovid deſcribes this ſport, Metam. lib. x. ver. 175. The Romans learnt the game of the *diſcus* of the Greeks, and practiſed it among themſelves. Dempſter, Paraleip. in Roſin. Antiq. Rom. lib. v. cap. 1. and Pet. Faber, Agoniſticon, lib. ii. cap. 1. treat of the diverſion of the *diſcus*.

DISC, or **DISK**, in *Aſtronomy*, the body, or face of the ſun, or moon; ſuch as it appears to us. For, though they are really ſpherical bodies, they are apparently circular planes.

The *diſc* is conceived to be divided into twelve equal parts, called *digits*; by means whereof it is, that the magnitude of an eclipſe is meaſured, or eſtimated. Such an eclipſe was ſo many digits, or parts of the ſun, or moon's *diſc*.

In a total eclipſe of either of thoſe luminaries, the whole *diſc* is obſcured, or darkened; in a partial eclipſe, only part of them. See ECLIPSE.

DISC, *illuminated*, *of the earth*. See CIRCLE *of Illumination*.

DISC, **DISCUS**, in *Botany*, is applied to the central, or middle part of radiated flowers; as being round, and plain like a quoit.

This is ſometimes alſo called the *pelvis*, or *baſin*. The *diſc* is compoſed of ſeveral floſculi perpendicularly placed.

DISC, in *Optics*, the magnitude of a teleſcope glaſs; or the width of its aperture, whatever its figure be, whether a plain, convex, meniſcus, or the like.

DISC, in the Greek *Liturgy*, is nearly the ſame thing with the *patena* in the Latin. See PATENA.

In the Greek church the conſecrated bread is laid on a *diſcus*, as in the Latin church it is on a *patena*. The *diſcus* only differs from the *patena*, in that it is bigger and deeper, as reſembling a plate, which was the proper ſignification of the word *diſcus* among the ancients.

DISCEIT, in our *Old Writers*. See DECEIT and DECEPTIONE.

DISCENT. See DESCENT.

DISCERNING, an act of the mind, whereby it diſtinguiſhes between ideas.

On this faculty of *diſcerning* depends the evidence and certainty of ſeveral, even general propoſitions, which paſs for innate truths; and which in reality flow from this clear *diſcerning* faculty of the mind, whereby it perceives two ideas to be the ſame, or to be different.

In being able nicely to diſtinguiſh one thing from another, where there is the leaſt difference, conſiſts in great meaſure that exactneſs of judgment, and clearneſs of reaſon, which is to be obſerved in one man above another; which is quite oppoſite to wit: this conſiſts moſt in the aſſemblage of ideas, and putting thoſe together with quickneſs and variety, which have the leaſt reſemblance to form agreeable viſions; whereas judgment ſeparates carefully thoſe ideas, wherein can be found the leaſt difference, to prevent error and deluſion. To the well diſtinguiſhing our ideas, it chiefly contributes, that they be clear and determinate; and when they are ſo, there will not ariſe any confuſion, or miſtake, about them, though the ſenſes ſhould convey them from the ſame object differently on different occaſions. See JUDGMENT.

DISCEUS, or **DISCIFORMIS** *Cometa*. See DISCUS.

DISCHARGE, in *Electricity*. See CHARGE.

DISCHARGE, in *Law*. See CHARGE, in *Law*.

DISCHARGE, in *Military Language*, is the diſmiſſion of a ſoldier from the troop or company to which he belonged, either by his own requeſt, or when after long and faithful ſervice, he is intitled to his majeſty's bounty.

To **DISCHARGE**, in *Sea Language*, ſignifies to unload a ſhip, or take out her ſtores, ammunition, artillery, &c. When applied to the crew, it implies to diſband them from immediate ſervice.

DISCHARGER, or **DISCHARGING** *Rod*, in *Electricity*, conſiſts of a handle of glaſs or baked wood, A (*Tab. Electricity*, *fig.* 3.) and two bent metal rods BB, terminating in points, and capable of being ſcrewed into the knobs DD, which move by a joint C, fixed to the handle A. Thus it may be uſed either with the points or balls, as occaſion requires; and by being made moveable on a joint, it may be applied to larger or ſmaller jars at pleaſure. By bringing one of theſe knobs or points to one coated ſide of a charged electric, and the other to the other ſide, or to any conductor connected with it, the communication is completed between the two ſides, and the electric is *diſcharged*.

Discharger, *the univerſal*, contrived by Mr. Henly, conſiſts of a flat board A (*Tab.* II. *Electricity, fig.* 14.) fifteen inches long, four broad, and about one inch thick, and two glaſs pillars B, B, cemented in two holes upon the board A, and furniſhed at their tops with braſs caps; each of which has a turning joint, and ſupports a ſpring tube, through which the wire DC ſlides. Each of theſe caps is compoſed of three pieces of braſs, connected in ſuch a manner that the wire DC not only ſlides through the ſocket, but may be moved both vertically and horizontally. Each of the wires DC, DC is furniſhed with an open ring at one end, and at the other end with a braſs ball D, which, by a ſhort ſpring ſocket, may be ſlipt on its pointed extremity, or removed from it at pleaſure. E repreſents a ſtrong circular piece of wood, five inches in diameter, in the ſurface of which a ſlip of ivory is inlaid; it reſts on a cylindrical foot, fitting the cavity of the ſocket F, which is faſtened in the middle of the board A, and by means of a ſcrew G, the circular board may be fixed at any required height. To this inſtrument belongs a ſmall preſs H, compoſed of two oblong pieces of board, which may be preſſed againſt each other by two ſcrews *a, a*; the lower of theſe boards has a cylindrical foot of the ſame ſize with that of the circular board E; and thus the preſs may be fixed in the ſocket F, in the room of E. Cavallo's Electr. p. 164, &c.

This inſtrument may be uſed in a variety of electrical experiments. Thus, glaſs may be ſtained with metals, by putting a ſmall ſlip of gold, ſilver, or braſs-leaf, between two ſlips of common window-glaſs, about three inches long, and half an inch wide, and preſſing them between the boards of the preſs H; then, if a ſhock be made to paſs through this metallic leaf, a ſmall part of which projects beyond the ſlips of glaſs at each end, the force of the exploſion will ſo fix the metal to the glaſs, that it cannot be wiped off, or even be affected by any of the common menſtrua, which would otherwiſe diſſolve it. If a ſmooth piece of metal, or ſemi-metal, be fixed on each of the wires, that bear the knobs D, D, and their ſurfaces be brought near each other, ſo that the battery may be *diſcharged* through them, by connecting one wire of the *diſcharger* with the outſide of the battery, and the other wire with the inſide of it, each ſurface will be marked with a central ſpot, and concentric circles, which are more or leſs diſtinct, and more or leſs in number, as the metal upon which they are marked requires a greater or leſs degree of heat to melt it, and as a greater or leſs force is employed. If a plain piece of metal be fixed on one of the wires, and a ſharp-pointed needle on the other, directed to the ſurface of the metal, the exploſion of a battery repeatedly paſſed from one to the other, will gradually mark the ſurface of the metal, oppoſite to the point, with circles conſiſting of all the priſmatic colours; the coloured rings will appear ſooner, and be cloſer to one another, as the point is nearer to the ſurface of the metal; and the number of rings depends on the acuteneſs of the point. See Circular *ſpots*, Colours, and Fairy *Circles*.

DISCIPLE, from *diſco, I learn*, one who learns any thing from another. Thus the followers of any teacher, philoſopher, &c. are called *diſciples*. In the Chriſtian ſenſe, they were the followers of Jeſus Chriſt, in general; but in a more reſtrained ſenſe, the *diſciples* denote thoſe alone who were the immediate followers and attendants on his perſon; of which there were ſeventy, or ſeventy-two. The names *diſciple* and apoſtle are often ſynonimouſly uſed in the goſpel hiſtory; but ſometimes the apoſtles are diſtinguiſhed from *diſciples*, as perſons ſelected from them, to be the principal miniſters of his religion; of theſe there were only twelve. The Latins keep the feſtival of the ſeventy, or ſeventy-two *diſciples*, on July 15; and the Greeks on January 4.

DISCIPLINE primarily ſignifies inſtruction and government; but the word is figuratively applied to a ſtated method of living, according to the rules of ſome profeſſion.

We ſay the *military diſcipline*, the *eccleſiaſtic* or *church diſcipline*, the *regular* or *monaſtic diſcipline*, &c.

We do not ſay *civil diſcipline*, but inſtead thereof policy.

Discipline is alſo uſed in a peculiar ſenſe for the chaſtiſement, or bodily puniſhment, inflicted on a religious, who has been caught delinquent; or even for that which the religious voluntarily undergo, or inflict on themſelves, by way of mortification.

Among all the auſterities practiſed by the ancient monks and ſolitaries, Dupin obſerves, there is no mention made of *diſcipline*: in effect, it does not appear to have been in uſe in antiquity, unleſs to puniſh the monks who had been taken tripping.

It is commonly ſaid to be St. Dominic, and Peter Damian, who firſt introduced the uſe of *diſcipline*; but F. Mabillon notes, that Guy, abbot of Pompoſa, and others, had practiſed it before them. It is pretty certain, the practice was firſt eſtabliſhed in the eleventh century, with deſign to redeem the penances the canons impoſed on divers offences; and at length they came not only to redeem for themſelves, but alſo for others. See F. Mabillon.

Discipline is alſo frequently uſed for the inſtrument wherewith a monk chaſtiſes, or mortifies himſelf; which is uſually made of ropes, knotted hair, or twiſted parchment; ſometimes of broken rods. St. Jerom is painted with *diſciplines* of iron chains, armed with ſpur-rowels, &c. See Flagellation.

Discipline, *Book of*, in the *Hiſtory of the Church of Scotland*, is a common order, drawn up by the aſſembly of miniſters in 1650, for the reformation and uniformity to be obſerved in the *diſcipline* and policy of the church. In this book the government of the church by prelates is ſet aſide, church-ſeſſions are eſtabliſhed, the ſuperſtitious obſervation of faſt-days and ſaints days is condemned, and other regulations for the government of the church are determined. This book was approved by the privy-council, and is called the firſt book of *diſcipline*.

Discipline, *military*, denotes the exerciſe of thoſe laws that are eſtabliſhed for regulating the conduct of military men.

Discipline, *marine*, ſignifies the training up ſoldiers for ſea-ſervice, in ſuch exerciſes and manœuvres as can be performed on board ſhips of war at ſea.

DISCLAIMER, in *Law*, a plea, containing an expreſs denial, renouncing, or *diſclaiming*, of a thing alleged.

As if the tenant ſue a replevin upon a diſtreſs taken by the lord, and the lord avow the taking, ſaying, that he holds of him as his lord, and that he diſtrained for rent not paid, or ſervice not performed; then the tenant, denying to hold of ſuch lord, is ſaid to *diſclaim*; and the lord proving the tenant to hold of him, the tenant loſes his land.

Alſo a man, denying himſelf to be of the blood, or kindred of another, in his plea, is ſaid to *diſclaim* his blood. If a man arraigned of felony, *diſclaim* goods; being cleared, he loſes them.

Thus likewiſe in chancery, if a defendant by his anſwer renounces having any intereſt in the thing in queſtion, this is a *diſclaimer*: to which may be added, a *diſclaimer* by renouncing an executorſhip of a will, or the right to an adminiſtration.

DISCLOSED, a term uſed for chickens or hawks newly hatched; alſo for buds or flowers juſt blown.

DISCOBOLI, Δισκοϐολοι, from δισκος and βαλλω, *I throw*, among the *Ancients*, an appellation given to thoſe who gained the victory at the *diſcus*. See Discus.

DISCOIDES *fibula*, in *Natural Hiſtory*, the name of a genus of the echinodermata, or ſea hedge-hogs; the periphery of the baſe of theſe is exactly round, and the body of a convexo-concave figure. The principal ſpecies of this genus is the ſubuclus, which has ſometimes a roſaceous top, the lines being very neat and elegant, ſometimes a plain and ſmooth top; ſometimes it is all over covered with extremely minute and fine ſtriæ, and ſometimes it is much flatter than at others. Klein's Echinoderm.

DISCONTINUANCE, an interruption, intermiſſion, or ceſſation, of the courſe of a thing: as, *diſcontinuance* of poſſeſſion, of a plea, proceſs, &c.

The effect of a *diſcontinuance of poſſeſſion* is, that a man may not enter on his own land, or tenement alienated, whatever his right be to it, of himſelf, or by his own authority; but muſt bring his writ, and ſeek to recover poſſeſſion by law. As if a man alien the lands he holdeth in right of his wife; or a tenant in tail make any feoffment, or leaſe for life not warranted by the ſtat. 32 Hen. VIII. by fine, or livery of ſeiſin; ſuch alienations are called *diſcontinuances*.

The effect of *diſcontinuance of proceſs*, is, that the opportunity of proſecution is loſt, and not recoverable, but by beginning a new ſuit. For to be *diſcontinued*, and to be put off without a day, are the ſame thing; and are nothing leſs than to be finally diſmiſſed the court.

Diſcontinuance of proceſs, at *Common Law*, is helped by appearance; and by ſtatute 32 Hen. VIII. cap. 30. all *diſcontinuances*, miſcontinuances, and negligences therein, of plaintiff or defendant, are cured after verdict.

Discontinuance *of plea*, is when divers things ſhould be pleaded to in a ſuit or action, and ſome are omitted. If a dea defendant's plea anſwers to part only, it is a *diſcontinuance*; and the plaintiff may take judgment by *nil dicit*, for that which is not anſwered; but if the plaintiff plead over, the whole action is *diſcontinued*.

If a juſtice-ſeat be *diſcontinued* by the not coming of the juſtices, the king commonly renews the ſame by his writ, &c.

DISCORD, in *Muſic*, the relation of two ſounds, which are always, and of themſelves, diſagreeable, whether applied in ſucceſſion or conſonance.

If two ſimple ſounds be in ſuch a relation of tune, that is, have ſuch a difference of tune, as that, being ſounded together, they make a mixture, or compound ſound, which the ear receives with diſpleaſure, it is called a *diſcord*; as, on the contrary, if it receive it with pleaſure, it is called a *concord*; and whatever two ſounds make an agreeable, or diſagreeable compound, they will have the ſame effects reſpectively, if they be applied in ſucceſſion.

As concords are denominated harmonical intervals, ſo may *diſcords* be denominated unharmonical intervals.

Diſcords are diſtinguiſhed into *concinnous*, and *inconcinnous* intervals.

Discords, *concinnous*, by the ancients called *ecmeli*, are ſuch as are apt, or fit for muſic, next to, and in combination with concords. Theſe are relations, which in themſelves are neither very agreeable, nor very diſagreeable; and have only a good effect in muſic by their oppoſition, as they heighten and illuſtrate the more natural and eſſential principles of the pleaſure we ſeek for; or, as by their mixture, and combination with them, they produce a variety neceſſary to our being better pleaſed.

Notwithſtanding this, they are ſtill called *diſcords*; as the bitterneſs of ſome things may help to ſet off the ſweetneſs of others, and yet they may ſtill be bitter.

Discords, *inconcinnous*, by the ancients called *ecmeli*, are ſuch as are never choſen in muſic; as having too great a harſhneſs in them, though even the greateſt *diſcord* is not without its uſe.

The eſſential principles of harmony, harmonical intervals, or concords, are but few, in number only eight; the indefinite number of other ratios are all *diſcords*. Hence Mr. Malcolm ſhews the neceſſity of taking ſome of the leſs untoward of theſe *diſcords* into the ſyſtem of muſic. In order to this, he conſiders the effect of having none but harmonical intervals in the ſyſtem of muſic.

1. With reſpect to a ſingle voice: if that ſhould move always from one degree of tune to another, ſo as every note, or ſound to the next, were in the ratio of ſome concord; the variety, which is the life of muſic, would ſoon be exhauſted. For to move by no other than harmonical intervals, would not only want variety, and ſo weary us with a tedious repetition of the ſame things, but the very perfection of ſuch relations of ſounds would cloy the ear, in the ſame manner as ſweet and luſcious things do the taſte; which, for that reaſon, are artfully ſeaſoned with the mixture of ſour and bitter.

2. With reſpect to muſic in parts, i. e. when two or more voices join in conſonance, the general rule is, that the ſucceſſive ſounds of each be ſo ordered, that the ſeveral voices ſhall be all concords. Now there ought to be a variety in the choice of theſe ſucceſſive concords, and alſo in the method of their ſucceſſions; all which depends on the movement of the ſingle parts. So that, if theſe could only move in an agreeable manner by harmonical diſtances, there are but a few different ways wherein they could move from concord to concord; and hereby we ſhould loſe much of the raviſhment of ſounds in conſonance. As to this part then, the thing demanded is a variety of ways whereby each ſingle voice, or more in conſonance, may move agreeably in the ſucceſſive ſounds, ſo as to paſs from concord to concord, and meet at every note in the ſame, or a different concord, from what they ſtood in at the laſt note.

In what caſes, and for what reaſons, *diſcords* are allowed, the rules of compoſition muſt teach; but only joining theſe two conſiderations, &c. we ſee how imperfect muſic would be without any other intervals than concords.

Beſide the *concinnous diſcords*, uſed deſignedly in muſic, there are ſeveral other *diſcord* relations, which happen unavoidably, in a kind of accidental and indirect manner. Thus, in the ſucceſſion of ſeveral notes, there are to be conſidered not only the relations of thoſe which ſucceed others immediately, but alſo of thoſe betwixt which other notes intervene. Now the immediate ſucceſſion may be conducted ſo as to produce good melody; yet among the diſtant notes there may be very groſs *diſcords*, that would not be tolerable in immediate ſucceſſion, and far leſs in conſonance. And ſuch *diſcords* are actually contained in the ſcale of muſic. Thus, taking any one ſpecies, e. gr. that with the greater third, and marking the degrees betwixt each term and the next; though the progreſſion be melodious, as the terms refer to one common fundamental, yet there are ſeveral *diſcords* among the mutual relations of the terms; e. gr. from 4th to 7th *g*, is 32 : 45; and from 2d *g* to 6th *g*, is 27 : 40; and from 2d *g* to 4th, is 27 : 32; all *diſcords*.

The ſpecies of counterpoint, wherein there is a mixture of *diſcords*, is called *figurative counterpoint*; of which there are two kinds; that wherein the *diſcords* are introduced occaſionally, to ſerve as tranſitions from concord to concord; and that wherein the *diſcord* bears a chief part in the harmony.

Diſcords may tranſiently paſs upon the unaccented parts of the meaſure, without any offence to the ear: this is called *ſuppoſition*, becauſe the tranſient *diſcord* ſuppoſes a concord immediately following.

The harmony of *diſcords* is that wherein the *diſcords* are made uſe of as a ſolid and ſubſtantial part of the harmony. For, by a proper interpoſition of a *diſcord*, the ſucceeding concords receive an additional luſtre. Thus the *diſcords* are in muſic what the ſtrong ſhades are in painting.

The *diſcords* are the 5th when joined with the 6th; the 4th joined with the 5th; the 9th is of its own nature a *diſcord*; ſo is the 7th.

Theſe *diſcords* are always to be introduced into the harmony with due preparation, and muſt be ſucceeded by concords; which is commonly called the *reſolution of the diſcord*. The *diſcord* is prepared by ſubſiſting firſt in the harmony in quality of a concord; that is, the ſame note, which becomes the *diſcord*, is firſt a concord to the baſs-note immediately preceding that to which it is a *diſcord*.

The *diſcord* is reſolved by being immediately ſucceeded by a concord deſcending from it by the diſtance only of greater 2d, or leſſer 2d.

Discord, *apple of*, *pomum diſcordiæ*, a phraſe uſed to ſignify the ſubject, or occaſion of ſome miſunderſtanding in a ſociety. It is borrowed from the heathen mythology: the poets feign, that at the marriage of Thetis and Peleus, the goddeſs of *diſcord* threw a golden apple, whereon were written theſe words, *To the faireſt*; which immediately ſtirred up a diſſenſion between Juno, Pallas, and Venus, each pretending a title to the apple.

DISCOVERT, in *Law*, denotes an unmarried woman.

DISCOVERY, in *Law*, the act of revealing or diſcloſing any matter by the defendant, in his anſwer to a bill filed againſt him in a court of equity.

DISCOVERY *of accomplices* is provided for in the caſes of robbery, burglary, houſe-breaking, and larceny, to the value of five ſhillings, from ſhops, warehouſes, ſtables, and coach-houſes, by 4 and 5 W. and M. cap. 8. 10 and 11 W. III. cap. 23. and 5 Anne, cap. 31. which enact, that if any ſuch felon, being out of priſon, ſhall diſcover two or more perſons who have committed the like felonies, ſo that they may be convicted, he ſhall in moſt caſes receive a reward of 40*l*. and in general be entitled to a pardon of all capital offences, excepting only murder and treaſon. And if any ſuch perſon, having feloniouſly ſtolen any lead, iron, or other metals, ſhall *diſcover* and convict two offenders of having illegally bought or received the ſame, he ſhall by ſtat. 29 Geo. II. cap. 30. be pardoned for all ſuch felonies committed before ſuch *diſcovery*.

Discovery *by bankrupt*. See Certificate *of Bankrupt*.

Discovery, in *Dramatic Poetry*, a manner of unravelling a plot, or fable, very frequent in tragedies, comedies, and romances; wherein, by ſome unforeſeen accident, a *diſcovery* is made of the name, fortune, quality, and other circumſtances, of a principal perſon, which were before unknown.

A *diſcovery* ſhould never be in vain, by leaving thoſe who thus diſcover one another in the ſame ſituation and ſentiments they were in before: in effect, thoſe *diſcoveries*, which are immediately followed by a peripetia, or change of fortune of ſome principal character, whereon the unravelling depends, are always the moſt beautiful.

One of the fineſt *diſcoveries* ever brought upon the ſtage, is that of Oedipus in Sophocles; for the minute he finds himſelf the ſon of that Jocaſta, who was then his wife, he becomes of the moſt happy, the moſt miſerable of all men.

There are three ſorts of *diſcoveries*: the firſt by certain marks in the body, either natural, or accidental: ſuch is that of Ulyſſes, who having received a wound in the thigh by a boar, before the Trojan war, is diſcovered by the old nurſe, upon waſhing his legs after his return home incognito.

The ſecond by tokens: as the caſket of things, which the prieſts found with Ion when he was expoſed, diſcovers Creuſa, whom he was going to kill, to be his mother.

The third is made by remembrance: that is, when the ſight or hearing of any thing occaſions us to recollect our misfortunes. Thus, when Ulyſſes heard Demodocus ſing his actions at Troy, the memory of them ſtruck him, and drew tears from his eyes, which diſcovered him to Alcinous.

But the fineſt ſort is, that which ariſes from the ſubject, or incidents of the fable; as that of Oedipus from his exceſſive curioſity, and the letter that Iphigenia ſent by Pylades.

DISCOUNT, in *Commerce*, a ſum deducted, or retained in hand, upon paying a greater. See DEDUCTION.

The term is much uſed among mechanics, and manufacturers, who keep workmen, journeymen, labourers, &c. for the ſums advanced them before-hand, which are diſcounted when the payments are made in courſe.

DISCOUNT is more particularly uſed for an allowance made on a bill of exchange, or any other debt not yet become due; to induce the acceptor, or debtor, to advance the money.

In the uſual mode of calculating this *diſcount*, it is ſuppoſed that the whole intereſt which might be made of the debt till it becomes payable, ſhould be *diſcounted*: but this is not juſt; for though it be true, that from this time to the time when the debt becomes due, ſuch intereſt might be made of it, yet it is not true, that by paying the whole debt without *diſcount*, the debtor loſes ſo much at this time as that intereſt; becauſe he cannot be ſaid to have loſt it, till the time comes when he ſhould receive it; and therefore he cannot be ſaid to loſe any more at this time than ſuch a ſum, as being laid out at intereſt from this time till the time of payment of the debt would amount to the intereſt of the debt for the ſame time: in order to obtain this ſum, find the amount of 1*l.* for the given time, which, at the rate r and for the time t, will be $1+rt$. See INTEREST. And rpt is the intereſt of the principal p for the ſame time; therefore $1+rt:1::rpt:\frac{rpt}{1+rt}$, which is the *diſcount* required. Or, otherwiſe, find a principal, which, being laid out at a certain rate of intereſt for the given time of *diſcount*, will amount to the debt: this principal is its preſent worth, and the difference between this and the debt is the true *diſcount*. Thus $1+rt:1::p:\frac{p}{1+rt}$: and $p-\frac{p}{1+rt}=\frac{prt}{1+rt}$ the true *diſcount* as before. Hence we have the following rule: divide the continual product of the debt, rate and time by the ſum of 1 and the product of the rate and time. To find the annual *diſcount* at 3 *per cent.* divide .03 by 1.03; at $3\frac{1}{2}$ *per cent.* .035 by 1.035; at 4 *per cent.* .04 by 1.04, &c. and the ſeveral quotients will be the *diſcounts* required. Thus,

At 3 *per cent.* the *diſcount* is .0291,2621,3592.
$3\frac{1}{2}$ - - - .0338,1642,5121.
4 - - - .0384,6153,8462.
$4\frac{1}{2}$ - - - .0430,6220,0957.
5 - - - .0476,1904,7619.
6 - - - .0566,0377,3585.
8 - - - .0740,7407,4074.
10 - - - .0909,0909,0909.

The *diſcount* of 1*l.* for one year multiplied by any principal will give the annual *diſcount* of that principal: e. g. the *diſcount* of 100*l.* for a year at 5 *per cent.* is 4.7619*l.* &c. or 4*l.* 15*s.* 2*d.* $\frac{3}{4}$: and 95*l.* 4*s.* 9*d.* $\frac{1}{4}$ will amount to 100*l.* in a year at this intereſt: whereas it is the common practice to allow 5*l.*

The *diſcount* on any debt for one year being found equal to $\frac{pr}{1+r}$, as $t=1$, Dr. Harris in his Lexicon directs to find the *diſcount* of the ſame debt for any part of one year, by taking the proportional part anſwering to the time, as the 365th part of the whole *diſcount* for that of a day, &c. But it is eaſy to perceive the erroneouſneſs of this rule, as well as of the tables which he has given founded upon it. By his rule $1:\frac{pr}{1+r}::t:\frac{prt}{1+r}$ inſtead of $\frac{prt}{1+rt}$ the *diſcount* required: the former quantity is evidently leſs than the latter, if t be a fraction, but greater when t is a whole or mixt number. The following rule, by which Mr. Smart has conſtructed his tables, which are the moſt accurate of this kind, will give a ſimilar reſult with the theorem already propoſed. Find the intereſt of 1*l.* for any day or number of days, at any given rate; then divide unit by the ſum of 1*l.* and its intereſt; and the arithmetical complement of the quotient will be the required *diſcount*. Example at 5 *per cent.*

1*l.* with its intereſt for 1 day is 1.0001,3699
2 - 1.0002,7397, &c.

Then divide unit by	The quotients are,	And arithmetical complements,	Diſcounts of 1*l.* for
1.0001,3699	.9998,6303	.0001,3697	1 day
1.0002,7397	.9997,2610	.0002,7390	2
1.0004,1096	.9995,8921	.0004,1079	3
1.0005,4795	.9994,5235	.0005,4765	4
1.0006,8493	.9993,1554	.0006,8446	5
1.0008,2192	.9991,7876	.0008,2124	6
1.0009,5890	.9990,4202	.0009,5798	7
1.0010,9589	.9989,0531	.0010,9469	8
1.0012,3288	.9987,6864	.0012,3136	9
1.0013,6986	.9986,3201	.0013,6799	10
1.0136,9863	.9864,8649	.0135,1351	100
1.0273,9726	.9733,3333	.0266,6667	230

Thus a table of *diſcount* may be formed for any number of days. See ſuch a table at twelve ſeveral rates in Smart's Tables, 4to edit. See alſo on this ſubject Malcolm's Arithm. book vi. chap. 10.

Diſcounts are alſo frequently given for the payment of dubious, or bad debts.

DISCOUNT is alſo uſed among merchants when they buy commodities on truſt, with a condition, that the ſeller ſhall *diſcount* ſo much with him *per cent.* for each payment made before the time expired. See PROMPT *payment*.

The Sieur de la Porte diſtinguiſhes between theſe two kinds of *diſcount*: the firſt, or that upon bills of exchange, is reckoned like the exchange, at the rate of ſo much *per cent.* E. gr. At 2 *per cent. diſcount* on a hundred pounds, there is only ninety-eight pounds to pay: whereas that on commodities, is not only laid on the hundred pounds, but on the hundred and *diſcount* added together. So that *diſcounting* for goods at 10 *per cent.* there is only eight abated on a hundred and eight, and not on the hundred. This laſt, he ſays, is the true *diſcount*.

DISCOUNT is alſo uſed with leſs propriety for the tare, or waſte of any commodity, ſum, &c.

DISCOURSE, in *Logic*, from *diſcurro*, *I run over*, an operation of the human mind, whereby it paſſes, or proceeds from one thing to another, that is, from a known thing to an unknown.

The ſchoolmen define it an act of cognition, whereby the mind deduces one thing from another: this it does, when, in conſequence of an aſſent given to one propoſition, it yields aſſent to another: ſo that *diſcourſe* conſiſts in a dependency of aſſents; and ſuppoſes ſuch an order between the acts, that that belonging to the conſequent ariſes from that belonging to the antecedent. So that the intellect is then ſaid, *diſcurrere*, *to diſcourſe*; when, from an aſſent to one or more propoſitions, it infers or draws an aſſent to another.

The object of *diſcourſe*, therefore, or that about which the intellect is employed in *diſcourſing*, is the connexion of extremes conſidered with regard to ſome third, or medium: thus, when it judges, that every reaſonable animal is riſible, affirming, that there is a connexion between riſibility and rationality; and then finds, there is likewiſe a connexion betwixt man and reaſonable animal; and afterwards gathering from the connexion found between riſible and man, with rational, that man and riſible have likewiſe a connexion, as both are connected with rational; it is ſaid to *diſcourſe*.

Hence it appears, that *diſcourſe*, whereon men uſe to value themſelves, does really betray the infirmity of the human underſtanding; as it denotes a chain or ſcale of ſeveral ſucceſſive acts of cognition neceſſary to arrive at a truth. So that there is no *diſcourſe* in God, who underſtands all things originally and truly. See REASONING.

DISCOURSE, in *Rhetoric*, is uſed in the ſame ſenſe with ORATION.

DISCOUS *Flower*. Botaniſts reckon two claſſes of plants with a *diſcous flower*. 1. Such as have the flower compounded, and the ſeed pappous, but the leaves and ſtalks not milky when broken. 2. The corymbiferous plants, whoſe flowers are compounded into a *diſcous* figure, but their ſeeds not pappous. Of the former kind are the flea-banes, ragweeds, groundſels, &c. and of the latter are daiſies, chamomile, tanſy, wormwood, &c. Theſe are diſtinctions founded by Mr. Ray, but not regarded by the later botaniſts.

DISCRETE, or DISJUNCT, *Proportion*, is, when the ratio between two or more pairs of numbers, or quantities, is the ſame, and yet there is not the ſame proportion between all the four numbers.

Thus, if the numbers 6 : 8 :: 3 : 4 be conſidered; the ratio between the firſt pair, 6 and 8, is the ſame as that between 3 and 4, and therefore theſe numbers are proportional: but it is only *diſcretely*, or *disjunctly*; for 6 is not to 8, as 8 to 3; that is, the proportion is broken off between 8 and 3, and is not continued all along, as it is in theſe following, which are called *continual proportionals*, viz. 3 : 6 : : 12 : 24.

Discrete *Quantity*, is ſuch as is not continued and joined together.

Such is a number, whoſe parts, being diſtinct units, cannot be united into one *continuum*; for in a *continuum* there are no actual determinate parts before diviſion, but they are potentially infinite; wherefore it is uſually and truly ſaid, that continued quantity is diviſible *in infinitum*. See Continuity.

DISCRETION, in *Law*, the faculty of diſcerning between right and wrong; and therefore whoever hath power to act at *diſcretion*, is bound by the rule of reaſon and law. 2 Inſt. 56. 298. Infants, &c. under the age of *diſcretion*, are not puniſhable for crimes; and want of *diſcretion* is a good exception againſt a witneſs. 2 Hawk. 434. See Age, and Infancy.

DISCRETIONE, in the *Italian Muſic*, is uſed to direct the finger or player to execute his part with care diligently.

DISCRETIVE *Propoſitions*, are thoſe where various judgments are made, and denoted, by the particles *but*, *notwithſtanding*, or by words of the like nature either expreſſed, or underſtood. Thus, fortune may deprive me of my wealth, *but* not of my virtue; they, who croſs the ſeas, change their climate, *but* not their diſpoſition; are called *diſcretive propoſitions*.

DISCUS, among the *Ancients*, a name given to a round ſhield, conſecrated to the memory of ſome famous hero, and hung up in the temples of their gods, as a trophy of ſome great action.

From the figure of this *diſcus*, or rather of that which the Greeks and Romans uſed to divert themſelves with, eſpecially at their public games, and which was a round quoit of braſs, comes the word ſo much in uſe among aſtronomers, viz. the *diſc* of the ſun, or moon. See Disc.

Discus, Disceus, or Disciformis *Cometa*, a comet or fiery meteor reſembling a round diſh or platter. The chief of this kind is called a ſolar comet, from the likeneſs of its rays to thoſe of the ſun; it is called alſo *roſa* and *chryſeus*, from its bright ſilver colour mixed with a golden or amber one.

DISCUSSION, in matters of literature, ſignifies a clear treating, or handling of any point, or problem. The word imports a ſhaking off, or diſpelling the difficulties and obſcurities with which a thing was embarraſſed. We ſay, ſuch a point was well *diſcuſſed*, when it was well treated of, and cleared up.

Discussion is alſo uſed, in a medicinal ſenſe, for a diſperſing the matter of any tumour, or ſwelling, through the pores of the body; or an evacuation of ſome thin matter gathered in any part, by inſenſible perſpiration.

DISCUSSORIA, *Diſcutientia*, διαφορητικα, *diſcutients*. See Discutients.

DISCUTIENTS, in *Medicine*, either repellers or remedies proper to open the pores, and evacuate the redundant or peccant humours of the body by inſenſible perſpiration or otherwiſe.

Diſcutients are in this laſt ſenſe the ſame with what we otherwiſe call *diaphoretics*.

DISDIAPASON, in *Muſic*, a compound concord, in the quadruple ratio of 4 to 1, or of 8 to 2.

The *diſdiapaſon* is produced when the voice goes from the firſt tone to the fifteenth, and may be called a *fifteenth*.

The voice ordinarily does not go further than from its firſt tone to the *diſdiapaſon*; i. e. it does not go beyond the compaſs of a double octave; for the *diſdiapaſon* is an octave doubled. It may ſometimes riſe ſeveral tones above a *diſdiapaſon*, but the effort or ſtruggle diſfigures it, and makes it falſe. In reality, the ancient ſcale, or diagramma, only extended to a *diſdiapaſon*.

Disdiapason-*Diapente*, in *Muſic*, a concord in a ſextuple ratio of 1 to 6.

Disdiapason-*Diateſſaron*, a compound concord in the proportion of 16 to 3.

Disdiapason-*Ditone*, a compound conſonance in the proportion of 10 to 2.

Disdiapason-*Semiditone*, a compound concord in the proportion of 24 to 25.

DISEASE, in *Medicine*, that ſtate of a living body, wherein it is prevented the exerciſe of any of its functions, whether vital, natural, or animal. See *Acute* and *Chronic* Disease.

Or, *diſeaſe* is an indiſpoſition contrary to nature, whereby the action of ſome part is immediately injured.

Or, *diſeaſe* is a depraved and diſorderly ſtate of the ſolid, and fluid parts; whereby all, or ſome of the functions, either of the body, or mind, or both, are either aboliſhed, or impaired.

An ingenious author of a late Latin treatiſe, De Purgatione, holds the eſſence of a *diſeaſe* to conſiſt in a want of that equilibrium between the ſolid and fluid parts, which is neceſſary to the maintenance of health: others add, that all *diſeaſes* ariſe either from too lax, or too ſtrict a tenſion of the fibres.

Of all animals, man is ſubject to the moſt *diſeaſes*; and of men, the ſtudious and ſpeculative are moſt expoſed thereto. Other animals have their *diſeaſes*; but they are in ſmall number: nor are plants without them; though their maladies ſcarce exceed half a ſcore. The ancients deified their *diſeaſes*: Voſſius De Idolol. lib. viii. cap. 5. Some *diſeaſes* only impair the uſe of the part immediately affected; as the ophthalmia, gout, &c. Others deſtroy it entirely; as the *gutta ſerena*, palſy, &c. Some affect the whole body; as the fever, apoplexy, epilepſy, &c. Others only impair a part; as the aſthma, colic, dropſy, &c. Some only affect the body; as the gout: others diſturb the mind; as melancholy, delirium, &c. Laſtly, others affect both the body and mind; as the mania, phrenſy, &c.

The colder the country, in general, the fewer and the leſs violent are the *diſeaſes*. Scheffer tells us, that the Laplanders know no ſuch thing as the plague, or fevers of the burning kind, nor are ſubject to half the diſtempers we are. They are robuſt and ſtrong, and live to eighty, ninety, and many of them to more than a hundred years; and, at this great age, they are not feeble and decrepid, as with us, but a man of ninety is able to work or travel as well as a man of ſixty with us. They are ſubject, however, to ſome *diſeaſes* more than other nations: thus they have often diſtempers of the eyes, which is owing to their living in ſmoke, or being blinded by the ſnow. Pleuriſies and inflammations of the lungs are alſo very frequent among them; and the ſmall-pox often rages with great violence. They have one general remedy againſt theſe, and all other internal *diſeaſes*: this is the root of that ſort of moſs, as Scheffer expreſſes it, which they call *jerth*. They make a decoction of this root in the whey of rein-deer milk, and drink very large doſes of it warm, to keep up a breathing ſweat; if they cannot get this, they uſe the ſtalks of angelica boiled in the ſame manner: they have not ſo great an opinion of this as of the other remedy; but the keeping in a ſweat, and drinking plentifully of diluting liquors, may go a great way in the cure of their *diſeaſes*, whether either the one, or the other of the drugs, have any virtue or not. They cure pleuriſies, by this method, in a very few days; and get ſo well through the ſmall-pox with it, that very few die of it.

It has been always obſerved, that people of particular places were peculiarly ſubject to particular *diſeaſes*, which are owing to their manner of living, or to the air, and effluvia of the earth and waters. Hoffman has made ſome curious obſervations on *diſeaſes* of this kind. He obſerves, that ſwellings of the throat have always been common to the inhabitants of mountainous countries: and the old Roman authors ſay, Who wonders at a ſwelled throat in the Alps? The people of Swiſſerland, Carynthia, Styria, the Hartz foreſt, Tranſylvania, and the inhabitants of Cronſtadt, he obſerves, are all ſubject to this *diſeaſe* from the ſame cauſe. See Bronchocele.

The French are peculiarly troubled with fevers, with worms, and with hydroceles and ſarcoceles; and all theſe diſorders ſeem to be owing originally to their eating very large quantities of cheſnuts. The people of our own nation are peculiarly afflicted with hoarſeneſſes, catarrhs, coughs, dyſenteries, conſumptions, and the ſcurvy: and the women with the *fluor albus*, or whites; and children, with a *diſeaſe* ſcarce known elſewhere, which we call the rickets. In different parts of Italy, different *diſeaſes* reign. At Naples, the venereal *diſeaſe* is more common than in any other part of the world. At Venice, people are peculiarly ſubject to the bleeding piles. At Rome, tertian agues and lethargic diſtempers are moſt common. In Tuſcany, the epilepſy, or falling ſickneſs. And in Apulia they are moſt ſubject to burning fevers, pleuriſies, and to that ſort of madneſs which is attributed to the bite of the Tarantula, and which, it is ſaid, is only to be cured by muſic.

In Spain, apoplexies are common, as alſo melancholy, hypochondriacal complaints, and bleeding piles. The Dutch are peculiarly ſubject to the ſcurvy, and to the ſtone in the kidneys. Denmark, Norway, Sweden, Pomerania, and Livonia, are all terribly afflicted with the ſcurvy: and it is remarkable, that in Denmark, Sweden, and Norway, fevers are very common; but in Iceland, Lapland, and Finland, there is ſcarce ever ſuch a *diſeaſe* met with; though peripneumonies are very common in theſe places, as alſo *diſeaſes* of the eyes and violent pains of the head. The Ruſſians and Tartars are afflicted with ulcers, made by the cold, of the nature of what we call chilblains, but greatly worſe; and in Poland and Lithuania there reigns a peculiar *diſeaſe*, called the *plica polonica*, ſo terribly painful and offenſive, that ſcarce any thing can be thought of worſe.

The people of Hungary are very ſubject to the gout and rheumatiſm: they are more infeſted alſo with lice and fleas than any other people in the world, and they have a peculiar *diſeaſe* which they call *cremor*.

The Germans, in different parts of the empire, are ſubject to different reigning *diſeaſes*. In Weſtphalia, they are peculiarly troubled with peripneumonies and the itch. In Sileſia, Franconia, Auſtria, and other places thereabout, they are very liable to fevers of the burning kind, to bleedings at the noſe, and other hæmorrhages; and to the gout, inflammations, and conſumptions. In Miſnia they have purple fevers; and the children are peculiarly infeſted with worms In Greece, Macedonia, and Thrace, there are very few *diſeaſes*; but what they have, are principally burning fevers and phrenſies. At Conſtantinople the plague always rages; and in the Weſt Indian iſlands, malignant fevers, and the moſt terrible colics. Theſe *diſeaſes* are called endemic.

As the actions, or conditions of the body, ſo alſo the *diſeaſes*, or defects thereof, may be reduced to three general heads; viz. 1. *Diſeaſes* of the ſolid parts. 2. Thoſe of the fluid parts. And, 3. *Diſeaſes* compounded of both.

A popular ſyllabus of *diſeaſes* may be given, as follows: the ſolid parts, i. e. the bones, and fleſh, may be diſordered five ways; viz. they may be rendered turgid by tumours; cut with wounds; corroded by ulcers, or caries; removed out of their place, as in hernias, prolapſuſes, and diſlocations; or diſcontinued by fractures, and contuſions.

Diſeaſes of the fluids are either in the maſs of the blood, or the ſpirits: thoſe of the blood are reducible to two kinds; thoſe that thicken, and inſpiſſate, or, which amounts to the ſame, retard its motion; and thoſe which attenuate, and diſſolve, and of conſequence accelerate it. To this latter kind belong fevers, and feveriſh affections alone: all the other *diſeaſes* of the blood belong to the former.

In too thick a ſtate of the blood, its principles are too craſs, and its molecules too big; whence a lentor, lazy motion, and even ſtoppage, particularly in the ſinous paſſages of the glands; and hence obſtructions, inflammations, ſchirrhuſes, ſarcomas, verrucæ, puſtules, œdemata, impetigines, and other tumours, and congeſtions, both in the viſcera, and habit of the body: and hence, again, drowſineſs, melancholy, hypochondriacal affections, &c. If this thick blood be too much replete with ſharp acid ſalts, it will deſtroy the texture of the parts, and break out in ulcers; as in phthiſical, ſcrophulous, ſcorbutic, and venereal *diſeaſes*, gangrenes, carboes, cancers, and other eroſive tumours, according to the quality and degree of ſaltneſs and acrimony; and from the ſame ſource ariſe cephalalgias, cardialgias, colics, gouts, rheumatiſms, pleuriſies, &c. which, by abrading the ſolid ſubſtance, frequently emaciate the body.

The *diſeaſes* of the animal ſpirits ariſe either, 1. From an intermiſſion, or retardation of their motion; or a diminution of their quantity: or, 2. From a diſorder in their craſis, or quality.

To the firſt claſs are reduced the catalepſis, apoplexy, coma, carus, palſy, ſtupor, tremor, &c. To the ſecond belong the mania, phrenſy, delirium, fooliſhneſs, melancholy, vertigo, ſpaſms, epilepſy, hyſteric affections, horror, &c. Add, that, as all *diſeaſes* of the blood ariſe from external cauſes, viz. ſome one, or more, of the non-naturals, as food, air, evacuation, &c. ſo thoſe of the ſpirits generally proceed from diſorders of the blood.

Laſtly, the *diſeaſes* of the fluids, whether thoſe in the blood, or ſpirits, are ſeldom confined long thereto; but they preſently come to diſturb and impede ſome of the functions of the ſolid parts; and, at laſt, corrupt the ſubſtance of the ſolids themſelves. Hence compound, or complicated *diſeaſes*, which are infinitely various.

The learned Boerhaave furniſhes us a much more accurate and ſcientifical diviſion of *diſeaſes*, into thoſe of the ſolids and fluids.

DISEASES *of the ſolids* he conſiders, either as of the ſimple and ſimilar parts, or of the organical.

DISEASES, *Similar*, are, 1. Thoſe of the laſt and ſmalleſt fibres; which are reducible to too great tenſion, and laxneſs, too great ſtrength, or weakneſs, and a ſolution of their continuity.

2. Thoſe of the membranes, which, being only aſſemblages of the fibres juſt mentioned, are ſubject to the ſame diſorders.

3. Thoſe of the laſt and ſmalleſt canals, which are formed of ſuch membranes.

4. Of the membranes compoſed of ſuch canals.

5. Of canals, compoſed of ſuch membranes, which are all the greater veſſels of the body.

6. Of the ſolid parts, which are compoſed of canals, compreſſed and grown together, ſo as to be void of humour to diſtend them; or canals growing into one conſiſtent part, the humour hardening together with the veſſel that contained it.

Laſtly, Suppoſing theſe parts all ſound, *diſeaſes* may befal them, with reſpect to their ſtructure, from a vice, or vicious application, of the matter of nutrition.

DISEASES, *Organical*. An organical part, conſiſting of the ſeveral ſimple parts above mentioned, and fitted to perform any office, by means of ſome humour contained in it, may be conſidered, either in itſelf, as a ſolid part, or with reſpect to the humour it contains. In the firſt view, *organical diſeaſes* are reducible to four claſſes.

1. Diſorders in the figure, and the circumſtances thereof; as roughneſs, ſolidity, cavity, &c. To this belong the αναϛομωσις, when one veſſel opens into another; the διαπηδησις, when a rupture is made; διαιρεσις, when a breach is occaſioned by corroſion; the εμφραξις, which is a total obſtruction of the cavity, by a viſcous, grumous matter; the ϛενοχωρια, or narrowneſs of the paſſage; the θλιψις, or compreſſion of the ſides of the cavity; συμφυσις, when the ſides are quite joined; and συνιζησις, when the veſſel is ſo emptied, that, the ſides falling together, the cavity is loſt. See DIAPEDESIS, DIÆRESIS, &c.

2. In the number, where it is either deficient or redundant: but the parts ſeldom err in this reſpect, ſo as to occaſion a *diſeaſe*.

3. In magnitude, to which belong nodes, exoſtoſes, and and calluſes.

4. In the ſituation, and connexion; as, when the ligaments are too long, or too ſhort, when broken, or depraved; alſo, diſtortions, luxations, ſubluxations, herniæ, or ruptures in the groin, ſcrotum, bladder; procidentiæ of the womb, bladder, and rectum; diſorders of the tendons, and muſcles, particularly their flying out of their places; the relaxation, or rupture of the membranous ligament that ſhould retain them.

Laſtly, There is a *diſeaſe*, common both to ſimilar and organical parts, called ſolution of continuity.

DISEASES *of the fluids*, conſidering thoſe fluids ſimply, and in themſelves, may be reduced to diſorders in reſpect of quantity and quality: but conſidering them as contained in ſolids, they may err, too, in place and proportion.

As to the firſt, ſuch an abundance of the humours as diſturbs the animal functions, is called a plethora: as to *diſeaſes* from the defect of humours, we ſcarce know of any.

As to the ſecond, ſuch quality of the humours as diſturbs the animal functions, is called cacochymia. Now, this is either in the fluids, conſidered in themſelves, their own parts, and compoſition; or conſidered as they concur towards conſtituting ſome part of the body.

If the morbid quality be conſidered in the particles of the humour, it muſt either conſiſt in an augmentation of bulk, whence the emphraxis, atrophy, ſymphyſis, and ſynyzeſis; or in the diminution thereof, as in the diapnæ, and ceneangeia; or an increaſe of ſolidity, whence too great an attenuation; or a decay thereof, whence a lentor, ſtagnation, and coheſion; or in the figure, as when of ſpherical it becomes angular, and conſequently, with reſpect to the part it is applied to, ſharp; whence acrimonies, both acid, alkaline, muriatic, ammoniac, ſaponaceous, vitriolic, &c. and oleoſities; or in rigidity, and flexibility; or in elaſticity; or in coheſion, and diviſibility. See ATROPHY, &c.

Again, all the juices being conſidered together, the principal diſorders they are ſubject to, are, too great fluidity, or tenacity; or too much velocity in their veſſels, or too little.

Laſtly, conſidering the fluids as contained in the ſolids, there ariſe divers *diſeaſes*, merely from their changing of place: theſe may be reduced to two claſſes, viz. the groſſer humours, intruding themſelves into the finer canals; and the humours, extravaſating, or getting out among the ſolid parts; whence inflammations, aneuryſms, varices, enchymoſes, œdemas, puſtules, dropſy, ſpongious ſwellings of the head, breaſt, abdomen, and uterus; and emphyſemas.

Add, that the humours collected, and ſtagnating among the parts, grow putrid, purulent, ichorous, eroſive, and ſharp; and thus deſtroy the tender ſtamina, or ſolids; whence ſinuſes, fiſtulas, ulcers, gangrenes, ſphaceluſes, cancers, and the like.

Theſe are the prime differences of the *diſeaſes* of the body; and from theſe ariſe moſt of the reſt; ſo that they may be regarded, not only as *diſeaſes*, but as the cauſes of *diſeaſes*. See each farther explained under its reſpective article in this work.

There is alſo another diviſion of *diſeaſes*, in uſe among phyſicians, taken from certain external accidents, which are common to a great many different *diſeaſes*; which diſtinction, too, has its uſe, though they generally run it too far. *Diſeaſes* are by this diſtinguiſhed, 1. With reſpect to their cauſe, into idiopathy, ſympathy, protopathy, deuteropathy, hereditary, connate, and acquired. 2. With reſpect to their ſubject, into *diſeaſes* of old age, children, adults, men, women, maids, pregnant, parturient; and into endemical, epidemical, &c. 3. With reſpect to ſeaſons, into vernal, autumnal, continued, and intermitting. 4. With reſpect to their effects, into benign, malignant, curable, incurable, mortal, and contagious. 5. With reſpect to their ſtate, into beginning, progreſs, ſtate, declenſion, and end. And laſtly, With reſpect to duration, into moſt acute, which terminate in four days; acute, in twenty; and chronical, which are all thoſe of longer continuance.

DISEASE, *Acute*, is that which terminates, or comes to its period, in a few days; or, as the phyſicians expreſs it, *cito & cum periculo terminatur*.

In this ſenſe, the word ſtands oppoſed to *chronical*. All *diſeaſes* which hold above forty days, are reputed chronical.

Dr. Quincy thinks an *acute diſeaſe* may be defined, that which is attended with an increaſed velocity of blood.

Acute diſeaſes are the more dangerous, in that, beſide the violence of the ſymptoms, if there be not time to empty the *primæ viæ*, it is very difficult to ſtop their progreſs, and ſave the patient.

Acute diſeaſes are uſually divided into thoſe ſimply called *acute*; and thoſe which, by reaſon of the vehemence of the ſymptoms, are called *moſt acute*.

DISEASES, *Chronic*, ſtand in oppoſition to acute *diſeaſes*, which are ſpeedy, and haſten to a criſis; as fevers, ſmall-pox, &c.

Chronic diſeaſes are uſually owing either to ſome natural defect in the conſtitution, or to an irregular manner of living; and evacuation of one kind or another, is nine parts in ten of their remedy, according to Dr. Cheyne.

The ſources of chronical diſtempers, ſays the ſame author, are, 1. Viſcidity in the juices, or the over-largeneſs of their conſtituent particles; which not being ſufficiently broken by the concoctive powers, ſtop, or retard the circulation. Or, 2. Too great abundance of ſharp acrimonious ſalts; whereby the juices themſelves are rendered ſo corroſive, as to burſt or wear out the ſolids. Or, 3. A relaxation, or want of due force and ſpringineſs of the ſolids themſelves.

An exceſs in the quantity of our meat and drinks begets the firſt; the bad condition of the ſame foods, the ſecond; and both together, with want of due exerciſe, the third.

Several authors have given us very compendious theories of *diſeaſes*; reducing them all to ſome one general diſaffection. Bontekoe deduces all the *diſeaſes* of the human frame from the ſcorbutus; Muſgrave, from the arthritis; Dr. Woodward, from the bile. Others imagine all *diſeaſes* the effects of a virus, which has lurked in the ſeed ever ſince the ſin of Adam: Helmont, and Serenus the Dane, take them to depend on ſome extraneous ferment, formed in or out of us. Laſtly, it appearing from the obſervations of Pliny, Kercher, Langius, and Bonomo, that there are little worms in feveriſh blood, puſtules, carboes, and the itch, divers phyſicians have taken occaſion to ſuſpect, that all *diſeaſes* ariſe from inſects.

DISEASES *of ſoldiers*. See DIET, and SOLDIERS.

DISEASES, *Feigned*. The cheat of feigning *diſeaſes*, for idleneſs, or profit ſake, or for other occaſional purpoſes, has been too common in all ages, and is too difficult to be diſcovered in all caſes; though, in many, there are ways of coming at the truth. We have had a very late inſtance of a young lady, who puzzled ſeveral of our beſt phyſicians, to account for the nature of a *diſeaſe*, which ſhowed itſelf in a ſingular kind of excoriations; and the ſecret perhaps had never been diſcovered, had not a bottle of *aqua fortis* been accidentally found in her chamber; the touching the arms, &c. with which, had occaſioned all the appearances, which ſome ſtrange fault in the juices had been before accuſed of.

Diſſimulation in regard to *diſeaſes*, may be reduced to three kinds. In the firſt, the ſickneſs is pretended by words only, and really is not: of this nature are the pretended head-ach, colic, and the like; which, as the patient can only know, the phyſician may always be deceived. In the ſecond, there are not only words for teſtimonies of the ſickneſs, but there appear ſigns and marks of it on the body, which yet are only counterfeited to ſerve certain purpoſes. Scabbineſs, leproſy, and even the exulceration of the lungs may be thus counterfeited; the laſt by a pretended ſpitting of blood. Gravidation is often pretended alſo. Our beggars often contrive the means of theſe to excite compaſſion. In the third kind of diſſimulation of *diſeaſes*, we are to include the concealing a *diſeaſe*, which really exiſts, inſtead of the owning one which does not.

In the diſcovery of theſe deceits, on which the credit of the phyſician often depends, it is not mere medical knowlege that will ſucceed, but there muſt be added to it a ſagacity in exploring all circumſtances and outward accidents, and eſpecially thoſe things which relate to the genius, temper, and ſtate of the perſon ſuſpected. The DÆMONIACS of former ages, exorciſed by prieſts who wanted to propagate the credit of their religion, or their own ſanctity, have generally been cheats of this kind, and might have been diſcovered by any who had talents and opportunities for the proper examinations. Sylvaticus, an Italian author, has given an excellent ſet of rules for the diſcovery of theſe frauds, and all others of pretended ſickneſſes, to which we refer the curious reader.

DISEASES *of infants*. See INFANTS.

DISEASES, *Peſtilential* or *epidemic*. Many think that the cauſe of all theſe is in the air, and is exhaled in vapours through the pores of the earth.

It is generally obſerved, that *peſtilential diſeaſes* ſeize firſt the cattle; which is not wonderful, ſince they naturally carry their noſes near the ground, and ſuck in the vapours as they riſe, or feed on the herbage that is infected by them. It often happens, that the vapours do not riſe ſo high as to affect men at all; but though in this caſe the plague would be naturally confined to the cattle alone, yet it gets among men by means of the food eaten by them, and before tainted with the contagion. There is no doubt but that the fleſh of animals that die of *diſeaſes*, partakes ſomewhat of the nature of theſe *diſeaſes*; and when they are peſtilential, may ſpread a peſtilence among us, which, perhaps, would otherwiſe never have reached us.

The plague once begun, frequently joins itſelf with ſuch other *diſeaſes* as the people it attacks are moſt ſubject to; hence, in the northern nations, where the ſcurvy is frequent, it is often ſeen that the plague and ſcurvy appear mixed. Theſe two *diſeaſes*, in their nature, ſomewhat agreeing, make each other the worſe and more violent; but, on the contrary, there are other *diſeaſes*, depending on ſuch contrary cauſes, that the plague, if the patient ſurvives, proves a cure to them.

Dr. Hodges inſtances the conſumption, and the king's evil, as two *diſeaſes* of this kind; which, though in themſelves of the moſt terrible kind, and when in an advanced ſtage uſually baffling all remedies, yet he ſaw perſons in the plague that laſt raged in London, cured of both by the plague; the ſymptoms of the *diſeaſe* appearing more mild in theſe than in other caſes, and the patients at once recovering of both complaints.

He alſo tells us of ſome people terribly afflicted with the gout for many years, who being at that time affected by the contagion, had the plague with leſs violent ſymptoms than others; and were, on its going off, cured of the gout alſo.

A fever is uſually a concomitant ſymptom of the plague, but it is not an inſeparable ſign of it. A palpitation of the heart is another of the uſual, but not conſtant ſymptoms; where this comes on, it is uſually very violent, and often is ſo loud, that it may be heard at a conſiderable diſtance.

The plague is leſs contagious than is uſually ſuppoſed, and thoſe who eſcape the terror of it, often eſcape it wholly. Hodges gives us an inſtance of a poor woman who had the plague ſoon after her delivery, and ſuckled her young child as ſhe lay ill of it. She had a carbuncle on her breaſt, near the nipple which the child ſucked at, and yet the mother recovered, and the child never caught the infection at all; though this ſeemed a circumſtance under which there could be no eſcaping.

Hodges, treating of the prognoſtics of an imminent plague, tells us, that one very remarkable one is the change of chronic diſtempers in general into acute ones, and thoſe attended with very violent ſymptoms; and a murrain among the cattle happening at the ſame time, form together a prognoſtic not eaſily to be got over, without the terrible ſequel of a general peſtilence.

If the plague is very terrible at its firſt appearance, it never is of long duration; and on the contrary, when it comes, from a ſcarce perceptible beginning, more and more violent, it is generally of a long continuance. What time it takes from the beginning to the height, the ſame it takes from the height to the final period.

The moſt fatal ſymptoms in the laſt plague in London, and which uſually preſaged death very near, were hæmorrhages from the noſe or ears, fluxes of the menſtrua in women, diarrhœas, dyſenteries, and greenneſs and blackneſs of the excrements.

The firſt ſweats coming on without giving eaſe, and long nauſeouſneſs continuing afterwards, are alſo terrible ſymptoms. The pulſe and urine, which are the two great things to judge by in moſt illneſſes, in theſe preſage nothing at all. The pulſe is fallacious in the higheſt degree; and the urine often appears as well in the height of the plague, as while the perſon was in health.

Among the ſeveral preſervatives for particular places, the two beſt are the burning ſweet-ſcented woods in the time, and ſome of the reſins, ſuch as frankincenſe and the like; the other is the firing a number of cannon every morning and evening. Hodges de Peſt. See EPIDEMIC, and PLAGUE.

DISEASES *of Plants.* M. Tournefort, in an expreſs diſſertation on this ſubject, in the Memoires de l'Academie des Sciences, refers all the *diſeaſes* of plants to the following cauſes:

1. The too great abundance of the nutritious juice. 2. The defect, or want of this juice. 3. Some ill qualities it acquires. 4. Its unequal diſtribution in different parts of the plant. And, 5. External accidents.

The *diſeaſes*, principally obſerved by our gardeners, are,

1. Barrenneſs, when the tree, though ſeeming freſh and healthy, bears no bloſſoms; or, if it does, they ſoon fall; or, if they ſet, the fruit drops before it comes to maturity.

2. Blaſting of the buds, occaſioned by a froſt happening when the leaves and bloſſoms are wet; by this means the pores are ſhut, and the vital juices ſuffocated; when, if the ſun break out on a ſudden, they turn yellow, with round fiery ſpecks growing on them; whence frequently proceed tumours, like warts, which, rotting, grow full of maggots. Mr. Mortimer adds, that the want of rain in bloſſoming-time often occaſions the dropping off of the bloſſoms, for want of ſap; he, therefore, recommends the watering them.

3. Conſumption, proceeding from a want of ſuſtenance, through the failure of the nouriſhing juices, or from obſtructions of the veins and roots; or ill digeſtion, and ſecretion of humours, &c.

4. The moſs; an account of which ſee under the article MOSS.

5. The jaundice, which, though it does not hinder the tree from appearing ſound, yet, when it begins to ſprout, the leaves become of a whitiſh green, and, as they grow bigger, turn yellow: this frequently ariſes from external cauſes, as the mildew; but, chiefly, from a ſtony or chalky ſoil, impregnated with an acid ſalt.

6. Mildew, a kind of epidemical *diſeaſe*, moſt frequent and fatal in the ſpring ſeaſon: it is properly a corroſive and nipping dew, proceeding from pent up vapours now exhaled, and returned back on the tender opening buds, which infects them by its acrimony, and obſtructs the circulation of the nutritive juices; by which means the leaves begin to fade and wither, and both the bloſſoms and fruit are much prejudiced.

7. A thick fog, or too abundant dew, Agricola aſſures us, occaſions the ſame *diſeaſes* as the mildew, only in a leſs degree.

8. Falling of the leaves; which happens when the trees, ſprouting too ſoon, are either ſurpriſed by exceſſive heat, or violent cold.

9. Uredo, or ſcorching: of which there are two kinds; the firſt happening upon the fall of a ſubtil dew, or ſmall rain, immediately followed by the piercing beams of the ſun, which ſuddenly cloſes the pores, before dilated, and burns up the leaves: the ſecond happening from the like fervour in the internal parts of the tree, viz. in the pith, occaſioned by ſome inward failing: Agricola imputes it to the fault of the gardeners, who, in tranſplanting trees, frequently cut off the leſſer filaments and roots, as alſo the greater roots, without covering the wounds with wax, or the like.

10. Scurf, or leproſy; a *diſeaſe* chiefly of the bark, cauſed by a too great dilatation of the pores, whereby too much perſpirable matter tranſuding, it hangs and hardens on the bark, which, by this means, chaps and cracks; and thus a ſort of lepra is formed, perſpiration is obſtructed, &c. Add, that this ſcurfy ſkin proves a harbour for vermin, which live both on the bark and tree.

11. The worm, a little animal, generated in the corrupted ſubſtance of the bark, bloſſoms, fruit-leaves, pith, and roots. M. Gentie mentions another kind, called cockchaffers, which ſtick to the roots of young tender trees, and bark, and kill them. There is a third ſort, called breezes, or gad-flies, which gnaw the bark. The worm is a very frequent *diſeaſe*, whereby young hopeful trees are, all of a ſudden, brought to languiſh and decay.

12. Rotten roots, occaſioned chiefly by their being planted too deep. This *diſeaſe* is incurable.

13. Blights; a particular account whereof, ſee under the article BLIGHT.

Some diſorders ariſe in the tree itſelf, and others in the ſoil and other things about it. Of the laſt kind are weeds, which are of the utmoſt ill conſequence to all ſorts of trees while young, and ſhould be pulled up by hand after rain: if they are too ſtrong rooted for this, they muſt be dug up; and this will have a double advantage, as the ſtirring the earth about their roots will do the trees very great good. When the trees are grown to any tolerable height, they require no care about weeds, for they kill them with their own droppings. Suckers are another diſtemperature of trees ariſing from the tree itſelf: they muſt be pulled off, or cut up cloſe to the place where they come out, opening the earth to come at them there. Over-much wet often is a very great prejudice to trees, and eſpecially to thoſe kinds which naturally love a dry ſoil. This is to be remedied by cutting drains: and if a drip fret the body of the tree by the head (which will certainly decay it), the place muſt be firſt cut ſmooth, and then ſome loam or clay, mixed well with horſe-dung, is to be applied to the place, which will defend it from miſchief till a new bark is formed over it. All wounds made in trees in winter are much harder to cure than thoſe made in ſummer; and for theſe it is proper to add ſome tallow to the mixture of loam and dung.

When trees are bark-bound, which is eaſily ſeen by the unnatural tightneſs and ſtraining of the bark over them, it is to be remedied by cutting through the bark with a knife from the top to the bottom of the tree. This may ſeem a dangerous remedy to thoſe who have not experienced it, but it never was found to do any injury to trees. It is to be done in February or March; and if the wound gape very much, it may be filled up with cow-dung, which will defend the tree from injury till it heals. The digging about the root of the tree is a very good practice alſo on this occaſion, and the cutting off the dead or withered branches.

The grubs of beetles called teredines and coſſi, which get between the bark and the tree, do great miſchief: if the places can be found out where they lie, it is proper to pierce into the bark with a pointed inſtrument upon them, and then to open a ſmall hole below to let out whatever moiſture may be there. When trees of the fruit kind are burnt up and bliſtered on the bark with hot and dry ſeaſons, and this is followed by a vaſt number of the pucerons or tree-lice, which feed on the juices, ſome recommend the boring a large hole in the main root, and pouring in ſome brandy, then ſtopping up the hole with a pin of the ſame wood. The tree ſuffers nothing by this, but the juices are ſo much altered for the preſent by it, that theſe animals do not like them, and conſequently quit their habitation. See PUCERON.

If a tree is by any accident barked or ſtripped all round, ſo that it cannot grow any longer, the proper method is to cut it off juſt above ſome principal branch; the ſtump muſt be cut off ſlanting and covered with clay, and the branch will ſoon become the body of a tree in the place of the other: the place where the ſtump is cut off being covered with a bark in the manner of a tree that is grafted.

Deer and hare, as alſo rabbits, are apt to bark trees, and do them great miſchief. The defences againſt deer are by paling them round, or painting the lower part of the tree, but the firſt is much the better method. The hares and rabbits may be kept off by tying bands of ſtraw round the foot of every tree as far as they can reach. Evelyn recommends the rubbing them over with human dung made into a ſoft paſte with urine, ſo that it may be laid on with a bruſh; but this is attended with great trouble, as it muſt be renewed after every hard rain. Some uſe tar and lime mixed together, but this always damages the tree more than theſe creatures would have done; and in general ſtraw-bands, where any thing is neceſſary, do beſt.

DISEMBARK, ſignifies to land goods from on ſhip-board.

DISEMBOGUE. When a ſhip paſſes out of the mouth of ſome great gulf, or bay, they call it *diſemboguing*. They ſay, alſo, of a river, that at ſuch a place, or after it has run ſo many leagues, it *diſembogues* itſelf into the ſea.

DIS-ERGOT, in the *Manege*. See ERGOT.

DISFIGURING, in *Law*. See MAYHEM.

DISFRANCHISING, the taking away one's freedom, or privilege. See FRANCHISE.

DISGORGE, in the *Manege*, is uſed for diſcuſſing or diſperſing an inflammation or ſwelling: thus, if a horſe's legs are gorged or ſwelled, we ſay he muſt be walked out to *diſgorge* them.

DISGUISE. Perſons doing unlawful acts in *diſguiſe*, are by our ſtatutes ſometimes ſubjected to great penalties, and even declared felons. Thus perſons convicted of hunting in *diſguiſe* in foreſts, parks, or warrens, or of unlawful hunting in the night, are to ſuffer as felons.

But the principal act of parliament in this reſpect is that commonly called the BLACK *act*.

DISH, in *Mining*, is a trough made of wood, about twenty-eight inches long, four inches deep, and ſix inches wide; by which all miners meaſure their ore. If any be taken ſelling their ore, not firſt meaſuring it by the barmaſter's *diſh*, and paying the king's duties, the ſeller forfeits his ore, and the buyer forfeits for every ſuch offence forty ſhillings to the lord of the field, or farmer.

DISHERISON, an old word, of the ſame import as diſinheriting.—Our lord the king, conſidering his own damage, and *diſheriſon* of the crown, &c. Stat. 8 Richard II. Henry IV.

DISHERITOR, a perſon who diſherits, or puts another out of his inheritance.—The ſheriff ſhall, forthwith, be puniſhed as a *diſheritor* of our lord the king, and his crown. Stat. 3 Edw. I.

DISJUNCT *Proportion*. See DISCRETE *Proportion*.

DISJUNCTIVE, ſomething that ſeparates, or disjoins.

Thus, *or*, *neither*, &c. are called *disjunctive* CONJUNCTIONS; which, in connecting a diſcourſe, do yet ſeparate the parts thereof. E. gr. *Aut Cæſar, aut nullus*; *either Cæſar, or nothing*. He *neither* advanced, *nor* gave back.

Disjunctive conjunctions may alſo be called *partitive*, *diſtributive*, and *alternative*.

DISJUNCTIVE *propoſitions*, in *Logic*, are compound propoſitions, conſiſting of two members, or parts, connected by a *disjunctive* conjunction.

The firſt propoſition of a dilemma is uſually a *disjunctive* propoſition:

You muſt either obey the king, or be a rebel.
But you muſt not be a rebel.
Therefore you muſt obey the king.

DISK. See DISC, and DISCUS.

DISLOCATION, the putting a bone out of joint, by ſome violence, uſually called by the phyſicians, *luxation*. See LUXATION.

We have an inſtrument of Mr. Freke's invention for the reduction of *diſlocated* ſhoulders, deſcribed in the Philoſophical Tranſactions, N° 470.

DISMASTED, in *Sea Language*, denotes the ſtate of a ſhip, when ſhe has loſt her maſts by engagement or bad weather.

DISMEMBERED, in *Heraldry*, is applied to birds that have neither feet nor legs; as alſo to lions, and other animals, whoſe members are ſeparated. See MEMBERED.

DISMES, *Decimæ*, in our *Law Books*, tithes. See TITHE.

DISMISSION *of a bill*, in *Chancery*. If the plaintiff does not attend on the day fixed for the hearing, his bill is *diſmiſſed* with coſts. It may be alſo *diſmiſſed* for want of proſecution, which is in the nature of a NON-SUIT at law, if he ſuffers three terms to elapſe without moving forward in the cauſe.

DISMOUNTING, in the *Military Art*, the act of unhorſing. Thus, to *diſmount* the cavalry, the dragoons, or the like, is to make them alight.

To DISMOUNT *the cannon*, is to break their carriages, wheels, and axletrees, ſo as to render them unfit for ſervice.

Horſes are alſo *diſmounted* when they are rendered unfit for ſervice.

DISORDERLY *Houſes*. See NUSANCE.

DISORDERLY *Perſons*. See VAGABONDS.

DISORIENTATED, from *dis*, and *oriens*, *eaſt*, a term applied to a thing that is turned, or removed from the eaſt, to which it was originally directed.

But the word is moſt frequently uſed in a figurative ſenſe, for the diſconcerting, or putting a man out of his way or element. Speak of law to a phyſician, or of phyſic to a lawyer, and they will both be *diſorientated*.

Andrew Marvel uſes the word *diſoccidentated*, inſtead of *diſorientated*: Geneva had *diſoccidentated* our geographer.

DISPARAGEMENT, in *Law*, is uſed for the matching an heir, &c. in marriage, below his or her degree or condition; or againſt the rules of decency.

The word is a compound of the privative particle *dis*, and *par*, *equal*.

DISPART, in *Gunnery*, is uſed for ſetting a mark on the muzzle-ring of a piece of ordnance; ſo that a ſight-line taken upon the top of the baſe ring againſt the touch-hole, by the mark ſet on or near the muzzle, may be parallel to the axis of the concave cylinder. The common way of doing which, is, to take the two diameters of the baſe ring, and of the place where the *diſpart* is to ſtand, and divide the difference between them into two equal parts, one of which will be the length of the *diſpart*, which is ſet on the gun with wax or pitch, or faſtened there with a piece of twine or marlin: but an inſtrument may be made to do it to all poſſible nicety. See *Line of* DIRECTION.

DISPART *Frontlet*. See FRONTLET.

DISPATCH, a letter on ſome affair of ſtate, or other buſineſs of importance, ſent with care and expedition, by a courier expreſs.

The buſineſs of *diſpatches* lies on the ſecretaries of ſtate, and their clerks. The king gives directions to his miniſters abroad by *diſpatches*.

The word is alſo uſed for the packet, or mail, containing ſuch letters.

The French, during the reign of Lewis XIV. had a *conſeil des depêches*, *council of diſpatches*, held in the king's preſence, at which the dauphin, the duke of Orleans, the chancellor, and four ſecretaries of ſtate, aſſiſted.

DISPAUPER. When any perſon, by reaſon of his poverty, is admitted to ſue in FORMA *pauperis*; if afterwards, before the ſuit be ended, the ſame party have any land or perſonal eſtate fall to him, or that the court, wherein his ſuit is depending, think fit for that, or ſome other reaſon, to take away the privilege from him, he is then ſaid to be *diſpaupered*.

DISPENSARY, or DISPENSATORY, a name given to divers collections of recipes for compound medicines, wherein are ſpecified the ingredients, proportions, and circumſtances, of the preparation and mixture; the ſame with what we otherwiſe call a *pharmacopœia*, or *antidotary*. Such are the *Diſpenſaries* of Meſue, Cordus, that of the College of Phyſicians at London, and Edinburgh, Quincy, &c.

The apothecaries, in and about London, are obliged to make up their compound medicines according to the formulas preſcribed in the College *Diſpenſary*, and are enjoined to keep always ready in their ſhops, all the medicines there enumerated.

DISPENSARY is likewiſe uſed for a magazine or office of medicines, kept ready to be *diſpenſed* at the prime coſt of the ingredients, for the benefit of the ſick poor.

Of which kind we have had two or three in London, maintained by the college of phyſicians; one at the college itſelf, firſt begun in the year 1696; another in St. Peter's ally, Cornhill; and a third near Covent-garden: where the beſt medicines were ſold for their intrinſic value, and patients were adviſed every day, but Sunday, at one of the three places. There are at this time ſeveral ſupported by voluntary contribution.

DISPENSATION, in *Law*, &c. a permiſſion to do ſomething contrary to the ſtanding laws; or a relaxation, or ſuſpenſion of a law, on ſome juſt occaſion.

Some confound *diſpenſation* with equity; but they are very different things; for equity is only the correction, or modification, of a law which is too general; but a *diſpenſation* ſuſpends the obligation of the law itſelf, and can, therefore, be only given by the legiſlative power.

The king of France grants *diſpenſations* of age to ſome officers, to be admitted before the legal age: but the greateſt dealer in *diſpenſations* is the pope, who claims the office, *jure divino*, and extends it to every thing: indeed, the more ſober of the Romaniſts themſelves deny, that he can give a *diſpenſation* for a thing contrary either to the divine law, or the law of nature, and confine him to what is contrary to poſitive laws, as to things relating to faſts, marriages, holding ſeveral benefices, &c. And even in theſe things they ſet bounds: thus, ſay they, a *diſpenſation* in the firſt degree of affinity, as that of father and daughter, brother and ſiſter, would be abuſive and null. But it is certain the papal ſee does not apprehend itſelf under any ſuch ſevere reſtrictions.

The right of giving *diſpenſations* they thus prove. It is certain the church has power to make laws; a power which the apoſtles themſelves exerciſed, and which their ſucceſſors have continued to exerciſe after them. Whoever can make a law, can annul it; and much more, can he diſpenſe with it in certain caſes: the church, then, may diſpenſe with the laws itſelf has made, and we find it to have done accordingly in all ages. See PREMUNIRE.

The archbiſhop of Canterbury has a power, by ſtat. 25 Hen. VIII. c. 21. of *diſpenſing* in any caſe, within the realm, wherein *diſpenſations*, not contrary to the law of God, were formerly granted by the ſee of Rome, as well to the king as to his ſubjects: but in extraordinary matters, or in a caſe that is new, the king and council are to be conſulted; and the *diſpenſation* muſt be confirmed under the broad ſeal: and during the vacancy of the archbiſhop's ſee, the guardian of the ſpiritualities may grant *diſpenſations*. Every biſhop, of common right, has the power of *diſpenſing* in common caſes.

DISPENSATIONS *for pluralities*. See CHAPLAIN.

DISPENSATION *of the king*, makes a thing prohibited lawful to be done by the perſon that has it, though a thing evil in itſelf will not admit of a *diſpenſation*. When an offence wrongs none but the king, or if the ſuit is only the king's for the breach of a penal law, that is not to the damage of a third perſon, the king may *diſpenſe:* but in caſe the ſuit is the king's, for the benefit of another, he cannot. It was formerly held that the king might in many caſes *diſpenſe* with penal ſtatutes, and the exerciſe of this *diſpenſing* power was one of the moſt ignominious badges of ſlavery and engines of tyranny, which ever diſgraced and harraſſed this country; but by 1 W. and M. ſtat. 2. c. 2. it is declared, that the ſuſpending or *diſpenſing* with laws by regal authority, without the conſent of parliament, is illegal: it is alſo a maxim in law, that it requires the ſame ſtrength to diſſolve, as to create an obligation. See Blackſt. Com. vol. i. p. 142, 185, 342. and vol. ii. p. 429, 432. See PREROGATIVE.

DISPENSATION *by non-obſtante.* See NON-OBSTANTE.

DISPENSATION, in *Pharmacy*, the diſpoſition and arrangement of ſeveral medicines, either ſimple or compound, all weighed in their proper doſes, or quantities; in order to be employed in the making a compoſition.

DISPERSION, in *Dioptrics. Point of* DISPERSION, is a point from which refracted rays begin to diverge, when their refraction renders them divergent.

It is called *point of diſperſion*, in oppoſition to the *point of concourſe*, which is the point wherein converging rays concur after refraction.

But the latter is more uſually called *focus*, and the former, *virtual focus*.

DISPERSION *of light*, occaſioned by the REFRANGIBILITY of the rays, or the nature of the refracting MEDIUM. See ABERRATION, and INFLECTION.

DISPERSION *of Mankind*, in the *Hiſtory of the World*, was occaſioned by the CONFUSION *of tongues*, and took place in conſequence of the overthrow of Babel at the birth of Peleg; whence he derived his name: and it appears by the account given of his anceſtors, Gen. chap. xi. 10—16, to have happened in the 101ſt year after the flood, according to the Hebrew chronology, and by the Samaritan computation in the 401ſt. However, various difficulties have been ſuggeſted by chronologers concerning the true æra of this event. Sir John Marſham and others, in order to reconcile the Hebrew and Egyptian chronologies, maintain a *diſperſion* of mankind before the birth of Peleg: others, unable to find numbers ſufficient for the plantation of colonies in the ſpace of 101 years, according to the Hebrew computation, fix the *diſperſion* towards the end of Peleg's life, thus following the computation of the Jews: Petavius aſſigns the 153d year after the flood; Cumberland, the 180th; and Uſher, though he generally refers it to the time of Peleg's birth, in one place aſſigns the 131ſt after the flood for this event. Mr. Shuckford ſuppoſes the *diſperſion* to have been gradual, and to have commenced with the ſeparation of ſome companies at the birth of Peleg, and to have been completed thirty-one years after. According to the calculation of Petavius, the number of inhabitants on the earth at the birth of Peleg amounted to 32,768; Cumberland makes them 30,000; Mr. Mede ſtates them at 7000 men, beſides women and children; and Mr. Whiſton, who ſuppoſes that mankind now double themſelves in four hundred years, and that they doubled themſelves between the deluge and the time of David in ſixty years at a medium, when their lives were ſix or ſeven times as long as they have been ſince, by his computation, produces about 2389, a number much too inconſiderable for the purpoſes of ſeparating and forming diſtinct nations. This difficulty induced Mr. Whiſton to reject the Hebrew, and to adopt the Samaritan chronology, as many others have done; which, by allowing an interval of 401 years between the flood and the birth of Peleg, furniſhes, by the laſt mentioned mode of computation, more than 240,000 perſons. Marſh. Can. Chron. ſec. 1. Petav. Doctrin. Temp. lib. ix. c. 14. Cumb. Orig. Gent. Antiq. p. 142—154. Uſher ad A. M. 1757 & 1787. Whiſton's View Chron. O. T.

As to the manner of the *diſperſion* of the poſterity of Noah from the plain of Shinar, it was undoubtedly conducted with the utmoſt regularity and order. The ſacred hiſtorian informs us, that they were divided in their lands, every one according to his tongue, according to his family, and according to his nation; Gen. x. 5, 20, 31: and thus, as Mr. Mede obſerves, they were ranged according to their nations, and every nation was ranged by their families, ſo that each nation had a ſeparate lot and each family in every nation. The following abſtract will ſerve to give a general idea of their reſpective ſettlements: Japhet, Noah's eldeſt ſon, had ſeven ſons, viz. Gomer, whoſe deſcendants inhabited thoſe parts of Aſia, which lie upon the Ægean ſea and Helleſpont northward, containing Phrygia, Pontus, Bithynia, and a great part of Galatia: the Galatians, according to Joſephus, were called Gomeræi; and the Cimmerii, according to Herodotus, occupied this tract of country: and from theſe Gomerians, Cimmerii or Celts, Mr. Camden derives our ancient Britons, who ſtill retain the name Cymro or Cymru: Magog, the ſecond ſon of Japhet, was probably the father of the Scythians on the eaſt and north-eaſt of the Euxine ſea: Madai planted Media, though Mr. Mede aſſigns Macedonia to his ſhare: Javan was the father of the Grecians about Ionia, whoſe country lies along upon the Mediterranean ſea; the radicals of Javan and Ionia being the ſame יון: to Tubal and Meſhech belonged Cappadocia and the country which lies on the borders of the Euxine ſea; and from them, migrating over the Caucaſus, it is ſuppoſed the Ruſſians and Muſcovites are deſcended: and Tiras occupied Thrace. The ſons of Shem were five: Elam, whoſe country lay between the Medes and Meſopotamians, and was called by the Gentile writers Elymais; and Joſephus calls the Elamites the founders of the Perſians: Aſhur, who was driven out of Shinar by Nimrod, afterwards ſettled in Aſſyria, and there built Nineveh and other cities: Arphaxad, who gave name to the country which Ptolemy calls Arraphacitis, a province of Aſſyria, though Joſephus makes him the father of the Chaldees: Lud, who inhabited and gave name to the country of Lydia about the river Mæander, remarkable for its windings, in Aſia Minor: and Aram, the father of the Syrians. Ham, the youngeſt ſon of Noah, had four ſons, viz. Cuſh, whoſe poſterity ſpread into the ſeveral parts of Arabia, over the borders of the land of Edom, into Arabia Felix, up to Midian and Egypt: Mizraim, the father of them, who inhabited Egypt and other parts of Africa: Phut, to whom Bochart aſſigns the remaining part of Africa, from the lake Tritonides to the Atlantic ocean, called Lybia: and Canaan, to whom belonged the land of Canaan, whence the Phœnicians derived their origin. Mede's Works, vol. i. diſc. 50. p. 276, &c. Bochart, Phaleg. lib. iii. & iv. Patrick in loc. Shuckford's Conn. vol. i. book 3. and Un. Hiſt. vol. i. part 1. book 1. chap. 2. § 6.

Dr. Bryant has advanced a new hypotheſis on this ſubject, and ſupported it with his uſual acuteneſs and learning: he maintains, that the *diſperſion* as well as the CONFUSION *of tongues* was local, and limited to the inhabitants of the province of Babel; that the ſeparation and diſtribution recorded to have taken place in the days of Peleg, Gen. x. 25, 31, 32, which was the reſult of divine appointment, occaſioned a general migration; and that all the families among the ſons of men were concerned in it: the houſe of Shem, from which the Meſſiah was to ſpring, was particularly regarded in this diſtribution; the portion of his children was near the place of ſeparation; they in general had Aſia to their lot; as Japhet had Europe, and Ham the large continent of Africa. But the ſons of Chus would not ſubmit to the divine diſpenſation; they went off under the conduct of Nimrod, and ſeem to have been for a long time in a roving ſtate: however, at laſt they arrived at the plains of Shinar, and having ejected Aſhur and his ſons, who were placed there by divine appointment, ſeized his dominions, and laid there the foundation of a great monarchy. But afterwards fearing leſt they ſhould be divided and ſcattered abroad, they built the tower of Babel, as a land-mark, to which they might repair, and probably to anſwer the purpoſes of an idolatrous temple, or high altar, dedicated to the hoſt of heaven, from which they were never long to be abſent. They only, viz. the ſons of Chus or the Cuthites, and their aſſociates from other families, who had been guilty of rebellion againſt divine authority, and of wicked ambition and tyranny, were puniſhed with the judgment of confounded ſpeech through a failure in labial utterance, and of the *diſperſion* recorded in Gen. x. 8, 9: in conſequence of which they were ſcattered abroad from this city and tower, without any certain place of deſtination. The Cuthites invaded Egypt or the land of Mizraim, in its infant ſtate, ſeized the whole country, and held it for ſome ages in ſubjection: and they extended likewiſe to the Indies and Ganges, and ſtill farther into China and Japan. From them the province of Cuſhan or Goſhen in Egypt derived its name; here they obtained the appellation of royal ſhepherds; and when they were by force driven out of the country, after having been in poſſeſſion of it for two hundred and ſixty or two hundred and eighty years, the land which they had been obliged to quit was given to the Iſraelites, who were alſo denominated ſhepherds, but ſhould not be confounded with the former or the antecedent inhabitants of Goſhen. Bryant's Analyſis of Ancient Mythol. vol. iii. p. 16, &c.

DISPERSION *of inflammations*, in *Medicine.* See INFLAMMATIONS.

DISPLANTING, among *Gardeners*, is the plucking up a tree or plant out of the ground.

DISPLANTING *ſcoop*, an inſtrument for taking up plants with earth about their roots.

DISPLAYED, in *Heraldry*, is underſtood of the poſition of an eagle, or other bird, when it is erect, with its wings expanded, or ſpread forth.

DISPONDEE, in the *Greek* and *Latin Poetry*, a double ſpondee; or a foot conſiſting of four long ſyllables: as *jūrāmēntūm*, *dēlēctāntēs*, ϑᾱυμᾱζο̄ντω̄ν.

DISPOSITION, from *dis*, and *pono*, *I place*, in *Architecture*, is the juſt placing of all the ſeveral parts of an edifice, according to their proper nature and office. See BUILDING.

DISPOSITION, in *Logic*, is that operation of the mind, whereby we put the ideas, propoſitions, and arguments which we have formed concerning one ſubject, into ſuch an order as is fitteſt to gain the cleareſt knowlege of it, to retain it longeſt, and to explain it to others in the beſt manner: the effect of this is called METHOD. Watts's Logic.

DISPOSITION, in a *Military Senſe*, is the arrangement of an army or body of men upon the moſt advantageous ground, and in the beſt ſituation for a vigorous attack or defence.

DISPOSITION, in *Rhetoric*, is defined, by Cicero, the act of diſtributing the things, or arguments, invented or found out, into a proper order; or a due placing, or ranging, the ſeveral parts of a ſpeech, or diſcourſe.

The *diſpoſition* makes one of the great branches, or diviſions, of rhetoric. Iſocrates was the firſt among the Greeks, that made them ſenſible of the beauty of *diſpoſition*; and Cicero among the Romans.

The *diſpoſition* is of the ſame neceſſity in oratory, as the marſhalling of an army in order to a battle; or a beautiful compoſition in architecture, painting, &c. Horace enjoins it expreſsly in poetry: *Singula quæque locum teneant ſortita decenter*. The *diſpoſition*, then, is the order, or arrangement, of the parts of an oration; which parts are uſually reckoned four, viz. the *exordium*, or *beginning*; the *narration*; the *confirmation*; and the *peroration*, or *concluſion*. Though ſome make them ſix, viz. the *exordium*, *diviſion*, *narration*, *confirmation*, *confutation*, and *peroration*; as indicated in that popular verſe:

Exorſus, *narro*, *ſeco*, *firmo*, *refuto*, *peroro*.

But the diviſion is more naturally referred to the exordium; and the confutation to the confirmation.

The *diſpoſition* is either *natural* or *artificial*. *Natural*, is the order the parts are above rehearſed in. *Artificial*, is when, for ſome particular reaſon, we recede from the order of nature. See each part under its proper article, EXORDIUM, &c.

DISPROPORTION, a term of relation implying a want of proportion, or ſymmetry.

DISPROVING, in *Rhetoric*. See REFUTATION.

DISPUTE, or **DISPUTATION**, from *dis*, and *puto*, *I think*, in the *Schools*, *&c.* a conteſt, or combat, either by word or writing, on ſome point of learning or religion, for a degree, prize, exerciſe, or even for the mere ſake of truth, or advantage of a party, or the honour of a triumph. See THESIS.

The Port royaliſts take occaſion to obſerve, that nothing gives ſo many different lights and openings, for diſcovering the truth, as *diſputation*. The movements of a mind, employed ſingly in the examination of any ſubject, are uſually too cool and languid; the mind needs a certain degree of heat to awake its ideas. Now, by the oppoſitions in a *diſpute*, we come to find wherein the difficulty lies, and the vigour the mind has acquired enables us to ſurmount it.

DIQUISITION, from *dis*, and *quæro*, *I enquire*, an enquiry into the nature, kinds, and circumſtances of any problem, queſtion, or topic; in order to gain a right notion of it, and to diſcourſe clearly about it.

DISSECTION, from *dis*, and *ſeco*, *I cut*, in *Anatomy*, the operation of cutting and dividing the parts of an animal body, with a knife, ſciſſars, &c. in order to ſee and conſider each of them apart.

The ancients made *diſſections* of living men: as we read of Herophilus and Eraſiſtratus; and, in our own times, of Carpus and Veſalius.

Yet, Le Gendre obſerves, that the *diſſection* of a human body, even dead, was held a ſacrilege till the time of Francis I. And the ſame author aſſures us, he has ſeen a conſultation held by the divines of Salamanca, at the requeſt of Charles V. to ſettle the queſtion, whether or no it were lawful, in point of conſcience, to *diſſect* a human body, in order to learn its ſtructure? See ANATOMY.

DISSEISIN, in *Law*, an unlawful diſpoſſeſſing a man of his land, tenement, or other immoveable and incorporeal right.

Diſſeiſin is of three ſorts; viz. *ſimple diſſeiſin*, committed by day, without force and arms: and *diſſeiſin by force*; for which ſee DEFORCEOR, and FRESH *diſſeiſin*. See alſo RE-DISSEISIN and POST-DISSEISIN. *Wrongful force* makes no deſcent in law.

Aſſiſes are called *writs of diſſeiſin*, which lie againſt diſſeiſors in any caſe: whereof ſome are termed *little writs of diſſeiſin*, as being vicontial, that is, ſuable before the ſheriff in the county-court, becauſe determinable by him without aſſiſe.

DISSEISOR, he who *diſſeiſeth*, or puts another out of his land: as *diſſeiſee* is he who is put out.

If a *diſſeiſor*, after he has expelled the right owner, gains peaceable poſſeſſion of the lands five years without claim, and continues in poſſeſſion, ſo as to die ſeiſed, and the land deſcends to his heirs, they will have a right to the poſſeſſion till the owner recovers at law; and the owner ſhall loſe his eſtate for ever, if he doth not proſecute his ſuit within the time limited by the ſtatute of limitations.

DISSEMINATE *vacuum*. See VACUUM *diſſeminatum*.

DISSENTERS, a general denomination of equal import with non-conformiſts.

It expreſſes certain ſects, or parties, in England, who, in matters of religion, church-diſcipline, and ceremonies, *diſſent* from, or diſagree with the church of England, and have a TOLERATION by law for the ſame.

Such, particularly, are the preſbyterians, independents, anabaptiſts, and quakers. See PRESBYTERIANS, &c.

At the Revolution, a law was enacted, that the ſtatutes of queen Elizabeth, and king James I. concerning the diſcipline of the church, ſhould not extend to proteſtant *diſſenters*: but the perſons *diſſenting* are to ſubſcribe the declaration of 30 Car. II. c. 1. and take the oaths or the declaration of fidelity, &c. And they muſt not hold their meetings until their place of worſhip is certified to the biſhop, &c. or to the juſtices at their quarter ſeſſions, and regiſtered there; alſo they are not to keep the doors of their meeting-houſes locked, &c. If any perſon diſturbs them at their worſhip, on conviction at the ſeſſions, he ſhall forfeit 20*l*. Stat. 1 W. and M. And there are many ſtatutes relating to *diſſenters* beſide the Toleration act: as 5 and 6 Edw. VI. c. 1. 23 Eliz. c. 1. 3 Jac. I. c. 4. 13 Car. II. c. 1. 17 Car. II. c. 2. 22 Car. II. c. 1. 1 W. and M. c. 18. 10 Anne, c. 2. 1 Geo. I. c. 6. &c.

DISSEPIMENTUM, among *Botaniſts*, the thin ſeptum ſeparating the cells of the fruit of plants.

DISSIDENTS, a denomination applied in Poland to thoſe of the Lutheran, Calviniſtic, and Greek profeſſion. The king of Poland engages by the *pacta conventa* to tolerate them in the free exerciſe of their religion, but they have often had reaſon to complain of the violation of theſe promiſes.

DISSIMILAR *leaves*, denote the two firſt leaves of any plant at its firſt ſhooting out of the ground.

They are thus called, becauſe they uſually are of a different form from the common leaves of a grown plant.

Theſe Dr. Grew obſerves to be nothing but the very lobes of the ſeed thus expanded, and thus advanced.

Their uſe is for the protection of the plume; which being young and tender, is thus guarded on each ſide, and has alſo ſome rain and dew gradually conveyed down to it by this means. See PLUME.

DISSIMILAR, in *Anatomy*. Authors divide the parts of the body into *ſimilar*, and *diſſimilar*.

Diſſimilar parts, by ſome called alſo *compound*, and *organical* parts, are ſuch as may be divided into various parts, of different ſtructure, &c. Thus the hand is diviſible into veins, muſcles, bones, &c. whoſe ſubdiviſions are neither of the ſame nature nor denomination.

DISSIMILITUDE, in *Geometry*, *&c.* See SIMILITUDE.

DISSIMILITUDE, or **DISSIMILI**, in *Rhetoric*, *&c.* an argument, wherein, from *diſſimilar*, or unlike things, other *diſſimilars* are deduced.

Thus Cicero, *Si barbarorum eſt in diem vivere*; *noſtra conſilia ſempiternum tempus ſpectare debent*. Catullus furniſhes a very beautiful argument from *diſſimilitude*.

Soles occidere & redire poſſunt.
Nobis cum ſemel occidit brevis lux,
Nox eſt perpetua una dormienda.

DISSIMULATION, in *Morals*, the act of diſſembling, by fallacious appearances, or falſe pretenſions.

Good princes regard *diſſimulation* as a neceſſary vice; but tyrants conſider it as a virtue.

It is apparent that ſecreſy is often neceſſary, to oppoſe thoſe who may be willing to circumvent our lawful intentions. But the neceſſity of precaution would become very rare, were no enterprizes to be formed, but ſuch as could be avowed openly. The frankneſs with which we could then act, would engage people in our intereſts. Marſhal Biron would have ſaved his life, by dealing ingenuouſly with Henry IV.

With reſpect to *diſſimulation*, three things are to be obſerved; 1. That the characters of thoſe are not to be eſteemed, who are reſerved and cautious without diſtinction. 2. Not to make ſecrets of unimportant matters. 3. To conduct ourſelves in ſuch manner, as to have as few ſecrets as poſſible.

DISSIPATION, in *Phyſics*, an inſenſible loſs, or conſumption, of the minute parts of a body; or, more properly, that flux whereby they fly off, and are loſt. See EFFLUVIA.

We do not ſay *diſſipation*, but loſs of blood, in ſpeaking of the blood diſcharged at a wound, or in any other ſenſible manner: on the contrary, we ſay *diſſipation*, or expence, of ſpirits: this is more copious than that of the ſolid parts; and, conſequently, the reparation ought to be more copious.

DISSIPATION, *Circle of*, or ABERRATION, in *Optics*, denotes that circular ſpace upon the retina of the eye, which is occupied by the rays of each pencil in indiſtinct viſion: thus, if the diſtance of the object, or the conſtitution of the eye be ſuch, that the image falls beyond the retina, as when objects are too near; or before the retina, when the rays have not a ſufficient divergency, the rays of a pencil, inſtead of being collected into a central point, will be *diſſipated* over this circular ſpace: and all other circumſtances being alike, this circle will be greater or leſs, according to the greater or leſſer diſtances from the retina of the focuſes of refracted rays. But this circle cauſes no perceptible difference in the diſtinctneſs of viſion, while that circle is not greater than ſome determinate magnitude; as ſoon as it exceeds that magnitude, we begin to perceive an indiſtinctneſs, which increaſes as the circle of *diſſipation* increaſes, and at length the object is loſt in confuſion. This circle is alſo greater or leſs, according to the greater or leſs magnitude of the viſible object: and though it is not eaſy to aſſign the diameter of the ſaid circle, it ſeems very probable, that viſion continues diſtinct for all ſuch diſtances, or ſo long, as theſe circles or the pencils of light from them do not touch one another upon the retina; and the indiſtinctneſs begins, when the ſaid circles begin to interfere. It has been often obſerved, that a preciſe union of the reſpective rays upon the retina is not neceſſary to diſtinct viſion; but the firſt author that aſcertained the fact beyond all doubt, was Dr. Jurin. See a variety of obſervations and experiments on this ſubject, in his Eſſay on Diſtinct and Indiſtinct Viſion, in Smith's Optics, Appendix. See MOON, and VISION.

DISSIPATION, *Radius of*, is the radius of the circle of DISSIPATION.

DISSOLVENT, ſomething that *diſſolves*, i. e. divides, and reduces a body into its ſmalleſt parts. See DISSOLUTION.

Thus, AQUA *regia* is the *diſſolvent* of gold; AQUA *fortis* of ſilver, and other metals; water, of ſalts and gums; ſpirit of wine, of reſins; ſpirit of vinegar, of pearls, corals, &c.

Sea-ſalt is found the proper *diſſolvent* of gold. This, in almoſt any form, whether as a fluid, or a ſolid, or a ſpirit, does the buſineſs: accordingly, this is a baſis, or fundamental ingredient, of *aqua regia*.

So nitre is the proper *diſſolvent* of ſilver, and has that effect, in whatever form it is applied: and, accordingly, it is the baſis of *aqua fortis*.

Spirit of nitre, added to that of ſea-ſalt, makes it *diſſolve* gold the better: but ſpirit of ſea-ſalt, added to ſpirit of nitre, diſables it from having any effect on ſilver. Yet Mr. Homberg furniſhes an inſtance of a *diſſolution* of ſilver made by the *diſſolvent* of gold. An *aqua regia* may be compoſed of ſpirit of ſalt, and ſpirit of nitre, only in ſuch ſmall quantity each, that they may float ſeparately in a third liquor, and not meet often enough to unite, at leaſt not in any quantity. This water may be made ſo weak as not to *diſſolve* gold, but only extract a ſlight yellow tincture from it, that ſcarce takes off any thing of the weight of the metal: nor will it *diſſolve* ſilver, as being too weak; ſo that both metals are ſafe from it. But this *aqua regia*, after it has *diſſolved* gold as far as it can do; that is, after it has extracted a yellowiſh tincture from it, is ſtill in a condition to *diſſolve* ſilver.

This phenomenon Mr. Homberg accounts for hence: that ſpirit of ſalt, whether alone, or joined with ſpirit of nitre, being employed in keeping thoſe few particles of gold *diſſolved*, will not meddle with the ſilver: which, by this means, receiving the impreſſion of the greater quantity of ſpirit of nitre alone, is *diſſolved* thereby. But the experiment cannot be inverted, i. e. *aqua regia* cannot begin with *diſſolving* ſilver lightly firſt, and afterwards *diſſolve* gold; becauſe ſpirit of nitre does not hinder ſpirit of ſalt from acting on gold, as ſpirit of ſalt does ſpirit of nitre from acting on ſilver.

Diſſolvents are uſually called by the chemiſts, *menſtruums*.

DISSOLVENT, *Univerſal*. See ALCAHEST.

DISSOLUTION, in *Chemiſtry*, *Pharmacy*, and *Phyſics*, a diſcontinuation, or analyſis, of the ſtructure of a mixed body; whereby, what was one, and contiguous, is divided into little parts, either homogeneous, or heterogeneous. See ANALYSIS, and DIVISION.

Diſſolution, then, is a general name for all reductions of concrete bodies into their ſmalleſt parts, without any regard either to ſolidity or fluidity: though, in the uſual acceptation of the word among authors, it is reſtrained to the reduction of ſolid bodies into a ſtate of fluidity, by the action of ſome fluid MENSTRUUM or *diſſolvent*; in which caſe an union is formed between the integrant parts of one body, and thoſe of another of a different nature; ſo that it is nothing elſe than an act of COMBINATION: this is more properly expreſſed by SOLUTION, as a branch of *diſſolution*.

According to the opinion of F. Tertius de Lanis, adopted by the learned Boerhaave, in his Chemiſtry, the power, or faculty, of diſſolving, is lodged in fire alone.

Other fluids, commonly ſuppoſed diſſolvents, only produce their effect by means of the fiery ſpicula they abound with. Even air, which is judged a powerful menſtruum, owes all its force to the rays of light diffuſed therein.

Sir Iſaac Newton accounts for all *diſſolutions*, and the ſeveral phenomena thereof, from the great principle of attraction; and, in effect, the phenomena of *diſſolution* furniſh a great part of the arguments and conſiderations, whereby he proves the reality of that principle.

A ſpecimen of that great author's way of philoſophiſing on the ſubject of *diſſolution*, take as follows:

When ſalt of tartar diſſolves by lying in a moiſt place, is not this done by an attraction between the particles of the ſalt of tartar, and thoſe of the water which float in the air in form of vapours? And why does not common ſalt, or ſaltpetre, or vitriol, do the like, but for want of ſuch an attraction? And when *aqua fortis*, or ſpirit of vitriol, poured on ſteel filings, diſſolves the filings, with a great heat and ebullition, is not this heat and ebullition effected by a violent motion of the parts? And does not that motion argue, that the acid parts of the liquor ruſh towards the parts of the metal with violence, and run forcibly into its pores; till getting between the outermoſt particles and the main maſs of metal, they looſen them therefrom, and ſet them at liberty to float off into the water? When a ſolution of iron, in *aqua fortis*, diſſolves *lapis calaminaris*, and lets go the iron; or a ſolution of copper diſſolves iron immerſed in it, and lets go the copper; or a ſolution of mercury in *aqua fortis*, poured on iron, copper, tin, or lead, diſſolves the metal, and lets go the mercury; does not this argue, that the acid particles of the *aqua fortis* are attracted more ſtrongly by the *lapis calaminaris*, than by iron; by iron, than by copper; by copper, than by ſilver; and by iron, copper, tin, and lead, than by mercury? And is it not for the ſame reaſon, that iron requires more *aqua fortis* to diſſolve it, than copper; and copper, more than the other metals; and that of all metals, iron is diſſolved moſt eaſily, and is moſt apt to ruſt; and next after iron, copper? When *aqua fortis* diſſolves ſilver, and not gold; and *aqua regia* diſſolves gold, and not ſilver; may it not be ſaid, that *aqua fortis* is ſubtile enough to penetrate the pores of gold as well as of ſilver, but it wants the attractive force to give it entrance; and the ſame of *aqua regia*, and ſilver? And when metals are diſſolved in acid menſtruums, and the acids, in conjunction with the metal, act after a different manner; ſo as that the taſte of the compound is milder than that of the ſimples, and ſometimes a ſweet one; is it not becauſe the acids adhere to the metallic particles, and thereby loſe much of their activity? And if the acid be in too ſmall a proportion to make the compound diſſoluble in water; will it not, by adhering ſtrongly to the metal, become unactive, and loſe its taſte; and the compound become a taſteleſs earth? For ſuch things as are not diſſoluble by the moiſture of the tongue are inſipid. Newt. Opt. in Calce.

Dr. Freind gives us a mechanical account of *diſſolution*, in the inſtance of ſalt diſſolved in water, which is the moſt ſimple operation that falls under this head. This motion he aſcribes to that attractive force, which is ſo very extenſive in natural philoſophy, that there is no kind of matter but what is under its influence. It may be obſerved, he ſays, that the corpuſcles of ſalts, which are the moſt ſimple of any, are withal very minute, and, for their bulk, very ſolid; and therefore they exert a very ſtrong attractive force, which, *cæteris paribus*, is proportional to the quantity of matter. Hence it comes to paſs, that the particles of water are more ſtrongly attracted by the ſaline particles than they are by one another: the particles of water, therefore, cohering but looſely, and being eaſily moveable, approach the corpuſcles of ſalts, and run, as it were, into their embraces; and the motion of them is quicker, or ſlower, according to their leſs or greater diſtances; the attractive force, in all bodies, being ſtrongeſt at the point of contact. Therefore, if ſalt be thrown into the middle of a diſh full of water, we ſhall find the aqueous particles, which are in the middle of the diſh, ſharp and pungent to the taſte; but the water upon the ſides of the veſſel almoſt inſipid: ſo that, when ſuch a motion once ariſes, the aqueous particles are carried with the ſame force towards the ſalts; and the moment of them is to be eſtimated from the ratio of their weight, and celerity, conjunctly. By the force of this impulſe, they open to themſelves a paſſage into the pores of the ſalts, which are very numerous; and, at length, they ſo break and divide its texture, that all coheſion of the parts is deſtroyed: hereupon, being ſeparated and removed to a convenient diſtance from one another, they are diſperſed, and float here and there about the water.

M. Geoffroy furniſhes ſome curious experiments on *cold diſſolutions*: it is nothing ſurpriſing, that a ſimple *diſſolution* ſhould be cold; that common water, for inſtance, wherein ſea-ſalt, or ſal ammoniac, or vitriol, has been caſt, ſhould become the colder by the mixture of ſuch ſalts; it being obvious, that the ſalts, being of themſelves deſtitute of motion, and coming to ſhare that which the fluidity gives the water, muſt diminiſh it, when they become intimately mixed therewith by *diſſolution*; and it is generally agreed, among philoſophers, that heat is a motion, and cold a ceſſation, or, at leaſt, a diminution of motion.

Yet, notwithſtanding this general principle, it is no great wonder all *diſſolutions* are not cold, as thoſe are of all volatile alcalies in common water; but that ſome are hot, as thoſe of all fixed alcalies. This difference may be accounted for hence, that all fixed alcalies having been calcined by a vehement fire, they have impriſoned and retained in their pores ſome of the particles thereof. But it is ſurpriſing, that *diſſolutions*, accompanied with fermentation, &c. where the matters boil and ſwell, and that with a great noiſe, ſhould be cold, and make the thermometer fall, when immerged therein.

This coldneſs, with ſo conſiderable an augmentation of motion, is ſomewhat extraordinary. But this is not all; for of theſe cold fermentations, there are ſome that emit hot vapours. Thus it is with a mixture of oil of vitriol, and ſal ammoniac; for a thermometer being plunged in the mixture, and another a little higher, to receive only the fumes thereof; the firſt thermometer is ſeen to fall very haſtily, through the coldneſs of the fermentation; and the latter to riſe, through the heat of the vapours. M. Geoffroy adds an experiment, ſhewing that cold water is rendered ſtill colder, for a few moments, by throwing a large quantity of live coals therein.

DISSOLUTION *of metals, &c.* by fire, is particularly called *fuſion.*

DISSOLUTION *of the blood*, is an affection of that humour, directly oppoſite to coagulation.

The *diſſolution* is ſuch a comminution of the fibrous parts of the blood, as indiſpoſes it for that ſeparation of the craſſamentum from the ſerous part, which always enſues in healthy blood on its cooling out of the body.

This *diſſolution* is frequently the conſequence of malignant and peſtilential fevers, and ſhews itſelf in petechiæ, or purple ſpots; alſo of certain poiſons, particularly the bites of venomous beaſts, &c.

DISSOLUTION *of parliament.* See PARLIAMENT.

DISSONANCE, or DISCORD, in *Muſic*, a falſe conſonance, or concord.

A *diſſonance* is properly the reſult of a mixture, or meeting, of two ſounds, which are diſagreeable to the ear: ſuch are *ditones*, *tritones*, *falſe fifth*, *redundant fourth*, *ſeventh*, &c.

Diſſonances are ſometimes uſed in muſic, and have a good effect therein, though it be only occaſionally. See DISCORD.

DISSYLLABLE, a word of two ſyllables; as *fortune*, *lament*, &c.

The ſpondee, trochee, iambus, and pyrrhichius, are *diſſyllabic* feet. See SPONDEE, &c.

DISTAFF, an inſtrument about which flax is tied, in order to the ſpinning it.

DISTAFF-*thiſtle*, a name ſometimes given to the *atractylis* of authors. See THISTLE.

DISTANCE, properly denotes the ſhorteſt line between two points, objects, &c.

Diſtance, according to an ingenious author, cannot of itſelf and immediately be ſeen. For *diſtance* being a line directed endwiſe to the eye, it projects only one point in the fund of the eye, which point remains invariably the ſame, whether the *diſtance* be longer or ſhorter. Dr. Berkeley, Eſſay on Viſion.

A late eminent mathematician obſerves, that the *diſtance* here ſpoken of, is *diſtance* from the eye; and that what is ſaid of it muſt not be applied to *diſtance* in general. The apparent *diſtance* of two ſtars is capable of the ſame variations as any other quantity or magnitude. Viſible magnitudes conſiſt of parts into which they may be reſolved, as well as tangible magnitudes; and the proportions of the former may be aſſigned, as well as thoſe of the latter: ſo that it is going too far to tell us, that viſible magnitudes are no more to be accounted the object of geometry, than words; and that the ideas of ſpace, and things placed at a diſtance, are not, ſtrictly ſpeaking, the object of ſight, and are not otherwiſe perceived by the eye than by the ear. Mr. Maclaurin, in his Account of Sir Iſaac Newton's Diſcoveries, p. 225.

The word is alſo uſed figuratively for an interval, not only in reſpect of place, but alſo of time, or quality.

Thus, we ſay the *diſtance* of the creation of the world, from the nativity of Jeſus Chriſt, is upwards of four thouſand years: the *diſtance* between the Creator and creature is infinite.

For the diviſion of DISTANCES, or the manner wherein we come by the idea of *diſtance* in objects, ſee VISIBLE.

DISTANCE, in *Aſtronomy*. The *diſtance* of the ſun, planets, and comets, is found from their PARALLAX.

The proportional or relative *diſtances* of the planets are deduced with great exactneſs from the theory of gravity: for Kepler has long ſince diſcovered, that the ſquares of their periodical times are as the cubes of their diſtances. Epit. Aſtron. lib. iv. See alſo Greg. Aſt. book i. prop. 40. If we, therefore, ſuppoſe the mean *diſtance* of the earth from the ſun to be 100000, we ſhall obtain by the preceding analogy, from the periodical times which are known, the relative *diſtances* of the other planets: thus,

The periodical revolutions to the ſame fixed ſtar in days and decimal parts of a day.

Mercury.	Venus.	Earth.	Mars.	Jupiter.	Saturn.
87,9692	224,6176	365,2564	686,9785	4332,514	10759,275
Relative mean *diſtances* from the Sun.					
38710	72333	100000	152369	520096	954006

In order to find the real *diſtance* of the earth, and for an account of the real *diſtances* of the other planets; ſee PARALLAX, and PLANETS.

For the *diſtances* of the ſecondary planets from the centers of their reſpective primaries; ſee SATELLITES.

That of the fixed ſtars, as having no ſenſible parallax, we can do little more than gueſs at.

Dr. Hook, by exact obſervation with a teleſcope of ſixteen feet perpendicularly placed, firſt diſcovered, that the *diſtances* of the ſtars from the zenith is not the ſame at all times of the year: particularly the bright ſtar in the Dragon's Head he found twenty-ſeven or thirty ſeconds nearer the zenith of Greſham college, in the winter ſolſtice, than in the ſummer: and, after him, Mr. Flamſteed obſerved the like variations in the Pole ſtar. See LIGHT.

DISTANCE *of the ſun from the moon's node*, or *apogee*, is an arch of the ecliptic intercepted between the ſun's true place, and the moon's node, or apogee. See NODE.

DISTANCE, *Curtate*. See CURTATE.

DISTANCE *of the baſtions*, in *Fortification*, is the ſide of the exterior polygon.

DISTANCES, in *Geometry*, are meaſured by the chain, decempeda, and the like. See CHAIN, &c.

DISTANCES, *Inacceſſible*, are found by taking bearings thereto from the two extremes of a line whoſe length is given. See PLAIN-TABLE, THEODOLITE, &c.

DISTANCE, in *Geography*, is the arch of a great circle interſected between two places.

To find the *diſtance* of two places A and B (*Tab. Geogr. fig.* 4.), far remote from each other. Aſſume two ſtations, C and D, from which both the places A and B may be ſeen; and with a proper inſtrument find the angles ADC, CDB, ACD, and DCB; and meaſure the *diſtance* CD.

Then in the triangle ACD we have two angles given, ACD and ADC, together with a ſide; from which, by an eaſy rule in trigonometry, delivered under the article TRIANGLE, we find AD.

So alſo, in the triangle CDB, the baſe DC, and the angles at the ſame, being given; DB is found.

Laſtly, in the triangle ADB, having the ſides AD and DB, together with the included angle ADB; the *diſtance* required, AB, is found by the rules given for the reſolution of triangles.

The height of a remote object being known, to find its *diſtance*, when the eye firſt deſcries it; and, again, the height of the eye being given, to find the *diſtance* to which the eye can reach on the ſurface of the ſea, or land. Add the height of the eye AB (*fig.* 9.) to the ſemidiameter of the earth BC, by which you have AC; and ſince in the rectangled triangle ADC the ſides AC and DC are given, the angle DCA is found by the common rule for reſolution of triangles, the quantity of which angle forms the arch DB; which arch, converted into feet, or the like, gives the *diſtance* required.

Suppoſe, e. gr. the height of the eye AB five feet, which is ſomewhat leſs than in a man of ordinary ſtature: ſince BC is 19695539, AC will be 19695544: and the angle DAB will be found $89^\circ\, 57'\, 43''$: conſequently DCB, or the arch DB, is $2'\, 17''$, or $137''$; and therefore, ſince 1°, or $3600''$, make 343752 Paris feet; DB is $13081\frac{2}{3}$ feet.

After the ſame manner we find the *diſtance* DB, to which an object of a given altitude AB may be ſeen; and, conſequently, we know what *diſtance* we are off from an object of a given altitude, when we firſt diſcover the top thereof. See Horizon.

Distance, *Apparent*, in *Optics*, that *diſtance* which we judge an object to be from us when ſeen afar off, being commonly very different from the true *diſtance*; becauſe we are apt to think that all very remote objects, whoſe parts cannot well be diſtinguiſhed, and which have no other object in view near them, to be at the ſame *diſtance* from us, though perhaps the one is thouſands of miles nearer than the other, as is the caſe with regard to the ſun and moon.

M. De la Hire enumerates five circumſtances, which aſſiſt us in judging of the *diſtance* of objects; viz. their apparent magnitude, the ſtrength of the colouring, the direction of the two eyes, the parallax of the objects, and the diſtinctneſs of their ſmall parts. Dr. Smith maintains, that we judge of *diſtance* principally, or ſolely, by the apparent magnitude of objects; and concludes univerſally, that the *apparent diſtance* of an object ſeen in a glaſs, is to its *apparent diſtance* ſeen by the naked eye, as the apparent magnitude to the naked eye is to its apparent magnitude in the glaſs: but Alhazen long ſince obſerved, that we do not judge of *diſtance* merely by the angle under which objects are ſeen; and Mr. Robins clearly ſhews the hypotheſis of Dr. Smith to be contrary to fact, in the moſt common and ſimple caſes. Thus, if a double convex glaſs be held upright before ſome luminous object, as a candle, there will be ſeen two images, one erect, and the other inverted: the firſt is made ſimply by reflexion from the neareſt ſurface; the ſecond, by reflexion from the farther ſurface, the rays undergoing a refraction from the firſt ſurface both before and after the reflexion. If this glaſs has not too ſhort a focal *diſtance*, when it is held near the object, the inverted image will appear larger than the other, and alſo nearer; but if the glaſs be carried off from the object, though the eye remain as near to it as before, the inverted image will be diminiſhed ſo much faſter than the other, that it will, at length, appear very much leſs than it, but ſtill nearer. Here, ſays Mr. Robins, two images of the ſame object are ſeen under one view, and their *apparent diſtances* immediately compared; and it is evident that thoſe *diſtances* have no neceſſary connexion with the apparent magnitude. This experiment may be made ſtill more convincing, by ſticking a piece of paper on the middle of the lens, and viewing it through a ſhort tube. He obſerves farther, that the apparent magnitude of very diſtant objects, is neither determined by the magnitude of the angle only under which they are ſeen, nor is the exact proportion of that angle compared with their true *diſtance*, but is compounded alſo with a deception concerning that *diſtance*; ſo that if we had no idea of difference in the *diſtance* of objects, each would appear in magnitude proportional to the angle under which it was ſeen; and if our apprehenſion of the *diſtance* was always juſt, our idea of their magnitude would be, in all *diſtances*, unvaried; but in proportion as we err in our conception of their *diſtance*, the greater angle ſuggeſts a greater magnitude. By not attending to this compound effect, Mr. Robins apprehends, that Dr. Smith was led into his miſtake.

Montrula alſo, without being appriſed of what Mr. Robins had written, made ſimilar objections to the hypotheſis of Dr. Smith. Dr. Porterfield has made ſeveral remarks on the five methods of judging concerning the *diſtance* of objects above recited from M. De la Hire; and he has added to them, the conformation of each eye. See *Circle of* Dissipation. This, he ſays, can be of no uſe to us, with reſpect to objects that are placed without the limits of diſtinct viſion. But the greater or leſs confuſion with which the object appears, as it is more or leſs removed from thoſe limits, will aſſiſt the mind in judging of its *diſtance*: the more confuſed it appears, the farther will it be deemed. However, this confuſion hath its limits; for when an object is placed at a certain *diſtance* from the eye, to which the breadth of the pupil bears no ſenſible proportion, the rays proceeding from a point in the object may be conſidered as parallel; in which caſe, the picture on the retina will not be ſenſibly more confuſed, though the object be removed to a much greater *diſtance*. The moſt univerſal, and often the moſt ſure means of judging of the *diſtance* of objects, he ſays, is the angle made by the optic axes: our two eyes are like two different ſtations, by the aſſiſtance of which, *diſtances* are taken; and this is the reaſon, why thoſe perſons who have loſt the ſight of one eye, ſo frequently miſs their mark in pouring liquor into a glaſs, ſnuffing a candle, and ſuch other actions as require that the *diſtance* be exactly diſtinguiſhed. With reſpect to the method of judging by the apparent magnitude of objects, he obſerves, that this can only ſerve, when we are otherwiſe acquainted with their real magnitude. Thus he accounts for the deception to which we are liable in eſtimating *diſtances*, by any extraordinary magnitudes that terminate them; as, in travelling towards a large city, caſtle, or cathedral, we fancy them to be nearer than they really are. Hence alſo animals and ſmall objects ſeen in a valley, contiguous to large mountains, or on the top of a mountain or high building, appear exceeding ſmall. Dr. Jurin accounts for the laſt recited phenomenon, by obſerving, that we have no diſtinct idea of *diſtance* in that oblique direction, and therefore judge of them merely by their pictures on the eye. Dr. Porterfield obſerves, with reſpect to the ſtrength of colouring of different objects, that if we are aſſured they are of a ſimilar colour, and one appears more bright and lively than the other, we judge the brighter object to be the nearer. When the ſmall parts of objects appear confuſed, or do not appear at all, we judge that they are at a great *diſtance*, and *vice verſa*; becauſe the image of any object, or part of an object, diminiſhes as the *diſtance* of it increaſes. Finally, we judge of the *diſtance* of objects by the number of intervening bodies, whereby it is divided into ſeparate and diſtinct parts; and the more this is the caſe, the greater will the *diſtance* appear. Thus *diſtances* upon uneven ſurfaces appear leſs than upon a plane, becauſe the inequalities do not appear, and the whole *apparent diſtance* is diminiſhed by the parts that do not appear in it: and thus the banks of a river appear contiguous to a diſtant eye, when the river is low and not ſeen. Accidens de la Vue, p. 358. Smith's Optics, vol. i. p. 52. and Rem. p. 51. Robins's Tracts, vol. ii. p. 230, 247, 251. Porterfield on the Eye, vol. i. p. 105. vol. ii. p. 387, &c. See Prieſtley's Hiſt. of Viſion, p. 205, and p. 689, &c.

Distance, in *Navigation*, is the number of miles, or leagues, that a ſhip has ſailed from any point. See Sailing.

Distance, *Line of*, in *Perſpective*, is a right line drawn from the eye to the principal point. Such is the line OF (*Tab. Perſpective, fig.* 12.), drawn between the eye O, and the principal point F.

This, as it is perpendicular to the plane, or table, can only be the *diſtance* of the eye from the table.

Distance, *Point of*, in *Perſpective*, is a point in the horizontal line at ſuch *diſtance* from the principal point, as is that of the eye from the ſame.

Such are the points P, and Q (*Tab. Perſpective, fig.* 12.), in the horizontal line PQ; whoſe *diſtance* from the principal point F, is equal to that of the eye from the ſame F.

DISTASTE, or Disgust, a loſs of appetite, or an averſion, or repugnance, to foods which are commonly eaten.

Diſtaſte is held, by phyſicians, one of the principal diſorders of the ſtomach. It ariſes from a want of ſenſation in the upper orifice of the ventricle, which may be occaſioned various ways: as, by a too great abundance of food; thick, heavy humours in the ſtomach; fat, viſcid aliment; obſtructions of the lacteals; ſuppreſſions of the uſual evacuations; intermiſſions of the ordinary exerciſes; a defect in the nerves, in having their natural faculty aboliſhed, or ſuſpended, as in a lethargy, and apoplexy; and, according to Sylvius, by a groſs viſcid ſaliva, or a thick bile, aſcending out of the ſmall guts into the ſtomach.

DISTEMPER, in *Medicine*. See Disease.

Distemper is alſo uſed, in *Painting*, for the working up of colours with ſomething elſe beſides bare water, or oil.

If the colours be prepared with the former of theſe, that kind of painting is called *limning*; and if with oil, it is called *painting in oil*, or ſimply *painting*.

If the colours be mixed with ſize, whites of eggs, or any ſuch proper glutinous, or unctuous ſubſtance, and not with oil, they then ſay, it is done in *diſtemper*; as thoſe of the admirable cartoons formerly at Hampton court

The beſt method of compounding the colours with the vehicles, is to mix the ſize in water; then to levigate the colours in part of it, and afterwards to put each kind into a proper pot, adding as much more of the melted ſize as will bring it to a due conſiſtence, and mixing the whole well together in the pot, with a proper bruſh or wooden ſpatula. Warm water may be afterwards added, if neceſſary, for grinding the colours, or for working. The pots muſt be tied with bladders. This method of painting is chiefly confined to ſcenes, and groſſer works, where the effect depends more on the perſpective art, and oppoſition of the colours, than on their brightneſs.

DISTENSION, the act of ſtretching a thing; alſo the ſtate of a thing violently ſtretched, and diſtended. See TENSION.

DISTENSION, *Diſtenſio*, Διατασις, in the *Ancient Muſic*, was uſed for the differences of ſounds with relation to acute and grave. Wallis's Append. ad Ptolem. Harm. p. 154.

Nature in this reſpect, ſtrictly ſpeaking, aſſigns no limits. But, with regard to our uſe, the ancient muſicians held, that the nature of what ſounded, and alſo of what was to judge, that is, the human ear, was to be conſidered: for, neither the human voice, nor even any inſtrument, can give intervals or *diſtenſions* immenſely great or ſmall, nor could the ear judge of ſuch. Ariſtoxenus fixes the leaſt interval or *diſtenſion* in practice, to the *dieſis enharmonica.* As to the greateſt, he thinks it does not exceed two octaves, and a fourth, or a fifth, if we conſider any human voice; or three octaves, if we conſider one and the ſame inſtrument. He does not deny that the extent of the voice, conſidered in different ſubjects, as in men and children, may go even beyond four octaves. Ariſtoxen. p. 21. edit. Meibom.

DISTICH, Διστιχον, a couplet of verſes; or a piece of poetry, the ſenſe whereof is comprehended in two lines.

There are excellent morals in Cato's *diſtichs.* See Vigneul de Marville on the *diſtichs* of Cato, tom. i. p. 54, 55.

Hexameter and pentameter verſes, otherwiſe called elegiacs, are diſpoſed in *diſtichs.*

DISTICHIASIS, in *Medicine*, a diſorder of the eye-lids; wherein, inſtead of one, they have two rows of cilia, or hairs.

The word is formed of δις, *twice*, and στιχος, or στοιχος, *order*, *rank.*

In the *diſtichiaſis*, over the common, and natural hairs, there grows another extraordinary row, which frequently eradicates, and tears up the former; and, pricking the membrane immediately inveſting the eye, occaſions pain, and draws defluxions upon it.

It is cured by plucking up the ſecond rows of hairs with nippers, and cauteriſing the pores out of which they iſſued.

DISTICHOUS *Stalk*, in *Botany.* See STALK.

DISTILLATION, or DESTILLATION, in *Chemiſtry* and *Pharmacy*, the art, or act, of ſeparating, or drawing off the ſpirituous, aqueous, oleaginous, or ſaline parts of a mixed body from the groſſer and more terreſtrial parts, by means of fire; and collecting and condenſing them again by cold.

The uſe of *diſtillation* is very great; it being by means hereof that waters, ſpirits, eſſences, and extracts, are chiefly made.

Diſtillation is uſually performed by means of fire raiſed to a greater or leſſer degree, as circumſtances require.

The fire is either applied immediately to the veſſels wherein the matters are to be *diſtilled*; or it is applied mediately, by means of water, ſand, iron filings, &c. Theſe different methods of applying the fire, are called *baths, balnea*; *balneum Mariæ*, or *maris*; *balneum arenoſum*, &c. They are alſo called *heats*; as ſand-heat, water-heat, &c.

Diſtillation is twofold: 1. *Per aſcenſum, by aſcent*; when the matter to be *diſtilled* is above the fire, and the ſpirit, or other principle, is raiſed from it.

2. *Per deſcenſum, by deſcent*; when the matter which is to be *diſtilled* is below the fire, and the vapour drawn from it is precipitated to the bottom of the veſſel.

Diſtillation by aſcent is either *right*, or *oblique.*

DISTILLATION, *Right*, is performed with a common ALEMBIC, or cucurbit; wherein the liquor is raiſed, and deſcends again, in form of drops, into a receiver. This is chiefly uſed when the texture of the body is ſuch as allows of an eaſy aſcent, as in vegetables.

DISTILLATION, *Oblique*, is performed ſideways, and in crooked veſſels, as RETORTS. This has been called *diſtillation per latus.* Its uſe is, for ſuch bodies as conſiſt of heavier particles, and which cannot be raiſed without a ſtrong impulſe, nor even by the ſtrongeſt ſo high as the top of the alembic; of which kind are almoſt all minerals and metals.

Mr. Woulfe, F. R. S. has contrived an apparatus for *diſtilling* a variety of ſubſtances, by which the fumes or vapours, that uſually eſcape in the ordinary method of *diſtillation*, and are often injurious to the lungs, are condenſed by paſſing into water, or ſome other fluid. See *Tab. Chemical Veſſels, fig.* 7. A is a retort, in the room of which may be ſubſtituted, on ſome occaſions, an iron pot with a ſtone-ware head, having its neck inſerted into the receiver. B is a receiver, into the neck of which that of the retort is inſerted; this has a ſpout at its bottom, through which the diſtilled liquor paſſes into the bottle C, and an opening in the ſide at D, into which one end of a tube bent at right angles is inſerted: the other end of the tube paſſes into a veſſel H, open at both ends, having its lower opening cloſed with a glaſs ſtopple. Through the upper mouth of the veſſel H, one end of another tube I, bent twice at right angles, paſſes, while the other end is inſerted into a bottle F, and immerſed in the water or other fluid contained in that bottle. The crooked tubes are fitted into the mouth of the veſſel H by means of a cock, in which are two ſemicircular notches, through which the tubes paſs, and by lute. The tube which paſſes into the bottle F is fitted into its mouth by means of a cock, with a ſemicircular notch, but without lute. The vapour that is raiſed from the ſubſtance expoſed to heat in the retort, paſſes into the receiver B, where part of it is condenſed, and flows into the bottle C, while the reſt of it paſſes through the tube at D into the veſſel H. From this veſſel, the vapour that remains ſtill uncondenſed paſſes through the crooked tube I into the water contained in the bottle F, by which it is all condenſed excepting ſome elaſtic air, which is extricated in almoſt all *diſtillations.* This elaſtic air riſes through the water, and eſcapes at the ſemicircular notch of the cock in the mouth of the veſſel, which on this account is not accurately cloſed with lute. In moſt *diſtillations*, a quantity of air is abſorbed at different times during the proceſs; and in this caſe the external air will preſs on the liquor in the bottle F, and force it through the tube I into the veſſel H, from which it may be taken by opening the ſtopple L. The uſe of the veſſel H is to receive the liquor that may be thus raiſed from the bottle F, and to prevent it from paſſing into the receiver B, and from thence into the bottle C, where it might ſpoil the diſtilled liquor. By *diſtilling* 12 lb. of Britiſh ſal ammoniac with 26 lb. of quick-lime and two gallons of water, Mr. Woulfe obtained 8¼ lb. of volatile alcaline ſpirit, ſtrong enough to make eau de luce, which was collected in the bottle joined to the receiver; and on adding two other gallons of water, he obtained 7 lb. of weak volatile ſpirit. Two ſtone gallon bottles, with three quarts of water in each, were ſucceſſively made uſe of to condenſe the vapour; as the one was heated by the fumes, the other was ſubſtituted in its room; and by the condenſed vapour the ſix quarts acquired an increaſe of 2½ lb. in weight: and it appeared from experiments, made with a view to compare the ſtrength of the alcali thus condenſed by water with that of the ſtrongeſt alcaline liquor firſt obtained, that a pound of the former was to a pound of the latter as 140 to 76; ſo that the quantity ſaved was nearly equal to 5 lb. of volatile alcali, which would have been loſt by the common method of *diſtillation.* Mr. Woulfe obſerved a ſingular difference betwixt the alcaline liquor collected in the bottle joined to the receiver, and that condenſed by the water in the bottle F; a conſiderable heat was excited by mixing the latter with the vitriolic acid, whereas there was no heat in a mixture of the former with the ſame acid.

Mr. Woulfe likewiſe *diſtilled* 14 lb. of common ſalt with an equal quantity of oil of vitriol, diluted with 7 lb. of water; and collected 9 lb. 5½ oz. of ſpirit of ſalt in the bottle C, and 6 lb. 12½ oz. of the ſame ſpirit condenſed in ſix quarts of water in the bottle F; and the reſiduum weighed 18 lb. 6 oz. ſo that there was a loſs of 8 oz. or 1/70th of the whole, moſt of which was probably elaſtic air. The ſtrength of the acid condenſed in water was found to be to the ſtrength of that collected in the bottle C, as 200 to 109; ſo that the 6 lb. 12½ oz. of the former is equal to near 13 lb. 1 oz. of the latter; and ſo much was ſaved by this method of *diſtillation.*

He obſerves, that the ſlower the *diſtillation* was conducted, the more concentrated were the acid vapours condenſed in water: and that the moſt concentrated portion of the acid of ſea-ſalt is the moſt volatile; and that in ſtrength it is to the vitriolic acid, whoſe ſpecific gravity was to that of water as 24 to 13, in the proportion of 44¼ to 31: and moreover, that the vapour of ſpirit of ſalt condenſed in water contained no vitriolic acid, though the ſpirit collected in the bottle C contained ſome of that acid. Mr. Woulfe formed a marine ÆTHER, by applying the vapour of rectified ſpirit of wine to this very concentrated vapour of ſpirit of ſalt, and condenſing the combined vapours in ſpirit of wine. The proceſs for this purpoſe was briefly as follows: the necks of two retorts, one of which contained the ſpirit of wine, and the other the ſea-ſalt and vitriolic acid, from which the marine acid was to be diſtilled, opened into one receiver, where the vapours meet; from this receiver the vapours paſſed through a tube into ſpirit of wine contained in a bottle; and thoſe which were not there condenſed, paſſed through another tube into ſpirit of wine contained in a ſecond bottle. By a farther *diſtillation* and cohobation, with ſlaked lime, of the ſeveral liquors collected in the receiver, and in the ſpirit of wine in which the vapours were condenſed, a very ſubtle penetrating æther was produced. The apparatus for this purpoſe is repreſented in *fig.* 8. B is a glaſs tubulated retort, coated with loam up to B, and placed in the furnace A: D is another tubulated retort fixed in a veſſel with ſand in the furnace C. E is a ſtone veſſel, in which the vapours of B and D are combined together; F is the bottle for receiving the liquor which diſtils; G is a tube about three quarters of an inch bore fitted to E, and H a crooked pipe about a quarter of an inch bore; I and K are glaſs veſſels containing ſpirit of wine, and L is a crooked glaſs tube.

Mr. Woulfe apprehends that his method of condenſation may be applied to the *diſtillation* of vitriolic acid, to the rectification of phoſphorus, the vapours of both which ſubſtances ſhould be condenſed by means of water; to the rectification or *diſtillation* of vitriolic æther, the vapours of which ſhould be condenſed in ſpirit of wine; and to many other *diſtillations*. Phil. Tranſ. vol. lvii. for 1767. art. 50. or Dict. Chem. vol. iii. ad fin.

DISTILLATION *by deſcent*, is where the fire is applied on the top, and all around the veſſel, whoſe orifice is at the bottom; and, conſequently, the vapour not being able to riſe upwards, it is forced to precipitate, and diſtil down to the bottom. This method of *diſtillation* has many faults, is abſolutely unneceſſary, and is entirely neglected.

There is a ſecond kind of *diſtillation* by deſcent, called *per deliquium*; which is a natural liquefying, or reſolving, of ſalts into a liquor, by means of moiſture.

In the reſolution of ſimples, an excellent method to preſerve their virtues is, in lieu of fire, or any other foreign heat, which might alter or deſtroy theſe virtues, to make uſe of the heat of a dunghil made of putrefied herbs.

The proceſs and meaſures of *diſtillation* are very different, according to the different ſubjects to be diſtilled. Care ſhould be taken that no greater heat is applied than is juſt neceſſary to raiſe the ſubſtances to be diſtilled: this is proper both for the ſucceſs of the operation, and for preventing the breaking of the veſſels.

Acid ſpirits are uſually drawn into a *reverberatory* FURNACE, and with a vehement fire; ponderous woods, as guaiacum, box, &c. are diſtilled in a retort, after the ſame manner. In theſe, firſt comes a little phlegm, and then, the fire increaſing, the ſpirits fly out in white clouds: when they ceaſe to come, the matter in the receiver is filtrated through a tunnel, which lets paſs the ſpirits, leaving a black fetid oil behind. See CONCENTRATION.

Odoriferous plants, as baum, wormwood, ſage, hyſſop, &c. are diſtilled by the CUCURBIT, or veſica; firſt pouring a ſtrong decoction of the ſame plant hot upon the plant itſelf bruiſed, or adding common water to the plant, whether dry or freſh, cut with ſheers into ſmall pieces, and letting the whole digeſt in a cloſe veſſel two days: then about half the water, or ſpirit, is drawn away by *diſtillation*; and what remains, being preſſed, filtrated, and evaporated, to the conſiſtence of honey, is the extract of the plant. Laſtly, drying what remained in the cloth after expreſſion, and burning it, they make a lixivium of its aſhes; which being filtrated, and evaporated to dryneſs, what remains is the fixed ſalt of the plant.

Plants not odoriferous, are ſometimes managed thus: the plant, being pounded, and two thirds of the alembic, or retort, filled with it; they pour a good quantity of the expreſſed juice of the ſame plant upon it, ſo as the bruiſed matter may float therein, without ſticking any where to the veſſel; then they draw off about half as much water as there was juice, which is the diſtilled water of that plant: what remains, being preſſed in a cloth, and the juice ſettled, they filtrate, and evaporate it to two thirds; and, ſetting it in a cool place, the eſſential ſalt ſhoots into cryſtals.

There is a method of DISTILLING *cold*; which is thus performed: they take, for inſtance, four pounds of flowers, more or leſs, and put them in three or four pints of water, and put the whole in a limbec, which they lute exactly; then place it in a veſſel half filled with ice, beaten and ſalted, as if they meant to freeze the water; then fit on a receiver, and lute it well: then, wetting a linen cloth in hot water, they cover the limbec-head therewith, repeating this ſeveral times; by which means, the fineſt parts are raiſed from the flowers. But care muſt be taken, that all the ſuperfluous water hath been firſt emptied out of the limbec.

Dr. Beal, in the Philoſophical Tranſactions, mentions an extraordinary kind of cold *diſtillation*, viz. made by froſt and cold air: his thermometer being expoſed out of doors, during the ſevere froſts of 1665, fine clear drops, like dew, aſcended to the top of the tube, which afterwards, in time, re-deſcended into the ſtem, and filled the ſpace of half an inch; and, though the ſpirit of wine itſelf was tinged very deep, yet this ſecond ſpirit was clearer and brighter than any cryſtal. The like he did by expoſing his thermometer to the hot air in the middle of ſummer; and hence takes occaſion to recommend a farther proſecution of this pſychrotechnia.

The aſcent of fluids, we are taught by philoſophy, is effected two ways: 1. By their ſpecific gravity; and, 2. By impulſe.

The firſt way of elevation is manifeſt, from this lemma, viz. that particles of bodies which ſwim in any fluid, if they be ſpecifically lighter, muſt be borne upwards by that fluid: hence, as diſtilled liquors are carried upwards through the air, it is to be inquired, how they come to be ſpecifically lighter than air.

Now, a fluid will be ſpecifically lighter than another, when, under a larger ſurface, it has an equal, or a leſs gravity: according to this proportion, the bulk of the fluid ought to be increaſed in *diſtillation*; and how eaſily, by the help of fire, it may be increaſed, or, which is the ſame thing, rarefied, will appear, from what we have ſaid under the articles HEAT, and RAREFACTION.

It is known, by computation, that the proportion of the ſpecific gravity of water to that of air, is ſomething more than as eight hundred to one: ſince, therefore, ſimilar ſpheres, or ſolids, are as the cubes of their diameters; and the ſpecific gravity decreaſes reciprocally in the very ſame proportion as the cubes of their diameters increaſe; in order to make a particle of water lighter than a particle of air, no more is neceſſary than to rarefy it till its diameter becomes ten times greater; which, in this caſe, is but a very ſmall degree of rarefaction: for the cube of the diameter, in a particle ſo rarefied, is 1000: if the diameter be made eleven times greater, the cube will be 1331; and if twelve, 1728: ſo that water, when rarefied but twelve degrees, will be above doubly lighter than air; and, if the rarefaction be carried on farther, it may eaſily be collected, from the increaſe of the numbers, that a particle of water may be rendered almoſt infinitely lighter than air. Now, the elevation of bodies equally fluid, and heavy, is always proportionable to their different aptitude to be rarefied; that is, they aſcend quicker, upon the application of any force, the more ſuſceptible they are of rarefaction: but, in bodies whoſe aptitude to rarefy is equal, the time of aſcent is to be determined by their ſpecific gravity.

But it is not only ſpecific gravity that ſerves to elevate bodies in *diſtillation*; but an external impulſe may alſo cauſe their aſcent: the impulſe we have here to do with, comes from the fire; whoſe particles, though extremely ſmall and light, yet may raiſe bodies much heavier than themſelves, by acting upon them with a certain degree of force. For ſince the moment of a body, or that force by which it acts upon another, is in a compound ratio of the quantity of matter, and celerity; the celerity may be ſo increaſed, as to give a ſufficient force to the body, though the quantity of matter in it be ever ſo ſmall. Let ſome heavy body, therefore, be ſuppoſed to deſcend, with no other moment than what it receives from its own gravity; in this caſe, then, the air, which is much lighter, may be moved with ſuch celerity, as not only to ſuſtain that body, but to mount it up higher: and the more rapid the impetus of the air is, or the ſurface of the body more diffuſed, the higher and ſwifter will the elevation be.

So fire, though it be a body of the minuteſt ſize, may be moved with that rapidity, as to acquire and communicate what force can be deſired towards removing any obſtacles. When, therefore, the moment of fire is augmented in the manner explained, ſo as to exceed the force of the diſtilled body, it will remove it from its former ſituation; or, what is here the ſame thing, becauſe the direction of its motion tends upwards, it will carry it up. And thus, particles ſpecifically heavier than the air contained in the retort, as thoſe of acid ſpirits are, aſcend by a more violent impulſe of the fire uſed in *diſtillation*.

Another thing to be noted, is, that the ſame quantity of matter is elevated ſo much the eaſier, in proportion as the ſurface is enlarged: for the more this is diffuſed, the more particles of fire it receives. Having, therefore, this united force to drive it up, it more eaſily aſcends; ſo that, by the ſame degree of fire, bodies will not equally ariſe, though they are equally heavy, if there be that difference in their ſurfaces already ſuppoſed.

The air, alſo, has no ſmall ſhare in the buſineſs of an impulſe: for, being rarefied by the fire, it is not only impelled upwards itſelf, but it carries other particles up with it: and it may be learned, by many very familiar experiments, what impetus bodies, ſo rarefied, exert. Whoſoever, therefore, well conſiders theſe things, viz. ſpecific levity, an impelling force, and the extent of ſurface; and what may be effected by them; and how many ways, and in what proportions, all of them may be changed; will very eaſily account for all the variety which is found in the ſeveral proceſſes of *diſtillation*.

DISTILLATION, *Combinatory*, a term introduced into uſe by Dr. Shaw, in his Eſſay on Diſtillation, to expreſs that ſort of rectification of diſtilled ſpirits which is done with ADDITIONS, and which he otherwiſe calls improper rectification, by way of diſtinction from that proper rectification, which is the only method of reducing a ſpirit to its utmoſt degree of purity and perfection.

In the *combinatory diſtillation*, many ingredients are added in order to rectify the ſpirit, as the diſtillers expreſs it; and ſome part of theſe actually come over and mix themſelves along with the ſpirit ſo intimately, as not to be ſeparable again without great difficulty. This is done with a deſign to alter, improve, or aboliſh the natural flavour of the ſpirit; but inſtead of rectifying it, they only obſcure and pervert its true qualities. In the buſineſs of rectification, properly ſo called, of the malt ſpirit, all that is neceſſary is the re-diſtilling the low wines procured from the waſh; the again diſtilling over the ſpirit thus obtained, and called proof-ſpirit, into a totally inflammable liquor called alcohol. This is done by the common proceſſes, only taking care not to increaſe the fire by ſudden ſpurts, ſo as to raiſe the oil with the ſpirit, which if once mixed will not be eaſily ſeparated again, and ſcarce ever perfectly, whatever care is uſed.

The methods of combinatory rectification, on the other hand, are very numerous, every diſtiller having his peculiar noſtrum about it. Malt ſpirit is the general ſubject of this proceſs, and the means uſed to rectify it on this plan may be reduced to three heads: 1. That by fixed alkaline ſalt alone. 2. That by fixed alkaline ſalts and acid ſpirits. And, 3. That by ſaline bodies and flavouring additions. The general method is that by fixed alkaline ſalts alone; but it is ſurpriſing to ſee in how careleſs and ſlovenly a manner this is done by the generality of our diſtillers, though we are allowed to excel all other nations in it. The effect of this operation, when carefully performed, is to attenuate and thin the ſpirit, and to keep back a part of its groſs and fœtid oil, and ſo far to alter the part of the oil which comes over, as ſcarce to leave the ſpirit diſtinguiſhable for a malt ſpirit. This end is greatly promoted by a prudent and ſteady management of the fire, and by leaving out the faints; but this is a thing our diſtillers never attend to: they hurry over the operation, working the ſtill in its full force, and by this means raiſe and carry over the oil; though the whole buſineſs of the proceſs is to keep it back; and they even ſuffer the fulſome bitter oil, made into a kind of liquid ſoap with the ſalt in this proceſs, to run among the ſpirit with the faints; by this the whole intent of the proceſs is fruſtrated, and the ſpirit rendered much harder to clean than it was before.

This operation is uſually performed upon proof-ſpirit, and the quantity allowed is from eight to fourteen pounds of ſalt of tartar, fixed nitre, pot-aſh, or more commonly calcined tartar, to the piece. The tartar being only roaſted to a blackneſs in this laſt proceſs, is ſold under the abſurd notion of a vinous ſalt; and the dealers will often praiſe the vinoſity of their ſpirit, becauſe diſtilled from this ſalt: but the truth is, that this ſalt never fails to give, inſtead of a vinoſity, a ſaponaceous, urinous, or lixivial taſte and ſmell. This is the great misfortune that attends the method of rectifying by means of fixed ſalt, for they all of them become volatile in part during the operation; and this volatile portion paſſes over the helm with the ſpirit, and impregnates it, uniting itſelf alſo with that portion of oil yet retained in the ſpirit, and much more firmly combining it and the ſpirit together than they were before; ſo that in reality the ſpirit thus rectified is no other than an alkaline or tartariſed ſpirit, as the chemiſts call it, a thing extremely different from a true vinous ſpirit.

This method, therefore, though it were practiſed to the utmoſt perfection, would never do what was intended by it, but would alter, inſtead of rectifying the ſpirit. Hence there appears the neceſſity of ſome acid to deaden the force of the alkali thus uſed in the rectification. The neceſſity of this, gave occaſion to the method of mixing acids and alkalies together for theſe purpoſes. The acids uſed by our diſtillers on this occaſion, are thoſe of the mineral kingdom, becauſe of their cheapneſs; and the moſt common in uſe among them are oil of vitriol, ſpirit of nitre, oil of ſulphur, and the like. The moſt celebrated rectifiers in the malt way have got their reputation by the uſe of theſe acids. There is ſome choice, however, to be made of the ſpirits, according to the greater or leſſer foulneſs and need of rectification, and they muſt not only be well proportioned, but carefully introduced, and regularly mixed; and indeed without ſome ſkill and judgment in the management of theſe corroſives, no diſtiller ought to attempt to meddle with them.

Theſe ſtrong and violent acids at beſt are not ſo well adapted to the work as the milder ones, particularly the ſulphureous ſpirit of vitriol, which comes over in the rectification of the oil; to this may be added the common *ſpiritus nitri dulcis*, and Mr. Boyle's acid ſpirit of wine well prepared.

Some of our rectifiers, inſtead of the fixed ſalt, uſe quick-lime, which cleanſes and dephlegmates conſiderably: but this method requires the aſſiſtance of acids alſo afterwards, to take off not only the alkaline diſpoſition, but alſo the ſtinking flavour it leaves behind it. Some alſo uſe chalk, virgin earth calcined, and burnt animals bones. Theſe are of conſiderable uſe in the rectifying brandy without rendering the ſpirit any more unfit for the purpoſe of the compounders than before, or requiring much acid afterwards.

The great art of uſing the flavouring ingredients in rectification, is the proper admixture of ſalts in the operation, for without theſe the flavours added by this means do very little. The ſalts uſed on this occaſion are either the fixed alkalies, as pot-aſh and calcined tartar, or decrepitated common ſalt, or calcined vitriol, alum, or ſandiver. The flavouring ingredient is to be applied afterwards, and the whole quantity of the ſpirit either drawn over again, or not, as the occaſion and nature of the addition requires. But theſe ſaline bodies perform ſo very little, that the ſpirit is uſually left impregnated with a flavour from its own oil, which is but badly hidden, or overpowered by the other ingredients. The moſt common flavourers, as they call them, are theſe; mace, orrice-root, parſnip, artichoak, rhodium, raiſinſtalks, damaſk-roſes, wine-lees, rape or grape-huſks, and the oil of wine. The laſt of theſe is infinitely preferable to all the others, but is not ſo well known. Theſe and the like ingredients judiciouſly mixed, will, when the ſpirit is very well purified firſt, give the flavour of foreign brandies with ſome tolerable exactneſs; but if this is not attained, their flavour will be loſt in the original one, and the general taſte reſulting from the whole will be like nothing at all. The ultimate perfection aimed at in all the proceſſes of *combinatory diſtillation*, is the depurating the Engliſh malt ſpirit at one operation, ſo as to render it taſteleſs and inodorous, and yet vinous; or elſe to make it reſemble the French brandy, arrack, or ſome other low-flavoured vinous ſpirits.

This is certainly practicable, though not uſually practiſed to the perfection that it might be: the principal thing to be endeavoured after, is the obtaining a taſteleſs ſpirit, capable of receiving any impreſſion, and then the buſineſs of flavouring is eaſy. The method of rectifying, by fixed alkaline ſalts, is capable of great improvement, as by ſteeping the ſpirit firſt brought near to the ſtate of alcohol, upon a well-dried ſalt of tartar, or any other cheaper, but pure fixed alkali; by this means it will be almoſt totally freed of its oil without volatiliſing much of the ſalt, as it does in the way of *diſtillation*; by this means a weak tincture of ſalt of tartar may be procured, and an acid added to this, to take off the effects of the alkali in the ſpirit; the whole is then to be diſtilled, and the fire being well managed, a very clean ſpirit will be thus procured at one operation, ſuch as can no way elſe be obtained at once.

The uſe of the compound neutral ſalts in rectification ſeems not yet to be ſufficiently known; what is meant by theſe ſalts is a fixed alkaline ſalt ſaturated with an acid one. Such a ſalt has indeed been expected from the *caput mortuum*, or white ſaline cake, remaining upon the *diſtillation* of the ſpirit of nitre with oil of vitriol; but it proves too hard, ſtony, and inſoluble, to be of any great uſe on this occaſion: a much better effect may be expected from ſoluble tartar, carefully prepared, and properly uſed; though even this is apt to render the ſpirit a little ſaponaceous. Some compound neutral ſalts have been made, however, upon this foundation, that would rectify common malt ſpirit from proof at a ſingle operation,

tion, much better than all the other more perplexed and tedious methods in uſe. A prudent uſe of fine dry ſugar may alſo be of ſome ſervice, as it readily unites with the eſſential oil, and detains and fixes it, without imparting any urinous or other nauſeous flavour to the ſpirit rectified upon it. Another hint to this purpoſe, which may be made to turn to very good account, is that given by the ingenious method invented by Dr. Cox, of taking all the oil out of the volatile ſalts, by firſt bringing them to a neutral ſtate with ſpirit of ſalt, and then ſubliming them with ſalt of tartar, which does the buſineſs to perfection. In the caſe of ſpirits the acid may be varied, and virgin-earth, chalk, calcined flints, or the like abſorbents uſed inſtead of ſalt of tartar, and yet the general effect will be the ſame. Shaw's Eſſay on Diſtillery.

Diſtillation, *Brewing for*. See Brewing.

Diſtillation *of ſalt-water*, in order to obtain freſh. See *Salt*-Water.

DISTILLED *Juice of tar*. See Tar-*water*.

Diſtilled *Waters*. The waters *diſtilled* from plants and other medicinal things, may receive ſomething from the veſſels in which they are *diſtilled*, which may in ſome degree alter their properties. Even water alone *diſtilled* in glaſs veſſels, and in thoſe of metal, differs ſo much, that theſe two diſtillations being mixed, will render one another turbid. The Florentine academicians have taken this change of waters under their conſideration, among the many other minutiæ of natural and experimental philoſophy omitted by others. They found that common water *diſtilled* in leaden veſſels would render all other waters turbid, on mixing with it; whether it were ſpring, fountain, river, or well-water, except alone the water of the conduit at Piſa: an experiment that proved a quality in that water, different from all others, though never before ſuſpected in it. The experiment being repeated at various ſeaſons afterwards, the water of this conduit was ſometimes found to grow turbid alſo; but this was at ſuch times as other waters, from rain, &c. had blended themſelves with the genuine water of the ſpring. Waters *diſtilled* in glaſs veſſels, and mixed with waters *diſtilled* in lead veſſels, were ſuppoſed by the Florentines indeed not to render one another turbid; but, by the obſervations often made by the curious Redi, it proved that they did. See Redi's Obſervat.

Common water *diſtilled* in gold, ſilver, or glaſs, with a glaſs head, and kept in glaſs, remains always clear; but, in cryſtal of Piſa, it grows turbid in a few hours, then milky, and in a few days yellow, and after all this bitter; whereas in cryſtal of Rome or Venice, the ſame water does not grow turbid till after two or three days, and never becomes yellow or bitter in it; and in cryſtal of Paris it will ſcarce grow turbid, but after a very conſiderable time. The various materials uſed in the making theſe ſeveral kinds of cryſtal, at the glaſs-houſes of theſe different places, and the various manner of working them, are the occaſion of this great difference in them; and on theſe principles we may find a new and more than ordinary way of judging of the goodneſs of glaſſes, which ſeem equal to one another. See Waters.

Diſtilled *Waters of laurel-leaves*. See Laurel.

DISTILLER, a perſon who diſtils ſpirits for ſale. Such a perſon is liable to the ſurvey and duties; and is not allowed to have any ſtill or number of ſtills, which ſingly or together contain leſs than a hundred gallons, under the penalty of 100*l.* and the waſh-ſtill ſhall contain at leaſt four hundred gallons, excluſive of the head, under the ſame penalty. 2 Geo. III. c. 5. and 14 Geo. III. c. 73.

Diſtillers are to enter their warehouſes, ſtills, and veſſels, &c. at the next office of exciſe, on pain of 20*l.* and perſons occupying any ſuch ſhall forfeit 50*l.* and the veſſels are to be marked by the gager. 8 and 9 W. c. 19. 24 Geo. II. c. 40.

Diſtillers who uſe private pipes, &c. for conveyance of diſtilled liquor, forfeit 100*l.* 10 and 11 W. c. 4. They ſhall alſo make holes in the breaſt of the ſtill for taking gages and ſamples, and provide locks on the ſtill-heads, the holes, diſcharge-cocks, and furnace-door, under a penalty of 50*l.* and of 200*l.* for breaking or wilfully damaging ſuch lock or faſtening, after it has been ſecured by the officer. 12 Geo. III. c. 46. 14 Geo. III. c. 73.

Diſtillers are required to give notice to the officer of exciſe, before they receive any wine, cyder, &c. or any kind of fermented waſh, on pain of 50*l.* and alſo before they charge or open the ſtill, expreſſing and deſcribing the number and marks of the waſh-batches uſed; and they are prohibited from charging the ſtill with any other, under a penalty of 100*l.* 24 Geo. II. c. 40. 12 Geo. III. c. 46. 14 Geo. III. c. 73.

Diſtillers, in preparing griſt for waſh, that uſe more wheat than in the proportion of one quarter of wheat to two quarters of any other grain, forfeit 50*l.* 33 Geo. II. c. 9.

Exciſe officers may enter warehouſes, &c. uſed by *diſtillers* and dealers, to take account of liquor, by day or night; and perſons obſtructing them forfeit 50*l.* 6 Geo. I. c. 21. and 5*s.* a gallon is forfeited for all liquors concealed; 3 W. c. 15.

Retailers of diſtilled liquors, or ſuch as ſell the ſame in leſs quantity than two gallons, muſt take out a licence; which is to be granted only to thoſe who keep taverns, victualling-houſes, inns, coffee-houſes, or ale-houſes; who, within the limits of the head office of exciſe in London, pay 10*l.* a year rent and pariſh rates, and in places where the occupiers are not rated, 12*l.* a year; and who, in other parts of the kingdom, pay to church and poor. They muſt firſt be licenced to ſell ale in the places where they dwell. Retailers without licence forfeit 10*l.* which may be either levied, and is in no caſe to be mitigated below 5*l.* or the offender may be committed to hard labour for two months; and by another act, the forfeiture is 50*l.* 16 Geo. II. c. 8. 17 Geo. II. c. 17. 24 Geo. II. c. 40. 26 Geo. II. c. 13. 9 Geo. III. c. 6. 13 Geo. III. c. 56. Hawkers of ſpirituous liquors in the ſtreets, &c. are liable to a forfeiture of 10*l.* 9 Geo. II. c. 23. 11 Geo. II. c. 26. Perſons giving away ſpirituous liquors, or paying wages in them, ſhall be deemed retailers. 9 Geo. II. c. 23. Keepers of gaols, workhouſes, &c. ſelling ſpirituous liquors, or knowingly ſuffering them to be ſold, except ſuch as are preſcribed by a phyſician, ſurgeon, or apothecary, forfeit for the firſt offence 100*l.* and for the ſecond, their office. Debts for ſpirituous liquors cannot be recovered, unleſs they have been contracted, or the liquors delivered at one time to the value of 20*s.* or upwards: and *diſtillers* knowingly ſelling or delivering diſtilled liquors to unlicenced retailers, forfeit 10*l.* and treble their value; and the retailer, convicting the *diſtiller*, is entitled to a ſhare of the penalty, and is himſelf indemnified. Perſons riotouſly reſcuing offenders, or aſſaulting informers, and their aiders or abettors, are guilty of felony, and liable to ſeven years tranſportation. 24 Geo. II. c. 40. No liquor exceeding one gallon ſhall be removed without a permit. 6 Geo. I. c. 21. Britiſh ſpirits made from corn are allowed on exportation as merchandize, a bounty or drawback of 3*l.* 12*s.* *per* ton; provided that they are not exported in caſks containing leſs than a hundred gallons, and in veſſels of leſs burden than a hundred tons; except to Africa and Newfoundland, whither they may be exported in any veſſels of more than ſeventy tons. 2 Geo. III. c. 5. and 6 Geo. III. c. 46.

DISTILLERY, the art of diſtilling Brandy and other ſpirits. This art was firſt brought into Europe by the Moors of Spain, about the year 1150: they learned it of the African Moors, who had it from the Egyptians: and the Egyptians are ſaid to have practiſed it in the reign of the emperor Diocleſian, though it was unknown to the ancient Greeks and Romans. Anderſon's Hiſt. of Commerce, vol. i. p. 83. See Fermentation, and Malt *diſtillery*.

DISTINCT *notion*, or *idea*, according to M. Leibnitz, is, when we can enumerate marks and characters enough whereby to recollect a thing.

Such, e. gr. is this; that a circle is a figure bounded with a curve line that returns into itſelf; all the points whereof are equally diſtant from one middle part. Or, it is that wherein the mind perceives a difference from all other ideas.

Diſtinct *baſe*, in *Optics*, is that diſtance, from the pole of a convex glaſs, in which objects, beheld through it, appear *diſtinct*, and well defined: ſo that the *diſtinct baſe* coincides with what we otherwiſe call the focus.

The *diſtinct baſe* is cauſed by the collection of the rays proceeding from a ſingle point in the object, into a ſingle point in the repreſentation: and therefore concave glaſſes, which do not unite, but ſcatter and diſſipate the rays, can have no real *diſtinct baſe*.

DISTINCTION, a diverſity in things, or conceptions.

Logicians define *diſtinction*, an aſſemblage of two, or more words, whereby diſparate things, or their conceptions, are denoted.

There are three kinds of *diſtinctions*, taken from the three different modes of exiſtence: the firſt, *real*; the ſecond, *modal*; and the laſt, *rational*.

Diſtinction, *Real*, is that between things which may exiſt, or be conceived to exiſt, apart from each other: ſuch is that between two ſubſtances, or the modes of two ſubſtances.

Diſtinction, *Modal*, is that between ſeveral things, one whereof may exiſt without the other; but not *vice verſa*, the other without that: ſuch is that between the mind, and an act of will; between wax, and its hardneſs; water, and its freezing, &c.

DISTINCTIO *Rationis*, or *Rational* **DISTINCTION**, is that between ſeveral things, which are really one and the ſame, and whereof one cannot exiſt without the other, nor, *vice verſa*, the other without this: ſuch is that between a thing, and its eſſence; between the eſſence, and properties, &c.

Of this *diſtinction* ſome authors admit two kinds; the one barbarouſly called *rationis ratiocinatæ*, having ſome foundation in things; as when we diſtinguiſh the juſtice of God from his mercy: the other called *rationis ratiocinantis*, which has no foundation at all; and therefore is, by many, quite rejected.

Though others contend, that there is no *diſtinctio rationis*, but is, at the ſame time, a *real diſtinction*: thus, ſay they, God, and juſt God, are, to each other, as milk, and white milk; and a juſt God, and merciful God, as white milk, and ſweet milk. But when I ſay, milk is *diſtinguiſhed* from white milk, or white milk from ſweet milk, the *diſtinction* falls between whiteneſs and ſweetneſs, which is a *real diſtinction*. See REALISTS.

DISTINCTION, *Metaphyſical*, called alſo by the ſchoolmen *alietas*, *alteritas*, and *diverſitas*, is a non-agreement of being, whereby this entity is not that, or one thing is not another.

DISTINCTIO, or **DISTINGUO**, in the *Schools*, an expedient to evade an argument, or to clear up, and unfold an ambiguous propoſition, which may be true in one ſenſe, and falſe in another. The reſpondent was hard preſſed, but he diſengaged himſelf by a *diſtinguo*. Moliere makes T. D. ſay to his miſtreſs, who had told him, he muſt ſubmit to the will of a perſon he loved: *Diſtinguo, Mademoiſelle, pour l' intereſt de ſon amour*, *Concedo*; *contre ſa paſſion*, *Nego*.

DISTORTION, in *Medicine*. **DISTORTIO** *oris*, or **DISTORTION** *of the mouth*, is a contraction, or ſhortening of one ſide of the mouth, occaſioned by a convulſion, or a palſy of the muſcles of one ſide of the face.

When a *diſtortion* ariſes from a convulſion, it is on the ſame ſide with the convulſion, the force of the convulſed part being ſuperior to that of the ſound part: on the contrary, when it ariſes from a palſy, it is on the oppoſite ſide, the paralytic part being here ſurmounted by that which is ſound.

In a *diſtortion of the mouth*, the patient can only ſpit on one ſide; and if he laughs, or pronounces the letter O, he only moves one ſide of his mouth.

The Greeks call this diſorder σπασμος κυνικος, *ſpaſmus cynicus*. This malady is often the effect of careleſſneſs and ill habits. A remarkable inſtance of this kind is mentioned by Winſlow; in which, by careleſſneſs, dreſſing, and leaning, the back-bone of a young lady became crooked, and bent ſideway in contrary directions, like the letter S.

DISTORTION *of the eye*, called alſo SQUINTING, or STRABISMUS.

DISTORTOR *oris*, in *Anatomy*, a muſcle of the mouth, called alſo ZYGOMATICUS.

DISTRACTION, in *Medicine*, ſometimes denotes the act of pulling a fibre, membrane, or the like, beyond its natural extent: and what is capable of this enlargement, is ſaid to be *diſtractile*.

DISTRAIN, in *Law*. *To* **DISTRAIN**, is to attach, or ſeize on one's goods, for the ſatiſfaction of a debt.

DISTRESS, in *Law*, a compulſion recurred to in certain real actions, for bringing a man to appear in court, or to pay rent, or other duty denied: and by the common law, *diſtreſſes* for rent were not to be ſold, but only detained for enforcing payment of the rent; but this is altered by ſtatute.

The method of *diſtreſs* for rent has been much altered in this caſe. If any tenant of lands or tenements ſhall fraudulently carry away his goods, to prevent *diſtreſs*, the landlord may within thirty days after *diſtrain* them wherever they ſhall be found, as if they had been on the premiſes; but no ſuch goods ſhall be *diſtrained*, if ſold, *bona fide*, for valuable conſideration before ſeizure, to any perſon not privy to the fraud. Tenants committing ſuch fraud, or others aſſiſting, ſhall forfeit double the value of the goods carried off, to be recovered by action of debt, &c. and where they ſhall not exceed fifty pounds value, the landlord may exhibit a complaint before two juſtices of peace, who are to examine the fact, and enquire into the value of the goods, and thereupon order the offender to pay double value, leviable by *diſtreſs* and ſale; or for want thereof, commit the offender to the houſe of correction for ſix months. Landlords or their agents may, with the aſſiſtance of a conſtable, ſeize any goods fraudulently concealed in any houſe, out-houſe, &c. And in caſe of a dwelling-houſe, on oath firſt made to ſome juſtice, of reaſon to ſuſpect that ſuch goods are therein, may break open the ſame, and *diſtrain* them. They may alſo *diſtrain* for rent, any cattle, or ſtock of their tenants, feeding on any common; or corn growing on the land, which they ſhall cure, and lay up when ripe, in any proper place, giving notice to the tenant within a week where lodged; and diſpoſe thereof toward ſatiſfaction of the rent and charges; the appraiſement to be taken when cut and cured. But if after *diſtreſs* ſo taken, before the product be ripe and gathered, the tenant ſhall pay the rent, and charges of the *diſtreſs*, the ſaid *diſtreſs* ſhall ceaſe. Perſons may ſecure *diſtreſſes* lawfully taken, and ſell them upon the premiſes, in like manner as may be done off the ſame, by 2 W. and M. and any perſons may go to and from the premiſes, to view, appraiſe, buy, or take away the goods of the purchaſer; and if a reſcous be made for the *diſtreſs*, the perſons aggrieved ſhall have the remedy given by the ſaid ſtatute. Stat. 11 Geo. II. cap. 19.

The uſual effect of *diſtreſs* is to drive the party *diſtrained* to replevy the *diſtreſs*, and ſo take his action of treſpaſs againſt the *diſtrainer*; or elſe to compound with him for the debt, or duty, for which *diſtreſs* was made.

There are ſeveral things not *diſtrainable*; for a *diſtreſs* muſt be of a thing, whereof a valuable property is in ſome body; and, therefore, dogs, bucks, coneys, &c. that are *feræ naturæ*, cannot be *diſtrained*.

Again, although it be of a valuable property, as a horſe, (yet when a man or woman is riding on him) or an ax (in a man's hand cutting wood) and the like, are for that time privileged, and cannot be *diſtrained*.

Again, valuable things ſhall not be *diſtrained* for rent, which are for the benefit and maintenance of trades, and which, by conſequence, are for the commonwealth, and are by authority of the law there; as an horſe in a ſmith's ſhop; materials in the weaver's ſhop for making cloth; cloth, or garments, in the taylor's ſhop; ſacks of corn, or meal in a mill, or a market; nor any thing *diſtrained* for damage-feſant, for it is in *cuſtodia legis*.

Again, nothing ſhall be *diſtrained* for rent, which cannot be rendered again in as good a plight as it was at the time of the *diſtreſs* taken; as ſheaves or ſhocks of corn cannot be *diſtrained* for rent, but for damage-feſant they may. Again, beaſts belonging to the plough ſhall not be *diſtrained*.

Laſtly, furnaces, cauldrons, or the like, fixed to the freeholds, or doors, or windows of an houſe, or the like, cannot be *diſtrained*; when a *diſtreſs* is taken that has life in it, it muſt be brought into the common pound, or kept in an open place, where the owner may give it food.

Diſtreſs is divided, by Briton, into *real*, and *perſonal*.

DISTRESS, *perſonal*, is made by *diſtraining* a man's moveable goods, and ſeizing all the profits of his lands and tenements, from the teſte, or date of the writ, for the defendant's contempt in not appearing to an action brought againſt him when he was ſummoned, or attached; and the iſſues ſo returned by the ſheriffs, are forfeited to the king, and eſtreated into the exchequer.

DISTRESS, *real*, is made on immoveable goods. It differs from an attachment in this, that it cannot be taken by any common perſon, without the compaſs of his own fee; except it be preſently after the cattle, or other things, are driven, or borne off the ground, on purpoſe to avoid *diſtreſs*.

Diſtreſs is alſo divided into *finite*, and *infinite*.

DISTRESS, *finite*, is that limited by law, how often it ſhall be made to bring the party to trial of the action; viz. once, twice, &c.

DISTRESS, *infinite*, is without limitation, till the party come; as againſt a jury, which refuſes to appear upon certificate of aſſiſe, the proceſs is *venire facias*, *habeas corpus*, and *diſtreſs infinite*.

Laſtly, *diſtreſs* is again divided into *grand diſtreſs*, by Fitzherbert called *magna diſtrictio*; and *ordinary diſtreſs*.

DISTRESS, *grand*, is that made of all the goods and chattles the party hath within the county.

DISTRIBUTION, the act of dividing a thing into ſeveral parts, in order to the diſpoſing each in its proper place. See DIVISION.

DISTRIBUTION, in *Architecture*. **DISTRIBUTION** *of the plan*, denotes the dividing, and diſpenſing the ſeveral parts, and members, which compoſe the plan of a building.

DISTRIBUTION *of ornaments*, is an equal, orderly placing of the ornaments in any member, or compoſition of architecture. See ORNAMENT.

DISTRIBUTION, in *Law*; the ſurplus of an eſtate, or *pur autre vie*, is diſtributable by adminiſtrators. See ADMINISTRATORS.

For the *diſtribution* of the eſtates of inteſtates, ſee INTESTATE.

DISTRIBUTION, in *Logic*, is a kind of diviſion which diſtinguiſhes an univerſal whole into its ſeveral kinds or ſpecies. The rules of a good *diſtribution* are much the ſame as thoſe of DIVISION.

DISTRIBUTIONS, *manual* and *quotidian*, in *Eccleſiaſtical Matters*, denote certain ſmall ſums of money, appointed by the donors, or founders thereof, to be *diſtributed* to ſuch of the canons of a chapter as are actually preſent, and aſſiſtant at certain offices.

DISTRIBUTION; in *Painting*, denotes the diſpoſition of the objects and lights in a picture. See CLAIR-OBSCURE.

DISTRIBUTION, in *Printing*, the taking a form aſunder, ſeparating the letters, and diſpoſing them in the caſes again, each in its proper cell.

DISTRIBUTION, in *Rhetoric*, is a kind of deſcription; or a figure whereby an orderly diviſion and enumeration is made of the principal qualities of a ſubject.

For example, He has underſtanding to ſee our faults, juſtice to reſtrain them, and authority to puniſh them. Their throat is an open ſepulchre; they flatter with their tongues; the poiſon of aſps is under their lips; their mouth is full of curſing, and lyes; and their feet are ſwift to ſhed blood.

DISTRIBUTIVE, that *diſtributes*, from *dis*, *aſunder*; and *tribuere*, *to give*.

DISTRIBUTIVE *juſtice*, is that whereby we give every perſon what belongs to him. See JUSTICE.

DISTRIBUTIVES, in *Grammar*. See NUMERALS.

DISTRICT, the territory, or extent of juriſdiction, of a judge.

A judge, or officer, cannot act out of his own *diſtrict*. See JUDGE.

DISTRICT, in *Law*, properly denotes the place wherein a man has the power of diſtraining; or, the circuit, or territory, wherein one may be compelled to appear.—Where we ſay, *hors de ſon fee*; others ſay, *extra diſtrictum ſuum*.

DISTRINGAS, a writ directed to the ſheriff, or other officer, commanding him to diſtrain one for a debt to the king; or for his appearance at a certain day. See DISTRESS.

DISTRINGAS *juratores*, a writ directed to a ſheriff, whereby he is commanded to diſtrain upon a jury to appear, and to return iſſues on their lands, &c. for non-appearance. This writ iſſues for the ſheriff to have their bodies in court, &c. at the return of the writ.

DISVELOPED, in *Heraldry*, is uſed much in the ſame ſenſe with diſplayed. Thus colours, ſaid in an army to be flying, are, in heraldry, ſaid to be *diſveloped*.

DISUNITE, in the *Manege*, is uſed for a horſe that drags his haunches, that gallops falſe, or upon an ill foot. See GALLOP.

DITCH, in *Agriculture*. In marſhes, and other wet land, where there are no hedges, the common fence or incloſure for land is a *ditch*. They allow theſe *ditches* ſix foot wide againſt high-ways that are broad, and againſt commons five foot. But the common ditches about incloſures, dug at the bottom of the bank, on which the quick is raiſed, are three foot wide at the top, one at the bottom, and two foot deep; by this means each ſide has a ſlope, which is of great advantage; for where they neglect this, and dig them perpendicular, they are always waſhing down; beſide, in a narrow bottomed *ditch*, if cattle get down into it, they cannot ſtand to turn themſelves to crop the quick; but where the *ditch* is four foot wide, it ſhould be two and a half deep; and where it is five wide, it ſhould be three deep, and ſo in proportion.

DITCH, in *Fortification*, called alſo *foſs* and *moat*, a trench dug round the rampart, or wall of a fortified place, between the ſcarp, and counterſcarp. See *Tab. Fortif. fig.* 21. *lit. h h h*, &c.

Some *ditches* are dry; others full of water; each whereof have their advantage. The earth dug out of the *ditch* ſerves to form the rampart.

The *ditch* in front ſhould be of ſuch breadth as that the talleſt tree may not reach over it, i. e. from eighteen to twenty feet, and about ſeven or eight feet deep; and the *ditches* on the ſides are about ten feet wide, and ſix feet deep; though the rule others give for the dimenſions of the *ditch*, is, that it afford earth enough to build the rampart of due magnitude. The ſpace between the rampart and *ditch*, being about ſix feet, is called the *berm*, or *liſt*.

DITCH-*water*. See WATER.

DITHYRAMBIC, ſomething that relates to the *dithyrambus*. We ſay, a *dithyrambic* verſe, *dithyrambic* poet, *dithyrambic* heat, &c. A compound *dithyrambic* word, Mr. Dacier obſerves, has ſometimes its beauty and force. Some moderns call compoſitions which are in the taſte of an ode, only not diſtinguiſhed into ſtrophes, and conſiſting of all kinds of verſe indifferently, *dithyrambic* odes.

Dithyrambic poetry owes its birth to Greece, and the tranſports of wine. It ſavours ſtrongly of its original; as admitting of no rules, but the ſallies of a fiery imagination. And yet art is not quite excluded; but delicately applied, to guide and reſtrain the *dithyrambic* impetuoſity, and only indulge it in flights that are pleaſing. In effect, what our poets ſay of the ode, is more true of the *dithyrambic* than of the ode, that its diſorder is an effect of art.

DITHYRAMBUS, Διθυραμϐος, in the *Ancient Poetry*, a hymn in honour of Bacchus, full of tranſport, and poetical rage.

The meaſure, which is what diſtinguiſhes this kind of poetry, is ſaid to have been invented by *Dithyrambus*, a Theban; but Pindar attributes it to the Corinthians; and the modern etymologiſts furniſh us with another origin of the word.

In effect, the verſe might be called thus from the god it was conſecrated to, who himſelf was named *Dithyrambus*; either on account of his having been brought twice into the world, according to the fable of Semele and Jupiter, or by reaſon of his having triumphed twice; from δις, *twice*; and θριαμϐος, *triumph*. Be this as it will, the ancients, we are told by Ariſtotle and Horace, gave the appellation *dithyrambus* to thoſe verſes wherein none of the common rules or meaſures were obſerved; much like thoſe called by the French *vers libres*, by the Italians *verſi ſciolti*, and by the modern Greeks *politici*, a name they give to proſe, which theſe verſes reſemble more than poetry.

We have now no remains of the *dithyrambi* of the ancient poets, ſo that we cannot ſay preciſely what their meaſure was; all we know is, that it was very bold and irregular. The poets not only took the liberty to forge new words for the purpoſe, but they made double, and compound words, which contributed very much to the magnificence of the *dithyrambus*.

Horace has ſometimes imitated them. Dacier, F. Commire, and ſome other modern writers, have compoſed Latin pieces of all kinds of verſe indifferently, according as the ſubject and words preſented themſelves, without any order, or diſtribution into ſtrophes, and call them *dithyrambi*. See PINDARIC.

DITONE, DITONUM, in *Muſic*, an interval comprehending two tones, a greater and a leſs. See INTERVAL, and TONE.

The word is formed of δις, *twice*, and τονος, *tone*.

The ratio of the ſounds that form the *ditone* is of 4 to 5; and that of the *ſemi-ditone*, of 5 to 6. F. Parran makes the *ditone* the fourth kind of ſimple concords; others make it the firſt diſcord, dividing the *ditone* into eighteen equal parts, or commas, the nine on the acute ſide go to the greater tone. Salomon de Caux.

DITONICO, DIATONIC, in *Muſic*, according to Zarlino, is the pure and natural diatonic genus, or the diatonic of Didymus; in which not one of the ſounds is in the leaſt altered: ſuch is the plain chant of the church. But the *genus diatonum ditonicum* of Ptolemy, which coincides with the *diatonic* of Pythagoras, and reſults from that diviſion of a monochord bearing the name of Euclid's ſection of the canon, is expreſſed by $\frac{256}{243} \times \frac{9}{8} \times \frac{9}{8} = \frac{4}{3}$. But theſe ancient ſyſtems have juſtly been laid aſide, ſince the invention of a temperament, as being unfit for the execution of muſical compoſitions in ſeveral parts. Smith's Harmon. p. 33.

DITONICUM *Diatonum*. See GENUS.

DITRIGLYPH, in *Architecture*, the ſpace between two triglyphs. See TRIGLYPH.

DITRIHEDRIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek δις, *twice*, τϱις, *three*, and ἑδϱα, a *ſide* or *plane*. The bodies of this genus are ſpars compoſed of twice three planes, being formed of two trigonal pyramids joined baſe to baſe, without the intervention of any intermediate column. Of this genus there are five known ſpecies. 1. One with long and pointed pyramids, found in the mines of Cornwall, and ſome other parts of England. 2. One with long and broad pyramids, found looſe in the fiſſures of the alabaſter quarries of Blanckenberg, in Germany. 3. One with ſhort and broad pyramids, found in the mines of Rammelſberg. 4. One with extremely broad depreſſed pyramids, found in the alabaſter quarries at Blanckenberg, and ſometimes in the mines of Goſſelaer in Saxony. 5. One with ſhort, but ſharp-pointed pyramids, found very frequently in the mines of the Harte Foreſt, and ſometimes on Mendip Hills with us. Hill's Foſſils, p. 218.

DITTANDER, or PEPPER-*wort*, or *Poor Man's Pepper*, *Lepidium*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs. Its characters are theſe: the flower has four oval petals placed in form of a croſs, and ſix awl-ſhaped ſtamina; two of which are ſhorter than the other. In the center is ſituated a heart-ſhaped germen, which turns to a ſpear-a ſpear-ſhaped ſeed-veſſel with two cells, divided by an intermediate partition, containing oblong ſeeds. There are ſeveral ſpecies.

The leaves of the broad-leaved *dittander*, bruiſed and mixed with hog's lard, and applied as a cataplaſm to the hips, helps the ſciatica; when chewed, they cauſe a great flux of rheum; and by that means are ſaid to help ſcrophulous humours of the throat. The women in Suffolk give them boiled in ale, to haſten the birth.

The *dittander* with a graſs leaf, or iberis, is alſo commended for its virtues in ſciaticas, when applied as the former; and hence it has been ſometimes called the *ſciatica creſs*.

DITTANY, *white*, *Dictamnus*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower hath five petals, which are unequal, and ten ſtamina, which are as long as the petals. In the center is ſituated a five-cornered germen, which afterward becomes a capſule, with five cells joined together, incloſing ſeveral roundiſh, hard, ſhining ſeeds. We have but one ſpecies, which is the white *dittany*, commonly called *fraxinella*.

There are three varieties of this plant; one with a pale red flower, ſtriped with purple; another with a white flower, and one with ſhorter ſpikes of flowers; but as they have been obſerved to vary when propagated by ſeeds, they are to be eſteemed only ſeminal varieties.

This is a very ornamental plant for gardens; and as it requires very little culture, deſerves a place in all good gardens. It hath a perennial root, which ſtrikes very deep into the ground.

The *fraxinella*, or *white dittany* of authors, is cultivated in gardens with us, and grows wild in France, Italy, and Germany. It generally grows about two foot high. The leaves much reſemble thoſe of the common aſh-tree, whence it has its name; the flowers are produced in long ſpikes, and are of a whitiſh red, mixed with purple. The cortical part of the root is ſometimes brought to us, dried and rolled up in the form of quills.

This root ſhould be choſen plump and full, white within and without, little burdened with ſmall fibres, and clean. It is alexipharmic, anthelmintic, diuretic, and uterine, but now very rarely uſed.

Dittany, *baſtard*. See Horehound.

Dittany *of Crete*. See *Wild* Marjoram.

DITTO, in *Books of Accounts*, written contracted D°. ſignifies the *ſame*, viz. as the preceding article.

The word is corrupted from the Italian *detto*, the *ſaid*; as in our law-phraſe "the ſaid premiſes," meaning the ſame as were aforementioned.

DIVAL, in *Heraldry*, the herb night-shade, a plant with poiſonous berries, looking like black cherries, uſed by ſuch as blazon with flowers and herbs inſtead of colours and metals, for ſable, or black. See Sable.

DIVALIA, in *Antiquity*, a feaſt held among the ancient Romans on the twenty-firſt day of December, in honour of the goddeſs Angerona; whence it is alſo called Angeronalia.

On the day of this feaſt, the pontifices performed ſacrifice in the temple of Voluptia, or the goddeſs of joy and pleaſure, who, ſome ſay, was the ſame with Angerona; and ſuppoſed to drive away all the ſorrows and chagrins of life.

DIVAN, a council-chamber, or court, wherein juſtice is adminiſtered, in the eaſtern nations, particularly among the Turks.

Divan is an Arabic word, ſignifying the ſame with *ſopha* in the Turkiſh dialect.

There are two ſorts of *divans*, that of the grand ſignior, called the council of ſtate, which conſiſts of ſeven of the principal officers of the empire; and that of the grand vizir, compoſed of ſix other vizirs, or counſellors of ſtate, the chancellor and ſecretaries of ſtate, for the diſtribution of juſtice.

The word is alſo uſed for a hall, in the private houſes of the orientals. The cuſtom of China does not allow the receiving of viſits in the inner parts of the houſe, but only at the entry, in a *divan* contrived on purpoſe for ceremonies. Le Compte.

Travellers relate wonders of the ſilence and expedition of the *divans* of the Eaſt.

Divan-Beghi, the appellation of one of the miniſters of ſtate in Perſia.

The *divan-beghi* is the ſuperintendant of juſtice; his place is the laſt of the ſix miniſters of the ſecond rank, who are all under the athemadaulet, or firſt miniſter.

To the tribunal of the *divan-beghi* appeals lie from ſentences paſſed by the governors. He has a fixed ſtipend, or appointment, of 50,000 crowns, that he may render juſtice *gratis*. All the ſerjeants, uſhers, &c. of the court, are in the ſervice of the *divan-beghi*. He takes cognizance of the criminal cauſes of the chams, governors, and other great lords of Perſia, when accuſed of any fault, and receives appeals from the daruga.

There are *divan-beghis* not only at court, and in the capital; but alſo in the provinces, and other cities of the empire.

This officer is not confined by any other law, or rule, in the adminiſtration of juſtice, but the Alcoran; which alſo he interprets at pleaſure. He takes no cognizance of civil cauſes.

DIVER, in *Ornithology*, the Engliſh name of the colymbus, a genus of water birds; the characters of which are theſe; they have narrow, ſtrait, and ſharp bills; the upper mandible is the longeſt, with the edges of each bending in, the noſtrils are linear, their heads are ſmall, the tongue pointed, long and ſerrated near the baſe, their wings ſhort, their feet placed far backward on the body, and near the tail, which is ſhort, conſiſting of twenty feathers, and their legs broad and flatted, their claws broad like the nails of ones fingers. They are called *colymbi*, and in Engliſh *divers*, from their great expertneſs in diving, and long continuance under water.

There are properly two ſubordinate genera of theſe birds; the one having the feet not webbed, but the toes looſe, yet all widened by a membrane, and having no tail. Thoſe of the other genus have webbed feet like the duck, and have tails.

Of each of theſe genera there are ſeveral ſpecies. See *Tab. Birds*, N° 47. and articles Dob-*chick*, *Sea-turtle* Dove, Lumme, and Fludder.

Diver, *black*. See Scoter.

Diver, *dun*. See Dun-*diver*.

DIVERGENCY. For the point of *divergency* or *divergence* in *Optics*, ſee *Virtual* Focus.

DIVERGENT, or Diverging *lines*, in *Geometry*, are ſuch whoſe diſtance is continually increaſing.

Lines which converge one way, *diverge* the oppoſite way.

Divergent, or **Diverging**, in *Optics*, is particularly applied to rays, which, iſſuing from a radiant point, or having in their paſſage undergone a refraction, or reflexion, do continually recede farther from each other.

In which ſenſe the word is oppoſed to *convergent*, which implies the rays to approach each other; or to tend to a center, where, being arrived, they interſect; and, if continued farther, become *diverging*.

Concave glaſſes render the rays *diverging*; and convex ones, converging.

Concave mirrors make the rays converge; and convex ones, *diverge*. See Focus.

It is demonſtrated, in *Optics*, that as the diameter of a pretty large pupil does not exceed ⅕ of a digit; *diverging* rays, flowing from a radiant point, will enter the pupil, parallel, to all intents and purpoſes, if the diſtance of the radiant from the eye be 40,000 feet. See Light, and Vision.

Diverging *hyperbola*, is one whoſe legs turn their convexities towards one another, and run towards quite contrary ways.

DIVERSIFYING, in *Rhetoric*, is of infinite ſervice to the orator; it is an accompliſhment eſſential to his character, and may fitly be called the ſubject of all his tropes and figures. Voſſius lays down ſix ways of *diverſifying* a ſubject. 1. By enlarging on what was briefly mentioned before. 2. By a conciſe enumeration of what had been inſiſted on at length. 3. By adding ſomething new to what is repeated. 4. By repeating only the principal heads of what had been ſaid. 5. By tranſpoſing the words and periods. 6. By imitating them. Voſſ. Rhet. lib. v. p. 281, ſeq.

DIVERSION, in *Medicine*, the turning of the courſe or flux of humours from one part to another, by proper applications.

Diversion, in *War*, the act of attacking an enemy in one place, where he is weak, and unprovided, with deſign to make him call his forces from another place, where he was going to make an irruption, or is to be attacked with greater force.

The Romans had no way to drive Hannibal out of Italy, but to make a *diverſion*, by attacking Carthage.

DIVERSITY. This differs from diſtinction in this, that the latter is the work of the mind; but the former is in things themſelves, antecedent to the operation of the mind. For things that are ſeveral, are different; even though I do not conceive them. See Distinction.

The *diverſity*, or difference of things, therefore, ariſes from their eſſential attributes. See Identity.

Diversity, in *Painting*, conſiſts in giving every part or figure in a picture its proper air and attitude. The ſkilful painter has the penetration to diſcern the characters of nature, which vary in all men; whence the countenances and geſtures of the perſons he paints continually vary.

DIVESTING, properly ſignifies undreſſing, or ſtripping off one's garment, in contradiſtinction from *inveſting*.

In law, it is uſed for the act of ſurrendering, or relinquiſhing one's effects. By a contract of donation, or ſale, the donor, or ſeller, is ſaid to be diſſeiſed, and *diveſted* of their property in ſuch a commodity, and the donee, or purchaſer, becomes *inveſted* therewith. See INVESTITURE.

A demiſe is a general *diveſtiture*, which the fathers and mothers make of all their effects, in favour of their children.

DIVIDEND, in *Arithmetic*, the number given to be divided; or that whereof the diviſion is made.

The *dividend* muſt always be greater than the diviſor. The *dividend* contains the diviſor as many times as the quotient contains unit.

DIVIDEND *of a bankrupt's eſtate*, is that part which is diſtributed to every creditor in proportion to his debt.

DIVIDEND, in the *Exchequer*, is one part of an indenture. 10 Ed. I. c. 11.

DIVIDEND, in *Law*, is uſed for a dividing of fees and perquiſites between officers of court, ariſing from writs, &c.

DIVIDEND *of ſtocks*, is a ſhare, or proportion of the intereſt of ſtocks erected on public funds, as the South Sea, India, Bank, &c. divided among, and payable half-yearly to the ſtock-holders: and the orders they have for receiving theſe *dividends*, are called *dividend-warrants*. Stealing any *dividend-warrants* of the Bank, South Sea Company, Eaſt India Company, or of any other corporation, is made felony, with or without benefit of clergy, in the ſame manner as if the offender had ſtolen, or taken by robbery, goods to the value of the money due on ſuch *dividend-warrants*. Stat. 2 Geo. II. c. 25.

DIVIDEND, in the *Univerſity*, is that part or ſhare, which every one of the fellows equally divide among themſelves, of their annual ſtipend.

DIVIDIVI, the name of a drug brought from the Caraccas into Spain in 1769; and which, by experiments that have been made upon it at Madrid, is found to be preferable to galls in dying black.

DIVIDUAL, in *Arithmetic*, is uſed for that part of the dividend, diſtinguiſhed by a point, in working by the rule of diviſion.

DIVINATION, the pretended act, or art, of foretelling future events. This art or ſcience, in which the pagans thought themſelves ſure of ſucceſs, if they proceeded according to certain eſtabliſhed rules, was founded in their ſyſtem of theology. They had deified all the parts and powers of nature, and more eſpecially the heavenly bodies; aſcribing to the latter not only life and intelligence, but a fore-perceiving motion, and a ſovereign influence on every thing here below. They had alſo other gods beſides the objects of nature, viz. DÆMONS, from whoſe ſubordinate miniſtry and mediation, *divination*, prophecy, and magic were ſuppoſed to proceed. Ammian. Marcell. lib. i. c. 1. Herod. lib. ii. c. 83. Plato in Symp. in Epinomide, in Phædra. Porphyr. ap. Euſeb. Præp. Evan. lib. iv. v. vi. & de Abſtinentia, lib. ii. Jamblich. de Myſter. Apul. Apol. Id. de Deo Socrat. Diogen. Laert. in Vita Pythag. lib. xxxii. p. 514. Farmer on Miracles, chap. iii. ſect. 3. See PROPHECY, ENTHUSIASM, &c.

Divination proceeded originally from the Egyptians to the Jews, Greeks, and Romans; and was divided by the ancients into *artificial*, and *natural*.

DIVINATION, *Artificial*, is that which proceeds by reaſoning upon certain external ſigns, conſidered as indications of futurity.

DIVINATION, *Natural*, is that which preſages things from a mere internal ſenſe, and perſuaſion of the mind, under a particular emotion or agitation, without any aſſiſtance of ſigns.

Plutarch, in his book De Defectu Oraculorum, allows that DÆMONS might be appointed by the gods to preſide over *divination* and oracles, and to be the guardians of the temperature of thoſe exhalations, to which they are aſcribed; but at the ſame time it is aſſerted, that the ſoul is naturally endued with the faculty of divining, and that certain exhalations of the earth were the means of exciting the prophetic power or virtue. P. 418, D. and p. 436, F.

Natural divination, again, is of two kinds; the one *native*, the other by *influx*.

The firſt is founded on this ſuppoſition, that the ſoul, which was thought to be a particle of the divine air or ſpirit, taken out from God, and to have exiſted from eternity, collected within itſelf, and not diffuſed, or divided among the organs of the body, has, from its own nature and eſſence, ſome fore-knowlege of future things: witneſs what is ſeen in dreams, extaſies, the confines of death, &c.

The ſecond is founded on this, that the ſoul receives, after the manner of a mirror, ſome ſecondary illumination from the preſence of God, and other ſpirits: and hence proceeded ORACLES.

DIVINATION, *Artificial*, is alſo of two kinds: the one arguing from natural cauſes: ſuch are the predictions of phyſicians about the events of diſeaſes, from the pulſe, urine, &c. ſuch alſo are thoſe of the politician, *O venalem urbem, & mox perituram, ſi emptorem inveneris!* The ſecond proceeds from experiments and obſervations arbitrarily inſtituted, and is moſtly ſuperſtitious.

Infinite are the ſyſtems of *divination* reducible to this head; by birds, the entrails of beaſts, dreams, lines of the hand, points marked at random, numbers, names, the motion of a ſieve, the air, fire, the SORTES *Præneſtinæ*, *Virgilianæ*, and *Homericæ*; with numerous others, the principal ſpecies whereof, and their names, are: Pſychomancy, or ſciomancy, which conſiſts in calling up the ſouls, or ſhades of the deceaſed, to learn of them ſomething required. Dactyliomancy, performed by means of one, or more rings. Hydromancy, performed with ſea-water. Pegomancy, with ſpring-water. Ornithomancy, or divining by the flight of birds, which was the buſineſs of the augurs. Clidomancy, performed with keys. Coſcinomancy, with a riddle, or ſieve. Cledoniſm, by words, or voice. Extiſpicina, by the entrails of victims. Alphitomancy, or aleuromancy, by flour. Keraunoſcopia, by the conſideration of thunder. Capnomancy, by ſmoke. Alectryomancy, by cocks. Pyromancy, by fire. Lithomancy, by ſtones. Eychnomancy, by lamps. Necromancy, by the dead, or their bones, &c. Oneirocritica, by dreams. Ooſcopy, by eggs. Lecanomancy, by a baſon of water. Gaſtromancy, by the belly, or by phials. Palpitation, ſaliſſatio, παλμὸς, by the pulſation, or motion of ſome member. Axinomancy, by a hatchet, or cleaver. Catoptromancy, or cryſtallomancy, by a mirror. Chiromancy, by the lines of the hand. Geomancy, by the earth. Ceromancy, by figures of wax. Arithmomancy, by numbers. Belomancy, by arrows. Sycomancy, &c. all deſcribed by Cardan, in his fourth book, De Sapientia; and under their proper articles in this Dictionary.

All theſe kinds of *divination* have been condemned by the fathers, and councils, as ſuppoſing ſome compact with the devil: though ſome of them, as well as the heathen philoſophers, contended for the ſupernatural power and efficacy of pagan *divination* and ſorcery. Euſeb. Præp. Ev. lib. v. c. 4. Aug. de Civ. Dei. lib. viii. c. 16. Farmer on Miracles, ubi ſupra.

Fludd has ſeveral treatiſes on the different ſpecies of *divination*: and Cicero has two books of the *divination* of the ancients, in which the ſeveral kinds of it are explained; and which he reſolves into many cauſes very different from that of an immediate revelation from ſome ſpiritual being.

In Holy Scripture, we find mention made of nine different kinds of *divination*: the firſt performed by the inſpection of planets, ſtars, and clouds: it is ſuppoſed to be the practiſers of this, whom Moſes calls מעונן *meonen*, of אנן *anan*, *cloud*, Deuter. chap. xviii. ver. 10. 2. Thoſe, whom the prophet calls in the ſame place מנחש *menacheſeh*; which the Vulgate, and generality of interpreters, render *augur*. 3. Thoſe, who in the ſame place are called מכשף *mecaſheph*; which the Septuagint and Vulgate tranſlate, *a man given to ill practices*. 4. Such authors, whom Moſes in the ſame chapter, ver. 11. calls הובר *hhober*. 5. Thoſe, who conſult the ſpirits called *Python*; or, as Moſes expreſſes it in the ſame book, אוב אשל, *thoſe who aſk queſtions of Python*. 6. Witches, or magicians, whom Moſes calls ידעני *judeoni*. 7. Thoſe, who conſult the dead, *necromancers*. 8. The prophet Hoſea, chap. iv. ver. 12. mentions ſuch as conſult ſtaves, שאל מקלי; which kind of *divination* may be called *rhabdomancy*. 9. The laſt kind of *divination* mentioned in Scripture is *hepatoſcopy*, or the conſideration of the liver. See RHABDOMANCY, MAGICIANS, &c.

DIVINE, ſomething that comes from, or relates to GOD.

The word is alſo uſed figuratively, for any thing that is excellent, extraordinary, and that ſeems to go beyond the power of nature, and the capacity of mankind.

In which ſenſe, the compaſs, teleſcope, clocks, &c. are ſaid to be *divine* inventions: Plato is called the *divine author*, the *divine Plato*; and the ſame appellation is given to Seneca: Hippocrates is called the *divine old man*, *divinus ſenex*, &c. The Arabs give the appellation *divine*, אלהון *elahioun*, to their ſecond ſect of philoſophers, conſiſting of ſuch as admit a firſt mover of all things, a ſpiritual ſubſtance free from all kind of matter; in a word, a God. By this name they diſtinguiſh them from their firſt ſect, whom they call *deberioun*, or *thabaioun*, i. e. *worldlings*, and *naturaliſts*, as admitting of no principles beyond the material world, and nature.

The word אלהיון *elahioun* is derived from אלא *Alla*, *God:* ſo that the *elahioun* are the *divines*, or *theologues*, as Caſtellus renders it; or, ſuch as own a God.

DIVING, the art, or act of deſcending under water, to conſiderable depths, and abiding there a competent time.

The uſes of *diving* are very conſiderable, particularly in the fiſhing for pearls, corals, ſponges, &c. See PEARL-*fiſhing*.

There have been divers methods propoſed, and engines contrived, to render the buſineſs of *diving* more ſafe and eaſy. The great point in all theſe is to furniſh the *diver* with freſh air, without which, he muſt either make but a ſhort ſtay, or periſh.

Thoſe who *dive* for ſponges in the Mediterranean, help themſelves by carrying down ſponges dipt in oil in their mouths. But conſidering the ſmall quantity of air that can be contained in the pores of a ſponge, and how much that little will be contracted by the preſſure of the incumbent air, ſuch a ſupply cannot long ſubſiſt the *diver*. For it is found by experiment, that a gallon of air included in a bladder, and by a pipe reciprocally inſpired and expired by the lungs, becomes unfit for reſpiration in little more than one minute of time. For though its elaſticity be but little altered in paſſing the lungs, yet it loſes its vivifying ſpirit, and is rendered effete.

In effect, a naked *diver*, Dr. Halley aſſures us, without a ſponge, cannot remain above two minutes incloſed in water; nor much longer with one, without ſuffocating; nor without long practice, near ſo long; ordinary perſons beginning to be ſuffocated in about half a minute. Beſides, if the depth be conſiderable, the preſſure of the water in the veſſels makes the eyes blood-ſhotten, and frequently occaſions a ſpitting of blood.

Hence, where there has been occaſion to continue long at the bottom, ſome have contrived double flexible pipes, to circulate air down into a cavity incloſing the *diver*, as with armour, both to furniſh air, and to bear off the preſſure of the water, and give leave to his breaſt to dilate upon inſpiration; the freſh air being forced down one of the pipes with bellows, and returning by the other of them, not unlike to an artery, and vein.

But this method is impracticable when the depth ſurpaſſes three fathoms; the water embracing the bare limbs ſo cloſely, as to obſtruct the circulation of the blood in them; and withal preſſing ſo ſtrongly on all the junctures where the armour is made tight with leather; that if there be the leaſt defect in any of them, the water ruſhes in, and inſtantly fills the whole engine, to the great danger of the *diver*'s life.

DIVING-*bell*, is a machine contrived to remedy all theſe inconveniences. In this the *diver* is ſafely conveyed to any reaſonable depth, and may ſtay more or leſs time under the water, as the bell is greater or leſs.

It is moſt conveniently made in form of a truncated cone, the ſmalleſt baſe being cloſed, and the larger open. It is to be poiſed with lead, and ſo ſuſpended, that it may ſink full of air, with its open baſis downward, and as near as may be in a ſituation parallel to the horizon, ſo as to cloſe with the ſurface of the water all at once.

Under this covercle the *diver* ſitting, ſinks down with the included air to the depth deſired; and if the cavity of the veſſel can contain a ton of water, a ſingle man may remain a full hour, without much inconvenience, at five or ſix fathoms deep.

But the lower you go, ſtill the more the included air contracts itſelf, according to the weight of the water that compreſſes it; ſo that at thirty-three feet deep, the bell becomes half full of water; the preſſure of the incumbent water being then equal to that of the atmoſphere; and at all other depths, the ſpace occupied by the compreſſed air in the upper part of the bell, will be to the under part of its capacity filled with water, as thirty-three feet to the depth of the ſurface of the water in the bell below the common ſurface thereof. And this condenſed air, being taken in with the breath, ſoon inſinuates itſelf into all the cavities of the body, and has no ill effect, provided the bell be permitted to deſcend ſo ſlowly as to allow time for that purpoſe.

One inconvenience that attends it, is found in the ears, within which there are cavities which open only outwards, and that by pores ſo ſmall, as not to give admiſſion even to the air itſelf, unleſs they be dilated and diſtended by a conſiderable force. Hence, on the firſt deſcent of the bell, a preſſure begins to be felt on each ear, which, by degrees, grows painful, till the force overcoming the obſtacle, what conſtringes theſe pores, yields to the preſſure, and letting ſome condenſed air ſlip in, preſently eaſe enſues. The bell deſcending lower, the pain is renewed, and afterwards it is again eaſed in the ſame manner.

But the greateſt inconvenience of this engine is, that the water entering it, contracts the bulk of air into ſo ſmall a compaſs, that it ſoon heats, and becomes unfit for reſpiration: ſo that there is a neceſſity for its being drawn up to recruit it; beſides the uncomfortable abiding of the *diver*, who is almoſt covered with water.

To obviate the difficulties of the *diving-bell*, Dr. Halley, to whom we owe the preceding account, contrived ſome farther apparatus, whereby not only to recruit and refreſh the air from time to time, but alſo to keep the water wholly out of it at any depth; which he effected after the following manner:

His *diving-bell* (ſee *Tab. Hydraulics, fig.* 1.) was of wood, three feet wide at top, five feet at bottom, and eight feet high, containing about ſixty-three cubic feet in its concavity, coated externally with lead ſo heavy, that it would ſink empty; a particular weight being diſtributed about its bottom R, to make it deſcend perpendicularly, and no otherwiſe. In the top was fixed a meniſcus glaſs D, concave downwards, like a window, to let in light from above; with a cock, as at B, to let out the hot air; and a circular ſeat, as at L M, for the *divers* to ſit on: and, below, about a yard under the *bell*, was a ſtage ſuſpended from it by three ropes, each charged with a hundred weight, to keep it ſteady, and for the *divers* to ſtand upon to do their buſineſs. The machine was ſuſpended from the maſt of a ſhip by a ſprit, which was ſecured by ſtays to the maſt-head, and was directed by braces to carry it overboard clear of the ſide of the ſhip, and to bring it in again.

To ſupply air to this *bell* when under water, he had a couple of barrels, as C, holding thirty-ſix gallons each, caſed with lead, ſo as to ſink empty, each having a bung-hole at bottom, to let in the water as they deſcended, and let it out again as they were drawn up again. In the top of the barrels was another hole, to which was fixed a leathern pipe, or hoſe, well prepared with bees wax and oil, long enough to hang below the bung-hole; being kept down by a weight appended. So that the air driven to the upper part of the barrel by the encroachment of the water, in the deſcent, could not eſcape up this pipe, unleſs the lower end were lifted up.

Theſe air-barrels were fitted with tackle, to make them riſe and fall alternately, like two buckets; being directed in their deſcent by lines faſtened to the under edge of the *bell*; ſo that they came readily to the hand of a man placed on the ſtage, to receive them; and who taking up the ends of the pipes, as ſoon as they came above the ſurface of the water in the barrels, all the air included in the upper part thereof was blown forcibly into the *bell*; the water taking its place.

One barrel thus received, and emptied; upon a ſignal given, it was drawn up, and at the ſame time the other let down; by which alternate ſucceſſion freſh air was furniſhed ſo plentifully, that the learned doctor himſelf was one of five, who were all together in nine or ten fathoms deep of water for above an hour and a half, without the leaſt inconvenience; the whole cavity of the *bell* being perfectly dry.

All the precaution he obſerved, was, to be let down gradually about twelve feet at a time, and then to ſtop, and drive out the water that had entered, by taking in three or four barrels of freſh air, before he deſcended farther. And, being arrived at the depth intended, he let out as much of the hot air that had been breathed, as each barrel would replace with cold, by means of the cock B, at the top of the *bell*, through whoſe aperture, though very ſmall, the air would ruſh with ſo much violence, as to make the ſurface of the ſea boil.

Thus, he found, any thing could be done that was required to be done underneath. And by taking off the ſtage, he could, for a ſpace as wide as the circuit of the *bell*, lay the bottom of the ſea ſo far dry as not to be overſhoes therein. Beſides, that by the glaſs-window ſo much light was tranſmitted, that, when the ſea was clear, and eſpecially when the ſun ſhone, he could ſee perfectly well to write or read, much more to faſten, or lay hold of any thing under him that was to be taken up. And by the return of the air-barrel he often ſent up orders written with an iron pen or a plate of lead, directing how he would be moved from place to place.

At other times, when the water was troubled and thick, it would be as dark as night below; but in ſuch caſes he was able to keep a candle burning in the *bell*.

Dr. Halley obſerves, that they were ſubject to one inconvenience in this *bell*; they felt at firſt a ſmall pain in their ears, as if the end of a tobacco-pipe were thruſt into them; but after a little while there was a ſmall puff of air, with a little noiſe, and they were eaſy. This he ſuppoſes to be occaſioned by the condenſed air ſhutting up a valve leading from ſome cavity in the ear, full of common air; but when the condenſed air preſſed harder, it forced the valve to yield, and filled every cavity. One of the *divers*, in order to prevent this preſſure, ſtopped his ear with a pledget of paper; which was puſhed in ſo far, that a ſurgeon could not extract it without great difficulty.

The ſame author intimates, that by an additional contrivance he has found it practicable for a *diver* to go out of the *bell* to a good diſtance from it; the air being conveyed to him in a continued ſtream by ſmall flexible pipes, which ſerve him as a clue to direct him back again to the *bell*. For this purpoſe, one end of one of theſe pipes, kept open againſt the preſſure of the ſea, by a ſmall ſpiral wire, and made tight without by painted leather, and ſheep's guts drawn over it, being open, was faſtened in the *bell*, as at P, to receive air, and the other end was fixed to a leaden cap on the man's head, reaching down below his ſhoulders, open at bottom, to ſerve him as a little *bell*, full of air, for him to breathe at his work, which would keep out the water from him, when at the level of the great *bell*, becauſe of the ſame denſity as the air in the great *bell*. But when he ſtooped down lower than the level of the great *bell*, he ſhut the cock F, to cut off the communication between the two *bells*. Phil. Tranſ. abr. vol. iv. part ii. p. 188, &c. vol. vi. p. 550, &c.

The air in this *bell* would ſerve him for a minute or two; and he might inſtantly change it, by raiſing himſelf above the great *bell*, and opening the cock F. The *diver* was furniſhed with a girdle of large leaden weights, and clogs of lead for the feet, which, with the weight of the leaden cap, kept him firm on the ground; he was alſo well cloathed with thick flannels, which being firſt made wet, and then warmed in the *bell* by the heat of his body, kept off the chill of the cold water for a conſiderable time, when he was out of the *bell*.

Mr. Martin Triewald, F. R. S. and military architect to his Swediſh majeſty, contrived to conſtruct a *diving-bell* on a ſmaller ſcale, and leſs expence, than that of Dr. Halley, and yet capable of anſwering the ſame intents and purpoſes. This *bell*, AB (*fig.* 2.) ſinks with leaden weights DD, ſuſpended from the bottom of it. It is made of copper, and tinned all over on the inſide; three ſtrong convex lenſes GGG, defended by the copper-lids HHH, illuminate this *bell*. The iron plate E ſerves the *diver* to ſtand upon, when he is at work; this is ſuſpended by chains FFF, at ſuch a diſtance from the bottom of the *bell*, that when he ſtands upright, his head is juſt above the water in the *bell*, where he has the advantage of air fitter for reſpiration, than when he is much higher up; but as there is occaſion for the *diver* to be wholly in the *bell*, and conſequently his head in the upper part of it, Mr. Triewald has contrived, that, even there after he has breathed the hot air as long as he well can, by means of a ſpiral copper tube *b c*, placed cloſe to the inſide of the *bell*, he may draw the cooler and freſher air from the lowermoſt parts; for which purpoſe a flexible leather-pipe, about two feet long, is fixed to the upper end of the tube at *b*; and to the other end of the pipe is faſtened an ivory mouth-piece, for the *diver* to hold in his mouth, by which to reſpire the air from below. We ſhall only remark, that as air rendered effete by reſpiration is ſomewhat heavier than common air, it muſt naturally ſubſide in the *bell*; but it may probably be reſtored by the agitation of the ſea-water, and thus become fitter for reſpiration. See *Fixed* AIR. Phil. Tranſ. abr. vol. viii. p. 634. or Deſaguliers's Exper. Phil. vol. ii. p. 220, &c.

The famous Corn. Drebell had an expedient in ſome reſpects ſuperior even to the *diving-bell*, if what is related of it be true. He contrived not only a veſſel to be rowed under-water, but alſo a liquor to be carried in the veſſel, which ſupplied the place of freſh air.

The veſſel was made for king James I. carrying twelve rowers, beſides the paſſengers. It was tried in the river Thames; and one of the perſons in that ſubmarine navigation, then living, told it one, from whom Mr. Boyle had the relation.

As to the liquor, Mr. Boyle aſſures us, he diſcovered by a phyſician, who married Drebell's daughter, that it was uſed from time to time, when the air in that ſubmarine boat was clogged by the breath of the company, and rendered unfit for reſpiration: at which time, by unſtopping the veſſel full of this liquor, he could ſpeedily reſtore to the troubled air ſuch a proportion of vital parts, as would make it ſerve again a good while. The ſecret of this liquor Drebell would never diſcloſe to above one perſon, who himſelf aſſured Mr. Boyle what it was. Boyle's Exp. Phyſ. Mech. of the Spring of the Air.

We have had many projects of *diving* machines, and *diving* ſhips of various kinds, which have proved abortive.

DIVING-*bladder*, a term uſed by Borelli for a machine, which he contrived for *diving* under the water to great depths, with great facility, and prefers to the common *diving-bell*. The veſica, or *bladder*, as it is uſually called, is to be of braſs or copper, and about two foot in diameter. This is to contain the *diver's* head, and is to be fixed to a goat's ſkin habit, exactly fitted to the ſhape of the body of the perſon. Within this veſica there are pipes, by means of which a circulation of air is contrived; and the perſon carries an air-pump by his ſide, by means of which he may make himſelf heavier or lighter, as the fiſhes do, by contracting or dilating their air-bladder: by this means, the objections all other *diving* machines are liable to are obviated, and particularly that of the air; the moiſture by which it is clogged in reſpiration, and by which it is rendered unfit for the ſame uſe again, being here taken from it by its circulation through the pipes, to the ſides of which it adheres, and leaves the air as free as before. Borelli Opera Poſthuma.

DIVINITY, the quality, nature, and eſſence, of God.

It is falſly, that the atheiſts hold the notion of a *divinity* to be a political invention of the ancient legiſlators, to ſecure and enforce the obſervation of their laws: on the contrary, it is certain, the legiſlators made uſe of that opinion, which they found already impreſſed on the minds of the people.

The *heathen divinities* may be reduced to three claſſes: the firſt *theological*, repreſenting the *divine* nature under divers attributes: thus Jupiter denotes the abſolute power of God, Juno his juſtice, &c.

The ſecond claſs of *divinities* are *phyſical*: thus Æolus is that power in nature, whereby vapours and exhalations are collected to form winds, &c.

The laſt are *moral divinities*. Thus the Furies are only the ſecret reproaches and ſtings of conſcience.

DIVINITY is alſo uſed in the ſame ſenſe with THEOLOGY.

DIUIOHU, in *Botany*, a name given by the people of Guinea to a ſpecies of plant, with which they uſe to ripen or break boils, beating the leaves, and laying them on.

DIVISIBILITY, a paſſive power, or property in quantity, whereby it becomes ſeparable into parts; either actually, or at leaſt mentally.

The ſchoolmen define *diviſibility*, *capacitas coextenſionis cum pluribus*; a capacity of being co-extended with ſeveral things: thus, a ſtaff four feet long is *diviſible*, becauſe it may be co-extended with four feet, or forty-eight inches, &c.

This the Peripatetics and Carteſians univerſally hold an affection, or property of all matter, or body: the Carteſians, as holding the eſſence of matter to conſiſt in extenſion; for every part, or corpuſcle of the body, being extended, has parts including other parts, and conſequently is *diviſible*.

The Epicureans, again, hold *diviſibility* to agree to every phyſical continuum, as, without parts adjacent to parts, there can be no continuity; and wherever there are parts ſo adjacent, there muſt be *diviſibility*. But they deny, that this affection agrees to all bodies; for the primary corpuſcles, or atoms, they hold perfectly inſecable, and indiviſible.

The principal argument they allege is, that, from the *diviſibility* of all body, and of every aſſignable particle of body, even after any repeated number of diviſions, it follows, that the ſmalleſt corpuſcle is infinitely *diviſible*, which with them is an abſurdity. For a body can only be divided into ſuch parts as it actually contains. But to ſuppoſe infinite parts in the ſmalleſt corpuſcle, ſay they, is to ſuppoſe it infinitely extended: for infinite parts placed externally to each other, as the parts of bodies doubtleſs are, muſt make an infinite extenſion.

They add, that there is a great difference between the *diviſibility* of phyſical, and mathematical quantities. For every mathematical quantity, or dimenſion, they grant, may be increaſed and diminiſhed infinitely; but phyſical quantity, neither the one nor the other.

An artiſt, dividing a continued body, arrives at certain minute parts, beyond which he cannot go; theſe we may call *minima artis*. In like manner, nature, which may begin where art ends, will find bounds; which we may call *minima naturæ*; and God, whoſe power is infinite, beginning where nature ends, may ſubdivide the *minima naturæ*; but he will at length come at certain parts, to which there being no other parts continuous, they cannot be taken away. Theſe minute parts are ATOMS.

All we can ſay on this ſubject is, that on the one hand it is certain, every extended corpuſcle muſt have two ſides, and conſequently is *diviſible*; for, if it had not two ſides, it were not extended; and if it had no extenſion, an aſſemblage of divers ſuch corpuſcles would not compoſe a body. And on the other hand, the infinite *diviſibility* ſuppoſes an infinity of parts in the minuteſt corpuſcle; whence it follows, that there is no body, how ſmall ſoever,

ever, but may furniſh as many ſurfaces, or parts, as the whole globe of the earth can; nay, and infinitely more; which, to ſay no worſe, is a ſtrange paradox.

The infinite *diviſibility* of mathematical quantity is thus proved, and illuſtrated by the mathematicians: ſuppoſe a line AD (*Tab.* II. *Geometry*, *fig.* 27.) perpendicular to BF; another as GH, at a ſmall diſtance from A, alſo perpendicular to the ſame line; with the centers C, C. C, &c. and diſtances CA, CA, &c. deſcribe circles cutting the line GH in the points *e*, *e*, &c. Now, the greater the radius AC is, the leſs is the part *e* G; but the radius may be augmented *in infinitum*, and therefore the part *e* G may be diminiſhed in the ſame manner; and yet it can never be reduced to nothing; becauſe the circle can never coincide with the right line BF. Conſequently, the parts of any magnitude may be diminiſhed *in infinitum*.

The chief objections againſt this doctrine are, that an infinite cannot be contained by a finite; and that it follows from a *diviſibility in infinitum*, either that all bodies are equal, or that one infinite is greater than another. To which it is anſwered, that to an infinite may be attributed the properties of a finite and determined quantity; and who has ever proved, that there could not be an infinite number of parts infinitely ſmall in a finite quantity; or that all infinites are equal? The contrary is demonſtrated by mathematicians in innumerable inſtances. We are not here contending for the poſſibility of an actual diviſion *in infinitum:* we only aſſert, that however ſmall a body is, it may be ſtill farther divided; which we imagine may be called a diviſion *in infinitum*, becauſe what has no limits, is called *infinite*.

All that is ſuppoſed, in ſtrict geometry, concerning the *diviſibility* of magnitude, amounts to no more, than that a given magnitude may be conceived to be divided into a number of parts, equal to any given or propoſed number. It is true, that the number of parts, into which a given magnitude may be conceived to be divided, is not to be fixed or limited, becauſe no given number is ſo great but a greater may be conceived and aſſigned; but there is not, therefore, any neceſſity of ſuppoſing the number of parts actually infinite; and if ſome have drawn very abſtruſe conſequences from ſuch a ſuppoſition, yet geometry ought not to be loaded with them. Mac-Laurin's Fluxions, art. 290. See EXTENSION.

It is true, that there are no ſuch things as parts infinitely ſmall; yet the ſubtilty of the particles of ſeveral bodies is ſuch, that they very much ſurpaſs our conception; and there are innumerable inſtances in nature of ſuch parts actually ſeparated from one another.

Mr. Boyle gives us ſeveral inſtances of this. He ſpeaks of a ſilken thread 300 yards long, that weighed but two grains and an half. He meaſured leaf-gold, and found by weighing it, that fifty ſquare inches weighed but one grain: if the length of an inch be divided into 200 parts, the eye may diſtinguiſh them all; therefore there are in one ſquare inch 40000 viſible parts; and in one grain of it there are 2000000 of ſuch parts; which viſible parts no one will deny to be farther *diviſible*.

Again, a whole ounce of ſilver may be gilt with eight grains of gold, which may be afterwards drawn into a wire thirteen thouſand feet long.

In odoriferous bodies we can ſtill perceive a greater ſubtilty of parts, and even ſuch as are actually ſeparated from one another; ſeveral bodies ſcarce loſe any ſenſible part of their weight in a long time, and yet continually fill a very large ſpace with odoriferous particles.

The particles of LIGHT, if light conſiſts of real particles, furniſh another ſurpriſing inſtance of the minuteneſs of ſome parts of matter. A lighted candle placed on a plane will be viſible two miles, and conſequently fill a ſphere, whoſe diameter is four miles, with luminous particles, before it has loſt any ſenſible part of its weight. And as the force of any body is directly in proportion to its quantity of matter multiplied by its velocity; and ſince the velocity of the particles of light is demonſtrated to be at leaſt a million of times greater than the velocity of a cannon ball, it is plain, that if a million of theſe particles were round, and as big as a ſmall grain of ſand, we durſt no more open our eyes to the light, than expoſe them to ſand ſhot point-blank from a cannon.

By help of microſcopes, ſuch objects as would otherwiſe eſcape our ſight, appear very large: there are ſome ſmall animals ſcarce viſible with the beſt microſcopes; and yet theſe have all the parts neceſſary for life, as blood, and other liquors. How wonderful muſt the ſubtilty of the parts be, which make up ſuch fluids! See ANIMALCULES.

Whence is deducible the following theorem:

Any particle of matter, how ſmall ſoever, and any finite ſpace, how large ſoever, being given; it is poſſible for that ſmall ſand, or particle of matter, to be diffuſed through all that great ſpace, and to fill it in ſuch manner, as that there ſhall be no pore in it, whoſe diameter ſhall exceed any given line; as is demonſtrated by Dr. Keil. Introduct. ad Ver. Phyſ.

DIVISION, the act of ſeparating a whole into the parts it contains.

If the whole be compoſed of parts really diſtinct, called *integral parts*, the *diviſion* made thereof is properly called *partition*; as when a houſe is divided into its apartments. If the whole be compoſed of parts, called *ſubjective*; that is, if the whole be only one common term, the ſubjects compriſed in the extent whereof are the parts, the *diviſion* thereof is what we properly call *diviſion:* ſuch is the *diviſion* of a genus into its ſpecies, &c.

DIVISION, in *Algebra*, or *Species*, is performed by reducing the dividend and diviſor into the form of a fraction: this fraction being the quotient.

Thus, if ab were to be divided by cd, it muſt be placed thus, $\frac{ab}{cd}$, and that fraction is the quotient; though others chooſe to write it thus, $cd)\,ab$, or $cd : ab$, or $ab \div cd$, which laſt mark $\div$ is the moſt common character for *diviſion*.

To perform the work of *diviſion* algebraically, theſe rules are to be obſerved: 1. When the dividend is equal to the diviſor, the quotient is unity, and muſt be placed in the quotient, becauſe every thing contains itſelf once.

2. When the quotient is expreſſed fraction-wiſe (as in ſimple *diviſion*) if the ſame letters are found equally repeated in each member of the numerator, and denominator; caſt away thoſe letters, and the remainder is the quotient: thus, $\frac{ab}{a})\,a$, and $\frac{abc}{ab}(c$, &c.

3. When there are any co-efficients, divide them as in common arithmetic, or divide them by any common meaſure, and to the quotients annex the quantities expreſſed by letters: thus, $\frac{360\,ab}{24\,b}(=15\,a$.

4. The general way of *diviſion* of compound quantities, after ranging them according to the dimenſions of one of their letters, is like the ordinary way in common arithmetic, reſpect being had to the rules of algebraic addition, ſubtraction, and multiplication; as alſo that the like ſigns give +, and unlike — in the quotient; taking care to divide every part of the dividend by its correſponding diviſor (that is, that whoſe letters ſhew it of the ſame kind with the other), to prevent a fraction, which would otherwiſe ariſe: thus,

$$\begin{array}{lllll}
a+b) & aa+ab & -ca-cb & (a-c \\
 & \underline{aa+ab} & & \\
 & 0 & & \\
 & & 0-ca-cb & \\
 & & \underline{\;\;-ca-cb} & \\
 & & \quad 0 &
\end{array}$$

That the ſame reaſon for like ſigns giving a poſitive, and unlike a negative quotient, does hold in *diviſion*, as in multiplication, is clear from conſidering the nature of *diviſion* (which is only reſolving the thing into its parts); conſequently, ſince every dividend is nothing elſe but the product of the diviſor and quotient multiplied by each other, the quotient muſt conſiſt of ſuch ſigns, which could produce the dividend; therefore, if the dividend be divided by a quantity, that has a ſimilar ſign with it, the quotient muſt be poſitive; if by a quantity having a diſſimilar ſign, the quotient muſt be negative. It may be a general rule in compound *diviſion* in algebra, always to place ſuch a letter in the quotient, as will, when multiplied into the diviſor, produce the dividend; for that is always a rectangle under the diviſor, and the quotient: as for example,

$$\begin{array}{llllll}
zz-16) & z^6-8z^4 & -124\,zz & -64 & (z^4+8zz+4. \\
 & \underline{z^6-16z^4} & & & \\
 & \quad 8z^4 & -124\,zz & & \\
 & \quad \underline{8z^4} & \underline{-128\,zz} & & \\
 & & \quad 4\,zz & -64 & \\
 & & \quad \underline{4\,zz} & \underline{-64} & \\
 & & & \;\;0 &
\end{array}$$

In ſome caſes the quotient will form an *infinite* SERIES, and then it is uſual to ſet down the laſt remainder with the diviſor under it.

DIVISION, in *Arithmetic*, is the laſt of the four fundamental rules, being that whereby we find how often a leſs quantity is contained in a greater; and the overplus.

Diviſion, in reality, is only a compendious method of ſubtraction; its effect being to take a leſs number from another greater, as often as poſſible; that is, as oft as it is contained therein. There are, therefore, three numbers

bers concerned in *diviſion*: 1. That given to be divided, called the *dividend*. 2. That whereby the dividend is to be divided, called the *diviſor*. 3. That which expreſſes how often the diviſor is contained in the dividend; or the number reſulting from the *diviſion* of the dividend by the diviſor, called the *quotient*.

There are diverſe ways of performing *diviſion*, one called the *Engliſh*, another the *Flemiſh*, another the *Italian*, another the *Spaniſh*, another the *German*, and another the *Indian* way, all equally juſt, as finding the quotient with the ſame certainty, and only differing in the manner of arranging, and diſpoſing the numbers.

We have likewiſe *diviſion* in integers; *diviſion* in fractions; and *diviſion* in ſpecies, or algebra.

Diviſion is performed by ſeeking how often the diviſor is contained in the dividend; and when the latter conſiſts of a greater number of figures than the former, the dividend muſt be taken into parts, beginning from the left, and proceeding to the right, and ſeeking how often the diviſor is found in each of thoſe parts.

For example, it is required to *divide* 6759 by 3. I firſt ſeek how oft 3 is contained in 6, viz. twice; then, how oft in 7, which is likewiſe twice, with one remaining. This 1, therefore, is joined to the next figure 5, which makes 15, and I ſeek how oft 3 in 15; and laſtly, how oft 3 in 9. All the numbers expreſſing how oft 3 is contained in each of thoſe parts, I write down according to the order of the parts of the dividend, that is, from left to right, and ſeparate them from the dividend itſelf, by a line, thus.

Diviſor. Dividend. Quotient.
3) 6759 (2253

It appears therefore, that 3 is contained 2253 times in 6759; or that 6759 being divided into 3 parts, each part will be 2253. If there be any remainder, that is, if the diviſor repeated a certain number of times is not equal to the dividend, what remains is wrote over the diviſor fraction-wiſe. Thus, if inſtead of 6759 the dividend were only 6758, the quotient will be the ſame as in the former caſe, except for the laſt figure 8; for 3 being only contained twice in 8, the laſt number in the quotient will be 2; and as twice three is only 6, there remains 2 of the dividend; which I write after the quotient, with the diviſor underneath it, and a line to ſeparate the two, thus:

3) 6758 ($2252\frac{2}{3}$

If the diviſor is a digit, the *diviſion* may be eaſily performed, without ſetting down any thing but the remainders. Again, if the diviſor has cyphers in the firſt places towards the right-hand, theſe may be cut off, provided that an equal number of figures be cut off from the right of the dividend; and when the *diviſion* is finiſhed, we obtain the integral quotient; then to the remainder annex all the excluded figures of the dividend, and ſubjoin the whole diviſor. Thus,

8|00) 3678|54 (459 integral quotient.
Rem. 654, and the fractional part of the quotient is $\frac{654}{800}$

Moreover, if the diviſor is the product of two or more digits, which may be eaſily diſcovered, divide firſt by any one of theſe, and then divide the quotient by the other, and ſo on; the laſt quotient is that required; and for the fractional part, multiply the laſt remainder by the preceding diviſor, and to the product add the preceding remainder; multiply this ſum by the next preceding diviſor, and to the product add the next preceding remainder, and ſo on, till you have got through all the diviſors and remainders to the firſt. Thus, to divide 3428689 by 126, divide by 3, 6, and 7, becauſe $3\times6\times7=126$; the firſt quotient is 1142896, and the remainder 1; the ſecond quotient is 190482, and the remainder 4; the laſt quotient is 27211, and the remainder 5, which multiplied by the preceding diviſor 6, produces 30, to which the preceding remainder 4 being added, we have 34; this multiplied by the preceding or firſt diviſor, produces 102, and the remainder 1 added, makes 103, the true remainder; and the fractional part of the quotient is $\frac{103}{126}$. For the *diviſion* of concrete, or applicate numbers, ſee REDUCTION.

Proof of DIVISION.

Diviſion is proved by multiplying the quotient by the diviſor, or the diviſor by the quotient; and adding what remains of the *diviſion*, if there be any thing. If the ſum be found equal to the dividend, the operation is juſt, otherwiſe there is a miſtake.

DIVISION, in *Decimal Fractions*. See DECIMAL.

DIVISION, in *Geometry*, or *geometrical* DIVISION, is alſo called *application*; the deſign of which, when it is employed about the conſtruction of plain problems, is this; viz. a rectangle being given, as alſo a right line; to find another right line, the rectangle contained under which, with the right line given, ſhall be equal to the rectangle firſt given. Such effection, or conſtruction, is called the *application* of a given rectangle to a right line given; and the right line ariſing by ſuch application, is called the *geometrical quotient*.

This is found by the rule of three, by ſaying, as the line given is to one ſide of the rectangle, ſo is the other ſide to the line ſought.

Not unlike to which is Des Cartes's way of working *diviſion* in lines, by ſcale, and compaſs: thus, ſuppoſe ac (=6), were to be divided by ad (=3) (*Tab.* II. *Geometry, fig.* 28.) make any angle at pleaſure, and therein ſet off firſt ad (=3) the diviſor, and then on the ſame leg, au = to unity; then on the other leg of the angle ſet ac (=6) the dividend, and join dc, and to it through u, draw ub parallel to dc, which ſhall cut off ab the quotient ſought; for as $ad : au :: ac : ab$; that is, as the diviſor : is to unity :: ſo is the dividend : to the quotient; on which proportion depends all *diviſion*.

DIVISION *of a word*, in *Grammar*, is a diſcourſe explaining the latitude, or comprehenſion of a word; the latitude, when the word is univerſal; as when the genus is *divided* into ſpecies, and differences; the comprehenſion, when the word is ambiguous, as *taurus*, *bull*; which ſometimes denotes a conſtellation, ſometimes a beaſt, and ſometimes a mountain.

DIVISION *by Logarithms*. See LOGARITHM.

DIVISION, in *Logic*, is the ſeparating any thing into diverſe parts, or ideas. See DISTRIBUTION.

The ſchoolmen define it a diſcourſe, explaining a thing by its parts; in which it approaches near to the nature of a definition, whoſe character is to define a thing by its parts.

Diviſion, we have ſaid, is a diſtribution of a whole, &c. But there are two ſorts of wholes, as above expreſſed.

The firſt is what conſiſts of integral parts; as the human body, which contains diverſe members.

The ſecond is properly no other than an abſtract idea common to more things than one, as the univerſals; or a compound idea comprehending the ſubſtance, and its accidents, or at leaſt moſt of its accidents.

The whole admits of a triple *diviſion*. 1. When the genus, or kind, is divided by its ſpecies, or differences; as when ſubſtance is *divided* into body and ſpirit; or into extended, and thinking.

2. When any thing is *divided* into ſeveral claſſes, by oppoſite accidents; as when the ſtars are *divided* into thoſe which ſhine by their own light, and thoſe that only reflect a borrowed light.

3. When the accidents themſelves are *divided* according to the ſubjects in which they inhere; as when goods are *divided* into thoſe of the body, the mind, and fortune.

The laws of *diviſion* are, 1. That it be full and adequate, that is, that the members of the *diviſion* entirely exhauſt the whole thing *divided*; as when all numbers are *divided* into equal, and unequal.

2. That the members of the *diviſion* be oppoſite; as equal, and unequal; corporeal, and not corporeal; extended, and thinking.

3. That one member of the *diviſion* be not contained in another, ſo as the other may be affirmed of it. Though, in other reſpects, it might be included without any fault in the *diviſion*: thus extenſion, geometrically conſidered, may be *divided* into a line, ſurface, and ſolid; though the line be included in the ſurface, and the ſurface in the ſolid.

4. The *diviſion* muſt not be made into too many, or too general parts. Laſtly, the members, unleſs the ſubject require it, not to be too unequal; as if the univerſe were *divided* into heaven and earth.

DIVISION *of mathematical inſtruments*. See GRADUATION, and MURAL *Arc*.

DIVISION *of a mode*, divides a quality into its degrees. Philoſophers, after the phyſicians, ſuppoſe eight degrees of every quality: hence when a quality is ſaid to be in the eighth degree, it marks, that it can be no further intended, or heightened.

DIVISION, in *Muſic*, imports the dividing the interval of an octave into a number of leſſer intervals.

The 4th and 5th, each of them, divide or meaſure the octave perfectly, though differently. When the 5th is below, and ſerves as a baſs to the 4th, the *diviſion* is called *harmonical*; when the 4th is below, the *diviſion* is called *authentic*.

DIVISION *by Neper's Bones*. See NEPER'S *Bones*.

DIVISION, in *Phyſics*, or DIVISIO *continui*, is the ſeparation of the parts of a quantity; whereby, what before was one, is now reduced into ſeveral. See CONTINUITY and DISSOLUTION.

This *diviſion* is effected by means of motion, without which there can be no ſeparation of any continuum, or even contiguum.

This motion is performed diverſe ways, by fraction, ſciſſion, ſection, fiſſion, reſolution, dilution, maceration, diſperſion, effuſion, diſtraction, &c.

DIVISION *of Powers.* See POWERS.

DIVISION *of Proportion.* See PROPORTION.

DIVISION, in *Rhetoric*, the arrangement of a diſcourſe under ſeveral heads, to be ſpoken to ſeparately. See DISPOSITION.

DIVISION, in *Vulgar Fractions.* See FRACTION.

DIVISIONS *of an army*, in the *Military Art*, the ſeveral brigades and ſquadrons into which it is cantoned. See BRIGADE.

DIVISIONS *of a battalion*, the ſeveral platoons into which it is divided in marching or firing, each of which is commanded by an officer. See BATTALION.

DIVISION, in the *Sea-Language*, the third part of a naval army, or fleet; or one of the ſquadrons thereof, diſtinguiſhed by a particular flag or pendant, under the command of ſome flag-officer. See SQUADRON.

The white flag denotes the firſt ſquadron of France, the white and blue the ſecond, and the third is characterized by the blue. In England, the firſt admiral, or the admiral of the fleet, diſplays the union flag at the main-top-maſt-head; next follows the white flag with St. George's croſs; and afterwards the blue. The private ſhips carry pendants of the ſame colour with their reſpective ſquadrons at the maſts of their particular *diviſions*; ſo that the laſt ſhip in the *diviſion* of the blue ſquadron carries a blue pendant at her mizen-top-maſt head.

Naval battles are uſually ranged in three lines, according to their three *diviſions*.

DIVISIONES, in *Antiquity*, certain preſents of money, oil, bread, wine, or the like, appointed by will to be diſtributed annually among certain perſons or companies, and ſometimes to the people in general.

DIVISOR, the dividing number; or that which ſhews how many parts the dividend is to be divided into.

DIVISOR, *common.* See COMMON *meaſure.*

DIVORCE, from *diverto*, *I turn away*, a breach, or diſſolution, of the bond of MARRIAGE.

In our law, *divorce* is of two kinds; the one total, *a vinculo matrimonii*; which alone is properly *divorce*; the other partial, *a menſa & thoro*; a ſeparation from bed and board.

The woman divorced *a vinculo matrimonii*, receives all again that ſhe brought with her; the other has a ſuitable, ſeparate maintenance allowed her out of her huſband's effects. See ALIMONY.

The firſt only happens through ſome eſſential impediment, as conſanguinity or affinity within the degrees forbidden, precontract, impotency, &c. of which impediments the canon-law allows fourteen, comprehended in theſe verſes:

Error, conditio, votum, cognatio, crimen,
Cultus, diſparitas, vis, ordo, ligamen, honeſtas,
Si ſis affinis, ſi forte coire nequibis,
Si parochi & duplicis deſit præſentia teſtis,
Raptave ſit mulier, nec parti reddita tutæ.

In this kind of *divorce*, the marriage is declared null, as having been abſolutely unlawful *ab initio*, and the parties are ſeparated *pro ſalute animarum*, and allowed to marry again; the iſſue of ſuch marriage as is thus entirely diſſolved, are baſtards. *Divorce a menſa & thoro* diſſolveth not the marriage, becauſe it was juſt and lawful *ab initio*; but, for ſome ſupervenient cauſe, it becomes improper or impoſſible for the parties to live together; as in the caſe of intolerable ill temper, or adultery, in either of the parties. However, *divorces a vinculo matrimonii*, for adultery, have of late years been frequently granted in England by act of parliament.

Divorce is a ſpiritual judgment, and therefore is paſſed in the ſpiritual court. Under the old law, the woman *divorced* was to have of her huſband a writing, as St. Jerom and Joſephus teſtify, to this effect: *I promiſe, that hereafter I will lay no claim to thee*; which was called a *bill of divorce*.

Divorce was allowed of in great latitude both among the pagans and Jews. At Rome, barrenneſs, age, diſeaſe, madneſs, and baniſhment, were the ordinary cauſes of *divorce*. Spurius Carvilius, between 500 and 600 years after the building of Rome, under the conſulſhip of M. Attilius, and P. Valerius, was the firſt who put away his wife, becauſe ſhe was barren; though Plutarch, in his Roman Queſtions, maintains, that Domitian was the firſt who permitted *divorce*.

Juſtinian afterwards added impotence, a vow of chaſtity, and the profeſſion of a monaſtic life, as valid reaſons of *divorce*.

The Roman lawyers diſtinguiſh between *repudium* and *divortium*; making the former to be the breaking of a contract or eſpouſal, and the latter ſeparation after matrimony. Romulus enacted a ſevere law, which ſuffered not a wife to leave her huſband, but gave the man the liberty of turning off his wife, either upon poiſoning her children, counterfeiting his private keys, or for the crime of adultery; but if the huſband on any other occaſion put her away, he ordered one moiety of his eſtate for the wife, and the other to the goddeſs Ceres; beſides an atonement to the gods of the earth. Plut. in Rom. However, in later times, the women, as well as the men, might ſue a *divorce*. Juvenal, Sat. ix. Martial, lib. x. Ep. 41.

The common way of *divorcing* was by ſending a bill to the woman, containing the reaſons of ſeparation, and the tender of all her goods which ſhe brought with her; and this was called *repudium mittere*; or elſe it was performed in her preſence, and before ſeven witneſſes, and accompanied with the formalities of tearing the writings, refunding the portion, taking away the keys, and turning the woman out of doors.

The Grecian laws concerning *divorces* were different: the Cretans allowed *divorce* to any man that was afraid of having too many children. The Spartans ſeldom *divorced* their wives; and it was extremely ſcandalous for a woman to depart from her huſband. The Athenians allowed *divorce* on very ſmall grounds, by a bill, containing the reaſon of the *divorce*, and approved, if the party appealed by the chief magiſtrate; and women alſo were allowed to leave their huſbands on juſt occaſions. Perſons *divorcing* their wives were obliged to return their portions; otherwiſe, the Athenian laws obliged them to pay nine oboli a month for alimony. The terms expreſſing the ſeparation of men and women from each other were different; the men were ſaid αποπεμπειν, or απολευειν, *to diſmiſs their wives*, but wives, απολειπειν, *to leave their huſbands.* Pott. Arch. Græc. vol. ii. book iv. cap. 12.

Among the Jews, beſides incontinence and adultery, uglineſs, old age, or ill humour in a wife, were ſufficient reaſons for giving her a bill of *divorce.* Nay, even the man's own pleaſure, or his repenting of his match, were admitted as good reaſons. Selden de Uxore Heb. lib. iii. cap. 17.

It is generally held, that Jeſus Chriſt allowed of *divorce* in the caſe of adultery. But ſome take this for a miſtake; and maintain, that *divorce* is no where permitted in the New Teſtament for adultery; but only a ſeparation. See Matt. xix. 9. Mark x. 11. Paul 1 Cor. vii. 27. See alſo the council of Florence; at the end, after the queſtions propoſed to the Greeks. Tertull. de Monogam. cap. 9. & 10. Auguſtin. de Bono Conjugio, & de Adult. Conjug. See ADULTERY.

Pope Innocent I. in his decretal to Exuperius, declares ſuch as contract a new marriage after *divorce*, adulterers; as well as the perſons with whom they marry. The occaſion of this decree was, that ſuch marriages were then allowed of by the Roman laws. There is an exception, however, in the caſe of marriage between two heathens, which the decrees allow to be diſſolved after the converſion of one of the parties. And St. Paul ſays the ſame, 1 Cor. vii. 15. Yet even in this caſe, 1. The marriage is not immediately diſſolved by the converſion of one of the parties, but they may ſtill live together, and even on ſome occaſions they ought to do ſo. Nor is it even diſſolved by the ſeparation of the infidel party; for if ſhe be afterwards converted, he is obliged to take back his wife. But the marriage is totally diſſolved by a ſecond marriage of the converted party with another perſon.

2. Though the party converted to the faith may, the minute of his converſion, legally ſeparate himſelf, and contract with another; a liberty the Chriſtian law allows him; as in juſtice he is not deemed to owe any thing to an infidel; yet charity frequently forbids ſuch *divorce* and ſeparation: as, e. gr. if the infidel conſent to live with him, and do not moleſt him in his religion; if his faith be not at all in danger; if there be any hopes of converting her; or of gaining the children; if the ſeparation would prove a ſcandal to the heathens, and render Chriſtianity odious, &c. See St. Paul 1 Cor. vii. 13, 14.

The fourth council of Toledo decrees, that in a country where Chriſtianity is the prevailing religion, the infidel party muſt be advertiſed to become Chriſtian; which if ſhe refuſe, the marriage is to be diſſolved.

The council of Trent prohibits *divorce* on any occaſion whatever. The papal diſpenſations, however, are a ſalvo for this inſtance of rigour.

In England, *divorce* can only be had by conſent of parliament. Milton has an expreſs treatiſe of the doctrine and diſcipline of *divorce*, where he maintains, that *divorce* ought to be permitted for a mere incompatibility of humours.

DIURESIS, Διȣρησις, that ſeparation which is made of the urine by the kidneys.

The word is formed from δια, *through*; and ȣρεω, *I make water*.

DIURETICS, in *Medicine*, are ſuch remedies as provoke or promote the diſcharge of urine.

Such is water drank plentifully; white wine drank in a morning; alcali ſalts of all kinds; ſea-ſalt, ſal gemmæ, nitre, borax, alum, tartar, ſal ammoniac, whey, ſour milk, lemon-juice, &c.

Aqueous liquors are generally *diuretic*, eſpecially if mixed with ſalt, and drank cold. Fermented liquors are the leaſt *diuretic* of all; and the leſs ſo, as they are the fatter. Sharp thin ſour wines, rheniſh, &c. as alſo acid ſpirits of vinegar, ſalt, ſulphur, alum, vitriol, &c. aſparagus, bitter almonds, ſmallage, eryngium, eupatorium, ſaſſafras, &c. are all *diuretics*.

DIURETICUS *ſal*. See Sal *Diureticus*.

DIURNAL, from *dies*, *day*, in *Aſtronomy*, ſomething relating to the day; in oppoſition to nocturnal, which regards the night.

Diurnal *arch*. See Arch.

Diurnal *circle*. See Circle *Diurnal*.

Diurnal *motion of a planet*, is ſo many degrees and minutes, &c. as any planet moves in twenty-four hours.

The **Diurnal** *motion of the earth*, is its rotation round its axis, the ſpace whereof conſtitutes the natural day.

The reality of the *diurnal rotation* of the earth is now paſt all diſpute.

Diurnal is alſo uſed in ſpeaking of what belongs to the nycthemeron, or natural day of twenty-four hours. In which ſenſe it ſtands oppoſed to annual, menſtrual, &c.

The *diurnal* phænomena of the heavenly bodies are ſolved from the *diurnal* revolution of the earth; that is, from the revolution of the earth round its own axis in twenty-four hours. To illuſtrate this: ſuppoſe the circle PRTH (*Tab. Aſtronomy*, *fig.* 2.) to denote the earth; C the center of the earth, through which its axis is conceived to paſs, around which its *diurnal* revolution is performed; P denotes any place on the earth; the line EW the viſible horizon of the place; E the eaſt point of the ſaid horizon, W the weſt; the circle *a b c d e f*, the circumference of the heavens; the circle S, the ſun in the heavens; the ſemicircle PRT, the enlightened hemiſphere of the earth; or that half of it oppoſite to the ſun; and laſtly, the ſemicircle PHT, the darkened hemiſphere of the earth.

Now, the earth ſuppoſed in this ſituation, and moving round its axis towards the ſun; it is evident, the place P of the earth will then juſt begin to be enlightened by the ſun; and ſo the ſun will appear there to be juſt riſing, or aſcending the horizon at E the eaſt point of it. The earth being moved round its own axis, ſo that the place P of the earth, which before was under the point *a* in the heavens, is now under the point *b*; it is evident, the horizon of the ſaid place P will be now ſo ſituated, as that the ſun will appear to a ſpectator at P, conſiderably aſcended above E, the eaſt end of the horizon. And while, by the revolution of the earth round its axis, the place P paſſes from under the point *b* in the heavens, to the point *c*, the horizon of the place P will continually ſink lower and lower in reſpect of the ſun, and ſo the ſun will appear to aſcend higher and higher, till P is come under *c*, where the ſun will appear in its greateſt height above the horizon for that day; and ſo it will be noon, or mid-day, at the place P. The earth moving on, as the place P paſſes from under *c* to *d*, the weſt point of its horizon will aſcend higher and higher, and ſo the ſun will appear more and more to deſcend, as is repreſented by the horizon at the point of the earth under *d*. The place P being carried by the *diurnal* revolution of the earth from under *d* to under *e*, the ſun will then appear juſt in W, the weſt point of the horizon, and ſo will appear to be juſt ſetting. The place P being come under *f*, it will be then midnight there. Laſtly, the place P being come round again under *a*, it will be there ſun-riſing again. The ſame holds good as to any other of the celeſtial lights, and the earth, as is obvious from the figure: the circle repreſenting the ſun being taken to denote any other ſtar, planet, &c.

It remains to obſerve, that whereas, by the *diurnal* revolution of the earth, all the ſeveral celeſtial lights ſeem to move in the heavens from eaſt to weſt, hence this ſeeming *diurnal motion* of the celeſtial lights is called their *common motion*, as being common to all of them. Beſides which, all the celeſtial lights, except the ſun, have a proper motion; from which ariſe their proper phænomena; as for the proper phænomena of the ſun, they likewiſe ſeem to ariſe from the proper motion of the ſun; but they are really produced by another motion, which the earth has, and whereby it moves round the ſun once every year, whence it is called the *annual motion of the earth*.

DIURNARY, **Diurnarius**, an officer in the Greek empire, who wrote down, in a book for that purpoſe, whatever the prince did, ordered, regulated, &c. every day.

DIUTURNITY, the long continuance or duration of any being.

DIVUS, **Diva**, in *Antiquity*, appellations given to men and women who had been deified, or placed in the number of the gods.

Hence it is, that on medals ſtruck for the conſecration of an emperor, or empreſs, they give them the title of *Divus*, or *Divo*. For example: DIVUS JULIUS. DIVO ANTONINO PIO. DIVO PIO. DIVO CLAUDIO. DIVA FAUSTINA AUG. &c.

DIZOSTOS, in *Botany*, a name given by ſome of the old Greek writers to the *apios*, or knobby-rooted ſpurge: it is ſo called, becauſe of its having uſually two or three ſlender, and ruſh-like ſtalks, growing up from the roots, which ſeem as if they were fit to be uſed as cords or bandages. See Apios.

DIZZINESS, in *Medicine*. See Vertigo.

DO, in the *Italian Muſic*, is a ſyllable uſed inſtead of *ut*, being ſuppoſed more reſonant and muſical than *ut*.

Do *law* —To *do law*, *facere legem*, is the ſame as to *make law*, anno 23 Hen. VI. cap. 14. See Make.

DOB-CHICK, or **Didapper**, in *Zoology*, the common Engliſh name of a ſmall water-fowl, the leaſt of all the *diver-kind*, and known among authors by the name of *colymbus minor*; and called by Linnæus *colymbus auritus*. It ſeldom exceeds ſix ounces in weight, and has a ſhort beak not more than a finger's breadth long, large at the baſe, but tapering to a point at the end; its eyes are large, and it is covered with a very thick downy plumage; it is of a very deep blackiſh brown on the back, and very white on the belly; its wings are very ſmall, and it has no tail.

This bird is of ſuch a ſtructure, that it moves much more eaſily under water, than on its ſurface, or aloft. He raiſes himſelf from the water with great difficulty; but when he is got up to the air, he can then continue his flight for a long time. He forms his neſts by the water, near the banks, with a large quantity of vegetables, the fermentation of which, occaſioned by the warmth of the bird, hatches the eggs, though the water riſes through the neſt, and keeps them wet. Phil. Tranſ. Nº 206. p. 990.

DOBULA, in *Ichthyology*, a name given by Geſner, and other writers, to the chub. It has been called *capito* and *cephalus* by the moderns, and *ſqualus* by the ancients; but it requires no generical name, being properly only a ſpecies of the cyprinus. See Cephalus and Cyprinus.

Dobula is alſo uſed for a freſh-water fiſh, of the leuciſcus, or dace kind, but is of a larger and thinner ſhape, and a much better taſted fiſh. It is caught in the freſh waters of Germany about Hamburgh, and in many other places. Schonefeldt, Hiſt. Piſc.

DOCETÆ, from δοκειν, *to appear*, in *Eccleſiaſtical Hiſtory*, the followers of Julius Caſſianus, one of the Valentinian ſect, towards the cloſe of the ſecond century, who revived a notion that had been adopted by a branch of the Gnostics, againſt whom St. John, Ignatius, and Polycarp, had aſſerted the truth of the incarnation. They believed and taught, as their name imports, that the actions and ſufferings of Jeſus Chriſt were not in reality, but only in appearance.

DOCIMASIA, Δοκιμασια, from δοκιμαζω, *I try*, in *Antiquity*, a cuſtom among the Athenians, by which every man, before he was admitted to a public employment, was obliged to give an account of himſelf, and his paſt life, before certain judges in the forum; for if any man had lived a vicious and ſcandalous life, he was thought unworthy of the meaneſt office. Nor was this thought enough; for in the firſt ordinary aſſembly after their election, they were a ſecond time brought to the teſt; when, if any thing ſcandalous was found againſt them, they were deprived of their honours. Pott. Archæol. Græc. lib ii. cap. 11. tom. i. p. 73.

DOCIMASTICAL *experiments*. See Assaying.

DOCIMENUM *marmor*, a name given by the ancients to a ſpecies of marble, of a bright and clear white, much uſed in the large ſumptuous buildings, as temples and the like. It had its name from Docimenos, a city of Phrygia, afterwards called Synaia, near which it was dug, and from whence it was ſent to Rome. It was accounted little inferior to the Parian in colour, but not capable of ſo elegant a poliſh; whence it was leſs uſed by the ſtatuaries, or in other ſmaller works. The emperor Adrian is ſaid to have uſed this marble in building the temple of Jupiter, and many other of the great works of the Romans are of it.

DOCK, *Rumex*, *Lapathum*, in *Botany*, a genus of the *hexandria trigynia* claſs. Its characters are theſe: the empalement of the flower is permanent; the flower has three petals, which are larger than the empalement, to which they are very like. It hath ſix ſhort hair-like ſtamina, terminated by erect thin ſummits; and a three-cornered germen, ſupporting three hair-like reflexed ſtyles, thruſting out of the clefts of the petals, crowned by large jagged ſtigmas; the germen afterward becomes a three-cornered ſeed, included in the petals of the flower. There are ſixteen ſpecies.

The great *water-dock* has been long famous in medicine. The roots of the common wild *docks* are nearly of the ſame quality; and equally diſcover their aſtringent matter, both to the taſte, and by ſtriking an inky blackneſs with ſolution of chalybeate vitriol. Muntingius wrote a treatiſe De Britannica Antiquorum Herba. He endeavours to prove, that its name *Britannica* was not derived from that of our iſland, but from Teutonic words, expreſſing the power of faſtening looſe teeth, or of curing the diſeaſe which makes them looſe; and later experience has ſhewn, that it is a medicine of conſiderable efficacy againſt putrid ſpongy gums, and as an internal antiſcorbutic. The roots are principally uſed, and are ſaid to be of great ſervice in the jaundice, in the herpes, and eryſipelas, and in diſpoſing inveterate ulcers to heal. It is alſo ſaid to be a remedy in quinzies.

It has been chiefly uſed in medicated wines and ſmall ales, with the addition of ſome ſpicy materials, and ſometimes of other antiſcorbutic plants, as ſcurvy-graſs, buck-bean, horſe-raddiſh, &c.

The *lapathum acutum*, *Oxylapathum*, or ſharp-pointed leaved *dock*, is as eminent as an antiſcorbutic, and a cleanſer of the blood. It is ſuppoſed to have an aperient as well as an aſtringent virtue, and is recommended in habitual coſtiveneſs, and obſtructions of the viſcera. A decoction of half an ounce, or an ounce, of the freſh roots, or of a dram or two of the dry roots, is commonly directed for a doſe. It is alſo uſed externally in fomentations and ointments againſt the itch, and other cutaneous foulneſſes.

The ſorrel has been claſſed by Linnæus under this genus. See Sorrel.

Dock, in the *Manege*, is uſed for a large caſe of leather, as long as the *dock* of a horſe's tail, which ſerves it for a cover. The French call the *dock*, *trouſſequeue*. It is made faſt by ſtraps to the crupper; and has leathern thongs that paſs between his thighs, and along the flanks to the ſaddle-ſtraps, in order to keep the tail tight, and to prevent its whiſking about.

Dock, among *Sportſmen*, is uſed for the fleſhy part of a boar's chine, between the middle and the buttock.

Dock, Docking, in *Law*, a means or expedient for cutting off an eſtate tail in lands, or tenements, by means of a common recovery; that the owner may be enabled to ſell, give, or bequeath the ſame.

Dock, probably from δοχιον, *receptaculum*, of δεχομαι, *I receive*, in the *Sea-Language*, a pit, pond, or creek, by the ſide of an harbour, made convenient to work in, in order to build or repair ſhips.

This is of two ſorts: a *dry dock*, where the water is kept out by great flood-gates, till the ſhip is built, or repaired; but afterwards can be eaſily let into it again to float, and launch her.

A *wet dock* is any place in the ouze, where a ſhip may be haled in, and ſo *dock* herſelf, or ſink herſelf a place to lie in; and where ſhe can be cleaned only during the receſs of the tide.

Dock-*yards*, are magazines of all ſorts of naval ſtores, and timber for ſhip-building; the royal *dock-yards* in England, are thoſe at Chatham, Portſmouth, Plymouth, Woolwich, Deptford, and Sheerneſs. In time of peace, ſhips of war are laid up in theſe *docks*, thoſe of the firſt rates moſtly at Chatham, where, and at other yards, they receive, from time to time, ſuch repairs as are neceſſary.

Theſe yards are generally ſupplied from the northern crowns, with hemp, pitch, tar, roſin, canvaſs, oak-plank, and ſeveral other ſpecies. But as for maſts, particularly thoſe of the largeſt ſize, they have been uſually brought from New England.

The principal *dock-yards* are governed by a commiſſioner, reſident at the port, who ſuperintends all the muſters of the officers, artificers, and labourers, employed in the *dock-yard*, and ordinary. He alſo controuls their payments; examines the accounts; contracts and draws bills on the navy-office to ſupply the deficiency of ſtores, and regulates whatever belongs to the yard, maintaining due order in the reſpective offices.

DOCKET ſometimes denotes a little bill tied to wares or goods, and directed to the perſon and place they are to be ſent to.

Docket, or Dogget, in *Law*, is a brief in writing, on a ſmall piece of paper, or parchment, containing the purport and effect of a larger writing. The rolls of judgment are *docketted*, when they are brought into the court of common-pleas, and entered on the *docket* of that term; ſo that by ſearching theſe *dockets*, any judgment may be found, if the attorney's name is known. Decrees in chancery are alſo *docketted*.

DOCTOR, a perſon who has paſſed all the degrees of a faculty, and is impowered to teach, or practiſe the ſame.

The title of *doctor* was firſt created towards the middle of the twelfth century; to ſucceed to that of maſter, which was become too common and familiar.

The eſtabliſhment of the *doctorate*, ſuch as now in uſe among us, is ordinarily attributed to Irnerius, who himſelf drew up the formulary. The firſt ceremony of this kind was performed at Bologna, in the perſon of Bulgarus, who began to profeſs the Roman law, and on that occaſion was ſolemnly promoted to the *doctorate*, i. e. inſtalled *juris utriuſque doctor*. But the cuſtom was ſoon transferred from the faculty of law to that of theology; the firſt inſtance whereof was given in the univerſity of Paris, where Peter Lombard, and Gilbert de la Potree, the two chief divines of thoſe days, were created *doctors* in theology, *ſacræ theologiæ doctores*.

Spelman takes the title of *doctor* not to have commenced till after the publication of Lombard's ſentences, about the year 1140; and affirms, that ſuch as explained that work to their ſcholars, were the firſt that had the appellation of *doctors*.

Others go much higher, and hold Bede to have been the firſt *doctor* at Cambridge, and John de Beverley at Oxford, which latter died in the year 721. But Spelman will not allow *doctor* to have been the name of any title or degree in England, till the reign of king John, about the year 1207.

To paſs *doctor in divinity* at Oxford, it is neceſſary the candidate have been four years bachelor of divinity. For *doctor of laws*, he muſt have been ſeven years in the univerſity to commence bachelor of law; five years after which he may be admitted *doctor of laws*. Otherwiſe, in three years after taking the degree of maſter of arts, he may take the degree of bachelor in law; and in four years more, that of LL. D. which ſame method and time are likewiſe required to paſs the degree of *doctor in phyſic*.

At Cambridge, to take the degree of *doctor in divinity*, it is required the candidate have been ſeven years bachelor of divinity. Though in ſeveral of the colleges, the taking of the bachelor of divinity's degree is diſpenſed with, and they may go out *per ſaltum*. To commence *doctor in laws*, the candidate muſt have been five years bachelor of law, or ſeven years maſter of arts. To paſs *doctor in phyſic*, he muſt have been bachelor in phyſic five years, or ſeven years maſter of arts.

A *doctor* of the civil law may exerciſe eccleſiaſtical juriſdiction, though a layman, ſtat. 37 Hen. VIII. cap. 17. ſect. 4.

Doctor *of the law* was a title of honour or dignity among the Jews.

The Jews, it is certain, had *doctors* long before Jeſus Chriſt. The inveſtiture, if we may ſo ſay, of this order, was performed by putting a key, and a table-book in their hands; which is what ſome authors imagine our Saviour had in view, Luke xi. 52. where ſpeaking of the *doctors of the law*, he ſays, *Woe unto you*, doctors of the law; *for you have taken away the key of knowlege*; *you entered not in yourſelves, and them that were entering, you hindered.*

The Greek text of St. Luke calls them νομικοι; and the Vulgate *legiſperiti*; agreeably to which, our Engliſh tranſlators call them *lawyers*. But the French verſion of *docteurs de la loi* ſeems the moſt adequate. In effect, the word *lawyer*, *legiſperitus*, is only found in St. Luke, and St. Paul, Titus iii. 13. And νομικος, in St. Matthew xxii. 35. is rendered by the Vulgate, *legis doctor*; though the Engliſh verſion ſtill retains the word *lawyer*.

Theſe Jewiſh *doctors* are the ſame whom they otherwiſe call Rabbins.

Doctor *of the church*, a title given to certain of the fathers whoſe doctrines and opinions have been the moſt generally followed and authorized.

We uſually reckon four *doctors* of the Greek church, and three of the Latin. The firſt are St. Athanaſius, St. Baſil, St Gregory Nazianzen, and St. Chryſoſtom. The latter are St. Jerom, St. Auguſtine, and Gregory the Great.

In the Roman Breviary there is a particular office for the *doctors*. It only differs from that of the confeſſors, by the anthem of the Magnificat, and the leſſons.

Doctor is alſo an appellation adjoined to ſeveral ſpecific epithets, expreſſing wherein the merit of ſuch as the ſchools owned for their maſters, conſiſted.

Thus Alexander Hales is called the *irrefragable doctor*, and the *fountain of life*, as mentioned in Poſſevinus. Thomas Aquinas is called the *angelical doctor*; St. Bonaventure,

venture, the *ſeraphic doctor*; John Duns Scotus, the *ſubtile doctor*; Raimond Lully, the *illuminous doctor*; Roger Bacon, the *admirable doctor*, &c.

Doctor, Διδασκαλος, in the Greek *Church*, is a particular officer, appointed to interpret part of the Scriptures. He who interprets the Goſpels, is called *doctor of the Goſpels*; he who interprets St. Paul's Epiſtles, *doctor of the Apoſtle*; he who interprets the Pſalms, *doctor of the Pſalter*.

Doctor's *Commons*. See College *of Civilians*.

DOCTRINE, from *doceo*, *I teach*, denotes in general any thing that is taught, as a matter either of faith or practice; and the term has accordingly been applied to a variety of opinions, that have been adopted and inculcated in philoſophy, religion, &c. There are certain *doctrines* reſpecting the political conſtitution of Great Britain, the aſſerting and publiſhing of which are made illegal by ſtatute. Thus, if any perſon maliciouſly or adviſedly affirm, that both or either of the houſes of parliament have any legiſlative authority without the king, ſuch perſon ſhall incur all the penalties of a præmunire. 13 Car. II. cap. 1. Alſo if a perſon affirm and maintain, by writing or printing, that the king and parliament have no right to direct the ſucceſſion of the crown, he is guilty of high treaſon; and if he maintains the ſame *doctrine* by teaching, or adviſed ſpeaking, he incurs a præmunire. 13 Eliz. cap. 1. 6 Anne, cap. 7. There are alſo other doctrines of a religious nature, which it is unlawful publicly to maintain and preach. See Blasphemy, Common *Prayer*, Heresy, Trinity, &c.

Doctrine, *Chriſtian, fathers of* See Fathers.

DOCUMENT, in *Law*, ſome written monument produced in proof of any fact aſſerted, eſpecially an ancient one

DODARTIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the empalement is cut into five parts at top; the flower hath one petal, and the upper-lip is twice as long as the lower. It has four ſtamina, two of which are ſhorter than the other; in the center is ſituated a round germen, which afterward becomes a globular capſule with two cells, filled with ſmall ſeeds. There are two ſpecies, natives of the Eaſt.

James ſays there are no medical virtues attributed to this plant.

DODDER, *Cuſcuta*. In the Linnæan ſyſtem of *Botany*, this makes a diſtinct genus of plants, of the *tetrandria digynia* claſs, the characters of which are theſe: the calyx is a one-leaved perianthium, in form of a cup, fleſhy at the baſe, and divided ſlightly into four obtuſe ſegments at the rim. The flower is compoſed of only one petal, of an oval figure, a little longer than the cup, and divided ſlightly into four obtuſe ſegments at the edge. The ſtamina are four pointed filaments of the length of the cup; the antheræ are roundiſh; the germen of the piſtil is roundiſh; the ſtyles are two in number, and are erect, and ſhort; the ſtigmata are ſimple; the fruit is fleſhy, and roundiſh, and contains two cells ſplitting open horizontally; the ſeeds are two from each flower.

This is a plant that differs from all others, in having no leaves, but conſiſting of a number of long, ſlender, red threads, or filaments, by which it takes hold, and twiſts about the plants that are near it, ſucking its nouriſhment from them. It has ſeveral monopetalous flowers, divided generally into four ſhort and narrow ſegments, to which ſucceed little round ſeed-veſſels, containing each four ſmall ſeeds. It grows frequently upon heaths and commons, on furze and nettles; as alſo in the fields upon flax and tares, doing great damage, and almoſt choaking them; whence it is called by the country people hell-weed, and devil's guts.

The *cuſcuta* grows indifferently on all kinds of herbs; and, of conſequence, the kinds thereof are infinite; to which writers uſually attribute the particular virtues of the plants they grow on.

The moſt known of theſe plants, and thoſe moſt uſed in medicine, are ſuch as grow on thyme; which are the proper *epithymes*; and thoſe on flax. There are two kinds in the ſhops; the one from Venice, the other from Candia; they have both an aromatic taſte, but that of Venice has the ſtrongeſt.

Dodder of thyme has been accounted opening and cleanſing; good to purge melancholy and bilious humours, to open obſtructions in the liver and ſpleen, good for the jaundice, and ſerviceable againſt the itch. But in this country it is an entire ſtranger to practice; though the remarkable ſubtility of its taſte ſeems to promiſe ſome conſiderable medicinal power.

DODECACTIS, in *Natural Hiſtory*, a name by which Linkius, and ſome other authors, have called a kind of aſtrophyte, or branched ſtar-fiſh, which has twelve rays, firſt parting from the body, and each of theſe finally divided into many others.

DODECADACTYLON, in *Anatomy*, a name given by ſome of the old authors, to the gut called the duodenum, from its being anciently ſuppoſed to be about twelve fingers-breadth long.

DODECAGON, from δωδεκα, *twelve*, and γωνια, *angle*, a regular polygon, or figure, with twelve equal ſides and angles.

Dials are ſometimes drawn on all the ſides of a *dodecagon*. In *Fortification*, a place ſurrounded with twelve baſtions is called a *dodecagon*; ſuch is Palma Nova in Friuli, &c.

DODECAGYNIA, from δωδηκα, *twelve*, and γυνη, *female*, a *wife*, in *Botany*, an order of plants, comprehending ſuch as have ſtyles. See *Tab.* II. *of Botany*.

DODECAHEDRON, from δωδεκα, *twelve*, and ἑδρα, *ſeat*, in *Geometry*, one of the regular bodies, comprehended under twelve equal ſides, each whereof is a pentagon.

Or, a *dodecahedron* may be conceived to conſiſt of twelve quinquangular pyramids, whoſe vertices, or tops, meet in the center of a ſphere conceived to circumſcribe the ſolid; conſequently they have their baſes and altitudes equal.

To find the ſolidity of the Dodecahedron. Find that of one of the pyramids, and multiply it by the number of baſes, viz. 12; the product is the ſolidity of the whole body. Or its ſolidity is found by multiplying the baſe into ^{1} of its diſtance from the center, twelve times; and to find this diſtance, take the diſtance of two parallel faces; the half is the height.

The diameter of the ſphere being given, the ſide of the *dodecahedron* is found by this theorem: the ſquare of the diameter of the ſphere is equal to the rectangle under the aggregate of the ſides of a *dodecahedron*, and hexaedron inſcribed in the ſame, and triple the ſide of the *dodecahedron*. Thus, if the diameter of the ſphere be 1, the ſide of the *dodecahedron* inſcribed will be $(\sqrt{\frac{5}{3}} - \sqrt{\frac{1}{3}}) \div 2$; conſequently, that is to this as 2 to $(\sqrt{\frac{5}{3}} - \sqrt{\frac{1}{3}})$, and the ſquare of that, to the ſquare of this, as $6 : 3 - \sqrt{5}$. Therefore the diameter of the ſphere is incommenſurable to the ſide of an inſcribed *dodecahedron*, both in itſelf, and its power.

DODECANDRIA, in *Botany*, the eleventh claſs of plants, which have hermaphrodite flowers, with twelve, or from twelve to nineteen, incluſive, ſtamina, or male parts in each. See *Tab. of Botany*, *Claſs* 11.

The word is formed of δωδεκα, *twelve*, and ανηρ, *male*. This claſs comprehends five orders, viz. the *monogynia*, *digynia*, *trigynia*, *pentagynia*, and *dodecagynia*.

Of this claſs of plants are the aſarabacca, agrimony, &c.

DODECATEMORY, from δωδεκα, *twelve*, and μερος, *part*, the twelfth part of a circle.

The term is chiefly applied to the twelve houſes, or parts of the zodiac of the primum mobile; to diſtinguiſh them from the twelve ſigns.

Dodecatemory is alſo a denomination ſome authors give to each of the twelve ſigns of the zodiac, becauſe they contain a twelfth part of the zodiac a-piece.

DODECATHEON, in *Botany*, a genus of plants of the *pentandria monogynia* claſs, with a wheel-ſhaped reflex flower, the ſtamina reſting on the tubular baſe, and the fruit an oblong capſule, containing a ſingle cell.

DODO, in *Zoology*, the name of a bird, called alſo by ſome *cygnus cucullatus*, by others *gallus gallinaceus peregrinus*, and by Bontius *dronte*. It is a very ſingular bird, ſomewhat larger than a ſwan, but wholly different from the ſwan in ſhape, though by ſome eſteemed a kind of that bird. Its head is large, and is covered with a membrane reſembling a hood; its beak is of an oblong figure, and is yellow at its origin, and black at the point, and is ſomewhat crooked; it is very naked, having only a few feathers ſcattered over its body, and the rudiments of wings made up of a few naked quills; the hinder parts of its body are very bulky and fat, and it has a tail made of four or five curled greyiſh feathers, reſembling thoſe of the oſtrich. Its legs are very thick and ſtrong. See *Tab. of Birds*, N° 6.

DODONÆA, in *Botany*, the name of a genus of plants, about which authors were very unſettled in their opinions, till Linnæus characterized it under this name, and ranged it in the *octandria monogynia* claſs. Burman has made it a ſpecies of the carpinus, and Plumier of the *ſtaphylodendron*. The characters are theſe: the perianthium is divided into three oval, erect, and equal ſegments. There are no petals. The ſtamina are eight in number, and are extremely ſhort; the antheræ are of an oblong figure; they ſtand very low, and ſcarce exceed the length of the cup. The germen of the piſtil is of a three-cornered ſhape; the ſtyle is ſubulated and very long, and the ſtigma is ſimple. The fruit is a roundiſh capſule, having three inflated cells, with prominent angles. The ſeeds are contained each in one cell. The cup has ſometimes four ſegments, and the fruit four cells.

DODONÆUS, Dodonian, in *Antiquity*, an epithet given to Jupiter, as adored, or worſhipped, in the temple of *Dodona*, in a foreſt of the ſame name.

Dodona, whence the appellation ariſes, is an ancient city of Epirus, celebrated on divers accounts, as the foreſt of *Dodona*, the oracle of *Dodona*, and the fountain of *Dodona*.

Dodona's foreſt was a wood, or grove of oaks, all conſecrated to Jupiter. In this was a temple of that god, wherein was the moſt famous, and, as it ſaid, the moſt ancient oracle of all Greece.

Indeed, it was not in the temple only that oracles were delivered; the very pigeons that inhabited the wood are ſaid to have done the ſame.

The origin, and occaſion of this fable, we have from Herodotus, who obſerves, it was founded on this, that πελειας. which in the Theſſalian language ſignifies a pigeon, does likewiſe ſignify a witch, or propheteſs. But what is more extraordinary is, another tradition among the poets, as if the very oaks of the foreſt of *Dodona* ſpoke, and delivered oracles. This fable is eaſily deduced from the former; the pigeons in the oaks being ſuppoſed to ſpeak, it was no great flight of poetical fancy, to introduce the trees themſelves ſpeaking, &c. See Voſſius de Idololat. lib. i cap. 7. p. 27.

The fountain of *Dodona* was in the temple of Jupiter. The ancient naturaliſts aſſure us, it had a property of rekindling torches, &c. when newly extinguiſhed. This, no doubt, it did, by means of ſome ſulphureous fumes exhaling from it; as we ſtill find a fountain in Dauphiné, called the *burning fountain*, do. It is alſo ſaid to have extinguiſhed lighted torches; which is no great miracle, ſince plunging them into a place where the ſulphur was too denſe, or into the water, muſt have that effect.

DODRA, in *Roman Antiquity*, a drink prepared from nine different ingredients; which are enumerated by the epigrammatiſt in the following line,

> *Jus*, *aqua*, *mel*, *vinum*, *panis*, *piper*, *herba*, *oleum*, *ſal*.

Vid. Auſon, Epigram 86.

DODRANS, in *Antiquity*, a diviſion of the As; being ¾ thereof, or nine unciæ.

DOE, the female of the buck.

DOG, *Canis*, in *Zoology*, a large genus of quadrupeds. See Canis.

The *dog* in its wild ſtate lives in the woods in many parts of the Eaſt; it does not attack a man, neither does it diſcover any of that familiarity which we find in tame ones. Indeed many other animals may be made as tame as the *dog* by the ſame treatment; as has been tried on the other, with ſucceſs.

Authors mention many ſpecies of this animal, as the maſtiff, wolf-*dog*, hound, grey-hound, ſpaniel, water-ſpaniel, bull-*dog*, lap-*dog*, &c. but theſe are only varieties of the original wild kind, which is of a middle ſize between the maſtiff and grey-hound, and diſtinguiſhed by a tail bending upwards.

Dr. Caius, an Engliſh phyſician in the reign of queen Elizabeth, has given the following ſyſtematical arrangement of Britiſh *dogs*.

- I. The moſt generous kinds
  - *Dogs* of chace
    - Hounds
      - Terrier
      - Harrier
      - Blood-hound
    - Gaze-hound
    - Grey-hound
    - Leviner, or Lyemmer
    - Tumbler
  - Fowlers
    - Spaniel
    - Setter
    - Water-ſpaniel, or Finder
  - Lap-*dogs*
    - Spaniel gentle, or Comforter
- II. Farm-dogs
  - Shepherd's *dog*
  - Maſtiff, or Ban-*dog*
- III. Mongrels
  - Wappe
  - Turnſpit
  - Dancer.

See Hound, Mastiff, Spaniel, Terrier, &c. Pennant's Zoology, vol. i. p. 59, &c.

By a late act, commencing May 1, 1770, ſtealing of *dogs* incurs a forfeiture of 20*l*. and charges of conviction, for the firſt offence, or an impriſonment for any time between ſix and twelve months; and for a ſubſequent offence of not leſs than 30*l*. and charges, or, on non-payment, impriſonment for twelve months, and public whipping. Perſons alſo in whoſe cuſtody *dogs*, or their ſkins, are found, are liable to like penalties.

Dog, *ſetting*. See Setting.

Dog, *water*. See Spaniel.

The ſportſmen generally eſteem the black *water-ſpaniels* above thoſe of any other colour, they being generally the moſt hardy. If there be any farther judgment to be made from the colour, it is, that the ſpotted or pied are generally the quickeſt at ſcent, and the ſimple liver-coloured the quickeſt at ſwimming. Theſe, however, are but very uncertain rules to judge by, and the things principally to be regarded are the *dogs* being of a good breed, and well taught. As to the ſhape, the head of a good *water-dog* is generally round, and the hair curling, the ears large and broad, and hanging down; the eyes full and lively, the noſe ſhort, and the lips like a hound's. The neck ſhould be thick and ſhort, the ſhoulders broad, the legs ſtrait, and the chine ſquare. The buttocks ſhould be round, and the thighs brawney; the paſterns ſtrong, and the fore-feet round; the hair in general ſhould be long and curled, not looſe and ſhaggy.

As to the training up a dog for ſporting, the maſter of him cannot begin when he is too young, the principal thing to be taught being obedience, and that being beſt taught while the creature is young. As ſoon as he can lap, he ſhould be taught to couch and lie cloſe at command, and not to dare to ſtir from that poſture till he is ordered; he will ſoon be brought to this, by beating when he diſobeys, and encouraging him when he does right. He ſhould always be taught before the times of his eating, and never have his food given him, but when he has done ſomething to deſerve it. This will teach him always to do well, for the ſake of the expected victuals. No perſon ſhould ever interfere in the teaching; for two maſters breed a confuſion, and the creature never will learn well from them.

The teacher muſt be careful always to uſe the ſame words in his leſſons; thoſe words are to be choſen which are the moſt plain in their ſounds, and the moſt diſtinct from one another; and when theſe are once fixed upon, they muſt never be altered; for the *dog*, being guided wholly by the ſound, not at all by the ſenſe, any alteration of them, though the change be into words of the ſame ſenſe, quite confounds the creature. The word *down* is ſhort and expreſſive, and no other need be uſed when he is ordered to couch; but this being once given him, is never to be varied afterwards. The next ſound he ſhould be taught after this, is the word of correction; for no leſſon can be given but faults will be committed, and no fault ſhould paſs without correction or blame; in this caſe the word *ſirrah*, ſpoke angrily, will always be underſtood. This, at firſt, ſhould be uſed with a laſh or a blow, and after a time he will know it as a word of diſpleaſure, and it will do for ſmall faults without the blow. Certain words of cheriſhing and encouragement muſt alſo be taught him at the ſame time, as *good boy*, or the like, uſing always with them actions and looks of chearfulneſs and pleaſure, as clapping him on the back, and the like. After theſe, he muſt be taught the meaning of ſome words of advice, to put him in mind of his buſineſs, when he is out upon the ſport, ſuch as *take heed*, or the like. Theſe will not only ſet him upon the watch, and make him diligent; but he will alſo be careful and cunning, and at the ſame time chearful and pleaſed in himſelf, as knowing that he is doing his maſter a pleaſure.

When the young *dog* is thus far inſtructed, and knows the meaning of the words of inſtruction, correction, encouragement, and advice, and will couch and lie down at his maſter's feet, how and when he pleaſes, and that with the ſignal of a word, or a look only; he is then to be taught to follow cloſe at his maſter's heels, by leading him by a line tied to his collar; he is to be carefully taught this, ſo that when taken out to the ſport, he muſt neither run under the legs, nor hang too far back; this alſo will tend to the making him the more obedient. When he has been thus taught to follow with a line, he muſt be taught to follow in the ſame manner, looſe, and without a line, and always to be at his maſter's heels.

The next leſſon he is to be taught, is to fetch and carry any thing he is commanded; this muſt be taught him by way of ſport, as a diverſion, by ſhaking a glove at his head, and teaching him to ſnatch it, and afterwards to catch it when thrown from the hand, and bring it back again; this he is to be encouraged in with cheriſhing words, and all other means.

The beſt method of perfecting the creature in this, is by letting him have no food, but what he earns by doing well, always feeding him when he does as he ſhould do. If he carry the glove away, or play wantonly with it, and refuſe to bring it back, his maſter is to uſe the word of inſtruction, as *take heed*. If this does not bring him to, he is to uſe the word of correction; and if he does not bring it back at this, he muſt proceed to blows; and on many other trials he muſt have nothing given him to eat, till he has done as he ought, and has it by way of reward. When by this means he is taught ſo well, that he will bring back the glove, wherever it is thrown, and carry it only to his maſter, though he is in company with other perſons, who all call him; he is then to be cheriſhed and encouraged, and taught to bring back any thing elſe that is thrown, whether ſticks, ſtones, or any thing whatever. After this, he is to be taught to carry dead fowl, and finally live ones, and this with ſo tender a mouth, as not to hurt them: thus he will be taught at length to bring the fowl that his maſter ſhoots, without tearing them or hurting a feather. The next leſſon is to be taught by taking him out in the field, and dropping ſomething unknown to him; after he is come to ſome diſtance from the place, he is to be ſent back to ſeek for it, and if he bring it back, he is to be encouraged. If he bring back a wrong thing, he is to be encouraged for the attempt, and ſent back again. By repeating this at different diſtances, he will be taught to go back ever ſo far in ſearch of any thing; and if he fails in the leſſons, he is to be chid, beaten, or kept faſting, for it, according to the offence.

When he has been perfected in all theſe leſſons, he muſt be taught his buſineſs of hunting; he is to be firſt taught with tame fowl, which his maſter is to aſſiſt him in taking, and reward and encourage him when he has done. After this he is to be ſent in without aſſiſtance to take the fowl alone; and if he ſucceeds, he is to be encouraged and rewarded, and corrected if he fails. By this practice he will ſoon become maſter of his game; but great care is to be taken in teaching him, when he has caught it, to bring it back to the ſhore, without biting or hurting it.

The next thing to this, is the training him to the gun; to this purpoſe he muſt be taught to follow ſtep by ſtep behind his maſter, and under covert of his ſhadow, till he has ſhot, or, when there is occaſion, to couch and lie cloſe, never daring to ſtir till the gun has gone off; and then, upon the leaſt notice or beckoning, to come and do what he is commanded.

Many of theſe *dogs* are ſo expert, that they will have their eye upon the game as ſoon as their maſter; and the moment the gun is gone off, they will, without bidding, go and fetch it; but this is being too forward; and if he is uſed afterwards with nets or lime-twigs, he will do great miſchief, by ruſhing on the birds as ſoon as they are taken, and tearing the nets, or ſpoiling the twigs. Obedience is the beſt quality in this ſort of *dog*; and it is better he ſhould wait for command, than know his buſineſs without it.

The ſportſmen, who know the time of birds moulting, make a very great uſe of this ſort of *dog*, taking him with them without gun, net, or any other aſſiſtance. The common moulting-time of *water-fowl* is from June to Auguſt; in this time they are not able to fly well; and in ſome part of it, when their old wing-feathers are off, and the new ones are grown ſcarce at all, the *dog* is then to be taken to the ſides of rivers, and other waters, and ſet to hunt about the cloſe places, among which they hide themſelves at this time; the *dog*, being ſet to hunt, will eaſily find them in theſe retreats, and will take them either by leaping ſuddenly upon them, or fairly purſuing ſuch of them as have not the uſe of their wings.

There is alſo another great uſe of the *dog* in driving them without catching them. This is practiſed only in mooriſh and fenny countries, where they are very numerous. In theſe countries a proper place is to be ſought for, where the birds retire to, and theſe are planted with nets; then the *dog* is ſent into the waters and places of covert, where they are ſuppoſed to be, and this at the moulting-time, when they cannot fly away from him. The alarm he puts them into which he firſt attacks, ſoon calls many others together, and there is a large body of them formed, which the *dog* drives before him like a flock of ſheep; and being directed by the ſportſmen, frightens directly into the places of their retreat, where the nets are placed before hand to receive them.

DOG, in *Aſtronomy*, a name common to two conſtellations, called the *Great*, and *Little Dog*; but, among aſtronomers, more uſually, *Canis major*, & *minor*. See CANIS *major* & *minor*.

DOG-*draw*, in the *Foreſt Law*, a manifeſt deprehenſion of an offender againſt veniſon in a foreſt; when he is found *drawing* after a deer by the ſcent of a hound, led in his hand.

There are four offences in the foreſt, noted by Manwood; viz. *ſtable-ſtand*, *dog-draw*, *back-bear*, or *back-berond*, and *bloody-hand*. See STABLE-*ſtand*, &c.

DOG's *Bane*, in *Botany*, *Apocynum*, from απο and κυνος, a *dog*, becauſe the ancients believed this plant would kill dogs. This belongs to the claſs of *pentandria digynia*, in the Linnæan ſyſtem. Its characters are theſe: the flower is of one leaf, cut into five acute ſegments at the top, which turn backward; and in the bottom of the flower are ſituated five nectariums, which ſurround the germina; and there are five ſtamina, which are ſcarcely viſible. In the center are two oval germina, which afterward become two large pointed capſules, having one cell, which is filled with compreſſed ſeeds, lying over each other like tiles on a houſe, and furniſhed with long feathery down; by which when the pods are ripe and open, the ſeeds are wafted by the wind to a conſiderable diſtance; ſo that where theſe plants grow naturally, they are very troubleſome weeds. There are eleven ſpecies. The down of theſe plants is in great eſteem in France, for ſtuffing eaſy chairs, and making very light quilts, which are ſo warm and light, that they are a very proper covering for gouty perſons. This the French call *delawad*; and in the ſouthern parts of France, where ſome of the ſorts will thrive in the open air, and perfect their ſeeds, there are many plantations of theſe plants for the ſake of the down.

James attributes no virtues to this plant.

DOG's *Bane*, *Baſtard*, *Cynanchum*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the flower hath one petal, which is ſpread open, plain, and divided into five parts; the nectarium, which is ſituated in the center of the flower, is erect, cylindrical, and the length of the petal. It hath five ſtamina, which are parallel to the nectarium, and an oblong bifid germen; the empalement becomes a capſule, with two oblong pointed pods, which open longitudinally, and are filled with ſeeds, lying over each other imbricatim, crowned with long down. There are ſeven ſpecies, natives of warm climates.

DOG-*berry tree*. See *Cornelian* CHERRY.

DOG's *cabbage*. See *Dog's* CABBAGE.

DOG-*days*. See CANICULAR *days*.

DOG-*fiſh*. See CANIS *galeus*.

DOG-*fly*, *Cynomyia*, in *Natural Hiſtory*, the name of a ſpecies of fly common in woods and among buſhes, and particularly troubleſome to *dogs*. It uſually ſeizes upon the ears, and it is in vain to beat it off; for it returns in a moment, and cannot be prevented but by being killed. It ſtings very ſeverely, and always raiſes a bliſter in the part. It ſomewhat reſembles the flat black fly, ſo troubleſome to cattle. It has no trunk, but has two teeth much reſembling thoſe of the waſp. Its wings are always placed ſo cloſe upon its body, that they are not ſeen. There are two kinds of it, one larger, and found in woods, and the other common in hedges.

DOG's *graſs*. See GRASS.

DOG's *Mercury*. See MERCURY.

DOG-*roſe*, a name for the common briar, or hip-tree. It is obſervable of ſome kinds of this ſhrub, that the flowers ſmell extremely ſweet in the night, or very early in the morning, but not at all ſo in the day-time. The reaſon of which ſeems to be the ſame as in all the noctuolent plants, of which there are ſeveral kinds, as ſome of the geraniums, and of the jaſmines, &c. that is, that the ſun exhales and diſſipates their odorous effluvia in the day-time as ſoon as they are expanded from the flower, but that in theſe cold times the vapours are condenſed, and reach our noſtrils in an agreeable manner. Phil. Tranſ. N° 114.

DOG's *tail graſs*, *Cynoſurus*, in *Botany*, a kind of graſs called *criſtata* by Scheuchzer, and other authors; but in the Linnæan ſyſtem of botany, under this name, it makes a diſtinct genus of plants, of the *triandria digynia* claſs; the characters of which are, that the cup is only a partial covering, lying on one ſide, but large, and made of two leaves, which are pennated, and remain when the flower is fallen. The glume contains many flowers, and is bivalve, the valves being ſlender, pointed, and equal in ſize; the flower is made of two valves, the exterior one is long, hollow, and bearded; the interior plain, and naked. The ſtamina are three capillary filaments; the antheræ are oblong; the germen of the piſtillum is of a turbinated form; the ſtyles are two in number, hairy, and crooked; the ſtigmata are ſingle; the flower does not open, but nicely encloſes the ſeed, which is ſingle, of an oblong ſhape, and pointed at both ends.

DOG's *teeth*, in *Anatomy*. See TEETH.

DOG's *tongue*, in *Botany*. See HOUND's *tongue*.

Dog's *tooth, Violet*, in *Botany*, *Dens Canis*, or *Erythronium*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower is bell-ſhaped, compoſed of ſix oblong petals, which ſpread open to their baſe. It hath ſix ſtamina joined to the ſtyle; in the center is ſituated a three-cornered germen, which afterward becomes an oblong, obtuſe, capſule, with three cells, filled with flat ſeeds. There are two ſpecies. The flowers are propagated by off-ſets from their roots; and love a ſhady ſituation, and a loamy ſoil; but ſhould not be too often removed.

The powder of the dried root of this plant is ſaid to kill worms in children. Drank in wine, it is an approved remedy for the colic. It is ſaid to be reſtrictive and reſtorative, and taken in water, cures children of the epilepſy; it is alſo eſteemed a great provocative to venery.

Dog's *tooth ſhell*. See Dentalis.

Dog-*wood*. This wood, when put into water, is ſaid to ſtupify fiſh there, ſo that they are eaſily taken with the hand. It is uſed in America for this purpoſe; and the method is to tie it to the ſtem of the fiſhing boat. It is the wood of a ſpecies of cornus. See *Cornelian* Cherry.

Dog-*wood of Jamaica*. See Acacia.

Dog-*wood of Virginia*. See Bay-*tree*, and Corallodendron.

DOGA, in *Antiquity*, a large veſſel into which the wine was put when newly brought from the vintage.

DOGE, the chief magiſtrate in the republics of Venice and Genoa.

The word properly ſignifies *duke*, being formed from the Latin *dux*; as *dogate*, and *dogado*, from *ducatus*, *duchy*.

The *dogate*, or office and dignity of *doge*, is elective; at Venice, the *doge* is elected for life; at Genoa, only for two years; he is addreſſed under the title of *Serenity*, which among the Venetians is ſuperior to that of highneſs.

The *doge* is the chief of the council, and the mouth of the republic; yet the Venetians do not go into mourning at his death, as not being their ſovereign, but only their firſt miniſter. In effect, the *doge* of Venice is no more than the phantom, or ſhadow of the majeſty of a prince; all the authority being reſerved to the republic. He only lends his name to the ſenate; the power is diffuſed throughout the whole body, though the anſwers be all made in the name of the *doge*. If he gives any anſwers on his own account, they muſt be very cautiouſly expreſſed, and in general terms, otherwiſe he is ſure to meet with a reprimand. So that it is abſolutely neceſſary he be of an eaſy and pliable diſpoſition.

Anciently, the *doges* were ſovereigns; but things are much altered; and at preſent, all the prerogatives reſerved to the quality of *doge*, are theſe which follow: he gives audience to ambaſſadors; but does not give them any anſwer from himſelf, in matters of any importance; only he is allowed to anſwer according to his own pleaſure, to the compliments they make to the ſignory; ſuch anſwers being of no conſequence. The *doge*, as being firſt magiſtrate, is head of all the councils; and the credentials which the ſenate furniſhes its miniſters in foreign courts, are written in his name; and yet he does not ſign them; but a ſecretary of ſtate ſigns them, and ſeals them with the arms of the republic. The ambaſſadors direct their diſpatches to the *doge*; and yet he may not open them, but in preſence of the counſellors. The money is ſtruck in the *doge's* name, but not with his ſtamp, or arms. All the magiſtrates riſe, and ſalute the *doge*, when he comes into council; and the *doge* riſes to none but foreign ambaſſadors.

The *doge* nominates to all the benefices in the church of St. Mark; he is protector of the monaſtery delle Virgine; and beſtows certain petty offices of uſhers of the houſhold, called *Commanders of the Palace*. His family is not under the juriſdiction of the maſter of the ceremonies; and his children may have ſtaff-officers, and gondoliers in livery.

His grandeur, at the ſame time, is tempered with a variety of circumſtances, which render it burdenſome. He may not go out of Venice, without leave of the council; and if he does go out, he is liable to receive affronts, without being entitled to demand ſatiſfaction; and, if any diſorder ſhould happen where he was, it belongs not to him, but to the podeſta, as being inveſted with the public authority, to compoſe it.

The children and brothers of the *doge* are excluded from all the chief offices of ſtate. They may not receive any benefice from the court of Rome; but are allowed to accept of the cardinalate, as being no benefice, nor including any juriſdiction. The *doge* may not diveſt himſelf of his dignity, for his eaſe; and after his death, his conduct is examined by three inquiſitors, and five correctors, who ſift it with great ſeverity.

DOGGS, machines of iron for burning wood on; alſo hooks fixed in large timbers, for drawing them with horſes.

DOGGER, a ſmall ſhip, built after the Dutch faſhion, with a narrow ſtern, and two maſts; viz. a main-maſt, and a mizen-maſt, principally uſed in fiſhing on the *doggers* bank.

DOGGERS, in the Engliſh *Alum-Works*, a name given by the workmen to a ſort of ſtone found in the ſame mines with the true alum-rock, and containing ſome alum, though not nearly ſo much as the right kind. The county of York, which abounds greatly with the true alum-rock, affords alſo a very conſiderable quantity of theſe *doggers*; and in ſome places they approach ſo nearly to the nature of the true rock, that they are wrought to advantage. See Alum.

Dogger-*fiſh*, in our *Statutes*, ſeem to be fiſh brought in the fiſhing-veſſels, called *doggers*, to Blackneſs Haven, &c. anno 31 Edw. III. ſtat. 3. cap. 2.

Dogger-*men*, fiſhermen belonging to *dogger*-ſhips. 25 Hen. VIII. cap. 4.

DOGGET. See Docket.

DOGMA, Δογμα, a maxim, tenet, ſettled propoſition, or principle; particularly in matters of religion, or philoſophy.

DOGMATICAL, ſomething relating to a doctrine, or opinion.

In common uſe, a *dogmatical* philoſopher is ſuch an one as aſſerts every thing poſitively; in oppoſition to a ſceptic, who doubts of every thing.

A *dogmatical* phyſician is he, who, on the principles of the ſchool philoſophy, rejects all medicinal virtues not reducible to manifeſt qualities.

DOGMATICI, Dogmatists, a ſect of ancient phyſicians, called alſo *logici*, *logicians*, from their uſing the rules of logic and reaſon, in ſubjects of their profeſſion.

They laid down definitions, and diviſions, reducing diſeaſes to certain genera, thoſe genera to ſpecies, and furniſhing remedies for them all; ſuppoſing principles, drawing conſequences, and applying thoſe principles and conſequences to the particular diſeaſes under conſideration. In which ſenſe the *dogmatiſts* ſtand contradiſtinguiſhed to empirics, and methodiſts.

The *dogmatiſts* were thoſe who brought phyſic into a form, and arrangement, like thoſe of other ſpeculative ſciences; defining, dividing, laying down principles, and drawing concluſions; and hence they had alſo the appellation of *logici*; q. d. *reaſoners*. They alſo applied themſelves to ſeek the cauſes of diſeaſes, the nature of remedies, &c.

Eraſiſtratus, a famous *dogmatiſt*, went ſo far, that, not content to diſſect dogs, and other brute animals, he begged condemned criminals of the magiſtrates, and opened them while alive, and ſearched in their entrails.

DOITKIN, a kind of baſe coin of ſmall value, prohibited by the ſtatute 3 Hen. V. cap. 1. Hence came the phraſe, *Not worth a doitkin*.

DOLABRUM, among the Romans, a kind of knife uſed in ſacrifices among that people. Vid. Hiſt. Acad. Inſcript. tom. ii. p. 345.

DOLE, in the Saxon and Britiſh tongue, ſignifies a part or portion, moſt commonly of a meadow.

Hence alſo *dole-meadow*; a meadow wherein ſeveral perſons have ſhares.

The word ſtill ſignifies a *ſhare*; a diſtributing, or dealing of alms; or a liberal gift made by a great man to the people.

Dole, in the *Law of Scotland*, is uſed for a malevolent intention. The word is taken from the civil law term *dolus*.

Dole, in the law of Scotland, as well as in the civil law, is an eſſential ingredient to conſtitute an action criminal. In crimes wherein the will, not the event, muſt be regarded, no negligence can equal *dole*; unleſs the negligence be ſo extremely ſupine, as not to be conceivable without implying *dole*.

Under *dole* are comprehended the vices and errors of the will, which are immediately productive of the criminal fact, though not premeditated, but the effect of ſudden paſſion. In this reſpect *dole* differs from what the Engliſh law calls malice. However both laws agree in this, that the bare intention never brought forth into act, is no crime; yet giving counſel to perpetrate is criminal, if the fact is done purſuant thereto.

Dole-*fiſh*, in our *Statutes*, ſeems to be that fiſh, which the fiſhermen, yearly employed in the North ſeas, do of cuſtom receive for their allowance or ſhares. Vid. ſtat. 35 Hen. VIII. cap. 7.

DOLET, in *Natural Hiſtory*, a word uſed by ſome writers, in *Medicine*, for red vitriol, or colcothar of vitriol.

DOLG-BOTE, in the Saxon *Laws*, a recompence, amends, or ſatisfaction, made for a ſcar or wound.

DOLICHODROMUS, in the *Ancient Exerciſes*, one who ran the length of a *dolichos*. See DOLICHOS.

DOLICHOLITHOS, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of ſtone, of a blackiſh colour, and of the ſhape of a kidney-bean, found in great abundance about Tyrol, and yielding a ſmell on rubbing.

DOLICHOS, in *Antiquity*, a word uſed by different writers in different ſenſes. The ancient phyſicians underſtood by it long or prolix, and uſed it in this ſenſe in their deſcriptions of diſeaſes. Others uſed it for the fruit or pod of the kidney-bean. Suidas makes it ſignify a race, or courſe, of twelve ſtadia, or of twenty-four.

DOLICHOS, in *Botany*, the name of a genus of plants, of the *diadelphia decandria* claſs, the characters of which are theſe: the perianthium is compoſed of one leaf; it is very ſhort, and is divided into four ſegments at the end; the upper ſegment is emarginated: the flower is of the papilionaceous kind; the vexillum is roundiſh, large, and emarginated, and is wholly bent backward; and there are two callous oblong bodies running parallel to one another, and growing in the tender part of the vexillum towards its baſe. Theſe compreſs the alæ together; the alæ are of an obtuſe oval figure, and are of the length of the carina; the carina is compreſſed, the filaments are diadelphous, and the antheræ are ſimple. The germen of the piſtil is ſlender and compreſſed, the ſtyle points upward, the ſtigma is bearded, and runs from the middle of the inner part of the ſtyle to its apex, which is callous and obtuſe. The fruit is a large pod, of a pointed oblong figure; it is bivalve, and is divided into two cells; the ſeeds are of an elliptic figure, and uſually are compreſſed. This plant approaches greatly to the phaſeoli, but is diſtinguiſhed at firſt ſight by the carina of the flower, which is not ſpiral, as in that genus.

DOLIMAN, a kind of long caſſock, worn by the Turks, hanging down to the feet, with narrow ſleeves, buttoned at the wriſt.

The Turks, both men and women, wear drawers next the ſkin; over that a ſhift, or ſhirt; and over the ſhirt a *doliman*. In ſummer it is linen, or muſlin; in winter, ſattin, or ſtuff.

DOLIUM, in *Natural Hiſtory*, the name of a genus of ſhells, called by ſome *conchæ globoſæ*, and by the French, *tonnes*. The characters are theſe: it is an univalve ſhell, with a globoſe, or round belly, with a lax aperture, ſometimes ſmooth, and ſometimes dentated. The clavicle is either moderately umbonated or depreſſed; and the columella is in ſome ſpecies ſmooth, in others wrinkled. Some authors have called theſe *conchæ ampullaceæ*; and they have had, at times, many other names, but all tending to the ſame ſenſe, and expreſſing the globular figure of the body, which is the great character by which theſe are diſtinguiſhed from all other ſhells. See *Tab. of Shells*, Nº 15.

The Perſian ſhell, ſo much eſteemed in cabinets, is a very ſingular one; but the globoſe figure of its body evidently refers it to this genus, though it differ in many other particulars from all the ſpecies of it. Aldrovandus could not tell what to make of the ſhells of this genus, but has thrown them together at the end of his book; obſerving, that they ſeemed to be of the turbinated kind, but that they want the turbo.

Of the round umbilicated *dolia*, there are ſix ſpecies; of the oblong and ſmooth, five ſpecies; of the oblong coſtated, and umbonated, ſeven ſpecies; of thoſe with long and arched tails, five ſpecies; of that ſeries, which from their ſhape are called *bullæ*, ſeven ſpecies: to which is to be added a very rare ſpecies of *dolium*, which is faſciated, of a blue colour on the outſide, and white within; this is called by ſome the *vitta cærulea*; and there is an olive-coloured ſhell of the ſame kind.

DOLLAR, or DALLER, a ſilver COIN, nearly of the value of the Spaniſh piece of eight, or French crown.

Dollars are coined in diverſe parts of Germany and Holland; and have their diminutions, as *ſemi-dollars*, *quarter-dollars*, &c.

They are not all of the ſame fineneſs, nor weight. The Dutch *dollars* are the moſt frequent. In the Levant they are called *aſlaini*, from the impreſſion of a lion thereon.

DOLOR, *Pain*, in *Medicine*. Galen, in his firſt book of Elements, has defined pain, in oppoſition to pleaſure, to be a diſagreeable and troubleſome ſenſation. Of pain there are various kinds; one is attended with pulſation; another with a ſenſe of incumbent weight; another with a tenſion. There is a *pain* which attends eroſion, inciſion, punction, and perforation, comprehended with theſe and the like differences, under the name of acute; and laſtly there is a *pain* attended with a torpor or numbneſs.

Pains conſidered as prognoſtics of a recovery. *Pains* affect the patient in the beginning of a diſeaſe, or afterward: in the beginning they are for the moſt part to be accounted as pathognomonic ſigns, ſignifying that ſome part among the viſcera labours under an inflammation. Thus it is when the *pain* begins with a fever, and a tumor or tenſion of ſome part; and theſe ſorts of *pain* are called inflammatory. It is beſt for the patient when theſe *pains* are neither violent nor continual; but after a ſhort duration, are either quite removed, or elſe mitigated, and are, beſides, attended with no other pernicious ſigns. But it is beſt of all, and ſafeſt in ſuch a caſe, when theſe *pains* ceaſe or remit with reaſon, or for ſome manifeſt cauſe; as it happens when ſuch ceſſation or remiſſion is owing to ſome beneficent evacuation, excited by nature, or procured by art; ſuch as veneſection, ſpontaneous bleeding at the noſe, ſweats, ſtools, ſpitting, or when a ſubſequent fever removes the *pain* by virtue of its heat; as we learn from Hippocrates.

As for thoſe *pains* which ariſe in the progreſs of the diſtemper, thoſe which phyſicians call critical, are thought to be the more kindly and favourable; becauſe partly as as a ſign, and partly as a cauſe, they prognoſticate a happy criſis. As a ſign they indicate an hæmorrhage, vomiting, or ſome other evacuation, agreeable to the obſervation of Hippocrates. 1 Epid. ſect. 3.

Theſe are the *pains*, which by indicating a happy criſis, prognoſticate a recovery; ſuch, in particular, are the *pains* which affect, ſometimes for a long while together, the ignoble parts which lie remote from the viſcera, and are principally to be regarded, as well as other ſigns, when they happen on a critical day, with manifeſt tokens of concoction; in which circumſtance we may with confidence predict a recovery, if none of the mortal ſigns appear.

Pains prognoſticating death. All pains affecting a noble part of the body are bad; whether they are produced together with the diſeaſe, and ſo are eſteemed pathognomonic ſigns, or are excited afterward; for the former, in conjunction with other pathognomonic, or proper ſigns, form a prognoſtic. Thus a violent and continual pain of the head in a phrenſy, with other deſtructive ſigns of a phrenſy, is mortal. Some *pains* are generally mortal, from the excellence and uſefulneſs of the part which they affect: thoſe, for inſtance, which ſeize the heart, or cauſe ſtrangulations in the mouth of the ſtomach, the fauces, head, ears, breaſt, or bladder. For *pains* in theſe members are always pernicious, and eſpecially when attendant on a continual fever, with other bad ſymptoms, indicating an inflammation, which are generally mortal.

Pains in the viſcera and noble parts, which affect not the patient in the beginning of acute diſtempers, but are felt afterward in the progreſs of the diſeaſe; if ſevere and conſtant, are to be eſteemed very pernicious; as ſhewing ſome noble part of the viſcera to be afflicted with a high inflammation, acceſſary to the fever, and not to be ſubdued but by extraordinary ſtrength of nature. Wherefore theſe pains are uſually ſucceeded by very formidable ſymptoms; ſuch as a coldneſs in the extreme parts, which is the ordinary conſequence of violent pains, according to Hippocrates. 7 Aph. 26.

Thus may be ſeen what judgment is to be made, and what prognoſtics to be drawn, from pains moleſting the viſcera, or noble parts; but if theſe *pains* are accompanied or ſucceeded by ſome mortal ſign, no leſs than the deſtruction of the patient is indicated. The ſame conſequence may be prognoſticated from a variety of *pains* affecting the noble parts, or other ſevere ſymptoms of a different kind, appearing at the ſame time; for theſe, as they are indications of ſeveral dangerous diſorders in conjunction, ſo when attendant on *pain*, or a multiplicity of *pains*, they portend nothing but the worſt of events. For if nature finds it difficult to ſubdue one conſiderable diſtemper, it muſt certainly ſink and give way to the joint attacks of many diſeaſes, unleſs upheld by an extraordinary meaſure of ſtrength.

Pain in the ignoble parts we have before declared to be good; and if attended with a concoction of the humours, of conſiderable duration, are effectual in removing, or at leaſt in mitigating the fever, with its threatening ſymproms, and putting the patient in a better ſtate. Such *pains* begin on critical days, and are not concerned in exaſperating any of the ſymptoms. But *pains* in the ignoble parts, in the beginning of a diſeaſe, when all things are crude, by which no ſymptoms of the noble parts are removed or diminiſhed, but rather exaſperated and multiplied, and the ſick rendered worſe, are of a bad kind. But *pains* ariſing in the ignoble or remote parts, are moſt to be dreaded, when ſucceeded by a fever, and other no leſs ſevere and dangerous ſymptoms, under which the patient grows worſe.

Pains of the ignoble parts are no leſs formidable, and to be ſuſpected, when they vaniſh, and become inſenſible on a ſudden; or when they begin in a remote part, and thence remove toward the viſcera; which indicate a conflux of humours to the noble parts.

Aſclepiades conſidered *pain* as a principal indication for bleeding; for he thought *pain* was cauſed by a retention of the larger molecules, in the pores or paſſages, which nothing but bleeding could diſlodge. The rule is excellent, whatever the reaſon he gives for it may be; for it would be difficult to lay down a maxim in phyſic either more univerſal, or of greater importance. James.

Pain, conſidered as a ſymptom of a diſeaſe, makes a conſiderable article in a palliative cure.

Pain is mitigated, or aſſuaged, divers ways; as, 1. By diluting and ſoftening acrimonies, with warm water mixed with flour, applied by way of drink, fomentation, clyſter, or bath. 2. By reſolving and waſhing away obſtructions, by the ſame means, and reſolvents. 3. By relaxing the nervous veſſels, with drinks, fomentations, baths, relaxants, anodynes, and aperients. 4. By correcting the acrimony itſelf with proper remedies. 5. By freeing the obſtruent, obſtructed, and acrimonious parts from the too great preſſure of the vital humour; and by ſoftening, and ſuppurating, and depurating them. 6. By rebating or deadening the ſenſe by narcotics, either internally or externally.

DOLPHIN, *Delphinus*, in the Linnæan ſyſtem of *Zoology*, makes a diſtinct genus of fiſhes of the order of *cete*, and claſs of MAMMALIA; the characters of which are, that there are teeth in both jaws, and a pipe in the head.

In the Artedian ſyſtem of ichthyology, *delphinus* is alſo the name of a genus of the plagiuri, or cetaceous fiſhes; the characters of which are theſe: the teeth are placed in both the jaws, the pipe or opening is in the middle of the head, and the back is always pinnated.

The ſpecies of this genus are theſe, 1. The *dolphin*, with a coniform body, with a broad back, and a ſub-obtuſe ſnout. This is the *phocæna* or porpeſſe. 2. The *dolphin*, with an oblong ſubcylindric body, with a long acute ſnout: this is the *delphinus* of the generality of authors, and is called the *porpeſſe* alſo by the Engliſh. 3. The *dolphin* with the back ridged upwards, and with broad ſerrated teeth; this is the *orca* of authors, called by us the *grampus* and *north caper*; the body of this fiſh is ſo thick, that its breadth is equal to half its length. See PORPESSE.

The name *delphinus* is of Greek origin, and is ſuppoſed by ſome to be derived from the word δελφαξ, a *pig* or *hog*; and, according to others, from the word δελφος, *vulva*, this fiſh being of the viviparous kind, and one of thoſe few which have the vulva and penis in the different ſexes, like thoſe of land animals.

All the nations who have given this fiſh their ſeveral names, have derived them from its reſemblance to the ſame creature, a hog; and this not without reaſon, as there is much analogy between the two animals; the *dolphin* being as fat as the hog, and having his intrails extremely like thoſe of that quadruped; but in this there has yet been ſome confuſion, as the common porpeſſe, which much reſembles the *dolphin* in many reſpects, has alſo been indiſcriminately called by the ſame name with that fiſh. The difference between the two is, that the *dolphin* has a much longer ſnout or noſe, ſticking out ſomewhat in form of a gooſe's bill, and is in the whole a longer, ſlenderer, more fleſhy, and leſs fat fiſh, and is the larger of the two. The *phocæna* or *porpeſſe* is fatter, ſmaller, broader backed, and has a more obtuſe and ſhorter ſnout.

The *dolphin* is a cetaceous fiſh, covered with a ſmooth, but very tough and firm ſkin; its body is long and rounded, and its back prominent. Above the ſnout it has a pipe, by which it throws out the water neceſſarily taken in with food. Theſe fiſh are ſuppoſed to live a great number of years. The figures of them on ſome antique marbles and coins, which repreſent them crooked and unnatural, have been conceived originally by perſons who had ſeen them playing about on the ſurface of the water, in which caſe they ſometimes deceive the eye, and appear crooked: from theſe probably our ſign-painters took their idea of the *dolphin*. They are an extremely ſwift fiſh in ſwimming, and are able to live a long time out of the water, though they can continue but a little while under it without air; hence they are ſometimes taken up dead by fiſhermen in their nets, having been ſuffocated by being forcibly kept under water: they have been known to live three days on dry ground. Willughby, Hiſt. Piſc. p. 30.

This fiſh was conſecrated by the ancients to the gods, and called the ſacred fiſh. Scarce an accident could happen at ſea, but the *dolphin* offered himſelf to convey to ſhore the unfortunate. The ſtory of Arion, the muſician, is related by Ovid, Faſti, lib. ii. ver. 113.

It was formerly reckoned a great delicacy in this country.

DOLPHIN is alſo a name given by the Engliſh to the fiſh called *hippuris*, by the generality of authors; but by ſome *hippoſele* and *equiſele*, and by others *dorado*. According to the new ſyſtem of Artedi, this fiſh is a ſpecies of the *coryphæna*, and is diſtinguiſhed from all the other kinds, by its having a forked tail. See HIPPURIS and CORYPHÆNA.

DOLPHIN, *Delphinus*, in *Aſtronomy*. See DELPHINUS.

DOLPHINS *of a cannon*, in *Gunnery*, are the two handles placed on the ſecond reinforce ring of braſs guns, reſembling the fiſh of that name. They ſerve for mounting and diſmounting the guns.

DOLPHIN *of the maſt*, in *Sea-Language*, is a peculiar kind of wreath, formed of platted cordage, to be faſtened occaſionally round the maſts, as a ſupport to the PUDDENING, whoſe uſe is to ſuſtain the weight of the fore and main-yards, in caſe the rigging or chains, by which thoſe yards are ſuſpended, ſhould be ſhot away in the time of battle.

DOM, or **DON**, a title of honour, originally Spaniſh, though uſed occaſionally in other countries. See TITLE.

It is equivalent to *maſter*, *ſir*; or *lord*, *monſieur*, *ſieur*, *mynheer*, &c.

Gollut, in his Mem. des Bourg. lib. v. cap. 11. aſſures us, that the firſt on whom the Spaniards conferred the title, was *dom* Pelayo; when, upon their being routed, and driven out, by the Saracens, at the beginning of the eighth century, they rallied again on the Pyreneans, and made him king.

In Portugal, nobody is allowed to aſſume the title of *dom*, which is a badge or token of nobility, without the king's leave.

DOM is likewiſe uſed in France among ſome orders of religious, as the Chartreux, Benedictines, &c.

We ſay, the reverend father *dom* Calmet, *dom* Alexis, *dom* Balthaſar, &c.

In the plural they write *doms*, with an *s*, in ſpeaking of ſeveral. RR. PP. *doms* Claude du Ruble, and Jaques Douceur.

The word is formed from the Latin *domnus*, or *dominus*; of which it is an abbreviature. *Domnus* is found in diverſe Latin authors of the barbarous age. Onuphrius aſſures us, it was a title firſt given to the pope alone; then to the biſhops, abbots, and others, who held any eccleſiaſtical dignity, or were eminent for virtue and religion. At length it was uſurped by the mere monks.

Some ſay, the religious declined the title *dominus* out of humility, as belonging to God alone; and aſſumed that of *domnus*, as expreſſing inferiority, *quaſi minor dominus*. Indeed, the appellation *domnus* for *dominus* appears very ancient, if we conſider the ſurname of Julia, wife of the emperor Septimius Severus, who is called on medals, IVLIA DOMNA, for JULIA DOMINA.

DOM and **SOM**, words uſed in ancient charters, ſignifying a power of judging, and ſecurity in poſſeſſing. Hence *dome's* men, who were perſons appointed to determine ſuits and controverſies between parties. See DAY's *man*.

DOM-*Book*. See DOMES-DAY.

DOMAIN, the inheritance, eſtate, or poſſeſſion, of any one. See DEMESNE.

Menage derives the word from *domanium*, written in the barbarous Latin for *dominium*. See DOMINIUM.

DOME, or **DOOM**, ſignifies judgment, ſentence, or decree. The homagers oath, in the Black Book of Hereford, ends thus: So help me God at his holy *dome*, and by my trowthe.

DOME, in *Architecture*, a ſpherical roof; or a work of a ſpherical form raiſed over the middle of a building, as a church, hall, pavilion, veſtibule, ſtair-caſe, &c. by way of crowning, or acroter. See *Tab. Architecture*, *fig.* 40. D.

The word is formed from the barbarous Latin, *doma*, which ſignified a *roof*, or *open porch*; as is obſerved by Papias. It is frequent in the corrupt Latin authors, who borrowed it from the Greeks, among whom *trullus*, or *trullum*, is a common name for any round building; ſuch as the palace of Conſtantinople, wherein was held the council thence called *in trullo*.

Domes are the ſame with what the Italians call *cuppolas*; and we frequently *cupolas*; the Latins, according to Vitruvius, *tholi*.

They are uſually made round; though we have inſtances of ſquare ones; as thoſe of the Louvre; and others that are polygons, as that of the Jeſuits church in the rue St. Antoine at Paris. They have uſually columns ranged around their outſides, both by way of ornament, and to ſupport the vault.

DOME, *a flat*, is that whoſe ſweep, or contour, is leſs than a hemiſphere.

DOME, *eye of a*. See EYE.

DOME, in *Chemiſtry*, the arched cover of a reverberatory furnace. See REVERBERATORY.

DOMENGER, in *Middle Age Writers*, is ſometimes uſed for damſel. See DAMSEL.

DOMES-DAY, or DOOMS-DAY-*Book*, *Liber judiciarius vel cenſualis Angliæ*, the judicial book, or book of the ſurvey of England; a moſt ancient record made in the time of William the Conqueror; upon a ſurvey, or inquiſition, of the ſeveral counties, hundreds, tithings, &c.

Its name is formed from the Saxon *dom*, *doom*, *judgment*, *ſentence*; and *day*, which has the ſame force; ſo that *dome-day* is no more than a reduplicative, importing *judgment judgment*.

But ſome condemn this etymology as whimſical; and contend that if it was juſt, the Latin for *domeſday* would be *dies judicii*; whereas, as appears above, it is ſtiled *Liber judiciarius*, *vel cenſualis Angliæ*. Bullet, in his Celtic Dictionary, hath the word *dom*, which he reads *ſeur*, *ſeigneur*, (and hence the Spaniſh word *don*) as alſo the words *deya*, and *deia*, which he renders *proclamation*, *advertiſement*. *Doomſday* therefore ſignifies the lord's or king's proclamation, or advertiſement, to the tenants who hold under him; and agrees well with great part of the contents of this famous ſurvey. Obſervations on the Statutes, p. 190. note (*m*).

The drift, or deſign of the book, is to ſerve as a regiſter, by which ſentence may be given in the tenures of eſtates; and from which that noted queſtion, whether lands be ancient demeſne, or not, is ſtill decided. Its contents are ſummed up in the following verſes:

> *Quid deberetur fiſco, quæ, quanta tributa,*
> *Nomine quid cenſus, quæ vectigalia, quantum*
> *Quiſque teneretur feodali ſolvere jure,*
> *Qui ſunt exempti, vel quos angaria damnat,*
> *Qui ſunt vel glebæ ſervi, vel conditionis,*
> *Quove manumiſſus patrono jure ligatur.*

This book is ſtill remaining, fair and legible; conſiſting of two volumes, a greater, and a leſs; the greater comprehending all the counties of England, except Northumberland, Cumberland, Weſtmorland, Durham, and part of Lancaſhire, which were never ſurveyed; and except Eſſex, Suffolk, and Norfolk, which are comprehended in the leſſer volume, which concludes with theſe words: *Anno milleſimo octogeſimo ſexto ab incarnatione Domini, vigeſimo vero regis Wilhelmi, facta eſt iſta deſcriptio non ſolum per hos tres comitatus, ſed etiam alios.*

It is called *Liber judicialis*, becauſe a juſt and accurate deſcription of the whole kingdom is contained therein; with the value of the ſeveral inheritances, &c.

It was begun by five juſtices, aſſigned for that purpoſe in each county, in the year 1081, and finiſhed in 1086. Camden calls it *Gulielmi Librum cenſualem*, king William's Tax-book.

This book was formerly kept under three different locks and keys; one in the cuſtody of the treaſurer, and the others of the two chamberlains of the exchequer. It is now depoſited in the chapter-houſe at Weſtminſter, where it may be conſulted, on paying to the proper officers a fee of 6*s.* 8*d.* for a ſearch, and 4*d.* per line for a tranſcript.

Our anceſtors had many *dome-books*. We are told by Ingulphus, that king Alfred made a like regiſter with that of William the Conqueror. It was begun upon that prince's dividing his kingdom into counties, hundreds, tithings, &c. when an inquiſition being taken of the ſeveral diſtricts, it was digeſted into a regiſter, called *Dom-boc*, q. d. the *Judgment-book*, and was repoſited in the church of Wincheſter; whence it is alſo called the *Wincheſter-book*, and *Rotulus Winton*. This book is ſaid to have been extant ſo late as the reign of king Edward IV. but is now unfortunately loſt. It probably contained the principal maxims of common-law, the penalties for miſdemeanors, and the forms of judicial proceedings. And upon the model of this *Dom-boc* it is, that the *Domeſday* of the Conqueror was formed.

That of king Alfred referred to the time of king Ethelred; and that of the Conqueror, to the time of Edward the Confeſſor; the entries being thus made, *C. tenet rex Gulielmus in dominico, & valet ibi ducatæ*, &c. T. R. E. *valebat*; q. d. it is worth ſo much *tempore regis Eduardi*, in the time of king Edward.

There is a third *Dom-boc*, or *Domes-day-book*, in quarto, differing from the other in folio, rather in form than matter. It was made by order of the ſame Conqueror; and ſeems to be the more ancient of the two.

A fourth book there is in the exchequer, called *domeſday*; which, though a very large volume, is only an abridgment of the other two. It has abundance of pictures, and gilt letters at the beginning, which refer to the time of Edward the Confeſſor. There is alſo a fifth book, called *Domes-day*, and the ſame with the fourth now mentioned.

DOMESTIC, from *domus*, *houſe*, a term of ſomewhat more extent than that of ſervant; the latter only ſignifying ſuch as ſerve for wages, as footmen, lacquies, porters, &c. whereas *domeſtic* comprehends all who act under a man, compoſe his family, and live with him, or are ſuppoſed to live with him. Such are ſecretaries, chaplains, &c.

Sometimes *domeſtic* goes farther, being applied to the wife and children.

DOMESTIC *gown*, *toga domeſtica*. See TOGA.

DOMESTICUS, Δομεϛικος, in *Antiquity*, was a particular officer in the court of the emperors of Conſtantinople.

Fabrot, in his gloſſary on Theophylax Simocatta, defines *domeſticus* to be any perſon entruſted with the management of affairs of importance; a counſellor, *cujus fidei graviores alicujus curæ, & ſolicitudines committuntur.*

Others hold, that the Greeks called *domeſtici* thoſe who at Rome were called *comites*; particularly, that they began to uſe the name *domeſticus*, when that of count was become a name of dignity, and ceaſed to be the name of an officer in the prince's family.

Domeſtici, therefore, were ſuch as were in the ſervice of the prince, and aſſiſted him in the adminiſtration of affairs; both thoſe of his family, thoſe of juſtice, and thoſe of the church.

The grand DOMESTIC, *Megadomeſticus*, called alſo abſolutely the *domeſticus*, ſerved at the emperor's table, in quality of what we occidentals call *dapifer*. Others ſay, he was rather what we call a *majordomo*.

DOMESTICUS *menſæ* did the office of grand ſeneſchal, or ſteward.

DOMESTICUS *rei domeſticæ* acted as maſter of the houſhold.

DOMESTICUS *ſcholarum*, or *legionum*, had the command of the reſerved forces called *ſcholæ palatinæ*, whoſe office was to execute the immediate orders of the emperor.

DOMESTICUS *murorum*, had the ſuperintendance of all the fortifications.

DOMESTICUS *regionum*, that is, of the eaſt and weſt, had the care of public cauſes, much like our attorney or ſollicitor-general.

DOMESTICUS *icanatorum*, or of the military cohorts.

There were diverſe other officers of the army, who bore the appellation *domeſticus*, which ſignified no more than commander, or colonel. Thus, the *domeſtic of the legion* called *optimates*, was the commander thereof.

DOMESTICUS *chori*, or *chantor*, whereof there were two in the church of Conſtantinople; one on the right ſide of the church, and the other on the left. They were alſo called *protopſaltes*.

Dom. Magri diſtinguiſhes three kinds of *domeſtici* in the church: *domeſtic of the patriarchal clergy*; *domeſtic of the imperial clergy*, that is, maſter of the emperor's chapel; and *domeſticus deſpoinicus*, or of the empreſs. There was another order of *domeſtics*, inferior to any of thoſe abovementioned, called *patriarchal domeſtics*.

DOMESTICI was alſo the name of a body of forces in the Roman empire. Pancirollus takes them to have been the ſame with thoſe called *protectors*; who had the chief guard of the emperor's perſon, in a degree above the prætorians; and who under the Chriſtian emperors had the privilege to bear the grand ſtandard of the croſs.

They are ſuppoſed to have been 3500 before Juſtinian's time, who added 2000 more to the number. They were divided into ſeveral companies, or bands, which the Latins called *ſcholæ*, ſome whereof are ſaid to have been inſtituted by Gordian. Some of them were cavalry, and ſome infantry.

Their commander was called *comes domeſticorum*.

DOMICELLARY *canons*. See CANONS.

DOMICELLUS. See DAMSEL.

DOMIFYING, DOMIFICATION, in *Aſtrology*, the dividing or diſtributing the heavens into twelve houſes; in order to erect a theme, or horoſcope, by means of ſix great circles, called *circles of poſition*.

There are diverſe ways of *domifying*, according to diverſe authors. That of Regiomontanus, which is the moſt uſual, makes the circle of poſition paſs through the interſections of the meridian, and horizon. Others make them paſs through the poles of the world, or the equator; and others through the poles of the zodiac.

DOMINANT *of a mode*, in *Muſic*, that ſound which makes a perfect fifth to the final, in authentic modes; and a third to the final or ſixth, to the loweſt chord of a plagal mode.

DOMINARUM AQUA, a name given by Mynſicht to a diſtilled water, which he recommends to the ladies to facilitate delivery.

DOMINATION, in *Theology*, the fourth order of angels, or bleſſed ſpirits, in the hierarchy; reckoning from the ſeraphim. See HIERARCHY, and SERAPH.

St. DOMINGO *Company*. See COMPANY.

DOMINI—*Anno* DOMINI. See ANNO.

Bull in Cœna DOMINI. See BULL.

DOMINIAL *offices.* See Offices.

DOMINICAL *Letter*, in *Chronology*, properly called *Sunday Letter*, one of the ſeven letters of the alphabet ABCD EFG, uſed in almanacs, ephemerides, &c. to denote the Sundays throughout the year.

The word is formed from *Dominica*, or *Dominicus dies, Lord's day, Sunday.*

The *Dominical letters* were introduced into the calendar by the primitive Chriſtians, in lieu of the nundinal letters in the Roman calendar.

Theſe letters, we have obſerved, are ſeven: and that, in a common year, the ſame letter ſhould mark all the Sundays, will eaſily appear; inaſmuch as all the Sundays are ſeven days apart, and the ſame letter only returns in every ſeventh place.

But in biſſextile, or leap-year, the caſe is otherwiſe: for by means of the intercalary day, either the letters muſt be thruſt out of their places for the whole year afterwards, ſo, e. gr. as that the letter which anſwers to the firſt of March, ſhall likewiſe anſwer to the ſecond, &c. or elſe the intercalary day muſt be denoted by the ſame letter as the preceding one. This latter expedient has been judged the better, and accordingly the Sundays after the intercalary day have another *Dominical letter.*

Hence, 1. As the common Julian and Gregorian year conſiſts of 365 days, i. e. of 52 weeks, and one day; the beginning of the year, every common year, goes backwards by one day: thus, e. gr. if this year the beginning, or firſt day fall on a Sunday, the next year it will fall on Saturday, the next on Friday, &c. Conſequently, if A be the *Dominical letter* of the preſent year, G will be that of the next year; and ſo on in a retrograde order.

2. As the Julian, and Gregorian biſſextile, or leap-year, conſiſts of 366 days, i. e. 52 weeks, and 2 days, the beginning of the next year after biſſextile goes back 2 days. Whence, if in the beginning of the biſſextile year, the *Dominical letter* were A, that of the following year will be F.

3. Since in leap-years the intercalary day falls on the 24th of February, in which caſe the 24th and 25th days are conſidered as one day, and denoted by the ſame letter; after the 24th day of February the *Dominical letter* goes back one place: thus, if in the beginning of the year the *Dominical letter* be A, it will afterwards be G. This day is now added to the end of February, and thence the change takes place.

4. As every fourth year is biſſextile, or leap-year, and as the number of letters is 7; the ſame order of *Dominical letters* only returns in 28 years; which, without the interruption of biſſextiles, would return in 4 years.

5. Hence the invention of the ſolar cycle of 28 years; upon the expiration whereof the *Dominical letters* are reſtored ſucceſſively to the ſame days of the month, or the ſame order of the letters returns.

To find the Dominical *letter of any given year.* Seek the cycle of the ſun for that year, as directed under Cycle; and the *Dominical letter* is found correſponding thereto. When there are two, the propoſed year is biſſextile; and the firſt obtains to the end of February; and the laſt for the reſt of the year.

The *Dominical letter* for any year of the preſent century may be found by the following canon:

Divide the odd years, their fourth and four by ſeven,
What is left ſubtract from ſeven, the letter is given.

Thus for the year 1778, the *letter* will be D.

The *Dominical letter* may be found univerſally, for any year of any century, thus:

Divide the centuries by four; and twice what does remain
Take from ſix; and then add to the number you gain
Their odd years and their fourth; which, dividing by ſeven,
What is left take from ſeven, and the letter *is given.*

Thus the letter for the year 1878 is F.

The reaſon of the foregoing rules may be eaſily explained. Every common year brings the *Dominical letter one* backward, and every leap year *two*; therefore to any number of years, under 100, add its fourth part for the leap years, omitting fractions; and the ſum will be the number of times the *letter* has ſhifted backward during that number of years, which, being divided by 7, leaves a remainder, that will be the number of the letter of the preſent year, reckoning from the *letter* belonging to the laſt centeſſimal year, in a retrograde order; or the complement of the remainder to 7 will be the preſent *Dominical letter* in a direct order. It is alſo evident, that four Gregorian centuries, containing three centeſſimal common years, which remove the letter two forward, and one centeſſimal leap year, which removes it one forward, will complete a revolution of the letter. Thus the *Dominical letter* of 1600 is A; of 1700 C; of 1800 E; of 1900 G; of 2000 A, &c. Therefore A, the ſixth letter backward from G, is the *Dominical letter* of a biſſextile centeſſimal year; and 6 muſt be added to the odd years and their fourth, and the ſum be divided by 7, in order to obtain the *letter* of any year in the next century, or the ſeventeenth; and, as the firſt common centeſſimal year brings the letter two forward from A, or two leſs than ſix backward from G, the remainder, after dividing the centuries by 4, muſt be doubled; and ſo we ſhall have 6 − 2 = 4 to be added to the odd years, and their 4th, in the ſecond common century; and 6 − 4, or 2, muſt be added in the third, and 0 in the 4th, becauſe the Gregorian biſſextile recurs, and the number of centuries may be divided by 4, without leaving any remainder.

By the reformation of the calendar under pope Gregory, the order of the *Dominical letters* was again diſturbed in the Gregorian year; for the year 1582, which at the beginning had G for its *Dominical letter*; by the retrenchment of ten days after the 4th of October, came to have C for its *Dominical letter*; by which means the *Dominical letter* of the ancient Julian calendar is four places before that of the Gregorian; the letter A in the former anſwering to D in the latter.

Dominical, in *Church Hiſtory.* The council of Auxerre, held in 578, decrees, that women communicate with their *dominical.* Some authors contend, that this *dominical* was a linen cloth, wherein they received the ſpecies; as not being allowed to receive them in the bare hand. Others will have it a kind of veil, wherewith they covered the head. The moſt probable account is, that it was a ſort of linen cloth, or handkerchief, wherein they received, and preſerved, the Euchariſt, in times of perſecution, to be taken on occaſion at home. This appears to have been the caſe by the practice of the firſt Chriſtians, and by Tertullian's book Ad Uxorem.

Dominical was alſo formerly uſed in the ſame ſenſe with homily.

DOMINICANS, an order of religious, called in ſome places *Jacobins*, and in others, *Predicants*, or *Preaching Friers.* See Jacobins, &c.

The *Dominicans* take their name from their founder Dominic de Guzman, a Spaniſh gentleman, born in 1170, at Calaroga, in Old Caſtile. He was firſt canon and archdeacon of Oſma; and afterwards preached with great zeal and vehemence againſt the Albigenſes in Languedoc, where he laid the firſt foundation of his order. It was approved of in 1215, by Innocent III. and confirmed in 1216, by a bull of Honorius III. under the title of St. Auguſtin; to which Dominic added ſeveral auſtere precepts and obſervances, obliging the brethren to take a vow of abſolute poverty, and to abandon entirely all their revenues and poſſeſſions; and alſo the title of *Preaching Friers*, becauſe public inſtruction was the main end of their inſtitution.

The firſt convent was founded at Tholouſe, by the biſhop thereof, and Simon de Montfort. Two years afterwards they had another at Paris, near the biſhop's houſe; and ſome time after, a third in the rue St. Jaques, St. James's ſtreet, whence the denomination of Jacobins.

Juſt before his death, Dominic ſent Gilbert de Freſney, with twelve of the brethren, into England, where they founded their firſt monaſtery at Oxford in the year 1221, and ſoon after another at London. In the year 1276, the mayor and aldermen of the city of London gave them two whole ſtreets by the river Thames, where they erected a very commodious convent, whence that place is ſtill called Black Friers, from the name by which the *Dominicans* were called in England.

St. Dominic, at firſt, only took the habit of the regular canons, that is, a black caſſock, and rochet; but this he quitted in 1219, for that which they now wear, which, it is pretended, was ſhewn by the bleſſed Virgin herſelf to the beatified Renaud d'Orleans.

This order is diffuſed throughout the whole known world. It has forty-five provinces under the general, who reſides at Rome; and twelve particular congregations, or reforms, governed by vicars general.

They reckon three popes of this order, above ſixty cardinals, ſeveral patriarchs, a hundred and fifty archbiſhops, and about eight hundred biſhops; beſide maſters of the ſacred palace, whoſe office has been conſtantly diſcharged by a religious of this order, ever ſince St. Dominic, who held it under Honorius III. in 1218.

The *Dominicans* are alſo inquiſitors in many places. See Inquisition.

Of all the monaſtic orders, none enjoyed a higher degree of power and authority than the *Dominican* friers, whoſe credit was great, and their influence univerſal. But the meaſures they uſed in order to maintain and extend their authority, were ſo perfidious and cruel, that their influence began to decline towards the beginning of the ſixteenth century. The tragic ſtory of Jetzer, conducted at Bern in 1509, for determining an uninteresting diſpute between them and the Franciſcans, relating to the *immaculate* Conception, will reflect indelible infamy on this order. See an account of it in Burnet's Travels through France, Italy, Germany, and Switzerland, p. 31. or Moſheim's Eccl. Hiſt. vol. iii. p. 294, 8vo. They were indeed perpetually employed in ſtigmatizing with the opprobious name of hereſy numbers of learned and pious men; in encroaching upon the rights and properties of others, to augment their poſſeſſions; and in laying the moſt iniquitous ſnares and ſtratagems for the deſtruction of their adverſaries. They were the principal counſellors, by whoſe inſtigation and advice Leo X. was determined to the public condemnation of Luther. The papal ſee never had more active and uſeful abettors than this order, and that of the Jesuits.

The dogmata of the *Dominicans* are uſually oppoſite to thoſe of the Franciſcans.

There are alſo nuns, or ſiſters, of this order, called in ſome places, *Preaching Siſters*. Theſe are even more ancient than the friers; St. Dominic having founded a ſociety of religious maids, at Prouilles, ſome years before the inſtitution of his order of men; viz. in 1206.

There is alſo a *third order of Dominicans*, both for men and women.

DOMINIUM, Dominion, in the *Civil Law*, denotes the abſolute power, or property, of a thing, to uſe or diſpoſe of it how we pleaſe.

Directum dominium is the right alone of *dominium*; and *dominium utile*, the profit redounding from it. The wife retains the *dominium directum* of her jointure, and the *dominium utile* paſſes to her huſband. With reſpect to ſignory, he who pays rent, has the *dominium utile* of the lands; and the lord he pays it to, the *dominium directum.*

Dominium, Dominion, or Domaine, in our *Ancient Cuſtoms*, denotes a rent due to the lord, where the property is not his.

DOMINORUM, *Affidatio*. See Affidatio.

DOMINUS, in *Ancient Times*, a title prefixed to a name, uſually to denote the perſon either a knight, or a clergyman. See Vice-dominus.

Though the title was ſometimes alſo given to a gentleman not dubbed; eſpecially if he were lord of a manor. See Dom, Gentleman, and Sire.

In Holland, the title *dominus* is ſtill retained, to diſtinguiſh a miniſter of the reformed church.

Recto quando Dominus *remiſit*. See Recto.

DOMO *reparanda*, a writ that lies for one againſt his neighbour, by the fall of whoſe houſe he fears damage to his own. Reg. of Writs, fol. 153. In which caſe the civilians have the action *de damno infecto*.

DONARIA, among the *Ancients*, in its primary ſignification, was taken for the places where the oblations offered to the gods were kept; but afterwards was uſed to denote the offerings themſelves; and ſometimes, though improperly, the temples.

DONATION, Donatio, an act, or contract, whereby a man transfers to another, either the property, or the uſe, of the whole, or a part of his effects, as a free gift.

A *donation*, to be valid and complete, ſuppoſes a capacity both in the donor, and the donee; and requires conſent, acceptance, and delivery; and by the French law regiſtry alſo.

Donation *mortis cauſa*, in *Law*, a diſpoſition of property made by a perſon in his laſt ſickneſs, who, apprehending his diſſolution near, delivers, or cauſes to be delivered to another, the poſſeſſion of any perſonal goods, to keep in caſe of his deceaſe. If the donor dies, this gift needs not the conſent of his executor; but it ſhall not prevail againſt creditors; and it is accompanied with this implied truſt, that, if the donor lives, the property ſhall revert to himſelf, being only given in proſpect of death, or *mortis cauſa*. This method of *donation* ſeems to have been conveyed to us from the civil lawyers, who borrowed it from the Greeks. Odyſſey, lib. xvii. ver. 78. and Euripides Alceſtes, ver. 1020. See Blackſt. Com. vol. ii. p. 514.

DONATISTS, ancient ſchiſmatics in Africa, ſo denominated from their leader, Donatus.

They had their origin in the year 311, when, in the room of Menſurius, who died in that year, on his return to Rome, Cæcilian was elected biſhop of Carthage, and conſecrated without the concurrence of the Numidian biſhops, by thoſe of Africa alone; whom the people refuſed to acknowlege, and to whom they oppoſed Majorinus; who, accordingly, was ordained by Donatus, biſhop of Caſæ Nigræ. They were condemned, in a council held at Rome, two years after their ſeparation; and afterwards in another at Arles, the year following; and again at Milan, before Conſtantine the Great, in 316, who deprived them of their churches, and ſent their ſeditious biſhops into baniſhment, and puniſhed ſome of them with death. Their cauſe was eſpouſed by another Donatus, called the Great, the principal biſhop of that ſect, who, with numbers of his followers, was exiled by order of Conſtans. Many of them were puniſhed with great ſeverity. See Circumcelliones. However, after the acceſſion of Julian to the throne in 362, they were permitted to return, and reſtored to their former liberty. Gratian publiſhed ſeveral edicts againſt them; and in 377 deprived them of their churches, and prohibited all their aſſemblies. But notwithſtanding the ſeverities they ſuffered, it appears that they had a very conſiderable number of churches towards the cloſe of this century; but at this time they began to decline, on account of a ſchiſm among themſelves, occaſioned by the election of two biſhops, in the room of Parmenian, the ſucceſſor of Donatus; one party elected Primian, and were called Primianiſts, and another Maximian, and were called Maximianiſts. Their decline was alſo precipitated by the zealous oppoſition of St. Auguſtin, and by the violent meaſures which were purſued againſt them, by order of the emperor Honorius, at the ſolicitation of two councils held at Carthage; the one in 404, and the other in 411. Many of them were fined, their biſhops were baniſhed, and ſome put to death. This ſect revived and multiplied under the protection of the Vandals, who invaded Africa in 427, and took poſſeſſion of this province; but it ſunk again under new ſeverities, when their empire was overturned in 534. Nevertheleſs they remained in a ſeparate body till the cloſe of this century, when Gregory, the Roman pontiff, uſed various methods for ſuppreſſing them; his zeal ſucceeded, and there are few traces to be found of the *Donatiſts* after this period. They were diſtinguiſhed by other appellations; as Circumcelliones, Montenſes, or Mountaineers, Campites, Rupites, &c. They held three councils, or conciliabules; that of Cirta in Numidia, and two at Carthage.

The errors of the *Donatiſts*, beſide their ſchiſm, were, 1. That baptiſm conferred out of the church, that is, out of their ſect, was null; and accordingly they rebaptized thoſe who joined their party from other churches, and re-ordained their miniſters. 2. That theirs was the only true, pure, and holy church; all the reſt of the churches they held as proſtitute, and fallen.

Donatus ſeems likewiſe to have given into the doctrine of the Arians, with whom he was cloſely allied; and, accordingly, St. Epiphanius, Theodoret, and ſome others, accuſed the *Donatiſts* of Arianiſm; and it is probable that the charge was well founded, becauſe they were patronized by the Vandals, who were of theſe ſentiments. But St. Auguſtine, ep. 185, to count Boniface, & Hær. 69. affirms, that the *Donatiſts*, in this point, kept clear of the errors of their leader.

DONATIVE, Donativum, a preſent made any perſon; called alſo *gratuity*.

The Romans made large *donatives* to their ſoldiers. Julia Pia, wife of the emperor Severus, is called, on certain medals, MATER CASTRORVM, becauſe of the care ſhe took of the ſoldiery, by interpoſing for the augmentation of their *donatives*, &c.

Donative was properly a gift made to the ſoldiery; as *congiarium* was that made to the people. See Congiarium.

Salmaſius, in his notes to Lampridius, in his Life of Heliogabalus, mentioning a *donative* that emperor gave of three pieces of gold per head, obſerves, that this was the common and legitimate rate of a *donative*. Caſaubon, in his notes on the Life of Pertinax by Capitolinus, obſerves, that Pertinax made a promiſe of three thouſand denarii to each ſoldier; which amounts to upwards of ninety-ſeven pounds ſterling. The ſame author writes, that the legal *donative* was twenty thouſand denarii; and that it was not cuſtomary to give leſs, eſpecially to the prætorian ſoldiers; that the centurions had double, and the tribunes, &c. more in proportion.

Donative, in the *Canon Law*, a benefice given, and collated to a perſon, by the founder, or patron; without either preſentation, inſtitution, or induction by the ordinary.

If chapels founded by laymen be not approved by the dioceſan, and, as it is called, *ſpiritualized*, they are not accounted proper benefices, neither can they be conferred by the biſhop, but remain to the pious diſpoſition of the founders; ſo that the founders, and their heirs, may give ſuch chapels without the biſhop.

Gwin obſerves, that the king might of ancient time found a free chapel, and exempt it from the juriſdiction of the dioceſan; ſo may he, by letters patents, give liberty to a common perſon to found ſuch a chapel, and make it *donative*, not preſentable; and the chaplain, or beneficiary, ſhall be deprivable by the founder or his heir, and not by the biſhop. And this ſeems to be the original of *donatives* in England.

Donatives are within the ſtatute againſt ſimony; and if they have cure of ſouls, within that againſt pluralities. If the patron of a *donative* doth not nominate a clerk, there can be no lapſe thereof, unleſs it be ſpecially provided for in the foundation; but the biſhop may compel him to do it by ſpiritual cenſures. But if it be augmented by queen Anne's bounty, it will lapſe like other preſentative livings. 1 Geo. I. ſtat. 2. cap. 10. The ordinary cannot viſit a *donative*, and therefore it is free from procuration, and the incumbent is exempted from attendance at viſitations.

All biſhopricks in ancient time were *donative* by the king. Again, where a biſhop has the gift of a benefice, it is properly called a *donative*, becauſe he cannot preſent to himſelf.

DONAX, in *Zoology*, a name by which ſeveral of the old authors have called the ſolen, or razor-fiſh. See SOLEN.

DONAX, in *Botany*, the name by which ſome authors call the great reed, the arundo maxima, or arundo Cypria of others. Tourn. Inſt. p. 256. See ARUNDO.

DONE *ſur, grant and render*, in *Law*, a double fine, comprehending the fine *ſur cognizance de droit com ces*, and the fine *ſur conceſſit*, which may be uſed to create particular limitations of eſtates. See FINE.

DONGON, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to a peculiar ſpecies of crane, which has a large body like a gooſe, and a ſhorter neck than the common kind: it has a long and very broad beak, and is of a grey colour; they have, beſides this, another ſpecies of crane, which they call tipul or tihol; as remarkable for the length of its neck and legs, as this for the breadth of its beak. This tipul can ſtand erect, and look over a tall man's head.

DONJON, in *Fortification*, generally denotes a large ſtrong tower, or redoubt, of a fortreſs, where the garriſon may retreat in caſe of neceſſity, and capitulate with greater advantage. See DUNGEON.

DONIS *conditionalibus*, *ſtatute de*, in *Law*, is the ſtatute of Weſtminſter 2. viz. 13 Edw. I. cap. 1. which revived in ſome ſort the ancient feodal reſtraints, that were originally laid on alienations, by enacting, that from thenceforth the will of the donor be obſerved; and that the tenements ſo given, to a man, and the heirs of his body, ſhould at all events go to the iſſue, if there were any; or, if none, ſhould revert to the donor. Blackſt. Com. vol. ii. p. 112.

DONNA, or *La* DONNA, in *Ichthyology*, a name given by Zuchelli, and ſome other authors, to the manati, or SEA-COW.

DONOR, in *Law*, he who gives lands, or tenements, to another, in tail. As donee, is he to whom the ſame are given.

DONZELLINA, in *Zoology*, a name by which ſome called the *julis*, a very beautifully painted fiſh of the Mediterranean, approaching to the nature of the turdus or wraſſe. See JULIS.

DOOLS, a term uſed in ſeveral parts of the kingdom for balks, or ſlips of paſture, left between the furrows of ploughed lands.

DOOR, in *Architecture*, an aperture in a wall, to give entrance, and exit, in and out of the building, or ſome apartment thereof. Moſt of the obſervations that are applicable to WINDOWS may be applied to *doors*.

The proportions of *doors* are adjuſted by thoſe of a man: in larger buildings they muſt always be larger than in ſmaller; but in none ſhould they be leſs than ſix feet high, to admit a man of juſt ſtature, erect; and as the breadth of a man, with his arms placed a-kimbo, is nearly ſubduple his height, the width ſhould never be leſs than three feet.

Some architects give us theſe dimenſions: in ſmall buildings the breadth of the *door* four feet, or four and a half; in middling buildings, five or ſix; in large ones, ſeven or eight; in chambers of the firſt, three and a half, three quarters, or four; of the ſecond, four, or four and a half; and of the third, five, or ſix; in churches, ſeven, or eight; in gates, nine, ten, or twelve: hence their height is eaſily determined; except for the gates of cities, which ſhould only be four fifths of their breadth.

It is an obſervation of Palladio, that the principal *door*, or entrance, of a houſe, muſt never be regulated by any certain dimenſions, but by the dignity of the perſon that is to live in it: yet, to exceed rather in the more, than the leſs, is a mark of generoſity; and may be excuſed with ſome noble emblem, or inſcription, as that of the conte de Bevilacqua over his large gate at Verona, where had been committed a like diſproportion, *Patet Janua, Cor magis.*

The principal *door*, as it is the entrance into all the apartments, ſhould be in the center of an edifice; though in ſmall houſes convenience may ſometimes require its being placed on one ſide.

DOOR, *ſcenography of a.* See SCENOGRAPHY.

DOORS, *architrave.* See ARCHITRAVE.

DOR, the Engliſh name for the common black beetle. Some alſo apply it to the duſty beetle, that flies about hedges in the evening. See SCARABÆUS.

DORADO, in *Aſtronomy*, a ſouthern conſtellation, not viſible in our latitude; it is alſo called XIPHIAS. The ſtars of this conſtellation, in Sharp's Catalogue, are ſix.

Names and ſituations of the ſtars.	Signs.	Longitud.			Latitude.			Magnitude.
		°	′	″	°	′	″	
In the head	♐	7	36	27	87	33	48	6
In the gills	♓	13	11	57	85	25	29	6
In the belly	♈	22	50	07	88	14	20	5
Above the back	♉	18	32	09	85	4	22	4
In the tail		4	5	31	74	38	11	3.4
5. In the end of the tail		2	44	28	70	12	28	4

DORADO, in *Ichthyology*, the name of a large ſea-fiſh, called by the Braſilians guaracapema; and ſo much reſembling the hippuris, as by many to be ſuppoſed to be the ſame fiſh; it grows to ſix or ſeven feet in length, and is of a ſomewhat broad and flatted form, being a foot and a half broad near the head; the head ends in a ſquare, and is thinned away to an edge, for the advantage of the creatures ſwimming the more ſwiftly. Its mouth is but ſmall for its ſize, and is furniſhed with very ſharp teeth; its eyes are large and round, and placed but a little above its mouth; its gills are large. It has one long fin running the whole length of the back, and another anſwering it on the belly, reaching from the anus to the tail; the tail is long, large, and forked; its ſcales are very ſmooth, and ſcarce ſenſible to the touch; its head, back, and ſides, are of a ſilver-green, its belly white; its back and ſides are ſpotted with blue; it is a very ſwift fiſh in ſwimming, and is very delicate and well taſted.

DOREAS *Lybica*, in *Natural Hiſtory*, the name by which Ælian and ſome other authors have called the common antelope. See GAZELLA.

DOREE, or *John* DOREE, in *Ichthyology*, a name given by us to a fiſh, called by authors the faber and gallus marinus. We have borrowed the name *doree* from the French; and, as to the word *John*, by ſome writers prefixed to it, it ſeems only a corruption of the French word *jaune, yellow*; they expreſſing the colour of the ſides of this fiſh, which is a gold-yellow, by the phraſe *jaune dorée*; this has given us the words *John Dorée*, or by thoſe who ſpell yet worſe, *John Dory*; as we ſee it in ſome authors.

According to the new Artedian ſyſtem, this is a ſpecies of the zeus, and is diſtinguiſhed by that author from the others of that genus, by the name of the zeus, with a prickly belly, and with a tail, not forked at the end, but rounded. Willughby, Hiſt. Piſc. p. 295. See ZEUS.

It is a ſhort and very broad and flat fiſh, being every where of the ſame thickneſs, and ſomething approaching to the plaiſe in figure, but ſwimming upright. Its head is large and very much flatted, its mouth extremely wide, and its eyes large. Its ſides are of an olive colour, beautifully variegated with a bluiſh white; and in the middle of each ſide, there is one large black ſpot of the ſize of a ſilver two-pence. It has two fins on the back, the anterior is the higher, and has ten rigid ſpines, accompanied with ſofter and very large rays, which bend into the form of a reaper's fickle. The tail ends in a circular figure. Its uſual ſize is from ſix to ten inches in length, and it is commonly nearly half as broad as long. See *Tab. of Fiſhes*, N° 50.

The fleſh is well taſted, and by many preferred to that of the turbot. It is caught in the Mediterranean and other ſeas, and is not uncommon on the Cornwall coaſt, and other of the Engliſh ſhores.

The *Indian* DOREE is a fiſh caught in many parts of the Eaſt Indies, and called by the Dutch there, the meerhaen, the ſame with the abacatuai of Marcgrave, caught in the Braſilian ſeas. See ABACATUAIA.

DORIA, in *Botany*. See GOLDEN-*rod*.

DORIALTIDES, in *Natural Hiſtory*, the name of a ſtone, to which great virtues, medicinal and magical, were attributed by the writers of the middle ages.

DORIAN, in *Ancient Muſic*, the fourth ſpecies of the diapaſon. See DIAPASON.

DORIC, in *Architecture*, is the ſecond of the five orders; being that between the Tuſcan and Ionic. It is uſually placed upon the Attic baſe, though originally it had no baſe.

The *Doric* order ſeems the moſt natural, and beſt proportioned, of all the orders; all its parts being founded on the natural poſition of ſolid bodies. Accordingly, the *Doric* is the firſt, and moſt ancient, of the orders of architecture; and is what gave the firſt idea of regular building. See *Tab. Archit. fig.* 25. See alſo ARCHITECTURE.

At its firſt invention it was more ſimple than at preſent; and when in after-times they came to adorn and enrich it more, the appellation *Doric* was reſtrained to this richer manner, and the primitive ſimple manner they called by a new name, the Tuſcan order, which was chiefly uſed in temples; as the former, being more light and delicate, was for porticos and theatres.

The tradition is, that Dorus, king of Achaia, having firſt built a temple of this order at Argos, which he dedicated to Juno, occaſioned it to be called *Doric*; though others derive its name, from its being invented, or uſed, by the Dorians.

Some time after its invention they reduced it to the proportions, ſtrength, and beauty, of the body of a man; hence, as the foot of a man was judged the ſixth part of his height, they made the *Doric* column, including the capital, ſix diameters high, i. e. ſix times as high as thick. Afterwards they added another diameter to the height, and made it ſeven diameters; with which augmentation it might be ſaid to be nearer the proportion of a man; the human foot, at leaſt in our days, not being a ſixth, but nearly a ſeventh part of the body.

The characters of the *Doric* order, as now managed, are, the height of its column, which is eight diameters; its frize, which is enriched with triglyphs, drops, and metopes; its capital, which is without volutes; and its admitting of cymatiums.

Vitruvius, indeed, complains of the *Doric* as very troubleſome and perplexing, on account of the triglyphs and metopes, ſo as ſcarce to be capable of being uſed, except in the pycnoſtyle, by putting a triglyph between each two columns, or in the aræoſtyle, by putting three triglyphs between each two columns.

The moderns, on account of its ſolidity, uſe it in large ſtrong buildings; as in the gates of cities, and citadels, the outſides of churches, and other maſſy works, where delicacy of ornaments would be unſuitable.

The gate of Burlington-houſe in Piccadilly is of the *Doric* order.

The moſt conſiderable ancient monuments of this order, are the theatre of Marcellus, at Rome; wherein the capital, the height of the frize, and its projecture, are much ſmaller than in the modern architecture; and the Parthenion, or temple of Minerva, at Athens, in which the ſhort and maſſy columns bear upon the pavement without a baſe; and the capital is a ſimple torus, with its cincture, and a ſquare, plain, and ſolid abacus.

Vignola adjuſts the proportions of the *Doric* order thus: the whole height of the order, without pedeſtal, he divides into twenty parts, or modules; one of which he allows the baſe, fourteen to the ſhaft, or fuſt, one to the capital, and four to the entablature.

The particular proportions, &c. of the ſeveral parts and members, ſee under their reſpective articles, ARCHITRAVE, BASE, CAPITAL, COLUMN, CORNICH, ENTABLATURE, FRIZE, and PEDESTAL.

DORIC *Cymatium.* See CYMATIUM.

DORIC, in *Grammar.* The *Doric dialect* is one of the five *dialects*, or manners of ſpeaking, which obtained among the Greeks. See DIALECT.

It was firſt uſed by the Lacedæmonians, and particularly thoſe of Argos; thence it paſſed into Epirus, Libya, Sicily, the iſlands of Rhodes, and Crete.

In this *dialect*, Archimedes and Theocritus wrote, who were both of Syracuſe; as likewiſe Pindar.

In ſtrictneſs, however, we ſhould rather define *Doric*, the manner of ſpeaking peculiar to the Dorians, after their receſs near Parnaſſus, and Aſopus; and which afterwards came to obtain among the Lacedæmonians, &c. Some even diſtinguiſh between the Lacedæmonian, and *Doric*; but, in reality, they were the ſame; ſetting aſide a few particularities in the language of the Lacedæmonians; as is ſhewn by Rulandus, in his excellent treatiſe, De Lingua Græca, ejuſque Dialectis, lib. v.

Beſide the authors already mentioned to have written in the *Doric* dialect, we might add Archytas of Tarentum, Bion, Callinus, Simonides, Bacchylides, Cypſelas, Alcman, and Sophron.

Moſt of the medals of the cities of Græcia Magna, and Sicily, ſavour of the *Doric* dialect in their inſcriptions: witneſs, ΑΜΒΡΑΚΙΩΤΑΝ, ΑΠΟΛΛΩΝΙΑΤΑΝ, ΑΧΕΡΟΝΤΑΝ, ΑΧΥΡΙΤΑΝ, ΗΡΑΧΛΕΩΤΑΝ, ΤΡΑΧΙΝΙΩΝ, ΘΕΡΜΙΤΑΝ, ΚΑΥΛΟΝΙΑΤΑΝ, ΚΟΠΙΑΤΑΝ, ΤΑΥΡΟΜΕΝΙΤΑΝ, &c. Which ſhews the countries wherein the *Doric* dialect was uſed.

The general rules of this dialect are thus given by the Port-royaliſts:

D'ε Ητα, *d'ω grand, d'ε, d'ο & d'ȣ l'α fait le Dore.*
D'ει fait ητα; *d'ȣ, ω; & d'ω* αυ *fait encore.*
Oſte ι de l'infini: & pour le ſingulier
Se ſert au femenin du nombre plurier.

But they are much better explained in the fourth book of Rulandus; where he even notes the minuter differences of the dialects of Sicily, Crete, Tarentum, Rhodes, Lacedæmon, Laconia, Macedonia, and Theſſaly.

The α abounds every-where in the *Doric*; but this dialect bears ſo near a conformity with the Æolic, that many reckon them but one.

DORIC, in *Muſic.* The *Doric mode* is the firſt of the authentic modes of the ancients.

Its character is, to be ſevere, tempered with gravity and mirth: it is proper for occaſions of religion, and war. It begins with *D, Sol, Re.*

Plato admires the muſic of the *Doric* mode; and judges it proper, to preſerve good manners, as being maſculine. And on this account he allows of it in his Commonwealth.

The ancients had likewiſe their *Sub-Doric* mode, which was one of their plagal modes. Its character was, to be very grave, and ſolemn. It began with *G Ut*, a diateſſaron lower than the *Doric mode.*

DORING, or DARING, among the *Sportſmen*, a term uſed to expreſs a method of taking larks, by means of a CLAP-*net*, and a looking-glaſs. For this ſport there muſt be provided four ſticks, very ſtraight and light, about the bigneſs of a pike; two of theſe are to be four feet nine inches long, and all notched at the edges, or at the end. At one end of each of theſe ſticks there is to be faſtened another of about a foot long on one ſide; and on the other ſide a ſmall wooden peg, about three inches long. Then four more ſticks are to be prepared, each of one foot length; and each of theſe muſt have a cord of nine foot long faſtened to it at the end. Every one ſhould have a buckle for the commodious faſtening on to the reſpective ſticks when the net is to be ſpread.

A cord muſt alſo be provided, which muſt have two branches. The one muſt be nine foot and a half, and the other ten foot long, with a buckle at the end of each; the reſt or body of the cord muſt be twenty-four yards long. All theſe cords, as well the long ones as thoſe about the ſticks, muſt be well twiſted, and of the bigneſs of one's little finger. The next thing to be provided is a ſtaff of four foot long, pointed at one end, and with a ball of wood on the other, for carrying theſe conveniencies in a ſack or wallet.

There ſhould alſo be carried, on this occaſion, a ſpade to level the ground where there may be any little irregularities; and two ſmall rods, each eighteen inches long, and having a ſmall rod, fixed with a packthread at the larger end of the other. To theſe are to be tied ſome packthread loops, which are to faſten the legs of ſome larks; and there are to be reels to theſe, that theſe birds may fly a little way up and down.

When all this is done, the looking-glaſs is to be prepared in the following manner. Take a piece of wood, about an inch and a half thick, and cut it in form of a bow, ſo that there may be about nine inches ſpace between the two ends; and let it have its full thickneſs at the bottom, that it may receive into it a falſe piece; in the five corners of which, there are to be let in five pieces of looking-glaſs. Theſe are to be ſo fixed, that they may part their light upwards, and the whole machine is to be ſupported on a moveable pin, with the end of a long line fixed to it; and made in the manner of the children's play-thing of an apple and a plum-ſtone; ſo that the other end of the cord being carried through a hedge, the barely pulling it may ſet the whole machine of the glaſſes a-turning. This and the other contrivances are to be placed in the middle between the two nets. The larks fixed to the place, and termed calls, and the glittering of the looking-glaſſes, as they twirl round in the ſun, invite the other larks down; and the cord that communicates with the nets, and goes through the hedge, gives the perſon behind an opportunity of pulling up the nets, ſo as to meet over the whole, and take every thing that is between them. The places where this ſort of ſporting ſucceeds beſt are open fields, remote from any trees or hedges, except one by way of ſhelter for the ſportſman, and the wind ſhould always be either in the front or back; for if it blows ſideways, it prevents the playing of the nets.

DORMANT, from *dormio, I ſleep*, is the herald's term for the poſture of a lion, or other beaſt, borne as ſleeping in a coat of arms.

DORMANT-*tree*, in *Building*, a name the workmen frequently give to a great beam lying acroſs the houſe; uſually called a *ſummer*.

DORMANT, or DORMAR-*tyles*. See TYLE.

DORMER, or DORMANT, in *Architecture*, denotes a window made in the roof of an houſe, or above the entablature; being raiſed upon the rafters.

The Latins call it *lucerna*, whence the French *lucerne*, and our *luthern*.

There are diverſe kinds; ſquare, round, &c. See LUTHERN.

DORMITORY, a gallery in convents, or religious houſes, divided into ſeveral cells, wherein the religious lodge, or lie, &c.

The word is formed from the Latin *dormitorium*; of *dormire, to ſleep*.

It is deemed a crime in a religious to lie out of the *dormitory*. By chap. xxii. of the rule of St. Benedict, it appears, that the ancient *dormitories* were not divided into cells, but were a kind of large open wards, filled with beds, as in our hoſpitals.

DORMITORY is alſo uſed for a burying-place. See COEMETERIUM.

DORMOUSE, in *Zoology*, the name of a ſpecies of wild field-mice, called alſo the ſleeper, claſſed under the genus of MOUSE, in the order of *glires*, in the Linnæan ſyſtem. It has two cutting-teeth in each jaw; four toes before, and five behind, and naked ears. There are two kinds of this creature, a larger and a ſmaller.

The larger *dormouſe* is the *mus quercinus* of Linnæus, with a long hairy tail, and a black ſpot under the eyes, and nearly of the ſize of the common rat. Its colour is a browniſh grey, like that of the common mouſe, but variegated with ſomewhat of a reddiſh caſt on the ſides, and on the head; the tail is all over hairy, and is terminated by a thick tuft of white fur. The eyes are large and prominent, and of a fine jetty ſhining black. The beard is partly white, and partly black. Round about the eyes, and round the ears, there is a fine blackneſs, the upper part of the tail is alſo black. The ſmell of this creature is the ſame with that of the mouſe, and its dung of the ſame kind. It lives in caverns under-ground, and ſleeps the chief part of the winter. It feeds on vegetables, and is particularly fond of hazel-nuts, which it uſually hoards up. It lodges in holes in the walls, and brings five or ſix young at a time; infeſts gardens; and is very deſtructive to fruits of all kinds.

The ſmaller kind is the *mus avellanarius* of Linnæus, with a long hairy tail, red body, and whitiſh throat, and is much more common than the larger one. This is of the ſize of the common mouſe, and in different countries varies much in colour. In Italy, Mr. Ray obſerved it all over of a reddiſh tawney on the upper part, except the end of the tail, and its upper part white, the tail only excepted; the tail covered with long and thick-ſet hairs, and looking ſomewhat like a ſquirrel's. The eyes are very black and prominent. Thoſe which the ſame author obſerved in England were leſs of the reddiſh hue on the back, and were not white under the belly, but only on the throat; neither had they the white tip at the end of the tail. Poſſibly the Italian and Engliſh may be really diſtinct ſpecies. This creature feeds on nuts, and other ſuch fruits. It retires into caves in winter, rolls itſelf up, and ſleeps much. It lives in thick hedges, forms its neſt of dead leaves, moſs, or graſs, and brings three or four young at a time.

DORONICI *radix*, in the *Materia Medica*, the name of a root kept in the ſhops in ſome places, but at preſent little uſed. There are two kinds of it, the Roman and the German. The Roman is a ſmall yellow root, appearing white when broken, of a ſweet aſtringent taſte, and viſcous in the mouth. The faireſt and plumpeſt roots ſhould be choſen, and ſuch as are freſh dried, or at leaſt not worm-eaten. The root is brought from the Alps, and ſome other places. The plant which produces it is the *doronicum officinarum* of Gerrard, and is kept with us in the gardens of the curious. The leaves are broad, and the flower is yellow, and of the ſize of a marygold.

It is ſaid to be an alexipharmic, but is not uſed in the preſent practice. Authors are indeed not at all agreed about its nature; ſome accounting it a very valuable medicine, and others a poiſon.

The German *doronicum* is a native of the mountainous parts of Germany, and flowers through the ſummer. The leaves and flowers bruiſed, emit a light pungent ſmell, which provokes ſneezing. They yield their virtues by infuſion, both to water, and rectified ſpirit; the roots are more aromatic than the other parts. This plant has been eſteemed in Germany as a ſpecific for diſſolving coagulated blood, occaſioned by falls and bruiſes, and thence has been intitled *lapſorum panacea*. It is likewiſe recommended in various obſtinate chronical diſorders; but its operation is too violent. Lewis's Mat. Med. p. 255. See DURUNEGI.

DORONICUM, in *Botany*. See LEOPARD'*s Bane*.

DORSAL, from *dorſum, back*, any thing that belongs to the back; as *dorſal* GLANDS, *dorſal* NERVES, *dorſal* MUSCLES, &c.

DORSCH, in *Ichthyography*, the common name of ſmall fiſh of the cod-kind, frequent in the Baltic, but more rare in other ſeas, and called by authors the aſellus varius, or ſtriatus. It is remarkable for having the ſmootheſt and ſofteſt ſkin of all the cod-kind; nevertheleſs it has ſmall ſcales. It is uſually caught of a foot, or a little more, in length. It approaches neareſt to the ſpecies called the whiting-pollack, but differs from it in having a beard. It is a fine fiſh for the table.

DORSI *primus*, in *Anatomy*, a name given by Fallopius, and many other authors, to a muſcle, now generally known by the name of *quadratus lumborum*, or the external lumbal muſcle. See QUADRATUS.

DORSI *latiſſimus*, in *Anatomy*. See LATISSIMUS *dorſi*.

DORSI *longiſſimus*, a muſcle common to the loins, and the back. It riſes from the upper part of the os ſacrum, ilium, and firſt vertebra of the loins; and in its beginning is confounded, if not the ſame, with the ſacrolumbalis. It runs upwards along the whole tract of the back, and is connected to every tranſverſe proceſs in its way; ending ſometimes in the firſt vertebra of the back, and ſometimes in the firſt of the neck. See *Tab. Anat.* (*Myol.*) *fig.* 7. *n.* 17. 17.

DORSI, *ſacer*. See SACER.

DORSIFEROUS, or DORSIPAROUS *plants*, from *dorſum*, and *fero, I bear*, are thoſe of the capillary kind; which are without ſtem, and bear their ſeeds on the backſide of their leaves.

DORSTENIA, in *Botany*. See CONTRAYERVA.

DORSUM, in *Anatomy*, is the hind-part of the thorax; commonly tranſlated the *back*.

The *dorſum* includes alſo the loins. See LOINS.

DORSUM *manus*, and *pedis*, is the outſide of the hand and foot; or that part oppoſite to the palm and ſole.

DORSUM *naſi* is the ridge of the noſe, which runs the whole length of that part.

In thoſe we call Roman noſes, the *dorſum* is higher, and more prominent, about the middle, than in the reſt; which part is called the *ſpina*, or *ſpine*.

DORT, *ſynod of*, in *Eccleſiaſtical Hiſtory*, a national ſynod, ſummoned by authority of the ſtates-general, the provinces of Holland, Utrecht, and Overyſſel, excepted, and held at Dort in 1618. The moſt eminent divines of the United Provinces, and deputies from the churches of England, Scotland, Switzerland, Bremen, Heſſia, and the Palatinate, aſſembled on this occaſion, in order to decide the controverſy between the GOMARISTS, or CALVINISTS, and ARMINIANS; the latter of whom were declared corrupters of the true religion. But the authority of this ſynod was far from being univerſally acknowleged either in Holland or in England. The provinces of Frieſland, Zealand, Utrecht, Guelderland, and Groningen, could not be perſuaded to adopt their deciſions; and they were oppoſed by the authority of archbiſhop Laud, and king James I. in England. The reformed churches in France, though at firſt diſpoſed to give a favourable reception to the deciſions of this famous ſynod, in proceſs of time eſpouſed doctrines very different from thoſe of the Gomariſts; and the churches of Brandenburgh and Bremen would not ſuffer their doctors to be tied down to the opinions and tenets of the Dutch divines. The liberty of private judgment, with reſpect to the doctrines of PREDESTINATION and GRACE, which the ſpirit that prevailed among the divines of Dort ſeemed ſo much adapted to diſcourage and ſuppreſs, acquired new vigour, in conſequence of the arbitrary proceedings of this aſſembly. Moſh. Eccl. Hiſt. vol. iv. p. 498, &c. 8vo. ed.

DORTMANNA, in *Botany*. See LOBELIA.

DORYCNIUM, in *Botany*, a name given by ſome to the upright umbellated ſilvery bindweed, called by others *cneorum*. See CONVOLVULUS.

DORYDREPANON. See DREPANON.

DORYPHORI, from δορυ, *ſpear*, and φερω, *I bear*, an appellation given to the life-guard-men of the Roman emperors. They were held in ſuch high eſtimation, as frequently to have the command of armies conferred on them.

It was uſual alſo for chief commanders to have their *doryphori*, or life-guard, to attend them.

DOSE, in *Pharmacy*, &c. the quantity of a medicine to be taken at one time.

The word is formed from the Greek δοσις, which ſignifies gift, or a thing given; from διδωμι, *do, I give*.

A ſecret in phyſic is nothing, unleſs the *doſe* be known.

In authors, and diſpenſatories, that deſcribe the ſame remedy, frequently the *doſe* is different; which occaſions a great difference in its effect.

Dr. Cockburn has given us an eſſay towards determining the *doſes* of purgative medicines, on mechanical principles.

Several attempts have been made to aſcertain the proportional *doſes* for the different ages and conſtitutions of patients; but, after all that can be ſaid on this ſubject, much muſt be left to the judgment of the perſon who adminiſters the medicine. The following general proportions may be obſerved, though by no means intended for exact rules. A patient between 20 and 14 may take two-thirds of the *doſe* ordered for an adult; from 14 to 9, one half; from 9 to 6, one third; from 6 to 4, one fourth; from 4 to 2, one ſixth; from 2 to 1, a tenth; and under one, a twelfth. Buchan's Dom. Med. App. p. 695.

DOSENS, ſtreight cloths made in Devonſhire, and ſo called in Rot. Parl. 2 Hen. V. See DOWSEINES.

DOSITHEANS, DOSITHEI, an ancient ſect among the Samaritans, in the firſt century of the Chriſtian æra.

Mention is made in Origen, Epiphanius, Jerom, and divers other Greek and Latin fathers, of one Doſitheus, the chief of a faction among the Samaritans; but the learned are not at all agreed as to the time wherein he lived. St. Jerom, in his dialogue againſt the Luciferians, places him before our Saviour; wherein he is followed by Druſius, who, in his anſwer to Serrarius, places him about the time of Sennacherib, king of Aſſyria; but Scaliger will have him poſterior to our Saviour's time. And, in effect, Origen intimates him to have been contemporary with the apoſtles; where he obſerves, that he endeavoured to perſuade the Samaritans, that he was the Meſſiah foretold by Moſes.

He had many followers; and his ſect was ſtill ſubſiſting at Alexandria in the time of the patriarch Eulogius; as appears from a decree of that patriarch, publiſhed by Photius. In that decree, Eulogius accuſes Doſitheus of injuriouſly treating the ancient patriarchs and prophets; and attributing to himſelf the ſpirit of prophecy. He makes him contemporary with Simon Magus; and accuſes him of corrupting the Pentateuch in divers places, and of compoſing ſeveral books, directly contrary to the law of God.

Archbiſhop Uſher takes Doſitheus to be the author of all the changes made in the Samaritan Pentateuch; which he argues from the authority of Eulogius; but all we can juſtly gather from the teſtimony of Eulogius is, that Doſitheus corrupted the Samaritans copies ſince uſed by that ſect; but that corruption did not paſs into all the copies of the Samaritan Pentateuch, now in uſe among us, which vary but little from the Jewiſh Pentateuch.

And in this ſenſe we are to underſtand that paſſage in a Samaritan chronicle, where it is ſaid, that Douſis, i. e. Doſitheus, altered ſeveral things in the law of Moſes.

The author of that chronicle, who was a Samaritan by religion, adds, that their high-prieſt ſent ſeveral Samaritans to ſeize Douſis, and his corrupted copy of the Pentateuch. Epiphanius takes him to have been a Jew by birth, and to have abandoned the Jewiſh party for that of the Samaritans. He imagines him likewiſe to have been the author of the ſect of the Sadducees: this is inconſiſtent with his being later than our Saviour. And yet the Jeſuit Serrarius agrees to make Doſitheus the maſter of Sadoc, from whom the Sadducees are derived.

Tertullian, making mention of the ſame Doſitheus, obſerves, that he was the firſt who dared to reject the authority of the prophets, by denying their inſpiration. But he charges that as a crime peculiar to this ſectary, which, in reality, is common to the whole ſect, who have never allowed any but the five books of Moſes for divine.

DOSSER, a ſort of baſket to be carried on the ſhoulders of men. It is uſed in carrying the overplus earth from one part of a fortification to another, where it is wanted. There are likewiſe ſmall carts and wheel-barrows for the ſame uſe.

DOSSIL, in *Surgery*, is lint made into a cylindric form, or reſembling the ſhape of dates or olive-ſtones. *Doſſils* are ſometimes ſecured by a thread tied round their middle. Heiſt. Surgery, Introd. § 53.

DOTAL *goods*. See GOODS.

DOTE *aſſignanda*, in *Law*, a writ that lay for a widow, where it was found by office, that the king's tenant was ſeiſed of tenements in fee, or fee-tail, at the day of his death; and that he held of the king in chief, &c. in which caſe, the widow came into the chancery, and there made oath, that ſhe would not marry without the king's leave. Anno 15 Edw. III. c. 4. And hereupon ſhe had this writ to the eſcheator; for which ſee Reg. of Writs, fol. 297. and Fitz. Nat. Br. fol. 263. Theſe widows are called the king's widows.

DOTE *unde nihil habet*, in *Law*, a writ of dower that lies for the widow againſt the tenant, who bought land of her huſband in his life-time, whereof he was ſolely ſeiſed in fee-ſimple or fee-tail, in ſuch ſort, as the iſſue of them both might have inherited. Fitz. Nat. Br. fol. 147.

DOTE, *recto de*. See RECTO.

DOTIS *admenſuratione*. See ADMEASUREMENT, and Reg. of Writs, fol. 171.

DOTTEREL, in *Zoology*, the name by which the *morinellus* is commonly known in moſt parts of England.

The uſual weight of this bird is a quarter of a pound; but the male is ſmaller than the female, and weighs uſually half an ounce leſs. Its beak is a finger's breadth long. Its head is very beautifully variegated with ſmall black and white ſpots, and has a line of white over the eyes. Its throat is of a greyiſh white, variegated with ſtreaks of brown. Its breaſt, and the under part of its wings, are of a duſky yellow. It is common in Lincolnſhire, and ſome other counties of England; and is a very delicate bird. It is commonly caught in the night. Ray's Ornith. p. 230.

DOTTEREL, *Sea*, *Morinella* TRINGA, in the Linnæan ſyſtem, a name given by authors to the bird, commonly known in England by the name of the *turnſtone*; and called by Turner, *cinclus*. Ray's Ornith. p. 231. See TURNSTONE.

DOTTO, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of the emerald, which was a good green, but not clear or fine.

DOUBLE, in the *Manege*. A horſe is ſaid to *double* his reins, when he leaps ſeveral times together to throw the rider. Thus we ſay, this *ramingue doubles* his reins, and makes *pontlevis*. See RAMINGUE, and PONTLEVIS.

A hare is ſaid to *double* when ſhe keeps the plain fields, and winds about to deceive the hounds. Dict. Ruſt.

DOUBLE *Aſpect*. See ASPECT.

DOUBLE *Baſtion*. See BASTION.

DOUBLE *Caſt*, in *Huſbandry*, a term uſed by the farmers for that method of ſowing which does not diſpenſe the neceſſary quantity of ſeed for a piece of land at one bout, but requires the going over it twice. Plot, Oxf. p. 251.

DOUBLE *Children*, **DOUBLE** *Cats*, **DOUBLE** *Pears*, *&c.* inſtances of, are frequent in the Philoſophical Tranſactions, and elſewhere. See MONSTER.

Sir John Floyer, in the ſame Tranſactions, giving an account of a *double* turkey, furniſhes ſome reflections on the production of *double* animals in general. Two turkeys, he relates, were taken out of an egg of the common ſize, when the reſt were well hatched, which grew together by the fleſh of the breaſt-bone; but, in all other parts, were diſtinct. They ſeemed leſs than the ordinary ſize, as wanting bulk, nutriment, and room for their growth, which latter, too, was apparently the occaſion of their coheſion.

For, having two diſtinct cavities in their bodies, and two hearts, they muſt have ariſen from two cicatriculas; and conſequently, the egg had two yolks, which is no uncommon accident. He had a dried *double* chicken: he aſſures us, that though it had four legs, four wings, &c. it had but one cavity in the body, one heart, and one head; and that this, conſequently, was produced from one cicatricula.

So, Paræus mentions a *double* infant with only one heart: in which caſe, the original, or ſtamen of the infant, was one, and the veſſels regular; only the nerves and arteries towards the extremities, dividing into more branches than ordinary, produced thoſe *double* parts.

The ſame is the caſe in the *double* flowers of plants, occaſioned by the richneſs of the ſoil. So it is in the eggs of quadrupeds, &c.

There are, therefore, two reaſons of duplicity in embryos: 1. The conjoining, or connexion of two perfect animals; and, 2. An extraordinary diviſion, and ramification of the original veſſels, nerves, arteries, &c.

DOUBLE *Concave*, and **DOUBLE** *Convex Glaſs*. See CONCAVE, CONVEX, and GLASS.

DOUBLE *Cone*. See CONE.

DOUBLE *Dancette*, in *Heraldry*. See DANCETTE.

DOUBLE *Deſcant*, in *Muſic*. See DESCANT.

DOUBLE *Horizontal-Dial*, one with a double gnomon, whereof one points out the hour on the outward circle, and the other ſhews the hour on the ſtereographic projection drawn upon it. This dial finds the meridian, hour, the ſun's place, riſing, ſetting, &c. and many other propoſitions of the globe. See DIAL.

DOUBLE *Dieſis*. See DIESIS.

DOUBLE *Eccentricity*. See ECCENTRICITY.

DOUBLE *Feaſt*. See FEAST.

DOUBLE *Fever*. See FEVER.

DOUBLE *Fiché*, or **DOUBLE** *Fichy*, in *Heraldry*. A croſs is denominated *double fiché*, when the extremities are pointed at each angle; that is, when each extremity has two points: in contradiſtinction to *fiché*, where the extremity is ſharpened away to one point.

Gibbon expreſſes it by an octagonal croſs, the two points whereof at each extremity are parted inwards by a ſmall ſpace of a line; by which it is diſtinguiſhed from the croſs of Malta, the two points whereof proceed from a third point, or acute angle between them.

Double *Fine*. See Fine.

Double *Fugue*. See Fugue.

Double *Leaf*, in *Botany*. See Twyblade.

Double *Letter*, in *Grammar*, a letter, which has the force and effect of two; as the Hebrew *Tſade*, which is equivalent to *T* and *S*; or the Greek ξ, or Latin *x*, &c.

Theſe letters are evidently equal to two; when we pronounce the Latin *axis*, or the Engliſh *axillary*, we give the *x* the ſame ſound, as if it were written with two *cc*, *accis*, *accillary*; or a *c* and *s*, *acſis*, *acſillary*.

The Greeks have three, Ζ, Ξ, Ψ; the Latins only two, X and Z; and moſt of the modern languages have the ſame.

Double *Meaſure*. See Measure.

Double *Pedeſtal*. See Pedestal.

Double *Plea*, in *Law*, is where the defendant alleges for himſelf two ſeveral matters in bar of the action; whereof either is ſufficient to effect his deſire, in debarring the plaintiff.

This is not admitted in common law: for which reaſon it is to be well obſerved, when a plea is *double*, and when not: for if a man alleges ſeveral matters, one not at all dependent on another, the plea is accounted *double*; but if they be mutually depending on each other, then it is accounted but *ſingle*.

Double *Plough*. See Plough.

Double *Point*, in the *Higher Geometry*. When all the right lines tending the ſame way with the infinite leg of any curve, do cut it only in one point (as happens in the ordinates of the Carteſian, and the cubical parabola, and in the right lines which are parallel to the abſciſſes of hyperbolas, and parabolas), then you are to conceive, that thoſe right lines paſs through two other points of the curve placed, as it may be ſaid, at an infinite diſtance. Which coincident interſection, whether it be a finite, or an infinite diſtance, Sir Iſaac Newton calls the *double point*.

Double *Poſition*. See Position.

Double *Quarrel*, *Duplex querela*, a complaint made by a clerk, or other, to the archbiſhop of the province, againſt an inferior ordinary, for delaying juſtice in ſome eccleſiaſtical cauſe; as to give ſentence, inſtitute a clerk preſented, or the like.

Its denomination ſeems owing to this, that it is commonly made both againſt the judge, and him at whoſe ſuit juſtice is delayed.

Double *Ratio*. See Duple.

Double *Roads*. See Roads.

Double *Tenaille*. See Tenaille.

Double *Time*. See Time.

Double *Tongue*, in *Botany*, a name ſometimes given to the Butcher's *broom*, and Geranium.

Double *Vault*. See Vault.

Double *Veſſel*, in *Chemiſtry*, is when the neck of one bolthead, or matraſs, is put, and well luted, into the neck of another.

Of theſe there are divers kinds and forms, uſed in the circulation of ſpirits, in order to their being exalted, and refined, as high as can be. See Circulation.

Double *wheeled plough*. See Plough.

Double *winding ſtairs*. See Stairs.

Double *inciſion, grafting by*. See Engrafting.

Double *voucher, recovery with*. See Recovery.

DOUBLED *Column*. See Column.

DOUBLES, in our *Statutes*, ſignify as much as letters patent, being a French word made of the Latin *diploma*. Anno 14 Hen. VI. cap. 6.

DOUBLETS, among *Lapidaries*, denote cryſtals wrought into ſuch a form, and ſo coloured, that the ſurfaces of two pieces thus coloured being laid together, might produce the ſame effect as if the whole ſubſtance of the cryſtal had been tinged. For this purpoſe, two plates of cryſtal muſt be cut in the manner of a brilliant, and fitted ſo exactly, that no diviſion can appear when they are laid together. The upper part muſt be poliſhed ready for ſetting, and then the colours may be put between them by the following proceſs: take of Venice, or Cyprus turpentine, two ſcruples, and add to it one ſcruple of the grains of pure maſtic powdered. Melt them together in a ſilver or braſs ſpoon ladle, or other veſſel, and mix with them any of the coloured ſubſtances propoſed, well powdered. Warm the *doublets* to the ſame degree of heat with the mixture, and paint the upper ſurface of the lower part, and put the upper one inſtantly upon it, preſſing them evenly together. When the cement is quite cold, ſcrape the edges, and let the *doublets* be ſkilfully ſet, by carrying the mounting over the joint, ſo that the two pieces may be well ſecured from ſeparating. The colour of the ruby may be imitated, by mixing a fourth part of carmine with fine crimſon lake; the ſapphire and amethyſt may be counterfeited by mixing very bright Pruſſian blue with a ſmall quantity of crimſon lake; the emerald may be imitated by diſtilled verdigris, with a little powdered aloes; the garnet may be counterfeited by dragon's blood, the brightneſs of which may be improved by the addition of a ſmall quantity of carmine; the yellow topazes may be imitated by mixing the powdered aloes with a little dragon's blood. Glaſs may be alſo prepared in the ſame manner.

Doublets may be eaſily diſtinguiſhed, by holding them betwixt the eye and the light, in ſuch poſition, that the light may paſs through the upper part and corner of the ſtone; which will then ſhew ſuch parts to be white, and that there is no colour in the body of the ſtone. Handmaid to the Arts, vol. ii. p. 328, &c.

DOUBLINGS, in *Heraldry*, the linings of robes, or mantles of ſtate; or of the mantlings in atchievements.

Doubling, in a *Military Senſe*, is the putting two ranks, or files of ſoldiers, into one.

When the word of command is, *double your ranks*, then the ſecond, fourth, and ſixth ranks are to march up into the firſt, third, and fifth; ſo that of ſix ranks they make but three, leaving double the interval there was between them before. But it is not ſo when they *double the half files*, becauſe then three ranks ſtand together, and the three others come up to *double* them; that is, the firſt, ſecond, and third, are *doubled* by the fourth, fifth, and ſixth; or on the contrary.

Double your files, directs each to march to that next to it on the right or left, according to the word of command; in which caſe the ſix ranks are turned into twelve, the men ſtanding twelve deep; the diſtance between the files being now *double* of what it was before.

Doubling *a Cape*, or *Point*, in *Navigation*, ſignifies the coming up with it, paſſing by it, and leaving it behind the ſhip.

The Portugueſe pretend to be the firſt that ever *doubled* the Cape of Good Hope, under their admiral Vaſquez de Gama; but we have accounts in hiſtory, particularly in Herodotus, of the Egyptians, Carthaginians, &c. having done the ſame long before them.

Doubling-*nails*, among *Shipwrights*, are the nails commonly uſed to faſten the lining of the gun-ports, &c.

Doubling-*upon*, in a *Naval Engagement*, is the art of encloſing any part of a hoſtile fleet between two fires, or of cannonading it on both ſides. It is uſually performed by the van or rear of that fleet which is ſuperior in number, taking the advantage of the wind; or of its ſituation, and tacking, or veering round the van or rear of the enemy, who are thereby expoſed to great danger, and can ſcarcely avoid being thrown into a general confuſion.

DOUBLON, Dubloon, a Spaniſh and Portugueſe coin, being the *double* of a piſtole. See Pistole and Coin.

There are alſo *double dubloons* formerly current among us for three pounds twelve ſhillings.

DOUBTING, the act of with-holding a full aſſent from any propoſition; on ſuſpicion, that we are not thoroughly appriſed of the merits thereof; or from our not being able peremptorily to decide between the reaſons for, and againſt it.

The Sceptics and Academics *doubt* of every thing; the character of their philoſophy is, not to allow any thing for truth; but to with-hold the aſſent, and keep the mind free, and in ſuſpenſe. See Sceptics.

The Epicureans truſt their ſenſes, and *doubt* of their reaſon: their leading principle is, that our ſenſes always tell truth; that they are the firſt and only criterions of truth; and that if you go ever ſo little from them, you come within the proper province of *doubting*.

The Carteſians, on the contrary, of all things bid us *doubt* our ſenſes; they are perpetually inculcating the deceitfulneſs of our ſenſes; and tell us, that we are to *doubt* of every one of their reports, till they have been examined, and confirmed by reaſon. See Cartesians.

Doubting, in *Rhetoric*, a figure wherein the orator appears ſome time fluctuating, and undetermined what to do, or ſay. See Aporia.

Tacitus furniſhes us with an inſtance of *doubting*, almoſt to a degree of diſtraction, in thoſe words of Tiberius, written to the ſenate: *Quid ſcribam, P. S. aut quomodo ſcribam, aut quid omnino non ſcribam hoc tempore, dii me deæque pejus perdant quam perire quotidie ſentio, ſi ſcio.*

DOUCETS, or Doulcets, among *Sportſmen*, denote the teſtes of a deer or ſtag. Dict. Ruſt.

DOUCINE, in *Architecture*, a moulding, or ornament, on the higheſt part of the corniche, in form of a wave, half convex, and half concave. See *Tab. Archit. fig.* 8.

The *doucine* is the ſame with a *cymatium*, or *gula*. See CYMATIUM, and GULA *recta*, and *inverſa*.

DOVE, in *Ornithology*. See PIGEON.

DOVE, *ring*, in *Ornithology*, the name of a bird of the pigeon kind, called by Aldrovand, and other authors, the *palumbus torquatus*, and by the Greeks *phaſſa*. Its beak is yellow, its feet naked and red, its legs feathered almoſt down to the feet. The head, back, and coverts of the wings, are of a bluiſh aſh-colour; the lower ſide of the neck and breaſt are of a purpliſh red, daſhed with aſh-colour. The upper part of its neck has a very regular and beautiful white circle, from which the bird has its name; and its whole neck, above and below this, is beautifully variegated with changes of colours, according as it is oppoſed to the light. The belly is of a dirty white, the greater quill feathers are duſky, the reſt aſh-coloured; underneath the baſtard wing is a white ſtroke, pointing downwards. It is the largeſt pigeon we have, and may be diſtinguiſhed by its ſize. It ſeldom flies ſingle, but in large flocks, and builds on trees; its food is ivy-berries, and other vegetable matter. They begin to cooe in March, when they pair, and leave off in the beginning of winter. See *Tab. of Birds*, N° 13.

DOVE, *turtle*, *Turtur*, in *Ornithology*, a very beautiful little bird of the pigeon kind. The head, neck, and back, are of the bluiſh grey colour of the common pigeon, with ſome mixture of a reddiſh brown near the rump, and at the bottom of the neck. Its belly is white; but its breaſt and throat of a fine bright purple, having the verge of each feather yellow; and the ſides of the neck are variegated with a ſort of ringlet of beautiful white feathers, with black baſes. The tail is about three inches and a half long, having the two middlemoſt feathers of a duſky brown, and the others black, with white tips; and the end and exterior ſide of the outmoſt feathers wholly white. The weight of this bird is about four ounces. It feeds on hemp-ſeed, and other vegetable matters. It is remarkably ſhy, and breeds in thick woods, generally of oak.

DOVE, *ſea-turtle*, or *Greenland-dove*, in *Ornithology*, is a ſpecies of the DIVER, or the COLYMBUS *grylle* of Linnæus. The bill is an inch and a half long; ſtrait, ſlender, and black; on each wing is a large bed of white, which in young birds is ſpotted; the tips of the leſſer quill-feathers, and the inner coverts of the wings, are white; except theſe the whole plumage is black. In winter it is ſaid to change to white; and a variety, ſpotted with black and white, is not uncommon in Scotland. The tail conſiſts of twelve feathers; and the legs are red. Theſe birds always keep at ſea, except in breeding time, and they are ſhot with great difficulty, becauſe they dive at the flaſh of the pan. The Welch call this bird *caſganllongwr*, or the ſailor's hatred, from a notion that its appearance forebodes a ſtorm. It viſits St. Kilda's iſle in March, makes its neſt far underground, and lays a grey egg, or, as ſome ſay, a whitiſh egg, ſpotted with ruſt, and ſpeckled with aſh-colour.

DOVE'*s foot*, in *Botany*. See GERANIUM.

DOVE-*tail*, in *Carpentry*, the ſtrongeſt of all the kinds of jointings; wherein the tenon, or piece of wood that enters the other, goes widening to the extreme, and ſo cannot be drawn out again, becauſe the tip, or extreme, is bigger than the hole.

It has its denomination from the reſemblance the tenon bears to a *dove's* tail. The French call it *queue d'aronde*, *ſwallow's tail*; which name the Engliſh themſelves alſo retain in fortification.

DOVELLA, in *Ichthyology*, a name given by the Maſſilians to the fiſh called the donzellina by the Italians: it is the julia, or julis, of authors; and, according to the Artedian ſyſtem, it is a ſpecies of the labrus. That author diſtinguiſhes it by the name of the labrus of variegated colours, with two large teeth in the upper jaw. See LABRUS.

DOULEIA, Δουλεια, among the Athenians, a kind of puniſhment, by which the criminal was reduced into the condition of a ſlave. It was never inflicted upon any but the ατιμοι, *ſojourners*, and *freed ſervants*. Potter's Archæol. Græc. lib. i. cap. 25. tom. i. p. 130.

To DOUSE, in *Sea Language*, is to lower ſuddenly, or ſlacken; and it is applied to a ſail in a ſquall of wind, an extended hawſer, &c.

DOWAGER, DOTISSA (q. d. a widow *endowed*, or that has a jointure), a title, or addition, applied to the widows of princes, dukes, earls, and perſons of high rank only.

DOWAGER, *queen*. See QUEEN.

DOWER, DOTARIUM, DOARIUM, or DOS, a portion of lands, or tenements, which a widow enjoys for term of life, from her huſband, in caſe ſhe ſurvives him; and which, at her death, deſcends to their children. But ſhe muſt have been the wife of the party at the time of his deceaſe; or not divorced *a vinculo matrimonii*: nor, if ſhe has eloped from her huſband, and lives with an adulterer, ſhall ſhe be entitled to *dower*, unleſs her huſband be voluntarily reconciled to her. The widows of traitors are alſo barred of their *dower* by 5 and 6 Ed. VI. cap. 11. but not the widows of felons. An alien cannot be endowed, unleſs ſhe be queen-conſort. And if a woman levies a fine with her huſband, or if a common recovery be had with the huſband and wife of the huſband's lands, ſhe is barred of her *dower*. A widow, clear of theſe impediments, is by law entitled to be endowed of all lands and tenements, of which her huſband was ſeiſed in fee-ſimple or fee-tail at any time during the coverture; and of which any iſſue ſhe might have had, might by poſſibility have been heir. See JOINTURE.

Our law-books diſtinguiſh five kinds of *dower*; viz. *dower per legem communem*; *per conſuetudinem*; *ex aſſenſu patris*; *ad oſtium eccleſiæ*; and *de la plus belle*. But the two firſt are now only in uſe.

DOWER *by the common law* is a third part of ſuch lands as the huſband was ſole ſeiſed of in fee during the marriage; which the wife is to enjoy during her life, and for which there lies a *writ of dower*.

DOWER *by cuſtom* gives the wife, in ſome places, half her huſband's lands, ſo long as ſhe lives ſingle, as in gavelkind. And as cuſtom may enlarge, ſo that the widow may have the whole during life, which is called her *free bench*, ſo may it abridge, *dower*, and reſtrain it to a fourth part.

In DOWER *ex aſſenſu patris*, and *ad oſtium eccleſiæ*, the wife may have ſo much *dower* as ſhall be aſſigned, or agreed upon; but it ought not to exceed the third part of the huſband's lands. If this be done before marriage, it is called a *jointure*.

DOWER *de la plus belle*. By this ſhe is *endowed* with the faireſt and beſt part of her huſband's eſtate.

DOWER, *admeaſurement of*. See ADMEASUREMENT.

DOWER, *aſſignment of*. See ASSIGNMENT.

DOWER, *tenant in*. See TENANT.

DOWLE and DEAL, in our *Old Writers*, are uſed to ſignify a diviſion. The word comes from the Saxon *dal*, i. e. *diviſio*, and that from *dælan*, *dividere*; whence our Engliſh word *dealing* is formed.

In this ſenſe it is, that the ſtones laid to the boundaries of lands are called *dowleſtones*.

DOWN, in *Natural Hiſtory*, denotes the firſt feathers of geeſe, with which beds and pillows are ſtuffed. The cottony ſubſtance on the tops of thiſtles, &c. is alſo thus called.

DOWNS, a bank, or elevation, of ſand, which the ſea gathers and forms along its ſhores; and which ſerves it as a barrier.

The word is formed from the French *dune*, of the Celtic *dum*, a *mountain*. Charles de Viſch. in his Compend. Chronolog. Exord. & Progreſſ. Abbat. Clariſſ. B. Mariæ, de Dunis, ſays, *Vallem reperit arenarum collibus (quos incolæ* Duynen *vocant) undique cinctam.*

DOWNS are particularly uſed for a famous road for ſhips, along the eaſtern coaſt of the county of Kent; from Dover to the North Foreland.

This road has excellent anchorage, and is well defended by the caſtles of Sandwich, Deal, and Dover.

Here it is the Engliſh fleets uſually meet

DOWNY, ſomething partaking of the nature of *down*. Thus ſome leaves and fruit, &c. are ſaid to be covered with a *downy* matter.

DOWRY, DOS, is properly the money, or fortune, which the wife brings her huſband in marriage, to have the uſe of it, during her marriage, towards ſupporting the charge thereof.

It is otherwiſe called *maritagium*, *marriage goods*; by the Romans *dos*; and it differs from *dower*. See DOWER.

Among the Germans, it was anciently cuſtomary for the huſband to bring a *dowry* to his wife. *Romanos non in uſu fuit uxoribus* dotes *retribuere*; *ideo verbo genuino carent quo hoc dignoſcitur*; *& rem ipſam in Germanorum moribus miratur Tacitus*: dotem, *inquit*, *non uxor marito*, *ſed uxori maritus affert*. Spelman.

DOWRY is alſo uſed, in a monaſtic ſenſe, for a ſum of money given along with a maid, upon entering her in ſome religious order.

In France, the *dowry* of perſons entering a monaſtery, to make profeſſion of a religious life, is limited by law. That, e. gr. given upon entering a monaſtery of Carmelites, Urſelines, and others, not regularly founded, but eſtabliſhed ſince the year 1600, by letters patent, muſt not exceed the ſum of 8000 livres, in towns where parliaments are held; nor 6000, in other places.

DOWSEINES, a ſort of kerſeys made in Devonſhire, in length twelve yards; whence alſo their name, which is otherwiſe writ *doſens*, *dozens*, or *dozeins*.

DOXOLOGY, an appellation given by the Greeks to the fourteenth verſe of the ſecond chapter of St. Luke, *Glory be to God in the higheſt*, &c. becauſe beginning with the Greek word δοξα, *glory*.

This they diſtinguiſh by the name of *great doxology*; and the *Gloria Patria*, *Glory be to the Father*, they call the *leſs doxology*, as beginning with the ſame word δοξα.

Philoſtorgius, lib. iii. n. 13. gives three formulas of the *leſſer doxology*. The firſt is, *Glory be to the Father, and to the Son, and to the Holy Ghoſt*; the ſecond, *Glory be to the Father, by the Son, in the Holy Ghoſt*; and the third, *Glory be to the Father, in the Son, and the Holy Ghoſt*.

Sozomen, and Nicephorus, give a fourth; viz. *Glory be to the Father, and the Son, in the Holy Ghoſt*.

The firſt of theſe *doxologies* is that in common uſe throughout the weſtern church. It was firſt inſtituted about the year 350, by the Catholics of Antioch, then called *Euſtathians*.

The three others were compoſed by the Arians: the ſecond was that of Eunomius, and Eudoxus, and which was approved by Philoſtorgius. The three were all made about the year 341, in the council of Antioch, when they firſt began to diſagree among themſelves. Philoſtorgius aſſures us, that Flavian, afterward patriarch of Antioch, was the author of the firſt, or *catholic doxology*; but Sozomen, and Theodoret, ſay nothing of it; and Philoſtorgius's ſingle authority is hardly ſufficient.

There were anciently very great diſputes, and principally at Antioch, as to the form of *doxology*; that moſtly uſed among the orthodox was, the ſame as ſtill obtains; the reſt were affected by the Arians, and other Antitrinitarians; yet St. Baſil, in his book on the Holy Spirit, defends the ſecond as orthodox, and legitimate; and it is certainly more agreeable to Scripture authority; to which we muſt ultimately appeal, as the only infallible rule of our devotion, as well as of our conduct: and it has been urged, that no inſtance of the former *doxology* occurs in the New Teſtament.

Some authors write hymnology as ſynonymous with *doxology*; but there is a difference: hymnology is applied to Pſalms, or the recitation of Pſalms; and *doxology* only to the little verſe, *Glory be to the Father*, &c. repeated at the end of each Pſalm.

DOZEIN, *Decenna*. In the ſtatute for view of frank-pledge, made 18 Edw. II. one of the articles for ſtewards in their leets to enquire of, is, if all the *dozeins* be in the aſſize of our lord the king, and which not, and who received them. Art. 3. See DECINERS.

DOZEIN is alſo uſed for a ſort of Devonſhire kerſeys. Anno 5 and 6 Edw. VI. cap. 6. See DOWSEINES.

DOZELLINA, in *Zoology*, a name by which ſome authors have called the muſtela of the common ſpecies, which we in Engliſh term the *ſea-loche*, and *whiſtle-fiſh*.

DRABA, in *Botany*, *Whitlow-graſs*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe: the flower hath four petals, in form of a croſs, and ſix ſtamina, four of which are as long as the empalement. In the center is ſituated a bifid germen, which afterward becomes an oblong, oval, entire pod, with two cells, ſeparated by the ſwelling ſtyle, which is oblique. The valves are parallel to the middle, and open oblique, each cell containing a ſingle ſeed. There are ſix ſpecies. See DITTANDER.

DRABLER, in the *Sea-Language*, a ſmall ſail in a ſhip, which is the ſame to a bonnet, that a bonnet is to a courſe, and is only uſed when the courſe and bonnet are too ſhoal to clothe the maſt. See BONNET and COURSE.

DRABS, in the Engliſh *Salt-Works*, a name given to a ſort of wooden caſes into which the ſalt is put, as ſoon as it is taken out of the boiling-pan. Theſe are partitions like ſtalls made for horſes; they are lined on three ſides and at the bottom with boards, and at the front have a ſliding-board to put in or take out occaſionally. Their bottoms are made ſhelving, being higheſt at the backſide, and gradually inclining forwards; by which means the ſaline liquor that remains mixed with the ſalt eaſily drains out from it, and the ſalt in three or four days becomes ſufficiently dry, and is then taken out and laid up in large heaps for ſale. In ſome places they uſe cribs inſtead of the *drabs*. See CRIBS.

DRACÆNA, in *Botany*, a genus of the *hexandria monogynia* claſs: the corolla is erect, and divided into ſix ſegments; the filaments are thickeſt in the middle, and the fruit is a three-celled berry, containing a ſingle ſeed.

DRACÆNA, in *Zoology*, is alſo the name of a ſpecies of American LIZARD.

DRACHM, Δραχμη, an ancient ſilver coin, uſed among the Greeks. See COIN.

This they divided into ſix OBOLI; and their larger coins above the *drachm* were the *didrachm*, *tridrachm*, and *tetradrachm*, or *ſtater*. The *drachm* was likewiſe a weight as well as a piece of money; and their *mina* contained a hundred *drachmæ*, both as a ſum and a weight; and their talent ſixty *minæ*, or ſix thouſand *drachmæ*, both by weight and tale; and this method of reckoning was common to all Greece; ſo that if the *drachma* of one city differed from that of another, their talents differed in the ſame proportion. The Attic *drachma* has been ſuppoſed by moſt authors, before Greaves, who firſt ſuggeſted the contrary, to have been the ſame, among the Greeks, with the DENARIUS, among the Romans; which was equivalent to four ſeſterces. Of this opinion is Budæus, De Aſſe; who confirms it from the authorities of Pliny, Plutarch, Strabo, and Valerius Maximus, with whom δραχμη is ſynonymous with *denarius*. Plin. Nat. Hiſt. lib. xxi. fin.

A. Gellius, who reſided long at Athens, and could not be ignorant of the value of the current money of that city, ſays, that ten thouſand *drachms* were in Roman money ſo many *denarii*. Lib. i. cap. 8. See alſo Val. Maxim. lib. vii. cap. 6. and Strabo Geog. lib. v. the former of whom writes, that a certain commodity was ſold for two hundred *denarii*; and the latter, in ſpeaking of the ſame thing, ſays, that it was bought for two hundred *drachmæ*. But this is no ſtrong conviction, that the two coins were preciſely of the ſame value; thoſe authors, not treating expreſly of coins, might eaſily render the one for the other, provided there were no conſiderable difference between them. Greaves's Miſc. Works, by Birch, vol. i. p. 287, &c. 8vo.

Scaliger, in his diſſertation, De Re Nummaria, does not ſay abſolutely that the *denarius* and *drachma* were the ſame thing; but from a Greek paſſage in an ancient law, c. xxvi. *Mundati*, where the *drachma* is ſaid to be compoſed of ſix oboli, he concludes, that in the age of Severus, at leaſt, they were the ſame. But Agricola, De Menſ. & Ponder. lib. xiv. ſhews, from Pliny, Celſus, and Scribonius Largus, that the denarius contained only ſeven ounces; and from Livy, Appian, Cleopatra, &c. that the *drachma* contained eight; and maintains, that when ſome Greek authors ſpeak of the ounce as only containing ſeven *drachms*, that they do not mean the Attic *drachm*, but the Roman denarius, which Greek authors render by δραχμη. We learn from Galen, that the writers on weights and meaſures differed in the number of *drachms* or *denarii*, which they aſſigned to an ounce; moſt of them making it to contain ſeven and a half, ſome but ſeven, and others eight. De Med. Comp. ſec. Genera, lib. iii. cap. 3.

Gronovius agrees with Agricola, that the *drachma* was the eighth part of an ounce; and the opinion is confirmed by Iſidore, lib. xiv. cap. 24. by Fannius, who ſays as much in expreſs terms, and by Voluſius, who divides the ounce into twenty-four *ſcriptuli*, or ſcruples, of which the *drachm* comprehended three.

It is probable, that, when the Romans became maſters of Greece and Aſia, the Athenians might find it their intereſt to lower their *drachm* to the weight of the denarius, long before they were reduced into the form of a Roman province by Veſpaſian. When they did this is uncertain; but it appears by the treaty between the Romans and Antiochus, recorded by Polybius, Excerp. Leg. ſect. 35. and by Livy, lib. xxxviii. cap. 38. which ſtates the Euboic TALENT at eighty Roman pounds; and ſuppoſing this to be equal to the Attic, and to contain ſix thouſand Attic *drachms*, and eighty Roman pounds to contain ſix thouſand ſeven hundred and twenty *denarii*, that the weight of the Attic *drachm* muſt have been to that of the denarius as 6720 to 6000; and this proportion is confirmed by an anonymous Greek fragment, publiſhed by Montfaucon, which makes a hundred Attic *drachmæ* equal to a hundred and twelve *denarii*. Anal. Græc. p. 393. Pariſ. 1688.

Greaves concludes, after weighing a number of Attic *tetradrachms*, and ſtating the weight of the *tetradrachm* at two hundred and ſixty-eight grains, that the Attic *drachm* was ſixty-ſeven grains. J. Caſpar Eiſenſchmid, in his book De Pond. & Menſ. Vet. from an ancient *tetradrachm* weighing three hundred and thirty-three Paris grains, and by eſtimating the proportion between the Roman pound and Attic talent, mentioned by Livy, lib. xxxviii. makes the *drachm* $83\frac{1}{4}$ Paris grains, or almoſt $68\frac{1}{10}$ troy.

Mr. Raper has eſtimated the weight of the Attic *drachm*, by comparing it with the gold coins of Philip and Alexander, which were probably formed upon that ſtandard. They both coined gold of 4, 2, 1, and $\frac{1}{2}$ an Attic *drachm*; and from a mean of twenty-one Philippics, which were equivalent to two *drachmæ*, preſerved in the Britiſh Muſeum, and in private collections, or mentioned by other writers, he infers, that the ſtandard weight of the Philippic was not leſs than 133 troy grains; which agrees very nearly with the weights of ſome preſerved ſilver *drachms* of Philip and Alexander, and with the mean weight of ſeven perfect ſilver *tetradrachms* of Alexander, which give a *didrachm* a little more than 132½ grains. He obſerves, that the gold Philippics, both of Alexander and his father, are ſo correctly ſized, and ſo perfect, that the mean *didrachm*, derived from them of 133 troy grains, muſt be very near its juſt weight; and its half, 66½ grains, that of the Attic *drachm*. Then, for the value of it, as ſixty-two Engliſh ſhillings are coined out of eleven ounces two penny-weight troy, of fine ſilver, and eighteen penny-weight of allay, the troy grain of fine ſilver is worth $\frac{62}{111}$ths of a farthing; and ſince the Greeks and Romans uſed no allay in their money, but eſteemed what they coined to be fine ſilver, the Attic *drachm* of 66½ grains will be found worth a little more than 9¼*d.* or, for the eaſe of reduction,

	£	s.	d.
The Attic *drachm* may be ſtated at	0	0	9.286
The *obolus* a little more than	0	0	1½
The *chalcus* about —	0	0	0 $\frac{7}{9}$ of a farthing
The *mina* —	3	17	4.6 or £3.869
The *talent* —	232	3	0 or £232.15

Phil. Tranſ. vol. lxi. part ii. art. 48.

Others eſtimating the ancient Roman ounce equal to the modern one, or to 536 French grains, and the Attic *drachma* at 67 grains, and ſuppoſing the ſilver at Athens of the ſame fineneſs with ours, make it equal to 7 pence ¾ ſterling. See COIN.

DRACHM, or **DRAM**, is alſo a weight uſed by our phyſicians; containing juſt ſixty grains, or three ſcruples, or the eighth part of an ounce troy, and the ſixteenth of an ounce avoirdupois.

DRACHM was likewiſe an ancient Jewiſh money; having on one ſide a harp, and on the other ſide a bunch of grapes.

This coin was a half ſhekel; and was ſo called by the Jews. It is only the Greeks called it δραχμη. It was equal to two Attic *drachmæ*. See SHEKEL.

DRACO, DRAGON, in *Aſtronomy*, a conſtellation of the northern hemiſphere; whoſe ſtars, according to Ptolemy, are 31; according to Tycho, 32; according to Hevelius, 40; according to Bayer, 33; and according to Mr. Flamſteed, 80. The longitudes, latitudes, magnitudes, &c. whereof, are as follows.

Names and ſituations of the ſtars.	Bayer's Cha.	Signs	Longitud.			Latitude N.			Magnitude
			°	′	″	°	′	″	
Laſt of the tail	λ	♌	5	58	30	57	13	3	3.4
			6	28	20	57	30	30	6
			10	35	20	56	6	30	6
			12	32	43	61	9	40	6
Next the tail	κ		11	51	40	61	43	20	3
5.									
			11	35	8	61	57	20	6
			18	32	2	61	4	10	6
			21	45	0	60	53	45	6
Preced. of the antepenult. of the tail	i	♍	20	22	48	61	57	15	6
			0	31	5	65	21	38	5
10.									
Antepenult. of the tail	α		3	2	43	66	20	52	2
Preced. in the laſt bend	ι	♎	0	33	5	71	4	4	3
	θ		12	24	12	74	26	0	3
South of the 2 following the laſt bend	η		9	54	0	78	26	30	3
Northern	A	♍	0	48	52	81	0	5	4
15.									
		♏	8	36	47	72	59	16	5
Laſt of thoſe following the laſt bend	g	♍	8	35	32	73	1	0	5
			29	45	58	81	37	10	5
Middle in the 3d bend	b	♎	0	7	47	83	17	43	5
			1	3	28	83	18	40	6
20.									
In the tongue	μ	♏	20	27	45	76	17	10	5.4
Subſequent in the third bend	ζ	♍	28	39	5	84	47	0	2
Over the eye	β	♐	7	45	46	75	19	55	2.3
In the mouth; double	1.ν		6	1	18	78	11	50	4
	2.ν		6	6	33	78	11	18	4
25.									
		♏	22	17	40	84	34	30	6
1ſt of the 2 to the weſt in the preceding △	f	♌	21	59	50	86	50	45	5
Subſequent to the next to the pole of the ecliptic	ω	♋	8	13	33	86	52	10	4
		♐	9	5	40	81	58	33	6
			19	24	36	74	11	30	6
30.									
Next to the 3 in the preced. triangle	ψ	♋	9	1	50	84	7	40	7
At the knee	ξ	♐	20	29	20	80	19	40	3
Above the head	γ	♊	23	42	48	74	58	20	2
			29	20	58	84	30	10	4.5
	2.ψ		29	11	0	79	27	50	6
35.									
		♒	1	3	10	87	27	10	6
		♉	24	18	20	87	18	50	6
North. of the 3 in the bend of the knee	b	♑	20	33	48	87	17	55	6
			18	1	44	81	48	40	5
		♊	25	44	5	76	31	50	5
40.									
		♓	25	45	38	76	28	0	5
South. of the next 2 in the preced. △	φ		8	24	27	87	14	20	6
		♊	6	56	28	84	50	40	5
Northern	χ		12	16	57	83	31	20	4
Middle of the 3 in the bend of the neck	d		12	24	56	79	44	44	5
45.									
Southern	c	♑	25	43	36	77	54	0	5
Subſequent to theſe to the eaſt	o	♒	10	43	30	80	50	0	4
			9	26	5	79	7	0	6
			6	40	30	76	57	40	6
			8	27	2	80	24	25	4.5
50.									
Preced. of the 3 in the △ in the flexure, &c.	υ		4	28	0	74	42	0	5.6
		♉	16	8	5	83	11	30	4.5
		♒	15	12	6	77	13	48	5
			18	44	27	77	44	20	5
		♑	29	26	6	82	57	20	6
55.									
		♊	7	7	25	79	0	6	6
N. in the □ againſt the 1ſt bend, &c.	δ	♈	13	6	3	82	52	50	3.4
Southern	π	♓	29	22	35	81	48	30	4
		♊	5	7	40	78	39	16	6
North. of the 2 in the △, &c.	τ	♉	20	44	10	80	40	3	4.5
60.									
South.	σ	♈	27	9	35	80	55	14	4.5
		♉	13	37	30	79	4	50	6
N. of thoſe following in the □	ε	♈	28	31	40	79	27	40	5.6
			2	7	18	77	28	10	5.6
	e		1	25	10	77	19	10	6.5
65.									
		♓	22	0	8	75	47	46	6
South.	s	♈	16	13	43	78	7	40	5
		♓	23	42	52	75	15	20	6
		♉	25	23	29	76	36	10	6
		♈	4	46	8	76	16	45	6
70.									
		♓	26	12	33	74	33	10	6
			27	0	53	74	13	40	6
		♉	16	38	8	75	18	45	5.6
		♊	7	5	0	72	47	20	6
			8	6	48	72	36	50	6
75.									
			10	6	20	71	33	46	5
		♉	25	48	54	72	35	20	5
			7	16	6	70	22	7	5
			11	39	27	69	55	0	7
80.			8	7	10	68	18	20	6

DRACO, DRAGON, in *Natural Hiſtory*, a fabulous animal, which has been repreſented under the form of a ſerpent with wings and feet. The ancients have given various deſcriptions of this animal, with reſpect to its ſize, ſhape, and colour, and have attributed many ill qualities to it, without foundation. Their accounts of it are very various and contradictory. They were probably led to the idea they formed of it by ſome extraordinary animals of the genus of ſerpents, lizards, or crocodiles, &c. which were ſingular, either on account of their figure or ſize. See DRACO *Volans*.

DRACO, or **DRAGON**, in *Mythology*, is the ſymbol of Janus, and alſo of Bacchus Beſſarus. *Dragons* are likewiſe employed to draw the chariot of Ceres; and a *dragon* keeps the garden of the Heſperides.

DRACO *Marinus*, in *Zoology*, the name of a fiſh of the TRACHINUS, or COTTUS kind, known in England by the name of the weever. It is a very long-bodied fiſh, ſomewhat flat, with a crooked belly, and ſtrait back; the mouth is large, and the lower-jaw is longer than the upper. It has two fins on the back; the foremoſt of theſe is very ſhort, and the other very long. The foremoſt of theſe fins has ſeveral prickly points, tinged with black, and theſe are ſaid to inflict a ſort of poiſonous wound; the ſecond conſiſts of ſeveral ſoft rays; it commences juſt at the end of the firſt, and continues almoſt to the tail; the pectoral fins are broad and angular, and the ventral fins ſmall. Its tail is but ſlightly forked, and is bluiſh in colour. The vent is placed very forward, very near the throat. The ſides are marked lengthways with two or three dirty yellow lines, and tranſverſely by a number of ſmall ones: the belly of this fiſh is ſilvery; its fleſh is delicate, and it grows in ſome ſeas to twelve, or even eighteen inches in length. The fiſhermen are much afraid of its pricking them, and always, as ſoon as they have caught it, cut off the back-fin. This fiſh buries itſelf in the ſands; and if trod on ſtrikes with great force. The wounds it gives are attended with pain and inflammation; ſea-ſand, or ſtale urine warmed, and rubbed on the place affected, is applied as a remedy; and when the wound has been dangerous, ſweet oil has been applied, and opium and Venice treacle taken internally with ſucceſs.

DRACO *Volans*, in *Natural Hiſtory*, a name given by ſome people to one of the flying Lizards. But, among *Meteorologiſts*, it is uſed for a fat, heterogeneous, earthy meteor, appearing long, and ſinous, ſomething in the ſhape of a flying dragon.

This ſhape is ſuppoſed to ariſe from the hind part of the matter of this meteor being fired with greater impetuoſity than what comes firſt out of the cloud; and it is ſuppoſed, that the broken parts of the cloud, and the ſulphureous matter which adheres to them, form the apparent wings of this imaginary *dragon.*

This ſort of exhalation is principally ſeen on the borders of rivers, and in marſhy places, and ſeldom riſes very high from the ground, but plays and dances about the ſurface in an agreeable manner; and if people go up to it, it will ſtick to their hands or cloaths without burning, or doing them any injury. They are more common in the ſummer-months than in the winter, and are more frequently ſeen in thick weather than in clear.

DRACOCEPHALUM, in *Botany*. See Dragon's *Head.*

DRACONARIUS, in *Antiquity*, *Dragon-bearer*. Several nations, as the Perſians, Parthians, Scythians, &c. bore dragons on their ſtandards; whence the ſtandards themſelves were called *dracones*, *dragons.* The Romans borrowed the ſame cuſtom from the Parthians, or, as Caſaubon has it, from the Dacæ; or, as Codin, from the Aſſyrians.

The Roman *dracones* were figures of dragons painted in red, on their flags; as appears from Ammianus Marcellinus; but among the Perſians, and Parthians, they were like the Roman eagles, figures in full relievo; ſo that the Romans were frequently deceived, and took them for real dragons.

The ſoldier, who bore the dragon, or ſtandard, was called by the Romans *draconarius*; and by the Greeks δρακοναριος, and δρακοντειοφορος; for the emperors carried the cuſtom with them to Conſtantinople.

Pet. Diaconus, Chron. Caſin. lib. iv. cap. 39. obſerves, that the bajuli, cercoſtatarii, ſtaurophori, aquiliferi, leoniſeri, and draconarii, all marched before king Henry when he entered Rome.

DRACONIS, *caput.* See Caput, and Dragon.

Draconis, *eauda.* See Cauda.

Draconis, *ſanguis.* See Sanguis, and Dragon.

Draconis, *venter.* See Venter.

DRACONTEAS, a name given by Neophytus, and ſome others of the later Greek writers, to two plants diſtinguiſhed by the epithets of the great and the little kinds. The great *draconteas* is the plant we call dragons, and the ſmall *draconteas* is the arum. Neophytus ſays, that the roots of ſome ſpecies of the ſmall *draconteas* were eatable, which we alſo know to be true at this time; for though with us the juice of this plant is fiery and corroſive, yet we know that there are eſculent arums in other parts of the world. The Greek writers, from the earlieſt times we have accounts of, were not ignorant of this; and Theophraſtus in particular has deſcribed an eſculent-rooted arum under the name of arum edodimum.

DRACONTHEMA, a name uſed by ſome of the old writers in medicine for what we call *ſanguis draconis*, or dragon's blood, a red vegetable reſin.

DRACONTIA, or Dracontia *lapis*, in *Natural Hiſtory*, a name given by authors to a roundiſh or oval pellucid ſtone, which ſeems no other than a cryſtal cut into that form, and poliſhed by the ſavage inhabitants of ſeveral nations before the Roman conqueſts, and intended to be worn as ornaments. Authors tell a number of idle and fabulous ſtories about this ſtone, imagining it to be naturally of this figure and poliſh, and to be found in the head of a dragon. They are not indeed all agreed about the ſpecies of the ſtone; Ficinus deſcribing an aſtroites under this name, and others ſome other coloured ſtone; but the generality of writers, eſpecially the old ones, make it colourleſs and pellucid.

DRACONTIC *Month*, the ſpace of time wherein the moon going from her aſcending node, called *caput draconis*, returns to the ſame.

DRACONTIUM. The Greeks, from whom the botanical writers have taken this name, never uſed it ſingly as the denomination of a plant, but only as an adjective expreſſing ſome peculiarity in which that plant differed from ſome others of the ſame ſpecies. Thus the plant which we now call ſimply *dracontium*, was called by the Greeks *arum dracontium*, that is, the arum with ſtalks ſpotted like dragons or ſnakes-ſkins; and the plant we call dracunculus, or tarragon, had the ſame epithet from its fiery heat. See Dragons.

DRACUNCULI, in *Medicine*, a name uſed by authors for a ſort of long and ſlender worms, which breed in the muſcular fleſh of the arms, legs, &c. and from their being more frequent in ſome parts of Guinea than elſewhere, are called by many Guinea-worms. They have been long known in the world; and Plutarch quotes Agartharcides for an account of theſe animals, which, he ſays, the people about the Red-ſea were at a certain time very much afflicted with. It is more particularly a diſeaſe in children, wherein they feel a vehement itching; ſuppoſed to ariſe from theſe worms, called *dracunculi*, generated of a viſcid humour under the ſkin, about the back, ſhoulders, and arms.

Children ſeized with the *dracunculi* become hectic, and ſcarce receive any nouriſhment at all, though they eat plentifully. The diſeaſe, however, is not ſo peculiar to children, but that grown perſons have been ſometimes affected with it. The emperor Henry V. is ſaid to have died of it; having had it from his birth.

The women in Poland cure their children of the *dracunculi*, after the following manner: the child is waſhed, and bathed in warm water, wherein a quantity of crummed bread, and a handful of aſhes, have been caſt. The water being poured off, and the bread gathered into a maſs; when they come to break it again the next day, they find in it an infinite quantity of fine hairs, which ſome call *dogs hairs*, and others, *worms*; and it is thoſe hairs, or worms, which are ſuppoſed to be the cauſe of the diſeaſe.

After thus bathing the children, they rub their ſhoulders and arms with flour ſteeped in vinegar, or honey; upon which immediately there ariſes on the ſkin a great number of tubercles, like poppy-ſeed; ſuppoſed to be the heads of worms. Theſe they ſcrape off as faſt as they appear; otherwiſe they withdraw beneath the ſkin again. The operation is repeated till ſuch time as no more tubercles ariſe.

The *dracunculi* is a diſeaſe little known in England. The editors of the Leipſic Acts, ſpeaking of it, in the tome for the month of October, 1682, call the bodies, which put forth at the pores after bathing, thick hairs, *corpuſcula pilorum craſſiorum inſtar denſa & ſpiſſa*, and not fine ſlender hairs, as Degori calls them. They add, that theſe little corpuſcles are hence called Crinones; and by reaſon of their devouring the food, which ſhould nouriſh the children, Comedones. Velſchius, in a curious diſſertation on the ſubject, calls them *capillary worms: exercitatio de vermibus capillaribus infantum.*

As to the nature and figure of theſe little bodies, the ſame editors obſerve, that the microſcopes have put it paſt doubt, that they are real living animals, of an aſh-colour, having two long horns, two large round eyes, and a long tail terminated with a tuft of hair; but that it is difficult to draw them out whole, by ſcraping the child's body; becauſe, being very ſoft, the leaſt rubbing bruiſes them, and breaks them.

They are no where ſo frequent as on the Gold-coaſt in Guinea about Anamaboe and Cormantyn. The worm is white, round, long, and uniform, very much reſembling a piece of white round tape or bobbin. It is lodged between the interſtices of the membranes and muſcles, where it inſinuates itſelf to a prodigious length, ſometimes exceeding five ells. It occaſions no great pain in the beginning; but when it is about to ſhow its head, a ſwelling and inflammation appear on the part, which is uſually the ankle, or ſome part of the leg or thigh.

The countries where this creature is thus produced are very hot, and ſubject to great droughts, and the inhabitants make uſe of ſtagnating and corrupted water, in which it is probable the ova of theſe animals lie: the white people and negroes, who drink this water, are equally ſubject to theſe worms.

The ſurgeons ſeldom attempt to extract this worm by inciſion; but when the tumor appears, they endeavour to bring it to a ſuppuration as ſoon as they can; and when they have broke the ſwelling, and the head of the worm appears, they faſten it to a ſtick, and continue gradually winding it round at the rate of an inch or two in a day, till they by this means have wound it all out. If it be wound too haſtily, it is apt to break in the operation; and if it does, the end is not eaſily recovered again; and if not, there are abſceſſes formed, not only at the place where it breaks, but all along the whole winding of the muſcles where the dead worm remains; ſo that often from one worm thus broken, there are produced a number of obſtinate ulcers in different parts. When the worm has not been broken, the ulcer out of which it was extracted heals eaſily, and there is no farther trouble about it. Town's Diſeaſes of the Weſt Indies, p. 561.

The daily uſe of aloes, or of any other anthelmintric medicine, is proper, during the extraction of the worm, in order to facilitate its diſcharge. See Chætia.

DRACUNCULUS, in *Ichthyology*, the name of a ſea-fiſh, called by Bellonius and Geſner, a kind of the exocœtus. It is a ſmall fiſh, of about a hand's breadth long, and ſometimes a little larger. It is of a long and rounded body, and of a dead greeniſh or olive colour on the back, and white on the belly, and is marked on the ſides with a great number of bluiſh, white, and very light ſmall ſpots. On the upper part of the head, which is large, and flat at the top, below the eyes, it has a purpliſh triangular ſpot; the eyes are large, and ſo placed on the upper part of the head, as to look upwards, whence it has been ranked among the uranoscopi; the mouth wide, and furniſhed with ſmall teeth; and the upper-jaw is longer than the under. The apertures of the gills are cloſed; on the end of the bones that cover them is a very ſingular trifurcated ſpine. This fiſh has two pair of fins on the belly, and two fins on the back, ſituated in a kind of furrow; the tail is long and rounded, and conſiſts of ten rays. It is common in the Mediterranean, and other ſeas, and is brought to market among other ſmall fiſh at Rome, and in other places. In the Linnæan ſyſtem it is a ſpecies of the callionymus. See *Tab.* II. *of Fiſh*, N° 10.

Dracunculus, in *Botany*. See Dragons.

DRAFF, a name given in ſome places to the waſh given to hogs; and the grains given to cows.

DRAG, in *Building*. A door is ſaid to *drag*, when in opening or ſhutting it hangs, or grates upon the floor.

Drag-*ropes*. See Ropes.

Drag, in *Sea-Language*, is a machine, conſiſting of a ſharp, ſquare, iron ring, encircled with a net, and commonly uſed to take the wheel off from the platform or bottom of the decks.

DRAGGING *the anchor*. See Anchor.

DRAGMA, in *Pharmacy*, a name uſed by the ancients for a handful of any herb or other medicine.

DRAGMIS, in *Pharmacy*, a word uſed by the ancients to ſignify a pugil, or as much of any thing as can be taken up at a pinch, between the thumb and two fingers.

DRAGOMAN, or Drogman, a term of general uſe through the Eaſt, for an interpreter, whoſe office is to facilitate commerce between the orientals and occidentals. Theſe are kept by the ambaſſadors of Chriſtian nations reſiding at the Porte, for this purpoſe.

The word is formed from the Arabic *targeman*, or *targiman*, of the verb *taragem*, *he has interpreted*. From *dragoman* the Italians formed *dragomano*, and with a nearer relation to its Arabic etymology, *turcimanno*; whence the French, and our *trucheman*, as well as *dragoman*, and *drogman*.

DRAGON, in *Aſtronomy*. See Draco.

Dragon's head, and *tail*, *caput & cauda draconis*, are the nodes of the planets; or the two points, wherein the ecliptic is interſected by the orbits of the planets, and particularly that of the moon; making with it angles of five degrees, and eighteen minutes.

One of theſe points looks northward; the moon beginning then to have northward latitude, and the other ſouthward; where ſhe commences ſouth.

This her deviation from the ecliptic ſeems (according to the fancy of ſome) to make a figure like to that of a *dragon*, whoſe belly is, where ſhe has the greateſt latitude; the interſection repreſenting the head and tail, from which reſemblance the denomination ariſes.

But note, that theſe points abide not always in one place, but have a motion of their own in the zodiac, and retrograde-wiſe, 3 minutes 11 ſeconds per day; completing their circle in 18 years 225 days; ſo that the moon can be but twice in the ecliptic, during her monthly period; but at all other times ſhe will have a latitude, or declination from the ecliptic.

It is about theſe points of interſection that all eclipſes happen.

They are uſually denoted by theſe characters, ☊ *dragon's* head, and ☋ *dragon's tail.*

Dragon-*beams*, in *Architecture*, are two ſtrong braces or ſtruts, which ſtand under a breaſt-ſummer, and meet in an angle on the ſhoulder of the king-piece.

Dragon's *blood*, *ſanguis draconis*, in *Medicine*, a reſinous ſubſtance brought from the Eaſt, in oval drops, wrapped up in flag-leaves, of conſiderable uſe, as an agglutinant and deſiccative, againſt fluxes, both alvine and uterine, and ulcerations internal and external, &c.

It derives its name *dragon's blood* from the redneſs of its colour, and gives its name *dragon* to the tree that yields it. Some botaniſts talk of the figure of a *dragon*, finely repreſented under the rind of the fruit of that tree. But this is a mere fiction.

The genuine *dragon's blood* is the juice, or reſin, of a large tree, called *draco arbor*, the *dragon-tree*, reſembling the palm, growing in Africa, and America, as well as in China. The reſin is of a dark red, and in ſubſtance of no diſcernible ſmell or taſte, and eaſily diſſolves when brought towards the fire: if caſt into the fire, it flames; but it diſſolves with much difficulty in any watery liquor. It is ſoluble by the aſſiſtance of heat in rectified ſpirit, and in expreſſed oils, to which it communicates a deep red colour.

It is a good aſtringent; and is uſed in hæmorrhages and dyſenteries; as alſo to faſten the teeth, and ſtrengthen the gums. A ſolution of *dragon's blood* in ſpirit of wine is uſed for ſtaining marble, to which it gives a red tinge, which penetrates more or leſs deeply, according to the heat of the marble during application. But for fine deſigns, the marble ſhould be cold, becauſe it ſpreads whilſt it ſinks. Mr. Du Fay ſays, that by adding pitch to this ſolution, the colour may be rendered deeper.

There is alſo a counterfeit *dragon's blood*, made of the gum of the cherry, or almond-tree, diſſolved, and boiled in a tincture of Brazil wood; but this is of no uſe, except for external diſeaſes of horſes. Theſe adulterated reſins are diſtinguiſhed from the true by their diſſolving in water, and crackling in the fire without burning.

Dragon *reverſed*, *Knights of*, an order of knighthood inſtituted by the emperor Sigiſmund, about the year 1418, after the council of Conſtance, in memory of the condemnation of John Huſs and Jerome of Prague. This order, which once flouriſhed in Germany and Italy, is now extinct.

Dragon-*fly*, *Libella*, or *Libellula*, in *Natural Hiſtory*, the name of a very large genus of four-winged flies, called by us *adder-flies* and *dragon-flies*. They belong to the order of *neuroptera* in the Linnæan ſyſtem; they are characterized by having jaws, by antennæ ſhorter than the thorax, by extended wings, and by the male's tail being terminated by a hooked kind of forceps. See Fly. *Tab. Inſects*, *fig.* 1.

Theſe flies have all two very large and reticulated eyes, covering the whole ſurface of the head, which are a beautiful object for the microſcope. They fly very ſwiftly, and prey upon the wing, being of great uſe to mankind, in clearing the air of innumerable little flies.

They are produced of ſeveral ſpecies of ſix-legged worms living in the waters, and figured by Mouffett, and other authors, under the name of *pulices* and *locuſtæ aquaticæ*. Mr. Ray deſcribes twenty-three ſpecies of theſe flies.

Moſt of theſe ſpecies are found in Auguſt and September, in our fields and gardens, eſpecially near places where there are waters, as they have their origin from worms living in that element. The great ones uſually live all their time about waters, but the ſmaller are common among hedges, and the ſmalleſt of all are moſt frequent in gardens. The ſmaller kinds often ſettle upon buſhes, or upon the ground; but the large ones are almoſt always upon the wing, ſo that it is very difficult to take them. Ray's Hiſt. Inſect. p. 50.

The manner of this inſect's coupling with the female is a thing that has attracted the obſervation and admiration of multitudes, as they are frequently ſeen, in the hotter months, in that ſtate, flying together about the edges of waters.

Mr. Homberg, of the Academy of Paris, has taken great pains to inform the world of the whole ſecret of this ſtrange coitus, and of ſeveral other remarkable particulars in regard to the creature. The part to which the wings are fixed is called the breaſt in animals of this kind; but in this creature the lungs are not ſituated there, but in the middle of the belly, which is ſeen continually riſing and falling at inſpiration and expiration. The laſt joint of the body of the male is a ring containing the anus, and this is furniſhed with two pair of hooks; the one pair outward and larger, the other inward and ſmaller: theſe the creature is able to open and ſhut as lobſters do their claws. The extremity of the belly of the female ſeems to conſiſt of two tubes, or pipes, one placed upon the other; the upper one is the anus, at which it voids its excrements; the under one is the female part of generation, and the entrance to the womb of the animal. When the male of this ſpecies finds the female ſitting upon a leaf, or ſtick, he ſeizes her as ſhe flies, taking faſt hold of her with the hooks at the anus by the neck, or that part which joins the head to the breaſt, and immediately flies away with her, holding her fixed by the neck to the end of his tail.

The male does not carry his bride far before he ſettles himſelf upon ſome plant, and raiſes his tail ſo, that the female may be brought to ſit eaſily under him upon the ſame plant. As ſoon as the female is thus ſeated, ſhe turns up her tail, and brings it between the legs of the male, then places it to a certain part of the breaſt of the male, in which are the organs of generation in that ſex. All this while the male keeps his hold of her neck with his forceps, or hooks. They uſually remain in this poſture about three minutes; and after that the male gently raiſing up his breaſt, they become ſeparated, and leaving the hold he had on her neck, at the ſame time, he flies away as he pleaſes. The female uſually remains on the place for half a quarter of an hour, and then ſhe flies away alſo. Mr. Homberg having obſerved the coupling of theſe animals thus far, was determined to examine the organs uſed in it by diſſection. To this purpoſe he caught ſeveral of them, and on the whole collected ſeveral curious obſervations, which may be ſeen in Mem. Acad. Par. 1699.

DRAGON, *gum*. See TRAGACANTH.

DRAGON'S *Head*, *Dracocephalum*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower has one ringent petal, with large, oblong, inflated chaps; the upper lip is obtuſe and arched, the under trifid. It has four ſtamina, two ſhorter than the other; and a four-parted germen, which becomes four oval, oblong ſeeds, encloſed in the empalement. There are eight ſpecies, one of which is the balm of Gilead; they all require little culture, except keeping clear from weeds.

DRAGON-*ſhell*, in *Natural Hiſtory*, a name given by people, curious in ſhells, to a ſpecies of concamerated patella or limpet. This has a top very much bent, and is of an aſh-colour on the outſide, but of an elegant and bright fleſh-colour within. This has been found ſticking on the back of a tortoiſe, as the common limpets do on the ſides of rocks; and ſome have been found affixed to large ſhells of the pinna marina, brought from the Eaſt Indies at different times.

DRAGON, *Sea*. See DRACO *Marinus*.

DRAGON, *ſnap*. See SNAP *Dragon*.

DRAGONS, *Dracontium*, in *Botany*, a genus of the *gynandria polyandria* claſs. Its characters are theſe: it hath a cloſe cylindrical ſpadix, and a boat-ſhaped ſheath; the flowers have no empalement, but have five oval concave petals. They have an oval germen, which afterward becomes a roundiſh berry, including ſeveral ſeeds. There are five ſpecies.

All the ſpecies are propagated by parting their knobby roots, which when they have ſtood undiſturbed for three years will afford a great number of off-ſets. Theſe are to be taken off and planted in autumn, ſoon after the green leaves decay; for if they are removed after they have taken freſh root, and began to ſhoot, they ſeldom produce flowers the ſucceeding ſummer; or if they do, they are very weak; they will thrive in almoſt any ſoil and ſituation.

Dragons are accounted a good alexipharmic, and uſeful in malignant contagious diſtempers, and peſtilential fevers; and, as the vulgar phraſe it, to drive any thing from the heart. Wherefore it is given in medicines to drive out the ſmall-pox and meaſles, and to cauſe ſweat. Miller's Bot. Off.

They have much the ſame medical virtues with the ARUM, or WAKE-*robin*.

DRAGON-*tree*. See PALM-*tree*.

DRAGON, *wild*, and *wort*. See SOUTHERNWOOD, and MUGWORT.

DRAGONET, in *Ichthyology*, a name given by Pennant to the DRACUNCULUS.

DRAGONNEE, in *Heraldry*. A *lion dragonnee*, is where the upper half reſembles a *lion*; the other half going off like the hind part of a *dragon*.

The like may be ſaid of any other beaſt as well as the lion.

DRAGOON, in *Ornithology*, the name of a ſmall kind of CARRIER-*pigeon*, called *columba tabellaria minima* by Moore. It is a baſtard-breed between the two ſpecies of pigeons called the *horſeman* and the *tumbler*. They are very good breeders, and as they are lighter than the horſeman, they are ſuppoſed more expeditious in flight for a few miles, but the horſeman outdoes them at greater lengths. One of theſe pigeons flew from St. Edmundſbury to London, being a diſtance of ſeventy-two miles, in two hours and a half.

DRAGOONS, in *War*, an order of ſoldiery, who march on horſeback, and fight on foot, though ſometimes, too, on horſeback.

Menage derives the word *dragoon* from the Latin *draconarius*, which in Vegetius is uſed to ſignify ſoldier. But it is more probably derived from the German *tragen*, or *draghen*, which ſignifies *to carry*; as being infantry carried on horſeback.

They are divided into brigades, and each regiment into troops. They encamp generally on the wings of an army, and ſometimes they cover the general's quarters. The firſt regiment of *dragoons* raiſed in England was in 1681; and called the regiment of *dragoons* of North Britain. In battle, or attacks, they generally fight ſword in hand after the firſt fire. In the French army they are ſaid to ride without boots.

Their arms are, a ſword, firelock, and bayonet. In the French ſervice, when the *dragoons* march on foot, their officers bear the pike, and the ſerjeants the halbert; neither of which are uſed in the Engliſh ſervice.

DRAGS, in the *Sea-Language*, is uſed for whatever hangs over the ſhip in the ſea, as ſhirts, coats, or the like; and boats when towed, or whatever elſe that, after this manner, may hinder the ſhip's way when ſhe ſails.

DRAIN, or DREIN, in the *Military Art*, a trench made to draw the water out of a moat, which is afterward filled with hurdles and earth, or with faſcines, or bundles of ruſhes and planks, to facilitate the paſſage over the mud. See TRENCHES.

DRAINS, a name given in the fen-countries to certain large cuts or ditches, of twenty, thirty, nay ſometimes forty foot wide, carried through the marſhy ground to ſome river, or other place capable of diſcharging the water they carry out of the fen-lands. Moſt of theſe *drains* are made in our fen-countries by a body of men called the *undertakers*, whoſe reward is one third of the ground they *drain*. They alſo erect ſluices at a great expence, often not leſs than two thouſand pounds each. Yet theſe, with all the care they employ in erecting them, are ſubject to be blown up by the vaſt weight of water that lies upon them when the lands are overflown. Some of theſe ſluices have two or more pair of doors, of ſix, eight, or ten foot high, which ſhut when the water in the river is higher than in the *drains*, by the weight and force of it; and ſo *è contra*, throw out a body of eight foot ſquare of water for about ſix or ſeven hours during the ebb. The real uſe of theſe *drains* is very evident from the preſent ſtate of the land where they are cut, and that of it before. In Camden's time all this was bog, and now it is all firm land. The country about Crowland was in that author's time ſo ſoft, that it was not paſſable by carriages; and thus grew a witticiſm upon it, that all the carts that entered this town were caſed on the wheels with ſilver; but this is now ſo firm ground, that carriages of any kind paſs over it. The duck-ponds uſed to be called the fen corn-fields, and they now are ſuch in reality, their bottoms being dry, and producing oats, and rape-ſeed, or cole-ſeed, with great increaſe. Phil. Tranſ. N° 223.

Drains are alſo more generally uſed to carry off the ſuperfluous moiſture from wet and marſhy lands. For this purpoſe a deep *drain* muſt be cut in the loweſt part, ſo as to reach the bed, whether of gravel or ſand, through which the water flows; and ſmaller *drains* ſhould be made from this ditch to thoſe places which appear to be the heads of ſprings; and theſe ſhould be left open for ſome time, till the quantity of moiſture abates; they ſhould then be filled up about Michaelmas with ſtones, and over theſe heath, broom, or ſtraw, or with faggots made of the branches of trees. A foot depth of mould over the *drain* will be ſufficient in paſture-ground; and at leaſt a foot and a half in ploughed lands. But if the quantity of water to be diſcharged is conſiderable, the main *drain* ſhould either be left open, or made very deep and wide, and filled with ſtones. See BOG.

It may be neceſſary in many caſes, and has proved very uſeful, to flag the bottom, and to line the ſides of the *drains* with tiles, brick, or ſtone, to keep the earth from falling in, and to preſerve a free paſſage for the water. The clay which is dug out of theſe *drains* may be converted, either by burning, or laying up in heaps with quicklime, into an excellent manure, either for corn or graſs land, where it is moſt wanted.

When the ground in which the ſprings are, lies on a gentle declivity, Mr. Tull adviſes to plough it in an horizontal direction, by which means each furrow carries off the water, which would otherwiſe ſink into the next ridge. See FEN.

DRAINING *Plough*. See PLOUGH.

DRAM. See DRACHM.

DRAMS. See CORDIALS.

DRAMA, in *Poetry*, a piece, or poem, compoſed for the ſtage.

The word is Greek, δραμα, which literally ſignifies *action*; becauſe in *dramas*, or dramatic poems, they *act*, or repreſent *actions*, as if they really paſſed.

A *drama*, or, as we popularly call it, a *play*, is a compoſition either in proſe or verſe, conſiſting, not in the ſimple recitation, but in the actual repreſentation of an action.

Our *dramas* are, TRAGEDIES, COMEDIES, OPERAS, and FARCES.

Some critics take the book of Canticles for a *drama*, or *dramatic poem*; others maintain the ſame of the book of Job. Some ſcrupulous authors would reſtrain *drama* to ſerious pieces, as tragedies; but with reſpect to the etymology, a comedy is as much a *drama*, as a tragedy.

The primary parts of the *drama*, as divided by the ancients, are the *protaſis*, *epitaſis*, *cataſtaſis*, and *cataſtrophe*. The ſecondary parts are, the *acts* and *ſcenes*. The acceſſary parts are, the *argument* or *ſummary*, the *prologue*, *chorus*, *mimus*, *ſatura*, and *atellana*. Laſtly, the *epilogue*, which pointed out the uſe of the piece, or conveyed ſome other notice to the audience in the poet's name.

DRAMATIC, in *Poetry*, is an epithet given to pieces written for the ſtage.

For the laws of *dramatic* poetry, ſee UNITY, ACTION, CHARACTER, FABLE, &c.

Stylo DRAMATICO. See STYLE.

DRANK, a name given by our farmers to the great wild oats. Theſe are often very troubleſome to the plowed lands, eſpecially after wet ſeaſons and much froſt. Many to deſtroy this weed ſow the land with black oats, which being ripe much ſooner than the ſeeds of this plant, are cut down before it can ſow itſelf for another year; eſpecially if they are cut a little the earlier, which will do them no harm, if they be ſuffered to lie a while upon the ground afterwards, for the grain to ſwell before they are carried in. But, in general, when plowed lands begin to run to theſe weeds and thiſtles, it is a token to the farmer that it is time to fallow them, or elſe to ſow them with hay-ſeed, and make paſtures of them. The ſowing beans upon a land ſubject to theſe weeds is alſo a good method, becauſe the farmer may ſend in his ſheep when they are about three inches high, which will eat up the *drank*, and all the other weeds, and will not hurt the beans. The general method is to put twenty ſheep to an acre; but they muſt be put in only in dry weather, and not left too long.

DRAPERY, in *Painting*, and *Sculpture*, the repreſentation of the garments, or cloathing of human figures.

The word is French, *draperie*, formed from *drap*, *cloth*.

In the general ſenſe, *drapery* includes not only the garments, but alſo the tapeſtry, linens, and moſt other things that are not carnations, nor landſcapes.

The art of *drapery* conſiſts chiefly in three points, viz. the ordering of the folds, or plaits; the different quality of the ſtuffs; and the variety of their colours.

As to the folds, they ſhould be ſo managed, that you may eaſily perceive what it is that they cover, and diſtinguiſh it from any thing elſe. For inſtance, that you ſee it is an arm that is under the *drapery*, and not a leg, &c. The folds, again, muſt be large, as breaking and dividing the ſight the leſs. There ſhould likewiſe be a contraſt between them, otherwiſe the *drapery* will appear ſtiff.

The quality of the ſtuffs ſhould likewiſe be well conſidered; ſome make their folds abrupt, and harſh; and others more ſoft and eaſy. The ſurface of ſome, again, has a luſtre; others are dull; ſome are fine, and tranſparent; others ſtrong, and ſolid.

The variety of colours, when well managed, makes the great beauty of a painting; all being not equally amicable, and friendly, with reſpect to each other; and ſome are never to be placed near certain others.

M. de Piles gives abundance of good obſervations, relating to *drapery*. Their firſt effect, he obſerves, and that which the painter ought to have principally in view, is, that they expreſs the thing they are ſuppoſed to cover; and they muſt never be made to adhere, and ſtick to the parts of the body; a great lightneſs, and motion of the *drapery*, are only proper for figures in great agitation, or expoſed to the wind. The nudities of the figures ſhould always be deſigned, before the painter proceed to the *draperies*. Titian, Paul Veroneſe, and Vandyke, excelled in *draperies*.

DRASTIC, from δραω, *I act*, a ſtrong and powerful medicine; more particularly, a purgative that works with ſpeed and vigour; as jalap, ſcammony, and the other ſtronger cathartics.

DRAUGHT, in *Medicine*. See POTION.

DRAUGHT, in *Trade*, is an allowance made in the weight of commodities; the ſame as clough. See CLOUGH.

DRAUGHT is alſo uſed ſometimes for a bill of exchange, and commonly for an order for the payment of any ſum of money due, &c. Then the perſon who gives the order is ſaid to *draw* upon the other.

DRAUGHT, in *Painting*, &c. See DESIGN.

DRAUGHT, or, as it is pronounced, DRAFT, in *Architecture*, the figure of an intended building deſcribed on paper; wherein are laid down, by ſcale and compaſs, the ſeveral diviſions and partitions of the apartments, rooms, doors, paſſages, conveniencies, &c. in their due proportion.

It is uſual, and even exceedingly convenient, before a building is begun to be raiſed, to have *draughts* of the ichnography, or ground-plot of each floor, or ſtory; as alſo of the form and faſhion of each front, with the windows, doors, ornaments, &c. in an orthography, or upright.

Sometimes the ſeveral fronts, &c. are taken, and repreſented in the ſame *draught*, to ſhew the effect of the whole building: this is called a *ſcenography*, or *perſpective*. See SCENOGRAPHY.

DRAUGHT, *reduction of a*. See REDUCTION, and PENTAGRAPH.

DRAUGHT-*compaſſes*, thoſe provided with ſeveral moveable points, to draw fine *draughts* in architecture, &c. See COMPASS.

DRAUGHT-*hooks*, are large hooks of iron fixed on the cheeks of a cannon-carriage, two on each ſide, one near the trunnion-hole, and the other at the train, and are called the fore and hind *draught-hooks*. Large guns have *draught-hooks* near the middle tranſum, to which are fixed the chains, which ſerve to eaſe the ſhafts of the limbers on a march. The fore and hind-hooks are uſed for drawing a gun backwards or forwards by men with ſtrong ropes, called *draught*, or *drag-ropes*, fixed to theſe hooks.

DRAUGHT-*horſe*. See HORSE.

DRAW. A ſhip is ſaid to *draw* ſo much water, according to the number of feet ſhe ſinks into it.

Thus, if fifteen feet from the bottom of her be under water, or if ſhe ſink into the water fifteen feet perpendicularly, ſhe is ſaid to *draw* fifteen feet water; and according as ſhe *draws* more, or leſs, ſhe is ſaid to be of more, or leſs *draught*; and that this may be more readily known, the feet are marked on the ſtern and ſtern-poſt regularly from the keel upwards.

DRAW, in the *Foreſt Law*. See DOG-*draw*.

DRAW-*back*, in *Commerce*, a rebate, or diſcount, upon the price of commodities, purchaſed on certain conditions. See REBATE, and DISCOUNT.

Draw-back is more particularly uſed to denote certain duties, either of the cuſtoms or of the exciſe, that are allowed upon the exportation of ſome of our own manufactures, or upon certain foreign commodities that have paid a duty at importation.

The oaths of the merchants importing or exporting are required, to obtain the *draw-back* of foreign goods, affirming the truth of the officer's certificate of the entry, and the due payment of the duties; and theſe may be made by the agent or huſband of any corporation or company, or by the known ſervant of any merchant, uſually employed in making his entries, and paying his cuſtoms. 2 and 3 Ann. cap. 9. With reſpect to foreign goods entered outwards, if leſs in quantity or value be fraudulently ſhipped out than is expreſſed in the exporter's certificate, the goods therein mentioned, or their value, are forfeited, and no *draw-back* is to be allowed for the ſame. Foreign goods exported by certificate, in order to obtain the *draw-back*, not ſhipped or exported, or re-landed in Great Britain, unleſs in caſe of diſtreſs, to ſave them from periſhing, which muſt be immediately ſignified to the officers of the cuſtoms, are to loſe the benefit of the *draw-back*, and are forfeited, or their value, with the veſſels, horſes, carriages, &c. employed in the re-landing of them; and the perſons concerned in re-landing them, or by whoſe privity they are re-landed, or into whoſe hands they ſhall knowingly come, are to forfeit double the amount of the *draw-back*. 13 and 14 Car. II. cap. 11. 8 Ann. cap. 13. This is to be paid for within five years after the offence. And the ſeizure of the horſes, &c. may be adjuſted by two or more juſtices of the peace. 6 Geo. I. cap. 21. 8 Geo. I. cap. 18. and 11 Geo. I. cap. 29. Officers of the cuſtoms conniving at, or aſſiſting in any fraud relative to certificate goods, beſide other penalties, are to forfeit their office, and to ſuffer ſix months impriſonment, without bail or mainprize; as are alſo maſters or perſons belonging to the ſhips employed in this buſineſs. 8 Ann. cap. 13. Bonds given for the exportation of certificate goods to Ireland muſt not be delivered up, nor *draw-back* allowed for any goods, till a certificate under the hands and ſeals of the comptroller, or collector, &c. of the cuſtoms of ſome port in Ireland be produced, teſtifying the landing, which certificate muſt be produced in ſix months from the date of the bond. 8 Ann. cap. 13. 5 Geo. I. cap. 11. 9 Geo. I. cap. 8. 2 Geo. II. cap. 28. See CUSTOMS, DEBENTURES, DUTIES, &c.

DRAW-*bridge*, a bridge made after the manner of a floor, to be *drawn* up, or let down, as occaſion ſerves, before the gate of a town or caſtle. See BRIDGE.

DRAW-*gear*, in *Huſbandry*, any kind of harneſs for drawing a waggon or other carriage.

DRAW-*net*, a kind of net for taking the larger ſort of wild fowl, which ought to be made of the beſt packthread, with wide meſhes: they ſhould be about two fathoms deep, and ſix long, verged on each ſide with a very ſtrong cord, and ſtretched at each end on long poles.

It ſhould be ſpread ſmooth and flat upon the ground, and ſtrewed over with ſedge, graſs, or the like, to hide it from the fowl; and the ſportſman is to place himſelf in ſome ſhelter of graſs, fern, or ſome ſuch thing.

DRAWER *of a bill of exchange*, &c. the perſon who draws the bill upon his correſpondent. See BILL, and EXCHANGE.

DRAWING *a caſt*, among *Bowlers*. See BOWLING.

DRAWING *medicines*, or DRAWERS. See EPISPASTIC, and RIPENERS.

DRAWING, *tooth*. See TOOTH-*drawing*.

DRAWING *of gold*, or *ſilver*, is the paſſing it through a number of holes in an iron, each leſs than another, to bring it into a wire. See WIRE-*drawing*, and DUCTILITY.

DRAWING *of a bill of exchange*, is the writing, ſigning, and giving it to the perſon, who has already paid the value, or content thereof, to receive it in another place.

A perſon ſhould never *draw* a bill of exchange, unleſs he be well aſſured it will be accepted, and paid. See BILL *of Exchange*.

DRAWING, in *Painting*, &c. See DESIGNING, and COUNTER-DRAWING.

DRAWING, among *Hunters*, is, when they beat the buſhes after a fox.

DRAWING *amiſs* is, when the hounds, or beagles, hit the ſcent of their chace the contrary way, ſo as to purſue it up the wind, when they ſhould have done it down the wind.

DRAWING *on the ſlot* is, when the hounds touch the ſcent, and *draw* on, till they rouſe, or put up the chace.

DRAWING, *fine*. See FINE-*drawing*.

DRAY, a name given by ſportſmen to ſquirrel neſts, built on the tops of trees. See SQUIRREL.

DRAY is alſo a cart uſed by brewers to carry beer on; likewiſe a ſledge without wheels.

DRAY-*plough*. See PLOUGH.

DREAMS. According to Wolfius every *dream* takes its riſe from ſome ſenſation, and is continued by the ſucceſſion of phantaſms in the mind. His reaſons are, that when we *dream* we imagine ſomething, or the mind produces phantaſms; but no phantaſm can ariſe in the mind, without a previous ſenſation: hence neither can a *dream* ariſe without ſome previous ſenſation. He obſerves farther, that though it be certain *à priori*, from the nature of the imagination, that *dreams* muſt begin by ſome ſenſation, yet that it is not eaſy to confirm this by experience; it being often difficult to diſtinguiſh thoſe ſlight ſenſations, which give riſe to *dreams*, from phantaſms, or objects of imagination. Yet this is not impoſſible in ſome caſes, as when the weak ſenſation ſufficient to give riſe to a *dream* gradually becomes ſtronger, ſo as to put an end to it, as it often happens in uneaſy and painful ſenſations. Wolf. Pſychol. Empir. § 123.

The ſeries of phantaſms, or objects of imagination, which conſtitute a *dream*, ſeem to be ſufficiently accounted for, from the law of imagination, or of aſſociation; though it may be extremely difficult to aſſign the cauſe of every minute difference, not only in different ſubjects, but in the ſame, at different times, and in different circumſtances. We have an eſſay on this ſubject by M. Formey, in the Mem. de l'Acad. de Berlin. tom. ii. p. 316. He expreſly adopts Wolfius's propoſition above mentioned, that every *dream* begins by a ſenſation, and is continued by a ſeries of acts of imagination, or of phantaſms; and that the cauſe of this ſeries is to be found in the law of the imagination. *Si naturale ſomnium eſt, initium capere debet per legem ſenſationis, & continuari per legem imaginationis.* Hence he concludes thoſe *dreams* to be ſupernatural, which either do not begin by ſenſation, or are not continued by the law of the imagination.

This opinion is as ancient as Ariſtotle, who expreſly aſſerted, that a *dream* is only the φαντασμα, or *appearance* of things, ariſing from the previous motions excited in the brain, and remaining after the objects are removed. Hobbes has adopted this hypotheſis: he aſcribes different *dreams* to different diſtempers of the body, and whimſically enough obſerves, that lying cold breedeth *dreams* of fear, and raiſeth the thought and image of ſome fearful object. Thus he accounts for that which was in reality the waking viſion of Brutus, which addreſſed him the night before the battle of Philippi. "I am, Brutus, "thine evil-genius; but thou ſhalt ſee me again near "Philippi." And Mr. Locke, though he does not expreſly declare how *dreams* are excited during ſleep, ſeems to aſcribe the perfection of rational thinking to the body; and traces their origin to previous ſenſations, when he ſays, "The *dreams* of ſleeping men are all made up of "the waking man's ideas, though for the moſt part "oddly put together." He urges the incoherence, frivolouſneſs, and abſurdity, of many of our *dreams*, as well as the ſuppoſed fact that ſome ſleep without *dreaming*, as objections to the notion that men think always: to which it has been replied, that *dreams* may be entirely, imperfectly, or not at all remembered, according to the various degrees in which the nerves are impreſſed by the motion given to the animal ſpirits in ſleep. Ariſt. de Inſomn. cap. 3. Hobb. Lev. cap. 2. & cap. 45. Lock. Eſſ. book ii. ch. i. § 10, &c. Watts's Eſſ. § 2. p. 120, &c.

Dr. Hartley explains all the phænomena of the imagination by his theory of vibrations and aſſociations. *Dreams*, he ſays, are nothing but the imaginations or reveries of ſleeping men, and they are deducible from three cauſes, viz. the impreſſions and ideas lately received, and particularly thoſe of the preceding day, the ſtate of the body, and particularly of the ſtomach and brain, and aſſociation. Obſ. on Man, vol. i. § 5. p. 383, &c.

Democritus and Lucretius account for *dreams*, by ſuppoſing that ſpectres and *ſimulacra* of corporeal things, conſtantly emitted from them, and floating up and down in the air, come and aſſault the ſoul in ſleep. Lucret. De Rer. Nat. lib. iv.

Thoſe who have maintained the eſſential difference between ſoul and body have ſolved the common phænomena of *dreams* by the union of theſe two ſubſtances, and the neceſſary connection ariſing thence between ideas in the mind, and certain motions in the body, or in thoſe parts more immediately united to the ſoul; whilſt others, who have denied the exiſtence of matter, account for them in the ſame manner as for our other ideas, which may not be improperly called *waking dreams*.

A learned author has not long ſince aſſerted, that our *dreams* are prompted by ſeparate immaterial beings; an opinion which was advanced long ago by the heathens, and maintained very generally, and applied to a ſpecies of DIVINATION. He contends, that the phantaſm, or what is properly called the viſion, is not the work of the ſoul itſelf, and that it cannot be the effect of mechanical cauſes; and therefore aſcribes it to ſeparate ſpirits, having acceſs to our minds, and furniſhing us with ideas while we ſleep. See Mr. Baxter's Eſſay on the Phæn. of Dreaming, in his Enquiry into the Nature of the human Soul, vol. ii. 3d edit. 1745.

The phyſicians who have accurately examined the ſtate of their patients in every particular circumſtance, have not omitted, at times, to enquire into their *dreams* in thoſe hours of ſleep which their ill ſtate allows them, and partly from experience, partly from reaſon and analogy, have found, that there are many preſages of diſeaſes to come, and many indications of ſuch as are preſent, but unperceived, at leaſt not ſeen in their full extent, to be had from what the ſenſes ſuffer in *dreams*. Indeed, if *dreams* are different from what might be expected from the buſineſs of the day, or the turn of thought before, they may always be looked upon as ſigns of a more or leſs diſtempered ſtate of the body; and the true condition of that ſtate may often be better learned from them, than from any other means. What has been obſerved by phyſicians in regard to the prognoſtics from *dreams*, may be ſummed up in the following manner: to *dream* of fire, indicates a redundance of yellow bile; to *dream* of fogs or ſmoak, indicates a predominancy of black bile; to *dream* of ſeeing a fall of rain or ſnow, or a great quantity of ice, ſhews that there is a redundance of phlegm in the body; he who fancies himſelf among ſtinks may be aſſured, that he harbours ſome putrid matter in his body; to have red things repreſented before you in ſleep, denotes a redundance of blood; if the patient *dreams* of ſeeing the ſun, moon, and ſtars, hurry on with prodigious ſwiftneſs, it indicates an approaching delirium; to *dream* of a turbid ſea, indicates diſorders of the belly; and to *dream* of ſeeing the earth overflowed with water, or of being immerged in a pond or river, indicates a redundance of watery humours in the body; to *dream* of ſeeing the earth burnt or parched up, is a ſign of great heat and drineſs; the appearance of monſters and frightful enemies, indicates deliriums in diſeaſes; and to *dream* often of being thrown down from ſome very high place, threatens an approaching vertigo, or ſome other diſorder of the head, as an epilepſy, apoplexy, or the like. Theſe and a great many others are the obſervations of Hippocrates on the *dreams* of his patients. From thoſe, and from ſome farther aſſiſtances, Lomnius has carried the ſubject to a very great length, and given many rules of judging from them. Lomnii Med. Obſ. But quære, how true.

DREDGE, or DREG, a term uſed by the farmers for oats and barley mingled together.

DREDGERS, a term uſed in the admiralty-courts for the fiſhers for oyſters. See ſtat. 2 Geo. II. cap. 9.

DREGS *of oil*, a name given by the people who trade in oil, to that coarſe and thick part of it, which ſubſides to the bottom of the veſſels in which great quantities of it are kept. This is not fit for the common uſes of the clear oil at the top, but there are ſeveral purpoſes to which it ſerves very well. Great quantities of theſe lees or *dregs* of common oil are uſed by the ſoap-boilers, principally in making the common ſoft ſoap. The leather-dreſſers alſo uſe it in conſiderable quantities to ſoften the hides they are employed to prepare for the ſeveral artificers who uſe them. Some of theſe *dregs* are alſo uſed in the making of flambeaux, which inſtead of being made of yellow wax as pretended, are uſually compoſed of pitch, roſin, and this oil, mixed in ſuch a proportion as to make a maſs of a proper hardneſs and conſiſtence. People who uſe preſſes, and other works in which there are many ſcrews, ſometimes buy this to greaſe their ſcrews, inſtead of ſoap or ſuet. Theſe are the uſes mentioned by Savary; but beſide theſe we have in England another manufacture, which conſumes a greater quantity than all theſe put together. This is the making ſpermaceti; ſome perſons among us have found the art of making this out of the fæces of oil, and will give an oilman at any time as much clear oil in exchange of theſe *dregs*, as they are in quantity. All the other uſes of theſe *dregs* leave the trader at a great loſs; and as Savary obſerves, the more fæces the oil contains, the greater is the loſs to the buyer; but with us, this is rendered equal, and there is no loſs in it.

All ſorts of oil produce more or leſs fæces and *dregs*, but of all others, the whale-oil is obſerved to produce the largeſt quantity, and the nut-oil the leaſt.

DREIT DREIT, in our *Old Writers*, ſignifies a double right, that is, *jus poſſeſſionis & jus dominii*. Bracton, lib. iv. cap. 27. and lib. iv. tract. 4. cap. 4. and lib. v. tract. 3. cap. 5. Coke on Littl. fol. 266.

DRENCH, among *Farriers*, a phyſical draught, or potion, given a horſe, by way of purge.

DRENCHES, or DRENGES, DRENGI, or THRENGI, in our *Old Cuſtoms*, a term, about which the lawyers and antiquaries are a little divided. See THRENGUS.

Drenges, ſays an ancient manuſcript, were *tenentes in capite:* according to Spelman, they were *e genere vaſallorum non ignobilium, cum ſinguli qui in domes-day nominantur ſingula poſſiderent maneria:* ſuch as, at the coming in of the Conqueror, being put out of their eſtates, were afterwards, upon complaint, reſtored thereto; becauſe, they, being before owners thereof, were neither in auxilio, nor conſilio, againſt him.

DRENGAGE, DRENGAGIUM, vel *ſervitium drengagii*, in our *Old Writers*, the tenure by which the *drenches* held their lands; concerning which, ſee Term. Trin. 21 Ed. III. Ebor. and Northum. Rot. 191. *Notandum eſt, eos omnes eorumve anteceſſores, qui e* drengorum *claſſe erant, vel per* drengagium *tenuere, ſua incoluiſſe patrimonia ante adventum Normannorum*. Spelm. Gloſſ. Du-Cange, Gloſſ. Lat. in voc. *drenches*.

DREPANON, Δρήπανον, among the Greeks, an engine of iron crooked like a ſickle, and fixed to the top of a long pole. It was uſed in cutting aſunder the cords of the ſail-yards, in order to diſable the ſhip by letting fall the ſails, and was otherwiſe called *dorydrepanon*. Potter's Archæol. tom. ii. p. 141.

DRESSING *of hemp and flax*. See HEMP and FLAX.

DRESSING *of hops*. See HOPS.

DRESSING *of meats*, the preparing them for food, by means of culinary fire.

The deſign of *dreſſing* is, to looſen the texture of the fleſh, and diſpoſe it for diſſolution, and digeſtion in the ſtomach. Fleſh not being a proper food without *dreſſing*, is alleged as an argument, that man was not intended by nature for a carnivorous, or fleſh-eating animal.

The uſual operations are, *roaſting*, *boiling*, and *ſtewing*. In *roaſting*, it is obſerved, meat will bear a much greater and longer heat than either in *boiling*, or *ſtewing*; and in *boiling* greater and longer than in *ſtewing*. The reaſon is, that *roaſting* being performed in the open air, as the parts begin externally to warm, they extend and dilate, and ſo gradually let out part of the rarefied included air, by which means the internal ſucceſſions, on which the diſſolution depends, are much weakened, and abated; *boiling* being performed in water, the preſſure is greater, and conſequently, the ſucceſſions to lift up the weight are proportionably ſtrong; by which means the coction is haſtened; and even in this way there are great differences; for the greater the weight of water, the ſooner is the buſineſs done.

In *ſtewing*, though the heat be much leſs than what is employed in the other ways, the operation is much more quick, becauſe performed in a cloſe veſſel, and full; by which means the ſucceſſions are more often repeated, and more ſtrongly reverberated. Hence the force of Papin's DIGESTOR; and hence an illuſtration of the operation of DIGESTION.

Boiling, Dr. Cheyne obſerves, draws more of the rank, ſtrong juices from meat, and leaves it leſs nutritive, more diluted, lighter, and eaſier of digeſtion: *roaſting*, on the other hand, leaves it fuller of the ſtrong, nutritive juices, harder to digeſt, and needing more dilution. Strong, grown, and adult animal food, therefore, ſhould be *boiled*; and the younger, and tenderer, *roaſted*.

DRESSING *of ore*. See BUDDLE, and ORE.

DRESSING, in *Surgery*, denotes the treatment of a wound, or any diſordered part. The apparatus for this purpoſe conſiſts of doſſils, tents, plaſters, compreſſes, bandages, bands, ligatures, &c.

DRESSING *a ſhip*, is the act of ornamenting a ſhip with a variety of colours, as enſigns, flags, pendants, &c. diſplayed from different parts of her maſts and rigging, on a day of feſtivity.

DRIE, or DRY. See DRY.

DRIFT, in *Mining*, a paſſage cut out under the earth betwixt ſhaft and ſhaft, or turn and turn, or a paſſage or way wrought under the earth to the end of a meer of ground, or part of a meer.

DRIFT *of the foreſt*, an exact view, or examination of what cattle are in the foreſt; that it may be known whether it be overcharged, or not, and whoſe the beaſts are; and whether they are commonable beaſts, or not. See FOREST, and COMMON.

DRIFT, in *Navigation*, denotes the angle which the line of a ſhip's motion makes with the neareſt meridian, when ſhe drives with her ſide to the wind and waves, and is not governed by the power of the helm; and alſo the diſtance which the ſhip drives on that line, ſo called only in a ſtorm.

DRIFT-*ſail*, in a *Ship*, a ſail uſed under water; veered out right a-head, by ſheets, as other ſails are: its uſe being to keep the ſhip's head right upon the ſea, in a ſtorm; and to hinder a ſhip's driving too faſt in a current; with which view it is generally uſed by fiſhermen, eſpecially in the North ſea.

DRILL, in *Mechanics*, a ſmall inſtrument for making ſuch holes as *punches* will not conveniently ſerve for. *Drills* are of various ſizes, and are chiefly uſed by ſmiths and turners.

It is a very well known fact, that a *drill* made of iron has frequently not only a polarity, but ſo ſtrong an attractive virtue of the magnetic kind, that it will ſuſpend a common needle from its point. It is uſually ſuppoſed that a *drill* acquires this polarity by boring iron. But it is not only by boring of iron, that this power is obtained, but in the very making. As ſoon as one of them is finiſhed and hardened, its point becomes a north pole before it has ever been worked either in iron or any other materials, ſo that of the great numbers of theſe inſtruments found in a ſhop, endued with this power, it is to be ſuppoſed that more of them owe it to their original make, than to any after uſe. All pieces of wrought iron which in ſhape reſemble *drills*, that is, which are of a long and ſlender form, will not only have this polarity, but they will change it on being placed for ſome time in an inverted poſture, and that which was the oppoſite to the north pole, by ſtanding downwards will be the north pole. This has been an old obſervation, but on a fair experiment it does not prove to be true in all things without exception, though it be ſo in moſt particulars. The larger pieces of iron ſeem to be moſt eaſily influenced in their polarity, by changing their poſition; but the ſmall ones will ſometimes be found to have fixed poles, which no change of poſture will alter. Phil. Tranſ. N° 246. See MAGNET.

DRILL, or DRILL-*box*, a name given to an inſtrument uſed in the new method of horſe-hoeing huſbandry for ſowing the land. See BROAD-*caſt*, and HUSBANDRY.

The *drill* is the engine that plants the corn and other ſeeds in rows; it makes the channels and ſows the ſeeds in them, and covers them with earth when ſown, and all this at the ſame time, and with great expedition. The principal parts of the *drill* are the ſeed-box, the hopper, the plough, and its harrow. The ſeed-box is the chief of theſe; it meaſures or rather numbers out the ſeeds which it receives from the hopper, and is for this purpoſe as an artificial hand, but it delivers out the ſeed much more equally, than that can be done by a natural hand. The plough and hopper are drawn by a horſe, and by theſe the ground is opened, and the ſeed is depoſited in it; the harrow follows, and lightly rakes in the earth over them. When the ground is fine, and the ſeeds ſmall, a hurdle with ſome prickly buſhes faſtened to its under part, will ſerve better than the harrow. The whole apparatus for this method of ſowing is deſcribed and illuſtrated with figures by Tull in his Horſe-hoeing Huſbandry. See *Drill*-PLOUGH.

DRILL-*rake*, in *Huſbandry*. See *Drill*-RAKE.

DRILLING is popularly uſed for exerciſing ſoldiers.

The word is derived from the French *drille*, which ſignifies a *raw ſoldier*.

DRINK, a part of our ordinary nouriſhment, in a liquid form, ſerving to dilute, and moiſten the dry meat.

The *drinks*, in different countries, are different. Thoſe uſed among us, are water, malt-liquors, wine, cyder, punch, brandy, tea, &c. See each under its proper article, Cyder, &c.

The *malt-drink* brewed in England, in one year, Chamberlayne aſſures us, amounts to very near two millions of barrels, ſtrong and ſmall.

The firſt *drinks* of mankind were certainly water and milk; but luxury ſoon introduced the art of preparing intoxicating and inebriating *drinks* out of vegetables. The vine gave the firſt of theſe liquors; after this, wheat, barley, millet, oats, rice, apples, pears, and pomegranates; and after theſe the juices drained from the pine, ſycamore, and maple, were brought to this uſe; in latter times, roots, berries, and the pith of the ſugar-cane, have been employed for the ſame purpoſes. Honey alſo is at preſent in ſome repute; but before the uſe of the other things here mentioned, the vinous liquor made of honey and water was in the very higheſt eſtimation. The bees were natural purveyors, and their ſtores were one of the firſt delicacies probably of the human race. It was very natural to attempt the meliorating ſo raw a drink as water, by an addition of this ſweet ſubſtance; and ſuch a mixture needing only time for fermentation to become vinous, accident might ſoon lead to this diſcovery. Mead therefore may naturally be ſuppoſed to have been one of the firſt ſtrong liquors in uſe in the world; and among the very oldeſt writers among the Greeks we find it named as a thing well known. Homer, Heſiod, and Ariſtophanes, all give plain proofs of their having been acquainted with it. The people who have ſtudied the human frame to moſt purpoſe, all agree, that amongſt the ſtrong *drinks*, wine is the moſt pernicious; and that good water, milk, beer, and cyder, are greatly preferable to it, none of them bringing on the variety of diſorders, to which immoderate wine-drinkers are ſubject, ſuch as decay of ſight, trembling of the limbs, &c.

Water, Dr. Cheyne obſerves, is the only ſimple fluid (for there are but three more in nature, mercury, light, and air, none of which is fit for human *drink*) fitted for diluting, moiſtening, and cooling; the only ends of *drink*, appointed by nature; and happy had it been for the race of mankind, had other mixed, and artificial liquors never been invented. Water alone is ſufficient, and effectual, for all the purpoſes of human wants in *drink*. Strong liquors were never deſigned for common uſe. They were formerly kept here in England, as other medicines are, in apothecaries ſhops, and preſcribed by phyſicians, as they do diaſcordium, and Venice treacle, to refreſh the weary, ſtrengthen the weak, and raiſe the low-ſpirited. The effect of the ordinary uſe of wine, and ſpirituous liquors, as natural cauſes will always produce their effects, is to inflame the blood into gout, ſtone, and rheumatiſm, fevers, pleuriſies, ſmall-pox, &c. to dry up the juices, and ſcorch and ſhrivel the ſolids. Thoſe whoſe appetite and digeſtion are good and entire, never want ſtrong liquors to ſupply them with ſpirits; ſuch ſpirits are too volatile, and fugitive, for any ſolid or uſeful purpoſes of life. Two ounces of fleſh-meat, well digeſted, beget a greater ſtock of more durable and uſeful ſpirits, than ten times as much ſtrong liquors.

All ſtrong liquors are as hard to digeſt, and require as much labour of the concoctive powers, as ſtrong food itſelf. Water is the only univerſal diſſolvent, or menſtruum, and the moſt certain diluter of all bodies proper for food. There are a great many ſpirituous liquors, which not only will not diſſolve, but which will harden, and make more indigeſtible, certain parts, eſpecially the ſalts of bodies, wherein their active qualities, that is, thoſe which can do moſt harm to human conſtitutions, conſiſt. And we have known perſons of tender conſtitutions, who could neither eat, nor digeſt, upon *drinking* wine, who, by *drinking* at meals common water, warmed, have recovered their appetites, and digeſtion, and have thriven, and grown plump. It is true, ſtrong liquors, by their heat, and ſtimulation on the organs of concoction, by increaſing the velocity of the motion of the fluids, and thereby quickening the other animal functions, will carry off the load that lies upon the ſtomach, with more preſent chearfulneſs. But then, beſide the future damages of ſuch a quantity of wine to the ſtomach, and the fluids, by its heat, and inflammation, the food is hurried into the habit unconcocted, and lays a foundation for a fever, a fit of the colic, or ſome chronical diſeaſe. Eſſay on Health, &c. p. 47, & ſeq.

With reſpect to fermented liquors, which are commonly uſed, it may be obſerved, that thoſe which are too ſtrong hurt digeſtion, and are ſo far from ſtrengthening the body, that they weaken and relax it. They keep up a conſtant fever, which exhauſts the ſpirits, heats and inflames the blood, diſpoſes to numberleſs diſeaſes, and occaſions a premature old age. But fermented liquors may be too weak, as well as too ſtrong: theſe muſt either be drank new, before the fermentation is over, and in this caſe will generate air in the bowels, and occaſion flatulencies; or they ſoon become ſtale, ſour the ſtomach, and injure digeſtion. On this account all malt-liquors, cyder, &c. ſhould be ſufficiently ſtrong, to keep till they are ripe, and then they ſhould be uſed; and neither ſooner nor later. Liquors that are adulterated with a mixture of ingredients of the opiate kind, which are poiſonous in their quality, by thoſe who make them for ſale, hurt the nerves, relax and weaken the ſtomach, and ſpoil its digeſtive powers.

DRINKING-*glaſſes*. See Glasses.

DRINKLEAN, in our *Old Writers*, a ſcot-ale or contribution of the tenants towards a potation, i. e. ale provided to entertain the lord or his ſteward. In ſome records it is written, *potura drinklean*.

DRIP, in *Architecture*. See Larmier.

Drips is alſo uſed in building, for a kind of ſteps, on flat roofs, to walk upon.

This way of building is much uſed in Italy; where the roof is not made quite flat, but a little raiſed in the middle; with *drips*, or ſteps, lying a little inclining to the horizon. See Roof.

DRIVE, in the *Sea-Language*. A ſhip is ſaid to *drive*, when an anchor being let fall, will not hold her faſt, but that ſhe ſails away with the tide, and wind.

The beſt way to prevent this, is to veer out more cable; for the more cable ſhe has, the ſurer, and ſafer ſhe rides; or elſe to let fall more anchors.

Alſo, when a ſhip is a-hull, or a-try, they ſay, ſhe *drives* to leeward, or in with the ſhore, according to the way ſhe makes.

Drive-*bolts*, in *Ship-Building*. See Bolts.

DRIVER, the name given by our ſportſmen to an inſtrument uſed in taking pheaſant-powts, in the method called *driving*. This inſtrument conſiſts only of a parcel of ozier wands, ſuch as are uſed by the baſket-makers, which are made up into a bundle, or ſort of great whiſk, and faſtened in a handle; and to prevent their ſpreading too much at the points are tied round in one or two places in the length; with this inſtrument the ſportſman having fixed his nets, drives the young birds into them. See Driving.

Driver, in a *Ship*, is an oblong ſail, occaſionally hoiſted to the mizen-peak, when the wind is very fair. The lower corners of it are extended by a boom or pole, thruſt out acroſs the ſhip, and projecting over the lee-quarter.

Drivers, *wool*. See Wool.

DRIVING, amongſt *Sportſmen*, a term applied to the taking of young pheaſants, and ſome other birds in nets of an open ſtructure. The method of doing this, is, when an eye of pheaſants is found, the ground all about is to be ſearched, for finding their principal haunts. The induſtrious ſearcher will ſoon be able to make out ſome one of their paths, which are beaten in the manner of ſheep-tracks, only more ſlightly. When one of theſe is found, the place is to be marked by ſetting up a ſtick with another tied to its top like the hand of a road poſt, marking out the place where the path ſeems to run to. On examining the reſt of the ground thereabouts, having regard to the ſame direction, it is highly probable, that ſeveral more of the ſame ſort of tracks will be found all running the ſame way. By one or other of theſe probably the ſportſman will be led to their haunt, which he will not miſs knowing by the nakedneſs and barrenneſs of the ground, and its being covered with the dung and feathers of the young birds. When this is found, the nets are to be placed near this ſpot, looſe and circularly, in ſuch a manner, that the under part being faſtened down to the ground, the upper part may be a hollow, and give a paſſage to the young birds in, and entangle them when there. When the nets are fixed, the perſon muſt go to the haunts and call them together by the artificial noiſe of the pheaſant-call, which is ſo like the real note of the pheaſant, that the powts, or young ones, will ſeldom fail being deceived by it. When they hear this, and begin to anſwer it with their chucking and piping, the call is to be ſtopped, and a perſon is to get behind them, taking the wind with himſelf, as they always run with the wind. He is to have in his hand the inſtrument called by the ſportſmen a *driver*.

When the perſon who carries this inſtrument perceives that he is come pretty near ſome of the powts, he muſt ſoftly beat the buſhes with the *driver*, or only lightly draw it over them; the little noiſe this makes will terrify theſe timorous creatures, and they will gather together in the track, and run a little way forward, and then all ſtop and turn about; on this the perſon is to make the ſame noiſe again, upon which they will run farther; and when they ſtop again, the ſame noiſe will again ſend them forward. Whatever other powts are in the way will join the main body in this fright, and the whole will be *driven* in this manner, like a flock of ſheep, and by a little addreſs of the ſportſman be ſent into the nets; ſo that out of a whole eye, it often happens that not one is miſſed. If in the fright the birds happen to run out of their track, and take a wrong way, then the *driver* is to make a raking noiſe with his inſtrument dragged along the ground, on that ſide on which they are running; this will amaze and terrify them ſo, that they will immediately ſtart back, and come into the beaten track that leads directly to the haunt. There are but two cautions neceſſary to the ſucceeding perfectly in this method of taking them: theſe are ſecreſy and patience. Whatever ſtops they make, or however tediouſly they move, the ſportſman who would make ſure of them, muſt bear with it; for over-raſhneſs and hurrying will ſpoil all, and he muſt content himſelf with terrifying them by the noiſe alone, keeping himſelf carefully out of their ſight; for if they eſpy him, all the plan is diſconcerted, and they will no more move forwards, but will every one run a different way, and hide under the roots of trees, and thick buſhes, and all the art in the world will never bring them out again till night, when it will be too dark to watch them.

Driving *of wild fowl*, is only practicable in the moulting time, which is in July and Auguſt; and it is to be done by means of a ſpaniel, well trained to the purpoſe. The nets are to be ſet in creeks and narrow places, or at their uſual night retreats, and the dog is to put them up, and *driving* them forward, they will be ſent immediately into the nets, not being able to fly away from the dog, from the want of their wing feathers. The people who live in the fens find great account in this practice, taking very great numbers of wild-ducks by it. They are uſually indeed poor and out of fleſh at this time, but as they are always taken alive, and without any hurt, the people find it eaſy to fatten them with beaſts livers, barley, paſte, ſcalded bran, and the like; and they will on this become, in a very little time, fat and well taſted, excelling in flavour both the tame ducks commonly kept in the yards, and the wild ducks in their natural ſtate.

When the ſportſman takes the dog into places where they are not ſo frequent, he may hunt them ſingly, and the dog alone will take them.

Driving, in *Metallurgy*, is uſed by the refiners of ſilver, to expreſs the riſing up of copper from its ſurface in red fiery bubbles. When the lead that was added for refining the ſilver is burnt away before the copper is gone from it, theſe bubbles appear very fiercely on the ſurface. They ſay, on this occaſion, that the metal *drives*, and then add more lead till the remainder of the copper is conſumed. Phil. Tranſ. N° 142.

DROCK, in *Huſbandry*, a name given by our farmers to a part of the common plough. It is an upright piece of timber, running nearly parallel with the hinder part of the plough, but belonging to the right ſide of the tail, as that does to the left. The ground wriſt of the plough is faſtened to this, as alſo is the earth-board. See Wrist, Earth-Board, and Plough.

DROFFAND, or Dryffand, in our *Old Writers*, was a quit-rent, or yearly payment made by ſome tenants to the king or their landlords, for driving their cattle through the manor to fairs or markets.

The word comes from the Saxon *dryfene*, *driven*.

DROGMAN. See Dragoman.

DROIT, Jus, in our *Law-Books*, ſignifies *right*, or *law*; whereof ſome diſtinguiſh ſix kinds, viz. 1. *Jus recuperandi*, right of recovering. 2. *Jus intrandi*, right of entering. 3. *Jus habendi*, right of having. 4. *Jus retinendi*, right of retaining. 5. *Jus percipiendi*, right of receiving. 6. *Jus poſſidendi*, right of poſſeſſing. See Law, and Right; as alſo Rectum, Entry, Possession, &c.

Droit, *Right*, gives name to the higheſt writ of all real writs, becauſe the greateſt regard is paid to it, and it has the moſt aſſured and final judgment. Of this kind are the *droit de advowſon*, &c.

Droit *cloſe*. See Recto.

Droit *de advowſon*. See Recto *de Advocatione Eccleſiæ*.

Droit Droit, *Jus Duplicatum*, or double right, is the right of poſſeſſion, joined with that of property; and when actual poſſeſſion is united to this double right, then a title is completely legal.

Droit *de dower*. See Recto *De dote*.

Droit *patent*. See Recto.

Droit *ſur diſclaimer*. See Recto *ſur Diſclaimer*.

Droit, *monſtrans de*. See Monstrans.

DROMEDARY, in *Zoology*, the name of a ſpecies of camel, which has only one bunch on its back. Its hairs are ſoft to the touch, and are ſhorter than thoſe of our oxen, except that there are ſome longer on the head, the throat, and the top of the neck; and on the middle of the back there are hairs of a foot long, which, though very ſoft and flexile, yet naturally ſtanding in an erect poſture, make the moſt viſible part of the bunch. For when theſe are removed by the hand, the fleſh ſcarce appears more prominent, than that of the back of a hog, and there is not the leaſt fleſhy or callous excreſcence there.

The head is ſmall in proportion to the body; the upper lip is divided as in the hare; the feet are not hoofed, but each terminated by two ſmall claws; the ſole of the foot is broad and very fleſhy, and ſeems ſoft to the touch, though the ſkin is very hard and callous; the feet are indeed cloathed as it were with living ſhoes, which are of very great ſervice to it in travelling over the ſandy countries. It has ſix callous hardneſſes on the knees and ſhoulders of the forelegs, and one on each of the hinder ones. And beſide theſe, there is another much larger, which adheres to the breaſt, on an eminence which is there, as if made to ſupport it; this is uſually eight inches long, ſix inches broad, and about two thick. The uſe of theſe is to ſuſtain the weight of the creature's body on occaſion of his ſtooping to reſt, or to be loaded.

Its ſtomach is very large, and divided into four parts as in other of the ruminating animals, but of a ſingular ſtructure; becauſe, at the upper part of the ſecond ventricle, there are ſeveral ſquare holes, which are the orifices of a great number of a ſort of bags placed between the membranes which compoſe the ſtomach, and theſe ſeem to be the receptacles of water kept for the time of neceſſity; for the creature always drinks a vaſt quantity at once, and will then live a great while without drinking again. It is yet a queſtion to be decided, whether this creature is of the retromingent kind, and whether it copulates backwards? This has been affirmed by ſome, but it is greatly doubted by others. See *Tab. of Quadrupeds*, N° 16. and Camel.

The *dromedary* is ſwift; and is trained in Arabia for races, and in ſome places for carrying couriers, who can travel above a hundred miles a day on them, for nine days together, over burning deſarts, uninhabitable by any living creature. Ray & Leo Afric. 338.

DROMEUS, from δρεμω, *I run*, in *Natural Hiſtory*, a word uſed by the ancients, as the name of two very different animals, the ſtag and the dromedary. The meaning of the word is *ſwift in running*; and the ſtag had this name as being ſwifter than any other animals, and the dromedary as being ſwifter than any of the camel kind beſide.

DROMONARII, in *Antiquity*, rowers belonging to the ſhips called *dromones*.

DROMONES, in *Antiquity*, a kind of yachts or expeditious ſhips uſed in carrying proviſions, or other neceſſaries. Pitiſc. Lex. Ant. in voc.

Dromones, Dromos, or Dromunda, in middle age writers ſignified any large ſhips; but afterwards it was uſed chiefly for men of war; and in this ſenſe it is uſed in Walſingham, anno 1292, and in Knighton, lib. iii cap. 14, &c.

DRONE, in *Muſic*. See Burden.

Drone, in *Natural Hiſtory*, a ſort of bee of a larger ſize than the common working bee, which being unprovided with the neceſſary apparatus, never goes out to work, in collecting either wax or honey, but lives on the honey collected by the reſt. Theſe are the males of the ſwarm; the common working bees are of no ſex at all, or rather females in diſguiſe, and the female is uſually only one in a hive: for there is reaſon to conclude, from numerous late experiments, that the queen-bee lays only two kinds of eggs, thoſe that are to produce *drones*, and thoſe from which the working bees are to proceed. The proportion of *drones* to other bees in ſwarms is various; ſome having more than others. See Queen *Bee*.

This larger ſpecies of *drones* may be eaſily diſtinguiſhed from the working bees, by being nearly double their ſize. Their head is round, their eyes full, their tongue ſhort, and belly broader and more obtuſe than that of the other claſſes; they are likewiſe of a darker colour, and more thickly cloathed; and they make a much greater noiſe in flight, ſo that they may be eaſily known, though unſeen. They have alſo no ſting, as the other bees have.

The diſſection of the *drone*-bee gives as great proof of its being the male, as that of the queen does of her being female. In this creature there is no appearance of ovaries or eggs, nor any thing of the ſtructure of the common working bees, but the whole abdomen is filled with tranſparent veſſels, winding about in various ſinuoſities, and containing a white or milky fluid. This is plainly analogous to that fluid in the males of other animals,

mals, which is deſtined to render the eggs of the female prolific; and this whole apparatus of veſſels, which much reſembles the turnings and windings of the ſeminal veſſels in other animals, is plainly intended only for the preparation and retention of this matter, till the deſtined time of its being emitted on the eggs. At the extremity of the laſt ring of the body is placed the aperture of the anus in the female, and in the working bees; and it is at this aperture, that the ſting is alſo thruſt forth; but the caſe is quite otherwiſe in the *drone* or male bee; for the extremity of that ring is not open, but abſolutely cloſed; and the aperture of the anus is in the under part of that ring about its middle. On preſſing the body of this bee, there is alſo forced out at this part the penis; this is a ſmall and ſlender fleſhy body, contained between two horns of a ſomewhat harder ſubſtance, which join at their baſe, but gradually part aſunder as they are continued in length. When the preſſure is continued, there are finally thruſt out at the ſame aperture a part of the internal apparatus of the ſeminal veſſels, and, in fine, there is uſually ſome of the milky liquor extravaſated; but this ſeems rather to be let out by the burſting of a veſſel, than by any natural paſſage. Theſe parts, found in all the *drones*, and none of them in any other bees except theſe, ſeem to prove very evidently the difference of ſex; but there is one thing extremely remarkable in regard to them, which is, that though they appear ſo evidently on being forced out of the body by preſſure, yet it is very difficult to find them in it on diſſection. The cauſe ſeems to be their ſwelling when expoſed to the air; and Swammerdam ſuppoſes, that to this purpoſe they are furniſhed with a great number of tracheæ, which readily admit the air as ſoon as ever they are expoſed to it.

Maraldi, as well as Swammerdam, diſcovered in the ſtructure of the *drones* ſome reſemblance to the male organs of generation, and from thence concluded that they were the males; but neither of theſe accurate and induſtrious obſervers could detect them in the act of copulation. Swammerdam, therefore, entertained a notion, that the female or queen-bee was fecundated without copulation; that it was ſufficient for her to be near the males, and that her eggs were impregnated by a kind of vivifying aura, exhaled from the body of the males, and abſorbed by the female. However, M. Reaumur thought, that he had diſcovered the actual copulation of the *drones* with the female bee, and he has very minutely deſcribed the proceſs of it. Hiſt. Inſect. tom. x. p. 128. 149. 157.

Nevertheleſs, many of the ancients, as well as moderns, have ſuppoſed that the eggs of the female bee are not impregnated with the male ſperm, while in the body of the creature; but that they are depoſited unimpregnated in the cells, and that the male afterwards ejects the male ſperm on them, as they lie in the cells; in the ſame manner as the generation of fiſhes is ſuppoſed to be performed by the males impregnating the ſpawn after it is caſt out by the females.

M. Maraldi long ſince conjectured that this might be the caſe; and he was confirmed in the opinion, by obſerving a liquid whitiſh ſubſtance ſurrounding each egg at the bottom of the cell, a little while after it had been laid, and that a great number of eggs, which were not encompaſſed by this liquor, remained barren in the cell. Hiſt. Acad. Sc. 1712. p. 332. See *Generation of* BEES.

This method of impregnation has been lately eſtabliſhed beyond all contradiction by the obſervations of Mr. Debraw of Cambridge. Having put ſome bees into glaſs-hives with a large number of *drones*, he obſerved on the firſt or ſecond day (always before the third) from the time in which the eggs were placed in the cells, which the queen generally lays on the fourth or fifth day after they are put into the hive, that a great number of bees faſtened themſelves to one another, and formed a kind of curtain from the top to the bottom of the hive, probably in order to conceal the proceſs of generation. Mr. Debraw, however, could ſoon perceive ſeveral bees, whoſe ſize he was not able to diſtinguiſh, inſerting the poſterior part of their bodies each into a cell, and ſinking into it; after a little while they retired, and he could ſee with the naked eye a ſmall quantity of whitiſh liquor left in the angle of the baſe of each cell, containing an egg; this liquor was leſs liquid than honey, and had no ſweet taſte. See *Generation of* BEES.

In order farther to aſcertain the fact, that the eggs are thus fecundated by the males, Mr. Debraw took a ſwarm of bees, and having ſeparated the *drones*, by ſhaking all the bees into a tub of water, and leaving them in it till they were quite ſenſeleſs, replaced the working bees and their queen, as ſoon as they were recovered, by ſpreading them on a brown paper in the ſun, in a glaſs hive. The queen laid eggs, ſome of which, at the end of twenty days, were hatched into bees, others withered away, and ſeveral of them were covered with honey. Suſpecting that ſome of the males, having eſcaped his notice, had impregnated only part of the eggs, he was anxious to aſcertain the fact; and with this view he removed all the brood-comb that was in the hive, and determined to watch the motions of the bees after new eggs were depoſited in the cells. On the ſecond day he perceived the operation, already related in a former caſe; and on taking out a piece of the comb, containing two of the bees which had thruſt the poſterior part of their bodies into the cell, he examined them, and found that they had no ſting; and upon diſſection, he diſcovered in them, by the help of a microſcope, the four cylindrical bodies, containing the whitiſh liquor above deſcribed, which Maraldi has obſerved in the large *drones*. In a ſubſequent experiment, Mr. Debraw ſeparated from the ſame parcel of bees all that had no ſtings; and he found no leſs than fifty-ſeven of the number exactly of the ſize of common bees, which on being preſſed between the fingers, yielded a ſmall quantity of whitiſh liquor. Having killed all theſe, the remainder of the ſwarm was reſtored to the hive. On the fourth or fifth day, the queen-bee depoſited her eggs in the cells, but no part of the proceſs of impregnation could be diſcovered; the eggs, after the fourth day, inſtead of changing in the manner of caterpillars, remained in the ſame ſtate they were in the firſt day, except that ſome of them were covered with honey: all the bees left their hive, and attempted to get into a neighbouring hive, probably in ſearch of males; but the queen was found dead, having been killed in the engagement. Mr. Debraw made another experiment, which muſt be conſidered as an *experimentum crucis*, and abſolutely deciſive on this ſubject. He took a part of the unimpregnated brood-comb, and placed it under a glaſs bell, in which he confined a queen, and ſome common bees, without any *drones*; the other part of the ſame brood-comb he put under another glaſs bell, with a few *drones*, a queen, and a number of common bees. In the former glaſs the eggs remained in the ſame ſtate; there was no impregnation; and when the bees were releaſed on the ſeventh day, they all flew away. The *drones*, in the other glaſs, were obſerved to impregnate the eggs in every cell, on the day after they were put in; the bees remained in the hive, and in the courſe of twenty days every egg underwent the neceſſary transformations, and a numerous young colony was thus produced. Phil. Tranſ. vol. lxvii. part i. art. 3. See QUEEN-*Bee*.

Maraldi and Reaumur had long ago diſcovered, that there were *drones* of the ſame ſize with the common bees; but theſe curious experiments, beſides aſcertaining the fact, throw new light on their importance and uſe, and remove conſiderable difficulties, which embarraſſed the proceſs of generation among theſe uſeful inſects. It is well known that the large *drones* never appear in the hive before the middle of April, and that they are all dead before the end of Auguſt, when the principal breeding ſeaſon terminates; and they are deſtroyed, together with all their worms or nymphs, by the working bees, probably by order of the queen to ſave honey; and yet it is equally certain that the bees begin to breed early in the ſpring, ſometimes in February, if the weather is mild; and that many broods are completed before theſe *drones* appear. But if *drones* of a ſmaller ſize are ſuffered to remain, which in a time of ſcarcity conſume leſs honey than the others, theſe will anſwer the purpoſe of ſupplying the early broods, and the larger *drones* are produced againſt a time of greater plenty.

An ingenious friend of the editor, who amuſes himſelf with obſerving the œconomy of bees, and who has long ſince diſcovered the ſmall *drones*, and from whoſe amuſements the world may probably derive uſeful information with regard to theſe inſects, aſſures him, that theſe ſmaller *drones* are all dead before the end of May, when the larger ſpecies appear, and ſuperſede their uſe.

It was not without reaſon that a modern author ſuggeſted, that a ſmall number of *drones* are reſerved to ſupply the neceſſities of the enſuing year; and that theſe *drones* are very little, if at all larger, than the common bees. Nat. Diſp. p. 90.

DRONE-*fly*, or BEE-*fly*, a two-winged fly, ſo extremely like the common bee as to be at firſt ſight not eaſily diſtinguiſhable from it. The diſtinction between the two inſects, however, beſide the different number of their wings, is, that the bee has a ſomewhat longer and leſs thick body, and the head is proportionably much ſmaller than that of the fly which ſo much reſembles them. The bee-fly alſo ever carries its wings parallel in their poſition, but without its body; whereas the bee itſelf uſually carries its wings croſſed on the back, and covers its body with them; this is not however an invariable poſture

ture with the wings of the bee, though it is the moſt frequent one. The bee-fly is found among the flowers, as is the bee; and though it gathers no wax, it has a trunk by means of which it ſucks the honey.

The trunk, by means of which the fly is enabled to do this, has no teeth, and conſequently the fly belongs to Mr. Reaumur's firſt general claſs of the two-winged flies; and the form of its body, which is ſhort and flat, determines it to be of his firſt ſubordinate genus of that claſs.

The moſt ſingular and obſervable part of the life of this inſect is that which it paſſes without wings, and in form of a fly-worm and nymph. The general exterior form of the fly-worms of this genus has been well enough known to the generality of naturaliſts; and Goedart, Merian, and Albinus, were well acquainted with them ſo far; but they did not give themſelves the trouble of a farther examination, and were not ſenſible that theſe worms had many obſervable things to offer to our conſideration.

The matter among which they are found is that of all others the moſt offenſive and diſagreeable. They are of the claſs of thoſe with variable heads; but their great diſtinction from all others is their having a long ſlender tail. This at different times the worm makes of very different lengths, but in its ſhorteſt it is longer than the body of the creature. It is round, ſmooth, and at times extremely ſmall at the extremity, and ſometimes much reſembles the tail of a rat; whence the whole claſs of theſe worms are well diſtinguiſhed by the name of rat-tailed worms.

To know the uſe of the tail of this worm, it is however neceſſary firſt to underſtand the nature of the worm itſelf. Theſe worms being uſually found on dry land, and only picked up now and then ſparingly, gave the world for a great while no room to believe that they were ſo numerous as they really are; nor had people any idea that they were to look for them in the water. In examining veſſels of corrupted and ſtinking water, however, they have been found in very great multitudes together, lying among the mud at the bottom. Theſe taken out of this filth, and put into veſſels of clean water, will ſoon ſhew the curious obſerver the uſe of their long tails. Notwithſtanding that theſe worms are to live under water, and in mud, there is no doubt to be made but that, like other of water-fly worms, they have a neceſſity of breathing freſh air; and it is to this great purpoſe that their long tail ſerves them; for while they lie buried in the mud, this is extended up to the top of the water, and being open at the extremity lets the air into the body of the creature. It is a pleaſing ſight to obſerve, that theſe animals, after having been put into a veſſel of freſh water, all get quickly to the bottom, and each thruſts up the extremity of its tail to the ſurface.

It is very eaſy, from ſeeing that at whatever depths the worms lie, their tails ſtill reach the ſurface, to conclude, that they have a power of lengthening them at pleaſure. The ready way to be aſſured of this is to add depth to the water, by pouring more into the veſſel; for as the worms love the bottom, they muſt, if they will remain there, lengthen their trails proportionably, in order to breathe from the ſurface. The repeating ſeveral of theſe additions ſhews, that the worm is able to extend its tail to the length of five inches; an extremely remarkable length for a creature, whoſe body is not much more than half an inch, and whoſe tail in its more common ſtate is not much longer than that. Five inches is however the ſtint, beyond which they cannot go in this action; and when the water in the veſſel is made of a greater depth, the worms leave the bottom, and either crawl up the ſides of the veſſel to a proper height, or elſe ſwim in the water at the depth of five inches, which is the depth at which they carry their tails up to the ſurface.

The organization of ſo remarkable a part as the tail of this animal, cannot but appear to the curious greatly worth the enquiring into; and the tranſparence both of it, and of the body of the creature, is ſuch as to favour very greatly this examination. And indeed in many of the younger of theſe worms, and ſuch as have not yet come to the ſtate at which they quit the water, one may diſtinguiſh the parts within the body as plainly almoſt as if placed for examination in a glaſs tube. It is eaſy in all ſtates of the worm to diſtinguiſh that the tail is compoſed of two hollow tubes, the one of which nicely fits, and is eaſily retracted within the other, or thruſt out of it again, as the creature's occaſions require. The outter and larger tube ſeems an elongation of the fleſhy matter that forms the rings of the body. It is white like the body, and is compoſed of a vaſt number of rings, as the body is. Within this is lodged a leſſer pipe, a great part of which is of a blackiſh brown; and by means of this colour the inner tube may be diſtinguiſhed, even when it is wholly within the other. This inner one may be called the tube of reſpiration. It is eaſy to ſee now that the tail of the worm may be made more and more long, as his inner tube is thruſt out of the other, which ſerves it as a caſe or ſheath. But this is not all; it is eaſily known that theſe pipes are in themſelves capable of extenſion, by obſerving, that when the whole inner tube is lodged within the caſe, or outer one, yet this is of no determinate length, but is ſometimes longer, ſometimes ſhorter.

Many of the water-fly worms do not quit that element till they arrive to the fly ſtate; but this ſpecies, as ſoon as they have acquired their full growth, leave the water, and crawl upon the earth. Their bodies in this new element become dirty and greyiſh; and when they have found a proper ſpot of ground where the earth is ſoft and moiſt, they bury themſelves, and, after a neceſſary time for their change, come out in the form of flies. Their changes are all made under a ſhell of their own ſkin, which in a few hours is found beginning to harden, and by degrees becomes very firm, of a yellowiſh colour, and is remarkable for having four horns, two larger, and two ſmaller, placed in different directions near the head; and theſe are the organs of reſpiration to the encloſed nymph.

Theſe are the changes of the flies of this claſs. They are of ſeveral ſpecies, and differ in ſize not leſs than the worms from which they are produced. Of theſe the largeſt are found in vaults and privies; and in winter, multitudes of them may be met with in the hollows of willows, and other trees where there is water. Reaumur.

DRONTE, in *Ornithology*. See Dodo.

DROPAX, Δρωπαξ, in *Pharmacy*, an external medicine, in form of a plaſter, uſed to take off the hairs from any part. See Hair, and Depilatory.

The *dropax* is of two kinds, *ſimple*, and *compound*. The *ſimple* is made of an ounce of dry pitch, and two drachms of oil.

The *compound* is made with pitch, wax, colophony, common ſalt, bitumen, ſulphur vivum, pepper, euphorbium, cantharides, and caſtor. There are alſo other ways of making it, to be found in the diſpenſatories.

It was anciently much in uſe alſo to warm the parts, to draw the blood and ſpirits to them, and to cure atrophies. To this purpoſe it was applied hot on the part affected, after firſt ſhaving it; and was pulled off again before it became quite cold; then heated afreſh, and applied again; and the operation thus repeated, till the part was rendered very red.

DROPPING, or Dripping, a term uſed among *Falconers*, when a hawk mutes directly downwards, in ſeveral *drops*, not throwing out her dung ſtraight forwards.

DROP, in *Sea-Language*, is a name ſometimes given to the depth of the principal ſails: thus, a main-top-ſail *drops* ſeventeen yards.

DROPS, in *Architecture*. See Guttæ, and Triglyph.

Drops, in *Medicine*, a liquid remedy, whoſe doſe is eſtimated by a certain number of *drops*.

Drops, in *Meteorology*. See Rain.

The ſpherical figure, into which the *drops* of fluids conform themſelves, is a phænomenon that has a little perplexed the philoſophers. The ſolution commonly given, was, that the equable, uniform preſſure of the ambient, or incumbent atmoſphere, cloſed them into this form. But this account will no longer paſs; now that we find that the phænomenon holds in vacuo as well as in air.

The Newtonian philoſophers, therefore, aſcribe it to their attraction, which being greater between the ſeveral particles of the fluids, than between them and thoſe of the medium, they are, as it were, concentrated, and brought as near each other, and into as little compaſs, as may be; which cannot be, without their being ſpherical.

Thus, Sir Iſaac Newton: *Guttæ enim corporis cujuſque fluidi, ut figuram globoſam inducere conentur, facit mutua partium ſuarum attractio; eodem modo quo terra mariaque in rotunditatem undique conglobantur, partium ſuarum attractione mutua, quæ eſt gravitus.* Opt. p. 338.

Drops, *Engliſh*, or *volatile Engliſh drops*, *Guttæ Anglicanæ*. See Guttæ *Anglicanæ*.

DROPPER. See Fishing.

DROPSY, Ὑδρωψ, in *Medicine*, a preternatural collection of ſerum, or water, in ſome part of the body.

The word is compounded of the Greek ὑδωρ, *water*.

The *dropſy* acquires different names from the different parts it afflicts, or the different parts the waters are collected in. That of the abdomen, or lower belly, called ſimply, and abſolutely, *dropſy*, is particularly denominated ASCITES. That of the whole habit of the body, in which a ſerous humour is collected through the whole cellular ſyſtem, and lodges under the ſkin, *ανασαρκος*, is called ANASARCA, or *leucophlegmatia*. That of the head, HYDROCEPHALUS. That of the ſcrotum, HYDROCELE. There is alſo a ſpecies of this diſeaſe, ſuppoſed to be cauſed, inſtead of water, by a collection of wind, called *tympanites*, and by Hippocrates, the *dry dropſy*. See EMPHYSEMA.

We alſo meet with *dropſies* of the breaſt, lungs, pericardium, ovaries, uterus, &c.

Some think that the anaſarca, leucophlegmatia, hydrops aſcites, tympanites, hydrocele, &c. differ ſo exceeding little, that it is ſcarce worth while to retain ſo many pompous Greek names. Medic. Eſſ. Edinb. vol. i.

The general cauſe of all *dropſies* is the exhalent veſſels throwing off more fluid than the abſorbent veſſels can take up; and the remote cauſes are whatever may obſtruct the ſerous part of the blood, ſo as to make it ſtagnate in the veſſels; or burſt the veſſels themſelves, ſo as to let the blood out among the membranes; or weaken and relax the tone of the veſſels; or thin the blood, and make it watery; or leſſen the perſpiration, and the vital heat.

Theſe cauſes are various; viz. ſometimes acute diſeaſes, ſcirrhous tumors of any of the more noble viſcera, exceſſive evacuations, particularly hæmorrhages, and remote fluxes of the belly, ſuppreſſion of cuſtomary evacuations, as the menſes, hæmorrhoids, &c. want of exerciſe, hard drinking, eſpecially of ſpirituous liquors, drinking of cold, weak, watery liquors, after having been accuſtomed to liquor of a more generous kind, or when the body has been heated by violent exerciſe, the uſe of aliment that is viſcous, and hard of digeſtion, living in a low, damp, marſhy ſituation, &c.

The aſcites, or *water-dropſy* of the abdomen, is the moſt uſual caſe, and what we particularly call the *dropſy*. In this diſorder, the water is accumulated in the cavity of the belly, between the peritonæum and the viſcera, in the dilated cavities of the glands, or other veſſels contained in the abdomen, or in the duplicature of the peritonæum: its ſymptoms are tumors, firſt of the feet and legs, and afterwards of the abdomen, which keep continually growing; and if the belly be ſtruck, or ſhaken, with one hand, whilſt the other hand is placed on the oppoſite ſide, there is heard a quaſhing of water. Add to this three other attendants, viz. a dyſpnœa, intenſe thirſt, and ſparing urine; with which may be numbered heavineſs, liſtleſſneſs, coſtiveneſs, a ſlight fever, and an emaciation of the body.

This ſpecies of *dropſy* ſhould be carefully diſtinguiſhed from pregnancy, excreſcences, and other tumors in the belly, and from a tympany. In young and ſtrong patients, this diſeaſe, if taken betimes, may admit of a cure; but if the patient be old, or has led an irregular, or a ſedentary life, or if there be any reaſon to ſuſpect that the liver, lungs, or any of the viſcera, are unſound, there is ground to fear that the conſequences may prove fatal. When the anaſarca and aſcites are combined, the caſe is very dangerous.

The curative indications are two; viz. the evacuation of the water, and the ſtrengthening of the blood and viſcera. The firſt is effected by ſtrong purgatives, particularly elaterium, and the infuſion of crocus metallorum, though this laſt works upwards more than downwards. Purging medicines of different kinds will be required for different patients, and for the ſame patient at different times; but, in general, for the ſtronger, calomel and jalap; and for the weaker, calomel and rhubarb will be proper. Occaſional doſes of ipecacuanha in powder, and oxymel of ſquills, may be likewiſe adminiſtered as emetics.

But if the diſeaſe proceeds from a bad habit, or an unſound ſtate of the viſcera, ſtrong purges and vomits ſhould be avoided, and recourſe be had to ſuch medicines as will palliate the ſymptoms, by promoting the ſecretions, and to warm nouriſhing cordials for ſupporting the patient's ſtrength. For ſuch as are too weak to bear purgatives, Dr. Sydenham recommends diuretics, whereof the beſt are thoſe made of the lixivial ſalts; to which hellebore may be joined, for increaſing their effects.

Dr. Baker's tonic pills have been celebrated in *dropſies*, both as diuretic and purgative. The recipe for preparing them is as follows:

> ℞ Extract. helleb. nigr. myrrhæ ſolut. āā ℥i. card. bened. pulv. ʒiii. & ℈i. m. f. maſſa aere ſicco exſiccanda; donec formandis pillulis apta ſit; ſingul. ad gran. ſemiſſ.

Theſe pills have been given in different numbers, up to thirty, for a doſe, taken by ten at a time, and an hour between each portion.

The following diuretic infuſion, taken every four or five hours a day, may be of conſiderable ſervice: take juniper-berries, muſtard-ſeed, and horſe-raddiſh, of each half an ounce; infuſe them in a quart of Rheniſh wine, or ſtrong ale, for a few days, and ſtrain off the liquor. Or, take of zedoary root, two drams; dried ſquills, rhubarb, and juniper-berries bruiſed, of each a dram; cinnamon in powder, three drams; ſalt of wormwood a dram and a half; infuſe them in a pint and a half of old hock wine, and filter the liquor; and let a wine-glaſs of it be taken three or four times a day.

Nitre, taken in the quantity of a dram every morning, has produced a very good effect; and the ſame diuretic purpoſe may be anſwered by ſix or eight grains of the powder of ſquills, with a ſcruple of nitre, adminiſtered twice a day in a glaſs of ſtrong cinnamon-water. Others have extolled the efficacy of a large ſpoonful of unbruiſed muſtard-ſeed, taken every night and morning, with half a pint of the decoction of the tops of green broom drank after it. Cream of tartar, the doſes of which may be gradually increaſed to two or three ounces a day, have been uſeful in ſome caſes.

The decoction of ſeneka root, or Mindererus's ſpirit, taken in a doſe of two table ſpoonfuls, in a cup of wine, three or four times a day, will promote perſpiration. Dr. Percival, for this purpoſe, recommends rubbing the ſkin every night and morning with dry cloths, fumigated with camphor, and giving internally the julep and camphor; ſo that a dram of camphor may be taken in a day. Wainwright extols an infuſion of green tea in Rheniſh wine, and alſo briony juice, as excellent in this diſeaſe. Some alſo commend garlic.

Dropſies, attended with anaſarcous ſwellings, are not to be cured with purging alone, nor by ſoap, nor mercurials; but chiefly by the lixivial ſalts, either in the form of broom-aſhes, ſalt of wormwood, or ſalt of tartar. The common method is this: about thirty or forty grains of ſalt of tartar is diſſolved in an infuſion of wormwood, to which is added ſpirit of juniper; and this mixture is to be given in three doſes, and repeated daily. Beſides this it may be proper to give the patient, once in four or five days, half a dram of *pilulæ ex coloquintida cum aloe*, as a purge; and toward the decline of the diſeaſe, ſome common chalybeate. The diureſis may alſo be promoted by ſwallowing garlic, or muſtard-ſeed. See Pringle's Obſerv. on Diſeaſes of the Army, p. 213.

Dr. Buchan obſerves, that he has known an obſtinate *anaſarca* cured by the infuſion of broom-aſhes in wine. It may be obſerved in general, that, when the water of an *aſcites* is carried off by any other means than by a puncture through the peritonæum, it is done by that operation of nature called ABSORPTION; and hence is derived the principal uſe of purgatives, ſudorifics, and diuretics. Lond. Med. Obſ. vol. ii. art. 2.

For the ſecond intention, exerciſe, and change of air, wine, and other generous liquors, alſo ſtomachics, chalybeats, and other corroborating medicines, are preſcribed.

The diet ſhould be dry and nouriſhing; the pungent and aromatic vegetables, as garlic, muſtard, onions, horſe-raddiſh, &c. may be freely uſed. The beſt liquor is Spa water, or Rheniſh wine. The patient ſhould alſo have his body rubbed, two or three times a day, with a hard cloth, or the fleſh-bruſh; and always wear flannel next his ſkin.

Where other means fail for evacuating the water, recourſe is to be had to the PARACENTESIS, or operation of tapping. This will, at leaſt, prove a palliative; and if uſed ſoon enough may even effect a cure; but a delay is very dangerous.

Exerciſe is recommended to hydropic people immediately before tapping, that the groſſer particles in the water of their belly may be mixed with the thinner, and ſo run out with them. And if there is reaſon to ſuſpect any ſuch groſs parts remaining after the operation, ſome adviſe the injection of barley-water to dilute and bring them away.

We have lately had accounts, in the Philoſophical Tranſactions, of *dropſies* cured by tapping, and afterwards injecting Cahor wine, mixed with Briſtol water.

There is alſo an account of an uncommon *dropſy*, from the want of a kidney, in the Philoſophical Tranſactions. The ſubject was a young woman; the water evacuated from the abdomen on diſſection, meaſured near half a hogſhead, and was contained in a large ſack, which almoſt occupied the whole cavity of the abdomen above ſix feet in circumference, and extended upwards of four feet from the xyphoid cartilage, to the os pubis. The figure and deſcription of this ſack, and the adjacent parts, may be ſeen in Phil. Tranſ. N° 482. ſect. 2.

We read of an hydropic body becoming ſo infectious, that the ſurgeon who tapped the corpſe, was thrown into a peſtilential fever. Phil. Tranſ. N° 454. ſect. 4.

Baglivi notes, that in a *dropſy* ariſing from a morbid liver, there is always a vehement dry cough; which is never obſerved in any other ſpecies.

DROPSY *of the breaſt*, *Hydrops Pectoris*, ariſes from water extravaſated in the breaſt on one or both ſides of the mediaſtinum; or contained in *hydatides*, ſituated on the diaphragm,

phragm, pleura, lungs, heart, or pericardium. This may be occaſioned by a diſorder of the lungs, or the rupture of a lymphatic, or by any of the cauſes of a common *dropſy*. Inſtances have rarely occurred in which the water hath been abſorbed; but the diſeaſe is commonly very dangerous. When the water is perceived to fluctuate, it may be drawn off by a canula and trochar, introduced between the fourth and fifth of the falſe ribs, and about four finger's breadth from the ſpines. Le Dran's Oper. ed. 2. p. 117, 118. Motherby's Dict.

DROPSY *encyſted*. See DROPSY *of the lungs*.

DROPSY *of the head*. See HYDROCEPHALUS.

DROPSY *of the knee*, *Hydrops Genu*, is formed by water collected under the capſular ligament of the knee. Mr. Sharp recommends, for a cure, a tight bandage, leaving the ſuperfluity to be abſorbed by the bibulous veins; to which may be added ſome attenuating and diſcutient embrocations. Gooch's Caſes, &c. vol. ii. p. 259. 266. Motherby. See SPINA *ventoſa*.

DROPSY *of the lungs*, *Hydrops Pulmonum*, is ſeated in the cellular membrane of the lungs. This is a very uncommon diſtemper; but it has been ſometimes obſerved by the phyſicians of our own nation. The moſt perfect account, however, any where given of this diſeaſe, is that of Mr. Maloet, of the Paris academy, in the caſe of a poor invalid ſoldier, whom he had attended through all the ſtages of it. He had a very great difficulty of reſpiration, accompanied with a ſlow fever. When in bed he could neither lie with eaſe on either ſide, nor on his back; but was forced to lie upon his belly, and conſequently, as that was a very troubleſome poſture, he uſually took his reſt in a chair. His hands and arms were much ſwelled, as were alſo his legs and feet, and his urine was of a brick colour. Mr. Maloet, from all theſe circumſtances, ſuſpected water in the breaſt, but was never able to perceive any fluctuation, into whatever change of poſture he made the patient go, nor could he find that the man himſelf ever perceived any ſuch ſenſation within him. The unhappy creature died, after two years illneſs; and his body being opened, there was no water found looſe in the breaſt, but on each ſide of the lungs there was obſerved an oval tumor of ſix inches long, and four inches broad; they were both of the ſame ſize, and on touching them with the hand, there was a very ſenſible fluctuation obſerved. On opening theſe, water run out in a large quantity; and on examining their ſtructure, they were found encyſted tumors, with conſiderably thick membranes, compoſed of ſeveral beds, or coats of matter, but with no blood-veſſels diſtinguiſhable in them. Examining the liver, there was found another encyſted tumor there, the contents of which were a lymph, tinged to a yellowiſh green by gall. Mem. Acad. Par. 1732.

This diſorder may be relieved by a briſk mercurial cathartic, and liberal doſes of the ſeneka root, and other diuretics and ſudorifics. In a deſperate caſe an opening may be tried, as in the operation for the EMPYEMA, and a puncture may be made into the lungs for diſcharging its morbid contents. Edinb. Med. Eſſ. vol. vi. p. 126. Percival's Eſſ. Med. and Exp. p. 172. Motherby.

DROPSY *of the ovaries*, *Hydrops Ovarii*, is of the encyſted kind, and ſometimes happens to pregnant women, but moſt frequently to the barren and ſuperannuated. The patient in the commencement and firſt progreſs of this diſeaſe has neither bad health nor pain. It is not perceptible, while ſmall, except in particular ſituations. At firſt it is commonly ſituated towards one ſide, in the lower part of the belly, and is moveable under the hand; then it becomes gradually more fixed, more extended both forwards and upwards in the belly, and more painful and oppreſſive to the patient. When the cyſt is ſingle, and extended over the whole abdomen, it cannot be diſtinguiſhed by feeling from a common *aſcites*; but when there is a number of cyſts, the inequalities in the ſwelling are generally ſenſible from firſt to laſt. Dr. Hunter obſerves, that the *dropſy* of the ovarium is an incurable diſeaſe, and that a patient will have the beſt chance of living longeſt under it, who does the leaſt to get rid of it. He is of opinion, that the *trocar* is almoſt the only palliative; and that a radical cure by the exciſion of the cyſt can hardly be attempted; and that inciſion and ſuppuration are operations which cannot be recommended, but under very particular circumſtances, and that they change the *dropſy* into an incurable *fiſtula* in the belly. The diſorder generally terminates in an univerſal *leucophlegmatia*. However, Dr. Percival gives an inſtance of a cure being effected by a ſpontaneous vomiting. Lond. Med. Obſ. &c. vol. ii. p. 41, &c. Percival's Eſſ. Med. and Exp.

DROPSY *of the ſcrotum and teſtis*. See HYDROCELE.

DROPSY *of the Womb*, *Hydrops Uteri*, is ſeated in the cavity of the womb. It is diſtinguiſhed from the *aſcites*, by being confined to the region of the uterus, and by the thinneſs of the *os tincæ*. When it proceeds from a ſchirrhus, it is never in the middle, nor is it round, as in the common *dropſy*. A *canula* introduced into the womb promiſes the beſt and ſpeedieſt remedy; but this is ſometimes prevented by a ſchirrhus, cicatrix, or tubercles; in which caſe recourſe muſt be had to hard riding, emetics, ſternutatories, and briſk cathartics. Borax may be given from ten to twenty-five grains twice a day as a deobſtruent, and a peſſary may be alſo tried. Motherby, and James, art. HYDROPS.

DROPWORT, in *Botany*. For the characters, ſee SPIRÆA.

The common *dropwort* grows plentifully upon chalky grounds in many parts of England. The roots conſiſt of a great number of oval knobs or glandules, which are faſtened together by ſlender fibres, from whence it had the name of *dropwort*. The leaves are winged, and compoſed of many ſawed lobes, which are almoſt placed alternately along the mid-rib. Thoſe near the baſe are the ſmalleſt; the others increaſe in ſize to the middle; and decreaſe afterward again to the point. The flower-ſtalk riſes a foot or more in height, and has ſeldom more than one leaf upon it; the top is garniſhed with looſe bunches of ſmall white flowers, ſtanding upon ſlender foot-ſtalks, which are ſucceeded by ſeveral capſules, ranged circularly. The roots of theſe plants are uſed in medicine, and are accounted diuretic. It is rarely kept in gardens; but there is a variety with double flowers, which was found growing naturally in the north of England; that is kept in gardens for the ſake of variety.

They are propagated either by ſuckers, which they produce in great abundance, or by laying down the tender branches of the old plants. When they have taken root, they ſhould be removed into the nurſery for two or three years, and will then be fit for tranſplanting in the places where they are to remain.

DROPWORT, *Water*, *Oenanthe*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe; it is a plant with an umbelliferous flower; the principal umbel has but few rays; but the particular umbels have many ſhort ones; the rays of the principal umbel are diſform. Thoſe flowers in the diſk are hermaphrodite, and are compoſed of five heart-ſhaped inflexed petals, which are almoſt equal. The germen is ſituated under the flower, ſupporting two awl-ſhaped permanent ſtyles, crowned by two obtuſe ſegments; the germen afterward becomes an oval fruit, divided in two parts, containing two almoſt oval ſeeds, convex on one ſide, and plain on the other. There are five ſpecies.

One of the ſpecies of this plant, diſtinguiſhed by its yellow juice, and by growing near waters, is a very terrible poiſon. Many accounts have been given of people dying by it, but none which ſets its terrible effects in ſo juſt a light, as one which happened very lately to ſome French priſoners with us, and which is recorded in the Philoſophical Tranſactions, Nº 481.

It is extremely neceſſary that this dangerous plant ſhould be well known, as it grows very plentifully with us all about the banks of the Thames; and Mr. Watſon has cauſed a fine drawing, both of this, and of another poiſonous plant, which it is often confounded with, the cicuta aquatica, or water-hemlock of Wepfer, to be prefixed to that number of the Tranſactions where this account is given; and this ſeems the more neceſſary, as the plant ſeems to have been miſtaken in a manner by all the world, not only by the common people, but the more verſed in plants, having miſtaken it at times for ſeveral very different things. The ſame gentleman informs us, from various authors, that eight lads in Ireland had been poiſoned by it, miſtaking it for the root of the water parſnip; two men died by miſtaking it for the Macedonian parſley; and Wepfer, who wrote an expreſs treatiſe on the poiſonous nature of the water-hemlock, has confounded this plant with it, ſaying, that Lobel had deſcribed the water hemlock under the name of this *œnanthe*, or *dropwort*; and the generally accurate Hoffman, when treating of the vegetable poiſons, makes no mention of the difference between theſe two plants.

Neither the roots of this *œnanthe*, or thoſe of the cicuta aquatica, or water hemlock of Wepfer, have any diſagreeable flavour to deter thoſe who taſte of them from eating; and they both occaſion violent convulſions, and death, if not timely prevented. The intention of cure ſeems in both the ſame; firſt by emptying the ſtomach and inteſtines as ſoon as poſſible, and then cauſing the patient to drink largely of oleaginous fluids; there is great difficulty, however, in getting the patient to ſwallow any thing, the jaws being faſtened together by the ſpaſm. After the ſtomach has been freed from this pernicious vegetable, the ſymptoms have generally abated by degrees, and the patient has recovered.

Threlkeld mentions this plant as growing in Cumberland, where the people call it *dead tongue*, and uſe it as a poultice to the galled backs of their horſes. The German botaniſts do not mention it as growing among them, nor Haller in his Enumeratio Stirpium Helvetiæ; whence it ſeems to be ſeldom met with, except in England, Holland, and ſome parts of France.

DROSERA, in *Botany*. See SUN-*Dew*.

DROSOLITHUS, in *Natural Hiſtory*, the name of a ſtone to which many great virtues are attributed, by the writers of the middle ages; but the accounts they have left us of it, are too imperfect to give us any juſt idea of what ſtone it was. They ſay it was variegated with many colours; and that when laid upon the fire it ſweat or oozed out large drops of clear water, all over its ſurface.

DROVERS, are perſons that buy cattle in one place, and drive them for ſale to another. They are to be married men, and houſholders, and to be licenſed by ſtatute 5 Eliz. cap. 12. And if they drive their cattle on the Lord's day, they ſhall forfeit 20*s.* by 1 Car. I. cap. 1.

DROUGHT, in the *Natural Hiſtory of the Air*, is a long continuance of dry weather. Great *droughts* are very prejudicial to the farmer and his paſture; and ſuch years afford but very little reward for the labour and expence of keeping it in order. The only remedies are high incloſures, and plenty of water at hand. The firſt of theſe is always in the farmer's power, and ſhould be carefully provided by planting hedges in a proper manner, in counties moſt ſubject to ſuffer by this diſadvantage. The other is not always ſo eaſy, but may be managed ſeveral ways, as by ſinking wells; but theſe, when deep, are very expenſive; or by bringing the water in pipes, gutters, or other conveyances; and this is eaſily done where there is a ſpring or brook in the neighbourhood higher than the lands. Pumps, wheels, and ſuch other engines, are alſo uſed in ſome places to bring on the water; and in others, ponds, ciſterns, and receptacles, are made to take in the rains and winter floods, and retain the water till ſummer, when it is wanted.

The farmers of England are very deficient in this laſt method, which they might uſe to their great benefit in many places. In Spain they have no water in many parts but what they preſerve in this manner. And at Amſterdam and Venice they have whole cellars made into ciſterns, which receive the water that falls in rains, and preſerve it all the year. Want of water for the cattle in ſummer in many places might be eaſily remedied by ſome care of this kind; and many thouſand acres of land made uſeful, which are now left as waſte, by this means alone. The practicability of thus obtaining water is evinced by its being done in places where there falls much leſs rain annually than with us; and yet by this the inhabitants have always freſh water enough for the uſe of their houſes, cattle, and gardens, none of which ever fail. See CISTERN.

DROWNING, the act of ſuffocating, or being ſuffocated, by water.

People not accuſtomed to diving, Dr. Halley obſerves, begin to *drown* in about half a minute's time.

Drowning was anciently a kind of puniſhment. In the time of Louis XI. of France, the chronicles aſſure us, that they frequently *drowned* their criminals, inſtead of hanging them. Chron. Scand. See FOSSA and FURCA.

Natural hiſtorians and phyſicians furniſh us with divers well atteſted inſtances of ſurpriſing recoveries of perſons *drowned*; which, if maturely conſidered, might perhaps let a little light into the dark notions of life and death.

We ſhall not particularly recite the improbable ſtories mentioned by Pechlin, De Aer. & Alim. Def. cap. 10. of one who was under water ſixteen hours, of another who was under water three whole days, and of a third who was in this ſtate ſeven weeks, and recovered. *Sit penes ipſum fides.* But there are ſeveral unqueſtionable facts, though they have rarely occurred, in every country, which ſhew the poſſibility of a recovery from ſudden death, whether by apoplexy, convulſive fits, ſuffocation by noxious vapours, ſtrangulation by the cord, or *drowning*. However, inſtances of this kind merely excited tranſient attention and ſurprize, and many perſons were loſt for want of proper attempts for their recovery. This was particularly the caſe in Holland, where, from the great abundance of canals and inland ſeas, the inhabitants are much expoſed to accidents by water; and where many perſons were *drowned* every year for want of aſſiſtance. In 1767, a ſociety was formed at Amſterdam, which offered premiums to thoſe who ſhould ſave the life of a citizen in danger of periſhing by water; and which propoſed from time to time, to publiſh the treatment, and method of recovery, obſerved in ſuch caſes. This inſtitution was every where encouraged through the United Provinces, by the magiſtrates, and by the ſtates general, and has been attended with very conſiderable ſucceſs; and it appears that no leſs than two hundred perſons have been recovered from death, by this inſtitution, in the ſpace of about ſix years. In ſeveral of theſe caſes, the recovered patients had continued upwards of an hour, without any ſigns of life, after they had been taken out of the water. Inſtigated by this example, the magiſtrates of health at Milan and Venice iſſued orders, in 1768, for the treatment of *drowned* perſons. The city of Hamburgh appointed a ſimilar ordinance to be read in all their churches, extending their ſuccour not only to the *drowned*, but to the ſtrangled, to thoſe ſuffocated by noxious vapours, and to the frozen. The firſt part of the Dutch Memoirs was alſo tranſlated into the Ruſſian language, by command of the empreſs. In 1769, an edict was publiſhed in Germany, extending its directions and encouragement to every accident, like death, that afforded a poſſibility of relief. In 1771, the magiſtrates of the city of Paris alſo founded an inſtitution in favour of the *drowned*; and in France they have been inſtrumental in ſaving forty-five perſons out of ſixty-nine, in about ſixteen months. In 1773, Dr. Cogan, and Mr. Hawes, of London, propoſed a plan for the introduction of a ſimilar inſtitution into theſe kingdoms. The plan was ſo well received and encouraged, that they were ſoon, viz. in 1774, enabled to form a ſociety, ſince called the Humane Society, for promoting its laudable deſigns.

The following abſtract of the plan of this ſociety, and method of treatment recommended by it, will not, we apprehend, be unacceptable to our readers. This ſociety has undertaken to publiſh, in as extenſive a manner as poſſible, the proper methods of treating perſons in the unfortunate circumſtances, to which they extend their relief; to diſtribute a premium of two guineas among the firſt perſons, not exceeding four in number, who attempt to recover any perſon, taken out of the water for dead, within thirty miles of the cities of London and Weſtminſter, provided they have not been longer than two hours under the water, and provided the aſſiſtants perſevere in the uſe of the means recommended for the ſpace of two hours, whether their attempts are ſucceſsful or not. Theſe rewards are alſo to include every other inſtance of ſudden death, whether by ſuffocation from noxious vapours, hanging, ſyncopies, freezing, &c. They propoſe to diſtribute in like manner four guineas wherever the patient has been reſtored to life; to give to any publican, or other perſon, who ſhall admit the body into his houſe without delay, and furniſh the neceſſary accommodations, the ſum of one guinea, and to ſecure them from the charge of burial in unſucceſsful caſes; and to preſent an honorary medal to thoſe medical gentlemen, or others, who give their aſſiſtance *gratis*, and who are provided with a fumigator, and other neceſſaries always in readineſs, in all thoſe caſes in which they may prove inſtrumental of ſucceſs. The device on one ſide of their medal is a boy, who is repreſented blowing an extinguiſhed torch, with the hope, as the legend, *Lateat ſcintillula forſan*, imports, that a little ſpark may ſtill remain. The reverſe exhibits a civic wreath, which was the Roman reward for ſaving the life of a citizen, with a blank for the name of a perſon to whom the medal may be given; the inſcription round the wreath, *Hoc pretium cive ſervato tulit*, expreſſes the merit which obtained it.

The following is the method of treatment recommended by the ſociety.

1. In removing the body to a convenient place, great care muſt be taken that it be not bruiſed, nor ſhaken violently, nor roughly handled, nor carried over the ſhoulders with the head hanging downwards, nor rolled upon the ground, or over a barrel, nor lifted up the hills. For experience proves, that all theſe methods are injurious, and often deſtroy the ſmall remains of life. The unfortunate object ſhould be cautiouſly conveyed by two or more perſons, or in a carriage upon ſtraw, lying as on a bed, with the head a little raiſed, and kept in as natural and eaſy a poſition as poſſible.

2. The body being well dried with a cloth ſhould be placed in a moderate degree of heat, but not too near a large fire. The windows or door of the room ſhould be left open, and no more perſons be admitted into it than thoſe who are abſolutely neceſſary; as the life of the patient greatly depends upon having the benefit of a pure air. The warmth moſt promiſing of ſucceſs is that of a bed or blanket, properly warmed. Bottles of hot water ſhould be laid at the bottom of the feet, in the joints of the knees, and under the arm-pits; and a warming-pan, moderately heated, or hot bricks wrapped in cloths, ſhould be rubbed over the body, and particularly along the back. The natural and kindly warmth of a healthy perſon lying by the ſide of the body has been found in many caſes very efficacious. The ſhirt or clothes of an attendant, or the ſkin of a ſheep freſh killed, may alſo

be uſed with advantage. Should theſe accidents happen in the neighbourhood of a warm bath, brew-houſe, baker, glaſs-houſe, ſaltern, ſoap-boiler, or any fabrick where warm lees, aſhes, embers, grains, ſand, water, &c. are eaſily procured, it would be of the utmoſt ſervice to place the body in any of theſe, moderated to a degree of heat, but very little exceeding that of a healthy perſon.

3. The ſubject being placed in one or other of theſe advantageous circumſtances as ſpeedily as poſſible, various ſtimulating methods ſhould next be employed. The moſt efficacious are, to blow with force into the lungs, by applying the mouth to that of the patient, cloſing his noſtrils with one hand, and gently expelling the air again by preſſing the cheſt with the other, imitating the ſtrong breathing of a healthy perſon. The medium of a handkerchief, or cloth, may be uſed, to render the operation leſs indelicate. If the lungs cannot be inflated in this manner, it may be attempted by blowing through one of the noſtrils, and at the ſame time keeping the other cloſe. Dr. Monro for this purpoſe recommends a wooden pipe, fitted at one end for filling the noſtril, and at the other for being blown into by a perſon's mouth, or for receiving the pipe of a pair of bellows, to be employed for the ſame purpoſe, if neceſſary. Whilſt one aſſiſtant is conſtantly employed in this operation, another ſhould throw the ſmoke of tobacco up by the fundament into the bowels, by means of a pipe, or FUMIGATOR, ſuch as are uſed in adminiſtering clyſters; or by a pair of bellows, till the other inſtrument can be procured. A third attendant ſhould, in the mean time, rub the belly, cheſt, back, and arms, with a coarſe cloth, or flannel, dipped in brandy, rum, or gin, or with dry ſalt, ſo as not to rub off the ſkin; ſpirits of hartſhorn, volatile ſalts, or any other ſtimulating ſubſtance, muſt alſo be applied to the noſtrils, and rubbed upon the temples very frequently. Electrical ſhocks made to paſs in different directions through the body, and particularly through the heart and lungs, have been recommended as very powerful *ſtimuli*; and from the trials that have already been made, promiſe conſiderable ſucceſs. The body ſhould at intervals be ſhaken alſo, and varied in its poſition.

4. If there be any ſigns of returning life, ſuch as ſighing, gaſping, twitching, or any convulſive motions, beating of the heart, the return of the natural colour and warmth, opening a vein in the arm or neck may prove beneficial; but the quantity of blood taken away ſhould not be large; nor ſhould an artery ever be opened, as profuſe bleeding has appeared prejudicial, and even deſtructive to the ſmall remains of life. The throat ſhould be tickled with a feather, in order to excite a propenſity to vomit; and the noſtrils alſo with a feather, ſnuff, or any other ſtimulant, ſo as to provoke ſneezings. A tea-ſpoonful of warm water may be occaſionally adminiſtered, in order to learn whether the power of ſwallowing be returned; and if it be, a table-ſpoonful of warm wine, or brandy and water, may be given with advantage; but not before, as the liquor might get into the lungs, before the power of ſwallowing returns. The other methods ſhould be continued with vigour, until the patient be gradually reſtored.

When the patient has been but a ſhort time ſenſeleſs, blowing into the lungs or bowels has been, in ſome caſes, found ſufficient; yet a ſpeedy recovery is not to be expected in general. On the contrary, the above methods are to be continued with ſpirit for two hours, or upwards, although there ſhould not be the leaſt ſymptoms of returning life. The ſame means of reſtoration are applicable to the various other caſes of ſudden death, recited in the beginning of this article.

When theſe meaſures prove unſucceſsful, the ſurgeon's laſt reſource is BRONCHOTOMY, or opening the *arteria trachæa*; for perhaps the air entering freely into the lungs, through the aperture made in the canal, through which they received it in their natural ſtate, will reſtore the play of the lungs, and all the motions of the breaſt.

Mr. Hunter, F. R. S. has, at the requeſt of a member of the Humane Society, publiſhed propoſals for recovering perſons apparently *drowned*. In the caſe of apparent death by *drowning*, he conſiders that a ſuſpenſion of the actions of life has taken place, owing to the loſs of reſpiration, and the immediate effects which this has on the vital motions of the animal: at leaſt, he ſays, this privation of breathing appears to be the firſt cauſe of the heart's motion ceaſing; therefore, moſt probably, the reſtoration of breathing is all that is neceſſary to reſtore the heart's motion. The loſs of life in *drowned* people has been accounted for, by ſuppoſing that the blood, damaged by want of the action of the air in reſpiration, is ſent, in that vitiated ſtate, to the brain, and other vital parts; by which means the nerves loſe their effect upon the heart, and the heart in conſequence its motion. But Mr. Hunter concludes from experiments on a dog, in which a large column of bad blood, viz. all that was contained in the heart and pulmonary veins, was puſhed forward, without producing any ill effect, and alſo from the recovery of *drowned* perſons, and ſtill-born children, that the heart's motion muſt depend immediately on the application of air to the lungs, and not on the effects which air has on the blood, and which that blood has on the vital parts. Therefore blowing air into the lungs, ſoon after the immerſion, may be ſufficient to effect a recovery; and the *dephlogiſticated* AIR of Dr. Prieſtley may prove more efficacious than common air. But if a conſiderable time, as an hour, has been loſt, it may be neceſſary to apply ſtimulating medicines, as the vapour of volatile alcali, mixed with the air; and theſe are beſt thrown in by the noſtrils, as applications of this kind to the olfactory nerves rouſe the living principle, and put the muſcles of reſpiration into action, while ſome applications to the mouth rather depreſs than rouſe, by producing ſickneſs. The larynx ſhould be at the ſame time preſſed againſt the œſophagus and ſpine, which will prevent the ſtomach and inteſtines from being too much diſtended by the air; however, the trachæa, and the aperture into the larynx, ſhould be both left perfectly free. Heat alſo is congenial with the living principle, which by increaſing the neceſſity of action, increaſes action; and to a due proportion of heat the living principle owes its vigour. Bed-clothes properly heated ſhould, therefore, be gently laid over the patient, and the ſteam of volatile alcali, or of warm balſams, and eſſential oils, may be thrown in, ſo as to come in contact with many parts of his body. The ſame ſteam may alſo be conveyed into the ſtomach by means of a hollow bougie, and a ſyringe; together with the ſpirits of hartſhorn, pepper-mint water, juice of horſe-raddiſh, and alſo balſams and turpentines, in ſuch ſmall quantities, as not to produce ſickneſs. Theſe may alſo be thrown up by the anus. When the heart begins to move, Mr. Hunter adviſes to leſſen the application of air to the lungs; he abſolutely forbids bleeding, becauſe it weakens the animal principle, or that principle which preſerves the body from diſſolution, and is the cauſe of all its actions, and which Mr. Hunter ſuppoſes to be inherent in the blood, and conſequently leſſens both the power and diſpoſitions to action. Nothing ſhould be adminiſtered that ordinarily produces a nauſea or vomiting, or by the anus, that ha a tendency to produce an evacuation that way; becau every ſuch evacuation tends to leſſen the animal power On this account he does not particularly recommend the fumes of tobacco, becauſe they always produce ſickneſs or purging, according to the mode of their application. He recommends the following apparatus, with a view to the purpoſes of this ſociety. Firſt, a pair of bellows; ſo contrived with two ſeparate cavities, that by opening them, when applied to the noſtrils or mouth of a patient, one cavity may be filled with the common air, and the other with air ſucked out from the lungs; and by ſhutting them again, the common air may be thrown into the lungs, and that ſucked out of the lungs diſcharged into the room. The pipe of theſe ſhould be flexible, in length a foot or a foot and a half, and at leaſt three eighths of an inch in width; by this the artificial breathing may be continued, while the other operations, the application of the ſtimuli to the ſtomach excepted, are going on, which could not conveniently be the caſe, if the muzzle of the bellows were introduced into the noſe. The end next the noſe ſhould be double, and applied to both noſtrils. Secondly, a ſyringe with a hollow bougie, or flexible catheter, of ſufficient length to go into the ſtomach, and to convey any ſtimulating matter into it, without affecting the lungs. Thirdly, a pair of ſmall bellows, ſuch as are commonly uſed in throwing fumes of tobacco up the anus. Phil. Tranſ. vol. lxvi. part 2. p. 412. 425.

The Humane Society, ſince its firſt eſtabliſhment, to the beginning of the year 1779, has been inſtrumental in recovering two hundred and eighty-ſeven perſons out of the number of caſes, to which their attempts have been applied. See Reports of the Society for the Recovery of Perſons apparently *drowned*.

Societies of a ſimilar nature have been lately formed at Norwich, Briſtol, Liverpool, Colcheſter, and Hull; and likewiſe at Corke, in Ireland. The board of police in Scotland has alſo intereſted itſelf in favour of the ſame benevolent deſign.

DRUG, in *Commerce*, a general name for all ſpices, and other commodities, brought from diſtant countries, and uſed in the buſineſs of medicine, and the mechanic arts. The *drugs* uſed in medicine are very numerous, and make the greateſt part of the commerce of our *druggiſts*. Some of them grow in England, France, &c. but the greateſt part are brought from the Levant, and the Eaſt Indies.

A liſt of all of them would be endleſs. Some of the principal are, aloes, ambergris, amber, aſſa-fœtida, antimony, bezoar, borax, benjoin, camphor, cantharides, cardamum, caſſia, caſtoreum, coloquintida, civet, coral, cubebs, coffee, cocoa, gum animæ, armoniac, adraganth, elemi, gamboge, labdanum, opopanax, ſagapenum, ſandarac, lacca, jalap, manna, maſtic, myrrh, muſc, opium, pearls, quinquina, hellebore, galanga, zedoary, rhubarb, ſarſaparilla, ſtorax, galbanum, ſanguis draconis, ſenna, ſpermaceti, ſpica nardi, ſcammony, ſal ammoniac, tamarinds, tea, turpentine, turbith, tutia, &c.

The natural hiſtory, &c. whereof, ſee under their reſpective articles Aloes, Ambergris, &c.

The *drugs* uſed by dyers are of two kinds: the *colouring*, which give a dye or colour; and *non-colouring*, which only diſpoſe the ſtuffs to take the colours the better, or to render the colours more ſhining. Of the firſt kind are, paſtels, woad, indigo, kermes, cochineal, madder, turmeric &c. Of the ſecond kind are, alum, tartar, arſenic, realgal, ſalt-petre, common ſalt, ſal gemmæ, ſal ammoniac, cryſtals of tartar, agaric, ſpirit of wine, urine, pewter, iron, bran, ſtarch, lime, aſhes, &c.

There is a third ſort of *drugs*, which anſwer both intentions; as the root, bark, and leaf, of the walnut-tree, galls, copperas, &c.

DRUGGET, in *Commerce*, a ſort of ſtuff, very thin, and narrow, ſometimes all wool, and ſometimes half wool, and half thread; having ſometimes the whale, but more uſually without.

Thoſe without the whale in the plain *druggets* are woven on a loom with two treddles, after the ſame manner as linen, camblet, &c. Thoſe with the whale, or the corded *druggets*, are wrought on a loom with four treddles. Thoſe are called threaded *druggets*, that have the woof of wool, and the warp of thread. M. Savery invented a kind of gold and ſilver *druggets*; the warp being partly gold and ſilver thread, and the woof linen.

DRUIDS, Druides, or Druidæ, the prieſts, or miniſters of religion, among the ancient Celtæ, or Gauls, Britons, and Germans.

Some authors derive the word from the Hebrew דרושים, *deruſſim*, or *druſſim*, which they tranſlate, *contemplatores*. Picard, Celtopæd. lib. ii. p. 58, believes the *Druids* to have been thus called from *Druis*, or *Drytus*, their leader. the fourth or fifth king of the Gauls, and father of Saron, or Naumes. Pliny, Salmatius, Vigenere, &c. derive the name from δρυς, *oak*; on account of their inhabiting, or at leaſt frequenting, and teaching in foreſts; or perhaps, becauſe, as Pliny ſays, they never ſacrificed but under the oak. But it is hard to imagine, how the *Druids* ſhould come to ſpeak Greek. Menage derives the word from the old Britiſh *drus*, *dæmon*, *magician*. Borel, from the Saxon *dry*, *magician*; or rather from the old Britiſh *dru*, or *derw*, *oak*; whence he takes δρυς to be derived, which is the moſt probable ſuppoſition. Gorop. Becanus, lib. i. takes *druis* to be an old Celtic, and German word, formed from *trowis*, or *truwis*, a doctor of the truth and the faith; which etymology Voſſius acquieſces in.

The *Druids* were the firſt, and moſt diſtinguiſhed order among the Gauls and Britons; they were choſen out of the beſt families; and the honours of their birth, joined with thoſe of their function, procured them the higheſt veneration among the people. They were verſed in aſtrology, geometry, natural philoſophy, politics, and geography; and had the adminiſtration of all ſacred things; they were the interpreters of religion, and the judges of all affairs, indifferently. Whoever refuſed obedience to them, was declared impious and accurſed.

We know but little as to their peculiar doctrines; only that they believed the immortality of the ſoul; and, as is generally alſo ſuppoſed, the metempſychoſis; though a late author makes it appear highly probable they did not believe this laſt, at leaſt not in the ſenſe of the Pythagoreans.

The chief ſettlement of the *Druids* in Britain was in the iſle of Angleſley, the ancient *Mona*, which they might chuſe for this purpoſe, as it was well ſtored with ſpacious groves of their favourite oak.

They were divided into ſeveral claſſes, or branches; viz. the *vacerri*, *bardi*, *eubages*, *ſemnothii*, or *ſemnothei*, and *ſaronidæ*. The *vacerri* are held to have been the prieſts; the *bardi*, the poets; the *eubages*, the augurs; and the *ſaronidæ*, the civil judges, and inſtructors of youth. As to the *ſemnothei*, who are ſaid to have been immediately devoted to the ſervice of religion, it is probable, they were the ſame with the *vacerri*.

Strabo, however, lib. iv. p. 197, and Picard after him, in his Celtopædia, do not comprehend all theſe different orders under the denomination of *Druids*, as ſpecies under their genus, or parts under the whole; but make them quite different conditions, or orders. Strabo, in effect, only diſtinguiſhes three kinds; *bardi*, *vates*, and *Druids*. The *bardi* were the poets; the *vates*, κατεις (apparently the ſame with the *vacerri*), were the prieſts, and naturaliſts; and the *Druids*, beſide the ſtudy of nature, applied themſelves likewiſe to morality.

Diogenes Laertius aſſures us, in his Prologue, that the *Druids* were the ſame, among the ancient Britons, with the ſophi, or philoſophers, among the Greeks; the magi, among the Perſians; the gymnoſophiſts, among the Indians; and the Chaldeans, among the Aſſyrians.

The *Druids* had one chief, or *arch-druid*, in every nation, who acted as high-prieſt, or *pontifex maximus*. He had abſolute authority over the reſt; and commanded, decreed, puniſhed, &c. at pleaſure. At his death he was ſucceeded by the moſt conſiderable among his ſurvivors; and, if there were ſeveral pretenders, the matter was ended by an election, or elſe put to the deciſion of arms.

The *Druids*, we have obſerved, were in the higheſt eſteem. They preſided at ſacrifices, and other ceremonies; and had the direction of every thing relating to religion. The Britiſh and Gauliſh youth flocked to them in crowds, to be inſtructed by them. The children of the nobility, Mela tells us, they retired with into caves, or the moſt deſolate parts of foreſts, and kept them there, ſometimes, for twenty years, under their diſcipline.

Beſide the immortality and metempſychoſis, they were here inſtructed in the motion of the heavens, and the courſe of the ſtars; the magnitude of the heavens and the earth; the nature of things; the power and wiſdom of the gods, &c. They preſerved the memory and actions of great men in their verſes, which they never allowed to be wrote down, but made their pupils get them by heart. In their common courſe of learning, they are ſaid to have taught them twenty-four thouſand ſuch verſes.

They held the plant miſletoe in ſingular veneration. Pliny relates the ceremony wherewith they gathered it every year, lib. xvi. cap. 44. They placed great confidence, alſo, in ſerpents eggs, gathered after a peculiar manner, and under a certain diſpoſition of the moon, deſcribed by Pliny; and imagined them effectual means for the gaining of law-ſuits, and procuring the good graces of princes. And hence the ſame author concludes it is, that the caduceus, or rod encompaſſed with two ſerpents interwoven, has been aſſumed as a ſymbol of peace. Suetonius, in his Life of Claudius, aſſures us, they ſacrificed men; and Mercury is ſaid to be the god to whom they offered theſe victims. Diod. Siculus, lib. vi. obſerves, it was only upon extraordinary occaſions they made ſuch offerings: as, to conſult what meaſures to take, to learn what ſhould befal them, &c. by the fall of the victim, the tearing of his members, and the manner of his blood guſhing out. Auguſtus condemned the cuſtom; and Tiberius, and Claudius, puniſhed and aboliſhed it. See Cæſar, lib. vi. cap. 13. and Mela, lib. iii. cap. 2.

We learn from Cæſar, that the *Druids* were the judges and arbiters of all differences and diſputes, both public and private; they took cognizance of murders, inheritances, boundaries, and limits, and decreed rewards and puniſhments. Such as diſobeyed their deciſions, they excommunicated, which was their principal puniſhment, the criminal being hereby excluded from all public aſſemblies, and avoided by all the world; ſo that no body durſt ſpeak to him, for fear of being polluted. Strabo obſerves, they had ſometimes intereſt and authority enough to ſtop armies, upon the point of engaging, and accommodate their differences.

They held an aſſembly, every year, at a certain ſeaſon, about the middle of the country; and there, in a place conſecrated for the purpoſe, they kept their aſſizes, and terminated the differences of the people, who flocked thither from all parts.

Cæſar, who had ſeen ſome of the *Druids* in Britain, was of opinion, they had come thence into Gaul: divers among the moderns take this for a miſtake, and believe the very contrary. In effect, it appears pretty probable, that the ancient Britons were originally Gauls; that ſome of the Celtæ, or Belgæ, Gauliſh nations, were the firſt that entered our iſland, and peopled it; and that the *Druids* went along with them.

Hornius, in his Hiſtory of Philoſophy, lib. ii. cap. 12. believes all the learning and philoſophy of the *Druids* to have been derived from the Aſſyrian magi; who are ſtill called, in Germany, *trutten*, or *truttner*; and that, as magus has loſt its ancient ſignification, which was honourable, and now ſignifies a magician, or ſorcerer; ſo *Druid*, which had the ſame ſenſe, has likewiſe degenerated, and now ſignifies no other than a perſon who has commerce with the devil, or is addicted to magic. And, accordingly, in Frieſland, where there anciently were *Druids*, witches are now called *Druids.* Gale, Dickenſon, and ſome others, vainly contend, that the *Druids* borrowed all their philoſophy, as well as religion, from the Jews.

There were alſo women who bore the appellation *Druides*, or *Druidæ*, among the Gauls, &c. The authors of the Hiſtoria Auguſta, particularly Lampridius, and Vopiſcus, make mention of theſe.

Salmaſius, in his notes on Lampridius, is a little in doubt who theſe women were; but he gives into the moſt eaſy and plauſible opinion, that they were either the wives or the children of the *Druids*.

DRUM, *Tympanum*, a military muſical inſtrument, ſaid by Le Clerc to be an oriental invention, and brought by the Arabians, or perhaps the Moors, into Spain; of uſe, both among the foot and dragoons, ſerving to call the ſoldiers together, and to direct their march, attack, retreat, &c.

The body of the *drum* is made of very thin oak, which is bent into a cylinder, and covered at each end with parchment, which is ſtrained, or braced, more or leſs, according to the height or depth of the ſound required, by ſmall cords and ſliding leathers; and is then ſtruck with ſticks. The depth of the *drum* is equal to its breadth, which does not exceed two feet and a half, becauſe no ſkins can be had to cover bigger. Every troop of dragoons, and every company of foot or artillery, has two or more *drums*, according to the number of men.

There are alſo *drums* whoſe body is of braſs, which are of uſe principally among the horſe. See KETTLE-*drums.*

DRUM, or DRUMMER, alſo denotes a ſoldier appointed to beat the *drum*. When a battalion is drawn up, the *drums* are on the flanks; and when it marches by diviſions, they march between them.

There are divers beats of the *drum*; as the *general march, double march, aſſembly, charge, retreat, alarm, chamade, retraite, reveille, tat-too, &c.* See ASSEMBLY, CHAMADE, &c.

DRUM-*major*, is that perſon in a regiment who beats the beſt *drum*, commands the others, and teaches them their duty. Every regiment has a *drum-major*.

DRUM, in *Anatomy*, or *Ear*-DRUM, denotes a cavity in the inner ear; thus called from the reſemblance it bears to the figure of a war-*drum*. See EAR.

Its outer extreme is covered with a membrane, by anatomiſts called alſo *tympanum, drum*; but, more properly, *membrana tympani*.

The office of this *drum*, or *membrana tympani*, has been greatly controverted by anatomiſts. The account beſt warranted is, that being a medium for the conveyance of the ſound to the auditory nerve, by its different degrees of tenſion, it ſerves to modify the ſound, and propagate it to the nerve well proportioned, and commenſurate thereto. See HEARING, and SOUND.

DRUM, *String of the*. See CHORDA *Tympani*, and EAR.

DRUM-*head of a capſtan*. See CAPSTAN.

DRUM, in *Architecture*. See TAMBOUR.

DRUM is uſed to ſignify a kind of fiſh in Virginia. The oil of this fiſh is ſaid to cure pains in the limbs, frequent in that country. See Phil. Tranſ. Nº 454. § 1.

DRUM, *Mire*. See BITTERN.

DRUNGUS, Δρȣγγος, a body, or company of forces; thus called in the latter times of the Roman empire.

The name *drungus*, as appears from Vegetius, lib. iii. cap. 16. was at firſt only applied to foreign, and even enemies troops; but, under the Eaſtern empire, it came in uſe for the troops of the empire itſelf; where it amounted, pretty nearly, to what we call a regiment, or brigade.

The ſame author notes, that δρȣγγος, among the modern Greeks, ſignifies a *ſtaff*, or *rod*, the badge of a dignity, or office, as *agla* among the Turks; and he thinks, that the name may be formed from the Latin *truncus*. But it appears from Vegetius, that *drungus* is a barbarous, not a Latin word. Spelman takes it for Saxon; becauſe, at this day, *throng*, in Engliſh, ſignifies a *multitude.* Salmaſius derives it from ῥυγχος, *beak*; on account of the *drungus*'s being diſpoſed beak-wiſe, or terminating in a point.

Leunclavius obſerves, that the *drungus* was not leſs than one thouſand men, nor more than four thouſand.

DRUNKENNESS, *Ebriety*, phyſically conſidered, conſiſts in a preternatural compreſſion of the brain, and a diſcompoſure of its fibres; occaſioned by the fumes, or ſpirituous parts of liquors. It is accounted for thus: an immoderate quantity of wine taken into the ſtomach, is there heated, and undergoes a kind of efferveſcence; which ariſes the more readily, as the liquor abounds the more in ſulphur. By this action it becomes attenuated and rarefied; ſo that the groſſer parts being left behind, its finer parts are fitted to penetrate, and ſhoot through the veins to the brain, or are conveyed through the veins to the heart; whence, after a farther heat and rarefaction, they are ſent through the carotid arteries, &c. to the brain: hence neceſſarily ariſes a repletion of the meninges of the brain, and a compreſſion of the fibres of the brain itſelf, from the freſh ſtock of rarefied ſulphur continually aſcending into them: hence, alſo, ariſe obſtruction of the pores or paſſages of the brain, a frequent and diſorderly pulſation of the fibres, and the other ſymptoms of this diſtempered ſtate.

Hence it is, that all liquors will not give *drunkenneſs*; but only ſuch as, by their ſulphur, or ſpirit, are diſpoſed for an efferveſcence in the ſtomach and heart, to diffuſe their ſubtle attenuated parts plentifully to the brain.

It is a popular miſtake, that the only remedy for gluttony, is *drunkenneſs*; or that the cure of a ſurfeit of meat, is a ſurfeit of wine; than which nothing can be more contrary to nature. Cheyne.

The ancient Lacedæmonians uſed to make their ſlaves frequently *drunk*, to give their children an averſion and horror for this vice. The Indians hold *drunkenneſs* a ſpecies of madneſs; and, in their language, the ſame term *ramjam*, that ſignifies *drunkard*, ſignifies alſo a *phrenetic*.

Drunkenneſs is puniſhable by the laws of England. The penalty is five ſhillings fine, or the ſtocks in caſe of non-payment. For a ſecond offence, the guilty perſon may be bound to his good behaviour. And an alehouſe-keeper convicted of the ſame offence, ſhall be diſabled to keep any ſuch alehouſe for three years. All flag officers and perſons belonging to his majeſty's ſhips of war, being guilty of *drunkenneſs*, are liable to ſuch puniſhment, as a court martial ſhall think fit to impoſe. See ſtat. 4 Jac. I. c. 5. 21 Jac. I. c. 7. 22 Geo. II. c. 33.

Hobbes makes voluntary *drunkenneſs* a breach of the law of nature, which directs us to preſerve the uſe of our reaſon. The law of England alſo does not allow it to be an excuſe in any caſe whatſoever.

DRUPE, among *Botaniſts*, a ſpecies of pericarpium, conſiſting of a ſoft, fleſhy, and ſucculent pulp, without valves, in the center of which there is a nucleus. See PERICARPIUM.

DRUSA, in *Natural Hiſtory*, a name given by ſome of the Saxon miners to the common pyrites, and by others to ſome peculiar kinds of it. But in general it is underſtood to ſignify both the pyrites and the marcaſite.

DRUSES, or DRUSIANS, in *Eccleſiaſtical Hiſtory*, a people of Paleſtine, inhabiting the environs of mount Libanon, who call themſelves Chriſtians, and occaſionally profeſs themſelves Mahometans; but all their Chriſtianity conſiſts in ſpeaking with reſpect of Jeſus Chriſt and the Virgin Mary. They are ſomewhat jealous of their wives, who only among them know how to read or write. They conſider men as deſtined by their ſtrength, courage, and underſtanding, to more uſeful and exalted purſuits than tracing characters upon paper; and are not able to conceive how a man who is capable of bearing arms, can amuſe himſelf with turning over the leaves of a book. They carry on a trade in wine, ſilk, corn, and ſaltpetre. They have had ſeveral diſputes with the Turks, who govern them by emirs, that have ſeveral times been ſtrangled by them.

The *Druſes* are probably the remains of the Chriſtian armies in the holy war; and they themſelves now ſay, that they are deſcended from the Engliſh; though others ſay, they are deſcended from the Franks, whom Godfrey of Bulloign brought with him to the holy war. Pococke's Deſc. of the Eaſt, vol. ii. book i. chap. 1.

DRY. A *dry* air, *cæteris paribus*, leſſens the weight of the human body, and the contrary quality increaſes it. See MOISTURE *of the air*.

DRY *Baths, Confects, Dock.* See the ſubſtantives.

DRY *Exchange, Cambium ſiccum*, a ſoft appellation, anciently uſed to diſguiſe uſury under, intimating ſomething to paſs on both ſides; whereas, in truth, nothing paſſed but on one: in which reſpect it might be called *dry*. See INTEREST, and USURY.

Cambium ſiccum, ſays Lud. Lopes, *de Contract. & Negot. eſt cambium non habens exiſtentiam cambii, ſed apparentiam, ad inſtar arboris exſiccatæ, &c.*

DRY *Fiſh, Fruits, Maſs, Meaſures.* See the ſubſtantives.

DRY *Meat*, in the *Manege*, is uſed for corn and hay. After taking the horſe from graſs, or houſing him, he is frequently put to *dry meat*.

DRY *Moat, Rent, Storax, Suture, Spavin.* See the ſubſtantives.

DRYADES, DRYADS, in the *Heathen Theology*, the nymphs of the woods; a ſort of imaginary deities, which the ancients believed to inhabit the woods and groves, and to hide themſelves under the bark of the oak, called by the Greeks δρυς.

The *dryades* differed from the *hamadryades*, in that theſe latter were attached to ſome particular tree, with which they were born, and with which they died; whereas the *dryades* were the goddeſſes of the trees and woods in general, and lived at large, in the middle thereof. For, though δρυς properly ſignifies an oak, it was alſo uſed for tree in general.

We likewiſe find mention made, in divers authors, of a kind of propheteſſes, or witches, among the Gauls, called *dryades*, or rather *druides*. See DRUIDS.

DRYERS, in *Painting*, are ſubſtances ſo called from their uſe in remedying the fault of oils, which dry too ſlowly. See *Drying* OIL.

DRYAS, in *Botany*, the name of a genus of plants of the *icoſandria polygynia* claſs; called alſo by ſome *dryadæa*, and by Tournefort and others made a ſpecies of the *caryophyllata*. The characters are theſe: the perianthium is compoſed of one leaf divided into eight ſtraight obtuſe equal ſegments, ſomewhat ſhorter than the petals of the flower: the flower conſiſts of eight oblong expanded emarginated petals, inſerted into the cup: the ſtamina are numerous, very ſhort capillary filaments inſerted into the cup: the antheræ are ſimple and ſmall: the germina are numerous, ſmall, and ſet cloſe together: the ſtyles are capillary, and are inſerted into the ſides of the germina; and the ſtigmata are ſimple: there is no fruit, but the ſeeds ſtand naked together, and are numerous, and of a roundiſh compreſſed figure, and ſuſtain a number of hairy ſtyles.

DRYINUS, *Oak-ſnake*, a ſpecies of ſerpent, ſo called from its being uſually found about hollow oaks. Bellonius, who has mentioned it, ſays, that ſcarce any ſerpent grows to a larger ſize, or makes a more terrible hiſſing. Authors in general ſeem however ſo little agreed about its deſcription, that it is not eaſy to aſcertain the name to any peculiar ſpecies of ſnake.

DRYITES *lapis*, in *Natural Hiſtory*, a name given by authors to a ſubſtance but ill deſerving the name of a ſtone; it being only foſſile wood found in detached maſſes. There is much of this foſſile wood found in Italy, in the banks and on the ſhores of rivers. We know alſo by what we ſee of the foſſile wood of England, that it may be found in all degrees of petrifaction, from that of almoſt unaltered wood, to abſolute ſtone or mineral matter, with only the ſuperficial grain of wood. See *Foſſile* WOOD.

DRYOPEIA, Δρυοπεια, in *Antiquity*, an anniverſary day obſerved in memory of Dryops, one of Apollo's ſons.

DRYPIS, in *Botany*, a genus of plants of the *pentandria trigynia* claſs: the calyx is cut into five ſegments; the petals are five; and the fruit is a covered capſule, containing a ſingle ſeed.

DS JERENANG, a name by which ſome authors have called a ſpecies of palm-tree, from the fruit of which is procured dragon's blood. Kempfer, Amœn. Exot. p. 552.

DUALISM, or DITHEISM, an opinion which ſuppoſes two principles, two gods, or two independent uncreated beings, of which one is the firſt cauſe of good, the other of evil. See MANICHEES.

DUBBING *a cock*, cutting off his comb and wattles.

DUBIOUS *Acids*. See ACIDS.

DUBITATIVE *Conjunctions*. See CONJUNCTION.

DUCAL. The letters patent granted by the ſenate of Venice, are called *ducals*: ſo alſo are the letters wrote, in the name of the ſenate, to foreign princes.

The denomination of *ducal* is derived hence; that, at the beginning of ſuch patents, the name of the duke, or doge, is wrote in capitals, thus, *N—— Dei Gratia Dux Venetiarum*, &c. The date of *ducals* is uſually in Latin, but the body is in Italian. A courier was diſpatched with a *ducal* to the emperor, returning him thanks for renewing the treaty of alliance (in 1716) againſt the Turks, with the republic of Venice.

DUCAT, a foreign coin, either of gold or ſilver, ſtruck in the dominions of a duke; being about the ſame value with a Spaniſh piece of eight, or a French crown, or four ſhillings and ſix pence ſterling, when of ſilver; and twice as much, when of gold. See COIN.

The origin of *ducats* is referred to one Longinus, governor of Italy; who, revolting againſt the emperor Juſtin the Younger, made himſelf duke of Ravenna, and called himſelf *Exarcha*, i. e. *without lord or ruler*; and, to ſhew his independence, ſtruck pieces of money of very pure gold, in his own name, and with his own ſtamp, which were called *ducati*, *ducats*; as Procopius relates the ſtory.

After him, the firſt who ſtruck *ducats* were the Venetians, who called them alſo *Zecchini*, or *ſequins*, from Zecca, the place where they firſt were ſtruck. This was about the year 1280, in the time of John Danduli: but we have pretty good evidence, that Roger king of Sicily had coined *ducats* as early as 1240. And Du-Cange ſcruples not to affirm, that the firſt *ducats* were ſtruck in the duchy of Apulia, in Calabria. The chief gold *ducats* now current, are, the ſingle and double *ducats* of Venice, Florence, Genoa, Germany, Hungary, Poland, Sweden, Denmark, Flanders, Holland, and Zurich. The heavieſt of them weighs five pennyweights ſeventeen grains, and the lighteſt five pennyweights ten grains; which is to be underſtood of the double *ducats*, and of the ſingle in proportion.

The Spaniards have no *ducats* of gold; but, in lieu thereof, they make uſe of the ſilver one; which, with them, is no real ſpecies, but only a money of account, like our pound. It is equivalent to eleven rials. See RIAL. The ſilver *ducats* of Florence ſerve there for crowns.

DUCATOON, a ſilver coin, ſtruck chiefly in Italy; particularly at Milan, Venice, Florence, Genoa, Lucca, Mantua, and Parma: though there are alſo Dutch and Flemiſh *ducatoons*.

They are all nearly on the ſame footing; and, being a little both finer and heavier than the piece of eight, are valued at two pence or three pence more, viz. at about four ſhillings and eight pence ſterling.

There is alſo a gold *ducatoon*, ſtruck and current chiefly in Holland: it is equivalent to twenty florins, on the footing of one ſhilling and eleven pence halfpenny the florin.

DUCENARIUS, in *Antiquity*, an officer in the Roman army, who had the command of two thouſand men.

The emperors had alſo *ducenarii* among their procurators, or intendants, called *procuratores ducenarii*. Some ſay, that theſe were ſuch whoſe ſalary was two hundred ſeſterces; as in the games of the circus, horſes hired for two hundred ſeſterces, were called *ducenarii*. Others hold, that *ducenarii* were thoſe who levied the two hundredth penny, the officers appointed to inſpect the raiſing of that tribute. In the inſcription at Palmyra, the word *ducenarius*, in Greek δȣκεναριος, occurs very often.

DUCENTESIMA, in *Antiquity*, a tax of the two hundredth penny, exacted by the Roman emperors.

DUCES *tecum*, a writ commanding one to appear at a day in chancery, and to bring with him ſome evidences, or other things, which the court would view.

DUCES *tecum licet languidus*, a writ directed to a ſheriff, who, having in his cuſtody a priſoner, in a perſonal action, returns, upon a *habeas corpus*, that he is *adeo languidus*, that, without danger of death, he cannot have his body before the juſtices.

DUCK, *Anas*, in *Ornithology*, the name of a very large genus of birds, of the order of *anſeres*; the characters of which are theſe: the beak is ſhorter in proportion than that of the gooſe, ſtrong, flat or depreſſed, and commonly furniſhed at the end with a nail, and the edges divided into ſharp lamellæ; and the feet proportionably larger, with the middle toe the longeſt: the legs are ſhorter, and are placed farther backward; and the back is flatter, and the body more compreſſed: the noſtrils are ſmall and oval; and the tongue broad, with the edges near the baſe fringed. Some of theſe love the freſh waters, others are found only at ſea, and of both theſe are very numerous ſpecies. See ANAS.

This fowl is furniſhed with a peculiar ſtructure of veſſels about the heart, which enable it to live without reſpiration a conſiderable time under water, as is neceſſary for it in diving. This made Mr. Boyle think it a more proper object for experiments by the air-pump, than any of the other birds. A full-grown *duck* being put into the receiver of the air-pump, of which ſhe filled one third part, and the air exhauſted, the creature ſeemed to bear it better for the firſt moments, than a hen or other ſuch fowl; but after about a minute, ſhe gave great ſigns of diſcompoſure, and in leſs than two minutes her head fell down, and ſhe appeared dying, till revived by letting in the air. Thus whatever facility of diving, this and other water-fowl may have, it does not appear, that they can ſubſiſt without air for reſpiration, any longer than other animals. A young callow *duck* was afterwards tried in the ſame manner, and with the ſame ſucceſs, being reduced very near death in leſs than two minutes. But it is obſervable, that both birds ſwelled extremely on the pumping out of the air, ſo as to appear much larger to the ſpectators, eſpecially about the crop. It not being intended that any water-fowl ſhould live in an exceedingly rarified air, but only be able to continue on occaſion ſome time under water; nature, though ſhe has provided them with the means of this, has done nothing for them in regard to the other.

The ſtrongeſt inſtance of this creature's being calculated to live any where, we have in the accounts of the blind *ducks* of the Zirchnitzer lake in Carniola. It is now well known, that this lake communicates with another lake under ground in the mountain Savornick, and fills or empties itſelf according to the fulneſs or emptineſs of that lake; the waters of the upper lake running off at the time of its emptying by large holes in the bottom, and that in vaſt quantities. The *ducks*, which are very plentiful in the water, are often carried down with it, and forced into the ſubterraneous lake the waters retire to. In this unnatural habitation, many of them doubtleſs periſh, but ſome remain alive; theſe become blind and loſe all their feathers, and in the next filling of the lake, both they and vaſt numbers of fiſh are thrown up with the water. They are fat at this time, but make a ſtrange appearance in their naked ſtate, and are eaſily caught, for want of ſight to avoid the danger. In about a fortnight they recover their ſight and their feathers, and are then of the ſize of a common wild *duck*, but of a black colour, having a white ſpot upon their forehead. When opened on being taken at their firſt coming up in their blind ſtate, their ſtomachs are found full of ſmall fiſhes, and ſomewhat reſembling weeds. It ſeems from this, that they cannot be abſolutely blind, but that the degree of light to which they ſeem accuſtomed in their dark habitation, had formed their eyes to ſee by that ſmall quantity, ſo well as to get their food by it; and their blindneſs on coming into broad day-light again, is no other than that of a man who has been long in the dark, on having in an inſtant a large blaze of candles ſet juſt under his eyes. The eye in neither caſe can bear the ſudden change, and muſt be habituated to it, before it can ſee objects by it. Theſe blind *ducks* are not only caſt up in this lake, but after great rains they are frequently thrown up at a hole in the mountain Storſeg, near the town of Laas. The water guſhing out at this hole with great force on theſe occaſions, brings away with it theſe blind and bald *ducks*; and their frequency on theſe occaſions in theſe places, makes them be eſteemed no rarity; but the common people underſtand that there are under-ground lakes, which they inhabit, and out of which they are thus thrown. Phil. Tranſ. Nº 191.

There are two ſorts of *ducks* common with us, the tame, and the wild; the *anas boſchas* of Linnæus, and *domeſtica* of other authors. The mallard of this ſpecies has its bill of a yellowiſh green; the head and neck are of a deep and ſhining green; more than half round the lower part of the neck is an incomplete circle of white; the upper part of the breaſt is of a purpliſh red, and the beginning of the back of the ſame colour; the breaſt and belly of a pale grey, marked with tranſverſe ſpeckled lines of a duſky hue. The ſcapulars are white, barred with brown; the ſpot on the wing is of a rich purple; the tail conſiſts of twenty-four feathers, the four middle ones of which are black and ſtrongly curled upwards, which diſtinguiſhes the male of this ſpecies from all others: but the females have not this mark. Their plumage is of a pale reddiſh brown, ſpotted with black: the legs are of a ſaffron colour. The common tame ſpecies take their origin from theſe: the drakes, however they vary in colour, always retain the curled feathers of the tail; and both ſexes the form of the bill of the wild kind. Pennant.

The firſt ſort is very beneficial to the huſbandman, and at the ſame time requires no charge to keep, as living on loſt corn, worms and ſnails, &c. Indeed once a year, this fowl is a great layer of eggs; and when ſhe ſits, muſt be carefully fed with barley or other grain. As to the ducklings, they are fed in the ſame manner as goſlins; and may be fattened in three weeks time with any kind of pulſe or grain, and plenty of water.

For preſerving wild *ducks*, a place, with a pond in it, muſt be walled in, and covered with a ſtrong net; the pond is to be ſet with tufts of oziers, and have many ſecret holes and creeks; whereby they will be induced to feed freely, though confined. Teal, widgeons, ſheldrakes, and green plovers, may alſo be ordered in the ſame manner. See Decoy.

Of exotics or foreign *ducks*, authors deſcribe many ſpecies; as,

Duck, *the Black* or *Velvet*, *Anas nigra* or *fuſca*. The male of this ſpecies is larger than the tame *duck*. The bill is broad and ſhort, yellow on the ſides, black in the middle, and the hook red: the head and part of the neck is black tinged with green; behind each ear is a white ſpot; and in each wing is a white feather; all the reſt of the plumage is of a fine black, and ſoft as velvet: the legs and feet are red; the webs black. The female is entirely of a deep brown colour, the marks behind each ear and on the wings excepted: the bill wants the protuberance at the baſe which Linnæus gives to the male. This ſpecies is common on the coaſts of Norway, but ſeldom appears with us except in hard winters. Ray and Pennant.

Duck, *Braſilian*, is about the ſize of a gooſe. Its beak, legs and feet are brown, and its body wholly black, with a green gloſs, except the upper part of the wings, which is white. It has a creſt compoſed of black feathers on its head, and a large red fleſhy tubercle over the origin of the bill, and a naked red membrane round its eyes. It flies to the top of the higheſt trees, and is a very fleſhy and delicately-taſted bird. Margraave.

Duck, *St. Cuthbert's*, *Anas molliſſima* of Linnæus, and *Eider* of Wormius, is a ſpecies of *duck* found in the Weſtern iſles of Scotland, and in the Farn iſles, but in greater numbers in Norway, Iceland, and Greenland, from which a great quantity of ſoft down, called *eider* or *edder*, produced from the breaſt of the bird in breeding ſeaſon, is annually imported. It is much valued for ſtuffing beds, coverlets, &c. The male and female differ very much in this ſpecies; the male very much reſembles the common *duck*, but is about twice its ſize; its bill is black; the feathers of the forehead and cheeks advance far into the baſe, ſo as to form two very ſharp angles; the forehead is of a full velvet black; from the bill to the hind part of the head is a broad black bar, paſſing acroſs the eyes on each ſide. On the hind part of the neck, juſt beneath the ends of theſe bars, is a broad pea-green mark, that appears like a ſtain; the crown of the head, the cheeks, the neck, back, ſcapulars and coverts of the wings are white; the lower part of the breaſt, the belly, tail, and quill feathers, are black, and the legs are green. The female is a duſky brown, ſpotted with black. This ſpecies forms its neſts in the holes of rocks, and among the ſtones on the ſea-ſhore, and lays a number of eggs, which are of a pale olive colour, large, gloſſy, and ſmooth, and well taſted. Ray and Pennant.

Duck, *Decoy*. See Decoy.

Duck, *The Fly-Catching*, *Anas Muſcaria*, is a name given to a kind of *duck* from its catching flies which play about the waters. This is deſcribed as a diſtinct ſpecies, but Mr. Ray ſuppoſes it to be the ſame with our wild *duck*. Linnæus makes it the *Anas Clypeata*, or ſhoveler.

Duck, *Anas Strepera*, is a ſpecies of *duck* which frequents freſh water, uſually called the *gadwall* and *gray*. It is about the ſize of the widgeon. The bill is black and flat; the head and upper part of the neck are of a reddiſh brown, ſpotted with black; the lower part, the breaſt, the upper part of the back, and the ſcapulars, are beautifully marked with black and white lines; the belly is of a duſky white, the rump above and below is black; the tail aſh-coloured, edged with white; the coverts on the ridge of the wing are of a pale reddiſh brown; thoſe beneath are of a purpliſh red, the loweſt of a deep black; the greater quill-feathers are duſky; the inner web of three of the leſſer quill-feathers are white, which forms a conſpicuous ſpot; the legs are orange-coloured. The breaſt of the female is of a reddiſh brown, ſpotted with black; the back of the ſame colour; and though it has the ſame marks on the wings, they are much leſs bright than thoſe of the male. Ray and Pennant.

Duck, *Anas Clangula*, or *Platyrynchos*, a ſpecies of *duck* commonly called *golden-eye*, found about the ſea-coaſts, and frequently freſh waters. Its body is ſhort and thick; its head large, of a deep black, gloſſed with green, and its neck ſhort; its beak is ſhort and broad at the baſe, and black; at each angle of the beak there is a large white ſpot, whence the Italians call this bird *quatt' occhii*, or *four-eyes*; the *irides* are of a bright yellow; the neck, ſhoulders, breaſt, and belly, are white, and the back black; the wings are black and white, and the tail is wholly black; the legs are very ſhort, the feet broad, and both of an orange-colour; the hinder toe is ſmall, but is edged on each ſide by a membrane which adds much to its breadth. The head of the female is of a deep brown, tinged with red; the neck grey; breaſt and belly white, coverts and ſcapulars duſky and aſh-coloured; the legs duſky. See *Tab. Birds*. No. 50. Ray and Pennant.

Duck, *broad-beaked*, *Anas clypeata*, or *Latiroſtra*, a ſpecies of ſea-*duck*, known with us by the name of *ſhoveler*. It is ſomewhat ſmaller than the common *duck*; the beak is remarkably broad, whence its name, and grows broader and rounder toward the end, where it is hollowed like a ſhield, and the edges of each mandible are pectinated or ſupplied with thin laminæ, that lock into each other when the mouth is cloſed. The irides are of a bright yellow; the head and upper part of the neck of a blackiſh green; the lower part of the neck, the breaſt, and the ſcapulars are white; the back brown; the coverts of the wings of a fine ſky-blue; thoſe next to the quill feathers tipt with white: the greater quill feathers are duſky; the exterior webs of thoſe in the middle are of a gloſſy green; the tail is ſhort and variegated with black and white; the belly of a bay-colour; the vent-feathers black, and the legs and feet red. The female has the ſame marks in the wings as the male, but the colours are leſs bright. The reſt of the plumage reſembles that of the common wild *duck.* Ray and Pennant.

DUCK, *Hook billed*, *Anas adunca*, *roſtro incurvato*, is of the ſhape and ſize of the common *duck*, but differs from it in the ſhape of the bill, which is ſomewhat longer and hooked downwards; and in the head, which is ſmaller and ſlenderer. Ray.

DUCK, *Horn*, *Anas cornicenſis*, an American *duck*, deſcribed by Nieremberg, and named from the ſimilitude of its note to that of a huntſman's horn. It is very imperfectly deſcribed. Ray.

DUCK, *Indian and Lybian.* See *Muſcovy* DUCK.

DUCK, *Morillon*, or *Grey-headed*, *Anas glaucion*, is a ſmall ſpecies of ſea-*duck*, ſomewhat larger than the teal. The bill is of a yellowiſh brown; the irides gold-coloured; the head of a duſky ruſt colour; round the upper part of the neck is a collar of white; beneath that a broader of grey. The back and coverts are duſky, with a few white lines; the greater coverts duſky, with a few large ſpots of white. The breaſt and belly are white; the tail is duſky; the ſides above the thighs black; the legs yellow. This is ſuppoſed to be the ſame with the *capo roſſo.* Ray and Pennant.

DUCK, *Muſcovy*, *Anas Moſchata*, is the largeſt ſpecies of the *duck* kind. The general colour both in the male and female is a purpliſh black, variegated with white, though the female is ſometimes quite white. The beak and feet are red. It has red fleſhy protuberances about its beak and eyes; its voice is hoarſe, and ſcarce audible, unleſs when it is angry. Its eggs are remarkably round. Ray and Linnæus.

DUCK, *black*, *Anas nigra.* See SCOTER.

DUCK, *Burrough*, *Anas Tadorna.* See TADORNA.

DUCK, *Northern*, *Anas arctica* of Cluſius. See PUFFIN.

DUCK, *Scaup*, *Anas marila*, is a ſpecies of *duck* ſomewhat ſmaller than the common *duck*, and of a ſtrange diverſity of colours, even in the different birds of the ſame ſpecies, inſomuch, that it is not eaſy to find two perfectly alike in a flock of forty or fiſty. The beak is blue, and the moſt common colours of the other parts are theſe: the head, and part of the neck, are of a greeniſh black; the lower part of the neck has ſome whiteneſs, and the breaſt is black; the belly is white, with a mixture of yellow in the lower part, and near the anus it becomes black. The upper part of the neck is a ſooty black; the middle of the back is white, variegated with duſky browniſh lines, and the rump and tail are brown, as are alſo the wings, with ſome tranſverſe ſtreaks of white; the tail is not above two inches long; the legs are bluiſh. Theſe birds take their name from feeding on *ſcaup*, or broken ſhell fiſh. Ray.

DUCK, *Long-tailed*, *Anas glacialis*, is a ſpecies of *duck* which breeds in the moſt northern parts of the world, and only viſits our coaſts in the ſevereſt winters. The bill of this ſpecies is ſhort, black at the tip and baſe, and orange-coloured in the middle; the feet are red; the head, throat, breaſt, and belly, are white; the four middle feathers of the tail are black, and longer than the other, which are white. Linnæus and Pennant.

DUCK, *Pintail*, or *ſharp-tailed*, *Anas acuta*, or *caudacuta*, a ſpecies of *duck*, ſometimes called the *cracker* and *ſea-pheaſant*, is of the ſize of the common wigeon. Its head is all over of a ferruginous brown, but behind the ears there is a ſlight tinge of purple; its neck is ſomewhat longer than that of the wigeon, and its beak of a bluiſh black; the head is ſmall, and on each ſide of it is a white ſtreak, which reaches down to the throat; the throat is grey, variegated with tranſverſe lines, as is alſo the back; but the ſhoulder-feathers are, in a great meaſure, black; the tail is grey, with a mixture of white about the edges of the feathers; the two middle feathers are black, and longer than the others, and run out into narrow points, whence this bird has the name of ſea-pheaſant; the feet are of a lead colour. The female is of a light brown colour, ſpotted with black. Ray.

DUCK, *Tufted*, *Anas fuligula*, is ſometimes called *capo negro*, *querquedula criſtata*, and the little *morillon.* The bill is broad, of a bluiſh grey, and the hook black; the irides are of a fine yellow; the head is adorned with a thick but ſhort pendent creſt; the belly and under coverts of the wings are of a pure white; the quill-feathers duſky without; and at their extremities, and part within, white, and the ſecondaries are white tipt with black. The reſt of the plumage is black, varied about the head with purple; the tail is very ſhort, and conſiſts of fourteen feathers; the legs of a bluiſh grey; the webs black. The female has no creſt. Ray and Pennant. For other ſpecies of *duck*, ſee TEAL and WIGEON.

DUCK'*s foot*, or *May apple*, *podophyllum*, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the bud of the flower is incloſed in a large three-leaved empalement, in form of a ſpatha or ſheath; it has nine roundiſh concave petals, plaited on their borders, and ſmaller than the empalement; and a roundiſh germen, without a ſtyle, crowned by a plaited obtuſe ſtigma. The germen turns to an oval capſule of one cell, crowned by the ſtigma, and filled with roundiſh ſeeds. There is but one ſpecies, a native of North America.

DUCK'*s meat*, *Lemna*, or *Lenticula*, in *Botany*, a genus of the *monoecia diandria* claſs, whoſe characters are theſe: it grows in the water, and is ſeated at the ſuperficies; its appearance is quite ſimple and foliaceous, and its roots ſlender, capillaceous, and pellucid. This genus produces male and female flowers, neither of which have any *corolla.* The calyx is ſingle-leaved; the fruit is an unilocular capſule. Boerhaave mentions three ſpecies of this plant.

This is a ſmall plant which frequently covers the whole ſurface of ponds and ditches, conſiſting only of ſmall round green leaves, having neither flower nor ſeed perceivable; only from the middle of the under ſide of each leaf, ſmall white thready roots.

Duck's meat, is of a cooling, mollifying nature, good to be applied to inflammations, St. Anthony's fire, or the ſhingles; alſo for the gout, either applied by itſelf, or mixed with barley meal. Six ounces of a ſtrong infuſion made in white wine, taken for nine days together, is commended as a cure for the jaundice.

The *duck's meat* is thought to be very cooling and lenifying; ſome apply it as a cataplaſm to eaſe the gout and inflammation of the parts; but the repelling the humours is to be feared in theſe ſorts of remedies; for which reaſon, to aſſuage the pain of the hæmorrhoids, powder two handfuls of *duck's meat* with half an ounce of myrrh; put it all in a linen bag, and bathe the piles with the water which drops through the bag.

DUCK'*s meat*, *Starry*, in *Botany.* See CALLITRICHE.

DUCKING, or plunging in water. Olaus Magnus tell us, this was a diverſion anciently practiſed among the Goths, by way of exerciſe; but among the Celtæ, and Franks, it was a ſort of puniſhment. Tacitus likewiſe aſſures us, that it was executed among the ancient Germans, on the lazy and infamous. At Marſeilles, and Bourbon, their men and women of ſcandalous life are condemned to the *cale*, as they call it; that is, to be ſhut up, naked to the ſhift, in an iron cage, faſtened to the yard of a ſhalop, and *ducked* ſeveral times in the river. The ſame is done alſo at Tholouſe, to blaſphemers.

DUCKING is alſo a puniſhment for ſeamen; who are thrown into the ſea from the top of the yard of the main-maſt ſeveral times, according to the quality of their offence. Sometimes a cannon-ball is faſtened to their feet, to make the fall the more rapid.

There is alſo a kind of *dry ducking*, wherein the patient is only ſuſpended by a rope, a few yards above the ſurface of the water: this is a ſpecies of ſtrapada.

The puniſhment is uſually made public by the diſcharge of a cannon.

DUCKING is alſo a penalty, which veteran ſailors pretend to inflict on thoſe, who, for the firſt time, paſs the tropic of Cancer, the equator, or the Streights of Gibraltar, in conſequence of their refuſal or incapacity to pay the uſual fine levied on this occaſion.

DUCKING-*Stool*, in our *Cuſtoms.* See CUCKING-*Stool.*

DUCKUP, a word uſed at ſea by the ſteerſman, or him that is at the helm, when either main-ſail, fore ſail, or ſprit-ſail hinder his ſight ſo that he cannot ſee to ſteer by a land-mark, or the like; for then his word is, *duckup* the clew lines of thoſe ſails; and as to the ſprit-ſail, when a ſhot is to be made by a chaſe-piece, and the clew of that ſail hinders the ſight, they ſay, *duckup* the clew lines of the ſprit-ſail; that is, hale the ſail out of the way.

DUCT, DUCTUS, in *Anatomy*, is applied in a general ſenſe to all the canals, or tubes, in the animal body, as veins, arteries, &c. through which the humours or juices are conveyed.

DUCT has alſo a more immediate application to ſeveral particular veſſels: as the

DUCTUS *Alimentalis*, a name given by Dr. Tyſon to the gula, ſtomach, and inteſtines; all which make but one continued canal, or *duct.* This *duct* he makes the proper charactereſtic of an animal.

DUCTUS *Adipoſi*, are little veſicles in the omentum, which either receive the fat ſeparated from the adipoſe loculi, or cells, or elſe bring it to them; for the extreme fineneſs of theſe veſſels renders it very difficult to trace their origin, or courſe.

Indeed, it remains ſomewhat doubtful, whether they be hollow, and real *ducts*; or, whether they be not real fibres, ſuch as are obſerved in the ſpleen, along which the liquid fat does, as Dr. Drake expreſſes it, drill its way, as the eaſieſt it can find. Malpighi, their firſt diſcoverer, inclines to the former opinion. All we know for certain, is, that they terminate in little globules of fat, concerning the uſe and progreſs whereof, much remains to be conſidered.

Malpighi ſtarts a doubt, whether the adipoſe *ducts* may not be propagated from fibres which abound in the ſpleen, or thoſe fibres from them? As alſo, whether there be not a yet undiſcovered communication between the adipoſe membrane and the omentum?

Ducts, *Aqueous*. See Aqueous *Humour*.

Ductus *Chyliferus*, or *Roriferus*; the ſame as *ductus thoracicus*. See Thoracic.

Ductus *Communis Choledochus*, a large canal, formed by an union of the *ductus* cyſticus, and hepaticus. This *duct*, deſcending about four inches, diſcharges itſelf into the duodenum, by an oblique inſertion, which does the office of a valve, in preventing the regreſs of the bile, conveyed hereby into the inteſtines. See *Tab. Anat.* (Splanch.) *fig.* 5. *lit.* k. See Bile, and Choledochus.

The *ductus communis* ſometimes opens into the duodenum at the ſame aperture with the pancreatic *duct*.

Ductus *Cyſticus*, or *Meatus Cyſticus*, a large canal, about the bigneſs of a gooſe-quill, which ariſing from the neck of the gall-bladder, about two inches diſtance therefrom, joins the porus biliarius; and, together with it, conſtitutes the *ductus* communis. See *Tab. Anat.* (Splanch.) *fig.* 1. *lit. d. fig* 5 *lit. g g.*

Ducts, *Excretory*. See Excretory.

Ducts, *Galactophorous*. See Galactophorous.

Ductus *Hepaticyſticus*. See Cyst-Hepatic.

Ductus *Hepaticus*, called alſo *Meatus Hepaticus*, and *Bilary Pore*. See *Porus* Bilarius.

Ductus *Lachrymales*, the excretory veſſels of the glandulæ lachrymales, ſerving for the effuſion of tears. See Lachrymalia.

Ductus *Pancreaticus*, a little canal, ariſing from the pancreas, and opening into the duodenum; ſerving to diſcharge the pancreatic juice into the inteſtines. See Pancreas, and Pancreatic *Juice*.

This *duct*, being firſt diſcovered by Wirtſungus, is frequently called *ductus* Virtsungianus.

Duct, *Pecquets*. See Pecquets.

Ductus *pneumaticus*, in *Ichthyology*, the name of a certain *duct* or canal, found in all thoſe fiſh which have an air-bladder, reaching from that bladder to the orifice of the ſtomach, or ſome other part of it. This *duct* is variouſly ſituated in the different kinds. Artedi Ichthyolog. See Air Bladder.

Ductus *Salivales*, the excretory tubes of the ſalival glands; ſerving to diſcharge the ſecreted ſaliva into the mouth. See Salival *ducts*.

Ductus *Thoracicus*. See Thoracic *duct*.

Ductus *Umbilicalis*. See Umbilicalis *Funiculus*.

Ductus *Urinarius*; the ſame as *Urethra*. See Urethra.

DUCT, Ductus, in *Building*. See Caliducts, Ventiducts, Sewers, Cloaca, &c.

DUCTILITY, in *Phyſics*, a property of certain bodies, whereby they become capable of being beaten, preſſed, drawn, or ſtretched forth, without breaking; or whereby they are capable of great alterations in their figure and dimenſions; and of gaining in one way as they loſe in another.

Such are metals, which, being urged by the hammer, gain in length and breadth what they loſe in thickneſs; or, being drawn into wire through holes in iron, grow longer as they become ſlenderer.

Such, alſo, are gums, glues, reſins, and ſome other bodies; which, though not malleable, yet may be denominated *ductile*; inaſmuch as, when ſoftened by water, fire, or ſome other menſtruum, they may be drawn into threads.

Some bodies are *ductile* both when they are hot and cold, and in all circumſtances: ſuch are metals, and particularly gold and ſilver; other bodies are *ductile*, only when they have a certain degree of heat; ſuch as wax, and ſubſtances of the ſame kind, and glaſs; and others again, as ſome kinds of iron, viz. thoſe called by workmen *red-ſhort*, braſs, and ſome other metallic allays, are *ductile* only when cold, and are brittle, when hot.

So that we have two claſſes of *ductile* bodies; the one hard, and the other ſoft; on each of which we ſhall beſtow ſome conſiderations.

The cauſe of *ductility* is very obſcure; as depending, in great meaſure, on hardneſs; than which there is nothing in nature we know leſs of. It is true, we uſually account for hardneſs, from the force of attraction between the particles of the hard body; and for *ductility*, from the particles of the *ductile* body being, as it were, jointed, and entangled with each other.

Inſtead of fanciful hypotheſes to account for *ductility*, we ſhall here entertain the reader with ſome truly amazing circumſtances and phænomena thereof, in the inſtances of gold, glaſs, and ſpider's-webs.

Obſerving, however, that the *ductility* of metals decreaſes in the following order: gold, ſilver, copper, iron, tin, lead.

Ductility *of gold*. One of the properties of gold is, to be the moſt *ductile* of all bodies; of which the gold-beaters, and gold wire-drawers, furniſh us with abundant proof. Fa. Merſenne, M. Rohault, Dr. Halley, &c. have made computations thereof: but they truſted to the reports of the workmen. M. Reaumur, in the Memoires de l'Académie Royale des Sciences, an. 1713. took a ſurer way; he made the experiment himſelf. A ſingle grain of gold, he found, even in the common gold-leaf, uſed in moſt of our gildings, is extended into thirty-ſix and a half ſquare inches; and an ounce of gold, which, in form of a cube, is not half an inch either high, broad, or long, is beat under the hammer into a ſurface of 146 and a half ſquare feet; an extent almoſt double to what could be done in former time. In Fa. Merſenne's times, it was deemed prodigious, that an ounce of gold ſhould form 1600 leaves; which, together, only made a ſurface of 105 ſquare feet.

But the diſtenſion of gold under the hammer (how conſiderable ſoever) is nothing to that which it undergoes in the drawing-iron. There are gold leaves, in ſome parts, ſcarce the $\frac{1}{360000}$ part of an inch thick; but $\frac{1}{360000}$ part of an inch is a conſiderable thickneſs, in compariſon of that of gold ſpun on ſilk in our gold thread.

To conceive this prodigious *ductility*, it is neceſſary to have ſome idea of the manner wherein the wire-drawers proceed. The wire, and thread we commonly call gold-thread, *&c.* which is only ſilver wire gilt, or covered over with gold, is drawn from a large ingot of ſilver, uſually about thirty pounds weight. This they round into a cylinder, or roll, about an inch and a half in diameter, and twenty-two inches long, and cover it with the leaves prepared by the gold-beater, laying one over another, till the cover is a good deal thicker than that in our ordinary gilding; and yet, even then, it is very thin; as will be eaſily conceived from the quantity of gold that goes to gild the thirty pounds of ſilver: two ounces ordinarily do the buſineſs; and, frequently, little more than one. In effect, the full thickneſs of the gold on the ingot rarely exceeds $\frac{1}{400}$, or $\frac{1}{500}$ part; and, ſometimes not $\frac{1}{1000}$ part of an inch.

But this thin coat of gold muſt be yet vaſtly thinner: the ingot is ſucceſſively drawn through the holes of ſeveral irons, each ſmaller than the other, till it be as fine, or finer than a hair. Every new hole leſſens its diameter; but it gains in length what it loſes in thickneſs; and, of conſequence, increaſes in ſurface: yet the gold ſtill covers it: it follows the ſilver in all its extenſion, and never leaves the minuteſt part bare, not even to the microſcope. Yet, how inconceivable muſt it be attenuated while the ingot is drawn into a thread, whoſe diameter is 9000 times leſs than that of the ingot!

M. Reaumur, by exact weighing, and rigorous calculation, found, that one ounce of the thread was 3232 feet long; and the whole ingot 1163520 feet, Paris meaſure, or 96 French leagues; equal to 1264400 Engliſh feet, or 240 miles Engliſh; an extent which far ſurpaſſes what Fa. Merſenne, Furetiere, Dr. Halley, &c. ever dreamt of.

Merſenne ſays, that half an ounce of the thread is 100 toiſes, or fathoms long; on which footing, an ounce would only be 1200 feet: whereas, M. Reaumur finds it 3232. Dr. Halley makes ſix feet of the wire one grain in weight, and one grain of the gold ninty-eight yards; and, conſequently, the ten thouſandth part of a grain, above one third of an inch. The diameter of the wire he found one 186th part of an inch; and the thickneſs of the gold one 154500th part of an inch. But this, too, comes ſhort of M. Reaumur; for, on this principle, the ounce of wire would only be 2680 feet.

But the ingot is not yet extended to its full length. The greateſt part of our gold thread is ſpun, or wound on ſilk; and, before they ſpin it, they flat it, by paſſing it between two rolls, or wheels of exceedingly well poliſhed ſteel; which wheels, in flatting it, lengthen it by above one ſeventh. So that our 240 miles are now got to 274. The breadth, now, of theſe laminæ, or plates, M. Reaumur finds, is only one 8th of a line, or one 96th of an inch; and their thickneſs one 3072d. The ounce of gold, then, is here extended to a ſurface of 1190 ſquare feet; whereas, the utmoſt the gold-beaters can do, we have obſerved, is to extend it to 146 ſquare feet. But the gold, thus exceedingly extended, how thin muſt it be! From

M. Reaumur's calculus, it is found to be one 1750000th of a line, or one 21000000th of an inch; which is ſcarce one 13th of the thickneſs of Dr. Halley's gold. But he adds, that this ſuppoſes the thickneſs of the gold every-where equal, which is no-ways probable; for in beating the gold-leaves, whatever care they can beſtow, it is impoſſible to extend them equally. This we eaſily find, by the greater opacity of ſome parts than others; for, where the leaf is thickeſt, it will gild the wire the thickeſt.

M Reaumur, computing what the thickneſs of the gold muſt be where thinneſt, finds it only one 31500000th part of an inch. But what is the one 31500000th part of an inch? Yet this is not the utmoſt *ductility* of gold: for, inſtead of two ounces of gold to the ingot, which we have here computed upon, a ſingle one might have been uſed; and, then, the thickneſs of the gold, in the thinneſt places, would only be the 63000000th part of an inch.

And yet, as thin as the plates are, they might be made twice as thin, yet ſtill be gilt; by only preſſing them more between the flatter's wheels, they are extended to double the breadth, and proportionably in length. So that their thickneſs, at laſt, will be reduced to one thirteenth, or fourteenth millionth part of an inch.

Yet, with this amazing thinneſs of the gold, it is ſtill a perfect cover for the ſilver: the beſt eye, or even the beſt microſcope, cannot diſcover the leaſt chaſm, or diſcontinuity. There is not an aperture to admit alcohol of wine, the ſubtileſt fluid in nature, or even light itſelf, unleſs it be owing to cracks occaſioned by repeated ſtrokes of the hammer. Add, that if a piece of this gold-thread, or gold-plate be laid to diſſolve in aqua-fortis, the ſilver will be all excavated, or eat out, and the gold left entire, in little tubules.

It ſhould be obſerved, that gold, when it has been ſtruck for ſome time by a hammer, or violently compreſſed, as by gold wire drawers, becomes more hard, elaſtic, and ſtiff, and leſs *ductile*, ſo that it is apt to be crackt or torn: the ſame thing alſo happens to the other metals by percuſſion and compreſſion. But *ductility* and tractability may be reſtored to metals in that ſtate, by ANNEALING them, or making them red hot. Gold ſeems to be more affected by percuſſion and annealing, than other metals.

As to the DUCTILITY *of ſoft bodies*, it is not yet carried to that pitch. The reader, however, muſt not be ſurpriſed, that, among the *ductile* bodies of this claſs, we give the firſt place to the moſt brittle of all other, glaſs.

DUCTILITY *of Glaſs*. We all know, that, when well penetrated with the heat of the fire, the workmen can figure and manage *glaſs* like ſoft wax; but what is moſt remarkable, it may be drawn, or ſpun out into threads, exceedingly fine and long.

Our ordinary ſpinners do not form their threads of ſilk, flax, or the like, with half the eaſe, and expedition, as the glaſs-ſpinners do threads of this brittle matter. We have ſome of them uſed in plumes for children's heads, and divers other works, much finer than any hair, and which bend and wave like it with every wind.

Nothing is more ſimple and eaſy than the method of making them: there are two workmen employed; the firſt holds one end of a piece of glaſs over the flame of a lamp; and, when the heat has ſoftened it, a ſecond operator applies a glaſs hook to the metal thus in fuſion; and, withdrawing the hook again, it brings with it a thread of glaſs, which ſtill adheres to the maſs: then, fitting his hook on the circumference of a wheel about two feet and a half in diameter, he turns the wheel as faſt as he pleaſes; which, drawing out the thread, winds it on its rim; till, after a certain number of revolutions, it is covered with a ſkain of glaſs-thread.

The maſs in fuſion over the lamp, diminiſhes inſenſibly; being wound out, as it were, like a pelotoon, or clue of ſilk, upon the wheel; and the parts, as they recede from the flame, cooling, become more coherent to thoſe next to them; and this by degrees: the parts neareſt the fire are always the leaſt coherent, and, of conſequence, muſt give way to the effort the reſt make to draw them towards the wheel.

The circumference of theſe threads is uſually a flat oval, being three or four times as broad as thick: ſome of them ſeem ſcarce bigger than the thread of a ſilk-worm, and are ſurpriſingly flexible. If the two ends of ſuch threads be knotted together, they may be drawn and bent, till the aperture, or ſpace in the middle of the knot, doth not exceed one 4th of a line, or one 48th of an inch diameter.

Hence M. Reaumur advances, that the flexibility of glaſs increaſes in proportion to the fineneſs of the threads; and that, probably, had we but the art of drawing threads as fine as a ſpider's web, we might weave ſtuffs and cloths hereof, for wear. Accordingly, he made ſome experiments this way; and found he could make threads fine enough, as fine, in his judgment, as any ſpider's web; but he could never make them long enough to do any thing with them.

DUCTILITY *of Spider's-webs*. See WEB.

DUEL, a ſingle combat, at a time and place appointed, in conſequence of a cartel, or challenge.

The word is uſually derived from *duellum*, uſed by the barbarous Latin writers, *quaſi duorum bellum*.

Duels were anciently allowed by common law, in caſes where proof could not be had. In which view, Fleta defines *duel*, *ſingularis pugna inter duos ad probandam veritatem litis*; *& qui vicit, probaſſe intelligitur*. Stat. de Finib. Levat. 27 Edw. I.

This *duelling* was ſo general a method of terminating diſſerences among the nobility, that even eccleſiaſtics, prieſts and monks, were not excuſed from the ſame; only, to prevent their being ſtained with blood, they obliged theſe to procure champions to fight in their ſtead; as is ſhewn at large by father Dacheri, in his Spicilegium, tom. viii.

None were excepted from theſe legal *duels*, but women, ſick people, and cripples, and ſuch as were under twenty-one years of age, or above ſixty.

The cuſtom was, for the two champions to enter a liſt, or ſmall incloſure, appointed by the authority of the ordinary judge, not only on criminal occaſions, but on ſome civil ones, for the maintenance of their right.

The monk Sigebert even relates, that a queſtion on a point of law being preſented to the emperor Otho I. viz. whether repreſentation had place in direct ſucceſſion? and the doctors finding themſelves embarraſſed in the reſolution thereof; the emperor remitted the deciſion of ſo critical a point to the judgment of arms, and pitched on two bold fellows to maintain the *pro* and the *contra*. The victory fell to him who contended for repreſentation; in favour of whom a law was immediately made, which is in force to this day.

This cuſtom came originally from the northern nations; among whom it was uſual to end all their differences by arms, as we are aſſured by Paterculus. It afterwards paſſed as a law among the Germans, Danes, and Franks; eſpecially after Gondebaud, king of the Burgundians, admitted it in lieu of ſwearing. Towards the concluſion of the fifth century, M. Godeau, in his hiſtory of the church, VII. cent. ſays, it was the Lombards who firſt introduced into Italy the barbarity of ſingle combats, whence the cuſtom ſpread throughout the reſt of Europe.

This mode of trial was introduced into England, among other Norman cuſtoms, by William the Conqueror; but was only uſed in three caſes, viz. one military, in the court-martial, or court of chivalry and honour; the ſecond, criminal, in appeals of felony; and the third, civil, upon iſſue joined in a writ of right, which was the only deciſion of ſuch writ of right after the Conqueſt, till Henry II. with conſent of parliament introduced the alternative of the grand aſſize, or a peculiar ſpecies of trial by jury. See BATTLE.

The preparation for the combat, and the proceſs of it, are deſcribed under the article CHAMPION. We ſhall only farther obſerve, that when the day of combat was come, they made choice of four cavaliers to guard the field; and performed diverſe ceremonies, prayers, oaths, &c. deſcribed by Paſquier, and other authors, and quoted by Du-Cange, who mentions an ordonnance of king Philip the Fair in 1306, preſcribing the ſeveral rules, conditions, and ceremonies, to be obſerved herein.

The method of trial by *duel* was inſtituted as a way of conſulting Providence, to learn who was the criminal; and it was imagined, that God, thus interrogated, would not fail to declare himſelf in favour of the innocent. But it happened ſo often, that the unjuſt accuſer came off victorious; that they at length began to be convinced, they muſt not preſcribe to his wiſdom, the neceſſity of interrupting the courſe of ſecond cauſes. This was giving rules to murder, and diſguiſing aſſaſſinations under method and meaſure.

Saxo Grammaticus obſerves, that as early as the year 981, the kings of Denmark had abrogated the proof by *duel*; and in lieu thereof, appointed the proof by red-hot iron, which was alſo annulled in its turn.

But *duels* were condemned before by a council held at Valentia, in 855, where the perſon who killed his enemy, was excommunicated; and the perſon killed was pronounced unworthy of burial. Afterwards, the popes Nicolas I. Celeſtine III. and Alexander III. likewiſe interpoſed; and Frederic I. and II. prohibited them in Germany; Louis VII. began to reſtrain them in France, in the year 1168; and St. Louis proceeded to aboliſh them, but his ordonnance, A. D. 1260, only took place in his own territories, and not in thoſe of his vaſſals. After his example, the counts d'Auvergne and Poictou, and ſeveral other lords, forbad them likewiſe. Philip the Fair, following the footſteps of his grandfather, St. Louis, at one time forbad all gages, or pledges of battle;

and yet he permitted them in four caſes, in the ordonnance above mentioned of the year 1306. The laſt *duel* of note was in the year 1547, before king Henry II. between Jarnac and Chaſtaignerie, mentioned by Thuanus, and de Serres.

In England, the trial by *duel* is diſuſed; though the law on which it is founded be ſtill in force. It appears from Madox's Hiſtory of the Exchequer, that trials of this kind were ſo frequent in England, that fines, paid on theſe occaſions, made no inconſiderable branch of the king's revenue, vol. i. p. 349. The laſt trial of this kind was appointed in the year 1631, between Donald lord Rey, or Rhee, appellant, and David Ramſay, eſq. defendant, in the painted chamber at Weſtminſter. But that quarrel terminated without bloodſhed, being accommodated by Charles I. as was alſo another of the ſame kind in 1571, by the interpoſition of Queen Elizabeth. Another inſtance occurs ſeven years after that, in 1631. Ruſhworth's Obſervations on the Statutes, &c. p. 266. See Battle and Combat.

Duel is alſo uſed for a ſingle combat on ſome private quarrel or occaſion. See Challenge.

The *duel* muſt be premeditated; otherwiſe it is only a rencounter.

The folly, or rather madneſs, of *duelling* reigned for ſome ages in France; where the flower of the nobleſſe periſhed thereby. It is one of the glories of the late Louis XIV. to have uſed all his power and authority for aboliſhing *duels*. The ſevere edicts and laws he made againſt *duelliſts*, have, in a great meaſure, put a ſtop to the cuſtom.

Deliberate *duelling* is by the law of England a ſpecies of murder; and accordingly, it charges both the crime and puniſhment of murder on the principals; and as ſome ſay, on their ſeconds alſo. Blackſt. Com. vol. iv. p. 199.

And yet, as Dr. Robertſon obſerves, ſo powerful is the dominion of faſhion, that neither the terror of penal laws, nor reverence for religion, have been able entirely to aboliſh a practice unknown among the ancients, and not juſtifiable by any principle of reaſon; though, at the ſame time, it muſt be admitted, that, to this abſurd cuſtom we muſt aſcribe, in ſome degree, the extraordinary gentleneſs and complaiſance of modern manners, and that reſpectful attention of one man to another, which, at preſent, render the ſocial intercourſes of life far more agreeable and decent than among the moſt civilized nations of antiquity. Hiſt. Ch. vol. iii. p. 16, &c. 8vo.

DUKE, Dux, a ſovereign prince, without the title, or quality, of king. Such are the *duke* of Lorraine, *duke* of Holſtein, &c.

The word is borrowed from the modern Greeks, who call *doucas* what the Latins call *dux*.

There are alſo two ſovereigns, who bear the title of *grand-duke*; as, the *grand-duke* of Tuſcany, and the *grand-duke* of Muſcovy, now called the *czar*, or emperor of Ruſſia. The heir of the throne of Ruſſia is now called *grand-duke* of Ruſſia. The emperor of Germany is *arch-duke* of Auſtria. The king of Poland aſſumes the title of *grand-duke* of Lithuania.

Duke, Dux, is alſo a title of honour, or nobility, the next below princes.

The *dukedom*, or dignity of *duke*, is a Roman dignity, denominated *a ducendo*, leading, or commanding. Accordingly, the firſt *dukes*, *duces*, were the *ductores exercituum*, commanders of armies. Under the late emperors, the governors of provinces in war-time were intitled *duces*. In after-times the ſame denomination was alſo given to the governors of provinces in time of peace. The firſt governor under the name of *duke*, was a *duke* of the Marchia Rhætica, or Griſons, whereof mention is made in Caſſiodorus; and there were afterwards thirteen *dukes* in the eaſtern empire, and twelve in the weſtern. The Goths, and Vandals, upon their over-running the provinces of the weſtern empire, aboliſhed the Roman dignities wherever they ſettled. But the Franks, &c. to pleaſe the Gauls, who had long been uſed to that form of government, made it a point of politics, not to change any thing therein; and accordingly they divided all Gaul into duchies and counties; and gave the names ſometimes of *dukes*, and ſometimes of counts, *comites*, to the governors thereof.

In England, during the Saxons time, Camden obſerves, the officers and commanders of armies were called *dukes*, *duces*, after the ancient Roman manner, without any addition. After the Conqueror came in, the title lay dormant, till the reign of Edward III. who created his ſon Edward, firſt called the Black Prince, *duke* of Cornwall, which hath ever ſince been the peculiar inheritance of the king's eldeſt ſon, during the life of his father, ſo that he is *dux natus, non creatus*. After whom, there were more made, in ſuch manner as that their titles deſcended to their poſterity. They were created with much ſolemnity, *per cincturam gladii, cappæque, & circuli aurei in capite impoſitionem*. However, in the reign of queen Elizabeth, A. D. 1572, the whole order became utterly extinct; but it was revived about fifty years afterwards, by her ſucceſſor, in the perſon of George Villiers, *duke* of Buckingham.

Though the French retained the names, and form of the ducal government, yet, under their ſecond race of kings, there were ſcarce any ſuch thing as *dukes*; but all the great lords were called *counts*, *peers*, or *barons*: excepting, however, the *dukes* of Burgundy, and Aquitain; and the *duke* of France, which was a dignity Hugh Capet himſelf held, correſponding to the modern dignity of maire de palais, or the king's lieutenant.

By the weakneſs of the kings, the *dukes*, or governors, ſometimes made themſelves ſovereigns of the provinces truſted to their adminiſtration. This change happened chiefly about the time of Hugh Capet; when the great lords began to diſmember the kingdom, ſo that that prince found more competitors among them than ſubjects. It was even with a great deal of difficulty they could be brought to own him their ſuperior, or to hold of him by faith and homage.

By degrees, what with force, and what by marriages, theſe provinces, both duchies and counties, which had been rent from the crown, were again united to it. But the title *duke* was no longer given to the governors of provinces. From that time *duke* became a mere title of dignity, annexed to a perſon, and his heirs male, without giving him any domain, territory, or juriſdiction over the place whereof he is *duke*. All the advantages thereof now conſiſt in the name, and the precedence it gives.

The *dukes* of our days retain nothing of their ancient ſplendor, but the coronet on their eſcutcheon; which is the only mark of their departed ſovereignty. They are created by patent, cincture of the ſword, mantle of ſtate, impoſition of a cap, and coronet of gold on the head, and a verge of gold in their hand.

The eldeſt ſons of *dukes* are by the courteſy of England ſtyled *marquiſſes*, though they are uſually diſtinguiſhed by their fathers ſecond title, whether it be that of marquis or earl; and the younger ſons, *lords*, with the addition of their chriſtian name, as lord James, lord Thomas, &c. and they take place of viſcounts, though not ſo privileged by the laws of the land.

A *duke* has the title of *grace*; and being writ to, he is ſtyled, in the heralds language, *moſt high, potent, and noble prince*. *Dukes* of the blood royal are ſtyled, *moſt high, moſt mighty, and illuſtrious princes*.

Duke, among Hebrew grammarians, is an appellation given to a ſpecies of accents, anſwering to our comma. See Accent.

Duke-Duke, a quality given in Spain to a grandee of the houſe of Sylva, on account of his having ſeveral duchies from the uniting of two conſiderable houſes in his perſon. Don Roderigo de Sylva, eldeſt ſon of Don Ruy Gomez de Sylva, and heir of his duchies and principalities, married the eldeſt daughter of the *duke* de l'Infantado; in virtue of which marriage, the preſent *duke* de Paſtrana, who is deſcended therefrom, and is grandſon of Don Roderigo de Sylva, has added to his other great titles, that of *duke-duke*, to diſtinguiſh himſelf from the other *dukes*, ſome whereof may enjoy ſeveral duchies, but none ſo conſiderable ones, nor the titles of ſuch eminent families.

DULCIFYING. See Edulcoration in, *Chemiſtry*.

DULCIMER, a muſical inſtrument in the ſhape of a ſmall cheſt or box, with ſtrings on the lid of it.

DULCINISTS, in *Eccleſiaſtical Hiſtory*. See Apostolici.

DULCINO, in the *Italian Muſic*, a wind inſtrument, otherwiſe called *quart fagotto*. It ſerves for tenor to the hautboy, and is no more than a little baſſoon. Broſſ. Dict. Muſ. in voc.

DULCIS *Aſſa*, or *Aſa*. See Asa.

DULEDGE, in *Gunnery*, a peg of wood which joins the ends of the ſix fellows, which form the round of the wheel of a gun-carriage; and the joint is ſtrengthened on the outſide of the wheel by a ſtrong plate of iron, called the *duledge plate*.

DULIA, ΔΟΥΛΕΙΑ, *Service*. See Worship, Latria, and Hyperdulia.

DULKAK, among Arabian writers, a fabulous ſea monſter, in form of a man, riding on an oſtrich, which is ſaid to attack ſhips, and fight with the men on board. Hofm. Lex. in voc.

DULMA, a Turkiſh diſh, made of any vegetable, as cucumbers, onions, cabbage leaves, &c. ſtuffed with forced meat. Pococke's Egypt, p. 183.

DULNESS *of hearing*. See Hearing.

DULWICH *Water*, a well-known mineral water near London. It contains a kind of cathartic bitter ſalt: it ſeems not to have any iron in it. Phil. Tranſ. N° 461. § 22.

DUM *non fuit compos mentis*, in *Law*, a writ that lies for one, who aliens any lands or tenements while not of ſound memory or judgment, in order to recover the ſame from the *alienee*, againſt whom the writ is taken.

DUM *fuit infra ætatem*, in *Law*, a writ which lies for him, who, before he came to full age, made a feoffment of his land, to recover it again of the *vendee*. Fitz. Nat. Br. fol. 192.

DUMBNESS, the ſtate of a perſon who wants the natural uſe of ſpeech.

People born deaf, are ſaid to be all naturally *dumb*, as not being able to learn words.

Dumbneſs is ſometimes the reſult of the want, or even the ill conformation, of the tongue. Yet in the third tome of the Ephem. German. we have an account of a book, intituled, Jac. Rolandi Agloſſoſtomographia, ſive Deſcriptio Oris ſine Lingua, quod perfecte loquitur. See TONGUE and MUTE.

When this diſorder ariſes from deafneſs, it ſometimes admits of a cure. See Phil. Tranſ. N° 61. where Dr. Wallace gives an account of two perſons deaf and *dumb*, who were taught to underſtand and ſpeak a language. And in N° 245, the doctor gives an account of his method for this purpoſe.

DUN, in the *Manege*, a colour partaking of brown and black.

DUNDIVER, in *Zoology*, the name of a water-fowl, eſteemed a diſtinct ſpecies of bird, not only by the vulgar, but by the generality of authors, but being in reality no other than the female MERGANSER or gooſander. This is leſs than the male; the head and upper part of the neck are ferruginous; the throat white; the feathers on the hind part are long, and form a pendent creſt; the back, coverts of the wings, and tail, are of a deep aſh-colour; the greater quill-feathers are black, and the leſſer white; the breaſt and middle of the belly are white, tinged with yellow. The wings, both in this and in the male, are very ſhort in proportion to the ſize of the body; yet they fly along the ſurface of the water very ſwiftly. Ray and Pennant.

DUNG, in *Agriculture*, &c. All kinds of *dung* contain ſome matter; which, when mixed with the ſoil, ferments therein, and by that fermentation, diſſolves the texture of the earth, and divides and crumbles its particles very much. This is the real uſe of *dung* in agriculture; for as to the pure earthy part of it, the quantity is ſo very ſmall, that after a perfect putrefaction, it bears an extremely inconſiderable proportion to that of the earth it is intended to manure.

The fermenting quality of *dung* is principally owing to the ſalt it contains; and yet thoſe, or any other ſalts, applied immediately to the roots of plants, always deſtroy them. This proves, that the buſineſs of the *dung* is not to nouriſh, but to divide and ſeparate that terreſtrial matter, which is to afford the nouriſhment to vegetables through the mouths of their roots. And the acrimony of the ſalts of *dung* is ſo great, that the niceſt managers of vegetables we have, the floriſts, have wholly baniſhed the uſe of it from their gardens. The uſe of *dung* ſhould be alſo forbid in kitchen-gardens; for it is poſſible to ſucceed full as well without it; and it gives an ill taſte to all the roots and plants that are to ſtand in the earth, in which it is an ingredient. The water of a cabbage raiſed in a garden, manured with *dung*, if boiled, is of an intolerable ſtink; but this is not ſo much owing to the nature of the plant, as of the manure uſed to it; for a field-cabbage being boiled, the water has ſcarce any ſmell, and what it has, is not diſagreeable

It is alſo a well-known fact in the country, that a carrot raiſed in a garden has nothing of that ſweet flavour, that ſuch as grow in the fields have; but inſtead of this natural reliſh, the garden one has a compound taſte, in which the matter of the manure has no ſmall ſhare. And there is the ſame ſort of difference in the taſte of all roots nouriſhed with ſuch different diet. *Dung* not only ſpoils the flavour of the eſculent vegetables, but it ſpoils the drinkables into the original compoſition of which it enters: they are obliged to uſe *dung* to the poor vineyards in Languedoc; and the conſequence is, that the wine is nauſeous. The poor, who only raiſe a few vines for the wine they drink themſelves, and cannot be at the expence of this manure, have the leſs of it, but then it is better, by many degrees, than the other; and it is a general obſervation which the French expreſs in theſe words, that the poor people's wine in Languedoc is the beſt, becauſe they carry no *dung* into their vineyards. Tull's Horſehoeing Huſbandry, p. 20. Another diſadvantage attending the uſe of *dung* is, that it gives riſe to worms. It is for this reaſon, that garden carrots are generally worm-eaten, and field carrots ſound; and the ſame obſervation will hold good in other vegetables, in the field and in the garden. Vegetable and animal *dung* are, in fact, only the putrefaction of earth, after it has been altered, by paſſing through vegetable or animal veſſels. Vegetable *dung*, unleſs the vegetable be buried alive in the ſoil, makes a much leſs ferment in it than animal *dung* does; but the *dung*, or putrid matter of vegetables, is much more eligible and wholeſome for the eſculent roots and plants, than that of animals is. Venemous animals are found to be very fond of *dung*, and are brought into gardens by the ſmell of the *dung* uſed in them as manure. The ſnakes uſually frequent *dung*-hills, and lay their eggs in them; and gardens where *dung* is much uſed, are always frequented by toads; whereas the fields where roots are planted, are much leſs infeſted by them.

However unneceſſary and prejudicial *dung* is in gardens, it is, however, very neceſſary in the corn-fields; and little can be done without it in the old method of huſbandry. *Dung* is not ſo injurious in fields as in gardens, becauſe it is uſed in much ſmaller quantities, in proportion to the quantity of ſoil; and cabbages, turneps, potatoes, and other things growing in fields, and intended only for the food of cattle, will not be injured by *dung*, tillage, and hoeing all together; for the crops will by this means be the greater, and the cattle will like the food never the worſe. *Dung* is very beneficial in giving very large crops of wheat; and it is found by experience, that the country farmer, at a diſtance from a large town, can never have ſo good crops by all his tillage, as thoſe who live in the neighbourhood of cities, where *dung* is produced in great plenty, and eaſily had. The *dung* uſed in fields, beſides its diſſolving and dividing virtue, is of great uſe in the warmth its fermenting gives to the young plants of the corn in their weakeſt ſtate, and in the moſt ſevere ſeaſons; the laſting of this ferment is not eaſily determined, becauſe the degrees of heat are very difficult to be judged of when they become ſmall.

The farmers uſually underſtand by the term *dung*, not only the excrements of animals, with the litter, but every thing that will ferment with the earth; ſuch as the green ſtalks and leaves of plants buried underground, and the like; and every thing they add to it, except fire.

The uſes of the *dungs* of ſeveral animals are ſufficiently proved every day. They are uſed to repair the decays of exhauſted and worn-out land, and to cure the ſeveral defects in different natural bad ſoils; the faults of which are as different as the nature of the different *dungs* uſed to improve them. Some land is too cold, moiſt, and heavy, and the other too light, and dry; and to improve and meliorate theſe, we have ſome *dung* hot, and light, as ſheep's, horſe's, pigeons, &c. and others fat and cooling, as that of oxen, hogs, &c. There are two remarkable qualities in *dung*; the one is to produce a ſenſible heat, capable of bringing about great efforts; the other is to fatten the ſoil, and render it more fertile. The firſt of theſe is ſeldom found in any but the *dung* of horſes or mules; the great effects of which, when newly made, and a little moiſt, are ſeen in the kitchen-garden, where it invigorates, and gives a new life to every thing, ſupplying the place of the ſun; and to this, in a great degree, we owe all the vegetable delicacies of the ſpring. Beſides, Horſe *dung* is the richeſt of all improvements that can be had in any quantity for poor hungry lands; yet, when either too new, or when uſed alone, it is very prejudicial to ſome lands; and if ſpread too thin on dry lands in ſummer, it becomes of very little ſervice; the ſun ſoon exhaling all its riches, and leaving it little more than a heap of ſtubble or dry thatch.

Horſe *dung* is always beſt for cold lands, and cow *dung* for hot ones; but being mixed together, they make a very good manure for moſt ſorts of ſoils, and for ſome they are very properly mixed with mud.

Sheep's *dung*, and deer's dung, differ very little in their quality, and are eſteemed by ſome the beſt of all *dung* for cold clays; for this purpoſe, ſome recommend the beating them to powder, and ſpreading them thin over the autumn or ſpring crops, at about four or five loads to an acre, after the ſame manner as aſhes, malt-duſt, &c. are ſtrewed. And in Flanders, and ſome other places, they houſe their ſheep at nights in places ſpread with clean ſand, laid about five or ſix inches thick; which, being laid on freſh every night, is cleared out once a week, and with the *dung* and urine of the ſheep is a very rich manure, and ſells at a very conſiderable price. It is principally uſed for ſtubborn lands; but Mr. Quinteney is of opinion, that it is the beſt of all manure for land in general.

Hog's *dung* is by many recommended as the fatteſt and richeſt of all *dung*; and is found on experience, to be better than any other kind for fruit trees, apples, pears, and the like. It is alſo a very rich *dung* for graſs; and is ſaid to do as much good in one load, as any other *dung* whatever in two.

The *dung* of pigeons, hens, and geeſe, are great improvers of meadow and corn land. That of pigeons is unqueſtionably the richeſt that can be laid on corn land; but before it is uſed, it ought to be expoſed for ſome time out of the dove-houſe to the open air, to take off its fiery heat. It is in general very proper for cold clay lands; but then it always ſhould be well dried before it is laid on, becauſe it is apt to clod in the wet. It is beſt alſo to mix it with ſome dry earth, to break its parts, that it may be ſpread the more regularly; and it is in itſelf ſo very rich and hot, as to bear ſuch an admixture without greatly impoveriſhing it. This *dung* is alſo by ſome recommended as better than any other for aſparagus, and ſtrawberries, and for the propagation and culture of the tender garden flowers. The *dung* of pigeons is alſo particularly recommended by Mr. Gentil for thoſe trees whoſe leaves are apt to turn yellow, if they grow in cold ſoils; but for this uſe, it ſhould firſt lie three years in a dunghill, and then be applied ſparingly in autumn, laying about an inch thickneſs of it at the root of the tree, and ſuffering it to remain there till the March following.

The *dung* of poultry being hot, and full of ſalts, tends much to facilitate vegetation, and is abundantly quicker in its operation than the *dung* of animals which feed on the leaves of plants. It is an obſervation of Sir Hugh Plat, that one load of grains will enrich ground, more than ten loads of common *dung*; and it is eaſy to inſer from hence, that the ſame grain muſt needs be of greatly more virtue, when it has paſſed through an animal body. Human *dung* is alſo a great improver of all cold and four lands, but ſucceeds beſt when mixt with other *dungs* or earths, to give it a fermentation.

But for all ſtubborn clayey ſoils, there is no manure ſo good as the cleanſing of London ſtreets; the parts of tough land will be more expeditiouſly ſeparated by this than by any other compoſt; and where it is to be had, it is of the greateſt value both for field and garden land. Miller's Gard. Dict.

DUNG, *Gooſe*. This is a very valuable manure, and as uſeful to the farmer as pigeon's dung, or that of any other fowl. The ancients thought otherwiſe, and condemned it as prejudicial both to corn and graſs; and many are of the ſame opinion ſtill; but without any foundation in fact. Indeed where corn is high, and when graſs is ready to be mown, theſe birds, if they get among it, will do great damage, by treading it down with their broad feet; but their *dung*, inſtead of being hurtful to the land, does it great ſervice. Near Sutton, in Nottinghamſhire, there is a barren piece of land given by the town for a gooſe-paſture; the geeſe have been kept in it many years; and their dung has ſo enriched it, that it is one of the moſt fruitful pieces of ground in the whole country. There has been an opinion alſo, that cattle feeding on graſs, where theſe creatures had much dunged the ground, would ſuffer by it; but it appears from trial, that cattle are moſt fond of all of thoſe parts of paſtures where the geeſe have dunged moſt; and that they ſuffer no alteration by it, except the growing fat upon it. The *dung* of fowls in general is very enriching to land. And Fowley Iſland, in Lancaſhire, a place ſo called from the abundance of wild fowl continually found on it, is ſo enriched with their *dung*, that it fattens ſheep in a ſurprizing manner. See COMPOST and MANURING.

DUNG *in Medicine, the properties of*. The following properties are attributed by medical writers to the ſeveral kinds of *dung*.

Neat's *dung*, applied freſh, mitigates inflammations in wounds. The *dung* of goats, eſpecially of ſuch as live on the mountains, drank in wine, cures the jaundice; and exhibited with ſpices, provokes the menſes, and expels the dead fœtus. The *dung* of ſheep, applied as a cataplaſm, with vinegar, cures *epinyctides*, corns, *thymi*, and *acrochordones*; burnt and ſpread upon cerate of roſes, it ſerves for the ſame purpoſe. The *dung* of ſwine, dried, and drank in wine or water, ſtops vomiting of blood, and eaſes inveterate pains of the ſides; drank in vinegar, it is effectual in ruptures and ſpaſms; and applied in cerate of roſes, it cures luxations. The *dung* of horſes and aſſes, mixed with vinegar, repreſſes hæmorrhages. The *dung* of cattle, which feed on herbs, dried, infuſed in wine, and drank, is an excellent remedy for the poiſon of the ſcorpion. The *dung* of ſtorks, drank in water, is ſuppoſed to be good for the epilepſy; and the *dung* of a vulture, in a ſuffumigation, is ſaid to expel the dead fœtus. The *dung* of mice, pounded in vinegar, and rubbed on the part, cures an *alopecia*; and drank in mulſum, with frankincenſe, expels the ſtone; uſed in a ſuppoſitory for children, it ſtimulates the belly to excretion. The *dung* of dogs, evacuated in the canicular ſeaſon, dried, and drank in wine, or water, ſtops a looſeneſs. Human *dung*, applied freſh, preſerves wounds from inflammation, and at the ſame time conglutinates them: dried, and rubbed on the parts with honey, it is reported to give relief in a quinſey. The *dung* of the land crocodile, ſerves the women as a coſmetic, to render the ſkin of the face of a lively colour, and ſhining. James Med. Dict.

DUNG-*meers*, or *dung-hills*, in *Huſbandry*, places where ſoils and *dungs* are mixed and digeſted together. For this purpoſe, it is uſual to dig a pit, ſufficient to hold the ſtock of ſoil the huſbandman is capable of making; and to prepare it at the bottom with ſtone and clay, that it may hold the water and moiſture of the *dung*; and it ſhould be ſo ſituated, that the drips of houſes or barns may run into it. Into this pit they caſt refuſe fodder, litter, dung, weeds, &c. where they lie and rot together, until the farmer has occaſion for it. Where ſuch a pit is wanting, it is neceſſary to cover the dung with turf, or other ſtuff, to prevent the ſun and wind from drawing off its virtues. Compoſt *dung-hills*, which are formed by a mixture of earth with *dung*, lime, and other manure, are made with leaſt expence on the field for which they are intended.

DUNG-WORMS, a ſpecies of fly-worms, of a ſhort and ſomewhat flat body, found in great plenty among the cow-*dung* in the months of September and October. Theſe have all their metamorphoſes into the fly ſtate, performed within a ſhell of their own ſkin.

The fly produced from this worm, is one of Reaumur's firſt claſs of the two-winged flies; it has a trunk with lips, and has no teeth; it is of the claſs of thoſe with the ellipſoid bodies; but its body is remarkably long for one of thoſe, and is compoſed of ſix rings: its head is very round, and nearly of a ſpherical form, and is large in proportion to its body; it has antennæ of the lenticular or battledore form; its reticular eyes are of a deep cheſnut brown; and its three ſmall eyes are placed in the common manner. Its corcelet is of a fine gilded green; and its back is not eaſily to be deſcribed as to colour, for it is changeable, and ſeems compoſed of a violet colour, and of a deeper and a paler copper colour. The under part, or belly, is of a pale yellow, and the legs and balancers of a yet paler yellow. Reaumur's Hiſt. Inſect. v. iv. p. 350.

DUNGEON, DONJON, in *Fortification*, the higheſt part of a caſtle built after the ancient mode; ſerving as a watch-tower, or place of obſervation: and alſo for the retreat of a garriſon, in caſe of neceſſity, ſo that they may capitulate with greater advantage.

The word comes from the French, *donjon*, which ſignifies the ſame; and which Fauchet derives from *domicilium*, becauſe the dungeon, being the ſtrongeſt part of the caſtle, was uſually the lord's apartment. Menage derives it from *dominione*, or *dominionus*, which in ſome ancient writings we find uſed in the ſame ſenſe. Du-Cange derives the appellation from *duno aut colle ædificatum*, which the barbarous writers have altered into *dunjo*, *dungeo*, *dongio*, *dangio*, *domgio*, and *domnio*.

In ſome caſtles, as that of Vincennes, &c. the *donjon* ſerves as a priſon for perſons they would have the moſt ſecurely kept; whence the general uſe of our word *dungeon*, for a dark cloſe priſon under ground.

DUNKERS, in *Eccleſiaſtical Hiſtory*, a religious ſect at Ephrata or *Dunker*-town, near Lancaſter, in Penſylvania, which took their riſe about fifty years ago, and conſiſting moſtly of Germans. Their name is ſaid to be derived from their mode of baptizing new converts, which is by dipping, after the manner of the Anabaptiſts. Their habit is a kind of long coat or tunic, made of linen, for the ſummer, and woollen for the winter, reaching down to the heels, with a ſaſh or girdle round the waiſt; and a cap, or hood, hanging from the ſhoulders, reſembling the dreſs of the Dominican friars. The men ſhave neither the head nor beard. The men and women have diſtinct habitations and governments: they have for this purpoſe erected two wooden buildings; in each of which there is a banqueting-room, and an apartment for public worſhip; ſo that they never meet together even at their devotions. They live chiefly on roots and vegetables, and eat no fleſh, except on occaſion of their love-feaſts, when the brethren and ſiſters dine together. The *Dunkers* allow of no intercourſe between the brethren and ſiſters, not even by marriage; a regulation not very favourable to their ſubſiſtence and increaſe; and if any break through this reſtraint, and marry, they are removed from communion with the unmarried, to a place about a mile diſtant, called Mount Sion. Their principal tenet is ſaid to be, that future happineſs is only to be obtained by penance and mortification in this life; and that, as Jeſus Chriſt, by his meritorious ſufferings, became the Redeemer of mankind in general, ſo each individual of the human race, by a life of abſtinence and reſtraint, may work out his own ſalvation.

DUNLIN, in *Ornithology*, an Engliſh name of a bird of the ſnipe-kind, or the TRINGA *alpina* of Linnæus. It is of the ſize of the ſmaller ſnipe; its beak is furrowed; its belly is white, variegated with large black ſpots; the head, back, and upper part of the neck, are ferruginous, marked with black ſpots; and the lower part of the neck is white, marked with ſhort duſky ſtreaks; the tail is aſh-coloured; the legs black; and the toes divided to their origin. It is common in watry places, and on the ſea-coaſts in the northern counties of England, and picks up its food out of the mud. They are eſteemed a great delicacy. Ray's Ornitholog. p. 226.

DUNNAGE, in *Sea-Language*, a quantity of faggots, boughs of trees, or other looſe wood, laid in the bottom of a ſhip, either to raiſe the heavy goods which might make her too ſtiff, or to keep the cargo ſufficiently above the bottom, that it may receive no damage from the water, if the ſhip ſhould prove leaky.

DUNTER-*Gooſe*, a ſpecies of the wild gooſe, found in Zeatland. Phil. Tranſ. N° 473. § 8. See *Cuthbert* DUCK.

DUO, in *Muſic*, a ſong, or compoſition, to be performed in two parts only; the one ſung, and the other played on an inſtrument; or by two voices alone.

DUO is alſo when two voices ſing different parts, accompanied with a third, which is a thorough baſe. Uniſons and octaves are rarely to be uſed in *duos*, except at the beginning and end.

DUOBUS, *Pilulæ ex*, in *Medicine*. See PILLS.

DUOBUS, *ſal de*, is *vitriolated* NITRE.

DUODENA *Arteria*, and *Vena*, a branch of an artery, which the duodenum receives from the cœliac; to which anſwers a vein of the ſame name, returning the blood to the porta.

DUODENUM, in *Anatomy*, the firſt of the *inteſtina tenuia*, or ſmall guts; being that which receives the food half chylified from the ſtomach. See *Tab. Anat.* (*Splanch.*) *fig.* 1. *lit. h and i. fig.* 2 *lit c.*

It has its name *duodenum*, as being above twelve fingers breadth long; on which account, ſome call it *dodecadactylum.*

The *duodenum* ariſes from the pylorus, or right orifice of the ſtomach; whence deſcending towards the Spine, from right to left, quite ſtrait, it terminates where the circumvolution of the reſt begins.

Its coats are thicker, and its cavity or canal is leſs than any of the other inteſtines. At its lower end are two canals, opening into its cavity, one from the liver, and gall-bladder, called the *ductus communis choledochus*; and the other from the pancreas, called *pancreaticus*.

The *duodenum* is quite ſtrait; but the inteſtinum jejunum makes diverſe windings and inflexions: the reaſon is, that the bile, and pancreatic juice, mixing at the beginning thereof, or at the end of the *duodenum*, would otherwiſe precipitate not only the groſs parts of the excrements, but alſo the chyle itſelf, too haſtily. Brunnerus diſcovered a number of ſmall glands in the *duodenum*, which diſcharge a menſtruous lymph; ſo that the digeſtion of the aliment begun in the ſtomach is completed in the *duodenum*.

The deſcription and draughts of the *duodenum*, as given by moſt anatomiſts, appearing faulty, Mr. Monro has endeavoured to rectify their omiſſions and miſtakes in the Med. Eſſ. Edinb. vol. iv. art. 11.

This inteſtine is ſometimes found ſo large, as to be called *ventriculus ſuccenturiatus.*

Authors ſeldom take notice of the *duodenum* as the ſeat or cauſe of any particular diſeaſe; but its diſtention and preſſure on the many veſſels to which it is contiguous, may diſturb the functions of the animal œconomy; and accordingly it is the ſource of many diſorders, which may be relieved by emetics and purgatives.

DUPLA, DUPLE *Ratio*, is where the antecedent term is double the conſequent; or, where the exponent of the *ratio* is 2: — thus 6 : 3 is in a *duple ratio*. See RATIO.

DUPLE, SUB, *Ratio*, is where the conſequent term is double the antecedent; or, the exponent of the *ratio* is $\frac{1}{2}$: Thus, 3 : 6 is in a *ſub-duple ratio.*

DUPLA *Seſquialtera*
DUPLA *Superbipartiens tertias* } *Ratio.* See RATIO.

DUPLE *Time.* See TIME.

DUPLICATE, a ſecond inſtrument, or act in writing; or a tranſcript, or copy of another.

The word is formed from the Latin *duploma*, or *duplum*, double.

It is uſual to ſend a *duplicate*, when it is apprehended the firſt diſpatch, &c. is loſt.

DUPLICATE, in *Chancery*, is particularly uſed for a ſecond letter patent granted by the lord chancellor, in a caſe where he had formerly done the ſame. See PATENT.

DUPLICATE *Ratio*, the *ratio* between the ſquares of two quantities. Thus the duplicate *ratio* of *a* to *b* is the *ratio* of *aa* to *bb*, or of the ſquare of *a* to the ſquare of *b*.

In a ſeries of geometrical proportions, the firſt term to the third is ſaid to be in a *duplicate ratio* of the firſt to the ſecond; or as its ſquare is to the ſquare of the ſecond: thus in 2, 4, 8, 16, the *ratio* of 2 to 8, is *duplicate* of that of 2 to 4; or as the ſquare of 2 to the ſquare of 4: wherefore, *duplicate ratio* is the proportion of ſquares; as triplicate is of cubes, &c. and the ratio of 2 to 8, is ſaid to be compounded of that of 2 to 4, and of 4 to 8.

DUPLICATE *Root*, among *Botaniſts*, one compoſed of two coats. See ROOT.

DUPLICATION, DOUBLING, in *Arithmetic*, and *Geometry*, the multiplying a quantity, either diſcrete or continued, by two.

DUPLICATION *of a cube*, is the finding of the ſide of a cube that ſhall be double in ſolidity to a given cube; which is a famous problem cultivated by the geometricians two thouſand years ago.

It was firſt propoſed by the oracle of Apollo at Delphos; which, being conſulted about the manner of ſtopping a plague then raging at Athens, returned for anſwer, that the plague ſhould ceaſe when Apollo's altar, which was cubical, ſhould be doubled. Upon this, they applied themſelves in good earneſt, to ſeek the *duplicature* of the cube, which henceforward was called the *Delian problem.*

The problem is only to be ſolved by finding two mean proportionals between the ſide of the cube, and double that ſide; the firſt whereof will be the ſide of the cube doubled, as was firſt obſerved by Hippocrates Chius.

Thus let x and z be two mean proportionals between a and $2a$; then $a : x :: x : z = \frac{x^2}{a}$; and $x : \frac{x^2}{a} :: \frac{x^2}{a} : 2a$; therefore $x^3 = 2a^3$. Suppoſing the ſide of the given altar a to be 10, then the cube root of $2a^3$, or 2000, found by approximation, will be the ſide of the altar required, nearly.

Eutochius, in his comments on Archimedes, gives ſeveral ways of performing this by the meſolabe. Pappus Alexandrinus, and his commentator Commandine, give three ways: the firſt, according to Archimedes; the ſecond, according to Hero; and the third, by an inſtrument invented by Pappus, which gives all the proportions required.

The ſieur de Comiers has likewiſe publiſhed an elegant demonſtration of the ſame problem, by means of a compaſs with three legs; but theſe methods are all only mechanical.

***Re*-DUPLICATION.** See REDUPLICATION.

DUPLICATUM *Arcanum.* See ARCANUM.

DUPLICATURE, in *Anatomy*, a doubling or folding of membranes, or other like parts.

Such are the *duplicatures* of the peritonæum, of the omentum, of the pleura, &c.

In the hiſtory of the French academy for the year 1714, an account is given of a young man, who died at the age of twenty-ſeven years, in the *duplicature* of whoſe meninges there were found little bones, that ſeemed to proceed out of the inner ſurface of the dura mater, and with their acute points ſtimulated the pia mater.

That *duplicature* of the peritonæum, wherein the ancients placed the bladder, is not found by the modern anatomiſts. Dionis.

Fabricius ab Aquapendente firſt diſcovered the *duplicature* of the cuticula.

DUPLODES. See GAMBEZON.

DUPONDIUS, in *Antiquity*, a weight of two pounds; or a money of the value of two aſſes. See AS.

As the as, at firſt, weighed a juſt pondo, or libra; the *dupondius* then weighed two. And hence the name.

And though the weight of the as was afterwards diminiſhed, and of conſequence that of the *dupondius* alſo; yet they ſtill retained the denomination. See POUND, and LIBRA.

DURA *Mater*, or *Meninx*, a ſtrong, thick membrane, which lines or covers all the inner cavity of the cranium, and includes the whole brain; being itſelf lined on its inner, or concave ſide, by the pia mater, or meninx tenuis. See *Tab. Anat.* (*Oſteol.*) *fig.* 4. *lit. cc. fig.* 6. *lit. cc.*

The *dura mater* ſticks very cloſe to the baſis of the ſkull, and its ſutures, by the fibres and veſſels it ſends to the pericranium.

It is faſtened to the pia mater, and the brain, by the veſſels which paſs from one to the other. It gives a coat, or covering, to all the nerves which riſe from the brain; and to the medulla ſpinalis, and all the nerves, which riſe from it.

Its ſurface is rough towards the ſkull, and ſmooth towards the brain. It is a double membrane, woven of ſtrong fibres, which may be plainly ſeen on its inſide, but very little on its outſide next the ſkull; it has three proceſſes made by the doubling of its inner membrane. The firſt reſembles a ſickle, and is therefore called *falx*. The ſecond ſeparates the cerebrum from the cerebellum, down to the medulla oblongata, that the weight of the cerebrum may not offend the cerebellum, which lies under it. This proceſs is very ſtrong and thick, and in ravenous beaſts for the moſt part it is bony, becauſe of the violent motion of the brain. The third is the ſmalleſt, and ſeparates the external ſubſtance of the hind parts of the cerebellum into two protuberances.

In the *dura mater* are ſeveral ſinuſes, or channels, which run between its internal and external membranes; the four principal ones are the ſinus longitudinalis; the ſecond and third ſinuſes are called *laterales*; and the fourth, *torcular*. Beſides theſe, there are more of inferior note, mentioned by anatomiſts, as Du Verney, Dr. Ridley, &c. Their uſe is to receive the blood of the adjacent parts from the veins, to which they ſerve as ſo many trunks, and to diſcharge it into the internal jugulars.

The veſſels of the *dura mater* are, firſt, a branch from the carotid, while it is in its long canal, which is diſperſed in the fore and lower part of the *dura mater*; ſecondly, an artery, which enters the hole of the ſkull, called *foramen arteriæ duræ matris*: it is diſperſed on the ſides of this membrane, and runs as high as the ſinus longitudinalis; the vein which accompanies the branches of this artery, goes out of the ſkull, by the foramen lacerum. Thirdly, a branch of the vertebral artery, and vein, which laſt paſſes through the hole behind the occipital apophyſis, where they are diſperſed in the hind part of the *dura mater*. It has alſo nerves from the branches of the fifth pair, which give it an exquiſite ſenſe. It has a motion of ſyſtole, and diaſtole, which is cauſed by the arteries which enter the ſkull. No doubt, the great number of arteries in the brain contribute more to it, than thoſe few peculiar to itſelf; theſe may aſſiſt a little, though not very ſenſibly, becauſe of their ſmallneſs and paucity.

The uſe of the *dura mater* is to cover the brain, the ſpinal marrow, and all the nerves; to divide the cerebrum into two, and to hinder it from preſſing the cerebellum.

DURA *Portio*. See PORTIO.

DURABLE *Fortification*. See FORTIFICATION.

DURALE, or DURO, in the *Italian Muſic*, ſignifies hard, harſh, or, more properly, ſharp. This name is given to B natural, becauſe its ſound is ſharp, when compared with B mol, or flat.

DURANTA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower is of the ringent kind, with one petal, which is erect and concave, and hath an empalement divided into five equal ſegments. It hath four ſhort ſtamina, the two middle ones ſhorter than the others. The germen, which is ſituated under the flower, afterward becomes a globular berry, with one cell, incloſing four angular ſeeds. There are two ſpecies, which being natives of warm countries, require a ſtove to preſerve them in winter.

DURATION, an idea we get by attending to the fleeting, and perpetual periſhing parts of ſucceſſion.

The idea of ſucceſſion we get by reflecting on that train of ideas, which continually follow one another in our minds, while awake. The diſtance between any parts of this ſucceſſion is what we call *duration*; and the continuation of the exiſtence of ourſelves, or any thing elſe commenſurate to the ſucceſſion of ideas in the mind, is called our *own duration*, or that of the thing co-exiſting with our thinking. So that we have no perception of *duration*, when that ſucceſſion of ideas ceaſes.

Duration, in Mr. Locke's philoſophy, is a mode, or modification of ſpace.

The ſimple modes of *duration* are any lengths, or parts thereof, of which we have diſtant ideas; as hours, days, weeks, months, years, time, eternity, &c.

Duration, as marked by certain periods and meaſures, is what we properly call *time*.

1. By obſerving certain appearances at regular, and ſeemingly equidiſtant periods, we get the ideas of certain lengths and meaſures of *duration*, as minutes, hours, &c. 2. By being able to repeat thoſe meaſures of time, as often as we will, we come to imagine *duration* where nothing really endures, or exiſts: thus we imagine, tomorrow, next year, yeſterday, &c. 3. By being able to repeat ſuch idea of any length of time, as of a minute, year, &c. as often as we will, and add them to one another, without ever coming to an end, we get the idea of eternity.

Time is to *duration*, as place is to ſpace, or expanſion. They are ſo much of thoſe boundleſs oceans of eternity, and immenſity, as is ſet out, and diſtinguiſhed, from the reſt; and thus they ſerve to denote the poſition of finite, real beings, in reſpect of each other, in thoſe infinite oceans of *duration* and ſpace.

DURATION *of action*. See ACTION.

DURATION *of an eclipſe*. See ECLIPSE.

DURATION, *ſcruples of half*. See SCRUPLE.

DURATION *of a ſolar eclipſe*. See ECLIPSE.

DURATION *of ſound*, in *Muſic*. See SOUND.

DURE, DOOR. See SUTH-*Dure*.

DURESSE, *Hardſhip*, in *Law*, is where a perſon is kept in priſon, or reſtrained of his liberty, contrary to order of law; or is threatened to be killed, maimed, or beaten. In which caſe, if a perſon ſo in priſon, or in fear of ſuch threats, make any ſpecialty, or obligation, by reaſon of ſuch impriſonment, or threats, ſuch deed is void in law; and in an action brought on ſuch ſpecialty, the party may plead, that it was brought by *dureſſe*.

DURION, in *Natural Hiſtory*, the name of a fruit common in China and the Eaſt Indies, and eſteemed by the Indians the fineſt of all fruits; but the Europeans do not eſteem it ſo highly, becauſe of its diſagreeable ſmell. The tree which bears it is large and much branched, and its wood is like that of the hazel. The leaves are of a very ſingular figure, being about ſix inches long, and ſixteen or eighteen inches broad; they terminate in a long and ſlender point. The upper ſide of the leaves is of a duſky green, the under ſide is whitiſh, with ſome yellow ſpecks. The leaves grow on ſhort pedicles, which are joined to the ſtalks by a protuberance or oblong knot. The fruit grows to the large branches, adhering to their middles by a ſtrong wood ſtalk. It is of the ſize of an ordinary melon, and of a conic ſhape, pointed at the extremity, and is all over beſet with prickles reſembling thoſe of a hedge-hog; they are green, and very large and thick. When thoroughly ripe, the fruit opens at the extremity into five parts, and the cracks or openings running by degrees up to the top, the inner ſubſtance or pulp is diſcovered. This is of a whitiſh colour, and of a very agreeable flavour, which may not unaptly be compared to that of cream and ſugar; but it is of a more firm conſiſtence. This fruit contains in every compartment five large ſeeds perfectly reſembling the common cheſnut, but that they have no other covering than their own ſkin.

The fruit itſelf, were the ſmell as agreeable as its taſte, would vie with any fruit in the world; but its very diſagreeable ſcent requires time and cuſtom to enable any one to bear it; but uſe makes the natives wholly diſregard it. The ſmell is very like that of onions, that have lain in heaps till they are very rotten. The fruit is not only agreeable to the taſte, but of a very cordial virtue; but it will intoxicate if eaten in a large quantity, eſpecially ſuch of the fruits as are of a yellowiſh colour. The natives make debauches with it, as our poorer people do with ſpirituous liquors. But it is not ſo eaſily come at as thoſe, and therefore is very fatal to many families among them, who will ſell their liberties for a time to purchaſe enough of it for a debauch. Mem. Ac. Sc. Par. 1699.

DURSIANS, or DURURIANS, in *Eccleſiaſtical Hiſtory*. See DRUSES.

DURUNEGI, in the *Materia Medica*, a name given by the Arabian writers to the root of the doronicum, which is ſo well deſcribed by Avicenna, that we are very well informed of its nature, and find it to be the root of the ſame plant, which we at this time know by that name. He ſays it came to them in pieces, looking like the ſhort joints of a woody root; and that it was either yellow or white on the inſide, and of a greyiſh colour on the ſurface, and that it was conſiderably hard and ponderous.

The doronicum we know at this time has a root that very well anſwers theſe characters; and though yellow, when freſh, is very apt to become whitiſh in decaying.

The name *durunegi* is a very plain copy of the Greek name of the ſame plant, which is not doronicon, as might be ſuppoſed from the Latin doronicum, but *durunizi*, or δυρυνιζι. The change of the ζ into a *g*, or the *g* into a ζ, is very common in the turning Greek into Arabic, or Arabic into Greek names. Thus the zedoar of the Greeks is the geduar of the Arabians, and ſo in a thouſand other inſtances.

The word *durunegi*, or, as it is ſometimes written, *durenegi*, is however ſometimes made to expreſs another plant, whoſe ſhape, as well as virtues, are very different from that above mentioned.

We have at this time two plants of the doronicum kind, the one called thora, and the other antithora; the one allowed to be a poiſon, the other by many eſteemed an alexipharmic. The thora, or poiſonous kind, is yellow within, and the antithora is white. Theſe may probably be the two kinds of *durunegi* mentioned by the Arabians; and if ſo, the poiſonous qualities of the one, and the virtues of the other, ſtand on a higher record than many have ſuppoſed. Theſe two roots were lately ſent over into England among our parcels of gentian, and did much miſchief, many people ſuffering greatly by the bitter infuſions in which they made a part. This was probably owing wholly to the thora, or yellow root, which has a poiſonous ſmell; not to the other, which has all the appearances of being innocent.

DUST, minute and almoſt inſenſible particles broken off from any hard body.

Thoſe broken from ſtones, or formed of extremely ſmall ſtones, are more properly called *ſand*. See SAND.

The ſubtile matter of Des Cartes is a ſort of *duſt* produced by the colliſion of the matter of the ſecond element. See SUBTILE.

DUST, *Gold*, and *Lead*. See the reſpective articles.

DUST, *moſs*. See BYSSUS.

DUTCH *Coins, Fortification, Monies, Pens, Pink, Teleſcope, Tyles, Trading Companies, Meaſures*. See the ſubſtantives.

DUTCHY, in *Geography*, an appellation given to the dominions of a duke. See DUKE.

DUTCHY-*Court*. See COURT.

DUTY, in a moral ſenſe. See OFFICE.

DUTY *of marriage*. See MARRIAGE.

DUTY, in *Policy*, and *Commerce*, an impoſt laid by authority of a prince, &c. on merchandizes and commodities, either of his own country, or brought from abroad; towards ſupporting the expences of the government. See CUSTOMS, FUND, and TAXES.

The general principles on which all *duties* and cuſtoms ſhould be laid on foreign merchandizes, which are imported into theſe kingdoms, are ſuch as tend to cement a mutual friendſhip and traffic between one nation and another; and therefore due care ſhould be taken in laying them, that they may anſwer this end, and be reciprocal in both countries; and they ſhould be laid in ſuch a manner, that the exports of this nation may, at leaſt, be equal to our imports from thoſe nations with which we trade; ſo that a balance in money ſhould not be iſſued out of Great Britain to pay for the goods and merchandizes of other countries; to the end that no greater number of our land-holders and manufacturers ſhould be deprived of their revenues ariſing from the product of the lands, and the labour of the people, by foreign importations, than by exportations to ſuch countries. Dict. of Commerce, art. DUTIES.

The *duties* on various kinds of commodities are infinite. The principal are, the

DUTIES *of exportation*, and *importation*, paid upon the bringing in, or carrying out, of the diverſe kinds of goods, animals, and even perſons; agreeable to the tarifs ſettled between the ſeveral nations. See EXPORTATION, &c.

There is no ſtate in Europe, or perhaps in the world, where the *duties* of exportation and importation are ſo many, and ſo conſiderable, as in England. The two principal are the *duties* of tonnage and poundage. The firſt charged on liquors, in proportion to their meaſure, and content. See TONNAGE. The ſecond on the other commodities, and paid according to their value, ſettled in a tarif. See POUNDAGE.

Theſe two *duties*, which have a long time been on foot in England, were re-eſtabliſhed at the reſtoration of king Charles II. in 1660, upon the parliament's annulling all the laws made under Cromwell, and decreeing the execution of the ancient ordinances.

To theſe there have been ſeveral new *duties* added ſince that time; ſome of them for liquids, and the others on other kinds of commodities.

The DUTIES *on liquids*, are the ancient *duty* of tonnage, or old ſubſidy; the additional *duty*; *duty* of exciſe, *duty* of coinage, the old impoſition, the additional impoſition, the orphans money, the *duty* on French wines, the new ſubſidy, the *duty* on Hungary wines, and the one third, and two thirds ſubſidies, &c. See COINAGE, EXCISE, ORPHAN's *Money*, SUBSIDY, &c.

The DUTIES on other commodities are the ancient *duty* of poundage; the additional *duty* of 1660, on linens and ſilks; the new impoſition of poundage, called the *impoſt of* 1690; another impoſition of four fifths in 1693; the *duty* of 25 *per cent.* on French goods, impoſed in 1695; the new ſubſidy of poundage in 1697; another additional ſubſidy of a third of poundage in 1703; another third in 1704; a *duty* on fiſh, oils, and whale-fins, in 1709; another on leather, vellum, and parchment, in 1711; a ſecond on the ſame goods, in 1712; and laſtly, in the ſame year, a *duty* on paper, paſte-board, and ſoap. See IMPOST, POUNDAGE, &c. and the principal articles of commerce.

The Engliſh merchants, it is to be obſerved, are not obliged to pay theſe ſeveral *duties* before twelve months; nor foreigners before nine; giving ſecurity for the ſame. Or, if they pay ready money, there is a deduction made them of 5 *per cent.* on the old new third, and two third ſubſidy, and on the other *duties* ſix, and one-fourth *per cent.* Add, that if theſe merchandizes be again exported into other countries, after they have been entered in England, the *duties* are returned; though this only within the compaſs of a year to natives, and of nine months to foreigners. See ALIEN *Duty*.

In Spain, the *duties* of export and import, are called *duties of alcavala*, and amount to about 5 *per cent.* of the value of the goods: for inſtance, the piece of velvet of forty Spaniſh vares, or yards, pays twenty rials; hats of Vigonia, five rials a-piece; linens, 224 rials *per* 100 vares; gold and ſilver laces, 2 rials 3 quarters the mark weight. The *duties* of exportation are nearly on the ſame footing.

In Portugal, the *duties* of importation were anciently the ſame on all kinds of goods; viz. 18 *per cent.* of the value. But ſince the year 1667, ſilks have been excepted out of the general tarif, and reduced to 13 *per cent.* For exportation the *duties* are only 6 *per cent.*

In Holland, the *duties* of *exportation*, and *importation*, are nearly alike; both of them being about the rate of 5 *per cent.* on the value of the goods. At Hamburgh, and Bremen, the *duties* are but 1 *per cent.* At Lubeck, three 4ths *per cent.* In Muſcovy, they are 5 *per cent.*

At Venice, theſe *duties* are 6¼ *per cent.* for what the natives import; and 10½ to ſtrangers; the duties of exportation are 9 *per cent.* At Leghorn, the *duties* of exportation and importation are very inconſiderable; but, with the addition of a number of petty dues, they become as great as at Venice.

In the ports of the Levant, Conſtantinople, Smyrna, Aleppo, &c. the *duties* of *exportation* and *importation* are nearly on an equal footing, viz. 3 *per cent.* except to the Venetians, and Jews, who pay 5 *per cent.* The conſuls *duties* are likewiſe to be added for Smyrna, &c. which are about 2 *per cent.*

At Cairo, Alexandria, and ſome other cities of Egypt, the *duties* are of two kinds: one for goods brought in ſhips from Europe; the other for thoſe brought by the caravans from Aſia. The firſt are fixed at 20 *per cent.* the ſecond are arbitrary, but they are always very high. Beſide the ordinary *duty*, they here pay the golden *duty*, which is the tenth part of what is paid for the firſt *duty*. As to *duties* of exportation, they may be ſaid to pay none, the 1½ *per cent.* being rather the cuſtom-houſe fee, than any *duty* paid the ſovereign.

DUTY, in the *Military Art*, is the exerciſe of thoſe functions that belong to a ſoldier; with this diſtinction, that mounting guard, and the like, where there is no enemy directly to be engaged, is called *duty*; but marching to meet and fight an enemy is called going on ſervice.

DUUMVIR, a general appellation among the ancient Romans, given to magiſtrates, commiſſioners, and officers, where *two* were joined together in the ſame function. So that they had almoſt as many *duumviri*, as they had officers joined two by two in commiſſion.

There were *duumviri* to direct the building, repairing, and conſecrating, of temples and altars; *capital duumviri*, who took cognizance of crimes, and condemned to death; *duumviri* of the marine, or navy, &c. But the moſt conſiderable of the *duumviri*, and thoſe uſually thus called by way of eminence, were the

DUUMVIRI *Sacrorum*, created by Tarquin, for the performance of ſacrifices, and keeping of the ſibyls books. Theſe were choſen from among the nobility, or patricians; and held their office for life: they were exempted from ſerving in war, and from the offices impoſed on the other citizens; and without them the oracles of the ſibyls could not be conſulted.

The commiſſion laſted till the year of Rome 388, when, at the requeſt of C. Licinius, and L. Sextius, tribunes of the people, they were changed into *decemviri*; that is, in lieu of *two* perſons, the truſt was committed to *ten*, who were half patricians, half plebeians.

Sylla added five more to their number, upon which they became denominated *quindecemviri*; their body was afterwards much increaſed, and at length amounted to ſixty; yet ſtill it retained the denomination of *quindecemviri*.

They were entirely aboliſhed under the emperor Theodoſius, along with the reſt of the heathen ſuperſtitions.

DUUMVIRI, *the capital, Duumviri Perduellionis*, were not ordinary magiſtrates; but created only on certain occurrences. The firſt commiſſioners of this kind were thoſe appointed to judge the ſurviving Horatius, for killing his ſiſter, after vanquiſhing the Curiatii.

There were alſo *duumviri* in the Roman colonies; who held the ſame rank and authority in their reſpective colonies, that the conſuls held at Rome. They were choſen out of the body of decuriones, and wore the prætexta, or robe bordered with purple.

We alſo read of *municipal duumviri*, whom Vigenere compares

pares to our ſheriffs, or rather mayors of towns, whoſe authority laſted only five years.

DUUMVIRATE, Duumviratus, the magiſtrature, office, or dignity, of the *duumviri*. See Duumvir.

DUYT, in *Commerce*, a Dutch copper coin.

DWALE, or Dwal, in *Heraldry*, the herb night-ſhade; uſed by ſuch as blazon with flowers and herbs, inſtead of colours and metals, for ſable, or black.

DWARF. See Pygmy, and Stature.

Dwarfs were called *nani* and *nanæ* amongſt the Romans; and were held in ſuch requeſt, that artificial methods were uſed in order to prevent the growth of boys deſigned for *dwarfs*, by incloſing them in a box, or binding them with bandages. Auguſtus's niece Julia was very fond of one of theſe *dwarfs* called Sonopas, who was only two feet and a hand-breadth high.

In the Philoſophical Tranſactions we have well authenticated accounts of two *dwarfs*; one born in Norfolk, who, at the age of twenty-two, weighed no more than thirty-four pounds with all his clothes on, and whoſe height, including hat, wig, and ſhoes, was only thirty-eight inches; and another in Wales, who, at the age of fifteen, meaſured no more than two feet ſeven inches, and weighed only thirteen pounds; and who at that early period of life laboured under all the infirmities and calamities of very old age. Phil. Tranſ. vol. xlvi. p. 67. and vol. xlvii. p. 279.

Dwarf-*trees*, a ſort of diminutive fruit-trees, frequently planted in the borders of gardens; thus called from the lowneſs of their ſtature.

Dwarf-trees were formerly very much in requeſt in gardens, but ſince the introducing of eſpaliers, they are much neglected. The manner however of propagating *dwarf* pears, which have been found to ſucceed the beſt of any *dwarfs*, is this: they are to be grafted on a quince ſtock, and that at about ſix inches above the ground; and when the bud has ſhot ſo far as to have four eyes, it is to be ſtopped, to give riſe to lateral branches. Two years after the budding, the trees will be fit to tranſplant to the ſpot where they muſt remain. They ſhould be ſet at five and twenty, or thirty feet ſquare diſtance, and the ground between may be ſown or planted for kitchen uſe while the trees are young, only obſerving not to plant too near their roots. There ſhould be ſtakes driven down all round the tree, to which the branches muſt be nailed with liſt, while they are young, training them into an horizontal direction, and no branches are to be ſuffered afterwards to croſs one another, and in ſhortening the ſhoots, the uppermoſt eye muſt always be left outwards. The ſummer and autumn pears are thoſe which do beſt in *dwarfs*, for the winter ones never ſucceed well on them.

Apples are alſo ſometimes planted as *dwarfs*, and are for this purpoſe moſt commonly grafted on paradiſe ſtocks. Theſe ſpread much leſs than the pears, and therefore need only be ſet at about eight feet diſtance. Some alſo plant apricots and plums for *dwarfs*; but theſe being of a more tender conſtitution ſeldom ſucceed well. Miller. See Espalier.

Dwarf-*fern*. See *Dwarf*-Fern.

DYADIC *Arithmetic*. See Arithmetic.

DYE, in *Architecture*, the trunk of the pedestal; or that part between the baſe and the cornice; being ſo named, becauſe it is frequently made in the form of a cube, or *dye*. See *Tab. Archit. fig.* 24, 25, 26, 27, 28.

It is alſo called *dado*, by the Italians; and by Vitruvius, *truncus*.

Dye is alſo uſed for a cube of ſtone, placed under the feet of a ſtatue, and over its pedeſtal; to raiſe it, and ſhew it the more.

DYER'S *Black*. See Black.

Dyer's *Blue*. See Blue.

Dyer's *Broom*, the name of a ſpecies of geniſta. See Broom.

Dyer's *Green*. See Green.

Dyer's *Weed*, in *Botany*, the *luteola* of Tournefort, and a ſpecies of the *reſeda* in the Linnæan ſyſtem. For the generic characters, ſee *Baſe* Rocket.

It grows in moſt parts of the world. The Greeks, of old, uſed it in dying yellow, as we do at this time, and called it *cymene*, and ſometimes *thapſia*, that word ſignifying, with them, ſeveral different things which had the property of dying yellow. It was called alſo by ſome *robia*, or *rubia*; but thoſe who gave it this name have always diſtinguiſhed it by ſome peculiar epithet from the common *rubia*, or madder. Paulus Ægineta mentions it as an herb uſed in dying cloths; and Neophytus, and ſeveral others, give it a place among the things uſed to tinge the hair. See Weld.

Dyer's *Yellow*. See Yellow.

DYING, the art, or act, of tinging cloth, ſtuff, or other matter, with a permanent colour, which penetrates the ſubſtance thereof.

Dying differs from bleaching, or whitening, which is not the giving a new colour, but the brightening of an old one. It alſo differs from painting, gilding, marbling, and printing, or ſtamping; becauſe the colours in theſe only reach the ſurface.

Dying may be defined, the art of colouring wool, linen, cotton, ſilk, hair, feathers, horn, leather, and the threads and webs thereof; with woods, roots, herbs, ſeeds, and leaves; by means of ſalts, limes, lixiviums, waters, heats, fermentations, macerations, and other proceſſes.

Dying, with regard to the manner of applying the colours, is divided into *hot*, and *cold*.

Dying *hot*, Θερμοβαφη, is that wherein the liquors and ingredients are boiled, before the cloth be dipped therein; or even where the cloths themſelves are boiled in the *dye*.

Dying *cold*, Ψυχροβαφη, is where the ingredients are diſſolved cold; or at leaſt ſuffered to grow cold, before the ſtuffs be put in them. Vid. Savar. D. Comm. tom. ii. p. 1697, voc. *Teinture*. Salmaſ. Exerc. ad Solin. tom. ii. p. 1167.

Dying, *origin and progreſs of*. The *dying* art is of great antiquity; as appears from the traces of it in the oldeſt ſacred as well as profane writers. The honour of the invention is attributed to the Tyrians; though what leſſens the merit of it is, that it is ſaid to have owed its riſe to chance. The juices of certain fruits, leaves, &c. accidentally cruſhed, are ſuppoſed to have furniſhed the firſt hint. Pliny aſſures us, that, even in his time, the Gauls made uſe of no other *dyes*. It is added, that coloured earths, and minerals waſhed and ſoaked with rain, gave the next *dying* materials. But the purple, an animal juice, found in a ſhell-fiſh called *murex*, *conchylium*, and *purpura*, ſeems from hiſtory to have been prior to any of them. This, indeed, was reſerved for the uſe of kings and princes; private perſons were forbidden, by law, to wear the leaſt ſcrap of it. The diſcovery of its tinging quality is ſaid to have been taken from a dog; which, having caught one of the purple fiſhes among the rocks, and eaten it up, ſtained his mouth and beard with the precious liquor; which ſtruck the fancy of a Tyrian nymph ſo ſtrongly, that ſhe refuſed her lover Hercules any favours, till he had brought her a mantle of the ſame colour.

Pliny ſeems to aſcribe the invention of the art of dying wools to the Lydians of Sardis: *Inficere lanas Sardibus Lydi*; where the word *incepere* muſt be underſtood. But a modern critic ſuſpects a falſe reading here; and not without reaſon, for *Lydi*, ſubſtitutes *Lydda*, the name of a city on the coaſt of Phœnicia, where the chief mart of the *purple-dye* was. Plin. Hiſt. Nat. lib. vii. cap. 56. Hardou. not. ad loc. Nurra, in Bibl. Choiſ. tom. xx. p. 193, ſeq.

After the Phœnicians, the Sardinians ſeem to have arrived at the greateſt perfection in the *dying* art; inſomuch that βαμμα Σαρδινιακον, *Sardinian dye*, paſſed into a proverb among the Greeks. Ariſtophanes in two places, to expreſs a thing red as ſcarlet, compares it to the βαμμα Σαρδινιακον. Salmaſius, Palmerius, and Spanheim, indeed, for Σαρδινιακον ſubſtitute Σαρδιανικον; which they ſuppoſe a poſſeſſive of Sardis, and to denote *Sardian dye*; but Nurra, in a diſſertation expreſly on the ſubject, has ſtrenuouſly ſupported the pretenſions of his country againſt this innovation. Ariſtoph. in Acharnan. v. 112. item Pax. v. 11. 74. I. Paul. Nurra Diſſ. de Varia Lectione Adagii ΒΑΜΜΑ ΣΑΡΔΙΝΙΑΚΟΝ, tinctura Sardiniaca, Flor. 1709. 4to. Le Clerc. Bibl. Choiſ. tom. xx. p. 187, ſeq.

Till the time of Alexander we find no other ſort of *dye* in uſe but purple, and ſcarlet. It was under the ſucceſſors of that monarch, that the Greeks applied themſelves to the other colours; and invented, or at leaſt perfected, blue, yellow, green, &c. As to the ancient purple, it has been long loſt; but the perfection to which the moderns have carried the other colours, abundantly indemnifies them for the loſs. In this, particularly in the ſcarlet and black colours, the French, under the auſpices of that excellent miniſter M. Colbert, ſeem to have out-ſtripped moſt of their neighbours. See Gobelins.

Among the Romans, the *dye-houſes*, *baphia*, were all under the direction of the *comes ſacrarum largitionum*; though they had each their peculiar præpoſitus, as at Alexandria, Tyre, &c. The method of *dying* and dreſſing woollen cloths was very imperfectly underſtood in England, in the year 1608; before which period they were ſent white into Holland, where they were *dyed* and dreſſed, and from thence brought back for ſale. In this year, Sir William Cockayne, an alderman of London, obtained a patent for *dying* and dreſſing of colours at home; but great confuſion ariſing from this grant, it was revoked in 1615. But in 1667, workmen were introduced into this country from the Netherlands, under whoſe direction the art was brought to a conſiderable degree of perfection.

The *dyers* of London make the thirteenth company of the city, incorporated under Henry VI. conſiſting of a maſter, warden, and livery. At Paris, and in moſt of the great cities in France, the *dyers* are divided into three companies; viz. thoſe *of the great dye*, *du grand & bon teint*, who are only to uſe the beſt ingredients, and ſuch as ſtrike the ſureſt and moſt laſting colours. *Dyers of the leſſer dye*, *du petit teint*, who are allowed to uſe the inferior ſorts of drugs, which only yield falſe and fading colours. And ſilk, wool, and thread *dyers*. All the higher-priced cloths and ſtuffs are reſerved to the *dyers* of the firſt ſort: thoſe of leſs value, particularly ſuch as are not rated at above forty ſols the ell in white, are committed to the maſters of the *petit teint*. Blue, red, and yellow, are reſerved more peculiarly to thoſe of the *grand teint*; browns, fallows, and blacks, are common to both ſorts As to black, it is begun by the *dyers* of the *grand teint*, and finiſhed by thoſe of the *leſſer*. It ſeems there is a tradition among *dyers*, that Jeſus Chriſt was of their profeſſion; which we alſo find delivered in the *Goſpel of the infancy of Jeſus*, though on what grounded we know not; but it is hence that the Perſian *dyers*, notwithſtanding all their Mahometaniſm, have choſen Jeſus for the patron of their art; inſomuch that, among them, a *dye-houſe* is called *Chriſt's ſhop*. V. Notit. Imper. Hoffm. L. tom. i. p. 469. Pitiſc. L. Ant. tom. i. p. 249. New View of Lond. tom. ii. p. 601. ſeq. Savar. Dict. Comm. tom. ii. p. 1668. voc. *Teint*. Sike Not. ad Evang. Infant. p. 55. Hilſcher De Stud. Chriſt. in Miſc. Lipſ. Obſ. 96. § 10. tom. v. p 34.

Dying, *requiſites in*. There are three things demanded by the Greek chemiſts to a good *dye*; viz. Αραιωσις, opening, or rarefying, of the body to be *dyed*, to diſpoſe it to imbibe the colour. Βαφη, the tincture, or *dye*, itſelf. Κατοχη, or Στυψις, by the Romans called *alligatio*, the binding or fixing the colour, to prevent its fading, or being diſcharged. Some add a fourth condition, viz. Στιλψις, by the Latins called *lumen*, by us *luſtre*, or *brightneſs*.

Among ſome, theſe three were done ſeverally at three different operations, in different liquors, or decoctions: by the firſt, the ſtuff was prepared to receive the *dye*; this was called προϐαφιον, and ὑποςυφη; by the ſecond, the deſired colour was given it; and by the third, the colour was fixed on it. But others did all three at once, with one decoction, and at one dip. Vid. Salmaſ. Exerc. ad Solin. tom. ii. p. 1146, ſeq.

Dying, *theory of*, is ſtill far from being thoroughly known, or eſtabliſhed; though many facts and obſervations, and particular proceſſes, have been offered for this purpoſe. We ſhall collect the principal of them in the ſequel of this article.

The baſis of a juſt hiſtory of *dying*, muſt be a theory of light and colours. Two things, it may be obſerved, are chiefly aimed at in the inquiry of colours: the firſt, to increaſe the *materia tinctoria*; the ſecond, to fix thoſe colours we have.

In order to theſe, it may be remembered, that ſome colours are *apparent*; as thoſe of flowers, the juices of fruits, and thoſe of animals. Others are *latent*, and only diſcovered by the effects which the ſeveral ſpecies of ſalts, and other things, have on them.

Concerning the *apparent* colours of vegetables and animals, and the effects of different ſalts in changing them from one colour to another, we have many inſtances in Mr. Boyle, collected and ranged in a new order by Dr. Liſter: as, 1. That acid ſalts advance the colours of flowers and berries; thus they make the infuſions of bauſtia, or pomgranate-flowers, red roſes, clove-july-flowers, mezerion, peas-bloom, violets, and cyanus-flowers, of a very fine red; and the juices of the berries of liguſtrum, of black-cherries, and buckthorn-berries, of a much fairer red. To the ſame purpoſe it is obſerved, that acid ſalts make no great alterations upon the white flowers of jaſmin and ſnow-drops.

2. Urinous ſalts and alcalies, on the contrary, quite alter the colours of the flowers laſt named, as well as the juices of the berries above mentioned, from red to green.

3. Urinous ſalts and alcalies advance, at leaſt they do not hurt, the colours of the juices of vegetable leaves, woods, and roots. Thus urinous ſpirits and alcalies make the yellow infuſions of madder-roots, red; of Braſil wood, purpliſh; of lignum nephriticum, blue; the red infuſion of log-wood, purple; and that of the leaves of ſena, red.

4. Acid ſalts quite alter the ſaid infuſions from red, or blue, to yellow.

5. Cochineal, which of itſelf is red, upon the affuſion of oil of vitriol, an acid ſalt, ſtrikes the moſt vivid crimſon that can be imagined; and with urinous ſalts, and alcalies, it will be again changed into an obſcure colour betwixt a violet and a purple.

6. All red, blue, and white flowers, are immediately, upon the affuſion of an alcali, changed to a green colour; and thence, in no long proceſs of time, they turn yellow.

7. All the parts of vegetables which are green, will, in like manner, ſtrike a yellow with an alcali.

8. What flowers are already yellow, are not much changed, if at all, by an alcali, or urinous ſpirit.

9. The blue ſeed-huſks of glaſtum ſylveſtre, old gathered, and dry, diluted with water, ſtain a blue, which, upon the affuſion of lye, ſtrikes a green; which ſaid green, or blue, being touched with oil of vitriol, *dyes* a purple; and all theſe three colours ſtand.

10. On the tops of the fungus tubuloſus are certain red knots, which, upon the affuſion of lye, will ſtrike a purple, and ſtand.

As for the *latent* colours in animals and vegetables, diſcovered to us by the affuſion of ſalts, they likewiſe are very numerous. We will only mention a few. 1. The milky juice of the lactuca ſylveſtris coſta ſpinoſa, & ſonchus aſper & lævis, upon the affuſion of lye, will ſtrike a vivid flame-colour, or crimſon; and, after ſome time, quite degenerate into a dirty yellow.

2. The milk of the cataputia major, upon the affuſion of lye, eſpecially if it be drawn with a knife, and have any time ſtood upon the blade thereof, will ſtrike a purple or blood-red colour, and ſoon after will change into a dull yellow.

3. The common hawthorn-caterpillar will ſtrike a purple, or carnation, with lye, and ſtand.

4. The heads of beetles, piſmires, &c. will, with lye, ſtrike the ſame carnation colour, and ſtand.

5. The amber-coloured ſcolopendra will give, with lye, a moſt beautiful and pleaſant azure, or amethyſtine, and ſtand.

It remains to be obſerved, 1. That in all the inſtances above mentioned, whether vegetable or animal, there is not one colour truly fixed; though there may be ſome uſe made of them as they are. By *not truly fixed*, we mean, not proof againſt ſalt and fire; for what ſeem to ſtand, and be lye-proof, are either wholly deſtroyed by a different ſalt, or changed into a much different colour; which muſt needs prove a ſtain and blemiſh, when it ſhall happen in the uſe of any of them.

2. That both the apparent and latent colours of vegetables are fixable; an inſtance whereof we may obſerve in the ſeed-huſks of glaſtum, and the uſe *dyers* make of the leaves of that plant, after due preparation.

3. It is probable, from the ſame inſtance, that we may learn from the colour of ſome part of the fruit, or ſeed, what colour the leaves of any vegetable, and the whole plant, might be made to yield for our uſe.

4. That the latent colours of vegetables are pre-exiſtent, and not produced; from the ſame inſtance of woad, and likewiſe from this, that the milky juice of lactuca ſylveſtris affords of itſelf a red ſerum.

5. That the change of colours in flowers is gradual and conſtant.

6. That the colours of flowers, which will not ſtand with lye, ſeem to be wholly deſtroyed by it, and irrecoverable. Thus one part of a violet leaf, upon the affuſion of lye, is changed very ſoon into yellow, and will never be revived into a red by an acid ſalt; but if another part of the ſame leaf be ſtill green, it will be revived.

7. The dryneſs ſeems to be a means, if not of fixing, yet of bringing the vegetable colour into a condition of not wholly and ſuddenly periſhing by the otherwiſe deſtroying alcali.

8. That thoſe plants, or animals, which will ſtrike different, yet vivid colours, upon the affuſion of different ſalts, and ſtand, as the cochineal, and glaſtum, are of all others to be reckoned the beſt. Vid. Liſt. in Phil. Tranſ. N° 70. p. 2132. See alſo Boerh. Elem. Chem. part iii. tom. ii. p. 467. edit. Leipſ.

Many more valuable colours may be drawn from the vegetable kingdom, if the world would be at the pains of enquiring more minutely into the properties of plants. Mr. Juſſieu obſerved in the drying plants between ſheets of paper, in order to the making a hortus ſiccus in the common way, that ſome plants tinged the paper with colours the ſame with thoſe they naturally poſſeſs, and others with different ones; and that many plants in drying aſſumed a colour which was not natural to them. Alkanet, woad, the ſeveral ſorts of gallium, and ſome of the ſpecies of anonis, tinge the papers between which they are dried to a yellowiſh or reddiſh colour, becauſe their ſtalks, or ſome other part of them, are of that colour. The common ros ſolis, or ſun-dew, whoſe leaves are red, tinges the paper red alſo; and the ros ſolis of Portugal diffuſes this tinge through three or four ſheets of paper. The alpine veronica, though green in itſelf, leaves its mark in red upon the paper; and many of the common leguminous plants always become black in the drying. The common mercury, which is green while growing, becomes blue in the drying; and turneſol has the ſame change, though it is white in its natural ſtate.

One great reaſon of theſe changes of colour is, that all paper is impregnated with alum; and this ſalt may very eaſily extract, or even alter the colours of plants, whoſe juices it receives; and in ſuch caſes, where the alum is not in ſufficient quantity to do this, it is no wonder that it ſhould however ſo far affect the leaves as to turn them black.

On this principle Mr. Juſſieu attempted, by means of alum, to ſeparate colours from ſeveral plants, not known or uſed at preſent among the dyers, which might prove ſerviceable to them. The firſt experiments made on this occaſion proved, that there were many plants not uſed at preſent, which afford colours not at all inferior to thoſe in common uſe. The experiments the ſame gentleman tried on the drugs uſed for *dying* in the Indies, proved very plainly that they were no way ſuperior in many caſes to vegetables of our own growth; and that in order to have the moſt lively colours from ſuch ſubſtances, it is always neceſſary to have recourſe to ſome ſalt.

Among the other drugs uſed abroad in *dying*, there were ſent over to France, on this occaſion, certain yellow flowers of the radiated kind, which afforded on trial a very beautiful yellow *dye*; and Mr. Juſſieu found, on trying parallel experiments, that there were alſo yellow flowers in Europe of a like radiated kind, which were capable of affording a like beautiful yellow *dye*.

The flower which Mr. Juſſieu tried theſe experiments upon, was the common yellow corn marygold, the chryſanthemum ſegetum of Lobel. This plant flowers in the middle of July; and Mr. Juſſieu drying its flowers between papers at that time of the year, found that they did not loſe their colour, as moſt others do in the operation, but became of a deeper yellow than before. Hence it was eaſy to judge, that this flower contained a matter proper for colouring; and decoctions being made of it of different ſtrengths, cloths of different kinds dipped into them became tinged to a light pale yellow, and kept this colour after being boiled in fair water. A little alum was after this added to the decoctions, and cloths dipped in theſe became much more finely *dyed*, the colour being much ſtronger and more lively. They alſo imbibed the colour much more ſpeedily from theſe decoctions; and on boiling afterwards in water, they loſt no part of it, but remained as ſtrongly and as lively tinged as before. This experiment was afterwards tried by a *dyer*, under whoſe hands it ſucceeded much better than before with Juſſieu, who was unacquainted with the regular methods of the trade. The decoction of the flowers gave a ſort of ſulphur colour; but linen, woollen, and ſilken things, which had been the day before ſteeped in alum water, received from this decoction a very beautiful and ſufficiently ſtrong yellow. Another decoction of the flowers made ſtronger than the firſt, tinged a woollen cloth to a greeniſh lemon colour; and the ſame decoction gave a bright gold yellow to ſilk; and a piece of woollen cloth, before *dyed* blue with indigo, on dipping it in this decoction became of a beautiful deep green. A ſmall quantity of chimney-ſoot added to the decoction made it tinge cloth to a yellowiſh brown; and a ſmall quantity of roucou added to the ſimple decoction produced an olive yellow.

The mixture of ſeveral other drugs uſed to be added to the decoction of the common luteola, or dyer's weed, to vary its tinge, produced the ſame changes with the decoction of this flower, and abundantly teſtified its value and uſe in the *dying* trade. Mem. Acad. Par. 1724.

With reſpect to the theory of *dying*, it is farther to be obſerved, 1. That all the materials, which of themſelves give colour, are either red, yellow, or blue; ſo that out of them, and the primitive fundamental colour, white, all that great variety, which we ſee in dyed ſtuffs, ariſes. 2. That few of the colouring materials (as cochineal, ſoot, wood-wax, or woad) are in their outward and firſt appearance, of the ſame colour, which by the ſlighteſt ſolutions in the weakeſt menſtrua, they dye upon cloth, ſilk, &c. 3. That many of the colouring materials will not yield their colours without much grinding, ſteeping, boiling, fermenting, or corroſion by powerful menſtrua; as red-wood, weld, woad, arnotto, &c. 4. That many of the ſaid colouring materials will of themſelves give no colouring at all, as copperas, or galls, or with much diſadvantage, unleſs the cloth, or other ſtuff to be dyed, be firſt covered or incruſtated as it were, with ſome other matter, though colourleſs, aforehand; as madder, weld, and brazil, with alum. 5. That ſome of the colouring materials, by the help of other colourleſs ones, do ſtrike different colours from what they would alone, and of themſelves; as cochineal, and brazil. 6. That ſome colours, as madder, indigo, and woad, by reiterated tinctures, will at laſt become black. 7. That though green be the moſt frequent and common of natural colours, yet there is no ſimple ingredient, which is now uſed alone, to dye green with upon any material; ſap-green, the condenſed juice of the rhamnus or buckthorn-berry, being the neareſt; and this only uſed by country people. 8. There is no black thing in uſe which dyes black; though both the coal and ſoot of moſt things burnt, or ſcorched, be of that colour; and the blacker, by how much the matter, before it was burnt, was whiter, as in the famous inſtance of ivory black. 9. The tincture of ſome *dying* ſtuffs will fade even with lying, or with the air, or will ſtain even with water; but very much with wine, vinegar, urine, &c. 10. Some of the dyers materials are uſed to bind and ſtrengthen a colour; ſome to brighten it; ſome to give luſtre to the ſtuff; ſome to diſcharge and take off the colour, either in whole or in part; and ſome out of fraud, to make the material dyed, if coſtly, to be heavier. 11. Some *dying* ingredients, or drugs by the coarſeneſs of their bodies, make the thread of the dyed ſtuff ſeem coarſer; and ſome by ſhrinking them, ſmaller; and ſome by levigating their aſperities, finer. 12. Many of the ſame colours are dyed upon different ſtuffs with different materials; as red-wood is uſed in cloth, not in ſilks; arnotto in ſilks, not in cloth; ſo that they may be died at ſeveral prices. 13. Scowering, and waſhing of ſtuffs to be dyed, is to be done with appropriate materials; as ſometimes with ox-galls, ſometimes with fullers earth, ſometimes with ſoap: this latter, however, is pernicious in ſome caſes, where pot-aſhes will ſtain or alter the colour. 14. Where great quantities of ſtuff are to be dyed together, or where they are to be done with great ſpeed, and where the pieces are very long, broad, thick, &c. they are to be differently handled, both in reſpect to the veſſels and ingredients. 15. In ſome colours and ſtuffs the tingent liquor muſt be boiling; in other caſes only blood-warm, in ſome it may be cold. 16. Some tingent liquors are fitted for uſe by long keeping; and in ſome the virtue wears away by the ſame. 17. Some colours, or ſtuffs, are beſt dyed by reiterated dippings ever into the ſame liquor at ſeveral intervals of time; and ſome by continuing longer, and others for a ſhorter time therein. 1 In ſome caſes, the matter of the veſſels wherein the liquors are heated, and the tinctures prepared, muſt b regarded; as that the kettles be pewter for bow-dye. 19. Little regard is had how much liquor is uſed in proportion to the dying drugs; the liquor being rather adjuſted to the bulk of the ſtuff, as the veſſels are to the breadth of the ſame; the quantity of *dying* drugs being proportioned to the colour higher or lower, and alſo to the ſtuffs; as likewiſe the ſalts are to the *dying* drugs.

Concerning the weight which colours give to ſilks, for in them it is moſt taken notice of, as being ſold by weight, and being a commodity of great price; it is obſerved, that one pound of raw ſilk loſes four ounces by waſhing out the gums, and natural ſordes. That the ſame ſcowered ſilk may be raiſed to above thirty ounces from the remaining twelve, if it be dyed black, with certain materials. That the reaſon why black colour may be dyed the heavieſt is, that all ponderous drugs may be dyed black, being all of colours lighter than it; whereas, perhaps, there ſeem to be few or no materials wherewith to encreaſe the weight of ſilk, which will conſiſt with fair light colours; ſuch as will having been uſed, as white arſenic to carnations.

Of things uſed in dying, eſpecially black, nothing encreaſes weight ſo much as galls; by means whereof black ſilks recover the weight which they loſt by waſhing out their gum. Nor is it counted extraordinary, that blacks ſhould gain about four or ſix ounces in the dying upon each pound. Next to galls, old fuſtic increaſes the weight about 1 ½ in 12. Madder about an ounce in the pound. Weld half an ounce. The blue fat, in deep blues of the fifth ſtall, adds no conſiderable weight. Neither do logwood, cochineal, or arnotto; nor even copperas of itſelf, where galls are not uſed. Slipp adds much to the weight, and gives a deeper black than copperas, which affords a good excuſe for the dyers that uſe it. Petty's Appar. to Hiſt. of Dying, ap. Sprat. Hiſt. R. S. p. 302.

There is great reaſon to believe, that the art of *dying* might be carried to much greater perfection than it is at preſent, if the attempts to improve it were in proper hands, and the perſons employed in it could be enabled to ſet out with all the knowlege there is at preſent in regard to its ſeveral materials, and their manner of uſe, as a fund of real facts on which to ground future diſcoveries. This however ſeems difficult to be brought about;

for the people who exerciſe the art generally are acquainted only with a certain ſet of rules, which though they know not why they follow, yet they will not depart from them, and eſteem every thing a loſs of time that can be propoſed to them as improvements. They keep their knowlege alſo a cloſe ſecret from thoſe who might be expected to improve upon it; and uſually one man trades only in ſome one part of it, without any knowlege of the reſt. Hence the difficulties attending the acquiring a knowlege of the firſt principles of the art are very diſcouraging, but they are not inſurmountable. The idea which preſents itſelf moſt naturally to us, as to the manner in which ſtuffs are dyed, is, that the colouring particles which ſwim in the liquor, immediately attach themſelves to the ſurface of the body that is plunged into it, and there adhere in ſo firm a manner, that there is no removing many of them without wholly taking off the ſurface of the body. The barely plunging a white ſubſtance into a coloured liquor is not however ſufficient for the *dying* it in many caſes. Indeed there are only a few colours which will ſtrike with this eaſe and facility; and the others require that the matter to be dyed ſhould have firſt received the particles of another fluid, which is in moſt caſes a ſolution of alum and tartar in common water. And, according to the nature of the colour that is to be given the ſtuff afterwards, the alum is put in in large quantities, or the ſtuff boiled in the liquor a longer or a ſhorter time. After boiling in this liquor, a ſtuff is in the proper condition to receive the greater part of the common colours; but for blue, ſtuffs require no preparation at all; and for ſcarlet, the liquor in which they are firſt boiled is made without alum.

The matter of the ſtuff to be dyed makes it neceſſary alſo to change the liquor in which it is to be boiled, or to vary the ingredients; and the greateſt naturaliſt, without a mechanical knowlege of *dying*, would be amazed to ſee, that if a ſkain of white wool, and another of white cotton, be plunged together into the ſcarlet dye, and this even after they have both received the ſame previous boiling and preparation, the ſkain of cotton would come out of the liquor as white as it was put in, while the wool comes out tinged to a beautiful fire colour. The dyer, however, ſees this every day, without any admiration of the cauſe, and never troubling his thoughts about the manner in which it is done. He uſes it daily to dye any thing woollen to a ſcarlet colour, leaving a part white; in order to which, he knows there requires no more than that the part to be left white ſhould be of cotton.

Mr. Dufay ſuppoſing this to be owing to the cotton's imbibing much more ſlowly than the wool, the liquor in which they are both previouſly boiled to make them receive the colour, as the cotton is well known not to take wet ſo ſoon as wool, ordered a ſort of cloth to be wove, the warp of which was wool, and the woof cotton; and ſending this to the fuller's, the two ſubſtances were ſo well blended together, that it became impoſſible for the one to receive the impregnation of any liquor without the other. With all theſe precautions, however, the whole came out of the ſcarlet dye in the ſame condition as if nothing had been done, the cotton remaining wholly white, and the wool being marked with fire colour and white; ſo that it may be eſteemed a certain fact, that the colour of cochineal cannot be given to cotton by the means of acids; the ſame alſo holds good of kermes and gum lac, both which are uſed inſtead of cochineal to dye in ſcarlet; but neither of theſe, any more than the cochineal, will dye cotton. It is not to be concluded from hence, however, that cotton cannot be dyed ſcarlet by theſe ſubſtances; the whole is, that it requires a different treatment; and as wool, to take the ſcarlet dye, requires only to be firſt impregnated with tartar, cotton requires to be firſt impregnated with alum, as wool does, for the generality of the other colours. The acid of ſea-ſalt, of vitriol, vinegar, and verjuice, all ſerve to dye wool to a ſcarlet with cochineal, but none of theſe will make it give any tinge to cotton, to which alum alone can ſerve.

The ſame dye will give very different colours to the different parts of a cloth, which have been differently prepared. And this gentleman ſhewed before the academy a piece of cloth, which he had carefully prepared in a different manner in the different parts, which being all plunged together in the dye, when taken out and dried was found to be of a dirty red in that part where it had not been impregnated with any thing; and in the other parts, where it had been differently impregnated, was found of all the degrees of red, from a pale damaſk roſe colour to the deepeſt ſcarlet, and this while it had in every part been dipt an equal time in the ſame dye. This equally holds good of the other colours. And in theſe experiments the dirty colours given to ſuch parts of the cloth as have received no previous impregnation, will be waſhed away, and quite carried off, while the others remain in all their perfection.

Another circumſtance very worthy attention in the *dying* of ſcarlet is this, that the dye is evidently compoſed of a clear or common water, in which the colouring particles are ſuſpended, and from which it is eaſy to ſuppoſe that they are ſeparated and applied to the ſtuff in *dying*. As this is naturally ſuppoſed to be the caſe in regard to all colours, ſo it appears very evidently to be a fact in this, ſince the colouring particles adhere in ſuch quantities to the matter, and ſeparate themſelves ſo readily and perfectly from the water, that after an hour and half's boiling of the dye with a proper quantity of the ſtuff in it, the whole coloured matter ſhall be attached to the ſtuff, and the remaining liquor be only clear water; and what might appear wonderful is, that all the boiling in the world will never diſlodge any of the colour from the ſtuff, or occaſion its being received into the water again. It might be ſuppoſed that this was wholly owing to the particles of ſalts, which had been imbibed into the ſtuff in its prior preparation; that theſe attracting the particles of the colour to the ſtuff, while the water of the dye had none of them to cauſe ſuch an attraction in it, they did not remain in it. But this appears not to be the caſe, but that the ſtuff will attract the colour, whether it be previouſly prepared, or the preparation and the *dying* be all one act; ſince the dyers ſometimes dye ſcarlet at once in this manner, only plunging the ſtuff into a dye made of cochineal, a ſolution of tin mixed in a large quantity of water, with a ſmall quantity of ſal ammoniac, and cream of tartar. All theſe ingredients are mixed together before the ſtuff is put in; yet after it has boiled about an hour and a half, all the colour is in the ſtuff, and the liquor is become colourleſs as water. The event is the ſame in the dyes made of woad and indigo for the *dying* blue, and indeed in the greater part of other colours; but as the ingredients of theſe are not ſo pure as the cochineal, and there are uſually many heterogene particles among them, the liquor does not become ſo wholly colourleſs in theſe, as in the caſe of the ſcarlet. But the dyers, who well know that ſo long as there is any colour left in the liquor, ſo long the ſtuff will be profited by remaining in it, always take ſmall quantities out of it, and examining it by pouring it gently down againſt the light, they know when it is that the ſtuff has received all the tincture it can, by there being no more colouring matter ſuſpended in the dye.

Experience ſhews, that all colours do not attach themſelves with equal readineſs to the ſtuff, or remain equally firmly united to it. Woad, indigo, cochineal, kermes, and many other colours, never reach farther than the ſurface of the ſtuff. The liquor of the dye penetrates indeed perfectly through the body of it, but the colouring particles ſtopping at the ſurface become entangled there, and never penetrate, at leaſt not in any great quantity, to the central part, which remains either quite white, or only very ſlightly tinged. This however only happens to ſuch ſtuffs as are thick, and of a very cloſe texture; others are coloured throughout. And this is only the caſe in regard to ſome dyes, not to all ſorts, ſince the moſt of the wood colours penetrate wholly through the ſtuff be it ever ſo thick, and colour it equally every where. Whence it ſeems probable, that the colouring particles of the woods are either more minute and fine, or much more intimately blended with the water, than thoſe of cochineal, indigo, and ſuch others as do not penetrate beyond the ſurface.

It might ſeem ſtrange, that the ſtuffs which are thus readily coloured on the ſurface, ſhould not afterwards, by the continual boiling of the water, have the colouring particles carried farther down into the body, as the water continually penetrates the whole from each ſurface to the center, and might naturally be expected to carry a part of the colouring particles in along with it. But if we conſider the whole proceſs from the beginning, we find that the colouring particles are ſtrongly attracted by the ſtuff, and ſcarce at all by the water. Whence they almoſt immediately leave the water, and attach themſelves to the firſt part of the ſtuff they come in contact with, which is its ſurface; and when once fixed there, it is no wonder that the particles of water, ever ſo long paſſing by them, do not attract or take them away from this ſurface, as they muſt do in order to carry them in; ſince we have before had proof, that their attraction to the water is greatly weaker than that to the ſtuff. And the difference between the wool and the cotton, the one receiving, and the other not receiving at all the coloured particles in its natural ſtate, or with the ſame impregnation, by means of which the other does, ſeems reſolvable into the ſame principle, that though the attraction in wool be much greater in regard to the coloured particles than that of the water, and therefore it robs the water of them; yet the attraction in cotton being leſs than in water, the colouring particles remain in the water without any tendency to attach themſelves to the cotton. Mem. Acad. Sc. Paris. 1737.

M. Hellot's theory of *dying* is, that the colouring particles are fixed into the pores of ſtuffs chiefly by means of a vitriolated tartar, which he believes to exiſt in each proceſs, to be produced by the acid of alum and alkaline baſis of tartar in the proceſs for red and yellow dyes, to exiſt originally in the pot-aſh employed in the blue dye, and in the nuts and roots employed in the root-coloured dye. He ſuppoſes that the pores of the ſtuff are cleanſed and enlarged by the preparatory ſalts, and by the boiling water, ſo as to receive the colouring particles, which particles are afterwards detained by the contraction of the pores occaſioned by cold; and farther, that theſe pores are lined with a ſaline cruſt of vitriolated tartar, or of tartar; which ſalts being difficultly ſoluble in water, retain firmly the colouring particles. But this theory, ſays the ingenious tranſlator of the Dictionary of Chemiſtry, cannot be admitted, when we conſider that vitriolated tartar does not exiſt in any of the materials uſed in ſome of the proceſſes for *dying*, as in the root-coloured materials, from which no vitriolated tartar can be obtained, unleſs by accident, till they have been by burning reduced to aſhes, and even then the quantity is exceedingly ſmall; that although common pot-aſh generally contains ſome vitriolated tartar, yet M. Hellot has not ſhewn, that pure fixed alkali is incapable of producing the ſame effect; and laſtly, that vitriolated tartar, and tartar, although they require much water to be diſſolved, are yet ſoluble by water; and therefore if the colouring particles were fixed chiefly by means of theſe ſalts, they might be waſhed out by a large quantity of water, which is contrary to experience. The above mentioned writer ſuggeſts the following conjectural obſervations on this ſubject: that the colorific particles of moſt ſubſtances uſed in *dying* ſeem to be unſoluble in water, in ſpirit of wine, and even in alkaline lixiviums; that their diffuſion through theſe liquids is cauſed merely by their adheſion to certain gummy and reſinous particles; and that they may be diſengaged from theſe gummy and reſinous matters, by applying a piece of ſtuff, to which they have a greater adheſive power; and this ſeems to be the caſe of the root-coloured and blue dyes; or by applying another ſubſtance, to which theſe particles have a greater power of adheſion; ſuch as the earth of alum, in thoſe dyes where that ſalt is uſed, together with ſome other ſubſtance, as fixed or volatile alkali, capable of decompoſing alum; or as the ferruginous earth of the green vitriol in black dyes, to which the colorific particles of the galls adhere; which earths are capable of applying themſelves, and of adhering to the ſtuffs. The ſeparation of the colouring particles from the gummy and reſinous matters is probably facilitated by the addition of acids and neutral ſalts, which may coagulate in ſome meaſure the vegetable matters, and leave the colorific particles diſengaged; ſo that they may apply themſelves to the ſtuff, or to the above mentioned earths. Theſe ſalts are alſo uſeful by heightening certain colours; all acid ſalts and alum having the property of heightening the red colours of vegetables. The metallic ſalt uſed in the ſcarlet dye, conſiſting of a decoction of cochineal, to which a ſolution of tin in aqua regia, and ſome tartar, are added, has the effect of changing the crimſon colour of cochineal into a vivid ſcarlet; and probably has alſo the other effects of alum, of affording an earth, namely that of tin, to which the colouring particles may adhere, and of coagulating the vegetable matters, ſo that they ſhall leave the colouring particles detached and ſuſpended in the water. The chief difference then betwixt the falſe and true dyes is, that the colouring particles in the former dyes are applied to ſtuffs, together with ſome gummy or reſinous matter to which they adhere, and are therefore liable to be waſhed out along with thoſe matters by any liquid capable of diſſolving gums or reſins; while the colouring particles of the true dyes are applied to ſtuffs, either alone, or adhering to ſome fine earth, as that of alum, or of tin; and as both the colouring and the earthy particles are unſoluble in any liquids, to which they are moſt apt to be expoſed, as water, ſoap-ſuds, &c. they are capable of reſiſting the action of theſe liquids, and are therefore durable. The above conjectures are confirmed by obſerving, that when the colouring particles of vegetables and animals are diffuſed in an alkaline lixivium, by means of gummy, reſinous, or oily matters, to which they adhere, they may be ſeparated from theſe adheſive matters by adding alum, the acid of which unites with the alkali of the lixivium; while the colouring particles apply themſelves to the baſis or earth of the alum, now diſengaged, with which they form what are called by painters LAKES, the colouring matter of which is not now ſoluble in water or ſpirit of wine; although theſe liquids are capable of extracting that colouring matter from the animal and vegetable ſubſtances which contain it, by the intervention, as above ſuppoſed, of ſome gummy or reſinous matters. Dict. Chem. Eng. ed. 8vo. art. DYING, note.

DYING *Ingredients*, or the *Materia Tinctoria*, are beſt reduced under two heads. *Colorata*, or thoſe which properly give the colour. And *Non-colorata*, uſed to prepare the ſtuffs for better taking the dye, and to heighten the luſtre of the colours.

As to the *colouring ingredients*, *colorantia colorata*, we have, 1. Iron and ſteel, or what is made from them, which are uſed in *dying* blacks; though how they contribute thereto is not ſo obvious: we know that green oaken boards become black by the affriction of a ſaw; a green ſour apple, cut with a knife, turns of the ſame colour; the white greaſe wherewith the wheels of coaches are anointed, becomes likewiſe black, by means of the iron boxes wherewith the nave is lined, and the friction between the nave and the axle-tree; and that an oaken ſtick becomes black by a violent friction againſt other wood in a turning-lath; and the black colour on earthenware is given with ſcalings of iron, vitrified. From all which it ſeems to follow, that the buſineſs of blacking lies in the iron, and particularly in its uſtulation or affriction Be this as it will, copperas, the moſt uſual ingredient for *dying* black, is the ſalt of the pyrites, wherewith old iron is incorporated. And, where-ever this is uſed, ſome of the aſtringents are to accompany it. 2. Redwood chopped, and ground in a mill, is uſed for *dying* cloth, rugs, &c. of the coarſer ſort. Its tincture, which is a ſort of brick-colour, is got out by long-boiling it with galls, and the cloth with it. It ſtands better than brazil. 3. Brazil chopped alſo, and ground, dyes a pink-colour, or carnation, neareſt approaching cochineal: it is uſed with alum; with pot-aſhes it alſo ſerves for purples. It eaſily ſtains. 4. Madder gives a colour nearly approaching the *bow-dye*, or new ſcarlet: thoſe called baſtard-ſcarlets are dyed with it. It endures much boiling, and is uſed both with alum and argol, and holds well. The brighteſt dyes with madder are made by over-*dying* the ſtuff, and then diſcharging part of it, by back-boiling in argol. It is uſed with bran-water inſtead of white liquor. 5. Cochineal, uſed with bran-liquor, in a pewter veſſel, with aqua-fortis, gives the dye called among us, though improperly, *ſcarlet in grain.* Too much acid takes off the intenſe redneſs of the colour, and turns it towards an orange, or flame-colour. With this colour, the Spaniſh leather and wool, uſed by ladies, are dyed. 6. Arnotto gives an orange-colour, eſpecially to ſilk, linens, and cottons; for it does not penetrate cloth: it is uſed with pot-aſhes. 7. Weld, by the help of pot-aſhes, yields a deep lemon-colour; though it is uſed to give all ſorts of yellow. 8. Wood-wax, or green-wood, called alſo *geniſta tinctoria*, and the *dyer's weed*, has the like effect as weld, though its uſe is chiefly confined to coarſe cloths. It is ſet with pot-aſhes, or urine. 9. Fuſtic is of two ſorts, young and old: the former, chopped and ground, yields a kind of rediſh orange-colour: the latter, a hair-colour, diſtant ſeveral degrees of yellow from the former. It ſpends with or without ſalts, works either hot or cold, and holds firm. 10. Wood-ſoot, containing not only a colour, but a ſalt, needs nothing to extract its dye, or make it ſtrike on the ſtuff. The natural colour it yields is that of honey; but it is the foundation of many other colours, on wool and cloth only. 11. Woad, ground, or chopped with a mill for the purpoſe, is made up into balls; which being broken, and ſtrewed on lime or urine, is uſed with pot-aſhes, or ſea-weed, and gives a laſting blue. The lime or chalk accelerates the fermentation of the woad, which in three or four days will work like a guile of beer, and be covered with a greeniſh froth or flower. An intenſe woad-colour is almoſt black; that is, of a damaſcene-colour. It is the foundation of ſo many colours, in different degrees or ſhades, that the dyers have a ſcale whereby to compute the lightneſs and depth of this colour. See WOAD. 12. Indigo is of the like nature, and uſed for the ſame purpoſe as woad, only that it is ſtronger. 13. Logwood, chopped and ground, yields a purpliſh blue: it may be uſed with alum. Formerly it was of ill repute, as a moſt falſe and fading colour; but, ſince it has been uſed with galls, it is leſs complained of. V. Petty's Apparat. to Hiſt. of Dying, in Sprat's Hiſt. Roy. Societ. p. ii. p. 288. Mer. Not. on Neri, c. cx. p. 335.

The *dying* materials are generally applied in decoctions made in water, more or leſs ſtrong, according to the occaſion; ſometimes by only dipping the ſtuff in the vat of dye; ſometimes by boiling it therein; and ſometimes by leaving it a day or more to ſteep. As to the alum, in *dying* ſilks, it is always applied cold, in which ſtate alone it contributes to the brightneſs of the dye.

The *non-colouring ingredients* are, certain *reſtringent*, or *binding materials*, as galls, ſumac, alder-bark, pomegranate-peel, walnut-rinds and roots, ſapling-bark, and crab-tree-bark. Certain *ſalts*, as alum, argol, ſalt-petre, ſal armoniac, pot-aſhes, lime, and urine. *Liquors*, as well water, river water, aqua vitæ, vinegar, lemon-juice, aqua fortis, honey, and molaſſes. *Gums*, as tragacanth, arabic, maſtic, and ſanguis draconis. *Smectics*, or *abſterſives*, as ſoap, fullers earth, linſeed-oil, ox-gall, &c. *Metals*, and *Minerals*, as ſteel filings, ſlippe, and pewter; to which add copperas, verdigris, antimony, litharge, and arſenic. Laſtly, bran, wheat-flour, yolks of eggs, leaven, cummin-ſeed, fenugreek ſeed, agaric and ſena.

Of the moſt of theſe ingredients, ſome account may be found under their reſpective articles, in the courſe of this book; but with regard to their uſe and effect in *dying*, it will be neceſſary to conſider them more particularly, and to bring them together in one view.

Among the *non-colouring drugs*, then, from the mineral kingdom come: 1. Copperas, ſteel-filings, and ſlippe, (the ſtuff found in the troughs of old grind-ſtones, whereon edge-tools have been ground) theſe are uſed for all true or Spaniſh blacks, though not for the Flanders blacks. 2. Pewter, diſſolved in aqua fortis, uſed for the new ſcarlet or BOW-*dye*. 3. Litharge, though not owned or allowed, is uſed to add weight to dyed ſilks. 4. Antimony, uſed chiefly for the ſame purpoſe, though it alſo contains a tingent ſulphur; which, by precipitation, &c. affords a great variety of colours. 5. Arſenic, uſed in dying crimſon, on pretence of giving a luſtre. 6. Verdigris, uſed by linen-dyers, in their yellow and green colours. 7. Alum, much uſed, though with what intent is not agreed on; whether to fix the dye, to render water a proper menſtruum to extract the tingent particles of certain hard drugs; or to ſcower the ſordes, which may interpoſe between the ſtuff and the dye, and hinder their due adheſion; or to intenerate the hairs of wool, and hair ſtuffs, that they may better imbibe their colours; or to contribute to the colour itſelf, as copperas does to galls, in making black, or juice of lemons to cochineal, in carnations, or aqua fortis impregnated with pewter in the bow-dye; or, which ſeems moſt probable, to ſerve as a vinculum between the cloth and the colour ,as clammy oils and gum waters do in painting; alum being a ſubſtance whoſe aculeated particles, diſſolved with hot liquors, will enter the pores of ſtuffs, and on which the particles of dying drugs will catch; though it may alſo ſerve another uſe, viz. to dry up certain particles which diſagree with the colour to be ſuperinduced: to which add, that it may alſo ſerve to brighten a colour, by incruſtating the ſtuff to be dyed with its cryſtals, on which the dye coming to be applied, has a finer effect, than if it were applied on a ſcabrous matter, ſuch as an unalumed cloth is. 8. Bran, and bran-water, whoſe flour entering the pores of the ſtuff, levigates its ſurface, and thus renders the colour laid on it more beautiful; much as woods to be gilded, are firſt ſmoothened over with the white colours. 9. Salt-petre, uſed chiefly in aqua fortis, in the bow-dye, to brighten colours by back-boiling. For which purpoſe, 10. Argol is more commonly uſed. 11. Lime, or chalk, uſed in the working of blue vats.

Non-colouring ingredients of the animal kind are, 1. Honey. 2. Yolks of eggs. 3. Ox-gall: though this, and the two laſt, are only uſed by a few particular dyers, to ſcower, promote fermentation, and increaſe weight. 4. Stale urine, uſed as a lixivium to ſcower, alſo to help the fermenting and heating of woad; though it is alſo uſed in the blue fats inſtead of lime. In reality, as it diſcharges the yellow wherewith blue and moſt greens are compounded, it is uſed to ſpend weld withal: yet it is known, that the urine, or cold mud of piſſing-places, will dye a well-ſcowered piece of ſilver of a golden colour; it being with this (not Bath-water, as imagined) that the Bath ſix-pences, &c. are prepared.

To the claſs of non-colouring ingredients, may alſo be added water, by dyers called *white liquor*, which is of two ſorts: 1. Well-water, uſed in reds, and in other colours wanting reſtringency, as well as in dying ſtuffs of a looſe contexture, as callico, fuſtian, and the ſeveral ſpecies of cottons; but naught for blues, and making yellows and greens look ruſty. 2. River-water, ſofter and ſweeter than the former, and diſſolving ſoap better, uſed in moſt caſes by the dyers, for waſhing, rinſing, &c. their clothes after dying. 3. Liquor abſolutely ſo called, which is bran liquor made of one part bran, and five of river-water, boiled an hour, and put in a leaden ciſtern to ſettle: four or five days in ſummer turn it too ſour, and render it unfit for uſe. Its office is to contribute to the holding of the colour. It is known, that ſtarch, which is only the flour of bran, makes a clinging paſte, which will conglutinate paper, though not wood or metals. Accordingly bran liquors are uſed to mealy dying ſtuffs, as to madder, which is rendered clammy and glutinous by being boiled in bran-water, and thus made to ſtick the better to the dyed ſtuff. 4. Gums tragacanth, arabic, maſtich, and ſanguis draconis, are uſed in dying ſilk, chiefly to give it a gloſſineſs, which may make it ſeem finer, ſtiffer, and to increaſe its weight. Petty, ubi ſupra.

DYING, *the Art of*, may be divided into as many branches as there are different colours to be communicated, and ſorts of different ſtuffs to be the ſubjects of it.

DYING *of Cloths*, *Serges*, *Druggets*, *and other woollen Manufactures*. With reſpect to *black*, in cloths and ſtuffs of price, it is begun with a ſtrong decoction of woad and indigo, which gives a deep blue. The uſe aſſigned for this blue ground is that the cloth, having already a conſiderable body of colour, may require leſs of the blackening materials, and conſequently be leſs weakened, than if it was dyed directly from white to black: beſides, blue is eſſential to the production of the black dye; for without either a blue ground, or a blue ſuperadded to the vitriol and galls, no other than brown dyes are obtained. Stuffs, whoſe price will not admit of blue dyes, are ſaid, by the French and German writers, to be grounded with a deep brown, by boiling them with walnut peels, or walnut-tree roots: but this practice is never followed by our dyers. However it ſhould ſeem, that any deep colour, which does not hurt the cloth, is preferable to white. After bluing, the ſtuffs being boiled with alum and tartar, or pot-aſhes, are to be maddered with common madder. This practice of maddering is one of the regulations for the French dyes, publiſhed by the order of M. Colbert. It has not been found, however, on fair trials, to be abſolutely neceſſary, or to contribute any thing either to the beauty or duration of the black. M. Hellot obſerves, that having dyed a piece of cloth of deep blue, he maddered one half, and dyed both the maddered and unmaddered halves black in one copper; and that the unmaddered half was the beſt black, without that ruſty hue which the other had. The moſt plauſible reaſon in ſupport of this practice is this, that it prevents the black cloth from ſtaining the ſkin or linen; but, according to M. Hellot, all that the madder can do in this reſpect is to diſcharge the ſuperfluous blue, which is owing not to the madder itſelf, but to the boiling with alum and tartar preparatory to the madder dye: an advantage which may be obtained by ſufficiently ſcowering the cloth in the fulling-mill after the dye. Dr. Lewis adds, that this is evident from the ſuperfine cloths dyed by our dyers, among whom the injudicious and unfrugal practice of maddering is unknown. They have indeed a colour called madder black, dyed on baize, for exportation to Spain and Portugal, which is a kind of black dye, very durable, without any vitriol or other preparation of iron, from a combination of blue dye, with the madder red. Cloth is then dyed black with Aleppo galls, copperas, and ſumach, and finiſhed by back-boiling in weld or logwood. Logwood is the material which adds blackneſs to the various ſhades of brown produced by vitriol and gall; and this black dye, though not of the moſt durable kind, is the moſt common. On blue cloth, a good black may be died by vitriol and galls alone; but even here, an addition of logwood contributes much to improve the colour. A hundred pounds of woollen cloth, dyed firſt to a deep blue, require for the black dye about five pounds of vitriol, five of galls, and thirty of logwood. The galls, beaten into moderately fine powder, and tied up in a bag, are boiled for a little time in a copper of water ſufficiently for working the cloth in. The blued cloth, after being ſteeped in river water, and drained, is in this ſtate put into the boiling decoction of the galls, and kept turning therein for two hours or more; the bag of galls being now and then ſqueezed, in order to extract their virtues. The logwood, being raſped or ſhaved into ſmall chips, or pulverized, is boiled in another copper for ſeveral hours; and this liquor is uſually prepared a conſiderable time before it is uſed, as its colour improves by keeping. When this liquor is made of a ſcalding heat, the vitriol is thrown into it; and as ſoon as it is diſſolved, the galled cloth is put in. A boiling heat ſhould never be uſed after the vitriol is added to the liquor, becauſe it would augment the corroſive power of the ſalt, and impair the beauty of the colour, by haſtily extricating part of the ferruginous matter of the vitriol in an ochery form, before it can come ſufficiently in contact with the aſtringent ſubſtance with which the cloth is impregnated. The cloth is continually turned about in the liquor, and occaſionally taken out and aired, which operation contributing tributes to ſecure the colour. After two hours continuance in the dye, the cloth, having received a good black, is taken out, waſhed with cold water, and paſſed through the fulling-mill. Superfine cloth is fulled three times with warm ſolutiou of ſoap, by which the ſuperfluous colour is diſcharged, and the cloth ſoftened. The cloth is improved neither in beauty nor durableneſs of colour, by being repeatedly paſſed through the *dying* liquor, or by increaſing the quantity of ingredients firſt uſed, after it has once acquired a full black colour. Our dyers uſe a ſmall quantity of verdigreaſe for ſome of the ſuperfine black cloths; but this is more frequently uſed by the French. M. Hellot gives the following proceſs, as the beſt, and as that, which, producing the fineſt velvet black on cloth, is followed in the beſt dye-houſes in France. For a hundred pounds of blue cloth, ten pounds of logwood chips, and the ſame quantity of Aleppo galls, in powder, are tied up together in a bag, and boiled in a middling copper, with a ſuitable quantity of water, for twelve hours. One-third of this decoction is taken out into another copper, and two pounds of powdered verdigreaſe added to it. In this mixture, kept gently boiling, or rather ſcalding hot, the cloth is dipped, and conſtantly turned for two hours; after which it is taken out and aired. Another third of the decoction is laded out into the ſame copper, eight pounds of green vitriol added, and the fire ſlackened about half an hour. The vitriol being diſſolved, the cloth is put in and worked for an hour, and then taken out and aired again. The remaining third of the decoction is then put to the other two, the bag of galls and logwood being well preſſed out, fifteen or twenty pounds of ſumac are now added; and as ſoon as the copper begins to boil, two pounds more of vitriol are thrown in, with ſome cold water, to ſlacken the heat. The cloth is kept in for an hour, then taken out and aired, dipped a ſecond time, and kept turning for an hour longer. The cloth, now completely dyed, is waſhed in a river, and ſcowered in the fulling-mill till the water comes from it colourleſs. It is then paſſed through a copper of weld, which is ſuppoſed to ſoften the cloth and confirm the colour; but it is obſerved in this proceſs, that the quantities of vitriol and galls may be diminiſhed, and the time of boiling much ſhortened; and that the weld liquor only ſupplies the place of ſoap, and is altogether unneceſſary, after ſcowering with ſoap; the liquor remaining after both theſe proceſſes retains, and will communicate a dilute black, or a grey colour, to as much cloth as can be conveniently worked in it.

As galls are an expenſive article in the operation of *dying*, other cheaper aſtringents have been recurred to as a ſubſtitute; ſo that they have been uſed in leſs quantity than in the proportion already ſtated, and weaker aſtringents have been taken in larger quantity. In the Swediſh Tranſactions for the year 1753, a fine black is ſaid to be *dyed*, without galls or logwood, by means of a plant called in Sweden, *mjælon* or *mjælon-ris*, which Linnæus has ſhewn, is no other than the *uva urſi*. This plant is gathered in autumn, while the leaves are green, and carefully dried, that they may retain their green colour. A hundred pounds of woollen cloth are directed to be boiled with ſixteen pounds of green vitriol, and eight pounds of white tartar, for two hours; and the cloth is next day to be rinſed out: then one hundred and fifty pounds of the dried plant, cut a little, are boiled in water for two hours; and when the plant is taken out, a ſmall quantity of madder is added to the liquor. The cloth is put in along with it, and boiled for an hour and a half, or an hour and three quarters, and afterwards rinſed in water. This dye is ſaid to be chiefly uſed for fine cloth, and to give leſs harſhneſs than the common black. Dr. Lewis purſued theſe directions with the German *uva urſi* both on white and blue cloth; the colour in the former was only a dark brown, as with other aſtringents, and in the latter a tolerably good black. From ſome other experiments on oak-duſt, Dr. Lewis concludes, that it deſerves the attention of dyers, and that this duſt, or the heart of the oak reduced to powder in mills, will be found an aſtringent of ſufficient efficacy, and ſupply with advantage the place of galls.

It has been generally obſerved, that cloth is weakened by the black dye, on account of the corroſive quality of the vitriol more than by any other; and the finer the black the more it has been thought to injure the cloth; and therefore the beauty and durability of the cloth have been thought incompatible with one another. But a German writer on *dying*, diſtinguiſhed by the approbation of the celebrated Stahl, alleges, that the vitriol is corroſive only ſo far as it is not ſaturated with galls; and he propoſes, in order to determine the quantity of galls ſufficient for complete ſaturation, to mix a decoction of galls and ſolution of vitriol in different proportions, and to drop theſe liquors much diluted on white paper; and the proportions which give the deepeſt black colour, are thoſe which ſhould be followed by the dyer, and in which the vitriol is made harmleſs. This proportion Dr. Lewis ſhews, is about equal parts of the one and the other; and as the dyers generally uſe theſe proportions, he concludes, that the common black dye cannot hurt the cloth; and this concluſion is farther confirmed by the teſtimony of a judicious dyer, who deſcribes the rottenneſs or periſhableneſs, often complained of in black cloths, to the damage it has received before *dying*. It is well known, that all colours receive a black dye, though black will not receive any other, whence it happens, that black is the laſt reſource for cloths that have been damaged, or that have had their colour ſtained, or impaired by different accidents: beſides, vitriol is uſed in greater quantities for ſome coffee colours than the black; and the aqua fortis employed in ſcarlets, oranges, &c. is certainly more corroſive. Wool is dyed black in the ſame manner with cloth, after having been ſcowered by a mixture of ſtale urine, with twice or thrice its quantity of water made ſcalding hot; in which operation it is ſaid to loſe between one-fifth and one-fourth of its weight. Dict. of Commerce. Hellot's Art of Dying, and Lewis's Comm. Phil. Techn. p. 401, &c.

It appears by ſome experiments lately made, that lime-water, though it tends to deepen the colour produced by ſome aſtringents and martial vitriol, by no means adds to the duration of thoſe colours; and that either by trituration or coction, it entirely deſtroys the property in logwood of ſtriking black with martial vitriol, and therefore can be of no ſervice in the black dye, where logwood is a material ingredient. It is alſo inferred from the ſame experiments, that ſlight boiling is preferable to trituration, for the purpoſes of *dying*, when a durable colour is wanted. Phil. Tranſ. vol. lxiv. p. i. art. 4.

Simple *greys*, which are no other than ſhades of black, are dyed nearly in the ſame manner as the full blacks; only by uſing a leſs proportion of the *dying* ingredients, or continuing the cloth in the liquor for a ſhorter time. Theſe ſimple *greys* are dyed from white cloth without any previous ground of blue on other colours. There are alſo a multitude of compound greys and browns, produced from cloth dyed blue, red, yellow, brown, or of colours compounded of theſe, by darkening them with the black dye. *Scarlet* is dyed with kermes and cochineal with which may alſo be uſed agaric and arſenic. *Crimſo ſcarlet* is given with cochineal, maſtich, aqua fortis, ſa armoniac, ſublimate, and ſpirit of wine. *Violet-ſcarlet*, *purple*, *amaranth*, and *panſy-ſcarlets*, are given with woad, cochineal, indigo, braziletto, brazil, and archil. See ARCHIL, COCHINEAL, CRIMSON, &c. &c. For common *reds*, pure madder is uſed, without any other ingredients. *Crimſon-reds*, *carnations*, *flame*, *and peach colours*, are dyed according to their ſeveral hues, with cochineal, maſtich, without madder or the like. *Crimſon-red* is prepared with Roman alum, and finiſhed with cochineal. *Peach-colour* muſt be back-boiled a little with galls and copperas or the like. *Orange-aurora*, or *golden-yellow*, *brick-colour*, and *onion-peel colour*, are given with woad and madder, tempered according to their reſpective ſhades. For *blues*, the *dark* are given with a ſtrong tincture of woad: the *brighter*, with the ſame liquor, as it weakens in working. *Dark-browns*, *minims*, and *tan-colours*, are given with woad, weaker in decoction than for black, with alum and pot-aſhes; after which, they are maddered higher than black: for tan-colours, a little cochineal is added. *Pearl-colours* are given with galls and copperas; ſome are begun with walnut-tree roots, and finiſhed with the former; though, to make them more ſerviceable, they uſually dip them in a weak tiucture of cochineal. *Greens* are begun with woad, and finiſhed with weld. *Pale-yellows*, *lemon-colour*, and *ſulphur-colour*, are given with weld only. *Olive-colours* of all degrees are firſt put in green, and taken down again with ſoot, more or leſs, according to the ſhade required. *Feulemort*, *hair-colour*, *muſk*, and *cinnamon-colour*, are given with weld and madder. *Nacarat*, or *bright orange-red*, is given with weld, and goats-hair, boiled with pot-aſhes. Fuſtic here is forbid, as a falſe colour. V. Savar. Dict. de Com. tom. ii. p. 1690. See alſo le Teinturier Parfait, Leid. 1708, 12°. Salm. Polygraph. lib. iii. cap. 37. See the ſeveral colours with the ſubſtances above enumerated in the courſe of this Dictionary.

DYING *of wools for tapeſtry*, is performed after the ſame manner as cloths, excepting blacks, which are only to be woaded, and then put in black, as above.

Black wools for cloths and ſerges, may be begun with walnut-tree root, and walnut-rinds, and finiſhed by dipping in a vat of black.

DYING *of ſilks* is begun by boiling them with ſoap, &c. in which proceſs it loſes about one-fourth part of its weight; then ſcouring and waſhing them out in ſoft water, and ſteeping them in alum-water cold. For *crimſon* they ſcour them a ſecond time before they put them in the cochineal vat.

Red crimſon is dyed with pure cochineal maſtich, adding galls, turmeric, arſenic, and tartar, all put together in a copper of fair water almoſt boiling: with theſe the ſilk is to be boiled an hour and a half; after which, it is ſuffered to ſtand in the liquor till next day. *Violet crimſon* is alſo given with pure cochineal, arſenic, tartar, and galls; but the galls in leſs proportion than the former. When taken out, it is to be well waſhed, and put in a vat of indigo. *Cinnamon crimſon* is begun like the violet, but finiſhed by back-boiling, if too bright, with copperas; if dark, with a dip in indigo. *Light blues* are given in a back of indigo. *Sky blues* are begun with archil, and finiſhed with indigo. For *citron colours*, the ſilk is firſt alumed, then welded with a little indigo. *Pale yellows*, after aluming, are dyed in weld alone. *Pale* and *brown auroras*, after aluming, are welded ſtrongly, then taken down with rocou diſſolved with pot-aſhes. *Flame-colour* is begun with rocou, then alumed, and dipped in a vat or two of brazil. *Carnation*, and *roſe-colours*, are firſt alumed, then dipped in brazil. *Cinnamon-colour*, after aluming, is dipped in brazil and braziletto. *Lead-colour*, is given with fuſtic, or with weld, braziletto, galls, and copperas: but the galls, on theſe and other occaſions, are not to be overdoſed, which increaſes the weight to the damage of the purchaſer; for which reaſon, it is puniſhed in France as a fraud; and in reality few but black ſilks need galls.

Black ſilks of the *coarſer* ſort, are begun by ſcouring them with ſoap, as for other colours; which done, they are waſhed out, wrung, and boiled an hour in old galls, where they are left to ſtand an hour or two; after which, they are waſhed again with fair water, wrung, and put in another vat of new and fine galls; then waſhed and wrung again, and finiſhed in a vat of black. *Fine black* ſilks are only put once into galls, viz. the new and fine ſort, which has only boiled an hour; then they are waſhed, and wrung out, and dipped thrice in black, to be afterwards brought down by back-boiling with ſoap. Savar. lib. cit. p. 1693, ſeqq.

M Macquer, in his Diſſertation on the Art of *Dying* Silk, has given the following proceſs for *dying* of black, which is followed in the manufactories of Tours and Gênes: the ſilk, waſhed with ſoap, is ſteeped in a decoction of one-third its weight of Aleppo or blue galls, or half its weight of the weaker white galls of Sicily and Romania, and afterwards waſhed with water: every twelve ounces are reduced by the cleanſing to nine, which ought to be increaſed by the galling to eleven, and no more. The *dying* liquor, for one hundred pounds of ſilk, is prepared by boiling twenty pounds of galls in about one hundred and twenty-ſix gallons of water, and adding to this decoction, after being ſettled and drawn off from the ſediment, two and a half pounds of Engliſh vitriol, twelve of iron-filings, and twenty of the gum of the cherry or plum-tree; that the gum may diſſolve the more readily, it is put into a large copper cullender, immerſed in the hot liquor, and ſtirred from time to time with a wooden rod till it is all paſſed through. This mixture is kept for ſix or ſeven days or more, a circumſtance ſuppoſed to be neceſſary to its perfection; and being then made as hot as the hand can bear, freſh parcels of the galled ſilk are dipped in it ſucceſſively, and kept in about ten minutes each; and all of them, after being aired, are dipped over again, ſeveral times, with the addition of more vitriol and iron-filings till they have acquired the requiſite blackneſs, after which they are well waſhed in water. Dr. Lewis obſerves on this proceſs, that while five or ſix pounds of galls are ſufficient for one hundred pounds of wool, upwards of fifty pounds of galls are here allowed to the ſame quantity of ſilk; and that logwood, an eſſential ingredient in the black dye on white woollen, is not at all required for ſilk. He alſo found, in repeating this proceſs with a leſs quantity of the ſeveral ingredients but in the ſame proportion, that by adding more and more of the vitriol, ſo that the whole amounted to one-fifth of the weight of the ſilk, and repeating the dippings thirty times or more, he obtained at laſt a good black: nor did he obſerve any difference in two blacks produced by repeating the operation with and without any iron filings: he apprehends likewiſe, that the gum is rather of diſſervice than advantage. Dr. Lewis concludes upon the whole, that a good black may be dyed on ſilk, with the ſame materials, in the ſame method, and with the ſame diſpatch, as on wool and woollen cloth. Com. Phil. Tech. p. 425, &c.

DYING *of thread* is begun by ſcouring it in a lye of good aſhes; after which, it is wrung, rinſed out in river water, and wrung again. For a *bright blue*, it is given with braziletto and indigo. *Bright green* is firſt dyed blue, then back-boiled with braziletto, and verditer, and laſtly woaded. For a *dark green*, it is given like the former, only darkening more before woading. *Lemon*, or *pale yellow*, is given with weld, mixt with rocou. *Orange* and *Iſabella*, with fuſtic, weld, and rocou. *Red*, both *bright* and *dark*, with *flame-colour*, &c. are given with brazil, either alone, or with a mixture of rocou. *Violet*, *dry roſe*, and *amaranth*, are given with brazil, taken down with indigo. *Feulemort* and *olive-colour* are given with galls and copperas, taken down with weld, rocou, or fuſtic. *Black* is given with galls and copperas, taken down and finiſhed with braziletto wood.

It is obſervable, that the black vitriolic dye, which is very durable on the ſubſtances already mentioned, is periſhable on linen and cotton. Pieces of both ſorts of cloth and ſkains of thread boiled firſt with galls, and afterwards infuſed and dipped repeatedly in a decoction of logwood with vitriol, received a good black colour, which was in ſome meaſure diſcharged by waſhing with ſoap; and the black dye proved equally periſhable, though the linen was ſteeped for a month previous to the dye, with galls and with oak-bark. The dyers of thread obtain a colour ſomewhat more laſting, by ſteeping it firſt in alum-water for ſeveral days; and then dipping it repeatedly in the dying liquor, cold, or only lukewarm. This liquor conſiſts of the irony and aſtringent matters mixed together; and in the room of, or along with vitriol, they uſe either filings of iron or ſlippe. Dr. Lewis made ſeveral unſucceſsful trials to fix the black dye in linen and cotton. He has given us, from the diſſertation of M. l'Abbé Mazeas, on the red printed cottons of the Eaſt Indies, an account of a method practiſed by the Indians, of impregnating their cotton with animal matter, in order to its receiving a red ſtain. A ley is made from the aſhes of a certain kind of wood, and with this is mixed ſome ſheep's dung, and a quantity of the oil of ſeſamum, in want of which oil they uſe hog's lard: theſe ingredients ſtirred together are ſaid ro unite into a milky liquid. The cotton is ſteeped in this liquor during the night, and expoſed to the hotteſt ſun during the day for a fortnight. He applied a ſimilar preparation to the black dye; but the reſult was not ſuch a degree of ſucceſs as to render the proceſs intereſting to the workman. He obſerves, on the credit of a ſkilful artiſt, that ſome printed linens and cottons have a durable black ſtain, which is made with madder and a ſolution of iron. For this purpoſe a quantity of iron is put into four ſtrong beer; and to promote the diſſolution of the metal, the whole is occaſionally well ſtirred, the liquor at times drawn off, the ruſt beaten from the iron, and the liquor poured on again; the ſolution is not fit for uſe in leſs than a twelvemonth. This ſolution ſtains linen yellow, and of different ſhades of buff colour, and is the only known material by which theſe colours can be fixed on linen. The cloth, ſtained deep with the iron liquor, being afterwards boiled with madder, without any other addition, becomes of the dark colour which is ſeen on printed linens and cottons; which, though not a perfect black, bears a very near reſemblance to it. He apprehends, that a better black might thus be dyed on thread, than that which the printer on linen produces; becauſe in this laſt buſineſs, while ſome parts of the linen are ſtained deep with the iron liquor, in order to their being made black; others are ſtained paler, with the ſame liquor diluted with water, for making purple; and others, deſigned to be red, are prepared with a ſolution of alum and ſugar of lead; all theſe colours are dyed in the ſame copper of madder, with a heat a little below boiling; but a boiling heat, which would injure the red colour, would deepen the black, and might be advantageouſly applied, if thread, or whole pieces of linen or cotton, were to be dyed of this colour. Com. Phil. Techn. p. 429, &c.

DYING *of hats*, is done by boiling a hundred pounds of logwood, twelve pounds of gum, and ſix pounds of galls, in a proper quantity of water for ſome hours; after which about ſix pounds of verdigris, and ten pounds of green vitriol are added, and the liquor kept ſimmering, or of a heat a little below boiling. Ten or twelve dozen of hats are immediately put in, each on its block, and kept down by croſs bars for about an hour and a half; they are then taken out and aired, and the ſame number of others put in their room; the two ſets of hats are then dipped and aired alternately, eight times each; the liquor being refreſhed each time with more of the ingredients, but in leſs quantity than at firſt. This proceſs affords a very good black on woollen and ſilk ſtuffs as well as on hats. Com. Phil. Techn. p. 428. See HAT.

Dyes, *Proof of.* There are divers ways of proving the truth of *dyes*, or examining the juſtneſs and legitimacy of their compoſition. To diſcover whether a cloth have been duly treated by the dyer, and the proper foundation laid, a white ſpot, by the French called *roſette*, of the bigneſs of a ſhilling, ought to be left; beſides a white ſtripe between the cloth and the liſt.

Farther proof is had by boiling the dyed ſtuff in water with other ingredients different according to the quality of the *dye* to be proved. If the colour ſuſtain the teſt, i. e. do not diſcharge at all, or very little, ſo that the water is not tinctured by it, the dye is pronounced good: otherwiſe it is falſe.

Some colours will for a long time reſiſt the injuries of the air; and theſe are therefore called the good or ſtanding colours; and there are others which the bare expoſure to the air will deſtroy or deface in a very little time; theſe are therefore called the falſe or fading colours. In what manner is the action of the air upon theſe laſt to be explained? Does it take away, or carry off from the ſtuff the particles of the colours; or does it only break and deſtroy that beautiful and regular texture of each particle on which the colour depends? The dyers very often have recourſe to ſeveral ingredients, in order to produce one colour; and reaſon ſeems to urge, that one of theſe falſe or fading colours might be rendered laſting by mixing it with a permanent one: the dyers are alſo of this opinion. But it is nevertheleſs an erroneous one; for repeated experiments have proved, that one of theſe falſe colours fades as ſoon, when it is mixed with a ſtanding or laſting colour, as when it is uſed alone. There are but few colours on which this experiment can be tried, ſo as to come to a regular deciſion. One of the principal is the mixing a blue and a yellow, for producing a green. In this experiment, if the blue and the yellow be both ſtanding or permanent colours, the ſtuff will perfectly hold its colours, and ſucceed alike, whether it be *dyed* firſt blue, and afterwards yellow; or firſt yellow, and afterwards blue. But if one of the two colours be a falſe or fading colour, it is found that the green produced by the mixture will not ſtand, though the other be ever ſo good or permanent a colour.

There is a ſhorter way of trying the permanence of many colours of this kind than that of expoſing them to the air, ſince in boiling only five minutes in a pint of water, in which there has been diſſolved half an ounce of alum, they will loſe as much colour as they would have done by being expoſed two days to the air in ſummer. Some colours require different methods of trial, but this ſerves for almoſt all. The ſhades of blue, yellow, red and green, purple and green, are the fineſt colours to experiment theſe things upon, as the ſame previous preparation or impregnation of the ſtuff ſerves for both, and both depend upon blue for their baſis, the purple being made of blue and red, and the green of blue and yellow.

It ſhould not ſeem ſurpriſing, if the ſtuff be firſt dipped into a *dye* of a ſtanding blue, and afterwards into a fading red or yellow, to turn it green or purple, that the action of the air, or boiling in alum water, ſhould carry off thoſe falſe colours, which had only been applied to the ſtuff after it was before ſaturated with a ſtanding colour. But it might be expected, that when the ſtuff was firſt impregnated with them, and afterwards had the blue added upon them, that either the blue muſt be the colour that went off, or that they muſt all remain. But, in effect, nothing of this difference is found, but the blue remains, while the fading colours go off, however or in whatever manner or order they are applied. Mem. Acad. Scienc. Par. 1737.

Dyes *of Silk, Proofs of the.* For red crimſon, the proof is made by boiling the ſilk with an equal weight of alum. For ſcarlet crimſon, it is boiled with ſoap almoſt of the weight of the ſilk. For violet crimſon, with alum of equal weight with the ſilk, or with citron juice, about a pint to a pound of ſilk. Theſe ingredients are to be mixed, and put in fair water when it begins to boil; after which, the ſilks are alſo to be put in; and after boiling the whole for half a quarter of an hour, if the dye be falſe, the liquor of the red crimſon will be violet, in caſe it has been dyed with archil; or very red, if with brazil. That of crimſon ſcarlet, if rocou hath been uſed, will become of an aurora colour; or, if brazil hath been uſed, red. On the contrary, if the three ſorts of crimſon be truly dyed, their liquors will diſcover very little alteration.

A ſtill ſurer way to diſcover whether crimſon ſilks have been rightly dyed, is by boiling a piece of ſtandard dyed ſilk, kept for that purpoſe at Dyers-hall, after the ſame manner, and then comparing the tinctures of the two liquors.

To diſcover whether other colours have been dyed with galls, the ſilk is to be put in fair boiling water, with pot-aſhes, or ſoap, nearly of the weight of the ſilk; after ſome time, it is taken out; upon which, if it hath been dyed with galls, the colour will be all vaniſhed, and nothing but that of the galls left, which is a ſort of ſeule-mort, or wood colour.

The *dying* of ſilk with galls may alſo be detected by putting it in boiling water, with a gallon of citron juice; being taken out, and waſhed in cold water, and then dipped in a black *dye*, if galls have been uſed, it will turn black; if not, it will be of a brown-bread colour.

To diſcover whether black ſilk has been over-doſed with galls, ſteel-filings, or ſlippe, it is boiled in fair water, with twice its weight of ſoap: if it be loaden with galls, it will turn reddiſh, otherwiſe it will keep its colour.

Dyes *of Cloths, Proofs of the.* To diſcover whether black cloth has been firſt woaded, and maddered; a ſample of it, and, at the ſame time, a ſample of ſtandard black, kept for that purpoſe by the Dyers company, is to be taken; and then as much Roman alum as is equal in weight to both, together with a like weight of pot-aſhes, is to be put over the fire in a pan of bran-water: when it begins to boil, the two ſamples are to be put in; and after half an hour to be taken out and compared. The piece which has only been woaded will be found bluiſh, with ſomewhat of a dull green; if it hath been both woaded and maddered, it will be of a tan, or minim colour; and, if it has been neither woaded nor maddered, its colour will be dunniſh, between yellow and fallow.

The ſame diſcovery may be made by ſteeping a ſmall bit of the black cloth for a day or two in water acidulated with oil of vitriol; or by boiling it about a quarter of an hour in a ſolution of alum and tartar, made by the proportion of one ounce of each to a pint of water: if the cloth has had a previous blue ground, it will remain of a bluiſh black colour; but if it has been dyed directly from white, it will look of a muddy reddiſh brown. The dyers commonly leave ſome blue marks at the end of pieces of black cloth, by fixing pieces of lead on them, in order to ſhew that the piece has been regularly dyed in a blue ground, and that the colour is durable.

For cloths dyed of a minim colour, the proof is to be made after the ſame manner as that of blacks.

To know whether ſcarlet or crimſon cloth hath been dyed with pure cochineal, they are to be boiled with an ounce of alum to a pound of cloth.

For cloths of other colours, the proof is to be made in the ſame manner as that of blacks and minims. Savar. lib. cit. p. 1665, ſeqq. voc. Debouilli.

Dying, *the Laws relating to*, are as follow. Dyers ſhall dye both the cloth and the liſt, or forfeit it. 1 R. III. cap. 4. No dyer may dye any cloth with archil, or with brazil, to make a falſe colour in cloth or wool, &c. on pain of twenty ſhillings. Stat. 3 & 4 Edw. VI. cap. 2. Dyers are to fix a ſeal of lead to cloths, with the letter *M*, to ſhew that they are well maddered, &c. or forfeit three ſhillings and four pence; and not to uſe logwood in *dying* on pain of forfeiting twenty pounds. Stat. 23 Eliz. cap. 9. and penalties are inflicted on dyers, who dye any cloths deceitfully, and not being dyed throughout with woad, indigo, and madder; alſo marks ſhall be put to the cloth dyed, &c. Dyers in London are ſubject to the inſpection of the Dyers company, who may appoint ſearchers; and out of their limits, juſtices of peace in ſeſſions to appoint them: oppoſing the ſearchers incurs ten pounds penalty, by Stat. 13 Geo. I. c. 24.

Dying, in a more extenſive ſenſe, is applied to all kinds of colourings given to bodies of any ſort.

In which ſenſe, *dying* amounts to the ſame with *coloration*; and includes ſtaining, painting, gilding, marbling, printing, &c. The Chineſe are ſaid to practiſe the *dying* of tea with catechu, which gives the worſe ſorts of green tea-leaf the colour, and its infuſion the tincture of bohea. Short. Diſſ. on Tea, pref. p. 15. See TEA and CATECHU.

The ſorts of *dying* now commonly uſed in vulgar trades, are, 1. Whitening of wax, and ſeveral ſorts of linen, and cotton cloths, by the ſun, air, and reciprocal effuſions of water. See BLEACHING. 2. Staining of wood and leather by lime, ſalt, and liquors, as in ſtaves, canes, marble, leathers, marquetry, &c. 3. Marbling of paper, by tempering the colours with ox-gall, and applying them upon a ſtiff gummed liquor. See PAPER. 4. Colouring, or rather diſcolouring ſilks, tiffanies, &c. by brimſtone. 5. Colouring ſeveral iron and copper-works into black with oil. 6. Giving leather a gold colour, or rather *dying* ſilver-leaves like gold, by varniſhes; and in other caſes by urine and ſulphur. 7. Staining of marble and alabaſter, with heat, and coloured oils. 8. Tinging ſilver into braſs with brimſtone or urine. 9. Colouring the barrels and locks of guns blue and purple with the temper of ſmall-coal heat. 10. Colouring glaſs cryſtals, and earthen-ware, with the ruſts and ſolutions of metals. See POTTERY, &c. 11. Colouring live hair, as in Poland, both horſe and man's hair; and alſo of furs. 12. Enamelling and annealing. See ENAMELLING. 13. Application of colours, as in the printing of books and pictures; and the making of playing-cards, japanning, &c. See PRINTING, CARDS, and JAPANNING. 14. Gilding, and tinning with mercury, block-tin, and ſal armoniac. See GILDING and TINNING. 15. Colouring metals, as copper with calamine into braſs, and with zink or ſaltpetre into falſe gold, or into falſe ſilver with arſenic. See CALAMINE, BRASS, ZINK, ARSENIC, &c. 16. Making painters colours, by preparing of earth, chalk, and ſlates, as in umber, oker, Cologn earth, &c. out of the calces of lead, as ceruſs and minium; by ſublimates of mercury and brimſtone, as in vermillion; by tinging of white earths variouſly, as in verditer, and ſome of the lakes; by concrete juices or fæculæ, as in indigo, pinks, ſap-green, and lakes; and by ruſts, as in verdegris, &c. See CERUSS, MINIUM, VERMILLION, INDIGO, &c. 17. The applying of theſe colours by the adheſion of ox-gall, as in the marbled paper aforeſaid; or by gum-water, as in limning; or clammy drying oils, as the oils of linſeed, nuts, ſpike, turpentine, &c. See PAINTING, LIMNING, &c. 18. Watering of tabbies. See WATERING, CALENDER, TABBY, &c. Petty Appar. Hiſt. of Dying, ap. Sprat.

Glaſs *dyed* is the common matter of artificial jewels: the tinctures are given with zaffer, manganeſe, feretto, crocus martis, &c. The proceſſes are deſcribed at length in Antonio Neri, de Re Vitraria, lib. i. cap. 12, 13, 14, ſeqq. See GLASS, GEM, &c.

The Peruvian women, when grown old, *dye* their grey hairs black by a very untoward operation, viz. holding the head ſome hours with the hair ſopped in a boiling tincture of the root of a tree called *cuchau*, by the Spaniards *maquey*.

DYING *of leather*, *ſkins*, &c. A *black* colour is eaſily given to tanned leather, by rubbing it over three or four times with a ſolution of vitriol, or with a ſolution of iron in the vegetable acids. For leathers that have not been tanned, ſome galls or other aſtringents are added to the ſolution of iron; and in many caſes, particularly for the finer parts of leather, and for renewing the blackneſs, ivory or lamp-black are uſed. See CURRYING. A *blue* colour is given by ſteeping the ſubject a day in urine and indigo, then boiling it with alum: or it may be given by tempering the indigo with red wine, and waſhing the ſkins therewith. *Red* is given by waſhing the ſkins, and laying them two hours in galls; then wringing them out; dipping them in a liquor made with liguſtrum, alum, and verdigris in water; and laſtly; in a *dye* made of brazil wood boiled with lye. *Purple* is given by wetting the ſkins with a ſolution of roch alum in warm water, and when dry again, rubbing them with the hand with a decoction of logwood in cold water. *Green* is given by ſmearing the ſkin with ſap-green and alum-water boiled; to darken the colour, a little more indigo may be added. *Dark green* is alſo given with ſteel-filings, and ſal armoniac ſteeped in urine till ſoft, then ſmeared over the ſkin; which is to be dried in the ſhade. *Sky-colour*, is given with indigo ſteeped in boiling water, and the next morning warmed and ſmeared over the ſkin. *Yellow*, by ſmearing the ſkin over with aloes and linſeed oil diſſolved and ſtrained; or by infuſing it in weld. *Orange-colour*, is given by ſmearing with fuſtic berries boiled in alum-water; or for a deep orange, with turmeric. Salm. Polygr. lib. iii. cap. 34. p. 272.

The following proceſſes for *dying* leather red and yellow, as practiſed in the Eaſt, for that kind called Turky-leather, were lately communicated by Mr. Philips, a native of Armenia, to the Society of Arts, &c. The ſkins are prepared for both dyes, by dreſſing them in lime. For this purpoſe, after having been dried with the hair on, they are firſt laid to ſoak in clean water for three days; they are then broken over the fleſh ſide, put into freſh water for two days longer, and afterwards hung up to drain half an hour. They are then broken again on the fleſh ſide, limed with cold lime on the ſame ſide, and doubled together with the grain ſide outward. In this ſtate, they are hung up within doors for five or ſix days, till the hair be looſe, which is then taken off; and the ſkins are returned into the lime pit for about three weeks. They are then taken out and well worked, fleſh and grain, every ſixth or ſeventh day during that time; after which they are waſhed ten times in clean water, and the water is changed at each waſhing. The next operation is drenching: in order to which, a liquor is prepared, by mixing bran and water, and new milk, warm, allowing about three pounds of bran for five ſkins, and about a gallon of water to each pound of bran: the ſkins are left to lie in this drench three days, when they muſt be well worked, and returned into it for two days longer. They are then taken out and rubbed between the hands; the water is ſqueezed from them, and the bran ſcraped off clean from both ſides; after which they are waſhed ten times in clean water, and the water ſqueezed out of them. The ſkins that are to be dyed red are then prepared by honey and bran in the following manner: a pound of honey is diſſolved in three pints of lukewarm water; to which are added, two double handfuls of bran; and then four ſkins are well worked in this quantity of mixture, one after another. They are then folded ſeparately in a round form, with the fleſh ſide outward, and laid in an earthen pan, or other proper veſſel, by the ſide of each other in ſummer, and upon each other in winter; and the veſſel is placed ſloping, ſo that the liquor may drain from them. In this operation the liquor will ferment, and the ſkins ſwell; in which ſtate they remain about ſeven or eight days, the liquor that drains from them being poured off as occaſion requires. On the eighth or ninth day, they are taken out of this mixture, and rubbed with dry common ſea-ſalt, in the proportion of about half a pound to each ſkin; by which they are contracted, and the remaining moiſture is to be ſqueezed out, by drawing each ſkin ſeparately through the hands. They are then ſcraped clean on both ſides from the bran and ſuperfluous ſalt and moiſture; and freſh ſalt is ſtrewed over the grain ſide, and well rubbed in with the hands. They are now doubled, with the fleſh ſide outward, lengthwiſe, from tail to tail, and more ſalt is thinly ſtrewed over the fleſh ſide and rubbed in. About one pound and a half of ſalt for each ſkin will ſuffice for both theſe operations. In this ſtate they are folded on each other, and laid between two clean boards, under a heavy weight, and continued in this draining ſtate for two days or more, when they will be fit for *dying*. The red dye is prepared by boiling ſeven ounces of ſhenan, tied up in a linen bag, in eight gallons of water for about an hour; and by putting into the boiling mixture two drams of pomegranate bark, three-fourths of an ounce of turmeric, three ounces of cochineal, and two ounces of loaf ſugar, and letting the mixture afterwards boil for ſix minutes: this is the proportion for four ſkins. N. B. The ſhenan is eaſily to be obtained from any of the ports in the Levant: it is the eaſtern jointed kali, called by botaniſts *ſalicornia*, but different from the ſmall ſpecies met with on the Engliſh ſea-coaſt. Two pints of the above liquor are to be meaſured out in a flat earthen pan; and when it is as cool as new milk, one ſkin folded lengthwiſe, with the grain ſide outwards, is to be dipped in it, and rubbed gently with the hand; then it is hung up to drain; and the ſuperfluous dye is thrown away. The ſame proceſs muſt be obſerved with reſpect to the other three ſkins; and the ſame operation muſt be repeated on each ſkin ſeparately eight times, before each freſh dipping: then let the ſkins be ſqueezed and laid in a ſloping-pan to drain for about two hours, or till they are cold. They are next to be tanned, by working them well for half an hour or more in a mixture, made by powdering four pounds of the beſt white galls in a marble mortar, ſifting and mixing them with about three quarts of water: the ſkins are folded in four folds, and left to lie in the ſun twenty-four hours; after which they are again to be worked, ſcraped clean from the firſt galls, and put into the like quantity of freſh galls and water: they muſt be well worked in this for three quarters of an hour, folded up as before, and left in it three days. On the fourth day they muſt be waſhed clean from the galls in ſeven or eight freſh quantities of water, and hung up to dry. When they are almoſt dry, they are to be ſcraped on the fleſh ſide with the ſcraper, in order to reduce them to a proper thickneſs; they are then to be laid on a ſmooth board, and glazed, by rubbing them with a ſmooth glaſs. Afterwards they muſt be oiled, by rubbing them with olive oil, in the proportion of one ounce and a half of oil to four ſkins, and then grained on a graining board lengthwiſe, breadthwiſe, and croſſwiſe, from corner to corner.

The ſkins that are deſigned for the yellow dye, after having been drenched, muſt be well worked for half an hour or more, in a mixture of one pound and a half of the beſt white galls, powdered with two quarts of clean water: this is the proportion for four ſkins. They muſt then be ſeparately doubled lengthwiſe, rolled up with the fleſh-ſide outwards, laid in the mixture, and cloſe preſſed on each other; in which ſtate they are to remain two whole days. On the third day they muſt be again well worked in the tan, and afterwards ſcraped clean from the galls with an ivory or braſs inſtrument; and then put into a freſh tan made of two pounds of galls, with about three quarts of water, and well worked in it fifteen times. After this they muſt be doubled, rolled up as before, and remain in the ſecond tan for two days. On the third day, a quarter of a pound of white ſea-ſalt muſt be worked into each ſkin, and the ſkins be doubled and rolled, and laid in the tan till the following day, when they are to be waſhed ſix times in cold water, and four times in lukewarm water. The ſkins muſt then be well preſſed between two boards, and drained.

The yellow dye, for which they are now ready, muſt be prepared by mixing ſix ounces of caſſiari gehira, or the berries of an eaſtern rhamnus, or buck thorn-tree, with the ſame quantity of alum; theſe are to be pounded together in a marble or braſs mortar, with a braſs peſtle: this is the proper quantity for four ſkins. The berries may be obtained at Aleppo, or other parts of the Levant; or the Avignon berries, though they yield a weaker dye, may be ſubſtituted in their room. The powdered materials are to be divided into three equal parts; and one of theſe parts is to be ſtirred in about a pint and a half of hot water, in a china or earthen veſſel. When the liquor has been boiled and ſtood to cool, ſo as not to ſcald the hand; a fourth part of it is poured on the grain ſide of one of the ſkins laid flat on a table in a warm room, with this ſide uppermoſt, and well rubbed over the ſkin. The ſame proceſs is to be purſued with the other three ſkins. The ſame operation muſt be repeated twice more, ſeparately on each ſkin, with the remaining eight ounces of the pulveriſed berries and alum, mixed with the ſame proportion of hot water. When the ſkins are dyed, they are to be hung up looſely, with the grain ſide outwards, for about three quarters of an hour to drain, and then well waſhed ſix times or more in running water. They muſt then be preſſed for about an hour, till the water is well ſqueezed out, and hung to dry in a warm room. And laſtly, they muſt be dreſſed and grained, in the manner already preſcribed for thoſe dyed red, except that they muſt not be oiled. Doſſie's Mem. of Agriculture, vol. i. p. 400, &c.

Dying *or ſtaining of wood, for inlaying, veneering*, &c. *Red*, is done by boiling the wood in water and alum; then taking it out, adding brazil to the liquor; and giving the wood another boil in it. *Black*, by bruſhing it over with logwood boiled in vinegar, hot; then waſhing it over with a decoction of galls and copperas till it be of the hue required. *Any other colour* may be given by ſqueezing out the moiſture of horſe-dung through a ſieve, mixing it with diſſolved roch alum and gum arabic; and to the whole adding green, blue, or any other colour deſigned. After ſtanding two or three days, pear-tree, or other wood, cut to the thickneſs of half a crown, is put into the liquor boiling hot, and ſuffered to remain till it be ſufficiently coloured. Park. Treat. of Japann. cap. xxvii. p. 82.

Dying *of bone, horn, or ivory*. *Black* is performed by ſteeping braſs in aqua fortis till it be turned green: with this the bone, &c. is to be waſhed once or twice; and then put in a decoction of logwood and water, warm. *Green*, is begun by boiling the bone, &c. in alum-water; then with verdigris, ſal armoniac, and white-wine vinegar; keeping it hot therein till ſufficiently green. *Red*, is begun with boiling it in alum-water, and finiſhed by decoction in a liquor compounded of quicklime ſteeped in rain-water, ſtrained, and to every pint an ounce of brazil wood added: the bone, &c. to be boiled herein till ſufficiently red. Other methods are given by Salmon. And from him by Houghton. Park. lib. cit. p. 83. Salm. Polygraph. lib. iii. cap. 35. p. 275. Hought. Collect. N° 138. tom. i. p. 361. See Bones, Horn, Ivory, &c. The refuſe of the bow-dye given to hogs to feed on, is ſaid to tinge their very bones red.

Dying *of marble and ſtones*. See Staining.

DYKE-*Reeve*, a bailiff, or officer, that has the care and over-ſight of the *dykes* and drains in deepening fens, &c. We find mention made of this officer anno 16 & 17 Car. II. cap. 11. See Dike.

DYNA, in *Commerce*, a kind of Eaſt-Indian coin, worth about thirty ſhillings of Engliſh money.

DYNAMICS, from δυναμις, *power*, is the ſcience of moving powers; more particularly of the motion of bodies which mutually act on one another. See Mechanics, Motion, Communication *of Motion*, Oscillation, Percussion, &c.

DYNASTY, a term in *Hiſtory*, ſignifying a race or ſucceſſion of kings of the ſame line, or family. The word is formed from the Greek, δυναϛεια, of δυναϛευω, *to be powerful, to be king*.

We find frequent mention in ancient hiſtory of *dynaſties* of Perſians, Aſſyrians, Medes, &c. The ancient Chronicon of Egypt mentioned by Syncellus, gives us an account of three different *dynaſties*; that of the gods, that of the demi-gods or heroes, and that of men or kings. The two former are repreſented as continuing thirty-four thouſand two hundred and thirty-one years, in order to favour the high antiquity of the Egyptians: the laſt as commencing with the reign of Menes the firſt king of Egypt, and terminating with Nectanebus II. under whom the kingdom was conquered by Artaxerxes Ochus; and this is ſaid to have laſted two thouſand three hundred and twenty-four years. Manetho has left us an hiſtorical chronology of Egypt, divided into thirty *dynaſties*, comprehending a ſpace of more than five thouſand three hundred years to the reign of Alexander: but it is certain, that theſe were collateral and not ſucceſſive.

DYOTA, in *Chemiſtry*, from δις, *double*, and ȣς, *ear*, a pelican, or circulating veſſel with two ears, in ſhape reſembling a man ſtanding with his arms bent outwards, and with his hands on his ſides.

DYPTYCHA, or rather Diptycha. See Diptycha.

DYSÆ, in *Mythology*, inferior goddeſſes among the Saxons, being the meſſengers of the great Woden, whoſe province it was to convey the ſouls of ſuch as died in battle to his abode, called *Valhall*, i. e. the hall of ſlaughter; where they were to drink with him and their other gods, *cereviſia*, or a kind of malt liquor, in the ſculls of their enemies. The *Dyſæ* conveyed, thoſe who died a natural death, to *Hela*, the goddeſs of hell, where they were tormented with hunger, thirſt, and every kind of evil.

DYSCRASY, from δυς and κρασις, an ill temperament or habit of the blood and humours, as in a jaundice or the like.

DYSENTERY, Δυσεντερια, in *Medicine*, a bloody diarrhœa; or a flux of blood by ſtool, attended with pains and griping. Dr. Akenſide calls this diſeaſe a rheumatiſm of the bowels.

The word *dyſentery* is formed from the Greek, δυς, *difficulty*, and εντερον, *inteſtine*; and properly ſignifies that kind of flux of the belly, characterized by the frequency of ſtools, or ejections, mixed with blood, and accompanied with gripes. The fever, ulcers, &c. which attend it, are not eſſential to the diſeaſe; though many both of the ancients and moderns, think the latter are.

The *dyſentry*, Sydenham obſerves, begins with a chilneſs and ſhivering; which is followed by a heat: then gripings of the belly enſue, with mucous, or ſanious ſtools, which in progreſs of time are found interſperſed with ſtreaks of blood, and attended with vehement pain.

The ſtools are ſometimes void of blood; and yet, if they be frequent, and attended with gripes, and a mucous colluvies, the ſame author ſays, it is a proper *dyſentery*.

Along with the excrements, beſides a whitiſh mucoſity, frequently there come ſcrapings of the guts, in form of little ſkins. If pure blood be evacuated, the patient's life is in great danger. Vomiting and hiccupping are alſo bad ſigns, becauſe they indicate an inflammation of the ſtomach. A feeble pulſe, coldneſs of the extremities, with difficulty of ſwallowing, and convulſions, are ſigns of approaching death.

Etmuller makes three kinds of *dyſenteries*. 1. When a laudable blood is evacuated, from a mere plethora, or plenitude, without any diſorder of the inteſtines; as in the hæmorrhoidal flux.

2. When a thin, watery blood is evacuated, called the *hepatic flux*, though really ariſing from the hæmorrhoidal veſſels.

The third kind, which is that we more peculiarly call *dyſentery*, is, when blood is caſt out mixed with a purulent matter in the excrements. See Flux.

This is either *benign*, i. e. without a fever, and not contagious; or *malignant*, which is attended with a peſtilential fever, and frequently ravages whole cities and provinces; happening moſt commonly in armies. In the laſt ſtage, a ſort of caruncles are frequently ejected along with the purulent matter, which are difficult to be accounted for, unleſs from an excoriation and ulceration of the inteſtines. Sometimes the inteſtines in this caſe are even gangrened.

The cauſe of the *dyſentery*, as aſſigned by ſome phyſicians, is a ſerous, or other morbid humour, mixed with the maſs of blood; the conſequence of which is a too great fermentation in the blood, and a diſſolution of its parts, which are rendered too liquid. The ſecond cauſe is a vellication and irritation of the nervous fibres of the inteſtines, occaſioned by ſharp acid humours ſeparated from the blood, which occaſion the ſpiral fibres that produce the periſtaltic motion of the guts to move too faſt, and thus to expel the matters too haſtily out of the inteſtines. The mediate cauſe, in the phyſicians language, is ſome foreign body adhering ſtrongly to the inteſtines; and, by its ſharp points, vellicating the nervous fibres of the inteſtines, and at length ulcerating them. The remote cauſes are any thing that corrupts the maſs of blood, as viſcid and crude, ſharp juices; ill foods, autumnal fruits, grapes, new wine drank in exceſs, poiſons, violent medicines, waters that have corroded leaden pipes; rainy weather in the ſpring, with a dry winter, and a hot ſummer and autumn.

The *dyſentery* is owing to cauſes little different from thoſe which produce the bilious or putrid fever. Accordingly it is agreed on all hands, that it chiefly proceeds from two cauſes, different in appearance, but in effect the ſame; one from acrimony, generated within the body; and the other from foul ſteams, which being received into it, act as a ferment, and ſuddenly produce the ſame diſorder that ariſes more ſlowly from an internal cauſe.

As to the acrimony, it appears to be of the putrid kind, the *dyſentery* being moſt frequent in hot, cloſe, and moiſt ſeaſons, when bodies are moſt ſubject to putrefaction; and beſides, it prevails chiefly among thoſe of a ſcorbutic habit, or the meaneſt and pooreſt people, who, from foul air, bad diet, and naſtineſs, are moſt liable to putrid diſeaſes.

There is likewiſe an old obſervation, that ſuch ſeaſons as produce moſt flies, caterpillars, and other inſects (the increaſe whereof depends ſo much upon heat, moiſture, and conſequently upon corruption) have likewiſe been the moſt productive of *dyſenteries*.

Laſtly, it is beyond diſpute, that the infection is communicated by putrid effluvia from the bodies; but more eſpecially the fæces of thoſe who are ill of the diſtemper. See Pringle, Obſervations on the Diſeaſes of the Army, p. 224, ſeq.

This diſeaſe is the ſame in camps as in other places; its greater fatality in the former, ariſing from want of neceſſaries, than from any extraordinary virulence in the *dyſentery* itſelf.

The ſeat of the diſeaſe is in the inteſtines, either the large or the ſmall, or both. When the diſeaſe is in the ſmall ones, the gripes begin long before the ſtools, and are felt about the navel; and the blood and excrements are more blended, as being longer together. When the large inteſtines are ſeized, the pain is leſs vehement, and is felt lower, &c.

Phyſicians diſtinguiſh three ſtates of the *dyſentery*: the firſt, when recent; the ſecond, when it has continued ſome time, and has much impaired the ſtrength, weakened the tone of the inteſtines, and abraded their villous coat; and the third, when, either from the putrid fumes within, or the foul air of an hoſpital, a malignant fever is joined, and a mortification threatened.

In the firſt ſtage bleeding is proper, though not in the ſubſequent ones: alſo vomiting with *ipecacuhana*, in ſmall quantities, and repeated ſeveral times. *Vitrum ceratum antimonii* is alſo recommended as the moſt efficacious emetic for relieving the ſtomach and bowels, provided it be given in the beginning of the diſtemper. After vomiting, a purge of rhubarb, to which are added a few grains of ſalt of wormwood, may be given. In winter, indeed, and vernal fluxes, bleeding and rhubarb have been found ſufficient, without vomits. In regard to diet, the common practice is to confine the patient in the beginning to rice-gruel, panado, mutton-broth, and the like; and for drink, rice or barley-water, or the white-decoction, are recommended. In the convaleſcent ſtate, they may be allowed meat, but no ſmall beer; and never any milk unleſs diluted with lime-water. Pringle, Obſervations on the Diſeaſes of the Army, p. 230, ſeq.

In the ſecond ſtage, the ſame diet, with ſmall doſes of the bark; to which has been added the extract of logwood, or the *tinctura Japonica*, is recommended. The following electary, prepared with the *Japonic* CONFECTION, two ounces; Lucatelli's balſum, one ounce; powdered rhubarb, half an ounce; and ſyrup of marſhmallows, may be given in the quantity of a nutmeg, twice or thrice a day, as the ſymptoms may require.

In a putrid *dyſentery*, the patient may be allowed to eat freely of moſt kinds of good ripe fruit, as apples, grapes, currants, ſtrawberries, &c. theſe being excellently calculated to counteract putrefaction; and with the ſame intention fixed air, adminiſtered both by way of drink and clyſter, may be highly uſeful. Whey alſo may be taken both ways; and camomile tea is alſo an exceeding proper drink, both for ſtrengthening the ſtomach, and by its antiſeptic qualities preventing a mortification of the bowels.

The *dyſentery*, after a ſeeming cure, is apt to recur upon any cold, or error in diet; however, it is to be obſerved, that for the moſt part, relapſes are not attended with ſuch acrimony as at firſt. When relapſes are apprehended, or the cure imperfect, the patient muſt ſtill uſe a ſoft mucilaginous diet, and continue to take ſome mild aſtringent; which laſt intention may be anſwered by lime-water, given to a pint a day, and ſoftened with half that quantity of boiled milk. Sometimes ſmall doſes of the bark have been no leſs effectual. Id. ibid.

Gripes always attend the *dyſentery*, and are relieved by opiates, by fomenting the belly, and drinking chamomile-tea; for carminatives, in this caſe, inſtead of mitigating, increaſe the pains. The tea produces this effect not only by its antiſpaſmodic but antiſeptic virtue. The fomentations, which are made of herbs, adding ſome ſpirits, muſt be frequently repeated; and when theſe are found ineffectual, the pains may be relieved with a bliſter, or only a warm plaſter, with a fourth or fifth part of the *emplaſtrum epiſpaſticum* added to it.

As to the third ſtage of this diſtemper, it coincides with the malignant or hoſpital-fever. See HOSPITAL-*fever*.

Purgatives have rarely any good effect in *dyſenteries*; as increaſing the fermentation of the blood, and irritating the fibres of the inteſtines more and more. Nor are emetics in general much better, as tending to draw the peccant humours into the ſtomach; or at leaſt into the higher inteſtines, and thus cauſe more frequent ſtools.

Ipecacuanha, however, is excellent on this occaſion: not ſo much as a vomitory, Dr. Freind obſerves, as a ſudorific; having this faculty beyond all other emetics, that it corrects the *dyſentery* ferment in proportion as it evacuates it. In the Philoſophical Tranſactions, we have an expreſs diſcourſe on the ſubject; where it is aſſerted to be infallible in all *dyſenteries* and looſeneſſes, how dangerous and inveterate ſoever; except in pulmonic and hydropic patients, whoſe fluxes are indications of approaching death.

Sydenham commends phlebotomy; but Willis ſays, no evacuation is good, and preſcribes hot cardiacs, as ſpirit of wine a little burnt, &c. Balſamic and ſtyptic medicines are alſo to be uſed, according to the diverſe cauſes and ſymptoms of the diſeaſe.

Borri, in a letter to Bartholine, affirms there is no better medicament in *dyſenteries* than roſe-water wherein gold has been extinguiſhed.

Dolæus relates, that he cured above an hundred perſons with oil of ſweet almonds, mixed with orange-juice.

In this diſorder, ſome, after bleeding and vomiting, give their patients ſmall doſes of calomel once a day, till their breath begins to be tainted; the purging being moderated by opiates, glutinous food, drink, and anodyne glyſters, which is the more neceſſary, as the guts in this caſe are eaſily irritated. Medic. Eſſ. Edinb. abridg. vol. i. p. 72.

The vitrum antimonii ceratum has been found a moſt efficacious remedy in this diſtemper. See VITRUM *Antimonium ceratum*.

Repeated doſes of ipecacuanha, and of rhubarb with calomel, with opiates in the evening, have alſo been found ſucceſsful. Medic. Eſſ. Edinb. abridg. vol. i. p. 65. where it is obſerved, that aſtringent medicines, without gentle revulſions and evacuations, generally retard the cure.

Ipecacuanha, and the ſimarouba, have often had great effects in this diſtemper. See Juſſieu in Mem. Acad. Scienc. ann. 1729. This gentleman ſays, that the ſimarouba may be compared to, and ſubſtituted for the *macer* of the ancients, which is by ſome ſuppoſed to have been a ſpecific in this diſtemper. See SIMAROUBA.

DYCESTHESIA, from δυς, *difficult*, and αισθησις, *ſenſation*, in *Medicine*, is uſed for a difficulty of, or fault in ſenſation.

DYSEPULOTICA, from δυς, επι, and ουλη, *cicatrix*, of ουλος, *ſound*, in *Medicine*, great ulcers beyond cure. See ULCER.

DYSOREXIA, from δυς and ορεξις, *appetite*, in *Medicine*, a want of appetite, proceeding from an ill diſpoſition, or diminiſhed action of the ſtomach. See APPETITE.

DYSPEPSY, Δυσπεψια, from δυς and πεπτειν, *coquere*, *to concoct*, in *Medicine*, a difficulty or weakneſs of digeſtion. See DIGESTION.

The *dyſpepſy* may ariſe from the too great weakneſs of the ferment of the ſtomach, or its being too ſparing in quantity; from a relaxation of the fibres of the ſtomach; the want of a proper heat in the ſtomach, &c. Bitters and ſubaſtringents are its proper remedy.

DYSPHONIA, from δυς and φωνη, *voice*, in *Medicine*, a difficulty of ſpeech from an ill diſpoſition of the organs.

DYSPNOEA, Δυσπνοια, from δυς and πνεω, *I breathe*, in *Medicine*, a difficulty of breathing.

The *dyſpnœa* admits of three degrees: a ſhort-breath, an aſthma, and an orthopnœa. The ſhort-breath is the firſt and lighteſt degree. The aſthma is more violent, and is accompanied with a wheezing.

The orthopnœa is the higheſt of all; the patient affected therewith not being able to lie down, but obliged to keep erect, without which he could not reſpire.

The moſt uſual cauſes of *dyſpnœas* are phlegm lodged in the bronchia, or the too ſtrong conſtriction of the bronchia themſelves, which prevents the eaſy ingreſs of the air into the lungs. See ASTHMA and ORTHOPNOEA.

DYSTHANATOS, from δυς and θανατος, *dying*, a word uſed by the ancient writers, ſometimes to ſignify any diſeaſe which occaſions a painful and ſlow death, and ſometimes for the perſon dying in ſuch a lingering manner.

DYSURIA, Δυσουρια, from δυς and ȣρειν, *to make urine*, in *Medicine*, a difficulty of making urine, accompanied with pain, and a ſenſe of heat.

It is alſo called *ardor urinæ*, becauſe the urine ſeems to burn the urethra as it iſſues forth.

The *dyſuria* differs chiefly from the ſtrangury in this, that in the ſtrangury the urine only ouſes out, as it were drop by drop; whereas in the *dyſuria*, when it is made, it ſtreams out without any interruption, and frequently in the proper quantity: thus it alſo differs from the *iſchuria*, which is a total ſuppreſſion of urine.

The ordinary cauſes of the *dyſuria* are, the acrimony, or ſharpneſs of the urine, and the excoriation or exulceration of the neck of the bladder, or of the urinary paſſage.

The uſual remedies in this caſe are cooling laxatives and mucilaginous medicines, as gum arabic, diſſolved in barley-water; decoctions of marſhmallow-root, with or without nitre; camphor, and ſmall doſes of laudanum. See ISCHURIA and STRANGURY.

DYTISCUS, in *Zoology*. See *Water*-BEETLE.

E.

E, The fifth letter of the alphabet, and the ſecond vowel.

E is a letter that admits of ſome variety in the pronunciation, in moſt languages; whence grammarians uſually diſtinguiſh ſeveral *E's*, or kinds of *E*. In Engliſh, *E* has two ſounds; long, as *ſcēne*, and ſhort, as *mĕn*. *E* final has the peculiar quality of lengthening the preceding vowel, as *căn*, *cāne*; yet there are ſome inſtances in which it has not this effect; as *gŏne*, &c. It ſerves alſo to modify the foregoing conſonants; as *ſince*, &c. It is alſo ſounded at the end of proper names, as *Penelope*, and in monoſyllables that have no other vowel, as *the*; but in every other caſe it is mute. It was formerly uſed much more generally at the end of words than at preſent, and had probably a ſoft ſound like the French *E* feminine; and afterwards was made vocal or ſilent in poetry, as the verſe required, till at laſt it became univerſally ſilent. Camden calls it the ſilent *E*. Johnſon.

The Greeks, have their ſhort and long *E*, viz. ε and η, epſilon and eta. The Greek η, or H, *eta*, or *ita*, was no original letter; but was added to the alphabet in after-times. Of this we have proofs ſtill extant in the ancient monuments; particularly, the Farneſe columns, brought to Rome from the Via Appia, where the *epſilon*, E, is uſed in lieu of the H: e. gr. ΔΕΜΕΤΡΟΣ ΚΟΡΕΣ, for ΔΗΜΗΤΡΟΣ ΚΟΡΗΣ. This letter is ſaid to have been added by Simonides.

The pronunciation of the η ſeems to have been varied; it having been ſometimes the ſame with the Latin *E*, ſometimes with *I*. Terentianus aſſures us of the former; and the Greeks themſelves for many ages have only uſed the latter.

The Latins have an opener *E*, called *vaſtius*; ſuch was the ſecond *E*, in the word *here*, *maſter*; and another cloſer, as that in the adverb *here*, *yeſterday*. This latter *E* they frequently uſed promiſcuouſly with *I*. Thus for *here*, they wrote *heri*; and, in diverſe places, we meet with *ſibe*, *quaſe*, &c. for *ſibi*, *quaſi*, &c.

The Roman *E* was likewiſe ſometimes written, by corruption, *æ*; for which reaſon, F. Hardouin takes that medal of Gallienus, GALLIENÆ AUGUSTÆ, not to be any ſatirical medal, as others have imagined; nor to be a dative feminine, but a vocative maſculine, *Galliene Auguſte*, wrote with the *æ*.

It has been much diſputed how the Latins render the η in their language. The common opinion is, that they render it by an *E*; as in Δημητριος, Βητα, Ημερα, Θησευς, Θησαυρος, &c. which they rendered *Demetrius*, *Beta*, *Hemera*, *Theſeus*, *Theſaurus*, &c. Though there are perſons exceedingly well verſed in antiquity, who hold that they pronounced it like an *i*. Lud. de Dieu, one of the moſt learned grammarians of his age, obſerves as much in his animadverſions on Geneſis vi. 24. Adding, that it is for this reaſon, that the Hebrews, e. gr. the paraphraſt Jonathan, expreſſes it by a *Hhirek*; μηϛωρ, מסטור. J. Rod. Wetſtein proves the ſame in his learned oration on the true pronunciation of the Greek tongue, from an infinity of inſtances. To this purpoſe he cites a manuſcript Pſalter of the eighth century, where all the *η's* are expreſſed by *i's*. In effect, Wetſtein ſhews, not only that the Latins pronounced and wrote it as an *i*, which might happen from its being ſo eaſily confounded in writing with an *i*; but alſo that they rendered it by an *æ*, and *ai*; that it was often uſed for Υ and ΕΙ; and that in the time of Plato this letter had a kind of intermediate ſound between the ε and ι. See that author, and Voſſius de Idolol. lib. ii. cap. 16.

The French have, at leaſt, ſix kinds of *E*; the firſt pronounced like *a*; as in *emporter*, *orient*, &c. The ſecond, a final mute, in the laſt ſyllable of diverſe words not pronounced at all; as in *bonne*, *donne*, &c. The third, an imperfect mute, pronounced much like the diphthong *ea*, &c. as in *je*, *de*, *te*. The fourth, *e fermé*, or *e maſculine*, marked at the ends of words with an accent, *é*. The fifth, is *e ouvert*, or *long e*, having the ſame ſound with *ai*, as in *mere*, *feſte*, &c. In the middle of words it is ſometimes marked with a circumflex, and in the end, with an accent, *é*. The ſixth, is an intermediate *e*, between the *ouvert* and *fermé*; as in *cabaret*, *lettre*, &c. Some add a ſeventh kind of *e*, not reducible to any of the former, as that in *grammarien*, *hiſtorien*, &c. And others admit of only three kinds, viz. the mute, open, and ſhut; but they make variations therein, which amounts to the ſame thing.

As to the figure of the letter *E*, we borrow it from the Latins, who had it from the Greeks, and they from the Phœnicians, by Cadmus, who firſt brought it them. Now the Phœnicians had the ſame characters with the Hebrews. Accordingly, the form of the ancient Hebrew *He* was the ſame with that of our *E*, as may be ſeen in the Hebrew medals, and the Jeſuit Souciet's Diſſertation thereon, p. 143. All the difference between them conſiſts in this, that the Hebrews, reading from right to left, turn their letters that way; whereas the moderns, reading from left to right, write their letters accordingly.

The little *e* was formed of the great one, by writing it faſt, and making the croſs ſtrokes at top and bottom without taking pen off paper, and then adding the ſtroke in the middle.

E, on the keys of an organ, or harpſichord, denotes the tones, *E*, *mi*, *la*.

On the compaſs, in ſea-charts, &c. it marks the eaſt point, or wind. E. eaſt; E. S. E. eaſt-ſouth-eaſt; N. E. north-eaſt, &c.

In the calendar, *E* makes the fifth of the Dominical letters.

Among authors, *e. gr.* ſtands for *exempli gratia*, *for inſtance*. In ſeveral dictionaries we find it noted, that the letter *E*, among the ancients, was a numeral letter, ſignifying 250, according to the verſe,

> *E quoque ducentos & quinquaginta tenebit.*

But it has already been obſerved, that this uſe of numeral letters was unknown among the earlieſt people. Iſidore Hiſpalenſis, an author of the ſeventh century, ſays as much in expreſs terms, in the firſt book of his Origines, cap. 3. In effect, it was firſt introduced in the times of barbariſm and ignorance.

EADISH. See EDDISH.

EAGER *Wine*. See WINE.

EAGLE, *Aquila*, Αετος, in *Ornithology*, the largeſt, ſtrongeſt, and ſwifteſt, of all the birds that live by prey.

In the Linnæan ſyſtem it is a ſpecies of the FALCON. See *Tab. of Birds*, N° 1.

It has a long beak, hooked almoſt from the root; yellow legs, which are feathered to the toes; and the toes are covered with large ſcales; thick, crooked talons, and a ſhort tail, of a deep brown, with waves of aſh-colour, and uſually white at the roots of the feathers. Its plumage is cheſnut-coloured, brown, ruddy, and white. Its beak black at the tip, and in the middle blue, though in ſome yellow. The *eagle* is diſtinguiſhed from the hawk by his bigneſs; and from the vultur, by the crookedneſs of his beak.

This is the *golden eagle* of ſome authors, the *falco chryſætos* of Linnæus, and the *royal eagle* of others.

Its aery, or neſt, is uſually on the higheſt rocks, ſometimes on the tops of old trees. It feeds its young till ſuch time as they are able to fly, and then drives them out of the neſt.

Its food is birds, hares, lambs, kids, and fawns; nay, Sir Robert Sibbald aſſures us, children too, when it can catch them; of which he gives an inſtance in the Orcades iſlands. Prod. Nat. Hiſt. Scot. lib. iii. p. 2. and 14.

Ray mentions an *eagle's* neſt, found near the river Derwent, in 1668. It conſiſted of large ſtrong ſticks, one end whereof was laid on the crag of a rock, and the other on two beech-trees; it was two yards ſquare; in it was found one *eaglet*, with the carcaſe of a lamb, one hare, and three grygalli. Synopſ. Method. Av. p. 6.

The *eagle* frequently watches the fiſhing-hawk, and as ſoon as it perceives it to have ſtruck a fiſh, takes wing, and purſues the bird till it lets fall its prey, and often catches it before it reaches the earth or water. Phil. Tranſ. Nº 201.

Eagles are remarkable for their longevity, and for their faculty of ſuſtaining a long abſence from food. Keyſler relates, that an *eagle* died at Vienna after a confinement of a hundred and four years, which juſtifies the alluſion of the Pſalmiſt. Pſalm ciii. 5.

Its ſight is quick, ſtrong, and piercing, to a proverb. Job xxxix. 29. The reaſon why the *eagle*, the fibres of whoſe optic nerves are not ſtronger than thoſe of other animals, is able to face the ſun, and endure its brighteſt rays, the Jeſuit Angelus, in his Optics, aſſures us, is, that it has two ſets of eye-lids, the one thick and cloſe, and the other thinner and finer, which laſt it draws over the eye, when it looks at any luminous body, and thus breaks the force of its rays.

The falconers have trained up *eagles* to the game; but they only ſucceed in mountainous countries. On plains they cannot keep any time on the wing; and when they ſtoop, or light, are weak, ſo that the ſaker beats them.

Ariſtotle, and Pliny, reckon up ſix kinds of *eagles*, to which they give names correſponding to the difference of their plumage: as the *eagle-royal*, called by Ariſtotle *γνησιος*, and *αστεριας*, from the ruddy, golden colour of its feathers, which are likewiſe ſpotted as it were with ſtars. The *black eagle*, *valeria*, the ſmalleſt and moſt vigorous of all. The *white-tailed eagle*, or *pygargus*. The *middle-ſized eagle*, with a large tail, living in moraſſes, *morphnus*. The *ſea-eagle*, *haliætus*. And the *bearded-eagle*, a kind of *oſſifraga*.

Eagle, *black*, a ſpecies, called alſo *aquila valeria* by ſome authors. It is a ſmall *eagle*, of twice the bigneſs of a crow. Its jaws and eye-brows are deſtitute of feathers, and look reddiſh; its head, neck, and breaſt, are black, and in the middle of its back he has a large triangular ſpot, of a pale browniſh red, with ſomething of whiteneſs intermixed. His rump is a reddiſh brown, and his wings variegated with black, white, and grey. His beak is not large, black at the end; the ſkin, covering the noſtrils, red; and the iris of his eyes hazel-coloured. His legs are feathered a little below the knee, and below that are red; and the claws very ſharp. Willughby's Ornithology, p. 30.

Eagle, *creſted*, in *Ornithology*, a name under which Nieremberg has deſcribed an American ſpecies of bird, of the *eagle* kind, called by the Indians *yzuahtli*. It is, by much, the largeſt of all the *eagles*, yet it is eaſily tamed, and fitted for the diverſions of hawking. This is placed by Mr. Ray among the birds, the deſcriptions of which he is very ſuſpicious of. Ray's Ornithol. p. 299.

Eagle, *ſea*, in *Ornithology*, a name uſed by ſome authors for the HALIÆTUS, or oſprey.

Eagle, *ſea*, in *Ichthyology*, the name of a ſpecies of cartilaginous flat fiſh, of the paſtinacha marina kind. It is generally found ſmall, but ſometimes grows to a very large ſize. Its head is large for a fiſh of this genus, and ſomewhat reſembles a toad's in ſhape; its eyes are large and prominent; its mouth is placed in the under part of the head, and is large, and furniſhed with ſtrong teeth. Its ſides are broad and thin, and repreſent the expanded wings of an eagle, whence it had its name. See *Tab. of Fiſhes*, Nº 1.

Eagle, *white-tailed*, *Falco fulvus* of Linnæus, is a ſpecies common in the northern parts of Europe and America. This is called in Scotland the *black eagle*, from the dark colour of the plumage. It is about the ſame ſize with the golden *eagle*; the bill is of a blackiſh horn colour, the cere yellow, and the whole body is of a deep brown, ſlightly tinged with ruſt colour; but its diſtinguiſhing characteriſtic is a band of white on the upper part of the tail. The legs are feathered to the feet, the toes are yellow, and the claws black. The white-tailed *eagle* of Canada is a variety of this, differing only in ſome white ſpots on the breaſt. See PYGARGUS.

Eagle, in *Heraldry*, is the ſymbol of royalty, as being, according to Philoſtratus, the king of birds; and for that reaſon dedicated, by the ancients, to Jupiter.

The *eagle* is the arms of the emperor, the king of Poland, &c. It is accounted one of the moſt noble bearings in heraldry, and, according to the learned in that art, ought never to be given, but in conſideration of ſingular bravery, generoſity, &c. On which occaſions, either a whole *eagle*, or an *eagle naiſſant*, or only the head, or other parts, agreeable to the exploit, may be granted.

The *eagle* is ſometimes repreſented with one head, and ſometimes with two, though never more than one body, two legs, and two wings opened, or ſtretched out, in which poſture it is ſaid to be *ſpread* or *diſplayed*: ſuch is that of the empire, which is blazoned a *ſpread eagle*, *ſable*, *diademed*, *langued*, *beaked* and *membered*, *gules*.

The reaſon why *eagles* are generally given in heraldry diſplayed, is partly, becauſe in that poſture they fill up the eſcutcheon better, and partly, becauſe it is imagined a poſture natural to the *eagle*, when it plumes its feathers, or faces the ſun. However, there are *eagles* borne in other poſtures; and ſome monſtrous ones, with human or wolves heads, &c. The late authors only ſay *diſplayed* to expreſs the two heads; and ſay *an eagle*, without any addition, when it has but one. The kingdom of Poland bears *gules*, *an eagle argent*, *crowned and membred*, *or*.

The *eagle* has been borne, by way of enſign, or ſtandard, by ſeveral nations. The firſt who ſeem to have aſſumed the *eagle*, were the Perſians, according to the teſtimony of Xenophon. Afterwards, it was taken by the Romans; who, after a great variety of ſtandards, at length fixed on the *eagle*, in the ſecond year of the conſulate of C. Marius: till that time, they uſed indifferently wolves, leopards, and *eagles*, according to the humour of the commander.

Several among the learned maintain, that the Romans borrowed this cuſtom from Jupiter, who had appropriated the *eagle* as his own badge, in commemoration of its ſupplying him with nectar, while he lay concealed in Crete, for fear of being devoured by his father Saturn. Others hold that they borrowed it from the Tuſcans, and others from the Epirots.

The Roman *eagles*, it muſt be obſerved, were not painted on a cloth, or flag; but were figures in relievo, of ſilver or gold, borne on the tops of pikes; the wings being diſplayed, and frequently a thunderbolt in their talons. Under the *eagle*, on the pike, were piled bucklers, and ſometimes crowns. Thus much we learn from the medals. See Feſchius in his Diſſert. de Inſignibus. And Lipſius, De Militia Romana, lib. iv. dial. 5.

Conſtantine is ſaid to have firſt introduced the *eagle* with two heads, to intimate, that though the empire ſeemed divided, it was yet only one body. Others ſay, that it was Charlemagne, who reſuming the *eagle*, as the Roman enſign, added to it a ſecond head; but that opinion is deſtroyed, by an *eagle* with two heads, noted by Lipſius, on the Antonine column; as alſo by the *eagle's* only having one head on the ſeal of the golden bull, of the emperor Charles IV. The conjecture, therefore, of F. Meneſtrier appears more probable, who maintains, that as the emperors of the Eaſt, when there were two on the throne at the ſame time, ſtruck their coins with the impreſſion of a croſs, with a double traverſe, which each of them held in one hand, as being the ſymbol of the Chriſtians; the like they did with the *eagle* in their enſigns; and inſtead of doubling their *eagles*, they joined them together, and repreſented them with two heads. In which they were followed by the emperors of the Weſt.

F. Papebroche wiſhes, that this conjecture of Meneſtrier were confirmed by ancient coins; without which, he rather inclines to think the uſe of the *eagle* with two heads, to be merely arbitrary; though he grants it probable, that it was firſt introduced on occaſion of two emperors in the ſame throne.

The *eagle* on medals, according to M. Spanheim, is a ſymbol of divinity, and providence; and, according to all other antiquaries, of empire. The princes on whoſe medals it is moſt uſually found, are the Ptolemies and the Seleucides of Syria. An *eagle* with the word CONSECRATIO, expreſſes the apotheoſis of an emperor.

Eagles, a name found very frequently in the ancient hiſtories of Ireland, and uſed to expreſs a ſort of baſe money that was current in that kingdom in the firſt years of the reign of Edward the firſt, that is, about the year 1272. There were, beſides the *eagles*, lionines, roſades, and many other coins of the ſame ſort, named according to the figures they were impreſſed with. Simon's Hiſt. Coins.

The current coin of the kingdom was at that time a compoſition of copper and ſilver, in a determined proportion, but theſe were ſo much worſe than the ſtandard proportion of that time, that they were not intrinſically worth quite half ſo much as the others. They were imported out of France, and other foreign countries. When this prince had been a few years eſtabliſhed on the throne, he ſet up mints in Ireland for the coining ſufficient quantities of good money, and then decried the uſe of theſe *eagles*, and other the like kinds of baſe coins, and made it death, with confiſcation of effects, to import any more of them into the kingdom.

Eagle, *Aquila*, in *Aſtronomy*, is a conſtellation of the northern hemiſphere, having its right wing contiguous to the equinoctial.

For the ſtars in this conſtellation, their number, longitude, latitude, &c. ſee Aquila.

There are alſo three ſeveral ſtars, particularly denominated among the Arab aſtronomers, *Naſr*, i. e. *eagle.* The firſt, *Naſr Sohail*, the *Eagle of Canopus*, called alſo *Sitareh Jemen*, the ſtar of Arabia Felix, over which it is ſuppoſed to preſide; the ſecond, *Naſr Althair*, the *Flying Eagle*; and the third, *Naſr Alvake*, the *Reſting Eagle.*

Eagle, *White*, is a Poliſh order of knighthood, inſtituted in 1325, by Uladiſlaus V. on marrying his ſon Caſimire with a daughter of the great-duke of Lithuania.

The cavaliers of this order were diſtinguiſhed by a gold chain, which they wore on the ſtomach, whereon hung a ſilver *eagle* crowned.

Eagle, *Black*, was a like order, inſtituted in 1701, by the elector of Brandenburgh, on his being crowned king of Pruſſia.

The knights of this order wear an orange-coloured ribbon, to which is ſuſpended a black *eagle.*

Eagle, in *Architecture*, is a figure of that bird anciently uſed as an attribute, or cognizance of Jupiter, in the capital and friezes of the columns of temples conſecrated to that god.

Eagle-*flower.* See Balsamine.

Eagle-*ſtone*, in *Natural Hiſtory*, a ſtone, by the Greeks, called *ætites*, and by the Italians, *pietra d'aquila*, as being ſuppoſed to be ſometimes found in the *eagle's* neſt. It is of famous traditionary virtue, either for forwarding, or preventing, the delivery of women in labour, according as it is applied above, or below, the womb.

Matthiolus tells us, that birds of prey could never hatch their young without it, and that they go in ſearch for it as far as the Eaſt Indies. Bauſch has an expreſs Latin treatiſe on the ſubject. See Ætites.

EAGLET, or **Eaglon**, a diminutive of *eagle*, properly ſignifying a young *eagle.*

The *eagle* is ſaid to prove his *eaglets* in the brightneſs of the ſun; and if they ſhut their eye-lids, he diſowns them. In *Heraldry*, when there are ſeveral *eagles* on the ſame eſcutcheon, they are called *eaglets.*

EALDERMAN, or **Ealdorman**, among the Saxons, was of like import with *earl* among the Danes. Camden's Britan. p. 107.

The word was alſo uſed for an elder, ſenator, or ſtateſman. Hence, at this day, we call thoſe *aldermen*, who are aſſociates to the chief officer in the common-council of a city or corporate town.

EAR, *Auris*, the organ of hearing; or that part whereby animals receive the impreſſion of ſounds.

The *ear* is generally divided into *internal* and *external.* The *external*, or *outer ear*, in moſt animals, conſiſts of two principal parts, viz. that which appears prominent from the head, called the *auricle*; and an inner part, which enters the ſkull by a narrow paſſage, called the *meatus auditorius*; and leads to the *auris* or *ear*, properly ſo called.

The *auricle*, or outer part of the *external ear*, is ſemicircular, and contains divers ſinuoſities. Its upper part, which is the broadeſt, is called *pinna*, and ſometimes *ala*; and the lower, which is narrower, ſofter, and pendant, the *lobe*, or *fibra*, being that to which ladies hang their ear-rings, &c. The outer area, or extent of the *auricle*, is called the *helix*; and the inner, oblong prominence, ſurrounded by it, the *anthelix*; the little protuberance of the ſide next the face, is called the *tragus*, or *tircus*; and the ridge juſt above, and oppoſite to it, the *antitragus*; and the cavity, leading to the beginning of the *meatus*, the *concha.* See each part deſcribed under its proper article.

The *auricle* ſtands out from the head, and is furrowed with divers winding canals, which receive and collect the wandering circumambient impreſſions, and undulations of ſound, and modify and forward them to the inner *ear.* It is formed of a thin cartilage, covered with a ſkin. It has two muſcles, which in men are very ſmall, whence ſome anatomiſts deny there are any at all, though others increaſe their number to three, one attollent, and two retrahent; and others to four. But in brutes, which move and prick the *ears*, as horſes, aſſes, &c. they are very large and conſiderable. Thoſe who have loſt their *auricles*, M. Dionis obſerves, have but a confuſed way of hearing; and are obliged either to form a cavity round the *ear* with their hands, or to make uſe of a horn, applying the end of it to the *meatus auditorius.*

The inner part of the *external ear* is poſſeſſed by the *meatus auditorius*, or auditory paſſage, which commences from the bottom of the concha, called the *alvearium*, and is continued in a winding direction, turning ſometimes this way, and ſometimes that, to the *membrana tympani.* The *meatus* is dug out of the *os temporis*, and lined with a ſkin, or membrane, which is furniſhed with divers little glands, that ſeparate a thick, yellow, glutinous humour, called *cerumen*, or *ear-wax*, ſerving to defend the *ear* from the ingreſs of vermin, and other extraneous bodies, and cellular membrane. This *meatus* is all the *external ear*, in diverſe animals, as reptiles, birds, moles, divers fiſhes, &c. The farther end thereof is cloſed by a thin, dry, round, tranſparent membrane, called the *membrani tympani*, and improperly, *tympanum*, or drum, which ſeparates the *external ear* from the *internal.* The arteries of the external *ear* come anteriorly from the *arteria temporalis*, and poſteriorly from the *occipitalis*, which is a branch of the external carotid. The veins are rami of the *jugularis externa.*

Behind the *membrana tympani*, is a cavity called, by different authors, the *tympanum*, *cavitas tympani*, *concha interna*, and *meatus auditorius internus.* In this cavity are five conſiderable parts; viz. four little bones; two apertures, called *foramina*, or *feneſtræ*; as many meatuſes, or paſſages; four muſcles, and a branch of a nerve.

The firſt of the bones, or oſſelets, is the *malleolus*, *malleus*, or hammer; the ſecond, is called the *incus*, or anvil; the third, the *ſtapes*, or *ſtirrop*; and the fourth, the *orbiculare.* Theſe bones are nearly of the ſame bigneſs at the birth of the child, as when arrived at maturity, ſo that all that age does is to harden them.

To give motion to theſe bones, is the office of the four muſcles of this cavity; three of them belonging to the *malleus*; viz. the *externus*, *obliquus*, and *internus*; and the fourth to the *ſtapes*, called the *muſculus ſtapedis.*

The two meatuſes are ſituated at the ſides of the cavity; the one opening into the palate, called *aquæductus*, or Euſtachian tube; the other, ſhorter and bigger, opening into the ſinus, in the mamillary proceſs.

The two apertures, or *feneſtræ*, of the tympanum, are in the ſurface of the *os petroſum*, which is oppoſite to the membrane of the tympanum. The firſt, called *feneſtra ovalis*, becauſe of its figure, is ſituate a little higher than the other, and receives the baſis of the *ſtapes.* The other is called *rotunda*, notwithſtanding its figure is oval, like the former, and is cloſed by a thin, dry, tranſparent membrane, reſembling that of the tympanum.

The laſt thing conſidered in the cavity of the tympanum is a fine chord, which runs over the inner ſurface of the membrane, called *chorda tympani.* Anatomiſts have long diſputed, whether it was an artery, a vein, or nerve, or the tendon of one of the muſcles of the malleus; but it is now diſcovered to be a branch of the fifth pair of nerves, which meets the *portio dura* of the auditory nerve.

The two *feneſtræ* above mentioned open into a cavity dug out of the *os petroſum*, called the *labyrinth*, as being perplexed with divers windings and meanders: in this cavity is ſuppoſed to be contained the *innate* air. It is divided into three parts, which are lined by a fine perioſteum, in which, and alſo through the whole extent of the perioſteum of the inner *ear* may be diſcovered a great number of blood-veſſels; the firſt is called the *veſtible*, becauſe it leads into the other two; in it are obſerved nine apertures, or foramina. The ſecond, placed on one ſide of the veſtibulum, towards the back of the head, comprehends three round canals, diſpoſed in a ſemicircular form, and thence called *canales ſemicirculares.* The third is the *cochlea*, which conſiſts of two parts, viz. a ſpiral ſemi-oval canal; and a lamina, formed into a ſpiral flight. The canal makes two turns and an half round a newel, or axis, ſtill growing leſs as it aſcends; the ſpiral lamina divides this cavity into two, being faſtened by its baſe to this newel; and, by its other extremity, to the ſurface of the canal oppoſite to the newel, by means of a very fine membrane. The cavity of the cochlea, thus divided, forms, as it were, two winding ſtair-caſes, both formed on the ſame newel, one over the other, but without any communication between them. In the aqueduct is the auditory nerve; which conſiſts of two branches, or parts; the one ſoft, called *portio mollis*; and the other harder, *portio dura*; the ſoft part is ſpent on the organ of hearing, being divided into five branches, which form a delicate web, that lines the veſtibulum, cochlea, &c. The hard part paſſing through the whole bony duct called *aqueductus Fallopii*, out of the cranium, is diſtributed among the parts of the external *ear*, &c.

The other veſſels of the internal *ear* are arteries and veins from the carotids and jugulars. Particular deſcriptions of each part of the ear, ſee under Fenestra, Foramen, Malleus, Stapes, Orbiculare, Labyrinth, Vestible, Cochlea, Auditory *Nerve*, &c. The immediate organ of hearing has been generally ſuppoſed to be the membrane of the tympanum; but later anatomiſts ſhew this to be a miſtake, from divers inſtances, wherein that membrane has been abſolutely deſtroyed, and broken, without the leaſt diminution of the ſenſe of hearing.

The parts that bid the faireſt for this prerogative, are thoſe which compoſe the labyrinth; viz. the cochlea, lamina ſpiralis, veſtible, and ſemicircular canals; the portio mollis of the auditory nerve, ramified and diffuſed through theſe parts, receives the impreſſions of ſounds, and propagates them to the brain.

The commiſſaries of the Royal Society of Phyſicians at Paris, appointed to examine the work of M. Geoffroy, entitled Diſſertations ſur l'Organe de l'Oüe de l'Homme, de Reptiles, des Poiſons, publiſhed in 1778, infer, from the facts and obſervations which he has recited, that the impreſſion made on the branch or part of the auditory nerve, called the *portio mollis*, is ſufficient to produce the perception or ſenſation of ſound; that the ſemicircular canals render this perception more lively and intenſe; that the cochlea adds little to the intenſity of the impreſſion, but the ſmall bones, or oſſicles, conſiderably; and that the human ſpecies, quadrupeds, and cetaceous fiſhes, form the firſt claſs of animals, whoſe organ of hearing is the moſt ſubtile, and of the moſt perfect conſtruction; that birds are to be placed in the ſecond; reptiles, who have the external marks of a tympanum, in the third; cartilaginous fiſhes in the fourth; ſpinous or prickly fiſhes in the fifth; fiſhes of the eel-kind, which ſeem to have only two ſemicircular canals completely formed, in the ſixth; and ſerpents, who appear to have no ſemicircular canals, in the ſeventh.

Behind, and under the external *ear*, are a number of large glands, called *parotides*, wherein is ſeparated a great deal of ſaliva; which is conveyed, by the excretory ducts, into the mouth.

Diſtempers incident to the ear, and adjacent parts, are noiſes, Otalgia, Deafness, &c.

Ear, *wounds of the.* Wounds of the external *ear* are eaſily united by ſticking-plaſters, unleſs the cartilage is entirely divided, and then it will require the help of the needle, and the application of vulnerary balſams, with the proper compreſſes and bandages. When the *ear* is wounded in the neighbourhood of the meatus auditorius, great care muſt be taken to prevent the diſcharge of blood and matter into that paſſage, which would do great miſchief to the tympanum; but this may be done only by filling the internal *ear* with lint or cotton. Heiſter's Surgery, p. 81.

M. Le Cat, in his Treatiſe of the Organ of Sound, has new figures of ſeveral parts of the *ear*. Med. Eſſ. Edinb. abr. tom. ii. p. 481.

We have alſo ſome treatiſes on the *ear* by Dr. Caſſebhom, containing very minute deſcriptions of the parts. Ibid.

Ears, *running of the*, in infants. See Infant.

The comparative anatomy of the *ear* furniſhes abundant inſtances of the Creator's wiſdom. In birds, the outer *ear* is of a form proper for flight; not protuberant, as that would obſtruct their progreſs, but cloſe and covered.

In quadrupeds, its form is agreeable to the poſture and motion of the body, but admirably varied, according to their various occaſions: in ſome, as the hare, it is large, open, and erect; by which means that timorous, defenceleſs creature, is warned of the leaſt approach of danger: in others, it is covered, to keep out noxious bodies. In the ſubterraneous quadrupeds, who are forced to mine and dig for their food and habitation, as a protuberant *ear* would obſtruct them, and be liable to injuries, their *ears* are very ſhort, and are lodged deep, and backwards in the head.

Thus moles have no auricle at all, but only a round hole, between the neck and ſhoulder. Some authors obſerve, that this meatus, or paſſage, is cloſed with a little ſkin, which opens and ſhuts like an eye-lid. The ſea-calf, and the ſeveral ſpecies of lizards and ſerpents, are likewiſe without any external *ear*. And the tortoiſe, cameleon, and generality of fiſhes, have the paſſage of the *ear* quite ſtopped, or covered over. And there is a ſort of whale, which has the aperture of the *ear* under the ſhoulder.

Among all the varieties in the ſtructure of this organ, none, as Dr. Grew obſerves, are more remarkable than thoſe in the paſſage into the os petroſum; for in an owl, which perches on a tree, or beam, and hearkens after the prey beneath her, it is produced farther out above, than below, for the better reception of the leaſt ſound: in a fox, which ſcouts underneath the prey at rooſt, it is, for the ſame reaſon, produced farther out below: in a pole-cat, which hearkens ſtrait forwards, it is produced behind, for the taking of a forward ſound; whereas in a hare, which is very quick of hearing, and thinks of nothing but being purſued, it is ſupplied with a bony tube, directed backwards, ſo as to receive the ſmalleſt and moſt diſtant ſound that comes behind her.

Schelhammer denies the exiſtence of the innate air, ſo much talked of, in the labyrinth; and with good reaſon, as there is a paſſage out of the labyrinth into the throat, through which the innate air muſt eſcape. This is paſt doubt; ſince, by ſtopping the breath, and ſtraining, we can force the external air into the *ear*, and even hear it ruſhing in. When the paſſage is any way ſtopped, as by a cold, &c. the hearing thereby becomes dull and obtuſe; and when, by ſtrong ſwallowing, or other motion of the throat, the paſſage is opened, we perceive it by a ſudden crack, and immediately hear very clearly, the load of feculent air being then diſcharged from the inner *ear*.

Several naturaliſts and phyſicians have held, that cutting off the *ear* rendered perſons barren, and unprolific; and this idle notion was what firſt occaſioned the legiſlators to order the *ears* of thieves, &c. to be cut off, leſt they ſhould produce their like.

The *ear* has its beauties, which a good painter ought by no means to diſregard; where it is well formed, it would be an injury to the head to be hidden. Suetonius inſiſts, particularly, on the beauties of Auguſtus's *ears*; and Ælian, deſcribing the beauties of Aſpaſia, obſerves ſhe had ſhort ears.

Martial alſo ranks large *ears* among the number of deformities. Felibien.

Among the Athenians, it was a mark of nobility to have the *ears* bored, or perforated. And among the Hebrews and Romans, this was a mark of ſervitude.

Loſs of one *ear* is a puniſhment enacted by 5 & 6 Ed. VI. cap. 4. for fighting in a church-yard; and by 2 & 3 Ed. VI. cap. 15. for combinations to raiſe the price of proviſions, labour, &c. if it be the third offence, beſide pillory, and perpetual infamy, or a fine of 40*l*.

By a ſtatute of Henry VIII. maliciouſly cutting off the *ear* of a perſon is made a treſpaſs, for which treble damages ſhall be recovered; and the offender is to pay a fine of ten pounds to the king. 37 Hen. VIII. cap. 6. § 4. In the index to the Statutes at Large, it is ſaid, that this offence may be puniſhed as felony, by 22 & 23 Car. II. cap. 1. § 7. commonly called Coventry's act; but *ear* is not mentioned in that ſtatute.

Ear, *tingling of the.* See Tinnitus.

Ear, in *Muſic*, denotes a kind of internal ſenſe, whereby we judge of muſical ſounds and harmony; they who poſſeſs this ſenſe are ſaid to have a good *ear*. And the like diſtinction we ſhould, probably, acknowlege in other affairs, had we got diſtinct names to denote thoſe powers of perception by.

Thus, a greater capacity of perceiving the beauties of painting, architecture, &c. is called a *fine taſte*. See Taste.

Ear-*ach*. See Otalgia.

Ear *of fiſhes.* All the cetaceous fiſhes have external meatus auditorii, or paſſages for hearing; but other fiſh have nothing of theſe external appearances, and ſeem neither to be intended by nature to make any ſounds, or to hear any. Though ſound being a tremulation in the air, it may be felt by them as motion, though not diſtinguiſhed as ſound. It may eaſily be proved, that they do not hear our voices in ſpeaking, by walking near the ſide of a pond or river well ſtored with fiſh about the edges, if the body and its ſhadow be kept out of their ſight, they will never ſtart at the voice.

Yet how far fiſhes are deaf and dumb, ſeems a queſtion not yet perfectly decided. See Fish.

Ear, in *Gardening*, a name given to the ſeminal leaves of plants, or thoſe two green and ſucculent leaves which firſt appear from the ſeed, and are very different, in all reſpects, from thoſe which follow. Thus in the melon plants, the two firſt leaves are called *ears*; and the leaves, with their ſtalks, which ſhoot out afterwards, are called knots, and denominated the firſt, ſecond, and third knot, according to their place, and time of growing. The cutting off every third knot in this plant, is the great means of procuring the fineſt and largeſt fruit. Phil. Tranſ. N° 45.

Ear, in *Botany*, is alſo applied to a long cluſter of flowers, or ſeeds, produced by certain plants; and uſually called, by botaniſts, *ſpica*. The flowers and ſeeds of wheat, rye, barley, &c. grow in *ears*. The ſame holds of the flowers of lavender, &c.

We ſay, the ſtem of the *ear*, i. e. its tube, or ſtraw; the knot of the *ear*; the lobes, or cells, wherein the grains are incloſed; the beard of the *ear*, &c. great numbers of *ears* of wheat have been known to ariſe from the ſame root.

Ear, *Jews.* See Auricula *Judæ*.

Ear-*picks*, are inſtruments of ivory, ſilver, and other metal,

tal, ſomewhat in form of a probe, for cleaning the *ear*. The Chineſe are particularly fond of entertaining themſelves with picking and tickling their *ears*; this they do either for themſelves, or interchangeably for one another, and have a great number of inſtruments of peculiar ſhapes and ſtructure, invented for this purpoſe. But Sir Hans Sloane very judiciouſly obſerves, that the uſe of them ſeems very prejudicial; for that, among many people in England who had applied to him on account of deafneſs, the far greater part were thrown into their complaints by too often picking their *ears*, and thereby bringing humours, or ulcerous diſpoſitions, on them. Phil. Tranſ. N° 246. p. 406.

Ear-*ring*. See Pendant.

Ear-*wax*. See Cerumen.

Ear-*wig*, *Forficula*, in *Zoology*, the name of a genus of inſects, of the order of *coleoptera*, the tail of which forms a kind of forceps, capable of pinching; the exterior wings are very ſhort, but dimidiated; and the antennæ are ſetaceous. It has ſix feet; its body is about the thickneſs of a ſmall worm, and very ſmooth.

It is a very troubleſome creature, frequently introducing itſelf into the ears, and cauſing a great deal of pain by its biting: it likewiſe burrows in other parts of the body, which it bites in the ſame manner.

They are likewiſe very pernicious in gardens, eſpecially where carnations are preſerved. In order to prevent the miſchief attending them, it is uſual to erect ſtands, ſupporting baſons of water, or to hang the hollow claws of crabs or lobſters on ſticks in different parts of the garden, in which they lodge.

The dried powder of *ear-wigs* is eſteemed good for deafneſs; and the oil prepared from them, in convulſions and ſpaſms. Vide Lemery, Dict. des Drog. in voc. *Forficula.*

Ear-*wig*, *Sea.* See Forficula *Marina.*

Ear-*ſhell*, *Auris Marina*, in *Natural Hiſtory*, the name of a genus of ſhell-fiſh, the characters of which are theſe: it conſiſts only of one ſhell, or valve, and is of a flatted ſhape, in ſome meaſure reſembling that of the human *ear*, and has an extremely wide mouth, or aperture, at its baſe, the wideſt of that of all ſhells, except only the patella or limpet, which is all mouth below. See *Tab. of Shells*, N° 3.

In the Linnæan diſtribution this is a ſpecies of the HALIOTIS.

Aldrovand and Rondeletius have given this genus the name of *patella fera*, the wild limpet; but in this they have been followed by no author, as it confounds the *auris marina* and *patella*, which are two abſolutely diſtinct genera. Theſe authors have alſo ranked both this and the limpet among the bivalve ſhells, but nothing can be more abſurd than this.

This genus of ſhells ſometimes yields ſmall pearls, the rudiments of which are very frequently ſeen in thoſe ſhells which have not perfect ones, and the whole inſide of the ſhell is of the colour of the fineſt mother of pearl. This alſo appears on the outſide, when the rough coat is ſo far eaten away by acids, as to leave this pearly ſurface bare; in this caſe it makes a very elegant appearance, being of the ſplendor of the moſt perfect mother of pearl both within and without, and it is frequently preſerved in cabinets in that ſtate.

The inſide and outſide of this ſhell are both rigid with very high ribs, which run from one ſide to the other; and there is in all theſe ſhells a row of holes near one edge, of which ſix are uſually open, and there are beyond theſe the marks of three or four others, which do not go through the ſhell. Theſe are formed in the growth of the fiſh, which, as it enlarges, enlarges alſo the ſhell; and when a new rim is formed, in which there is an open hole, one of the hinder ones is always cloſed up by the growth of freſh ſhelly matter over it. Aldrovand. de Aquat. Rondelet. de Aquat.

There is one very ſingular ſpecies of *auris marina*, which differs from all the others in its length; it is large, and brought from the Eaſt Indies, but is not found in the European ſeas. The general ſpecies of *aures marinæ* are four; thoſe with ſix holes; thoſe with ſeven, and which are more pearly than the reſt; thoſe of an oblong form; and thoſe which have no mark of aperture at all. Hiſt. Nat. Eclaire. part ii. p. 243, 244.

Ear *of corn*, in ſtone. See *Tab. of Foſſils*, *Claſs* 6.

EARINÆ *veſtes*, from ἐαρ, *ſpring*, among the ancient Greeks, a habit worn in the ſpring, which was made of wool, and dyed green. The cuſtom of wearing green veſtments in this ſeaſon, has not been unknown in modern times.

Dempſter ſays, it was cuſtomary, in his time, for the king, and nobility of England, to go a-hunting in the ſpring, dreſſed in green, that they might be of a ſimilar colour with the ſeaſon.

EARING, in a ſhip, that part of the bolt-rope, which, at the four corners of the ſail, is left open, in the ſhape of a ring. The two uppermoſt parts are put over the ends of the yard-arms, and ſo the ſail is made faſt to the yard; and into the lowermoſt *earings* the ſheets and tackles are ſeized, or bent at the clew.

Earing *Third*, in *Huſbandry*. See Third.

EARL, an Engliſh title of honour, or degree of nobility, next below a marquis, and above a viſcount.

Earls were anciently attendants or aſſociates of the king in his councils, and martial expeditions; much as comites, counts, were of the magiſtrates of Rome, in quality of deputies, to execute their offices for them.

Hence, alſo, *earls* are called, in Latin, *comites*; in French, *comtes*, counts, &c. The Germans call them *graves*, as landgrave, markgrave, palſgrave, &c. The Saxons, *ealdormen*; the Danes, *eorlas*; and the Engliſh, *earls*.

Earl was a conſiderable title among the Saxons: it is obſerved to be the moſt ancient of any of the peerage; and that there is no other title of honour in uſe among the preſent nobility, which was likewiſe uſed among the Saxons, beſide it. The original titles of honour among the Saxons, were *edeling*, *ealderman*, and *degen*, or *degn*. The firſt appropriated to thoſe of the royal family; the other two to the reſt of the nobility; only the thani were afterwards diſtinguiſhed into majores and minores.

Originally, the title *earl* always died with the man. William the Conqueror firſt made it hereditary; giving it in fee to his nobles, and annexing it to ſhires or counties; for the ſupport of the ſtate thereof, he allotted the third penny out of the ſheriff's court, iſſuing out of all pleas of the ſhire from which the *earl* took his title. But, of later days, the matter is much altered.

Earls are now created by patent, without any authority over, or particular relation to, their counties; and without any profit ariſing thence, except ſome annual ſtipend out of the exchequer, for honour-ſake. The number of *earls* being of late much increaſed, and no more counties being left for them, ſeveral of them have made choice of ſome eminent part of a county, as Lindſey, Holland, Craven, &c. Others of ſome town, as Marlborough, Exeter, Briſtol, &c. And others, of ſome village, or their own ſeat, park, &c. as Godolphin, Bolton, Danby, &c.

Some *earls* we have who are not local, i. e. not dignified from any places, but from noble families, viz. *earl* Rivers, and *earl* Paulet. A third is denominated from his office, viz. the *earl* Marſhal.

Earls are created by cincture of ſword, mantle, a cap, and a coronet put on his head, and a charter in his hand. Their title is, *moſt potent and noble lord.* Their coronet has the pearls raiſed on points, with leaves between.

Their place is next to a marquis, and before a viſcount; and as in very ancient times, thoſe who were created counts or earls, were of the blood royal; our Britiſh monarchs to this day call them in all public writings *our moſt dear couſin*; an appellation as ancient as the reign of Henry IV. They alſo originally did, and ſtill may, uſe the ſtyle of *nos*.

Earl-*marſhal* is one of the great officers of the crown; who takes cognizance of all matters relating to honour and arms, determines contracts that reſpects deeds of arms out of the realm upon land, and matters concerning war within the realm, which cannot be determined by common law, in which he uſually proceeds according to the civil law. He had, anciently, ſeveral courts under his juriſdiction, as the court of chivalry, now almoſt forgotten; and the court of honour.

He has alſo ſome pre-eminence in the court of marſhalſea, where he may ſit in judgment againſt criminals offending within the verge of the court; whence the chief officer under him is called *knight-marſhal.* Under him is alſo the heralds office, or college of arms. See College and Court.

The office of *earl-marſhal* is hereditary in the family of Howard; and enjoyed by the duke of Norfolk, the principal branch thereof; though now, on account of the religion of the duke of Norfolk, which renders him incapable of adminiſtering it in perſon, it is diſcharged by deputation; but yet it is to be obſerved, it is not given out of the name and family of Howard.

EARNEST, *Arrhæ*, money advanced to complete or aſſure a verbal bargain, and bind the parties to the performance thereof.

By the civil law, he who recedes from his bargain, loſes his *earneſt*; or, if the perſon who received the *earneſt* give back, he is to return the *earneſt* double. But, with us, the effect of *earneſt* is more: the perſon who gave it is, in ſtrictneſs, obliged thereby to abide by his bargain; and, in caſe he decline it, is not diſcharged upon forfeiting his *earneſt*; but may be ſued for the whole money ſtipulated. And by 29 Car. II. cap. 3. no contract for the ſale of goods, to the value of 10*l.* or more, ſhall be valid, unleſs the buyer receives part of the goods ſold by way of earneſt on his part, or unleſs he gives part of the price to the vender by way of *earneſt*, to bind the bargain, &c.

EARNING, or YEARNING, a name uſed in ſeveral parts of the kingdom for rennet. See RUNNET.

EARSH. See EDDISH.

EARTH, *Terra*, in *Natural Philoſophy*, one of the four vulgar, or peripatetical elements; defined a ſimple, dry, and cold ſubſtance; and, as ſuch, an ingredient in the compoſition of all natural bodies.

It ſhould be well obſerved, that the element *earth* is a very different matter from the *earth* whereon we tread. Ariſtotle, having laid down cold and dry as his firſt element, to give it a ſuitable name, looked among the diverſe bodies for that which ſhould come the neareſt thereto; which being *earth*, he gave his firſt element that denomination; though thus borrowing a word that had been uſed for a different thing, occaſioned a great part of his followers to run into an extravagant error, and to ſuppoſe, that this habitable foſſil *earth* was an element.

EARTH, in *Chemiſtry*, is the fourth of the chemical elements, or principles, into which all bodies are reſolvable by fire.

After drawing off the ſpirit, ſulphur, and phlegm, and ſalt, e. gr. of wine, what remains in the retort is a taſteleſs, ſcentleſs, duſty matter, not capable, either of being raiſed by diſtillation, or diſſolved by ſolution; and is called *earth*, or *terra damnata*, or *caput mortuum.* See CAPUT *Mortuum*.

This *earth* is ſuppoſed to be the baſis, or ſubſtratum of all bodies; and that wherein the other principles reſide. It is all that is ſolid, e. gr. in an animal, or vegetable body, i. e. all the real vaſcular parts; the reſt being juices.

There is plainly a ſubtile *earth*, which may be ſeparated from all animal and vegetable ſubſtances, and is the ſame in all, and is the baſis of all. This remains after the ſeparation of the other principles by chemiſtry, from all animal and vegetable ſubſtances, and neither coheres together, nor ſuffers any change in the fire. The aſſayers acknowlege no difference between the *earth* of animals and vegetables, but make their teſts for the niceſt uſes equally of both. If water be poured on theſe aſhes, they acquire ſome degree of tenacity, ſo as to become capable of being formed into veſſels; but if oil be added, they cohére into a much ſtronger and more compact maſs; hence it ſhould appear, that oil and *earth* are the principles which give conſiſtence and tenacity to plants. This oil, as well as this *earth*, ſeems the ſame in all, and poſſeſſes nothing of the poiſonous or medicinal virtues of this peculiar plant, they being all ſeparable by decoction, diſtillation, and other proceſſes of that kind, and not remaining in the caput mortuum, which conſiſts of the *earth*, and this connecting oil. Long drying will diveſt plants of all their virtues; ſo that nothing but theſe principles ſhall remain in them, theſe giving ſolidity and figure, the plant retains its former appearance; but only theſe remaining, it poſſeſſes none of its virtues. Boerhaave's Chemiſt. part ii. p. 21.

To obtain this chemical principle pure and unmixed from the common analyſis of vegetables, and other bodies, let the remaining maſs, after diſtillation, be thoroughly calcined, then boiled in ſeveral waters, to get out all its ſalt, and after this dryed in a clear fire, or in the ſun, and the dryed maſs will be the pure earth. Shaw's Lectures, p. 151.

EARTH *of dew*, an *earth* much valued by many of the chemical experimenters, and prepared in the following manner: a large quantity of dew is to be collected, and ſet in a wooden veſſel, in a cool ſhady place, covered with a canvas, to keep out duſt and flies, there will in three weeks, and ſometimes longer, come on a putrefaction in the liquor. During the time of this putrefaction, certain films are daily formed on the ſurface of the liquor, and theſe falling down to the bottom, one after the other, form, by degrees, a ſediment of a ſort of mud. This is to be thrown away, and the dew, when ſeparated from it, is to be filtred clear, and evaporated to a drineſs, the remainder is a greyiſh *earth*, which is the true *earth* of dew; this is very light and friable, and is of a foliated ſtructure in the maſs, looking like ſo many leaves of brown paper, ſpread very thin and even over one another. Phil. Tranſ. Nº 3.

This *earth*, expoſed to a ſmart fire, loſes its foliated texture, and runs into a maſs, reſembling a mixture of ſalt and brimſtone melted together, but it is not at all inflammable. This, ground on a levigating ſtone, tinges the water to a purpliſh colour. A pound of this *earth*, properly treated by calcination and elixiviation, will yield an ounce of a pure and white ſalt, ſomewhat reſembling nitre. The chemiſts have been at great pains to procure this *earth*, but they do not ſeem yet to have made any very important uſe of it; and, in all probability, it is no other than that common ſpar which we know to be contained in all water, and which encruſts the ſides of our tea-kettles, and other veſſels, in which water is often boiled. We know, by manifold inſtances, that ſpar is rarifiable into vapour with water, and therefore it would be a greater wonder if dew were found not to contain it, than that it does.

EARTH, in *Natural Hiſtory*, is a foſſil or terreſtrial matter, whereof our globe principally conſiſts. It is either ſimple, or compoſed of entirely ſimilar particles; or compound, having a mixture of ſuch as are heterogeneous, as ſand, or the like, among them.

Earths are defined to be friable, opake, inſipid bodies; not inflammable, vitrifiable by extreme heat, diffuſible in water, and ſeparable from it by filtration.

The ſimple *earths* are divided into two orders; and under thoſe, into five genera. Of the firſt order are thoſe *earths* which are naturally moiſt, of ſmooth ſurfaces, and of a firmer texture; and of the ſecond are thoſe which are naturally dry, of rough duſty ſurfaces, and of a looſer texture. Of the firſt of theſe orders, there are three genera, the boles, the clays, and the marles; and of the ſecond there are two, the ochres, and the tripelas, according to Hill's diſtribution; and chalks, according to Da Coſta. The ſeveral diſtinguiſhing characters of which are theſe.

Of the firſt order. 1. *Boles* are *earths* moderately coherent, ponderous, ſoft, not ſtiff or viſcid, but, in ſome degree, ductile while moiſt, compoſed of fine particles, ſmooth to the touch, eaſily breaking between the fingers, readily diffuſible in water, and freely and eaſily ſubſiding from it. See BOLE.

2. *Clays* are *earths* firmly coherent, weighty, and compact, very ſtiff and viſcid, ductile to a great degree while moiſt, ſmooth to the touch, not eaſily breaking between the fingers, nor eaſily diffuſible in water, and, when mixed in it, not readily ſubſiding from it. See CLAY.

3. *Marles* are *earths* but ſlightly coherent, not ductile, ſtiff, or viſcid, while moiſt, moſt eaſily diffuſible in, and diſunited by water, and by it reduced to a ſoft, looſe, incoherent maſs. See MARLE.

Of the ſecond order are, 1. *Ochres.* Theſe are *earths* ſlightly coherent, compoſed of fine, ſmooth, ſoft argillaceous particles, rough to the touch, and readily diffuſible in water. See OCHRE.

2. *Tripelas* are *earths* firmly coherent, compoſed of fine, but hard, particles, and not readily diffuſible in water. M. De la Coſta, inſtead of *tripelas*, ſubſtitutes the genus of chalks, which he defines to be earths generally hard and dry, harſh and rough to the touch, and readily diffuſible in water. See CHALK. Hiſt. of Foſſils, p. 75.

The compound *earths* are a claſs of foſſile bodies, uſually confounded with the genuine and ſimple *earths*, as if ſubſtances of the ſame kind, but being of a very different nature and origin. They are foſſils compoſed of argillaceous and marly particles, ſeparated and divided by adventitious matter, and never found free from thoſe admixtures, or in the ſtate of pure ſimple marles or clays. Of this claſs of foſſils there are two general orders; thoſe of the one are known by the name of loams, and are compoſed of ſand and clay; and thoſe of the other are called moulds; theſe are the *earths* that vegetables grow in, and are compoſed of argillaceous and marly particles, ſeparated by ſand, ſmall pebbles, and the grit of ſtone, and uſually intermixed with, and enriched by, the putrified remains of animal and vegetable ſubſtances. Of each of theſe there are ſeveral genera. Hill's Hiſt. of Foſſils. See LOAM, MOULD, and TERRA.

The ancient naturaliſts contented themſelves with diſtributing *earths* according to their uſes, into medical *earths*, and ſuch as are uſed for pottery, painting, and other mechanical purpoſes. Dr. Woodward, in his Method of Foſſils, divides earth into two claſſes, viz. thoſe that are ſmooth or unctuous, ſubdivided into ſuch as do and do not adhere to the tongue, and thoſe that are dry, harſh, and rough to the touch. Stahl divided them into the calcareous and vitrifiable earths. Pott, who is followed by Macquer, into alcaline or calcareous, argillaceous, vitrifiable, and gypſeous. Linnæus, into ochres, ſand, clay, calx, or animal *earth*, and *humus*, or vegetable earth. Other authors have enlarged or contracted the number of diviſions; for a general account of which, we refer to the tables at the beginning of Linnæus's Syſtema Naturæ, tom. iii. 1770. See alſo Da Coſta's Foſſils, 119, &c.

See the divers kinds of *earths* deſcribed under their proper articles, BOLE, CHALK, PUMICE, SIGILLATA *Terra*, &c.

Naturaliſts generally rank ſand as a ſpecies of *earth*, though with no great propriety; ſands being, in ſtrictneſs, a ſort of cryſtals, or little tranſparent pebbles, calcinable, and by the addition of a fixed alcaline ſalt, fuſible, and convertible into glaſs; and therefore properly reducible to the claſs of ſtones.

By means of ſand it is, that the fatty earth is rendered fertile, and fit to feed vegetables, &c. for pure *earth* is liable to coaleſce into a hard coherent maſs, as is clay; and *earth* thus embodied, and, as it were, glued together, would be very unfit to nouriſh plants. But if with ſuch *earth*, ſand, i. e. hard cryſtals, which are indiſſoluble in water, and ſtill retain their figure, be intermixed, they will keep the pores of the *earth* open, and the *earth* itſelf looſe and incompact, and by that means will give room for the juices to move, aſcend, &c. and for plants to be nouriſhed thereby. Thus a vegetable planted either in the ſand alone, or in the fat glebe and *earth* alone, receives no growth or increaſe; but is either ſtarved or ſuffocated; but mix the two, and the maſs becomes fertile. In effect, by means of ſand, the *earth* is rendered in ſome meaſure organical: by preſerving a ſort of pores, and interſtices therein, ſomewhat analogous to veſſels, by which the juices of the *earth* may be conveyed, prepared, digeſted, circulated, and at length excreted and thrown off into the roots of plants.

EARTH, *animal*, belongs to the claſs of chalks in the above diſtribution, and conſiſts of ſhells of animals; or that which is obtained by calcination, or putrefaction of animal ſubſtances. To this head we may reduce the *earth* of the ſhells of fiſhes, and of eggs, which have the general properties of calcareous *earths*; the *earths* of calcined bones and horns, which are ſoluble by the nitrous, marine, and vegetable acids, but not capable of being converted into quicklime by calcination, and unfuſible in other fuſible mixtures; and the *earth* of blood, fleſh, and ſkins of animals, which is ſoluble by all acids, and fuſible by fire, but not calcareous.

EARTH, *mercurial*, is a ſubſtance which, according to Becher, and other chemiſts, enters into the compoſition of many bodies, chiefly the metallic, together with vitrifiable *earth* and phlogiſton, called by him the inflammable *earth*. But the exiſtence of this mercurial *earth* has not yet been ſatisfactorily demonſtrated. Macquer.

EARTHS, *vegetable*, are diſtributed by Wallerius into three claſſes: the firſt claſs includes thoſe which are obtained by becoming ſoft, ſpongy, and farinaceous plants; they are partly ſoluble by vitriolic acids, and fuſible by fire, more or leſs, as the plant was more or leſs nouriſhing. The ſecond claſs is had by burning the harder and leſs ſucculent plants; this *earth* is more ſoluble than the former in nitrous and marine acids, but leſs ſoluble in vitriolic acid; it is alſo fuſible by fire. The third claſs is obtained by burning wood, which is calcareous, and fuſible with greater difficulty, as the wood which yielded it is harder; and thus it is found that aſhes of the hardeſt woods make the moſt unfuſible glaſs. Swed. Mem. 1760.

EARTH, in *Agriculture* and *Gardening*. See SOIL, LAND, &c.

EARTH, *untried*, the ſoil, or *earth*, which is ſix or ſeven inches deep, where neither ſpade nor plough has reached. This is greatly recommended by Mr. Lawrence, for amendments and improvements, both in the fruit and kitchen garden. He aſſures us, from his own experience, that no kind of compoſt, made with art, exceeds it; and adds, that if the choiceſt fruit-trees be planted herein, they preſently diſcover an uncommon healthfulneſs and vigour; and that, if any tender ſort of annuals be diſcretely ſown in this *earth*, made fine by ſifting, their looks, colour, &c ſoon diſcover that they like the ſoil. Melons and cucumbers need no other compoſt but this *untried earth*; and aſparagus itſelf will proſper, at leaſt, as well in this *untried earth*, if laid a foot and a half deep, as with all the uſual expence of dung; though for the tenderer flowers, and exotics, this *earth* is not found to have any extraordinary excellencies. For annual plants, produced from ſeed, a coat of this *untried earth*, two inches deep, may ſuffice: on other occaſions a greater depth is required.

EARTH, *Japan*. See CATECHU.

EARTH, *Black*. See BLACK.

EARTH, *Fullers*. See FULLERS *Earth*.

EARTH, *Lemnian*. See LEMNIAN *Earth*.

EARTH, *Livonian*. See LIVONICA *Terra*.

EARTH *of Malta*. See MELITENSIS *Terra*.

EARTHS *of mineral waters*. All mineral waters contain *earth* of ſome kind, though very different in quantity and in nature. Theſe are found, in different waters, of very different colours and appearances, ſome white, ſome grey, ſome yellowiſh, ſome reddiſh, and ſome brown. They are alſo as different in their qualities as in their form; ſome of them are ſoluble in acids, others are not ſo; ſome fuſible in the fire; others not; and ſome retain their natural colour, after burning; others change it in the fire. By this we learn, that ſome are marly, others argillaceous, others ochreous, and ſome ſandy; others there are which are produced by the concretion of certain juices, ſaline or ſulphureous, and others not ſo. Some are ſimply mineral, others are metallic. And as many of theſe are very different from any of the known *earths*, even in their pure and ſeparate ſtate, they are yet much leſs diſtinguiſhable when mixed one with another, as they very frequently are in the waters of even our common ſprings, much more ſo in the mineral medicinal ones.

The ſimple infuſions of certain ſulphureous mineral *earths* may remarkably alter the waters of wells and fountains, without having any thing of thoſe *earths* remaining, after their diſtillation; in the ſame manner as nothing is ſeparable, by art, from certain liquors, rendered emetic by antimony. The hot mineral waters may contract ſome alteration from the ſulphureous and bituminous matters which they meet with in their courſe; for theſe ſubſtances all contain ſubtile ſalts, which hot water may take up, and carry away with it.

EARTH *of Nocera*. See NOCERIANA *Terra*.

EARTH *of Portugal*. See PORTUGALLICA *Terra*.

EARTH, *Samian*. See SAMIA *Terra*.

EARTH, *Sealed*. See SIGILLATA *Terra*.

EARTH, *Soap*. See SOAP *Earth*.

EARTH-*bags*, *Sacs à terre*, in *Fortification*. See SACKS *of* EARTH, and SAND-*Bags*.

EARTH-*banks*, in *Huſbandry*, &c. are a very common fence about London, and in ſeveral other parts of England. Where ſtones are not to be had cheap, theſe are to be preferred to all other fences, both for ſoundneſs and duration.

The beſt manner of making them is this: dig up ſome turf in a graſſy place, a ſpit deep, or nearly to the breadth of the ſpade, and about four or five inches thick; lay theſe turfs with the graſs outward, even by a line on one ſide, and on the backſide of theſe lay another row of turf, having a foot ſpace of ſolid ground on the outſide, to prevent the bank from ſlipping in, if it ſhould be any way faulty. On the outſide of this make a ditch, or elſe let the ſides be lowered both ways with a ſlope two feet deep, and there will be no paſture loſt by the fence, becauſe it will bear graſs on both ſides.

The *earth* that is dug out of the ditches, or from the ſlopes, muſt be thrown in between the two rows of turf, till the middle is made level with the reſt. Then lay on two more rows of turf in the ſame manner, and with more of the *earth* fill up, and make level as before. Let this method be continued till the bank is raiſed four foot high, or more if neceſſary, only obſerving, that the higher it is to be carried, the wider the foundation muſt be made. As the bank is carried up, the ſides muſt not be raiſed perpendicular, but ſloping inward both ways, ſo that at the top it may be about two foot and a half wide. This ſort of fence, when made with leſs care, and faced with clay, is left naked, and ſerves very well in ſome places; but when it is thus managed with the turf, the joining of the ſeveral pieces are hid in a little time, by the growth of the graſſy part of the turf on each ſide; and it makes a beautiful fence, of as green and pleaſant a colour as the reſt of the field.

The great improvement upon this plan, is the planting quickſets, or young white-thorn plants, in the middle of the top of the bank. The *earth* on each ſide of theſe may be raiſed up with a ſort of wall, and the rain that falls wholly preſerved for the plants. This plenty of water, and depth of fine *earth*, make the young plants grow quicker and more vigorouſly than in any other way; and the moſt beautiful of all hedges is formed in this manner. When this ſort of hedge is young, there muſt be placed on each ſide of it a ſhort dry hedge, of about a foot high, to keep the ſheep from cropping the young plants, but this may be taken away after a little time.

There is one caution neceſſary in regard to the making of theſe banks, which is, that they muſt never be made in a very dry ſeaſon, becauſe if much rain ſhould follow, the *earth* of the bank would ſwell and burſt out, or ſpoil the ſhape of the bank; but if this ſhould happen, it is eaſily enough repaired. This beautiful fence may be made at a ſmaller price than thoſe unaccuſtomed to theſe things may imagine. In good digging ground, where men work for fourteen-pence a day, it may be made and planted with quick for two ſhillings a pole. It may be made proper for the keeping in of deer, only by the ſmall addition of planting, at every eight or ten foot diſtance, a poſt a little ſlanting, with a mortiſe in it; let this ſtand about two foot above the bank, and into the mortiſes all along, put a rail made of a bough of any tree, no deer will ever go over this, nor can they creep under it, as they often do when a pale tumbles down. The quick, on the top of this bank, may be kept clipped, and will grow very thick, and afford the beſt ſhelter for cattle of any fence in uſe with us. Mortimer's Huſbandry.

EARTH-*board*, in *Huſbandry*, that part of a PLOUGH which turns over the *earth*.

Earth-*flax.* See *Plume* Allum.

Earth-*nut, Arachis,* in *Botany,* a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement of the flower opens in two parts; the flower is of the butterfly-kind, and has ten ſtamina, nine of which coaleſce, and the upper one ſtands off. In the center is ſituated an oblong germen, which turns to an oblong pod, containing two or three oblong blunt ſeeds. We have but one ſpecies of this plant, which, it is thought, came originally from Africa, though our ſettlements in America abound with it, where the negroes cultivate it for food, and eat it both raw and roaſted. It multiplies very faſt in a warm country; but being impatient of cold, cannot be propagated in the open air in England. Miller.

This plant, with ſome others of the trifoliate kind, has the property of burying its ſeeds under ground. As ſoon as the plant is in flower, it is bent towards the ground till it touches it. The pointal of the flower is then thruſt into the ground to a ſufficient depth, where it extends itſelf, and forms the ſeed-veſſel and fruit, which is brought to maturity under-ground. An oil is expreſſed from the ground-peas, which Sir Hans Sloane maintains to be as good as that of almonds, and which, it is ſaid, may be uſed, at a very cheap price, for the ſame purpoſes, both of food and phyſic, as the oil of almonds, or olives. Phil. Tranſ. vol. lix. Nº 52. an. 1769.

Earth-*nut peas.* See *Chickling* Vetch.

Earth-*pitch.* See Pissasphaltum.

Earth-*pucerons,* in *Natural Hiſtory,* a name given by authors to a ſpecies of puceron very ſingular in its place of abode. In the month of March, if the turf be raiſed in ſeveral places in any dry paſture, there will be found, under ſome parts of it, cluſters of ants, and, on a further ſearch, it will be uſually found, that theſe animals are gathered about ſome pucerons of a peculiar ſpecies. Theſe are large, and of a greyiſh colour, and are uſually found in the midſt of the cluſters of ants. See Puceron.

The common abode of the ſeveral other ſpecies of pucerons is on the young branches or leaves of trees; as their only food is the ſap or juice of vegetables, probably theſe *earth* kinds draw out thoſe juices from the roots of the graſſes and other plants, in the ſame manner that the others do from the other parts. The ants that conduct us to theſe, are alſo our guides where to find the greater part of the others; and the reaſon of this is, that as theſe creatures feed on the ſaccharine juices of plants, they are evacuated from their bodies in a liquid form, very little altered from their original ſtate; and the ants, who love ſuch food, find it ready prepared for them, in the excrements which theſe little animals are continually voiding. Reaumur.

Earth, in *Geography,* this terraqueous globe, or ball, whereon we inhabit, conſiſting of land and ſea.

Earth, *the figure of the,* is demonſtrated to be nearly ſpherical. Thus the moon is frequently ſeen eclipſed by the ſhadow of the *earth*; and, in all eclipſes, that ſhadow appears circular, what way ſoever it be projected, whether towards eaſt, weſt, north, or ſouth, and howſoever its diameter vary, according to the greater or leſs diſtance from the *earth.*

Hence it follows, that the ſhadow of the *earth,* in all ſituations, is really conical; and, conſequently, the body that projects it, i. e. the *earth,* is nearly ſpherical.

The natural cauſe of this ſphericity of the globe is, according to Sir Iſaac Newton, the great principle of attraction, which the Creator has ſtamped on all the matter of the univerſe; and whereby all bodies, and all the parts of bodies, mutually attract one another.

And the ſame is the cauſe of the ſphericity of the drops of rain, quickſilver, &c.

We ſay it is nearly ſpherical; for the inequalities on its ſurface prevent its being perfectly ſo: beſides that, Huygens and Sir Iſaac Newton have ſhewn, that the *earth* is higher and bigger under the equator, than at the poles; ſo that its figure, nearly, is that of an oblate ſpheroid, ſwelling out towards the equatorial parts; and flatted, or contracted, towards the poles.

Though Sir Iſaac Newton in his Principia, firſt printed in 1686, had demonſtrated from the theory of gravity, that this muſt be the real form of the earth, as it revolved about an axis; yet Meſſrs. Caſſini, both father and ſon, the one in 1713, and the other in 1701, attempted to prove, in the Memoirs of the Royal Academy of Sciences at Paris, that the *earth* was an oblong ſpheroid; and in 1718, M. Caſſini again undertook, from obſervations, to ſhew the contrary, or that the longeſt diameter paſſes through the poles, which gave occaſion for Mr. John Bernouilli, in his Eſſai d'une Nouvelle Phyſique Celeſte, printed at Paris in 1735, to triumph over the Britiſh philoſopher, apprehending that theſe obſervations would invalidate what Sir Iſaac had demonſtrated. In 1720, M. de Mairan advanced arguments, ſuppoſed to be ſtrengthened by geometrical demonſtrations, farther to confirm M. Caſſini's aſſertion. But in 1735 two companies of mathematicians were employed, one for a northern, and another for a ſouthern expedition, the reſult of whoſe obſervations and meaſurement plainly proved that the *earth* was flatted at the poles. See Degree.

Having found that the centrifugal force at the equator is $\frac{1}{289}$th of gravity, he aſſumes, as an hypotheſis, that the axis of the *earth* is to the diameter of the equator as 100 to 101, and thence determines what muſt be the centrifugal force at the equator to give the *earth* ſuch a form, and finds it to be $\frac{4}{505}$th of gravity: then, by the rule of proportion, if a centrifugal force equal to $\frac{4}{505}$th of gravity would make the *earth* higher at the equator than at the poles by $\frac{1}{100}$ of the whole height at the poles, a centrifugal force that is the $\frac{1}{289}$th of gravity, will make it higher by a proportional exceſs, which by calculation is $\frac{1}{229}$th of the height at the poles; and thus he diſcovered that the diameter at the equator is to the diameter at the poles, or the axis, as 230 to 229. But this computation ſuppoſes the *earth* to be every where of an uniform denſity; for if the *earth* is more denſe near the center, then bodies at the poles will be more attracted by this additional matter being nearer; and therefore the exceſs of the ſemidiameter of the equator above the ſemiaxis will be different.

This roundneſs of the *earth* is farther confirmed, by its having been frequently ſailed round: the firſt time was in the year 1519, when Ferd. Magellan made the tour of the whole globe in 1124 days. In the year 1557, our countryman, Drake, performed the ſame in 1056 days; in the year 1586, Sir Thomas Cavendiſh made the ſame voyage in 777 days; Simon Cordes, of Rotterdam, in the year 1590, and in the year 1598; Oliver Noort, a Hollander, in 1077 days; Will. Corn. Van Schouten, in the year 1615, in 749 days; Jac. Heremites, and Joh. Huygens, in the year 1623, in 802 days; and many others have ſince performed the ſame navigation, particularly our own countryman, lord Anſon. All of whom, ſailing continually from eaſt to weſt, at length arrived in Europe, whence they ſet forth; and, in the courſe of their voyage, obſerved all the phænomena, both of the heavens and earth, to correſpond to, and evince this ſpherical figure.

Thus as we go ſouthwards the northern ſtars are depreſſed, and the ſouthern ſtars elevated; and the ſun arrives at the meridian of places that are more eaſterly, ſooner than to the meridian of thoſe towards the weſt, in proportion to the diſtance of the meridians meaſured upon the equator. The ſame globular figure is likewiſe inferred from the operation of levelling, in which it is found neceſſary to make an allowance for the difference between the apparent and the true level.

What the *earth* loſes of its ſphericity by mountains and vallies, is nothing conſiderable; the higheſt eminence being ſcarce equivalent to the minuteſt protuberance on the ſurface of a lemon; what it loſes by the ſwelling of the equatorial parts, on account of the diurnal rotation of the earth on its axis, is more ſenſible. Huygens determines the ratio of the greater diameter to the leſs to be as 578 to 577.

Sir Iſaac Newton makes the greateſt diameter $34\frac{1}{5}$ miles longer than the leſs, fixing the ratio as 692 to 688, or as 230 to 229. If the *earth* were in a fluid ſtate, its revolution round its axis would neceſſarily make it put on ſuch a figure, becauſe the centrifugal force being greateſt towards the equator, the fluid would there riſe and ſwell moſt; and that its figure really ſhould be ſo now, ſeems neceſſary, to keep the ſea in the equinoctial regions from overflowing the earth thereabouts.

The proportion of the equatorial diameter to the polar, as ſtated by the gentlemen employed on the northern expedition for meaſuring a degree of the meridian, is as 1 to 0,9891; by the Spaniſh mathematicians as 266 to 265, or as 1 to 0,99624; by M. Bouguer as 179 to 178, or 1 to 0,99441, which colonel Roy alſo deduced from collecting the beſt experiments that have hitherto been made with the pendulum into one view, and applying the equation which the denſity of the air, in which they ſeverally vibrated, ſeemed to require; and he obſerves, that this proportion agrees very nearly with the mean reſult from the meaſurement of the degrees of the meridian. Phil. Tranſ. vol. lxvii. part ii. p. 767.

The following problem, communicated by Dr. Leatherland to Dr. Pemberton, and publiſhed by Dr. Robertſon, will ſerve for finding the proportion between the axis and the equatorial diameter, from meaſures taken of a degree

gree of the meridian in two different latitudes, ſuppoſing the *earth* to be a ſpheroid, with its axis leſs than the equatorial diameter.

Let $aPAp$ (*Tab.* II. *Aſtronomy, fig.* 68.) be an ellipſis repreſenting a ſection of the *earth* through its axis Pp; the equatorial diameter, or the greater axis of the ellipſis, being Aa; let E and F be two places, where the meaſure of a degree has been taken; theſe meaſures are proportional to the radii of curvature in the ellipſis at thoſe places; and if CQ, CR, are conjugates to the diameters, whoſe vertices are E and F, CQ will be to CR in the ſubtriplicate ratio of the radius of curvature in E to that in F, by Cor. 1. Prop. iv. part vi. of Milnes's Conic Sections, and therefore in a given ratio to one another. Then QV and RZS being drawn parallel to Pp, and QXYW parallel to aA, the angles QCP, RCP are the latitudes of E and F; ſo that theſe angles, and the ratio of CQ to CR being given, the rectilinear figure CVQXRY is given in ſpecies; and the ratio of $VC^2 - ZC^2$ ($= QX \times XW$) to $RZ^2 - QV^2$ ($= RX \times XS$) is given, which is the ratio of CA^2 to CP^2; therefore the ratio of CA to CP is given. Hence, if the ſine and coſine of the greater latitude be each augmented in the ſubtriplicate ratio of the meaſure of the degree in the greater latitude to that in the leſſer, then the difference of the ſquares of the augmented ſine, and the ſine of the leſſer latitude, will be to the difference of the ſquares of the coſine of the leſſer latitude, and the augmented coſine, in the duplicate ratio of the equatorial to the polar diameter. Becauſe Cq being taken in CQ equal to CR, and qv drawn parallel to QV, Cv and vq, CZ and ZR will be the ſines and coſines of the reſpective latitudes to the ſame radius; and CV, VQ will be the augmentations of Cv and Cq in the ratio named. Then, in order to find the ratio between the two axes of the *earth*, let E denote the greater, and F the leſſer of the two latitudes, M and N the reſpective meaſures taken in each; and let O denote $\sqrt[3]{\frac{M}{N}}$:

And $\sqrt{\frac{\grave{s}\,\grave{s},\ F - O^2 \times \grave{s}\,\grave{s},\ E}{O^2 \times s\,s,\ E - s\,s,\ F}}$ is $= \frac{\text{leſſer axis}}{\text{greater axis}}$.

It alſo appears by the above problem, that if one of the degrees meaſured is at the equator, the coſine of the latitude of the other being augmented in the ſubtriplicate ratio of the degrees, the tangent of the latitude will be to the tangent anſwering to the augmented coſine in the ratio of the greater axis to the leſſer. For ſuppoſing the place out of the equator to be E; if the ſemicircle $Plmnp$ be deſcribed, and lC joined, and mo drawn parallel to aC; Co is the coſine of the latitude to the radius CP; and CY that coſine augmented in the expreſſed ratio; YQ being to Yl, i. e. Ca to Cn, or CP, as the tangent of the angle YCQ, the latitude of the point E, to the tangent of the angle YCl, belonging to the augmented coſine. Thus if M repreſent the meaſure in a latitude denoted by E, and N the meaſure at the equator, let A denote an angle, whoſe meaſure is $\sqrt[3]{\frac{M}{N}} \times \grave{s}$, E. Then $\frac{t,\ A}{t,\ E}$ is $= \frac{\text{leſſer axis}}{\text{greater axis}}$. But M, or the length of a DEGREE, obtained by actual menſuration in different latitudes, is known from the following table.

	°	′		Toiſes
Maupertuis and aſſociates in lat.	66	20	found	M = 57438
Caſſini and De la Caille	49	22		M = 57074
	45	0		M = 57050
Boſcovich	43	0		M = 56972
De la Caille	33	18		M = 57037
Juan and Ulloa	At the Equator			M = 56768
Bouguer				M = 56753
De la Condamine				M = 56749

By comparing the firſt of theſe meaſures with each of the following, the ſecond with each of the following, &c. by the problem, and its corollary, we ſhall obtain twenty-five reſults, ſhewing the relation of the axes or diameters; and from the arithmetical means of the ſeveral compariſons, we ſhall have the ratio of the greater axis to the leſs as 1 to 0,9940688; or as 1 to 0,9946736; or as 1 to 0,9952621; or as 1 to 0,9972818; or as 1 to 0,9947082; and from the mean of all of them as 1 to 0,9951989. If the meaſures of the latitudes of $49^{\circ}\ 22'$, and of 45°, which fall within the meridian line drawn through France, and which have been re-examined and corrected, ſince the northern and ſouthern expedition, be compared with thoſe of Maupertuis and his aſſociates in the north, and that of Bouguer at the equator, the ratio of the greater axis to the leſs will be reduced to the following ſix; viz. as 1 to 0,9919994, 1 to 0,99337, 1 to 0,9952717, 1 to 0,9981542, 1 to 0,9967698, and 1 to 0,9965152; the arithmetical mean of which ratios, or that of 1 to 0,9953467, may be taken for the ratio of the greater axis to the leſs; which is as 230 to 228,92974 nearly the ſame with that aſſigned by Sir Iſaac Newton.

Add, that experiments made on pendulums, which muſt be of different lengths, to ſwing equal times here and at the equator, evince the ſame thing. Thus, a pendulum muſt be $2\frac{169}{1000}$ lines ſhorter at the equator than at the poles.

M. de la Hire, and Mr. Derham, indeed, have ſhewn, that this diverſity may ariſe, either from the greater heat, or the greater rarity, of the air there than here; as having obſerved a like variation between pendulums, when heated, and cold; and when in vacuo, and open air. But, beſides that Sir Iſaac Newton, and M. Bernouilli, have ſet aſide theſe cauſes, as inſufficient, it has been found, by actual menſuration, that the degrees of a meridian grow larger, the farther we go towards the line; which puts the ſpheroidiſm of the *earth* beyond queſtion.

The ancients had various opinions as to the figure of the *earth:* ſome, as Anaximander, held it cylindrical; and others, as Leucippus, in form of a drum. But the principal opinion was, that it was flat; that the viſible horizon was the bounds of the *earth*, and the ocean the bounds of the horizon; that the heavens and *earth* above this ocean were the whole viſible univerſe; and that all beneath the ocean was hades: of which opinion were not only divers of the ancient poets and philoſophers, but alſo ſome of the Chriſtian fathers, as Lactantius, St. Auguſtine, &c.

F. Tacquet draws ſome pretty concluſions from the ſpherical figure of the *earth*; as, 1. That if any part of the ſurface of the *earth* were quite plain, a man could no more walk upright thereon, than on the ſide of a mountain. 2. That the traveller's head goes a greater ſpace than his feet; and a horſeman than a footman, as moving equal arches of greater circles. 3. That a veſſel, full of water, being raiſed perpendicularly, ſome of the water will be continually flowing out, yet the veſſel ſtill remain full; and, on the contrary, if a veſſel full of water be let perpendicularly down, though nothing flow out, yet it will ceaſe to be full: conſequently, there is more water contained in the ſame veſſel at the foot of a mountain, than on the top; becauſe the ſurface of the water is compreſſed into a ſegment of a leſs ſphere below than above. Tacq. Aſtronom. lib. i. cap. 2.

EARTH, *changes of the.* Mr. Boyle ſuſpects there are great, though ſlow internal changes, in the maſs of the *earth*. He argues from the varieties obſerved in the change of the magnetic needle, and from the obſerved changes in the temperature of climates. But as to the latter, we doubt whether he could have diaries of the weather ſufficient to direct his judgment. Boyle's Works abr. vol. i. p. 292, 293. See ABSORPTIONS *of the earth.*

EARTH, *magnetiſm of the.* The notion of the magnetiſm of the *earth* was ſtarted by Gilbert; and Mr. Boyle ſuppoſes magnetic effluvia moving from one pole to the other. See Works abr. vol. i. p. 285, 290.

Dr. Knight alſo thinks, the *earth* may be conſidered as a great loadſtone, whoſe magnetical parts are diſpoſed in a very irregular manner; and that the ſouth pole of the *earth* is analogous to the north pole in magnets, that is, the pole by which the magnetical ſtream enters. See MAGNET.

He obſerves, that all the phænomena attending the direction of the needle, in different parts of the *earth*, in great meaſure correſpond with what happens to a needle, when placed upon a large terella; if we make allowances for the different diſpoſitions of the magnetical parts, with reſpect to each other, and conſider the ſouth pole of the *earth* to be a north-pole, with regard to magnetiſm. The *earth* might become magnetical by the iron ores it contains, for all iron ores are capable of magnetiſm. It is true, the globe might notwithſtanding have remained unmagnetical, unleſs ſome cauſe had exiſted capable of making that repellent matter producing magnetiſm move in a ſtream through the *earth*.

Now the doctor thinks that ſuch a cauſe does exiſt. For if the *earth* revolves round the ſun in an ellipſis, and the ſouth pole of the *earth* is directed towards the ſun, at the time of its deſcent towards it, a ſtream of repellent matter will thereby be made to enter at the ſouth pole, and come out at the north. And he ſuggeſts, that the *earth's* being in its perihelion in winter may be one reaſon why magnetiſm is ſtronger in this ſeaſon than in ſummer.

This cauſe here aſſigned for the *earth's* magnetiſm muſt continue, and perhaps improve it from year to year. Hence the doctor thinks it probable, that the *earth's* magnetiſm has been improving ever ſince the creation, and that this may be one reaſon why the uſe of the compaſs was not diſcovered ſooner. See Dr. Knight's Attempt to demonſtrate, that all the Phænomena in Nature may be explained by Attraction and Repulſion. prop. 87.

Earth, *the magnitude of the*; and the number of miles its diameter contains, have been variouſly determined by various authors, ancient and modern. The way to arrive at it is, by finding the quantity of a degree of a great circle of the *earth*; but this degree is found very different, according to the different methods and inſtruments made uſe of, as well as the different obſervers.

The method obſerved by Mr. Norwood, and the French aſtronomers, Picard, Caſſini, &c. viz. by meaſuring the diſtance between two remote places on the ſame meridian, is undoubtedly the beſt, and was performed with great accuracy, eſpecially by M. Caſſini, and ſince by others. See Degree *of latitude*. According to that author, the ambit, or circumference of the *earth*, is 123750720 Paris feet, or 134650777 Engliſh feet, or 25031½ of our ſtatute miles; whence, ſuppoſing the *earth* ſperical, its diameter muſt be 7967 ſtatute miles; and, conſequently its radius, or ſemidiameter may be taken in a round number, for 200000000 feet, its ſurface will be 199444206 miles; which, being multiplied into ⅓ of its ſemidiameter, gives the ſolid content of the globe of the *earth* 264856000000 cubic miles These ſeveral dimenſions are greater or leſs, according to the aſſumed meaſure of a degree. Caſſini adopted Picard's meaſure of 57060 toiſes. But the magnitude, as well as the FIGURE of the *earth*, may be deduced from the preceding problem. For, as half the *latus rectum* of the greater axis A *a*, (*Tab.* II. *Aſt. fig.* 68.) is the radius of curvature in A, it is given in magnitude from the degree meaſured there, and thence we ſhall have the axes themſelves. Thus, the circular arch equal to the radius being 57,29578 degrees, if this number be multiplied by 56753 toiſes, the meaſure of a degree at the equator, as Bouguer has ſtated it, we ſhall have the radius of curvature there, or half the *latus rectum* of the greater axis; and this is to half the leſſer axis in the ratio of the leſſer axis to the greater, i. e. as 0,9953467 to 1: whence the leſſer ſemiaxis will be 3266910 toiſes, and the greater 3282183.

From the ſame problem and figure it appears, that if an angle be taken, whoſe tangent ſhall be to the tangent of either latitude, as the leſſer axis to the greater, the meaſure of a degree in that latitude will be to the meaſure of a degree at the equator, in the triplicate ratio of the coſine of this angle to the coſine of the latitude, e. g. If E be one of the places meaſured, the tangent of the angle YCl will be to the tangent of YCQ the latitude of E, as Yl to YQ. i. e. as the leſſer axis to the greater; and $CQ : Cl :: S, ClY : S, CQY ::$ coſ. lCY : coſ. QCY; but by the property of the ellipſe, $QC^3 : Cl^3$ (CP^3) :: the radius of curvature in E to the radius of curvature in A, i. e. as the meaſure of a degree in E to the meaſure of a degree in A. Therefore, if M repreſents the meaſure in a latitude E, and N the meaſure at the equator; and an angle A be found, ſo that t, A may be $= \frac{\text{leſſer axis}}{\text{greater axis}} \times t$, E, N will be $= M +$ cube $\frac{s,\ E}{s,\ A}$: and hence the axes may be known as above. Thus from the ſix ratios between the axes already found, ſee *Figure of the* Earth, we may obtain nine values of the axes, by comparing each ratio with both of its reſpective latitudes and meaſures; and the means will be, for the greater ſemiaxis, 3276473 toiſes; and for the leſſer, 3260299: and theſe, proportioned again by the mean ratio of the axes above ſtated, and by their aſſigned magnitudes will give, for the greater ſemiaxis 3279328 French toiſes, and for the leſſer ſemiaxis 3264068; and allowing 6 Paris feet to a toiſe, and the proportion of the Engliſh foot to the French, as 107 to 114, the greater ſemiaxis will be 3493863 Engliſh fathoms, or, dividing by 880, the number of fathoms in an Engliſh mile, 3970,298 miles; and the leſſer ſemiaxis 3477606 fathoms, or 3951,824 miles; and the greater axis, or equatorial diameter, equal to 7940,596 miles; and the leſſer, or polar diameter, equal to 7903,648 miles; ſo that the equatorial diameter is about 36,948 miles longer than the polar or *earth*'s axis. See farther on this ſubject, Suite des Mem. de l'Acad. R. ann. 1718, p. 247. Maclaurin's Fluxions, vol. ii. book i. ch. 14. Robertſon's Navigation, book viii. ſect. 8.

On the ſurface of the *earth* are conceived the ſame circles as on the ſurface of the mundane ſphere elſewhere deſcribed, viz. an Equator, Ecliptic, Tropics, Polar *Circles*, Meridians, Horizon, Parallels, &c. which ſee; as alſo Sphere and Globe. The ſeas and unknown parts of the *earth*, by a meaſurement of the beſt maps, contain 160522026 ſquare miles; the inhabited parts, 38990569; Europe, 4456065; Aſia, 10768823; Africa, 9654807; America, 14110874: in all, 199512595, which is the number of ſquare miles on the whole ſurface of our globe.

The terraqueous globe is now generally granted to have two motions, beſides that on which depends the PRECESSION of the equinoxes; the one DIURNAL, around its own axis in the ſpace of 24 hours, which conſtitutes the natural day or nycthemeron. The other annual, round the ſun, in an elliptical orbit or tract, in 365 days, 6 hours, conſtituting the year.

From the former we derive the diverſities of NIGHT and DAY. And from the latter the viciſſitudes of ſeaſons, ſpring, ſummer, &c.

See the motion of the *earth* proved, under Earth *in aſtronomy*.

In the terraqueous globe we diſtinguiſh three parts, or regions, viz. 1. The external part, or cruſt, which is that from which vegetables ariſe and animals are nouriſhed. 2. The middle, or intermediate part, which is poſſeſſed by foſſils, extending farther than human labour ever yet penetrated. 3. The internal, or central part, which is unknown to us, though by many authors ſuppoſed of a magnetic nature; by others, a maſs or ſphere of fire; by others, an abyſs, or collection of waters, ſurrounded by the ſtrata of *earth*; and by others, a hollow, empty ſpace, inhabited by animals, who have their ſun, moon, planets, and other conveniencies within the ſame: others divide the body of the globe into two parts, viz. the external part, which they call the cortex, including the whole depth or maſs of the ſtrata of the *earth*; and the internal, which they call the nucleus, being of a different nature from the former, and poſſeſſed by fire, water, or the like.

The external part of the globe either exhibits inequalities, as mountains or vallies; or it is plain and level; or dug in chanels, fiſſures, beds, &c. for rivers, lakes, ſeas, &c.

Theſe inequalities in the face of the *earth* are, by moſt naturaliſts, ſuppoſed to have ariſen from a rupture or ſubverſion of the *earth*, by the force either of the ſubterraneous fires or waters. The *earth*, in its natural and original ſtate, De Cartes, and after him, Burnet, Steno, Woodward, Whiſton, and others, ſuppoſe to have been perfectly round, ſmooth, and equable; and they account for its preſent rude and irregular form principally from the great deluge. See Deluge.

In the external, or cortical part of the *earth*, we meet with various ſtrata, which are ſuppoſed to be the ſediments of various floods; the waters whereof, being replete with matters of divers kinds, as they dried up, or ouſed through, depoſited theſe different matters, which in time hardened into ſtrata of ſtone, ſand, coal, clay, &c.

Dr. Woodward has conſidered the ſubject of theſe ſtrata with great attention, viz. their order, number, ſituation with reſpect to the horizon, depth, interſections, fiſſures, colour, conſiſtence, &c. He aſcribes the origin and formation of them all, to the great flood or cataclyſmus. At that terrible revolution, he ſuppoſes all the terreſtrial bodies of all kinds to have been diſſolved and mixed with the waters, and ſuſtained therein, ſo as only to conſtitute one common maſs therewith. This maſs of terreſtrial particles, intermixed with water, he ſuppoſes to have been at length precipitated to the bottom; and that generally, according to the laws of gravity, the heavieſt ſinking firſt, and the lighter in their order. By ſuch means were the ſtrata formed whereof the *earth* conſiſts; which, attaining their ſolidity and hardneſs by degrees, have continued ſo ever ſince. Theſe ſediments, he farther concludes, to have been at firſt all parallel and concentrical; and the ſurface of the *earth* formed thereby, perfectly ſmooth and regular; but that in courſe of time, divers changes happening. from earthquakes, volcanos, &c. the order and regularity of the ſtrata was diſturbed and broken, and the ſurface of the *earth* by ſuch means brought to the irregular form in which it now appears. M. de Buffon ſuppoſes that the *earth*, as well as the other planets, are parts ſtruck off from the body of the ſun by the colliſion of comets; and that, when the *earth* aſſumed its form, it was in a ſtate of liquefaction by fire. See farther particulars under Deluge.

Earth, in *Aſtronomy*, is one of the primary planets, according to the ſyſtem of Copernicus. Its character is ⊖.

In the hypotheſis of Ptolemy, the *earth* is the centre of the ſyſtem.

Whether the earth move, or remain at reſt, i. e. whether it be fixed in the centre, with the ſun, heavens, and ſtars moving round the ſame from eaſt to weſt; or whether the heavens and ſtars being at reſt, the *earth* moves from weſt to eaſt, is the great article that diſtinguiſhes the Ptolemaic from the Copernican ſyſtem.

Earth, *motion of the*. The happy induſtry of the aſtronomers of our age has put the mobility of the *earth* beyond all reaſonable doubt; on which account, the names of Copernicus, Gaſſendus, Kepler, Hook, Flamſteed, Bradley, &c. will ever be mentioned with the higheſt honour.

Indeed, the ſame motion had been held by many of the ancient philoſophers. Cicero, in his Tuſc. Quæſt. aſſures us, that Nicetas of Syracuſe firſt diſcovered that the *earth* had a diurnal motion, by which it revolved round its axis in the ſpace of 24 hours; and Plutarch, de Placit. Philoſoph. tells us, that Philolaus diſcovered its annual motion round the ſun; and about 100 years after Philolaus, Ariſtarchus, the Samian, propoſed the motion of the *earth* in ſtronger and clearer terms, as we are aſſured by Archimedes in Arenar.

But the religious opinions of the heathen world prevented the doctrine's becoming more cultivated. For Ariſtarchus being accuſed of ſacrilege by Cleanthes for moving Veſta and the tutelar deities of the univerſe out of their places, the philoſophers began to lay aſide ſo perilous a poſition.

Many ages afterwards, Nic. Cuſanus revived the ancient ſyſtem, in his Doct de Pignorant. and aſſerted the motion of the *earth*: but the dogma gained very little ground till the time of Copernicus, who ſhewed its great uſe and advantages in aſtronomy; and who had immediately all the philoſophers and aſtronomers who dared to differ from the croud, and were not afraid of eccleſiaſtical cenſures, on his ſide. So that Kepler, his contemporary, made no ſcruple to cry, *Hodierno tempore præſtantiſſimi quique philoſophorum & aſtronomorum Copernico adſtipulantur: ſecta eſt hæc glacies; vincimus ſuffragiis melioribus: ceteris pene ſola obſtat ſuperſtitio, aut metus a Cleanthibus.* See Copernican.

The arguments alleged againſt the motion of the *earth* are weak and frivolous. Such are,

1. That it is a heavy body, and very unfit for motion.
2. That if the *earth* were to move round its axis in 24 hours, all our houſes, buildings, &c. would tumble down.
3. That bodies would not fall upon the places perpendicularly under them; nor could a bullet, e. gr. ſhot perpendicularly from the ground, fall back again upon the ſame ſpot.
4. That it is contrary to the words of ſcripture. And
5. That it is repugnant to our ſenſes, which repreſent the *earth* at reſt, and the ſun in motion.

But the principal argument againſt the annual motion of the *earth*, is the want of an annual parallax in the fixed ſtars. For let T A *t* (*Tab.* II. *Aſt. fig.* 69.) repreſent the *earth*'s orbit about the ſun S, T X the axis of the *earth*, and *t x* parallel to T X, will repreſent the poſition of the ſame axis at the oppoſite point *t*. Suppoſe T X to be directed towards the ſtar P; and it is manifeſt, that the axis of the *earth* will not be directed to the ſame ſtar, when it comes to the ſituation *t x*, but will contain an angle *x t* P with the line *t* P, joining the *earth* and ſtar, equal to the angle *t* P T, under which the diameter T *t* of the *earth*'s orbit appears to a ſpectator, viewed from the ſtar P. It might be expected, therefore, that by obſerving the fixed ſtar P, from the different parts of the *earth*'s orbit, we might judge of the angle T P *t*, and conſequently of the proportion of T P, the diſtance of the ſtar to T *t*, the diameter of the *earth*'s orbit, or double diſtance of the ſun. Yet it is certain, that aſtronomers have not hitherto been able to diſcover any difference in the apparent ſituation of the fixed ſtars with reſpect to the axis of the *earth*, or to one another, that can ariſe from the motion of the *earth*: though, ſince the reſtoration of the Pythagorean doctrine of the *earth*'s motion, they have taken great pains to examine the matter.

The ſeeming motion of the pole-ſtar, obſerved by Mr. Flamſteed, was by ſome miſtaken for a proof of its annual parallax; but this phænomenon has ſince been accounted for in the moſt ingenious manner by Mr. Bradley, from the motion of light combined with that of the *earth* in its orbit. See Parallax and Light.

The objection to the *earth*'s motion, from there being no diſcernible parallax of the fixed ſtars, is anſwered by obſerving, that the diſtance of the fixed ſtars is ſo great, that the diameter of the *earth*'s orbit bears no ſenſible proportion to it; ſo that the parallax is not to be diſcovered by our exacteſt inſtruments. Nor is this immenſe diſtance of the fixed ſtars advanced by the Copernicans merely as an hypotheſis for the ſake of ſolving the objection. For there ſeems great reaſon to ſuppoſe fixed ſtars like to our ſun, and hence to conclude their diſtance to be vaſtly great, ſince they appear to us with ſo faint a light, and of no ſenſible diameter, even in the largeſt teleſcopes. But from the diligence and accuracy of late aſtronomers, we learn ſeveral curious things in confirmation of the motion of the *earth* about the ſun, and ſerving to ſolve this only material objection againſt it. See Light.

The arguments for the motion of the *earth* are of a different kind to the objections againſt it, and carry other ſort of evidence with them, being deduced from actual obſervation and phenomena, and not from the fanciful ſurmiſes of timorous zealots. They are theſe: 1. The ſun will equally appear in motion, and the *earth* as ſtanding ſtill, to a ſpectator on the *earth*, whether the ſun really move round the *earth* at reſt, or the *earth* move round the ſun at reſt.

For ſuppoſe the *earth* in T (*Tab. Aſtronom. fig.* 15. Nº 2.) and the ſun in 1; the ſun will then appear in ♈. And, ſuppoſe the ſun to proceed in an orbit ſurrounding the *earth* from 1 to 2, he will then appear in ♉; and, if he proceed farther to 3, he will ſeem in ♊: and thus will he appear to go on, according to the order of the ſigns in the ecliptic. Suppoſe, again, the *earth* in 1, and the ſun in T, the ſun will now be ſeen in ♎; let the *earth* go on from 1 to 2, the ſun will appear to the inhabitants of the *earth* to have proceeded from ♎ to ♏; and if the *earth* proceed to 3, the ſun will appear to have advanced farther from ♏ to ♐; and ſo on, according to the ſucceſſion of the ſigns of the ecliptic.

Thus does the ſun appear alike to move, whether he really move or ſtand ſtill; ſo that the objection from ſenſe is of no force. But again,

2. If one of the planets be ſuppoſed to have moved a certain ſpace from weſt to eaſt, the ſun, *earth*, and other planets, together with the fixed ſtars, will all ſeem to an inhabitant of that planet to have moved juſt ſo far round it the contrary way.

For, ſuppoſe a ſtar M (*fig.* 16. Nº 2.) in the zenith of an inhabitant of a planet placed in T; and ſuppoſe the planet to have revolved on its axis from weſt to eaſt; in a certain ſpace of time the ſun S will have arrived at the zenith of T, then the ſtar I, then N, then the *earth* L, and at length the ſtar M again. To the inhabitant of the planet, therefore, the ſun S, with the *earth* L, and the ſtars I, N, M, &c. will appear to have moved round the planet a contrary way.

Thus, to the inhabitants of the planets (if any ſuch there be) the mundane ſphere, with the ſun, ſtars, and all the other planets, will, as to us, appear to move round them from eaſt to weſt; and accordingly, the inhabitants of our planet, the *earth*, are only liable to the ſame deluſive appearances with thoſe of the reſt.

3. The orbits of the planets include the ſun as the common centre of them all; but it is only the orbits of the ſuperior planets that include the *earth*; which, however, is not in the centre of any of them, as is ſhewn under Sun and Planet.

4. The *earth*'s orbit being proved to be between thoſe of Venus and Mars, it follows, that the *earth* muſt turn round the ſun; for, as it lies within the orbits of the ſuperior planets, their motion would appear unequal and irregular; but they would never either be ſtationary or retrogade without this ſuppoſition.

5. From the orbits and periods of the ſeveral planets about the ſun, and of the moon and ſatellites round the *earth*, Jupiter and Saturn, it is evident, that the law of gravitation is the ſame towards the *earth*, Jupiter, and Saturn, as towards the ſun; and the periodical times of the ſeveral bodies moving around each, are in the ſame ratio to their ſeveral diſtances from them.

Now it is certain, that, on the hypotheſis of the *earth*'s annual motion, her periodical time exactly ſuits this law, bearing ſuch a proportion between thoſe of Mars and Venus as the ſeveral other bodies directed by the ſame law do bear; i. e. the ſquares of the periods are, in all, as the cubes of the diſtances from the centre of their orbits. But ſuppoſing the *earth* too at reſt, this law is broken moſt exorbitantly.

For, if the *earth* does not move round the ſun, the ſun muſt move with the moon round the *earth*: now, the diſtance of the ſun to that of the moon being as 23750 ſemidiameters of the *earth* to 60, or nearly as 396 to 1; and the moon's period being leſs than 28 days, the ſun's period ſhould be found no leſs than 212775 days, or 583 years; whereas, in fact, it is but one year. Which ſingle conſideration Mr Whiſton thinks of weight enough to determine the controverſy between the two ſyſtems, and to eſtabliſh the motion of the earth for ever.

Whereas, ſuppoſing our *earth* to have once revolved about the ſun in a circular orbit, whoſe ſemidiameter were equal to the *earth*'s original diſtance from the ſun ſix degrees paſt its perihelion, the annual period would be found exactly and ſurpriſingly equal to the lunar or the ancient ſolar year, which were exactly commenſurate, containing 12 ſynodical, or 13 periodical months, i. e. 365 days, 4 hours, 19 minutes.

6. The diſtances of certain of the fixed ſtars from the zenith have been obſerved to be various at various times of the year. That particularly of the pole-ſtar from the pole, has been diſcovered by Mr. Flamſteed from repeated obſervations, for ſeven years ſucceſſively, to be greater about the ſummer ſolſtice than about the winter, by about 40 ſeconds. Whence it appears, that the *earth* changes its ſituation, receding from the pole-ſtar, and returning back to it again annually.

Which argument is farther confirmed from this, that the *earth* is nearer the ſun at Chriſtmas than at Midſummer; as appears, both from the ſun's apparent diameter being greater in December than in June; and from its motion being ſwifter, by one twenty-fifth part in the former ſeaſon than the latter; whence it is, that there are about eight days more in the ſummer half-year, viz. from March to September, than in the winter, from September to March.

7. Either the heavenly bodies revolve round the *earth* in 24 hours, or the *earth* revolves round its axis in that time. Now, the planets revolving round the ſun, perform their revolutions in greater or leſs times, as their orbits are greater or leſs, i. e. as they are more or leſs remote from the ſun. Of conſequence, if the ſtars and planets revolved round the *earth*, they would perform their revolutions in unequal times, according as their orbits or their diſtances were unequally big. At leaſt, the fixed ſtars, which are at ſuch prodigious diſtances from the *earth*, would never move round it in 24 hours, as the neareſt planet is ſuppoſed to do.

This is an inelegancy, which is avoided in the ſyſtem where the *earth* is ſuppoſed to move; and where every planet is ſo much the longer in deſcribing its annual orbit round the ſun as that orbit is greater.

8. In all the works of nature with which we are acquainted, the Creator appears to act by the ſhorteſt, caſieſt, and ſimpleſt means. Now, if the *earth* be at reſt, and the ſtars move, the velocity of theſe latter muſt be immenſe; and yet all the purpoſes thereof might have been anſwered by a moderate motion of the *earth* alone.

For the moon's diſtance from the *earth* amounts to 240000 miles. Hence, the circumference of the moon's diurnal circle being 1507968 ſuch miles, the moon's horary motion muſt be 62832 miles inſtead of 2290 miles, which is really the caſe; conſequently, in each ſecond, a ſpace leſs than that of the pulſe of an artery, the moon, though the ſloweſt of all the heavenly bodies, muſt move more than 17 miles. Again, the ſun's mean diſtance from the *earth* is 23750 ſemidiameters of the *earth*, or 95000000 miles; conſequently the ſun's diurnal path when in the equator, muſt be 596904000 miles; and therefore, in the ſpace of one ſecond, i. e. in the twinkling of an eye, he muſt move more than 6908 miles.

Again, the diſtance of the ſun from the *earth* is to that of Mars, ſuppoſing the *earth*, and not the ſun to be the centre of the ſyſtem, nearly as one and a half; to that of Jupiter, as one to five and a quarter; and to that of Saturn, as one to nine: wherefore, as the diurnal ſpace, and all other things deſcribed in the ſame time, are in the ſame ratio, Mars, in one twinkling of an eye, muſt fly 10362, Jupiter 36266, and Saturn 62172 miles. Laſtly, the fixed ſtars being yet vaſtly more remote from the *earth* than Saturn, their motion in or near the equator muſt be vaſtly ſwifter than that of Saturn.

9. If the *earth* be at reſt, and the ſtars move by any common motion, the ſeveral planets muſt each day deſcribe ſeveral ſpirals running forth to a certain term towards the north, and thence returning to the oppoſite term towards the ſouth, ſometimes narrower and ſometimes broader.

For the diſtances of the ſeveral planets from the zenith alter every day, increaſing to a certain point towards the north, and thence decreaſing again towards the ſouth; conſequently, the altitude of the pole being always found the ſame, and the planets not returning to the ſame point of the meridian, they do not deſcribe circles, but ſpirals. Add, that as the ſeveral planets do not retain the ſame diſtance from the *earth*, but are ſometimes nearer, and ſometimes recede farther from it, at a greater diſtance, a greater ſpiral, and at a leſs, a leſs is deſcribed.

Farther, as their motion is ſlower when the planet is farther from the *earth*, the greater ſpirals are deſcribed in leſſer times than the leſſer; and, as the greateſt and leaſt diſtance of the planets from the *earth* is not affixed to the ſame point of the heavens, the planets have moved in different tracts every day from the beginning.

Beſides, the force by which the ſtars and planets revolve in their orbits are not directed to the centre of the *earth*, but to the centres of the ſeveral orbits which they deſcribe, or to innumerable imaginary points in the axis of the *earth*; and theſe forces tending to different and continually varying centres muſt likewiſe increaſe exactly in proportion to the diſtances from the axis; whereas the force of attraction is found to decreaſe.

10. Bodies let fall from any conſiderable height, are found by experiment, not to fall upon the ſpot perpendicularly under them, but to the ſouth-eaſt thereof.

The experiment was propoſed to Dr. Hook in the year 1679, by a perſon who ſuggeſted, that, if the *earth* had any diurnal motion, the body would fall to the eaſt of the perpendicular. Dr. Hook, on that occaſion, read a diſcourſe before the Royal Society, wherein he endeavoured, *à priori*, to aſſign what curve a falling body would deſcribe; aſſerting, particularly, that the fall of the body would not be directly eaſt, but ſouth-eaſt; which was confirmed by divers actual trials. The objection which ſuppoſes, that e. g. a ball fired perpendicularly upward in the air ſhould fall weſtward of the place from which it was projected, on the ſuppoſition of the *earth's* revolution eaſtward, can have no weight, when it is conſidered that the gun and ball partake of the *earth's* motion; and therefore, being carried forward with the air as quick as the *earth* and air turn, it muſt fall down on the ſame place, deſcribing in its deſcent the diagonal of a parallelogram, whoſe two ſides are proportional to the forces acquired from the *earth's* motion and the gravity of the ball. Thus a ſtone let fall from the top of a main-maſt, if it meets with no obſtacle, falls on the deck as near the foot of the maſt when the ſhip ſails as when it does not.

11. The power of gravity is found to decreaſe as you approach nearer to the equator, which is a circumſtance that agrees to all bodies which have a motion on their axis, and to them only, as being really the neceſſary reſult of ſuch motion.

For a body, revolving on its axis, the parts or appendages thereof, are continually endeavouring to recede from the centre. Conſequently, the equator being a great circle, and the parallels all decreaſing towards the poles, the centrifugal force is greateſt in the equator, and decreaſes towards the poles in the ratio of the diameters of the parallels to that of the equator. Now the power of gravity determines the ſeveral parts or appendages towards the centre of the whole: conſequently, the centrifugal force, acting contrary to the power of gravity, retards the deſcent of bodies, and that moſt where it is greateſt.

Dr. Keil computes, that the force of gravity to the centrifugal force at the equator is as 289 to 1; conſequently, a body placed there, would loſe one 289th part of the weight it would have were the *earth* at reſt; conſequently, the centrifugal force at the poles being infinitely ſmall, a body will there weigh 289 pounds, which at the equator only weighs 288.

12. The following is an actual demonſtration of the *earth's* motion, drawn from phyſical cauſes, for which we are indebted to the diſcoveries of Sir Iſaac Newton, and which Dr. Keil takes for concluſive and unanſwerable.

All planets, it is demonſtrated, gravitate towards the ſun; and obſervations teſtify to us, either that the *earth* turns round the ſun, or the ſun round the *earth*, in ſuch a manner as to deſcribe equal areas in equal times. But it is demonſtrated farther, that whenever bodies turn round each other, and regulate their motions by ſuch a law, the one muſt of neceſſity gravitate to the other: conſequently, if the ſun in its motion doth gravitate to the *earth*, action or re-action being equal and contrary, the *earth* muſt likewiſe gravitate towards the ſun.

Again, the ſame author has demonſtrated, that when two bodies gravitate to one another, without directly approaching one another in right lines, they muſt both of them turn round their common centre of gravity; the ſun and *earth*, therefore, do both turn round their common centre of gravity; but the ſun is ſo great a body in reſpect of our *earth*, which is, as it were but a point; that the common centre of gravity of the two bodies will lie within the body of the ſun itſelf, and not far from the centre of the ſun. The *earth*, therefore, turns round a point, which is in the body of the ſun, and therefore it turns round the ſun. Q. E. D.

13. Beſides, if the ſun moves about the *earth*, the *earth's* attractive power muſt draw the ſun towards it from the line of projection, ſo as to bend its motion with a curve; but the ſun being at leaſt 227000 times as heavy as the *earth*, it muſt move 227000 times as ſlowly toward the *earth* as the *earth* does toward the ſun; and conſequently the *earth* would fall to the ſun in a ſhort time, if it had not a very ſtrong projectile motion to carry it off.

There is indeed no ſuch thing in nature as a heavy body moving round a light one as its centre of motion. A pebble, as Mr. Ferguſon familiarly illuſtrates this matter, faſtened to a mill-ſtone by a ſtring, may, by an eaſy impulſe, be made to circulate round the mill-ſtone; but no impulſe can make a mill-ſtone circulate round a looſe pebble, for the mill-ſtone would go off and carry the pebble along with it.

14. Dr. Bradley, late aſtronomer royal, has found, by a long ſeries of the moſt accurate obſervations, that there is a ſmall apparent motion of the fixed ſtars, occaſioned by the obſervation of their light, and ſo exactly anſwering to an annual motion of the *earth*, as evinces the ſame even to a mathematical demonſtration. See Light.

To ſay no more; to ſuppoſe the *earth* at reſt, confounds and deſtroys all the order and harmony of the univerſe, annuls its laws, and ſets every part at variance with each other, robs the Creator of half the praiſe of his work, and mankind of the pleaſure of the contemplation thereof. In effect, it renders the motions of the planets inexplicable and uſeleſs, which otherwiſe are plain and ſimple. So that ſuch of the later aſtronomers, as have aſſerted it with the moſt zeal, have been forced to ſet it aſide, when they came to compute the motions of the planets. None of them would ever attempt to compute theſe motions in variable ſpirals; but in all their theories they tacitly ſuppoſe the *earth* to move on its axis, ſo as to turn the diurnal ſpirals into circles.

Thus, the Jeſuit Ricciolus, though he, at the pope's command, oppoſed the motion of the *earth* with all his might, as ſomething contrary to holy ſcripture; yet, to frame aſtronomical tables, which ſhould tolerably agree with obſervation, he was forced to have recourſe to the motion of the *earth* as his only refuge.

This, De Chales, another of the ſame fraternity, frankly confeſſes: "P. Ricciolus—*nullas tabulas aptare potuit, quæ* "*vel mediocriter obſervationibus reſponderent*; *niſi ſecundum* "*ſyſtema terræ motæ*; notwithſtanding that he called in "all the foreign and forced aſſiſtances of moveable epi"cycles, ſo that in his Aſtronomia Reformata, where he "undertakes to give accurate tables of the celeſtial mo"tions, he gives into the hypotheſis of the motion of the *earth*." De Chales Aſtron. Reformat. lib. x. cap. 1. See Copernican.

The ſyſtem then, which ſuppoſes the *earth* at reſt, is of itſelf of no uſe or ſignificancy in aſtronomy; nor does it avail more in phyſics; for the principal phænomena are no way deducible from it; but the retainers of it are either forced to fly to the immediate agency of the Deity (which in phyſics is the ſame as the *reductio ad abſurdum* in *Geometry*) or to reaſons and principles unknown

Some oppoſe the motion of the *earth* as contrary to revelation; there being mention made in holy ſcripture of the ſun's riſing and ſetting, of his ſtanding ſtill in the time of Joſhua, and his going back in that of Hezekiah.

Now, to take the genuine ſenſe of theſe paſſages, the laws of interpretation muſt be ſettled. 1. Then, we ſuppoſe, that the ſeveral words of ſcripture have their ſeveral ideas correſponding to them; and that a man takes their ſenſe, in whom thoſe ideas are excited by the reading. 2. That the words of ſcripture, attentively read, are ſufficient to excite thoſe ideas in a mind not prepoſſeſſed. Hence, 3. It follows, that either God muſt have exhibited the definitions of the words that occur in ſcripture; or, that he ſuppoſes prior notions, and leaves us to take their ſenſe in the ordinary way. Hence, 4. We argue, that no other ideas are to be affixed to the words of ſcripture, but ſuch as occur to a perſon who looks or attends to the things themſelves ſpoken of.

By the ſun's riſing, therefore, is meant no more than his re-appearance in the horizon, after he had been hid below it; and, by his ſetting, an occultation of the ſun, which was before viſible in the horizon. When the preacher therefore ſays, Eccleſ. i. 5. *The ſun alſo ariſeth, and the ſun goeth down, and haſteth to his place where he aroſe*, he means, doubtleſs, no more than that the ſun, which before was hid, is now ſeen in the horizon; and after being there conſpicuous, is hid again, and at length re-appears in the eaſt. For thus much only appears to a perſon who views the ſun; and therefore thus much, and no more, is expreſſed by the ſacred writers.

In like manner, when in Joſh. x. 12, 13. the ſun and moon are ſaid to have ſtood ſtill; all meant by ſtation is, that they did not change their place with reſpect to the *earth*. For that general, by *Sun, ſtand thou ſtill upon Gibeon, and thou moon, in the valley of Aijalon*, required no more, than that the ſun, which then appeared over that city, ſhould not change its ſituation. And from his bidding the ſun to keep its ſituation, it would be unjuſt to infer, that it moves round the *earth* at reſt.

Theſe, and ſimilar expreſſions, are true and proper deſcriptions of the phenomena, as they appear to us; but as the ſcriptures were never intended to inſtruct us in philoſophy and aſtronomy, they do not at all determine by what motions theſe phenomena are occaſioned. And it has been juſtly obſerved, that part of the account recorded in the book of Joſhua is merely a deſcription of the appearance; Gibeon and Aijalon, and the whole land of Canaan lying in too northern a latitude for the ſun or moon ever to be vertical to any part of it; and yet this was a juſt deſcription of the phenomenon as it appeared to Joſhua in the place where he then was; and if one part of the account merely deſcribe the phenomena, the other muſt likewiſe be underſtood in the ſame manner.

Gaſſendus, very pertinently to the ſame purpoſe, diſtinguiſhes "two ſacred volumes, the one written, called "the *Bible*; the other, *Nature*, or the *World*; God hav"ing manifeſted himſelf by two lights, the one of reve"lation, and the other of demonſtration; accordingly, "the interpreters of the former are divines, of the lat"ter, mathematicians. As to matters of natural know"ledge, the mathematicians are to be conſulted; and as "to the objects of faith, the prophets; the former be"ing no leſs interpreters, or apoſtles, from God to men, "than the latter. And as the mathematician would be "judged to wander out of his province, if he ſhould "pretend to controvert, or ſet aſide any article of faith "from principles of geometry; ſo it muſt be granted, "the divines are no leſs out of their limits, when they "venture to pronounce on a point of natural know"ledge, beyond the reach of any not verſed in geo"metry and optics, merely from holy ſcripture, which "does not pretend to teach any thing of the mat"ter.

"For inſtances, we may quote Lactantius and Au"guſtine; the firſt of whom rendered himſelf ridicu"lous by diſputing from ſcripture, againſt the round"neſs of the *earth*; and the latter, againſt the antipodes." See Antipodes.

Having thus proved the motion of the *earth*, it is to be farther obſerved, that the altitude of the pole being found at all times of the year, i. e. in all points of its annual orbit (the ecliptic) to be the ſame; it follows, that the *earth* proceeds in ſuch manner along its orbit, as that its axis is conſtantly parallel to the axis of the world, and of conſequence parallel to itſelf.

This motion, which Copernicus calls the *motion of libration*, may be well enough illuſtrated, by ſuppoſing a globe, with its axis parallel to that of the *earth*, painted on a flag, or ancient of a maſt, moveable on its axis, and continually driven by the weſt wind, while it makes the tour of an iſland; it is evident, that in every ſituation of the ſhip, the axis of the painted globe will continue parallel to the axis of the world.

According to Sir Iſaac Newton's principles, the *earth*'s axis does, in every annual revolution, incline twice towards the ecliptic, and twice return to its former poſition: on which mutation it is, that the preceſſion of the equinoctial points is ſuppoſed to depend.

Earth, *Latitude and Longitude of the*. See Latitude and Longitude.

Earth, *Inclination of the Axis of the*. See Inclination, Axis, and Angle.

Earth, *Quantity of matter, denſity, and attractive power at its ſurface*. See Density and Planets.

EARTHED *ſugar*. See Sugar.

EARTHEN *floors*. See Floor.

EARTHING, in the general ſenſe. See Interrment.

Earthing, in *Agriculture* and *Gardening*, denotes the covering of vines, celery, and other ſhrubs and plants with *earth*.

EARTHQUAKE, in *Natural Hiſtory*, a vehement ſhake, or agitation of ſome conſiderable place or part of the earth, from natural cauſes, attended with a terrible noiſe like thunder, and frequently with an eruption of water or fire, or elſe of ſmoke or winds.

Earthquakes are the greateſt and moſt formidable phenomena of nature. Ariſtotle and Pliny diſtinguiſh two kinds with reſpect to the manner of the ſhake, viz. a *tremor* and a *pulſe*; the firſt being horizontal, in alternate vibrations, compared to the ſhaking of a perſon in an ague; the ſecond perpendicular, up and down; which latter kind are alſo called by Ariſtotle, βρασσαι, from the reſemblance of their motion to that of boiling.

Earthquakes, *Phenomena of*. The Philoſoph. Tranſact. furniſh us with abundance of hiſtories of *earthquakes*; particularly, on at Oxford in 1665, by Dr. Wallis and Mr. Boyle. Another at the ſame place in 1683, by Mr. Pigot. And another in Sicily in 1692-3, by Mr. Hartop, Fa. Aleſſandro Burgos, and Vin Bonajutus, which laſt is one of the moſt terrible ones in all hiſtory.

This ſhook the whole iſland; and not only that, but Naples and Malta ſhared in the ſhock. It was of the ſecond kind mentioned by Ariſtotle and Pliny, viz. a perpendicular pulſation or ſucceſſion. It was impoſſible, ſaid the noble Bonajutus, for any body in this country to keep on their legs on the dancing earth; nay, thoſe that lay on the ground were toſſed from ſide to ſide as on a rolling billow, and high walls leaped from their foundations ſeveral paces, &c. Phil. Tranſ. N° 207. The miſchief it did is amazing; almoſt all the buildings in the countries were thrown down. Fifty-four cities and towns, beſide an incredible number of villages, were either deſtroyed or greatly damaged. We ſhall only inſtance the fate of Catania, one of the moſt famous, ancient, and flouriſhing cities in the kingdom, the reſidence of ſeveral monarchs, and an univerſity. This once famous, now unhappy Catania, to uſe the words of Fa. Burgos, had the greateſt ſhare in the tragedy. F. Anton Serrovita being on his way thither, and at the diſtance of a few miles, obſerved a black cloud like night, hovering over the city; and there aroſe from the mouth of Montgibello great ſpires of flame, which ſpread all around. The ſea, all of a ſudden, began to roar, and riſe in billows; and there was a noiſe as if all the artillery in the world had been at once diſcharged. The birds flew about aſtoniſhed; the cattle in the fields ran crying, &c. His and his companions horſes ſtopped ſhort, trembling; ſo that they were forced to alight. They were no ſooner off, but they were lifted from the ground above two palms; when caſting his eyes towards Catania, he with amazement ſaw nothing but a thick cloud of duſt in the air. This was the ſcene of their calamity; for of the magnificent Catania, there was not the leaſt footſtep to be ſeen. S. Bonajutus aſſures us, that of 18914 inhabitants, 18000 periſhed therein. The ſame author, from a computation of the inhabitants, before and after the *earthquake*, in the ſeveral cities and towns, finds that near 60000 periſhed out of 254900. Ibid. N° 202.

Jamaica is remarkable for *earthquakes*. The inhabitants, Dr. Sloane informs us, expect one every year. This author gives us the hiſtory of one in 1687; and another horrible one in 1692, is deſcribed by ſeveral anonymous authors. In two minutes time this ſhook down and drowned nine tenths of the town of Port-Royal. The houſes ſunk out-right, 30 or 40 fathoms deep. Phil. Tranſact. N° 209. The earth opening, ſwallowed up people; and they roſe in other ſtreets, ſome in the middle of the harbour; and yet many were ſaved, though there were 2000 people loſt, and 1000 acres of land ſunk. All the houſes were thrown down throughout the iſland. One Hopkins had his plantation removed half a mile from its place. Of all wells, from one fathom to ſix or ſeven, the water flew out at the top with a vehement motion. While the houſes on one ſide of the ſtreet were ſwallowed up, on the others they were thrown on heaps; and the ſand in the ſtreet roſe like waves in the ſea, lifting up every body that ſtood on it, and immediately dropping down into pits; and at the ſame inſtant a flood of water breaking in, rolled them over and over; ſome catching hold of beams and rafters, &c. Ships and ſloops in the harbour were overſet and loſt; the Swan frigate, particularly, was thrown over by the motion of the ſea and ſinking of the wharf, and was driven over the tops of many houſes. It was attended with a hollow rumbling noiſe like that of thunder. In leſs than a minute, three quarters of the houſes, and the ground they ſtood on, with the inhabitants, were all ſunk quite under water; and the little part left behind was no better than a heap of rubbiſh. The ſhake was ſo violent, that it threw people down on their knees or their faces as they were running about for ſhelter. The ground heaved and ſwelled like a rolling ſea; and ſeveral houſes, ſtill ſtanding, were ſhuffled and moved ſome yards out of their places. A whole ſtreet is ſaid to be twice as broad now as before; and in many places, the earth would crack, and open and ſhut, quick and faſt. Of which openings, two or three hundred might be ſeen at a time; in ſome whereof, the people were ſwallowed up; others, the earth cloſing, were caught by the middle, and preſſed to death; as to others, the heads only appeared. The larger openings ſwallowed up houſes; and out of ſome would iſſue whole rivers of waters, ſpouted up a great height into the air, and threatening a deluge to that part the *earthquake* ſpared. The whole was attended with ſtenches and offenſive ſmells, the noiſe of falling mountains at a diſtance, &c. and the ſky in a minute's time was turned dull and reddiſh like a glowing oven. Yet, as great a ſufferer as Port Royal was, more houſes were left ſtanding therein than on the whole iſland beſide. Scarce a planting-houſe or ſugar-work was left ſtanding in all Jamaica. A great part of them were ſwallowed up, houſes, people, trees, and all at once; in lieu of which, afterwards, appeared great pools of water, which, when dried up, left nothing but ſand, without any mark that ever tree or plant had been thereon. Above 12 miles from the ſea, the earth gaped, and ſpouted out with a prodigious force vaſt quantities of water into the air; yet the greateſt violences were among the mountains and rocks; and it is a general opinion, that the nearer the mountains the greater was the ſhake; and that the cauſe thereof lay there. Moſt of the rivers were ſtopped up for 24 hours, by the falling of the mountains, till ſwelling up, they made themſelves new tracts and channels, tearing up in their paſſage trees, &c. After the great ſhake, many of thoſe people who eſcaped got on board ſhips in the harbour, where many continued above two months; the ſhakes all that time being ſo violent, and coming ſo thick, ſometimes two or three in an hour, accompanied with frightful noiſes like a ruſtling wind, or a hollow rumbling thunder, with brimſtone-blaſts, that they durſt not come aſhore. The conſequence of the *earthquake* was a general ſickneſs, from the noiſome vapours belched forth, which ſwept away above 3000 perſons of thoſe who were left. Ibid.

After the detail of theſe horrible convulſions, the reader will have but little curioſity left for the phenomena of the *earthquake* at Lima in 1687, deſcribed by Fa. Alvarez de Toledo, wherein above 5000 perſons were deſtroyed; this being of the vibratory kind, ſo that the bells in the church rung of themſelves; or that at Batavia, in 1699, by Witzen; that in the north of England, in 1703, by Mr. Thoreſby; thoſe in New-England in 1663 and 1670, by Dr. Mather; that of Italy in 1742; that of Lima and the port of Callas in Peru, in 1746, which laſted 15 minutes, and deſtroyed moſt of the buildings in the city, deſtroyed moſt of the inhabitants, and ſwallowed up ſeveral ſhips then in the port; that of London in 1749; thoſe in 1750, felt in many parts of England; that of 1777, felt in the north of England; or laſtly, that at Liſbon in 1755: though this deſerves a more particular account than many others of much leſs conſiderable extent and duration. The three preceding years had been remarkably dry, inſomuch, that ſome ſprings which had been plentifully ſupplied with water were totally loſt; and the predominant winds were eaſt and north-eaſt, accompanied with various, though very ſmall motions and tremblings of the earth. The ſpring of the year 1755 was very rainy and wet; the weather on the day preceding the *earthquake*, which happened on the 1ſt of November, was clear, and uncommonly warm for the ſeaſon, and had continued clear and rather warmer than uſual for ſeveral days before. The day of the *earthquake* broke with a ſerene ſky, the wind continuing at eaſt; but about 9 o'clock the ſun began to grow dim; and ſoon after was heard a rumbling noiſe, like that of carriages, which increaſed to ſuch a degree as to equal that of the loudeſt cannon; upon which the firſt ſhock was felt, which was immediately ſucceeded by a ſecond and third, the whole duration of which was about 8 minutes; about 12 o'clock another ſhock was felt. During the firſt ſhock, the greateſt part of the public edifices and other buildings of the city were thrown down; and not leſs than 60000 of its inhabitants buried in the ruins. The earth opened in fiſſures in ſeveral parts, and ſeveral light flames of fire were obſerved to iſſue from the ſides of the mountains reſembling thoſe of kindled charcoal. Subterraneous rumblings were alſo felt, attended with a diſcharge of great quantities of ſmoke. The water in the ſea roſe ſeveral times, and in a few minutes made three fluxes and re-fluxes, riſing above the greateſt ſpring-tides no leſs than 15 Engliſh feet. The ſhock was ſo violent 50 leagues off at ſea, as greatly to injure the deck of a ſhip, and to lead the captain to apprehend, that he had miſtaken his reckoning, and ſtruck on a rock. The ſhock was alſo felt about the ſame time at Oporto, by which the whole city was ſhaken, ſeveral chimnies, ſtones, and croſſes, were thrown down, and ſome buildings opened at top; and the ſwelling in the river was ſo conſiderable, that two large ſhips, which were juſt got over the bar, were driven back into the harbour. The ſame ſhock was equally violent at Madrid, Seville, and Cadiz; and in this laſt place the ſea roſe in a wave at leaſt 60 feet higher than uſual, daſhed againſt the rocks on the weſt part of the town, and againſt the walls with ſuch violence as to beat in the breaſt-work and a great part of the walls, ſo that ſeveral perſons were drowned by it. The day when the *earthquake* happened at Cadiz was as clear and ſerene as the fineſt ſummer-day in England. Many other cities, both in Spain and Portugal, were conſiderably damaged. The effects of this *earthquake*, in violently agitating the waters, were perceived in many parts of England, Scotland, and Ireland; and the ſhock not only reached to Switzerland, Holland, and other parts of Europe, but it was communicated to Africa, and deſtroyed ſeveral cities on the coaſt of Barbary; and it was alſo felt about the ſame time in the iſland of Madeira, where the water roſe full 15 feet perpendicular above high-water mark. See Phil. Tranſ. N° 462, 463. 497; or vol. xlvi. p. 601, &c. vol. xlix. art. lviii. p. 351.—444.

M. Lomonſow preſented a paper to the Royal Academy of Sciences at Paris in 1758, in which he endeavours to ſhew, that the formation of metals is a neceſſary conſequence of *earthquakes*. He ſuppoſes that the fire, occaſioned by the ſulphureous matter with which the interior parts of the earth abound, acts on the foſſile ſubſtances and the vegetable ſalts contained in them and depoſited in the cavities of the earth, and reduces the whole into a mineral ſtate; and that the minerals diſſolved by the fire are diſtributed into beds and veins, as they are found to exiſt in the mine.

We will now relieve the reader after this long account, with ſome attempts towards a theory of *earthquakes*.

EARTHQUAKES, *Cauſes of*. Naturaliſts are here divided. Some aſcribe *earthquakes* to water, others to fire, and others to air; and all of them with ſome reaſon. To conceive which, it is to be obſerved, that the earth every where abounds with huge ſubterraneous caverns, veins, and canals, particularly about the roots of mountains; that of theſe cavities, veins, &c. ſome are full of water, whence are compoſed gulphs, abyſſes, ſprings, rivulets; and others full of exhalations; and that ſome parts of the earth are replete with nitre, ſulphur, bitumen, vitriol, &c.

This premiſed, 1. The earth itſelf may be the cauſe of its own ſhaking; when the roots, or baſis of ſome large maſs being diſſolved, or worn away by a fluid underneath, it ſinks into the ſame; and, with its weight, occaſions a tremor of the adjacent parts, and produces a noiſe, and frequently an inundation of water.

2. The ſubterraneous waters may occaſion *earthquakes*, by their overflowing, cutting out new courſes, &c. Add, that the water, being heated, and rarefied by the ſubterraneous fires, may emit fumes, blaſts, &c. which, by their action, either on the water, or immediately on the earth itſelf, may occaſion great ſuccuſſions.

3. The air may be the cauſe of *earthquakes*; for air being a collection of fumes and vapours raiſed from the earth and water, if it be pent up in the too narrow viſcera of the earth, the ſubterraneous, or its own native heat, rarefying and expanding it, the force wherewith it endeavours to eſcape may ſhake the earth: hence there will ariſe a diverſe ſpecies of *earthquakes*, according to the different poſition, quantity, &c. of the impriſoned air.

Laſtly, Fire is a principal cauſe of *earthquakes*; both as it produces the aforeſaid ſubterraneous aura or vapour; and as this aura or ſpirit, from the different matter and compoſition whereof ariſe ſulphur, bitumen, and other inflammable matters, is kindled either from ſome other fire it meets with, or from its colliſion againſt hard bodies, or its intermixture with other fluids; by which means burſting out into a greater compaſs, the place becomes too narrow for it; ſo that preſſing againſt it on all ſides, the adjoining parts are ſhaken; till, having made itſelf a paſſage, it ſpends itſelf in a volcano, or burning mountain.

But to come nearer to the point, Dr. Liſter, in Philoſoph. Tranſact. N° 157, is of opinion, that the material cauſe of thunder, lightning, and *earthquakes*, is one and the ſame, viz. the inflammable breath of the pyrites, which is a ſubſtantial ſulphur, and will take fire of itſelf. For the true theory of lightning, &c. ſee LIGHTNING.

The difference between theſe three terrible phenomena, he takes only to conſiſt in this: that this ſulphur in the former is fired in the air; and in the latter, underground; which is a notion that Pliny had long before him: *quid enim*, ſays he, *aliud eſt in terra tremor, quam in nube tonitru?*

This he thinks abundantly indicated by the ſame ſulphureous ſmell being found in any thing burnt with lightning, and in the waters, &c. caſt up in *earthquakes*, and even in the air before and after them.

Add, that they agree in the manner of the noiſe; which is carried on as in a train, fired; the one rolling and rattling through the air, takes fire as the vapours chance to drive; as the other fired under-ground, in like manner, moves with a deſultory noiſe.

Thunder, which is the effect of the trembling of the air, cauſed by the ſame vapours diſperſed through it, has force enough to ſhake our houſes; and it is by no means improbable that there may be thunder and lightning under-ground, in ſome vaſt repoſitories there; eſpecially if we reflect, that the matter which compoſes the noiſy vapour above us is contained in much larger quantities under-ground. Philoſophical Tranſactions, N° 202.

That the earth abounds in cavities, every body allows; and that theſe ſubterraneous cavities are, at certain times, and in certain ſeaſons, full of inflammable vapours, the damps in our mines ſufficiently witneſs; which, fired, do every thing as in an *earthquake*, only in a leſſer degree.

That the pyrites alone, of all the known minerals, yields this inflammable vapour, is highly probable; becauſe no mineral or ore whatſoever is ſulphureous, but as it is wholly or in part a pyrites; and there is but one ſpecies of brimſtone, at leaſt with us in England, which the pyrites naturally and only yields. The ſulphur vive or natural brimſtone, which is found in and about the burning mountains, is certainly the effect of ſublimation; and thoſe great quantities of it ſaid to be found about the ſkirts of volcanos, are only an argument of the long duration and vehemence of thoſe fires. Poſſibly, the pyrites of the volcanos, or burning mountains, may be more ſulphureous than ours; and indeed it is plain, that ſome of ours in England are very lean, and hold but little ſulphur; others again very much, which may be one reaſon why England is ſo little troubled with *earthquakes*; and Italy, and almoſt round the Mediterranean ſea, ſo very much; though another reaſon is, the paucity of pyrites in England, compared with thoſe places. Comparing our *earthquakes*, thunder and lightning, with theirs, it is obſerved, that there it lightens almoſt daily, eſpecially in ſummer-time, here ſeldom; there thunder and lightning are of long duration, here they are ſoon over; there the *earthquakes* are frequent, long, and terrible, with many paroxyſms in a day, and thus renewed for many days; here they are very ſhort, only of a few minutes, and ſcarce perceptible. To this purpoſe, the ſubterraneous cavities in England are ſmall and few, compared with the vaſt vaults in thoſe parts of the world, which is evident, from the ſudden diſappearance of whole mountains and iſlands.

Dr. Woodward gives us another theory of *earthquakes*. He endeavours to ſhew, that the ſubterraneous heat or fire (which is continually elevating water out of the abyſs to furniſh the earth with rain, dew, ſprings, and rivers) being ſtopped in any part of the earth, and ſo diverted from its ordinary courſe by ſome accidental glut or obſtruction in the pores or paſſages through which it uſed to aſcend to the ſurface, becomes by ſuch means, preternaturally aſſembled in a greater quantity than uſual, into one place, and therefore cauſeth a great rarefaction aad intumeſcence of the water of the abyſs, putting it into great commotions and diſorders, and at the ſame time making the like effort on the earth; which, being expanded upon the face of the abyſs, occaſions the agitation and concuſſion which we call an *earthquake*.

This effort, in ſome *earthquakes*, he obſerves, is ſo vehement that it ſplits and tears the earth, making cracks and chaſms in it ſome miles in length, which open at the inſtants of the ſhocks, and cloſe again at the intervals betwixt them; nay, it is ſometimes ſo violent, that it forces the ſuper-incumbent ſtrata, breaks them all throughout, and thereby perfectly undermines and ruins the foundation of them; ſo that theſe failing, the whole tract, as ſoon as the ſhock is over, ſinks down into the abyſs, and is ſwallowed up by it; the water thereof immediately riſing up, and forming a lake in the place where the ſaid tract before was. That this effort being made in all directions indifferently, the fire dilating and expanding on all hands, and endeavouring to get room, and making its way through all obſtacles, acts as violently on the water of the abyſs beneath as on the earth above, forcing it forth which way ſoever it can find vent or paſſage, as well through its ordinary exits, wells, ſprings, and the outlets of rivers, as through the chaſms then newly opened, through the camini or ſpiracles of Ætna, or other neighbouring volcanos; and thoſe hiatuſes at the bottom of the ſea, whereby the abyſs below opens into it, and communicates with it. That as the water reſident in the abyſs is, in all parts of it, ſtored with a conſiderable quantity of heat, and more eſpecially in thoſe where theſe extraordinary aggregations of this fire happen; ſo likewiſe is the water, which is thus forced out of it; inſomuch that, when thrown forth and mixed with the waters of wells, or ſprings of rivers, and the ſea, it renders them very ſenſibly hot.

He adds, that though the abyſs be liable to theſe commotions in all parts, yet the effects are no where very remarkable, except in thoſe countries which are mountainous, and conſequently ſtony and cavernous underneath; and eſpecially where the diſpoſition of the ſtrata is ſuch, that thoſe caverns open into the abyſs, and ſo freely admit and entertain the fire, which aſſembling therein, is the cauſe of the ſhock; it naturally ſteering its courſe that way, where it finds the readieſt reception, which is towards thoſe caverns. Beſides, that thoſe parts of the earth which abound with ſtrata of ſtone, or marble, making the ſtrongeſt oppoſition to this effort, are the moſt furiouſly ſhattered, and ſuffer much more by it than thoſe which conſiſt of gravel, ſand, and the like laxer matter, which more eaſily give way, and make not ſo great reſiſtance; but, above all, thoſe countries which yield great ſtore of ſulphur and nitre, are by far the moſt injured and incommoded by *earthquakes*; thoſe minerals conſtituting in the earth a kind of natural gunpowder, which taking fire upon this aſſemblage and approach of it, occaſions that murmuring noiſe or ſubterraneous thunder which is heard rumbling in the bowels of the earth during *earthquakes*; and, by the aſſiſtance of its exploſive power, renders the ſhock much greater, ſo as ſometimes to make miſerable havock and deſtruction.

And it is for this reaſon that Italy, Sicily, Anatolia, and ſome parts of Greece, have been ſo long and ſo often alarmed and haraſſed by *earthquakes*; theſe countries being all mountainous and cavernous, abounding with ſtone and marble, and affording ſulphur and nitre in great plenty.

It is obſerved, that Ætna, Veſuvius, Hecla, and the other volcanos, are only ſo many ſpiracles ſerving for the diſcharge of this ſubterraneous fire, when it is thus preternaturally aſſembled: that where there happens to be ſuch a ſtructure and conformation of the interior parts of the earth, as that the fire may paſs freely and without impediment from the caverns wherein it aſſembles unto thoſe ſpiracles; it then readily and eaſily gets out, from time to time, without ſhaking or diſturbing the earth; but where ſuch communication is wanting, or the paſſage is not ſufficiently large and open, ſo that it cannot come at the ſpiracles, it heaves up and ſhakes the earth with greater or leſs impetuoſity, according to the quantity of fire thus aſſembled, till it has made its way to the mouth of the volcano: that therefore there are ſcarce any countries much annoyed with *earthquakes*, which have not one of theſe fiery vents, conſtantly in flames when any *earthquake* happens, as diſgorging that fire, which, whilſt underneath, was the cauſe of the diſaſter: laſtly, that were it not for theſe diverticula, it would rage in the bowels of the earth much more furiouſly, and make greater havock than it doth.

Having thus ſhewn how fire and water contribute to the phænomena of *earthquakes*; let us next conſider the effects of air.

M. Amontons, in the Memoires de l'Acad. des Sciences, an. 1703, has an expreſs diſcourſe to prove, that on the foundation of the new experiments of the weight and ſpring of the air, a moderate degree of heat may bring the air into a condition capable of cauſing *earthquakes*. See AIR, *Elaſticity of*.

The ingenious Mr. Michell has publiſhed an elaborate paper of conjectures concerning the cauſe, and of obſervations on phenomena of the *earthquakes*. He ſuppoſes that they are occaſioned by ſubterraneous fires; which, if a large quantity of water ſhould be let out upon them ſuddenly, may produce a vapour, whoſe quantity and elaſtic force may be fully ſufficient for this purpoſe. The facts by which he ſupports this hypotheſis are the following: 1. The ſame places are ſubject to returns of *earthquakes*, not only at ſmall intervals for ſome time after any conſiderable one has happened, but alſo at greater intervals of ſome ages; and theſe, he apprehends, are very conſiſtent with the cauſe aſſigned. Since ſubterraneous fires, as well as volcanos, which they nearly reſemble, may be reaſonably ſuppoſed, and are found in fact to ſubſiſt for many ages, and may produce their effect, like the raging of volcanos, at unequal intervals, and with unequal degrees of force. 2. Thoſe places that are in the neighbourhood of burning mountains are always ſubject to frequent *earthquakes*; and the eruptions of thoſe mountains, when violent, are generally attended with them; and this is a conſideration, he ſays, which affords a ſtrong argument of their proceeding from a cauſe of the ſame kind; more eſpecially, as the earth is compoſed of ſeveral regular ſtrata, which are very extenſive, and lie more inclining from the mountainous countries than the countries themſelves. Hence he infers, that thoſe ſtrata of combuſtible materials which break out in volcanos on the tops of hills, are to be found at a conſiderable depth under-ground in the level and low countries near them; and if the ſame ſtrata ſhould be on fire in any places under ſuch countries as well as the tops of hills, all vapours of whatſoever kind, raiſed from theſe fires, muſt be pent up, unleſs ſo far as they can open for themſelves a paſſage between the ſtrata; whereas the vapours raiſed from volcanos find a vent, and are diſcharged in blaſts from the mouths of them; and yet when they find a vent, they are capable of ſhaking the country to the diſtance of ten or twenty miles round; what then may we not expect from them when they are confined? Thus Mr. Michell accounts for the fact, that the moſt extenſive *earthquakes* take their riſe from the level and low countries; and more eſpecially from the ſeas, which are waters covering ſuch countries. 3. The motion of the earth in *earthquakes* is partly tremulous and partly propagated by waves, which ſucceed one another ſometimes at larger and ſometimes at ſmaller diſtances; and this latter motion is generally propagated much farther than the former. Both theſe phænomena, it is obſerved, may be accounted for by the ſuppoſition, that *earthquakes* are cauſed by vapours raiſed from waters ſuddenly let out on ſubterraneous fires. As a ſmall quantity of vapour almoſt inſtantly generated at ſome conſiderable depth below the ſurface of the earth; ſo a very large quantity (whether generated inſtantly, or in any ſmall portion of time) will produce a wave-like motion. A large quantity of vapour may be conceived to raiſe the earth in a wave as it paſſes between the ſtrata, which it may eaſily ſeparate in an horizontal direction, there being, as it is ſuppoſed, little or no coheſion between one ſtratum and another. Thus, if a large quantity of vapour ſhould continue to be generated for ſome time, ſeveral waves might be produced by it. The vibratory motion, occaſioned by the firſt impulſe of the vapour, being propagated through the ſolid parts of the earth, will much ſooner become too weak to be perceived than the wave-like motion, occaſioned by the vapour inſinuating itſelf between the ſtrata, and capable of being propagated to very great diſtances. 4. *Earthquakes* generally come to one and the ſame place from the ſame point of the compaſs; and their velocity is much the ſame; whereas the velocity of *earthquakes* of different countries is very different; i. e. *earthquakes* derived from the ſame ſubterraneous fire muſt come to the ſame place in the ſame direction; and thoſe only which are derived from different fires will come from different points of the compaſs. 5. The great Liſbon *earthquake* has been ſucceeded by ſeveral local ones ſince, the extent of which has been much leſs: the vapour produced by one ſubterraneous fire diſtributing the materials over ſome other fire. For a more particular account of Mr. Michell's theory, and of the various facts which he alleges in illuſtration and ſupport of it, we muſt refer to Phil. Tranſ. vol. li. art. 55. p. 566—634.

EARTHQUAKES, *the theory of*, hath received conſiderable alteration and improvement from modern electrical diſcoveries. The firſt perſon who advanced the notion, that *earthquakes* were probably cauſed by electricity, was Dr. Stukeley, on occaſion of thoſe that happened in England in the years 1749 and 1750. He urges a variety of objections againſt the common hypotheſis, which aſcribes *earthquakes* to ſubterraneous winds, fires, vapours, or any thing that occaſions an exploſion, and thus heaves up the ground. He thinks there is no evidence of the cavernous ſtructure of the earth, which this hypotheſis requires; but that on the contrary, there is reaſon to believe that it is in a great meaſure ſolid. *Earthquakes* have alſo frequently happened without any eruption of fire, vapour, ſmoke, or ſmell, which he thinks is utterly inconſiſtent with the ſuppoſition of their being occaſioned by any ſubterraneous vapours; eſpecially in caſes where the ſhock is of conſiderable extent; beſides, this is a cauſe altogether inadequate to ſuch an effect; for a ſubterraneous power capable of moving a ſurface of earth only thirty miles in diameter, muſt be lodged at leaſt fifteen or twenty miles below the ſurface, and move an inverted cone of ſolid earth, whoſe baſe is thirty miles in diameter, and axis fifteen or twenty miles, which he judges to be abſolutely impoſſible; how much more inconceivable, then, that any ſuch power could produce the *earthquake* of 1755, which was felt in various parts of Europe and Africa, and the Atlantic Ocean; or that of Aſia Minor, A. D. 17, by which thirteen great cities were deſtroyed in one night, and which ſhook a maſs of earth three hundred miles in diameter, in order to which the moving power, if it had been internal fire or vapour, muſt have been lodged two hundred miles below the ſurface! Farther, in *earthquakes* the effect is inſtantaneous; whereas the operation of elaſtic vapour and the diſcharge of it muſt be gradual, and require a long ſpace of time; and if they were owing to exploſions, they muſt alter the ſurface of the country where they happened, deſtroy the fountains and ſprings, and change the courſe of its rivers, which is contradicted by hiſtory and obſervation. To all which it is added, that the ſtrokes which ſhips receive during an *earthquake* muſt be occaſioned by ſomething that could communicate motion with a much greater velocity than any heaving of the earth under the ſea by the elaſticity of generated vapours, which would only produce a gradual ſwell, and not an impulſe of the water, reſembling a thump againſt the bottom of a ſhip or ſtriking againſt a rock. Dr.

Stukeley, finding the common hypotheſis inſufficient, was led to conclude, that *earthquakes* were proper electrical ſhocks; and a particular ſurvey of the phenomena that either precede or attend them, confirmed this opinion: he obſerved, that the weather was uſually dry and warm for ſome time before an *earthquake* happened, and that the ſurface of the ground is thus previouſly diſpoſed for that kind of electrical vibration in which it conſiſts; whilſt at the ſame time, in ſome places where *earthquakes* have happened, the internal parts, at a ſmall depth below the ſurface, are moiſt and boggy; and thence he infers, that they reach very little below the ſurface. He adds, that the ſouthern regions are more ſubject to *earthquakes* than the northern, on account of the greater warmth and dryneſs of the earth and air, which are qualities ſo neceſſary to electricity. It was alſo obſerved, that before the *earthquakes* at London in 1749, all vegetables were remarkably forward, and electricity is well known to quicken vegetation. They were likewiſe preceded by frequent and ſingular appearances of the *aurora borealis*, and *auſtralis*, and by a variety of other meteors which indicate an electrical ſtate of the atmoſphere. Dr. Stukeley apprehends, that, in this ſtate of the earth and air, nothing more is neceſſary to produce an *earthquake* than the approach of a non-electric cloud to any part of the earth, when in an highly electrified ſtate, and the diſcharge of its contents upon it; and that as the diſcharge from an excited tube occaſions a commotion in the human body, ſo the ſhock, produced by the diſcharge between the cloud and many miles in compaſs of ſolid earth, muſt be an *earthquake*, and the ſnap from the contact be the noiſe attending it. He ſuppoſes, that a large black cloud which ſuddenly covered the hemiſphere a little before the *earthquake* of 1749, might have occaſioned the ſhock, by the diſcharge of a ſhower. The noiſe, it has been obſerved, uſually precedes the ſhock; whereas, if the concuſſion depended upon a ſubterraneous eruption, it muſt have been quite the contrary. The flames and ſulphureous ſmells which ſometimes attend *earthquakes*, are more eaſily accounted for, as Dr. Stukeley thinks, from the ſuppoſition of their being electrical phenomena than on any other hypotheſis. The ſudden, extenſive agitation, both of land and water, occaſioned by *earthquakes*, can only be effected by electricity. The little damage generally done by *earthquakes*, and the nature of the impulſe which they give to ſhips, already taken notice of, ſuggeſt an argument, that they are owing not to any convulſion in the bowels of the earth, but to an uniform vibration along its ſurface, occaſioned by an electrical ſnap; and that they are electrical phenomena, Dr. Stukeley farther infers, from their chiefly affecting the ſea-coaſt, places near rivers; we may add alſo, eminences; and finally from the effects which they produce on weak conſtitutions, ſuch as pains in the back, head-achs, colics, &c. ſimilar to thoſe occaſioned ſometimes by electrification. After all, he does not preſume to ſay, how the earth and atmoſphere are put into that electrical and vibratory ſtate, which prepares them to give or receive that ſnap and ſhock, which is called an *earthquake*; but this he thinks as difficult to account for as magnetiſm, gravitation, muſcular motion, and many other ſecrets in nature. Several circumſtances have been remarked by other writers, which confirm the theory that ſuppoſes *earthquakes* to be electrical phenomena. Signior Beccaria, whoſe name often occurs in the hiſtory of electricity, agrees with Dr. Stukeley, in ſuppoſing, that *earthquakes* are electrical phenomena; but he imagines, that the electric matter which occaſions them is lodged deep in the bowels of the earth; and if in this ſituation its equilibrium ſhould by any means be deſtroyed, ſo that the beſt method of reſtoring it ſhall be by the fluid's burſting its way into the air, and traverſing ſeveral miles of the atmoſphere to come to the place where it is wanted; it may eaſily be conceived, that violent concuſſions may be given to the earth, by the ſudden paſſages of this powerful agent; and that the electric fluid is ſometimes collected in the bowels of the earth, he thinks probable from the appearance of *ignes fatui* in mines, which ſometimes happens, and is very probably an electrical phenomenon. This ingenious philoſopher obſerves, that if two pieces of glaſs, incloſing a thin piece of metal, be held in the hand, while a large ſhock is ſent through them, a ſtrong concuſſion or vibration will be felt, which ſometimes breaks them to pieces. Mr. Henly, another excellent electrician, has diſcovered a method of increaſing the effect of the exploſion upon glaſs, ſo as to afford a very natural idea of an *earthquake*. Between the ends of two wires, laid on a piece of glaſs, with their extremities pointing to each other, and about an inch diſtant, through which the diſcharge is to be made, he places a thick piece of ivory upon the glaſs, and on the ivory a weight at pleaſure, from one-fourth of an ounce to ſix pounds; the glaſs is broken by an exploſion into innumerable fragments, and ſome of it is reduced into an impalpable powder: the weight is ſhook by the exploſion, and ſometimes thrown off from the ivory. In this experiment, if the glaſs is very thick, ſo that the force of the exploſion is not ſufficient to break it, it will be found marked with the moſt lively priſmatic COLOURS. The appearance of an *earthquake* may be alſo repreſented by cauſing the exploſion of a battery to paſs over the ſurface of any ſubſtances on which ſmall ſticks or cards are placed, which will never fail to be ſhook, and often be thrown down by the exploſion; or, by making a diſcharge over the ſurface of water, in which caſe the report will be much louder than when the diſcharge is made through the air; and a hand plunged deep into the water will feel the concuſſion; and we may add, that the ſpark which paſſes over the ſurface of the water in this experiment, bears a great reſemblance to thoſe balls of fire that have ſometimes been ſeen over the ſurface of the ſea or land in the time of an *earthquake*. Dr. Prieſtley contrived various methods of exhibiting the phenomena of *earthquakes*. He made the electric flaſh to paſs over wet boards ſwimming in water, over either of theſe ſeparately, or over both at once, on which pillars, &c. were erected; and thus, whilſt the board repreſented the earth, and the water the ſea, the phenomena of both during an *earthquake* were exhibited at the ſame time. Dr. Prieſtley, the ingenious hiſtorian of electricity, after having largely recited the obſervations of Dr. Stukeley and Signior Beccaria on the ſubject of *earthquakes*, of which we have given a ſummary in the foregoing part of this article, does not abſolutely decide which of theſe two philoſophers has advanced the more probable opinion concerning the ſeat of the electric matter which occaſions *earthquakes*; but he thinks a more probable general hypotheſis than either of them may be formed out of them both. Suppoſe, ſays he, the electric matter to be ſome way or other accumulated on one part of the ſurface of the earth, and, on account of the dryneſs of the ſeaſon, not eaſily to diffuſe itſelf; it may, as Signior Beccaria ſuppoſes, force itſelf a way into the higher regions of the air, forming clouds in its paſſage out of the vapours which float in the atmoſphere, and occaſion a ſudden ſhower, which may farther promote the paſſage of the fluid. The whole ſurface thus unloaded, will receive a concuſſion, like any other conducting ſubſtance, on parting with, or receiving, a quantity of the electric fluid. The ruſhing noiſe will likewiſe ſweep over the whole extent of the country. And, upon this ſuppoſition alſo, the fluid, in its diſcharge from the country, will naturally follow the courſe of the rivers, and alſo take the advantage of any eminences, to facilitate its aſcent into the higher regions of the air. See farther on this ſubject, Phil. Tranſ. vol. xli. p. 641, &c. Beccaria Lettre dell'Electriciſmo, p. 216. 362, &c. or Prieſtley's Hiſt. of Electricity, Period. x. ſect. 12.

EARTHQUAKES, *Artificial*. Chemiſtry furniſhes us with a method of making *artificial earthquakes*, which ſhall have all the great effects of natural ones; which, as it may illuſtrate the proceſs of nature in the production of theſe terrible phenomena under-ground, we ſhall here add:

To twenty pounds of iron-filings, add as many of ſulphur; mix, work, and temper the whole together with a little water, ſo as to form a maſs of the conſiſtence of a firm paſte. This being buried three or four feet underground, in ſix or ſeven hours time will have a prodigious effect; the earth will begin to tremble, crack, and ſmoke, and fire and flame will burſt through.

Such is the effect even of two cold bodies in cold ground; and there only wants a ſufficient quantity of this mixture to produce a true Ætna. If it were ſuppoſed to burſt out under the ſea, it would produce a water-ſpout; and if it were in the clouds, the effect would be thunder and lightning. However, *water*-SPOUTS and LIGHTNING are without doubt electrical phenomena.

EARTHWORM, *lumbricus*, in *Zoology*, a well known inſect, belonging to the genus of *inteſtines*, containing the parts of generation of both ſexes in each individual; long, deſtitute of feet, and of a reddiſh colour; of an oblong form, conſiderably thick, rounded in ſhape, and covered with a ſoft and ſlender ſkin, marked with annular ridges and furrows. When full grown, it is often ten inches or more in length, and more than a third of an inch in diameter. Its colour is a duſky red.

It is common every where, at little depths, under the ſurface of the earth; it is not unfrequently alſo met with in the human inteſtines, as well as in thoſe of other animals, in which ſtate it has been ſuppoſed a different creature, and called by a new name.

Beſides the common *earthworm*, there is found another ſpecies of *lumbricus* in the mud about the ſea-ſhores, very large, growing very often to a foot or more in length; it entirely reſembles the other, only that it is of a paler red, and has its ſkin covered with little prominences, which make it rough and ſcabrous to the touch.

Earthworms are by ſome eſteemed of great virtue in medicine, and are ſaid to be diuretic, diaphoretic, and anodyne; as alſo diſcutient, emollient, and openers of obſtructions; and are preſcribed in apoplexies, ſpaſms, and all nervous affections, and in the jaundice, dropſies, and colics.

EASE, in the *Sea-language*, ſignifies as much as ſlacken or let go ſlacker.

Thus they ſay, *eaſe* the bowling, *eaſe* the ſheet; that is, let them go ſlacker.

EASE *the ſhip*, in *Sea-language*, is the command given by the pilot to the ſteerſman, to put the helm cloſe to the lee-ſide; or *hard-a-lee*, when the ſhip is expected to pitch or plunge her fore-part deep in the water while cloſe-hauſed.

EASE, *Chapel of*. See CHAPEL.

EASEL-PIECES, among *Painters*, ſuch ſmaller pieces, either portraits or landſcapes which are painted on the *eaſel*, i. e. the frame whereon the canvaſs is laid.

They are thus called, to diſtinguiſh them from larger pictures drawn on walls, cielings, &c.

EASEMENT, in *Law*, a ſervice or convenience which one neighbour has of another by charter or preſcription, without profit; as a way through his ground, a ſink, or the like.

In the civil law, *eaſements* are called *ſervitus prædii*.

EAST, in *Coſmography*, one of the cardinal points of the horizon; being the point wherein the prime vertical interſects that quarter of the horizon in which the ſun riſes when in the equinoctial.

The word *eaſt* is Saxon. In Italy, and throughout the Mediterranean, the *eaſt*-wind is called the *levante*. In Greek, ανατολη and απηλιωτης, becauſe it comes from the ſide of the ſun, απ’ ηλιȣ. In Latin, *eurus*.

To find the *eaſt* and weſt line points, &c. ſee MERIDIAN-*Line*.

EAST-*Wind*, is that which blows from the *eaſt* point. See WIND.

EAST-*Dials*. See DIAL.

EAST-*India Companies*. See COMPANY.

EAST-*India Silk*. See SILK.

EAST, *Mooring for*. See MOORING.

EASTERN. See ORIENTAL.

EASTER, a feaſt of the church, held in memory of our Saviour's reſurrection.

The Greeks and Latins call it Πασχα, *paſcha*, originally a Hebrew word, ſignifying *paſſage*, applied to the feaſt of the Paſſover which is held among the Jews much about the ſame time. In Engliſh it is called *Eaſter*, from *Eaſtre*, a goddeſs worſhipped with peculiar ceremony in the month of April.

The obſervation of this feſtival is as ancient as the time of the apoſtles; for it is certain, that the Chriſtians of the ſecond century celebrated anniverſary feſtivals in commemoration of the death and reſurrection of Chriſt, and of the effuſion of the Holy Ghoſt upon the apoſtles. The day which was obſerved as the anniverſary of Chriſt's death was called the *paſchal* day, becauſe it was conſidered as the ſame with that on which the Jews celebrated their Paſſover. But towards the cloſe of this century, a diſpute commenced about the particular time in which this feaſt was to be kept. The Aſiatic churches kept it on the 14th day of the firſt Jewiſh month, and three days after commemorated the reſurrection of the Redeemer, pleading on behalf of this practice the authority of the apoſtles Philip and John, and the example of Chriſt, who held his paſchal feaſt on the ſame day that the Jews celebrated their Paſſover. The weſtern churches celebrated their paſchal feaſt on the night that preceded the anniverſary of Chriſt's reſurrection, and thus connected the commemoration of his death, and of his reſurrection; and they pleaded the authority of the apoſtles Peter and Paul. One principal inconvenience attending the Aſiatic method was, that this great feſtival was commonly held on other days of the week than the *firſt*. Victor, biſhop of Rome, towards the cloſe of the ſecond century, attempted to force the Aſiatic churches, by the pretended authority of his laws and decrees, to follow the rule which was obſerved by the weſtern churches: they refuſed to ſubmit, and were excommunicated by Victor. However, in conſequence of the mild interpoſition of Irenæus, biſhop of Lyons, the diſputants retained their own cuſtoms till the fourth century, when the council of Nice aboliſhed that of the Aſiatics, and rendered the time of the celebration of *Eaſter* the ſame through all the Chriſtian churches.

Eaſter is one of the moſt conſiderable feſtivals in the Chriſtian calendar; being that which regulates and determines the times of all the other moveable feaſts.

The rule for the celebration of *Eaſter*, fixed by the council of Nice, in the year 325, is, that it be held on the Sunday which falls upon, or next after, the full moon next after the 21ſt of March; i. e. the Sunday which falls upon, or next after the firſt full moon after the vernal equinox.

The reaſon of which decree was, that the Chriſtians might avoid celebrating their *Eaſter* at the ſame time with the Jewiſh Paſſover, which, according to the inſtitution of Moſes, was held the very day of the full moon.

To find *Eaſter* agreeable to this rule, the method that obtained throughout the church, from the time of Dionyſius Exiguus to that of the reformation of the calendar under Pope Gregory; and which ſtill obtains in countries where the Gregorian correction is not admitted, is, by means of the golden numbers, duly diſtributed throughout the Julian calendar.

The vernal equinox, at the time of the Nicene council, happening on the 21ſt of March, has been, upon Dionyſius's authority, affixed to the ſame day of the Julian year ever ſince; ſo that in the Julian way of computing, no full moon is paſchal, but that immediately after the 21ſt of March: therefore, *Eaſter* can never happen earlier than the 22d of March. Now, by finding the full moons next after the 21ſt of March for the ſeveral golden numbers or years of the lunar cycle, we ſhall have a table for finding *Eaſter* for ever.

Such table being of conſiderable uſe in the Julian computation, we ſhall here ſubjoin it.

Gold. Numb.	Full Moons next after Ver. Equin.		Gold. Numb.	Full Moons next after Ver Equin.	
I	5 April,	D	XI	15 April,	G
II	25 March,	G	XII	4 April,	C
III	13 April,	E	XIII	24 March,	F
IV	2 April,	A	XIV	12 April,	D
V	22 March,	D	XV	1 April,	G
VI	10 April,	B	XVI	21 March,	C
VII	30 March,	E	XVII	9 April,	A
VIII	18 April,	C	XVIII	29 March,	D
IX	7 April,	F	XIX	17 April,	B
X	27 March,	B			

Now to find *Eaſter* for any given year, find the dominical letter, and the golden number of the given year, as directed under DOMINICAL *Letter* and *Golden* NUMBER.

Then in the table, ſeeking the dominical letter, with the day of the paſchal full moon, and the Sunday letter annexed thereto; compare this letter with the dominical letter of the given year, that it may appear how many days are to be added to the day of the paſchal full moon to give *Eaſter*-day.

E. gr. In the year 1715, the dominical letter is B, and the golden number VI; conſequently, the paſchal full moon is fixed, by the the table, to the 10th of April; whoſe Sunday letter being B, the dominical letter given, itſelf is a Sunday; and therefore *Eaſter* will fall on the eighth day following, viz. on the 17th of April.

But in this computation, the vernal equinox is ſuppoſed affixed to the 21ſt of March; and the cycle of nineteen years, or golden numbers, is ſuppoſed to point out the places of the new and full moons exactly; both which ſuppoſitions are erroneous. Whence it follows, that the Julian *Eaſter* never happens at its due time, unleſs by accident.

For an inſtance of the error, it may be obſerved, that in the year 1715, the vernal equinox falls on the 10th of March, eleven days before the rule ſuppoſes it; and the paſchal full moon on the 7th of April, three days earlier than was ſuppoſed. *Eaſter*-day, therefore, which is held on the 17th of April, ſhould be held on the 10th.

This error was grown to ſuch a pitch, in courſe of time, that pope Gregory XIII. thought it neceſſary to correct it; and accordingly, in the year 1582, by the advice of Aloyſius Lilius, he ordered ten days to be thrown out of October, ſo to bring back the vernal equinox to its old place, viz. the 21ſt of March: and hence the Georgian calendar, Gregorian year, &c.

This correction, however, did not entirely remove the error; for the equinoxes and ſolſtices ſtill anticipate 1h. 53′ 20″ in every 400 Gregorian years; but the difference is ſo inconſiderable as not to amount to 24 hours, or to one whole day in leſs than 5082 Gregorian years. See BISSEXTILE.

To find *Eaſter* by the *Golden* NUMBER, ſee NUMBER *of Direction*.

In the new or Gregorian computation, in lieu of golden numbers, the time of *Eaſter* is found by means of epacts contrived for that purpoſe. See EPACT.

Having the dominical letter and the epact, *Eaſter*-day may be found by the two following rules: 1. For finding *Eaſter* limit, or the day of the paſchal full moon from March the firſt incluſive; add 6 to the epact; and if this ſum exceeds 30, 30 muſt be taken from it; the remainder ſubtracted from 50 will give the limit, which is never to exceed 49, nor fall ſhort of 21. 2. From the limit and dominical letter, *Eaſter-day* may be found, by adding 4 to the number of the dominical letter, ſubtracting the ſum from the limit, and the remainder from the next higher number, which is exactly diviſible by 7; add the laſt remainder to the limit, and the ſum will give the number of days from the firſt of March to *Eaſter-day*, both incluſive. Thus for the year 1778, the epact is 1, and the dominical letter D: 6 + 1 = 7: 50 — 7 = 43 paſchal limit; 43 — 8, the ſum of 4 and the dominical letter, = 35; and 42 — 35 = 7, which added to 43, the limit gives 50, or the number of days from March the 1ſt incluſive to *Eaſter-day*, or 19th of April.

The following table renders the finding of *Eaſter* in the Gregorian year from the year 1700 to the year 1900 very eaſy.

Epacts.	Paſchal full Moons.	Epacts.	Paſchal full Moons.
X	13 April, E	IX	4 April, C
XI	2 April, A	XX	24 March, F
XXII	22 March, D	I	12 April, D
III	10 April, B	XII	1 April, G
XIV	30 March, E	XXIII	21 March, C
XXV	18 April, C	IV	9 April, A
VI	7 April, F	XV	29 March, D
XVII	27 March, B	XXVI	17 April, B
XXVIII	15 April, G	VII	6 April, E
		XVIII	26 March, A

Now, to find *Eaſter* for any given Gregorian year, ſeek the dominical letter and the Gregorian expact, as ſhewn under Epact, &c. Find the epact in the table, and note the paſchal full moon, with the weekly letter correſponding to the ſame. The reſt is performed, as already taught for the Julian *Eaſter*.

E. g. the dominical letter of 1778 is D, and the epact I, conſequently the paſchal full moon falls on the 12th of April D, which is therefore Sunday, and *Eaſter-day* is the 19th of April, as before.

Though the Gregorian calendar be doubtleſs preferable to the Julian, yet it alſo has its defects. It cannot, for inſtance, keep the equinox fixed on the 21ſt of March, but it will ſometimes fall on the 19th, and ſometimes on the 23d.

Add, that the full moon happening on the 20th of March, might ſometimes be paſchal; yet is it not allowed as ſuch in the Gregorian computation; as on the contrary, the full moon of the 22d of March may be allowed for paſchal, which it is not. Scaliger and Calviſius have alſo proved other inaccuracies in this calendar. See Calendar. See an excellent paper on this ſubject by the earl of Macclesfield, in the Phil. Tranſ. vol. xl. p. 417. See Epact and *Golden* Number.

EASTER *Term*. See Term.

EASTERLING *Money*. See Sterling.

EASTERN *Amplitude*, *Church*, *Horizon*, *Ocean*. See the ſubſtantives.

EATUAS, in *Modern Hiſtory*, a name which the inhabitants of Otaheite in the South-ſea give to an imaginary inferior race of deities; two of whom, they ſay, at ſome remote period of time, inhabited the earth, and were the parents of the firſt man. The term is derived from *eothe*, which ſignifies *finiſhed*. Theſe ſubordinate deities are very numerous, and are of both ſexes; the male are worſhipped by the men, and the female by the women, in ſeparate Morais, and under the direction of diſtinct prieſts. There are alſo *Morais* common to both. Hawkeſw. Voyages, vol. ii. p. 239.

EAU *de Luce*, is a kind of volatile liquid ſoap, of a ſtrong, penetrating ſmell. The following inſtructions will ſerve for making it: take four ounces of rectified ſpirit of wine, and in it diſſolve ten or twelve grains of white ſoap; filtrate this ſolution; then diſſolve in it a dram of rectified oil of amber, and filtrate again: mix as much of this ſolution with the ſtrongeſt volatile ſpirit of ſal ammoniac, in a cryſtal glaſs bottle, as when ſufficiently ſhook, ſhall produce a beautiful milky liquor. If upon its ſurface be formed a cream, ſome more of the oily ſpirit of wine ought to be added.

EAVES, the margin or edge of the roof of a houſe, being the loweſt tiles, ſlate, or the like, which hang over the walls to throw off the waters to a diſtance from the wall.

Eaves-Lath, a thick feather-edged board, generally nailed round the *eaves* of a houſe for the lowermoſt tiles, ſlate, or ſhingles, to reſt upon.

Eaves-*Droppers*, in *Law*, are perſons who liſten under walls or windows, or the *eaves* of a houſe, to hearken after diſcourſe, and thereupon to frame ſlanderous and miſchievous tales. Theſe are a common nuiſance, and preſentable at the court-leet, or indictable at the quarter-ſeſſions, and puniſhable by fine, and finding ſureties for good behaviour.

EBBING *and* Flowing *of the Sea*. See Tides.

EBDOMARY, *ebdomadarius*, an officer, anciently appointed weekly in cathedral churches, to ſuperviſe the regular performance of divine ſervice, and preſcribe the particular duties of each perſon attending in the choir, as to reading, ſinging, and praying. To this purpoſe the *ebdomary*, at the beginning of his week, drew up in form, a bill or writing of the reſpective perſons, and their ſeveral offices, called *tabula*, and the perſons there entered were ſtyled *intabulati*.

EBDOME, Ἑβδομη, in *Antiquity*, a feſtival kept on the ſeventh of every lunar month, in honour of Apollo, to whom all ſeventh days were ſacred, becauſe one of them was his birth-day; whence he was ſometimes called *Ebdomagenes*. For the ceremonies of this ſolemnity, ſee Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 385.

EBEREMORTH, or Eberemors, in our *Old Laws*, the ſame as *eberemurdrum*, or *aberemurder*. See Aberemurder.

EBEREMURDRUM, or Aberemurdrum, in our *Old Writers*. See Aberemurder.

EBIONITES, ancient heretics, who roſe in the church in the very firſt age thereof, and formed themſelves into a ſect in the ſecond century, denying the divinity of Jeſus Chriſt.

Origen takes them to have been ſo called from the Hebrew word *ebion*, which in that language ſignifies *poor*; becauſe, ſays he, they were poor in ſenſe, and wanted underſtanding. Euſebius, with a view to the ſame etymology, is of opinion, they were thus called, as having poor thoughts of Jeſus Chriſt, taking him for no more than a mere man.

It is more probable the Jews gave this appellation to the Chriſtians in general, out of contempt; becauſe in the firſt times there were few but poor people that embraced the Chriſtian religion. This opinion, Origen himſelf ſeems to give into, in his book againſt Celſus, where he ſays, that they called *Ebionites*, ſuch among the Jews as believed that Jeſus was truly the expected Meſſiah.

It might even be urged, with ſome probability, that the primitive Chriſtians aſſumed the name themſelves, in conformity to their profeſſion. It is certain, Epiphanius obſerves, they valued themſelves on being poor, in imitation of the apoſtles. The ſame Epiphanius, however, is of opinion, that there had been a man of the name *Ebion*, the chief and founder of the ſect of *Ebionites*, contemporary with the Nazarenes and Cerinthians. He gives a long and exact account of the origin of the *Ebionites*, contemporary with the Nazarenes and Cerinthians. He gives a long and exact account of the origin of the *Ebionites*, making them to have riſen after the deſtruction of Jeruſalem, when the firſt Chriſtians, called *Nazarenes*, went out of the ſame to live at Pella.

The *Ebionites* are little elſe than a branch of Nazarites; only that they altered and corrupted, in many things, the purity of the faith held among thoſe firſt adherents to Chriſtianity. For this reaſon, Origen diſtinguiſhes two kinds of *Ebionites*, in his anſwer to Celſus: the one believed that Jeſus Chriſt was born of a virgin; and the others, that he was born after the manner of other men.

The firſt were orthodox in every thing, except, that to the Chriſtian doctrine they joined the ceremonies of the Jewiſh law, with the Jews, Samaritans, and Nazarites; together with the traditions of the Phariſees. They differed from the Nazarites, however, in ſeveral things, chiefly as to what regards the authority of the ſacred writings; for the Nazarites received all for ſcripture contained in the Jewiſh canon; whereas the *Ebionites* rejected all the prophets, and held the very names of David, Solomon, Iſaiah, Jeremiah, and Ezekiel, in abhorrence. They alſo rejected all St. Paul's Epiſtles, whom they treated with the utmoſt diſreſpect.

They received nothing of the Old Teſtament but the Pentateuch; which ſhould intimate them to have deſcended rather from the Samaritans than from the Jews. They agreed with the Nazarites in uſing the Hebrew Goſpel of St. Matthew, otherwiſe called the Goſpel of the Twelve Apoſtles; but they had corrupted their copy in abundance of places; and particularly, had left out the genealogy of our Saviour, which was preſerved entire in that of the Nazarites, and even in thoſe uſed by the Cerinthians.

Some, however, have made this goſpel canonical, and of greater value than our preſent Greek Goſpel of St. Matthew. See Nazarenes.

Theſe laſt, whoſe ſentiments, as to the birth of our Saviour, were the ſame with thoſe of the *Ebionites*, built their error on this very genealogy.

Beſide the Hebrew Goſpel of St. Matthew, the *Ebionites* had adopted ſeveral other books, under the names of St. James, John, and the other apoſtles: they alſo made uſe of the Travels of St. Peter, which are ſuppoſed to have been written by St. Clement, but had altered them ſo, that there was ſcarce any thing of truth left in them. They even made that ſaint tell a number of falſhoods, the better to authorize their own practices. See St. Epiphanius, who is very diffuſive on the ancient hereſy of the *Ebionites*, Hær. 30.

But his account deſerves little credit, as, by his own confeſſion, he has confounded the other ſects with the *Ebionites*, and has charged them with errors, to which the firſt adherents of this ſect were utter ſtrangers.

EBOLICS, *ebolica*. See Ecbolics.

EBONY, *of Crete*, *Ebenus*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement of the flower is ſlenderly indented, and hairy; and is of the butterfly kind, having ten ſtamina. In the bottom is ſituated an oblong germen, which afterward becomes an oblong ſwelling pod, opening with two valves, and incloſing three or four kidney-ſhaped ſeeds. There is only one ſpecies, which grows naturally in Crete, and ſome other iſlands of the Archipelago. It riſes with a ſhrubby ſtalk, three or four feet high, which puts out ſeveral ſide-branches, garniſhed with hoary leaves at each joint, compoſed of five narrow ſpear-ſhaped lobes, which join at their tails to the foot ſtalks, and ſpread out like the fingers of a hand: the branches are terminated by thick ſpikes of large purple flowers, which are of the butterfly or pea-bloom kind.

Theſe plants will not live in the open air through the winter in England; neither ſhould they be too tenderly treated.

Ebony *of the Alps*, *Cytiſus*. See *Baſe Tree*-Trefoil.

Ebony, *Falſe*, *Poinciana*. See Barbadoes *Flower-Fence*.

Ebony, *Mountain*. See Bauhinia.

Ebony wood is brought from the Indies, exceedingly hard and heavy, ſuſceptible of a very fine poliſh, and on that account uſed in moſaic and inlaid works, toys, &c.

There are divers kinds of *ebony*: the moſt uſual among us are black, red, and green, all of them the product of the iſland of Madagaſcar, where the natives call them, indifferently, *hazon mainthi*, q. d. *black wood*. The iſland of St. Maurice, belonging to the Dutch, likewiſe furniſhes part of the *ebonies* uſed in Europe.

Authors and travellers give very different accounts of the tree that yields the black *ebony*. By ſome of their deſcriptions, it ſhould be a ſort of palm-tree; by others, a cytiſus, &c. The moſt authentic of them is that of M. Flacourt, who reſided many years in Madagaſcar, as governor thereof; he aſſures us, that it grows very high and big, its bark being black, and its leaves reſembling thoſe of our myrtle, of a deep, duſky, green colour.

Tavernier aſſures us, that the iſlanders always take care to bury their trees, when cut down, to make them the blacker, and to prevent their ſplitting, when wrought.

F. Plumier mentions another black *ebony*-tree, diſcovered by him at St. Domingo, which he calls *ſpartium portulacæ foliis aculeatum ebeni materiæ*. Candia alſo bears a little ſhrub, known to the botaniſts under the name of *ebenus Cretica*, above deſcribed.

Pliny, and Dioſcorides ſay, the beſt *ebony* comes from Ethiopia, and the worſt from India; but Theophraſtus prefers that of India. Black *ebony* is much preferred to that of other colours. The beſt is a jet black, free of veins and rind, very maſſive, aſtringent, and of an acrid pungent taſte.

Its rind, infuſed in water, is ſaid to purge pituita, and cure venereal diſorders; whence Matthiolus took guaiacum for a ſort of *ebony*. It yields an agreeable perfume, when laid on burning coals: when green, it readily takes fire, from the abundance of its fat. If rubbed againſt a ſtone, it becomes brown. The Indians make ſtatues of their gods, and ſceptres for their princes, of this wood. It was firſt brought to Rome by Pompey, after he ſubdued Mithridates. It is now much leſs uſed among us, than anciently; ſince the diſcovery of ſo many ways of giving other hard woods a black colour.

As to the green *ebony*, beſides Madagaſcar and St. Maurice, it likewiſe grows in the Antilles, and eſpecially in the iſle of Tobago. The tree that yields it is very buſhy; its leaves are ſmooth, and of a fine green colour. Beneath its bark is a white blea, about two inches thick; all beneath which, to the very heart, is a deep green, approaching towards a black, though ſometimes ſtreaked with yellow veins. Its uſe is not confined to moſaic work: it is likewiſe good in dying, as yielding a fine green tincture.

As to red *ebony*, called alſo *grenadilla*, we know little of it more than the name.

The cabinet-makers, inlayers, &c. make pear-tree, and other woods, paſs for *ebony*, by giving them the black colour thereof. This ſome do by a few waſhes of a hot decoction of galls; and when dry, adding writing ink thereon, and poliſhing it with a ſtiff bruſh, and a little hot wax; and others heat, or burn, their wood black. See Dying.

EBRBUHARITES, a ſect, or order of religious, among the Mahomeans; thus called from their founder *Ebrbuhard*, a diſciple of Nacſchibendi.

The *Ebrbuharites*, notwithſtanding the extraordinary ſanctity they make profeſſion of, with an abſolute dereliction of all worldly things, are regarded, by the Muſlemans, as no better than heretics, becauſe they do not eſteem themſelves obliged to go in pilgrimage to Mecca. To excuſe themſelves from this labour, they urge, that the pureneſs of their ſouls, their ſublime contemplations, ecſtaſies, &c. ſhew them Mecca and Mahomet's tomb, without ſtirring out of their cells.

EBRICCATUM, a term uſed by Paracelſus, to expreſs the partial loſs, or deprivation of reaſon, as it happens during drunkenneſs; but with the addition of the epithet *cæleſte*, it ſignifies, with the ſame author, a much more exalted ſtate, a ſort of divine enthuſiaſm, or inſpiration, ſuch as the ſibyls of old boaſted of; and, among the moderns, the French prophets, and ſome other religious ſects have pretended to. Paracelſus himſelf pretended, at times, to be under ſome ſuch influence; but his mad fits ſeemed to have very little of inſpiration in them.

EBRIETAS, drunkenneſs, among the aphoriſms of Hippocrites, there is one, 5 aph. which reſpects *ebriety*, and is thus expreſſed: "If a drunken perſon loſe his voice of a "ſudden, he dies in convulſions, unleſs a fever ſeizes "him, or his voice returns at the going off of the drunken "fit."

EBRILLADE, in the the *Manege*, a check of the bridle, which the horſeman gives to the horſe by a jerk of one rein, when he refuſes to turn. An *ebrillade* differs from a *ſaccade*, the latter being made with both reins at once, and the former only with one. Moſt people confound theſe two words under the general name of a check or jerk of the bridle, called in French *coup de bride*. It is a chaſtiſement, and no aid, and is diſuſed in academies.

EBRIZIUS *color*, a term uſed by ſome of the old writers, to expreſs a very fine yellow. The word ſeems originally to have been obryzium, and was certainly derived from the *aurum obryzum*, or fine gold, of which this *ebrizius* expreſſed the colour.

EBSEMECH, in *Chemiſtry*, a word uſed by Langius, and ſome other authors, for quickſilver.

EBULLITION, in *Phyſics*, the act of emitting bubbles, by a vehement agitation of the parts of a fluid, produced by fire, or otherwiſe.

Philoſophers are diſagreed about the cauſe and manner of *ebullition*. See Boiling.

Ebullition *of the blood*, *ebullitio ſanguinis*, in *Medicine*, a term uſed by ſome of the old writers, to expreſs what they ſuppoſed to be the occaſion of the motion of the heart, which they attributed to a ſort of *ebullition* of the blood contained there. See Blood.

Ebullition, in *Chemiſtry*, &c. is uſed for a violent inteſtine motion, or colluctation, of parts, occaſioned by the mixture of ſalts of different natures.

Dr. Harris will have it properly and immediately, to ſignify that particular ſtruggle or efferveſcence, ariſing upon the mingling together of an acid and alcaliſate liquor.

Mr. Boyle has an experiment to ſhew, that a conſiderable *ebullition* may be produced by ſuch a mixture, without the bodies acquiring any heat; nay, that a degree of cold may be produced with it, greater than was in either of the bodies ſingly, though accompanied with a great ſtruggle, tumult, noiſe, and froth. For, having ſhook one part of oil of vitriol into twelve parts of common water, the mixture was at firſt ſenſibly warm; then the ball of a thermometer was placed in it, till the included ſpirit had gained the temperament of the mixture; but then a convenient quantity of volatile ſalt of ſal armoniac being gradually put in to ſatiate the acid ſpirits of the mixture, the ſpirit in the thermometer deſcended above an inch.

EBULUS, the *dwarf-elder*, in *Medicine*. This is a troubleſome weed in many of our fields, and called, danewort, and walwort. The leaves may be diſtinguiſhed from thoſe of the elder-tree, by their having nine, eleven, or thirteen lobes to each leaf, which are long, narrow, and very ſlightly indented on their edges; whereas the leaves of the common elder have ſeldom more than five, which are broader and ſhorter. The roots and leaves of dwarf-elder are ſaid to be briſk cathartics. The juice of this plant has been recommended in the dropſy, gout, and ſcorbutic diſorders. The flowers are eſteemed ſudorific; and the leaves, boiled till perfectly ſoft, make a good cataplaſm for the *ſciatica*. See **Elder**.

EBUR, *foſſile*, in *Natural Hiſtory*. See *Foſſile* **Ivory**.

Ebur *foſſile variegatum*, in the *Natural Hiſtory* of the ancients, a name given to the ſubſtance which we now call the rough or native turquoiſe.

Foſſile ivory, and the bones of other animals, are frequently found buried at great depths in the earth, and are found to have preſerved their ſubſtance, texture, and colour in different degrees, according to the nature of the matter they happen to have lain among. Sometimes they are firm and ſolid, and ſcarce altered in colour; and ſometimes more or leſs hardened, and tinged to different colours by the different matters in which they have been depoſited.

Of this kind was the ſpotted foſſile ivory of the ancients, which was in all reſpects the ſame with our rough turquoiſes of many places, which are no other than the teeth and bones of animals accidentally lodged in the way of particles of copper. See **Turcois**.

ECACOATE, in *Zoology*, a name by which the natives of ſome parts of America call the *Rattle*-**Snake**.

ECALESIA, Εκαλησια, in *Antiquity*, a feſtival kept in honour of Jupiter, ſurnamed *Hecalus*, or *Hecaleſius*, from *Hecale*, one of the borough-towns in Attica.

ECARTELE, in *Heraldry*. See **Quarterly**.

ECASTOR, in *Antiquity*, an oath wherein Caſtor was invoked. It was a cuſtom for the men never to ſwear by Caſtor, nor the women by Pollux.

ECATESIA, Εκατησια, in *Antiquity*, an aniverſary ſolemnity, obſerved by the Stratonicenſians, in honour of Hecate.

The Athenians likewiſe had a public entertainment, or ſupper, every new moon, in honour of the ſame goddeſs. The ſupper was provided at the charge of the richer ſort; and was no ſooner brought to the accuſtomed place, but the poor people carried all off, giving out, that Hecate had devoured it. For the reſt of the ceremonies obſerved on this occaſion, ſee Pott. Arch. Græc. lib. ii. cap. 20.

ECATÆA, Εκαταια, in *Antiquity*, ſtatues erected to the goddeſs Hecate, for whom the Athenians had a great veneration, believing that ſhe was the overſeer of their families, and that ſhe protected their children. Pott. Arch. Græc. lib. ii. cap. 20. tom. i. p. 386.

ECATOMBÆON, Εκατομβαιων, in *Chronology*, the firſt month of the Athenian year. It conſiſted of thirty days, and began on the firſt new moon after the ſummer ſolſtice, and conſequently anſwered to the latter part of our June, and beginning of July. The Bœotians called it *Hippodromus*, and the Macedonians *Lous*. See **Month**. The word is a derivative from the Greek, *ηκατομβη, a hecatomb*, becauſe of the great number of hecatombs ſacrificed in it.

ECAVESSADE, in the *Manege*, is uſed for jerk of the caveſſon.

ECBASIS, Εκβασις, in *Rhetoric*, is uſed for a digreſſion.

ECBOLE, Εκβολη, in *Rhetoric*, is alſo uſed for a digreſſion.

ECBOLICS, *ecbolica*, from εκβαλλω, *I eject*, in the writings of the ancient phyſicians, a term uſed to expreſs ſuch medicines as were given to promote delivery in childbirth; and alſo ſuch as cauſed abortion. See **Delivery**.

ECBRASMATA, from εκβραζω, *I cauſe heats*, in the writings of ſome of the earlier phyſicians, a word uſed to expreſs eruptions, or puſtules, of a fiery and enflamed nature, appearing on different parts of the body. Virgil calls theſe *ardentes papulæ*, and ſeems to attribute them to the wearing clothes made of the wool of ſheep which had died of a murrain, which he deſcribes.

ECBRYSOMATA, from εκβρυω, *I cauſe to ſpread*, a word uſed by Galen, and the old phyſicians, for thoſe eminences or protuberances of the bones at the joints, which appear through the ſkin.

ECCANTHIS, or **Encanthis**, in *Medicine*. See **Encanthis**.

ECCATHARTICS, a name given by different writers in *Medicine*, to medicines of different kinds, and producing very different effects. See **Cathartics**.

ECCE-HOMO, among *Painters*, a name given to a picture, wherein our Saviour is repreſented in a purple robe, with a crown on his head, and a reed in his hand, ſuch as he was preſented before Pilate by the Jews.

The phraſe is Latin, borrowed from the words of the Jews themſelves; q. d. this is the man.

ECCENTRIC. See **Excentric**.

ECCENTRICITY. See **Excentricity**.

ECCHYMOSIS, Εκχυμωσις, the effuſion of blood from a rupture in ſome of the ſmall veins near the ſkin, cauſing a lividity or blueneſs thereof.

This is alſo called *ecchymoma*, εκχυμωμα, and ſtands diſtinguiſhed from the *enchymoſis*, where there is no extravaſation.

The *ecchymoſis* is either *ſimple*, or with *abſceſs*. The former is a mere diſeaſe of the ſkin, wherein the blood extravaſated by ſome blow, or contuſion, upon its arrival between the fleſhy or muſcular parts and the cutis, ſtops there, and turns black or livid, without any appearance of a wound. In the latter, the extravaſated blood ſuppurates, and breeds an impoſthume.

An *ecchymoſis*, or extravaſation of blood under the ſkin, is an accident too common, after bleeding in the arm. This ſometimes is ſo violent in degree, that the arm after ſwelling, and becoming black and blue, is violently inflamed, with acute pain, and either a ſuppuration or beginning mortification. This accident frequently happens from the vein's having been cut quite aſunder in the operation, but oftener by the patient's uſing the arm too ſoon after bleeding, in violent and long exerciſes, in which the contractions of the muſcles make the veins ſwell, and force their blood through the orifice into the interſtices between the fleſh and ſkin.

In ſlight accidents of this kind there is no danger, the ſtagnating blood being eaſily diſperſed by a compreſs dipped in vinegar and ſalt, or in ſpirit of wine. And ſometimes it ſuppurates, and, making its way through the integuments, becomes naturally diſcharged, and the wound will heal with a diachylon plaſter. But where the quantity of extravaſated blood is large, there is no hope of its being diſperſed ſo eaſily, but the diſorder generally terminates in an abſceſs or gangrene. To prevent theſe accidents, the ſurgeon's buſineſs is to ſcarify the livid parts, and apply warm fomentations. Heiſter's Surgery, p. 285.

ECCLESIA, a Latin, or rather Greek term, ſignifying **Church**.

In our ancient law-books, Fitzherbert obſerves, that **Ecclesia**, Εκκλησια, properly ſignifies a *parſonage*. Whence, if a preſentation were made to a chapel, as to a church, by the name of *eccleſia*, it changed the name thereof, and it preſently commenced a church.

When the queſtion was, Whether it were *eccleſia, aut capella pertinens ad eccleſiam?* the iſſue was, Whether it had *baptiſterium & ſepulturam?* For if it had the adminiſtration of the ſacraments and ſepulture, it was in law judged a church. See **Chapel**.

Ecclesia, *Reſtitutione extracti ab*. See **Restitutione**.

Ecclesiæ, *Recto de advocatione*. See **Recto**.

Ecclesiæ, *Warda*. See **Warda**.

Ecclesiæ *ſculptura*, the image or ſculpture of a church in ancient times was often cut out in plate or other metal, and preſerved as a religious treaſure or relique; and to perpetuate the memory of ſome famous churches.

ECCLESIANS, **Ecclesiani**, in *Church Hiſtory*. Upon any falling out, or miſunderſtanding, between the emperors and the churchmen, the adherents to the emperor called ſuch as ſtuck to the intereſts of the church and churchmen, *eccleſiani*, a term of reproach, anſwering to our high-church men.

ECCLESIASTES, one of the books of the Old Teſtament; thus called, by a Greek word, ſignifying *preacher*; becauſe the author in it declaims, or *preaches*, againſt the vices and vanities of the world.

This is Mariana's judgment: Grotius thinks otherwiſe; taking the book to derive its appellation from its being a collection of fine ſentences and reflections on the vanity of the things of our earth, &c. from the word קהל, which ſignifies to *amaſs* or *collect*, συναθροιζειν. Some Hebrew doctors, ſuppoſing the ſame etymon, will have it to have been thus called on account of its *amaſſing* a great deal of wiſdom: others, becauſe the author's aim is to *aſſemble* and *call* together, all ſuch as are willing to conſult their ſafety, and avoid the dangers of the world, which is the opinion of Gejerus. Laſtly, others, with Calovius, deduce it from his *aſſembling* them about him, as a preacher aſſembles his auditors.

There are different ſentiments as to the author of this book: the moſt common is, that it is Solomon's, who is ſuppoſed to have wrote it towards the cloſe of his life, to give tokens of his penitence to poſterity.

Grotius, indeed, takes the work to be poſterior to Solomon, and to have been wrote after his death; by ſix authors, unknown, who, to give their book the greater authority, put Solomon's name to it, and repreſented him as repentant. What he chiefly founds his opinion on, is, that we meet with words in this book, which are no where elſe ſeen, but in Daniel, Eſdras, and the Chaldee paraphraſes; but it is certain, all Hebrews, Greeks, and Latins, have always ſpoke of it as a work of Solomon. Indeed, there are authors who have attributed all the books of Solomon to Iſaiah; but theſe are only to be underſtood as if that prophet had collected them. If it be true, that there are Chaldee words in the *Eccleſiaſtes*, it is eaſier to ſuppoſe Solomon underſtood that language, than to deny him to be the author of the book.

Calovius aſſures us, that the true reaſon why Grotius would not allow Solomon the author of the book of *Eccleſiaſtes*, is, that it ſpeaks too clearly and preciſely for his time, of the univerſal judgment, eternal life, and the pains of hell; but theſe are truths eſtabliſhed before Solomon, in the Pſalms, the Pentateuch, and Job.

There appears no reaſon, therefore, for denying this book to Solomon, but ſeveral for aſcribing it to him. As 1. The title of the book, which aſſerts its author to be the ſon of David, and king of Jeruſalem. 2. Several paſſages in the book, which agree to no body but that prince, as chap. i. ver. 12. chap. vii. ver. 25. chap. xii. ver. 9, &c. and 3. The conſtant tradition of the ancient Jews and Chriſtians.

The Talmudiſts, and other Rabbins, note, that it was ſome time before the book of *Eccleſiaſtes* was put in the canon. See the *Gemara* on the Pirke Abboth, fol. 1. col. 1. Maſſech Schabbath, cap. ii. fol. 30. col. 2. Aben Ezra on the *Eccleſiaſtes*, vii. 4. Maimonides, Moreh Nebochim, lib. iii. cap. 28. and Mercerus, Calovius, and Gejerus, on this book.

ECCLESIASTIC, or Ecclesiastical, ſomething belonging to, or ſet apart for the church, in contradiſtinction to *civil* or *ſecular*, which regard the world. See Civil, &c.

There are *eccleſiaſtical* things and perſons; *eccleſiaſtical law*, *juriſdiction*, *hiſtory*, *ceremonies*, *diſcipline*, *preferments*, &c. *Eccleſiaſtical* perſons are either *regular* or *ſecular*. See Regular and Secular. In the empire there are three *eccleſiaſtical* electors, viz. the archbiſhops of Mentz, Treves, and Cologne. In France, they have *eccleſiaſtical peers*, &c. See Peer.

Ecclesiastic *chambers*, *community*, *corporation*, *faith*, *patronage*, *tradition*, *courts*. See the different ſubſtantives.

ECCLESIASTICAL *State*, in *Geography*, the pope's dominions in Italy.

Theſe dominions are differently divided by geographers; but the moſt regular and convenient diviſion is into the following territories: 1. The duchy of Ferrara. 2. That of Bologna. 3. The province of Romagna. 4. The duchy of Urbino. 5. The marquiſate of Ancona. 6. The Perugiano. 7. The Orvietano. 8. The duchy of Caſtro. 9. The Patrimony of St. Peter. 10. Campania di Roma. 11. Sabina. 12. The duchy of Spoleto al Ombria. 13. The county called Citta di Caſtello. Beſide which, the pope is poſſeſſed of the following countries out of the papacy, viz. The duchy of Benevento, in the kingdom of Naples; the counties of Avignon and Venaiſin, in the Southern parts of France. He has beſides, a conſiderable number of fiefs in Italy, which hold of the papal ſee; the principal of which, are, the kingdom of Naples, and the ſtates of Parma and Placentia.

The pope may be conſidered in two reſpects, as the ſpiritual head and monarch of the Roman church, and as a conſiderable temporal prince in Italy. In the firſt character, his ſubjects may be divided into two claſſes, viz. clergy and laity; the former may not unfitly be compared to a ſpiritual ſtanding army, whoſe buſineſs is to maintain his rights and conqueſts; and the reſt, the laity, as his tributary ſubjects, who are obliged to maintain thoſe forces at their own charge; and if one may judge of the greatneſs of their number, by what pope Paul IV. uſed to boaſt, that he had 228000 pariſhes under his juriſdiction (all of whom have at leaſt one or more prieſts, and 4400 monaſteries, it will appear no inconſiderable army. But their number has been much leſſened ſince the Reformation.

In the ſecond view, the pope may be conſidered as a potent prince in Italy, whoſe ſovereignty is chiefly ſupported by the jealouſy between Spain, France, and the Empire; though in moſt other reſpects it is not to be compared with that of other princes of Europe. What his revenues are, may be hard to determine, though they muſt be allowed to be very conſiderable, and that he is able to maintain a great military force. But this court maintains itſelf by quite different means from thoſe of temporal princes; and his holineſs maintains but very few land forces, though the arſenal at Rome is ſaid to contain, arms ſufficient, kept in good order and repair, to equip 30000 men horſe and foot. His ſea forces conſiſt of 20 gallies, which are commonly ſtationed at Civita Vecchia.

ECCLESIASTICO *primo beneficio habendo.* See Primo.

ECCLESIASTICUS, an apochryphal book, compoſed by Jeſus the ſon of Sirach, and admitted by the Romiſh church into the canon of the Old Teſtament.

It is frequently cited by the abbreviation, *Eccli.* to diſtinguiſh it from the *Eccleſiaſtes*, which is cited by *Eccle.* Iſidore, lib. vi. Etym. cap. ii. and among the moderns, Grotius and Druſius deny the author of *Eccleſiaſticus* to be Jeſus the ſon of Sirach, grandſon of the high-prieſt Jeſus, who returned from Babylon with Zorobabel. Genebrard aſſerts, that Jeſus the ſon of Sirach was of the race of Jeſus ſon of Joſedec; but this does not appear.

St. Jerom aſſures us, in his preface to the books of Solomon, that he had ſeen this book in Hebrew; and that the Hebrews intitled it *Parables:* from which the Jeſuit Mariana concludes, that the high-prieſt Jeſus wrote this book in Hebrew, as it appears likewiſe from the prologue to the book itſelf; and that his grandſon tranſlated it into Greek, which likewiſe appears from the prologue; that he made this tranſlation in Egypt, where the author lived in his thirty-eighth year; that it was done under the reign of Ptolemy Euergetes, ſucceſſor of Ptolemy Philadelphus, who began to reign in the year of Rome 512,240 years before Chriſt; that the grandfather had intitled it *Parables*, which the grandſon changed into *Eccleſiaſticus:* laſtly, that the book, however, is attributed to the tranſlator becauſe he changed, and added many things to the original.

Fa. Calmet takes the book of *Eccleſiaſticus* to have been compoſed under the pontificate of Onias III. ſon of Simon, and the reign of Antiochus Epiphanes, king of Syria. He adds, that neither the author of the Latin tranſlation, nor the time when it was made, is known; but being quoted regularly by all the ancient fathers, there is no doubt of its being very ancient. He takes it to have been done by the tranſlator of the book of Wiſdom.

ECCLISIS, from εκκλινω, *I decline*, a word uſed by Hippocrates, and from him by many other of the old phyſicians, for a receſſion of a bone from its proper ſituation, that is, a luxation.

ECCOPÆUS, from εκκοπτω, *I cut*, the name of an inſtrument, deſcribed by ſome of the ancient writers in *Medicine*, and uſed for the ſame purpoſes for which the modern ſurgeons employ a lenticular or raſpatory. The ancient inſtrument was a ſort of knife, with which they cut down morbid eminences of bones, or took out bones, in caſe of a fractured ſkull.

ECCOPE, Εκκοπη, in *Chirurgery*, the ſame with exciſion or amputation.

The word is formed from the Greek, εκκοπτειν, *exſcindere*, *to cut off*.

Eccope is likewiſe uſed for a kind of fracture, or ſolution of continuity, of the ſkull, by a ſimple inciſion.

ECCOPROTICS, Εκκοπρωτικα, in *Medicine*, laxative, or looſening remedies, which purge gently, by ſoftening the humours and excrements, and fitting them for expulſion.

The word is compoſed of the Greek particle εκ, and κοπρος, *excrement*.

ECCRIMOCRITICA, from εκκρισις, *excretion*, and κριτικος, in *Medicine*, ſigns to judge of a diſtemper, from particular excretions.

ECCRINOLOGICA, from εκκρινω and λογος, a term uſed, by ſome writers, for that part of medicine which relates to the doctrine of excretions, or the diſcharge of any of the excrements out of the body.

ECCRISIS, an excretion of any excrementitious or morbid matter from any of the natural emunctories, as it happens in a perfect criſis. The matter thus excreted is alſo ſometimes called by this name.

ECDICI, Εκδικοι, among the *Ancients*, patrons of cities, who defended their rights, and took care of the public money. Their office reſembled that of the modern syndics.

ECDORA, from εκδερω, *I excoriate*, a word uſed, by the ancient phyſicians, to expreſs any kind of excoriation, but in a more particular manner that of the urethra.

ECDORIA, a term uſed, by the ancient writers in *Medicine*, for ſuch cauſtic or eſcharotic medicines, as have a power of taking off the ſkin.

ECDYSIA, Εκδυσια, in *Antiquity*, a feſtival obſerved by the Phœſtians in honour of Latona.

ECHAPE', in the *Manege*, is uſed to denote a horſe, got between a ſtallion and a mare, of a different breed and country.

ECHAPER, in the *Manege*, is uſed in the French academies for giving the horſe head, or putting him on full ſpeed. Hence they ſay, *laiſſez echaper de la main.*

ECHARPE. See Battery *en echarpe.*

ECHAUGUETTE, in the French *Military Art*, an elevated and covered place for a centinel. Richelet explains it by the Latin *ſpecula*, *excubiæ*. See Guerite.

Some diſtinguiſh the *exchauguette* from the guerite, giving the former name to centry-boxes made of wood, and ſquare; and the latter name to thoſe made of ſtone, and round.

ECHENEIS, in *Ichthyology*. The ancients have uſed this as the name of the petromyza, of ſome kinds; and Appian, in particular, plainly means by it our common lamprey. See REMORA.

ECHEVIN. See ESCHEVIN.

ECHIDNA, in *Natural Hiſtory*, a name given, by ſome authors, to the ſeveral kinds of ophites, or ſerpent-ſtone, from εχιδνα, a *viper*, or *ſerpent*.

ECHINATE *ſeeds*, are ſuch as are prickly and rough like the coat of a cheſnut; or, as ſome ſay, like the ſkin of a hedge-hog.

ECHINI *foſſiles*. It is a very remarkable obſervation of Aguſtino Scilla, that all thoſe foſſile *echini* which he had found in the Meſſineſe and Calabrian hills, and about Malta, were, when bruiſed, as was frequently the caſe, always bruiſed by a perpendicular preſſure. See ECHINITES.

ECHINI *ſpatagi*. It is obſerved, that the foſſile *echini ſpatagi* are very frequent in the iſland of Malta, and people who are for having all foſſile ſhells to be real terreſtrial bodies, produced of ſeeds in the earth, and never to have been parts of real animals, object to theſe having ever been ſuch, their being found ſo plentifully in this foſſile ſtate, and ſo rarely in the native or recent one. This is no objection of weight; becauſe the cornua ammonis give a much ſtronger, which are a more common foſſile, and have never been found recent at all. This is no argument of weight, however, ſince it is eaſy to conceive, that the ſea, at the time of the univerſal deluge, might throw up ſhells from its deep bottom, which we never can get at in fiſhing or otherwiſe. And Scilla has proved the abſurdity of the objection, in regard to the *echini ſpatagi*, and ſhewn that thoſe people who raiſed it, have been led into it by their ignorance. For he has affirmed, that they may be picked up by hundreds at a time in the port of Meſſina, and that himſelf once took up more than a hundred recent ones in an hour.

The ſhells of this ſpecies, found foſſile in the iſland of Malta, are very frequently full of the marle, of which the upper ſtratum of that iſland conſiſts; and ſome of them are cracked, and have been depreſſed a little inwards. This is an evident proof that they once were real ſhells, having, in this caſe, given way, as far as the included marle would let them, on the preſſure of ſome external force. See *Tab. of Shells*, N° 24.

ECHINITES, or ECHINITÆ, in *Natural Hiſtory*, the name given by authors to the foſſil ſhells of the ſeveral ſpecies of *echini marini*, and to the ſtones formed in them. Of theſe there is almoſt an endleſs variety in the foſſil world. Many of thoſe which we daily find in our chalk-pits are the ſame with thoſe now known to us in their recent ſtate, or living in the ſea; but we have numbers of others, of which our imperfect knowlege of the animal world gives us no certain account, in their recent ſtate.

The ſhells of ſome of theſe are found ſcarce at all altered from their original condition. In many others we have plated ſpar filling the places of the ſhells, and retaining every lineament of them. But their moſt frequent appearance is in the form of maſſes of hard flint, or other ſtone, which have been caſt and formed in them, having been received, while in a fluid ſtate, into the hollow of the ſhell, and therefore retaining all the lineaments of the inner ſurface. And, not unfrequently, theſe alſo are coated over with a ſparry or ſtony matter, ſupplying the place of the ſhell they were formed in; and having been made, by the inſenſible depoſition of hard matter, in the place of the particles of the ſhell inſenſibly waſting away; theſe retain all the lineaments of the outer part of the ſhell, as the formed flint does of the inner one. Sometimes pure cryſtal is found in the place of flint in theſe, and often cryſtal, but lightly debaſed by earth; and theſe make very elegant ſpecimens.

The various genera of foſſil echini, or *echinitæ*, are uſually known among authors by the names of *ſpatagi*, *cordati*, *galeati*, *pileati*, *diſcoides*, *ovarii*, *pentaphylloides*.

What is generally underſtood by the word *echinitæ*, is a ſort of arched ſhells, or ſtones formed in them, covered with divers eminences and cavities, ſome of which are diſpoſed into beautiful lines, diverging from the ſummit; and always having two apertures, the one for the mouth, the other for the anus of the animal. Of theſe,

The *echini cordati* are ſuch as have a remarkable furrow on one ſide, or end, which is uſually broader than any other part of the body, and by means of this furrow, repreſents, in ſome degree, the figure of a heart at cards.

The *galeati* are ſuch as have the baſis ſomewhat oblong, and the apertures one in the very margin, and the other near the margin, on the oppoſite ſide. The *pileati* and *diſcoides*, are ſubdiſtinctions of this kind.

The *pileati* are higher, and approach to a conic figure.

The *diſcoides* are flatter, and more compreſſed.

The *ovarii* have only one aperture at the baſe, and have large and unequal tubercles and papillæ.

The *pentaphylloides* have rows of ſhort lines, which are ſo diſpoſed as to repreſent a cinquefoil leaf.

The *ſpatagi* is a very comprehenſive term, taking in moſt of the others as ſubdiſtinctions. It comprehends all that have two apertures in the baſe, and that are covered with ſmall tubercles. See *Tab. of Foſſils*, *Claſs* 9.

ECHINODERMA, in *Natural Hiſtory*, the name of the ſea animal more commonly known by the name of the *echinus marinus*, or ſea hedge-hog. Theſe are fiſh living in an arched ſhell, of various figures, according to the various ſpecies; and always, beſides a vaſt number of ſmaller protuberances and cavities, having two remarkable apertures, the one ſerving for the mouth, the other for the anus of the animal; which are variouſly placed in the different genera and ſpecies.

There are yet wanting, in natural hiſtory, the proper characters and diſtinctions of cruſtaceous and teſtaceous fiſhes, and, till theſe are fixed, there is no ſaying whether theſe creatures belong to the teſtaceous or cruſtaceous tribe.

Many affirm that the ſpines of the echini ſerve them in the place of legs; but there are many alſo who deny this; and ſome affirm, that they have, in the living fiſh, found legs in another part, affixed not to the ſhell, but to the body of the animal. Klein, Echinod. p. 4. See CENTRONIA.

As to its medical virtues, it is friendly and beneficial to the ſtomach and belly; and provokes urine. The crude ſhell toaſted, is a good ingredient in medicines for abſterging the pſora; and the aſhes of it when burnt, cleanſe foul ulcers, and repreſs proud fleſh.

ECHINOMETRA, a name given by ſome to the ſeveral depreſſed ſpecies of the *echinodermata*. See *Tab. of Teſtaceous Animals*, N° 15, 16, 17, and ECHINODERMA.

ECHINOPHORA, in *Botany*. See *Prickly* PARSNEP.

ECHINOPHORA, in *Ichthyology*, a name given by Rondeletius to a ſpecies of ſea-ſnail, of the round-mouthed kind, or claſs of the cochleæ lunares.

He calls it *echinophora*, becauſe it is all over beſet with tubercles; but this is a very ill choſen name, as it confounds it with the echini or ſea-eggs; he had much better have called it cochlea tuberculoſa. See LUNARIS *Cochlea*.

ECHINOPHTHALMIA, in the works of the ancient writers on *Medicine*, the name of a diſeaſe, which was an inflammation on that part of the eye-lids, which is beſet with hairs, or on which the eye-laſhes grow.

ECHINOPUS, in *Botany*. See *Globe* THISTLE.

ECHINUS, in *Architecture*, a member, or ornament, near the bottom of the Ionic, Corinthian, and Compoſite capitals; which, from its circular form or contour, is called by the French, *quart de rond*, and by the Engliſh, *quarter round*, or *boultin*; and from its being uſually carved, or cut with figures of eggs, &c. is called alſo by the Latins, *ovum*, by the Italians, *ovolo*, the French, *œuf*, and the Engliſh, *eggs* and *anchors*. See *Tab. Archit. fig.* 5. Laſtly, the eggs being encompaſſed with a cover, and thus bearing ſome reſemblance to a cheſnut cut open; the Greeks have called it εχινος, *echinus*, a word which denotes the prickly cover of a cheſnut.

ECHINUS is alſo uſed by ſome botaniſts for the prickly head, or top, of any plant; thus called from its likeneſs to a hedge-hog, or the cover of a cheſnut.

ECHINUS, the hedge-hog, and ECHINUS *marinus*, the ſea-urchin. See HEDGE-HOG, ECHINODERMA, and CENTRONIA.

ECHIQUETE, in *Heraldry*. See CHECKY.

ECHITES, in *Botany*, a genus of the *pentandria monogynia* claſs. The characters of this genus are, that it is twiſted, that it has two long ſtrait leaves, a downy ſeed, and a funnel-ſhaped flower.

ECHIUM, in *Botany*. See VIPER's *Bugloſs*.

ECHO, or ECCHO, a ſound reflexed, or reverberated, from a ſolid, concave body, and ſo repeated to the ear. See SOUND, and REFLEXION.

The word is formed of the Greek ηχος, *ſound*, of the verb ηχεω, *ſono*, *I ſound*.

The Peripatetics, who took ſound for ſpecies, or image of the ſonorous body, impreſſed on the adjoining air, account for *echo* from a reſilition of that ſpecies, occaſioned by its meeting ſome obſtacle in the way. But the moderns, who know ſound to conſiſt in a certain tremor, or vibration in the ſonorous body communicated to the contiguous air, and by that means to the ear, give a more conſiſtent account of *echo*.

For a tremulous body, ſtriking on another ſolid body, it is evident, may be repelled without deſtroying or diminiſhing its tremor; and conſequently a ſound may be redoubled by the reſilition of the tremulous body, or air.

But a ſimple reflection of the ſonorous air is not enough to ſolve the *echo*: for then every plain ſurface of a ſolid hard body, as being fit to reflect a voice or ſound, would redouble it; which we find does not hold.

To produce an *echo*, therefore, it ſhould ſeem that a kind of concameration or vaulting were neceſſary, in order to collect, and, by collecting, to heighten and increaſe, and afterwards reflect the ſound; as we find is the caſe in reflecting the rays of light, where a concave mirror is uſed. In reality, as often as a ſound ſtrikes perpendicularly on a wall, behind which is any thing of a vault, or arch, or even another parallel wall; ſo oft will it be reverberated in the ſame line, or other adjacent ones.

For an *echo* to be heard, therefore, it is neceſſary the ear be in the line of reflection; for the perſon who made the ſound to hear its *echo*, it is neceſſary he be in a perpendicular to the place which reflects it; and for a manifold or tautological *echo*, it is neceſſary there be a number of walls and vaults, rocks, and cavities, either placed behind each other, or fronting each other.

Thoſe murmurs in the air, that are occaſioned by the diſcharge of great guns, &c. are a kind of indefinite *echoes*, and proceed from the vaporous particles ſuſpended in the atmoſphere, which reſiſt the undulations of ſound, and reverberate them to the ear.

A ſingle arch, or concavity, &c. can ſcarce ever ſtop and reflect all the ſound; but if there be a convenient diſpoſition behind it, part of the ſound, propagated thither, being collected and reflected, as before, will preſent another *echo*; or if there be another concavity, oppoſed at a due diſtance to the former, the ſound reflected from the one upon the other will be toſſed back again by this latter, &c.

Many of the phænomena of *echoes* are well conſidered by the biſhop of Leighlin and Ferns, Phil. Tranſ. abr. vol. i. p. 508, &c. who remarks, that any ſound, falling either directly, or obliquely, on any denſe body, of a ſmooth, whether plain or arched, ſuperficies, is reflected, or, in other words, it *echos* more or leſs. The ſurface, ſays he, muſt be ſmooth, otherwiſe the air, by reverberation, will be put out of its regular motion, and the ſound thereby broke and extinguiſhed. He adds, that it *echos* more or leſs, to ſhew that when all things are, as before deſcribed, there is ſtill an *echoing*, though it be not always heard; either becauſe the direct ſound is too weak to beat quite back again to him that made it, or that it does return to him, but ſo weak, that it cannot be diſcerned; or that he ſtands in a wrong place to receive the reflected ſound, which paſſes over his head, under his feet, or on one ſide of him, and which therefore may be heard by a man ſtanding in the place where the reflected ſound does come, provided no interpoſed body intercepts it; but not by him that originally made it. There can be no *echo*, unleſs the direct and reflex ſounds follow one another, at a ſufficient diſtance of time, or, in other words, unleſs the difference between the ray proceeding directly to the ear from the ſounding body, and the ſum of the incident and reflex phonic rays be ſufficiently great; for if the reflex ſound arrives at the ear before the impreſſion of the direct ſound ceaſes, the ſound will not be doubled, but only rendered more intenſe. Now if we allow, that no more than nine or ten ſyllables can be pronounced in a ſecond, in order to preſerve the ſounds articulate and diſtinct, there ſhould be about the ninth part of a ſecond between the times of their appulſe to the ear; or, as ſound moves about 1142 feet in a ſecond, the above mentioned difference ſhould be $\frac{1142}{9} = 127$ feet; and therefore every ſyllable will be reflected to the ear at the diſtance of about ſeventy feet from the reflecting body; and as in the ordinary way of ſpeaking three or four ſyllables are uttered in a ſecond, the ſpeaker, in order to have the *echo* returned as ſoon as they are expreſſed, ſhould ſtand about five hundred feet from the reflecting body; and ſo in proportion for any other number of ſyllables. Merſennus allows for a monoſyllable the diſtance of 69 feet; Morton, 90 feet; for a diſſyllable 105 feet, a triſyllable 160 feet, a tetraſyllable 182 feet, and a pentaſyllable 204 feet. Nat. Hiſt. Northampton. cap. 5. p. 358.

It is plain from the above account, that *echoes* may be applied for meaſuring inacceſſible diſtances. Thus, Dr. Derham, ſtanding upon the banks of the Thames, oppoſite to Woolwich, obſerved that the *echo* of a ſingle ſound was reflected back from the houſes in three ſeconds; conſequently the ſum of the direct and reflex rays muſt have been 1142 × 3 = 3426 feet, and the half of it, or 1713 feet, the breadth of the river in that place.

Echoes may be produced with different circumſtances; for,

1. A *plane* obſtacle reflects the ſound back in its due tone and loudneſs; allowance being made for the proportionable decreaſe of the ſound, according to its diſtance.

2. A *convex* obſtacle reflects the ſound ſomewhat ſmaller, and ſomewhat quicker, though weaker, than it otherwiſe would be.

3. A *concave* obſtacle *echos* back the ſound, bigger, ſlower, and alſo inverted; but never according to the order of words. Nor does it ſeem poſſible to contrive any ſingle *echo*, that ſhall invert the ſound, and repeat backwards; becauſe, in ſuch a caſe, the word laſt ſpoken, that is, which laſt occurs to the obſtacle, muſt be repelled firſt, which cannot be. For where in the mean time ſhould the firſt words hang, and be concealed; or how, after ſuch a pauſe, ſhould they be revived, and animated again into motion?

From the determinate concavity, or archedneſs of the reflecting bodies, it may happen that ſome of them ſhall only *echo* back one determinate note, and that only from one place.

4. The *echoing* body being removed farther off, it reflects more of the ſound than when nearer; which is the reaſon why ſome *echoes* repeat but one ſyllable, ſome one word, and ſome many. Of theſe ſome are tonical, which only return a voice when modulated into ſome particular muſical tone; and others polyſyllabical.

That fine *echo* in Woodſtock park, Dr. Plott aſſures us, in the day-time, will return very diſtinctly ſeventeen ſyllables, and in the night twenty. See Nat. Hiſt. Oxford. cap. 1. p. 7.

5. *Echoing* bodies may be ſo contrived, and placed, as that reflecting the ſound from one to the other, either directly and mutually, or obliquely and by ſucceſſion, out of one ſound, ſhall a *multiple echo*, or many *echoes*, ariſe.

At Roſneath, near Glaſgow, in Scotland, there is an *echo* that repeats a tune played with a trumpet three times completely and diſtinctly. See Birch's Hiſt. of the Royal Society, vol. i. p. 137.

At the ſepulchre of Metella, wife of Craſſus, there was an *echo*, which repeated what a man ſaid five times. Authors mention a tower at Cyzicus, where the *echo* repeated ſeven times. There is an *echo* at Bruſſels, which anſwers fifteen times.

One of the fineſt *echoes* we read of is that mentioned by Barthius, in his notes on Statius's Thebais, lib. vi. ver. 30. which repeated the words a man uttered ſeventeen times: this was on the banks of the Naha, between Coblents and Bingen. Barthius aſſures us, he had proved what he writes; and had counted ſeventeen repetitions. And whereas, in common *echoes*, the repetition is not heard till ſome time after hearing the word ſpoke, or the notes ſung; in this, the perſon who ſpeaks, or ſings, is ſcarce heard at all; but the repetition very clearly, and always in ſurpriſing varieties; the *echo* ſeeming ſometimes to approach nearer, and ſometimes to be farther off. Sometimes the voice is heard very diſtinctly, and ſometimes ſcarce at all. One perſon hears only one voice, and another ſeveral; one hears the *echo* on the right, and the other on the left, &c.

Addiſon, and other travellers into Italy, mention an *echo* in that country, at Simonetta palace, near Milan, ſtill more extraordinary, which will return the ſound of a piſtol fifty-ſix times, even though the air be very foggy. The *echo* is heard behind the houſe, which has two wings; the piſtol is diſcharged from a window in one of theſe wings, the ſound is returned from a dead wall in the other wing, and heard from a window in the back-front. See Addiſ. Trav. edit. 1718. p. 32. Miſſon. Voyag. d'Ital. tom. ii. p. 196. edit. 1691. Phil. Tranſ. Nº 480. p. 220.

Add, that a *multiple echo* may be made, by ſo placing the *echoing* bodies, at unequal diſtances, as that they may reflect all one way, and not one on the other; by which means, a manifold ſucceſſive ſound will be heard; one clap of the hands like many; one *ha* like a laughter; one ſingle word like many of the ſame tone and accent; and ſo one muſical inſtrument like many of the ſame kinds, imitating each other.

Laſtly, *echoing* bodies may be ſo ordered, that from any one ſound given, they ſhall produce many *echos*, different both as to tone and intenſion. By which means a muſical room may be ſo contrived, that not only one inſtrument playing therein ſhall ſeem many of the ſame ſort and ſize, but even a conſort of different ones; this may be contrived by placing certain *echoing* bodies ſo, as that any note played, ſhall be returned by them in 3ds, 5ths, and 8ths.

Echo is alſo uſed for the place where the repetition of the ſound is produced, or heard. This is either natural or artificial.

In *echoes*, the place where the ſpeaker ſtands, is called the *centrum phonicum*; and the object, or place, that returns the voice, the *centrum phonocampticum*.

Echo, in *Architecture*, is applied to certain vaults, and arches, moſt commonly of elliptical, or parabolical figures; uſed to redouble ſounds, and produce *artificial echoes*.

The method of making an *artificial echo* is taught by the Jeſuit Blancani, in his Echometria, at the end of his book on the ſphere.

Vitruvius tells us, that in divers parts of Greece and Italy there were brazen veſſels, artfully ranged under the ſeats of the theatres, to render the ſound of the actors voices more clear, and make a kind of *echo*; by which means, of the prodigious multitude of perſons preſent at thoſe ſpectacles, every body might hear with eaſe and pleaſure.

Echo, in *Muſic*, pieces compoſed in imitation of *echoes*.

Sometimes alſo the word *echo* ſtands for *piano*, intimating that the inſtrument, or voice, is to play or ſing after a ſoft and ſweet manner. Organs and harpſichords have what they call an *echo* ſtop.

Echo, in *Poetry*, denotes a kind of compoſition, wherein the laſt words, or ſyllables, of each verſe, contain ſome meaning, which being repeated apart, anſwers to ſome queſtion, or other matter, contained in the verſe.

Such is that famous *echo* of Eraſmus, *Decem annos conſumpſi in legendo Cicerone —one*, i. e. *ονε*, *aſine*.

The firſt *echo*, in verſe, according to Paſquier, is that in the Sylvæ of Johannes Secundus: but Paſquier is miſtaken; for the ancient Greek and Latin poets have wrote *echoes*. This, Martial intimates plainly enough; when, laughing at ſuch ſorts of baubles, he ſays, there is nothing like them among his poems. *Nuſquam Græcula quod recantat echo*: by which, on the one ſide, he ſhews there were Latin poets, in his time, who made *echoes*; and, on the other, that the invention came from the Greeks.

Ariſtophanes, in his comedy intituled Θεσμοφοριαζȣσαι, introduces Euripides in the perſon of *echo*; and Callimachus, in the epigram, Εχθαιρω το ποιημα το κυκλικον, ſeems to have intended a kind of *echo*.

There is a humorous ſpecimen of this kind of poetry in Hudibras.

ECHOMETER, in *Muſic*, a kind of ſcale, or rule, with ſeveral lines divided thereon, ſerving to meaſure the duration, or length, of ſounds, and to find their intervals and ratios.

The word is formed of the Greek ηχος, *ſound*, and μετρον, *meaſure*.

ECHOS, Ηχος, a *ſound*, in *Phyſic*. In Hippocrates this frequently imports what the Latins call *tinnitus aurium*, and the Engliſh a ringing of the ears; a ſymptom very frequent in acute diſtempers.

ECHPHYAS, from εκ and φυω, *I produce*, an excreſcence, or appendix, a word uſed by many of the ancient writers in medicine. The appendicula vermiformis is thus called by many authors.

ECHTHELYNSIS, from εκθηλυγω, of ϑηλυς, *feminine*, *I render effeminate*, a term uſed by the ancient phyſicians for a laxneſs, or flabby ſoftneſs, of the fleſh of the legs, or any other part of the body. Some have alſo uſed the word to expreſs a fault in bandages, when too looſe.

ECLAMPSIS, from λαμπω, *I ſhine*, a word uſed by Hippocrates in deſcribing the epilepſy, and, by moſt people, ſuppoſed, by a forced explanation, to mean the change which children undergo at the age of puberty, a time of great conſequence in this diſeaſe, at which nature ſhines forth in new luſtre, by the increaſe both of ſtrength and underſtanding. But the more natural and obvious ſenſe of the word ſeems to be the expreſſing thoſe reſplendent flaſhings and ſparklings of light which ſtrike the eyes of perſons ſubject to this diſtemper, and which are called by Cælius Aurelianus *ſcintillarum micæ*, and *circuli ignei*. And the ſame author, in deſcribing one of his epileptic caſes, particularly mentions the flaſhings of lightning, as it were, which were frequent before his eyes. It is not to be omitted that Hippocrates and Galen have both alſo uſed this word in another ſenſe, to expreſs the higheſt degree of a fever, juſt before and at the criſis, when it is in its utmoſt degree of heat, and exerts itſelf with its utmoſt violence.

ECLECTIC, Eclectici, a name given to ſome ancient philoſophers, who, without attaching themſelves to any particular ſect, took what they judged good, and ſolid, from each.

Hence their denomination; which, in the original Greek, ſignifies, *that may be choſen*, or *that chooſes*; of the verb εκλεγω, *I chooſe*.

Laertius notes, that they were alſo, for the ſame reaſon, denominated *analogetici*; but that they call themſelves *Philalethes*, i. e. lovers of truth.

The chief, or founder, of the *eclectici*, was one Potamon, of Alexandria, who lived under Auguſtus and Tiberius; and who, weary of doubting of all things with the Sceptics and Pyrrhonians, formed the *eclectic* ſect; which Voſſius calls the *eclective*.

Towards the cloſe of the ſecond century a ſect aroſe in the Chriſtian church under the denomination of *Eclectics*, or modern *Platonics*. They profeſſed to make truth the only object of their enquiry, and to be ready to adopt, from all the different ſyſtems and ſects, ſuch tenets as they thought agreeable to it. However, they preferred Plato to the other philoſophers, and looked upon his opinions concerning God, the human ſoul, and things inviſible, as conformable to the ſpirit and genius of the Chriſtian doctrine. One of the principal patrons of this ſyſtem was Ammonius Saccas, who at this time laid the foundation of that ſect, afterwards diſtinguiſhed by the name of the new *Platonics*, in the Alexandrian ſchool. This philoſopher was born of Chriſtian parents, and educated in the Chriſtian faith, and probably never deſerted the outward profeſſion of this religion; though Porphyry maintains, in oppoſition to the teſtimony of Euſebius, that in maturer life he became a pagan; and Fabricius, who is followed by Dr. Lardner, alleges that there were two perſons of the ſame name, the one a heathen philoſopher, and the other a Chriſtian writer. Thoſe who are deſirous of acquainting themſelves with the grounds of theſe oppoſite opinions, may conſult Fabricius's Bibl. Græc. lib. iv. cap. 26. p. 159. Lardner's Collection of Jewiſh and Heathen Teſtimonies, vol. iii. p. 195, &c. and Moſheim, De Rebus Chriſtianorum ante Conſt. Mag. p. 281, &c.

It was evidently the deſign of Ammonius to reconcile and unite all ſects, philoſophical and religious, and to inculcate a doctrine that ſhould comprehend all, the Chriſtians not excepted, in one common profeſſion. For this purpoſe he maintained, that the great principles of all philoſophical and religious truth were to be found, equally, in all ſects; that they differed from each other, only in their method of expreſſing them, and in ſome opinions of little or no importance; and that, by a proper interpretation of their reſpective ſentiments, they might eaſily be united into one body. Accordingly, all the gentile religions, and even the Chriſtian, were to be illuſtrated and explained by the principles of this univerſal philoſophy; and the fables of the prieſts were to be removed from paganiſm, and the comments and interpretations of the diſciples of Jeſus from Chriſtianity. In conformity to this plan he inſiſted, that all the religious ſyſtems of all nations ſhould be reſtored to their original purity, and reduced to their primitive ſtandard, viz. the ancient philoſophy of the Eaſt, preſerved uncorrupted by Plato; and he affirmed that this project was agreeable to the intentions of Jeſus Chriſt, whoſe ſole view, in deſcending upon earth, was to ſet bounds to the reigning ſuperſtition, to remove the errors that had blended themſelves with the religions of all nations, but not to aboliſh the ancient theology from which they were derived. He therefore adopted the doctrines which were received in Egypt concerning the univerſe, and the Deity, conſidered as conſtituting one great *whole*, concerning the eternity of the world, the nature of ſouls, the empire of Providence, and the government of the world by dæmons. He alſo eſtabliſhed a ſyſtem of moral diſcipline, which allowed the people in general to live according to the laws of their country, and the dictates of nature, but required the wiſe to exalt their minds by contemplation, and to mortify the body, ſo that they might be capable of enjoying the preſence and aſſiſtance of the dæmons, and of aſcending after death to the preſence of the Supreme Parent. In order to reconcile the popular religions, and particularly the Chriſtian, with this new ſyſtem, he made the whole hiſtory of the heathen gods an allegory, maintaining that they were only celeſtial miniſters, entitled to an inferior kind of worſhip; and he acknowleged that Jeſus Chriſt was an excellent man, and the friend of God, but alleged that it was not his deſign entirely to aboliſh the worſhip of dæmons, and that his only intention was to purify the ancient religion. This ſyſtem, ſo plauſible in its firſt riſe, but ſo comprehenſive and complying in its progreſs, has been the ſource of innumerable errors and corruptions in the Chriſtian church. At its firſt eſtabliſhment it is ſaid to have had the approbation of Athenagoras, Pantænus, and Clemens the Alexandrian, and of all who had the care of the public ſchool belonging to the Chriſtians at Alexandria. It was afterwards adopted by Longinus, the celebrated author of the treatiſe on the Sublime, Plotinus, Herennius, Origen, Porphyry, Jamblichus the diſciple of Porphyry, Sopater, Ediſius, Euſtathius, Maximus of Epheſus, Priſcus, Chryſanthius the maſter of Julian, Julian the Apoſtate, Hierocles, Proclus, and many others, both pagans and Chriſtians. Moſheim's Eccl. Hiſt. vol. i. p. 136, &c. &c. See Platonism.

Eclectics were alſo a certain ſet of phyſicians among the ancients, of whom Archigenes, under Trajan, was the chief, who ſelected from the opinions of all the other ſects, that which appeared to them beſt, and moſt rational;

tional; hence they were called *eclectics*, and their preſcriptions *medicina eclectica*.

ECLEGMA, or **Ecligma**, Εκλειγμα, or **Eclectos**, in *Medicine*, a pectoral remedy, of the conſiſtence of a thick ſyrup; called, alſo, *lohoch*, *linctus*, and *lambative*.

The word is Greek; formed of εκ, and λειχειν, *to lick*; becauſe the patient is to take it by licking it off the end of a liquorice ſtick dipt therein; in order that, being taken thus by little and little, it may remain the longer in the paſſage, and moiſten the breaſt the better.

There are *eclegmas* of the ſyrups of poppy, others of lentils, others of ſquills, &c. Their intention is to heal or eaſe the lungs, in coughs, peripneumonies, &c. They are uſually compoſed of oils, incorporated with ſyrups.

ECLIPSAREON, in *Aſtronomy*, is an inſtrument invented by Mr. Ferguſon for exhibiting the time, quantity, duration, and progreſs, of ſolar eclipſes, at all parts of the earth. This machine conſiſts of a terreſtrial globe A (*Tab.* II. *Aſtronomy*, *fig.* 70.) turned, by a winch M, round its axis B, inclining 23½°, and carrying an index round the hour-circle D; a circular plate E, on which the months and days of the year are inſerted, and which ſupports the globe in ſuch a manner, that when the given day of the month is turned to the annual index G, the axis has the ſame poſition with the earth's axis at that time; a crooked wire F, which points to the middle of the earth's enlightened diſc, and ſhews to what place of the earth the ſun is vertical at any given time; a penumbra, or thin circular plate of braſs I, divided into 12 digits by 12 concentric circles, and ſo proportioned to the ſize of the globe, that its ſhadow, formed by the ſun, or a candle placed at a convenient diſtance, with its rays tranſmitted through a convex lens, to make them fall parallel on the globe, may cover thoſe parts of the globe, which the ſhadow and penumbra of the moon cover on the earth; an upright frame HHHH, on the ſides of which are ſcales of the moon's latitude, with two ſliders K and K fitted to them, by means of which the center of the penumbra may be always adjuſted to the moon's latitude; a ſolar horizon C, dividing the enlightened from the darkened hemiſphere, and ſhewing the places where the general eclipſe begins and ends with the riſing or ſetting ſun; and a handle M, which turns the globe round its axis by wheel work, and moves the penumbra acroſs the frame by threads over the pulleys L, L, L, with a velocity duly proportioned to that of the moon's ſhadow over the earth, as the earth turns round its axis.

If the moon's latitude at any conjunction exceeds the number of diviſions on the ſcales, there can be no eclipſe; if not, the ſun will be eclipſed to ſome parts of the earth; the appearances of which may be repreſented by the machine, either with the light of the ſun, or of a candle. For this purpoſe, let the indexes of the ſliders KK point to the moon's latitude, the plate E be turned till the day of the given new moon comes to G, and the penumbra be moved till its center comes to the perpendicular thread in the middle of the frame, which thread repreſents the axis of the ecliptic; then turn the handle till the meridian of London on the globe comes under the point of the wire F, and turn the hour-circle D, till XII at noon comes to its index; and turn the handle, till the hour-index points to the time of new moon in the circle D, and then ſcrew faſt the collar N. Laſtly, elevate the machine, till the ſun ſhines through the ſight-holes in the ſmall upright plates O, O, on the pedeſtal; or, place a candle before the machine, at the diſtance of about four yards, ſo that the ſhadow of the interſection of the croſs threads in the middle of the frame may fall preciſely on that part of the globe to which the wire F points; with a pair of compaſſes take the diſtance between the center of the penumbra, and the interſection of the threads, and ſet the candle higher or lower, according to that diſtance; and place a large convex lens between the machine and candle, ſo that the candle may be in the focus of the lens; and thus the machine is rectified for uſe.

Let the handle be turned backward, till the penumbra almoſt touches the ſide HF of the frame, and then, turning it forward, the following phenomena may be obſerved. 1. Where the eaſtern edge of the ſhadow of the penumbral plate, I, firſt touches the globe at the ſolar horizon, thoſe who inhabit the correſponding part of the earth ſee the eclipſe begin on the uppermoſt edge of the ſun, juſt at the time of its riſing. 2. In that place where the penumbra's center firſt touches the globe, the inhabitants have the ſun riſing upon them centrally eclipſed. 3. When the whole penumbra juſt falls upon the globe, its weſtern edge at the ſolar horizon touches and leaves the place where the eclipſe ends at ſun-riſe on his lowermoſt edge. 4. By continued turning, the croſs lines in the center of the penumbra will go over all thoſe places on the globe where the ſun is centrally eclipſed. 5. When the eaſtern edge of the ſhadow touches any place of the globe, the eclipſe begins there; when the vertical line in the penumbra comes to any place, then is the greateſt obſcuration at that place; and when the weſtern edge of the penumbra leaves the place, the eclipſe ends there, and the times are ſhewn on the hour-circle; and from the beginning to the end, the ſhadows of the concentric penumbral circles ſhew the number of digits eclipſed at all the intermediate times. 6. When the eaſtern edge of the penumbra leaves the globe at the ſolar horizon C, the inhabitants ſee the ſun beginning to be eclipſed on his lowermoſt edge at its ſetting. 7. Where the penumbra's center leaves the globe, the inhabitants ſee the ſun centrally eclipſed; and laſtly, where the penumbra is wholly departing from the globe, the inhabitants ſee the eclipſe ending on the uppermoſt part of the ſun's edge, at the time of its diſappearing in the horizon.

This inſtrument will likewiſe ſerve for exhibiting the times of ſun riſing and ſetting, and of morning and evening twilight, as well as the places to which the ſun is vertical on any day, by ſetting the day on the plate E to the index G, turning the handle till the meridian of the place comes under the point of the crooked wire F, and bringing XII on the hour-circle D to the index: then if the globe be turned, till the place touches the eaſtern edge of the horizon C, the index ſhews the time of ſun-ſetting; and when the place comes out from below the other edge of C, the index ſhews the time when evening twilight ends; and morning twilight and ſun-riſing are ſhewn in the ſame manner on the other ſide of the globe. And the places under the point of the wire F are thoſe to which the ſun paſſes vertically on that day. Ferguſon's Aſtronomy, p. 298, &c. 4to edit. or Phil. Tranſ. vol. xlviii. p. 520.

ECLIPSE, from εκλειψις, of εκλειπω, *deficio*, *I fail*, in *Aſtronomy*, a privation of the light of one of the luminaries, by the interpoſition of ſome opake body, either between it and the eye, or between it and the ſun.

The ancients had frightful ideas of *eclipſes*; ſuppoſing them preſages of the moſt diſmal events. Plutarch aſſures us, that, at Rome, it was not allowed to talk publicly of any natural cauſes of *eclipſes*. They made a great noiſe with brazen inſtruments, and raiſed loud ſhouts, during *eclipſes* of the moon; as thinking, thereby, to eaſe her in labour: whence Juvenal, ſpeaking of a talkative woman, ſays, *Una laboranti poterit ſuccurrere lunæ*. Others attributed the *eclipſe* of the moon to the arts of magicians, who, by their enchantments, plucked her out of heaven, and made her ſkim over the graſs. The natives of Mexico keep faſt, during *eclipſes*; and particularly their women, who beat and abuſe themſelves; drawing blood from their arms, &c. They imagine the moon has been wounded by the ſun, in ſome quarrel between them.

The Chineſe fancy that *eclipſes* are occaſioned by great dragons, who are ready to devour the ſun and moon, and therefore, when they perceive an *eclipſe*, they rattle drums and braſs kettles, till the monſter, terrified by the noiſe, lets go his prey. The ſuperſtitious notions entertained of *eclipſes* were once of conſiderable advantage to Chriſtopher Columbus, when, in 1493, he was driven on the iſland of Jamaica, and diſtreſſed for want of proviſions, was refuſed relief; but having threatened them with a plague, and foretelling an *eclipſe*, as a token of it, which happened according to his prediction, the barbarians were ſo terrified, that they ſtrove who ſhould be the firſt in bringing him ſupplies, throwing them at his feet, and imploring forgiveneſs. Ricciolus's Almag. vol. i. lib. v. cap. 2. § 14. or p. 291.

Eclipse, *the duration of an*, is the time between the immerſion and emerſion.

Eclipse, *immerſion, or incidence*, *of an*, is the moment when part of the ſun, planet, or moon's diſk, firſt begins to be hidden. See **Immersion**.

Eclipse, *emerſion, or expurgation, of an*, is the time when the *eclipſed* luminary begins to re-appear, or emerge out of the ſhadow.

To determine the duration of *eclipſes*, they uſually divide the diameter of the luminary *eclipſed* into 12 equal parts, called *digits*, or *digiti ecliptici*.

Eclipſes are divided, with reſpect to the luminary *eclipſed*, into *eclipſes of the ſun*, *of the moon*, and of the *ſatellites*; and, with reſpect to the circumſtances, into *total*, *partial*, *annular*, &c. *eclipſes*.

Eclipse *of the moon*, is a deficiency of light in the moon, occaſioned by a diametrical oppoſition of the earth between the ſun and moon.

The manner of this *eclipſe* is exhibited in *Tab. Aſtronomy*, *fig.* 34. where A repreſents the earth, and B, or C, the moon.

When all the light of the moon is intercepted, i. e. when her whole diſk is covered, the *eclipſe* is ſaid to be *total*; when only part, *partial*; when the *total eclipſe* laſts for ſome time, it is ſaid to be *totalis cum mora, total with continuance*; when only inſtantaneous, *totalis ſine mora, total without continuance.*

Eclipſes of the moon only happen in the time of full moon; becauſe it is only then the earth is between the ſun and moon: nor do they happen every full moon, by reaſon of the obliquity of the moon's way with reſpect to the ſun's; but only in thoſe full moons which happen either in the nodes, or very near them, where the aggregate of the apparent ſemidiameters of the moon and the earth's ſhadow is greater than the latitude of the moon, or the diſtance between their centers.

The moſt conſiderable circumſtances in the eclipſes *of the moon* are, 1. That as the ſum of the ſemidiameters of the moon and earth's ſhadow is greater than the aggregate of the ſemidiameters of the ſun and moon (that, when leaſt, being $5\frac{1}{5}$; and this, when greateſt, ſcarce $3\frac{1}{5}$); it is evident, *lunar eclipſes* may happen in a greater latitude of the moon, and at a greater diſtance from the nodes, and, conſequently, are more often obſerved, in any one part of the earth, than *ſolar* ones; though, with reſpect to the whole earth, the latter are more frequent than the former, becauſe the ſun's ecliptic limits are greater than the moon's.

2. *Total eclipſes*, and thoſe of the longeſt duration, happen in the very nodes of the ecliptic; becauſe the ſection of the earth's ſhadow, then falling on the moon, is conſiderably greater than her diſc. There may likewiſe be *total eclipſes* within a little diſtance of the nodes; but the farther, the leſs their duration; farther off ſtill, there are only partial ones, and, at length, none at all; as the latitude and the ſemidiameter of the moon, together, are either leſs, equal, or greater than the ſemidiameter of the ſhadow.

3. All *lunar eclipſes* are univerſal, i. e. are viſible in all parts of the globe which have the moon above their horizon; and are every where of the ſame magnitude, and begin and end together.

4. In all *lunar eclipſes*, the eaſtern ſide is what firſt immerges, and alſo emerges; ſo that though, at firſt, the moon be more weſterly than the earth's ſhadow, yet her proper motion being ſwifter than the ſame, ſhe overtakes and outgoes it.

5. The moon, even in the middle of an *eclipſe*, has uſually a faint appearance of light, reſembling tarniſhed copper; which Gaſſendus, Ricciolus, Kepler, &c. attribute to the light of the ſun, refracted by the earth's atmoſphere, and tranſmitted thither.

Laſtly, ſhe grows ſenſibly paler, and dimmer, before ſhe enters within the earth's ſhadow; which is attributed to the earth's PENUMBRA.

Aſtronomy of lunar ECLIPSES, *or the method of calculating their times, places, magnitudes, and other phenomena.* Preliminary 1. To find the length of the earth's ſhadowy cone. Find the ſun's diſtance from the earth for the given time. See SUN, and DISTANCE. Then, as the ſun's diameter is known in ſemidiameters of the earth, the length of the cone will be found from the rules given under SHADOW. Suppoſe, e. gr. the diſtance of the ſun from the earth to be 95,000000 miles, and the eccentricity of the orbit 1,377000 miles, then will the greateſt diſtance be 96,377000, or 24094 ſemidiameters of the earth; and the ſun's ſemidiameter to that of the earth as 112 to 1, then will the length of the ſhadowy cone be 217 diameters of the earth.

Or, in the triangle *a b c* (*Tab.* II. *Aſtronomy*, *fig.* 71.) let *ab* repreſent the ſemidiameter of the ſun, which at his greateſt diſtance from the earth, whoſe ſemidiameter is *cd*, appears under the angle *a c b* equal to 15′ 44″; let the ſun's parallax, or the angle *c b d*, for the ſake of avoiding fractions, be 9″; then will the angle *d e c*, or the ſemi-angle of the conical ſhadow, be 15′ 35″; whence in the triangle *d c e*. we ſhall have, by trigonometry, the tangent of 15′ 35″ to radius as *cd*, or 1 ſemidiameter of the earth to *ce*: i. e. by Gardiner's Logarithmic Tables, 7,6563832 : 10,00, &c. : : 0,000, &c. : 2,3436168, which is the logarithm of the number 220,6 nearly; and therefore the length of the ſhadow is thus found to be above 220 ſemidiameters of the earth. But if the parallax be neglected, and the ſemi-angle of the cone ſuppoſed to be 15′ 50′, the height of the ſhadow will be only ſomewhat more than 217 ſemidiameters of the earth. And if we ſuppoſe the moon's ſhadow to be ſimilar to that of the earth, and the proportion of their ſemidiameters as 28 to 100, we ſhall have the height of the moon's ſhadow in the ſame circumſtances, above 61 ſemidiameters of the earth.

Hence, as the moon's leaſt diſtance from the earth is ſcarce 56 ſemidiameters, and the greateſt not more than 64; the moon, when in oppoſition to the ſun, in or near the nodes, will fall into the earth's ſhadow, though the ſun and moon be in their apogees; and much more, if they be in or near their perigees; becauſe the ſhadow is then longer, and the moon nearer the baſe of the cone.

2. To find the apparent ſemidiameter of the earth's ſhadow, in the place of the moon's paſſage, for any given time. Find the ſun and moon's diſtance from the earth, and thence their horizontal parallaxes; add the parallaxes together, and from the ſum ſubtract the apparent ſemidiameter of the ſun; the remainder is the apparent ſemidiameter of the ſhadow.

Thus, ſuppoſe the moon's horizontal parallax 57′ 18″, the ſun's 9″; the ſum is 57′ 27″: from which if the ſun's apparent ſemidiameter 16′ 5″ be ſubtracted, we ſhall have 41′ 22″ for the ſemidiameter of the ſhadow.

Note, M. De la Hire omits the ſun's parallax, as of no conſideration; but increaſes the apparent ſemidiameter of the ſhadow by a whole minute, for the ſhadow of the atmoſphere; which would give the ſemidiameter of the ſhadow, in our inſtance, 42′ 13″.

3. The moon's latitude, AL, at the time of her oppoſition, together with the angle at the node B, being given; to find the arch between the centers AI, and the arch IL (*fig.* 35.) Since in the ſpherical triangle AIL, rectangular at I, the ſide AL is given; as alſo the angle ALI, which is the complement of LAI, or B, to a right angle; the arch between the centers, AI, is found by ſpherical trigonometry; and ſince the angle LAI is equal to B, each of them, with IAB, making a right angle; and the moon's latitude AL is given; the arch LI will likewiſe be found by ſpherical trigonometry. See SPHERICAL *triangle.*

ECLIPSE *of the moon, to determine the bounds of an.* Since there is no *eclipſe* poſſible, but when the aggregate of the ſemidiameters of the ſhadow and the moon is greater than the moon's latitude (for, without this, the moon will not come in the ſhadow) add the apparent ſemidiameters of the moon in perigæo, and of the ſhadow, ſuppoſing the ſun in apogæo; by which you will have the ſide MO, (*fig.* 36). Then, in the ſpherical triangle MNO, having given the angle at the node, whoſe quantity is the moon's greateſt latitude in the conjunctions; the right angle M, and the leg MO; find the moon's diſtance from the node NO; which is the utmoſt bound, beyond which the *eclipſe* cannot reach. After the ſame manner, adding the apparent ſemidiameters of the moon in apogæo, and of the ſhadow of the earth when the ſun is in perigæo, for the ſake of having the ſide LH in the triangle NLH; the diſtance of the moon, from the aſcending node HN, will be found by ſpherical trigonometry; which is the bound within which the moon will neceſſarily be *eclipſed.*

Thus, e. gr. the ſemidiameter of the ſhadow, when the ſun is in apogæo, and the moon in perigæo, according to Kepler, is 49′ 40″. And the apparent ſemidiameter of the moon in perigæo 16′ 22″. Conſequently MO is 66′, or 1° 6′; and therefore there will be no *eclipſe* at all, if the moon's latitude be greater than 1° 6′. Now, as the ſame angle N is ſuppoſed by Kepler to be 5° 18′,

Log. ſin. N	89655337
Sin. MO	12832433
Whole ſine	100000000
Log. of ſine ON	93177096

The number correſponding to which in the tables is 11° 59′ 50″. If, therefore, the moon's diſtance from either of the nodes be greater than 12°, no *eclipſe* will generally happen. And, in like manner, the ſemidiameter of the ſhadow in the ſun's perigee, and the moon's apogee, is 43′ 50″, and the moon's ſemidiameter in her apogee 15′. Conſequently LH is 58′ 50″. And therefore there will be an *eclipſe*, if the moon's latitude doth not exceed 58′ 50″. This, however, admits of ſome variation; for when the full moon is in her apogee, ſhe will be *eclipſed*, if ſhe be within $10\frac{1}{2}$ degrees of the node; and when ſhe is full in her perigee, ſhe will be *eclipſed*, if ſhe be within $12\frac{1}{30}$ of the node.

To determine the quantity of an eclipſe, *or the number of digits* eclipſed.—Add the moon's ſemidiameter IK (*fig.* 35.) to the ſemidiameter of the ſhadow AM; then will $AM + IK = AI + IM + IK = AI + MK$. From this ſum, therefore, ſubtract the arch between the centers AI, the remainder gives the ſcruples or parts of the diameter *eclipſed* MK. Say, therefore, as the moon's diameter KH is to the ſcruples or parts thereof *eclipſed*, MK; ſo is 12 to the digits *eclipſed.*

To find the ſcruples of half duration of an eclipſe, *or the arch of the lunar orbit, which her center deſcribes from the beginning of the* eclipſe *to the middle thereof.* Add the ſemidiameters of the ſhadow AP, and the moon PN together; the ſum gives AN. From the ſquare of AN ſubtract the ſquare of AI; the remainder is the ſquare of IN. And the ſquare root of this reſidue is the arch IN required.

To find the ſcruples of half duration of total darkneſs in a total eclipſe. Subtract the moon's ſemidiameter SV (*fig.* 37.) from the ſemidiameter of the ſhadow AV; the remainder is AS: in the triangular AIS, which is rectangular at I, therefore, we have the arch AS given by the laſt method; and the arch between the centers AI; where the arch IS is found, as in the laſt problem.

To find the beginning, middle, and end, of a lunar eclipſe. Say, as the moon's horary motion from the ſun is to 3600 horary ſeconds; ſo are the ſeconds of the arch LI (*fig.* 35.) to the horary ſeconds equivalent thereto. Subtract theſe ſcruples, or ſeconds, in the firſt and third quadrant of the anomaly, from the time of full moon, and add it to the ſame in the ſecond and fourth; the reſult is the time of the middle of the *eclipſe*. Then ſay, as the moon's horary motion from the ſun is to 3600 ſcruples, or ſeconds, ſo are the ſeconds of half duration IN to the time of half duration; the double of which gives the whole duration. Laſtly, ſubtract the time of half duration from the time of the middle of the *eclipſe*, the remainder will be the beginning of the *eclipſe*. And add the ſame to the ſame, the ſum will be its end.

A lunar *eclipſe*, that is both total and central, laſts 3 hours 57 minutes 6 ſeconds, from the beginning to the end, when the moon is in her apogee; and 3 hours 37 minutes 26 ſeconds, when in perigee; her horary motion being floweſt in the former caſe, and quickeſt in the latter.

To calculate an eclipſe *of the moon.* 1. For the given time of the mean full moon, compute the moon's diſtance from the node, to find whether there be an *eclipſe* or not; as taught in the firſt problem.

2. Compute the time of the true full moon, with the ſun and moon's true place reduced to the ecliptic.

3. For the time of the true full moon, compute the moon's true latitude, and the diſtance of each luminary from the earth, with the horizontal parallaxes, and apparent ſemidiameters.

4. For the ſame time, find the ſun and moon's true horary motion.

5. Find the apparent ſemidiameter of the ſhadow. And,

6. The arch between the centers AI, with the arch LI.

7. Compute the ſcruples of half duration IN. And thence,

8. Determine the beginning, middle, and end, of the *eclipſe*.

Laſtly, Find the ſcruples *eclipſed*, and thence the quantity of the *eclipſe*; as taught under the preceding problems.

To draw a type, or figure, of a lunar eclipſe *on a plane.* 1. Let CD (*fig.* 38.) repreſent the ecliptic; and let the center of the ſhadow be in A; through which draw a right line GQ perpendicular to DC; and ſuppoſe D the eaſt, C the weſt, Q the ſouth, and G the north.

2. From A, with the interval of the aggregate AN, of the ſemidiameter of the ſhadow AP, and of the moon PN, deſcribe a circle DGCQ; and with the interval of the ſemidiameter of the ſhadow AP, draw another concentric circle EF, which will exhibit the ſection of the ſhadow in the paſſage of the moon.

3. Let AL be equal to the latitude of the moon at the beginning of the *eclipſe*; and in L erect a perpendicular LN, meeting the greater circle in N, towards the weſt. Then will the center of the moon, at the beginning of the *eclipſe*, be in N.

4. After like manner, make AS equal to the latitude of the moon at the end of the *eclipſe*; and in S erect a perpendicular OS, parallel to DC; then will the center of the moon be in O, at the end of the *eclipſe*.

5. Connect the points O and N by a right line; ON will be the arch of the orbit, which the center of the moon deſcribes during the *eclipſe*.

6. From O and N, with the interval of the moon's ſemidiameter, deſcribe circles PV and TX, which will exhibit the moon at the beginning and end of the *eclipſe*.

7. Then, from A, letting fall a perpendicular AI to ON; the center of the moon will be in I, in the middle of the darkneſs.

Wherefore, laſtly, from I, with the interval of the moon's ſemidiameter, deſcribe a circle HK: this will repreſent the moon in the greateſt darkneſs, and at the ſame time the quantity of the *eclipſe*.

Eclipse *of the ſun*, is an occultation of the ſun's body, occaſioned by an interpoſition of the moon between the ſun and the earth.

It is diſtinguiſhed, like that of the moon, into *total* and *partial*, &c. to which muſt be added a third ſpecies called *annular*.

Eclipſes of the ſun, ſome authors obſerve, ſhould in propriety be called *eclipſes of the earth*.

As the moon is found to have a parallax of latitude, *eclipſes* of the ſun only happen when the latitude of the moon, viewed from the earth, is leſs than the aggregate of the apparent ſemidiameter of the ſun and moon. *Solar eclipſes*, therefore, happen when the moon is in conjunction with the ſun, in or near the nodes, i. e. at the new moons. Conſequently, the memorable *eclipſe of the ſun*, at our Saviour's paſſion, happening at the time of full moon, when the ſun and moon are in oppoſition, was preternatural. Beſides, the darkneſs in total *eclipſes* of the ſun never laſts above four minutes in one place; whereas the darkneſs of the crucifixion laſted three hours, Matt. xxviii. 15. and overſpread, at leaſt, all the land of Judæa.

Though the new moon cover the ſun from the earth, yet is not there an *eclipſe* every moon; becauſe the moon's way is not preciſely under the ecliptic, but is placed obliquely thereto; only interſecting it twice in every period. So that *eclipſes* can only be occaſioned in ſuch new moons, as happen in theſe interſections or nodes, or very near them.

In the nodes, when the moon has no viſible latitude, the occultation is total; and with ſome continuance, when the diſc of the moon, in perigæo, appears greater than that of the ſun in apogæo, and its ſhadow is extended beyond the ſurface of the earth; and, without continuance, at moderate diſtances, when the cuſp, or point of the moon's ſhadow, barely touches the earth. Laſtly, out of the nodes, but near them, the *eclipſes* are partial.

The other circumſtances of *ſolar eclipſes* are, 1. That none of them are univerſal; that is, none of them are ſeen throughout the whole hemiſphere, which the ſun is then above; the moon's diſc being much too little, and much too near the earth, to hide the ſun from the diſc of the earth.

The moon's dark ſhadow covers only a ſpot on the earth's ſurface, about 180 Engliſh miles broad, when the ſun's diſtance is greateſt, and the moon's leaſt; and thus f only can the total darkneſs extend. In this caſe, if L (*Tab.* II. *Aſtronomy*, *fig.* 72.) repreſent the moon, T center of the earth, LT the diſtance of the moon e to 56 ſemidiameters of the earth, LM the height of ſhadow of the moon, equal to 60: then will TB be TM as 1 to 4, and as the ſine of the angle TMB= 15′ 50″ to the ſine of the angle TBM; i. e. 0,00, &c. : 0,60205999 :: 7,6632969 : 8,2653568, the ſine of 6 20″; therefore the arc AB, or the angle ATB=TMB +TBM=15′ 50″+63′ 20″=79′ 10″; and the arc BC =158′ 20″=183 miles. But her partial ſhadow, or penumbra, may then cover a circular ſpace 4900 miles in diameter, within which the ſun is more or leſs *eclipſed*, as the places are leſs or more diſtant from the center of the PENUMBRA. In this caſe the axis of the ſhade is ſuppoſed to paſs through the center of the earth, or the moon is ſuppoſed to change exactly in the node; and then the ſection of the ſhadow will be evidently circular; but in every other caſe the conical ſhadow is cut obliquely, and the ſection will be an ellipſe.

2. Nor does the *eclipſe* appear the ſame in all parts of the earth, where it is ſeen; but when in one place it is total, in another it is only partial.

Farther, when the moon, being in her apogee, appears much leſs than the ſun, as happens moſt ſenſibly, when he is in perigæo; the cuſp of the lunar ſhadow not reaching the earth, ſhe becomes in a central conjunction with the ſun, yet not able to cover his diſc, but lets his whole limb appear like a lucid ring or bracelet; this is hence called an *annular eclipſe*.

3. It does not happen at the ſame time in all places where it is ſeen; but appears more early to the weſtern parts, and later to the eaſtern.

4. In moſt *ſolar eclipſes* the moon's diſc is covered with a faint, dawning light; which is attributed to the reflexion of the light from the illuminated part of the earth.

Laſtly, in total *eclipſes* of the ſun, the moon's limb is ſeen ſurrounded by a pale circle of light; which ſome aſtronomers take for a manifeſt indication of a lunar atmoſphere; but which is probably the atmoſphere of the ſun; becauſe it has been obſerved to move equally with the ſun, and not with the moon; and beſides, the moon is now generally believed to have no ATMOSPHERE.

Eclipses *of the ſun, the aſtronomy of.* To determine the bounds of a *ſolar eclipſe*.

If the moon's parallax were inſenſible, the bounds of a *ſolar eclipſe* would be determined after the ſame manner as thoſe of a *lunar*; but becauſe here is a ſenſible parallax, we muſt alter our meaſures a little, viz.

1. Add the apparent ſemidiameters of the luminaries both in apogæo and perigæo together.

2. Since the parallax diminiſhes the northern latitude, to the former ſum add the greateſt parallax of latitude poſſible; and ſince the parallax augments the ſouthern latitude,

tude, from the ſame ſum ſubtract the greateſt parallax of latitude. Thus, in each caſe, will you have the true latitude, beyond which there can be no *eclipſe.*

This latitude given, the moon's diſtance from the nodes, beyond which *eclipſes* cannot happen, is found, as already directed for *lunar eclipſes.*

As different authors follow very different hypotheſes, with regard to the apparent diameters of the luminaries, and the greateſt parallax of latitude, they differ much in aſſigning the bounds at which *ſolar eclipſes* happen. Ptolemy makes the utmoſt bound of *eclipſes* at 19° 25′ diſtance from the node; Copernicus, at 19° 12′; Tycho, at 18° 25′; Kepler, at 17° 16′; Ricciolus, at 18° 49′. Though Ptolemy, in other places, judges 16° 42 minutes diſtance from the node, neceſſary; Copernicus, 16° 25′; Tycho, 17° 9′; Kepler, 15° 55′; and Ricciolus, 15° 58.

Aſtronomers have generally aſſigned 17° as the limit of ſolar *eclipſes*; but this admits of ſome variation; for in apogeal *eclipſes*, the ſolar limit is but $16\frac{1}{2}$ degrees, and in perigeal *eclipſes* it is $18\frac{1}{3}$°.

To find the digits eclipſed. Add the apparent ſemidiameters of the luminaries into one ſum; from which ſubtract the moon's apparent latitude, the remainder is the ſcruples, or parts of the diameter *eclipſed.* Then ſay, as the ſemidiameter of the ſun is to the ſcruples *eclipſed*; ſo are 6 digits reduced into ſcruples, or 360 ſcruples, to the digits *eclipſed.*

To find the ſcruples of half duration, or the line of immerſion The method is the ſame as that delivered for *lunar eclipſes.*

To determine the duration of a ſolar eclipſe. Find the horary motion of the moon from the ſun, for one hour before the conjunction, and another hour after: then ſay, as the former horary motion is to the ſeconds in an hour, ſo are the ſcruples of half duration to the time of immerſion; and as the latter horary motion is to the ſame ſeconds, ſo are the ſame ſcruples of half duration to the time of immerſion. Laſtly, adding the time of immerſion to that of emerſion, the aggregate is the total duration.

The moon's apparent diameter when largeſt, exceeds the ſun's when leaſt, only 1 minute 38 ſeconds of a degree; and in the greateſt ſolar *eclipſe* that can happen at any time and place, the total darkneſs can continue no longer than whilſt the moon is moving through 1′ 38″ from the ſun in her orbit, which is about 3 minutes 13 ſeconds of an hour: for the motion of the ſhadow on the earth's diſk is equal to the moon's motion from the ſun, which, on account of the earth's revolution on its axis towards the ſame way, or eaſtward, is about $30\frac{1}{2}$ minutes of a degree every hour, at a mean rate; but ſo much of the moon's orbit is equal to $30\frac{1}{2}$° of a great circle on the earth, becauſe the circumference of the moon's orbit is 60 times that of the earth; and therefore the moon's ſhadow goes $30\frac{1}{2}$ degrees, or 1830 geographical miles in an hour, or $30\frac{1}{2}$ miles in a minute.

To determine the beginning, middle, and end, of a ſolar eclipſe. From the moon's latitude, for the time of conjunction, find the arch IL (*fig.* 35.) or the diſtance of the greateſt obſcurity. Then ſay, as the horary motion of the moon from the ſun, before the conjunction, is to 3600 ſeconds of an hour; ſo is the diſtance of the greateſt darkneſs, to the interval of time between the greateſt darkneſs and the conjunction.

Subtract this interval, in the firſt and third quarter of the anomaly, from the time of the conjunction; and in the other quarters, add it to the ſame; the reſult is the time of the greateſt darkneſs. Laſtly, from the time of the greateſt darkneſs, ſubtract the time of incidence, and add it to the time of emerſion; the difference, in the firſt caſe, will be the beginning; and the ſum, in the latter caſe, the end of the *eclipſe.*

Indeed, as the interval between the conjunction, and the greateſt obſcurity, is very ſmall, and exceedingly precarious, it is not neceſſary to be ſo very preciſe; and accordingly, many authors uſe the time of the apparent conjunction for that of the greateſt darkneſs.

Or if you would determine it with more accuracy, ſubtract about two minutes for the diſtance between the conjunction ſeen, and the time of the greateſt obſcurity.

To find the moon's apparent latitude at the beginning and end of an eclipſe. From the argument of the moon's latitude, computed for the time of the apparent conjunction, ſubtract the ſcruples of half duration, together with the motion of the ſun, anſwering to the time of incidence; the remainder is the argument of latitude, at the beginning of the *eclipſe.*

To the ſame ſum add the ſame ſcruples, together with the ſun's motion anſwering to the time of emergence; the aggregate is the argument of latitude, at the end of the *eclipſe.* The argument of the latitude given, the moon's true latitude is found after the common manner. See LATITUDE. And from the latitude, is ſoon found the apparent one.

The apparent latitude of the moon, at the beginning and end of a ſolar eclipſe, *given; to draw a type or figure thereof.* This is performed, as already taught for *eclipſes* of the moon.

ECLIPSE *of the ſun, to calculate an.* 1. Find the mean new moon, and thence the true one; together with the place of the luminaries for the apparent time of the true one.

2. For the apparent time of the true new moon, compute the apparent time of the new moon obſerved.

3. For the apparent time of the new moon ſeen, compute the latitude ſeen.

4. Thence determine the digits *eclipſed.*

5. Find the times of the greateſt darkneſs, immerſion, and emerſion.

6. Thence determine the beginning, and ending, of the *eclipſe.*

From the preceding problems, it is evident, that all the trouble and fatigue of the calculus ariſes from the parallaxes of longitude and latitude; without which, the calculation of *ſolar eclipſes* would be the ſame with that of *lunar* ones. But after all that is here ſaid, it will be found impoſſible to calculate any *eclipſe*, either of the ſun or moon, without having a book of the tables for that purpoſe, and precepts ſhewing how to compute by them. See ſuch tables and precepts in Ferguſon's Aſtronomy, chap. xix.

In the Philoſophical Tranſactions, N° 461. ſect. 9 we have a contrivance to repreſent *ſolar eclipſes*, by means of the terreſtrial globe, by M. Seguer, profeſſor of mathematics at Gottingen. And Mr. Ferguſon has fitted a terreſtrial globe, ſo as to ſhew the time, quantity, duration, and progreſs of *ſolar eclipſes*, at any place of the earth where they are viſible. This he calls the ECLIPSAREON. He has alſo given a large catalogue of ancient and modern *eclipſes*, including thoſe recorded in hiſtory, from 721 years before Chriſt, to A. D. 1485; computed *eclipſes* from 1485 to 1700, and all the *eclipſes* viſible in Europe from 1700 to 1800. Aſtron. p. 175, &c.

ECLIPSES, *the number of*, of both luminaries, in any year, cannot be leſs than two, nor more than ſeven; the moſt uſual number is four, and it is rare to have more than ſix. The reaſon is obvious; becauſe the ſun paſſes by both the nodes but once in a year, unleſs he paſſes by one of them in the beginning of the year; in which caſe he will paſs by the ſame again a little before the year be finiſhed; becauſe the nodes move backwards $19\frac{1}{3}$° every year, and therefore the ſun will come to either of them 173 days after the other. And if either node is within 17° of the ſun at the time of new moon, the ſun will be *eclipſed*; and at the ſubſequent oppoſition, the moon will be *eclipſed* in the other node, and come round to the next conjunction before the former node is 17° beyond the ſun, and *eclipſe* him again. When three *eclipſes* happen about either node, the like number generally happen about the oppoſite; as the ſun comes to it in 173 days afterwards, and ſix lunations contain only four days more. Thus there may be two *eclipſes* of the ſun, and one of the moon, about each of the nodes. But if the moon changes in either of the nodes, ſhe cannot be near enough the other node at the next full, to be *eclipſed*; and in ſix lunar months afterward ſhe will change near the other node; in which caſe there can be only two *eclipſes* in a year, both of the ſun.

ECLIPSES, *period of*, is that ſpace of time in which the ſame *eclipſes* return again; and, as the nodes move backward $19\frac{1}{3}$° every year, they would ſhift through all the ſigns and degrees of the ecliptic in 18 years and 225 days; this would be the regular period of their return, if any complete number of lunations were finiſhed without a fraction; but this is not the caſe. However, in 223 mean lunations, after the ſun, moon, and nodes, have been once in a line of conjunction, they return ſo nearly to the ſame ſtate again, as that the ſame node, which was in conjunction with the ſun and moon at the beginning of the firſt of theſe lunations, will be within 28′ 12″ of a degree of a line of conjunction with the ſun and moon again, when the laſt of theſe lunations is completed; and in this period there will be a regular return of *eclipſes* for many ages. By adding to the mean time of any ſolar or lunar *eclipſe* this period, or 18 Julian years 11 days 7 hours 43 minutes 20 ſeconds, when the laſt day of February in leap-years is four times included, or a day leſs, when it occurs five times, we ſhall have the mean time of the return of the ſame *eclipſe*. In an interval of 6890 mean lunations, containing 557 years 21 days 18 hours 30 minutes 11 ſeconds, the ſun and node meet ſo nearly, as to be diſtant only 11 ſeconds.

ECLIPSES, *uſe of.* In *Aſtronomy*, *eclipſes* of the moon determine the ſpherical figure of the EARTH, and alſo that the ſun is bigger than the earth, and the earth than the moon. *Eclipſes* alſo, that are ſimilar in all circumſtances, and that happen at conſiderable intervals of time, ſeem to aſcertain the periods of the moon's motion. In *Geography*, *eclipſes* diſcover the LONGITUDES of different places; for which purpoſe thoſe of the moon are the moſt uſeful, becauſe they are more frequently viſible, and the ſame lunar *eclipſe* is of equal magnitude and duration at all places where it is ſeen. In *Chronology*, both ſolar and lunar *eclipſes* ſerve to determine exactly the time of any paſt event.

ECLIPSES *of the ſatellites.* See SATELLITES *of Jupiter.*

The chief circumſtances here obſerved are, 1. That the ſatellites of Jupiter undergo two or three kinds of *eclipſes*; whereof, the firſt are proper, being ſuch as happen when Jupiter's body is directly interpoſed between them and the ſun; theſe happen almoſt every day. Mr. Flamſteed, and Caſſini, give us tables, wherein immerſions into Jupiter's ſhadow, and emerſions again, are computed to hours and minutes.

The ſecond are occultations, rather than obſcurations; wherein the ſame ſatellites, coming too near to Jupiter's body, are loſt in his light; which Ricciolus calls *occidere zeuſiace*, *ſetting jovially*. In which caſe, Jupiter's neareſt ſatellite exhibits a third kind of *eclipſe*; being obſerved like a macula, or dark round ſpot, tranſiting Jupiter's diſc, with a motion contrary to that of the ſatellite; juſt as the moon's ſhadow projected on the earth, will appear to do, to the lunar inhabitants.

The *eclipſes* of Jupiter's ſatellites furniſh the beſt means of finding the longitude at ſea. Thoſe, particularly, of the firſt ſatellite, are much ſurer than the *eclipſes* of the moon, and they alſo happen much oftener; beſide that, the manner of applying them is very eaſy. See LONGITUDE.

ECLIPTIC, ECLIPTICUS, ſomething belonging to eclipſes.

All new and full moons are not *ecliptic*, i. e. eclipſes do not happen every new and full moon, though there be then an interpoſition, either of the earth between the ſun and moon, or of the moon between the ſun and earth. The reaſon is, that the interpoſition is only as to longitude, and not as to latitude. The ſun is always in the *ecliptic*, but the moon is not; ſhe deviates from it above five degrees, and ⅓, ſometimes on the north ſide, and ſometimes on the ſouth. But every five months, or thereabouts, ſhe cuts the *ecliptic*; and it is only about thoſe times, that there can be eclipſes either of the moon or ſun.

The places wherein ſhe cuts the *ecliptic*, are called the *nodes* of the moon.

ECLIPTIC *bounds*, or *limits*, are the greateſt diſtances from the nodes at which the ſun or moon can be eclipſed; namely, between 17 and 18 degrees for the ſun, and 12 for the moon.

ECLIPTIC *digits*, *digiti ecliptici*. See DIGITS.

ECLIPTIC is more particularly uſed for a line, or circle, in the ſphere of the ſtars, under which the center of the ſun apparently proceeds in its proper motion; or a line, which the ſun's center deſcribes in his annual progreſs.

It has its name *ecliptic*, becauſe all eclipſes happen when the two planets are in or near the nodes, or interſections of the *ecliptic*.

It is alſo called the *ſun's orbit*, and *ſun's way*, becauſe the ſun never deviates from it, in his apparent annual motion from weſt to eaſt.

The north, or aſcending node of the *ecliptic*, is called the *dragon's head*; and the ſouth, or deſcending node, the *dragon's tail*.

The *ecliptic* is placed obliquely with reſpect to the equator, and cuts it in two points, viz. the beginning of Aries and Libra, which are directly oppoſite to each other; and, accordingly, we find the ſun twice every year in the equator; and all the reſt of the year, either on the north or ſouth ſide thereof.

The *ecliptic* is a great circle of the ſphere, biſected by the horizon; conſequently, the arch of the *ecliptic*, intercepted between the horizon and the meridian, is a quadrant. And again, the ſolſtitial points of the *ecliptic*, i. e. thoſe moſt remote from the equator, are a quadrant diſtant from the equinoctial points. Laſtly, as the point of the *ecliptic*, which has the greateſt declination, with reſpect to the equator, is diſtant by a quadrant from the equinoctial points; the diſtance of this point from the equator will be the meaſure, or quantity, of the obliquity of the *ecliptic*, i. e. of the angle, formed by the interſection of the equator with the *ecliptic*.

The obliquity of the ecliptic, or the angle it makes with the equator, is about 23° 28′; which, therefore, is the greateſt declination of any point of the *ecliptic* from the equator; the points of which greateſt declination on each ſide, are called the *ſolſtitial points*; through which are drawn the two tropics, parallel to the equator.

The method of obſerving the greateſt declination of the *ecliptic* is thus: about the time of the ſummer ſolſtice obſerve the ſun's meridian altitude with the utmoſt care, for ſeveral days ſucceſſively: from the greateſt altitude obſerved, ſubtract the height of the equator; and the remainder is the greateſt declination, which is the ſolſtitial point.

Or, it may be found by obſerving the meridian altitude of the ſun's center on the days of the ſummer and winter ſolſtice; the difference of thoſe altitudes will be the diſtance of the tropics; and half that diſtance will be the obliquity of the *ecliptic*.

Ricciolus, e. gr. at Bologna, in the year 1646, obſerved the ſun's meridian altitude, on the 20th of June, to be 68° 59′ 55″; on the 21ſt, 69° 0′ 10″; and on the 22d, 68° 59′ 55″. The greateſt then was, 69° 0′ 10″; from which the altitude of the equator, 45° 29′ 50″, being ſubtracted, left 23° 30′ 20″ for the greateſt declination.

It has been matter of great diſpute among the late aſtronomers, whether the *obliquity of the ecliptic* be fixed or variable. To determine the point, the obſervations of the aſtronomers of all ages have been collected together, the chief of which may be ſeen in the following table.

Author's Names	Years before Chriſt	Obliquity		
		°	′	″
Pytheas	324	23	49	23
Eratoſthenes and Hipparchus	230 and 140	23	51	20
	after Chriſt			
Ptolemy	140	23	48	45
Almacmon	832	23	35	
Albategnius	880	23	35	
Thebat	911	23	33	30
Abul Waſi and Hamed	999	23	35	
Perſian Tables in Chryſococca	1004	23	35	
Albatrunius	1007	23	35	
Arzachel	1104	23	33	30
Almæon	1140	23	33	30
Choja Naſſir Oddin	1290	23	30	
Prophatius the Jew	1300	23	32	
Ebn Shattir	1363	23	31	
Purbachius and Regiomontanus	1460	23	30	
Ulugh Beigh	1463	23	30	17
Waltherus	1476	23	30	
Corrected by refraction, &c.	——	23	29	8
Wernerus	1510	23	28	30
Copernicus	1525	23	28	24
Egnatio Danti	1570	23	29	
Prince of Heſſe	1570	23	31	
Rothmannus and Byrgius	1570	23	30	20
Tycho Brahe	1584	23	31	30
Corrected	——	23	29	
Wright	1594	23	30	
Kepler	1627	23	30	30
Gaſſendus	1630	23	31	
Ricciolus	1646	23	30	
Corrected	1655	23	29	
Hevelius	1653	23	30	20
Corrected	1661	23	28	51½
Caſſini	1655	23	29	15
Mouton's, corrected, &c.	1660	23	29	3
Richer, corrected	1672	23	28	51½
De la Hire	1686	23	29	
Corrected	——	23	29	28
Flamſteed	1690	23	29	
Bianchini	1703	23	28	25
Roemer	1706	23	28	41
Louville	1715	23	28	24
Godin	1730	23	28	20
Bradley	1750	23	28	18
Mayer	1756	23	28	16
Hornſby	1772	23	28	8
Nautical Almanac	1779	23	28	7

Riccioli Alm. vol. i. lib. iii. cap. 27. Ptolem. Alm. lib. i. cap. 10. Flamſteed Proleg. Hiſt. Cœl. vol. iii. Phil. Tranſ. N° 163. Ib. vol. lxiii. part i. p. 125. Naut. Alm. 1779. Long's Aſtr. vol. i. cap. 16.

Upon the whole, as the oldeſt obſervations make the obliquity the greateſt, it appears to be mutable, and in a conſtant decreaſing ſtate. The chevalier de Louville, who has examined the merits of the cauſe with great attention, and made allowances for refraction and ſun's parallax, is of the ſame opinion. He gives us the reſult of his reſearches in the Memoirs of the Royal Academy, for the year 1716, viz. that the obliquity of the *ecliptic* diminiſhes at the rate of a minute in 100 years. His diſſertation is publiſhed in Latin in the Acta Erud. Lipſiæ, A. D. 1719.

According to an ancient tradition of the Egyptians, mentioned by Herodotus, the *ecliptic* had formerly been perpendicular to the equator: this notion they were led into, by obſerving, for a long ſeries of years, that the obliquity was continually diminiſhing; or, which amounts to the ſame, that the *ecliptic* was continually approaching to the equator. From hence they took occaſion to ſuſpect, that thoſe two circles, in the beginning, had been as far off each other as poſſible. Diod. Siculus relates, that the Chaldeans reckoned 403000 years from their firſt obſervations, to the time of Alexander's entering Babylon. This enormous account may have ſome foundation, ſuppoſing the Chaldeans to have built on the diminution of the obliquity of the *ecliptic* of a minute in 100 years. M. de Louville, taking the obliquity ſuch as it muſt have been at the time of Alexander's entrance into Babylon, and going back to the time when the *ecliptic*, at that rate, muſt have been perpendicular to the equator, actually finds 402942 Egyptian, or Chaldean years, which is only 58 years ſhort of the former epocha. In the general, there is no way of accounting for the fabulous antiquity of the Egyptians, Chaldeans, &c. ſo probable, as from the ſuppoſition of long periods of very ſlow celeſtial motions, whereof they had obſerved a little part, and thence calculated the beginning of the period; making the world and their own nation to commence together. If M. de Louville's ſyſtem be true, in 140000 years more the *ecliptic* and equator muſt coincide.

Godin, in the Memoirs of the Royal Academy for 1734, rejects the concluſions deduced by Louville from the obſervations of ancient aſtronomers, and, by comparing thoſe of Caſſini in 1655, which give the obliquity of the *ecliptic* 23° 29′ 15″, with others made at Paris, and elſewhere, ſince the year 1730, which make the obliquity no more than 23° 28′ 20″, he infers, that it diminiſhes at the rate of 55″ in 80 years, or nearly, at the rate of 1′ in 90 years.

Mr. Hornſby, comparing the reſult of his own obſervations, which gives the mean obliquity in 1772, 23° 28′ 8″, with the mean obliquity aſſigned by Mr. Flamſteed in 1690, viz. 23° 28′ 55,3″, concludes, that the obliquity has diminiſhed 47″ in 81 years, or at the rate of 58″ in 100 years; which, he obſerves, will be found nearly to correſpond with the mean of the computations framed by Mr. Euler, and Mr. de la Lande, upon the principles of attraction. Other writers have made it ſtill leſs. Phil. Tranſ. vol. lxiii part i. p. 125.

However, M. Caſſini, and M. le Monnier, are of opinion, that the obliquity of the *ecliptic* hath no other variation than what the mutation of the earth's axis will occaſion. Mem. R. Acad. 1762, & 1767.

But there is reaſon to believe, by comparing the more accurate obſervations in the preceding table, e. gr. thoſe of Ptolemy, Tycho, Flamſteed, Mayer and Bradley, that the obliquity of the *ecliptic* does gradually decreaſe, and probably at the rate of about half a ſecond in a year. And if we conſider, that the earth is not a perfect ſphere, but an oblate ſpheroid, having its axis ſhorter than its equatorial diameter; and that the ſun and moon are conſtantly acting obliquely upon the greater quantity of matter about the equator, drawing it, as it were, to a nearer and nearer coincidence with the *ecliptic*; it will not appear improbable that theſe actions ſhould gradually leſſen the angle between the planes of theſe circles. Nor is it leſs probable, that the mutual attraction of all the planets ſhould have a tendency to bring their orbits to a coincidence, though the change, being very ſmall, is not ſenſible for many ages. See Nutation, Preceſſion, and Star.

The *ecliptic* is divided into twelve parts, called *ſigns*. See Sign.

Ecliptic, *poles of the*. See Pole.

Ecliptic, *reduction to the*. See Reduction.

Ecliptic, in *Geography*, &c. is a great circle of the globe, cutting the equator under an angle of 23° 28′. See Globe.

The *terreſtrial ecliptic*, therefore, is in the plane of the *celeſtial ecliptic*; like which it has its equinoctial and ſolſtitial points, and is bounded by tropics.

ECLOGARII, among the *Ancients*, were perſons who ſelected the beſt pieces of the books they read, which, for that reaſon, were called *eclogues*, or ſelect pieces. See Eclogue.

ECLOGUE, Εκλογη, in *Poetry*, a kind of paſtoral compoſition, wherein ſhepherds are introduced converſing together. The *eclogue* is properly an image of the paſtoral life.

The beauty of the *eclogue*, M. Fontenelle obſerves, is not attached to what is rural, but rather to what is calm and eaſy in the rural life.

Yet there are *eclogues* in Theocritus of a lofty character; and Virgil has ſome in the ſublime ſtyle: the *eclogue*, therefore, occaſionally raiſes its voice. Yet M. Fontenelle eſteems it a fault in ſome modern poets, to have put matters of high concern in their *eclogues*, and to have made their ſhepherds ſing the praiſes of kings and heroes. Roſnard, in particular, has made himſelf ridiculous, by giving the *eloge* of Budæus and Vatable in his firſt *eclogue*, from the ſhepherd Margot. Such perſons ſhould have been above the knowlege of the ſimple Margot. The ſentiments in *eclogues*, the ſame author obſerves, ſhould be finer and more delicate than thoſe of real ſhepherds; only their form ſhould be as ſimple and rural as can be. But this ſimplicity excludes none beſides glaring and exceſſive ornaments.

Since the eſtabliſhment of the academy, or aſſembly of Arcadians at Rome, about the year 1690, the taſte for *eclogues* has been greatly improved among the Italians. Thoſe gentlemen, who are the flower of the wits of Italy, take the name of the ſhepherds of Arcadia, and will not allow their aſſembly to be treated as an academy. They have each of them a poetical name, which is always that of ſome ſhepherd; and apply themſelves particularly to *eclogues*, as pieces moſt proper to their profeſſion. See Academy.

The word *eclogue* is formed from the Greek εκλογη, *choice*. So that, according to the etymology of the word, *eclogue* ſhould be no more than a ſelect or choice piece; but cuſtom has determined it to a farther ſignification, viz. a little elegant compoſition in a ſimple natural ſtyle and manner.

Idyllion and *eclogue*, in their primary intention, are the ſame thing: thus the Idyllia, Ειδυλλια, of Theocritus, are pieces written perfectly in the ſame vein with the *Eclogæ* of Virgil.

But cuſtom has made a difference between them, and appropriated the name *eclogue* to pieces wherein ſhepherds are introduced ſpeaking; idyllion, to thoſe written like the *eclogue*, in a ſimple natural ſtyle, but without any ſhepherds in them. Some imagine the name *eclogue* to have been originally attributed to ſuch poems as were written in imitation of others; ſuch as the *Eclogues* of Virgil, which are only imitations of Theocritus.

Others are of opinion, the word was firſt formed from αιξ, αιγος, *goat*, and λογος, *diſcourſe*, q. d. a converſation or diſcourſe of goats, or goatherds. But Ruæus, in his notes on Virgil, thinks they would then have made it Αιγολογια, *ægology*, rather than *eclogue*; or, at leaſt, the word would have been written in Greek with αι, and in Latin by *æ*, not *e*.

Barthius advances another opinion; viz. that the name *eclogue* was given to all poetical compoſitions that were of a moderate length, though too ſhort to give them the name of books; and that hence it is that Statius, in the epiſtle at the head of the third book of his Sylvæ, and in the preface to his fourth book, calls his poems *Eclogues*; though he had not called them ſo in the title.

Auſonius, in the preface to his Cupid crucified, calls alſo his idylls *eclogues*. Add, that Cruquius, in his comment on Horace, declares that he had ſeen very ancient manuſcripts, wherein the ſatires of the poet are called *eclogues*; in which he is ſeconded by our learned countryman, Mr. Baxter.

Eclogue is alſo applied to certain compoſitions in proſe. Thus we read of the *eclogues* of Diodorus, of Polybius, of Cteſias, Theophraſtus, Strabo, &c. In which ſenſe the word only ſignifies *extract*, or *collection*.

ECLYSIS, from εκλυω, *I faint*, a word uſed, by the ancient phyſicians, for a general faintneſs and feebleneſs of all parts of the body. Hippocrates uſes it for a loſs of voice, with a general decay of ſtrength, and, in ſome other places, for a great weakening of the body, by violent diſcharges by ſtool.

ECMARTYRIA, Εκμαρτυρια, in *Antiquity*, a kind of ſecond-hand evidence, admitted in the Athenian courts. It was not founded on the knowlege of the witneſs himſelf, but on that of another perſon, who had been an eye-witneſs of the fact in queſtion, but was at this time either dead, or in a foreign country, or detained by ſickneſs; for, except in ſuch caſes, the allegations of abſent perſons were never taken for lawful evidence. Pott. Archæol. Græc. lib. i. cap. 21. tom. i. p. 117.

ECNEPHIAS, from εκ and νεφος, a *cloud*, a word uſed, by Galen, to expreſs a peculiar ſort of fever, which, he ſays, was at once hot and humid, and which he therefore reſembles, by the name, to the ſun breaking out from a watery cloud.

ECOUTE′, in the *Manege*, is uſed for a pace, or motion of a horſe, when he rides well upon the hand and the heels, is compactly put upon his haunches, and hears, or liſtens, to the heels or ſpurs; and continues duly balanced between the heels, without throwing to either ſide. This happens when a horſe has a fine ſenſe of the aids of the hand and heel.

ECPHONESIS, 'Εκφώνησις, in *Rhetoric*, the ſame with exclamation.

ECPHORA, from εκ, *out*, and φερω, *I bear*, *Projecture*, in *Archi-*

Architecture, uſually denotes the line, or diſtance, between the extremity of a member, or moulding, and the naked of the column, or other part it projects from.

Some authors, however, account the *ecphora*, or projecture, from the axis of the column; and define it to be the right line intercepted between the axis and the outermoſt ſurface of a member or moulding. See PROJECTURE.

ECPHRACTICS, Εκφρακτικα, in *Medicine*, ſuch remedies as have a faculty of opening and unſtopping the veſſels through which the humours are to paſs; or which incide and attenuate tough viſcid humours, and thereby promote their diſcharge. They are the ſame with *aperients* and *deobſtruents*.

The word is formed from the Greek εκφρασσειν, *to free from obſtructions*; of εκ and φρασσω, *obſtruo*, *ſepio*.

The chief ſimple *ecphractics*, are the little centaury, wormwood, agrimony, hyſſop, chamædrys, bark of tamariſk, roots of capers, ſcolopendrium, &c.

ECPHRAXIS, in *Medicine*, is taking away obſtructions in any part. Blancard.

ECPHYSESIS, from εκ and φυσαω, *I breathe*, in *Medicine*, is a diſeaſe in which the patient breathes thick.

ECPHYSIS, of εκ and φυω, *I produce*, in *Anatomy*, is any proceſs that coheres with, or adheres to a bone.

ECPIESMA, Εκπιεσμα, from εκ and ϖιεζω, *I preſs*, in *Chirurgery*, a kind of fracture of the ſkull, &c. wherein there are ſeveral ſplinters, that preſs and diſorder the inner membranes. See FRACTURE.

ECPIESMUS, Εκπιεσμος, in the ancient writers of *Medicine*, a word uſed to expreſs a diſtemperature of the eye, which conſiſts in a very great prominence of the entire globe of the eye, which is, as it were, thruſt out of its ſocket, or orbit, by a great flux of humours, or an inflammation.

ECPLEROMA, of εκ and ϖληροω, *I fill*, in the writings of the *Ancient Phyſicians*, the name given to a kind of cuſhion of leather, ſtuffed with ſome firm ſubſtance, and fitted to the cavities of the arm-pits, uſed in reducing luxations of the humerus.

ECPLEXIS, from εκπλησσω, *I am diſturbed*, in the writings of the *Ancient Phyſicians*, a word uſed to expreſs a tranſport of mind, proceeding from ſome ſudden perturbation. Hippocrates and Galen uſe the word to ſignify a ſtupor, or ſtupefaction, in which the patient lies without motion, without ſpeaking, or ſtirring, and with his eyes open.

ECPNEUMATOSIS, in *Medicine*, the ſame with expiration.

ECPNOE, from εκ and ϖνεω, *I breathe*, a word uſed by medical writers, to expreſs that part of reſpiration, in which the breath is expelled out of the lungs.

ECPTOMA, from εκπιπτω, *I fall out*, a word uſed, by the ancient phyſicians, in three or four different ſenſes. It is ſometimes made to expreſs a luxation, or diſlocation of a bone. Sometimes it is uſed for the falling off of any corrupted part, ſometimes for the excluſion of the ſecundines after child-birth, and ſometimes for a falling down of the womb, or a deſcent of the omentum or the inteſtine into the ſcrotum.

ECPTOSIS, in *Surgery*, the ſame with luxation.

ECPUCTICA, from εκπυεω, *I ſuppurate*, in the *Materia Medica*, are condenſing medicines.

ECREGMA, from εκρηγνυμι, *I break off*, properly the name of a part, piece, or ſegment of any thing; but Hippocrates has, in ſome places, uſed it as the name of an eruption.

ECRITHMUS, from εκ, *without*, and ῥιθμος, *number*, in *Medicine*, an irregular pulſe, which obſerves no method, nor number, incident to any age. Blancard.

ECSTASIS *cutis*, from εξιϛημι, *I extend*, an extenſion of the ſkin, a term uſed by the ancients, as the oppoſite to corrugatio, or wrinkling.

ECSTATICI, Εκϛατικοι, from εξιϛημι, *I am entranced*, in *Antiquity*, a kind of diviners, who were caſt into trances or ecſtaſies, in which they lay like dead men, or aſleep, deprived of all ſenſe and motion; but, after ſome time, returning to themſelves, gave ſtrange relations of what they had ſeen and heard. Pott. Archæol. Græc. lib. ii. cap. 12. tom. i. p. 302.

ECSTROPHIUS, from εκϛρεφω, *I turn out*, a name given by the ancient writers in medicine, to any thing that threw out the internal tumors of the piles, ſo that external remedies might be applied to them.

ECTHESIS, in *Church Hiſtory*, a name which the emperor Heraclius gave to a confeſſion of faith publiſhed by him in 639.

The word is Greek, εκθεσις, and ſignifies *expoſition*.

The *ecthеſis* favoured the error of the Monothelites, and eſtabliſhed only one will and one operation in Jeſus Chriſt. Heraclius publiſhed it at the inſtigation of Athanaſius, chief of the Jacobites, Cyrus patriarch of Alexandria, and Sergius patriarch of Conſtantinople; but the Roman church eſteemed it heretical, rejected it in a council held at Rome, A. D. 639, under the pontiff John IV. though Honorius, in ſpite of his infallibility, had approved it; and another edict was iſſued, ſuppreſſing the *ectheſis*, called the TYPE, which ſoon after ſhared the ſame fate.

ECTHLIMA, from εκθλιϐω, *I preſs out*, an ulceration ariſing from a violent compreſſion in the ſurface of the ſkin.

ECTHLIPSIS, in the *Latin Proſody*, a figure whereby an *m* is retrenched, or cut off, chiefly at the end of a word, when the following word begins with a vowel, or an *h*.

The word is Greek, εκθλιψις, which ſignifies *eliſion*.

Thus, in *multum ille, & terris jactatus & alto.* Virg. In ſcanning the verſe, we drop the *m* at the end of *multum*, and only make three ſyllables in the two firſt words, *mult-il-le*.

Some account the *ecthlipſis* a poetical licence in the Latin verſification; but, in reality, the eliſion of an *m* final, when the following word in the ſame verſe begins with a vowel, is a matter of neceſſity, not of licence.

Anciently, the *s* was likewiſe retrenched before a conſonant; as *facundu ſuoque*, for *facundus*, &c. In reality, the *m* and *s* were peculiarly rough and harſh in the Latin pronunciation; as appears from Quintilian; and it was this that led the poets to retrench them at the ends of their words; as the like cauſe induced the French to drop their *e* feminine before a word beginning with a vowel, to avoid the hiatus, or concourſe of vowels.

ECTHYMA, from εκθυω, *I break out*, a name given by Hippocrates to any puſtule, or cutaneous eruption.

ECTHYMOSIS, of εκ, *ex*, and θυμος, *animus*, *mind*, in *Medicine*, a vehement agitation and dilatation of the blood and ſpirits; ſuch as happens in extraordinary emotions of joy.

ECTOMIAS, from εκτεμνω, *I cut off*, a name uſed by the ancient phyſicians, to expreſs a caſtrated animal.

ECTRIMMA, from εκτριϐω, *I rub off*, excoriation or galing. Hippocrates has uſed the word particularly to expreſs exulcerations of the ſkin about the os ſacrum, contracted by lying long in one poſture, in caſes of fractures of the thigh, or in lingering illneſſes, in which the patient is confined to his bed for a long time.

ECTROPIUM, from εκτρεπω, *I turn out*, in *Surgery*, that diſtemperature of the eye-lids, in which they are everted or retracted, ſo as to ſhew their internal or red ſurface, and cannot ſufficiently cover the eye. Sometimes this is a ſimple and original diſorder, and ſometimes it is only a ſymptom of ſome other, as of an inflammation, ſarcoma, tumor, or the like. This ſometimes owes its original to the contraction of the ſkin of the eye-lids, by the ſcar of a wound, ulcer, burn, &c. or to the induration and contraction of the ſkin, after an inflammation, and ſometimes it in a great meaſure proceeds from the injudicious uſe of aſtringent collyriums, or eye-waters.

When this diſorder is become inveterate, it is not eaſily cured; while recent, it is to be attempted by relaxing and elongating the ſkin of the eye-lid, by the application of emollients, ſuch as the vapours of hot milk, or water, oil of almonds, mucilage of quince-ſeed, and ointment of marſhmallows. Theſe muſt be repeated every day, the ſkin of the eye-lid drawn frequently towards its right poſition, and when the patient goes to bed, the eye-lids ſhould be brought together, and reſtrained in their proper poſture by a plaſter, compreſs, and bandage. But if all this fail, and the caſe yet appear not incurable, manual operation muſt take place.

The operation is performed in the following manner: firſt a ſemilunar inciſion is to be made in the external ſkin of the eye-lid, next its tarſus, or cartilaginous margin, making the angles of the inciſion, downward in the upper lid, and upward in the under, that by this means the ſkin may be elongated. If it does not appear ſufficiently let out by one inciſion, two or three more may be made, running parallel with the firſt, and at the diſtance of a ſmall packthread. When the eye-lid is thus ſufficiently elongated, the inciſions muſt be dreſſed firſt with dry lint ſtuffed into them, and afterwards with lint, armed with ſome vulnerary unguent, which will prevent the ſkin from growing together again, and will occaſion new fleſh to be formed in the place, which will elongate the ſkin. Laſtly, to forward the extenſion and cure, a piece of ſticking plaſter ſhould be faſtened to the eye-lid, to keep it extended, and this muſt be continued till the eye will ſhut cloſe. When this caſe has continued from the patient's birth, the cure is very difficult, and it is a yet more hopeleſs caſe, when it happens to old people, from a weakneſs of the orbicular muſcle. Heiſter's Surgery, p. 372.

ECTROTICA, from εκτιτρωσκω, *I cauſe to miſcarry*, a name given, by the ancient phyſicians, to ſuch medicines as have a power to occaſion abortion.

ECTYLOTICS, Εκτυλωτικα, from εκ, and τυλος, *callus*, remedies proper to conſume and eat off calluſes, warts, and other excreſcences, formed on the fleſh.

ECTYPE, Εκτυπος, among *Medalliſts*, an emboſſed figure, or impreſſion of a ſeal, ring, or medal; or a figured copy of an inſcription, or other ancient monument. The word is Greek: αρχετυπον denotes the *original*, or *model*; εντυπον, the *copy*, or *image*, moulded or ſtruck in *creux*; and εκτυπον, *ectypon*, the image in *relievo*, or *emboſſed*.

Ectype *Craticular*. See Anamorphosis.

ECU, or **Escu**, the French crown. See Crown, Escu, and Coin.

Ecu *ancient*, in *Heraldry*, a term ſignifying the ancient ſhield. By this they mean the antique triangular-ſhaped ſhield, on which the arms of the noble families of France have been painted. This ſhield is to be ſeen on old gems, and ſome ruins; but the modern ſhield, which is ſquare, and rounded and pointed at the bottom, has baniſhed the uſe of this.

ECURIE, in the *Manege*, the covert-place for the lodging or houſing of horſes. The word is French. We uſe *ſtable* in common diſcourſe.

ECURY. See Equery.

ECUSSON, in *Heraldry*, an ineſcutcheon, or little eſcutcheon. See Escutcheon.

ECUYER, in the French *Manege*, is uſed for the riding-maſter. Sometimes it denotes certain officers in the king of France's houſhold, who help the king in mounting his horſe and alighting, and follow him on horſeback, and carry his ſword. Theſe are called *ecuyers de quartier*. Gentlemen-uſhers to the queen of France, and the maſters of the horſe to princes, and perſons of quality, are alſo called *ecuyers*. Beſides theſe, there are others called *ecuyers cavalcadours*. See Cavalcadour.

ECZEMA, from εκζεω, *I am externally hot*, a name given, by the ancient phyſicians, to any fiery puſtule on the ſkin.

EDDA, in *Antiquities*, is a ſyſtem of the ancient Icelandic, or Runic mythology, containing many curious particulars of the theology, philoſophy, and manners, of the northern nations of Europe; or of the Scandinavians, who had migrated from Aſia, and from whom our Saxon anceſtors were deſcended. Mr. Mallet apprehends that it was originally compiled, ſoon after the Pagan religion was aboliſhed, as a courſe of poetical lectures, for the uſe of ſuch young Icelanders as devoted themſelves to the profeſſion of a *ſcald* or poet. It conſiſts of two principal parts; the *firſt* containing a brief ſyſtem of mythology, properly called the *Edda*; and the *ſecond* being a kind of art of poetry, and called *Scalda*, or *Poetics*. The moſt ancient *Edda* was compiled by Soemund Sigfuſſon, ſurnamed the *Learned*, who was born in Iceland about the year 1057. This was abridged, and rendered more eaſy and intelligible, about a hundred and twenty years afterwards, by Snorro Sturleſon, who was ſupreme judge of Iceland in the years 1215 and 1222; and it was publiſhed in the form of a dialogue. He added alſo the ſecond part in the form of a dialogue, being a detail of different events tranſacted among the divinities. The only three pieces that are known to remain of the more ancient *Edda* of Soemund, are the Voluſpa, the Havamaal, and the Runic chapter. The Voluſpa, or prophecy of Vola or Fola, appears to be the text, on which the *Edda* is the comment. It contains in two or three hundred lines the whole ſyſtem of mythology, diſcloſed in the *Edda*, and may be compared to the Sibylline verſes, on account of its laconic yet bold ſtyle, and its imagery and obſcurity. It is profeſſedly a revelation of the decrees of the Father of nature, and the actions and operations of the gods. It deſcribes the chaos, the formations of the world, with its various inhabitants, the function of the gods, their moſt ſignal adventures, their quarrels with Loke, their great adverſary, and the vengeance that enſued; and concludes with a long deſcription of the final ſtate of the univerſe, its diſſolution and conflagration, the battle of the inferior deities, and the evil beings, the renovation of the world, the happy lot of the good, and the puniſhment of the wicked. The Havamaal, or *Sublime Diſcourſe*, is attributed to the god Odin, who is ſuppoſed to have given theſe precepts of wiſdom to mankind; it is comprized in about a hundred and twenty ſtanzas, and reſembles the book of Proverbs. Mr. Mallet has given ſeveral extracts of this treatiſe on the Scandinavian ethics. The Runic chapter contains a ſhort ſyſtem of ancient magic, and eſpecially of the enchantments wrought by the operation of Runic characters, of which Mr. Mallet has alſo given a ſpecimen. A manuſcript copy of the *Edda* of Snorro is preſerved in the library of the univerſity of Upſal; the firſt part of which hath been publiſhed with a Swediſh and Latin verſion, by M. Goranſon. The Latin verſion is printed as a ſupplement to Mr. Mallet's Northern Antiquities. The firſt edition of the *Edda* was publiſhed by Reſenius, profeſſor at Copenhagen, in a large quarto volume, in the year 1665; containing the text of the *Edda*, a Latin tranſlation by an Icelandic prieſt, a Daniſh verſion, and various readings from different MSS. Mr. Mallet has alſo given an Engliſh tranſlation of the firſt part, accompanied with remarks; from which we learn, that the *Edda* teaches the doctrine of the Supreme, called the Univerſal Father, and Odin, who lives for ever, governs all his kingdom, and directs the great things as well as the ſmall; who formed the heaven, earth, and air; made man, and gave him a ſpirit or ſoul, which ſhall live, after the body ſhall have mouldered away; and then all the juſt ſhall dwell with him in a place called *Gimle* or *Vingolf*, the palace of friendſhip; but wicked men ſhall go to *Hela*, or death, and from thence to *Niſlheim*, or the abode of the wicked, which is below in the ninth world. It inculcates alſo the belief of ſeveral inferior gods and of goddeſſes, the chief of whom is Frigga, or Frea, i. e. *lady*, meaning hereby the earth, who was the ſpouſe of Odin, or the Supreme God; whence we may infer that, according to the opinion of theſe ancient philoſophers, this Odin was the active principle or ſoul of the world, which uniting itſelf with matter, had thereby put it into a condition to produce the intelligences, or inferior gods, and men, and all other creatures. The *Edda* likewiſe teaches the exiſtence of an evil being, called Loke, the calumniator of the gods, the artificer of fraud, who ſurpaſſes all other beings in cunning and perfidy. It teaches the creation of all things out of an abyſs or chaos; the final deſtruction of the world by fire; the abſorption of the inferior divinites, both good and bad, into the boſom of the grand divinity, from whom all things proceeded, as emanations of his eſſence, and who will ſurvive all things; and the renovation of the earth in an improved ſtate. Fables 1, 2. 10. 16. 33. For a farther account of the *Edda*, ſee Mallet's Northern Antiquities, vol. ii. 1770, paſſim.

EDDISH, or **Eadish**, the latter paſture, or graſs, which comes after mowing, or reaping; otherwiſe called *eargraſs*, *earſh*, and *etch*.

EDDY, Sax. of *ed*, *backward*, and *ea*, *water*, in *Sea Language*, is when the water, at any place, runs back, contrary to the tide, or ſtream, and ſo falls into the current again.

The ſeamen call that *eddy water* which falls back, as it were, on the rudder of a ſhip under ſail, the *dead water*. An *eddy wind* is that which returns, or is beat back, from any ſail, &c.

EDELING. See Edhiling, and Atheling.

EDESSENUM, the name of a famous collyrium, reckoned among the number of the *monohemera*, or ſuch as cured certain diſorders of the eyes, in one day. It is ſuppoſed to have had its name *Edeſſenum* from the city of Edeſſa, where it was firſt invented, and in great uſe. Its compoſition was this: take gum arabic, tragacanth, ſarcocolla, acacia, and ſtarch, of each two drams; opium, four drams; ceruſe, eight drams; cadmia, ſixteen drams; theſe were all to be reduced to a fine powder, and afterwards mixed with a ſufficient quantity of water, to be uſed to waſh the eyes.

EDGE *in with a ſhip*, in the *Sea Language*, is ſaid of a chace, that is making up to it.

Edge *away*, is to decline gradually from the ſhore, or from the line of the courſe which the ſhip formerly ſteered, when ſhe ſails nearer the direction of the wind, or *larger* before the wind.

EDGINGS, in *Gardening*, rows of ſhrubs, herbs, or flowers, placed by way of borders around beds, compartiments, &c. For the *edgings* of compartiments, box ſeems the moſt proper. See Box.

EDHILING, **Edhilingus**, an ancient appellation of the nobility among the Anglo-Saxons.

The Saxon nation, ſays Nithard, Hiſt. lib. iv. is divided into three orders, or claſſes of people; the *edhilingi*, the *frilingi*, and the *lazzi*; which ſignify the nobility, the freemen, and the vaſſals or ſlaves.

Inſtead of *edhiling*, we ſometimes meet with *atheling*, or *ætheling*; which appellation was likewiſe given to the king's ſon, and the preſumptive heir of the crown. See Atheling.

EDICT, an inſtrument, ſigned and ſealed by a prince, to ſerve as a law to his ſubjects.

Edicts have no room in England, where the enacting of laws is not lodged in the king, but in the parliament.

In the Roman law we find frequent mention of the *edict of the prætor*, *quod prætor edixit*, which was a phraſe appropriated to the ordinances of the prætor; though it was ſometimes alſo uſed on other occaſions.

In the French law, *edicts*, *edits*, make a great figure; they are of various kinds; ſome importing a new law, or regulation,

gulation, as the *edict* of duels, that of ſecond marriages, &c. Others the erection of new offices, eſtabliſhment of duties, rents, &c. Sometimes articles of pacification, as the *edict* of Nantz, paſſed by Henry IV. in 1598, and revoked by Louis XIV. in 1685, &c.—*Edicts* are all ſealed with green wax, to ſhew that they are perpetual and irrevocable.

Edicts with them are much the ſame as proclamations with us; but with this difference, that the former have the authority of a law in themſelves, from the power which iſſues forth; whereas the latter are only declarations of a law, to which they refer, and have no power in themſelves.

EDICT, *chamber of the*. See CHAMBER.

EDIFICE, ÆDIFICIUM, a building. See BUILDING.

The word is formed of the Latin, *ædes* and *facio*, *I make.*

EDILE, or rather ÆDILE. See ÆDILE.

EDITOR, of *edo*, *I publiſh*, in the commonwealth of learning, a perſon who takes care of publiſhing the work of another author, uſually an ancient author.

Eraſmus was a great *editor* of ancient writings; the Louvain doctors, Scaliger, Petavius, Fa. Sirmond, biſhop Walton, Mr. Hearn, &c. are learned *editors*; the Benedictines of the Fathers, the Dauphins of the Claſſics, Hardouin of the Councils, &c.

EDUCATION, the art of bringing up, forming, and inſtructing children.

The follies of a too delicate *education* are well expreſſed in that device of an ape; which, by over careſſing and hugging its young ones, ſtrangles them; with this motto, *complectando necat.* Octavius Ferrarius has a very good Latin treatiſe on the ſubject of *education*, intitled *Chiron*; the name of the centaur, who was Achilles's tutor.

Mr. Locke's excellent treatiſe of *Education* is known to every body. Quintilian employs the ſecond chapter of his firſt book in enquiring whether a domeſtic, or a college *education* be preferable, i. e. whether it be better to bring up one's children at home, or ſend them to the colleges and public ſchools. After urging all that can be ſaid on either ſide, he concludes for a college or ſchool *education.*

The plan of *education*, whether it be domeſtic or collegiate, ſhould be ſuited to the ſtation and views of parents, and to the genius of their children; and it is alſo right to conſult their conſtitution and inclination. It is of great importance, that thoſe who are deſtined to occupy ſuperior ſtations in ſociety, ſhould enjoy the benefits of an enlarged and liberal *education*; that they ſhould be furniſhed with every ſubſtantial and ornamental accompliſhment; and thoſe that are intended for any particular profeſſion or employment, ſhould be principally directed to thoſe ſtudies which are appropriated to their reſpective views; and in every rank of life, an attention to the morals of youth ſhould be a primary object. Though the municipal laws of moſt countries have made no proviſion for conſtraining a parent to beſtow a proper *education* on his children; yet in the caſe of religion they are under peculiar reſtrictions in our own country. Some of theſe reſtrictions, as they affect proteſtants who diſſent from the religion of the ſtate, may be thought both impolitic and injurious, and have, therefore, lately been conſiderably relaxed; but thoſe which are deſigned to prevent the progreſs of popery, are prudent and neceſſary. Thus, if any perſon ſends a child under his care beyond the ſeas, to be inſtructed in any popiſh college, &c. in the principles of the popiſh religion, or ſhall contribute towards his maintenance, he ſhall forfeit one hundred pounds, beſides the diſabilities incurred by the child ſo ſent. 1 Jac. I. cap. 4. and 3 Jac. I. cap. 5. 11 and 12 W. III. cap. 4. and both ſhall be incapable of ſuing in law or equity, of being executor or adminiſtrator, of enjoying any legacy or deed of gift, or of bearing any office in the realm; and he ſhall forfeit all his goods and chattels, and likewiſe all his real eſtate for life. 3 Car. I. cap. 2.

EDULCORATION, of *edulco*, *I ſweeten*, in *Pharmacy*, is the dulcifying or ſweetening of any food, or remedy, by means of honey, ſugar, or ſyrups.

EDULCORATION, in *Chemiſtry*, denotes the freſhening or purging any thing of its ſalts, by repeated lotions, or waſhings in cold water.

Such is the dulcifying of the precipitates of mercury, metals, &c. by waſhing away thoſe ſharp ſalts, by whoſe means they had been diſſolved, or which had been mingled with them, to effect a diſſolution. See ABLUTION.

EDULCORATION, in *Metallurgy*, is the ſeparating, by a ſolution in water, the ſalts that have been left adhering to a body after any operation. This is properly a kind of moiſt ſolution, the ſaline parts adhering to bodies, not ſoluble in water, being by that menſtruum taken up, and eaten off from the body, and the ſolution afterwards ſeparated from the remaining ſolid, either by ſubſidence or filtration.

It is proper, in this ſituation, to enlarge the ſurface of the body to be edulcorated, by pounding it in a mortar, that the ſolution may have the ſpeedier ſucceſs; and for this purpoſe, it ſhould alſo be kept continually ſtirring with a ſtick, while the water is on it, that all the parts of the body to be edulcorated which otherwiſe would ſome of them ſink to the bottom, and remain applied againſt the bottom of the veſſel it is performed in, may be made equally at one time or other contiguous to the particles of the edulcorating fluid, by which all ſolutions are indeed greatly facilitated. Boiling water is alſo, in ſome caſes, requiſite, for the heat of that, by the inward motion and rarefaction it occaſions, promotes, in an extraordinary manner, ſaline ſolutions.

A perfect ablution from the ſalt, however, is not always obtained by this method; for as every part of the menſtruum contains in it a proportionable quantity of the matter diſſolved; and there remains always ſome part of the menſtruum thus impregnated in the body to be edulcorated, it is evident that there alſo remains in it the proportionable quantity of ſalt for that menſtruum. Let us take, for inſtance, the alkaline ſalt in wood-aſhes, pour hot water on ſuch aſhes, and let them boil together for ſome time; then by decantation, or otherwiſe, ſeparate the lye or water impregnated with the ſalt of the aſhes, from the aſhes themſelves; there will remain, after all you can do to pour it off, at leaſt one-fourth part of the lye among the aſhes, and of courſe a proportionable part of the diſſolved ſalt. Pour more water on this, and decant it off again, a quantity of ſalt, though much leſs than the former, will again remain; and ſo on, if the operation be repeated ever ſo often; only the ſalt will be in leſs and leſs quantity every time. Very frequent repetitions of this operation are therefore always neceſſary; and even where the operator has tired himſelf with them, a nice experimenter will always find ſome ſmall portion of the ſalt remaining.

To this remaining of the ſaline particles, in ſome degree, after ever ſo often repeated waſhings, is owing the great loſs artificers uſually find in reducing the calxes of gold and ſilver, made with acids. For the ſmall remainder of the acids which yet adhere, being agitated by an impetuous, and eſpecially by an open fire, carry off in their evaporation a great many particles of the metals with them, not even excepting aqua fortis itſelf, which is ſaid to be, nay, and really is, of a fixing nature, but that only in a certain degree. Cramer, Art. of Aſſ. 196.

EDYSTONE *light-houſe*, lying off Plymouth harbour, was firſt erected by the corporation of the Trinity-houſe in 1696; in conſideration of which, the maſters, &c. of Engliſh ſhipping agreed to pay one penny a ton outwards and inwards. It was demoliſhed by the ſtorm of 1703, and re-erected by act of parliament in the 4th of queen Anne, and the ſame duty on tonnage of ſhips granted for its ſupport, which law was enforced in the 8th of Anne. It has been ſince deſtroyed and rebuilt.

EEL, *Anguilla*, in *Ichthyology*, a ſpecies of the MURÆNA.

The common *eel* is the ſimple coloured *muræna*, with the loweſt jaw longeſt: it has three fins, viz. two pectoral, ſtanding on each ſide, and a ſingle low back-fin, which beginning at ſome diſtance from the head, runs along the back to the tail, and returns again underneath as far as the *anus.* The extremity of this fin, which forms what may be called the tail, is neither round nor ſquare, but ſubacute. *Eels* vary much in their colour, from a ſooty hue to a light olive-green; and thoſe which are called ſilver *eels*, have their bellies white, and throughout a remarkable clearneſs. See GRIGS.

The *eel* is common in all our freſh waters, ponds, ditches, and rivers; and is generally about two feet in length, though ſome are often caught much larger.

The fat of *eels* is accounted vulnerary, and good in an *alopecia*, caſes of deafneſs, and the hæmorrhoids. The dried livers and galls of *eels*, are recommended by Mr. Boyle, to aſſiſt women in hard labour. Boyle's Works, Obſ. vol. i. p. 93.

Eel-fiſhing is of divers kinds, as ſnigling, bobbing, &c. See FISHING.

There is ſcarce any animal, the generation of which has ſo much perplexed and puzzled the thoughts of the learned and curious as this. Ariſtotle firſt gave birth to an opinion, that *eels* were of no ſex, nor did propagate their ſpecies like other animals, but were equivocally gendered of the mud; and as wild and abſurd a ſyſtem as this is, there have not been wanting many, even in theſe later and more enlightened times, who have given into it. The preſent age has been ſo well inſtructed in the ſyſtem of animal generation, by the works of Swammerdam, Lewenhoeck, Malpighi, Redi, Ray, and a great number

ber of other writers, of the ſame valuable kind, that there is left no room to doubt but all animals are produced by the copulation of parents like themſelves; and the oddity of *eels* being found in new ponds, is eaſily accounted for, when we know that Dr. Plot, and many others, have given accounts of whole droves of them leaving one ditch or pond, and croſſing the meadows together to go to another. We know that the *eel*, of all the fiſhes, lives the longeſt out of water; and it is not difficult to conceive, that it may, without any inconvenience, ſpend ſo much time out of that element as is neceſſary for the paſſing from one water to another; and when a number of theſe fiſhes have found a new pond, it is no wonder that they continue in it, ſince they feed on worms and other inſects of the earth; and there is probability that theſe may be found in peculiarly great abundance in the pace where the earth has been newly diſturbed, and where they have not been preyed upon.

Though the learned world at this time generally allows, that *eels* are produced like other animals, by parents of their own kind, yet there remain many doubts about the manner in which this is performed; ſome allowing the *eels* to be like the generality of other animals, of different ſexes in the different individuals; and others affirming that they are all hermaphrodites, each having the parts of generation of both ſexes. Rondeletius affirms, they are of different ſexes; and Mr. Allen, who has given a very curious paper concerning them, in our Philoſophical Tranſactions, is of the ſame opinion; and both ſay, that the parts of the ſexes may be diſcovered, on a careful inſpection, and ſome found to be males, and others females: but theſe parts are, in both ſexes, they ſay, buried in a large quantity of fat; and they are of opinion, that hence proceeded the miſtake of Ariſtotle and his followers, who, not being able to find theſe parts, concluded that they did not exiſt at all.

Among thoſe who allow the *eel* to be produced like other animals, from animal parents, which have the ſexes, ſome are of opinion that they are viviparous; and others, that they are oviparous: but a gentleman of our nation, Mr. Chartwynd, ſeems to have determined this great controverſy, by obſerving, that if the aperture under the belly of the *eel*, which looks red in the month of May, be cut at that time, the young *eels* will be ſeen to come forth alive, after the operation. Mr. Lewenhoeck ſays, that he found an uterus in every *eel* he examined; and therefore concludes, that they are hermaphrodites; and he ſuppoſes that they have no male parts of generation, like thoſe of other animals, but that the office of theſe is performed by a liquor analogous to the male ſeed of animals, which is contained in certain glands, ſituated on the inſide of the uterus itſelf.

The conger, or ſea-*eel*, uſually grows to a very great bigneſs; but the common freſh-water *eel* ſeems intended to have been limited to a certain ſmall ſize; yet, at times, there have been caught ſome which have greatly exceeded this their ſeemingly ſtated limit. The common ſize of the CONGER, or ſea-*eel*, ſee *Tab. Fiſh. fig.* 11. at full growth, is the length of nine or ten foot, and the thickneſs of a man's thigh; and, when of this ſize, they will weigh from thirty to forty, or fifty pounds; though Salvian ſays, they uſually do not exceed thirty. Strabo tells us of ſome of them growing to eighty pound weight; but, by what we ſee of them, there is reaſon to believe, that between twenty-five and thirty pounds weight ſeems their natural ſtint, at full growth; and that thoſe which ſo exceed it, are like the monſtrous common *eels*, accidentally increaſed to a preternatural bulk. Pliny and Solinus talk of *eels* of thirty foot long; but the largeſt we find, even of our monſtrous ones, come greatly ſhort of that. The conger always has a ſort of barbs; and an *eel* that has not thoſe, may always be aſſuredly known by that character alone, to be a true freſh-water *eel*, though ever ſo large. Of this kind, the Thames, and ſome other rivers about London, ſeem to have furniſhed the largeſt of any part of Europe. Mr. Dale commemorates the taking of two of theſe, in the Philoſophical Tranſactions; the one near Crickſea in Eſſex, was five foot five inches long, and meaſured twenty-two inches round. The weight of this was about twenty pounds, which is the ſtint that Aldrovand gives to the freſh-water *eel*, ſaying, that they ſometimes, though very rarely, do come up to this, but that they never exceed it. The other was caught near Maldon, and was ſeven feet long, twenty-ſeven inches in circumference, and its weight was thirty pounds. Out of its back and belly there were taken five pounds of fat. This creature ſeemed to have been brought down the river by the violence of ſome land-flood, and was in a wounded condition when taken by the fiſhermen, having a hurt upon its back, which it ſeemed to have got in paſſing through ſome mill. Both this and the other were evidently freſh-river *eels*: and long ſince theſe, ſo lately, indeed, as in the year 1748, one of theſe large *eels* was taken at Limehouſe, where it was left on ſhore by the tide; it was five foot ſix inches long, and as thick as a man's thigh; its weight was twenty-ſeven pounds.

Eel, *Electrical*. See Gymnotus.

Eel, *Indian*, *anguilla Indica*, in *Zoology*, the name of the Eaſt-Indian *eel*, of which there are two kinds, the one all over ſpotted with brown, and the other of a fine yellow colour, ſtreaked with red. The fleſh of this is not accounted wholeſome.

Eel, *Sea*, *anguilla marina*, a fiſh common under holes of rocks, about the ſhores in many parts of the Eaſt-Indies. It is of a duſky brown colour, variegated with rhomboidal ſpots, not unlike thoſe on the ſkins of ſnakes. The anterior part of its body is thin and ſlender, the hinder part very thick; its noſe is long, its mouth large, and commonly gaping open, and its teeth very ſharp, but very ſmall. It grows extremely fat, and is very wholeſome and well taſted; yet thoſe who kill a number of them are ſaid to be affected with tremors, and ſometimes with a drowſineſs, which however goes off without farther miſchief.

Eels, *microſcopic, in ſour paſte.* The long-bodied animalcules, diſcovered by the microſcope in vinegar, ſour paſte, and many other ſubjects, have, from their figure, been generally diſtinguiſhed from the reſt of the microſcopic animalcules, by the name of *eels*. Theſe, and the other kinds, have been, by the moſt judicious naturaliſts, ſuppoſed to be produced of the eggs of other animalcules of the fly kind, floating in the air. But thoſe in paſte are diſcovered to be viviparous animals, producing living creatures of their own ſhape. In order to be always furniſhed with theſe minute *eels* ready for the microſcope, take ſuch paſte as bookbinders commonly uſe, of a moderate conſiſtence, and expoſe it to the air in an open veſſel, and prevent its becoming hard or mouldy, by occaſionally ſtirring it. After ſome days it will turn ſour; and, if examined attentively, you may diſcern multitudes of exceedingly ſmall, long, ſlender, wriggling animalcules, which grow larger daily, till you will be able to ſee them with the naked eye. In order to promote their coming forward, pour now and then a drop of vinegar on the paſte, and then they may be preſerved all the year: the continual motion of theſe animalcules will contribute to prevent any mouldineſs in the paſte, which is beſt kept in ſome glaſs veſſel. Apply them to the microſcope on a ſingle talc or iſinglaſs, after having firſt put upon it a ſmall ſpot of water for them to ſwim about in, the internal motion of their bowels may be plainly perceived; and when the water is almoſt dried away, and they are nearly expiring, their mouths may be ſeen opening to a conſiderable width. On cutting one of theſe paſte-*eels* in two acroſs the middle, a long and ſlender tube is ſeen to ſhoot out from each of the divided ends, and a number of ſeeming ova iſſue from this; but theſe examined ſtrictly, appear to be living *eels* of different growths, and all included in their proper membranes; ſome move themſelves but ſlowly, while others coil and uncoil themſelves pretty briſkly; and the moſt mature are ſeen to make ſtrong efforts towards the diſengaging themſelves of their enveloping membranes, and at length ſucceed, and ſwim at liberty, like their parent animal. The tube thruſt out each way, on dividing the body, is properly the uterus of the animal, which in the larger *eels* is ſeen to be full of dark ſpots, and are the embryo *eels*; and theſe dark ſpots are alſo to be obſerved in the young ones, as ſoon as produced. Phil. Tranſ. N° 478. § 13. and vol. xliv. p. 67. and Baker's Microſ. 1743, p. 81, &c. See Animalcule.

Eels *in vinegar*. See Vinegar.

Eel-*fares*, is uſed for the fry or brood of *eels*. Stat. 25. Hen. VIII.

Eel-*pout*, in *Ichthyology*, the Engliſh name of the muſtela fluviatilis, a fiſh of the gadus kind, according to Artedi, and diſtinguiſhed from the others by the name of the bearded gadus, with two fins on the back, and with both jaws of the ſame length. See Gadus.

This fiſh is caught in the Trent, and many other of our rivers, and in ſome places called a burbot, and is a very delicate fiſh for the table.

The name is derived from the German *aelput*, which is in that language the name of the ſame fiſh, and is compounded of the words *ael*, *an eel*, and *puit* or *pudd*, *a frog*; ſo that the Engliſh word ſhould properly be the *eel-frog*. It is commonly, when full grown, about fourteen inches long, and is ſlender in proportion to its length, and ſomething of the *eel*-ſhape, but too ſhort for its thickneſs, to be truly ſo. It is very ſoft and ſlippery to the touch, like the *eel*, and is covered either merely with a ſlimy matter, or elſe with extremely minute ſcales. It is of the colour of a tench; its head is large and flat, its noſtrils ſmall and round, and its jaws beſet with very ſmall teeth, which make them feel rough like a file; and there is, beſide theſe, a ſemicircular ſpot in the palate, rough in the ſame manner. There are two fins on the back, and one on the belly, reaching from the anus to the tail; and it has a little beard from the extremity of the lower jaw, and between the noſtrils and end of the ſnout, two others, and ſeven gills. Willughby's Hiſt. Piſc. p. 125. There is another variety of *eel-pout*, which Linnæus has made a ſpecies of Blennius: theſe are viviparous, and bring forth two or three hundred young at a time, a little after the depth of winter. They are common in the Eſk, at Whitby in Yorkſhire, and are a coarſe fiſh.

Eel-*ſpear*, a forked inſtrument with three or four jagged teeth, uſed for catching *eels*; that with four teeth is the beſt. This is ſtruck into the mud at the bottom of the river; where, if it ſtrikes againſt *eels*, it is ſure to bring them up.

Eel-*backed*, a term uſed by the dealers in horſes, for ſuch as have black liſts along their back.

EFFARE, or **Effraye**, *in Heraldry*, a term applied to a beaſt, when rearing on its hind legs, as if it were affrighted.

EFFECT, the reſult or conſequence of the application of a cauſe, or agent, on ſome ſubject.

It is one of the great axioms of philoſophy, that full or adequate *effects* are always proportionable to the powers of their cauſes.

Effect is alſo of ſome farther import in the arts; as when we ſay in *Painting* and *Architecture*, that ſuch a contraſt, or ſuch a drapery, or ſuch an attitude, have a fine or an ill *effect*, i. e. are beautiful, noble, or the contrary. Too many breaks, and little enrichments, in a building, have a pitiful *effect*, i. e. they give it a mean aſpect.

Effect, in the *Manege*, is applied to the motions of the hand which direct the horſe.

They diſtinguiſh four *effects* of the hand, viz. in uſing the bridle to put a horſe forwards, draw him backwards, and ſhifting it out of the right hand into the left, or *vice verſa*.

Effects, in *Commerce*, &c. the goods poſſeſſed by any perſon, whether moveable or immoveable; particularly thoſe which merchants and dealers acquire by trade. See Chattels.

The *effects* of merchants are uſually diſtinguiſhed into three claſſes, good, bad, and doubtful. By an ordonnance of the French court in 1673, every merchant is obliged to take an inventory or review every year, of all his *effects* of every kind.

Effects, *Vacant*. See Vacant.

EFFECTIONS, in *Geometry*, the geometrical conſtructions of propoſitions.

The term is alſo uſed in reference to problems and practices; which, when they are deducible from, or founded upon ſome general propoſitions, are called the *geometrical effections* thereof.

EFFECTIVE *men*, in *Military-language*, are ſoldiers fit for ſervice.

EFFEMINATE, *effeminati*, according to the vulgate, are mentioned in ſeveral places of ſcripture. The word is there uſed to ſignify ſuch as were conſecrated to ſome profane god, and proſtituted themſelves in honour of him.

The Hebrew word, *kadeſh*, tranſlated *effeminatus*, properly ſignifies *conſecrated*, and hence was attributed to thoſe of either ſex, who publicly proſtituted themſelves in honour of Baal and Aſtarte.

Moſes expreſly forbids theſe irregularities among the Iſraelites; but the hiſtory of the Jews ſhews, that they were notwithſtanding frequently practiſed. Levit. xxiii. 18. Calmet. Dict. Bibl. in voc.

EFFENDI, in the *Turkiſh language*, ſignifies *maſter*: and accordingly it is a title very extenſively applied; as to the mufti and emirs; to the prieſts of moſques, to men of learning, and of the law. The grand chancellor of the empire is called *rei-effendi*.

EFFERVESCENCE, is popularly uſed for a light ebullition, or a briſk inteſtine motion, produced in a liquor by the firſt action of heat, without any notable ſeparation of its parts.

Effervescence, in *Chemiſtry*, is not applied to all ebullitions or motions produced by fire, but only to thoſe reſulting from the mixture of bodies of different natures; which, by their acting on one another, occaſion a heat, reſembling the ebullition or boiling produced by fire.

The two moſt common oppoſites, acids and alcalies, on being mixed, cauſe a great ebullition or frothing, but no great heat; but the ſolutions of ſome metals in aqua fortis, cauſe intenſe heat, and emit flame. Aromatic oils mixed with acid mineral ſpirits, actually kindle and burn with violent exploſions; and ſome vegetable ſubſtances, putrefying with moiſture, will ſometimes heat ſo as to kindle what lies dry about that part of the heap where the putrefaction happens. Thus heaps of dung will grow hot, and haycocks often kindle into actual fire. Phil. Tranſ. N° 476. p. 475.

Chauvin defines *effervеſcence* more ſcientifically to be a violent expulſion of the air, out of the pores of the particles of one body, by the intruſion of the particles of another body mixed therewith into thoſe pores before poſſeſſed by air.

In order for *effervеſcence* to take place, the particles of the latter body muſt be ſuppoſed conformable, both in bulk and figure, to the pores of the other, ſo that they may enter and fill the ſame like wedges; and beſide, there muſt be a ſtrong degree of attraction between the particles of the two bodies, ſtronger than the attraction or force of coheſion between the particles of either of the bodies alone.

Hence it ſhould ſeem, that *effervеſcence* only differs from fermentation in the degree of exploſion; which in *effervеſcences*, occaſioned by the greater purity and freedom of the acid and alkali, is greater than in fermentations; but Fermentation is now uſed in a more reſtricted ſenſe.

Of *effervеſcences*, ſome are *hot*, and others *cold*. Of the firſt kind are thoſe produced by mixture of oil of tartar *per deliquium*, with ſpirit of vitriol; quicklime, with cold water; all acid ſpirits, with alkaline or earthy bodies; aqua fortis, ſpirit of vitriol, ſpirit of nitre, aqua regia, &c. with metallic bodies, marcaſites, and minerals; coral, with lemon or orange-juice; marble, with ſpirit of ſalt; chalk, crabs eyes, mother of pearl, and all ſhells, with acids. In all which, the *effervеſcences* are attended with a more or leſs intenſe heat.

The principal bodies in which *effervеſcences* happen, are, 1. Native vegetable acids, as moſt juices of trees, ſhrubs, and plants, that run in the ſpring; moſt juices of unripe ſummer fruits; particular juices, when ripe, as thoſe of oranges, lemons, citrons, tamarinds, ſorrel, wood-ſorrel, and crabs; fermented vegetables, as the meals when they turn ſour, Rheniſh and Moſelle wine, and tartar; vegetables twice fermented, native and diſtilled vinegar; the acids of animals, from tartiſh or acid vegetable aliment, as in the chyle, ſour milk, whey, butter-milk, and the whey thereof. 2. The native foſſile acids, as the acid of ſulphur, alum, or vitriol; or theſe acids, as they lie concealed in ſulphur or vitriol ſtones; or as thence extracted by a violent fire, or a ſtronger acid, as in the ſpirit of nitre, ſalt, alum, vitriol, or ſulphur. 3. True fixed alcalies, made of any vegetable matter by burning; the more volatile alcalies, whether ſpontaneous, as in garlic, onions, ſcurvy-graſs, muſtard, &c. produced by putrefaction from animal or vegetable ſubjects, or procured from the ſame by diſtillation and burning. 4. Certain bodies, improperly called alcalies, only on account of their agreeing with genuine alcalies, in fermenting with acids; theſe are many of the boles, and other earths, bones, chalk, corals, crabs-eyes, horns, hoofs, and nails of animals, pearls, ſhells of fiſh, &c. ſtones, and teeth. 5. The ſeven metals. 6. The ſemi-metals, antimony, biſmuth, lapis calaminaris, hæmatites, lime, and the like.

Hence we have four general rules: 1. That the bodies of the firſt claſs almoſt conſtantly make an *effervеſcence* with thoſe of the third and fourth, either ſooner or later, and with more or leſs ſtrength, as they are in themſelves weaker or ſtronger: this *effervеſcence* continues till the point of ſaturation is obtained, and then ceaſes; and at that time uſually the acrimony both of the one and the other of the ſubſtances is ſoftened. 2. The bodies of the firſt claſs make an *effervеſcence* with thoſe of the fifth, though only ſome with others, and not univerſally: ſome do this with more, and others with leſs ſtrength; and at the end, vitriols are uſually produced. 3. The bodies of the firſt claſs act in the ſame manner with thoſe of the ſixth. 4. The bodies of the third, fourth, fifth, and ſixth claſſes, being mixed together, are ſcarce found to make any *effervеſcence*; hence acids are found to have this effect in particular along with the reſt, though here it is limited. The beſt ſpirit of vinegar, poured upon oil of tartar *per deliquium*, makes no *effervеſcence* at firſt, but it does afterwards, and in doing it, weakens the alkali.

Pure volatile alkali, when freed from its oil, makes an *effervеſcence* with diſtilled vinegar; but much more cold than heat ariſes in the ebullitions of this kind; whereas, the generality of other *effervеſcences* produce heat in various degrees, from the leaſt ſenſible warmth up to actual flame. A dram of oil of cloves, mixed with two drams of Glauber's ſpirit of nitre, raiſes a thick ſmoak, and in the midſt of it a ſtrong red flame, and the matter is reduced to a dry ſpungy maſs: in this caſe the *effervеſcence* is not made with acid and alkali, but with acid, and a very rich oil. There are alſo two hard and cold bodies, viz. iron and ſulphur, which being ground together, and made into a paſte with water, make a ſpontaneous *efferveſcence*, and will even produce actual fire and flame. Boerh. Chem. part ii. p. 340.

Oil of vitriol, and oil of turpentine, mixed together, produce ſuch a vehement heat, that unleſs they be mixed drop by drop, they are apt to burſt forth into a flame, and break the phial.

Generally the ſubſtances which contain a ſenſible quantity of the inflammable principle, are thoſe which in ſimilar circumſtances produce the greateſt heat in *efferveſcing* with acids; and of all acids, the nitrous produces the greateſt heat, when it diſſolves theſe bodies.

Powdered coral, mixed with diſtilled vinegar, produces a cold *efferveſcence*, which has been accounted for hence, that the pores of the coral being very great, it may be eaſily diſſolved in the acid ſpirit, without any great friction or colliſion of the parts, ſuch as would be neceſſary to generate any conſiderable heat.

An *efferveſcence* may alſo be produced by the mixture of many other cold liquors. See DISSOLUTION.

EFFERVESCENCE, in *Vintage*, a term appropriated by Portzius and others, to ſignify that working of wine, which is by ſome, though improperly, called fermentation, thereby confounding two very different things. Fermentation, according to theſe authors, is nothing elſe but the action and re-action of the internal parts of the acid and alkali of the fluids, by which the ſpirits are ſeparated without precipitation; whereas, they ſay, by *efferveſcence*, there are no ſpirits ſeparated, ſo that all fermentation is done by means of *efferveſcence*; but all *efferveſcence* does not amount to fermentation. Fermentations are properly the mutual ſtrugglings between contrary principles, as between acid and alkali, or the like; but *efferveſcences* will happen between principles of the ſame kind, provided one be much ſtronger than the other. Thus a ſtronger acid poured upon a weaker, will raiſe an *efferveſcence*, but no fermentation. The *efferveſcence* of wine is not, however, of this kind, but the acid and alkali which are in them muſt raiſe this by their action upon one another, the alkaliſate parts combating with the acid ones, till they have wholly ſated them, and then the *efferveſcence* ceaſeth.

It has been obſerved by many, that wine in the caſks will always *efferveſce* more or leſs ſtrongly, at the time of the bloſſoming of the vines. This has been ſuppoſed by the vulgar to be owing to ſomething of ſympathy, or ſuch hidden cauſes; but it is only owing to the heats of that ſeaſon, which ſet the two ſalts at work upon one another. Portzius de Vin. Rhenan.

EFFICACIOUS, EFFECTUAL, in *Theology*. Within theſe 150 years there have been great diſputes on the ſubject of *efficacious* grace. Grace is uſually divided into ſufficient and *efficacious*; though the Janſeniſts hold, that there is no grace ſufficient but what is *efficacious*, i. e. but what effectually determines the will to act.

Efficacious grace is that which enlightens the mind, and touches the heart, in ſuch manner, as always to produce its effect, however it be oppoſed or reſiſted by the will. See GRACE.

Some divines maintain, that *efficacious* grace is *efficacious* of itſelf. *Efficacious* grace of itſelf, if there be any ſuch thing, is that which produces its effect merely of itſelf, and not in virtue of any conſent of the will. Calvin is the firſt that uſed the term, *gratia efficax per ſe, grace efficacious of itſelf*.

A late divine holds the *efficacy* of grace in itſelf to conſiſt in this: that *efficacious* grace is always joined with a moral neceſſity of doing the thing it inclines to; and ſufficient grace, joined with a moral impotence of doing it. The Arminian and Popiſh way of conceiving the neceſſity of *efficacious* grace, is, that this grace is never wanting, at leaſt to the righteous, except through their own default; that they always ſtand in need of other inner graces truly and properly ſufficient, in order to draw down this *efficacious* grace; and that theſe do infallibly draw it down, when they are not rejected, though they often remain without effect, becauſe men reſiſt, inſtead of yielding their conſent thereto.

F. Malebranche maintains, that the mutual commerce between ſoul and body, i. e. life, has no other vinculum or principle but the *efficacy* of God's decrees; and that ſecond cauſes have no proper *efficacy*, &c.

EFFICIENT, in *Philoſophy*. An EFFICIENT *cauſe* is that which produces an effect. See CAUSE and EFFECT.

Philoſophers uſually diſtinguiſh four kinds of cauſes in nature; the *efficient*, *final*, *formal*, and *material*. See each under its proper article.

The ſchool-philoſophers are exceedingly divided as to the nature and eſſence of an *efficient* cauſe. Ariſtotle defines it, *id unde, that from which*; or the firſt principle of change and reſt, i. e. of production and conſervation.

The *efficient* is called *id unde, that from which*; as the end or final cauſe, is that, *propter quod, for which*; the exemplar, *ad quod, that to which*; the matter, *ex quo, that out of which*; and the form, *per quod, that by which*.

Others of the ſchoolmen define *efficient* to be *principium per ſe influens in aliud ſine mutatione ſui*. The Ramiſts, after Plato and Cicero, define an *efficient* to be that, *a qua res eſt, from which a thing is*; to which a great author objecting, that a thing may be alſo from its end, adds, that an *efficient* is that, *a qua res vera cauſalitate proficiſcitur*.

Others define *efficient* to be, *quæ per actionem cauſat, that which cauſes by acting*; for to effect, every body knows, is to act; and hence neither a procatarctic, nor an exemplary cauſe, are properly *efficient*, though uſually ranked among them.

Laſtly, others define an *efficient* to be a cauſe, *a qua aliud producatur, from which ſomething is produced*; conſequently, what ariſes from ſuch a cauſe is called an *effect*; and thus God is the *efficient* cauſe of the world, and the world the effect of God: to which definition of an *efficient*, all the former definitions are reducible.

An *efficient cauſe*, then, is either phyſical, as the fire is the *efficient* cauſe of heat; or moral, as an adviſer is the cauſe of a murder; or univerſal, which in various circumſtances produces various effects, as God and the ſun; or particular, as a horſe which produces a horſe; or univocal, which produces an effect like itſelf, as a horſe begets a horſe; or equivocal, according to the old doctrine, as the ſun producing a frog; or natural, which acts not only without precept in oppoſition to artificial, but alſo from within, and according to its own inclination, in oppoſition to violent, as fire acts when it warms; or ſpontaneous, as a dog eating; or voluntary and free.

Others conſider *efficient* cauſes, either as principal, or as inſtrumental; others, either as next or remote, or as mediate or immediate; others, in fine, divide *efficient* cauſes among all the kinds of beings, natural and ſupernatural, ſpiritual and corporeal, ſubſtantial and accidental, vital and not vital, &c.

But the moſt celebrated diviſion of *efficients* is that into *firſt* and *ſecond*.

A *firſt efficient* cauſe is that between which and the effect there is ſome neceſſary connection: of which kind there is none but God alone.

A *ſecond efficient* cauſe is that from which an effect follows in conſequence of the will or conſtitution of the Creator, and which the Carteſians call an *occaſional cauſe*.

But theſe precarious or occaſional cauſes are, in reality, no cauſes at all, but only antecedent effects. This is eaſily ſhewn: for, 1. All action, at leaſt all corporeal action, is contained in motion; but motion can only reſult from the firſt cauſe, it being an allowed principle, that body of itſelf is inert and inactive. The true cauſe of motion, therefore, is a ſpiritual, not a corporeal nature. 2. But neither can a finite ſpiritual nature be the chief cauſe of motion; for there is no neceſſary connection between the will, e. gr. of an angel and the motion of a body, nor between that of any other being, except God. Thus, when an angel wills, a ſtone moves, becauſe God has conſtituted ſuch a law between the will of the angel and the motion of the ſtone: and thus we move our hands when we pleaſe; not that the ſoul is the principal cauſe of ſuch motion, but only the occaſional cauſe. See CAUSE.

EFFICIENTS, in *Arithmetic*, the numbers given for an operation of multiplication, called alſo the *factors*. See FACTOR and COEFFICIENT.

The *efficients* are the multiplicand and multiplier.

EFFIGY, EFFIGIES, a portrait, or repreſentation of a perſon to the life. See PORTRAIT.

EFFIGY, is alſo uſed for the print or impreſſion of a coin, repreſenting the prince's head who ſtruck it.

EFFIGY, *to execute or degrade in*, denotes the execution or degradation of a condemned, contumacious criminal, who cannot be apprehended or ſeized.

In France, they hang a picture on a gallows or gibbet, wherein is repreſented the criminal, with the quality or manner of the puniſhment: at the bottom is written the ſentence or condemnation. Such perſons as are ſentenced to death are executed in *effigy*.

EFFLORESCENCE, of *ex, out*, and *flos, flower*, in *Botany*, denotes the blooming of a flower.

EFFLORESCENCE, in *Chemiſtry*, denotes an operation which certain bodies undergo, when a kind of meal or powder is formed on their ſurfaces; and this may happen either by decompoſition or drying; as to cobalt in the firſt caſe, and to the cryſtals of marine alkali, Glauber's ſalt, alum, &c. in the ſecond.

EFFLORESCENCE, in *Medicine*, a breaking out of humours in the ſkin; as in the meaſles, or the like. See EXANTHEMA.

EFFLUENT *fever*, is ſometimes uſed for an inflammatory fever.

Dr. Morgan propoſes to cure ſuch by ſweats raiſed by low cooling drinks.

EFFLUVIUM, a flux, or exhalation of minute particles from any body; or an emanation of ſubtile corpuſcles from a mixed, ſenſible body, by a kind of motion of tranſpiration.

Odoriferous bodies, every one knows, are continually emitting ſubſtantial *effluvia*, by means whereof it is, that they excite in us the ſenſe of ſmelling. Theſe minute *effluvia* are ſometimes perceived by the eye, in form of fumes and vapours.

Some bodies are found to emit *effluvia* for a great number of years, without any conſiderable loſs, either as to bulk or weight; as divers odorous bodies, the tenuity of whoſe emanant corpuſcles is incredible; not but that the loſs they ſuſtain by the continual emiſſion of *effluvia* may be made up to them by the reception of other ſimilar *effluvia* of the ſame kind of bodies diffuſed through the air.

It is added, that theſe *effluvia* are emitted in manner of *radii*, rays, *in orbem*; and the circumference or bound of the activity of the radiation exhibits the ſame figure as is that of the radiant. This the aſtronomers ſufficiently prove, from the ratio of the refraction of the atmoſphere. For the law of the emiſſion of theſe *effluvia*, ſee QUALITY.

That *effluvia* may conſiderably operate upon, and have great effects on bodies within the ſphere of their activity, is proved by Mr. Boyle, in an expreſs Treatiſe on the Subtilty of *Effluvia*; where he ſhews, 1. That the number of corpuſcles emitted by way of *effluvia*, is immenſely great. 2. That they are of a very penetrating nature. 3. That they move with vaſt celerity, and in all manner of directions. 4. That there is frequently a very wonderful congruity, or incongruity, in the bulk and ſhape of theſe *effluvia*, compared with the pores of the bodies they penetrate into and act upon. 5. That in animal and organical bodies, particularly, theſe *effluvia* may excite great motions of one part of the frame upon another, and thereby produce very conſiderable changes in the œconomy. Laſtly, that they have ſometimes a power of procuring aſſiſtance in their operations from the more catholic agents of the univerſe, ſuch as gravity, light, magnetiſm, the preſſure of the atmoſphere, &c.

That *effluvia* are emitted to very great diſtances, we have a notable proof in odoriferous *effluvia* being in many caſes perceived at the diſtance of many leagues. Again, that the generality of *effluvia* retain the proper colour, ſmell, taſte, and other properties and effects of the bodies whence they proceeded, and this even after they have paſſed through the pores of other ſolid bodies, we have abundant proof. And the ſame we ſee confirmed in ſympathetic inks and powders, and in the ſagacity of blood-hounds, &c.

The wonderful extenſion of *effluvia*, and the ſmall diminution of the body they iſſue from, is one of the ſtrangeſt problems in phyſics.

The determinate natures of *effluvia*, according to the principal inſtances we have of them, are reducible to theſe three heads: 1. That theſe *effluvia* being, by condenſation, or otherwiſe, reunited, they appear to be of the ſame nature with the body that emitted them. 2. Their determinate nature may be ſometimes diſcovered by the difference that may be obſerved in their ſenſible qualities; foraſmuch as thoſe *effluvia* which are endowed with them proceed from the ſame ſort of bodies, and yet thoſe afforded by one kind of bodies being in many caſes manifeſtly different from thoſe which fly off from another, this evident diſparity in their exhalation argues, that they retain diſtinct natures, according to the nature of each body from which they proceed. 3. We may diſcover this different nature of *effluvia* from their effects upon other bodies than the organs of our ſenſes; conſidering that the effects which certain bodies produce on others by their *effluviums*, being conſtant and determinate, and always different from thoſe which other agents produce by their emiſſions on the ſame or other ſubjects, the diſtinct nature of the corpuſcles, emitted on this occaſion, may be ſufficiently judged of, were it only from this. Boyle on Effluvia.

EFFLUVIA, in *Medicine*, are aſſigned as the cauſe of various diſorders, eſpecially of the contagious kind. Thus, when a conſiderable quantity of putrid *effluvia* has been admitted into the blood, beſides acting thereupon ſlowly, by way of inquinamentum, or ferment, they ſeem immediately to affect the nerves, and thereby to bring on ſome extraordinary diſorder of the whole frame. Hence ariſe ſpaſms, obſtructions, palpitations, a high degree of fever, or a languid circulation, chilneſs, or intenſe heat, and a variety of contrary ſymptoms, according to the different affection of the nerves. To putrid *effluvia* is likewiſe owing the jail-diſtemper, which is the ſame with the hoſpital-fever. See HOSPITAL-*fever*.

Effluvia iſſuing from corrupted ſubſtances chiefly conſiſt of the phlogiſton or ſulphur principle, ſince they ſo readily unite with, and volatilize acids, as appears from the increaſe and particular change of the ſmell. But it is proper to remark, that from a ſimple putrid ſubſtance the phlogiſton does not ariſe alone, but combined with the ſaline parts of the body; for this principle, when ſingle, is perhaps imperceptible to the ſmell; and, when diveſted of theſe ſalts, is never, ſo far as is known, peſtilential; ſo that the deleterious particles of rotten ſubſtances ſeem to conſiſt of a certain combination of the ſulphureous with the ſaline principle, which united, not only become the moſt irritating ſtimuli to the nerves, but act upon the humours as a putrid ferment in promoting their corruption. Pringle's Obſ. on Diſeaſes of the Army, p. 186. 385, &c. See AIR *fixed* and MALIGNANT.

Dr. White, availing himſelf of the diſcoveries of Dr. Prieſtley, has applied *nitrous* AIR in the manner propoſed by him for aſcertaining the ſalubrity of different ſpecimens of air, and the effects of various kinds of *effluvia* upon it. The apparatus employed by him for this purpoſe conſiſted of a barometer tube, graduated by inches and decimals, and of ſuch a bore, that an ounce phial of the air to be examined, being thrown into it through a ſmall glaſs funnel (after it had been filled with water and inverted into a veſſel of the ſame fluid) occupied about 134 decimal parts of an inch, or nearly 13½ inches. On adding half an ounce of nitrous air, the mixture generally occupied, at firſt, about 205 decimal parts; and in half an hour, when the whole diminution may be ſuppoſed to have taken place, Dr. White obſerved the ſpace or number of decimal parts then occupied by the two airs; and ſubſtracting it from 205, conſidered the remainder as the number indicating the ſtate of purity in the particular air he had occaſion to examine. When he mixed the air in his garden with nitrous air in the abovementioned proportion, the ſpace occupied by the mixture in half an hour was 145; and this ſubtracted from 205, gives 60 for the ſtate of the common atmoſpherical air in that place, and at that time. But had he uſed the ſame quantity of perfectly noxious air inſtead of the air in the garden, there would have been no diminution, and the mixture would have ſtood at 205, ſo that 0 would expreſs the condition of that particular air; and therefore he marked the extent of his ſcale from 0, indicating the moſt noxious or mortal air to 60° or 61°, which was found to be the mean ſtate of the atmoſphere in more than 200 experiments. With this apparatus Dr. White found the difference between the air in the city of York and that of the country, not far from the city walls, to be 3°, the former being 59° and the latter 62°. The air of his bed, on entering it at night, was 62°, but reduced by the next morning to 58°, the bed curtains being open, and the room large and airy. By breathing the ſame air as long as he could without inconvenience, he reduced it from 62° to 40°. The air in an eight-ounce phial, which had contained a ſmall piece of freſh veal forty-eight hours, was reduced from 64° to 10°, and yet the fleſh was not putrid. Two ounces of black mud, taken from a ſtinking moraſs at York, being put into an eight-ounce phial of air, reduced it in twelve hours from about 60° or 62° to 34° or 36°. When this mud became perfectly dry, ſo as to be pulverized, the diminution it occaſioned was only from 62° to 60°: but when this powder was again reduced to mud, by the addition of a little water, and incloſed in a phial as before, it affected the air ſo as to reduce the diminution from 62° to 49°; and on ſtanding longer, from 62° to 29°. When more water was added, ſo as to ſwim at ſome height above the powder, which had ſubſided, the air again, tried by the teſt, never produced a greater reduction of the diminution than from 62° to 56°. Theſe experiments confirm the obſervations of Sir John Pringle and other medical writers, who have remarked, that the diſeaſes peculiar to low marſhy ſituations ſeldom begin to appear till the water is ſo far evaporated as to leave a black and ſlimy mud; that they ceaſe when the bogs and marſhy ground have been drained and become perfectly dry; and that, on the other hand, the danger ariſing from marſhes and bogs is, in a great meaſure, obviated, on their being laid wholly under water; or in the words of this ingenious writer, the putrid fermentation is either prevented by too much mixture, or the *effluvia* are abſorbed in paſſing through the ſuperincumbent bed of water. Phil. Transſ. vol. lxviii. part i. art. 13.

The earth ſends forth *effluvia* and ſteams in great abundance, and many things attributed to other agents, are really performed by them. Dr. Woodward has very juſtly attributed great effects to them on foſſils of many kinds; and it is poſſible many more of the preſent appearances of ſubterranean bodies may be owing to them than are at preſent imagined. The figures and delineations on ſtones, in form of trees and ſhrubs, have often their origin from theſe *effluvia*, getting into the cracks of them; and it is poſſible, that the ſtalactitæ, which we find on the roofs of caverns, may be in great part alſo formed by their means. Phil. Tranſ. N° 169. p. 920.

As for the *effluvia* proceeding from ſtagnant waters, mines, &c. ſee Air *Mephitic* and Damp.

EFFLUXION, a flowing out, from *ex*, *out of*, and *fluere*, *to flow*.

EFFRACTURA, a word uſed by Ambroſe Parey for a peculiar ſpecies of fracture of the ſkull, in which the bone is at once broken and depreſſed.

EFFRONTES, in *Church Hiſtory*, a ſect of heretics, in 1534, who ſcraped their forehead with a knife till it bled, and then poured oil into the wound. This ceremony ſerved them inſtead of baptiſm. See Baptism.

They are likewiſe ſaid to have denied the divinity of the Holy Spirit.

EFFUSION, the pouring out of any liquid thing with ſome degree of force.

In the ancient heathen ſacrifices there were divers *effuſions* of wine, and other liquors, called *libations*.

Effusion, or Fusion, in *Aſtronomy*, denotes that part of the ſign Aquarius, repreſented on celeſtial globes and planiſpheres, by the water iſſuing out of the urn of the water-bearer. See Aquarius.

Effusion *of blood*, *effuſio ſanguinis*, in our *Old Writers*, is uſed for the mulct, fine, or penalty, impoſed for the ſhedding of blood. This the king uſed frequently to grant to lords of manors. Among others, it was granted to the abbot of Glaſtenbury.

EFT, or Eff, in *Zoology*, the name of a creature very common in all parts of England, and called alſo *newt*, and the *ſwift*, and by others the *common lizard*, *lacertus vulgaris*.

The beak or ſnout of this creature is oval and obtuſe; its back of a ruſty iron-colour; its feet have each five toes, and are armed with very ſharp though ſmall claws. That toe which is in the place of the fore-finger with us is the longeſt of all; and that which anſwers to our thumb is placed lower. Ray's Syn. Quad. p. 264.

We have ſeveral ſpecies of this animal with us. 1. The common land *eft*, with the black ſpotted belly. 2. The ſnake-like *eft*, which is frequent in our heaths. 3. The ſmall brown land *eft*. This is very ſcarce. 4. The yellow ſcaly land *eft*, deſcribed by Plot in his Hiſtory of Staffordſhire. And, 5. The brown and black ſpotted water *eft*. Plot's Staff. p. 252.

The land *eft*, or as the naturaliſts often call it, the land *ſalamander*, has ſomething very remarkable in its outer coat. Its ſkin often appears dry, like that of the lizard kind, but often alſo it appears wetted, and as if covered with a fine ſhining varniſh: the change from one to the other of theſe ſtates is uſually performed in an inſtant, and it frequently becomes immediately wet all over on touching it. It alſo contains, under the ſkin, a ſort of milky liquor, which ſpurts out to a diſtance on preſſing the body of the animal.

The paſſages for this milk are a vaſt number of pores or holes, many of which are plainly viſible to the naked eye; and very probably the firſt-mentioned liquor, which covers the ſkin in manner of a varniſh, may be the ſame with this, its white colour not being diſtinguiſhable when it is ſpread ſo thin over the ſurface of the animal. This milk reſembles very much the milky juice which the tithymals, and many other of the ſucculent plants afford on being cut or broken. It is of an inſupportably acrid and ſtyptic taſte; and though the tongue receives no injury from touching it, yet the ſenſation is ſo violent, that one is apt to imagine there muſt be a wound made in it. This animal, when bruiſed, yields alſo a very diſagreeable ſmell.

It has generally been ſuppoſed, that this animal is of a poiſonous nature; and the famous ſalamander of the old writers ſeems to be of the ſame genus, if not the ſame animal. Mr. Maupertuis, determined to inform the world of the truth in regard to theſe remarkable particulars, cauſed a large number of theſe animals to be brought to him, which the country people, who had caught them about the bottom of old walls, brought to him with as much caution as if they had been vipers.

From his trials, it appeared very evident, that the ſtories of this creature's being poiſonous, are as idle and groundleſs as thoſe of its living in the fire.

One thing remarkable this gentleman obſerved in his diſſections of the animal, which was, that he found in ſeveral of the females, at once cluſters of eggs, and living young ones. The eggs formed cluſters reſembling thoſe of the ovaries of birds, and the young ones were contained in two tubes, or long pipes, the coats of which were perfectly tranſparent, and the young ones were eaſily diſtinguiſhed through them; and there were counted in one female fifty-four of theſe, all living and vigorous. Mem. Acad. Par. 1727.

The water *eft* affords an excellent opportunity of ſeeing the circulation of the blood by means of the microſcope, particularly of the ſolar one. By this apparatus the veſſels are ſeen beautifully delineated on the ſkin; and the tide of blood, in the large ones, is equal to that of the ſtream of water which is ſhewn in hydroſtatical experiments thrown out of a veſſel by condenſed air. In either of theſe caſes, you can ſee no appearance of ſeparate drops of globules, but the whole forms one continued body. In the leſſer veſſels the globules are ſeen paſſing along very ſwiftly, yet evidently ſeparate one from another.

It is remarkable, that in the tail of this animal there ſeem a greater number of veſſels than are immediately neceſſary to the circulation of the blood; for, when thus examined, there will be often ſeen two parallel veſſels, in one of which only the circulation is performed, and this ſucceſſively in one and the other of the veſſels, the tide often leaving the one wholly empty, which had juſt before been full and circulating in the other. Phil. Tranſ. N° 460. p. 728.

Eft-*ſtones*, in the *Materia Medica* of the American Indians, a name given to certain ſtones, ſaid to be found in the ſtomach of a certain ſpecies of water newt, or *eft*, in the manner of the bezoars in other animals. The waters of Braſil, Cuba, and Mexico, abound with this ſpecies of *eft*; but it does not ſeem well atteſted, that this ſort of ſtone was ever found in any of them by thoſe who have diſſected numbers of them, on purpoſe to ſearch for it. We have in Europe ſwallow-ſtones, and other ſuch things, whoſe names, and their fabulous hiſtories, would import their being produced in animals. As many ſwallows have been deſtroyed in England in looking for theſe ſtones, as newts in Mexico in looking for thoſe; and by the appearance of the American as well as the European ſtones, they both ſeem to be dug out of the earth, and to have been once the teeth or other parts of fiſhes. Redi, Experim.

The virtues of the *eft ſtone* of Mexico are celebrated by Ximenes, and all others who have been upon the ſpot. It is ſaid to be a certain remedy for the gravel, and all other nephritic complaints, and even to break and diſſolve the ſtone when already concreted in the bladder. But this account of its virtues ſeems as improbable as that of its origin. Redi tried theſe and many other ſtones of famous character among writers, and found no effect in any of them. Theſe *eft-ſtones* never produced any viſible effect in his trials, in nephritic complaints, nor the eagle-ſtone in women's labour, nor the ſtones ſwallowed by Caymans in quartans, though Menardes looks on theſe laſt as infallible in this caſe.

EGERMINATE, of *ex*, *out*, and *germen*, *bud*, in *Botany*, ſignifies to bud or ſpring out.

EGESTION, from *egero*, *I caſt out*, in *Medicine*, the ſame with dejection.

EGG, in *Natural Hiſtory*, a part formed in the females of certain animals; which, under a ſhell or cortex, includes an embryo or fœtus of the ſame ſpecies; the parts whereof are afterwards diſplayed and dilated, either by incubation, or by the acceſſion of a nutritious juice.

The ſpecies of animals that lay *eggs* are particularly denominated *oviparous*; and the part wherein the *egg* is formed, the *ovary*.

Of the various kinds of *eggs*, thoſe of hens or pullets being the moſt uſual, and which have been the moſt obſerved, we ſhall ſay ſomething of the ſtructure thereof, and the generation of the chick therein.

The exterior part, then, of a hen's *egg* is the ſhell, a white, thin, friable cortex, including all the other parts, and defending them from injuries. The matter of this ſhell is a fine, abſorbent earth, ſoluble in acids, and calcareous or convertible into quicklime. See *Animal* Earth.

Eggs with double ſhells are no unuſual phenomenon. Harvey, is very diffuſe on the rationale of theſe appearances in his treatiſe De Generat. Animal.

Immediately under the ſhell lies the membrana communis, which lines the whole cavity of the ſhell, adhering pretty cloſely to it, except at the bigger end, where a little cavity is left between them, containing a ſmall quantity of air, which with age grows bigger. Under this membrane are contained two albumina, or whites, each wrapped up in its own membrane. In the middle of the inner white, is the vitellus, or yolk, incloſed likewiſe in its ſeparate involucrum or cover. The outer albumen is oblong or oval, accommodated to the figure of the ſhell: the inner is ſpherical, and of a more craſs or viſcid ſubſtance, and the yolk is of the ſame figure.

The albumen is miſcible with water; and when expoſed to a gentle heat, as that of a healthy man's body, it grows continually more and more liquid, till at length loſing all its conſiſtence, it diſſolves into a liquor reſembling urine; and at the ſame time it waſtes ſenſibly, and at laſt leaves nothing but a thin pellicle reſembling paper. It is, in reality, a matter entirely of the nature of animal jellies, but of that kind which is coagulable by heat: for the albumen, if applied to a degree of heat ſomething greater, inſpiſſates, and hardens into a whitiſh, concrete, flaky ſubſtance, with the loſs of ſome of its finer fluid part, which eſcapes in form of a fume.

In effect, if an *egg* be laid on coals not the moſt intenſely hot, the ſame finer fluid will be found ſenſibly to tranſude the pores of the ſhell. Add, that if ſpirit of wine be poured on the freſh albumen of a new-laid *egg*, a coagulation is immediately produced as if by fire; and this the more perfectly, as the ſpirit and the albumen are more intimately mixed. By this means, the white of an *egg* is defended from all putrefaction.

Diſtilling the albumen by a retort in a ſand heat till it be brought to a dryneſs, it yields an incredible quantity of water, which has moſt of the properties of the whole maſs.

The white of an *egg* makes an extraordinary menſtruum. Being boiled hard in the ſhell, and afterwards ſuſpended in the air by a thread, it reſolves and drops down into an inſipid ſcentleſs liquor, which appears to be that anomalous unaccountable menſtruum ſo much uſed by Paracelſus; and will, though it contain nothing ſharp, oleaginous, or ſaponaceous, make a thorough ſolution of myrrh, which is more than either water, oil, ſpirits, or even fire itſelf, can effect. Boerhaave, New Meth. Chem. part ii. p. 358. ſeq. See MYRRH.

The origination of the albumen is ſomewhat obſcure. It is matter of common obſervation, that *eggs*, while in the ovaries of their birds, e. gr. of hens, conſiſt only of a yolk, without any albumen; and in *eggs*, when boiled, it is apparent, there is only a contiguity, but no connection between the two parts, ſince they are eaſily ſeparated, without a rupture of any thing, except in the places where the chalazæ are found. The reſult of the lateſt obſervations on this ſubject is, that the vitellus being deſcended into the ovary, the cavity of the ovary diſtils the matter of the albumen, and glues, or annexes it to the ſurface of the yolk. Harv. de Generat. Anim. exerc. xiv. p. 57. Bellin. de Mot. Cord. p. 40. Burggr. Lex. Med in voc.

The yolk of the *egg* is alſo compoſed of a gelatinous matter like the white, which coagulates and hardens with heat, and contains a conſiderable quanity of mild fat oil, that may be ſeparated from it by expreſſion.

The albumen is the nutritious juice, whereby the *egg* is diſtended and nouriſhed till it becomes big; and the yolk ſerves it for food after it is well grown, and partly alſo after it is hatched; for a good part of the yolk remains after excluſion, being received into the chicken's belly, as a ſtore-houſe, and conveyed thence by the appendicula, or ductus inteſtinalis, as by a funnel, into the guts, ſerving inſtead of milk.

At each end of the *egg* are the chalazæ, which are, as it were, the poles of this microcoſm: theſe are white, denſe bodies, conſiſting each of three little globules like hail joined together; by theſe, not only the ſeveral membranes are connected, or knit together, by which means the ſeveral liquors are kept in their proper place and poſition to each other, but they ſerve alſo to keep one and the ſame part of the yolk uppermoſt, let the *egg* be turned which way it will.

About the middle, between the chalazæ, on the ſide of the yolk, and in the membrane thereof, is a little veſica or bladder, not unlike a vetch, or lentil, called the CICATRICULA, and by ſome the *eye* of the *egg*. In this veſicle is contained an humour, in, and of which the chick is generated.

All theſe parts of a pullet's *egg* are found in all other *eggs*, to which the definition of an *egg* properly and ſtrictly agrees; ſuch *egg* being that, of a part whereof the animal is formed, the reſt ſerving for its food. Accordingly, the firſt ſeed, or ſtamen of the chick, is in the cicatricula.

Eggs, in diet, ſerve for an agreeable and nouriſhing aliment; but it is neceſſary, that they ſhould be freſh, and moderately coagulated by heat. If, upon holding them to a candle, they appear of a turbid colour, they are uſually reckoned ſtale; or if, upon preſenting them to the fire, they exhale a moiſture, they are freſh. The yolk is uſed in many medicinal preparations, as emulſions, &c.

Eggs, *Albumina*, or *whites of*, are of ſome uſe in medicine, though rather externally, in the preparation of collyriums for the eyes, and *anacollemata*, on account of their cooling, agglutinating, and aſtringent quality, than internally.

Albumina are uſed for burns, and in ſome mixtures with bole armeniac, &c. for conſolidating freſh wounds, and under bandages, and compreſſes to prevent the luxation of bones after reduction. A late writer recommends them as a ſecret in the jaundice. Junck. Conſp. Therap. tab. xiii. p. 379. Quinc. Diſpenſ. part ii. § 12. p. 204. Ephem. Germ. dec. 3. an. 2 obſ. 35, p. 43.

Beſides medical, the whites of *eggs* have alſo their chemical uſes, e. gr. for the clarifying of liquors; to which purpoſe, being mixed, and incorporated with the liquors to be clarified, and the whole afterwards boiled, the whites of *eggs* are by this means brought together, and hardened, and thus carry off the groſs parts of the liquor along with them. They likewiſe form a very white and ſhining varniſh, which is applied to ſeveral kinds of work, and particularly to pictures.

Egg-*ſhell white*, in *Painting*, is ſometimes uſed in water-colours, and preferred to flake or the Troy-white: it is prepared by peeling off the inner ſkins, and levigating the ſhell to a proper fineneſs, and waſhing over the powder.

Egg, what is termed *centeninum ovum*, among *Naturaliſts*, denotes a ſort of hen's *egg*, much ſmaller than ordinary, vulgarly called a *cock's egg*; from which it has been fabulouſly held, that the cockatrice or baſiliſk was produced. Brown, Vulg. Err. lib. iii. cap. 7.

The name is taken from an opinion, that theſe are the laſt *eggs* which hens lay, having laid an hundred before; whence *centeninum*, q. d. the hundredth *egg*.

Theſe *eggs* have no yolks, but in other reſpects are like common *eggs*, having the albumen, chalazas, membranes, &c. in common with others.

In the place of the yolk is found a body reſembling a little ſerpent, coiled up, which doubtleſs gave riſe to the tradition of the baſiliſk's origin from hence.

Their formation is probably aſcribed by Harvey to this, that the yolks in the vitellary of the hen are exhauſted before the albumina. Harvey de Generat. Animal. Exerc. 12.

M. La Peyronie has carried the hiſtory of the *ova centenina* to a greater length, as well as certainty: a hen was brought to him, which, for a conſiderable time, laid no other *eggs*. The ſame hen was alſo obſerved to crow like a cock, and to render by the cloaca a thin yellow matter, much like the yolk of an *egg* diluted in water. Upon opening her, ſhe was found hydropical; a bladder as big as the fiſt, full of water, was found contiguous to the oviduct, which it preſſed and crowded in ſuch manner, as not to leave the cavity thereof above five lines in diameter; ſo that a common *egg*, ſuch as it is when it falls from the ovary into the tube, could not paſs without burſting, by which the yolk was let out, and diſcharged another way. Mem. Acad. Scienc an. 1710. p. 730.

Eggs, *preſervation of*. Mr. de Reaumur, of the Paris academy, thinking nothing that could be a public benefit beneath the cognizance of a philoſopher, beſtowed conſiderable pains on finding a method of preſerving *eggs* for a long time, and ſucceeded at length ſo far in it, as to be able to produce *eggs* of months, nay years old, which taſted as freſh and well as if they had been laid but the day before. The *egg* always is quite full, when it is firſt laid by the hen, but from that time it gradually becomes leſs and leſs to its decay; and however compact and cloſe its ſhell may appear, it is nevertheleſs perforated with a multitude of ſmall holes, though too minute for the diſcernment of our eyes. The effect of theſe, however, is evident, by the daily decreaſe of matter within the *egg*, from the time of its being laid; a fluid matter is continually perſpiring through theſe perforations of the ſhell, which occaſions the decay; and this is carried on in a much quicker manner in hot weather than in cold. To preſerve the *egg* freſh, there needs no more to be done than to preſerve it full, and ſtop its tranſpiration; and the plain and rational method of doing this, is by ſtopping up theſe pores through which the matter tranſpires, with a matter which is not ſoluble in watery fluids, and therefore cannot be waſhed away by the matter perſpired by the *egg*; and on this principle, all kinds of varniſh, prepared with ſpirit of wine, will preſerve *eggs* freſh for a long time, if they are carefully rubbed all over the ſhell. This might ſeem to moſt people a very common and cheap ſubſtance for this purpoſe; but the misfortune is, that in country places, where it ſhould be put in practice, no ſuch thing is to be had; and the poorer ſort of country people are not eaſily brought into the uſe of any thing to which they are not accuſtomed.

To obviate the difficulty ariſing from this, Mr. Reaumur thought of ſubſtituting in the place of varniſh ſome other ſubſtance more common; and ſoon found, that another ſubſtance, which is very cheap, and every where to be had, would very well ſupply the office of varniſh; for experiments proved, that any hard fat would have the ſame effect. The beſt of all fat for this purpoſe, is found to be a mixture of that of mutton and of beef; theſe ſhould be melted together over the fire, and ſtrained through a linen cloth into an earthen pan; and when thoroughly melted, an *egg* is to be dipped into it, and immediately taken out again; and it is then in a ſtate to keep perfectly freſh more than a twelvemonth. Memoirs Acad. Scienc Par. 1735.

The only difficulty attending this method is, that the *eggs* cannot be ſo eaſily plunged into the fat, as that all their ſurfaces ſhall be covered by it; for if they are held in a pair of pincers, the parts of the *egg* where the pincers touch will be bare; but the *eggs* may be ſuſpended by a loop at the end of a thread, and by that means plunged in; and the thread being then coated over with the fat, as well as the ſurface of the *egg*, will preſerve that part which it covers as well as the coat of fat will the reſt. The great care is to uſe this means while the *eggs* are perfectly freſh; it ought indeed to be done on the very day when they are laid; for if the evaporation is begun, and the empty ſpace once made, there is room for a fermentation, which never terminates but in the deſtruction of the *egg*.

There is one advantage in this uſe of fat rather than varniſh, which is, that the *eggs* rubbed over with it boil as quick as if nothing had been done to them, the fat melting off as ſoon as they touch the hot water; whereas the varniſh, not being ſoluble even in hot water, only becomes moiſtened by it, and ſtill hanging about the *egg*, prevents the tranſpiration of juices, neceſſary to bring the *egg* to that ſtate in which it is to be eat. When the *egg*, which has been preſerved by fat, is taken out of the water, there remains very little fattineſs upon it, and what there does is eaſily wiped off with a napkin, the *egg* is as nicely freſh as if laid but the day before, and no palate can diſtinguiſh the leaſt difference.

The method of preſerving them by means of fat, is greatly preferable alſo to that by varniſh, when they are intended for putting under a hen to be hatched; as the fat eaſily melts away by the heat, while the varniſh remains and impedes the hatching. By this means the *eggs* of foreign fowl might be ſent over and hatched here, whereby many beautiful and valuable birds may be naturalized among us.

At Tonquin they are ſaid to keep *eggs* entire for three years, by covering them up in a paſte made of aſhes and brine.

EGGS, *ant*. See ANT.

EGGS *of flies*. After the congreſs with the male, the female fly is ſeldom ſo much as twenty-four hours before ſhe begins to depoſit her *eggs* on ſome ſubſtance proper to give nouriſhment to the worms that are to be produced from them.

The *eggs* are but a little time in hatching; and the growth, and all the changes of the animal, take up but a little time. The creature is found to make its way out of the upper part of the *egg*; and it is not more than three weeks from the laying the *egg* that is taken up, before the creature is ſeen in the form of a perfect fly, if a female, and ready to depoſit hers.

Among the butterfly claſs, the female has but one congreſs with the male, by which the *eggs* are fecundated, and immediately after it begins to depoſit her *eggs*, and continues ſo doing, without interruption, till ſhe has finiſhed: but it is much otherwiſe with the two-winged flies; for they, after having laid one ſet of *eggs*, have repeated congreſſes with the male for ſeveral days; and, after every one of theſe, lay a new ſet.

The female of the butterfly claſs does not depoſit her *eggs* on any plant at random, on which ſhe happened to be placed when the male coupled with her, but ſearches out ſuch a ſpecies of plant for leaving them on, as is what ſhe loved when in the caterpillar ſtate, and what the young caterpillars to be hatched from them will be able to feed on, that they may find food ready for them at the moment of their birth. She does not ſcatter them about irregularly, and without order, but ſhe diſpoſes them with perfect ſymmetry, and faſtens them one to another, not by their own glutinous nature, but by a viſcid liquor, which ſhe ſeparates for that purpoſe. In many ſpecies alſo, where the hinder part of the body of the female is covered with long hairs, ſhe, by degrees, throws off all thoſe hairs, and with them makes a neſt for the *eggs* ſhe is laying, where they are kept very ſoft, and ſafely, till the time of their hatching. This, indeed, is the whole buſineſs of her life; and when the *eggs* are all laid, ſhe dies. Memoirs Acad. Scienc. Par. 1736.

The *eggs* of butterflies are of very different ſizes, according to the ſpecies; they are alſo of many different figures, ſome are ſpheric, others ſegments of ſpheres, others conic, in different forms and degrees: nor is this all, their ſurfaces are very different alſo in the different kinds. Some are elegantly wrought, as it were; ſome dented; and others more deeply notched at the ſides; and others channelled or furrowed all over. In ſhort, the moſt ingenious artiſt could ſcarce contrive ſo many various ornaments as there are on theſe *eggs*, all which alſo are inviſible to the naked eye, being diſcoverable no way but by the microſcope.

The *eggs* of the different ſpecies of the two-winged flies, are alſo of very different figures.

There are ſome ſpecies which faſten their *eggs* to the ſides of veſſels of water; theſe all lay oblong *eggs*: ſome of them, however, are perfectly ſmooth in all parts; and thoſe of other ſpecies ſmooth only on their inner ſurface, and ridged longitudinally on the other. What is alſo the more remarkable in theſe, is, that they all have a fine thin flake running down all along the two ſides, diametrically oppoſite; and theſe two bands ſurrounding the whole *egg* in this manner, have much the appearance of a caſe, and give the *egg* the appearance of being incloſed in a paper frame. It is probable, that the uſe of this frame is to hold the body of the *egg* the better faſtened againſt the veſſel; and probably thoſe *eggs* which have it not, are depoſited from the body of the female fly with a viſcous matter about them, in ſufficient quantity to faſten them on without this aſſiſtance.

There are ſome *eggs* of the fly kingdom which muſt neceſſarily be held faſt to ſome other body, in order for the worm to be able to make his efforts towards the opening of them, without carrying them away; and ſome of the ſpecies require much more ſtrong attachments of this kind than others.

On the ſtalks of the common meadow graſſes there are alſo frequently found the *eggs* of flies depoſited in great numbers. On other ſtalks of graſs, one may often ſee alſo yellow ſpots and blotches, which may naturally enough paſs with an incurious obſerver for maladies of the plants; but, when examined with the microſcope, they appear to be, in reality, cluſters of *eggs*, and amaſſed in different numbers: ſometimes alſo they are formed perfect and whole, and at others with their ends eaten. Theſe laſt are ſuch *eggs* from which the worms have made their way. Theſe worms are white, and have a variable head, armed with two hooks, but their changes are not known. Reaumur, Hiſt. Inſect. vol. iv. p. 376—383.

EGGS *of gnats*. There are few creatures in the winged kingdom more prolific than the gnat. Its whole ſeries of changes, from the *egg* to the perfect animal, is uſually accompliſhed in three weeks or a month; and there are commonly ſeven generations of them in a year, in each of which every female is the parent of two or three hundred young ones, if all the *eggs* come to proper maturity. Theſe *eggs* are arranged by the animal in the form of a ſmall boat, and each ſeparate *egg* is of the ſhape of a ninepin. The thicker ends of theſe are placed downwards; they are all firmly joined to one another by their middles; and their narrower, or pointed parts, ſtand upwards, and make the upper ſurface of the boat of *eggs*, as it were, rough or prickly.

When theſe *eggs* are examined ſingly by the microſcope, they appear not exactly of the ninepin ſhape; the larger end is rounded, and terminated by a ſhort neck, the end of which is bordered with a ridge, which makes a kind of mouth. The neck of each of theſe is ſunk within the water on which the boat ſwims; for it is neceſſary that it ſhould keep on the ſurface, ſince, if wholly ſubmerged, the worms could never be hatched.

It is only in the morning hours that the gnats are to be found laying their *eggs*; and then they will frequently be found about the ſurfaces of ſuch waters as are in a proper condition to give ſupport to their young. The female gnat here places herſelf on a ſmall ſtick, the fragment of a leaf, or any other ſuch matter, uſually near the water's edge, and places her body in ſuch a manner, that the laſt ring but one touches the ſurface of the water; the laſt ring of all, where there is the paſſage for the *eggs*, is turned upward, and every *egg* is thruſt out vertically; and the creature, when it is almoſt diſengaged, applies it againſt the ſides of the already formed cluſter, to which it readily adheres, by means of a mucilaginous ſticking matter with which it is naturally covered, like the *eggs* of many other inſects. Ibid. p. 619. The greateſt difficulty to the creature, is the placing the firſt laid *eggs* in a proper poſition to receive the reſt, and ſuſtain themſelves and them in a proper direction; theſe ſhe with great precaution, places exactly, by means of her hinder legs; and when a ſufficient number of them are thus arranged together, the reſt is eaſy, becauſe they ſerve as a ſupport to all the following. Reaumur, vol. iv. p. 615, &c.

An **Egg**, improperly ſo called, is that, of the whole whereof the animal is formed: ſuch as are the *eggs* of flies, butterflies, &c. which Ariſtotle calls *vermiculi.*

The two have this farther difference, that whereas the former, after they are excluded from the female, need no external nutriment, nor any thing but warmth and incubation, to bring the *fœtus* to perfection: the latter, after they are fallen out of the ovary into the uterus, require the nutritious juices of the uterus to diſtend and enlarge them; whence, they remain much longer in the uterus than the other.

The principal differences among *eggs*, properly ſo called, are, that ſome are *perfect*, i. e. have all the parts above deſcribed, while in the ovary or uterus; and others, *imperfect*, as not having all thoſe parts till after they are excreted or laid; ſuch are the *eggs* of fiſh, which, after they are brought forth, aſſume an albumen to themſelves in the water.

Another difference is, that ſome are *fecundated*, and others not: the firſt are thoſe which contain a ſperm, injected by coition of the male, to diſpoſe them for conception; the reſt, not impregnated with this ſperm, never breed young by incubation, but always putrify.

An *egg* fecundified contains the rudiments of the chick, before the hen has ſat upon it. By the microſcope, we ſee, in the middle of the cicatricula, the plain carina of the chick, ſwimming in the liquamen or humour: it conſiſts of fine white zones or threads, which the warmth of future incubation enlarges, by rarefying and liquifying the matter firſt of the albumen, and then of the vitellus, and preſſing them into the veſſels of the cicatricula, for a farther preparation, digeſtion, aſſimilation, and accretion, till the chick, too big for its covercle, breaks the ſhell, and is delivered.

Malphigi has made very curious obſervations with the microſcope, of all the changes that happen in the *egg*, every half hour of incubation; and the learned Dr. Monro has given a ſummary of ſeveral obſervations of this kind. Med. Eſſ. Edinb. vol. ii. art. 10.

Voſſius, and diverſe other authors, are very ſolicitous about ſettling the queſtion, which was formed firſt, the *egg* or the pullet. De Idolol. lib. iii. cap. 78.

In Egypt, they hatch their *eggs* by the heat of a furnace, or oven, and frequently have ſeven or eight thouſand chickens come forth at a time. An account of the method hereof we have in the Philoſophical Tranſactions. See HATCHING.

It was anciently thought, that none but birds and fiſhes, with ſome other animals, were produced *ab ovo, from eggs*; but the generality of the moderns incline to think, that all animals, even man himſelf, is generated the ſame way. Harvey, de Graaf, Kerchringius, and ſeveral other great anatomiſts, have ſo ſtrenuouſly aſſerted this opinion, that it now generally obtains.

In the teſtes of women, are found little veſicles, about the ſize of green peas, which are accounted as *eggs*; for which reaſon theſe parts, which the ancients called *teſticles*, the moderns call *ovaries*. Theſe *eggs*, fecundified by the moſt volatile and ſpirituous part of the ſeed of the male, are detached from the ovary, and fall down the Fallopian tubes into the uterus, where they grow and increaſe.

This ſyſtem is countenanced and confirmed by abundance of obſervations and experiments. M. de St. Maurice, upon opening a woman at Paris, in 1682, found a fœtus perfectly formed in the teſticle.

Among the ancients, the *egg* was the ſymbol of the world; it being a tradition among them, that the world was made of an *egg*; whence *eggs* became of ſingular importance, in the ſacrifice of Cybele, the mother of the Gods. Some of their deities, they ſay, were likewiſe produced from *eggs*.

Berger, in his treatiſe de Natura Humana, lib. ii. cap. i. p. 461, makes no ſcruple to give it as his opinion, that the only difference between animals, called *oviparous*, and thoſe denominated *viviparous*, conſiſts in this: that the former caſt their *eggs* out of the body, and lay them in neſts; and that their *eggs* contain all the nouriſhment requiſite for the fruit, or fœtus: whereas, in the latter, the *eggs* are only laid from the ovary into the uterus; that they have but little juice; and that the mother furniſhes the reſt.

There is not ſo much as a plant, whoſe generation, according to the ſentiment of Empedocles, and ſince him of Malphigi, Rallius, Fabric. de Aquapendente, Grew, and others, is not effected by the means of *eggs*.

Egg, *wind*. See WIND-*Egg*.

Egg, *ſea*, *Echinus Marinus*. See ECHINODERMA.

Egg, *cows*, is a name which ſome authors give to a kind of bezoard, found in the ſtomachs of the cow kind.

Egg, in *Architecture*, an ornament of an oval form, cut in the echinus, or quarter-round of the Ionic and Compoſite capitals. The profile, or contour of the echinus, is enriched with *eggs* and anchors, alternately placed. See *Tab. Archit. fig.* 10.

Egg, *philoſophical*, in *Chemiſtry*. See PHILOSOPHICAL.

EGILOS, in *Botany*, a name given by Serapion's interpreters, to the plant which that author and Avicenna call alachuin. Their deſcriptions of the plant abundantly prove, that it is the ſame with the achillæa of the Greek writers; and this word *egilos* ſeems only a barbarous name for that plant, formed on a miſ-ſpelling of the achillæa.

EGITILLIA, a name by which ſome have called the ſtone *ægyptilla*. See ÆGYPTILLA.

EGLANTINE, or *ſweet briar*, a ſpecies of roſe. See ROSE.

EGLECOPALA, the name of a ſpecies of ſtony bluiſh marle. See MARLE.

EGOITOS, a term uſed by Van Helmont, to expreſs the light of underſtanding, by which we reflect and reaſon within ourſelves.

EGRA *ſalt*, *Egranum ſal*, a name given by Hoffman, and other writers, to a purging ſalt, extracted from the waters of *Egra* by evaporation. The waters of this place are in great eſteem for many diſeaſes; and are, by Hoffman himſelf, in ſome reſpects, preferred to the Pyrmont, as containing leſs ochre and calcareous earth. The ſalt is wholly of the nature of Glauber's ſalt, as is alſo that of many other ſprings thereabout, and even in our own country.

Egra *water*, *Egrana aqua*, the water of a medicinal ſpring, near that place, in the German dominions. It is famous for cleanſing the viſcera, obſtructed with viſcid matter, and is found of great ſervice in all hypochondriacal caſes, and in all diſeaſes ariſing from infarctions of the viſcera; it gently purges by ſtool, and affords a ſal, known among the German writers by the name of *Eg num ſal.*

EGUILETTE, in the *Manege*. See YERKING.

EGUISCE', ſee AIGUISCE'.

EGYPTIANS, popularly *Gypſies*, in our ſtatutes, a kind of impoſtors and jugglers, who diſguiſe themſelves in uncouth habits, ſmearing their faces and bodies, and framing to themſelves a canting language, wander up and down; and under pretence of telling fortunes, curing diſeaſes, &c. abuſe the common people, trick them of their money, and ſteal all that they can come at. There are ſeveral ſtatutes made againſt them.

Egyptians coming into England are to depart the realm in fifteen days, or be impriſoned, by 22 Hen. VIII. cap. 10. And by 1 and 2 P. & M. cap. 4. any perſon importing them into this kingdom, ſhall forfeit forty pounds; and if they remain here above one month; or if any perſon, fourteen years old, conſort with them, they are guilty of felony, without benefit of clergy. 5 Eliz. cap. 20. And we are informed by Sir M. Hale, that at one Suffolk aſſizes, no leſs than thirteen *Gypſies* were executed upon theſe ſtatutes, a few years before the Reſtoration. See alſo 39 Eliz. cap. 4. § 2. 17 Geo. II. cap. 5. § 2.

The origin of this tribe of vagabonds is ſomewhat obſcure; at leaſt, the reaſon of the denomination is ſo. It is certain, the ancient *Egyptians* had the character of great cheats, and were famous for the ſubtilty of their impoſtures; whence the name might afterwards paſs proverbially into other languages, as it is pretty certain it did into the Greek and Latin; or elſe, the ancient *Egyptians*, being much verſed in aſtronomy, which in thoſe days was little elſe but aſtrology, the name was on that ſcore aſſumed by theſe tellers of good fortune.

Be this as it will, there is ſcarce any country of Europe but has its *Egyptians*, though not all of them under that denomination: the Latins call them *Ægyptii*; the Italians, *Cingani* and *Cingari*; the Germans, *Zigeuner*; the French, *Bohemiens*; others, *Saracens*; and others, *Tartars*, &c.

Munſter, Geogr. lib. iii. cap. 5. relates, that they made their firſt appearance in Germany, in 1417, exceedingly tawny and ſun-burnt, and in pitiful array, though they affected quality, and travelled with a train of hunting-dogs after them, like nobles. The above date ſhould probably have been 1517, as Munſter himſelf owns, he never ſaw any till 1524. He adds, that they had paſſports from king Sigiſmund of Bohemia, and other princes. Ten years afterwards, they came into France, and thence paſſed into England. Several hiſtorians inform us, that when ſultan Selim conquered Egypt, in the year 1517, ſeveral of the natives refuſed to ſubmit to the Turkiſh yoke; but, being at length ſubdued and baniſhed, they agreed to diſperſe in ſmall parties over the world, where their ſuppoſed ſkill in the black art gave them an univerſal reception, in that age of ſuperſtition and credulity. In a few years, the number of their proſelytes multiplied, and they became formidable to moſt of the ſtates of Europe. Paſquier, in his Recherch. lib. iv. chap. 19. relates a leſs probable origin of the *Gypſies*, thus: On the 17th of April 1427, there came to Paris twelve penitents, or perſons, as they ſaid, adjudged to penance, viz. one duke, one count, and ten cavaliers, or perſons on horſeback: they took on themſelves the character of *Chriſtians of the Lower Egypt*, expelled by the Saracens; who, having made application to the pope, and confeſſed their ſins, received for penance, that they ſhould travel through the world for ſeven years, without ever lying on a bed. Their train conſiſted of 120 perſons, men, women, and children, which were all that were left of 1200, who came together out of Egypt. They had lodgings aſſigned them in the chapel, and people went in crowds to ſee them. Their ears were perforated, and ſilver buckles hung to them; their hair was exceedingly black, and frizzled; their women were ugly, thieviſh, and pretenders to telling of fortunes. The biſhop ſoon afterwards obliged them to retire, and excommunicated ſuch as had ſhewn them their hands.

By an ordonnance of the eſtates of Orleans, in the year 1560, it was injoined, all theſe impoſtors, under the name of *Bohemians* and *Egyptians*, to quit the kingdom, on penalty of the gallies. Upon this they diſperſed into leſſer companies, and ſpread themſelves over Europe. The firſt time we hear of them in England, was in the year 1530, when they were deſcribed by the ſtatute already cited, 22 Hen. VIII. cap. 10. They were expelled from Spain in 1591. Du-Cange.

Ralph. Volaterranus, making mention of them, affirms, that they firſt proceeded or ſtrolled from among the Uxii, a people of Perſis or Perſia.

EGYPTIAN *year*. See YEAR.

EHRETIA, in *Botany*, a genus of the *pentandria monogynia* claſs of plants, with a double-celled berry, a ſingle bilocular ſeed, and a marginated ſtigma.

EIA, or EY, in our *Old Writers*, are uſed for an iſland. Hence the names of places ending in *ey*, denotes them to be iſlands. Thus, Ramſey, the iſle of Rams; Sheppey, the iſle of Sheep, &c.

EI, is alſo ſometimes uſed for water; and hence the names of places near waters, or lakes, terminate in *ey*.

EIDER-*duck*. See DUCK.

EJACULATION, in *Medicine*, the act of emitting ſeed, from the Latin, *ejaculari, to caſt outwards*. See EMISSION.

EJACULATOR, in *Anatomy*, a name applied to two muſcles of the genitals, from their office in the ejaculation of the ſeed.

The *ejaculatores* ariſe from the ſphincter of the anus, and advance along the urethra as far as the middle thereof, where they are inſerted laterally.

The ſame denomination is likewiſe given to two muſcles of the clitoris, which, ariſing from the ſphincter ani, advance laterally along the labia, and are inſerted aſide of the clitoris.

EJACULATORY, in *Anatomy*, is a term applied to two little ducts, or canals, ariſing from the veſiculæ ſeminales. The *ejaculatory* ducts are about an inch in length: towards the veſiculæ, they are pretty wide; but they contract themſelves as they approach towards the urethra, which they penetrate together.

Some authors alſo apply the name *ejaculatory* to the vaſa deferentia.

EICETÆ, called alſo HEICETÆ and HICETÆ, heretics of the ſeventh century, who made profeſſion of the monaſtic life.

From that paſſage in Exodus, where Moſes and the children of Iſrael are ſaid to have ſung a ſong in praiſe of the Lord, after they had paſſed the Red-Sea, wherein their enemies had periſhed; the *Eicetæ* concluded, that they muſt ſing and dance, to praiſe God aright; and as Mary the propheteſs, ſiſter of Moſes and Aaron, took a drum in her hand, on the ſame occaſion, and all the women did the like, to teſtify their joy, by playing, beating, and dancing; the *Eicetæ*, the better to imitate their conduct herein, endeavoured to draw women to them to make profeſſion of the monaſtic life, and aſſiſt in their mirth.

EJECIT *infra terminum*. See QUARE *ejecit*.

EJECTION, the act of throwing out, or diſcharging any thing at ſome of the emunctories, as by ſtool, vomiting, or the like.

EJECTIONE *cuſtodiæ*, *ejectment de garde*, in *Law*, a writ which lies againſt him that caſts out the guardian from any land during the minority of the heir.

EJECTIONE *firmæ*, a writ that lies for the leſſee for years, who is ejected before the expiration of his term, either by the leſſor or a ſtranger.

Alſo *ejectment* may be brought by a leſſor againſt the leſſee, for rent in arrears, or holding over his term, &c. Reg. Orig. 227. But *ejectment* is now become an action in the place of many real actions, as writs of right, formedons, &c. which are very difficult, as well as tedious and chargeable; and this is the common action for trying of titles, and recovering of lands, &c. illegally kept from the right owner. Though, where entry is taken away by deſcents, fines, and recoveries, diſſeiſins, &c. *ejectment* may not be brought; ſo that all titles cannot be tried by this action.

The method of proceeding in the action of *ejectment* is, to draw a declaration, and therein feign a leaſe for three, five, or ſeven years, to him that would try the title; and alſo feign a caſual ejector or defendant; and then deliver the declaration to the ejector, who ſerves a copy of it on the tenant in poſſeſſion, and gives notice in writing at the bottom, for him to appear and defend his title; or that he, the feigned defendant, will ſuffer judgment by default, whereby the true tenant will be turned out of poſſeſſion: to this declaration the tenant is to appear, at the beginning of next term, by his attorney, and conſent to a rule to be made defendant, inſtead of the caſual ejector, and take upon him the defence; in which, he muſt confeſs leaſe, judgment, entry, and ouſter, and at the trial ſtand upon the title only: but in caſe the tenant in poſſeſſion does not appear, and enter into the ſaid rule in time, after the declaration ſerved, then, on affidavit being made of the ſervice of the declaration, with the notice to appear, the court will order judgment to be entered againſt the caſual ejector by default; and thereupon the tenant in poſſeſſion, by writ *habere facias poſſeſſionem*, is turned out of his poſſeſſion. On the trial in *ejectment*, the plaintiff's title is to be ſet forth from the perſon laſt ſeiſed in fee of the lands in queſtion, under whom the leſſor claims down to the plaintiff, proving the deeds, &c. and the plaintiff ſhall recover only according to the right which he has at the time of bringing his action. And here, another who had title to the land, upon a motion made for that purpoſe, may be defendant in the action with the tenant in poſſeſſion, to defend his title; for the poſſeſſion of the lands is primarily in queſtion, and to be recovered, which concerns the tenant, and the title thereto is tried collaterally, which may concern ſome other.

By a late ſtatute, in all caſes between landlord and tenant, when half a year's rent ſhall be in arrear, the landlord, having lawful right to re-enter for non-payment, may ſerve a declaration in *ejectment* on the tenant, without a formal demand or re-entry; or he may affix ſuch declaration on the door of the demiſed meſſuage, or notorious place of the lands, which ſhall be deemed a legal ſervice; and upon proof that half a year's rent was due before the declaration was ſerved, and no ſufficient diſtreſs on the premiſſes, the leſſor ſhall have judgment and execution; which if the leſſee ſuffer, without paying the arrears and coſts, and without filing a bill in equity to be relieved within ſix months, he ſhall be barred from all relief, except by writ of error; and the leſſor ſhall hold the premiſſes diſcharged from the leaſe: but if the tenant or leſſee tender to the leſſor, or bring into court the rent in arrear, together with coſts, all farther proceedings ſhall ceaſe; and if the leſſee be relieved in equity, he ſhall enjoy the demiſed premiſſes according to his leaſe, without obtaining a new one. Stat. 4 Geo. II. cap. 28. and 11 Geo. II. cap. 19.

EIGHT-FOIL, or *Double Quarter-foil*, in *Heraldry*, a modern DIFFERENCE, denoting the ninth ſon of the firſt houſe.

EIGHT, *piece of*. See PIECE *of eight*.

EIGHTH *pair of nerves*. See NERVE.

EIGNE, from French, *aiſne*, in *Law Books*, is uſed for eldeſt, or firſt-born. Thus we ſay, baſtard *eigne*, and *mulier puiſne*, for the elder baſtard, and the younger lawfully born.

EILAMIDES, from ειλεω, *I involve*, a word uſed by Hippocrates, to expreſs the meninges or membranes of the brain, the dura mater and pia mater.

EINBLINDER, in *Zoology*, the name of a ſort of lamprey, without eyes, called by the writers on theſe ſubjects the *lampetra cæca*, or *blind lamprey*. It is very ſmall, not exceeding the common dew-worms in length or thickneſs. It has no ſcales; but its body is divided by annular lines, into eighty-four rings, juſt in the manner of the large worms. Its mouth is in the under part of its head, and is round, and always open. It has a cavity in the middle of its head, like the reſt of the lampreys, for admitting water, and has ſeven gill-holes on each ſide. It has the common long fin running on the ridge of the back, but has no other. Willughby's Hiſt. Piſc. p. 107.

EINECIA, in our *Old Writers*, is uſed for primogeniture. It is ſometimes writ *eſnecia* and *eſnecy*. See ESNECY.

EIRE, ſee EYRE.

EIRESIONE, Ειρεσιωνη, from ειρος, *wool*, in *Antiquity*, an olive branch bound about with wool, and crowned with all ſorts of firſt fruits, which was carried in proceſſion in the Athenian feſtival, called PYANEPSIA. Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 428.

EISETERIA, Εισιτηρια, from εισειμι, *I enter*, in *Antiquity*, the day on which the magiſtrates at Athens entered upon their office; upon which it was cuſtomary for them to offer a ſolemn ſacrifice, praying for the preſervation and proſperity of the commonwealth, in the temple of Jupiter Βουλαιος, and Minerva Βουλαια, i. e. the counſellors. Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 385.

ELA *Calli*, in *Botany*, the name of a ſhrub which grows in ſandy ſoils, in ſome parts of the Eaſt Indies, about twice as high as a man. The bark of the root triturated, and drank in water in which rice has been boiled or waſhed, is recommended againſt the dropſy, and is ſaid to be a very mild medicine; which Mr. Ray juſtly wonders at, as the plant is full of an acrid cauſtic milk; which, however, when exhibited with butter in which it has been boiled, proves a mild and gentle purgative. The leaves heated at the fire, provoke urine; and the ſteam or vapour of a decoction of them, contributes to alleviate and remove pains in any part of the body. The juice, expreſſed from the leaves, either warmed or a little toaſted, cures pains of the ears, if put into them. It alſo removes ſpecks in the eyes, if dropt into them, and contributes to the cure of ſwellings in the pudenda, if the body is waſhed with it.

ELABORATION, the act of finiſhing or perfecting any thing with labour and time.

The term is chiefly uſed in *Medicine*, where the chyle, blood, and ſemen, are ſaid to be *well elaborated*, when they are well conditioned, have undergone all the ſecretions, mixions, impregnations, and circulations, neceſſary to bring them to perfection.

If the chyle went directly from its receptaculum to the breaſts, it would not be ſufficiently *elaborated* to afford good milk. See MILK.

ELABORATORY. See LABORATORY.

ELÆGNON. See AGNUS *Caſtus*.

ELÆAGNUS, in *Botany*, a name uſed by ſome authors for the gale frutex, the Dutch myrtle or gaule. Merret. Pin. p. 82.

ELÆAGNUS, in *Botany*. See *Wild* OLIVE.

ELÆOCARPUS, in *Botany*, a genus of plants of the *polyandria monogynia* claſs; the calyx of which is a five-leaved perianthium; the corolla conſiſts of five torn petals, the fruit a drupe, and the ſeed a criſp nucleus.

ELÆOMELI, in the writings of the ancient *Phyſicians*, the name of a ſubſtance, thus deſcribed by Dioſcorides. In Palmyra, a country of Syria, the *elæomeli*, which is an oil thicker than honey, and of a ſweet taſte, flows from the trunk of a tree. Two cyathi of this oil, he adds, drank with a hemina of water, evacuate crude and bilious humours by ſtool. There was much good obtained from the giving this medicine; but it had this remarkable effect, that thoſe who took it were ſeized with a torpor, and privation of ſtrength for a time: this was, however, of no ill conſequence, but people knew of and expected it, and uſed always to keep thoſe perſons awake who had taken it, and the ſymptoms ſoon went off. The ſame author alſo adds, that the oil was ſometimes prepared from the buds of the tree; and ſuch of this kind was eſteemed the beſt that was old, thick, fatty, and not foul or turbid. It was judged of a heating nature, and frequently applied externally to the eyes, with good effect in the cure of dimneſs of ſight, and contributed to the cure of leproſies, and pains of the nerves. Hermolaus Barbarus has a ſtrange conjecture in regard to the ſubſtance, which is, that it was the ſame with the manna mentioned in Scripture, only uſed in medicine inſtead of food: but the account which Dioſcorides gives of the effects of it is a very ſufficient anſwer to the abſurdity of ſuch an opinion. Dioſcorides, lib. i. cap. 37.

ELÆOSACCHARUM. See ELEOSACCHARUM.

ELÆOTHESIUM, Ελαιοθεσιον, in *Antiquity*. See ALIPTERIUM.

ELAIS, in *Botany*, a genus of the claſs of *palmæ*: both the male and female flowers have a ſix-leaved calyx; the corolla of the male is divided into ſix ſegments, and that of the female has ſix petals; the ſtamina of the former are ſix, and the ſtigmata of the latter three; the fruit is a fibrous drupe, containing a ſingle three-valved nut.

ELANULA, in *Medicine*, the name of a peculiarly hard alum.

ELAPHEBOLIA, Ελαφηβολια, in *Antiquity*, a feſtival kept in honour of Diana Ελαφηβολος, i. e. the Huntreſs, for which reaſon, a cake made in the form of a deer, and upon that account called ελαφος, was offered to her. For a farther account of it, ſee Pott. Archæol. Græc. lib. ii. cap. 20.

ELAPHEBOLION, Ελαφηβολιων, in ancient *Chronology*, the ninth month of the Athenian year. It conſiſted of thirty days, and anſwered to the latter part of our February, and beginning of March. See MONTH. It was thus called from the feſtival ELAPHEBOLIA kept in it.

ELAPHIS. See ELAPS.

ELAPHOBOSCUM, in *Botany*, the wild parſnep. See PARSNEP.

ELAPHOCAMELOS, in *Zoology*, a name by which ſeveral authors have called the Peruvian camel, uſually called *glama*, and employed there as a beaſt of burden. See GLAMA.

ELAPHONESUM *marmor*, a name uſed by the ancients to expreſs a ſpecies of marble uſed in ſtatuary, and called alſo *Proconenſium marmor*; it was of a bluiſh white, variegated with ſlender veins of black. See PROCONENSIUM.

ELAPS, or ELAPHIS, by ſome called alſo *elops*, the name of a ſerpent deſcribed by many authors, and met with by Bellonius in the iſland of Lemnos: it grows to about three foot long, and is on the back of a dark grey, with three longitudinal black lines, running from the head to the tail, and on the belly of a bright yellow, according to Aldrovandus. The people of Lemnos call it *laphiati*.

ELASMIS, in *Natural Hiſtory*, the name of a genus of foſſile bodies, of the talc claſs, the diſtinguiſhing characters of which are, that they are compoſed of ſmall plates, in form of ſpangles, each of which is either ſingle, and not farther fiſſile; or, if complex, fiſſile only to a certain degree, and that into ſomewhat thick laminæ. See *Tab. of Foſſils*, *Claſs* I.

The word is derived from the Greek, ἐλασμὸς, *a lamina* or *plate*: the ſeveral component parts of theſe maſſes being ſo many ſmall plates.

The bodies of this genus have been uſed to be named *mica*, *glimmer*, and *cat-ſilver*, by authors, in the ſame manner with the *bractearia*. There are only four known ſpecies of this foſſil.

ELASTIC *body*, in *Mechanics*, is that which, by being ſtruck or ſtretched, has its figure altered; but endeavours, by its own force, to reſume the ſame: or, it is a ſpringy body, which, when compreſſed or condenſed, or the like, makes an effort to ſet itſelf at liberty, and to repel the body that conſtrained it. Such is a ſword-blade, a bow, &c. which are eaſily bent, but preſently return to their former figure and extenſion. This property belongs more or leſs to almoſt all bodies; but as there are none which reſtore themſelves with the ſame force with which they were compreſſed, there are no bodies that are perfectly *elaſtic*.

The word is formed from the Greek, ελαςης, *impulſor*, of ελαυνειν, *to impell*, *puſh*, &c. See SPRING.

Elaſtic bodies are either *natural* or *artificial*: thoſe moſt eminent for their *elaſtic* power among *artificial* bodies, are ſteel, braſs, ivory, and marble balls; leather, ſkins, membranes; braſs, ſilver, iron, and ſteel chords or wires; nerves, guts, hemp, and flax ſtrings, &c.

Amongſt *natural bodies*, the principal are air, ſponges, the branches of green trees, wool, cotton, feathers, &c.

It is diſputed, whether or no water hath any *elaſtic* force: the moſt common opinion has long been, that it has none of itſelf; and that if it ſhews any, it is owing to the air contained therein. See COMPRESSION, under which article the contrary is demonſtrated.

The principal phenomena obſerved to obtain in *elaſtic bodies*, are, 1. That an *elaſtic body* (i. e. *a body perfectly elaſtic*, if any ſuch there be) endeavours to reſtore itſelf with the ſame force wherewith it is preſſed or bent.

2. An *elaſtic* body exerts its force equally towards all ſides; though the effect is chiefly found on that ſide where the reſiſtance is weakeſt; as is evident in the caſe of a bow ſhooting out an arrow, a gun exploding a ball, &c.

3. *Elaſtic bodies*, in what manner ſoever ſtruck, or impelled, are inflected, and rebound after the ſame manner. Thus a bell yields the ſame ſound in what manner, or on what ſide ſoever it be ſtruck.

4. A body perfectly fluid, if any ſuch there be, cannot be *elaſtic*, if we allow that its parts cannot be compreſſed. See FLUID.

5. A body perfectly ſolid, if any ſuch there be, cannot be *elaſtic*, in that having no pores, it is incapable of being compreſſed. See SOLID.

6. Hard, long, flexible bodies, apt to acquire *elaſticity*,

do it chiefly in three ways; either by being extended, by being contracted, or by being bent.

7. Bodies, in dilating themſelves by their *elaſtic* power, exert a greater force at the beginning of their dilatation, than towards the end thereof; becauſe the bodies are more compreſſed at firſt, and the renitency is always equal to the compreſſion.

8. The motion, whereby compreſſed bodies reſtore themſelves, is uſually an accelerated motion. See DILATATION.

9. The *elaſtic* property of bodies ſeem to differ, according to their greater or leſs compactneſs or denſity: thus, metals, by being hammered, are rendered more compact, and alſo more *elaſtic*. Tempered ſteel is much more *elaſtic* than ſoft ſteel; and the denſity of the former to the latter as 7809 to 7738. Cold likewiſe condenſes bodies, and renders them more *elaſtic*, whilſt heat, that relaxes them, has the contrary effect. M. Belidor has found, that cannon balls are projected farther from cold guns than from the ſame guns, when heated; and the ſtring of a violin is known to act more ſtrongly in winter than in ſummer. We muſt except, however, air, and other *elaſtic* fluids, which acquire an increaſe of *elaſtic* force from heat. Muſchenb. Int. ad Phil. Nat. vol. i. p. 231. 4to.

We may add 10. That the *elaſtic* force of bodies is the ſame in vacuo as in the air, when other circumſtances are alike.

For the laws of motion and percuſſion in *elaſtic* bodies, ſee MOTION and PERCUSSION.

ELASTIC CURVE. See CATENARIA.

ELASTICITY, or ELASTIC *Force*, in *Mechanics*, denotes a property or power in natural bodies, which denominates them *elaſtic*; and by which they are reſtored to the figure and extenſion they had loſt from any external cauſe.

The cauſe, or principle of this well-known and important property is variouſly aſſigned: the Carteſians account for it from the effort of the *materia ſubtilis* to paſs through pores that are too narrow for it. Thus, ſay they, in bending or compreſſing an elaſtic body, e. gr. a bow, its parts recede from each other on the convex ſide, and approach on the concave; conſequently, the pores are contracted or ſtraitened on the concave ſide; and if they were before round, they are now oval; and the materia ſubtilis endeavouring to paſs out at thoſe pores, thus ſtraitened, muſt make an effort, at the ſame time to reſtore the body to the firſt ſtate it was in when the pores were more patent and round, i. e. before the bow was bent. Other philoſophers account for *elaſticity* much after the ſame manner as the Carteſians, with this inconſiderable difference; that, inſtead of the ſubtile matter of the Carteſians, they ſubſtitute a fine etherial medium that pervades all bodies. Others again have ſuppoſed, that this ſubtile matter or ether is itſelf *elaſtic*.

Some reſolve *elaſticity* into the preſſure of the atmoſphere; for a violent tenſion or compreſſion, though not great enough to ſeparate the conſtituent particles of bodies far enough to let in any foreign matter, muſt yet occaſion many little vacuities between the ſeparated ſurfaces; ſo that upon the removal of the force they will cloſe again, by the preſſure of the aereal fluid upon the external parts.

Others make the elaſtic force of the air included within the pores of all bodies, the principle of their *elaſticity*: but this hypotheſis is contrary to fact; ſince the elaſtic force remains *in vacuo*. Malebranche, and others after him, have aſcribed this property to imaginary vortices of matter included within all bodies, whoſe ſpherical figure is changed by compreſſion into an oval figure, and whoſe centrifugal force reſtores them, together with the parts of bodies to which they belong, to their former ſtate.

Others account for *elaſticity*, from the great law of nature, attraction, or the cauſe of the coheſion of the parts of ſolid and firm bodies. Thus, ſay they, when a hard body is ſtruck or bent, ſo that the component parts are removed a little from each other, but not quite disjoined, or broke off, or ſeparated ſo far as to be out of the reach of that attracting force whereby they cohere; they muſt certainly, on the ceſſation of the external violence, ſpring back to their former natural ſtate. But it has been objected to this hypotheſis, that when e. gr. a ſpring is bent, the particles on the convex ſide will be ſeparated from one another, whilſt thoſe on the concave will be brought nearer, and the power of attraction, inſtead of making the ſpring reſtore itſelf, will keep it in the ſame ſtate, as it happens in bodies that have no *elaſticity*, where perhaps only attraction obtains; and therefore they have ſuppoſed the conſtituent particles of bodies to be endued with both a repulſive and an attractive power: thus, if a row of round particles touch one another in the point *c* in a line from A to B (*Tab.* III. *Mechanics*, *fig.* 36.) it is plain, from the laws of coheſion, that upon the leaſt alteration out of the poſition of a ſtrait line, theſe particles will run together, and form a ſphere, in which the globules will have more points of contact; and if theſe particles are ſuppoſed to have poles like magnets, in the oppoſite places marked *n*, *s*, ſo that all the poles *n*, *n*, *n*, &c. repel one another, and all the poles, *s*, *s*, *s*, &c. repel one another, the line A B will continue ſtrait; for if by any force the ſaid line B A be put into another poſition, as into the curve *b a*, then the poles *n*, *n*, &c. being brought nearer together, while the poles, *s*, *s*, &c. are farther aſunder, will repel one another more ſtrongly, and thereby hinder the globules from running together towards the concave part, and the ſpring left to itſelf, one end as *b*, B or β being fixed, will reſtore itſelf, throwing its end *a* back to A, and ſo on to α; then, being in the poſition α β, the poles *s*, *s*, &c. are brought nearer together, whoſe repulſion thus increaſed, throws back α to A, and ſo on forward, whilſt the line of particles performs ſeveral vibrations round B. A ſpring of ſteel, or other ſprings, may probably conſiſt of ſeveral ſeries of ſuch particles, whoſe polarity and attraction acting at the ſame time, will ſhew why ſuch bodies, where they have been bent, vibrate and reſtore themſelves. Hard ſteel is highly *elaſtic*; and the metal is thus hardened by making it white-hot, and immediately quenching it, ſo that it is fixed in an almoſt fluid ſtate, and the particles which the fire had made almoſt round have but a very ſmall contact; and accordingly, ſteel thus hardened is extremely brittle: but as ſpherical particles can never make a tough ſpring, the workmen bring down the temper of the hard ſteel, or *let down the ſpring*, as they expreſs it, by a proceſs which alters the figures of its conſtituent particles. For this purpoſe they heat it anew; and whilſt it is gently cooling, the mutual attraction increaſes the contact, ſo that the particles grow flatter in thoſe places where before they had but a ſmall contact; and leſt the contact ſhould become too great, they quench the ſpring in water, oil, or greaſe. Or they have another proceſs, which is to ſhape them in cold unelaſtic ſteel, and then heating them to a ſmall degree, e. gr. to a blood-red heat, immediately to cool them in ſome proper liquor; whereby the particles are ſettled in their oblong figure before they become round in the fuſion of a white heat. Nor is it improbable that they may thus acquire polarity, ſince dipping red-hot ſteel in cold liquors in a particular poſition will make it magnetical: and iron and ſteel are alſo made magnetical only with hammering. Deſagulier's Courſe of Exper. Phil. vol. ii. p. 38—40, &c. See SPRING. Perhaps the true cauſe of the *elaſticity* of bodies may ſtill remain among the unexplored ſecrets of nature.

ELASTICITY, *laws of*. To enquire a little more expreſsly into the nature and laws of *elaſticity*, we ſhall conſider the phenomena thereof. Let it be premiſed, then, that all the bodies wherein this power is obſerved, do conſiſt, or may be conceived to conſiſt, of ſmall threads or fibres, which, laid together, conſtitute ſuch bodies. To examine *elaſticity*, therefore, in its moſt ſimple caſe, we had beſt conſider it in muſical ſtrings or chords, and particularly in thoſe of metal; for thoſe of cat-gut having a ſpiral twiſt, cannot be conſidered as the fibres whereof bodies are formed.

Now the *elaſticity* of a fibre or chord, conſiſts in this: that it may be ſtretched or extended; and that upon removing the force whereby it was ſtretched or lengthened, it returns again to its former dimenſions. Fibres have no *elaſticity*, unleſs they be extended with a certain force; as appears in lax chords, which may be moved a little out of their poſition without endeavouring to recover it; though what the degree of tenſion is, neceſſary for *elaſticity* to commence, is not yet determined by experiment: add, that when a fibre is too far ſtretched, it loſes its *elaſticity*; though here, too, the degree of tenſion that deſtroys *elaſticity* is unknown; but it is certain, *elaſticity* depends on tenſion, and is confined within a certain ſphere, or boundary thereof, on either ſide. See SPRING. This, if it doth not give us the proper adequate cauſe of *elaſticity*, yet ſhews us the difference between *elaſtic* and *unelaſtic* bodies; how it is that a body loſes its *elaſticity*, and how a body, deſtitute of any ſuch force, comes to acquire it. Thus, a plate of metal, by repeated blows of a hammer, becomes *elaſtic*; and, being heated again, loſes that property.

Between the limits of tenſion, wherewith *elaſticity* is terminated, there are different forces required to give different degrees of tenſion, in order to ſtretch chords to certain lengths: what the proportion of theſe forces is, can only be determined by experiments made with chords of metal; but as the lengthenings of ſuch chords are ſcarce ſenſible, the proportions cannot be directly meaſured; but a particular apparatus, and a kind of circuit, are neceſſary to arrive thereat. Dr. s'Graveſande has taken a good deal of pains, in order to fix theſe laws, the reſults of whoſe experiments are as follow:

1. That a weight, whereby a fibre is increaſed a certain length, by ſtretching, is, in different degrees of tenſion, as the tenſion itſelf; if, e. gr. there be three fibres of the ſame kind, length, and thickneſs, whoſe tenſions are as 1, 2, and 3; any weights, in the ſame proportion, will ſtretch them equally.

2. That the leaſt lengthenings of the ſame fibres are to one another nearly as the forces whereby the fibres are lengthened; which property may likewiſe be applied to their inflexion.

3. In chords of the ſame kind and thickneſs, and which are equally ſtretched, but of different lengths, the lengthenings produced by ſuperadding equal weights, are to one another as the lengths of the chords; which ariſes hence, that the chord is lengthened in all its parts; conſequently, the lengthening of a whole chord is double the lengthening of half of it, or a chord of half the length.

4. Fibres of the ſame kind, but of different thickneſſes, may be compared together after the like manner; only conſidering them as conſiſting of a greater or leſs number of fine fibres of the ſame thickneſs; the number whereof muſt be taken in the ratio of the ſolidity of thoſe fibres, i. e. as the ſquares of the diameters, or as the weights of theſe fibres, when their lengths are equal: ſuch fibres, of conſequence, will be equally ſtretched by forces that are in the ſame ratio of the ſquares of the diameters; which ſame ratio is likewiſe required between the forces whereby the chords are inflected, that the ſagittæ may be equal in the given fibres.

5. The motion of a ſtretched fibre agrees with the motion of a body vibrating in a cycloid; and how unequal ſoever the vibrations are, they are all regularly performed in the ſame time.

6. In two equal chords, unequally ſtretched, unequal forces are required to inflect them equally: their motions may be compared to thoſe of two pendulums, deſcribing ſimilar cycloids, by different forces; conſequently, the ſquares of the times of the vibrations of the fibres are to each other inverſely as the forces whereby they are equally inflected, or as the weights by which the chords are ſtretched.

7. The motions of ſimilar chords, equally ſtretched, but of different lengths, may be compared with that of pendulums after another manner; for as the times of the vibrations are to be conſidered, the celerities alſo, wherewith the chords are moved, muſt be conſidered. Now theſe celerities are to one another directly as the weights whereby the chords are inflected, and inverſely as the quantities of matter in the chords; that is, inverſely as their lengths: the celerities, therefore, are in an inverſe duplicate ratio of thoſe lengths; that is, they are inverſly as the ſquares of the lengths; and the ſquares of the times of the vibrations are likewiſe in the inverſe ratio; conſequently, the lengths of the chords will be as the times of the vibrations.

Elaſtic laminæ, or plates, may be conſidered as congeries, or bundles, of *elaſtic* chords. When the plate is inflected, ſome fibres are lengthened; and there are unequal lengthenings in ſeveral points of the ſame plate.

The curve formed by the inflected plate is eaſily determined, from what has been ſhewn concerning chords: in effect, in the vibrations of ſuch plate, or ſpring, the motion thereof is accelerated, after the ſame manner as the motion of a chord, and of a pendulum in a cycloid, is accelerated; and the vibrations of ſuch ſprings are all performed in the ſame time.

Elaſtic balls, ſpheres, &c. may be conſidered as conſiſting of ſeveral *elaſtic* plates, or ſprings; and the introceſſions, or yieldings inward, of any point thereof, are proportionable to the forces wherewith the body is compreſſed.

The ELASTICITY *of fluids* is accounted for, from their particles being all endowed with a centrifugal force; whence Sir Iſaac Newton, prop. 23. lib. ii. demonſtrates, that particles, which mutually avoid, or fly off, from one another, by ſuch forces as are reciprocally proportional to the diſtances of their centers, will always compoſe an *elaſtic fluid*, whoſe denſity ſhall be proportional to its compreſſion; and, *vice verſa*, if any fluid be compoſed of particles that fly off and avoid one another, and hath its denſity proportional to its compreſſion; then the centrifugal forces of thoſe particles will be reciprocally as the diſtances of their centers.

ELASTICITY *of the air* is the force wherewith that element dilates itſelf, upon removing the force whereby it was before compreſſed.

The *elaſticity*, or *ſpring of the air*, was firſt diſcovered by lord Bacon, and farther eſtabliſhed by the great Galileo. See *Elaſticity of* AIR.

Its exiſtence is proved by this experiment of that philoſopher: let an extraordinary quantity of air be intruded, by means of a ſyringe, into a glaſs or metal ball, till ſuch time as the ball, with this acceſſion of air, weighs conſiderably more, in the balance, than it did before; upon opening the mouth thereof, the air ruſhes out, till the ball ſinks to its former weight.

From hence we argue, that there is juſt ſo much air gone out, as the compreſſed air which had been crouded in. Air, therefore, returns to its former degree of expanſion, upon removing the force that compreſſed, or reſiſted, its expanſion; and, conſequently, it is endued with an *elaſtic force*.

It muſt be added, that as the air is found to ruſh out, in every ſituation, or direction, of the orifice; the *elaſtic force* of the air acts every way, or in every direction.

The *elaſticity of the air* making a conſiderable article in the new pneumatics, we ſhall here give the principal laws thereof.

1. The *elaſticity* of the lower air is equal to the weight of all the upper incumbent air; for the upper air is eaſily proved to preſs on the lower.

And the *elaſticity of the air* has already been ſhewn equal to the compreſſing power; whence it follows, that the *elaſticity of the air* is equal to the weight of the whole incumbent atmoſphere.

Hence as the weight of the upper air, incumbent on the lower, is equal to the weight of a column of water of the ſame diameter with the column of air, and the altitude of 31 feet; or to a column of mercury 28 inches high; the ſpring of the lower air is equal to the ſame column of water, or mercury.

Hence, again, the ſpring of the air, included in a veſſel, &c. is likewiſe equal to the weight of the whole incumbent atmoſphere: conſequently, the air, included in a veſſel, preſſes with the ſame force as the weight of the atmoſphere; and therefore the *elaſticity* of the included air is able to ſuſtain mercury to the height of twenty-eight inches, and water to the height of thirty-one feet, in an empty tube.

2. The *elaſtic force* of air compreſſed, is to that of the ſame air dilated, reciprocally as the bulk of the dilated air to that of the compreſſed air.

For the *elaſticity of air* more compreſſed, is to that of air leſs compreſſed, as the weight incumbent on that, to the weight incumbent on this; but the bulks of more and leſs compreſſed air are in the ſame reciprocal ratio of theſe weights; therefore the *elaſtic force*, &c.

Hence the *elaſticity of air* more compreſſed, is ſtronger than that of air leſs compreſſed.

3. The *elaſticity* of more compreſſed air, is to that of air leſs compreſſed, *cæteris paribus*, as the maſs, or quantity, of more compreſſed air is to a maſs of air leſs compreſſed of the ſame bulk.

4. The ratio of the ſpace filled by air preſſed only by the weight of the atmoſphere, to the ſpace it is reduced into by farther compreſſion, being given; to determine the *elaſtic force* of the compreſſed air.

Since the ſpring of the air, preſſed only by the weight of the atmoſphere, is equal to the weight of a column of mercury, of the ſame baſe with the column of air, and of the height of twenty-eight inches; to the bulk of the compreſſed air, that of the air not compreſſed, and the weight of the column of mercury, ſeek a fourth proportional; this will expreſs the quantity of the *elaſtic force* in the compreſſed air.

Hence ſubtracting the weight of the column of mercury from the quantity of the *elaſtic force* thus determined, the remainder is the force of *elaſticity* whereby it exceeds the reſiſtance of the weight of the atmoſphere.

5. Heat increaſes the *elaſticity* of the air, and cold diminiſhes it. See HEAT, and COLD.

6. The *elaſtic force* of the air, whereby it is expanded, in rarefaction, is to the *elaſticity* of the air condenſed, as the bulk of rarefied air, to the bulk of condenſed air.

ELATE, in *Botany*, a genus of the claſs of *palmæ*. They have male and female flowers, whoſe calyx is not aſcertained; the corolla in each has three petals; the male has three ſtamina; the female a ſingle piſtil; the fruit is an oval acuminated drupe.

Elate is alſo uſed, by ſome authors, for a genus of plants, called by Linnæus *phœnix*, and, in the Hortus Malabaricus, *ratovindel*. See PHOENIX.

This word was alſo uſed by the ancients to expreſs the fir-tree; and likewiſe in other ſenſes.

ELATER, the name of a genus of the *coleoptera* order of inſects, with ſetaceous antennæ; which, when laid on their backs, have a power of leaping with great force and agility. There are various ſpecies of theſe four-winged flies, diſtinguiſhed by their different colours.

ELATERIUM, in *Botany*, a genus of the *monoecia monandria* claſs. This genus hath male and female flowers in the

the ſame plant; neither have any calyx; the corolla in both is hypocrateriform, or ſalver-ſhaped; the capſule is ſingle-celled, with two valves. Miller makes the *elaterium* of Boerhaave, or the wild cucumber, a ſpecies of the *momordica.* See *Male* Balsam *Apple.*

Elaterium, Ελατηριον, in *Pharmacy*, a violently purgative medicine, prepared from the wild cucumber. See *Male* Balsam *Apple.*

The word is formed from the Greek ελαυνω, *I impel, agitate,* &c.

Elaterium is made of the juice of the fruit, forced out with the finger; this, ſuffered to ſtand ſome time, lets fall a ſediment, which, careſully dried on chalk-ſtones, is the *elaterium.*

Elaterium is a vigorous purge, and is ſometimes uſed in lethargies, palſies, and hypochondriacal melancholies.

ELATINE, in the Linnæan ſyſtem of *Botany*, is a diſtinct genus of plants of the *octandria tetragynia* claſs; the characters of which are, that it has a four-leaved calyx, four petals, a four-celled depreſſed capſule, with four valves.

Elatine, *Fluellin*, or *Female Speedwell*, is, in Linnæus's diſtribution, a ſpecies of the ANTIRRHINUM; under which genus he has alſo claſſed the LINARIA. Miller makes the *elatine* a ſpecies of the *linaria*, or *toad*-FLAX. This is a low procumbent plant, with oval, acuminated, downy leaves, ſet alternately on the ſtalks. It is annual, grows wild in corn-fields, and flowers in July.

Elatine, in *Medicine*, is greatly recommended as an aperient, reſolvent, and vulnerary. Its ſimple water has been uſed for the ſame purpoſes, though it retains very little of the virtues of the plant. The infuſion is much better, and the expreſſed juice preferable ſtill. It is praiſed by ſome in leprous and ſcrophulous caſes; alſo externally for cancerous and other eating ulcers. An ointment is made of it for theſe purpoſes. At preſent, however, it is very little uſed.

A combination of its active matter with honey, prepared by boiling four pints of the depurated juice with four pounds of clarified honey, is ſometimes kept in the ſhops.

ELATITES, *fir-ſtone*, in *Natural Hiſtory*, a name given by authors to that ſort of petrified wood which ſhews the lineaments of the fir-tree wood, and has been originally either that or ſome wood of a like kind.

Elatites was alſo a name uſed by the ancients for an iron ore, eſteemed a ſpecies of hæmatites; it was of a yellowiſh white colour, and was more uſually called XANTHUS.

ELAWANDUM, in *Zoology*, the name of a remarkable ſpecies of monkey, common in the iſland of Ceylon; its hair is whitiſh, or of a pale grey, and it has a long and beautiful black beard hanging from its chin. Ray's Syn. Quad. p. 188.

ELBOW, the outer angle made by the flexure, or bend, of the arm.

That eminence whereon the arm reſts, called by us *elbow*, is by the Latins called *cubitus*, and the Greeks αγκων, and by others ολεκρανον.

Elbow is alſo uſed, by architects, maſons, &c. for an obtuſe angle of a wall, building, or road, which diverts it from its right line.

ELCESAITES, Helcesaites, or Elcesaians, as Theodoret calls them, ancient heretics, thus denominated from their great prophet *Elceſai.*

This Elceſai, by others called Elxai, who lived in the time of Trajan, gave into the ſentiments of the Ebionites, touching Jeſus Chriſt; though he altered and reformed them in ſome things, to denominate himſelf the author of a ſect.

His fundamental doctrines were, that Jeſus Chriſt, who was born from the beginning of the world, had appeared from time to time under divers bodies; that he was a celeſtial power, or virtue, called *the Chriſt*, whereof the Holy Spirit was ſiſter (note, the Hebrew word for ſpirit is feminine); and that both of them had deſcended into Jeſus, the ſon of Mary, who was clothed with a corporeal appearance, but not with a real body.

The *Elceſaites*, according to St. Epiphanius, were by ſome alſo called *Sampſeans*, from the Hebrew word *ſames*, *ſun.* Scaliger was notoriouſly miſtaken, in holding, that *Elxai* was no more than *Eſſai*, or *Eſſene*; on which ſuppoſition he made the *Elceſaites* the ſame with the ſect of Eſſenes, which is contrary to all antiquity.

Origen makes mention of the *Elceſaites*, in one of his homilies, as a hereſy newly riſen. The retainers hereto, ſays he, do not admit all the books of the canon, but only ſome of them: they allow ſome paſſages out of the Old Teſtament and the Evangeliſts, but reject all the Epiſtles of St. Paul. Add, that they have produced a book, which, they pretend, deſcended to them from heaven; and maintain, that whoever perform what is enjoined therein, ſhall obtain pardon of all their ſins. See Euſebius, Hiſt. lib. vi. cap. 38 who remarks, that this hereſy became extinct almoſt as ſoon as it aroſe.

St. Epiphanius is very full on the ſubject of this ſect. Hær. 19. where he obſerves, that Elxai was a Jew by birth; and that, not being able to live according to the law of Moſes, he invented new opinions, and gained followers. He was a profeſſed enemy of virginity, and obliged all, who followed his doctrine, to marry. He tutored them to hypocriſy in times of perſecution; pretending, it was lawful to adore idols, provided the heart had no ſhare therein.

Some have doubted, whether the *Elceſaites* ſhould be reckoned among the Chriſtian or Jewiſh ſects; for though they acknowleged Chriſt as a great king, it is not certain whether they meant Jeſus Chriſt, or ſome other pretended Meſſiah.

ELDER, a word uſed in ſome parts of the kingdom for fuel. Dict. Ruſt.

Elder-*tree*, *Sambucus*, in *Botany*, a genus of the *pentandria trigynia* claſs. Its characters are theſe: the flower hath a ſmall permanent empalement of one leaf, cut into five parts; it hath one concave wheel-ſhaped petal, cut into five obtuſe ſegments at the brim, which are reflexed; and five awl-ſhaped ſtamina, of the length of the petal, terminated by roundiſh ſummits, with an oval germen ſituated under the flower, having no ſtyle, in room of which is a ſwelling gland, crowned by three obtuſe ſtigmas; the germen afterward becomes a roundiſh berry, with one cell, including three angular ſeeds. There are five ſpecies.

The common *elder* is too well known to need a deſcription. Of this there are the following varieties, viz. the white and green-berried *elder*, and the variegated-leaved *elder.* For the medical virtues of that ſpecies, called the *dwarf elder*, ſee Ebulus.

The common *elder* will grow on any ſoil, or in any ſituation; the trees are frequently ſeen growing out of old walls, or cloſe to ditches, in very moiſt places, or from the hollow of another tree; for wherever the ſeeds are ſcattered, the plants will come up. The leaves and ſtalks are ſo bitter and nauſeous, that few animals will browſe upon them.

The young ſhoots of this tree are very full of pith; but as the trees grow old, the wood becomes very hard, and will poliſh almoſt as well as the box-tree; and is often uſed for the ſame purpoſe.

The bark, leaves, flowers, and berries of this tree, are uſed in medicine. The inner bark is eſteemed good for dropſies. Sydenham directs three handfuls of the inner bark to be boiled in a quart of milk and water, till only a pint remains, of which one half is to be taken in the morning, and the other at night; and this repeated every day. Boerhaave recommends the expreſſed juice of the middle bark, given from a dram to half an ounce, as the beſt of hydragogues, when the viſcera are ſound. The leaves, which are ſaid to be purgative and emetic, are outwardly uſed for the piles and inflammations. The flowers are inwardly uſed to expel wind; infuſions made from them while freſh are gently laxative and aperient; when dry, they are ſaid to promote the cuticular excretion, and to be particularly ſerviceable in eryſipetalous and eruptive diſorders; and the berries are eſteemed cordial, and uſeful in hyſteric diſorders; and are frequently put into gargariſms for ſore mouths and throats. Miller and Lewis.

Officinal preparations of the *elder*, are the *aqua florum ſambuci*, the *oleum ſambucinum*, the *unguentum ſambucinum*, made of the leaves and inner bark, and alſo of the flowers, and the *ſyrupus ſambuci.*

On the trunk of this tree frequently grows a fungous excreſcence, wrinkled, and turned up like an ear, whitiſh on the outſide, and black within, with ſeveral little veins. Theſe are called Jews ears, *auriculæ Judæorum*; they are accounted good for inflammations and ſwellings of the tonſils, ſore throats, and quinzies.

Elder, *marſh*, or *water.* See Wayfaring-*tree.*

Elder, *Spaniſh.* See Lizard's *Tail.*

ELDERS, *Seniors*, in the *Jewiſh Hiſtory*, were the moſt conſiderable perſons, for age, experience, and virtue, among that ancient people. Moſes, we read, aſſembled the *elders* of the people together, and acquainted them with what the Lord had commanded.

Long afterwards, thoſe who held the firſt rank in the ſynagogues were uſually called זקנים, *zekenim*, *elders*, in imitation of the ſeventy *elders*, whom Moſes eſtabliſhed for the judges of the ſanhedrim. Numbers xi. 16, 17, 24, 25. Exod. xxiv. 1. 9. 14. See Sanhedrim.

The preſident, or chief, had, in a particular manner, the appellation of *elder*; being, as it were, the *decanus ſeniorum*, *dean of the elders.*

In the aſſemblies of the primitive Chriſtians, thoſe who held the firſt place, or rank, aſſumed the denomination of preſbyters, or *elders*; for the word *preſbyters*, which occurs ſo frequently in the Old Teſtament, and which includes alike both biſhops and prieſts, does properly ſignify *elders*. See M. Simon's obſervation thereon, in his Supplement aux Ceremonies des Juifs.

The preſident, or biſhop, as being the chief of the *elders*, did likewiſe aſſume the denomination of *elder*; whence it is, that in the New Teſtament the name *biſhop* is frequently confounded with that of *preſbyter*. See BISHOP, and PRESBYTER.

For the like reaſon, the council of the firſt churches was called *preſbyterium*, or council of the *elders*, where the biſhop preſided in quality of firſt *elder*, being ſeated in the middle of the other *elders*. The prieſts, or *elders*, who ſat by him, had each his judge's chair; for which reaſon they are called, by the fathers, *aſſeſſores epiſcoporum*. Nothing of any importance was done, till it had firſt been examined, and reſolved, in this aſſembly, where the biſhop only made one body with the other *elders*, or prieſts; the juriſdiction which we now call epiſcopal, not being then dependent on the biſhop alone, but on all the *elders*, over whom he was only the preſident.

ELDERS is alſo a denomination ſtill retained in the preſbyterian diſcipline.

The *elders* are officers, who, in conjunction with the paſtors, or miniſters, and deacons, compoſe the conſiſtories, or kirk-ſeſſions, meeting to conſider, inſpect, and regulate, matters of religion and diſcipline. They are choſen from among the people, and are received publicly with ſome degree of ceremony. In Scotland, there is an indefinite number of *elders* in each pariſh; generally about twelve. See KIRK-*Seſſions*, and PRESBYTERY.

ELDRIENE, in *Zoology*, a name by which ſome call the ſmall fiſh, known in Engliſh by the name of the MINOW, and called by authors VARIUS, from the various colour of its ſides and belly.

ELEATIC *philoſophy*, among the *Ancients*, a name given to that of the STOICS, becauſe taught at Ἐλεα, in Latin Velia, a town of the Lucani.

The founder of this philoſophy, or of the *Eleatic* ſect, is ſuppoſed to have been Xenophanes, who lived about the fifty-ſixth Olympiad, or between five and ſix hundred years before Chriſt. This ſect was divided into two parties, which may be denominated metaphyſical and phyſical; the one rejecting, and the other approving, the appeal to fact and experiment. Of the former kind were Xenophanes, Parmenides, Meliſſus, and Zeno, of Elea. They are ſuppoſed to have maintained principles not very unlike thoſe of Spinoza; they held the eternity and immutability of the world; that whatever exiſted was only one being; that there was neither any generation nor corruption; that this one being was immoveable and immutable, and was the true God; and whatever changes ſeemed to happen in the univerſe, they conſidered as mere appearances and illuſions of ſenſe. However, ſome learned men have ſuppoſed, that Xenophanes and his followers, ſpeaking metaphyſically, underſtood by the univerſe, or the one being, not the material world, but the originating principle of all things, or the true God, whom they expreſly affirm to be incorporeal. Thus Simplicius repreſents them as merely metaphyſical writers, who diſtinguiſhed between things natural and ſupernatural; and who made the former to be compounded of different principles. Accordingly, Xenophanes maintained, that the earth conſiſted of air and fire, that all things were produced out of the earth, and the ſun and ſtars out of clouds, and that there were four elements. Parmenides alſo diſtinguiſhed between the doctrine concerning metaphyſical objects, called truth, and that concerning phyſical or corporeal things, called opinion; with reſpect to the former there was one immoveable principle, but in the latter two that were moveable, viz. fire and earth, or heat and cold; in which particulars Zeno agreed with him. The other branch of the *Eleatic* ſect were the atomic philoſophers, who formed their ſyſtem from an attention to the phenomena of nature; of theſe the moſt conſiderable were Leucippus, Democritus, and Protagoras. See EPICUREANS, and STOICS. See a farther account of the opinions of theſe ancient philoſophers, in Cudworth's Intellectual Syſtem.

ELECAMPANE, *Inula*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: it has a radiated compound flower, with an imbricated empalement; the diſk or middle of the flower is compoſed of hermaphrodite flowers; the border or ray of female half florets ſtretched out like a tongue. The hermaphrodite flowers are funnel-ſhaped, and cut into five parts at the top; theſe have five ſhort, ſlender ſtamina, which coaleſce at the top; and they have only one long germen crowned with down. The female half florets have narrow, entire, tongue-ſhaped petals, no ſtamina, but a long crowned germen, with a hairy ſtyle. The germina in both flowers become a ſingle, narrow, four-cornered ſeed, crowned with a down, ſitting on a naked receptacle. There are fifteen ſpecies; the firſt of which grows naturally in ſeveral parts of England, but is cultivated in gardens for the ſake of the roots. Miller. Tournefort joins moſt ſpecies of this genus to the *aſter*, or *ſtarwort*. Ray claſſes it under the *helenium*.

The root of the *inula*, or *elecampane*, has been long famous in all diſorders of the breaſt and lungs. It is alſo recommended as a ſudorific and alexipharmic, and as ſuch has a place in moſt of the compoſitions of that intention. The doſe of the dry root in ſubſtance is from a ſcruple to a dram, or two. An ointment made of the freſh roots and leaves with lard, is alſo much recommended in the itch, and other cutaneous foulneſſes. The roots yield in diſtillation an eſſential oil, which concretes into white flakes, reſembling camphor in many of its properties, and ſoluble in ſpirit of wine. An extract may alſo be obtained from the dry root, both by water and ſpirit; an ounce yielding by water 6½ drams, and by ſpirit 2½.

ELECAMPANE *wine*. See WINE.

ELECT, from *eligo*, *I chuſe*, *choſen*, in the *Scriptures*, is applied to the primitive Chriſtians. In which ſenſe, the *elect* are thoſe choſen and admitted to the favour and bleſſing of Chriſtianity.

ELECT, in ſome ſyſtems of *Theology*, is a term appropriated to the ſaints, or the predeſtinated. In which ſenſe the *elect* are thoſe perſons who are ſaid to be predeſtinated to glory as the end, and to ſanctification as the means. See ELECTION and PREDESTINATION, ARMINIANS, CALVINISTS, &c.

ELECT is likewiſe applied to archbiſhops, biſhops, and other officers, who are choſen, but not yet conſecrated, or actually inveſted with their office, or juriſdiction.

The emperor is ſaid to be *elect*, before he is inaugurated and crowned; a lord-mayor is *elect*, before his predeceſſor's mayoralty is expired, or the ſword is put in his hands.

ELECTARY, in *Pharmacy*. See ELECTUARY.

ELECTI, in *Church Hiſtory*, a ſect of heretics who neither eat fleſh, nor married. See AUDITORS.

ELECTION, a choice made of any thing, or perſon, whereby it is preferred to ſome other.

There ſeems this difference, however, between *choice* and *election*, that *election* has uſually a regard to a company or community, which makes the choice; whereas choice is ſeldom uſed, but when a ſingle perſon makes it.

We ſay, the *election* of a biſhop, a member of parliament, &c. See BISHOP, PARLIAMENT, &c.

The moſt ſolemn *election* is that of a pope; which is performed by the cardinals, in four ſeveral ways. The firſt by the Holy Spirit, as they call it; when the firſt cardinal who ſpeaks, having given his vote for any perſon, proceeds to the adoration, and proclaims him pope, as by a ſudden inſpiration of the Holy Ghoſt. In which caſe, he is deemed duly *elected*, if all, or at leaſt two-thirds of the aſſembly, be conſenting thereto.

The ſecond, by compromiſe, when the whole college pitches on three cardinals, to whom they give a power of nominating the pope; which power expires upon the burning out of a candle lighted on that occaſion.

The third, by way of poll or ſcrutiny, which laſt is the moſt uſual; the cardinals throwing ſealed tickets, wherein their votes are written, into a chalice, or cup, placed on the altar. Two thirds of the votes are required to determine an *election* by ſcrutiny.

The fourth is by way of acceſſion; when, the votes being too much divided to *elect* any body, ſome of the cardinals deſiſt from their firſt ſuffrage, and accede, that is, give their voices to him, who has already the majority by ſcrutiny.

The way of acceſſion, however, is always added to the ſcrutiny; it being the conſtant practice for all the cardinals to give their voices, after the laſt ſcrutiny, to him whom they find to have the plurality already. So that all *elections* of popes are with the unanimous conſent of all the cardinals. See CARDINALS, CONCLAVE, and POPE.

ELECTION *of numbers*, or *quantities*, in *Arithmetic* and *Algebra*, denotes the different method of taking any numbers of quantities given, either ſeparately, or in pairs, &c. or it is the ſum of all the combinations that can be made with a different number of quantities, in each ſet of combinations, out of any number of quantities propoſed. Thus, the *election* of 3 quantities a, b, c, is 7; a, b, c, ab, ac, bc, abc; of 4 quantities 15; and if N repreſent the number of quantities given, $2^N - 1$ is equal to the number of *elections* required; but as the ſingle quantities are equal in number to the given quantities, the number of proper *elections* will be $2^N - N - 1$.

See Combination.

Election *of a clerk of ſtatutes merchant*, in *Law*, a writ that lies for the choice of a clerk aſſigned to take ſtatutes merchant. It is granted out of chancery, on ſuggeſtion that the clerk, formerly aſſigned, is gone to dwell at ſome other place, or is under an impediment to attend the duty of his office, or that he has not land ſufficient to anſwer his tranſgreſſions, if he ſhould act amiſs. Fitz. Herb. Nat. Brev. 164.

Election *of eccleſiaſtical perſons*. *Elections* for the dignities of the church ought to be free, according to the ſtat. 9 Ed. II. cap. 14. If any perſons, that have a voice in *elections*, take any reward for an *election* in any church, college, ſchool, &c. the *election* ſhall be void. And if any perſons of ſuch ſocieties reſign their places to others for reward, they incur a forfeiture of double the ſum; and both the parties are rendered incapable of the place. Stat. 31 Eliz. cap. 6.

Election *of a verderor of the foreſt*, (*electione viridariorum foreſtæ*) in *Law*, a writ that lies for the choice of a verderor, where any of the verderors of the foreſt are dead, or removed from their offices. This writ is directed to the ſheriff, and the verderor is to be elected by the freeholders of the county, in the ſame manner as coroners. New Nat. Brev. 366.

Election is alſo the ſtate of a perſon who is left to his own free will, to take or do either one thing, or another, which he pleaſes. See Liberty.

Election, in *Theology*, ſignifies the choice which God, of his good pleaſure, makes of angels or men, for the objects of mercy, and grace.

The *election* of the Jews, was the choice God made of that people to be more immediately attached to his worſhip and ſervice, and for the Meſſiah to be born of them. And thus particular nations were *elected* to the participation of the outward bleſſings of Chriſtianity.

Election alſo, in the language of ſome divines, ſignifies a predestination to grace and glory, and ſometimes to glory only. And it has been enjoined as an article of faith, that predeſtination to grace is gratuitous, merely and ſimply ſo; *gratia, quia gratis data.* But the divines are much divided as to the point, whether *election* to glory be gratuitous, or whether it ſuppoſes obedience and good works, i. e. whether it be before, or after, the previſion of our obedience. See Grace, and Reprobation.

Election is alſo uſed for a part of *Pharmacy*; being that which teaches how to chooſe the medicinal ſimples, drugs, &c. and to diſtinguiſh the good from the bad.

Some diſtinguiſh a general *election*, which gives the rules and marks for all medicines in general; and a particular one for each medicine in particular. Pomet, in his Hiſtory of Drugs, gives very good rules for this *election*.

ELECTIVE, ſomething that is done, or paſſes, by election. See Elector.

Some benefices are *elective*, others collative. Municipal offices in England are generally *elective*; in Spain, venal. Poland is an *elective* kingdom. All prelatures in France are *elective*, ſince the Concordat.

Elective *attraction*, in *Chemiſtry*. See Affinity.

ELECTOR, a perſon who has a right to *elect*, or chooſe another to an office, honour, &c.

The word is formed of the Latin *eligere, to chooſe*.

We ſay, the *electors* of a burgeſs, a knight of the ſhire, a grand maſter of an order, &c.

Elector is particularly, and by way of eminence, applied to certain princes of Germany, in whom lies the right of electing the emperor; being all ſovereigns, and the principal members of the empire.

The origin of *electors* is not well known; ſome refer it to an edict of Otho III. confirmed by Gregory V. about the year 996. But this opinion is contradicted by the whole tenor of hiſtory. From the earlieſt period in the hiſtory of Germany, the perſon who was to reign over all, was elected by the ſuffrage of all. Thus, Conrad I. was elected either by all the princes and chief men, or by the whole nation; in 1204, Conrad II. was elected by all the chief men, and his election was approved and confirmed by the people; and at the election of Lotharius II. in 1125, ſixty thouſand perſons of all ranks were preſent, and he was named by the chief men, whoſe nomination was approved by the people. Others refer it to Frederic II. who died in 1250.

The firſt author who mentions the ſeven *electors* is Martinus Polonus, in this reign; and this reſtrictive privilege was probably obtained by degrees. The princes of greater authority were firſt allowed to name the perſon whom they wiſhed to be choſen emperor, and the people retained the right of approving or diſapproving the nomination; and when they had ſecured the right of voting firſt, or of *prætaxation*, as it was called, it became needleſs for the inferior eccleſiaſtics or barons to attend, merely to confirm their choice; more eſpecially as their attendance would become troubleſome and expenſive. Beſides, the aſſumed privilege of the ſeven electors, who poſſeſſed the moſt extenſive territories, was ſtrongly ſupported by their numerous dependents and allies; and they were conſidered as the repreſentatives of all the orders which compoſed the higheſt claſs of German nobility. See Robertſon's Hiſt. chap. v. vol. i. p. 458, &c. 8vo edit.

Others have aſcribed the origin of *electors* to Ralph of Hapſburg, founder of the houſe of Auſtria, in the year 1280.

It appears from the above account that their number was unſettled, at leaſt till the time of Frederic II. in the thirteenth century. The golden bull, publiſhed by Charles IV. in 1356, fixed the number of *electors* to ſeven; three of them eccleſiaſtics, viz. the archbiſhops of Mentz, Treves, and Cologne; and four ſeculars, viz. the king of Bohemia, the count palatine of the Rhine, the duke of Saxony, and the marquis of Brandenburgh. By the treaty of Munſter, in 1648, this order was changed; the duke of Bavaria being put in the place of the count palatine, and an eighth electorate erected for the count palatine.

In the year 1692, a ninth electorate was created by the emperor Leopold, in favour of Erneſt duke of Hanover, under the title of *elector* of Brunſwick. Some oppoſition was made to this election; and the princes of Germany ſtood out for ſome time, and refuſed to acknowlege it. But they afterwards acquieſced in it, and it has been ſince recognized by all the foreign princes. The king of France did it at laſt by the treaty of Raſtadt.

The *electors* have not only the power of chuſing the emperor, but they have actually exerciſed that of depoſing him. Thus they depoſed Adolphus of Naſſau in 1298, and Wenceſlaus in 1401.

The ſeveral functions of the *electors* are as follow: the *elector* of Mentz is chancellor of Germany; he convokes the ſtates, and gives his vote before any of the reſt. The *elector* of Cologne is grand chancellor of Italy, and conſecrates the emperor. The *elector* of Treves is grand chancellor of the Gauls, and confers the impoſition of hands on the emperor. The count palatine of the Rhine is grand maſter of the imperial palace, and preſents the emperor with a globe at his coronation. The marquis of Brandenburgh is grand chamberlain, and puts the ring on the emperor's finger. The duke of Saxony is grand marſhal, and gives the ſword to the emperor. The king of Bohemia, who was anciently only duke, is grand butler, and puts Charlemagne's crown on the emperor's head. Laſtly, the *elector* of Hanover, now king of Great Britain, is arch-treaſurer; though firſt erected under the title of ſtandard-bearer of the empire.

The *electoral* prince is the eldeſt ſon of an *elector*, and the preſumptive heir of his dignity.

Electors are always addreſſed under the title of *electoral highneſſes*.

The *electoral* college, conſiſting of all the *electors* of the empire, is the moſt illuſtrious and auguſt body in Europe. See Diet.

Electors *of members of parliament*. See Burgess, and Parliament.

ELECTORAL *crown*, or *coronet*. See Crown.

ELECTORATE, the dignity of an elector, with the territory, or dominions, to which that quality is annexed. See Elector.

Though the cuſtom ordinarily be, in Germany, for the ſons of princes to ſhare their fathers lands and territories among them; thoſe whereto the *electorate* is annexed, are not uſed to be divided, but paſs entire to the eldeſt ſon, who ſucceeds to the *electorate*.

ELECTRIC, derived from ηλεκτρον, *amber*, in *Phyſics*, is a term applied to thoſe ſubſtances, in which the *electric* fluid is capable of being excited, and accumulated, without tranſmitting it, and, therefore, called *non-conductors*, in oppoſition to conductors, under which article the reaſon of the terms, and the difference between *electric* and conducting ſubſtances, are particularly explained. Theſe are alſo called *electrics per ſe*, and original *electrics*. To this claſs belong glaſs, and all vitrifications, even of metals, all precious ſtones, of which the moſt tranſparent are the beſt; all reſins, and reſinous compoſitions; amber, ſulphur, baked wood, all bituminous ſubſtances, wax, ſilk, cotton, all dry animal ſubſtances, as feathers, wool, hairs, &c. paper, white ſugar, and ſugar-candy; air; the vapour of water, when examined in a degree of heat, in which it is capable of condenſing into water, and alſo that of quickſilver, as Dr. Prieſtley has very lately found (Obſ. on Air, &c. 1779. p. 426); ice froze to the

13th degree below 0 of Fahrenheit's ſcale, and produced from diſtilled water, as has been lately diſcovered by Mr. Achard of Berlin; oils, CHOCOLATE, calces of metals and ſemimetals, the aſhes of animal and vegetable ſubſtances, the ruſt of metals, all dry vegetable ſubſtances, and all hard ſtones, of which the beſt are the hardeſt. Subſtances of this kind are capable of being excited, ſo as to exhibit the electrical appearances of attracting and repelling light bodies, emitting a ſpark of light, attended with a ſnapping noiſe, and yielding a current of air, the ſenſation of which reſembles that of a ſpider's web drawn over the face, or any part of the body preſented to it, and a ſmell like that of phoſphorus, either by friction, or by heating and cooling, or by melting, and pouring one melted ſubſtance into another. The firſt is the moſt uſual method of exciting *electrics*; the effect of the ſecond was firſt obſerved with regard to the TOURMALIN, and has been ſince found to extend to many other ſimilar ſubſtances; and ſeveral particular circumſtances have been found to attend the operation of melting ſulphur, wax, &c. according to the nature of the veſſels in which they are diſſolved, and of the ſubſtances with which they are in contact, when left to cool.

Whenever an *electric* is excited by friction, it is neceſſary that the ſubſtance with which it is rubbed, called the *rubber*, ſhould communicate with the earth, or with bodies abounding with electricity, by means of good conductors; for, if the rubber be inſulated, i. e. if its communication with the earth be intercepted by *electrics*, the effect of friction will be inconſiderable, and the electrical power excited by it be very weak. An *electric* will not part with the power excited by friction, by bringing other *electric* ſubſtances into contact with it; and, therefore, a glaſs tube, or globe, ſurrounded by the air, which is an *electric*, retains its virtue for ſome time; but as the air is never a perfect *electric*, it will gradually loſe it, by communication to the moiſture, and other conducting particles, that float in this element. An inſulated conductor may alſo receive the electrical power, communicated to it by the approach of excited *electrics*, will then exhibit ſimilar appearances, and retain it in the ſame manner. But if any other conductor, communicating with the earth, be brought into contact with it, the electrical power will be conveyed away at once; whereas an excited *electric*, being itſelf a non-conductor, will loſe only part of the power which it poſſeſſes from that portion of the ſurface, to which the conductor is immediately preſented, and thus the whole is exhauſted by degrees; and, therefore, the ſpark of fire is not ſo denſe, nor the exploſion ſo loud from excited, as from communicated electricity.

No *electric* can be excited, without producing electrical appearances in the ſubſtance by which it is excited, provided that ſubſtance be inſulated; but the electrical powers of the excited *electric*, and of the inſulated rubber, are directly the reverſe of each other, and may be eaſily diſtinguiſhed, by their exhibiting oppoſite effects. Thus, if a ſmall ball of cork be ſuſpended by a ſilken thread, and preſented to the *electric*, it will be firſt attracted, and then repelled; but in this ſtate of repulſion from the *electric*, it will be more violently attracted by the rubber, than by any other conducting ſubſtance, and *vice verſa*. And if two ſuch inſulated balls of cork be preſented either to the *electric* or rubber ſeparately, they will repel each other; but if one of theſe balls be preſented to the *electric*, and the other to the rubber, and they be then brought within a ſufficient diſtance, they will mutually attract each other, and their electricity will be diſcharged: they have evidently the ſame effect of counterbalancing and deſtroying each other, as poſitive and negative quantities in algebra; and it has been obſerved, that two pieces of glaſs, or ſilk, poſſeſſed of theſe contrary electricities, will cohere together, and require a conſiderable force to ſeparate them. Beſides, theſe oppoſite powers may be diſtinguiſhed by preſenting any pointed conductor to the *electric*, ſuppoſed to be glaſs, and to the rubber of the common leather kind, in the dark; the light iſſuing from the *electric* to the point will appear like a ſtar upon it; but the light iſſuing from the point to the rubber will be a lucid pencil or bruſh, diverging from the point towards the rubber. See BRUSH, *Luminous* CONDUCTOR, and STAR.

We may alſo add, that a current of air may be perceived paſſing from theſe points, in both caſes, in oppoſite directions.

Moſt *electrics* may be made to acquire either of theſe electricities at pleaſure, by uſing proper rubbers; but as the former of them was firſt diſcovered by rubbing glaſs, it was called the *vitreous*, and the latter, produced by reſinous ſubſtances, as amber, ſealing-wax, ſulphur, &c. was called the *reſinous* electricity. However, electricians, afterwards concluding that excited glaſs acquired more than its natural quantity of the *electric* fluid by friction, and that excited wax or ſulphur, or the inſulated rubber, loſt part of it, called the former *poſitive*, and the latter *negative* electricity; terms which are now generally uſed, and juſtified by the principal phenomena of this ſcience. See *Theory of* ELECTRICITY.

The following table will ſhew what kind of electricity is excited in different bodies, when rubbed with different ſubſtances.

Back of a cat	Poſitive	Every ſubſtance with which it has been hitherto tried.
Smooth glaſs	Poſitive	Every ſubſtance hitherto tried, except the back of a cat.
Rough glaſs	Poſitive	Dry oiled ſilk, ſulphur, metals.
	Negative	Woollen cloth, quills, wood, paper, ſealing-wax, white wax, the human hand.
Tourmalin	Poſitive	Amber, air.
	Negative	Diamond, the human hand
Hare's ſkin	Poſitive	Metals, ſilk, load-ſtone, leather, hand, paper, baked wood.
	Negative	Other fine furs.
White ſilk	Poſitive	Black ſilk, metals, black cloth.
	Negative	Paper, hand, hairs, weaſel's ſkin.
Black ſilk	Poſitive	Sealing-wax.
	Negative	Hare's, weaſel's, and ferret's ſkin, load-ſtone, braſs, ſilver, iron, hand.
Sealing-wax	Poſitive	Metals.
	Negative	Hare's, weaſel's, and ferret's ſkin, hand, leather, woollen cloth, paper.
Baked wood	Poſitive	Silk.
	Negative	Flannel.

Cavallo's Electricity, p. 17.

See a larger catalogue of this kind, in which the rubbers were woollen garments, and ſilk, by Mr. Henly, in the Phil. Tranſ. vol. lxvii. part i. p. 122, &c.

It may be obſerved in general, that when different ſubſtances are rubbed together, the ſubſtance, whoſe electrical power is the ſtrongeſt, acquires the poſitive, and the other the negative electricity; and when two bodies, differing in the ſmoothneſs or roughneſs of their ſurfaces, are rubbed together, the ſmootheſt, which requires the leaſt friction, acquires the poſitive; and the rougheſt, the negative electricity. We may alſo obſerve, that, if an uninſulated conductor be brought within the atmoſphere, or ſphere of action, of an excited *electric*, or an electrified body, it will acquire on the ſide exhibited to the *electric*, an electricity oppoſite to that of the electrified body; which increaſes the nearer it approaches, till at laſt the conductor receives a ſpark from the *electric*, and the equilibrium is reſtored. But if the conductor be inſulated, both its ſides will in the acceſs appear to be electrified; that next to the *electric* acquiring an electricity oppoſite to that of the *electric* itſelf, and the remoter ſide poſſeſſing the ſame kind of electricity with the *electric*; and when the diſcharge is made, the electrical power of the inſulated conductor, and of the *electric*, are of the ſame kind.

If an *electric* be brought near to an electrified body, the circumſtances will be the ſame during the approach of one to the other; however, when the *electric* has received a ſmall quantity of electricity from the electrified body, it will ſtill, in ſome caſes, exhibit ſtrong electricities on different ſides, and repeated changes may ſometimes be obſerved from poſitive to negative electricity in the ſame *electric*; a phenomenon, which is explained by the non-conducting quality of an *electric*, and the diſpoſition which bodies have to acquire an electricity contrary to that of another contiguous electrified body. See *Electrical* ATMOSPHERE.

ELECTRIC, *charging and coating of*. See CHARGE, and COATING.

ELECTRICAL *air thermometer*, is an inſtrument contrived by Mr. Kinnerſley of Philadelphia, and uſed in determining the effects of the *electrical* exploſion upon air. This inſtrument conſiſts of a glaſs tube AB (*Tab.* II. *Electricity*, *fig.* 15.) about eleven inches long, and one inch in diameter, cloſed, air-tight, with braſs caps, C and D, which may be ſcrewed on or taken off at pleaſure; and of a ſmall glaſs tube, K, open at both ends, cemented into the braſs tube, L, which ſcrews into the upper part, C. The upper end of this tube has a braſs ferrel, with an air-hole, *a*, and the lower end is immerſed in coloured water at the bottom of the tube AB. Within this tube, AB, are fixed two wires, F and G; the wire F deſcends from a braſs cap at the upper end, and the wire G paſſes through the lower cap into the pedeſtal E, to which the veſſel, AB, is fixed by means of a male ſcrew, D, that goes into a braſs nut at E; and this wire may be raiſed or lowered at pleaſure, by means of a male ſcrew annexed to it, ſo as to produce a diſcharge from F to G. The wire, *b*, is a ſmall round ſpring, encompaſſing the tube K; and when air is blown into this tube, ſo as to raiſe the coloured water up to *c*, the gage-wire, *b*, is brought down to the top of the column, and the *thermometer* is ready for uſe. It is evident, from the conſtruction of this inſtrument, that, when the air within the tube AB is rarefied, the water will riſe in the ſmall tube, and the degree of its aſcent will meaſure the degree of rarefaction. When the wires F and G are in contact, a large charge of electricity, from above thirty ſquare feet of coated glaſs, produces no rarefaction in the air; the water in the ſmall tube not being at all moved from the gage-wire; and therefore the paſſage of the *electrical* fluid through conductors ſufficiently large, neither rarefies nor diſplaces the air about them. But when the wires are about two inches aſunder, the ſame charge raiſes the water to the top of the ſmall tube; and a charge from a glaſs jar, containing about five gallons and a half, raiſes it to *d*; which ſudden riſe is owing to a quantity of air actually diſplaced by the *electrical* flaſh. When the air coaleſces, the water in the tube ſubſides, till it is in equilibrio with the rarefied air; and then gradually deſcends, as the air cools, and ſettles at its former height. By carefully obſerving at what height above the gage-wire *b*, the deſcending column of water firſt ſtopped, Mr. Kinnerſley diſcovered the degree of rarefaction produced by the *electrical* exploſion. Franklin's Letters, &c. p. 389, &c. 4to. 1769.

ELECTRICAL *apparatus* conſiſts of glaſs tubes, about three feet long, and an inch and a half in diameter, one of which ſhould be cloſed at one end, and furniſhed at the other end with a braſs cap, and ſtop-cock, in order to rareſy, or condenſe, the incloſed air; ſticks of ſealing-wax, or tubes of rough glaſs, or glaſs tubes covered with ſealing-wax, or cylinders of baked wood, for producing the negative electricity; with proper rubbers, as black oiled ſilk, with AMALGAM upon it for the former, and ſoft new flannel, or hare ſkins, or cat's ſkins, tanned with the hair on, for the latter; coated jars, or plates of glaſs, either ſingle, or combined in a battery, for accumulating electricity; metal rods, as diſchargers; an electrical machine; electrometers, and inſulating ſtools, ſupported by pillars of glaſs, covered with ſealing-wax, or baked wood, varniſhed or boiled in linſeed oil. See theſe more particularly deſcribed under the articles *Electrical* BATTERY, CONDUCTORS, DISCHARGER, ELECTRICAL *Machine*, ELECTROMETER, &c.

Signior Beccaria contrived a ſubſtitute for glaſs, which is an expenſive article in the apparatus of an electrician, by mixing equal quantities of very pure colophonium, and finely pulverized marble, well dried, melting the mixture, and then ſpreading it on a piece of tinfoil, two or three inches beyond the edge of it, about one tenth of an inch thick; over this he laid another piece of tinfoil within about two inches of the edge of the mixture; and this coated plate ſerved him inſtead of a plate of glaſs, poſſeſſed a greater power, retained it longer, was leſs liable to break, and eaſily repaired.

ELECTRICAL *atmoſphere*. See ATMOSPHERE.

ELECTRICAL *attraction* and *repulſion*. See *Experiments and Phænomena in* ELECTRICITY and ELECTRIC.

ELECTRICAL *balls*. See BALLS and ELECTROMETER.

ELECTRICAL *battery*. See BATTERY, where the method of conſtructing a battery is deſcribed.

In caſes which require a great force of electricity, batteries are commonly uſed; but experiments of this kind ſhould be conducted with great care and caution. Metalline wires of a ſmall diameter may be made red-hot, and melted by the exploſion of a *battery*; and the red-hot particles of the metal are ſcattered by the exploſion in all directions; but if the force be very great, the wire will be entirely diſperſed. If the wire be melted on a piece of glaſs, the glaſs will be marked by the exploſion with all the priſmatic colours; and a force which is juſt ſufficient to render a wire, ſtretched by weights, red-hot, will conſiderably lengthen it. A ſlender wire, incloſed in a glaſs tube, about a quarter of an inch in diameter, will be reduced, by a moderate diſcharge of a *battery* through it, into globules of different ſizes, which may be collected from the inner ſurface of the glaſs tube; they will be found hollow, and to be little elſe than the mere *ſcoriæ* of the metal. Mr. Henly, and others, have obſerved, that in melting wires of ſome inches in length, the red heat begins at the end in contact with the diſcharging rod, or with the poſitive ſide of the *battery*, and proceeds gradually towards the coating of the *battery*, plainly evincing the direction of the electrical matter in the diſcharge. The conducting power of metals correſponding to the eaſe with which they are melted, the ſame ingenious electrician endeavoured to aſcertain this, by cauſing an exploſion to paſs through metal wire of different kinds, but of the ſame diameter; but he was not ſatisfied with the reſult of his trials.

Dr. Prieſtley infers, from ſome experiments on the conducting power of different metals, that the order in which they are to be ranked, with reſpect to the power of electricity to melt them, is the following; viz. iron, braſs, copper, ſilver, and gold; however, farther experiments are ſtill wanting for the abſolute deciſion of this queſtion. In comparing different exploſions by their power to melt wires, it muſt be obſerved, that, in wires of ſome thickneſs, the forces that melt them will be in the proportion of their lengths; and in wires of the ſame length, in the proportion of the ſquares of their diameters.

Mr. Henly, having obtained ſome grains of purified platina, which had received the utmoſt force of chemical fire, laid them in contact with each other on a line drawn with a blunt ended wire over the ſurface of a plate of white wax, about the length of half an inch; and at each end of the line of platina, and in contact with it, he placed a thick wire, with its ends nicely rounded off, and made perfectly ſmooth; and having covered the platina with a piece of thick plate-glaſs, and diſcharged through it three jars, containing ſixteen ſquare feet of coated ſurface, he fuſed it into ſeveral beautiful ſpherules. Mr. Nairne has ſince repeated the experiment with equal ſucceſs. Phil. Tranſ. vol. lxiv. part ii. art. 41. p. 414. 416, &c. Prieſtley's Hiſt. of Electricity, vol. ii. p. 370.

One of the moſt curious experiments in this department of electricity is that of making coloured rings on the ſurfaces of metal, by the electrical exploſion. See COLOURS, and FAIRY *Circles*.

We have already ſhewn how earthquakes may be imitated by the exploſion of an *electrical battery*. See EARTHQUAKES.

The effects of the lateral force of electrical exploſions, firſt taken notice of by Dr. Prieſtley, are beſt obſerved in the diſcharge of a *battery*; though they may be alſo ſeen in the diſcharge of a ſingle jar.

If pieces of cork, powder of any kind, or any light bodies, be placed near the exploſion of a jar, or *battery*, they will be moved out of their places at the inſtant of the diſcharge, in all directions from the center of the exploſion. A remarkable phenomenon of this kind happens in firing gun-powder by *electrical* exploſions; for, let the powder be ever ſo cloſely confined, if the exploſion is made in the center of it, a part of it only will be fired, and the reſt will be diſperſed with great violence; and the fragments of a melted wire, placed in the midſt of the powder, will fly about to a great diſtance from the place of exploſion. The greater the force of the exploſion, ſo much the greater will be the diſtance to which light bodies will be removed; and therefore it is no wonder, that very heavy bodies ſhould be moved to conſiderable diſtances by ſtrong flaſhes of lightning. Dr. Prieſtley apprehends, that this lateral force is produced by the exploſion of the air from the place where the exploſion is made; for the electrical matter makes a vacuum of air in its paſſage; and this air being ſuddenly diſplaced gives a concuſſion to all the bodies that happen to be near it. This lateral exploſion may be rendered viſible, by placing a charged jar on a table, and bringing one end of an inſulated metallic rod contiguous to its outſide coating, and placing a body of about ſix or ſeven feet in length, and a few inches broad, within about half an inch of its other end. Then, if a chain be put upon the table, with one end about an inch and a half diſtant from the coating of the jar, and one knob of the diſcharging rod be applied to the other end of the chain, and the other knob to the wire of the jar, ſo as to make a diſcharge, a ſtrong ſpark will be ſeen between the inſulated rod, which communicates with the coating of the jar, and the body near its extremity; which ſpark does not alter the *electrical* ſtate of that body; and therefore it is imagined, that this lateral ſpark flies from the coating of the jar, and inſtantaneouſly returns to it. This phenomenon may probably be owing to the interruption in the circuit; for in proportion to the interruption will be the degree of the lateral exploſion. Hiſt. Electr. vol. ii. p. 336. 8vo. 1775. Phil. Tranſ. vol. lix. p. 57.

Dr. Prieſtley tried the effects of the exploſion of a large battery on ſome of the larger animals, as on a cat and dog, with a deſign of obſerving in what manner the animal ſyſtem is affected by the *electrical* ſhock. He found that convulſions attended the ſtroke, which were followed by a convulſive reſpiration, and a rattling in the throat, with other circumſtances, for which we muſt refer to his Hiſtory, &c. vol. ii. p. 253, 8vo. 1775.

It has been doubted whether, when ſmall animals are killed by the *electrical* ſhock, any of the blood-veſſels are ruptured; but Mr. Henly informs the editor, that, on giving the ſhock of a very large battery to a full grown duck, which was inſtantly killed, the animal bled freely at the mouth, which fully aſcertained that fact. The duck was ſtruck by the conductor on the crown of the head, and the charge made to paſs through its legs.

We ſhall cloſe this article with hinting at two circumſtances, which ſhould be attended to by thoſe who make experiments with *electrical batteries*. The jars of a large *battery* are liable to be broken at the time of their diſcharge; and particularly if it be conſtructed of the thinner glaſs, which is capable of receiving a greater charge than the thicker. In order to avoid this inconvenience, Mr. Nairne never diſcharges a *battery* through a good conductor, unleſs the circuit be at leaſt five foot long; but the length of the circuit, though it may preſerve the *battery*, proportionably weakens the force of the ſhock. Care ſhould alſo be taken not to touch the wires of a *battery* with the hand, nor even that of a ſingle jar, after the diſcharge, before the diſcharging rod be repeatedly applied to its ſides; as there generally remains a *reſiduum* of the charge, which is ſometimes very conſiderable. This *reſiduum* is occaſioned by the electricity, which, whilſt the jar, or *battery*, is charging, ſpreads itſelf over the uncoated ſurface of the glaſs, near the coating; this will not be diſcharged at firſt, but gradually returns to the coating after the firſt diſcharge.

ELECTRICAL *beatification*. See BEATIFICATION.

ELECTRICAL *bells*. See BELLS.

ELECTRICAL *bruſh*. See BRUSH.

ELECTRICAL *cement*. See CÆMENT.

ELECTRICAL *circuit*. See CIRCUIT.

ELECTRICAL *conductors*. See CONDUCTORS.

ELECTRICAL *eel*. See GYMNOTUS.

ELECTRICAL *experiments*. See ELECTRICITY, LEYDEN *Phial*, POINTS, &c.

ELECTRICAL *fiſh*. See TORPEDO.

ELECTRICAL *fluid*. See *Theory of* ELECTRICITY.

ELECTRICAL *kite* was contrived by Dr. Franklin, to verify his hypotheſis of the identity of electricity and lightning. It conſiſted of a large, thin, ſilk handkerchief, extended and faſtened at the four corners to two ſlight ſtrips of cedar, and accommodated with a tail, loop, and ſtring, ſo as to riſe in the air like thoſe of paper. To the top of the upright ſtick of the croſs a very ſharp pointed wire was fixed, riſing a foot or more above the wood; and to the end of the twine, next the hand, a ſilk ribband was tied. From a key ſuſpended at the union of the twine and ſilk, when the kite is raiſed during a thunder ſtorm, a phial may be charged, and electric fire collected, as is uſually done by means of a rubbed glaſs tube, or globe. Phil. Tranſ. vol. xlvii. p. 565, or Franklin's Letters, p. 111, 112.

Kites made of paper, covered with varniſh, or with well boiled linſeed-oil, in order to preſerve them from the rain, with a ſtick and cane bow, like thoſe of ſchool-boys, will anſwer the purpoſe extremely well, and are very uſeful in determining the electricity of the atmoſphere. See CONDUCTOR.

ELECTRICAL *machine* is a part of the *electrical* apparatus, contrived for collecting a greater quantity of electricity, and exhibiting its effects in a more ſenſible manner than it was poſſible to do in any other way. The parts of which it conſiſts are the electric, the moving engine, the rubber, and the prime conductor. The electric now commonly uſed is ſmooth glaſs; though in the earlier ſtate of this ſcience, before the method of inſulating the rubber, and hereby of producing negative electricity, was introduced, other ſubſtances, as ſulphur, rough glaſs, or ſealing-wax, were uſed for this purpoſe. It is not yet abſolutely determined what kind of glaſs is the moſt proper; the beſt flint glaſs is generally uſed. Dr. Prieſtley ſuggeſts, that common bottle metal, on account of its great hardneſs, and exquiſite poliſh, is fitteſt for the purpoſe of excitation. Thinner glaſs ſeems to be preferable to that which is thicker; but the workmen ſhould be cautioned not to let the glaſs ſuddenly cool, which renders it liable to break in electrical operations. The common form of the electric is either that of a globe, or of a cylinder. Each figure has its advantages and its inconveniencies. In favour of cylinders, it is alleged, that more of their ſurface may be touched with the rubber; and, on the other hand, globes may more eaſily be blown true, ſo as to preſs the rubber equally; and they may alſo be made larger in diameter, whereby their axis, if they have any, is farther from the excited ſurface, which is abſolutely neceſſary to prevent the diſſipation of the electric fire. Globes are, on this account, made with one neck, cemented to a ſtrong braſs cap, in order to adapt them to a proper frame; and Dr. Prieſtley adviſes to preſerve a communication between the external air, and the air within the globe, by means of a hole in this cap, ſo that both may be always of the ſame denſity. The moſt convenient ſize is from nine to twelve inches in diameter. Cylinders are alſo made with two necks, without any axis, and their common ſize is from four inches diameter, and eight inches long, to twelve inches diameter, and two feet long.

Some have recommended an internal coating of ſome electric ſubſtance, as reſin, turpentine, &c. in order to increaſe the *electrical* power of the glaſs. The beſt compoſition for this purpoſe is prepared by boiling four parts of Venice turpentine, one part of reſin, and one part of bees-wax, for about two hours, over a gentle fire, and ſtirring it often, with the addition of one fourth part of vermilion; which is afterward left to cool. This mixture may be uſed, by breaking a ſufficient quantity of it into ſmall pieces, putting it into the glaſs, and holding the glaſs near the fire till it is melted, and, by continually turning the glaſs, equally ſpread over its ſurface in a coat of about the thickneſs of a ſix-pence. Phil. Tranſ. vol. lvii. p. 186.

There have been various contrivances for giving motion to the electric of a *machine*. Some have uſed multiplying wheels, which are eaſily turned by a winch. The common method is to fix a wheel, grooved round its circumference on the outſide of the frame of the *machine*, which may be turned by a winch; and on the neck of the globe, or cylinder, to fix a pulley, whoſe diameter is about a third or fourth part of the diameter of the wheel; and a ſtring of worſted, or a leathern ſtrap, is put over both the wheel and the pulley; ſo that by turning the winch the electric may make three or four revolutions for one revolution of the wheel. As the ſtring relaxes by uſe, it may be proper to make the wheel moveable from the frame, ſo that it may be fixed by means of a ſcrew at a proper diſtance, for a ſufficient tenſion of the ſtring; or the pulley may have ſeveral grooves, forming circumferences of different diameters for this purpoſe. Inſtead of the pulley and ſtring, ſome have uſed a wheel and pinion, or a wheel and endleſs ſcrew, which renders the *machine* more neat and compact; though this conſtruction is not without its inconveniences, which are not ſo eaſily remedied as thoſe of the other.

The next principal part of a *machine* is the rubber, which excites the electric. Rubbers were formerly made of red baſil ſkins, ſtuffed with hair, wool, flax, or bran; but Dr. Nooth has lately introduced ſilk cuſhions ſtuffed with hair, over which a piece of leather is to be laid, rubbed with amalgam, which are preferable to the others. If the rubber is fixed on a metal plate, the plate ſhould be free from all edges and points, and covered with ſilk; it ſhould reſt on a ſpring, ſo that it may be made to ſuit any inequalities in the ſurface of the glaſs, which ſpring may, by means of a ſcrew, be made to preſs more or leſs againſt the glaſs at pleaſure. The rubber ſhould alſo be inſulated in any way that may beſt ſuit the conſtruction of the *machine*, and the diſpoſition of the electric; and a chain or wire may be eaſily ſuſpended from it, to communicate with the floor, whenever the inſulation is not neceſſary; and thus poſitive and negative electricity may be produced at pleaſure.

The prime conductor, which is a neceſſary appendage to the *electrical machine*, in order to collect the electricity from the electric, and the method of inſulating it, have been already deſcribed. See *Prime* CONDUCTOR.

To this general account of *electrical machines*, we ſhall ſubjoin a deſcription of ſome of the principal now in uſe, illuſtrated by correſponding figures. We ſhall premiſe, however, a reference to *Tab*. II. *Electricity*, *fig*. 16. which repreſents Dr. Watſon's machine, with a contrivance for whirling four large globes at once, and of uniting the power of them all; though no ſuch *machines* are now conſtructed. Such *machines*, furniſhed with ſuitable batteries, might be employed to very important purpoſes, and probably lead the way to many new diſcoveries in the ſcience of electricity.

The *machine*, repreſented in *fig*. 17. is the moſt compact and elegant, were it not liable to many inſuperable objections. The globe A is turned with the winch B, by means of wheel-work incloſed in the braſs box C; the rubber D is fixed to a ſpring, the poſition of which may be adjuſted by the ſcrew F; the conductor, GH, is a braſs tube, with a round hollow ball at each end, which collects fire by the braſs piece I, fixed in the ball H. The barrel of the conductor is put into the braſs ſocket *a*, the ball G being firſt taken off; and to this ſocket is joined the braſs ſocket K, in which the upper end of the glaſs tube L is fixed with cement; and the lower end is cemented into the wooden foot M; and it is thus inſulated.

Machines of this kind may be ſcrewed to a table, and uſed with great eaſe; but they admit of little variety with reſpect to the ſize, ſhape, or number of the electrics; and the rubber is not inſulated.

The *machine* exhibited in *Tab.* III. *Electricity, fig.* 18. was invented by Mr. Read, mathematical inſtrument maker at Knightſbridge, and conſiſts of a cylinder A, perpendicular to the horizon, and ſupported by a braſs bow, which receives the upper end of the axis. It is moved by means of a pulley at the lower end of the axis, and a wheel B, which lies parallel to the table, and revolves four times for every ſingle revolution of the wheel. The conductor C is furniſhed with points to collect the fire, and it is ſcrewed to the wire of a coated jar D, which ſtands in a ſocket between the cylinder and the wheel. Mr. Lane's electrometer is annexed to the figure, which will be explained under the article ELECTROMETER. In this *machine* the conductor is fixed; but it admits no variety of globes or cylinders, and no inſulation of the rubber.

The *electrical machine* conſtructed by Dr. Ingenhouz, conſiſts of a circular glaſs, about nine inches, or a foot, in diameter, which turns vertically, by a branch fixed to the iron axis that paſſes through the middle of it, and is rubbed by four cuſhions, each an inch and a half, or two inches long, placed at the oppoſite ends of the vertical diameter. The frame is a board about a foot ſquare, which may be faſtened by an iron crank to a table, ſupporting two ſmaller upright boards, parallel to one another, and faſtened at top by a tranſverſe piece; the axis of the plate reſts on the middle of theſe boards, and to them the rubbers are faſtened. The conductor is a braſs tube, with two horizontal branches, extending from its extremity, and reaching within about an inch and a half of the extremity of the glaſs, and thus collecting the electricity from it. A *machine* of this kind was conſtructed about the ſame time by Mr. Ramſden, mathematical inſtrument maker in London. However ingenious the contrivance of this machine, it is liable to the inconvenience of not eaſily admitting the inſulation of the rubbers.

This machine hath been greatly improved by Mr. Cuthbertſon, at Amſterdam. He uſes two plates of glaſs, and has contrived to inſulate his rubbers in an elegant manner. In ſhort, he hath by theſe means conſtructed ſome of the moſt powerful, and at the ſame time portable, and elegant machines that have yet been exhibited.

The *machine* repreſented in *fig.* 7. *Tab. Electricity*, was conſtructed by Dr. Prieſtley, and is excellently adapted to all the purpoſes which the electrician can propoſe. The frame conſiſts of two boards of mahogany, *a*, *a*, parallel to one another, and about four inches aſunder; the lower board may be fixed to a table by iron cranks; two upright pillars of baked wood are ſupported by this board, one of which, *b*, being let through the upper, is fixed immoveably to the lower board; but the other is made to ſlide in a groove, reaching almoſt the whole length of the upper board, ſo that it may be placed at any required diſtance from the other pillar, for the convenience of admitting globes, or cylinders, of different ſizes; however, it is neceſſary only when an axis is uſed. In both pillars there are ſeveral holes, by means of which globes of different ſizes may be mounted higher or lower, or two or more globes may be uſed at the ſame time; though it will be difficult to fix proper rubbers to them all. When a globe with one neck is uſed, a braſs arm, with an open ſocket, *c*, is neceſſary to ſupport the axis beyond the pulley; and this part may be put higher or lower, together with the braſs ſocket in which the axis turns. The axis, *d*, is made to paſs through the pillar *b*, ſo that it may be turned by a handle without the wheel. The frame being ſcrewed to the table, may be placed nearer to, or farther from the wheel, as the length of the ſtring in different ſtates of the weather may require. The wheel is fixed in a frame by itſelf, as *e*, and thus it may have any ſituation with reſpect to the pulley, as may be moſt convenient; and it has ſeveral grooves for admitting more ſtrings than one, if two or three globes, or cylinders, are uſed at once. The rubber, *f*, conſiſts of a hollow piece of copper filled with horſe-hair, and covered with a baſil ſkin; it is ſupported by a ſocket, which receives the cylindrical axis of a round plate of glaſs *g*, the oppoſite part of which is inſerted into the ſocket of a bent ſteel ſpring *h*. Theſe parts are eaſily ſeparated, ſo that the rubber, or the plate of glaſs, ſerving to inſulate it, may be changed at pleaſure. The ſpring may be either ſlipped along the groove, or moved in the contrary direction, ſo as to give it every deſirable poſition with reſpect to the globe or cylinder; and it is alſo furniſhed with a ſcrew *i*, which makes it preſs harder or lighter, as the operator chuſes. The prime conductor of this *machine* has been already deſcribed under the article *Prime* CONDUCTOR.

When poſitive electricity is required, a wire or chain, *n*, connects the rubber with the table or floor; and in order to obtain negative electricity, that wire is connected with another cylindrical conductor, whilſt the pear conductor in the figure is connected by another wire, or chain, with the table; and Dr. Prieſtley obſerves, that the negative and poſitive powers are equally ſtrong. Hiſt. Electr. vol. ii. p. 112, &c. 8vo.

The *machine, fig.* 19. *Tab.* III. *Electricity*, was conſtructed by Mr. Nairne, F. R. S. an ingenious inſtrument maker in London, for the grand duke of Tuſcany. The glaſs cylinder of this *machine* is twelve inches in diameter, and the cylindrical part, excluſive of the necks, nineteen inches long; the rubber is fourteen inches long, and five broad, ſupported by two wooden ſprings, which are fixed on two glaſs rods lying horizontally under the cylinder, and ſerving to inſulate the rubber; the conductor is five feet long, and twelve inches in diameter, ſupported on two ſtands, with ſolid glaſs pillars, having at the end of it a ſhort braſs rod with a ball; the ball, which is repreſented as receiving the electrical ſpark from the conductor, is of braſs, and fixed to the end of a braſs tube, that is moveable in a hole at the top of the ſtand; from the bottom of the ſtand a chain paſſes along the floor, till it is in contact with the chain hanging from the back of the rubber. The ſpark from this conductor would ſometimes fly to the diſtance of fourteen inches. See *Prime* CONDUCTOR. Phil. Tranſ. vol. lxiv part i. p. 79.

Another *electrical machine*, which we ſhall deſcribe, is that repreſented in *fig.* 5. *Tab. Electricity*. This is of a convenient ſize, and, in a ſmall compaſs, poſſeſſes the advantages of moſt other *machines*. The frame of the *machine* conſiſts of the board ABC, which is capable of being faſtened to a table by two iron cranks. On this board are raiſed two ſtrong wooden pillars, KI, and AH, which ſupport both the cylinder and wheel. From one of the braſs caps of the cylinder FF, an axis of ſteel proceeds, which paſſes quite through a hole in the pillar KI, and has, on the outer ſide of the pillar, a pulley, I, fixed on its ſquare end. In the circumference of the pulley there are three or four grooves, ſuiting the variable length of the ſtring *ab*, which goes round one of them, and round the groove of the wheel D. The other cap of the cylinder has a ſmall cavity, which fits the cylindrical extremity of a ſtrong ſcrew, that proceeds from the pillar H. The wheel D, moved by the handle E, turns round a ſtrong axis, projecting from almoſt the middle of the pillar KI. The rubber G is a thin quilted cuſhion of ſilk, ſtuffed with hair, and faſtened with ſilken ſtrings to a piece of wood, adapted to the ſurface of the cylinder; its length is about four inches leſs than that of the body of the cylinder, and it rubs about one fourth part of its circumference. It is terminated at its upper extremity by a piece of oiled ſilk, which covers almoſt all the upper part of the cylinder; and to the lower part a piece of leather, well rubbed with amalgam, is faſtened, which, when turned over the cuſhion, interpoſes between it and the ſurface of the cylinder. The rubber is ſupported by two ſprings, ſcrewed to its back, and proceeding from the wooden cap of a ſtrong glaſs pillar, perpendicular to the board on which the machine reſts, and made to ſlide, by a ſquare wooden baſe, in two grooves of this board; and thus the pillar may be faſtened by a ſcrew at any required diſtance from the cylinder, and the rubber made to preſs harder or lighter upon it. By means of this glaſs pillar the rubber is inſulated; and when inſulation is not required, a chain may be hung to it by a ſmall hook, communicating with the leather, and falling down to the table or floor. The prime conductor of this *machine*, made of hollow braſs, (*fig.* 4.) is ſupported by glaſs pillars, fixed by braſs ſockets in the board CC; and it receives the electric fluid through the points of the collector L, which is placed about half an inch diſtant from the ſurface of the cylinder. If the wheel D be turned by the handle E, in the direction *a b c*, and the chain remain ſuſpended from the rubber to the floor, the conductor AB will be electrified poſitively; but if the chain be removed from the rubber to the prime conductor, the rubber will be electrified negatively; and another conductor, like the former, applied to the rubber, will be charged negatively to the ſame degree, as that was charged poſitively. *Machines* of this conſtruction are made and ſold by Mr. Adams, his majeſty's philoſophical inſtrument maker, &c. in Fleet-ſtreet, London. See Cavallo's Electricity, p. 154, &c.

Dr. M. Van Marum, a late German writer, has conſtructed a *machine*, in which gum lac, in the form of a diſc, is ſubſtituted as an electric in the room of glaſs, and quickſilver is uſed as a rubber. He enumerates ſeveral advantages attending this conſtruction; the effect of the *machine* depends very little on the temperature of the air; its operation is uniform; it is more eaſily worked than *machines* of the common kind; it may be kept in motion by a weight, which, after being wound up to the height of twelve feet, will continue to preſerve its motion for ſix hours; a negative power may be obtained from it, exactly ſimilar to the poſitive; and the conductors annexed to it will ſerve to convey the *electrical* power, with very little alteration, wherever it is required, without any addition of chain, wires, &c. Verhandeling over het Electrizeeren, &c. or a Treatiſe concerning the Method of Electrifying, by M. Martinus Van Marum. Groningen. 1776.

Electrical *phial.* See Leyden *Phial.*

Electrical *repulſion.* See *Experiments, &c. in* Electricity.

Electrical *rubber.* See Electrical *apparatus,* and Electrical *machine.*

Electrical *ſhock* denotes the exploſion between the oppoſite ſides of a charged electric; ſo called, becauſe, if the diſcharge from one to the other be made through the body of an animal, it occaſions a ſudden motion by the contraction of the muſcles through which it paſſes, and a diſagreeable ſenſation. The force of the *ſhock* is proportioned to the quantity of coated ſurface, the thinneſs of the glaſs, and the power of the machine by which it is charged. Its velocity is almoſt inſtantaneous, as it has not been found to take up the leaſt ſenſible ſpace of time in paſſing to the greateſt diſtances. Mr. Ferguſon accounts for the *ſhock* being felt at the ſame inſtant by perſons at various diſtances, without allowing the inſtantaneous velocity of the electric fluid, in the following manner. If a ſmall tube of any length, and open at both ends, be filled with water, and laid down flat on level ground, the water will continue motionleſs in the tube; but if a ſyringe be filled with water, and fixed to either end of the tube, and then the piſton of the ſyringe be preſſed inward, to force more water into the tube, the whole water in the tube is thereby put into motion; and at the inſtant the piſton begins to be puſhed, the water begins to run out at the other end of the tube, which is not the water that was in the ſyringe, but that which was in the tube before. This caſe, he ſays, is exactly ſimilar to that of a number of perſons feeling the *ſhock* at once; for each perſon has his natural quantity of electric fire, which lies dormant in him, till it is put in motion by ſome outward cauſe; and at the inſtant when the contents of the charged jar are diſcharged upon the firſt perſon, the electric fire in him is put into motion, and this puts it into motion in the next to him, and ſo on through the whole connected company. He adds, that in taking ſparks with the knuckle from a prime conductor, the velocity of the ſpark is not ſo great as to elude the ſight, even through the ſmall ſpace between the prime conductor and the knuckle. See Circuit.

Query, Is not this theory of Mr. Ferguſon's liable to an objection? Suppoſe a battery ſufficient to melt three feet of ſmall wire to be diſcharged through ſuch a circuit; the wire will be melted; but if the progreſs of the charge were *gradual*, beginning with the natural quantity in the wire, would the index of Mr. Henly's electrometer fall inſtantly to its ſtem upon the diſcharge, as is really the caſe? And, if the whole charge of the battery doth not ruſh through the circuit in an inſtantaneous manner, we muſt ſuppoſe the wire to contain in itſelf nearly as much electric matter as the battery is charged with; but this would be a ſuppoſition too groſs to be admitted.

It has been obſerved that the *electrical ſhock* is weakened by being thus communicated through different perſons in contact with one another. It is, indeed, obſtructed in its paſſage, even through the beſt conductors; as it will prefer a ſhort paſſage through the air to a long one through the moſt perfect conductors; and if the circuit be interrupted, either by electrics, or very imperfect conductors of a moderate thickneſs, the *ſhock* will rend them in its paſſage, diſperſe them in every direction, and exhibit the appearance of a ſudden expanſion of the air about the center of the *ſhock*. A ſtrong *ſhock* made to paſs through or over the belly of a muſcle, forces it to contract; and ſent through a ſmall animal body deprives it inſtantly of life, and haſtens putrefaction. It gives polarity to magnetic needles, reverſes their poles, and produces effects preciſely ſimilar, though inferior in degree, to thoſe of Lightning.

Electrical *ſtar.* See Star.

ELECTRICITY, or Electrical *force,* is that power, or property, which was firſt obſerved in amber, the *lyneurium,* or Tourmalin, and which ſealing-wax, glaſs, and a variety of other ſubſtances, called Electrics, are now known to poſſeſs, of attracting light bodies, &c. when excited by heat or friction; and which is alſo capable of being communicated in particular circumſtances to other bodies; and the *ſcience of electricity* is that part of natural philoſophy, which propoſes to inveſtigate the nature and effects of this power, and of other ſimilar powers connected with it. For an account of the etymology of the term, and the firſt uſe and application of it, ſee Amber. Muſchenbroek and Æpinus have obſerved a conſiderable analogy, in a variety of particulars, between the powers of *electricity* and magnetiſm; and they have alſo pointed out many inſtances in which they differ.

The principal phenomena in which they reſemble one another are the following: as a glaſs tube touched by an excited tube has a ſucceſſion of poſitive and negative parts, ſo a rod of iron held near a magnet will have ſeveral ſucceſſive poles. Magnets, when their oppoſite poles are laid to one another, adhere; and thus bodies poſitively and negatively electrical, when in contact, will unite to one another; the poſitive and negative ſides of glaſs anſwer to the attracting and repelling ends of hardened ſteel, made magnetical; the electric and magnetic fluids are moved in both with conſiderable difficulty. As there can be no condenſation of the electric fluid in glaſs without a rarefaction, there can be no condenſation, or poſitive magnetiſm, in one end of a bar, without an evacuation, or negative magnetiſm, in the other. Steel correſponds to electrics, and iron, in ſome meaſure, to conductors; ſteel does not ſo eaſily receive the magnetic virtue, but retains it more ſtrongly than iron, as electrics receive the electric fluid with greater difficulty than conductors, but do not ſo readily part with it. Electrified bodies attract and repel other bodies, in conſequence of rendering them electrical: thus a magnet attracts iron, after having firſt of all made it a magnet. The ſeveral pieces of a tourmalin have their poſitive and negative ſide, juſt as the pieces of a broken magnet would have theirs. Theſe powers alſo differ from one another; for, although they are both excited by friction, the magnetic virtue requires a determinate mode of friction, which the electric does not. Steel rubbed with iron will excite the former, whereas an electric rubber will not excite an electric. The magnetic virtue appears in ſome caſes without friction, or the uſe of the other ordinary means of exciting electrics. A moiſt air deſtroys *electricity,* without affecting magnetiſm; the magnetic virtue is of much longer duration than the electrical. Magnetical bodies require no particular inſulation, in order to diſcover their virtue, as electrified bodies do; magnetiſm acts only on iron, whereas *electricity* affects moſt other bodies; the magnetic virtue is much ſtronger than the electric, and yet produces neither light nor fire. The equilibrium in a magnet cannot be reſtored, by forming a communication between the oppoſite ends with iron, as it may in charged glaſs. There are no ſubſtances poſitively or negatively magnetical only, as there are bodies poſitively or negatively electrical only.

Signior Beccaria has alſo made a number of experiments, with a view of aſcertaining the connection between magnetiſm and *electricity,* and explaining the effects of the former on the latter in particular circumſtances; from which he concludes in general, that the magnetic direction given to a needle by lightning and artificial *electricity,* does not depend on the direction of the electric matter in entering into the needle, but on the particular poſition of the needle when the charge is ſent through it; and he is confirmed in his conjectures, that the peculiar magnetic force, obſerved in the loadſtone, is to be attributed to either atmoſpherical or ſubterraneous ſtrokes of lightning; and that the univerſal ſyſtematical properties of magnetic bodies are produced by an univerſal ſyſtematical circulation of the electric element, through the atmoſphere, or in the bowels of the earth. See farther on this ſubject, Muſchenbroek Introd. ad Phil. Natural. vol. i. p. 342, &c. 4to. 1762. and Æpinus's Tentamen Theoriæ Electric. & Magn. 1759; or for an abridgment of Æpinus Prieſt. Hiſt. Elec. vol. i. p. 501. Beccaria's Treatiſe on Artificial Electricity, &c. 1776.

Electricity, *abſtract of the hiſtory of.* The nature and compaſs of this work will allow our only mentioning ſome of the principal diſcoveries that have been made in the ſeveral periods of the progreſs of this ſcience; premiſing, in general, that there is no ſingle branch of natural knowlege that has been cultivated with greater aſſiduity and ſucceſs, or in which ſuch rapid advances have been made within fifty years paſt, as this of *electricity.*

W. Gilbert, a native of Colcheſter, and a phyſician in London, if we conſider that the ſubject was in a great degree new and unknown in his time, made many conſiderable experiments and diſcoveries, which are contained in his treatiſe De Magnete, publiſhed in the year 1600. He enlarged the liſt both of electrics, and of the bodies on which electrics act: he remarked, that a dry air was moſt favourable to electrical appearances, whilſt a moiſt air almoſt annihilates the electric virtue: he alſo obſerved the conical figure aſſumed by electrified drops of water: he conſidered electrical attraction ſeparately from repulſion, which, he apprehended, had no place in *electricity*, as a phenomenon ſimilar to the attraction of coheſion; and he imagined, that electrics were brought into contact with the bodies on which they act by their effluvia, excited by friction.

The honourable Mr. Boyle added to the catalogue of electric ſubſtances; but he thought that glaſs poſſeſſed this power in a very low degree: he found, that the *electricity* of all bodies, in which it might be excited, was increaſed by wiping and warming them before they were rubbed; that an excited electric was acted upon by other bodies as ſtrongly as it acted upon them; that diamonds, rubbed againſt any kind of ſtuff, emitted light in the dark; and that feathers would cling to the fingers and to other ſubſtances, after they had been attracted by electrics. He accounted for electrical attraction, by ſuppoſing a glutinous effluvium emitted from electrics, which laid hold of ſmall bodies in its way, and carried them back to the body from which it proceeded. Otto Guericke, the famous inventor of the air-pump, lived about the ſame time: this ingenious philoſopher diſcovered, by means of a globe of ſulphur, that a body once attracted by an electric was repelled, and continued in this ſtate of repulſion till it had been touched by ſome other body: he alſo obſerved, the ſound and light produced by the excitation of his globe; and that bodies immerged in electric atmoſpheres are themſelves electrified, with an *electricity* oppoſite to that of the atmoſphere. The light emitted by electrical bodies was, not long after, obſerved to much greater advantage by Dr. Wall, who aſcribes to light the electrical property which they poſſeſs; and he ſuggeſts a ſimilarity between the effects of *electricity* and lightning. Sir Iſaac Newton was not inattentive to this ſubject: he obſerved, that excited glaſs attracted light bodies on the ſide oppoſite to that on which it was rubbed; and he aſcribes the action of electric bodies to an elaſtic fluid, which freely penetrated glaſs, and the emiſſion of it to the vibratory motions of the parts of excited bodies. Mr. Hauksbee, with whom commenced a new æra in the hiſtory of this ſcience, wrote in the year 1709, and firſt took notice of the great electrical power of glaſs, the light proceeding from it, though others had before obſerved, the light proceeding from other electrified ſubſtances; and the noiſe occaſioned by it, together with a variety of phenomena relating to electrical attraction and repulſion: he firſt introduced a glaſs globe into the electrical apparatus; and to the uſe of this many of his important diſcoveries were owing. After his time, there was an interval of near twenty years in the progreſs of this ſcience; till Mr. Stephen Grey eſtabliſhed a new æra in the hiſtory of *electricity*. To him we owe the capital diſcovery of communicating the power of native electrics to other bodies, in which it cannot be excited, by ſupporting them on ſilken lines, hair lines, cakes of reſin, and glaſs; and a more accurate diſtinction than had hitherto obtained between electrics and non-electrics: he alſo ſhewed the effect of *electricity* on water much more obviouſly than Gilbert had done in the infancy of this ſcience. The experiments of Mr. Grey were repeated by M. du Fay, member of the Academy of Sciences at Paris, who added to the number many new experiments and diſcoveries of his own. He obſerved, that electrical operations are obſtructed by great heat as well as by a moiſt air; that all bodies, both ſolid and fluid, were capable of receiving *electricity*, when placed on warm or dry glaſs, or ſealing-wax; that thoſe bodies which were of themſelves the leaſt electric had the greateſt degree of *electricity* communicated to them by the approach of the excited tube. He alſo tranſmitted the electric virtue through a diſtance of 1256 feet; and firſt obſerved the electric ſpark from a living body, ſuſpended on ſilken lines, and noted ſeveral circumſtances attending it. M. du Fay likewiſe eſtabliſhed a principle, firſt ſuggeſted by Otto Guericke, that electric bodies attract all thoſe which are not ſo, and repel them as ſoon as they are become electric, by the vicinity or contact of the electric body. He alſo inferred from other experiments, that there were two kinds of *electricity*; one of which he called the *vitreous*, belonging to glaſs, rock cryſtal, &c. and the other *reſinous*, as that of *amber*, *gum lac*, &c. diſtinguiſhed by their repelling thoſe of the ſame kind, and attracting each other. He obſerved, that communicated *electricity* had the ſame property as the excited; and that electric ſubſtances attract the DEW more than conductors.

Mr. Grey, reſuming his experiments in 1734, ſuſpended ſeveral pieces of metal on ſilken lines, and found, that by electrifying them, they gave ſparks, which was the origin of metallic conductors; and, on this occaſion, he diſcovered a cone or pencil of electric light, ſuch as is now known to iſſue from an electrified point. From other experiments he concludes, that the electrical power ſeems to be of the ſame nature with that of thunder and lightning.

Dr. Deſaguliers ſucceeded Mr. Grey in the proſecution of this ſcience. The account of his firſt experiments is dated in 1739. To him we owe thoſe technical terms of *conductors* or *non-electrics*, and *electrics per ſe*, which are explained in the courſe of this work. He firſt ranked pure air among the electrics *per ſe*, and ſuppoſed its *electricity* to be of the vitreous kind. After the year 1742, in which Dr. Deſaguliers concluded his experiments, the ſubject was taken up and purſued in Germany: the globe was now ſubſtituted for the tube, which had been uſed ever ſince the time of Hauksbee, and a cuſhion was ſoon after uſed as a rubber inſtead of the hand. About this time, ſome uſed cylinders inſtead of globes; and ſome of the German electricians made uſe of more globes than one at the ſame time. By thus increaſing the electrical power, they were the firſt who ſucceeded in ſetting fire to inflammable ſubſtances. This indeed was firſt done by Dr. Ludolf, in the beginning of the year 1744, who kindled, with ſparks excited by the friction of a glaſs tube, the ætherial ſpirit of Frobenius. Mr. Winkler did the ſame by a ſpark from his own finger, and kindled French brandy and other ſpirits by previouſly heating them. Mr. Gralath fired the ſmoak of a candle juſt blown out, and lighted it again; and Mr. Boze fired gun-powder, by means of its inflammable vapour. Ludolf the younger, about this time, demonſtrated, that the luminous barometer was made perfectly electrical by the motion of the quick-ſilver: the electrical ſtar and electrical bells were alſo of German invention. Dr. Watſon in England made a diſtinguiſhed figure from this period in the hiſtory of *electricity*: he fired a variety of ſubſtances by the electrical ſpark, and firſt diſcovered, that they were capable of being fired by the repulſive power of *electricity*. In the year 1745, the accumulation of the electrical power in glaſs, by means of the Leyden phial, was firſt diſcovered. See LEYDEN *phial*. For the method practiſed about this time, of meaſuring the diſtance to which the electric ſhock may be conveyed; ſee *Electrical* CIRCUIT. Dr. Watſon made a very important diſcovery in this ſcience, that the glaſs tubes and globes did not contain the electric matter in themſelves, but only ſerved as *firſt-movers* or *determiners*, as he expreſſes it, of that power, which was alſo confirmed towards the end of 1746, by Mr. Wilſon, who made the ſame diſcovery, that the electric fluid did not come from the globe, but from the earth, and other non-electric bodies about the apparatus. Dr. Watſon alſo diſcovered what Dr. Franklin obſerved about the ſame time in America, and called the *plus* and *minus* in *electricity*. He likewiſe demonſtrated, that the electric matter paſſed through the ſubſtance of the metal of communication, and not merely over the ſurface.

We muſt omit other experiments and concluſions drawn from them by Mr. Wilſon, Mr. Smeaton, Dr. Miles in England; and by the Abbé Nollet, with regard to the effect of *electricity* on the evaporation of fluids, on ſolids, and on animal and other organized bodies, in France. The hiſtory of *medical* ELECTRICITY, commenced in the year 1747.

Whilſt the philoſophers of Europe were buſily employed in electrical experiments and purſuits, thoſe of America, and Dr. Franklin in particular, were equally induſtrious, and no leſs ſucceſsful. His diſcoveries and obſervations in *electricity* were communicated in ſeveral letters to a friend; the firſt of which is dated in 1747, and the laſt in 1754. A ſummary of his ſyſtem will be delivered under the articles *Theory of* ELECTRICITY, LEYDEN *Phial*, and POINTS. See alſo CHARGING, CONDUCTORS, ELECTRICS, &c.

The ſimilarity between lightning and *electricity* had been ſuggeſted by ſeveral writers on this ſubject; but Dr. Franklin firſt propoſed a method of bringing the matter to the teſt of experiment, by raiſing an ELECTRICAL *kite*; and he ſucceeded in collecting electrical fire by this means from the clouds, in 1752, a month after the electricians in France had verified the ſame theory, and independently of any knowlege of what they had done: and to him we owe the practical application of this diſcovery, in ſecuring buildings from the damage of lightning, by erecting metalline CONDUCTORS. See alſo LIGHTNING.

In the ſubſequent period of the hiſtory of this ſcience, Mr. Canton in England, and Signior Beccaria in Italy, acquired diſtinguiſhed reputation. They both diſcovered, independently of one another, that air was capable of receiving *electricity* by communication, and of retaining it when received; and they had various contrivances for this purpoſe. Mr. Canton alſo, towards the latter end of the year 1753, purſued a ſeries of experiments, which prove, that the appearances of poſitive and negative *electricity*, which had hitherto been deemed eſſential and unchangeable properties of different ſubſtances, as, e. g. of glaſs and ſealing-wax, depend upon the ſurface of the electrics, and that of the rubber. This hypotheſis, verified by numerous and inconteſtible experiments, occaſioned a controverſy between Mr. Canton and Mr. Delaval, who ſtill maintained, that theſe different powers depended entirely on the ſubſtances themſelves. About this time, ſome curious experiments were performed, by four of the principal electricians of that period, viz. Mr. Canton, Dr. Franklin, Meſſrs. Wilcke and Æpinus, in order to aſcertain the nature of electric atmoſpheres; the reſult of which may be ſeen under the article *Electric* ATMOSPHERE.

The theory of two electric fluids, always co-exiſtent and counteracting each other, though not abſolutely independent, was maintained by a courſe of experiments on ſilk ſtockings of different colours, communicated to the Royal Society by Mr. Symmer, in the year 1759, which were farther purſued by Mr. Cigna of Turin, who publiſhed an account of them in the Memoirs of the Academy at Turin for the year 1765.

Many inſtances occur in the hiſtory of the ſcience about this period, of the aſtoniſhing force of the electric ſhock, in melting wires, and producing other ſimilar effects: but the moſt remarkable is an experiment of S. Beccaria, in which he thus revivified metals. Several experiments were alſo made by Dr. Watſon, Mr. Smeaton, Mr. Canton, &c. on the paſſage of the electric fluid through a vacuum, and its luminous appearance, and on the power which particular ſubſtances poſſeſs of retaining the light communicated to them by an electric exploſion. Mr. Canton, S. Beccaria, and others, made many experiments to identify *electricity* and lightning, to aſcertain the ſtate of the atmoſphere at different times, and to explain the various phenomena of the AURORA *borealis*, *Water*-SPOUTS, HURRICANES, &c. on the principles of this ſcience.

Thoſe who are deſirous of farther information with reſpect to the hiſtory of electrical experiments and diſcoveries, may conſult the excellent work of Dr. Prieſtley, entitled, The Hiſtory and Preſent State of *Electricity*, "&c. Ed. 3. 1775." However, Dr. Prieſtly is not a mere hiſtorian: his work contains many original experiments and diſcoveries made by himſelf. He aſcertained the conducting power of CHARCOAL, and of hot glaſs; the *electricity* of fixed and inflammable air, and of oil; the difference between new and old glaſs, with reſpect to the diffuſion of *electricity* over its ſurface; the lateral exploſion in electrical diſcharges; a new method of fixing circular-coloured ſpots on the ſurfaces of metals, and the moſt probable difference between electrics and conductors; beſides a variety of other particulars, too numerous to be recited in this abſtract of the hiſtory, and yet of conſiderable importance with regard to the advancement and extenſion of the ſcience of *electricity*. We ſhall endeavour, in the courſe of this work, to do juſtice to the merits of other electricians, to whom the ſcience is under any peculiar obligations. The name of Mr. Henly often occurs in articles appropriated to this part of natural philoſophy; to him we owe ſeveral curious experiments and obſervations on the electrical and conducting quality of different ſubſtances, as CHOCOLATE, VAPOUR, &c. the reaſon of the difference between them; the fuſion of platina; the nature of the electric fluid, and its courſe in a diſcharge; the method of eſtimating the quantity of it in electrical bodies by an electrometer; the influence of POINTS, &c. &c.

ELECTRICITY, *Experiments and Phenomena in.* It may be premiſed in general for the uſe of young electricians, who have not acceſs to other treatiſes on this ſubject, that every part of the electrical apparatus ſhould be kept clean and dry; that, when the air is dry and the weather froſty, experiments are performed with the greateſt eaſe and advantage; that very hot weather is unfavourable to electrical experiments; that when the air is damp, they ſhould be performed in a room well dried with a fire. If a glaſs tube is uſed, its power may be increaſed by a ſmall quantity of bees wax drawn over its ſurface, and the hand ſhould be kept two or three inches below the upper part of the rubber. The globe, or cylinder of a machine, ſhould be firſt wiped with a clean hot flannel, or an old ſilk handkerchief; the ſilken part of the rubber ſhould be well dried; and the leather that is ſpread over it ſhould be firſt rubbed with tallow, and then with AMALGAM. It may not be improper here to mention the uſe of Dr. Higgins's amalgam, which is attended with ſeveral advantages. 1. It excites a ſtronger electricity; and 2. Does not fly off from the rubber by the motion of the electric. The compoſition is four parts of mercury to one of zinc. Theſe are melted together in an iron ladle, over a ſlow fire. Put in firſt the zinc, and by degrees add the mercury. It forms a hard maſs when cold, which may be warmed again when uſed; or it may be ſcraped off with a dull edged knife, and ſpread upon the rubber, which is firſt to be prepared with a little tallow. See an account of Mr. Canton's amalgam, under the article AMALGAMATION *of Tin*.

The rubber thus prepared, ſhould be made to communicate, when the room is very dry, with moiſt earth or water, by good conductors; and if the cylinder and rubber are in good order, the winch be turned, and no conductors communicate with the electric, the electric fluid will be felt on the knuckle held within a ſmall diſtance of it, like a current of air, attended with a ſpark and a crackling noiſe. When the machine has been uſed for ſome time, the electric will contract black ſpots from the amalgam, or foulneſs of the rubber, which muſt be carefully removed, or they will gradually increaſe, and prevent its excitation. An incruſtation of the ſame kind will be formed upon the rubber, by which it will be conſiderably improved; and if this be moiſtened or ſcraped, no addition of ſuch amalgam will be neceſſary. If the coated jars, which are deſigned for uſe, be warmed a little, they will better receive and retain the charge. Candles ſhould be placed at a conſiderable diſtance from the prime conductor, leſt their flames ſhould attract and diſperſe the electric fluid. The electrical operator ſhould be careful in the uſe of his machine, jars and battery, that he may ſuſtain no injury by any ſudden or unexpected diſcharge. Effectually to prevent this, we would always recommend the uſe of a diſcharging rod, with a handle of glaſs. With theſe precautions, there is no part of ſcience that will afford a greater variety o amuſing experiments than *electricity*. We ſhall ſelect th following as a ſpecimen:

1. If a ſmooth glaſs tube be excited by a proper rubb and the knuckle be moved lengthways from one end o the tube to the other, without touching it, you will hea a continued ſnapping or crackling noiſe; and if the roo be darkened, ſparks of light may be obſerved wherever the tube ſnaps; and a light may be ſeen following the hand that rubs the tube. When the tube is in good order, pencils of the electric matter will dart into the air from ſeveral parts of it ſpontaneouſly, and make a very beautiful appearance. If a rough tube be uſed with a proper rubber, the electric matter will be ſeen to ſpread upon its ſurface on the approach of the knuckle or any other conducting ſubſtance in a very agreeable manner. A large ſtick of ſealing-wax ſhews this phenomenon to great advantage.

2. If a ſmall light feather be brought near an excited tube, either of ſmooth or rough glaſs, it will be attracted, jump to the tube, and ſtick cloſe to the ſurface of it, till it be ſaturated with the electric matter, which, as it is a bad conductor, it receives ſlowly: it will then be repelled by it, and may be kept ſuſpended, or driven about the room by the electrified tube for a conſiderable time, unleſs it parts with its *electricity* to ſome conducting ſubſtance; and in this ſtate of repulſion, the ſame ſide of the feather will be always preſented to the tube; becauſe, being a bad conductor, the ſuperinduced *electricity* will be forced by the action of the tube to that ſide which is fartheſt from it; and that ſide will, of courſe, be moſt repelled: the charged bottle produces the ſame effect. If one perſon holds in his hand an excited ſmooth tube, and another holds an excited rough tube, or any other electric negatively electrified, at the diſtance of about one foot and a half, a feather introduced between theſe two tubes, poſſeſſing oppoſite *electricities*, will leap alternately from one to the other; or, if a finger is held at eight or ten inches from either tube, the feather will alternately jump from the tube to the finger, and from the finger to the tube. This experiment may be varied, by turning the winch of an electrical machine with one hand, and holding the other about three or four inches from the end of the prime conductor; then, if a ſmall lock of cotton be let fall on the hand near the conductor, it will jump from the hand to the conductor, and from the conductor to the hand again, being alternately attracted and repelled, and aſſuming an oblong form, though its motion will be ſo quick, that little elſe beſides its colour can be ſeen.

3. If two feathers or cork balls be ſuſpended, one by a ſilken, and the other by a linen thread, an excited tube will attract them both, but repel only the former; and if

the ſilken thread be well moiſtened, the feather ſuſpended by it will be attracted, but no more repelled by the tube; the electric matter in both caſes being inſtantly diſcharged by the conducting moiſture and linen thread. If the ſmall ball ſuſpended by a ſilk thread of about eight inches in length, be held in the hand, about eight inches from an electrified prime conductor, whoſe *electricity*, either poſitive or negative, is not very ſtrong, it will not be attracted; becauſe, by being inſulated, it is incapable of communicating part of its electric matter to, or receiving any from other bodies, and thus of acquiring an *electricity* oppoſite to that of the conductor. But if the finger, or any conducting body, be preſented to that ſide of the ball which is fartheſt from the prime conductor, it will move towards the conductor, having either received or loſt *electricity* from the body preſented to it; and after having touched the prime conductor, it will be repelled by it, both poſſeſſing the ſame kind of *electricity*, and having either more or leſs than their natural ſhare of it. However, if the inſulated ball be brought very near the prime conductor, or the prime conductor be ſtrongly electrified, it will be attracted without preſenting to it any conducting ſubſtance; for, in this caſe, the natural *electricity* of the ball will be forced into the air, or accumulated on the ſide remoteſt from the conductor electrified poſitively; or the redundance in the ball will be acquired from the air, or its natural quantity will be accumulated on the ſide neareſt to the conductor, electrified negatively. If the cork ball be ſuſpended by a linen thread, it will be attracted at a much greater diſtance; becauſe the electric fluid will eaſily paſs to it, or from it along the thread, as the prime conductor is electrified poſitively or negatively.

4. To a ring of wire, at leaſt a foot larger in diameter than the globe of the machine, let pieces of fine linen thread, about five inches long be tied at the diſtance of about two inches from each other. Let this ring be held horizontally round the globe, the conductor being firſt removed, and the globe turned, the threads will be attracted, and point towards the center of the globe, reſembling the ſpokes of a wheel: in this caſe, the electric fluid paſſes freely from the perſon who holds the ring to or from the globe, as it is electrified negatively or poſitively.

5. If a large plumy feather, as *b* (*fig.* 17. *Tab.* II. *Electricity*) be ſtruck into the prime conductor, and the globe be turned, its fibres will repel each other, and expand in all directions; but if any conducting ſubſtance be made to touch the prime conductor; or, if the point of a needle be brought near the feather or the conductor, it will ſhrink, the *electricity* being thus taken off; and if the point of the finger be held near the feather, it will cling round it, and bend to the motion of the finger round it.

6. If the conductor, in *fig.* 17, be placed, ſo that the points I may almoſt touch the globe of the machine; and Mr. Canton's ELECTROMETER, conſiſting of ſmall cork or pith balls O and P annexed to the ends of a linen thread be ſuſpended over the wire N, the threads will hang perpendicularly and parallel to one another, and the balls will touch; but if the globe be turned, the balls will be electrified, and repel each other, more or leſs in proportion to the degree of *electricity* communicated to the conductor. They are in this caſe electrified poſitively, or they receive more than their natural quantity of the electric fluid, which cannot be diſſipated in the air as faſt as they receive it, and therefore they repel each other; but if the prime conductor were electrified negatively, they would then have leſs than their natural quantity, and the caſe would be ſtill the ſame: no electric ſubſtance applied to the conductor can bring them together; but if the prime conductor be touched with ſome conducting ſubſtance uninſulated, the redundance would be carried off, or the deficiency ſupplied, and then the balls would immediately come together.

7. The attraction or repulſion of light electrified bodies may be beautifully repreſented, by ſuſpending the braſs-plate X from the prime conductor, directly over the plate Y, and about three inches from it. See *fig.* 17. On the lower plate place any light bodies, as bran, feathers, pieces of paper, or of leaf-gold, and then work the machine; upon which theſe light bodies will move to and fro between the plates, being firſt attracted by the upper plate, and then repelled; and having diſcharged themſelves on the lower, they will be alternately attracted and repelled again. If ſmall images, in the ſhape of men and women, be laid on the lower plate, the images will dance from one plate to the other in an amuſing manner. If a piece of leaf-gold be cut with a pretty large angle at one extremity, and a very acute one at the other, it will need no lower plate, but will hang by its larger angle at a ſmall diſtance from the conductor; and by the continual waving motion of its lower extremity, have the appearance of ſomething animated, nibbling at the conductor. and therefore called by Dr. Franklin the *golden fiſh*. If the *electrical* BELLS, already deſcribed, be hung from the ſame conductor, the ſinging and dancing will accompany each other; and the amuſement may be heightened, by occaſionally touching the prime conductor with a finger or braſs rod, which would make both to ceaſe at once; and when the finger or rod is removed, both will be renewed. If the application of the finger or rod be artfully concealed, the figures might be made to dance, and the bells to ring, ſeemingly at the word of command. In this experiment, the light bodies, and the lower plate, being within the atmoſphere of the upper electrified plate, become poſſeſſed of a contrary *electricity*, by communicating part of their natural quantity to the conductors with which they are connected; and thus being differently electrified, attract each other; but when theſe bodies touch the upper plate, they are endued with the ſame *electricity*, and are inſtantly repelled to the lower plate, which, being electrified with a contrary *electricity*, aſſiſts in repelling them back again to the upper one. If the lower plate Y, and its ſtand, be removed, and the light bodies be put upon a clean dry pane of glaſs, and held by one corner under the plate X, the experiment would not ſucceed; becauſe they cannot part with any of their natural quantity of the fluid, and become poſſeſſed of an *electricity* contrary to that of X; but if a finger, or any conductor, be preſented to the lower ſide of the glaſs, the attraction and repulſion will take place, becauſe the bodies will now part with their *electricity* to the upper ſurface of the glaſs, and charge it, the electric fluid belonging to the lower ſurface being repelled and carried away by the conductor. If the prime conductor were electrified negatively, the effect would be the ſame; but the *electricity* of the plates would be reverſed, the upper plate being electrified negatively, and the lower plate electrified poſitively. If a perſon, ſtanding on an inſulating ſtool, and having in his hand a chain faſtened to the prime conductor, ſtretch the other hand over the light ſubſtances on the lower plate, they will perform the dances already deſcribed.

8. Let a bent wire C D E (*fig.* 20. *Tab.* III.) be faſtened to the outſide of a coated jar, and be ſo bent as to have its knob E at the ſame height with the knob A of the jar; let a piece of cork be cut in the ſhape of a ſpider, and linen threads be drawn through it with a needle, and cut to a proper length to repreſent its legs; and then ſuſpended by a ſilk thread, ſo as to hang exactly in the middle between the knobs A and E; charge the jar, by bringing the knob A in contact with the prime conductor, and place it exactly where it ſtood before it was charged; the ſpider will now begin to move from knob to knob, ſtretching his legs towards each ball as he approaches it, and graſping each ball with them when he touches it, as if he were really animated, and continue its motion for a conſiderable time, till the jar is almoſt diſcharged. The ſpider is firſt attracted by the knob A, which communicates with the inſide of the bottle, and receiving part of its *electricity*, is repelled, and diſcharges it on the knob E, communicating with the outſide of the jar; and it is then alternately attracted and repelled by A and E, till the diſcharge is nearly completed, and the equilibrium between the oppoſite *electricities* of the inner and outer ſurfaces of the jar is nearly reſtored.

9. Let a metal cup, almoſt full of water, be ſuſpended by a loop or bow from the prime conductor, and the winch of the machine be turned, ſo as to electrify the water; and a finger be held then perpendicularly over the water, and very near it, the electrified water will riſe in a cone towards the end of the finger, and, in a dark room, a ſtream of fire will be ſeen to iſſue from the water to the finger. If one leg of a glaſs ſyphon be put into this water, and the other leg be drawn out into a capillary bore, that the water may only juſt drop out of it, and the water be electrified, it will run in a continued ſtream, which, in the dark, will be beautifully illuminated. If an unelectrified perſon with his finger, or a piece of metal, touch the prime conductor, the ſtream will ſtop, and the light diſappear; and when the metal is removed, both will be renewed.

10. Electric attraction and repulſion may be exhibited by means of the electric light, by fixing two pointed wires, one in the prime conductor, and the other in the rubber; when the winch is turned, the point of the former wire will be illuminated with a BRUSH OR PENCIL, and that of the latter with a STAR: if an excited glaſs tube be brought near the firſt wire, the bruſh will be turned aſide or repelled by the atmoſphere of the

tube; and if it be held directly oppoſite to the point, the bruſh will vaniſh: but if the excited tube be brought near the point of the wire, fixed upon the rubber, the ſtar will turn towards the tube, the wire in this caſe attracting and receiving the *electricity* of the tube. If an excited ſtick of ſealing wax or other ſubſtance negatively electrified be applied in the ſame manner, the appearances will be directly the reverſe.

11. If a fly, as D (*fig.* 4. *Tab. Electricity*) made of ſmall braſs wires and fixed in a braſs cap, be put upon the pointed wire K, and ſcrewed to the prime conductor, and the wires *a*, *b*, *c*, *d*, are pointed, and bent in the ſame direction; when the winch of the machine is turned, a flame will be ſeen at each point, and the fly will turn round in the direction of the letters *a*, *b*, *c*, *d*, contrary to that of the points of the wires; for the air, contiguous to the points, becomes poſſeſſed of a ſtrong *electricity*, of the ſame kind with that of the points, and therefore the air and the points will repel each other. This experiment may be rendered more amuſing, by faſtening the figures of horſes cut in paper to the wires, in ſuch a manner, that the points may be in their tails, and then the horſes will ſeem to purſue each other; whence the experiment is called the electrical horſe-race. If a circular plate of metal be cut into the ſhape of a ſtar, ſo that every point may be at the ſame diſtance from the center, and the center be made to turn freely on a point, like the wires in the preceding experiment, a ſmall flame be will ſeen at every point; and if the ſtar be turned round, it will exhibit the appearance of a lucid circle, without any diſcontinuance of the light.

12. The effects of electrical attraction and repulſion may be repreſented in a very ſtriking manner, by electrifying a hoop of metal, ſuſpended from the prime conductor, about half an inch above a plate of metal, and parallel to it; and placing a round glaſs bubble, blown very light, upon the plate near the hoop: the bubble will be immediately attracted to the hoop, and the part which touches it acquiring *electricity* from it, will be repelled; but, as the electric virtue is not diffuſed over the whole ſurface of the glaſs, part of it will be again attracted by the hoop, whilſt the electrified part goes to diſcharge its *electricity* upon the plate; and this will occaſion a revolution of the bubble round the hoop, as long as the electrification is continued. In a dark room the glaſs ball will be beautifully illuminated. Two balls may be made to move round the ſame hoop, one on the inſide and the other on the outſide, in the ſame, or in oppoſite directions: if more hoops are uſed, a greater nnmber of bubbles may be made to revolve, and a kind of planetarium or orrery be conſtructed, with a ball over the centre of the hoop, to repreſent the ſun in the centre of the ſyſtem.

13. If a metal rod with a round knob be preſented to the electrified prime conductor, the electric matter will paſs with violence from the one to the other; an electric ſpark, with the appearance of fire, will be ſeen darting between them, and a report, uſually compared to a ſnapping noiſe, will be heard. The longeſt and ſtrongeſt ſpark will be drawn from that end of the prime conductor which is fartheſt from the cylinder, or from the knob I of the rod B I fixed at the end of it. See *fig.* 4. *Tab. Electricity.* This ſpark will iſſue in a great variety of crooked directions, exactly reſembling the courſe of lightning; and the repreſentation of it may be ſeen, *fig.* 19. *Tab.* III. A friend of Dr. Franklin ſuppoſes, that the ſpark is thrown out of a ſtrait courſe by the denſity of the air, increaſed by the action and re-action of the two fluids, which are repulſive of one another. Franklin's Letters, p. 167. If the braſs-plate X (*fig.* 17. *Tab.* II.) be hung on the prime conductor, and the room be darkened, ſtreams of fire will be ſeen to iſſue from the plate to the knuckles, held near the edge of it, and to follow the hand moved round its edge, when the conductor is electrified. The electric light may be made to flaſh between two metallic plates, if they are held back to back, parallel to one another, and about two inches aſunder, the one by an inſulated perſon connected with the prime conductor, and the other by a perſon ſtanding on the floor. When the winch of the machine is turned, flaſhes of light may be obſerved between the two plates ſo denſe and ſo frequent, that any thing may be diſtinguiſhed in a dark room. Sparks may be alſo drawn from any part of the body of a perſon inſulated and connected with the prime conductor. They may be communicated from a ſmooth ball of metal annexed to a wire held in the hand of the inſulated perſon to any other on the floor.

14. If two perſons be inſulated, and one of them be electrified poſitively, and the other negatively, either of them touching a perſon ſtanding on the floor will give a moderate ſpark; but if they touch one another, the ſpark will be much ſtronger, and they will both be unelectrified, the redundancy of the one ſupplying the deficiency of the other: but if both perſons had been electrified either poſitively or negatively, there would have been no ſpark on their touching one another.

15. There are various methods of ſetting fire to inflammable ſpirits by the electric ſpark. This may be eaſily done, by ſuſpending from the prime conductor a ſhort rod, with a ſmall knob at its end, and then putting ſome ſpirits of wine, a little warmed, into a metal ſpoon, which ſhould be held about an inch below the knob; if the winch is turned, a ſpark will proceed from the knob aud kindle the ſpirits. If a perſon ſtanding on an inſulating ſtool, communicating with the prime conductor, holds the ſpoon in his hand, and another perſon on the floor brings his finger, or a piece of ice within a ſmall diſtance of it, the ſpirits will be ſet on fire; or, the ſpirits may be held by the perſon on the floor, and the inſulated perſon may communicate the ſpark by any conductor. Many other ſubſtances which throw out an inflammable vapour, may be kindled in the ſame manner.

16. Gun-powder may be fired by filling a ſmall cartridge of paper or the tube of a quill with it, and inſerting two wires, one at each end, ſo that their ends within the quill or cartridge may be about one-fourth or one-fifth of an inch from one another; then, if the charge of a phial be conveyed through theſe wires, the ſpark paſſing from the inner end of one to that of the other, will ſet fire to the gun-powder. Steel-filings mixed with the powder will make it take fire more readily.

17. The electric light is moſt beautifully exhibited in glaſs tubes and phials, exhauſted of their air. Thus, if a glaſs tube, about two inches in diameter, and about two feet long, with a braſs cap fixed to one end, and a ſtop-cock or valve to the other, be exhauſted of its air, it will appear to be full of light, whenever a ſpark is taken by it from the prime conductor, or an electric is diſcharged through it. Thus alſo, if a wire be made to paſs through a tall receiver of an air-pump, and the end of the wire within the receiver be moderately pointed, and the other end furniſhed with a knob; when the receiver is exhauſted of its air, and the knob of the wire brought into contact with the prime conductor, every ſpark will paſs through the receiver in a large diverging body of light, from the wire to the plate of the air-pump. Dr. Watſon has given us a particular account of ſeveral curious phenomena of *electricity* in vacuo, in the Philoſophical Tranſactions, vol. xlvii. p. 362, &c. The electric fluid, in its paſſage through an exhauſted tube, nearly three feet in length, and almoſt three inches in diameter, affords a very agreeable ſpectacle in a darkened room. We may obſerve, not as in the open air, bruſhes or pencils, of rays an inch or two in length, but corruſcations extending through the whole length of the tube; that is, in his experiment, thirty-two inches, and of a bright ſilver hue. Theſe did not immediately diverge, as in the open air, but frequently, from a baſe apparently flat, divided themſelves into leſs and leſs ramifications, and reſembled very much the moſt lively corruſcations of the aurora borealis. At other times, when the tube has been exhauſted in the moſt perfect manner, the *electricity* has been ſeen to paſs between two braſs-plates, contrived ſo, that they might be placed at different diſtances from each other, in one continued ſtream, of the ſame dimenſions through its whole length. The ſame experiments were tried with a Torricellian vacuum, very ingeniouſly contrived by lord Charles Cavendiſh. The apparatus (ſee *fig.* 21. *Tab.* III. *Electricity*) conſiſted of a cylindrical glaſs tube of about three-tenths of an inch in diameter, and of ſeven feet and a half in length, bent in ſuch a manner, that thirty inches of each of its extremities were nearly ſtrait, and parallel to each other, from which an arch ſprung, which was likewiſe of thirty inches. This tube was carefully filled with mercury; and each of its extremities being put into its baſon of mercury, ſo much of the mercury ran out, until, as in the common barometrical tubes, it was in equilibrio with the atmoſphere. Each of the baſons containing the mercury was of wood, and was ſupported by a cylindrical glaſs, of about four inches in diameter, and ſix inches in length; and theſe glaſſes were faſtened to the bottom of a ſquare wooden frame, ſo contrived, as that to its top was ſuſpended by ſilk lines, the tube filled with mercury before mentioned; ſo that the whole of this apparatus might be moved together without inconvenience. The Torricellian vacuum then occupied the ſpace of about thirty inches. In making the experiment, when the room was darkened, a wire from the prime conductor of the electrical machine communicated with one of the baſons of mercury; and any conductor

touching the other baſon, while the machine was in motion, the *electricity* pervaded the vacuum in a continued arch of lambent flame; and, as far as the eye could follow it, without the leaſt divergency. S. Beccaria obſerves, that no electric light is viſible in a barometer, in which there is a perfect vacuum, and hence infers, that electric light is viſible only by means of ſome vibrations which it excites in the air; and Mr. Walſh has lately diſcovered, that an electric ſpark would no more paſs through a vacuum of the more perfect kind, made in the above-deſcribed arched barometer by the aſſiſtance of Mr. de Luc, than through a ſtick of ſolid glaſs. Mr. Nairne conſtructed a barometer on purpoſe to repeat this experiment; but his was a common ſtrait tube, in which the mercury was boiled; and he affirms, that it was as perfect a vacuum as art could make; but the vacuum of this became perfectly luminous at three feet from the large conductor to the grand-duke of Tuſcany's machine. Note, Mr. Walſh's was the arched barometer of lord Charles Cavendiſh before mentioned, and the deſign of Mr. de Luc in preparing it, was to render the illuminated vacuum more beautiful. See AURORA *borealis* and *Luminous* CONDUCTOR.

18. There have been many contrivances for giving various forms to the appearance of the electric ſpark in its paſſage from one conductor to another. This may be done by means of a board, and a number of wires, in the following manner: let two holes be made through the board, about one-fourth of an inch on each ſide of the ſpot where a ſpark is deſired; let the extremities of the wires, neatly rounded, come through theſe holes, and be brought near together, exactly over the place; and let the wires on the backſide of the board be ſo diſpoſed, as that an electric ſpark muſt take them all in the ſame circuit. When they are thus prepared, all the points will appear luminous at once, whenever a ſpark is taken by them at the prime conductor. In this manner, ſays Dr. Prieſtley, beautiful repreſentations may be made of any of the conſtellations, as of the Great Bear, Orion, &c. and thus alſo may the outlines of any drawing, as of figures in tapeſtry, be repreſented.

A ſpiral line of fire may be exhibited by the inſtrument in *fig.* 22. *Tab.* III. compoſed of two glaſs tubes, C D, one within another, and cloſed with two knobbed braſs caps, A and B: the innermoſt tube has a ſpiral row of ſmall round pieces of tin-foil ſtuck on its ſurface, at the diſtance of about one-thirtieth of an inch from each other. If one end of this inſtrument be preſented to the electrified prime conductor, every ſpark will be ſeen to paſs with a ſpiral motion from one of theſe pieces to the other round the ſmall tube. Pieces of tin-foil may alſo be diſpoſed of on a flat piece of glaſs A B C D (*fig.* 23.) ſo as to repreſent flowers, letters, &c. and they may be illuminated by holding either extremity C or B, in the hand, whilſt the other is preſented to the electrified prime conductor.

19. There are various ways of receiving and tranſmitting the electric ſhock. If a perſon puts one hand to the coating of a charged jar, and the finger of the other hand to the wire, he will receive a ſhock through his arms and breaſt. If a number of perſons join their hands, or for the ſake of varying the experiment, tread on one another's toes, or lay their hands on each other's heads, and a perſon at one end of the circuit touch the outſide of a jar, whilſt a perſon at the other extremity touches the wire, the ſhock will be felt by all at the ſame time. The ſhock may alſo be communicated, if a baſon of water be placed between every two of the perſons who are to receive it, and they dip the fingers of the hands in the water, that would otherwiſe have been joined. See CIRCUIT. Electric ſhocks may likewiſe be given to any particular part of the body, without affecting the reſt, by bringing that part only into the electrical circuit: thus, if a chain connected with the outſide of a jar charged by the prime conductor, be tied with a ſilk ſtring or ribband to the elbow, and another chain be applied in the ſame manner to the ſhoulder, and brought into contact with the prime conductor, the ſhock will only be felt from the ſhoulder to the elbow. See *Medical* ELECTRICITY and ELECTROMETER.

A very convenient apparatus hath been contrived for this purpoſe by Mr. Henly, which hath been much approved. A curious apparatus hath alſo been contrived by Mr. Partington, which he very properly calls directors of the ſhock, and by which it may with great facility be determined to any part of the body.

20. If a few ſheets of a quire of paper, or the cover of a book or a card, be interpoſed in the circuit of an electrical exploſion, they will be perforated by the diſcharge, and the hole will give a ſtrong ſmell of ſulphur.

21. The direction of the electric fluid in a diſcharge, may be ſhewn, by cauſing the exploſion to paſs over the ſurface of a card, in the following manner: lay two wires, one on one ſide of the card, and the other under it, in the ſame direction, and with their extremities about an inch diſtant; then by connecting one of the wires with the outſide of a charged jar, and the other wire with the knob of the jar, the electric fluid will run over that ſurface of the card, upon which the wire lies that is connected with the poſitive ſide of the jar; and in order to paſs to the extremity of the other wire, it will break a hole through the card juſt over the extremity of the wire that is connected with the negative ſide of the jar. This is a curious experiment of Mr. Lullin; but the honourable Frederic Chriſtian Mahling, counſellor of ſtate at Copenhagen, has admirably improved this experiment, by firſt painting the card in a line about half an inch broad on each ſurface with vermilion. Mr. Henly has preſented an account of it to the Royal Society; for which, ſee Phil. Tranſ. vol. lxviii. part ii. art. 49.

22. The courſe of the electric fluid may alſo be exhibited by the following experiment of Mr. Henly: a ſmall phial, repreſented *fig.* 24. *Tab.* III. is coated on the outſide, about three inches from the bottom, with tin-foil; to the top is cemented a braſs cap with a hole and valve, and from the cap a wire proceeds within the phial, terminating in a blunt point. When the phial is exhauſted of its air, a braſs ball is ſcrewed on the cape to defend the valve, and prevent air from getting into the exhauſted phial. If this phial be held by its bottom, and the braſs knob be preſented to and held in contact with the prime conductor electrified poſitively, the electric fluid will cauſe a pencil of rays to proceed from the wire within the phial, as in *fig.* 20; and if it be diſcharged, a ſtar will appear in the room of the pencil, as in *fig.* 24; but if the phial be held by the braſs cap, and its bottom be made to touch the prime conductor, then the point of the wire within it will appear illuminated with a ſtar, when charging, and with a pencil, when diſcharging. All theſe appearances will be reverſed, when it is preſented to a conductor electrified negatively. See *Luminous* CONDUCTOR.

23. The direction of the electric fluid may alſo be exhibited by fixing to the end of the prime conductor remoteſt from the machine, a braſs rod ſix inches long, with a braſs ball at its extremity, about three-fourths of an inch in diameter; and, when the winch of the machine is turned, let the flame of a wax taper be preſented to the ball, and it will be blown almoſt horizontally from the ball, and in the direction of the electric fluid; but if a like wire and ball be fixed to the inſulated rubber, the flame of a wax taper preſented to the ball, will be blown upon the ball, ſhewing the true courſe of the fluid in its paſſage to the rubber that is receiving it.

Experiments with the Electrical Battery. See ELECTRICAL *Battery* and *Univerſal* DISCHARGER.

Experiments with the Leyden Phial. See LEYDEN *Phial.*

Experiments on the Uſe and Efficacy of Points. See POINTS.

ELECTRICITY, *Medical.* It is natural to imagine, that a power of ſuch efficacy as that of *electricity* would be applied to medical purpoſes; eſpecially, ſince it has been found, invariably, to increaſe the ſenſible perſpiration, to quicken the circulation of the blood, and to promote the glandular ſecretion: accordingly, many inſtances occur in the later period of the hiſtory of this ſcience, in which it has been tried with conſiderable advantage and ſucceſs. Among the variety of caſes to which it has been applied, there are none in which it ſeems to have been prejudicial, except thoſe of pregnancy and of the venereal diſeaſe. In moſt diſorders, in which it has been uſed with perſeverance, it has given, at leaſt, a temporary and partial relief, and in many, effected a total cure. The firſt inſtance that occurs of its ſalutary effect, is that of a woman, who was cured in a quarter of an hour of a contracted finger, by M. Kratzenſtein, at Halle, as early as the year 1744. It was afterwards applied in a variety of paralytic caſes, by M. Jallabert of Geneva, in 1747; M. Sauvages, of the academy in Montpelier; in the courſe of whoſe experiments, it appeared, that electrification increaſes the circulation of the blood about one-ſixth; Mr. Patrick Brydone in Scotland, in 1757; the Abbè Nollet, and others; in ſeveral of which caſes preſent relief was obtained; but the beneficial effect does not appear to have been permanent. One inſtance occurs, related by Dr. Hart of Shrewſbury, and recorded in the Philoſophical Tranſactions, vol. xlviii. part ii. p. 785, in which electrification was injurious, and brought an univerſal palſy on a young perſon, whoſe right arm was paralytic; and though this palſy was removed by a courſe of medicine, the diſeaſed arm remained incurable. It alſo appears, from a number of experiments made by Dr. Franklin in paralytic caſes, that no permanent advantage was derived from *electricity* in this diſorder; and Mr. Weſley, who has been long engaged in a courſe of medical *electricity*, obſerves, that though many paralytics have been helped by it, no palſy of a year's ſtanding has been thoroughly cured by it. However, a remarkable inſtance more lately occurs, in which an hemiphlegia was cured by this means, under the direction of a phyſician at Greenwich. The patient was in ſuch a ſtate, that boiling water might be applied from her hand to her ſhoulder, and from her ſhoulder to her foot, on the diſeaſed ſide, without being felt. This perſon was electrified, by drawing ſparks from the palſied ſide, and giving ſhocks, beginning with ſtronger ſhocks, till ſhe began to feel them, and continuing moderate ones, for 18 days; and in that time, during 31½ hours, the number of ſhocks was 141; and this perſeverance was attended with ſuch ſucceſs, that her feeling was quite reſtored, and that ſhe is capable of walking, and of writing with the hand, the uſe of which ſhe had loſt. Dr. de Haen obſerves, that with reſpect to partial palſies, electrification never did the leaſt harm; and that one or two perſons, who had received no benefit from it in ſix entire months, were yet much relieved by perſevering in the uſe of it; and that ſome perſons diſcontinuing it, after having received ſome benefit, relapſed again; but afterwards, by recurring to the uſe of *electricity*, recovered, though more ſlowly than before.

Dr. Hart, in 1756, mentions a cure performed on a woman, whoſe hand and wriſt had been for ſome time rendered uſeleſs, by a violent contraction of the muſcles: but the moſt remarkable caſe of this kind is that related by Dr. Watſon, Phil. Tranſ. vol. liii. p. 10. The patient, about ſeven years of age, was ſeized with an univerſal rigidity of her muſcles, ſo that her whole body felt more like that of a dead corpſe than of a living perſon: Dr. Watſon electrified her, at convenient intervals, from the middle of November 1762 to the end of January 1763, when every muſcle of the body was perfectly flexible, and ſubſervient to her will, ſo that ſhe could ſtand, walk and run like other children of her age. Mr. Miles Partington has lately communicated to the Royal Society a ſurpriſing inſtance of the cure of a very great degree of contraction and rigidity in the ſterno-maſtoideus muſcle, by means of electrical ſparks and ſhocks. Phil. Tranſ. vol. lxviii. part i. p. 97, &c. Mr. Wilſon mentions a ſingle inſtance, in which he had cured deafneſs of ſeventeen years continuance; but he acknowleges, that he tried ſimilar experiments on ſix other deaf perſons without ſucceſs. Mr. Lovet and Mr. Weſley have extended the medical application of *electricity* to a greater variety of caſes than any others: Mr. Lovet obſerves, in his Eſſay, that *electricity* is almoſt a ſpecific in all caſes of violent pains, of however long continuance, in any part of the body; as in obſtinate head-achs, the tooth-ach, the ſciatica, the cramp, and diſorders reſembling the gout; and that it has ſeldom failed to cure rigidities, or a waſting of the muſcles, and hyſterical diſorders: he adds, that it cures inflammations, and a fiſtula lachrymalis; that it has ſtopped a mortification, and diſperſed extravaſated blood; that it has been of excellent uſe in bringing to a ſuppurarion, or in diſperſing without ſuppuration, obſtinate ſwellings of various kinds, even thoſe that were ſcrophulous; that it has cured the falling-ſickneſs, and ſeveral kinds of fits, and a diſorder that ſeems to have been a *gutta ſerena*. He adviſes to begin, in general, with ſimple electrification, eſpecially in hyſterical caſes; then to proceed to take ſparks, and laſtly to give moderate ſhocks. Mr. Weſley obſerves, that he has ſcarce known an inſtance, in which ſhocks all over the body have failed to cure a tertian or quartan ague: he mentions a caſe of blindneſs cured and relieved by it, and hearing given by it to a perſon who was born deaf; and he farther ſays, that it has cured bruiſes, running ſores, the dropſy, and a palſy in the tongue; and that it has brought away gravel from the kidnies. In hyſterical caſes, he recommends the patient's being ſimply electrified, by ſitting on cakes of reſin, at leaſt for half an hour morning and evening; and then taking ſmall ſparks from him, and afterwards giving ſhocks, more or leſs ſtrong, as the diſorder requires. Dr. Antonius de Haen, in his Ratio Medendi, cited by Dr. Prieſtley, Hiſt. *Electricity*, vol. i. p. 485, &c. informs us, that a paralyſis and trembling of the limbs, from whatever cauſe it aroſe, never failed to be relieved by *electricity*; and that it alſo certainly cures St. Vitus's dance; that it has been of ſome uſe in caſes of deafneſs; but failed in its application to a *gutta ſerena* and ſtrumous neck. Mr. Hey, ſurgeon of Leeds, mentions ſeveral caſes, in which the power of *electricity* has been ſucceſsfully applied to an AMAUROSIS. The machine was uſed twice a day; the patient was placed on a ſtool with glaſs legs, and had ſparks drawn from the eyes and parts ſurrounding the orbits, eſpecially where the ſuperciliary and infra-orbitary branches of the fifth pair of nerves ſpread themſelves. After this operation had been continued for half an hour, the patient was made to receive for an equal time ſlight ſhocks through the affected parts, which were ſometimes directed acroſs the head, from one of the temples to the other, but chiefly from the ſupercilliary and infraorbitary *foramina* to the *occiput*. Med. Obſ. and Inq. vol. v. p. 1, &c. In rheumatic caſes, Mr. Ferguſon obſerves, that he has generally found *electricity* ſucceſsful, by continuing to take ſparks from the places where the pain lies, till the ſkin has been red and pimpled, and the patient has felt a glowing warmth where the ſparks were drawn off; and the ſame method has alſo proved effectual in old ſprains. The uſe of *electricity* has been lately recommended in caſes of ſudden death. See DROWNING.

In all caſes where ſhocks are given, gentle ones ſhould be firſt uſed; and if the diſorder continues, they may be gradually increaſed; and they ſhould be confined to the affected part. The efficacy of *electricity* in the tooth-ach is ſo great, that it ſeldom or ever fails to give immediate relief, unleſs the tooth be very much decayed. The following inſtrument will ſerve for this purpoſe: it conſiſts of two wires, AE and BE, fixed in the piece of baked wood H, and bent at CD and FG, and at A and B, as in *fig.* 25. *Tab.* III. *Electricity*. If the affected tooth be brought within the two wires at E, and the ring A or B be connected by a chain with the outſide of a charged jar, and the other ring be connected by a chain with the knob of the jar, the ſhock will paſs through the wires, and conſequently through the tooth.

Under this head of *medical electricity*, it may be proper juſt to mention thoſe medicated tubes, the imaginary virtues of which were firſt diſcovered by Signior Pivati at Venice, and which were much recommended in the years 1747 and 1748, both in Italy and by Mr. Winkler at Leipſick. Theſe gentlemen imagined, that odorous ſubſtances, confined in excited glaſs veſſels, would tranſpire through the pores of the glaſs, and communicate their medicinal virtue to the atmoſphere of a conductor, and to all perſons in contact with it; and that theſe ſubſtances would yield their virtues by being held in the hands of perſons electrified; and they pretended that many cures were wrought in this way, by the operation of medicines, without being taken into the ſtomach: but the whole was ſoon diſcovered to be a fallacy; and it was inconteſtibly proved, that no effluvia could paſs from the included ſubſtances through the pores of excited glaſs; and that no method was known for cauſing the power of medicine to inſinuate itſelf into the human body by *electricity*. Dr. Franklin, by proving that glaſs was impermeable to the electric fluid itſelf; and that its *electricity* was collected from the rubber, &c. evinced the abſurdity of every attempt to tranſmit the effluvia of any ſubſtances through the glaſs. See Franklin's Letters, p. 82, &c.

ELECTRICITY, *theory of*. It will be needleſs to recite the ancient hypotheſis on this ſubject, ſuch as that of the ſympathetic power of the Peripatetics, that of unctuous effluvia emitted by excited bodies, and returning to them again, adopted by Gilbert, Gaſſendus, Sir Kenelm Digby, &c. or that of the Carteſians, who aſcribed *electricity* to the globules of the firſt elements, diſcharged through the pores of the rubbed ſubſtance, and in their return carrying with them thoſe light bodies, in the pores of which they were entangled. Theſe hypotheſes were framed in the infancy of the ſcience, and of philoſophy in general, and have been long ſince exploded. In the more advanced ſtate of *electricity*, there have been two principal theories, each of which has had its advocates. The firſt we ſhall mention is that of two diſtinct electric fluids, repulſive with reſpect to themſelves, and attractive of one another, adopted by Mr. du Fay, on diſcovering the two oppoſite ſpecies of *electricity*, viz. the vitreous and reſinous, and ſince new-modelled by Mr. Symmer. Theſe two fluids are ſuppoſed to be equally attracted by all bodies, and to exiſt, in intimate union, in their pores; and in this ſtate to exhibit no mark of their exiſtence. The friction of an electric by a rubber ſeparates theſe fluids, and cauſes the vitreous *electricity* of the rubber to paſs to the electric, and then to the prime conductor of a machine, and the reſinous *electricity* of the conductor and electric to be conveyed to the rubber; and thus the quality of the electric fluid poſſeſſed by the conductor and the rubber is changed, but the quantity remains the ſame in each. In this ſtate of ſeparation, the two electric fluids will exert their reſpective powers; and any number of bodies charged with either of them will repel each other, attract thoſe bodies that have leſs of each particular fluid than themſelves, and be ſtill more attracted by bodies that are wholly deſtitute of it, or that are loaded with the contrary. According to this theory, the electric ſpark makes a double current; one fluid paſſing to an electrified conductor from any ſubſtance preſented to it, whilſt the ſame quantity of the other fluid paſſes from it; and when each body receives its natural quantity of both fluids, the balance of the two powers is reſtored, and both bodies are unelectrified. Thus alſo, when a phial is charged by a conductor, the reſinous *electricity* of that ſide which is connected with the conductor is tranſmitted to the oppoſite ſide connected with the rubber, and an equal quantity of the vitreous *electricity* is returned from this ſide to the other; ſo that all the vitreous *electricity* is conveyed to one of the ſides, and all the reſinous to the other. In this ſtate they mutually attract each other through the ſubſtance of the intervening glaſs, are thus prevented from being drawn away by any force that can be applied to them ſeparately, and ruſh to one another by means of proper conductors. For a farther account of the explication of ſome of the principal phenomena of *electricity* by this theory, we ſhall refer the reader to Dr. Prieſtley's Hiſtory, vol. ii. § 3. who, with a philoſophical liberality, has ſtated it in its full force, though he adopts the other theory, which we ſhall now offer in as few words as the nature and importance of it will allow. This is commonly diſtinguiſhed under the denomination of *poſitive and negative electricity*, and was firſt ſuggeſted by Dr. Watſon, and digeſted, illuſtrated, and confirmed by Dr. Franklin; and has been ſince known by the appellation of the Franklinian hypotheſis. This theory ſuppoſes, that all the phenomena of *electricity* depend on one fluid, *ſui generis*, extremely ſubtile and elaſtic, diſperſed through the pores of all bodies, by which the particles of it are as ſtrongly attracted as they are repelled by one another. When bodies poſſeſs their natural ſhare of this fluid, or ſuch a quantity as they are capable of retaining by their own attraction, they are then ſaid to be in an unelectrified ſtate; but if the equilibrium is diſturbed, and they either acquire an additional quantity *from* other bodies, or loſe part of their natural ſhare by communication *to* other bodies, they exhibit electrical appearances. In the former caſe they are ſaid to be electrified poſitively, or *plus*; and in the latter, negatively, or *minus*. This electric fluid is ſuppoſed to move with great caſe in thoſe bodies that are called CONDUCTORS, and with extreme difficulty and ſlowneſs in the pores of ELECTRICS; whence it comes to paſs, that all electrics are impermeable to it. Moreover, electrics are ſuppoſed to contain always an equal quantity of this fluid, ſo that there can be no over-charge or increaſe on one ſide without a proportionable decreaſe or loſs on the other, and *vice verſa*; and as the electric does not admit the paſſage of the fluid through its pores, there will be an accumulation on one ſide, and a correſponding deficiency on the other. See CHARGE. When both ſides are connected together by proper conductors, the equilibrium will be reſtored by the redundant fluid's ruſhing from the over-charged to the exhauſted ſurface. Thus alſo if an electric be rubbed by a conducting ſubſtance, the *electricity* is only conveyed from one to the other, the one giving what the other receives; and if one be electrified poſitively, the other will be electrified negatively, unleſs the loſs be ſupplied by other bodies connected with it, as in the caſe of the electric and inſulated rubber of a machine. The manner in which this effect is produced, has not yet been ſufficiently explained: S. Beccaria ſuppoſes, that the ſurface of the electric is enlarged by the action of the rubber, and rendered capable of receiving a greater quantity of the electric fluid from it, which additional *electricity* appears on the ſurface of the electric, when the rubber is withdrawn, and the capacity of the electric is again contracted.

This theory ſerves likewiſe to illuſtrate the other phenomena and operations in the ſcience of *electricity*. Thus, bodies differently electrified will naturally attract each other, till they mutually give and receive an equal quantity of the electric fluid, and the equilibrium is reſtored between them. Beccaria ſuppoſes, that this effect is produced by the electric matter making a vacuum in its paſſage, and the contiguous air afterwards collapſing, and thereby puſhing the bodies together. Bodies having the ſame kind of *electricity*, whether it be poſitive or negative, will repel each other; becauſe neither the augmentation nor diminution of the electric fluid on the ſurface of any body can take place, unleſs that ſurface be contiguous to an electric, which can acquire a contrary *electricity* at a ſmall diſtance; and therefore the augmented or diminiſhed quantity, in endeavouring to diffuſe itſelf over every part of the ſurface of electrified bodies, on account of the attraction ſubſiſting between the electric fluid and all the particles of matter, will make the bodies recede from each other, ſo that a quantity of air may be interpoſed between their ſurfaces, ſufficient to acquire a contrary *electricity* at a ſmall diſtance from them.

The influence of points in drawing or throwing off the electric fluid, depends on the leſs reſiſtance which it finds to enter or paſs off through fewer particles than through a greater number, whoſe reſiſtance is united in flat or round ſurfaces. The electric light is ſuppoſed to be part of the electric fluid, which appears when it is properly agitated; and the ſound of an exploſion is produced by vibrations, occaſioned by the air's being diſplaced by the electric fluid, and again ſuddenly collapſing.

As to the nature of the electric fluid, philoſophers have entertained very different ſentiments: ſome, and particularly Mr. Wilſon, have ſuppoſed, that it is the ſame with the ether of Sir Iſaac Newton, to which the phenomena of attraction and repulſion are aſcribed; whilſt the light, ſmell, and other ſenſible qualities of the electric fluid are referred to the groſſer particles of bodies, driven from them by the forcible action of this ether; and other appearances are explained by means of a ſubtile medium diffuſed over the ſurfaces of all bodies, and reſiſting the entrance and exit of the ether; which medium is ſuppoſed to be the ſame with the electric fluid, and to be more rare on the ſurfaces of conductors, and more denſe and reſiſting on thoſe of electrics: but Dr. Prieſtley has ſhewn, that though they may poſſeſs ſome common properties, they have others eſſentially diſtinct; the ether is repelled by all other matter, whereas the electric fluid is ſtrongly attracted by it. Others have had recourſe to the element of FIRE; and from the ſuppoſed identity of fire and the electric fluid, as well as from the ſimilarity of ſome of its effects, the latter has been commonly called the electric fire: but moſt electricians have ſuppoſed, that it is a fluid *ſui generis*. The honourable Mr. Cavendiſh has publiſhed an attempt to deduce and explain ſome of the principal phenomena of *electricity* in a mathematical, ſyſtematic manner from the nature of this fluid, conſidered as compoſed of particles which repel each other, and attract the particles of all other matter, with a force inverſely as ſome leſs power of the diſtance than the cube, whilſt the particles of all other matter repel each other, and attract thoſe of the electric fluid, according to the ſame law. Phil. Tranſ. vol. lxi. part ii. p. 584—677. A ſimilar hypotheſis and method of reaſoning have been alſo propoſed by Mr. Epinus, in his Tentamen Theoriæ Electricitatis & Magnetiſmi.

Dr. Prieſtley concludes, from experiments made with a view of determining the effects of the electrical exploſion on different kinds of air, that the electric matter either is or contains PHLOGISTON, ſince he found that both produced ſimilar effects. Mr. Henly alſo apprehends, that the electric fluid is a modification of that element, which, in its quieſcent ſtate, is called phlogiſton; in its firſt active ſtate, *electricity*; and when violently agitated, fire: and he has collected a variety of facts and obſervations, which ſeem to render this hypotheſis, at leaſt, probable. It uniformly appears, that bodies poſſeſſing an equal quantity of phlogiſton, or thoſe of the ſame kind, as glaſs or metal, acquire little or no *electricity* by friction; and as the difference in this reſpect is greater, ſo much the more *electricity* does the one body acquire from the other; and that thoſe bodies which poſſeſs a greater quantity of phlogiſton give the electric fluid to thoſe that have leſs of it, or acquire a negative *electricity* when rubbed with ſuch bodies; and that thoſe which have little phlogiſton acquire *electricity*, or are electrified poſitively, by the uſe of the ſame rubbers. Perhaps we may be allowed to enlarge our views, and conſider the ſun as the fountain of the electric fluid, and the zodiacal light, the tails of comets, the *Aurora borealis*, lightning, and artificial *electricity*, as its various and not very diſſimilar modifications. See on this ſubject, beſides Dr. Prieſtley's Hiſt. of *Electricity*, vol. ii. part iii. § 1, 2, 3. Wilſon's Eſſay towards an Explication of the Phenomena of *Electricity*, deduced from the Ether of Sir Iſaac Newton, p. 5. 1746. Wilſon and Hoadley's Obſ. &c. p. 55. 1759. Freke's Eſſay on the Cauſe of *Electricity* 1746. Prieſtley on Air, vol. i. p. 186. 274, &c. Phil. Tranſ. vol. lxvii. part i. p. 129, &c. and Mr. Eeles's Letters, on the ſame ſubject.

ELECTRICITY, *vindicating*, is a term introduced by Signior Beccaria, to expreſs a particular phenomenon in this ſcience: if two electrified electrics are joined together, they will be found to adhere, and their *electricities* diſappear; but as ſoon as they are ſeparated, they recover their *electricities*. Thus, in an experiment of Mr. Lane, firſt propoſed by Mr. Eeles, if two glaſs plates with plane ſurfaces be laid on one another, and their outward ſurfaces be coated with tin-foil, and they are then charged, they will adhere very firmly to each other; but if they are ſeparated, that plane, whoſe coating was preſented to the prime conductor, in charging, will be poſitively electrified on both ſides; and the other, whoſe coating was connected with the conductors, communicating with the earth, will be electrified negatively on both ſides. If theſe plates be again laid together, and diſcharged, they will appear, when ſeparated, to be electrified; but the firſt plate will be negative on both ſides, and the ſecond poſitive. And if they are ſeparated after the diſcharge in the dark, flaſhes of light will be ſeen between their inward ſurfaces; and theſe flaſhes will appear for a conſiderable time, whenever they are laid together, their coating is touched, and they are again ſeparated; but they will gradually diminiſh, and at laſt vaniſh. Mr. Henly obſerves, that crown glaſs will anſwer the purpoſe of this experiment as well as plate glaſs; and that Dutch plates, treated in the ſame manner, and kept a little time before they are ſeparated, will have each a poſitive and negative ſurface, and that the *electricity* of each ſurface is reverſed in the diſcharge. He adds, that if a clean, dry, uncoated plate of looking-glaſs be placed between the two firſt plates, it will appear, after charging, to be negatively electrified on both ſides; but if it be placed between the Dutch plates, it acquires, like them, a poſitive *electricity* on one ſurface, and a negative *electricity* on the other. Beccaria's Artificial Electricity, part ii. § 6. Phil. Tranſ. vol. lxvi. part ii. p. 517, &c. Id. vol. lxvii. part i. p. 98, &c. See ELECTROPHORUS.

ELECTROMETER, formed of ηλεκτρον, and μετρω, *I meaſure*, is an inſtrument contrived for meaſuring the quantity, and determining the quality of electricity in any electrified body. Mr. Canton, previous to the invention of inſtruments of this kind, eſtimated the quantity of electricity in a charged phial, by preſenting the phial with one hand to an inſulated conductor, and giving it a ſpark, which he took off with the other; and he proceeded in this manner till the phial was diſcharged, and then determined the height of the charge by the number of ſparks.

The moſt ſimple *electrometer* is a linen thread, called by Dr. Deſaguliers the *thread of trial*; which, if brought near to an electrified body, will be attracted by it; but this will do little more than determine, whether the body is in any degree electrified or not; without determining with any preciſion its quantity, much leſs its quality. The abbé Nollet uſed two threads, and ſhewed the degrees of electricity by the angle of their divergency exhibited in their ſhadow on a board placed behind them.

Mr. Kinnerſley's ELECTROMETER is already deſcribed under the article ELECTRICAL *Air-Thermometer*.

Mr. Canton's ELECTROMETER conſiſted of two balls of cork, or pith of elder, nicely turned in a lathe to about the ſize of a ſmall pea, and ſuſpended on fine linen threads, about ſix inches long, which may be wetted in a weak ſolution of ſalt. See *fig.* 26. *Tab.* IV. *Electricity.* Theſe may be kept in ſmall boxes, of the length of the ſtrings, that they may lie in them without being bent; and they may be thus carried in the pocket, and will be ready for uſe. See *Pocket* ELECTROMETER.

If the box containing theſe balls be inſulated, by placing it on a drinking glaſs, or any other electric ſubſtance, and an excited ſmooth glaſs tube be brought near them, they will firſt be attracted by it, and then repelled both from the glaſs, and from each other; but on the approach of excited wax, they will be attracted, gradually approach, and come together; and *vice verſâ.* This apparatus will alſo ſerve to determine the electricity of the clouds and air, by holding them at a ſufficient diſtance from buildings, trees, &c. for if the electricity of the clouds or air be poſitive, their mutual repulſion will increaſe by the approach of excited glaſs, or decreaſe by the approach of amber or ſealing-wax; and if negative, their repulſion will be diminiſhed by the approach of excited glaſs, and increaſed by amber or ſealing-wax. See an account of Mr. Canton's curious experiments with this apparatus in the Phil. Tranſ. vol. xlviii. part i. and part ii.

If two balls of this kind are annexed to a prime conductor, as in *fig.* 17. *Tab.* II. *Electricity,* they will ſerve to determine the degree and quality of its electrification, by their mutual repulſion and divergency. *Electrometers* of this kind may be combined, as in *fig.* 27. *Tab.* IV. in which B repreſents a pillar of wax, glaſs, or baked wood reſting on a wooden baſe A. From the top, project four arms of glaſs, or of baked wood, ſupporting four *electrometers*; two of which, D, D, are ſilken threads, about eight inches long, to each of which a ſmall downy feather is annexed; the other two, C [illegible]; are formed of a ſtick of glaſs, as *a b*, about ſix inches long, covered with ſealing-wax, and terminated at the upper end by a ring; from the lower end are ſuſpended two fine linen threads, *c c*, about five inches long, each of which bears a ſmall cork or pith ball, about an eighth of an inch in diameter. The balls, in the figure, are repreſented in a ſtate of electrification and repulſion; the glaſs ſtick, *a b*, ſerves for an inſulating handle, by which it may be ſupported, whenever it is uſed, without the hand AB. Cavallo's Electr. p. 161.

ELECTROMETER, *the diſcharging*, repreſented in *fig.* 18. *Tab.* III. was invented by Mr. Lane. It conſiſts of braſs work, G, the lower part of which is incloſed in the pillar F, made of wood, baked, and boiled in linſeed oil, and bored cylindrically about two-thirds of its length; the braſs work is fixed to the pillar by the ſcrew H, moveable in the groove I, ſo that it may be raiſed higher or lower, as the height of the jar D requires. Through the braſs work is made to paſs a ſteel ſcrew, L, the diſtance of whoſe threads is about one twenty-fourth of an inch, to the end of which, and oppoſite to, K, a poliſhed hemiſpherical piece of braſs, fixed to the prime conductor, is fixed a well poliſhed ball of braſs, M. To this ſcrew is annexed a circular plate, O, divided into twelve equal parts, and in every revolution of the ſcrew, pointing to the diviſions of the ſcale N; each of which diviſions is equal to each turn of the ſcrew. The uſe of this *electrometer* is to diſcharge a jar, D, or any battery connected with the prime conductor, without a diſcharging rod (ſee *Univerſal* DISCHARGER); and to give ſhocks ſucceſſively of the ſame degree of ſtrength; and on this account it is particularly adapted for medical purpoſes. Then, if a perſon holds a wire, faſtened to the ſcrew H in one hand, and another wire fixed to E, a loop of braſs wire paſſing from the frame of the machine to a tin-plate, on which the phial D ſtands, he will perceive no ſhock, when K and M are in contact; and the degree of exploſion, as well as the quantity of electricity accumulated in the phial, will be regulated by the diſtance of K and M from each other. Phil. Tranſ. vol. lvii. p. 451.

The ſurfaces of the balls, K and M, are very liable to loſe their poliſh by the exploſion, and in this caſe the inſtrument becomes unfit for uſe. But this is an inconvenience, to which the *quadrant* ELECTROMETER of Mr. Henly is not ſubject. This inſtrument conſiſts of a ſtem C, (*fig.* 28. *Tab.* IV.) terminating at its lower end with a braſs ferrule and ſcrew D, by means of which it may be fixed to a hole in the prime conductor, or to a knob of a jar or battery, or to a ſtand, as occaſion requires; and at its upper end in a ball E. B repreſents a graduated ſemicircle of ivory, on the center of which the index A, being an exceeding light rod, with a cork ball at its extremity, reaching to the braſs ferrule of the ſtem, is made to turn on a pin in the braſs piece E, ſo as to keep near the graduated limb of the ſemicircle. The ſtem and index are box, well rounded, and made ſmooth with emery paper. When the *electrometer* is not electrified, the index hangs parallel to the ſtem C; but as ſoon as it begins to be electrified, the index, repelled by the ſtem, will begin to move along the graduated edge of the ſemicircle (ſee E, *fig.* 4. *Tab. Electricity*), and mark, with the utmoſt exactneſs, the degree in which the prime conductor, &c. is electrified, or the height to which the charge of any jar or battery is advanced. This inſtrument, being made of materials that are very imperfect conductors, will not diſſipate the electricity which it receives. Phil. Tranſ. vol. lxii. p. 359, &c.

Mr. Henly hath alſo very much improved Mr. Lane's *electrometer*, by taking away the ſcrew, the double milled nut, and the ſharp-edged graduated plate. His improved diſcharger is made as follows: a ſpring tube is ſupported by a ſocket of braſs, which ſlips upon a ſupporter of glaſs. Through the ſpring tube paſſes, in an horizontal direction, a thick rod, or tube, of metal, furniſhed with a ball at each end. Two or three inches, at one end of this tube, are divided into tenths of an inch; and when the inſtrument is to be uſed, the ball at one end of the rod is made to touch the end of the ſpring tube, in which the horizontal rod, or tube, moves, and the ball at the other end of the ſame rod, or tube, at the ſame time, touches the prime conductor. The rod being then drawn back to any given diſtance, the end of the ſpring tube, through which it paſſes, cuts the diviſions upon the rod, or tube, and ſhews to the one-tenth of an inch the diſtance the ball next the conductor has been ſeparated from it, and conſequently the length of the ſpace of air through which the charge of electricity is to ſtrike.

Mr. Henly's diſcharger of this kind has two tubes, one ſliding within the other, in order to lengthen, and thus accommodate it to larger apparatus.

The following ELECTROMETER was contrived by Mr. Cavallo for obſerving the electricity of the atmoſphere. It conſiſts of a common jointed fiſhing-rod, AB, *fig.* 29. *Tab.* IV. without the laſt, or ſmalleſt joint. From the extremity of this rod proceeds a ſlender glaſs tube C, covered with ſealing-wax, and having a cork D at its end, from which a pith-ball *electrometer* is ſuſpended. HGI is a piece of twine, faſtened to the other end of the rod, and ſupported at G by a ſmall ſtring FG. At the extremity of the twine I, a pin is faſtened, which, when puſhed into the cork D, renders the *electrometer* E uninſulated. In this ſtate the inſtrument, held by the end A, is projected upwards from an higher window into the air, ſo as to make an angle of about 50° or 60° with the horizon; and when it has been kept in this ſituation for a few ſeconds, the pin is diſengaged from the cork D, by pulling the twine at H, which then falls into the ſituation LK, leaving the *electrometer* inſulated and electrified with an electricity contrary to that of the atmoſphere. The inſtrument is withdrawn, and the quality of the electricity examined, without any obſtruction from wind or darkneſs.

The ſame ingenious electrician has contrived a *Rain*-ELECTROMETER, which is a ſtrong glaſs tube, ABCI, *fig.* 30. about two feet and a half long, with a tin funnel, DE, cemented to its extremity, and defending part of it from the rain. The tube is covered with ſealing-wax from A to B, and alſo under the funnel. FD is a piece of cane, round which ſeveral braſs wires are twiſted in different directions, ſo as to catch the rain, without reſiſting the wind; the cane is fixed into the tube, and a ſlender wire paſſes from it through the tube to the ſtrong wire AG, thruſt through a piece of cork at the end A of the tube; from a ring at G, at the end of this wire, a pith-ball *electrometer* is ſuſpended. The inſtrument is faſtened to the ſide of a window-frame, by ſtrong braſs hooks at CB, the part FC is out of the window, and the end F a little elevated above the horizon; the remaining part paſſes into the room through a hole in a glaſs of the ſaſh. This inſtrument is frequently electrified, when it rains, eſpecially by flying ſhowers; and the divergency of the *electrometer* ſhews the quantity and quality of the electricity it receives. Mr. Cavallo obſerves, that the rain is generally electrified negatively, and ſometimes to ſuch a degree, that he has been able to charge a ſmall coated phial at the wire AG.

Mr. Cavallo has alſo deſcribed a convenient *Pocket* ELECTROMETER. The caſe of this *electrometer* is a glaſs tube, *fig.* 31, and 32. *Tab.* IV. about three inches long, and three-tenths of an inch in diameter, half of which is covered with ſealing-wax; to the uncovered end a loop of ſilk is fixed, which ſerves for occaſionally ſuſpending the *electrometer*; and to the other extremity a cork is adapted, which, by tapering at both ends, may be made to fit the tube with either extremity. From one end of the cork two linen threads proceed, ſomewhat ſhorter than the glaſs tube, and bearing little cones of pith of elder. When the inſtrument is uſed, the cork is inſerted in the tube, ſo that the cones of pith may hang outward, as in *fig.* 31. When it is carried in the pocket, the cork ſtops it, and the cones hang freely within the tube, as in *fig.* 32. This *electrometer* may be kept in a caſe, like a common tooth-pick caſe, *fig.* 33. cloſed at one end, A, with a piece of amber, which will ſerve to electrify the inſtrument negatively; and at the other end with a piece of ivory, faſtened to a piece of amber BC; the amber inſulates the ivory, which, in this inſulated ſtate, by being rubbed againſt woollen cloths, acquires a poſitive electricity, and will ſerve to electrify the *electrometer* poſitively. Phil. Tranſ. vol. lxvii. part i. p. 48, &c. part ii. p. 399. or Cavallo's Electr. p. 370, &c.

Mr. Cavallo has invented a third *electrometer*, perfectly incloſed in a phial, which is a very curious invention, and very ſenſible in its operation.

ELECTROPHORUS, derived from ηλεκτρον, and φερω, *I bear*, is an inſtrument, or machine, invented by M. Volta of Como, near Milan, in Italy, for exhibiting perpetual electricity. This machine conſiſts of two plates (ſee *fig.* 34.) one of which, B, is a circular plate of glaſs, covered on one ſide with ſome reſinous electric, as bees-wax and reſin, or equal parts of reſin, ſhell-lac, and ſulphur, and the other, A, is a plate of braſs, or a circular board, coated with tin-foil, and furniſhed with a glaſs handle I, which may be ſcrewed into its center by means of a braſs or wooden ſocket. If the plate B be excited by rubbing it with new white flannel, and the plate A be applied to its coated ſide, a finger, or any other conductor, will receive a ſpark on touching this plate; and if the plate A be then ſeparated, by means of the handle I, it will be found ſtrongly electrified with an electricity, contrary to that of the plate B. By replacing the plate A, touching it with the finger, and ſeparating it again, it will be found electrified as before, and give a ſpark to any conductor, attended with a ſnapping noiſe; and by this means a coated phial may be charged. The ſame phenomena may be repeatedly exhibited, without any renewed excitation of the electric plate B. The electric power of B has continued for ſeveral days, and even weeks, after excitation, though there is no reaſon for imagining that it is perpetual. Mr. Cavallo prepares this machine, by coating the glaſs-plate with ſealing-wax; and with a plate of this kind, no more than ſix inches in diameter, once excited, he has given a charge to a coated phial, which was ſufficient to pierce a card; the other plate, ſeparated from it, has emitted ſtrong flaſhes to the table on which the electric plate reſted, and to the ſurrounding air; and the power has been ſo ſtrong, that the two plates have adhered together, and the coated glaſs has been ſuſtained by the upper plate. Inſtruments of this kind have been made with plates twelve or fifteen inches in diameter, which have afforded a ſucceſſion of ſparks at the diſtance of three inches or more, and ſome, five feet in diameter, have given ſtrong ſparks at the diſtance of more than twelve inches.

Mr. Adams, philoſophical inſtrument maker to his majeſty, prepares machines of this kind with plates formed from a compoſition of two parts of ſhell-lac, and one of Venice turpentine, without any glaſs plate.

The action of theſe plates depends on a principle diſcovered and illuſtrated by the experiments of Franklin, Canton, Wilcke, and Epinus, that an excited electric repels the electricity of another body, brought within its ſphere of action, and gives it a contrary electricity. Thus the plate A, touched by a conductor, whilſt in contact with the plate B, electrified negatively, will acquire an additional quantity of the electric fluid from the conductor; but if it were in contact with a plate electrified poſitively, it would part with its electricity to the conductor connected with it. See an account of ſeveral curious experiments made with this machine, by Mr. Henly, and Mr. Cavallo, and Dr. Ingenhouſz, in the Phil. Tranſ. vol. lxvi. part ii. p. 513. vol. lxvii. part i. p. 116, &c. and part ii. p. 389, &c. and vol. lxviii. part ii. 1027, and p. 1049. See *Vindicating* ELECTRICITY.

ELECTRUM is ſometimes uſed for AMBER.

ELECTRUM more frequently ſignifies a mixed metal, of great value among the ancients.

ELECTRUM *minerale* is a name given by ſome chemiſts to a metallic maſs formed of tin and copper, and martial regulus of antimony, to which gold is ſometimes added. The maſs is powdered, and detonated with nitre and charcoal, to a kind of *ſcoria*; then powdered whilſt hot, and digeſted in ſpirit of wine; whence a tincture of a red colour is obtained, which is eſteemed a deobſtruent.

ELECTUARY, in *Pharmacy*, a form of medicine, compoſed of powders, and other ingredients, incorporated with ſome conſerve, honey, or ſyrup; to be divided into doſes, like boluſes, when taken.

Voſſius obſerves, that all the remedies preſcribed for the ſick, as well as the confections taken by way of regale, were called by the Greeks εκλειγματα, and εκλεικτα, of the verb λειχω, *I lick*; whence, ſays he, was formed the Latin *electarium*, and afterwards *electuarium*. This conjecture he ſupports from the laws of Sicily, where it is ordained, that *electuaries*, ſyrups, and other remedies, be prepared after the legal manner. The Bollandiſts, who relate this etymology, ſeem to confirm it. Act. Sanct. Mart. tom. ii. p. 131.

Electuaries are either ſoft, or ſolid; and of each kind, ſome are alterative, others corroborative, others purgative, &c. The *ſoft* are of the conſiſtence of honey, and may conſiſt of three ounces of powder to a pound of honey, or conſerve, and ſyrup.

The purgatives are uſually of the ſoft kind; but the corroborative only admit of 1, or 1½ ounce of powders, to five or ſix ounces of conſerve, with a proper quantity of ſyrup.

Among the ſoft *electuaries* of the ſhops, are reckoned lenitive *electuary*, Venice treacle, mithridate, the confection of hamech, that of alkermes, the catholicon, diaprunum, diaphœnicum, Galen's hiera picra, &c. which ſee explained under their reſpective articles.

Among the ſolid *electuaries*, are reckoned thoſe of carthamum, roſe juice, violet juice, &c. M. Lemery reckons up about a hundred and twenty ſorts of *electuaries*, and beſide theſe there is an infinite variety in extemporaneous preſcriptions.

To make *electuaries* in perfection, where a ſyrup is the baſis of the compoſition, as in the *electuary* of ſaſſafras, and the like, the ſyrup ſhould be prepared in a cloſe veſſel, that none of the virtues of the ingredients may be loſt; the powders, to be afterwards added to this, ſhould be freſh, and very finely ſifted; the gums, when there are any in the compoſition, ſhould be well cleanſed, and diſſolved in their proper menſtruums; and the whole muſt be reduced to a ſmooth maſs, of ſuch a conſiſtence, as will neither be ſubject to candy nor ferment.

Where ſyrups are uſed only to bring *electuaries* into form, care muſt be taken that they are not boiled too high; for that will ſubject them to candy in the *electuary*, and ſpoil the whole, as the being too low boiled, or thin, will leave them ſubject to ferment in hot weather, and afterwards grow ſour, ſo as to change, invert, or deſtroy the nature of the medicine.

Electuaries made of the pulp of fruits, are leſs diſpoſed to keep than others, on account of the great tendency theſe ſubjects have to ferment and putreſy. Hence a lenitive *electuary* can never keep long, eſpecially if made too thin.

Juſt the contrary of this is the caſe, however, with the capital *electuaries*, as Venice treacle, mithridate, and the like; for theſe require to be ſome time made, that the ingredients may digeſt or ripen, as it were, and grow mellow together, as the gums and ſpices that are in that compoſition keep it from any decay, provided the honey doth not candy, which ſome prevent by uſing it unclarified; and if theſe *electuaries* prove too dry, they are to be moiſtened with Canary wine, and thus they improve by keeping. This, however, is not the caſe with the diaſcordium, which loſes of its aſtringency as the ingredients become mellow together; and this is much better made up with ſugar of roſes, or ſyrup of diacodium, inſtead of honey. Shaw's Lectures, p. 209.

The way of powdering and ſifting the ingredients for *electuaries* is liable to loſe their finer and lighter parts, in form of a light duſt, and that of grinding them in a horſe-mill has the ſame inconvenience, with the additional one of a great quantity of ſtony matter mixing itſelf from the mill-ſtones with the powder. The beſt way would certainly be, by means of two iron rollers moving againſt one another in a cloſe box, as in the making of chocolate, and to grind together all the ingredients, with the honey and wine, and bringing all at once to a proper conſiſtence. Perhaps, indeed, a much better way than all, though a very troubleſome one, would be to get out the full virtues of all the ingredients ſeparately, in the form of extracts and eſſential oils, &c. and mix theſe with a proper quantity of honey, and, by this means, to concentrate the medicine, ſo that it might be given agreeably in very ſmall doſes.

ELECTUARY *e ſcammonio*, a new name given, in the London Pharmacopœia, to the compoſition commonly called *electuarium caryocoſtinum*. The compoſition is alſo ſo much altered, that inſtead of an ounce, a dram and a half is now a common doſe. The preſcription for it is this: take ſcammony, an ounce and a half; cloves and ginger, of each ſix drams; oil of carraway ſeeds, half a dram; honey, half a pound; mix all into an *electuary*. Pemberton's Lond. Diſp. p. 336.

ELECTUARY *for the Dyſentery*, *for the Epilepſy*, *for the Gonorrhœa*, *for the Piles*, *for the Palſy*, *for the Rheumatiſm*. See DYSENTERY, EPILEPSY, GONORRHOEA, HÆMORRHOIDS, PALSY, and RHEUMATISM.

ELEEMOSYNA *Carucarum*, or *pro Aratris*, or *Aratri*, in our *Ancient Cuſtoms*, a penny which king Ethelred ordered to be paid for every plough in England, towards the ſupport of the poor. Sometimes it is alſo called *eleemoſyna regis*, becauſe firſt appointed by the king.

ELEEMOSYNÆ is alſo uſed for the poſſeſſions belonging to churches. See ALMS, and FRANK *Almoign*.

ELEEMOSYNARIA. See AMBRY.

ELEEMOSYNARIUS, in our *Old Writers*, is uſed for the almoner, or peculiar officer who received the eleemoſynary rents and gifts, and diſtributed them to pious and charitable uſes. There was ſuch an officer in all religious houſes. The biſhops alſo uſed to have their almoners, as now the king has. Linn. Provinc. lib. i. tit. 12. See alſo Du-Cange, Gloſſ. Lat.

ELEEMOSYNARY *Corporations*. See CORPORATIONS.

ELEGANCE, ELEGANCY, from *eligo*, *I chuſe*, denotes a manner of doing, or ſaying things politely, agreeably, and with choice.

With choice, ſo as to riſe above the common manners; politely, ſo as to ſtrike people of delicate taſte; and agreeably, ſo as to diffuſe a reliſh which gratifies every body.

ELEGANCE, in *Oratory*, is one of the three parts of general ELOCUTION, and reſpects the purity and perſpicuity of the language. By the former a diſcourſe is rendered correct, and by the latter intelligible; and both extend to the ſelection of ſingle words, as well as to their conſtruction in ſentences. See PURITY, and PERSPICUITY.

Poetical *elegancies*, *elegantiæ poeticæ*, are of ſervice to ſcholars in making their verſes; by being too regular in the grammatical conſtruction, we loſe certain licences, wherein the *elegance* of language conſiſts. *Elegance*, though irregular, is better than regularity without *elegance*.

The *elegance* of a painting is not founded on the correctneſs of the deſign, as appears in Raphael, and the antique. It is moſt felt in works otherwiſe careleſs and inaccurate; as in Correggio, where, in ſpite of all the defects as to juſtneſs of deſign, there is an *elegance* even in the manner of the deſign itſelf, as well as in the turn of the attitudes, &c.

The *elegance* of a deſign is a manner which embelliſhes and heightens objects, either as to their form, or colour, or both; without deſtroying or perverting the truth.

ELEGIA, in *Botany*, a name given, by ſome authors, to the *arundo ſcriptoria*, or *writing reed*, common in Greece and Italy.

ELEGIAC, in the *Latin Poetry*, ſomething that belongs to *elegy*.

Elegiac verſes, Ελεγοι, are alternately hexameter, and pentameter.

Quintilian eſteems Tibullus the chief of the *elegiac* poets; but the younger Pliny gives the preference to Propertius. They have each of them reaſon on their ſide; and one might make a third choice, as juſt as either of them. See ELEGY.

ELEGIT, in *Law*, a judicial writ, given by the ſtatute Weſtm. 2. 13 Edw. I. cap. 18. which lies for him who has recovered debt or damages, or upon a recognizance in any court, againſt one not able in his goods to ſatisfy; and directed to the ſheriff, commanding him to make delivery of half the party's lands, and all his goods, oxen and beaſts for the plough excepted.

This writ ſhould be ſued out within a year and a day after the judgment.

The creditor ſhall hold the moiety of the ſaid land ſo delivered to him, till his whole debt and damages are ſatisfied; and during that time he is tenant by *elegit*. See TENANT.

ELEGY, Ελεγεια, a mournful, and plaintive kind of poem. Voſſius, after Didymus, derives the term from ἒ, ἒ, λεγειν, *to ſay alas!*

The firſt inventor of the *elegy* is not known: ſome ſay it was one Theocles of Naxus, or, according to others, of Eretria, who, in the heat of his phrenſy, firſt produced this kind of compoſition. But there is no wonder that we are at this time in the dark as to the matter; Horace aſſures us it was a point not ſettled among the grammarians even in his time, who the author was.

> *Quis tamen exiguos* elegos *emiſerit auctor,*
> *Grammatici certant, & adhuc ſub judice lis eſt.*

The chief writers of *elegy* among the Greeks, are Callimachus, Parthenius, and Euphorion; and among the Latins, Ovid, Catullus, Tibullus, and Propertius.

The Flemiſh have diſtinguiſhed themſelves among the moderns for this kind of Latin verſe. The *elegies* of Bidermann, Grotius, and eſpecially Sedronius and Vallius, ſeem worthy of the pureſt antiquity. The counteſs de la Suze has diſtinguiſhed herſelf for *elegies* in the French tongue.

In the Engliſh, we have nothing conſiderable of the *elegiac* kind, but what we have in Milton. The Engliſh and French *elegies* are chiefly in Alexandrine verſes.

In proceſs of time, *elegy* degenerated from its original intention; and not only matters of grief, but alſo joy, wiſhes, prayers, expoſtulations, reproaches, and almoſt every ſubject, were admitted into *elegy*.

The office of *elegy* is well delivered by M. Boileau:

> *La plaintive elegie en long habits de deuil,*
> *Scait, les cheveux epars, gemir ſur un cercueil:*
> *Elle peint des aimans la joye, & la triſteſſe;*
> *Flate, menace, irrite, appaiſe une maîtreſſe.*
>
> In mourning weeds ſad *elegy* appears,
> Her hair diſhevell'd, and her eyes in tears:
> Her theme, the lover's joys, but more his pains;
> By turns ſhe ſings, ſooths, threatens, and complains.

The diction of *elegy* ought to be clean, eaſy, perſpicuous, expreſſive of the manners, tender, and pathetic; not oppreſſed with ſentences, points, &c. No apoſtrophes are allowed; and the ſenſe ought to be generally cloſed in every diſtich, or two lines; at leaſt, in Latin compoſitions.

ELEMENTARY, ſomething that relates to the principles or *elements* of bodies.

The *elements* of a body are alſo called the *elementary principles* thereof. See PRINCIPLE.

The whole ſpace, included within the concave, or orbit of the moon, is called the *elementary region*, as being the ſeat, or ſphere, of the four vulgar *elements*, and the bodies compounded thereof.

The author of the Comte de Gabalis gives the name *elementary people* to a kind of beings who are ſuppoſed to inhabit the *elements*, and are only known by what they call the *philoſophers*, or *ſages*. According to theſe perſons, the *element* of *fire* is inhabited by ſalamanders; *water*, that is, the ſea and rivers, by nymphs, or oridians; *earth* by gnomes and gnomides; and *air* by ſylphs and ſylphides.

ELEMENTARY *Air*, *Fire*, *Geometry*, *Muſic*. See the ſubſtantives.

ELEMENTS, in *Phyſics*, the firſt principles or ingredients of things, whereof all bodies are compounded; and into which they are all reſolvable.

Elements are conceived as the moſt ſimple, homogeneous parts, or corpuſcles; of an aſſemblage and mixture whereof, all the bodies we ſee, conſiſt.

Authors generally talk wildly, and inconſiſtently, of the *elements*, and confound them with the *principles* of things, yet there is great difference; and we find by experience, that all things cannot indifferently be made of all; that ſtone, for inſtance, and marble, are not convertible into fleſh, nor are fit to nouriſh or augment an animal body: it ſeems to follow, that all the variety of bodies could never ariſe from the firſt ſimple combination of the two principles, matter and form; but only ſome infinitely ſimple beings, or corpuſcles, which being variouſly intermixed, might conſtitute all other bodies. Now thoſe moſt ſimple of all beings, thus formed of the firſt determination and concretion of principles, are what the philoſophers properly call *elements*; ſo that *elements* and principles have this difference between them, that a principle, as matter, is a kind of incomplete nature; but an *element* is a perfect or complete one.

Hence it follows, that there muſt, of neceſſity, be more *elements* than one; ſince otherwiſe all things would be equally ſimple, and there would be no ſuch thing as a compound in nature. Moſt of the ancients, not aware of this, confound *element* with principle; by which means the *elements* are ſometimes repreſented as corruptible, and ſometimes as incorruptible. The retainers to incorruptible *elements*, mean preciſely by *element* what we mean by the firſt matter. In effect, their *elements* are their atoms, or corpuſcles, which are ſuppoſed indiviſible, incorruptible, &c.

Democritus is held to have been the firſt author of this tenet; which accordingly is adhered to by Epicurus, and many of their deſcendants, the Epicurean and corpuſcular philoſophers. Among thoſe who hold the *elements* corruptible, ſome will only have one, and ſome ſeveral. Of the former, the principal are Heraclitus, who held fire; Anaximenes, air; Thales Mileſius, water; and Heſiod, earth; as the only *element*. Heſiod is followed by Bernardin, Teleſius; and Thales, by many of the chemiſts.

Among thoſe who admit ſeveral corruptible *elements*, the principal are the Peripatetics; who, after their maſter Ariſtotle, contend for four *elements*; viz. fire, air, water, and earth. Ariſtotle took the notion from Hippocrates; Hippocrates from Pythagoras; and Pythagoras from Ocellus Lucanus, who ſeems to be the firſt author of the dogma.

The Carteſians only admit three *elements*; which they pretend are all that could ariſe from the firſt diviſion of matter. See CARTESIAN *Philoſophy*.

Our great Sir Iſaac Newton conſiders the primary *elements* of bodies on the atomical ſyſtem, thus, all things conſidered, it ſeems probable, that God in the beginning formed matter in ſolid, maſſive, hard, impenetrable, moveable particles of ſuch ſizes, and figures, and with ſuch other properties, and in ſuch proportion to ſpace, as moſt conduced to the end for which he formed them; and that theſe primitive particles, being ſolids, are incomparably harder than any porous bodies compounded of them; even ſo very hard as never to wear out; no ordinary power being able to divide what God made one in the firſt creation. While the particles remain entire, they may compoſe bodies of one and the ſame nature and texture in all ages; but ſhould they wear away, or break in pieces, the nature of things, depending on them, would be changed; water and earth, compoſed of old worn particles, and fragments of particles, would not be of the ſame nature and texture now, with water and earth compoſed of entire particles in the beginning. And, therefore, that things may be laſting, the changes of corporeal things are to be placed only in the various ſeparations, and new aſſociations and motions, of thoſe permanent particles; compound bodies being apt to break not in the midſt of ſolid particles, but where thoſe particles are laid together, and only touch in a few points. It ſeems to him likewiſe, that theſe particles have not only a *vis inertiæ*, with the paſſive laws of motion reſulting therefrom, but are alſo moved by certain active principles; ſuch as is gravity, and that which cauſes fermentation, and the coheſion of bodies. See COHESION, EARTH, FERMENTATION, GRAVITY, and PRINCIPLE.

ELEMENTS, in *Chemiſtry*, are the principles, or component parts, of natural bodies, into which they are reſolvable by fire, &c.

The effect of chemiſtry is, to analyſe or reſolve bodies into their *elements*.

The chemical *elements* are divided into *active* and *paſſive*.

The chemiſts are ſomewhat divided as to their *elements*. Some to the vulgar Peripatetic *elements*, water, which they call phlegm; and earth, which they call *caput mortuum*, add three more; viz. ſalt, ſulphur, and mercury. Salt they hold the principle of taſte; and ſulphur, of ſmell, and inflammability: as to mercury, which they alſo call ſpirit, ſome hold it the principle of colours, but others deny this; and, in effect, they agree in nothing, but that it is the moſt ſubtile and ſpirituous part.

Other chemiſts conſider fire, air, water, and earth, as the only proper *elements*, or ſimple bodies; alleging, that by the moſt complete and accurate analyſes which have been made, nothing has been ever ultimately produced but from one or more of theſe four ſubſtances, according to the nature of the decompoſed bodies; and that they really act as ſuch in all chemical operations. Macquer.

The *elements* of foſſils are, 1. Mercury, as the baſe. 2. Sulphur, as the coagulator, or binder. 3. Salt. 4. Earth. The *elements* of metals, are ſulphur and mercury alone; mercury as the baſe, or matter, and ſulphur as the binder, or cement. The *elements* of foſſil ſalts are an acid ſpirit, and inſipid earth. The *elements* of earths are an oil, a little acid ſalt, and a calx. The *elements* of ſulphurs are an acid ſpirit, an oil, and an earthy or metallic matter. Boerhaave.

But, after all, it muſt be added, that there is no aſſigning any preciſe number of chemical *elements*; ſome bodies yielding more, and others leſs. And even theſe very *elements* themſelves are reducible, by a farther proceſs, into other *elements*. Thus, by repeated diſtillations of wine, we ſucceſſively get a ſpirit of wine, a vapid water, a ſubacid water, a more acid water, oil, bitter yellow ſpirit, and a *caput mortuum*, which is reſoluble into earth, oil, &c. Now, are theſe ſo many ſeveral *elements?* Add, that what they account an *element*, now that it is ſeparated, is very different from what it was when it exiſted in the mixt; as appears hence, that upon remixing all the *elements* a body is reſolved into, the mixture will bear no reſemblance to the firſt body.

In effect, theſe *elements* ſeem rather to be produced by the fire, than ſeparated by it. Beſide, that they are convertible, or at leaſt reſolvable, into one another. Thus ſpirit of wine is found to yield an acid, an oil, and a water; and ſalts yield either an acid, or an alkali, with phlegm.

What makes the notion of the chemical *elements* ſtill more precarious, is, that a pot-herb, and a poiſonous herb, ſhall ſometimes yield *elements* perfectly alike; more ſo, than the ſame plant analyſed at two different times. M. Homberg has conſidered the difficulties charged on *elements* with great attention.

The reſult of numerous experiments made to aſcertain the matter is, that the four principles, ſalt, oil, water, and earth, are always found in all plants, in what manner ſoever analyſed; that theſe principles are more or leſs volatile, or fixed, according to the different manners of analyſing; that this difference ariſes, not only from the different force of fire, but alſo from the fermentation of the mixed, preceding the analyſis; that a vehement fire, rendering different *elements* equally volatile, confounds them in the analyſis; that the fire evaporates, and abſolutely loſes ſeveral parts; and that to have the *elements* as pure as may be, only fermentation, and a gentle fire, muſt be uſed.

ELEMENTS is alſo uſed, figuratively, for the grounds and principles of arts and ſciences.

Thus we ſay, letters are the *elements* of ſpeech: he does not know the firſt *elements* of grammar.

The **ELEMENTS** of mathematics have been delivered by ſeveral authors in their courſes, ſyſtems, &c. The firſt work of this kind is that of Peter Herigon, in Latin and French, publiſhed in 1664, in ten tomes; wherein are contained the *elements* of Euclid, Euclid's Data, Apollonius Pergæus, &c. with the *elements* of arithmetic, algebra, trigonometry, architecture, geography, navigation, optics, ſpherics, aſtronomy, muſic, perſpective, &c. The work is remarkable for this, that throughout, a kind of real and univerſal characters are uſed; ſo that the demonſtrations may be underſtood by ſuch as only remember the characters, without any dependence on language or words at all.

Since Herigon, the *elements* of the ſeveral parts of mathematics have been laid down by others, particularly the Jeſuit Schottus, in his Curſus Mathematicus, in 1674. Sir Jonas Moor, in his New Syſtem of Mathematics, in 1681; De Chales, in 1674; Ozanam, in his Cours de Mathematique, in 1699; and, above all, Chriſt. Wolfius, in his Elementa Matheſeos Univerſæ, in two vols. 4to. the firſt publiſhed in 1713, and the ſecond in 1715;

a work never enough to be commended. There has been another edition of this excellent work publiſhed at Geneva, in five volumes in quarto; the firſt volume in 1732, the ſecond in 1733, the third in 1735, the fourth in 1738, and the fifth in 1741.

The *Elements* of Euclid are the firſt and beſt ſyſtem of geometry. We have abundance of editions and comments on the fifteen books of Euclid's *Elements*. Orontius Fincus firſt publiſhed the firſt ſix books in 1530, with notes, to explain Euclid's ſenſe. The like did Peletarius in 1557. Nic. Tartaglia made a comment on all the fifteen books, about the ſame time, with the addition of ſome things of his own; and the like did Fran. Fluſſates Candalla, a noble Frenchman, in the year 1578, with conſiderable additions as to the compariſon and inſcriptions of ſolid bodies; which work was afterwards republiſhed, with a prolix comment, by Clavius, whoſe edition has ſince been reprinted, at various places and times.

Dr. Gregory publiſhed an edition of all Euclid's works, including his *Elements*, in Greek and Latin, in 1703, fol. But as the whole fifteen books do not ſeem neceſſary, eſpecially for young mathematicians, ſome authors have choſen only the firſt ſix, with the eleventh and twelfth at moſt. It would be endleſs to relate the ſeveral editions hereof; there is a French one of De Chales, and a Latin one of And. Tacquet; the beſt edition of the former of which is that of Paris in 1709, by Ozanam; and of the latter, that of Cambridge in 1703, by Mr. Whiſton. Mr. T. Simpſon's *Elements* of Geometry is an excellent compendium of this kind; and Dr. Simpſon of Glaſgow publiſhed, in 1756, a Latin edition of the ſix firſt, and eleventh and twelfth books of Euclid, with notes.

ELEMENTS, in the *Higher Geometry*, are the infinitely ſmall parts, or differentials, of a right line, curve, ſurface, or ſolid. Thus, (*Tab. Analyſis*, *fig.* 18.) the ſmall ſpace PM*mp*, formed by the two ordinates PM, *pm* infinitely near each other, and the arc M*m* of the curve, is the *element* of the ſpace APM, P*p* is the *element* of the abſciſſe AP, M*m* that of the curve AM, &c. See DIFFERENTIAL, FLUXION, &c.

ELEMENTS, in *Aſtronomy*, are thoſe principles deduced from aſtronomical obſervations and calculations, and thoſe fundamental numbers, which are employed in the conſtruction of tables of the planetary motions. Thus, the *elements* of the theory of the ſun, or rather of the earth, are his mean motion and eccentricity, and the motion of the aphelia. The *elements* of the theory of the moon are its mean motion, that of its node and apogee, its eccentricity, the inclination of its orbit to the plane of the ecliptic, &c.

ELEMI, or ELEMY, in *Pharmacy*, a pellucid reſin, of a whitiſh colour, intermixed with yellowiſh particles, and often much of the colour and conſiſtence of wax; of a pretty briſk bitter, though not diſagreeable taſte; and a ſmell ſomewhat like that of fennel.

It is uſually called *gum elemi*, though very improperly, inaſmuch as it takes fire readily enough, and diſſolves in oleaginous liquors, which are the characters of a reſin, not a gum. It totally diſſolves in rectified ſpirit of wine; and in diſtillation with water, ſixteen ounces of gum yield one ounce of eſſential oil. It flows from inciſions made in the trunk and large branches of a large and tall tree, of the olive kind, growing in Ethiopia, and Arabia Felix. It is alſo found in Apulia, a province of the kingdom of Naples.

Pomet in his Hiſtory, and Lemery in his Dictionary of Drugs, deſcribe *elemi* as a white reſin, bordering on green, odoriferous, and brought from Ethiopia, in cakes of two or three pounds a-piece, and uſually wrapped up in the leaves of the Indian cane.

It is excellent in diſeaſes of the head; and is proper to digeſt, reſolve, and ſuppurate. It is held a kind of natural balſam; and is ſovereign in the cure of all ſorts of wounds.

One of the beſt officinal digeſtives, commonly called the ointment or liniment of Arcæus, conſiſts of ſix parts of the *elemi*, five or ſix of turpentine, and twelve of lard, or a mixture of lard and ſuet, melted together.

The true *gum elemi* is that above deſcribed; but there are ſeveral ſpurious ſorts, ſome natural, and others factitious, frequently ſold for it.

The factitious, or counterfeit, is uſually made of reſin waſhed in oil of aſpic; though the ill ſmell, and white colour of this, might eaſily diſcover the fraud. The natural gums, obtruded for *elemy*, are,

1. A gum brought from the American iſlands, in cags of different weights, covered up with the leaves of a plant unknown in Europe.

The ſecond might be taken for common reſin, but for its ſmell, which is ſomewhat ſweeter, and more aromatic.

The third is of an aſh colour, bordering on brown, brought over in large pieces, and very dry and friable.

Pomet does not take any of theſe for different genuine gums; but rather ſuppoſes them to be originally *elemy*, only impure, and coarſe, ſince melted down, and made up by the fire.

ELENCHUS, in *Antiquity*, a kind of ear-rings, ſet with large pearls.

ELENCHUS, Ελεγχος, in *Logic*, by the Latins called *argumentum*, and *inquiſitio*, is a vicious, or fallacious argument, which deceives under the appearance of a truth; the ſame with what is otherwiſe called *ſophiſm*.

ELEOCARPUS, in *Botany*. See ELÆOCARPUS.

ELEOSACCHARUM, rather ELÆOSACCHARON, Ελαιοσακχαρον, in *Pharmacy*, a mixture of ſugar with a diſtilled oil; in order to bring it to mix with ſome aqueous fluid for preſent uſe.

Grind an ounce of fine and dry loaf ſugar to an impalpable powder, in a glaſs mortar, with a glaſs peſtle; then add to it, by degrees, a dram of any eſſential oil, or half a dram, if the oil be very tenacious; continue rubbing them together till the oil be thoroughly mixed, and drank into the ſugar. The oil, in this operation, uſually diffuſes a fragrance to a great diſtance; wherefore, to prevent the loſs of its finer parts, the operation ſhould be performed as quick as poſſible, and the mortar covered, and the peſtel ſurrounded by a clean linen cloth; and if a little quantity of the white of an egg be added in the grinding, and mixed in with the ſugar and oil, the oil thus becomes more eaſily miſcible, but the mixture will not keep ſo long without growing rancid. Thus ſugar, which is a pure ſoap, or a true eſſential oily ſalt, divides the glutinous tenacity of the oil, interpoſes itſelf between the principles thereof, unites them cloſely with itſelf, and makes an extemporaneous ſoap, which may be commodiouſly diluted with water for medicinal uſes.

Though this mixture is not ſo perfect as an actual ſoap, or true eſſential ſalt, yet it ſuffices for uſe; nor is there reaſon to apprehend any inconvenience from the ſugar in this preparation; for ſugar is unjuſtly ſaid to be unwholſome, as there are no ſolid proofs extant of this; on the contrary, it is a wonderful ſalt that perfectly mixes with water, and ferments therewith into wine, and yet, what is ſurpriſing, it appears oleaginous and perfectly inflammable in the fire, whence it is known to conſiſt of oil and ſalt.

If theſe *eleoſaccharums* be carefully prepared, and put up in clean dry glaſſes, exactly cloſed with glaſs ſtoppers, they may be preſerved perfect a long time; and in this manner very effectual medicines may be eaſily carried from place to place, and, upon occaſion, directly uſed upon a journey, by mixing a ſmall quantity of them in a glaſs of wine. An *eleoſaccharum*, or mixture of the ſame nature, at leaſt, might be alſo made, by mixing an eſſential oil with a fixed alkaline ſalt, by grinding, by which means alſo a kind of ſoap is obtained; but alkalies, thus mixed, deſtroy the grateful properties of the eſſential oils, and change their natural taſtes and odours. Such mixtures alſo would preſently reſolve in the air, and thence be eaſily altered; but, by the method with ſugar, the phyſicians may always readily prepare a medicine rich in virtues. If the *eleoſaccharum* of mint, for inſtance, be diſſolved in mint water, then ſtrengthened with an addition of ſpirit of mint, and the mixture ſweetened with ſyrup of mint, the whole virtues of the plant will be thus obtained. Boerh. Chem. part ii. p. 100.

ELEOSELINUM, in *Botany*, a name by which ſome authors have called the paludapium or ſmallage. Ger. Emac. Ind. 2.

ELEPHANT, *Elephas*, in the Linnæan ſyſtem of *Zoology*, the name of a diſtinct genus of the *bruta*, in the claſs of *mammalia*. The characters which make the diſtinction of this genus, are, that the *elephant* has no *dentes inciſores*, or cutting-teeth, and that the *canine*, or dog-teeth, of the upper-jaw are very long; that it has a very long, flexible proboſcis, and almoſt naked body. The proboſcis is a long, cartilaginous trunk, formed of many rings, and terminated with a ſmall moveable hook. This trunk ſerves the animal inſtead of a hand, to convey any thing into the mouth, and to defend it from its enemies; the noſtrils are at the end of the proboſcis, which is the organ of feeling and of ſmell, both which ſenſes the *elephant* poſſeſſes in a very exquiſite degree. Beſides the proboſcis, the *elephant* has two large tuſhes projecting from the upper-jaw, and bending a little upwards. The largeſt of thoſe imported into England are ſeven feet long, and weigh a hundred and fifty-two pounds each. The eyes of this animal are ſmall; its ears large and pendulous; the back is arched; the lips are thick and clumſy; the neck ſhort; the feet are round and undivided, but terminated at their margins with five ſmall hoofs; the knees are flexible; it has two paps on the breaſt; the tail reſembles that of a hog, and the ſkin is very thick and callous, and, when dreſſed, impenetrable by a muſket-ball, of a duſky colour, and has a few ſcattered hairs on it. The *elephant* is the largeſt of all land animals, and is ſaid to be twelve or even fifteen feet high. See *Tab. Quadrupeds, fig.* 2.

Elephants are found both in Aſia and Africa; but thoſe of Aſia are the largeſt, though they are much more numerous in Africa. They are ſaid to go a year with young, and to bring forth one at a time; they live, according to Tavernier, in his Voyages, a hundred and twenty or a hundred and thirty years, and are thirty years before they attain their full growth. The *elephant*, notwithſtanding its enormous ſize, is exceedingly ſwift; and ſo ſtrong, that, after being tamed, they have been employed to carry pieces of artillery, ſmall towers, with a number of people in them, and alſo vaſt loads. The Indians have from very early times employed them in their wars; Porus, as Quintius Curtius informs us, lib. viii. cap. 41. oppoſed the paſſage of Alexander over the Hydaſpes, with eighty-five of theſe animals; and M. de Buffon apprehends, that ſome of the *elephants* taken by that monarch, and afterwards tranſported into Greece, were employed by Pyrrhus againſt the Romans. The *elephant*, notwithſtanding its ſize and ſtrength, is the moſt docile and tractable of all animals. Naturaliſts relate many inſtances in which they have diſcovered a ſenſibility of benefits, a reſentment of injuries, a modeſty, and an ambition, of a very ſurpriſing degree.

The figure of an *elephant* is found on many of the ancient medals. Julius Cæſar, towards the end of the Roman republic, being prohibited from putting the figure of his own head on their coin, ſubſtituted that of the *elephant*; thus flattering his ambition by a very trivial circumſtance; as in the Punic language, *Cæſar* ſignified an *elephant*. The *elephant* was afterwards uſed as a ſymbol of ſovereign power, of eternity, and of piety towards the Deity.

Elephants, *taming of*. The method of taking and taming this creature, in the iſland of Ceylon, is as follows: the natives pitch upon a proper place for a warren, or park, which is broad at the entrance, and grows narrower farther in, till, at the end, it is ſo narrow, that an *elephant* cannot turn himſelf, and it runs on of this narrowneſs ſo far, that twenty *elephants* may ſtand in it one behind another. When the incloſure of this warren is finiſhed, all the people of the neighbouring places aſſemble, and make a circumference round the woods, where they know there are *elephants*, which takes in, perhaps, ſixty miles. The men now ſtand at twenty-five yards diſtance, and kindle fires between them, and make all the noiſe they can, by ſhouting, blowing horns, beating drums, and the like, and, by degrees, approach nearer and nearer the warren. The *elephants* run from the fires and noiſe, and conſequently can go no where but towards the warren; the men, who every where ſurround them, except on the warren ſide, follow upon them in this manner, till they come together, and make a ring, and the *elephants* are driven into the incloſure. When theſe creatures perceive that they are thus taken, they make reſiſtance, and often turn upon the men, but there are always near the warren fences of poles, lying flat upon the ground, which the hunters need only raiſe up, and they keep in the prey, ſo that they can neither eſcape, nor injure them; they then purſue the *elephants* with firebrands, and drive them into the narrow part where they cannot turn.

They are, from this place taken one by one, and led to the ſtable, each between two tame *elephants* bred for that purpoſe, the points of whoſe long teeth are cut; and theſe, if the wild *elephant* be troubleſome, will lay hold of his trunk with theirs, and beat him with their teeth. A man, ſitting upon each of the tame *elephants*, directs them by a ſtaff with a hook at the end, with which he occaſionally touches their heads, and orders them as he pleaſes, without bridle, or any other furniture. When they are brought into the ſtable, they are led between two poſts, with ſtakes put athwart before their breaſts, and under their bellies, and are ſo tied that they cannot ſtir, nor lie down upon the ground; for, if permitted to lie down, they would become ſorrowful, and refuſe to eat, and would die. They are here fed with the trunks of plantains, a food they much delight in, and when they have been kept thus about ſix weeks, they become tame enough for ſale. If not ſold at that time, they feed them about ſix weeks longer in the ſtable with cocoa leaves, and they are, at the end of that time, perfectly tame as a ſpaniel, and will eat graſs with the oxen in the fields. Phil. Tranſ. N° 277. § 1.

The *elephants* of Ceylon have been ſo long hunted, that they now know man for their mortal enemy, and ſeldom fail to ſeize upon and kill him wherever they meet him; but if a man lie upon the ground, and pretend to be dead, they never meddle with him. Several people have, in this iſland, lain aſleep while *elephants* paſſed by them, and ſome have only pretended ſleep, and a perfect ſtillneſs has always been found to preſerve them, even though the creature came up to examine them.

Elephant, *Elephas*, gives the denomination to an ancient and honourable military order, conferred by the kings of Denmark on none but perſons of the higheſt quality, and extraordinary merit.

It is called the *order of the elephant*, from its badge, which is an *elephant*, with a caſtle on its back, ſet with diamonds, and hung on a watered ſky-coloured ribband, like the George in England.

There are different ſentiments as to the origin and inſtitution of this order; the firſt is that of Mennenius and Hoepingius, who attribute it to Chriſtian IV. who was elected king in 1584. The ſecond, that of Selden and Imhof, who derive it from Frederic II. elected in 1542. Gregorio Leti goes back as far as Frederic I. who reigned about the year 1530. Bernard Robolledus will have king John to be the author, who began to reign in 1478. Anſhelmius, Roſſærus, and Loeſcher, hold it to have had its riſe under Chriſtian I. father of Frederic I. Laſtly, Voigtius, Becman, and Bircherodius, maintain Canutus VI. to have been the firſt inſtitutor; and the occaſion thereof to have been the croiſades. This prince, according to the chronology of Swaning, reigned towards the cloſe of the twelfth century, from the year 1168, to 1191. This, at leaſt, we are certain of, that the order was ſubſiſting in the year 1494; there being a painting ſtill extant, done that year by count Reinden, a knight of this order. And we have even authentic evidences of the marquis of Mantua's being created knight of the ſame order by Chriſtian I. in 1474. There are bulls of pope Pius II. and Sextus IV. confirming the ſtatutes of the order, authorizing the holding of aſſemblies, or chapters, in the chapel of Roeſchild, and ſettling the privileges of the knights.

The order was at firſt called the *order of St. Mary, ordo S. Mariæ*; though it ſeems to have had the appellation of the *elephant* as early as Chriſtian I. witneſs the figure of an *elephant* ſo often ſtruck on his coins, medals, &c.

The manner of its inſtitution is thus related: king Canutus having ſent a fleet againſt the Saracens in 1189, which took Siluma and Ptolemais, a gentleman among the Daniſh croiſees killed an *elephant*; in memory of which extraordinary accident the order was erected. This account is rendered the more probable by this; that it is referred to an æra, when nothing was more common than to take the ſpoils of a vanquiſhed enemy for armories or cognizances; and accordingly, ſome of the principal arms of the like kind now on foot, e. gr. the lions of the Low-Countries, had their riſe at the time of the croiſades, as is ſhewn by Heuterius and Hoepingius; which circumſtances greatly corroborate the opinion of thoſe who aſcribe the order to king Canutus.

To the collar of the order hangs an *elephant*, with a ſilver turret on its back; and underneath the *elephant*, an image of the Holy Virgin, incircled with rays. See the abbot Juſtiniani, Hiſt. de tutti gl'Ord. Milit. e Caval. tom. ii. cap. 72.

The chapel of Roeſchild was founded by Chriſtian I. for the aſſemblies or chapters of this order to be held in. It was firſt called the *Chapel of the Three Kings, Capella Trium Regum*; afterwards Frederic I. gave it the name of the *Royal Chapel*.

The order was reſtored by Frederic II. who created abundance of knights at the ceremony of his coronation, which is the only time when the Daniſh kings made any knights of the *elephant*. Chriſtian V. augmented and enriched it very conſiderably. In the year 1694, a grand chapter of the order was held at Fredericksburg, in the chapel of the knights, wherein ſix German princes were admitted into the order.

We have a multitude of writings on the ſubject of this order, whereof that of Janus Bircherodius may ſerve for all the reſt; it is the lateſt, moſt ample, and learned. It was publiſhed at Copenhagen in 1705, under the title of Breviarum Equeſtre, ſeu de Illuſtriſſimo, & Inclytiſſimo Ordine Elephantino, &c.

Elephant'*s bones*. Many teeth and bones of animals have been found in a foſſile ſtate, both in Siberia, and on the banks of the Ohio, in North America. The French academicians, on comparing ſome of theſe with the bones of real *elephants*, determined, that they belonged to the ſame ſpecies of animal; but Dr. Hunter has diſcovered, on a more accurate examination, that they are very different from thoſe of the *elephant*, and belong to another animal. The tuſks of the true *elephant* have a ſlight lateral bend; but thoſe brought from America have a larger twiſt, or ſpiral curve, towards the ſmaller end: the grinders of the latter are made like thoſe of a carnivorous animal, being furniſhed with a double row of high and conic proceſſes, as if deſigned to maſticate, and not to grind its food; whereas, thoſe of the *elephant* are flat, and ribbed tranſverſely on their ſurface: beſides, the thigh bone is of a very diſproportionate thickneſs to that of the *elephant*, and has ſome other anatomical variations. And though the American tuſks, when cut and poliſhed by the workmen in ivory, did not differ in texture and appearance from the true ivory, Dr. Hunter concludes, that genuine ivory muſt be the production of two different animals, and not of the *elephant* alone; and that the animal to which theſe bones belonged may be the ſuppoſed *elephant* or mammouth of Siberia, and other parts of the world, which is yet unknown. Phil. Tranſ. vol. lviii. art. 5.

ELEPHANT's *foot*, in *Botany*. See ELEPHANTOPUS.

ELEPHANT's *head*, in *Botany*, a ſpecies of the *rhinanthus*. See LOUSEWORT.

ELEPHANT-*caterpillar*, a name given by ſome authors to a ſpecies of inſect, commonly known in Ireland by the name of *Connaught-worm*, and ſuppoſed to be poiſonous to cattle which feed on it. See *Connaught* WORM.

ELEPHANT's *noſe*, or *elephant's neuſe*, as it is called by the Dutch, is a ſpecies of the acus or needle-fiſh, caught in the Eaſt-Indies, ſo called from the reſemblance of its ſnout to the trunk of an *elephant*. It is a very ſingular ſpecies, the lower jaw running out into a very long and ſharp-pointed ſpine: it is round-bodied, and beautifully variegated with ſpots, and has on each ſide a green line running from head to tail. It is caught in ſalt-waters. Ray's Ichthyogr. app. p. 4.

ELEPHANT, *water*, ſee HIPPOPOTAMUS.

ELEPHANTIASIS, in *Medicine*, a kind of leproſy, called alſo *lepra Arabum*, in contradiſtinction to the *lepra Græcorum*, which is another diſeaſe.

The *elephantiaſis* is thus denominated, becauſe thoſe ſeized therewith have their arms and legs big ſwollen, and tumorous; the ſkin bloated, yet rough to the touch, and all wrinkled and rugoſe like the ſkin of an elephant.

The *elephantiaſis* is a diſeaſe unknown in our parts of the world, at leaſt in theſe days. Some authors call it *leontiaſis*, and others *ſatyriaſis*. The Greeks call it ελεφαντιασις, and ſometimes ελεφας, *elephant*; alſo ελεφαντια, and ελεφαντιασμος. The *elephantiaſis Græcorum*, or *lepra Arabum*, is deſcribed by Deodatus as a contagious diſeaſe, infecting the body with a variety of evils.

In the *lepra Arabum*, the ſkin is beſet with a dry ſcabby cruſt: as in the former caſe the ſalts, being left deſtitute of their humidity, are not ſo active, and therefore affect only the cuticle; in the latter caſe theſe ſalts, with their vehicle, crowding faſter than they can be evaporated through the pores of the ſkin (being ſtill *in fluore*, and ſo more cauſtic) corrode deeper, and eat not only the cuticle, but the excretory veſſels, and ſurface of the ſkin itſelf, which thereby exudes a liquor ſomewhat thicker than uſual; which, when the thinneſt and moſt aqueous parts are evaporated, are condenſed into that cruſt or ſcab, which is the diſtinguiſhing character of this diſeaſe.

Galen defines the *lepra*, an effuſion of thick diſorderly blood, that corrupts the whole habit of the body. Avicenna calls it an *univerſal cancer*.

The *lepra* always begins within-ſide, a long time before it appears without-ſide. It was frequent in Europe in the tenth and eleventh centuries, but ſeems at preſent almoſt extinct; unleſs we allow the venereal diſeaſe to be the ſame with the *lepra*, as was the opinion, among many others, of the learned Pitcairn; and has been lately endeavoured to be proved by Mr. Becket, in a diſcourſe expreſly on the ſubject, in the Philoſophical Tranſactions.

The ſymptoms of the ancient *lepra*, as laid down by Galen, Aretæus, Pontanus, Ægineta, Cardan, Varanda, Gordon, Pharæus, and others, are as follow: the patient's voice is hoarſe, and comes rather through the noſe than the mouth; the blood is full of little white ſhining bodies, like grains of millet, which, upon filtration, ſeparate themſelves from it; the ſerum is ſcabious, and deſtitute of its natural humidity, inſomuch, that ſalt applied to it does not diſſolve; it is ſo dry, that vinegar poured on it boils; and is ſo ſtrongly bound together, by little imperceptible threads, that calcined lead thrown into it ſwims. The face reſembles a coal half extinct, unctuous, ſhining, and bloated, with frequent hard knobs, green at bottom, and white at top. The hair is ſhort, ſtiff, and brinded, and not to be torn off without bringing away ſome of the rotten fleſh to which it adheres: if it grows again, either on the head or chin, it is always white. Athwart the forehead run large wrinkles or furrows, from one temple to the other; the eyes are red, and inflamed, and ſhine like thoſe of a cat; the ears ſwollen, and red, eaten with ulcers towards the bottom, and encompaſſed with little glands; the noſe ſunk, becauſe of the rotting of the cartilage; the tongue dry, and black, ſwollen, ulcerated, divided with furrows, and ſpotted with grains of white; the ſkin covered with ulcers, that die and revive on each other, or with white ſpots or ſcales, like a fiſh; it is rough, and inſenſible, and when cut, inſtead of blood, yields a ſanious liquor. It arrives in time to ſuch a degree of inſenſibility, that the wriſt, feet, or even the large tendon, may be pierced with a needle, without the patient's feeling any pain. At laſt the noſe, fingers, toes, and even privy members, fall off entire; and by a death peculiar to each of them, anticipate that of the patient. It is added, that the body is ſo hot, that a freſh apple held in the hand for an hour, will be dried and wrinkled as if expoſed to the ſun for a week.

Matthew Prior ſays, that in Chriſtendom there were fifteen thouſand hoſpitals for lepers; but the diſeaſe having been diſcontinued for two hundred years, the revenues of thoſe hoſpitals were abuſed, and perſons feigned themſelves lepers, to be entitled to the proviſion, which occaſioned their regulation in ſome countries, and their entire ſuppreſſion in others.

In France, they were united to the order of the religious of St. Lazarus and Mount Carmel in 1664, and the adminiſtration of them given to the knights of that order. See LAZARUS. In England they have been converted to other purpoſes.

Formerly the cauſes of lepers were committed to the eccleſiaſtical tribunals; and it was prohibited to proſecute a leper before a lay-judge, in regard they were under the protection of the church, which ſeparated them from the reſt of the people, by a ceremony ſtill to be ſeen in the ancient rituals.

As to the cure, that which proved effectual in thoſe ſouthern countries, is found to fail among us, where the ſtrongeſt medicaments, and the moſt powerful mercurials are neceſſary. Bathing is judged to be of good uſe in the *lepra*. Dogs and hares are ſaid to be ſubject to this diſeaſe. Among the Indians, a white man is deſpiſed, this paſſing with them for the mark of a leper.

The *elephantiaſis* of Madeira appears at firſt in the form of tubercles on any or all parts of the body; in time they ulcerate: if they happen on the beard or eye-brows, the hairs fall off, but not on the head. The legs ſwell, and are hard, white ſcales cover them, and fiſſures appear in different parts, though in ſome inſtances the legs are emaciated, and full of ulcers. Many other very diſagreeable ſymptoms are obſerved in different patients. None are obſerved to receive this diſorder from other by contact; but the children of the diſeaſed are generally ſubject to it. The bark, attended with a proper embrocation and bliſtering, have effected a cure of this diſorder, after mercurials and antimonials have failed. London Med. Tranſ. vol. i. p. 23, &c. See LEPROSY.

ELEPHANTINE, ſomething that relates to, or partakes of the qualities of elephants.

The term is chiefly applied to certain books of the ancient Romans, wherein were recorded the tranſactions of the emperors, and the proceedings, acts, &c. of the ſenate. This we learn from Pollio and Vopiſcus, in the Life of the Emperor Tacitus, where he obſerves, that in the ſixth preſs of the Ulpian library, was kept one of theſe *libri elephantini*; wherein, for a long courſe of time, were written down the decrees and edicts of the ſenate. In ſome of theſe books, were regiſtered all the acts and proceedings of the ſenate, and the magiſtrates of Rome; in others, the proceedings and events in the provinces, the armies, &c. There were about thirty-five large volumes of them, as many as there were tribes. In them were likewiſe contained the births, and claſſes of the citizens, with the muſters, and all things belonging to the cenſus. They were renewed every five years with the cenſors, and were all anciently kept in the ærarium, or public treaſury, in the temple of Saturn.

Vigenere, and ſeveral others, believe theſe books to have been called *elephantine*, by reaſon of their enormous bulk: but Loiſel, on the ſeventeenth chapter of the eleventh book of Aulus Gellius, gives us a different etymology; and aſſures us, they were called *elephantine*, becauſe, compoſed of ivory leaves or tablets, which every body knows is a production of the elephant. See DIPTYCHA.

ELEPHANTOPUS, of ελεφας and πȣς, *foot*, *elephant's foot*, in *Botany*, a genus of the *ſyngeneſia polygamia ſegregata* claſs. Its characters are theſe: the flowers are collected in one common involucrum, each containing four or five florets, which are tubulous, and divided into five equal parts, they have five very ſhort hairy ſtamina: in the bottom is ſituated an oval germen, which afterwards becomes a ſingle compreſſed ſeed, crowned with briſtles, and ſitting on a naked placenta.

There are two ſpecies, natives of the Eaſt and Weſt Indies.

ELEPHAS, ſee ELEPHANT.

ELETTARI, in the *Materia Medica*, a name uſed by ſome authors for the common ſmall cardamom of the ſhops.

ELEVATIO, in *Proſody*, the ſame as *arſis*. See ARSIS.

ELEVATION, the altitude or height of any thing. See ALTITUDE.

The word is formed from *elevare*, *to raiſe* or *lift up*.

ELEVATION *of a ſtar*, or other point, in the ſphere, is an arch of the vertical circle, intercepted between ſuch ſtar, or other point, and the horizon.

Hence, as the meridian is a vertical circle, a meridian altitude or *elevation*, i. e. the *elevation* of a point in the meridian, is an arch of the meridian, intercepted between that point and the horizon.

ELEVATION *of the pole*, denotes the altitude of the pole above the horizon of any place, or an arch of the meridian, intercepted between the pole and the horizon.

Thus, in *Tab. Aſtronomy, fig.* 4. AQ being ſuppoſed the equator, HR the horizon, HZPN the meridian, and P the pole; PR is the *elevation of the pole*.

In which ſenſe *elevation* ſtands oppoſed to *depreſſion* or depth. See DEPRESSION.

The *elevation of the pole* is always equal to the latitude of the place; that is, the arch of the meridian intercepted between the pole and the horizon, is always equal to the arch of the ſame meridian, intercepted between the equator and the zenith. Thus, the north pole is *elevated* 51° 32′ above the horizon of London; and there is the ſame diſtance, or number of degrees, between London and the equator; ſo that London is likewiſe in 51° 32′ of northern latitude.

To obſerve the *elevation of the pole* of any place, ſee POLE and LATITUDE.

ELEVATION *of the equator*, is an arch of the meridian, leſs than a quadrant, intercepted between the equator and the horizon of the place.

Thus AQ, as before repreſenting the equator, HR the horizon, P the pole, and HZPN the meridian; HA is the *elevation of the equator*. See EQUATOR.

The *elevations of the equator*, and of the pole, together, are always equal to a quadrant; conſequently, the greater the *elevation* of the pole, the leſs the *elevation of the equator*, and *vice verſa*.

Thus, in the figure juſt cited, PA is ſuppoſed by the conſtruction a quadrant; and HA + AP + PR a ſemicircle; conſequently, HA + PR is a quadrant.

ELEVATION *of the equator, to find the*. Find the *elevation* of the pole, after the manner hereafter directed, under the article POLE.

Subtract the *elevation* found from a quadrant, or 90°; what remains is the *elevation of the equator*. Thus, the *elevation* of the pole 51° 32′, being ſubtracted from 90°, leaves the *elevation of the equator* 38° 28′.

ELEVATION, in *Architecture*, denotes a draught or deſcription of the principal face or ſide of a building, called alſo its *upright* or *orthography*. See ORTHOGRAPHY.

ELEVATION is alſo uſed in ſome writers of perſpective for the ſcenography, or perſpective repreſentation of the whole body or building. See SCENOGRAPHY.

ELEVATION, in the *Romiſh religion*, is applied to that part of the maſs wherein the prieſt hoiſts or raiſes the hoſt, with the cup above his head, for the people to adore it, after having firſt conſecrated and adored it himſelf.

The prieſt who officiates at maſs, rings a bell at the *elevation*, to appriſe the people to caſt their eyes upon their new-formed Saviour, and adore him.

St. Lewis decreed, that they ſhould fall on their knees at the *elevation*, in imitation of certain religious whom he does not name. The Chartreux, and the religious de la Trappe, ſtill obſerve this ceremony of proſtrating themſelves at the *elevation*.

ELEVATION, *angle of*, in *Mechanics*, is the angle ARB (*Tab.* III. *Mechanics, fig.* 47.) comprehended between the line of direction of a projectile AR, and the horizontal line AB. See PROJECTILE and ANGLE.

ELEVATION *of a cannon* or *mortar-piece*, is the angle which the chaſe of the piece, or the axis of the hollow cylinder, makes with the plane of the horizon.

ELEVATOR, ELEVATORIUM, in *Surgery*, an inſtrument uſed to raiſe up bones, as thoſe in fractures of the ſkull, when beaten or cruſhed in with blows, or the like.

There are dented *elevators*, and *elevators* with three feet, called *elevators triploides*. See *Tab.* III. *Surgery, fig.* 35. The feet A, A, A, of this inſtrument may be brought nearer or farther from each other, as occaſion requires. Theſe feet are applied to the ſound parts of the head, and the ſcrew BC is made to lay hold of the depreſſed part of the cranium, by turning round the handle DD, after a ſmall hole has been made in the middle of it with a ſharp awl; then, by turning the ſcrew EE, the TREPAN at B is raiſed by degrees, and with it the depreſſed part of the cranium. The method of doing this is repreſented in *fig.* 36. See TREPANNING. The *elevator* made lever-wiſe, is a new invention: its uſe is in drawing teeth. One extremity of it is flat, to reſt on the gum, at the bottom of the tooth; and the other hooked, like one of the branches of a pelican, to lay hold of the tooth.

ELEVATOR, in *Anatomy*, is a name common to ſeveral muſcles, which do the office of raiſing or lifting up the parts they belong to, of equal import with the ATTOLLENS and LEVATOR. Such are the

ELEVATOR *alæ naſi*, a muſcle, or pair of muſcles of the noſe, of a pyramidal figure, very narrow, though fleſhy at its origination, on the fourth bone of the upper jaw, and very broad and thin at its termination on the ſide of the ala naſi. Its action is to pull the ala upwards, and turn it outwards. See *Tab. Anat.* (*Myol.*) *fig.* 1. *lit.* o.

It is called by Winſlow the *tranſverſalis* or *inferior naris*, and by Albinus the *compreſſor naris*. Coſſerius has deſcribed it under the name of the *parvus naſi muſculus*, and Fallopius under that of *muſculus alius carneus naſi*, and Riolanus by that of *alius externus naſi*.

ELEVATOR *auris*, or *attollens auriculam*, is in reality no more than a part of the muſcle of the ſcalp, with ſome fleſh-fibres in it, as it deſcends over the temporal muſcles to the upper part of the concha. Its action is ſcarce viſible; the auricles being hardly perceived in men to have ordinarily any motion at all. See *Tab. Anat.* (*Myol.*) *fig.* 6. *n.* 3. *fig.* 1. *n.* 13.

ELEVATOR *humeri*, in *Anatomy*, a name given by ſome authors to a muſcle, now generally known under the name of the *deltoides*. See DELTOIDES.

ELEVATOR *labiorum communis*, a muſcle of the lips, ariſing from the fourth bone of the upper jaw, and terminating at the angle of the lips, under the zygomaticus. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 4.

ELEVATOR *labii inferioris*, is a muſcle that ariſes from the ſecond bone of the under jaw, below the inciſores. It deſcends, and paſſes under the zygomaticus, and is inſerted into the under lip.

This, aſſiſted by a ſmall, but ſtrong pair of muſcles, ariſing from the gum of the dentes inciſivi, and deſcending directly, is inſerted into the lower part of the ſkin of the chin, and ſerves to pull the ſkin of the chin upwards, and conſequently to thruſt up the lip.

ELEVATOR *labii ſuperioris*, ariſes from the upper part of the ſecond bone of the upper jaw, and deſcending obliquely, is inſerted into the upper lip, above the dentes inciſivi: it draws up the lip. See *Tab. Anat.* (*Myol.*) *fig* 1. *n.* 3. and *n.* 5.

ELEVATOR *oculi*, one of the muſculi recti of the eye, ſerving to draw it upwards. See RECTUS and EYE.

ELEVE, a term purely French, though of late uſed alſo in our language. Literally it ſignifies a diſciple or ſcholar, bred up under any one, being formed from the Italian, *allievo*, *an apprentice* or *novice*.

It was firſt uſed by the French writers, in ſpeaking of painters; ſuch a painter was an *eleve* of Da Vinci, of Raphael, &c. From painting, it came to be applied to ſuch as ſtudied or learned any other art under a maſter. In the Royal Academy of Sciences, there were twenty *eleves*; and in that of inſcriptions, ten *eleves*. The *eleves* are to act in concert with the penſionaries. See ACADEMY.

The denomination *eleve*, however, has been ſince ſuppreſſed, and that of *adjoint* ſubſtituted in its room; becauſe every body did not know the ſenſe affixed to it by the academy: and now the penſionary academiſts have not, as formerly, each of them an *eleve*; but the *eleves* are become *adjoints*, or aſſociates of the academy.

ELEUSINIA, in *Antiquity*, the myſteries of the goddeſs Ceres, or the religious ceremonies performed to her honour; thus called from *Eleuſis*, a maritime town of the Athenians, wherein was a temple of that goddeſs, famous for the celebration of theſe myſteries.

Some writers call the city where the *Eleuſinia* was celebrated, *Eleuſinia* or *Eleuſis*: Harpocration confirms this orthography, in deriving its name from *Eleuſinus*, a ſon of Mercury; to which opinion Pauſanias likewiſe adheres, in his Attics. Others, who write it Ελευσις, *Advent*, ſuppoſe it thus called, becauſe Ceres, after running over the world in ſearch of her daughter, ſtopped here, and put an end to her purſuit. Diodorus Siculus, lib. v. will have the name *Eleuſis* to have been given this city, as a monument to poſterity, that corn, and the art of cultivating it, were brought from abroad into Attica.

The *Eleuſinia* were the moſt ſolemn and ſacred ceremonies in uſe among the Greeks; for which reaſon they were called *myſteries*, by way of eminence. They are ſaid to have been inſtituted by Ceres herſelf, at *Eleuſis*, in memory of the zeal and affection wherewith the Athenians received her.

This is the account Iſocrates gives in his Panegyric; but Diodorus Siculus aſſures us, lib. vi. that the *Eleuſinia* were inſtituted by the Athenians, in gratitude to Ceres, for having inſtructed them to lead a leſs barbarous and ruſtic life: yet the ſame author, in the firſt book of his Bibliotheca, relates the thing in another manner.

A great drought, ſays he, having occaſioned a miſerable famine throughout all Greece: Egypt, which had that year reaped a moſt plentiful harveſt, beſtowed part of the fruits thereof upon the Athenians. It was Erechtheus that brought this extraordinary ſupply of corn; in commemoration of which benefaction, Erechtheus was created king of Athens, who inſtructed the Athenians in theſe myſteries, and the manner of celebrating them.

This account comes near to what we are told by Herodotus and Pauſanias, viz. that the Greeks acquired the knowlege of their gods and their religion from the Egyptians.

Theodoret, lib. i. Græcanic. Affect. writes that it was Orpheus, not Erechtheus, who made this eſtabliſhment, and who inſtituted for Ceres what the Egyptians practiſed for Iſis; which ſentiment is confirmed by the ſcholiaſt on the Alceſtis of Euripides.

Eleuſis, the city where theſe myſteries were celebrated, was ſo jealous of the glory thereof, that, when reduced to the laſt extremity by the Athenians, it would not ſurrender but on this condition, that the *Eleuſinia* ſhould not be taken away; though theſe were no religious ceremonies peculiar to the town, but were held common to all Greece.

The matter of theſe myſteries, as related by Arnobius, and Lactantius, was an imitation, or repreſentation, of what mythologiſts teach of Ceres. They laſted ſeveral days; during which, the people ran about with burning torches in their hands; ſacrificed abundance of victims, not only to Ceres, but alſo to Jupiter; made libations from two veſſels, one of them to the eaſt, and the other to the weſt; marched in pomp to *Eleuſis*, making pauſes from time to time, wherein they ſung hymns, and ſacrificed victims; and this they performed, not only in going to *Eleuſis*, but in returning back to Athens. For the reſt, they were obliged to keep it an inviolable ſecret; and the law condemned to death any one who ſhould dare divulge their myſteries. Tertullian, in his book againſt the Valentinians, relates, that the figure ſhewn in the *Eleuſinia*, and which was ſo expreſly prohibited to be made public, was that of a man's privy parts. Theodoret, Arnobius, and Clemens Alexandrinus, likewiſe make mention of it; but they ſay it was the figure of a woman's privities.

The day after the feaſt, the ſenate aſſembled at *Eleuſis*, apparently to examine whether every thing had been managed according to order.

There were two kinds of *Eleuſinia*, the *greater*, and the *leſs*; thoſe we have been hitherto ſpeaking of were the greater.

The *leſſer* were inſtituted in favour of Hercules; for that hero deſiring to be initiated into the former, and the Athenians not being able to gratify him therein, becauſe the law prohibited any ſtranger being admitted; being loth, however, to give him an abſolute denial, they inſtituted new *Eleuſinia*, in which he aſſiſted. The greater were held in the month Boedromion, which anſwered to our Auguſt; and the leſſer in the month Antheſterion, which happened in our January. People were only brought to partake of theſe ceremonies by degrees; at firſt, they were to be purified; then admitted to the leſſer *Eleuſinia*; and at laſt initiated in the greater. Thoſe, who were yet only at the leſſer, were called *myſtæ*; and thoſe admitted to the greater, *epoptæ*, or *ephori*, i. e. *inſpectors*. They were uſually to undergo a probation of five years, before they paſſed from the leſſer to the greater. Sometimes, indeed, they were contented with a ſingle year; immediately after which, they were admitted to the moſt ſecret religious parts of the ceremony. Meurſius has an expreſs treatiſe on the *Eleuſinia*, where moſt of theſe points are proved.

ELEUTHERIUS, Ελευθεριος, in *Antiquity*, a Greek word, ſignifying *liberator*, or *deliverer*. It was uſed by the Greeks as a ſurname, or epithet of Jupiter, given him on occaſion of his having gained them the victory over Mardonius, general of the Perſians, and killed, as they ſay, 300,000 men of his army; and, by that means, delivered them from the danger they were in of being brought under the Perſian yoke.

The word is formed from ελευθερος, *free*.

There were alſo feaſts ſolemniſed on this occaſion, in honour of Jupiter *Eleutherius*, and called *Eleutheria*. They were held every five years, with races of armed chariots, &c. The ſcholiaſt on Pindar, Olymp. Od. 7. ſays they were celebrated at Platea, the place where the victory was obtained.

The Samians had another feſtival of this name, in honour of the god of Love; and ſlaves, when they obtained their liberty, were wont to keep a ſtated holyday in remembrance of the happy day on which they were made free. Potter, Archæol. Græc. lib. ii. cap. xx. tom. i. p. 388.

ELFS, or ELVÆ, called alſo *Fairies*, the name of deities honoured among the Saxons, with a kind of ſacrifice called *Alſ-blot*.

ELFS-*arrows*, a name given by the people of ſome parts of Scotland to certain ſtone-weapons which they find, and which had been in uſe before tools and weapons of iron were uſed there. It is not only in Scotland that theſe are found, but in America, and many other places alſo. They are ſtyled by ſome *ceraunia*, and *thunder-bolts*, and are ſuppoſed to have fallen from the clouds in ſtorms of thunder; others, not leſs erroneouſly, ſuppoſe them to be natural foſſils; but their true origin is from the workmanſhip of man, out of common flints, and other ſtones. Woodward's Cat. Foſſ. ii. p. 52.

ELHANNE, in *Botany*, a name given by ſome authors to the liguſtrum Ægyptiacum, or eaſtern privet.

ELICA *paſhnum*, in *Natural Hiſtory*, a name given by the people of the Eaſt-Indies to a kind of red orpiment, found very frequently in that part of the world, and given internally, after calcination, in intermitting fevers.

ELICE, or HELICE, in *Botany*, a name by which the ancient Greek writers have ſometimes called the willow, though its more general name among them is *hea*. Heſychius gives many inſtances of the willow being called *helice*.

ELICHRYSUM, in *Botany*. See CUDWEED.

ELICIT, or ELICITE, in *Ethics*, is applied to an act of the will, immediately produced by, and of the will, and received within the ſame.

Such are willing, nilling, loving, hating, &c. Theſe acts are denominated *elicit*, becauſe, being before in the power of the will, they are now brought forth into act. But they are ſo far intrinſic, that ſome authors conſider them as the will itſelf; and deny they ought to be diſtinguiſhed from it, any more than light is to be diſtinguiſhed from the ſun.

ELIDRION, a word uſed by the early writers in *Medicine*, in ſeveral very different ſenſes; ſome uſing it as the name of maſtic, others of raphontic, and others of crude mercury. Some of the chemical writers have alſo made it expreſs a certain mixed metal, compoſed of three parts; one ſilver, another braſs, and the third gold.

ELIGENDO *Viridario*. See VIRIDARIO.

ELIGIBILITY, in the Romiſh *Canon Law*. A *bull of eligibility* is a bull granted by the pope, to certain perſons, to qualify them to be choſen, or inveſted with an office, or dignity, whereof they were before incapable, by reaſon of want of age, birth, or the like.

The word is formed of the Latin *eligere, to chooſe*; whence the word *eligibilitas*, &c.

In ſeveral churches in Germany, a perſon, who is not of the chapter, cannot be elected biſhop, without a bull of *eligibility*.

ELIGII *morbus*, a name given by ſome medical writers to a fiſtula.

ELIGMA, a name given by Nicolaus, Myrepſius, and ſome other authors, to that form of medicine now called a *linctus*, or *lambative*.

ELIQUATION, in *Metallurgy*, is a ſeparation of the different parts of mixed bodies, by the different degrees of fire required to melt them. When the nature of ores, or of metallic mixtures is ſuch, that while one part of them melts in the fire, the other, more refractory and difficult of fuſion, remains ſtill ſolid: the firſt, when the maſs is placed in a mild fire, flows out of the interſtices of the other, and is thus ſeparated from it. The perfection of this operation requires a different fluidity of the parts that conſtitute the maſs. Lead, for inſtance, melts into one maſs with copper, by a ſtrong fire, whereas theſe metals cannot diſſolve each other in a moderate one; but if the maſs, compoſed of both theſe, thus blended together, is afterwards expoſed to a mild fire on an inclined plane, the lead alone melts, the copper becoming only brittle and ſpungy, and remaining in its ſolid form, even when the lead has run out of it. This ſeparation, however, is not ſo perfectly made, but that there ever remains ſome lead in the copper, and ſome ſmall part of the copper is alſo carried away with the lead; wherefore, it is neceſſary for this experiment, that the metals are not mixed in too minute proportions;

for if one thouſandth part only of lead were to be mixed with copper, or the ſame ſmall proportion of copper with the lead, the ſeparation, by *eliquation*, could not be effected.

It is generally neceſſary alſo, in order to make this operation ſucceed, to add ingredients that are capable either of deſtroying the force by which the different parts cohere together, or of procuring an eaſier flux of the metals; for the mixtures of the other metals will not be ſeparated like thoſe of copper and lead, without the admixture of other ſubſtances. For inſtance, gold, ſilver, and copper, melted together, and perfectly blended by that means with one another, remain in the ſame ſtate in any degree of fire: to make the *eliquation* of the gold and ſilver, therefore, out of ſuch a mixture, the ſame additions muſt be uſed as in the operation of *precipitation by fuſion*. Sulphur added, in this caſe, does indeed diſpoſe the copper to abandon the gold and ſilver; but if theſe two, as it moſt commonly happens, are mixed in a very ſmall quantity with a very large one of copper, then you cannot yet obtain the ſeparation of them; for beſide, that very ſmall quantities are no more to be ſeparated here than in the former inſtance of copper and lead, ſulphur renders the copper fluid by almoſt the ſame degree of fire by which the ſilver and gold are melted; a conſiderable quantity of lead muſt therefore be added in this caſe, that by the help of that addition, the gold and ſilver may be fuſed in a gentle fire, and the copper thus ſeparated from them.

Precipitations, by this method, and by fuſion, are both of infinite uſe in *Metallurgy*; for, by means of them, minute portions of gold and ſilver may, without any great expence, be ſeparated from a large maſs of other metals, which it has not hitherto been found poſſible to effect with advantage by any other method. Cramer, Art. Aſſ. 188.

ELIRE, ſee Conge *d'elire*.

ELISION, in *Grammar*, the cutting off, or ſuppreſſing a vowel at the end of a word, for the ſake of ſound or meaſure.

Eliſions, excepting in poetry, are but little known in Engliſh; in Latin, French, &c. they are frequent, and conſiſt moſtly in ſuppreſſions of the final *a*, *e*, and *i*: as in *Phillida amo ante alias. Si ad vitulum ſpectes*, &c.

In writing, *eliſions* are often marked by an apoſtrophe; as *egon' quem quæram?* for *egone*. *Emin' ego te?* for *emine*. *Veniſtin'* for *veniſtine*, &c. *Cett' eſperance*, for *cette*; *l'homme*, for *le homme*.

In the pronunciation we make frequent *eliſions*, but do not mark them in writing: thus we write *riſque it*, but pronounce *riſq' it*. So the French pronounce *un' ame*, but write *une ame*. In effect, they never mark any *eliſions* but at the end of the monoſyllables *je*, *ne*, *le*, *te*, *ce*, *que*, and *la*, They never elide the *o*, nor *u*, nor *i*, but in the conjunction *ſi* before *il*; nor *a*, but in *la*.

In poetry, the ſyllable where there is a vowel elided, is never reckoned; and great care is taken to avoid the claſhing of ſyllables where there is no *eliſion*, this making what they call a *hiatus* or *chaſm*.

Some reduce the *ecthlipſis* under the head of *eliſions*; as in *monſtrum*, *horrendum*, *ingens*, &c, See Ecthlipsis.

ELIXATION, in *Pharmacy*, &c. the infuſing, ſeething, or boiling of any medicine in a proper liquor, gently, and for a conſiderable time; amounting to what, in the dreſſing of meat, we call *ſtewing*.

The word is formed from the Latin, *lixare*, *to boil*, or *boil in water*.

The liquor ordinarily uſed in *elixations*, is ſpring or river water; though on ſome occaſions they uſe ſpirit, milk, whey, beer, or the like.

The ordinary purpoſe of *elixation* is, to extract the virtue out of the medicine, and impart it to the liquor; though it is ſometimes alſo uſed to free the parts of animals, plants, &c. of their crudities, as well as to ſoften and make them tender; to take away from foods or medicaments any diſagreeable taſte, or other ill quality; to ſeparate the earthy, or groſſer parts; and for other intentions.

Decoction is alſo a ſort of *elixation*. See Decoction.

ELIXIR, in *Medicine*, a compound tincture, or eſſence, drawn from a mixture of ſeveral ingredients, by infuſing them in a proper menſtruum.

Menage derives the word from the Arabic, *elicſir*, properly ſignifying *fraction*, becauſe *elixirs* have the force of breaking diſeaſes: others, more naturally, derive it from the Arabic, *alecſiro*, an artificial extraction of ſome eſſence; others from the Greek, ελαιον, *oil*, and συρω, *I draw*, q. d. an extract of the oil, which is the eſſential part of mixts; others from the Greek verb, αλεξεω, *I help* or *aſſiſt*, becauſe of the great ſuccours we receive from *elixirs*.

An *elixir* is properly a ſtrong ſpirituous liquor or juice, to be taken inwardly, containing the pureſt, and moſt efficacious parts of ſeveral mixed bodies, communicated to it by infuſion and maceration.

Quincy defines it, a ſtrong infuſion in ſome menſtruum, whereby the ingredients themſelves are almoſt diſſolved, and a liquor thus acquired of a thicker conſiſtence than an ordinary tincture.

Boerhaave conſiders an *elixir* as a compound magiſtery, i. e. a compound of various bodies, changed after the ſame manner as a ſingle body in a magiſtery.

Spirits drawn from vegetables, i. e. the ſtrong or ſpirituous waters of vegetables are uſually the baſis of *elixirs*, and the menſtruum, or diſſolvent, whereby the eſſence of the other ingredients is drawn or ſeparated. Spirit of wine is the beſt and moſt commodious menſtruum of all.

Quacks abuſe the term *elixir*, and apply it to abundance of ſimple extracts, or tinctures, only to put them off at the higher price. Some authors, for *elixir*, uſe the word *quinteſſence*.

Elixir *aloes*, a name given in the late London diſpenſatory to the medicine commonly known by the name of *elixir proprietatis*, which is there alſo ordered to be made in the following manner: take tincture of myrrh a quart, powder of aloes, and fine ſaffron, of each three ounces; digeſt them a due time, and then preſs off the tincture, and filter it for uſe. Pemberton's London Diſp. p. 283.

Elixir *paregoricum*, a name given in the late London diſpenſatory to the *elixir aſthmaticum* of Quincey, which is there ordered to be made thus:

Take flower of benjamin, and ſtrained opium, of each a dram; camphire, two ſcruples; eſſential oil of aniſeeds, half a dram; rectified ſpirit of wine, a quart: digeſt all together a proper time, and then ſtrain off the ſpirit. This allays tickling coughs, relieves difficult breathing, and is uſeful in many diſorders of children, particularly in the hooping-cough. The doſe for an adult is from 50 to 100 drops. Pemberton's Lond. Diſp. 283.

Elixir, *ſacred*, is prepared by infuſing ten drams of rhubarb, cut ſmall; ſix drams of Soccotorine aloes, in powder; and half an ounce of leſſer cardamom ſeeds, in two pints of French brandy, for two or three days, and then ſtraining the liquid. This uſeful ſtomachic purge may be taken from one ounce to an ounce and a half. Buchan's Dom. Med. p. 746.

Elixir *ſalutis*. Take of ſena leaves, cleared of their ſtalks, four ounces; of guaiacum chips, of dried elecampane-root, of the ſeed of aniſe, caraway, coriander, and of liquorice-root, of each two ounces; of ſtoned raiſins, eight ounces; and ſteep theſe ingredients in four quarts of French brandy, cold, for four days; and then ſtrain out the ſpirit for uſe. Daffy's *elixir* is ſaid to be little more than this. James. See Tinctura *Senæ*.

Elixir, *ſtomachic*, is prepared by boiling two ounces of gentian-root, one ounce of Curaſſoa oranges, and half an ounce of Virginia ſnake-root, and infuſing them for three or four days in two pints of French brandy, and then ſtraining out the *elixir*. This is an elegant ſtomachic bitter. A ſmall glaſs, twice a day, relieves in flatulencies, indigeſtion, want of appetite, and ſimilar complaints. A large doſe alſo relieves the gout in the ſtomach. Buchan.

Elixir *of vitriol.*, *acid*, is prepared by gradually mixing one pint of the *aromatic* tincture with three ounces of oil of vitriol; and after the fæces have ſubſided, filtring the *elixir* through paper in a glaſs funnel. This is an excellent medicine for hyſteric and hypochondriac patients, afflicted with flatulencies, ariſing from a relaxation or debility of the ſtomach and inteſtines. It is to be taken on an empty ſtomach, twice or thrice a day, in a glaſs of wine or water, or of any bitter infuſion; and the doſe may be from 10 to 40 drops. Buchan.

Elixir *proprietatis*, is a remedy firſt invented by Paracelſus, compoſed of aloes, myrrh, and ſaffron; the tincture or eſſence whereof is drawn, by putting them to diſſolve or digeſt with ſpirit of ſulphur: ſome add ſpirit of wine to the ſpirit of ſulphur.

Crollius takes this *elixir* to be the balm or balſam of the ancients; adding, that it contains all the virtues of the natural balm. It comforts and fortifies the heart and ſtomach, purifies the blood, and promotes perſpiration.

Elixir, among the *Alchymiſts*, is uſed for the philoſophers ſtone, or the powder of projection; and ſometimes for an univerſal medicine, which will cure all diſeaſes, called, by way of excellence, the *grand elixir*.

Thoſe two things moſt alchymiſts take to coincide; ſo that what will make gold, they think, will cure all diſeaſes. See Philosophers *ſtone*.

The notion of a *grand elixir* is of a long ſtanding.

ELIXIS, a name given by ſome of the *Old Writers* to that form of medicine now called a linctus,

ELK, in *Zoology*, a ſpecies of the *cervus* or STAG. The *alce*, or *elk*, is an animal ſo differently deſcribed by the ancients, that it is evident, they either knew very little of it, or elſe different writers have deſcribed different animals under this name. Pliny tells us, that the *elk* reſembles the horſe; but that it is diſtinguiſhed by the length of the neck, and largeneſs of its ears. Solinus ſays, that it reſembles the mule; and both authors add, that its upper lip is ſo large, that it cannot feed without moving backwards. Pliny, from report, affirms the ſame of the machlis, an animal of Scandinavia. Some have compared the *elk* to the goat, and others to the ſtag. Some ſay it was of a duſky yellowiſh colour; but Cæſar, in his Commentaries, repreſents it as variegated with ſpots. Pauſanias tells us, that it reſembled the ſtag kind, but was like the camel in the length of its neck. In the Linnæan ſyſtem, the *elk* is a ſpecies of the *cervus* or DEER, with horns, having ſhort beams ſpreading into large and broad palms; one ſide of which is plain, and the outmoſt furniſhed with ſeveral ſharp ſnags. It has no brow antlers: under the throat it has a ſmall excreſcence.

The *elk* is a wild beaſt, found in the foreſts of Muſcovy, Sweden, and Pruſſia; but more abundantly in Canada, and moſt parts of North America.

It is about the ſize and figure of a mule, only its ſnout bigger, its tail ſhorter, its feet cloven; and that it bears a large ramage, or horn, like that of a deer. That anatomized, in the Royal Academy of Sciences, was five feet ſeven inches long. Its hair is brown, about the length of that of a goat; and being very elaſtic, is uſed for matreſſes; its ears nine inches long, and four broad; and its tail not above two inches; its neck ſhort and thick; its ſkin ſtrong and hard, though thin; ſo that, according to Linnæus, it will turn a muſket ball: its fleſh very delicate, eſpecially that of the female: the tongues, eſpecially, are much commended, and are often brought to us from Ruſſia; and the ligaments of its joints exceeding ſtrong, which has occaſioned ſome authors to ſay, that its legs had no joints at all; and that it was this made it ſo ready at ſliding on the ice, to ſave itſelf from the wolves. It neither runs, nor bounds, but its trot is almoſt equal to the ſwifteſt running of a deer. See *Tab.* II. *Quadrupeds*, No. 10.

The hunting of the *elk*, is one of the principal and moſt agreeable employments of the ſavages of Canada, Acadia, &c. They chooſe a time when the ſnow is on the ground, in which the beaſt is apt to ſink and ſtick. When they have killed enough with their fire-arms to feaſt for ſeveral days, they flay them, and ſend the ſkins to the manufacturers, who dreſs them in oil, like the buffalo-ſkin.

The ſavages likewiſe take care to cut off the left hind-foot of each beaſt, eſpecially if it be a female; the hoof of which foot is that applauded remedy for the falling-ſickneſs.

Ancient authors tell us, that to catch the *elk*, the northern people watch the occaſion when it falls down of the epilepſy, which it frequently does; and that they lay hold of it before it can recover ſtrength enough to put its left foot in its ear, which cures it immediately.

And hence it is, that the notion of its virtue in the cure of that diſeaſe had its riſe. The Germans call it *elend*, that is, *miſery*, becauſe of the miſery it is reduced to, in falling ſo often into the epilepſy, though it has its remedy always about it; which has given reaſon to ſuſpect, that the virtue attributed to it is fabulous.

Accordingly, Olaus Magnus ſays, it is the outer hoof of the right foot that the *elk* puts in its ear to cure the epilepſy; which being impoſſible, it ſhould ſeem as if Olaus only ſpoke of it by way of ſneer.

He adds, that the blows which the *elk* deals are ſo ſtrong, that with its hind-feet it will even break the trees; and with its fore-feet pierce the hunters through and through; though they are inoffenſive animals, unleſs they are wounded, or in the rutting ſeaſon.

Pomet gives us the marks to diſtinguiſh the genuine *elks claws*; but as their virtue is very equivocal, not to ſay imaginary, there is no great harm in being deceived.

ELK, in *Ornithology*, a name by which many have called the cygnus ferus, or wild ſwan. See SWAN.

ELKE, is mentioned in our *Statutes*, as a kind of yew to make bows of. 32 Hen. VIII. cap. 9.

ELL, *ulna*, a meaſure, which obtains, under different denominations, in moſt countries.

The *ell* is the ſtandard, or meaſure, whereby cloths, ſtuffs, linens, ſilks, &c. are uſually meaſured, or eſtimated, anſwering, in good meaſure, to the yard of England, the canna of Italy, the vara of Spain, the palm of Sicily, &c.

Servius will have the *ell* to be the ſpace contained between the two hands when ſtretched forth; but Suetonius makes it only the cubit.

The *ells*, which occur moſt frequently in England, are *Engliſh* and *Flemiſh*; the *ell Engliſh* contains three feet nine inches, or one yard one quarter Engliſh meaſure; the *ell Flemiſh* contains twenty-ſeven inches, or three quarters of a yard; ſo that the *ell* Engliſh is to the Flemiſh *ell*, as five to three.

Mr Ricard, in his Treatiſe of Commerce, reduces the *ells* thus: an hundred *ells* of Amſterdam are equal to ninety-eight three quarters of Brabant, Antwerp, and Bruſſels; to fifty-eight and an half of England and France; to an hundred and twenty of Hamburgh, Francfort, Leipſic, and Cologne; an hundred and twenty-five of Breſlaw; an hundred and ten of Bergen and Drontheim; and an hundred and ſeventeen of Stockholm.

ELLIPOMACROSTYLA, in *Natural Hiſtory*, the name of a genus of cryſtals. The word is derived from the Greek, ἐλλιπὴς, *imperfect*, μακρὸς, *long*, and ϛυλος, *a column*, and expreſſes an imperfect cryſtal, with a long column. The perfect figure of cryſtal being a column terminated by a pyramid at each end; thoſe which want this character are eſteemed imperfect; and accordingly the bodies of this genus are defined to be imperfect cryſtals, with ſingle pyramids; one end of their column being affixed to ſome ſolid body, and compoſed of thin and ſlender hexangular columns, terminated by hexangular pyramids. Of this genus there are ſeveral ſpecies. See *Tab. of Foſſils, Claſs* 3.

ELLIPOPACHYSTYLA, in *Natural Hiſtory*, the name of a genus of cryſtal. The word is derived from the Greek, ἐλλιπὴς *imperfect*, παχὺς, *thick*, and ϛυλος, *a column*, and expreſſes a cryſtal of the imperfect kind, with a thick column. The bodies of this genus are cryſtals, compoſed of an hexangular column, conſiderably thick and ſhort, and affixed irregularly at one end to ſome ſolid body, and terminated at the other by an hexangular pyramid. Of this genus there are only two known ſpecies. See *Tab. of Foſſils, Claſs* 3.

ELLIPSIS, in *Geometry*, one of the conic ſections, popularly called an *oval*.

The word is formed from the Greek, ἐλλειψις, *deficiency*, a denomination which the ancient Greek geometricians gave this figure, becauſe, among other properties, this is one, that the ſquares of the ordinates are leſs than, or defective of, the rectangles under the parameters and abſciſſes.

The *ellipſis*, defined it from its form, is a regular continued curve line, including a ſpace that is longer than broad, wherein are two points equally diſtant from the two extremities of the length; from which, two right lines being drawn to any point, aſſumed at pleaſure in the *ellipſis*, their ſum is equal to the length of the *ellipſis*.

Thus, in the *ellipſis* A E B D M, &c. (*Tab. Conics, fig.* 21.) the lines F a and f a drawn from the two points F and f, equally diſtant from the two extremes A and B, are equal to A B.

Or, taking the *ellipſis*, as geometricians frequently do, for the ſpace contained or included within this curve line, it is defined a figure, contained under one ſingle oblong line, and having two unequal axes or diameters, A B and D E. The greater axis of the *ellipſis*, or the right line repreſenting the length of the *ellipſis* A B, or of the ſpace included by the *ellipſis*, is called the *tranſverſe axis* or *diameter*; and the leſſer axis, repreſenting the breadth of the *ellipſis* D E, the *conjugate* or *ſecond axis*. The two axes always biſect each other at right angles. See AXIS.

The two axes are the two greateſt diameters of the *ellipſis*; but there are an infinity of other different diameters. See DIAMETER, &c.

ELLIPSIS, *the centre of an*, is the point C, wherein the two axes interſect. See CENTER.

The two points F and f, in the greater axis, equally diſtant from the extremes thereof A and B, are called the *foci*, or *umbilici of the ellipſis*; from which two lines, drawn to the circumference of the *ellipſis*, as already obſerved, are equal to the greater axis. See FOCUS.

The *ellipſis*, conſidering it as a conic ſection, that is, as a curve, ariſing from the ſection of the cone, is beſt defined from its geneſis, or the manner of its production, thus: an *ellipſis* is a curve line, produced by cutting the right cone A B C (*fig.* 21. N° 2.) by a plane, paſſing through both its ſides, in ſuch manner, as that the axis of the ſection D E meets with the diameter of the baſe A B produced to F; or ſo that the cutting plane be not parallel to the baſe, in which caſe the ſection will produce a circle; or again, by cutting an oblique cone in any oblique direction, ſo that the cutting plane be not ſubcontrary to the baſe.

Or, defining it from one of its known properties aſſumed, an *ellipſis* is a curve line, wherein the ſquare of the ſemi-ordinate PM is to the rectangle of the ſegments of the axis AP and PB, as the parameter is to the axis. Thus, if AB=a, the parameter =b, PM=y, AP=x, then will b : a :: $y^2 : ax-x^2$; conſequently $ay^2=abx-bx^2$. See Conic *ſection*.

Hence, 1. $y^2=bx-\frac{bx^2}{a}$, or $\overline{ax-xx}\times\frac{b}{a}$; that is, the ſquare of the ſemi-ordinate is equal to the rectangle of the parameter into the abſciſs, abating another rectangle of the ſame abſciſs into a fourth proportional to the axis, parameter, and abſciſs.

2. Ellipsis, *to find the axis, parameter, and ſemi-ordinate of an.* The parameter, abſciſs, and ſemi-ordinate, in an *ellipſis*, being given, the axis is found, by making 1. $b : y :: y : \frac{y^2}{b}$, then 2. $x-\frac{y^2}{b}\left(=\frac{bx-y^2}{b}=\frac{x^2}{a}\right) : x :: x : a$.

3. The axis AB, the abſciſs AP (*fig.* 22.) and the ſemi-ordinate PM, being given, the parameter AG is thus found: make AI=PM; and from A, through M, draw the right line AL. In I erect a perpendicular LI; then, ſince $AP : PM :: AI : LI=\frac{y^2}{x}$. Produce PM to O, till $PO=LI=\frac{y^2}{x}$; and from B, through O, draw the right line BG. In A erect a perpendicular GA, which will be a fourth proportional to PB, PO, or LI, and AB, and therefore $=\frac{ay^2}{ax-x^2}$: this will be the parameter required.

4. The axis AB, and the parameter AG, being given, we can aſſign every abſciſs, as BP, its ſemi-ordinate PN, by drawing a line GB to the parameter AG, which is perpendicular to the axis AB; then, erecting a perpendicular PN, make PL=PH. Laſtly, on AL deſcribe a ſemicircle.

To find the foci, conjugate axis, ratio of the ordinates, &c. of an *ellipſis*. From B to L (*fig.* 21.) ſet off half the parameter, then will $CL=\frac{1}{2}a-\frac{1}{2}b$. In the centre C erect a perpendicular CK, meeting the ſemicircle deſcribed on AL: thus will $CK=\surd\left(\frac{1}{4}a^2-\frac{1}{4}ab\right)$; therefore, making CF=CK, F will be the focus. The latter equation furniſhes us with this theorem.

If the axis AB be cut in the focus F, the rectangle under the ſegments of the axis AF, FB will be ſubquadruple of the rectangle under the parameter and the axis.

5. The parameter and axis AB given, the conjugate axis is eaſily found, as being a mean proportional between the axis and parameter: conſequently, the parameter is a third proportional to the greater and leſſer axis. Add, that the ſquare of half the conjugate axis is equal to the rectangle, under the diſtance of the focus from the vertex, and its complement to the axis or AF×FB (*fig.* 21.)

6. In an *ellipſis*, the ſquares of the ſemi-ordinates PM, pm, &c. are to each other, as the rectangles under the ſegments of the axis: hence, $CD^2 : PM^2 :: CB^2 : AP\times PB$; conſequently, $DC^2 : CB^2 :: PM^2 : AP\times PB$; that is, the ſquare of the leſs axis is to the ſquare of the greater, as the ſquare of the ſemi-ordinate to the rectangle under the ſegments of the axis.

7. The right line FD (*fig.* 24.) drawn from the focus F, to the extremity of the conjugate ſemi-axis, is equal to half the tranſverſe axis AC.

Hence, the conjugate axes being given, the foci are eaſily determined; for, biſecting the greater axis AB in C, from C erect a perpendicular CD equal to the conjugate ſemi-axis; then from D, with the interval CA, the foci F and f are determined.

8. To deſcribe an *ellipſis*. The ſum of two right lines FM, and fM, drawn from each focus of an *ellipſis*, F and f, to the ſame point of the periphery M, being equal to the greater axis AB; the conjugate axes of an *ellipſis* being given, the *ellipſis* is eaſily deſcribed: for, determining the foci F and f, as already directed, and fixing two nails therein, and about theſe nails tying a thread FMf, equal to the length of the greater axis AB, and the diſtance of the foci, the thread being ſtretched, and a ſtyle or pin applied to its extent, the duct or ſweep of the ſtyle or thread about the nails will deſcribe an *ellipſis*. See Conic *ſection*.

9. The rectangle under the ſegments of the conjugate axis, is to the ſquare of its ſemi-ordinate, as the ſquare of the conjugate axis to the ſquare of the greater axis. Hence, the co-ordinates to the conjugate axis have the ſame relation as there is between the co-ordinates to the greater axis: conſequently, the parameter of the conjugate axis is a third proportional to the conjugate axis and the greater axis.

10. To determine the ſubtangent PT (*fig.* 25.) and ſubnormal PR in an *ellipſis*. As the firſt axis is to the parameter, ſo is the diſtance of the ſemi-ordinate from the centre to the SUBNORMAL.

11. The rectangle under the ſegments of the axis, is equal to the rectangle under the diſtance of the ſemi-ordinate from the centre into the SUBTANGENT.

12. As the diſtance of the ſemi-ordinate from the centre is to half of the axis, ſo is the abſciſs to the portion of the ſubtangent intercepted between the vertex of the *ellipſis* and the tangent.

13. The rectangle under the ſubtangent PT, into the abſciſs PC, is equal to the rectangle under the ſegments of the axis. Hence, the ſquare of the ſemi-axis AC is equal to the rectangle of CT, into PC.

14. The rectangle under the ſubtangent, and the diſtance of the ordinate from the centre, is equal to the difference of the ſquare of this diſtance, and the ſquare of the tranſverſe ſemi-axis.

15. In an *ellipſis*, the ſquare of the ſemi-ordinate to any diameter is to the ſquare of the conjugate ſemidiameter, as the rectangle under the ſegments of the diameter is to the ſquare of the diameter; conſequently, the relation of the ſemi-ordinates to the diameters is the ſame as to the axes; and the parameter of any diameter is a third proportional to that diameter and its conjugate. For other properties of the *ellipſe*, ſee Conic *ſection*.

Infinite ellipſes are thoſe defined by the equation $ay^{m+n}=bx^{m}\times a-x^{n}$ which ſome call *elliptoides*, if m be greater than 1, or n greater than 1.

In reſpect of theſe curves, the *ellipſis* of the former kind is called the *Apollonian ellipſis*.

It has been long known, that if a parallelogram, circumſcribed about a given *ellipſe*, have its ſides parallel to the conjugate diameters, then will its area be of an invariable or given magnitude, and equal to the rectangle contained by the axes of the figure; but this is only a caſe of a more general propoſition: for if, upon any diameter produced without the *ellipſe*, you take two points, on each ſide of the centre, at equal diſtances from it, and four tangents be drawn from theſe points to the *ellipſe*, thoſe tangents will form a parallelogram, which is always of a given or invariable magnitude, when the *ellipſe* is given, if the ratio of thoſe diſtances to the diameter be given; and when the ratio of thoſe diſtances to the ſemi-diameter is that of the diagonal of a ſquare to the ſide (or of √ 2 to 1) the parallelogram will have its ſides parallel to the conjugate diameters. Phil. Tranſ. N°. 468. p. 326.

Triangles, trapezia, or polygons, of any kind, may be determined, which, circumſcribed about a given *ellipſe*, are always of a given magnitude. For

If, upon any diameter produced without the *ellipſe*, any number of points be taken on the ſame, or on different ſides of the centre, at diſtances from it, that are each in ſome given ratio to that diameter; and from theſe points tangents be drawn to the *ellipſe*, in any one certain order; the polygon, formed by theſe tangents, is always of a given magnitude in a given *ellipſe*, and is equal to a polygon deſcribed by a ſimilar conſtruction about a circle, the diameter of which is a mean proportional betwixt the tranſverſe and conjugate axis of the *ellipſe*.

The polygons inſcribed in the *ellipſe*, by joining the points of contact (thus formed) and the ſectors, bounded by the ſemi-diameters, drawn to theſe points, are alſo of given or determined magnitudes; and the parts of any tangent, intercepted betwixt theſe interſections of the other tangents with it, or betwixt theſe interſections and the point of contact, are always in the ſame ratio to each other in the ſame figure. See Maclaurin's Fluxions, vol. i. p. 8. who obſerves that there is an analogous property of the other conic ſections.

Ellipsis, *quadrature of the.* See Quadrature.

Ellipse, *rectification of the.* See Rectification.

Ellipsis, in *Grammar* and *Rhetoric*, is a verbal figure, or a figure of ſyntax, wherein ſomething is ſuppreſſed, or left out, in a diſcourſe, and ſuppoſed or underſtood; or, it is a defect or omiſſion of ſome part of a ſentence, which muſt be ſupplied in order to render the conſtruction complete. See on this ſubject the Port Royal Latin Grammar, vol. ii. p. 168, &c. See Zeugma.

This chiefly happens, when, being under the tranſport of a violent paſſion, a man is not at leiſure to ſpeak every thing out at length, the tongue being too ſlow to keep pace with the rapid motions of the mind: ſo that on theſe occaſions we only bring forth broken interrupted words and expreſſions, which repreſent the violence of a paſſion better than any conſiſtent diſcourſe.

F. Boſſu conſiders the *ellipſis* as a way of diſguiſing ſentences, by ſuppreſſing the word which ſhould make the particular application, and leaving the whole in a kind of ingenious ambiguity.

Thus, the Trojans, in Virgil, being reduced by Turnus to the laſt extremity, and ready to be deſtroyed, ſpy Æneas coming to aſſiſt them; upon which the poet ſays, *Spes addita ſuſcitat iras.* Which expreſſion ſignifies either, in particular, that the hope they conceive retrieves and augments their courage; or in general, that the hope of aſſiſtance at hand naturally raiſes courage, and gives people new ſtrength.

If the poet had added a word, and ſaid, *Ollis ſpes addita ſuſcitat iras*, the paſſage had been expreſsly reſtrained to the firſt ſenſe, and had ceaſed to be a ſentence, and commenced only the application of a ſentence: the ſuppreſſion of that word makes it a ſentence in form.

This, that excellent critic looks on as one of the fineſſes of the Latin tongue, wherein it had vaſtly the advantage of the modern tongues. Trait. du Poeme Epique, p. 466, &c.

ELLIPTIC, or **Elliptical**, ſomething that belongs to an *ellipſis*.

Kepler firſt maintained, that the orbits of the planets are not circular, but *elliptical*; which hypotheſis was afterwards adhered to by M. Bouillaud. Mr. Flamſteed, Sir Iſaac Newton, M. Caſſini, and others, of the later aſtronomers, have confirmed the ſame; ſo that this, which was once, by way of contempt, called the *elliptic hypotheſis*, is now the prevailing doctrine. Sir Iſaac Newton demonſtrates, that if any body revolve round another in an *elliptic* orbit, its centrifugal forces, or gravities, will be in a duplicate ratio; or, as the ſquares of its diſtances from the umbilicus, or focus.

Serlio, Hartman, &c. endeavour to demonſtrate, that the beſt form for arches, or vaults, is the *elliptical*. See Arch. See alſo Catenaria.

Elliptic *ſpace*, is the area contained within the circumference, or curve of the *ellipſis*. See Ellipsis.

It is demonſtrated, 1. That the *elliptic ſpace* is to a circle deſcribed on the tranſverſe axis, as the conjugate diameter is to the tranſverſe axis.

2. That the *elliptic ſpace* is a mean proportional between two circles deſcribed on the tranſverſe and conjugate axes.

Elliptic *Conoid*, is the ſame with the spheroid.

Elliptic *Specula*, or *Mirrors*. See Mirror.

Elliptic *Winding-ſtairs*. See Stairs.

Elliptic *Wind-mill*. See Windmill.

Elliptic *Compaſſes*, an inſtrument made uſually in braſs, for the drawing any ellipſis or oval, by one revolution of an index.

Elliptic *Dial*, is an inſtrument uſually of braſs, with a joint to fold together, and the gnomon to fall flat, for the ſake of the pocket.

By it are found the meridian, hour of the day, riſing and ſetting of the ſun, &c. See Dial.

ELLIPTOIDES, an infinite ellipſis, i. e. an ellipſis defined by the equation $a\,y^{m+\,u}=b\,x^{m}\times a-x^{n}$, wherein $m > 1$ or $n > 1$. See Ellipsis.

Of this there are ſeveral kinds or degrees; as the cubical *elliptoid*, wherein $a\,y^{3}=b\,x^{2}\times a-x$. A biquadratic or furſeſolidal *elliptoid*, or that of the third order, wherein $a\,y^{4}=b\,x^{2}\times a-x^{2}$.

If any other ordinate be called v, and the correſpondent abſciſs z; there will be

$$a\,v^{m+n}=b\,z^{m}\times a-z^{n}:$$

Conſequently,

$$a\,y^{m+n}:a\,v^{m+n}::b\,x^{m}\times a-x^{n}:b\,z^{m}\times a-z^{n};$$

That is, $y^{m+n}:v^{m+n}::x^{m}\times a-x^{n}:z^{m}\times a-z^{n}$.

ELLISIA, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a ſmall cylindrical empalement of one leaf, indented in five parts at the brim. It has one tubulous petal, whoſe brim is cut into five ſegments, which ſpread open; it has four ſtamina, two of which are longer than the other, and a roundiſh germen, which becomes a roundiſh berry, crowned by the empalement, encloſing eight nuts, which have two cells, with one angular ſeed in each. We have but one ſpecies of this genus, which grows naturally in the Weſt Indies.

ELLOTIA, Ελλωτια, among the Greeks, a feſtival in memory of Europa, Agenor's daughter; who was called Ελλωτις by the people of Crete.

ELLYCHNIOTOS, in the medical writings of the *Ancients*, the name of a ſort of tent uſed by the ſurgeons, and made of cotton or lint, rolled up into the form of the wick of a lamp or candle. See the next article.

ELLYCHNIUM, a name given, by the ancients, to that ſort of matter, whatever it was, which ſerved them in common uſe for the wicks of their lamps, and had, beſide this, its uſe in ſurgery. Galen expreſly directs the uſe of the ſofteſt *ellychnium*, ſuch as that of Tarſus, inſtead of ſponge, in chirurgical caſes. But we are far from being aſcertained, at preſent, of what this *ellychnium* of Tarſus was. The commentators have gueſſed differently as to the meaning of the word; and Cornarius ſuppoſes it to ſignify a ſort of ſpongy and light fungus, which, when properly wrought up, might be made to ſerve for the wicks of lamps, being very inflammable, as we well know many of the funguſes to be, particularly that ſort which the people of ſome countries call ſpunck, and uſe inſtead of tinder, to catch fire from the ſparks of flint and ſteel; and when in its natural lax ſtate, might, by its open ſpongy texture, be very well ſuited to imbibe any medicinal fluid, and retain it a long time, while applied to any diſeaſed part. Others have gueſſed it to be the xylon, or cotton of the ancients; but from Galen's propoſing it to be uſed inſtead of ſponge, it ſeems much more probable to have been what Cornarius ſuppoſes. Galen, lib. xiii. and xiv. Cornar. Comment. in 3. Κατ. τοπ.

ELM, *Ulmus*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the flower has a rough permanent empalement of one leaf, cut into five points, and coloured within; it has no petals, but five awl-ſhaped ſtamina, twice the length of the empalement, terminated by ſhort, erect ſummits, having four furrows, and an orbicular erect germen, ſupporting two ſtyles, which are reflexed, and crowned by hairy ſtigmas. The germen afterward turns to a roundiſh, compreſſed, bordered capſule, including one roundiſh, compreſſed ſeed. There are ſix ſpecies.

All the ſpecies of the *elm* may be propagated either by layers, or by ſuckers taken from the old roots; but as theſe are often taken up with very bad roots, and are therefore very ſubject to miſcarry, the method by layers is much the beſt, and is very eaſy to be practiſed, as a ſmall ſpace of ground would be ſufficient to furniſh nouriſhment for a number of ſtools, or roots for laying, which would annually yield a great number. The beſt ſoil for a nurſery of this kind, is a moderately light and dry hazel loam, and the beſt ſeaſon for laying the branches is autumn. When they have taken root, they ſhould be removed from the old plant, and ſet in rows in nurſery beds, where, after four or five years, they will be ſtrong enough to be tranſplanted into the places where they are to remain. In planting them, great care is to be taken not to bury their roots too deep, which, when the ſoil is moiſt and ſtiff, often deſtroys them. The common *elm* ſeldom produces ſeed in great perfection, but the witch *elm* produces great quantities of good ones, from which ſome people raiſe nurſeries of the trees. Miller. See Fecundity.

Elm-trees are proper for hedges near the borders of fields, or for defending houſes or gardens from the violence of winds. *Elm*-wood is uſed in various kinds of waterworks; and the fineneſs of the grain makes it fit for eaving. The bark has been ſometimes commended both for its purgative and aſtringent virtue, but neither appear to have any foundation.

ELMOROSIA, a name given by the Moors to a diſh they are very fond of. It is made of pieces of beef, or of camel's fleſh, ſtewed with butter, honey, and water; ſome add rob of wine to it, and others garlic; but there is always added onions, ſaffron, and ſalt. Phil. Tranſ. N° 253.

ELOANX, a name given by ſome writers to *auripigmentum*, or orpiment.

ELOCUTION, is defined by Tully, the chooſing and adapting of words, and ſentences, to the things, or ſentiments, to be expreſſed. To the *elocution* then properly belongs the *delectus verborum*, or *choice of words*. That which treats of the ſeveral properties and ornaments of language in common, is called *general elocution*, conſiſting of elegance, composition, and dignity; and particular *elocution* conſiders them as they are made uſe of to form different ſorts of ſtyle.

Elocution is ſometimes uſed more reſtrictedly to denote the juſt and graceful management of the voice, countenance, and geſture, in ſpeaking; and in this ſenſe it is the ſame with that in which, in common language, is called a good delivery. As to that part which reſpects the management of the voice, it includes articulation, pronunciation, accent, emphaſis, pauſes, tones, and pitch or key; and the other requiſite of good delivery is gesture. See Articulation, &c. Sheridan's Lectures, &c. Lect. 2, &c. &c.

The beauties of *elocution* conſiſt chiefly in the uſe of figures, and figurative dictions or expreſſions, in the periods, and the ſtyle. See Figure, Period, and Style. Ward's Or. p. 307.

ELODES, in *Botany*, an epithet given to a very ſoft and woolly ſort of St. John's wort, or *hypericum*.

Elodes is alſo uſed, among the ancient writers in *Medicine*, for a ſpecies of fever, attended with profuſe ſweats.

ELOGIUM, **Eloge**, a praiſe, or panegyric, beſtowed on any perſon, or thing, in conſideration of its merit.

The word is Latin, but formed of the Greek ευλογια, *commendation*;

commendation; which is compounded of ευ, *well*; and λεγω, *to ſay*, or *ſpeak*.

The ſecretary of the Royal Academy of Sciences at Paris compoſes the *eloges* of ſuch members as die; and delivers them at the next public meeting of the company. Funeral orations are *eloges* of eminent perſons deceaſed.

Extravagant and improbable *eloges* are of the greateſt diſſervice to their own deſign; and do, in effect, diminiſh the perſon whom they pretend to magnify. Any worthy man may paſs through the world, unqueſtioned and ſafe, with a moderate recommendation: but when he is ſet off and bedawbed with rhetoric, and embroidered ſo thick, that you cannot diſcern the ground, it awakens naturally (and not altogether unjuſtly) intereſt, curioſity, and envy; for all men pretend a ſhare in reputation, and love not to ſee it engroſſed, or monopolized; and are therefore apt to enquire (as of great eſtates ſuddenly got) whether the perſon, ſo commended, came honeſtly by it, and of what credit the perſon is that tells the ſtory.

ELOHA, in *Scripture*, the ſingular of *Elohi*, one of the names of God. See Elohi.

ELOHI, Eloi, or Elohim, in *Scripture*, one of the names of God. But it is to be obſerved, that angels, princes, great men, judges, and even falſe gods, are ſometimes called by this name. The ſequel of the diſcourſe, is what aſſiſts us in judging rightly concerning the true meaning of this word. It is the ſame as *Eloha*; one is the ſingular, the other the plural. Nevetheleſs *Elohim* is often conſtrued in the ſingular number, particularly when the true God is ſpoken of; but when falſe gods are ſpoken of, it is conſtrued rather in the plural. Calmet, Diction. Bibl.

ELOI. See Elohi.

ELOINE, in our *Laws*, ſignifies to remove, or ſend a great way off. Thus it is ſaid, if ſuch as be within age be *eloined*, ſo that they cannot come to ſue perſonally, their next friends ſhall be admitted to ſue for them. Stat. 13 Edw. I. cap. 15.

ELOME, a name given by ſome authors to **ORPIMENT**.

ELONGATA, in *Law*, is a return of the ſheriff, that cattle are not to be found, or removed, ſo that he cannot make deliverance in replevin.

ELONGATION, in *Aſtronomy*, the digreſſion, or receſs of a planet from the ſun, with reſpect to an eye placed on our earth; or it is the angle formed by two lines drawn from the earth to the ſun, and from the earth to the planet, or the arc meaſuring this angle.

The greateſt diſtance of the planet, &c. from the ſun, is called the *greateſt elongation*; which varies on two accounts, viz. in that both the earth, and the planet, revolve, not in circles, but in ellipſes; and the variation is greateſt in the orbit of Mercury, which is the moſt elliptic. In a circular orbit, having the ſun for its center, the greateſt *elongation* would happen, when the right line joining the earth and planet, touched the orbit of the planet; and this might eaſily be found, becauſe the tangent to the orbit, and the diſtances of the earth and of the planet from the ſun, form a right-angled triangle, in which, having two ſides, viz. the diſtances, the vertical angle, or angle of *elongation*, may be eaſily found. But in an elliptic orbit it may happen, that the *elongation* from the ſun may grow ſtill greater, even after it has left the place where the line joining the earth and planet touches its orbit. For after that, the true diſtance of the planet from the ſun may increaſe, whilſt the diſtance of the ſun and planet from the earth do not increaſe, but they may rather decreaſe; and therefore in two triangles the greater baſe will ſubtend the greater angle. If the greateſt *elongation* be found by obſervation, the diſtance of the planet from the ſun, ſuppoſed to move in a circular orbit, may be obtained, in reſpect of the earth's diſtance from the ſame. Keil's Aſtron. p. 157.

The *elongation* is chiefly conſidered in Venus and Mercury.

The *greateſt elongation* of Venus is 48 degrees, and that of Mercury 28 degrees; that is, the former never recedes from the ſun, or is ſeen diſtant from him, above 48°; nor the latter above 28°. Whence it is, that Mercury is ſo rarely viſible; as being uſually loſt in the light of the ſun. See Mercury, and Venus.

The *elongation* of the ſuperior planets from the ſun may amount to 180°; or they may be in oppoſition to the ſun, as viewed from the earth.

Elongation is alſo uſed, by ſome authors, for the difference in motion, between the ſwifteſt and the ſloweſt of two planets; or the quantity of ſpace, whereby the one has overgone the other; called alſo *ſuperation*.

The ſwifteſt motion of the moon, with regard to the ſun, is called the *elongation* of the moon from the ſun. We alſo ſay, diurnal *elongation*, horary *elongation*, &c.

Elongation, *angle of*, or *angle at the earth*, is the difference between the ſun's true place, and the geocentric place of a planet. Such is the angle ETR (*Tab. Aſtron. fig.* 25.) between the place of the ſun E, and that of the planet R.

Elongation, in *Surgery*, is an imperfect luxation; when the ligament of any joint is ſo extended, or relaxed, as to lengthen the limb, but yet not to let the bone go quite out of its place. See Luxation.

ELOPEMENT, in *Law*, is when a married woman, of her own accord, departs from her huſband, and dwells with an adulterer; for which, without voluntary reconcilement to the huſband, ſhe ſhall loſe her dowry; nor ſhall the huſband, in ſuch caſe, be compelled to allow her any alimony.

> *Sponte virum mulier fugiens, & adultera facta,*
> *Dote ſua careat, niſi ſponſo ſponte retracta.*

The word is formed from the Belgic, *Ee, matrimony*, and *loopen, to run away*.

However, mere advertiſing a wife in the Gazette, or other public papers, is not a legal notice to perſons in general not to truſt her; though a perſonal notice given by the huſband to particular perſons is ſaid to be good. An action lies, and large damages are uſually given, againſt a perſon for carrying away, and detaining another man's wife.

ELOPITINUM, a name given by ſome of the old chemiſts to vitriol.

ELOPS, Ελωψ, in *Zoology*, the name of a ſerpent, otherwiſe called elaps.

Elops was alſo the name of a fiſh much eſteemed among the Greeks, and thought to be the ſame with the accipenser. Hofm. Lex. in voc.

ELOQUENCE, the art of ſpeaking, or writing well; ſo as to move and perſuade. See Rhetoric, and Oratory.

If *eloquence* and rhetoric be diſtinguiſhed, the latter may be conſidered as propoſing and explaining the theory, and the former as the practice of the art; but they are generally uſed indiſcriminately for each other.

Demoſthenes and Cicero are the two patterns of ancient *eloquence*; the one among the Greeks, the other among the Romans. Their manner, however, was exceedingly different; the firſt being cloſe, ſtrong, nervous, conciſe, and ſevere, ſo that a word could not be ſpared; the latter copious, florid, and rich, ſo that a word could not be added.

It was objected to Cicero, that his *eloquence* was Aſiatic, that is, redundant, or ſtuffed with ſuperfluous words and thoughts.

Pericles was called a *torrent of eloquence*, a *thunderbolt of eloquence*. Pedants do not diſtinguiſh *eloquence* from the heaping up of figures, the uſe of big words, and the rotundity of periods.

True *eloquence* depends principally on the vivacity of the imagination. In ſtrictneſs, it is not that which gives grace and ornament, but life and motion, to diſcourſe.

The authors of the Art of Thinking remark, that the rules of *eloquence* are obſerved in the converſation of people naturally *eloquent*, though they never think of them, while they practiſe thoſe rules, becauſe they are *eloquent*; not in order to be *eloquent*.

The *eloquence* of the chair, and pulpit, is much more difficult than that of the bar. Sir George Mackenzy has a treatiſe of the *eloquence* of the bar. Idea Eloquentiæ forenſis, &c.

ELOSSITES, in *Natural Hiſtory*, the name of a ſtone, mentioned with great reſpect by the writers of the middle ages; they have left us, however, ſo ſhort a deſcription of it, that it is impoſſible to determine what it was; they only ſay, that it was no very beautiful ſtone, but that, if worn in the pocket, it had a wonderful virtue in curing pains, and all other diſeaſes in the head.

ELIPS, a name given, by ſome of the chemical writers, to the ſcoriæ of ſilver.

ELPISTICI, Ελπιστικοι, among the Greeks, a ſect of philoſophers who made hope the ruling paſſion of mankind.

ELTHYMUM, in the *Materia Medica of the Ancients*, a name given to the epithymum, or dodder growing upon thyme.

ELUDING, the act of evading, or rendering a thing vain, and of no effect; a dextrous getting clear, or eſcaping out of an affair, difficulty, embarraſſment, or the like.

We ſay, to *elude* a propoſition, &c. The deſign of chicanery is, to *elude* the force of the laws: this doctor has not reſolved the difficulty, but *eluded* it. Alexander, ſays the hiſtorian, in cutting the Gordian knot, either *eluded* the oracle, or fulfilled it: *Ille nequicquam luctatus cum latentibus nodis, Nihil, inquit, intereſt, quomodo ſolvatur; gladioque ruptis omnibus loris, oraculi ſortem, vel* eludit, *vel implevit*. Q. Curt. 13.

ELVÆ. See Elfs.

ELVELA, in *Botany*, a name given by Linnæus to a genus of fungoſes, called by Micheli *fungoidaſter*, and *fungoides*.

Theſe differ from all the other kinds of funguſes, in that they are ſmooth both on the upper and under ſide, having no marks of lamellæ, pores, or fibres, in any part.

ELVERS, an Engliſh name for a ſmall ſort of eels, caught in ſome parts of the kingdom, particularly about Glouceſter and Tewkſbury. Theſe are, in reality, young congers, or ſea-eels. They get up into rivers while very ſmall, and as they precede the ſhads, it is conjectured that they ſupply them with food. They are taken in prodigious numbers in the rivers, in dark nights, by a kind of ſieve made of hair-cloth, fixed to a long pole, and are eſteemed a very delicate food. Willughby.

ELUL, one of the Hebrew months, anſwering partly to our Auguſt and September. There are but nine and twenty days in it. It is the twelfth month of the civil year, and the ſixth of the eccleſiaſtical. Upon the ſeventh or ninth day of this month the Jews faſt, in memory of what happened after the return of thoſe who went to view the promiſed land. Numbers, xiii. xiv.

Upon the twenty-ſecond of this month the feſtival of the *xylophori* was obſerved, when wood was carried to the temple. Selden ſays, that it was celebrated on the eighteenth day of the month *Ab*. On the twenty-ſixth of the ſame month, the dedication of the walls of Jeruſalem by Nehemiah was commemorated. Joſeph. lib. ii. cap. 17. p. 811. Nehem. xii. 27, &c. Calmet, Diction. Bibl.

ELUTRIATION, in *Metallurgy*, is the ſeparating the lighter matters from the mixt ores of metals, by means of great quantities of fair water. Solid bodies, not diſſoluble in water, are by this operation ſeparated from each other by water very well ſtirred, ſo that the lighter and finer parts are carried away with the water, and the heavier and more ſolid remain at the bottom of the veſſels.

Some of the ſtones, earths, and other bodies, naturally mixed with the ores of metals, are much lighter than the metalline parts of thoſe ores, and are therefore very eaſily thus ſeparated from the reſt by this operation, either by barely pounding and waſhing, or by firſt calcining, and then extinguiſhing them in water, and afterwards waſhing them.

The kinds of ores proper to be made the ſubjects of this operation, are known from the great ſpecific gravity of the ore, which ſhews us that the metallic maſſes, adhering to their matrix, are firm and ſolid, and combined in large molecules, not ſmall, and ſcattered and diſperſed ſparingly through it; they are known alſo by the comparative lightneſs and brittleneſs of their ſtony matrix; whether this laſt property be naturally inherent in the ſtony matter, or whether it be eaſily brought on by fire in calcination, for in ſuch caſe it renders the comminution of the compound maſs eaſy. In this caſe, however, it is proper, that the ore itſelf be of a nature ſufficiently fixed afterwards in the fire, and doth not fly away in the roaſting.

When ſtones, containing ore in them, are light and brittle, but hold a great quantity of ſulphur, and are interſperſed only with very minute maſſes of the metalline particles, or when theſe are incloſed in a very ponderous and hard matrix, not eaſily affected by fire, this method of ſeparation has no place. Cramer, Art of Aſſ. p. 195.

ELYCHRISUM, in *Botany*. See CUDWEED, and GOLDY *Locks*.

ELYSIUM, Ελυσιος, in the *Ancient Theology*, or rather *Mythology*, a place in the inferi, i. e. in the lower world, or, as we ſometimes render it, in hell; furniſhed with fields, meads, agreeable woods, groves, ſhades, rivers, &c. whither the ſouls of good people were ſuppoſed to go after this life.

Orpheus, Hercules, and Æneas, are ſuppoſed to have deſcended into *elyſium*, in their life-time, and to have returned again. Virgil, lib. vi. ver. 638, &c. Tibullus, lib. i. eleg. 3. gives us fine deſcriptions of the *elyſian fields*.

Virgil oppoſes *elyſium* to tartara; which was the place where the wicked underwent their puniſhment.

> *Heic locus eſt, partes ubi ſe via findit in ambas:*
> *Dextera, quæ Ditis magni ſub mœnia tendit:*
> *Hac iter* elyſium *nobis: at læva malorum*
> *Exercet pœnas, & ad impia tartara mittit.*

He aſſigns *elyſium* to thoſe who died for their country, to thoſe of pure lives, to truly inſpired poets, to the inventors of arts, and to all who have done good to mankind.

Some authors take the fable of *elyſium* to have been borrowed from the Phœnicians; as imagining the name *elyſium* formed from the Phœnician עלז, *alaz*, or עלץ, *alats*, or עלס, *alas*, *to rejoice*, or *to be in joy*; the letter *a* being only changed into *e*, as we find done in many other names; as in *Enakim*, for *Anakim*, &c. On which footing, *elyſian* fields ſhould ſignify the ſame thing as a place of pleaſure; or,

> *——Locos lætos, & amœna vireta*
> *Fortunatorum nemorum, ſedeſque beatas.* Virg.

Others derive the word from the Greek λυω, *ſolvo*, *I deliver*, *I let looſe*, or *diſengage*, becauſe here mens ſouls are freed, or diſincumbered, from the fetters of the body. Beroaldus, and Hornius, Hiſt. Philoſoph. lib. iii. cap. 2. take the place to have derived its name from Eliza, one of the firſt perſons who came into Greece after the deluge, and the author and father of the Ætolians. Ol. Rudbecks contends, that it was in Sweden the *elyſian* fields were placed.

ELYTROIDES, Ελυτροειδης, in *Anatomy*, one of the proper coats, or tunics, of the TESTICLES.

The word is formed of the Greek ελυτρον, *vagina*, *a ſheath*, and ειδος, *form*.

The *elytroides* is the ſecond proper coat of the teſtes: it reſembles a ſheath, or vagina; whence ſome have alſo called it *vaginalis*.

It is formed of a dilatation of the production of the peritonæum; its inner ſurface is ſmooth and equable; and the outer rough and unequal; which makes it adhere the more ſtrongly to the firſt of the proper coats, called *elytroides*.

ELYTRON, properly a covering of any ſort, and for any ſubſtance. Hippocrates has appropriated the word to ſignify the membranes which involve the ſpinal marrow.

ELZIMAR, a name given, by ſome of the chemical writers, to the flowers of braſs.

EMANATION, the act of flowing, or proceeding, from ſome ſource, or origin. Such is the *emanation* of light from the ſun; or that of effluvia from odorous, &c. bodies; of wiſdom from God, &c.

The word is formed of the Latin *e*, *out of*, and *manare*, *to flow*, or *ſtream*.

EMANATION is alſo uſed for the thing that proceeds, as well as the act of proceeding. The power given a judge is an *emanation* from the regal power; the reaſonable ſoul is an *emanation* from the divinity.

EMANATION is alſo uſed among the ſchoolmen, for the production of a leſſer thing, in order to the production of a greater, by virtue of ſome natural connexion, or dependence, between them.

For, as when ſeveral moveables are joined together, the ſame power that moves the firſt, moves all the reſt (as in pulling up the trunk of a tree, you pull up the roots, branches, &c. or in drawing one link of a chain, you bring forward all the reſt); the ſame is to be underſtood in all conjunct natural effects; viz. that the ſame power, whereby the firſt is produced, does alſo produce all the reſt, naturally connected with it; becauſe, by means of the connexion, the action of the agent is conveyed from one to the other; ſo that the firſt determines the agent to the production of all the reſt.

And hence that is called an *emanative cauſe* (in contradiſtinction to an efficient cauſe) which produces an effect by its mere preſence, without the intervention of any action; as a roſe doth a ſmell, &c. Others, and with good reaſon, deny, that there is any ſuch thing as an *emanative* cauſe, to produce an effect without any action. See CAUSE.

EMANCIPATION, in the Roman *Law*, was the act of ſetting a ſon free from the power and ſubjection of his father.

The word is formed from the Latin *ex*, *of*, and *mancipium*, *a ſlave*.

Emancipation differs from *manumiſſion*; as the latter was the act of a maſter in favour of a ſlave; the former that of a father in favour of his ſon.

The effect of *emancipation* was, that the goods, and moveable effects, which the ſon ſhould thenceforth acquire, ſhould be his ſole property, and not the property of his father; as they were before *emancipation*. Beſides, *emancipation* put the ſon in a capacity of managing his own affairs, and of marrying without his father's conſent, though a minor, or pupil, and under twenty-five years of age.

There were two kinds of *emancipation*; the one *tacit*, which was, by the ſon's being promoted to ſome dignity, or by his coming of age, or by marriage; in all which caſes, the ſon became his own maſter of courſe.

The other *expreſs*, where the father declared before the judge that he *emancipated* his ſon. This was not performed without ſome formality: the father was firſt to ſell his ſon, imaginarily, to another man, whom the lawyers call *pater fiduciarius*, *father in truſt*; of whom being bought back again by the natural father, he manumitted, or ſet him free, by a declaration before the judge.

This imaginary ſale was called *mancipatio*; and the manumiſſion, conſequent thereon, *emancipatio*.

Emancipation ſtill obtains in France, chiefly, with regard to minors, or pupils, who are hereby ſet at liberty to manage their effects, without the advice, or direction, of their fathers or tutors. It muſt be obſerved, however, that *emancipation* only extends to the ſelling of moveables, and letting of leaſes, &c. of immoveables; not to the ſelling or mortgaging of immoveables; which are only done with the conſent of a curator, ordinarily a perſon appointed, when *emancipated*.

Formerly *emancipation* was performed in the ordinary courts of juſtice, when deſired by the child; but if he were a minor, the king's letter was alſo required. Though there were other ways of *emancipation*, as by marriage; arriving at the age of twenty years; and in ſome provinces, by the death of the mother, becauſe the children were there under the power of the father and mother conjointly; ſo that the death of either of them *emancipated* the child.

Emancipation by marriage, in France, gives a power of marrying again, without the father's conſent, though under age; but among the Romans, Cujas tells us, a widow, under twenty-five years of age, though *emancipated* by her former marriage, returned into the power of the father, and might not marry a ſecond time, without his conſent.

Du-Cange obſerves, that the word *emancipation* was alſo uſed in the monaſteries, in ſpeaking of monks, promoted to any dignity, or removed from under the power of their ſuperiors; as alſo in ſpeaking of monaſteries, chapels, &c. themſelves, when exempted, by the pope, from the juriſdiction of the ordinary.

EMARGINATED *leaf*, among *Botaniſts*. See LEAF.

EMASCULATION, the act of taking from a male thoſe parts which are characteriſtic of his ſex. See CASTRATION.

EMAUX *de l'Eſcu*, in *Heraldry*, the metals and colours of a ſhield, or ſcutcheon.

EMBALMING, the opening a dead body, taking out the inteſtines, and filling their place with odoriferous and deſiccative drugs and ſpices, to prevent its putrefying.

The word is formed from *balm*, which was a principal ingredient in the *embalmings* of the ancient Egyptians.

Dr. Grew, in his Muſeum Regalis Societatis, is of opinion, that the Egyptians boiled their bodies in a large cauldron, with a certain kind of liquid balſam. His reaſon is, that in the mummies preſerved in the collection of the Royal Society, the balm has penetrated not only the fleſhy and ſoft parts, but even the very bones; ſo that they are all as black as if they had been burnt.

The Peruvians had an effectual method of preſerving the bodies of their incas, or kings, *embalmed*.

The way of *embalming* dead bodies among the Egyptians was as follows: when a man died, his body was carried to the artificers, whoſe trade it was to make coffins; they took the meaſure of the body, and made a coffin for it, proportioned to its ſtature, the dead perſon's quality, and the price that people were willing to give. The upper part of the coffin repreſented the perſon who was to be ſhut up in it, whether man or woman. If it was a man of condition, this was diſtinguiſhed by the figure which was repreſented on the cover of the coffin; there were generally added paintings and embelliſhments, ſuitable to the quality of the perſon. Vid. Caſſian. Collat. 15. cap. 3. & Cicero, Tuſc. Quæſt. lib. i. Herodot. lib. ii. cap. 86. Diodor. lib. ii. cap. 5.

When the body was brought home again, they agreed with the *embalmers* at what rate particularly they would have it *embalmed*, for the prices were different; the higheſt was a talent, twenty minæ was a moderate one, and the loweſt price was a very ſmall ſum. The Egyptian talent is ſuppoſed to be worth three hundred pounds ſterling. They immediately ſent for a deſigner, who marked the body, as it lay extended, at the place where it ſhould be opened, on the left ſide, and the length of the inciſion. A diſſector, with a very ſharp Ethiopian ſtone, made the inciſion, and hurried away as faſt as he could, becauſe the relations of the perſon deceaſed, who were preſent, took up ſtones, and purſued him as a wicked wretch, with an intention to ſtone him.

This operation being finiſhed, the *embalmers*, who were looked upon as ſacred perſons, entered to perform their office. They drew all the brains of the dead perſon through his noſtrils, with a hooked piece of iron, provided particularly for this purpoſe, and filled the ſkull with aſtringent drugs; they likewiſe drew all the bowels, except the heart and kidneys, through the aperture which they had made in the ſide. The inteſtines were waſhed in wine from the palm-tree, and in other ſtrong and binding drugs. The whole body was anointed with oil of cedar, with myrrh, cinnamon, and other ſpices, for about thirty days, ſo that it was preſerved entire, not only without putrefaction, but had a good ſcent with it. Αιγυπτιοι δε τα εντερα εξελοντες ταριχευσιν αυτους. And the Perſians, as the ſame author Sextus Empiricus obſerves, were uſed νιτρω ταριχευειν. Sext. Empir. Pyrrhon. Hypoth. lib. ii. cap. 24.

Bodies thus preſerved are called *mummies*, from the Arabic word *mam*, which ſigniſies *wax*, this being an ingredient in the preparation.

After this the body was put into ſalt for about forty days; wherefore when Moſes ſays, that forty days were employed in *embalming* Jacob, we are to underſtand him as meaning the forty days of his continuing in the ſalt of nitre, without including the thirty days paſt in performing the other ceremonies above mentioned, ſo that, in the whole, they mourned ſeventy days in Egypt, as Moſes likewiſe obſerves.

Afterwards the body was taken out of the ſalt, waſhed, wrapt up in linen ſwaddling-bands, dipped in myrrh, and rubbed with a certain gum, which the Egyptians uſed inſtead of glue. Then the body was reſtored to the relations, who put it in a coffin, and kept it in their houſes, or in tombs made particularly for this purpoſe. There are ſome found, at this day, in Egypt, in chambers, or ſubterraneous vaults, which fully juſtify the truth of what is here ſaid.

They who were not rich enough to bear this expence, contented themſelves with infuſing, by a ſyringe, through the fundament, a certain liquor extracted from the cedar, and leaving it there, wrapt up the body in ſalt of nitre. This oil preyed upon the inteſtines, ſo that when they took it out, the inteſtines came along with it dried, and not in the leaſt putrefied. The body being incloſed in nitre, grew dry, and nothing remained beſides the ſkin glued upon the bones. They who were too poor to be at any conſiderable expence, did no more than cleanſe the inſide, by ſyringing a liquor into it; this done, they put the body, without farther ceremony, into nitre for ſeventy days, in order to dry it. Calmet, Diction. Bibl. Pococke's Deſcription of the Eaſt, vol. i. p. 230, &c.

The preſent method of *embalming* in Egypt differs very much from the ancient. Maillet informs us, that it is now the cuſtom to waſh the body ſeveral times in roſe-water; then to perfume it with incenſe, aloes, and other odours, in great abundance; the body is afterwards wrapped up in a winding-ſheet, made partly of ſilk, and partly of cotton, moiſtened probably with ſome liquid perfume; this is again covered with another cloth of unmixed cotton, to which is added one of the richeſt ſuits of cloaths of the deceaſed. Letter X. p. 88.

It is no wonder that we find human bodies preſerved without corrupting for many ages, by means of ſpices, and other ingredients, proper to reſiſt putrefaction, applied with the niceſt care; but it is ſtrange that there ſhould be a ſort of *embalming* performed by nature, in ſome places, where bodies are preſerved merely by the virtues of the ſoil in which they lie; yet this is evidently the caſe in ſome inſtances. We have, in the Philoſophical Tranſactions, an account of a man and a woman who were loſt in the great ſnows on the moors of Hope, near the woodlands in Derbyſhire, on the fourteenth of January, 1674. Theſe perſons were not found till the third of the May following, at which time they ſmelt ſo ſtrong, that the coroner prudently ordered them to be buried on the ſpot. Theſe bodies lay buried in the peat-moſs twenty-eight years before they were looked at again, when ſome people of the country, who had heard of the ſtrange virtues of the ſoil thereabouts in preſerving dead bodies, opened the ground, and found them no way altered, the colour of the ſkin being fair and natural, and the fleſh as ſoft as that of perſons newly dead. Phil. Tranſ. Nº 434. p. 415.

After this the place was remarked where they lay, and they were ſhewn for a ſight for twenty years, though they were much changed by having been ſo often uncovered in that time.

EMBARCADERO, in *Commerce*, a Spaniſh term, much uſed along the coaſts of America, particularly thoſe on the ſide of the South ſea.

It ſignifies a place which ſerves ſome other conſiderable city farther within land, for a port, or place of ſhipping, i. e. of *embarking*, and *diſembarking* commodities.

Thus Calao is the *embarcadero* of Lima, the capital of Peru; and Arica the *embarcadero* of Potoſi. There are ſome *embarcaderos* forty, fifty, and even ſixty leagues off the city which they ſerve in that capacity.

EMBARGO, a reſtraint or prohibition, laid by a ſovereign on merchant-veſſels, to prevent their going out of port; ſometimes to prevent their coming in; and ſometimes both, for a limited time.

Embargoes are uſual in time of war; in apprehenſions of invaſions, &c. One great occaſion of *embargoes* is, that the government may make uſe of the merchant-veſſels, with their equipage, &c. in armaments, expeditions, tranſporting of ſoldiers, &c. another is, to ſtop the communication of intelligence at ſuch critical ſeaſons. *Embargoes* are of very miſchievous conſequence to commerce.

EMBARRAS, EMBARRASSMENT, a French term, though now naturalized; denoting a difficulty, or obſtacle, which perplexes or confounds a perſon, &c.

EMBASIS, in the writings of the *Ancient Phyſicians*, the name of a large veſſel, in which they prepared their medicated baths, and which was capable of holding the perſon to be bathed at his full length.

EMBASSADOR, or AMBASSADOR, a public miniſter, ſent from one ſovereign prince, as a repreſentative of his perſon to another.

The word is derived from the corrupt Latin *ambaſciator*, formed of *ambactus*, an old word borrowed from the Gauliſh, ſignifying *ſervant*, *client*, *domeſtic*, or *officer*. Such is the origin given by Borel, Menage, and Chiflet, after Salmaſius and Spelman.

In Latin we uſually call this kind of miniſter *legatus*, or *orator*; though it is certain the word *embaſſador*, with us, has a much more extenſive ſignification than that of *legatus* among the Romans; and, excepting that they are both under the protection of the law of nations, there is ſcarce any thing in common between them.

Embaſſadors are either *ordinary* or *extraordinary*.

EMBASSADOR *in ordinary* is he who reſides ſtatedly in the court of another prince, to maintain a mutual good underſtanding, look to the intereſts of their maſters, and tranſact ſuch affairs as may occur.

Embaſſadors in ordinary are but of modern invention; it is not above two hundred years ago ſince they were firſt heard of; till then, all *embaſſadors* were *extraordinary*, and retired as ſoon as they had diſpatched the affair they were ſent upon.

EMBASSADOR *extraordinary* is a perſon who is ſent to a prince's court on ſome particular and emergent occaſion; as to conclude a peace, marriage, or to make a compliment, &c.

Indeed there is no eſſential difference between *ordinary* and *extraordinary embaſſadors*; they equally enjoy all the privileges and prerogatives which the law of nations decrees.

At Athens the *embaſſadors* from foreign princes and ſtates always mounted the tribunal, or pulpit, of the public orators, and there opened their commiſſion, and acquainted the people with their buſineſs. At Rome they were introduced to the ſenate, and delivered their commiſſion to them. Among us, they make their addreſs immediately and ſolely to the king.

Athens and Sparta, ſays M. Tourreil, when in all their glory, were never ſo much delighted, as to ſee and hear a number of *embaſſadors*, in their aſſemblies, ſuing for their protection or alliance. It ſeemed to them the nobleſt homage that could be paid them; and that ſtate, which received the moſt embaſſies, were judged to have the advantage over the other.

The name of *embaſſador*, Cicero obſerves, is ſacred and inviolable: *non modo inter ſociorum jura, ſed etiam inter hoſtium tela incolume verſatur.* In Verr. Orat. vi.

The *embaſſadors* of kings ſhould never attend at any public aſſemblies, marriages, interments, or other ſolemnities, unleſs their maſters have ſome intereſt therein; nor muſt they even go into mourning, or the like, on any occaſions of their own, becauſe they repreſent the perſons of their princes; and for this reaſon, they owe no ſubjection to any laws but thoſe of their own country, and their actions are not ſubject to the controul of the private law of that ſtate, in which they are appointed to reſide. It has been held, both by our common lawyers and civilians, that an *embaſſador* is privileged by the law of nature and nations; and yet, if he commits any offence againſt [illegible]w of reaſon and nature, he ſhall loſe his privilege; and therefore, if an *embaſſador* conſpires the death of the king in whoſe land he is, that he may be condemned and executed for treaſon; but if he commits any other ſpecies of treaſon, he muſt be ſent to his own kingdom. However, though theſe principles might formerly obtain, the general practice of this country, as well as of the reſt of Europe, ſeems now to purſue the ſentiments of the learned Grotius, De Jur. Bell. & Pac. p. 18. 4. that the ſecurity of *embaſſadors* is of greater importance than the puniſhment of a particular crime. And, therefore, few, if any, examples have occurred within a century paſt, where an *embaſſador* has been puniſhed for any offence, however atrocious in its nature. With reſpect to civil ſuits, neither an *embaſſador*, nor any of his train or *comites*, can be proſecuted for any debt, or contract, in the courts of that kingdom where he is ſent to reſide. By 7 Anne, cap. 12. an act paſſed in 1708, in conſequence of the arreſt of an *embaſſador* from Peter the Great, czar of Muſcovy, for a debt of 50*l.* all proceſs, whereby the perſon of any *embaſſador*, or of his domeſtic, or domeſtic ſervant, may be arreſted, or his goods diſtrained or ſeized, ſhall be utterly null and void, and the proſecutors be puniſhed at the diſcretion of the lord-chancellor, and the two chief juſtices, or any two of them. However, no bankrupt trader, retained in the ſervice of an *embaſſador*, ſhall be privileged by this act; nor any ſervant, whoſe name is not regiſtered with the ſecretary of ſtate, and tranſmitted to the ſheriffs of London and Middleſex. Theſe privileges are allowed in the courts of law. Blackſtone's Commentaries, vol. i. p. 253, &c.

EMBASSY, or AMBASSY, *Legatio*, a miſſion from one ſovereign prince, or ſtate, to another, of ſome able experienced perſon, to negociate ſome affair, in quality of *embaſſador*.

Fa. Daniel obſerves, that under the ancient French kings, their *embaſſies* conſiſted of a body, or number of perſons, joined together in commiſſion, and who compoſed a kind of council; ſomething like which is ſtill retained at treaties of peace. Thus the French *embaſſy* at Nimeguen, for the peace, conſiſted of three plenipotentiaries; that of Utrecht, of two, &c.

We likewiſe read of *embaſſadreſſes*. Madame the marechale de Guebriant, Wicquefort obſerves, was the firſt, and perhaps the only woman, ſent by any court in Europe in quality of *embaſſadreſs*. Matth. lib. iv. Vie d'Henry IV. tells us, that the king of Perſia ſent a lady of his court on an *embaſſy* to the grand ſignior, during the troubles of the empire.

EMBATTLED, a term in *Heraldry*, when the outline of any ordinary is notched after the manner expreſſed in *Tab.* II. *Heraldry*, *fig.* 59. repreſenting the battlements of a wall, or caſtle. See BATTLEMENT.

None were ſuffered, in ancient times, to embattle their houſes, but thoſe who had great dignities, as the barons, and the like. Camden proves this in his account of Tunſtal's ſeat in England, in which he expreſſes it as a ſignal mark of the royal favour, that he had liberty given to embattle it. The heralds expreſs this embattled line by the term *crenelle*; and when it has the embattling on both ſides, which is the more rare, they call it *breteſſe*. See BRETESSE.

EMBER-*gooſe*, in *Ornithology*, the COLYMBUS *immer* of Linnæus, is larger than a common gooſe; its head is duſky; the back, coverts of the wings, and tail, are clouded with lighter and darker ſhades of the ſame; the primaries and tail are black; the under ſide of the neck marked with duſky ſpots; the breaſt and belly ſilvery, and the legs black. The ſkin is ſo tough, that it has been uſed in ſome of the northern countries as leather. This ſpecies inhabits the ſeas about the Orkneys; and in ſevere winters viſits the ſouthern parts of Great Britain. See DIVER.

This ſpecies of the wild gooſe is ſaid to hatch her young under her wing. The reaſon of this abſurd opinion is, that none ever ſaw her on the land, or out of the water, and that they have a cavity under one of their wings capable of containing a large egg. Phil. Tranſ. Nº 473. § 8.

EMBER-*weeks* are thoſe wherein the *ember*, or *embering-days* fall.

In the laws of king Alfred, and thoſe of Canute, thoſe days are called *ymbren*, that is, *circular days*, from whence the word was probably corrupted into *ember-days*. By the canoniſts they are called *quatuor anni tempora*, the four cardinal ſeaſons, on which the circle of the year turns; and hence Henſhaw takes the word to have been formed, viz. by corruption, from *temper*, of *tempora*.

Mr. Somner thinks they were originally faſts, inſtituted to beg God's bleſſings on the fruits of the earth. Agreeably to which, Skinner ſuppoſes the word *ember* taken from the aſhes, *embers*, then ſtrewed on the head.

The *ember-days* are the Wedneſday, Friday, and Saturday, after Quadrageſima Sunday, or the firſt Sunday in Lent, after Whitſunday, after Holyrood day in September, and after St. Lucy's day in December; which four times anſwer well enough to the four quarters of the year, ſpring, ſummer, autumn, and winter.

Theſe *ember-weeks* are now chiefly taken notice of on account of the ordination of prieſts and deacons; becauſe the canon appoints the Sundays next ſucceeding the *ember-weeks* for the ſolemn times of ordination; though the biſhops, if they pleaſe, may ordain on any Sunday or holiday.

EMBERIZA, in *Ornithology*, a name, with the epithets of white and yellow, expreſſing the bunting and yellow-hammer. In the Linnæan ſyſtem this is a diſtinct genus of *paſſeres*, including a great number of ſpecies. For the general characters, ſee **Bunting**. See alſo **Reed**-*ſparrow*, **Snow**-*bird*, **Yellow-hammer**, &c.

EMBLEM, Εμϐλημα, a kind of painted ænigma, which, repreſenting ſome obvious hiſtory, with reflections underneath, inſtructs us in ſome moral truth, or other matter of knowlege.

The word is pure Greek, formed of the verb εμϐαλλειν, *to caſt in, to inſert*. Suetonius relates, that Tiberius cauſed the word to be eraſed out of a decree of the Roman ſenate, becauſe it was borrowed from another language.

Such is that very ſignificant image of Scævola, holding his hand in the fire; with the words *agere & pati fortia, Romanum eſt: to do and ſuffer courageouſly is Roman.*

The *emblem* is ſomewhat plainer, and more obvious, than the ænigma. Gale defines *emblem* an ingenious picture, repreſenting one thing to the eye, and another to the underſtanding.

The Greeks alſo frequently gave the name *emblems*, εμϐληματα, to *inlaid*, or *moſaic* works, and even to all kinds of ornaments of vaſes, moveables, garments, &c. And the Latins uſed *emblema* in the ſame ſenſe. Accordingly, Cicero, reproaching Verres with the ſtatues and fine wrought works he had plundered from the Sicilians, calls the ornaments fixed thereto (and which, on occaſion, might be ſeparated from them) *emblemata*. Add, that Latin authors frequently compare the figures and ornaments of diſcourſe to theſe *emblemata*: thus, an ancient Latin poet, praiſing an orator, ſays, that all his words were ranged like the pieces in moſaics,

> *ut teſſerulæ omnes,*
> *Arte pavimenti, atque* emblemate *vermiculata.*

We do not uſe the Engliſh word *emblem* in this ſenſe; though the ancient juriſconſulti always retain the Latin *emblema* to expreſs ſuch ornaments; becauſe the Greek εμϐλημα literally denotes any thing applied, or added to a body by way of enrichment.

With us, *emblem* ordinarily ſignifies no more than a painting, baſſo relievo, or other repreſentation, intended to hold forth ſome moral or political inſtruction.

What diſtinguiſhes an *emblem* from a *device* is, that the words of an *emblem* have a full, complete ſenſe of themſelves; nay, all the ſenſe and ſignification which they have together with the figure.

But there is yet a farther difference between *emblem* and device; for a device is a ſymbol appropriated to ſome particular perſon, or that expreſſes ſomething which concerns him particularly; whereas an *emblem* is a ſymbol that regards all the world alike.

Theſe differences will be more apparent from comparing the *emblem* above quoted with the device of a candle lighted; and the words *juvando conſumor, I waſte myſelf in doing good.*

According to lord Bacon, *emblems* are of uſe in the art of memory, as ſenſible objects ſtrike the mind ſtronger than what is intellectual. Thus, it is eaſier to retain the image of a ſportſman hunting a hare, of an apothecary ranging his boxes, an orator making a ſpeech, a boy repeating verſes, or a player acting his part; than the correſponding notions of invention, diſpoſition, elocution, memory, and action. Works abr. vol. i. p. 136. vol. ii. p. 475. and vol. iii. p. 106.

EMBLEMATICAL *characters*. See **Character**.

EMBLEMENTS, Fr. from *emblaver*, q. d. *ſemer en blè, to ſow with wheat*, a term ſtrictly ſignifying the profits of lands ſown; though ſometimes uſed more largely for any profits ariſing, and growing naturally from the ground; as graſs, fruit, &c.

If a tenant for life ſow the land, and die, his executor ſhall have the *emblements*, and not he in reverſion. But if the tenant for years ſow the land, and before ſeverance the term expires, there the leſſor, or he in reverſion, ſhall have the *emblements*, and not the leſſee.

The advantages of *emblements* are particularly extended to the parochial clergy by 28 Hen. VIII. cap. 11.

EMBOLIMÆAN and **Embolismic**, *intercalary*, is chiefly uſed in ſpeaking of the additional months which chronologiſts inſert to form the lunar cycle of 19 years.

The 19 ſolar years, conſiſting of 6939 days, and 18 hours; and the 19 lunar years only making 6726 days; it was found neceſſary, in order to render the 19 lunar years equal to the 19 ſolar, which make the lunar cycle of 19 years, to intercalate or inſert ſeven lunar months, containing 209 days; which, with the four biſſextile days happening in that interval, make 213 days, and the whole, 6939 days. See **Cycle**.

By means of theſe ſeven *emboliſmic*, or additional months, the whole 6939 days and 18 hours of the ſolar years are employed in the calendar.

In the courſe of 19 years there are 228 common moons, and ſeven *emboliſmic* moons. Their diſtribution is thus: every 3d, 6th, 9th, 11th, 14th, 17th, and 19th years, are *emboliſmic*, and conſequently contain 384 days a-piece.

And this was the method of computing time among the Greeks, when they uſed the enneadecæterides, or cycle of 19 years. But they did not keep regularly to it, as the Jews ſeem to have done. The Greeks were followed by the Romans till the time of Julius Cæſar.

The *emboliſmic* months, like other lunar months, are ſometimes 30 days, and ſometimes only 29. See **Year**.

The *emboliſmic epacts* are thoſe between XIX and XXIX; which are thus called, becauſe, with the addition of the epact XI, they exceed the number XXX: or rather, becauſe the years, which have theſe epacts, are *emboliſmic*; having thirteen moons a-piece, whereof the 13th is the *emboliſmic*.

EMBOLISMUS, Εμϐολισμος, in *Chronology*, ſignifies *intercalation*.

The word is formed of εμϐαλλειν, to *inſert*. See **Embolismic**.

As the Greeks made uſe of the lunar year, which is only 354 days, in order to bring it to the ſolar, which is 365 days, they had every two or three years an *emboliſm*, i. e. they added a thirteenth lunar month every two or three years; which additional month they called *embolimæus*, εμϐολιμαιος, becauſe *inſerted*, or *intercalated*.

EMBOLUS, the moveable part of a pump, or ſyringe; called alſo the *piſton*, and popularly the *ſucker*. See **Piston**, **Pump**, and **Syringe**.

The pipe, or barrel of a ſyringe, &c. being cloſe ſhut, the *embolus* cannot be drawn up without a very conſiderable force; which force being removed, the *embolus* returns again with violence. This phænomenon the Ariſtotelians attribute to nature's abhorrence of a **vacuum**.

But the modern philoſophers finding, that in an exhauſted receiver the *embolus* is eaſily drawn up, though the orifice be ſtopped, prove that it is the preſſure of the atmoſphere on the external parts of the *embolus*, that makes the difficulty of drawing it up. See **Air**, **Atmosphere**, and **Suction**.

EMBOSSING, or **Imbossing**, the act of forming, or faſhioning works in relievo, whether they be caſt, or moulded, or cut with the chiſſel, &c.

Emboſſing is one great part of ſculpture; being that which has to do with figures raiſed, or prominent from the plain, or ground; the other part, which makes figures, &c. that are indented, or cut in below the ground, is called *engraving* See **Enchasing**.

EMBOWELLING *alive*, in *Law*, is part of the puniſhment of *High*-**Treason**.

EMBRACE *a volt*, in the *Manege*, is uſed when a horſe, in working upon volts, makes a good way every time with his fore-legs. The oppoſite term to embracing a volt, is beating the duſt, which is putting his fore-feet near the place from whence he lifted them.

Embracing the ground is uſed in the ſame ſenſe with *embracing* the *volt*. A horſe cannot take in too much ground, provided his croupe does not throw out; that is, does not go out of the *volt*. See **Beat**.

EMBRACEOR, in *Law*, a perſon who, when a matter is in trial between party and party, comes to the bar with one of the parties (having received ſome reward ſo to do), and ſpeaks in the cauſe, or privately labours the jury, or ſtands there to overlook, awe, or put them in fear. The penalty hereof is twenty pounds, and impriſonment at the diſcretion of the juſtices.

EMBRACERY, in *Law*, the act or offence of embraceors. See **Embraceor**.

EMBRASURE, in *Architecture*, an enlargement of the gap or aperture of a door, or window, within-ſide the wall. See **Door**.

Its uſe is to give the greater play, for the opening of the door, wicket, caſement, &c. or to take in the more light.

The *embraſure* coming ſloping inwards, makes the inner angles obtuſe. When the wall is very thick, they ſometimes make *embraſures* on the outſide.

Embrasures, in *Fortification*, denote the holes, or apertures, through which the cannons are pointed; whether in caſemates, in batteries, or in the parapets of walls. See **Cannon**, **Ordnance**, **Battery**, &c.

The *embraſures* are generally about fifteen feet apart, from ſix to nine or ten feet wide without, and from two to three within. Their height from the platform is uſually three feet on the inſide, and a foot and half on the outſide; that ſo the muzzle, on occaſion, may be ſunk, and the piece brought to ſhoot low.

The beſt *embraſures* are thoſe made with a neck, whereby a part of the opening becomes more contracted, and conſequently is better adapted to preſerve the gunners and cannon from the enemy's ſhot, than when the cheeks of the *embraſures* are made ſtrait. It is moſt deſirable to have the axis of the *embraſure* at right angles to the length of the parapet, yet it may be ſometimes neceſſary to have them oblique. In this caſe, the inſide of the parapet is notched, or cut away, ſo as to leave room for the front of the platform, that the wheels of the carriage may be drawn up againſt the inner opening, for the axis of the gun to lie in the axis of the *embraſure*; and the outſide of the parapet is to be ſtrengthened, in order to compenſate for that which is cut away within.

They are ſometimes called *cannonieres*, when big enough to paſs the mouth of a cannon through; and *meurtrieres*, when only big enough for muſquets.

When the parapet is ſo low, that the cannon may ſhoot without *embraſures*, it is ſaid to ſhoot *en barbe*.

EMBROCATION, or rather **Embrochation**, **Embrocha**, Εμϐροχη, formed from βρεχω, *irrigo*, *I ſprinkle*, or *moiſten*, in *Pharmacy*, denotes the application of remedies, as oils, ſpirits, decoctions, and other liquids, by ſprinkling, or even rubbing them on the part affected: this is alſo called *irrigation*.

Embrocations are only a kind of lotions; they are uſed to remove obſtructions, and to relieve pains, numbneſs, and palſies. The pumping uſed in natural baths is properly an *embrocation*.

Embrocation, *gall*. See Gall.

EMBROIDERY, the enriching of a cloth, ſtuff, or muſlin, by working diverſe figures thereon with the needle, and thread of gold or ſilver.

The word *embroidery* is derived from the French *broiderie*, of *broider*, *to embroider*; which ſome deduce, by tranſpoſition, from *bordeur*, becauſe they formerly *embroidered* only the borders of ſtuffs; whence the Latins alſo call the embroiderers, *limbularii*. Du-Cange obſerves, that they anciently wrote *aurobruſtus* for *embroidered* with gold, or *bruſtus brudatus*, and *brodatus*; whence *broderie*.

That done with ſilk, flax, or the like, is not now called *embroidery*; though anciently, and properly, the word denoted all kind of figuring, or flouriſhing.

The chief uſe of *embroidery* is in church veſtments, cloaths, houſings, guidons, ſtandards, &c. The invention of *embroidery* is attributed to the Phrygians; whence the Latins call embroiderers, *Phrygiones*.

The *embroidery* of ſtuffs is performed in a kind of loom; that of muſlin is done by ſtretching it on a pattern already deſigned; the former kind is the moſt eaſy, but the latter admits of the greateſt richneſs and variety. The thinneſt muſlins are the beſt for this purpoſe; and they are *embroidered* to great perfection in Saxony.

There are diverſe kinds of *embroidery*; as *embroidery on both ſides*, that which appears on both ſides. *Guimped embroidery*, performed either in gold or ſilver. In this work, a ſketch is firſt made on the cloth, then they put on a cut vellum, and afterwards ſew on the gold and ſilver with ſilk thread, interſperſing ſilver and gold cord, tinſel, and ſpangles. *Embroidery on the ſtamp*, where the figures are very high and prominent, being ſupported on wool, cotton, hair, &c. *Low and plain embroidery*, where the figures are low and flat, and without any enrichment between them.

EMBRYO, in *Medicine*, the firſt beginning, or rudiments, of the body of an animal, in its mother's womb, before it hath received all the diſpoſition of parts neceſſary to become animated; which is ſuppoſed to happen to a man on the forty-ſecond day; at which time the *embryo* commences a fœtus.

The word is derived from the Greek εμϐρυον, which ſignifies the ſame thing: formed of the prepoſition εν and βρυω, *ſcaturio*, *pullulo*, *I ſpring out*; becauſe of the manner of the firſt growth of the *embryo*, which reſembles that of the firſt ſhoots of a plant, as being a kind of zoophyte, and having only a vegetative life.

The moderns have made abundance of fine diſcoveries on the formation and growth of the *embryo*.

M. Dodart, having an *embryo* of twenty-one days age put into his hands, made a nice examen thereof; to find the order nature obſerves in the formation of the parts, and the firſt riſe of the parts themſelves.

The placenta he found more than half of the whole; and thence concludes, that the nearer the *embryo* is to the moment of its conception, the greater is the placenta with reſpect to the ſecundines, and the fœtus; which circumſtance furniſhes a reaſon why miſcarriages are more dangerous than regular deliveries; notwithſtanding that the fœtus in the former caſe is much leſs than in the latter. For though the *embryo* may have made a way ſufficient for itſelf, it may not for ſo great a placenta, as is to follow it.

The *embryo* itſelf was only ſeven lines long, from the top of the head to the bottom of the ſpina dorſi, where it terminated. The thighs were not yet unfolded; they only appeared like two little warts at the bottom of the trunk; the arms made the ſame appearance on the ſhoulders. The head was juſt one-third of the length of the whole ſeven lines: on this were ſeen two little black points, which would have become eyes. The mouth was very big; which M. Dodart takes for an indication, that the fœtus was fed by the mouth. There was no eminence for the noſe; but two little, almoſt imperceptible, pits for the noſtrils.

The painters uſually make the head one-eighth of the height of a well-proportioned man; and one-fourth of that of a young child: in the *embryo* we are ſpeaking of, the head made one-third part of the whole; whence it follows, that the younger the *embryo*, the bigger the head in proportion to the body. The parts nearer the head are alſo bigger in proportion to the reſt; and the legs and feet the ſmalleſt.

The *embryo* was a little crooked forwards, and bore ſome reſemblance to the maggot of a ſilk-worm; it weighed leſs than ſeven grains, which is an extraordinary lightneſs for a body ſeven lines long. It was ſo ſoft, that no part of it could be touched, without making a change in its figure.

Upon opening it, M. Dodart diſcovered the heart, and the right auricle: all the other parts in the thorax, and lower venter, were only ſimple lineaments, or outlines, and all veſicular, excepting a part on the left-ſide, which may be ſuppoſed to be the ſpleen. There was no appearance of any thing on the right ſide for a liver. Mem. de l'Acad. See Foetus, and Generation.

Embryo is alſo uſed by naturaliſts to expreſs the grain, or ſeed of a plant; ſometimes the germ, or firſt ſprout appearing out of the ſeed; becauſe the whole future plant is ſuppoſed to be contained therein. Juſt as the whole chick is ſuppoſed contained in the cicatricula, or treddle of an egg.

Embryo-*worms*. It is a matter of no ſmall curioſity, to obſerve the arrangement of the multitudes of the *embryo*-worms, as they are lodged in the bodies of the viviparous two-winged flies.

An accurate diſſection of one of theſe little animals, ſhews very plainly the parts where the *embryo*-worms are incloſed. This diſſection is eaſily made with a pair of fine pointed ſciſſars, taking off the whole upper ſhell of the body from the lower; and that part which covers the belly may be turned back upon the corcelet, without diſturbing the internal parts by the operation; and the form and arrangement of the parts which contain the *embryo*-worms in theſe, will be found very different from that of thoſe which contain the eggs in the common flies. Baker on the Microſcope, p. 115. 416, 417. 428. 430.

EMBRYONATUM *ſulphur*, in the writings of ſome *Chemiſts*, the name of one of the three general claſſes of *ſulphur* which they conſtitute. The firſt of theſe they call the univerſal *ſulphur*, or reſin of the earth; this is never united with any thing. By this they ſeem to mean what Boerhaave, and other late chemiſts, have called the vague acid. The ſecond is this ſame ſulphur united to metals and minerals; and the third is the ſame *ſulphur*, when ſeparated by art from theſe metals and minerals. This laſt ſeems *ſulphur* in its moſt advanced ſtate, and the ſecond kind is what they call the *ſulphur embryonatum*, as it is in the metals, &c. in an embryo-ſtate, and ready to be diſcloſed into its laſt form.

EMBRYOTHLASTES, Εμϐρυοθλαστης, an inſtrument wherewith to cruſh the bones of an embryo, or dead child; ſo as to make it eaſier of extraction, and prepare it for the embryulcus, to draw it out of the womb.

EMBRYOTOMY, Εμϐρυοτομια, formed of εμϐρυον, and τεμνω, *I cut*, in *Surgery*, the operation of cutting off the funiculus umbilicalis, or navel-ſtring, of a child juſt born, and tying it up.

EMBRYULCUS, in *Surgery*, the name of an inſtrument, in form of a ſort of crotchet, or hook, uſed for drawing out the fœtus in difficult labours. See Forceps.

EMBRYULKIA, or **Embryolkia**, Εμϐρυυλκια, or Εμϐρυοελκια, formed of εμϐρυον, *fœtus*, and ελκειν, *to draw*, in *Surgery*, an operation of extracting the child out of the mother's womb. See Cæsarean.

What the Greeks call *embryolkia*, the Latins call *Cæſarean ſection*; which latter name, M. Dionis obſerves, has taken place, and prevailed over the former; as being more eaſy of pronunciation.

EMENDALS, an old term ſtill uſed in the accounts of the Inner Temple; where, ſo much *in emendals* at the foot of an account ſignifies ſo much in the bank, or ſtock of the houſe, for reparation of loſſes, and other occaſions.

EMENDATIO *panis & cereviſiæ*, the aſſize of bread and beer; or the power of ſuperviſing and correcting the weights and meaſures belonging to them. See Assize.

EMERALD, a precious ſtone, when in its greateſt perfection green and tranſparent; and as to hardneſs nearly equal to the ruby.

The word is formed from the French *eſmeraude*, and that from the Latin *ſmaragdus*, which ſignifies the ſame. Others derive it from the Italian *ſmeraldo*, or the Arabic *zomorrad*.

Pliny reckons up twelve kinds of *emeralds*; and denominates each from the provinces, or kingdoms, where he ſuppoſed them to be found; as Scythian, Bactrian, Egyptian, Perſian, &c.

But the modern naturaliſts and jewellers only know of two fine kinds, viz. Oriental and Peruvian. And if we may credit Tavernier, in his treatiſe of coloured ſtones found in the Indies, inſerted in the ſecond volume of his Voyages, theſe two ſhould be farther reduced to one, viz. the Peruvian.

In effect, he pretends that there is not, nor ever was, any mine of *emeralds* in the Eaſt Indies; and that all that are there found, were brought from Peru by the way of the South-ſea; which was a method of commerce carried on by the Peruvians before the diſcovery of America by the Spaniards. But as the point of ſuch commerce is not ſufficiently proved, we muſt keep to the ancient diviſion. The Oriental *emerald* is harder, more brilliant, and tranſparent, than the Peruvian; which has generally clouds found in it, and ſparkles leſs. Beſide, that there are ſuch quantities brought from Peru, by the way of Carthagena, that they are much ſunk in value and reputation. There are alſo European *emeralds*, but they are little other than coloured cryſtal.

Some authors ſay, that *emeralds* are uſually taken out of iron mines; and Pomet aſſures us, he had one to which the iron ore was ſtill ſticking. To which, all we have to ſay, is, that it could not be a Peruvian, becauſe there is no iron mine in the country.

The *emerald* is ſuppoſed to grow more and more perfect in the mine like the ruby; and to arrive at its greenneſs by ſlow degrees, as the fruit comes to maturity on trees. It is a common opinion, that the *emerald* grows in the jaſper; and it is certain there are ſome jaſpers ſo perfectly green and fine, that many have taken parts of them for *emeralds*.

But the proper matrix or marcaſite of this ſtone is the *preme d'emeraud*, which is held among the coarſer precious ſtones; being hard, ſemi-pellucid, and often intermixed with yellow, green, white, and blue, &c.

The genuine *emerald*, when in its moſt perfect ſtate, is perhaps the fineſt and moſt beautiful of all the gems. It is found of various ſizes, but uſually ſmall. Multitudes are met with of about the ſixteenth of an inch in diameter, and they are found from this up to the ſize of a walnut. We have accounts of ſome of immenſe ſize among the ancients; but they were evidently not *emeralds* but jaſpers, or other green ſtones. The large ſpecimens at preſent are very ſcarce; and whether they are Oriental or Occidental, are of very great value.

The *emerald* is naturally of different figures, like the diamond, and many of the other gems. It is ſometimes found in a roundiſh, or pebble-like form, but much more frequently in a columnar, or angular one, reſembling common cryſtal. The pebble *emeralds* are always the hardeſt and brighteſt, but are ſeldom found exceeding the ſize of a pea, very rarely coming up to that of a horſe-bean. The cryſtalliform uſually grow ſeveral together, and are often conſiderably large. The pebble *emeralds* are found looſe in the earth of mountains, and in the ſands of rivers; the columnar are uſually found adhering to, or bedded in a white, opake, cryſtalline matter, and ſometimes to the jaſper, or to the praſius; which laſt has been therefore called by ſome the mother of the *emerald*.

The rough *emerald*, of whatever form, is uſually of a very bright, and naturally poliſhed ſurface, and is ever of a pure and beautiful green, without the leaſt admixture of any other colour. It is of all the various ſhades of green, from the deepeſt to the paleſt, and doubtleſs is ſometimes wholly colourleſs; but it is then eſteemed a ſapphire; all the harder gems, when colourleſs, being called by our jewellers *white ſapphires*.

With a moderately ſtrong heat the *emerald* becomes blue, but recovers its original green colour when cold. *Emeralds*, by being expoſed to condenſed ſolar heat, have been rendered white, and of various colours, and ſoon afterwards fuſed, by which operation they loſt part of their weight and hardneſs. But M. d'Arcet could not fuſe an *emerald* in the intenſe and long continued heat of a porcelain furnace, although the colour and tranſparency of it were thereby altered. *Emeralds* have the property of ſhining in the dark, after having been heated. They are the fourth in degree of hardneſs from DIAMONDS; and yet are ſuſceptible of impreſſion from a file. The Oriental *emeralds* are very ſcarce, and are at preſent found only in the kingdom of Cambay: very few of them have of late been imported into Europe, inſomuch, that ſome have ſuppoſed that there were in nature no Oriental *emeralds*; but within theſe few years ſome have been brought from Cambay into Italy, which greatly exceed all the American ones in beauty, as well as hardneſs.

The American *emeralds*, which as they are the fineſt that come to us, are called by our jewellers Oriental, are found principally about Peru, in the earth of ſome mountains. The European *emeralds* come principally from Sileſia, though there are of them in other places; and the coloured cryſtals, which are what we uſually meet with under the name of Occidental *emeralds*, are obtained from the mines of Germany.

The ancients made amulets of *emeralds* againſt all kinds of ſorcery; and ſuppoſed them effectual againſt a thouſand different diſeaſes. At preſent, when we have more experience, or leſs credulity, they are valued for their beauty, not their virtue; though there are ſtill ſome who ſuppoſe, that when reduced into an impalpable powder, and mixed with roſe-water, they may be of ſome uſe in medicine.

We read in authors of ſeveral *emeralds* of incredible magnitude. Roderigo de Toledo tells us, that when the Saracens took that town, king Tarik had for his ſhare of the plunder a table three hundred and ſixty-five feet long, and all of a piece, which he maintains to be an *emerald*. After this, the reader will not wonder at that pretended to have been ſeen by Theophraſtus, in a temple in Egypt, four cubits long, and three broad; nor even at an obeliſk of *emerald* forty feet high. But theſe were not properly *emeralds* in our ſenſe of the name, but only green marble, or other ſuch ſtones.

In the Dictionnaire de Commerce, we have a very curious and accurate eſtimate of the values of the different kinds of Peruvian *emeralds*; which the reader will not be diſpleaſed to find tranſcribed here.

Thoſe of the firſt and coarſeſt ſort, called *ploſmes*, for grinding, are worth 27 ſhillings ſterling the marc, or 8 ounces. The demi-morillons, 8*l.* ſterl. per marc. Good morillons, which are only little pieces, but of fine colour, from 13*l.* to 15*l.* per marc. *Emeralds*, larger than morillons, and called *of the third colour, or ſort*, are valued at from 50*l.* to 60*l.* the marc. *Emeralds*, called *of the ſecond ſort*, which are in larger and finer pieces than the preceding, are worth from 65*l.* to 75*l.* per marc. Laſtly, thoſe of the firſt colour, otherwiſe called *negres cartes*, are worth from 110*l.* to 115*l.*

Emeralds *ready cut, or poliſhed, and not cut, being of good ſtone, and a fine colour, are worth,*

		£.	s.
Thoſe weighing one carat, or four grains		0	10
Thoſe of two carats	——	1	7
Thoſe of three carats	——	2	5
Thoſe of four carats	——	3	10
Thoſe of five carats	——	4	10
Thoſe of ſix carats	——	7	10
Thoſe of ſeven carats	——	15	0
Thoſe of eight carats	——	19	0
Thoſe of nine carats	——	23	0
Thoſe of ten carats	——	33	0

Emerald, *counterfeit*. The manner of making *counterfeit emeralds* in paſte is this: take cryſtal prepared, two ounces; common minium, or red-lead, four ounces; mix theſe well together, then add of good verdegris two penny-weights, and crocus martis made with vinegar, eight grains. Mix all theſe well together, and ſet the whole in the hotteſt part of a potter's furnace, as long as the fire laſts. It muſt be put into a ſtrong crucible, and covered with a lute. When it is cold take off the lute, and, if it is baked enough, it will be clear to the bottom; otherwiſe relute the pot, and put it into the furnace again. Twenty-four hours commonly is ſufficient for making this; ſometimes it requires a little more. The paſte, thus made, is harder than ordinary, and is of a fine colour, and capable of a good poliſh. Neri's Art of Glaſs, p. 128.

If the paſte be deſired of a very deep *emerald* colour, take prepared cryſtal, one ounce; red-lead, ſix ounces and a half; of verdegris, three penny-weights and thirteen grains; and of crocus martis, made with vinegar, ten grains. This requires a longer baking than the other, and is leſs hard, though of a deeper colour.

The proportions of theſe ingredients may be varied at pleaſure, and the colour be made of all degrees of deepneſs; but the more lead is added, the more baking is required, and, after all, the paſte will be ſo much the ſofter.

Emerald-*colour*, in the *Glaſs Trade*. The way of giving this beautiful dye to glaſs is this: in the pots of melted metal, made of polverine, and without mangane ſe, when the matter is well purified, put a little crocus martis calcined with vinegar. About three ounces of this crocus is enough for a hundred weight of glaſs; let it ſtand till thoroughly mixed, then put into every hundred weight of metal two pound of calcined braſs; this muſt be added at ſix different times, letting the metal ſtand two hours every time. When this is all in, make a proof of the metal; and if it has any bluiſhneſs, add more crocus martis, a ſmall quantity at a time. When the whole is of a fine leek green, let it ſtand twenty-four hours to mix thoroughly, and then work it. Neri's Art of Glaſs, p. 51.

EMERALD, or **EMERAUD**, in *Heraldry*, is uſed in lieu of vert, or green, in blazoning the arms of dukes, earls, &c.

EMERGENT *year*, in *Chronology*, is the epocha, or date, whence we begin to account our time.

Our *emergent year* is ſometimes the year of the creation; the Jews uſe that of the deluge, or the Exodus, &c. The *emergent year* of the Greeks was the eſtabliſhment, or at leaſt reſtoration, of the Olympic games by Iphitus. The Romans accounted their years from the building of the city, AB U. C. that is, AB URBE CONDITA. See EPOCHA.

EMERSION, in *Phyſics*, the riſing of any ſolid above the ſurface of a fluid ſpecifically heavier than itſelf, into which it had been violently immerged, or thruſt.

It is one of the known laws of hydroſtatics, that a lighter ſolid, being forced down into a heavier fluid, immediately endeavours to emerge; and that with a force, or moment, equal to the exceſs of a weight of a quantity of the fluid above that of an equal bulk of the ſolid.

Thus, if a ſolid be immerged in a fluid of double its ſpecific gravity, it will emerge again, till half its bulk, or body, be above the ſurface of the fluid.

EMERSION, in *Aſtronomy*, is when the ſun, moon, or other planet, begins to re-appear, after its having been eclipſed, or hid by the interpoſition of the moon, earth, or other body.

The difference of longitude is ſometimes found by obſerving the immerſions and *emerſions* of the firſt of Jupiter's ſatellites.

The immerſions are obſerved from the time of Jupiter's being in conjunction with the ſun, to his oppoſition; and the *emerſion*, from the oppoſition to the conjunction; which two intervals are uſually ſix months a-piece, and divide the year between them.

But when Jupiter is in conjunction with the ſun, and fifteen days before and afterwards, there is nothing to be obſerved; the planet, with his ſatellites, being then loſt in the light of the ſun.

EMERSION is alſo uſed when a ſtar, before hid by the ſun, as being too near him, begins to re-appear, and to get out of his rays.

EMERSION, *ſcruples*, or *minutes of*, an arch of the moon's orbit, as TQ (*Tab. Aſtron. fig.* 46.), which the moon's center paſſes over, from the time ſhe begins to emerge out of the ſhadow of the earth to the end of the eclipſe.

EMERUS, in *Botany*. See *Scorpion* SENA.

EMERY, a ſort of metallic ſtone, found in ſeveral mines of metals; but chiefly in thoſe of iron, being properly an iron ore.

The word comes from the French *emeril*; formed from the Latin *ſmyris*, and that from the Greek σμυρις, which ſignifies the ſame thing; and which Lemery derives from the verb σμαω, *I clean*, *ſcour*.

We uſually diſtinguiſh three kinds of *emery*; the Spaniſh, *red*, and *common emery*. The firſt is found in the gold-mines of Peru, and other provinces of the Spaniſh America; it is judged a kind of ore of that rich metal; being ſtreaked with little veins, and ſpecks of gold. It is for this reaſon the king of Spain prohibits its being exported, which renders it exceeding rare among us; to the great regret of the ſeekers of the philoſophers ſtone, who have formed great hopes from the tranſmutation of this precious metal. The Spaniſh *emery* ſeems to be no other than the metal now called PLATINA; and the European *emeries* may probably participate of the ſame metal. The *red emery* is found in copper-mines; the little we have of it comes from Sweden and Denmark.

The *common emery* is taken out of iron mines; and is almoſt the only ſort uſed among us. The conſumption hereof is very conſiderable among the armourers, cutlers, lockſmiths, glaziers, lapidaries, maſons, &c. ſome of whom uſe it to poliſh and burniſh iron, and ſteel works; others, to cut and ſcollop glaſs, marble, and precious ſtones.

This *emery* is of a browniſh colour, ſometimes bordering a little on red; exceedingly hard, and of conſequence difficult to pulverize. The Engliſh are the only people that have acquired the art of making it into powder; which they do chiefly by means of certain mills contrived for that purpoſe; and thus ſend it in powder to their neighbours.

Pounding it in mortars were in vain; it being ſo hard, that it would pierce or break the mortar, before it would break itſelf.

Of the powder, the moſt ſubtile and impalpable is the beſt; as to the ſtone, it ſhould be choſen of a high colour, and as free of the rock as poſſible.

Emery fuſed with lead, and iron, hardens them. It is alſo ſaid to increaſe and heighten the weight and colour of gold. It is uſual to mix a little of it with the gold from Madagaſcar, which is naturally pale and ſoft. See GOLD.

Emery is ſaid to have a corroding and almoſt cauſtic quality; but this is without any juſt foundation. It is recommended by the ancients as an aſtringent and dentrifice. In this laſt intention, however, it muſt be uſed with great caution, as its hardneſs and ſharpneſs are ſuch, that it will be apt to wear off the enamel of the teeth.

EMERY, *putty of*, is a kind of a dirty matter, found on the lapidaries wheels; containing part of the powder of *emery* which they uſe.

EMETIC, from εμεω, *I vomit*, in *Medicine*, a remedy that excites vomiting; or that purges the ſtomach by the mouth.

Of theſe there is a great variety; as *ipecacuanha*, *carduus benedictus*, &c. The uſe of *emetics* is indicated by a foulneſs of the mouth in a morning, reaching, loathing, gnawing of the ſtomach, gradual loſs of appetite, ſpontaneous vomiting, &c.

Vomiting is raiſed by irritating the ſpirits with the preſence of ſomething loathed; by an unuſual agitation, as falling, &c. by tickling the fibres of the fauces and pharynx with a feather dipped in oil; by drinking quantities of warm water, &c. by any thing ſharp and viſcous; as the flowers and ſeeds of dill, leaves of groundſel, &c. crocus, and glaſs of antimony; the flowers and regulus thereof; mercurius vitæ, mineral turbith, and mercury ſharpened any way with acids.

The ancient phyſicians were very fond of *emetics*, as preſervatives againſt diſeaſes; and Hippocrates, in particular, has recommended the giving them twice a month, during winter, and in the ſpring. His *emetics* were very eaſy, ſimple, and gentle ones. One very common preſcription, to this purpoſe, was a decoction of hyſſop, with an addition of ſo much vinegar and ſalt as would make the patient nauſeate it. This was to be taken by ſtrong and robuſt people, in the morning, faſting, and, by the more weakly, after dinner or ſupper. Diodorus Siculus has aſſured us, that the great practice of the ancient Egyptian phyſicians conſiſted in glyſters, vomits, and abſtinence. Aſclepiades, who was a great enemy to purges, yet often ordered his patients gentle vomits after ſupper.

The *emetic* medicines are of two very different kinds, ſome being naturally mild and gentle, others harſh and rough; of the former kind, warm water with butter, or the water of the naturally warm mineral ſprings, are often capable of doing very great ſervice. The medicine of moſt general uſe at preſent, ipecacuanha, ſeems of a happy middle nature between theſe and the more rough ones, of which the vegetable kingdom afford us a great number, as aſarabacca, white hellebore, gamboge, and all the purges in too large doſes. The mineral world, however, affords much more numerous and more violent ones; ſuch are all the preparations of copper, and of the vitriols, the antimonial vomits, and the mercurial ones. The ancients, in violent diſeaſes, ſuch as madneſs, epilepſies, and ſome other diſorders, not attended with a fever, gave the white hellebore root as an *emetic*, with great ſucceſs; but we now uſe remedies leſs dangerous, as death has been ſometimes known to have been the effect of this medicine. Our ipecacuanha is a celebrated remedy for fluxes; nor is the obſervation new, that vomits are the greateſt of all remedies in theſe caſes. Celſus, lib. i. cap. 3. affirms, that vomits in general ſtop fluxes, yet always keep the body open. The country people, with us, frequently uſe aſarabacca as a ſuccedaneum for the ipecacuanha. It is rougher, indeed, than that medicine, but, if taken in decoction, the boiling carries off its acrid and too pungent quality, and it retains its *emetic* power in a more gentle degree, and, with it, has a balſamic and corroborating virtue, and has been known to cure inveterate quartans, and to do great ſervice in jaundices and dropſies. Among the antimonial vomits, the beſt is the *emetic* tartar, prepared from the crocus metallorum, not from the glaſs of antimony, for that makes it doubly rough and harſh in its operation. Three or four grains of this alone, or yet leſs of it, mixed with ipecacuanha, are often given with great ſucceſs; and when the intention is to purge and vomit at the ſame time, then three grains of this *emetic* tartar, added to a ſolution of manna, prove an excellent medicine. In aſthmatic and pituitous caſes, the oxymel of ſquills is a very efficacious and perfectly ſafe medicine; but all the preparations of copper, and the rougher antimonial vomits, are to be rejected, as being very dangerous and very uncertain, working either too little, or greatly too much, according to the ſtate of the humours in the ſtomach. The ſtronger *emetics* before mentioned, as ſafe ones, are often neceſſary in caſes of poiſon, eſpecially of the narcotic kind, and the infectious particles received from the effluvia of perſons in contagious diſeaſes, which being ſwallowed into the ſtomach with the ſpittle, would otherwiſe infallibly create the ſame diſeaſe. In diſorders ariſing from a vitiated or thick bile, formed, as it were, into a kind of viſcid coagulum, and ſtopping up the biliary ducts, as is the caſe in jaundices, and ſome other complaints, *emetics* are frequently uſed with great ſucceſs, after all the common methods have failed. In anaſarcas alſo, and leucophlegmaſies, and œdematous ſwellings of the parts, and in a curable aſcites, *emetics*, exhibited in large doſes, uſually carry off by ſtool, though rarely by vomit, the aqueous ſerum from the liver, and the ducts and glands of the inteſtines, meſentery, and pancreas; nor are theſe the only caſes in which *emetics*, properly adminiſtered, are capable of doing very ſingular ſervice; but there ſtill requires great care and caution in giving them, as it is an infallible rule, that the medicine which can do great good, may alſo do great harm. Hoffm. Medic. Rational. Syſtem.

It is proper, in order to make *emetics* work the more eaſily, always to give them in a liquid form, or in a ſufficient quantity of ſome moiſtening, relaxing, and fatty vehicle; for vomiting not only requires a ſtrong contraction of the pylorus, and bottom of the ſtomach, but alſo a relaxation of the ſuperior orifice of the œſophagus. During the operation of *emetics*, and after it is over, the patient muſt be carefully guarded againſt the cold, and abſtain from all cold liquors, from all hot or ſtimulating medicines, and from all violent emotions of the mind; and about four hours after the operation of a vomit is over, it is extremely proper to drink half a pint of aſſes milk, if it can be readily had.

Whenever bleeding and vomiting are both neceſſary, bleeding ſhould always be done firſt.

The ancients, in general, have recommended the giving vomits in tertians and quartans, before the acceſs of the fit; and Alexander Trallian has been very earneſt in recommending them on this occaſion. The practice is highly conſonant with reaſon, and all the known rules, and may be of great advantage, not only in theſe, but in many other caſes, in which it is not at preſent thought of.

Dr. Harris has obſerved of the antimonial vomits, that they are very ſafe in the heat of ſummer, but very dangerous in colder ſeaſons. This author alſo recommends a decoction of the herb digitalis, or fox-glove, as a very ſafe, though powerful *emetic*; and there is an account of another plant, uſually eſteemed of the dangerous kind, that is, the common creeping meadow-crowfoot, from which a very ſafe and efficacious *emetic* is to be prepared, that has been adminiſtered in many parts of England with great ſucceſs. The method of preparing it is only by diſtilling, in the common way, a ſimple water from the plant; this is very acrid and pungent to the taſte, and requires to be lowered, either by drawing a very large quantity from a little of the herb, or elſe by mixing common water with it. The method of giving it is this: let the patient drink about a quart of warm water, then give an ounce of this diſtilled water, and the whole will be immediately brought up with great eaſe; and the whole operation is then over for that doſe, and the water and medicine are again to be repeated as often as is judged neceſſary. Harris's Diſſertation.

If vomits operate too violently, common ſalt is a well known remedy. This ſeldom fails to check or ſtop them. Mild aromatics and opiates alſo have the ſame effect; and corroborating medicines, either taken internally, or applied by way of cataplaſm, or embrocation, to the region of the ſtomach.

Dr. Shaw thinks, the moſt ſafe, gentle, and agreeable *emetic* yet known, is an infuſion of the ipecacuanha-root in white wine, without heat. This is made by putting two drams of the root, in fine powder, into half a pint of white Liſbon wine, and, after ſtanding two days, adding a freſh quantity of wine to the remaining powder, when this is poured clear off. Theſe wines are to be mixed together, and given in a doſe ſuited to the ſtrength of the patient. This is greatly preferable to the vinum benedictum, *emetic* tartar, and all the medicines of a like kind, which are attended with danger and uncertainty in their operation; and while we have this, there is no reaſon why all the violent *emetics* ſhould not be wholly diſcarded from the practice of phyſic. Shaw's Lectures, p. 221.

The EMETIC *wine*, *vinum* EMETICUM, is only white-wine, wherein is infuſed ſome crocus metallorum, or glaſs of antimony.

Small doſes of *emetic* wine have been recommended as deobſtruent and ſudorific in ſlow fevers, in many chronical diſeaſes, and eſpecially in an obſtinate rheumatiſm. See Medic. Eſſ. Edinb. abr. vol. i. p. 170. and Huxham, Obſ. de Aere & Morb. epidem.

The EMETIC *powder*, called alſo *powder of Algaroth*, from the name of its author, is a precipitate of antimony; or butter of antimony ſweetened and ſoftened by repeated lotions.

EMETIC *tartar* is prepared from equal parts of crocus metallorum, and cream of tartar, boiled together in water, afterwards filtrated and cryſtallized. See CRYSTAL.

The operation of *emetic* medicines is thus accounted for by Dr. Quincy: the particles of the *emetic*, wedging themſelves into the orifices of the emiſſaries of the glands, placed adjacent to the ſurface of the ſtomach, do dilate the ſame (which by ſome extrinſic cauſe had been contracted); and after the ſame manner do diſſolve (at leaſt in ſome degree) the coheſion of the ſtagnant morbific matter; rendering it more fluid, and conſequently making its reſiſtance leſs.

Now the natural and conſtant action of the glands being ſecretion, and the impediment (by the dilatation of the orifice, and the attenuation of the fluid) being taken away, or at leaſt made leſs than the natural momentum of the glands; the matter muſt naturally flow into the cavity of the ſtomach, till it be heaped up in ſuch quantity (which not being to be done in an inſtant, muſt require ſome time) as is ſufficient, by its ſtimulus, to vellicate and force the fibres of the ſtomach, abdomen, and diaphragm, by communication of the firſt with the two laſt, into a violent contraction, and thereby throw all out by the œſophagus; and this makes all quiet for a time, till a new and ſufficient quantity be excerned from theſe glands to produce the aforeſaid contraction.

Thus there happen fits of vomiting and quiet alternately, till either all the morbific matter be thrown out, or the force of the *emetic* be ſo diluted, that it is no longer able to draw out the morbific matter from the glands.

And the ſtrong contraction in ſo many muſcles, and muſcular canals, as are at work in the action of vomiting, and the violent concuſſion which is produced all over the whole body by a power, which, by juſt computation, is not inferior to 26,000lb. weight, may, and often does, take away the obſtruction in many other canals, beſides thoſe which are adjacent to the ſtomach and gullet; as we plainly ſee, by thoſe vaſt ſweats, which urgent fits of vomiting occaſion.

Emetic and purgative medicines differ only in this, that the particles of the latter do not immediately vellicate the fibres of the ſtomach, dilate the orifices, and attenuate the matter contained in the glands of the ſtomach; but act gently, and aſſiſt the natural motion of digeſtion, and ſo are carried down into the guts; and how they operate there, ſee PURGATIVE.

EMEU, in *Zoology*, the common name of the CASSOWARY, a large bird of the oſtrich kind.

EMINENCE, in *Geography*, a little hillock, or aſcent, above the level of the adjoining champaign.

EMINENCE is alſo a title of honour given to cardinals.

The decree of the pope, whereby it was appointed, that the cardinals ſhould be addreſſed under the quality of *eminence*, bears date the tenth of January, 1630. They then laid aſide the titles of *illuſtriſſimi*, and *reverendiſſimi*, which they had borne before.

The grand maſter of Malta is likewiſe addreſſed under the quality of *eminence*.

The popes John VIII. and Gregory VII. gave the ſame title to the kings of France. The emperors have likewiſe borne it.

Eminentiſſimus, the ſuperlative of *eminent*, has of late been attributed to the cardinals.

EMINENTIAL *equation* is uſed by ſome algebraiſts in the inveſtigation of the areas of curvilinear figures; for a ſort of artificial equation, containing another equation *eminently*. Hayes, Flux. p. 97.

EMINENTLY, EMINENTER, in the *Schools*, is uſed in contradiſtinction to *formally*, and in the ſame ſenſe with *virtually*, viz. to denote that a thing poſſeſſes, or contains, any other in a more perfect or higher manner than is required to a formal poſſeſſion thereof.

Thus an angel is ſaid to have prudence *eminently*; as he has it in a higher and more perfect degree than it is in man, in whom it is formally.

For one thing to contain another *eminently*, there are uſually required two conditions. 1. That the containing be of a more excellent nature than the contained. 2. That the leſs excellent be ſome way contained in the more excellent; viz. either as in its productive cauſe, or by ſome ſimilitude, or as to the manner and order of acting, &c.

EMIR, a title of dignity, or quality, among the Turks and Saracens, attributed to ſuch as are relations or deſcendants of their great prophet Mahomet.

The word is Arabic, and literally ſignifies *prince*. It is formed of the verb אמר, *amar*, which is originally

Hebrew; and in both theſe languages ſignifies *to ſay*, and *to command.*

The *emirs* are held in high veneration, and have alone the privilege of wearing a green turban. On the borders of the Holy Land, there are ſeveral *emirs* ſovereign princes; as the *emir* of Gaza, and the *emir* of Terabea, over whom the grand ſeignior has but little authority.

The title *emir*, at firſt, was only given to the caliphs: in Perſia they were alſo called *emir zadeh*, q. d. prince's ſon; whence, by abbreviation of *emir*, they formed *mir*; and of *emir zadeh*, *mirza*. In after-times, when the caliphs had aſſumed the title of ſultans, that of *emir* remained to their children, as that of Cæſar did among the Romans.

At length, the ſame title of *emir* came to be attributed to all who were judged to deſcend from Mahomet by his daughter Fatimah, and who wear the green turban.

Emir, is alſo a title, which, being joined to ſome other word, frequently denotes an office or employ; as, the *emir al omera*, *commander of commanders*, who, in the time of the caliphs, was chief of the councils and armies.

The appellation *emir* is alſo applied by the Turks, to all viziers and baſhaws, or governors of provinces. See Bashaw, &c. Add, that *emir akhor*, vulgarly *imrahor*, is maſter of the horſe to the grand ſeignior.

Emir alem, vulgarly *miralem*, ſtandard-bearer and director of all the ſtandards of the empire.

Emir bazar, the provoſt, or ſuperintendent of the markets, who regulates the prices of proviſions.

The *emir hagge*, or prince conductor of the pilgrims of Egypt to Mecca, is baſhaw of Jeruſalem, and is named yearly from Conſtantinople, though he is generally left two years in his office, to make amends for his great expence in equipage in the firſt; and ſometimes, if he has capacity and intereſt at the porte, he is continued ſix years, but rarely longer; for if they conduct the caravan ſeven years, the grand ſeignior preſents them with a collar of gold; and it is ſaid, that their perſons, after this, become ſacred, and they cannot be publicly cut off. This officer has command over the eſtates that go to Mecca. The perquiſites of his office, beſide what he is allowed by the porte, conſiſt in having a tenth of the effects of all the pilgrims who die in the journey. Pocock's Egypt, p. 165.

Emir al moſlemin, or *emir al moumenin*, i. e. commander of the faithful, or the believers, was a title aſſumed by the Almoravides and Almohades, who reigned in Africa and Spain.

EMISSARIUM, in *Antiquity*, a ſluice, or drain, to draw off the water uſed in watering gardens, fields, &c.

EMISSARY, formed of *e* and *mitto*, q. d. *I ſend out*, a truſty, dextrous, able perſon, ſent ſecretly, to ſound the ſentiments and views of another, to make him ſome propoſal or overture; or to ſpread reports, watch the actions, motions, and countenance, of a contrary party or perſon, in order to make advantages of them all. See Spy.

The leaders of parties have abundance of emiſſaries employed in their ſervice, who inform them of what paſſes everywhere, that they may take their meaſures accordingly.

Emissary *of a gland*, the ſame with *excretory duct*, being the common canal, or pelvis, in which all the little ſecretory tubes of a gland terminate.

EMISSION, the act of throwing, or driving a thing, particularly a fluid, from within, outwards. The ancients took viſion to be performed by the *emiſſion* of viſual rays from the eye.

But the term *emiſſion* is chiefly applied among us, to the expulſion or Ejaculation of the ſeed.

EMITES, in *Natural Hiſtory*, the name uſed by ſome authors for the chermites, a beautiful ſpecies of white marble, of which the tomb of Darius, and many other of the great works of antiquity, were made. It was valued for its fine poliſh.

EMMELIA, Εμμέλεια, in *Antiquity*, a dance peculiar to tragedy, which had all the gravity and dignity that were ſuitable to the action then repreſenting, and was deſigned to inſpire the audience with ſentiments of compaſſion and benevolence for the unfortunate and oppreſſed, with indignation againſt the guilty, and with the love of virtue, and abhorrence of vice.

The movements of ſuch a dance as this muſt have been very ſolemn and majeſtic, and have bore a great affinity to the action of an orator; it was the only one, excepting the military dances, that had the approbation of Plato. Mem. Acad. Inſcript. vol. ii. p. 160. See Dance.

EMMENAGOGUES, Εμμηναγωγα, in *Medicine*, ſuch remedies as promote the menſes.

They are thus called from εν, *in*, μην, *month*, αγω, *duco*, *I lead*, becauſe their natural periods of flowing are once a month.

Emmenagogues either act by giving a greater force to the blood in its circulation, whereby its momentum againſt the veſſels is increaſed; or by making it thinner, whereby it will more eaſily paſs through any outlets.

The former intention is helped by chalybeats, which give a greater weight and momentum to a languid heavy blood, and all other ſubſtances of the like gravity and elaſticity; and ſuch is the caſe of a leuco-phlegmatic habit, or, as it is commonly called, the green-ſickneſs, and its cure.

But in the latter caſe, where the blood is florid, and too high, attenuating alteratives and detergents are the only remedies, becauſe fitteſt to render the blood more thin, and to give it ſuch a property, as will better carry it through thoſe little apertures deſtined for its diſcharge into the uterus.

EMMIELLURE, in the *Manege*, a kind of compoſition of honey, and other ingredients, uſed for ſprains and ſhoulder-ſplaits of horſes. See Charge.

The word is French, derived from *miel*, *honey*, which is a part of the compoſition.

EMODIA, Αιμωδια, of αιμα, *blood*, and οδȣς, *tooth*, in *Medicine*, a word uſed by ſome authors to expreſs a ſtupor of the teeth.

EMOLLIENTS, in *Medicine* and *Pharmacy*, remedies uſed to ſoften and looſen indurations or conſtrictions of the belly, or thoſe of tumours and ſwellings: ſuch are mallows, mercurials, lily-roots, linſeed, butter, wax, gum ammoniac, &c.

The term *emollient* is applied to external as well as internal remedies. We ſay, a laxative, anodyne, and *emollient* clyſter; an *emollient* emplaſter, an *emollient* cataplaſm, &c. Freſh cherries are an *emollient* food, though when dry, they rather conſtringe than relax, as wanting a great part of the phlegm which rendered them *emollient*. Ripe grapes, from being aſtringent, which they were before, become laxative and *emollient*. Hogs lard, applied externally, is reſolutive and *emollient*.

Quincy defines *emollients* to be ſuch things as ſheathe and ſoften the aſperities of the humours, and relax and ſupple the ſolids at the ſame time; for it is eaſy to conceive how theſe ſhould be both effected by the ſame medicine thus: by what means ſoever (whether in the ſtomach, or any other parts) the juices have obtained a ſharpneſs or aſperity, ſo as to vellicate and render uneaſy the fibres and nervous parts, which often happens; thoſe things which are ſmooth, ſoft, and yielding, cannot but wrap up their points, and render them imperceptible, whereby they may gradually, by the proper courſe of circulation, be brought to ſome convenient emunctory, without doing any injury by the way.

Such ſharpneſs of parts, likewiſe, draws the fibres into ſpaſms, keeps them too tenſe, and frequently thereby occaſions obſtructions of the worſt kind.

In all ſuch caſes, therefore, *emollients* lubricate and moiſten the fibres, ſo as to relax them into their proper dimenſions; whereupon, ſuch diſorders ceaſe.

EMOLUMENT, is properly applied to the profits ariſing daily from an office or employ.

The word is formed of the Latin, *emolumentum*, which, according to ſome, primarily ſignifies the profits redounding to the miller from his mill; of *molo*, *molere*, *to grind.*

The patent, or other inſtrument, whereby a perſon is preferred to an office, gives him a right to enjoy all the dues, honours, profits, and *emoluments*, belonging thereto.

In our law books, *emolument* is uſed in a ſomewhat greater latitude, for profit, or advantage, in the general.

EMPALEMENT, or Impalement, a cruel kind of puniſhment, whereby a ſharp pale or ſtake, is thruſt up the fundament, and through the body.

The word comes from the French, *empaler*, or the Italian, *impalare*; or rather, they are all alike derived from the Latin, *palus*, *a ſtake*, and the prepoſition *in*, *in*, *into.*

We find mention of *empaling* in Juvenal. It was frequently practiſed in the time of Nero, and continues to be ſo in Turkey.

Empalement, in *Botany*, denotes the cup, or outmoſt part of the flower of a plant, or that incompaſſing the foliation of the attire.

It is compounded of the three general parts of all plants, the ſkin, the cortical, and the woody bodies; each empaler being (whether conſiſting of one or more pieces) as another leaf, and deſigned to be a guard and a band to the flower, where it is weak and tender; ſo that ſuch plants as have flowers, with a firm and ſtrong baſis, as tulips, &c. have no *empalement*, nor need any. See Calyx.

EMPANELLING, or Impanelling, in *Law*, ſignifies the writing and entering into a parchment ſchedule, or roll of paper, by the ſheriff, the names of a jury ſummoned by him to appear for the performance of ſuch public ſervice as juries are employed in.

EMPARLANCE, or IMPARLANCE, in *Law*, a deſire, or petition in court, of a day to conſider, or adviſe, what anſwer the defendant ſhall make to the action of the plaintiff.

The civilians call it *petitio induciarum.* Kitchin mentions *emparlance general*, and *ſpecial*; the firſt ſeems to be only that made in one word, or in general terms; *emparlance ſpecial*, is where the party requires a day to deliberate, adding theſe words, *Salvis omnibus advantagiis tam ad juriſdictionem curiæ, quam ad breve & narrationem.*

Briton alſo uſes *emparlance* for the conference of a jury upon a cauſe committed to them.

EMPASMA, Εμπασμα, from εμπασσω, *I ſprinkle*, in *Pharmacy*, a powder thrown or ſprinkled over the body, to correct ſome ill ſmell thereof, or to prevent unneceſſary ſweats.

EMPASTING, or IMPASTING, a term uſed in *Painting*, for the laying on of colours thick and bold, or applying ſeveral lays of colours, ſo that they may appear thick. See COLOURING.

It is formed of the *French*, *empaſter*, which has the ſame ſignification of *paſte*, or *pâte*, *paſte.*

A painting is ſaid to be well empaſted with colours, when the colours are beſtowed plentifully, or it is well ſoaked, and ſaturated with colours.

The term is alſo uſed when the colours are laid diſtinct, and aſunder, and not ſoftened or loſt in each other: e. g. this head is not painted, it is only empaſted.

EMPATTEMENT, French, from *empater*, *to thicken*, in *Fortification*, a term uſed by ſome to denote the ſame with TALUS.

EMPRESS, EMPRESS, *Imperatix*, the feminine of emperor, applied either to an emperor's wife, or to a woman who rules ſingly over an empire, with all the authority of an emperor; as the *empreſs* of Ruſſia. See EMPEROR, QUEEN, &c.

EMPRESS, is alſo uſed in the *Ancient French Poetry*, for a particular kind of rhime, thus denominated by way of excellence.

The *rhime emperiere* was a ſort of crowned rhime, wherein the ſyllable that made the rhime was immediately preceded by two other like ſyllables of the ſame termination, which made a kind of echo, called the *triple crown*; and which, to the ſhame of the nation (as ſome of their late authors expreſs it) their beſt ancient poets took for a wonderful beauty and excellence.

Fa. Mourgues, in his treatiſe of French poetry, gives us an inſtance very proper to raiſe contempt of the miſerable taſte of that age, which knew no way of expreſſing that the world is impure, and ſubject to change, ſo excellent, as by ſaying,

Qu'es tu qu'un immonde, monde, onde.

EMPERICHORESIS, ſee CIRCUMINCESSION.

EMPEROR, *imperator*, among the *Ancient Romans*, ſignified a general of an army, who, for ſome extraordinary ſucceſs, had been complimented with this appellation. Thus Auguſtus, having obtained no leſs than twenty famous victories, was as often ſaluted with the title *emperor*; and Titus was denominated *emperor* by his army, after the reduction of Jeruſalem.

Afterwards, it came to denominate an abſolute monarch, or a ſupreme commander of an empire; a Roman *emperor*, &c. In this ſenſe Julius Cæſar was called *emperor*, and the title deſcended with the dignity to Octavius Auguſtus, Tiberius, and Caligula; and afterwards it became elective.

In ſtrictneſs, the title *emperor* does not, and cannot add any thing to the rights of ſovereignty; its effect is only to give precedence and pre-eminence above other ſovereigns; and as ſuch, it raiſes thoſe inveſted with it to the ſummit of all human greatneſs.

The *emperors*, however, pretend, that the imperial dignity is more eminent than the regal; but the foundation of ſuch prerogative does not appear: it is certain, the greateſt, moſt ancient, and abſolute monarchs, as thoſe of Babylon, Perſia, Aſſyria, Egypt, Macedonia, &c. were called by the name of *kings*, in all languages, both ancient and modern. See KING.

It is diſputed, whether or not *emperors* have the power of diſpoſing of the regal title. It is true, they have ſometimes taken upon them to erect kingdoms; and thus it is that Bohemia and Poland are ſaid to have been raiſed to the dignity; thus alſo, the *emperor* Charles the Bald, in the year 877, gave Provence to Boſon, putting the diadem on his head, and decreeing him to be called *king*, *Ut more priſcorum imperatorum regibus videretur dominari.*

Add, that the *emperor* Leopold erected the ducal Pruſſia into a kingdom, in favour of the elector of Brandenburg; and though ſeveral of the kings of Europe refuſed for ſome time to acknowledge him in that capacity, yet by the treaty of Utrecht, in 1712, they all came in.

In the Eaſt, the title and quality of *emperor* are more frequent than they are among us; thus, the ſovereign princes of China, Japan, Mogul, Perſia, &c. are all *emperors* of China, Japan, &c.

In the year 1723, the czar of Muſcovy aſſumed the title of *emperor of all Ruſſia*, and procured himſelf to be recognized as ſuch by moſt of the princes and ſtates of Europe.

In the Weſt, the title has been a long time reſtrained to the *emperors* of Germany. The firſt who bore it was Charlemagne, who had the title *emperor* conferred on him by pope Leo III. though he had all the power before. The imperial prerogatives were formerly much more extenſive than they are at preſent. At the cloſe of the Saxon race, A. D. 1024, they exerciſed the right of conferring all the eccleſiaſtical benefices in Germany; of receiving the revenues of them during a vacancy; of ſucceeding to the effects of inteſtate eccleſiaſtics; of confirming or annulling the elections of the popes; of aſſembling councils, and of appointing them to decide concerning the affairs of the church; of conferring the title of king on their vaſſals; of granting vacant fiefs; of receiving the revenues of the empire; of governing Italy as its proper ſovereigns; of erecting free cities, and eſtabliſhing fairs in them; of aſſembling the diets of the empire, and fixing the time of their duration; of coining money, and conferring the ſame privilege on the ſtates of the empire; and of adminiſtering both high and low juſtice within the territories of the different ſtates: but in the year 1437, they were reduced to the right of conferring all dignities and titles, except the privilege of being a ſtate of the empire; of *preces primariæ*, or of appointing once during their reign a dignitary in each chapter, or religious houſe; of granting diſpenſations with reſpect to the age of majority; of erecting cities, and conferring the privilege of coining money; of calling the meetings of the diet, and preſiding in them. Pfeffel Abregé de l'Hiſtoire d'Allem. p. 160 & 507.

To which ſome have added, 1. That all the princes and ſtates of Germany are obliged to do them homage, and ſwear fidelity to them. 2. That they, or their generals, have a right to command the forces of all the princes of the empire, when united together. 3. That they receive a kind of tribute from all the princes and ſtates of the empire, for carrying on a war which concerns the whole empire, which is called the *Roman month.* For the reſt, there is not a foot of land, or territory, annexed to his title: but ever ſince the reign of Charles IV. the *emperors* have depended entirely on their hereditary dominions as the only ſource of their power, and even of their ſubſiſtence. See DIET and ELECTORS.

The kings of France were anciently alſo called *emperors*, at the time when they reigned with their ſons, whom they aſſociated to the crown; thus, Hugh Capet, having aſſociated his ſon Robert, took the title of *emperor*, and Robert that of king; under which titles they are mentioned in the Hiſtory of the Council of Rheims, by Gerbert, &c. King Robert is alſo called *emperor* of the French, by Helgau of Fleury. Louis le Gros, upon aſſociating his ſon, did the ſame. In the Firſt Regiſter of the King's Charters, fol. 166, are found letters of Louis le Gros, dated in 1116, in favour of Raymond, biſhop of Maguelonne, wherein he ſtyles himſelf, *Ludovicus, Dei ordinante providentia, Francorum imperator Auguſtus.*

The kings of England had likewiſe anciently the title of *emperors*, as appears from a charter of king Edgar: *Ego Edgarus Anglorum baſileus, omniumque regum inſularum oceani quæ Britanniam circumjacent*, &c. *imperator & dominus.*

Add, that we ſay the king of England, *Omnem habet poteſtatem in regno ſuo quam imperator vendicat in imperio*; whence the crown of England has been long ago declared in parliament to be an imperial crown.

EMPEROR, among *Hebrew Grammarians*, is an appellation given to a ſpecies of accents, ſerving to terminate a ſenſe completely, and anſwers to our point. See ACCENT.

EMPEROR *elect*, ſee ELECT.

EMPETRON, in *Botany*, a name by which ſome authors, as Dodonæus, &c. have called the kali or glaſs-wort. Ger. Emac. Ind. 2. See KALI.

EMPETRUM, in *Botany*, ſee *Berry-bearing* HEATH.

EMPETRUM, is alſo a name uſed by ſome authors for the alypum, commonly called herb-terrible.

EMPHASIS, in *Rhetoric*, a force, ſtreſs, or energy, in expreſſion, action, geſture, or the like, which performs the ſame office in ſentences as the accent does in words. The word is Greek, εμφασις, which ſignifies the ſame. See ENERGY.

Some conſider *emphaſis* as a figure, whereby a thing is repreſented in the fineſt and ſtrongeſt terms; ſuch, e. gr is that of Auguſtus, *Forum aleatorium calefecimus*; which is much more energetical, than if he had ſaid, *Studioſe multumque luſimus alea.*

The neceſſity of obſerving propriety of *emphaſis* is ſo great, that the true meaning of words cannot be conveyed without it.

Emphaſis is of two kinds, ſimple, or complex. The former ſerves to point out the plain meaning of any propoſition; the latter alſo marks ſome affection or emotion of the mind, by the uſe of which a diſcourſe receives life and ſpirit, and is rendered capable of producing the nobleſt effects. See Sheridan's Lectures on Elocution, lect. 11.

EMPHATICAL, is uſed by the *Ancient Philoſophers*, to expreſs thoſe apparent colours which are often ſeen in clouds before the riſing, or after the ſetting of the ſun; or thoſe in the rainbow, &c.

Theſe, becauſe they are not permanent and laſting, they will not allow to be true colours; but, ſince theſe *emphatical* colours are light modified chiefly by refraction, and with a concurrence of reflexions, and ſome other accidental variations; and ſince they are the proper objects of ſight, and capable as truly to affect it as other permanent colours are, there is no reaſon for excluding them from the number of true and genuine colours, ſince all other colours are only modifications of light, as theſe are.

EMPHEREPYRA, in *Natural Hiſtory*, a genus of *ſiderochita*, compoſed of various cruſts or coats, ſurrounding a nucleus of the ſame matter and ſtructure with themſelves. See SIDEROCHITA.

Of this genus we have five ſpecies. Hill's Hiſt. Foſſils, p. 532.

EMPHRACTIC, in *Pharmacy*, the ſame with *emplaſtic.*

The word is formed from the Greek, εμφραττω, *I ſtop.*

EMPHRAXIS, in *Medicine*, an obſtruction in any part.

EMPHRUE, in *Botany*, the name given by the people of Guinea to a ſpecies of tree, the leaves of which they boil in wine, and give as a great reſtorative in caſes of weakneſs and decay. Its leaves are exactly of the ſhape of thoſe of the common mulberry, but they are not indented at the edge. Petiver has thence called it *arbor Guineenſis mori folio non crenato.* Philoſ. Tranſ. N° 232.

EMPHYSEMA, Εμφυσημα, from φυσαω, *I inflate*, in *Medicine*, a windy ſwelling, or bloating, of the whole outer habit of the body, like that in the parts of divers animals when blown up, after they are killed.

This word, though appropriated by ſome writers to a ſoft tumour, ariſing from air contained in the cavities of the membrana celluloſa, is uſed by Hippocrates to expreſs an inflation of the belly; and in ſome parts of his writings, in a more general ſenſe, for any tumour.

The wind, or air, which is the matter of the *emphyſema*, is lodged under the cutis, and principally in the cellulæ adipoſæ.

Hence the ſeat of the *emphyſema*, or the place wherein the wind is chiefly lodged, is in the adipoſe cells, under the ſkin covering the thorax. The ordinary occaſion is, ſome wound in the thorax, whereby the pleura is pierced, or the lungs are lacerated. Putridity is alſo a cauſe of this diſorder, as is ſeen in mortifications of the external parts, and in many inſtances of putrid fevers.

Mr. Littre accounts for it thus: when a perſon is wounded in the breaſt, there enters air in at the wound: now, it may happen, either from the narrowneſs of the wound, or the fleſh's cloſing again readily, or ſome other cauſe, that the air thus admitted cannot readily get out again, at leaſt not all of it; and thus air comes to be incloſed in the capacity of the breaſt.

Now, at every inſpiration, the lungs are to fill this capacity, by their ſwelling with the air which is naturally received; but here they cannot ſwell without preſſing upon the other extraneous air: the conſequence of which is, that this latter is made to ſlip between the interſtices of the fleſhy fibres, and perhaps to enter the little oſcula of the minuteſt veins, or lymphatics; immediately, another force comes to take place, contrary to that of inſpiration, viz. expiration: in this, the breaſt contracting itſelf, preſſes the extraneous air ſtill more than the lungs had done in their dilatation; and the two oppoſite moments, or actions, conſpire to the ſame effect.

M. Mery and Dr. Hunter are of opinion, that the air is forced into the cellular membrane only during expiration.

The air, thus continually impelled, will be propagated along the paſſages it firſt opened for itſelf, till at length it meets, and becomes collected in ſome place: now this place muſt be the cellules of the fat, rather than any where elſe, becauſe of the thinneſs and flexibility of their membranes; and as the air came from within the cavity of the breaſt, it will be in the fat that covers the breaſt under the ſkin; rather than elſewhere, that the windy tumor, or *emphyſema*; will lie.

Now, ſuch tumor cannot be very conſiderable, when only formed by the air received in at a wound; but if we ſuppoſe the wound to have pierced the ſubſtance of the lungs; then, beſide the air taken in by the wound, there will be part of that taken by inſpiration; ſo much as was contained in the bronchiæ, or veſiculæ, thus perforated or opened, eſcaping into the cavity of the breaſt, and driven along with the former into the fleſh; and as a freſh quantity of this is ſupplied every moment, there will be a continual acceſſion, ſo long as the wound of the lungs remains open.

Hence, an *emphyſema*, from a wound in the lungs, ſometimes poſſeſſes the whole habit, the air being carried to all the parts of the body.

M. Littre ſuppoſes, that the air of an *emphyſema* from wounded lungs may be partly air taken up by the pulmonary veſſels, and thrown from the arteries into the cellular membrane by a kind of ſecretion; but Dr. Hunter obſerves, that this is in the higheſt degree improbable; and that there is no occaſion for having recourſe to ſuch winding and obſcure paſſages.

When theſe tumours happen in putrid diſorders, fomentations, with equal parts of ſharp vinegar and rectified ſpirit of nitre, may be applied to them; but if they are cauſed by a wound, bleeding is neceſſary, which ſhould be repeated whilſt the breathing is quick and laborious: punctures, or ſmall inciſions may be made into the cellular membrane, or in different parts of the body, with a lancet; by which operation the air will be excluded, if the tumour is gently preſſed. When the air is thus evacuated, a compreſs may be dipped in vinegar, and applied to the part which is ſuppoſed to be wounded: this may be ſecured by a tight bandage, and the patient ordered to lie on the injured ſide, in order to prevent a freſh afflux of air. Internal ſuppurations may be prevented by nitre, and pectoral emulſions. When the air is lodged in the cavity of the breaſt, Mr. Hewſon propoſes to diſcharge it by a ſmall opening made with a knife on the fore-part of the cheſt, between the fifth and ſixth ribs, on the right ſide, becauſe the integuments are thin; or between the ſeventh and eighth, or eighth and ninth ribs, on the left ſide, to avoid wounding the pericardium. Mem. Acad. Sc. 1713. Lond. Med. Obſerv. &c. vol. ii. art. 2. p. 17, &c. and vol. iii. p. 28. 33. 372. 397.

EMPHYTEUSIS, in the *Civil and Canon Law*, the letting out of poor barren lands for ever, or at leaſt for a long term of years, on condition of the tenants cultivating, meliorating, or mending them, and paying a certain yearly conſideration.

The word is formed of the Greek, εμφυτευσις, which ſignifies *an engraftment*, and by metaphor, a *melioration* or *amendment*; for as we only graft trees to mend them, ſo a man only alienates his land by *emphyteuſis*, on condition of having it amended.

Emphyteuſes are a kind of alienations, differing from ſales, in that they only transfer the *dominium utile*, the benefits of the ground, not the property, or fee-ſimple. Among the Romans they were at firſt temporary, afterwards perpetual.

The twentieth canon of the council of Carthage prohibits the biſhop's ſeizing the church's *emphyteuſis* out of the hands of private perſons, unleſs they have been three years without paying rent.

EMPIRE, the territory or extent of land under the command and juriſdiction of an emperor. See EMPEROR.

We ſay, the Roman *empire*, the *empire* of the Eaſt, the *empire* of the Weſt, or the weſtern *empire*, the *empire* of the Great Mogul, &c.

Antiquaries diſtinguiſh between the medals of the *upper* and *lower*, or *bas empire*: The curious only value thoſe of the upper *empire*, which commences with Cæſar or Auguſtus, and ends in the year of Chriſt 260.

The lower *empire* comprehends near 1200 years, reckoning as low as the deſtruction of Conſtantinople, in 1453. They uſually diſtinguiſh two ages, or periods, of the lower *empire*; the firſt beginning where the upper ends, viz. with Aurelian, and ending with Anaſtaſius, including 200 years; the ſecond beginning with Anaſtaſius, and ending with the Palæologi, which includes 1000 years. See MEDAL.

In ancient hiſtory we read of four great monarchies or *empires*, viz. that of the Babylonians, Chaldeans, and Aſſyrians; that of the Medes and Perſians; that of the Greeks; and that of the Romans. The firſt ſubſiſted from the time of Nimrod, who founded it in the year of the world 1800, according to the computation of Uſher, to Sardanapalus their laſt king in 3257, and conſequently laſted above 1450 years. The *empire* of the Medes commenced under Arbace, in the year of the world 3257, and was united to that of the Babylonians and Perſians under Cyrus, in the year 3468, and it cloſed with the death of Darius Codomannus in 3674. The Grecian *empire* laſted only during the reign of Alexander the Great, beginning in the year of the world 3674, and terminating with the death of this conqueror in 3681, his conqueſts being divided among his captains. The Roman *empire* commenced with Julius Cæſar, when he was made perpetual dictator, in the year of the city 708, and of the world 3956, forty-eight years after Chriſt. The ſeat of the *empire* was removed to Byzantium by Conſtantine, in the year of our Lord 334: the Eaſt and Weſt were then united under the title of the Roman *empire*, till the Romans proclaimed Charlemagne emperor, A. D. 800. From this epocha the Eaſt and Weſt formed two ſeparate *empires*; that of the Eaſt, governed by Greek emperors, commenced A. D. 802; and being gradually weakened, terminated under Conſtantine Palæologus in 1453. The weſtern *empire* was afterwards known by the appellation of the *empire* or German *empire*.

Empire, or *the* **Empire**, uſed abſolutely, and without any addition, ſignifies the *empire* of Germany, called alſo in juridical acts and laws, the *holy Roman empire*, *S. R. I.* q. d. *ſacrum imperium Romanum*, which conſtitutes what we otherwiſe call the *Germanic body*.

The *empire* had its beginning with the ninth century; Charlemagne being created firſt emperor by pope Leo III. who put the crown on his head in St. Peter's church on Chriſtmas-day, in the year 800.

Authors are at a loſs under what form of government to range the *empire*; ſome of them will have it a monarchical ſtate, becauſe all the members thereof are obliged to aſk the inveſtiture of their ſtates of the emperor, and to take an oath of fidelity to him.

Others maintain it a republic, or ariſtocratic ſtate, becauſe the emperor cannot reſolve or determine any thing, without the concurring ſuffrages of the princes. It is added, that if they require inveſtiture from, and ſwear fealty to him, it is only as head of the republic, and in the name of the republic, and not in his own; juſt as at Venice, every thing is tranſacted in the name of the doge. See DOGE.

Laſtly, others will have the *empire* to be a monarcho-ariſtocratic ſtate, i. e. a mixture of monarchy and ariſtocracy; becauſe, though the emperor in many caſes ſeems to act ſovereignly, yet his decrees and reſolves have no force, in caſe the ſtate refuſe to confirm them.

In fine, we ſhould rather chooſe to call it an ariſto-democratic ſtate, becauſe the diet, wherein the ſovereignty is lodged, is compoſed of princes, and the deputies of the cities; and is divided into three orders, or bodies, called *colleges*, viz. the college of electors, the college of princes, and the college of cities.

We ſay, diet of the *empire*, circles of the *empire*, fiefs of the *empire*, princes of the *empire*, eſtates of the *empire*, members of the *empire*, capitulations of the *empire*, receſſus of the *empire*, &c. See DIET, CIRCLE, PRINCE, CAPITULATION, and RECESSUS.

The ſtates or eſtates of the *empire* are of two kinds, *mediate* and *immediate*. The *immediate* ſtates are thoſe who hold immediately of the *empire*, whereof, again, there are two kinds; the firſt, ſuch as have ſeats and voices in the imperial diet; the ſecond, ſuch as have none. The *mediate* ſtates are thoſe who hold of the *immediate*.

The ſtates which now compoſe the *empire* are the princes of the *empire*, the counts of the *empire*, the free barons of the *empire*, the prelates of the *empire*, the princeſſes or abbeſſes of the *empire*, the nobles of the *empire*, and the imperial cities.

EMPIRIC, a name given by antiquity, to ſuch phyſicians as formed for themſelves rules and methods on their own practice and experience, and not on any knowledge of natural cauſes, or the ſtudy of good authors; and who preſcribed, without inquiring into the nature of the diſeaſe, or the properties and virtues of their medicines; depending wholly on the authority of ſome general experienced remedies.

The word is formed of the Greek, εμπειρικος, and that of εμπειρος, *knowing*, *able*; but particularly, knowing and learned by experience; the root being πειρα, *eſſay*, or *experiment*.

Medicine was almoſt altogether in the hands of *empirics* till the time of Hippocrates, who firſt introduced reaſon, and the uſe of theory therein; and hence there aroſe a new ſect, called *theoretici*.

Pliny relates, that the ſect of *empirics* had its riſe in Sicily; the firſt who profeſſed it, he ſays, were Apollonius and Glaucias; others ſay, Acron Argentinus. They and their followers made great oppoſition to the diſſection of human bodies; and particularly to that practiſed by Herophilus and Eraſiſtratus, on living bodies of criminals who were condemned to death: but the word *empiric* is now more odious than ever, being confounded with that of *charletan* or *quack*, and applied to perſons who practiſe phyſic at random, without a proper education, or underſtanding any thing of the principles of the art.

Indeed it is poſſible, the word may be abuſed even on this ſide of the queſtion; for thoſe of the phyſicians ſervilely attached to the train and method of the ſchools, the reaſonings of Hippocrates and Galen, and the ſtatutes of the faculty, we all know, have been ever forward to treat thoſe who think more freely, and are leſs ſtifly devoted to antiquity, cuſtom, and the reigning practice or mode, as *empirics*, charletans, and quacks. See MEDICINE.

EMPIS, in *Natural Hiſtory*, the name given by authors to a large ſpecies of gnat, found about rivers and ponds; it is diſtinguiſhed from all other kinds, by a circle of white paſſing round the middle of its body.

EMPLASTER, popularly called PLASTER, a medicine of a ſtiff, glutinous conſiſtence, compoſed of divers ſimple ingredients, ſpread on leather, or linen, and applied externally.

The word is formed from the Greek, εμπλαττω or εμπλασσω, *to put in a maſs*, or *to ſmeer over*, becauſe the *emplaſter* is made of divers kinds of ſimple drugs, worked up into a thick tenacious maſs; or becauſe it covers over the piece of leather or linen to be applied on the part affected.

Emplaſters are made up in a ſtrong ſolid body, that by remaining a long time on the part, the medicinal ingredients they are chiefly compoſed of, may have time enough to produce their effect.

The drugs uſed to give a body and conſiſtence to *emplaſters*, are uſually wax, pitch, gums, fats, litharge, and other preparations of lead.

There are *emplaſters* of divers kinds, and uſed with divers intentions; ſtomachic *emplaſters*; cephalic, ſtyptic, hepatic, diaphoretic, reſolutive, deterſive, emollient, incarnative, aſtringent, conglutinative, &c. *emplaſters*.

In the preſcription of extemporaneous *plaſters*, the greateſt regard is to be had to that particular conſiſtence which the part can moſt conveniently bear, whereupon the application is to be made. Thus, plaſters to the breaſt and ſtomach, eſpecially in the intention of emollients or diſcutients, ſhould be yielding and ſoft, as in the official *emplaſtrum ſtomachicum*; but to the loins, or any of the limbs, where warm diſcutients and ſtrengtheners are to be applied, an higher and more adheſive conſiſtence is to be ſought for. The emollient plaſters likewiſe ſhould be laid on thick, and frequently repeated, if the ſymptoms continue, becauſe their better parts are ſoon ſpent. Diſcutients alſo applied to hard tumours, require repetition; but the ſtrengtheners, which are purpoſely contrived of a ſtrong adheſive conſiſtence, are permitted to lie on till they grow dry, and come off ſpontaneouſly. In ſome flatulent tumours, where *a plaſter* alone will not prevail, they are at intervals taken off, and diſcutient fomentations or lotions made uſe of; ſuch as are compoſed of bitters, carminatives, comprehending alſo lixivial ſalts or alcaline ſpirits.

EMPLASTRUM *adhæſivum*, *adheſive plaſter*, is prepared by melting together half a pound of the common plaſter with a quarter of a pound of Burgundy pitch. The black ſticking-plaſter, called the lady's court-plaſter, is formed by diſſolving twelve ounces of the gum benjamin in twelve ounces of rectified ſpirit of wine, and ſtraining the ſolution. In a ſeparate veſſel, diſſolve a pound of the beſt iſinglaſs in five pints of pure water; and after ſtraining this ſolution, mix it with the former, and let them ſtand in a narrow veſſel, that the groſſer parts may ſubſide: when the liquor is cold, it will become a jelly, which will melt near the fire when it is to be ſpread. This quantity will be ſufficient for ſpreading on ten yards of half-yard wide ſilk; in order to which, the ſilk muſt be ſtretched in a frame, and the mixture may be ſpread upon it with a ſpunge or bruſh, which ſhould be done near a fire. As each ſpreading dries, it muſt be repeated to the tenth or twelfth time, and then touched lightly with the bruſh to give it a gloſs. The following more ſimple preparation may be ſubſtituted for the former: diſſolve a pound and a quarter of fine iſinglaſs in five pints of water, and before it cools ſpread it on ſilk in the manner above directed.

EMPLASTRUM *anodynum*, *anodyne plaſter*, is prepared by melting an ounce of the adheſive plaſter; and, whilſt it is cooling, mixing with it a dram of powdered opium, and the ſame quantity of camphor, previouſly rubbed up with a little oil. This plaſter gives relief in acute pains, eſpecially of the nervous kind.

EMPLASTRUM *attrahens*, the *drawing-plaſter*, a plaſter ordered in the late London Pharmacopœia, to ſupply the place of the melilot-plaſter, in the dreſſing of bliſters. The college are ſatisfied, that the herb is of no ſort of uſe in the compoſition; and that very groſs abuſes are practiſed to give the green colour to the plaſter; for which reaſon they have ordered the plaſter to be now made in this manner: take yellow reſin, and yellow wax, of each three pounds; tried mutton-ſuet, one pound; melt all together, and ſtrain the mixture while it is hot. Pemberton's Lond. Diſp. p. 351.

EMPLASTRUM *commune*, a name given in the new London Pharmacopœia, to what has been long called *diachylon-plaſter*. The apothecaries had been long uſed to make this by a ſhorter way than has been preſcribed them; and the college has now authorized that method, ordering it to be made of only a gallon of oil of olives, and five pounds of litharge, boiled together, with about a quart of water, to keep them from burning, till they are perfectly mixed, and have the conſiſtence of a plaſter. Pemberton's Lond. Diſp. p. 357.

This plaſter is generally applied to ſlight wounds and excoriations of the ſkin; it keeps the part ſoft and warm, and defends it from the air, which is all that is neceſſary in ſuch caſes.

EMPLASTRUM *ex ammoniaco cum mercurio*, a form of medicine in the late London Diſpenſatory, ordered to be prepared in the following manner:

Take gum ammoniacum, ſtrained, a pound; quickſilver, three ounces; ſimple balſam of ſulphur, a dram: rub the quickſilver with the balſam of ſulphur till it no longer appear; then add by degrees the gum ammoniac melted, and almoſt cooled again, and make the whole into a plaſter. Pemberton's Lond. Diſp. p. 351.

This plaſter is recommended in pains of the limbs, ariſing from a venereal cauſe. Indurations of the glands, and other violent tumours, are likewiſe found ſometimes to yield to it.

EMPLASTRUM *gummi*, *gum-plaſter*. Take of the common plaſter, four pounds; gum ammoniac and galbanum, ſtrained, of each half a pound; melt them together, and add ſix ounces of Venice turpentine. This is uſed as a digeſtive, and for diſcuſſing indolent tumours.

EMPLASTRUM *roborans*, the *ſtrengthening-plaſter*, a form preſcribed in the London Diſpenſatory, and ordered to be made thus: take of the common plaſter, two pounds; of frankincenſe, half a pound; of dragon's blood, three ounces; melt the plaſter, and then add to it the other ingredients in powder. Pemberton's Lond. Diſp. p. 358.

EMPLASTRUM *ſtomachium*, *ſtomach plaſter*. Take of gum-plaſter, half a pound; camphorated oil, an ounce and a half; black pepper, or capſicum, one ounce: melt the plaſter, and mix with it the oil; then ſprinkle in the pepper, reduced to a powder. An ounce or two of this plaſter, ſpread on ſoft leather, and applied to the region of the ſtomach, will be of ſervice in flatulencies, ariſing from hyſteric and hypochondriac affections; a ſmall quantity of the expreſſed oil of mace, or a few drops of the eſſential oil of mint, may be rubbed upon it before it is applied. Buchan's Domeſtic Med. p. 737.

EMPLASTRUM *veſicatorium*, *bliſtering-plaſter*. Take of Venice turpentine, ſix ounces; yellow wax, two ounces; Spaniſh flies, in fine powder, three ounces; powdered muſtard, one ounce: melt the wax; and while it is warm, add the turpentine, taking care that it be not too much evaporated by heat. After the turpentine and wax are ſufficiently incorporated, ſprinkle in the powders, continually ſtirring the maſs till it be cold. Buchan. p. 736. See BLISTER.

EMPLASTICS, in *Pharmacy*, are ſalves, or medicines, which ſtop up and conſtipate the pores of the parts they are applied on; otherwiſe called *emphractics*.

The word is formed from the Greek, εμπλασσειν, *to ſtop up*.

Such are fats, mucilages, wax, the whites of eggs, &c.

EMPLASTRA *amyntica*. See AMYNTICA.

EMPNEUMATOSIS, from εμπνεω, *I inflate*, in *Medicine*, a word uſed by ſome writers to ſignify an inflation of the ſtomach; but by others, in a more general ſenſe, for inflations of the womb, or of any other part.

EMPORETICA *charta*. See CHARTA and PAPER.

EMPORIUM, in *Medicine*, is often uſed for the common ſenſory in the brain. See BRAIN.

EMPRIMED, among *Sportſmen*, a term applied to a hart, when he forſakes the herd.

EMPRION, from πριω, *to ſaw*, in the *Medical Writings of the Ancients*, a word uſed to denote a peculiar pulſe, in which the artery is felt to be diſtended in one part more than another at every ſtroke, and by that means is made to reſemble any ſerrated body, or the light teeth of a fine ſaw.

EMPROSTHOTONOS, in *Medicine*, a kind of tonic convulſion, wherein the head is drawn forwards, till the chin touch the breaſt.

The word is Greek, compoſed of εμπροσθεν, *before*, and τονος, *tenſion*, *ſtiffneſs*, of the verb τεινω, *I ſtretch*.

Sometimes too, it is ſo general, that the whole body is bent forward, and makes a kind of bow; and even ſometimes a kind of circle, the knees meeting the head.

The cauſe of this diſorder is a contraction of the anterior muſcles, particularly thoſe of the head, called *maſtoides*.

EMPTOR *familiæ*, *buyer of a family*, in the *Roman Law*, one who purchaſed the inheritance of a perſon, or the privilege of being appointed his heir by will.

This was done with the ceremony of ſcales and weights, before five witneſſes, with the uſe of a peculiar formula of words.

Such *buyer* differed from the heir, *hæres*, as the teſtator in ſome meaſure alienated the right to the former during his own life-time, whereas the latter had only a right by his death. Briſſon. de Formul. lib. vii. p. 585. Pitiſc. Lex. Ant. tom. i. p. 713, voc. *Emptor*.

EMPTOR *fiduciarius*, *fiduciary buyer*, one who receives a thing in the way of pledge, till the money he has advanced be repaid. Salmaſ. de Mod. Uſur. cap. 14. Pitſc. Lex. Ant. tom. i. p. 713. voc. *Emptor*.

EMPUSA, Εμπουσα, among the ancients, a kind of hobgoblin, or bugbear, under the direction of Hecate, who uſed to ſend it to frighten people who laboured under misfortunes. Hofm. Lex. in voc.

EMPYEMA, in *Medicine*, a collection of pus, or purulent matter, in the cavity of the breaſt, diſcharged thither upon the burſting of ſome abſceſs or ulcer in the lungs, or membranes that incloſe the breaſt; or formed from that inſpiſſated ſerum, which Dr. Hunter obſerves is found in large quantities in the cavities of the breaſt, belly, &c. Lond. Med. Obſ. &c. vol. ii. p. 61.

The word is formed of the Greek, εν, *in*, and πυον, *pus*, the letter ν being here changed into μ, a thing often done when the *n* happens to come in compoſition before the labials *b p*; as in the words *embamma*, *emblema*, *emporium*, &c.

The *empyema* ſometimes ſucceeds a quinſey, ſometimes a peripneumony, but more uſually than either, a pleuriſy, as being ordinarily the effect of a peripneumonic or pleuritic abſceſs.

It uſually comes fifteen or twenty days after thoſe diſeaſes. Sometimes, alſo, it is generated of extravaſated blood, iſſued out of a burſten, broken, or putrified vein; it is diſtinguiſhed by a difficulty of breathing, a dry cough, a heavineſs about the diaphragm, a noiſe, and fluctuating of the matter upon moving; a ſlow fever, ruddy cheeks, hollow eyes, the tips of the fingers hot, and a ſwelling of the abdomen.

The cure is difficult, from the difficulty of abſorbing or evacuating ſuch extravaſated matter: if nature ſhews any endeavour to throw it off by vomiting, or urine, or the like, ſhe muſt be ſeconded, and aſſiſted therein. Thus, if the urine be purulent, adminiſter diuretics; if the ſtools, laxatives; if the ſpitting, expectorants, or even emetics; otherwiſe, recourſe muſt neceſſarily be had to a PARACENTESIS, or tapping.

In order to this, an aperture muſt be made in the thorax, by a proper inſtrument, on the ſide affected, between the third and fourth ſpurious ribs on the right ſide; but on the left, between the ſecond and third, and about half or two-thirds of the diſtance from the ſternum to the vertebra, becauſe here the muſcles are thinneſt, the artery is concealed under the rib, and the diaphragm is at a due diſtance; and through this the pus muſt be ſlowly drawn.

This operation takes its name from the diſeaſe, *empyema*.

There is alſo a kind of *ſpurious*, or *baſtard empyema*, proceeding from a pituitous, or ſerous humour, brought by ſome duct or paſſage into the thorax; where corrupting, it degenerates into a matter like pus.

An *empyema*, in courſe of time, breeds a phthiſis; and death is often the conſequence.

EMPYREUM, among *Divines*, denotes the higheſt of the heavens, where the bleſſed enjoy the beatific viſion; called alſo *empyrean heaven*, and *paradiſe*.

The word is formed of εν and πυρ, *fire*, becauſe of its ſplendour.

EMPYREUMA, Εμπυρευμα, in *Chemiſtry*, &c. a ſmell or taſte of burning; a quality, or change in bodies that have been burnt, or much ſcorched with fire, ſenſible to the taſte and ſmell; or perhaps it may be ſome extraneous matter impreſſed, or added by the fire, and remaining on the burnt or ſcorched part, that gives the new offenſive ſmell and flavour.

The word is formed of the Greek, εμπυρευειν, *to inflame*, *kindle*.

The term is chiefly uſed when in boiling or diſtilling any thing, it ſticks and burns to the bottom of the veſſel, or alembic; the offenſive ſmell and taſte whereof are expreſſed by the word *empyreuma*. This term properly denotes the ſmell of burnt oils; and no other but oily ſubſtances can produce it; and it is peculiar to burnt animal and vegetable matters. The *empyreumatic* ſmell is therefore made a teſt of the exiſtence of oil in the ſubſtances which emits it.

EMPYREUMA, is alſo uſed for the heat remaining upon the declenſion of a fever.

EMRODS, or rather *Hæmorrhoids*. See HÆMORRHOIDS.

EMULATION, is a generous ardour kindled by the brave examples of others, which impels us to imitate, to rival, and, if poſſible, to excel them. This paſſion involves in it eſteem of the perſon whoſe attainments or conduct we emulate, of the qualities and actions in which we emulate him, and a deſire of reſemblance, together with a joy ſpringing from the hope of ſucceſs.

The word comes originally from the Greek, *αμιλλα*, *diſpute, conteſt*; whence the Latin, *æmulus*, and thence our *emulation*.

Plato obſerves of *emulation*, that it is the daughter of envy; if ſo, there is a great difference between the mother and the offspring; the one is a virtue, and the other a vice. *Emulation* admires great actions, and ſtrives to imitate them; envy refuſes them the praiſes that are their due; *emulation* is generous, and only thinks of ſurpaſſing a rival; envy is low, and only ſeeks to leſſen him.

Perhaps, therefore, it would be more juſt to ſuppoſe *emulation* the daughter of admiration: admiration, however, is a principal ingredient in the compoſition of it.

EMULGENT, in *Anatomy*, an epithet beſtowed on thoſe arteries which bring the blood to the kidneys, and thoſe veins which carry back what is ſuperfluous to the cava. See *Tab. Anat.* (*Angeiol.*) *fig.* 1. *n.* 49. *fig.* 6. *lit. s. s.*

The *emulgent* arteries ſpring from the deſcending trunk of the aorta; and the *emulgent* veins terminate in the aſcending trunk of the cava.

EMULSION, from *emulgere*, *to milk*, in *Medicine*, a ſoft liquid remedy, of a colour and conſiſtence reſembling milk. It is compoſed of oleaginous ſeeds, kernels, or fruits, gum reſins, and gummy or reſinous juices, pounded in a mortar, and diſſolved in diſtilled waters, or light decoctions, and afterwards expreſſed, or ſtrained or ſweetened with ſugar or ſyrup.

Emulſions ſerve to temper, dilute, and ſoften acrimonies of the breaſt; to moderate the heat of the kidneys; ſoften the ſharpneſs of the urine, and give the patient reſt and eaſe. They ſerve likewiſe as vehicles for certain ſubſtances which could not otherwiſe be conveniently taken in a liquid form. The common *emulſion* is made by blanching an ounce of ſweet almonds and a dram of bitter almonds, and beating them in a marble mortar; adding gradually the quantity of two pints of water, and ſtraining the liquid. If two ounces and a half of the mucilage of gum arabic are added to the almonds whilſt they are pounded in the mortar, we ſhall have the arabic *emulſion*. Theſe *emulſions* may be uſed as ordinary drink, in caſes which require ſoft cooling liquors. The camphorated *emulſion* is prepared by grinding half a dram of camphor, and half a dozen ſweet almonds together in a ſtone mortar, and adding by degrees eight ounces of mint water; ſtraining the liquor, and diſſolving in it half an ounce of white ſugar. A table-ſpoonful of this *emulſion* may be taken in fevers, and other diſorders which require the uſe of camphor, every two or three hours. The *emulſion* of gum ammoniac is made by grinding two drams of the gum with eight ounces of water poured gradually upon it till it is diſſolved.

This *emulſion* is uſed for attenuating viſcid phlegms, and promoting expectorations. In obſtinate coughs, two ounces of the ſyrup of poppies may be added to it. It may be adminiſtered in a doſe of two table-ſpoonfuls, three or four times a day. The oily *emulſion*, prepared by mixing ſix ounces of ſoft water with two drams of volatile aromatic ſpirit, and an ounce of Florence oil, and half an ounce of ſimple ſyrup, is ſerviceable in recent coughs: in more obſtinate coughs, it will be better to ſubſtitute for the aromatic ſpirit the paregoric elixir of the Edinburgh Diſpenſatory. A table-ſpoonful of it may be taken every two or three hours. Buchan's Dom. Med. p. 716, &c.

EMUNCTORY, from *emungere*, *to wipe away*, or *drain off*, in *Anatomy* and *Medicine*, a part of the body deſtined for the ſeparation of ſome humour judged uſeleſs, or even hurtful to the animal, after its having circulated ſome time with the blood.

The term *emunctory* alſo implies a cavity adjoining to the part that ſeparates, wherein the excrementitious humour is collected, and preſerved in readineſs for evacuation.

The kidneys, urinary bladder, and miliary glands of the ſkin, are *emunctories*; the parotides are not properly *emunctories*, becauſe deſtined to ſeparate the ſaliva, which is no uſeleſs or excrementitious humour, but neceſſary for the digeſtion of the food.

Some, without much propriety, confine *emunctory* to the receptacle into which the ſecreted excrement is diſcharged; as the pituitous humour of the brain into the noſtrils, the cerumen into the ears, the excrements into the inteſtines, &c. though theſe laſt have not undergone any circulation.

ENÆMON, *Εναιμων*, from *αιμα*, *blood*, an external medicine which ſtops or ſtanches the blood; or which, by binding, cooling, or drying, cloſes the paſſages of the veſſels before open, or diminiſhes the fluidity and motion of the blood. See STYPTIC.

ENÆOREMA, *Εναιωρημα*, from *αιωρεω*, *to exalt*, expreſſes ſuch contents of the urine as float about in the middle, reſembling a cloud; and thence alſo called NUBECULA. See URINE.

ENALLAGE, in *Rhetoric*, a figure whereby we change and invert the order of the terms in a diſcourſe, againſt the common rules of language.

The word is derived from the Greek, *εναλλαγη*, formed of *εναλλαττειν*, which ſignifies *to change*, as well as the ſimple verb *αλλαττειν*.

The grammarians too, have a kind of *enallage*, whereby one part of ſpeech, or one accident of a word, is put for another.

Such is the change of a pronoun, as when a poſſeſſive is put for a relative, e. gr. *ſuus* for *ejus*; or of a verb, as when one mood or tenſe is put for another.

ENALURON, in *Heraldry*, is uſed by Guillim to expreſs a bordure charged with birds; as an *enaluron* of martlets, &c. but Mackenzie charges this as a miſtake ariſing from ignorance of the French tongue; *enaluron* properly ſignifying orle, or in manner of a bordure, and being applicable to a bearing of any thing in that form.

ENAMEL *of the teeth*. See TEETH.

ENAMEL, popularly AMEL, a kind of metalline colour, by the Latins called *encauſtum*; uſed in enamelling, and painting in *enamel*.

Enamels are glaſſes containing ſome opake ſubſtance, that is either unvitrifiable or incapable of being vitrified with the degree of heat requiſite for the fuſion of ordinary glaſs. They are generally compoſed of glaſs, mixed with metallic calxes.

The common matter, which is the baſis of all *enamels*, is thus made: take fine lead, thirty pounds; and the ſame quantity of fine tin; calcine theſe together in a kiln, then ſift them; boil this powder in water, in clean earthen veſſels, and pour off the water, which will carry with it the finer part of the calx; put freſh water on the remainder, boil it again, and pour off in the ſame manner: do this ſo long as the water will carry off any part of the calx. Re-calcine the remaining matter, and waſh off its finer part in the ſame manner again, then evaporate all the waters which have waſhed off the finer calx, and keep the fire low towards the end of the operation, that the calx may not be waſted: this will be found at the bottom, of an extreme fineneſs.

Take of cryſtal frit, made with tarſo, and of this fine calx, each fifty pounds; white ſalt of tartar, eight ounces; powder and ſift theſe, and mix them well. Put this mixture into a new earthen-pot, give it a fire for ten hours, then powder it, and keep it in a dry covered place.

This is the common plain *enamel*, or matter of which all the other *enamels* are to be made. In making theſe, the following general cautions are neceſſary to be obſerved. 1. That the pots muſt be glazed with white glaſs, and muſt be ſuch as will bear the fire. 2. That the matter of *enamels* muſt be very nicely mixed with the colours. 3. When the *enamel* is good, and the colour well incorporated, it muſt be taken from the fire with a pair of tongs. 4. The general way of making the coloured *enamels* is this: powder, ſift, and grind all the colours very nicely, and firſt mix them well with one another, then with the common matter of *enamels*; then ſet them in pots in a furnace; and when they are well mixed and incorporated, caſt them into water; and when dry, ſet them in the furnace again to melt; and when melted, take a proof of them. If too deep coloured, add more of the common matter of the *enamel*; and if too pale, add more of the colour.

We may diſtinguiſh three kinds of *enamel*; the firſt intended for the counterfeiting and imitating of precious ſtones; the ſecond, for painting in *enamel*; and the third uſed by the enamellers, jewellers, and goldſmiths, on gold, ſilver, and other metals; with which laſt kind, particularly the white, it is that the makers of the Dutch ware give the gloſs to their works.

The *enamels* uſed in imitating precious ſtones, and thoſe for painting, are uſually prepared by the workmen themſelves,

ſelves, employed in thoſe arts; the reſt are brought from Venice and Holland. The compoſition is the ſame in the main in all the three kinds; all the difference conſiſts in giving the colour or tranſparency.

Enamels *for painting.*

Enamel, *azure blue.* To make this, take of the common matter of *enamels,* four pounds; zaffer prepared, two ounces; braſs thrice calcined, or calcined copper, forty-eight grains: mix all theſe well together, and melt them in the furnace in the uſual way. Neri's Art of Glaſs, p. 150.

Enamel, *turquois blue,* is prepared by a mixture of ſix pounds of the baſis of *enamels,* with three ounces of calcined copper, ninety-ſix grains of zaffer, and forty-eight grains of magneſia.

Enamel, *black.* To make the black *enamel,* take of the common matter of *enamels,* four pounds; tartar, four ounces; magneſia, two ounces: grind and mix theſe powders well with the matter of the *enamel,* then ſet them in a furnace in a large pot; when melted and refined, caſt them into water; and putting them again into the furnace, let them refine.

Or an excellent black *enamel* may be prepared by mixing equal quantities of magneſia, zaffer, and ſcales of iron, and adding one part of this mixture to fifteen or twenty of the baſis of *enamels.* Lewis's Com. Ph. Tech. p. 442.

Enamel, *the ruddy brown,* is made with fæces of vitriol and ſalt-petre, or with iron ruſt, well ground on an agat, with oil of ſpike.

Enamel, *green.* To make this, take of the common matter of *enamels,* four pounds; melt it, and caſt it into water; return it again to the furnace, and when purified, add braſs thrice calcined, or calcined copper, two ounces; crocus martis, made with vinegar, or ſcales of iron, forty-eight grains. Mix theſe firſt in fine powder, and put this in at three ſeveral times; when all is well incorporated, take it from the fire.

Enamel, *milk-white.* To make this uſeful colour in *enamels;* take of the common matter of *enamels,* ſix pounds; magneſia, prepared, forty-eight grains; melt them in the furnace, caſt the whole into water, and afterwards return it again into the furnace; and when refined, uſe it. See Delf-*ware.*

Enamel, *purple.* To make this, take of the common matter of *enamels,* ſix pounds; of magneſia, three ounces; braſs, thrice calcined, or calcined copper, ſix ounces; mix all well together, and ſet them in a furnace, let them refine, then caſt them into water; return the matter to the furnace again, and when thoroughly melted, take it out for uſe.

This mixture, with a ſmall proportion of braſs, makes the red *enamel.*

Vermilion red is made with vitriol calcined between two crucibles, luted together; then waſhed in aqua fortis, and afterwards in fair water: the fire is to be moderate, and to remain about half an hour.

The *lake red* is compoſed of fine gold, diſſolved in aqua regia, with ſal ammoniac, or common ſalt. The diſſolution being completed, it is put in a cucurbit with ſpring-water and mercury, over hot ſand for twenty-four hours. Some uſe a ſolution of pure block-tin, in aqua regia; and others crude tin, to precipitate the gold. The powder remaining at the bottom of the cucurbit, when the water is poured off, is ground up with double its weight of flower of ſulphur, and put in a crucible over a gentle fire; and when the ſulphur which takes fire, is exhaled, the red powder remaining is ground with rocaille.

Enamel, *violet-coloured.* The method of making the violet-coloured *enamel* is this: take of the common matter of *enamels,* ſix pounds; of magneſia, prepared, three ounces; of thrice calcined braſs, or calcined copper, forty-eight grains: mix the two powders well together; then mix the whole, put them into the furnace, and when refined, caſt them into water, return the water again to the furnace, and when refined take it out. Neri's Art of Glaſs, p. 157.

Enamel, *yellow.* To make this, take of the common matter of *enamels,* ſix pounds; of tartar, three ounces; of magneſia, ſeventy-two grains: mix all well together, and put them into the furnace in a large pot; when refined, caſt them into water, then return them to the furnace again; and when melted, take it out for uſe.

Laſtly, white copperas, calcined, makes a colour much like the amber-colour uſed by limners. See a Collection of Receipts for making ſeveral Kinds of *Enamel* of different Colours and Teints in, Doſſie's Handmaid to the Arts, vol. i. § 6. p. 336, &c. and Neri's Art of Glaſs, with Merret's Notes, and a Commentary by Kunkel, from which moſt of the above receipts are extracted.

Enamels, uſed by the jewellers, goldſmiths, and enamellers. Theſe, we have obſerved, come chiefly from Venice and Holland; they are in little thin cakes of different ſizes, uſually four inches in diameter, and half an inch thick. Every cake has the maker's mark ſtruck on it with a puncheon. The moſt uſual marks are the name Jeſus, a ſiren, monkey, ſun, &c.

Thoſe brought from Venice are chiefly white, flate-colour, ſky-blue, carnation, yellow, green, and a deep blue, called a *falſe lapis.* Theſe ſeven are the principles of all the others, which ariſe out of the mixture of theſe; and the white, in particular, is, as it were, the baſis of all the other ſix principal colours.

White is made, as already obſerved, of cryſtal glaſs, tin, and lead, calcined by a reverbatory fire: and this *enamel* is uſed not only by the jewellers and enamellers on metal, but alſo by the painters in *enamel,* the makers of Dutch ware, &c. By adding azure thereto, it becomes a flate-colour; by adding copper and Cyprus vitriol, it makes a ſky-blue; by perigueux, a fleſh-colour; and, by iron-ruſt, a yellow: to make a green, they add copper-filings, &c.

ENAMELLING, the art or act of applying *enamels* of various colours on metals, &c. either in the way of painting, or by the lamp. It has been thought, that this is the ſame with the encauſtic painting of the ancients; but modern diſcoveries have evinced the contrary. See Encaustic *Painting.*

Painting in Enamel, is a method of painting with *enamels,* or metalline colours, ground, reduced to powder, and uſed like other colours with a pencil; then fuſed, baked again, and vitrified by force of fire.

The art of *painting in enamel,* or at leaſt of giving colours to glaſs, whence this method of painting was derived, is very ancient, and appears to have been firſt practiſed on earthen veſſels, or potters-ware. As early as in the age of Porſenna, king of Tuſcany, we hear of beautiful vaſes made in his territories, enamelled with various figures, though far ſhort of thoſe afterwards made at Faenza, and Caſtel Durante, in the duchy of Urbino, in the time of Raphael and Michael Angelo. There are ſtill ſome of thoſe vaſes extant in the cabinets of antiquaries; in all which, the deſign, or drawing of the figures, is much better than the colouring; for they were at that time only acquainted with two colours, viz black and white, either for earthen or metal works, excepting a faint kind of carnation for the faces and other parts.

In the time of Francis I. of France, the art was retrieved in that country, particularly at Limoges, where there were produced abundance of very valuable pieces, in the manner of the ancients; that is, well performed as to the draught, and the clair-obſcure chiefly in two colours.

There are two ways of *painting in enamel;* the one with clear and tranſparent, and the other with thick and opake colours. To uſe the firſt, they are only ground up with water; the ſecond are ground up with oil of ſpike. The firſt are laid on the metal flat, and bordered, or edged with a rim of metal, to keep the colours aſunder; though we have ſeen pieces laid on contiguous, and without any partition, which is very difficult to practiſe, becauſe the tranſparent colours in melting are apt to run into each other, eſpecially in the ſmaller works.

The invention of opake colours is much later, and is greatly preferable to that of tranſparent ones. All metals, however, will not equally admit of both kinds: copper, for inſtance, which bears all the opake colours, will not bear the tranſparent ones; but to employ theſe latter upon copper, they are forced firſt to cover it with a layer or couch of black *enamel;* over which they lay a ſilver leaf, and on this apply the other ſuitable colours; that is, the colours or *enamels* proper for ſilver, which itſelf does not allow of all kinds.

Thoſe which ſuit it beſt are purple, green, azure, and aqua-marina; but gold receives all the kinds and colours, both opake and tranſparent, perfectly well. It muſt be added, however, that only the fineſt gold muſt be uſed herein; for the tranſparent colours being laid on a baſe gold, grow dim and livid; there being a kind of ſmoke that ſettles on it, not unlike black lead.

Of tranſparent *enamels,* the hardeſt are always the beſt; though there is a difference even among theſe; ſome loſing their colour in the fire, and others retaining it. As to the reds, they are only red by accident, being yellow when made, and applied on the gold, and becoming red in the furnace. The beſt tranſparent reds are thoſe made of calcined copper, iron-ruſt, orpiment, and calcined gold, melted, with the due proportions of ſand and ſalt of glaſs.

But it is the method of painting with opake or thick *enamel,* to which we owe all our fine modern pieces of *enamel,* particularly thoſe curious ones on gold, repreſenting portraits, to as much perfection as the beſt painting in oil; and even ſome hiſtory-pieces; with this great advantage, that their beauty and luſtre never decay, being equally ſecure from injuries of time and weather.

This art we are indebted for to the French; nothing of the kind having been attempted before the year 1632, when James Toutin, a goldſmith, of Chaſteaudun, and a great maſter in the common way of painting with tranſparent *enamel*, firſt applied himſelf to find a way to uſe thick colours of different teints, which ſhould melt with fire, and yet retain their luſtre, purity, &c.

Toutin ſucceeded in his attempt; and having got the ſecret, communicated it to his fellow-artiſts, who, in their turns, contributed to the bringing it to perfection: the firſt who diſtinguiſhed himſelf was Dubie, a goldſmith, who wrought in the galleries of the Louvre. After him came Moliere, a native of Orleans, who applied himſelf chiefly to the painting on rings and watch-caſes. His diſciple, Robert Vauquer, of Blois, exceeded them all, both in his deſigns and his colours. After him, Pierre Chartier of Blois applied himſelf to the painting of flowers, wherein he ſucceeded to admiration.

By this time the Engliſh were fallen into the way; who, as is allowed by foreigners themſelves, ſeem to have been the firſt who applied it with ſucceſs to the painting of portraits.

M. Felibien obſerves, that the firſt, and moſt finiſhed portraits, and thoſe in the fineſt colours, were brought into France by Petitot and Bordier, from England. This occaſioned Louis Hance and Louis de Guernier (two good painters in miniature) ſoon after to attempt the like; in which the latter ſucceeded beyond every body. He likewiſe invented ſeveral new teints for the carnations; and, had he lived, had probably merited the glory of carrying the art to its laſt perfection.

This kind of painting, to be in perfection, muſt be on plates of gold; for copper, beſide that it emits a fume which tarniſhes the colours, is apt to ſcale and crackle; and ſilver turns the whites yellow; though it is often performed on plates of copper, enamelled with the white *enamel*.

Theſe plates are made a little hollow one ſide, and raiſed on the other, either in a circular or oval manner, to prevent the gold's fretting by the fire, and making the colours crack and fly; nor muſt they be made too thick; it is ſufficient they can bear the colours, though it is uſual to ſtrengthen them all round with a circle ſomewhat thicker.

The plate being hammered very evenly throughout, they apply a white *enamel* on both ſides, though the deſign be only to paint on one of them: the intent of this is to prevent any ſwelling and warping by the fire; for, otherwiſe, in large pieces, and eſpecially if the colours be laid on any thing unequally, they are apt to riſe up in puffs or bliſters. Now, this firſt lay, which is white, remaining ſmooth and uniform, ſerves as a ground for all other colours. The compoſition of the white *enamel*, with the other opake colours, is already delivered under the article **Enamel**.

The gold plate, thus enamelled in white, the draught or deſign to be painted muſt be chalked thereon, and afterwards the whole accurately drawn out in a ruddy brown. The draught or out-line thus finiſhed, the piece is ſet to the fire, and then painted with the colours above preſcribed.

The white ground they paint on ſerves all the colours for white: the method being to ſpare the ground, from firſt to laſt, in the places where the lights are to be, after the ſame manner as in miniature, though they have another white to lay over the other colours when there is occaſion to raiſe them. Add, that as the painters in oil retouch their painting ſeveral times, and let them dry, ſo in this ſort of painting they touch the piece as often as they pleaſe, ſetting it each time to a reverberatory fire, and taking it away again as ſoon as they perceive that the *enamel* has got its full poliſh.

The reverberatory fire is made in a little furnace, wherein there is fire both a-top and all round, on a void place in the middle, where the piece is to be put for the *enamels* to neal. The colours are laid on with the tip or point of the pencil as in miniature, with this only difference, that they uſe oil of ſpike to dilute them inſtead of gum-water. See **Miniature**.

The workers in *enamel* muſt be very cautious of the good or bad qualities of the oil of ſpike they employ to mix their colours with: it is a thing very ſubject to adulterations; ſometimes with ſpirit of wine, ſometimes with oil of turpentine. In the firſt caſe, it wants body, as there is uſually too much ſpirit added; and in the latter, the ſmoak of the turpentine, when heated, ſpoils the colours. A ſmall mixture of ſpirit of wine does well; and the beſt method for the nice artificer, is to refine the oil, and afterwards add to it ſuch a quantity of ſpirit as is found beſt.

Enamelling *by the lamp; method of.* The works of this kind are all performed by the flame of a lamp; wherein, in lieu of oil, is put horſe's greaſe, by ſome called caballine oil. The lamp is of copper, or whited iron, and conſiſts of two parts, the box and the lamp; in the latter of theſe, which is a kind of flat oval, is put the oil, and out of this riſes the wick: all the uſe of the box is to receive the oil, which the ebullition occaſioned by the intenſe heat might throw abroad.

This lamp, or even where two or three artiſts work together, two or three more lamps, are placed on a table of a proper height, &c. under which, about the middle of its height, is a double-bellows, like thoſe of an organ, which one of the workmen raiſes and depreſſes with his foot to encreaſe and quicken the flame of the lamp, which is by ſuch means excited to a degree of vehemence almoſt incredible.

The wind of the bellows is conveyed to the ſeveral lamps, however many, by means of grooves cut along the thickneſs of the table, and covered with parchment, extending from the bellows, to a tube or pipe placed before each lamp. Theſe tubes are of glaſs; and, that the enamellers may not be incommoded with the heat of the lamp, each tube is covered, at about ſix inches diſtance, with a piece of tin called a fan, which is fixed in a hole of the table. In works that do not take up much time, they content themſelves with a glaſs blow-pipe to heighten the flame of the lamp.

Applying their cake of *enamel* to the flame of this lamp, they draw it out into threads inconceivably fine. Thoſe made uſe of in artificial plumes of feathers are ſo very ſlender, that they may be wound on a reel like ſilk or thread.

The factitious jets of divers colours, ſometimes uſed in embroideries, are alſo made of *enamel*, and that with ſo much art, that each piece has its hole to paſs the ſilk through wherewith it is ſewed. Theſe holes are made by blowing them in long pieces, which are afterwards cut off with a proper tool. See the proceſs of drawing out the *enamel*, illuſtrated under **Ductility** *of glaſs*.

It is rare that the Dutch or Venetian *enamels* are uſed pure; the common way is to melt them in an iron ladle, with an equal quantity of glaſs or cryſtal; and when the two matters are in perfect fuſion, they draw it out into threads of different ſizes as occaſion requires, by taking a quantity between two pipe-ſtopples held in the two hands, and removing them aſunder as far as the arms will reach. If the thread is to be longer than the workman can ſtretch, a ſecond perſon takes one of the ends, and continues to draw it out, while the firſt continues to keep the *enamel* to the flame. All the threads drawn after this manner are round; ſo that if the nature of the work require them to be flat, they are afterwards drawn through a pair of pinchers while yet hot. They have another iron inſtrument, in manner of plyers, to draw out the *enamel* by the lamp, when it is to be worked or diſpoſed in figures or otherwiſe. Laſtly, they have glaſs tubes, of various ſizes, ſerving to blow the *enamel* into various figures, and preſerve the neceſſary vacancies therein, as alſo to ſpare the ſtuff, and form the contours.

When the enameller goes to work, he ſeats himſelf before his lamp, with his foot on the treddle, and holding in his left hand the piece of work he is to *enamel*, or the braſs or iron wires his figures are to be formed with; with his right hand he draws out the thread from the *enamel* held to the lamp; and this is done with a dexterity and patience equally ſurpriſing.

There is nothing but may be thus repreſented in *enamel*; and there are figures ſo finely finiſhed of this kind, that one would take them to have come out of the hands of the ableſt ſculptors.

ENARGIA, Εναργεια, in *Rhetoric*, a figure, which paſſing from the narrative ſtyle, points out, and as it were, ſets the ſubject before the eyes of the audience. Voſſ. Rhet. lib. iii. p. 361.

ENARTHROSIS, Εναρθρωσις, a ſpecies of **Diarthrosis**. Such is that of the huckle-bone, &c. See **Articulation**.

ENCÆNIA, Εγκαινια, a Greek term, ſignifying *reſtauration* or *renovation*, being compounded of ahe prepoſition εν and καινος, *new*.

Encænia, is more particularly uſed for the name of a feaſt celebrated by the Jews on the twenty-fifth of the ninth month, in memory of the dedication, or rather purification of the temple, by Judas Maccabæus, after its having been polluted and plundered by Antiochus Epiphanes.

The Jews had alſo two other *Encænia*, viz. the dedication of the temple by Solomon, and that by Zorobabel, after the return from the captivity.

Encænia, is likewiſe applied in the *Fathers*, and *Church-Hiſtory*, to the dedication of Chriſtian churches.

St. Auguſtine aſſures us, that in his time the uſe of the word *Encænia* was even transferred to profane matters; and that they called it *Encæniare*, when they put on a new ſuit of clothes.

Our tranſlators of the Bible do not retain the word *Encænia*, in St. John, x. 22. where mention is made thereof; in lieu of that, they call it *Feaſt of the Dedication*, which is leſs proper. In effect, it is not the feaſt of the dedication, but of the purification or re-conſecration of the temple profaned, that is there ſpoken of.

ENCAMPMENT, in the *Military*. See CAMP.

ENCANTHIS, in *Medicine*, denotes a tumour of the caruncula lachrymalis, in the great canthus, or angle of the eye.

The word is Greek, εγκανθις, formed of the prepoſition εν and κανθος, *corner of the eye.*

It is oppoſed to rhyas, which is a diminution or conſumption of the ſame caruncle. See RHYAS.

This tubercle grows either out of the caruncula lacrymalis, or from the adjacent red ſkin, and is ſometimes ſo large, as not only to obſtruct the puncta lacrymalia, but alſo part of the ſight, or pupilla of the eye itſelf. In this diſorder the tears continually run down the cheek, which not only greatly deform the eye and face, but often give riſe to an ophthalmy.

The *encanthis* is of two kinds, the one mild, and without hardneſs or pain, and the other malignant, livid, and painful; this laſt tends, in ſome degree, to a cancerous nature.

In the beginning of the mild *encanthis*, it is beſt to ſcarify, and apply a mild cauſtic, as burnt alum, or vitriol, mixed with ſugar. This powder may be ſprinkled into the tumor, and carefully waſhed out of the eye afterwards with warm milk or water; but, if this is not ſufficient, it may be carefully touched with the common cauſtic; and, to give a turn to the humour, internal medicines, as purges, and the like, muſt be given, and iſſues, or ſetons, muſt be made. Heiſter's Surgery, p. 343.

If theſe methods take no effect, and the tubercle is of a malignant kind, it is to be drawn out either with a hook, or a pair of plyers, or, if very large, by a threaded needle paſſed through it, taking hold of both ends of the thread, and gently raiſing it till it can be cut off; but, in this, great care is to be taken not to wound the lacrymal caruncle. If the tubercle appear livid and cancerous, it is by all means to be let alone, as the irritating ſuch with medicines is always of very bad conſequence.

The *encanthis* is occaſioned by a defluxion on that part; or an ulcer therein, not ſpeedily enough dried.

ENCARDION, from καρδια, *heart*, in *Botany*, a name given by the Greeks to what the Latins properly call the mediata in trees, the heart of the wood, or central hard part of it.

ENCATHISMA, from εγκαθημαι, *I ſit in*, in the *Medical Writings of the Ancients*, a term uſed to expreſs a ſort of bath, in which the patient was only to be plunged up to the belly.

ENCAUMA, from καιω, *I burn*, in *Surgery*, a name given, by ſeveral writers, to the puſtule, or excoriation, owing to a burn. The ſame word is uſed alſo by ſome as the name of a peculiar kind of ulcer in the eye. Aëtius ſays, that the ſuperficial exulcerations of the eyes, which are owing to defluxions of humours, are called, by the authors who wrote in early times, by three names, according to their differences. 1. A *caligo:* this is a ſuperficial ulcer, of a bluiſh colour, formed in the black of the eye, and covering moſt of it; when the pupil itſelf is affected by this, the ſight is uſually much impaired. 2. The *nubecula:* this was a ſmaller, deeper, and whiter ulcer, formed alſo in the black of the eye. 3. The *epicauma:* this was a roughneſs of the whole black of the eye, in which it appeared parched, or burnt, and was of a greyiſh colour over the entire ſurface. 4. The laſt of theſe diſorders was the *encauma:* by this name they expreſſed an ulcer, which produced an impure and ſolid cruſt, either in the black or white of the eye, and uſually was produced by a fever. And the corroſion of the matter of this ſort of ulcer was ſo ſharp, that the coats of the eyes were not unfrequently eaten through, and the humours fell out. Aëtius, Tetrabibl. 2. cap. 3.

ENCAUMA, in the *Old Writers on Medicine*, is alſo uſed to expreſs the ſcoriæ of ſilver.

ENCAUSTIC *Painting*, Εγκαυστικη, from εγκαιω, *inuro*, *I burn in*, is a ſpecies of painting with burnt wax, practiſed by the ancients, and lately revived. Pliny has given the following brief account of the invention and nature of this art: *Ceris pingere ac picturam inurere, quis primus excogitaverit, non conſtat: quidam Ariſtidis inventum putant. poſtea conſummatum à Praxitele; ſed aliquanto vetuſtiores* encauſticæ *picturæ extitere, ut Polygnoti, & Nicanoris, & Arceſilai, Pariorum. Lyſippus quoque, Eginæ, picturæ ſuæ inſcripſit* ἐνέκαυσεν; *quod profectò non feciſſet, niſi* encauſtica *inventa. Pamphilus quoque Apellis præceptor non pinxiſſe tantùm* encauſtica, *ſed etiam docuiſſe traditur Pauſiam Sycionium, primum in hoc genere nobilem.* Lib. xxxv. cap. 11. From this paragraph we learn, that the method of painting in wax, and burning in the picture, was very ancient; nor is it improbable that in former times, when they were unacquainted with dry oils, and tranſparent varniſhes, they ſhould make uſe of this method for preſerving their colours from damps and heats; though ſome imagine, that by *ceris* is meant a compoſition, different from wax, and capable of bearing the fire; and that burning the picture denotes merely enamelling. Pliny in the ſame chapter informs us, that there were anciently two methods of *encauſtic* painting in uſe: Encauſto *pingendi duo fuiſſe antiquitùs genera conſtat, cerâ & in ebore,* ceſtro, i. e. viriculo; *donec claſſes pingi cæperè. Hoc tertium acceſſit, reſolutis igni ceris, penicillo utendi; quæ pictura in navibus nec ſole, nec ſale, ventiſque corrumpitur.* Dr. Parſons maintains, that the *ceſtrum* was a pointed tool uſed in modelling or carving upon ivory or wax; and he ſuppoſes that there is a contraſt between the uſe of the *ceſtrum*, and painting ſhips with a bruſh, and therefore that the term *pingendi* cannot be underſtood to mean the laying on of paint. However, there is a paſſage in Vitruvius, lib. vii. cap. 9. which ſerves to aſcertain the nature of the ancient *encauſtic* painting. *At ſi quis ſubtilior fuerit, & voluerit expolitionem miniaceam ſuum colorem retinere,* &c. i. e. if any one is more wary, and would have the poliſhing, or painting, with vermilion hold its colour, when the wall is painted and dry, let him take Carthaginian wax, melted with a little oil, and rub it on the wall with a hair-pencil; and afterwards let him put live coals into a chafing-diſh, and hold it cloſe to the wax; when the wall, by being heated, begins to ſweat, let it be made ſmooth; afterwards let him rub it with a candle, and clean linen rags, in the ſame manner as they do the naked marble ſtatues. This the Greeks call καυσις. The coat of Carthaginian wax is ſo ſtrong, that it neither ſuffers the moon by night, nor the ſun-beams by day, to deſtroy the colour. From this paſſage we learn the ancient method of painting in wax by inuſtion, more obſcurely expreſſed by Pliny; though Pliny, in another paſſage, expreſſly informs us, that they uſe coloured wax: *Ceræ* (he ſays) *tinguntur iiſdem his coloribus, quæ inuruntur*; that they employed a pencil to lay on the melted wax; *reſolutis igni ceris, penicillo utendi*; that the picture was fixed by inuſtion, *picturam inurere.* And we learn from Vitruvius, that the whole was cleaned and poliſhed with linen rags. This ancient art, after having been long loſt, was reſtored by count Caylus, a member of the Academy of Inſcriptions in France; and the method of painting in wax was announced to the Academy of Painting and Belles Lettres, in the year 1753; though M. Bachelier, the author of a treatiſe De l'Hiſtoire & du Secret de la Peinture en Cire, had actually painted a picture in wax in 1749; and he was the firſt who communicated to the public the method of performing the operation of inuſtion, which is the principal characteriſtic of the *encauſtic* painting. The count kept his method a ſecret for ſome time, contenting himſelf with exhibiting a picture at the Louvre in 1754, repreſenting the head of Minerva, painted in the manner of the ancients, which excited the curioſity of the public, and was very much admired. In the interval of ſuſpence, ſeveral attempts were made to recover the ancient method of painting. The firſt ſcheme adopted was that of melting wax and oil of turpentine together, and uſing this compoſition as a vehicle for mixing and laying on the colours. But this method did not explain Pliny's meaning, as the wax is not burnt in this way of managing it. In another attempt, which was much more agreeable to the hiſtorian's deſcription of *encauſtic* painting, the wax was melted with ſtrong lixivium of ſalt of tartar, and with this the colours were ground. When the picture was finiſhed, it was gradually preſented to the fire, ſo as to melt the wax; which was thus diffuſed through all the particles of the colours, ſo that they were fixed to the ground, and ſecured from the acceſs of air or moiſture. But the method of count Caylus is much more ſimple: the cloth, or wood, which he deſigned for the baſis of his picture, is waxed over, by only rubbing it ſimply with a piece of bees-wax; the wood, or cloth, ſtretched on a frame, being held horizontally over, or perpendicularly before a fire, at ſuch a diſtance, that the wax might gradually melt, whilſt it is rubbed on, diffuſe itſelf, penetrate the body, and fill the interſtices of the texture of the cloth, which, when cool, is fit to paint upon; but as water-colours, or thoſe that are mixed up with common water, will not adhere to the wax, the whole picture is to be firſt rubbed over with Spaniſh chalk or white, and then the colours are applied to it; when the picture is dry, it is put near the fire, whereby the wax melts, and abſorbs all the colours.

Mr. J. H. Muntz, in a treatiſe on this ſubject, has propoſed

poſed ſeveral improvements in the art of *encauſtic* painting. When the painting is on cloth, he directs it to be prepared by ſtretching it on a frame, and rubbing one ſide ſeveral times over with a piece of bees-wax, or virgin's wax, till it is covered with a coat of wax of conſiderable thickneſs. In fine linen, this is the only operation neceſſary previous to painting; but coarſe cloth muſt be rubbed gently on the unwaxed ſide with a pumice ſtone, to take of all thoſe knots, which would prevent the free and accurate working of the pencil. Then the ſubject is to be painted on the unwaxed ſide with colours prepared, and tempered with water; and when the picture is finiſhed, it muſt be brought near the fire, that the wax may melt and fix the colours. This method, however, can only be applied to cloth, or paper, through the ſubſtance of which the wax may paſs; but in wood, ſtone, metals, or plaſter, the former method of count Caylus muſt be obſerved.

Mr. Muntz has alſo diſcovered a method of forming grounds for painting with crayons, and fixing theſe, as well as water-colours, employed with the pencil. On the unwaxed ſide of a linen cloth, ſtretched and waxed as before, lay an even and thick coat of the colour proper for the ground: having prepared this colour, by mixing ſome proper pigment with an equal quantity of chalk, and tempering them with water. When the colour is dry, bring the picture to the fire that the wax may melt, paſs through the cloth, and fix the ground. An additional quantity of wax may be applied to the back of the picture, if that which was firſt rubbed on ſhould not be ſufficient for the body of colour; but as this muſt be laid on without heat, the wax ſhould be diſſolved in oil of turpentine, and applied with a bruſh, and the canvas be again expoſed to the fire, that the freſh ſupply of wax may paſs through the cloth, and be abſorbed by the colour; and thus a firm and good body will be formed for working on with the crayons. If cloth and paper are joined together, the cloth muſt be firſt fixed to the ſtraining frame; and then the paper muſt be paſted to it with a compoſition of paſte made with wheaten flour, or ſtarch and water, and about a twelfth part of its weight of common turpentine. The turpentine muſt be added to the paſte when it is almoſt ſufficiently boiled, and the compoſition well ſtirred, and left to ſimmer over the fire for five or ſix minutes; let wax be diſſolved in oil of turpentine to the conſiſtence of a thin paſte; and when the cloth and paper are dry, let them be held near a fire; and with a bruſh lay a coat of the wax and turpentine on both ſides the joined cloth and paper, in ſuch a degree of thickneſs, that both ſurfaces may ſhine throughout without any appearance of dull ſpots. Then expoſe the cloth to the fire or to the ſun; by which means the oil will evaporate, and the wax become ſolid, and be fit to receive any compoſition of colour for a ground, which is to be laid on as above directed in the caſe of cloth without paper.

Almoſt all the colours that are uſed in oil-painting may be alſo applied in the *encauſtic* method. Mr. Muntz objects, indeed, to brown, light pink, and unburnt *terra di Sienna*; becauſe theſe, on account of their gummy or ſtony texture, will not admit ſuch a coheſion with the wax as will properly fix them; but other colours, which cannot be admitted in oil-painting, as red-lead, red orpiment, cryſtals of verdegris, and red precipitate of mercury, may be uſed here. The crayons uſed in *encauſtic* painting are the ſame with thoſe uſed in the common way of crayon painting, excepting thoſe that in their compoſition are too tenacious; and the method of uſing them is the ſame in both caſes.

The *encauſtic* painting has many peculiar advantages; though the colours have not the natural varniſh or ſhining which they acquire with oil, they have all the ſtrength of paintings in oil, and all the airineſs of water-colours, without partaking of the apparent character or defects of either; they may be looked at in any light and in any ſituation, without any falſe glare; the colours are firm, and will bear waſhing; and a picture, after having been ſmoaked, and then expoſed to the dew, becomes as clean as if it had been but juſt painted. It may alſo be retouched at pleaſure, without any detriment to the colours; for the new colours will unite with the old ones, without ſpots, as is the caſe in common ſize painting; nor is it neceſſary to rub the places to be retouched with oil, as in oil pictures; it is not liable to crack, and eaſily repaired, if it ſhould chance to ſuffer any injury. The duration of this painting is alſo a very material advantage; the colours are not liable to fade and change; no damp can affect them, nor any corroſive ſubſtance injure them; nor can the colour fall off in ſhivers from the canvas. However, notwithſtanding all theſe and other advantages enumerated by the abbé Mazeas, and Mr. Muntz, this art has not yet been much practiſed. Many of theſe properties belong to a much higher ſpecies of *encauſtic* painting lately diſcovered in England, the colours of which are fixed by a very intenſe heat; nor are the colours, or grounds, on which they are laid, liable to be diſſolved or corroded by any chemical menſtruum, nor, like the glaſſy colours of enamel, to run out of the drawing on the fire. See on this ſubject, Phil. Tranſ. vol. xlix. art. 100. p. 652. art. 101. p. 655. Id. vol. li. art. 8. p. 40. art. 9. p. 53. Muntz's *Encauſtic* Eloge of count Caylus, in the Hiſt. de l'Acad. Roy. des Inſcript. & Belles Lettres, vol. xxxiv. Handmaid to the Arts, &c. vol. i. ch. ix. p. 245. 261.

ENCAUSTICE has been ſometimes uſed to denote the art of ENAMELLING.

ENCAUSTUM *cæruleum*, is a name given to powder BLUE.

ENCAUSTUM *ſacrum*, a name given, by many authors, to that fine red colour, uſed for illuminating the capital letters in ſome old manuſcripts. Procopius calls it *baphe*, ſome have called it coccus, and ſome cinnabar. It is ſaid that it was made of the purple colour, extracted from the murex, or purple fiſh, with ſome other additions. It is to be obſerved, that however well this colour, when laid on the parchment, or paper, might reſemble the colours of enamel, yet it was as improper to call it *encauſtum*, which ſignifies a *colour burnt in*, as in enamelling it would have been to have called it atramentum, or ink.

ENCEINTE, Fr. from *enceindre*, *to ſurround*, in *Fortification*, the wall, or rampart, which ſurrounds a place, ſometimes compoſed of baſtions and curtains either faced or lined with brick, or ſtone, or only made of earth.

The *enceinte* is ſometimes only flanked by round or ſquare towers, which is called a Roman wall.

ENCEPHALI, in *Medicine*, an epithet applied to worms generated in the head; where they occaſion violent pains, inſomuch as, ſometimes, to produce diſtraction.

The word is compounded of the prepoſition εν, *in*; and κεφαλη, *head*.

There are four kinds of *encephali*; thoſe properly ſo called, which are found in the brain; the narenarii, in the noſe; auriculares, in the ears; and the dentales, in the teeth.

The *encephali*, properly thus called, are rare; but there are certain diſeaſes wherein they ſwarm; and we are told of peſtilential fevers, that have ariſen wholly from them. In one of theſe fevers, the phyſicians, having opened the perſon it had carried off, found a little, ſhort, red worm in the head. Hereupon, they tried various medicines, to find what might deſtroy it; but all in vain, till Malmſey wine, wherein horſe-radiſh had been boiled, was applied; this was no ſooner thrown on the worm, than it died. The ſame remedy was afterwards tried on the ſick, and it recovered them almoſt all. The like worms have alſo been taken out by trepanning, and the patient recovered.

ENCEPHALITES *lapis*, in *Natural Hiſtory*, the name given, by authors, to a ſort of coarſe ſtone, ſuppoſed, in ſome degree, to reſemble the human brain. We have, in the foſſile world, many ſtones, named from the parts of animals, which they have, in reality, been formed from, or owed their original to; and theſe are properly enough called by names denoting the things whoſe forms they wear; but it is a very wrong practice, from ſome ſlight external reſemblances, to give ſuch names to things that never can have been ſuppoſed to be ſo entitled to them. No one can be ſo abſurd as to imagine a human brain can be petrified, though a ſtone may accidentally ſomewhat reſemble its form. The perſon poſſeſſed of ſuch an accidental ſpecimen, ſhould have ranked it among the ſtones to which it properly belonged as a ſtone, whether a flint, a pebble, or a nodule, and have named, as an accident only, this form of it; and not have given it a peculiar denomination, as if it were a new ſpecies.

ENCEPHALOS, in *Phyſiology*. See BRAIN.

ENCEPPE', in *Heraldry*, denotes chained, or girt round the middle; as is uſual with monkeys, &c.

ENCERIS, in *Pharmacy*, a word uſed by Galen to ſignify ſmall concretions of wax, which formed themſelves in melted plaſters, of which wax was one of the ingredients. As they cooled, the wax cooling firſt, and collecting itſelf into little grumes, ſpoiled the conſiſtence and form of the whole compoſition.

ENCHANTERS *Nightſhade*. See NIGHTSHADE.

ENCHANTMENT, of *in*, and *canto*, *I ſing*, denotes certain words and ceremonies uſed by magicians in the practice of their pretended and deluding art; thus called, becauſe the *formulæ* of their *enchantment* were generally compoſed in verſe, and deſigned to be ſung. See CHARM, FASCINATION, MAGIC, SORCERY, and WITCHCRAFT.

ENCHASING, INCHASING, or CHASING, the art of enriching and beautifying gold, ſilver, and other metal-works, by ſome deſign or figures repreſented thereon, in low relievo. See SCULPTURE, RELIEVO, &c.

Chaſing is only practiſed on hollow, thin works; as watch-caſes, cane-heads, tweezer-caſes, or the like. It is performed by punching or driving out the metal to form the figures from within-ſide, ſo as to ſtand out prominent from the plane or ſurface of the metal.

In order to this, they have a great number of fine ſteel blocks, or puncheons, of divers ſizes; and the deſign being drawn on the ſurface of the metal, they apply the inſide upon the heads or tips of theſe blocks, directly under the lines or parts of the figures. Then, with a fine hammer, ſtriking on the metal ſuſtained by the block, the metal yields, and the block makes an indenture or cavity on the inſide; correſpondent to which, there is a prominence on the outſide, which is to ſtand for part of the figure.

Thus the workman proceeds to *chaſe* and finiſh all the parts, by ſucceſſive applications of the block and hammer to the ſeveral parts of the deſign.

And it is ſurpriſing, with what beauty and juſtneſs, by this ſimple piece of mechaniſm, the artiſts in this kind will repreſent foliages, groteſques, animals, hiſtories, &c.

ENCHEIRESIS, Εγχειρησις, from εν, *in*, and χερ, *a hand*, in *Anatomy*, denotes manual operation; as diſſection.

ENCHELIDES, in *Zoology*, the name of a genus of animalcules, containing the capillary eels, whether of pepper-water, vinegar, &c. See ANIMALCULE and PEPPER, VINEGAR, and EEL.

ENCHELUS, Εγχελυς, in *Ichthyology*, the name given by Ariſtotle, Appian, and all the Greek writers, to the EEL.

ENCHESON, a French word, uſed in our *Law-books* and *Statutes*, ſignifying the occaſion, cauſe, or reaſon, wherefore any thing is done. Stat. 5 Edw. III. cap. 3.

ENCHYMA, of εγχυω, *I pour in*, in the *Medical Writings of the Ancients*, a word uſed in ſeveral ſenſes. Some have made it expreſs only an *infuſion*; others have uſed it for what the modern phyſicians call *plethora ad vaſa*, that is, a fulneſs of the veſſels, ſimply conſidered, as relative to themſelves; and others have made it the name of certain forms of liquid medicines, to be injected into the ears, into the thorax, or any other part.

ENCHYMOMA, of εγχυμος, from εγχυω, in the *Writings of the Ancient Phyſicians*, a word uſed to expreſs that ſudden effuſion of blood into the cutaneous veſſels, which ariſes from joy, anger, ſhame, or any other violent emotion of the mind, and is what we uſually call BLUSHING; which, according to Dr. Hunter, is a nervous affection.

ENCHYMOMA, is alſo an afflux of the blood, whereby the external parts are rendered black and blue, as in the ſcurvy, blood-ſhot eyes, &c.

ENCHYMONITES, in *Natural Hiſtory*, the name of a kind of ſtone found in Macedonia, and ſome other places, which was alſo called *pæonites* and *pæanites*: it was ſuppoſed to be of great virtue to aſſiſt women in labour. See CEANIDES.

ENCHYSMA, the ſame with CLYSTER or enema.

ENCHYTA, in the *Medical Writings of the Ancients*, a name given to ſuch medicines as were injected into the eyes, or into any part.

Some alſo have uſed the ſame word to expreſs a ſort of funnel, contrived to convey the fumes of medicines to any part of the body.

ENCÆLIA, of εν, *in*, and κοιλια, *belly*, a word uſed by many of the ancient medical writers, to expreſs the viſcera contained in the abdomen, or lower belly.

ENCLAVE´, in *Heraldry*, is where one thing is let into another, particularly where the jointure is ſquare.

ENCLITICA, of εγκλινω, *I incline*, in the *Greek and Latin Grammar*, certain particles, united ſo cloſely to the preceding word, that they only ſeem to form one word therewith; and the word which ſuſtains them does generally likewiſe bear the accent that governs them, eſpecially when the *enclitic* is a monoſyllable; as in *dominuſque*, κυριος τε.

There are three *enclitic* particles in the Latin, viz. *que*, *ne*, and *ve*; but in the Greek many, as τȣ, μȣ, μοι, με, σȣ, σοι, σε, πως, πη, τε, γε, φημι, ειμι, ποτε, and others.

ENCONDRUS, of εν, *in*, and χονδρος, *grain*, in the *Old Greek Writers*, a word uſed to expreſs any thing made up of a great number of ſmall pieces, or flakes, or ſmall grains of any thing. The manna of the ancients was not in large flakes, as we have it at preſent, but it was formed of a vaſt number of ſmall granules, and was therefore called by Dioſcorides, and ſome others of the Greeks, by this name. The word manna alſo ſignified with them the ſame thing; and they not only expreſſed the ſubſtance by it which we at preſent call ſo, but any other thing that was in ſmall flakes, or pieces, was called manna. Thus the manna thuris, ſo much talked of among the old Greeks, was only a collection of thoſe pieces which flew off from frankincenſe in the breaking. See MANNA *libanotis*.

ENCOPE, of εν and κοπτω, *I cut*, in *Surgery*, an inciſion of any part; as in a gangrene, &c.

ENCOUNTERS, in *Military Language*, a combat between two perſons; and the term is alſo more generally applied to attacks or battles between ſmall or large armies.

ENCRANIUM, in *Anatomy*, the ſame with CEREBELLUM.

ENCRASICOLUS, the anchovy, a ſmall ſea-fiſh, one of the harengiform kind, but wanting the row of ſerrated ſcales on the belly. They are caught in vaſt plenty in the Mediterranean, the Engliſh, and many other ſeas, and are well known in pickle in moſt nations of Europe. See ANCHOVY.

ENCRATITÆ, formed from εγκρατης, *continent*, a ſect of ancient heretics, thus called from their making profeſſion of continence, and abſolutely rejecting all uſe of marriage.

The founder of this ſect was Tatian, a diſciple of Juſtin, and one of the moſt learned perſons of all antiquity. After the death of that martyr, he made a ſeparation from the church, and ſoon had his followers; who, beſide the dogma juſt mentioned, borrowed a great many things from Saturninius and Marcion; beſide ſeveral errors, which they adhered to in common with the Gnoſtics and Valentinians.

They abſtained from eating any thing that had life, and denied that Adam was ſaved. They looked on ſuch as drank wine to be great ſinners; and for this reaſon only made uſe of water in celebrating the Euchariſt, as holding, that wine came from the devil. To countenance this tenet, they produced paſſages out of ſcripture, where mention is made of what befel Noah and Lot, when they were drunk.

They only admitted ſuch of the books of the Old Teſtament as they thought good; but in lieu thereof, they owned ſeveral ſpurious and apocryphal writings for canonical and divine. Such were the Acts of St. Andrew, John, and Thomas.

ENCRAULOS, in *Ichthyology*, the name given by Ariſtotle and many other of the ancient Greeks, to the fiſh which we call the anchovy. Authors deſcribe this under the diſtinct name of encraſicolus; but Artedi proves it to be a ſpecies of the ſame genus with the herring, and calls it the clupea with the upper-jaw longer than the under. This name carries a diſtinction with it that cannot be miſtaken.

ENCRINOS, in *Natural Hiſtory*, a name given by authors to a ſpecies of aſteropodium, or that plated and imbricated body which makes the baſe or root of the aſteria. This is compoſed of a number of ſmall plates, convex on one ſide, and concave on the other; and when found in fair pieces, is ſaid very exactly to reſemble a part of a ray of the magellanic ſtar. See ASTEROPODIUM.

ENCRIS, in the *Medical Writings of the Ancients*, ſignifies a ſort of cake made of fine flour, mixed with oil, and ſweetened with honey.

ENCROACHMENT, or ACCROACHMENT. See INCROACHMENT, and ACCROCHING.

ENCUMONIS, ſee ENCHYMONITES.

ENCURECK, in *Natural Hiſtory*, a venomous inſect, found in Perſia, and ſuppoſed by ſome to be a kind of tarantula. It neither ſtings nor bites, but lets fall its venom like a drop of water, which cauſes inſufferable pain in the part for a time; and afterwards ſo profound a ſleep, that we are told, nothing can raiſe the patient from it but cruſhing one of thoſe creatures on the part affected. It is nevertheleſs ſaid, that the ſheep eat theſe inſects without damage. Olearius, ap. Boyle, Works abr. vol. i. p. 37. Ibid. p. 38.

ENCYCLOPÆDIA, the circle or chain of arts and ſciences.

The word is compounded of the prepoſition εν, *in*, κυκλος, *circle*, and παιδεια, *ſcience*, *doctrine*, *diſcipline*, *learning*; the root being παις, *child*, *infant*.

The Greeks uſed the term for the knowlege of the ſeven liberal arts, and the poſſeſſion of all the ſciences. *Orbis ille doctrinæ, quem Græci* εγκυκλοπαιδειαν *vocant*, ſays Quintilian. It is ſometimes alſo written, κυκλοπαιδεια, *cyclopædia*.. Vitruvius, in the Preface to his ſixth book, calls it, *encyclios diſciplina*. See CYCLOPÆDIA.

END *for* END, in the *Sea-language*, when a rope runs all out of the block, ſo that it is unreeved, they ſay it is run out *end for end*.

ENDECAGON, or HENDECAGON, in *Geometry*. See HENDECAGON.

ENDECASYLLABUS, or HENDECASYLLABUS. See HENDECASYLLABUM.

ENDECERES, of ενδεκα, *eleven*, in the *Naval Architecture of the Ancients*, a word uſed to expreſs a galley which had eleven ſeries or tires of rowers. Thoſe with two or three tires were very much in uſe among the ancients, and from thoſe to ſuch as had five or ſix tires. Thoſe of nine tires were ſometimes uſed, but it was very ſeldom; and thoſe of eleven, fifteen, and ſo on, were rather for ſtate than ſervice. We read of them carried ſo high as to contain twenty, thirty, and forty rows of oars. One of this largeſt ſort was built for Philopator, which required four thouſand men.

ENDEIXIS, of ενδεικνυμι, *I indicate*, in *Medicine*, an indication of diſeaſes, whereby is ſhewn what is to be done; as for example, a *plethora*, or too great fulneſs of blood, indicates the opening of a vein. Blancard, in voc. See DISEASE.

ENDEIXIS, Ενδειξις, in *Antiquity*, an action brought againſt ſuch as affected any place or thing, of which they were incapable by law. Pott. Archæol. Græc. lib. i. cap. 23. tom. i. p. 125.

ENDEMIC *diſeaſe*, of εν and δημος, *people*, that which affects many people together in the ſame country, as proceeding from ſome cauſe peculiar to the country where it reigns. See DISEASE.

ENDENTED, DENTED, or INDENTED, in *Heraldry*. See INDENTED.

ENDENTED, is alſo applied to a feſs or pale, and other triangular pieces, when divided alternately between two different colours. Coupé, or *endented* with or and azure.

ENDESIS, from εν and δεω, *I bind*, a word uſed by Hippocrates to expreſs that part of the foot where the bones of the tibia end, and which is connected by ligaments to the ankle.

ENDEW, in *Falconry*, is ſaid of a hawk that digeſts her meat ſo well, that ſhe not only diſcharges her gorge of it, but ever cleanſes her pannel.

ENDICA, a word uſed by the alchemiſts for the fæces which ſubſide to the bottom of the veſſel in infuſions; to ſome of which they attribute great virtues.

ENDITEMENT, or INDICTMENT, in *Common Law*. See INDICTMENT.

ENDIVE, or SUCCORY, *cichorium*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the flower hath a common ſcaly empalement, which at firſt is cylindrical, but is afterward expanded; the ſcales are narrow, ſpear-ſhaped, and equal. The flower is compoſed of many hermaphrodite florets with one petal, which is tongue-ſhaped, and cut into five ſegments. Theſe have five ſhort hairy ſtamina: the germen is ſituated under the petal, which afterwards becomes a ſingle ſeed, incloſed with a down, and ſhut up in the empalement. There are four ſpecies. See *Tab.* V. *of Botany*, *Claſs* 1.

The curled *endive* is now much cultivated in the Engliſh gardens, being one of the principal ingredients in the ſallads of autumn and winter; for which purpoſe it is continued as long as the ſeaſon will permit. The firſt time for ſowing theſe ſeeds is in June; for thoſe which are ſown earlier in the year, generally run up to ſeed before they are arrived to a proper ſize for blanching.

Thoſe plants which were firſt tranſplanted will be fit to blanch by the end of Auguſt at fartheſt; and if they are properly managed, in three weeks or a month they will be ſufficiently blanched for uſe; which will be as ſoon as theſe ſallads are commonly required; for during the continuance of good cos lettuce, few perſons care for *endive*.

As the quantity of roots required for a middling family is not very great, ſo there ſhould not be too many plants tied up to blanch at the ſame time. The manner of tying them is this: firſt gather all the inner leaves of the plant in regular order into one hand; and then take up all thoſe that are ſound of the outſide ones, pulling off the decayed ones which lie near the ground, obſerving to place the outſide leaves near the middle ones, as near as poſſible in their natural order, ſo as not to croſs each other. Having thus got the whole plant up in your hand, tie it up with baſs or twigs, at about two inches below the top, very cloſe. About a week after, the plants ſhould be gone over again, to have another tie round the middle, to prevent the heart-leaves from burſting out on one ſide, which they are ſubject to do, as the plants grow, if not prevented.

After October, when the nights begin to be froſty, thoſe plants which are far above ground will be liable to be prejudiced thereby, eſpecially if not covered up at ſuch times: the beſt method, therefore, for the late crops is, to take up the plants in a very dry day, and with a large flat pointed dibble plant them into the ſides of trenches of earth, which ſhould be laid very upright, ſideways towards the ſun, with the tops of the plants out of the ground, ſo that the haſty rains may run off, and be kept dry and ſecured from froſts. The plants thus treated, will be blanched fit for uſe in about three weeks or a month's time; after which they will not keep good long.

The wild *ſuccory*, of which there are ſome varieties in the colour of the flowers, is ſeldom propagated in gardens, it growing wild in unfrequented lanes and dunghills, in divers parts of England, where the herb-women gather it, and ſupply the markets for medicinal uſe. Miller.

The common *ſuccory* ſtands recommended by moſt of the medical writers, as one of the beſt known aperients and detergents: it is preſcribed in all diſeaſes of the liver, and is a powerful diuretic, Schroder tells us, that it has alſo great virtues attributed to it againſt hæmorrhages; but it is not much regarded at preſent in that light.

ENDIVIA *marina*, the *ſea-endive*, in *Natural Hiſtory*, the name of a ſpecies of ſea-plant, deſcribed by count Marſigli. There are two ſpecies of it, the one having broad and jagged leaves, reſembling thoſe of the vine, the other much narrower. This laſt kind grows on ſtones, ſhells, pieces of wood, or any other ſubſtances, accidentally found at the bottom of the ſea. It ſeldom grows in very deep water, and thrives beſt in places where the ſea is calm and quiet. It is of a duſky greeniſh colour, variegated in ſome places with yellow. It exactly reſembles the ſhape of the *endive* common in our gardens, and its leaves are cut and fringed in the ſame manner; but they are of ſo tender a ſubſtance, that a ſlight touch deſtroys them; they are indeed tenderer and more delicate than thoſe of any other known plant, either of the ſea or land. When this plant is examined by the microſcope, its ſurface is found to be compoſed of a great number of eminences and cavities, or little holes, between and among them; and when the leaves are cut tranſverſely, there are ſeen a great number of glandules in them. Marſigli, Hiſt. de la Mer, p. 72. See CORALLINES.

ENDLESS *rolls*, and *ſcrew*, ſee the ſubſtantives.

ENDORSE, in *Heraldry*, an ordinary, containing the eighth part of a pale.

This, Leigh ſays, is never uſed but when a pale is between two ſuch; though others hold, that an *endorſe* may be borne between birds, fiſhes, beaſts, &c. Sir J. Ferne adds, that it ſhews the ſame coat has been ſometimes two coats, and afterwards conjoined within one eſcutcheon, for ſome myſtery of arms. He bears azure an *endorſe* argent. *Tab.* II. *Herald. fig.* 58.

ENDORSED, ENDOSSE', in *Heraldry*, is where things are borne back to back.

ENDORSEMENT, of *in* and *dorſum*, *back*, is particularly uſed in *Commerce*, for a writing on the back of a bill of exchange by the proprietor or bearer, either thereby to transfer it to ſome other, or to render it payable to the order of ſome other, or elſe to ſerve for an acquittance or receipt. See EXCHANGE.

The *endorſement* is only the name of the proprietor, or *endorſer*. Note, when the *endorſement* of a bill of exchange is to render it payable to another, it is called an *order*.

To an order it is neceſſary the *endorſement* be dated, and contain the name of him who paid the value thereof; in which caſe, the bill belongs to the perſon with whoſe name the order is filed, without any other tra n without theſe conditions, the bill is judged to belong to the perſon who *endorſed* it. The bearer of a bill of exchange proteſted has a remedy againſt the *endorſers* for the payment of the re-change of the places where the bill was negociated by their order. In caſe a bill or note is refuſed to be paid, &c. the bearer has a remedy againſt any one of the *endorſers*, where there are ſeveral. See BILL.

ENDORSING, or INDORSING, in *Law*, implies the writing on the back-ſide of a deed, inſtrument, &c. ſomething relating to the matters contained therein.

ENDOSIS, Ενδοσις, of εν and διδωμι, *I give*, in the *Medical Writings of the Ancients*, a word uſed to expreſs a remiſſion of any kind, as when a tumour, inflammation, or hardneſs of any part, becomes leſs violent; and when the patient becomes eaſier, after the exacerbations in fevers of the continual kind, and after fits of the intermittent.

ENDOWMENT, or INDOWMENT, the giving or aſſigning of a dower to a woman. See DOWER.

The word is alſo uſed figuratively, for the ſetting forth or ſevering a ſufficient portion for a vicar, towards his perpetual maintenance, when the benefice is appropriated; whence ſuch a vicarage is called a vicarage *endowed*.

ENDYMATIA, in *Antiquity*, a kind of dance uſed among the Greeks, performed in Arcadia, to the ſound of certain airs compoſed for the flute.

ENELIAXIS, Ενηλιαξις, or rather *Enyaliaxis*, Ενυαλιαξις, in *Antiquity*, a feſtival in honour of Enyalius, whom ſome will have to be the ſame with Mars, others only one of his miniſters. Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 394.

ENEMA, of ενιημι, *I put in*, in *Medicine*, denotes a *clyſter*. See CLYSTER.

ENEMY. See ALIEN.

ENEOREMA, of εναιρεω, *I lift up*, is uſed by ancient medical writers for thoſe parts of the urine which float about in the middle reſembling a cloud, formed, according to Boerhaave, principally of muriatic ſalt. Comm. Inſtit. § 382.

ENEOS, of εν and αυω, *I cry*, a word uſed by the ancient writers in *Medicine* for a perſon born deaf, or unable to perform the common offices of life, for want of any of the principal organs.

ENERGETICAL *bodies* or *particles*, are ſuch as are eminently active, and which produce manifeſt operations of various natures, according to the various circumſtances and motions of ſuch bodies or particles.

ENERGICI, an appellation given to certain diſciples of Calvin and Melancthon, of the ſixteenth century, becauſe they held the Euchariſt was the energy and virtue of Jeſus Chriſt; not his real body, nor a repreſentation thereof.

ENERGUMENUS, Ενεργουμενος, a term ſometimes uſed by divines and ſchoolmen, to ſignify a perſon poſſeſſed with a devil, or an evil ſpirit.

The word is formed from the Greek, ενεργεισθαι, *to be agitated*, *worked*, of εν, and εργον, *opus*.

Though Papius ſays, the *Energumeni* were ſuch as counterfeited the actions of the devil, performing things which ſeemed ſupernatural. The council of Orange debars, or deprives the *Energumeni* of the functions of the prieſthood. See DÆMONIAC.

ENERGY, an uncommon force or ſtrength in a diſcourſe, a ſentence, or a word. See EMPHASIS.

The word is Greek, ενεργεια, formed of the prepoſition εν and εργον, *work*, *labour*.

ENERVATING, the act of deſtroying the force, uſe, or office, of the nerves, either by cutting them, by weakening them with debauchery, or by ſome other violence.

Exceſs of wine, and other ſtrong, hot, ſpirituous liquors, *enervate* or weaken the nerves. When they would render a horſe uſeleſs, they *enervate* him, or cut his nerves.

ENERVATING, is particularly uſed in the *Manege*, for the cutting two tendons on the ſide of a horſe's head, under the eyes, which meet on the tip of the noſe; they thus *enervate* horſes, to make their heads ſmall and lean.

The word is alſo uſed figuratively. It is no ſmall artifice in diſputing, to be able to *enervate* and extenuate the allegations of one's antagoniſt. This author has a weak, *enervate* ſtyle. See NERVE.

ENERVATION, a term in the *Ancient Anatomy*, applied to the tendons of the recti, or ſtrait muſcles of the abdomen.

The fibres of the recti of the abdomen do not go from one extreme of the muſcles to the other, but are interſected by ſeveral nervous places, called by the ancients *enervations*, though they be real tendons.

Their number is not alike in all; ſome having three, others four, &c.

ENFANS *perdus*, a French phraſe, uſed in *War*, to ſignify the ſoldiers who march at the head of a body of forces appointed to ſuſtain them, in order to begin an attack, make an aſſault, or force a poſt.

The word literally imports *loſt children*, on account of the imminent danger they are expoſed to.

In Engliſh, they are called the *forlorn*, or *forlorn hope*.

At preſent, the grenadiers uſually begin ſuch attacks.

ENFILADE, a French term, ſometimes uſed in Engliſh, ſignifying a ſeries or continuation of ſeveral things, diſpoſed, as it were, in the ſame thread or line; as an *enfilade* of rooms, of doors, of buildings, &c.

The word is formed of the French verb, *enfiler*, *to ſtring a thing*, which is compounded of *en*, *in*, and *fil*, of *filum*, *thread*; q. d. a thread or ſtring of any thing.

ENFILADE, in *War*, is applied to thoſe TRENCHES, and other lines, which are ranged in a right line, and ſo may be ſcoured or ſwept by the cannon lengthways, or in the direction of the line, and rendered almoſt defenceleſs.

Care muſt be taken that the lines be not *enfiled*, or *enfiladed*; on the contrary, the covert line muſt be *enfiladed*, that the enemy may be driven out of it. The laſt boyau, or gut of the trenches, is ſubject to be *enfiladed*, that is, to be ſcoured according to its length.

A *battery d'enfilade*, is that where the cannon ſweep a right line.

A *poſt*, or command *d'enfilade*, is a height from which one may ſweep a whole line at once.

ENFRANCHISEMENT, the incorporating any man into a ſociety or body politic. See FREEDOM and FRANCHISE.

Thus, he that by charter is made denizen of England, is ſaid to be *enfranchiſed*. The like is underſtood of a perſon made a citizen of London, or other city or corporate town; becauſe he is thereby made partaker of the liberties appertaining to the corporation whereof he is *enfranchiſed*.

ENGAGEMENT, in a *Naval ſenſe*, denotes a particular or general battle at ſea, or an action of hoſtility between ſingle ſhips, or detachments, or ſquadrons of men of war: the whoſe œconomy of which may be arranged under the heads of preparation, action, and repair. The preparation is begun by iſſuing the order to clear the ſhip for action, which is repeated by the boatſwain and his mates at all the hatchways. The hammocks are firſt removed; every ſailor ſtowing his own bedding properly and firmly cording it with a laſhing, or line provided for that purpoſe: as each ſide of the quarter deck and poop is furniſhed with a double net-work, ſupported by iron cranes fixed immediately above the gunnel or top of the ſhip's ſide; the hammocks thus corded, are firmly ſtowed by the quarter-maſter between the two parts of the netting, ſo as to form an excellent barrier or ſort of parapet, to prevent the execution of ſmall ſhot on the quarter-deck: the tops, waiſte, and fore-caſtle, are fenced in the ſame manner. At the ſame time the boatſwain and his mates are employed in ſecuring the ſail-yards, to prevent them from tumbling down when the ſhip is cannonaded, whereby it might be diſabled. The yards are ſecured by ſtrong chains or ropes, beſides thoſe by which they are uſually ſuſpended. The boatſwain alſo provides the neceſſary materials for repairing the rigging; and the carpenter and his crew prepare ſhot-plugs and mauls to cloſe up any breach that may be made near the ſurface of the water, and provide the iron-works neceſſary to refit the chain-pumps. The gunner with his mates and quarter-gunners, examine the cannon of the different batteries, and provide proper charges, &c. The maſter and his mates attend to the number and trimming of the ſails, &c. The lieutenants viſit the different decks, taking care that all incumbrances are removed, and giving inſtructions to the other officers, that every thing may be ready for the expected *engagement* at a moment's warning. When the hoſtile ſhips have approached each other to a competent diſtance, the drums beat to arms: the boatſwain and his mates pipe, *all hands to quarters!* at every hatch-way. The perſons appointed to manage the great guns immediately repair to their reſpective ſtations; crows, hand-ſpikes, rammers, ſpunges, powder-horns, matches, and train-tackles are placed in order by the ſide of every cannon. The hatches are laid to prevent any one from eſcaping into the lower apartments. The marines are drawn up in rank and file, on the quarter-deck, poop, and fore-caſtle. The laſhings of the great guns are let looſe, and the tompions withdrawn: the whole artillery, above and below, is run out at the ports, and levelled to the point-blank range ready for firing. When the neceſſary preparations are finiſhed, the commencement of the action is determined by the mutual diſtance and ſituation of the adverſe ſhips, or by the ſignal from the commander in chief of the fleet or ſquadron. The cannon being levelled in parallel rows, projecting from the ſhip's ſide, the moſt natural order of battle is evidently to range the ſhips a-breaſt of each other, eſpecially if the *engagement* is general. The moſt convenient diſtance is probably within the point-blank range of a muſket, ſo that all the artillery may do effectual execution. The combat uſually begins by a vigorous cannonade, accompanied with the united efforts of all the ſwivel-guns and ſmall arms. Inſtead of firing platoons, or vollies of cannon at once, the general rule on theſe occaſions throughout the ſhip is to load, fire, and ſpunge the guns with all poſſible expedition, yet without confuſion or precipitation. The captain of each gun is enjoined to fire only when the piece is properly directed to its object. The lieutenants who command the different batteries traverſe the deck, to ſee that the battle is proſecuted with vigour, and to animate the men in their duty. The midſhipmen ſecond theſe injunctions, and give aſſiſtance where it is required at the guns committed to their charge. The gunner takes care that the artillery is ſupplied with powder, and that the cartridges are conveyed along the decks in covered boxes. The ſhip that is defeated acknowleges the victory by ſtriking the colours, and is immediately taken poſſeſſion of by the conqueror, who ſecures her officers and crew as priſoners in his own ſhip, and inveſts two principal officers with the command of the prize till a captain is appointed by the commander in chief. When the *engagement* is concluded, they begin the repair. The cannon are ſecured by their breechings and tackles; the ſails that have been rendered unſerviceable, are unbent; and the wounded maſts and yards ſtruck upon the deck, and fiſhed or replaced by others. The ſtanding rigging is knotted, and the running rigging ſpliced wherever this is neceſſary. Proper ſails are bent in the room of thoſe that are become uſeleſs. The carpenter and his crew repair breaches in the ſhip's hull by ſhot-plugs, pieces of plank, and ſheet-lead. The gunner and his aſſiſtants repleniſh the allotted number of charged cartridges, and refit the damaged furniture of the cannon.

When two fleets or ſquadrons are preparing for *engagement*,

ment, it will be the endeavour of the admiral or commander in chief to come to action as ſoon as poſſible. To facilitate the execution of the admiral's orders, the whole fleet is ranged into three ſquadrons; each of which is claſſed into three diviſions, under the command of different officers. Before the action begins, the adverſe fleets are commonly drawn up in two lines parallel to each other, and cloſe-hauled. When the admiral diſplays the ſignal for the line of battle, the ſeveral diviſions ſeparate from the colours in which they were diſpoſed according to the uſual order of ſailing, and every ſhip crowds into its ſtation in the wake of the next a-head, at the diſtance generally of about fifty fathom; which diſtance is regularly obſerved from the van to the rear: though the admiral may ſometimes find it neceſſary to contract or extend his line, according to the length of that of his adverſary; always taking care that his own line be ſecure from being doubled, which might throw his van and rear into confuſion. When the adverſe fleets approach each other, the courſes are commonly hauled up in the brails, and the top-gallant ſails and ſtay-ſails furled: the frigates, tenders, and fire-ſhips, being hauled upon the wind, lie at ſome diſtance behind the line of battle; and tranſports and ſtore-ſhips lie beyond theſe, at a ſtill greater diſtance from the ſcene of action; and if the number of ſhips allows it, a body of reſerve from the different ſquadrons is ſelected to cover the fire-ſhips, &c. and ſtationed oppoſite to the weakeſt parts of the line, ſo that they may readily fall into the line in caſe of neceſſity. Each ſhip forming the line ſhould keep cloſe to its ſtation during the *engagement*; the aſſault of boarding being ſeldom permitted unleſs in ſingle action: becauſe the regularity of a cloſe line conſtitutes the principal force of the fleet; and the ſkill of the admiral is greatly concerned in keeping his line, notwithſtanding unequal attacks and damage, as complete as poſſible. If he proves victorious, he ſhould proſecute his victory as much as poſſible, by ſeizing, burning, or deſtroying the enemies ſhips. If he is defeated and reduced to the neceſſity of retreating, he may judge it expedient, for greater ſecurity, to range his fleet into the form of a half-moon, placing himſelf in the centre. The enemy's ſhips that attempt to fall upon his rear will thus be expoſed to the fire of the admiral and his ſeconds, and the eſcape of his own ſhips will be facilitated whilſt the purſuit of his adverſary is retarded. Upon the whole, the real force or ſuperiority of a fleet conſiſts leſs in the number of veſſels and the vivacity of the action, than in good order, dexterity in working the ſhips, preſence of mind and ſkilful conduct in the admiral and captains. Falconer's Marine Dict. Art. Engagement. See Battle, Line *of battle*, and Signal.

Engagement, in *Engliſh Hiſtory*, was the obligation impoſed by Oliver Cromwell required to be ſigned by every member of the Firſt Parliament in 1654, aſſembled by his authority, after he was declared Protector, viz. I *A. B.* do hereby freely promiſe and engage myſelf to be true and faithful to the Lord Protector, and to the commonwealth of England, Scotland, and Ireland, and ſhall not (according to the tenure of the indenture whereby I am returned to ſerve in this preſent parliament) propoſe or give any conſent to alter the government, as it is ſettled in one ſingle perſon and a parliament. Many, who refuſed to ſign this *engagement*, were excluded from the houſe.

ENGAMOS, in *Natural Hiſtory*, the name given by the people of ſome parts of Guinea to a root very common there, and much reſembling our larger ſort of turneps, but not ſo ſweet or juicy. They commonly boil theſe with their pattatas, in the ſame kettle with their meat. The latter of theſe roots, which is conſiderably different from our potatoe, gives a fine flavour to the whole, and makes the broth and meat taſte as if roſe-water were added to it. The *engamos* alſo partakes of the flavour, and in this caſe becomes very agreeable. Phil. Tranſ. N° 108.

ENGASTRIMANTES, Εγγαστριμαντεις, in *Antiquity*, called alſo Engastrimythi, Εγγαστριμυθοι, a deſignation given to ſuch diviners as were poſſeſſed with demons, which either lodged or ſpoke within their bodies. Pott. Archæol. Græc. lib. ii. cap. 12. tom. i. p. 301.

ENGASTRIMYTHUS, Εγγαστριμυθος, or Engastrimander, a perſon who ſpeaks from, or with the belly, without opening his mouth; or, if open, without ſtirring the lips.

Thus called by the Greeks, from εν, γαστηρ *belly*, and μυθος, *ſpeech*; and by the Latins, *ventriloquus*, *quaſi ex ventre loquens.*

The ancient philoſophers, &c. are divided on the ſubject of the *engaſtrimythi*: Hippocrates mentions it as a diſeaſe. Others will have it a kind of divination, and aſcribe the origin and firſt diſcipline thereof to one Eurycłus, whom nobody knows any thing of. Others attribute it to the operation or poſſeſſion of an evil ſpirit; and others, to art and mechaniſm.

The moſt eminent *engaſtrimythi* were the Pythians or prieſteſſes of Apollo, who delivered oracles from within, without any action of the mouth or lips.

St. Chryſoſtom and Oecumenius make expreſs mention of a ſort of divine men, called by the Greeks *engaſtrimandri*, whoſe prophetic bellies pronounced oracles.

M. Schottus, library-keeper to the king of Pruſſia, in a Diſſertation on the Apotheoſis of Homer, maintained that the *engaſtrimythi* of the ancients were only poets; who, when the prieſteſs could not ſpeak in verſe, ſupplied the defect, by explaining or delivering in verſe what Apollo dictated in the cavity of the baſon, placed on the ſacred tripod.

Leo Allatius has an expreſs treatiſe on the *engaſtrimythi*. See Ventri-loquists.

ENGENDERING, or Ingendering, the act of begetting or producing the kind, by way of generation.

The term is likewiſe applied to other productions of nature: thus, meteors are ſaid to be *engendered* in the middle region of the air. Crude fruits *engender* worms. The ancients believed, that inſects were *engendered* of putrefaction.

ENGINE, in *Mechanics*, a compound machine, conſiſting of ſeveral ſimple ones, as wheels, ſcrews, levers, or the like, combined together, in order to lift, caſt, or ſuſtain a weight, or produce ſome other conſiderable effect, ſo as to ſave either time or force.

The word is formed of the French, *engine*; of the Latin, *ingenium, wit*; becauſe of the ingenuity required in the contrivance of *engines*, to augment the effect of moving powers.

The kinds of *engines* are infinite; ſome for war, as the balista, catapulta, scorpio, aries, &c. others for the arts of peace, as mills, cranes, presses, clocks, watches; *engines* to drive piles, to raiſe water, wheel and water-*works*; to extinguiſh fire, ſee Fire-*engine*, &c. See Hydrocanisterium. See Steam-*engine*, &c. See alſo Instrument.

ENGINEER, or Ingineer, in its general ſenſe, is applied to a contriver or maker of any kind of uſeful engines or machines.

In its more proper ſenſe, it denotes an officer in an army or fortified place, whoſe buſineſs is to contrive and inſpect attacks, defences, works, &c.

An *engineer* ſhould be an able and expert mathematician, particularly verſed in military architecture and gunnery; being often ſent to view and examine the places intended to be attacked; to chooſe out, and ſhew the general the weakeſt place; to draw the trenches, aſſign the places of arms, galleries, lodgments on the counterſcarp and half-moons; conduct the works, ſaps, mines, &c. and appoint the workmen their nightly taſk: he is alſo to make the lines of contravallation; with the redoubts, &c.

Under the eſtabliſhment of the office of his majeſty's ordnance, the corps of *engineers* conſiſts of one colonel in chief, two directors or lieutenant-colonels, four ſub-directors or majors, twelve *engineers* in ordinary or captains, twelve *engineers* extraordinary or captains, fourteen ſub-*engineers* or lieutenants, twenty-four practitioner-*engineers* or ſecond-lieutenants, excluſive of a few *engineers* on the Iriſh eſtabliſhment. See Ordnance.

ENGISOMA, Εγγισωμα from εγγυς, *near*, a ſpecies of fracture of the ſcull, wherein one of the extremities of the fractured bone is thruſt inwards upon the dura mater, and the other extremity raiſed outwards. See Trepanning.

ENGLECERIE, Englecherie, or Engleschyre, a term of great import among our anceſtors, though now obſolete; properly ſignifying the quality of an Engliſhman.

If a man were privately ſlain, or murdered, he was anciently accounted francigena (which comprehended every alien, eſpecially the Danes) till *englecerie* was proved, i. e. till it was made to appear that he was an Engliſhman, Bracton, lib. iii.

The origin of the cuſtom anciently ſubſiſting among the Goths in Sweden and Denmark, was thus: king Canutus, having conquered England, at the requeſt of his nobles, ſent back his army into Denmark, only reſerving a guard of Danes for his perſon; and made a law, that if any Engliſhman killed a Dane, he ſhould be tried for the murder; or, if he eſcaped, the village where the man was ſlain ſhould be charged to pay ſixty-ſix marks into the exchequer. After this law, which was continued by William the Conqueror, for the like ſecurity to his own Normans, whenever a murder was committed, it was neceſſary to prove the party ſlain an Engliſhman, that the penalty of ſixty-ſix marks might not be charged on the village. This practice was aboliſhed by ſtatute 14 Edw. III. cap. 4.

ENGLISH, in a general ſenſe, ſomething that relates to the country or people of England.

We ſay, the *Engliſh* crown, *Engliſh* copperas, *Engliſh* names, *Engliſh* money, *Engliſh* meaſures, *Engliſh* weights, &c.

The ſweating-ſickneſs is called by foreigners, *ſudor Anglicanus*, the *Engliſh ſweat*. Dr. Cheyne calls the vapours the *Engliſh malady*. See SUDOR-ANGLICUS.

ENGLISH *Drops*, *Guttæ Anglicanæ*. See DROP.

ENGLISH, or the **ENGLISH** *Tongue*, the language ſpoken by the people of England; and with ſome variation, by thoſe of Scotland, as well as part of Ireland, and the reſt of the Britiſh dominions.

The *Engliſh* is of Gothic, or Teutonic extraction: this was the root or ſtock upon which ſeveral other dialects have been ſince grafted, particularly the Latin and French. See TEUTONIC, &c.

The language anciently ſpoken in our Iſland was the Britiſh, or Welſh, which was common to the Britons and Gauls; and which ſtill ſubſiſts, in more or leſs purity, in the principality of Wales, the iſlands and Highlands of Scotland, part of Ireland, and ſome provinces of France, particularly Bretagne, and very lately ſubſiſted in the county of Cornwall. See CORNISH *language*.

As the Roman empire, extending itſelf towards the weſtern parts of Europe, under Julius Cæſar, Claudius, and Domitian, came to take in Gaul and Britain, the Roman tongue became propagated therewith; all the edicts, &c. relating to the public affairs, being deſignedly wrote in that language.

The Latin, however, it is certain, never got ſo much ground, or prevailed ſo far in England, as in Lombardy, Spain, and the Gauls; partly on account of its great diſtance from Rome, and the ſmall reſort of Romans hither; and partly, becauſe the entire reduction of the kingdom was not effected till ſo late as the reign of Claudius, when the empire was on the declining hand, and the new province was forced to be ſoon deſerted by its conquerors, called to defend their territorries nearer home.

Britain, thus left naked, became an eaſy prey to the Angli, or Anglo-Saxons, a ſtrolling nation, from Jutland and Norway, who took an eaſy poſſeſſion thereof about the year 450, much about the time that the Franks, another German nation, entered Gaul. The Gauls and Franks, it ſeems, at length came to terms; found means to unite into one nation; and thus, the ancient Gauliſh, with its mixture of Latin, continued the prevailing tongue, only farther intermixed with the Francic or lingua Franca of their new inmates: but the Britons were more conſtant, and determined abſolutely to refuſe any ſuch coalition: they had embraced Chriſtianity, Auguſtine being ſent from Rome to convert them about the year 570, and their competitors were heathens; rather than admit of ſuch an union, therefore, they choſe to be ſhut up, with their language, in the mountainous parts of Cambria or Wales.

The *Engliſh* Saxons, thus left abſolute lords, changed every thing; their own language was now fully eſtabliſhed; and the very name of the country was henceforth to be Anglo-Saxon. The new language remained, in good meaſure, pure and unmixed, till the Norman invaſion: the attempts of the Danes, and the neighbourhood of the Britons, indeed, wrought ſome leſſer innovations therein; but, in the main, it preſerved itſelf; for, as to the Danes, their language was not much different from the other. Edward the Confeſſor, however, who had lived long in France, might poſſibly bring in a little mixture of the dialect of that country.

But William I. and his Normans, having got poſſeſſion of England, an alteration was ſoon attempted: the conqueſt was not complete, unleſs the Conqueror's language, the French or Franco-Gallic were introduced; and accordingly, all his acts, diplomas, edicts, pleadings, and other judicial matters, were written, &c. in that tongue.

But his attempts proved unſucceſsful; the number of Normans he brought over being very ſmall in compariſon of the *Engliſh*, with whom they were incorporated, they loſt or forgot their own language, ſooner than they could make any change in the *Engliſh*. This, however, did not hinder, but, by the endeavours of the Conqueror, abundance of French words, though many of them of Latin original, crept into the *Engliſh*; and many *Engliſh* words, by degrees, grew out of uſe.

Hence, as to the origin and etymology of many of our words, Dr. Wallis lays it down, that ſuch words of German original as we have, in common with the French, are to be reckoned as our own, rather than as words borrowed from them; and that the old Gauliſh words, common to the French and the Welſh, which are found in our language, have been likewiſe taken from the Welſh, rather than from the French. Hence, alſo, the ſame author accounts why the names of the divers ſorts of cattle are Saxon; as ox, cow, calf, ſheep, hog, boar, deer, &c. and yet that their fleſh, when prepared for food, is French; as beef, veal, mutton, pork, brawn, veniſon, &c. the Norman ſoldiers, not concerning themſelves with paſtures, parks, and the like places, where ſuch creatures are fed and kept, ſo much as with markets, kitchens, feaſts, and entertainments, where the food was either prepared, ſold, or eaten.

Under Henry II. Dr. Swift obſerves, the French made a ſtill greater progreſs; becauſe of the large territories he poſſeſſed on that continent, both from his father and his wife, which occaſioned frequent journies thither, with numerous retinues, &c. And for ſome centuries after, there was a conſtant intercourſe between France and England, by the dominions we poſſeſſed there, and the conqueſts we made; ſo that the language, two or three hundred years ago, ſeems to have had much more French than at preſent.

Beſides this alteration from the conquerors, the language in proceſs of time underwent ſeveral others; and at length came to have numerous words and phraſes of foreign dialects ingrafted into it, in lieu of the ancient Saxon; particularly, by means of negociations and commerce with other nations; by the marriages of royal families; by the affectation of many writers, in moſt ages, who are fond of coining new words, and altering the uſual forms of ſpeech, for the greater delicacy; and, by the neceſſity of framing or borrowing new words, according as new things and inventions turn up: and by ſuch means was the old Anglo-Saxon converted into the preſent *Engliſh* tongue.

Having traced the riſe and progreſs of our language hiſtorically, we think it may be no incurious amuſement to repreſent by actual examples the ſeveral ſucceſſive changes and ſtages it has paſſed through, to arrive at its preſent perfection: in order to which, we ſhall make uſe of the collections of the ingenious Mr. Greenwood.

From the Saxon invaſion, we have no memorial extant of the language for 250 years: the oldeſt Saxon writing in being is a gloſs on the Evangeliſts, written in the year 700, by Eadfride, biſhop of Holy Iſland; in which the three firſt articles of the Lord's Prayer run thus:

“ Uren Fader thic arth in heofnas, ſic gehalgud
“ thin noma, ſo cymeth thin ric. Sic thin willa
“ ſue is heofnas, and in eortho,” &c.

Two hundred years after, in the year 900, the ſame was rendered thus:

“ Thu ure Fader the eart on heofenum, ſi thin
“ nama gehalgod; cume thin rice. Si thin willa on
“ eorthan ſwa, ſwa on heofenum.”

In the following age it was turned thus in the Saxon Homilies, ſaid to be tranſlated by king Alfred:

“ Fæder ure thu the earth on heofenum, ſi thin
“ nama gehalgod, to be cume thin rice, gewurthe
“ thin willa on eoarthan ſwa, ſwa on heofnum,” &c.

About the year 1160, under Henry II. near which period the Saxon began to aſſume a form in which the beginning of the preſent *Engliſh* may be diſcovered; it was thus rendered by pope Adrian, an Engliſhman, in rhyme:

“ Ure Fader in heaven rich,
“ Thy name be hayled ever lich,
“ Thou bring us thy michell bliſſe:
“ Als hit in heaven y-doe
“ Evar in yearth beene it alſo,” &c.

About 100 years after, in the time of Henry III. it was tranſlated thus:

“ Fadir that art in heaven bliſſe,
“ Thin helge nam it wurth the bliſs,
“ Cumen & mot thy kingdom,
“ Thin holy will be it all don,
“ In heaven and in erdh alſo,” &c.

Two hundred years after, under Henry VI. it was rendered thus:

“ Our Fadir that art in hevenes, halewid be thi
“ name, thi kingdom come to thee, be thi will
“ don in eerthe, as in hevene.”

Dr. Hickes furniſhes an extraordinary ſpecimen of the *Engliſh*, as ſpoken in the year 1385, in his Theſaur. Liter. Septent. which we ſhall the rather entertain the reader with, as it is on this very ſubject, the *Engliſh tongue*; and contains not only the hiſtory, but the reaſons of the changes and differences therein:

“ As it is knowe how meny maner peple beeth in this
“ lond; there beeth alſo ſo many dyvers longages and
“ tonges. Notheleſs Walſche men and Scots that beeth
“ nought medled with other nations, holdeth wel nyh
“ hir firſt longage and ſpeche: but yif the Scottes that
“ were ſometime confederat and woned with the Pictes

“ drawe ſomewhat after hir ſpeche; but the Flemynges
“ that woneth in the weſte ſide of Wales, haveth left
“ her ſtrange ſpech, and ſpeketh Sexonliche now. Alſo
“ Engliſhe men, they had from the bygynnynge thre
“ maner ſpeche: northerne, ſowtherne, and middel
“ ſpeche in the middel of the londe, as they come of
“ three maner of peple of Germania: notheleſs by
“ commyxtion and mellynge firſt with Danes, and
“ afterwards with Normans, in meny the contrary lon-
“ gage is apayred [corrupted]. This appayrynge of the
“ burthe of the tunge is bycauſe of tweie thynges, oon
“ is for children in ſcole agenſt the uſage and maner of
“ all other nations, beeth compelled for to leve hire
“ own longage, and for to conſtrue hir leſſons and here
“ thynges in French, and ſo they haveth ſethe Normans
“ come firſt into Engelond. Alſo gentlemen children
“ beeth taught to ſpeke Frenſche from the tyme that
“ they beeth rokked in here cradel, and kunneth ſpeke
“ and play with a childes broche; and uplondiſſche men
“ will linke hymſelf to gentilmen, and fondeth with
“ great beſyneſſe for to ſpeake Frenſche to be told of.
“ Hit ſeemeth a greet wonder how *Engliſche* men and
“ her own longage and tonge, is ſo dyverſe of ſown
“ in this oon ilond: and the longage of Normandie is
“ comlynge of another lond, and hath oon manner ſoun
“ amonge alle men that ſpeketh hit arigt in Engelond.
“ Alſo of the foreſaid Saxon tonge that is deled [divided]
“ a three, and is abide ſcarceliche with few uplondiſſche
“ men, is greet wonder. For men of the eſt, with
“ men of the weſt, is, as it were, under the ſame par-
“ tie of hevene acordeth more in ſownygne of ſpeche,
“ than men of the north, with men of the ſouth.
“ Therefore it is that Mercii, that beeth men of myddel
“ Engelond, as it were parteners of the endes, under-
“ ſtondeth bettre the ſide longages northerne and ſouth-
“ erne, than northerne or ſoutherne underſtondeth
“ either other. All the longage of the Northumbers,
“ and ſpecialliche at York, is ſo ſcharp, ſlitting and
“ frotynge, and unſchape, that we ſoutherne men may
“ that longage unnethe underſtonde. I trow that that
“ is by cauſe that they beeth nyh to ſtrange men and
“ nations, that ſpeketh ſtrongliche, and alſo bycauſe
“ that the kinges of Engelond wonneth alwey fer from
“ that cuntry,” &c.

The firſt of our authors, who can properly be ſaid to have written *Engliſh*, was Sir John Gower, who, in his Confeſſion of a Lover, calls Chaucer his diſciple.

How the *Engliſh* ſtood about the year 1400, may be ſeen in Chaucer, who refined and improved it very conſiderably; though he is charged with the affectation of mixing too many French and Latin words with his *Engliſh*, and by that means, with too much altering and corrupting the primitive language.

In the year 1537, the Lord's Prayer was printed according to the following verſion:

“ O oure Father which arte in heven, halowed be
“ thy name: let thy kingdome come, thy will be
“ fulfiled as well in erth as it is in heven,” &c.

Where the reader will obſerve the diction almoſt brought to the preſent ſtandard; the variations being principally in the orthography. See an hiſtorical view of the progreſs of the *Engliſh* language, with ſpecimens at different periods, from the age of Alfred to that of Elizabeth, in the Introduction to Dr Johnſon's *Engliſh* Dictionary, vol. i. fol.

Spencer, who lived in the ſame age, contributed not a little to the improvement and refining of the tongue: he threw aſide abundance of the outlandiſh ornaments, and wrote a purer *Engliſh*, yet with more elegance and variety than had been known before. He was ſucceeded by Shakſpeare, Ben. Johnſon, lord Bacon, Milton, Cowley, Waller, Tillotſon, Dryden, Addiſon and Pope, &c. whoſe works are in every body's hands; and by whom the language has been tranſmitted to us under all its preſent advantages.

The perfections aſcribed to the *Engliſh*, and that in a degree ſuperiour to any of the modern tongues, are, 1. That it is very ſtrong and ſignificant; to which our finely compounded words, formed on the model of the Greeks, do not a little contribute.

2. Copious; of which Mr. Greenwood gives us inſtances in the word ſtriking; which we have above thirty different ſynonymous expreſſions for; as *to ſmite*, *bang*, *beat*, *baſt*, *buffet*, *cuff*, *hit*, *thump*, *thwack*, *ſlap*, *rap*, *tap*, *kick*, *ſpurn*, *box*, *yerke*, *pummel*, *punch*, &c. and the word *anger*, for which he enumerates above forty. So we ſay *to ſeeth* or *boil* fleſh, *ſtew* prunes, *poche* eggs, *coddle* apples, *bake* bread; for which expreſſions, *to ſeeth*, *ſtew*, *poche*, *coddle*, and *bake*, the Latins, with all the boaſted copia of the tongue, have only one word, *coquere*; and the French, as much as they abound with terms of cookery, not many more; the word *cuire* ſerving indifferently for *ſeething*, *boiling*, *baking*, *ſtewing*, and *codling*.

3. Muſical and harmonious; in which reſpect Mr. Dennis makes no ſcruple to aſſert it ſuperior even to the French. This, which ſome may think ſtrange, he proves hence, that we have blank verſe which is harmonious by mere force of numbers and quantity; whereas the French have long ago deſiſted from all pretenſions to poetical numbers, without the aſſiſtance of rhyme.

It may be added on this laſt head, from Mr. Welſtead, that the *Engliſh* has many meaſures, the iambic and trochee, for inſtance, in common with the Greek and Latin; an advantage ariſing from the variation of the accent; and that rhyme is peculiarly natural to it, varying itſelf to the ear with exceſſive ſweetneſs; not to mention the cæſuras, pauſes, tranſpoſitions, and numberleſs other graces, which the *Engliſh* verſification is capable of, probably beyond every other living language.

Some object to the *Engliſh*, that it conſiſts too much of monoſyllables; which others make a piece of merit, as it argues the greater antiquity, if what Salmaſius ſays be true: *Certum quippe eſt, linguas omnes, quæ monoſyllabis conſtant, cæteris eſſe antiquiores*; he adds, that the *ancient Greek abounded herein, as appears from the ancient poets, and ſuch as affected antiquity.* De Re Helleniſt.

But we have a farther advantage from our monoſyllables, viz. *conciſeneſs*; as we are hereby enabled to expreſs more matter in the ſame compaſs of letters than any other modern tongue. The only thing we ſuffer by it, is, ſomething in point of ſoftneſs and numbers; and yet we have verſes compoſed wholly of monoſyllables, that do not want harmony; as that of Creech,

“ Nor could the world have borne ſo fierce a flame.”

Others object to our language, that it does not equal the ſoftneſs, the delicacy, of the more ſouthern languages, of France, Spain, and Italy. It ſeems to retain ſomewhat of the Gothic roughneſs of the people who framed and introduced it; the ſoil and climate it was planted in, not tending much to mellow and refine it.

To this purpoſe does Dr. Swift ſpeak, who accounts for the effect hence, that the Latin tongue was never in its purity in our iſland; and beſides, it was removed, in its imperfect ſtate, before it could have time to incorporate with the language of the country, and ſubdue and ſoften it, as it did in the other provinces of France and Spain, &c. But it is to be obſerved, that, upon the whole, this, ſuppoſing it true, does not lie as an objection againſt the language, but the people: our manners are alſo leſs poliſhed than ſome of our neighbours; we are not yet arrived at that pitch of moleſſe, of delicateſſe, of ſoupleſſe, which we cenſure in them; and it is but juſt our language correſpond with the reſt of our character.

Mr. Welſtead is of opinion, that the *Engliſh* language is not capable of a much greater perfection than it has already attained. We have trafficked, he obſerves, with every country for the enriching it; the ancients and moderns have both contributed to the giving it ſplendor and magnificence; the faireſt cyons that could be had from the gardens of France and Italy, have been grafted on our old ſtocks, to refine the ſavageneſs of the breed; we have laid aſide moſt of our harſh, antique words, and retained few but thoſe of good and ſound energy: the moſt beautiful poliſh is at length given our tongue that it will bear, without deſtroying and altering the very baſis and ground work of it; its Teutonic ruſt is worn away, and little or nothing is wanting either of copiouſneſs or harmony. He goes on to argue the maturity and perfection of the *Engliſh*, from another very extrinſic principle, viz. by comparing the time and circumſtances of the improvements made ſince the firſt refiners of it; with thoſe of the Greek, Latin, French, and other tongues that confeſſedly have riſen to their height.

Every civilized nation, that author thinks, has its claſſical age; and he ſuggeſts, that the *Engliſh* are not far from it. So that what remains to be done for the *Engliſh* tongue, ſhould not be to advance, but to fix it where it is, and prevent its declining. There is, in effect, a point of perfection, which when a language has once arrived at, it cannot exceed, though it may degenerate from it; and thus it happened to the two fineſt languages that the world has known.

It may ſeem odd to talk of fixing ſo unſtable a thing as language: the Greek liturgies of St. Baſil, and St. Chryſoſtom, ſtill uſed in that church, the one for ſolemn, the other for common days, have been a long time unintelligible to the people; ſo much is the vulgar Greek degenerated from its original purity! Polybius teſtifies, that the articles of truce between the Romans and Carthaginians could ſcarce be underſtood by the moſt learned Roman antiquaries, three hundred and fifty years after the time in which they were made. In effect, from the days of Romulus, to thoſe of Julius Cæſar, the Latin was perpetually changing; and what was written three hundred years before Tully, was as unintelligible in his time as the *Engliſh* and French of the ſame period are now; and theſe two have changed as much ſince William the Conqueror, in about ſeven hundred years, as the Latin appears to have done in a like term.

Whether our language will decline as faſt as the Roman did, may admit of ſome doubt; there being many circumſtances in the affairs of the nation, which contributed to that ſpeedy corruption, that may not, in all probability, find place among us. The French, for about a century paſt, has been poliſhing as much as it will bear; and it appears to be now declining, by the natural inconſtancy of that people, and the affectation of ſome late authors, to introduce cant words, which is the moſt ruinous corruption in any language. But without ſome ſuch conſideration, there does not ſeem any abſolute neceſſity, why a language ſhould be perpetually changing. We find examples to the contrary: from Homer to Plutarch, are above a thouſand years; and ſo long, at leaſt, Dr. Swift thinks, we may allow the purity of the Greek; the Grecians ſpread their colonies round all the coaſts and iſlands of Aſia Minor, and the Egean ſea, where the language was preſerved entire for many ages after they themſelves became provinces to Rome, and were overrun by the barbarous nations. The Chineſe have books in their language above two thouſand years old; neither have the frequent conqueſts of the Tartars been able to alter it. And the German, Spaniſh, and Italian, have admitted few or no changes for ſome ages paſt.

On ſuch conſiderations, that author moved the then prime miniſter, the earl of Oxford, to eſtabliſh a ſociety, or academy, for the ſettling, and aſcertaining, the purity of our tongue; to ſet a mark on the improprieties which cuſtom has made familiar, to throw out vicious phraſes and words, to correct others, and perhaps retrieve ſome others now grown obſolete, and to adjuſt the orthography, pointing, &c.

Without ſome ſuch means, he complains, that the fame any writer can expect will be ſo ſhort and ſcanty, as by no means to be a ſufficient motive to call forth, and engage a man to exert his genius. Our language is chiefly confined to theſe two iſlands; and it is hard our authors fame ſhould be limited in time as well as place. Were it not for the Bible and Common-Prayer, we ſhould hardly have been able to underſtand any thing written a hundred years ago.

It is a melancholy reflexion, that Petrarch ſtill ſpeaks good Italian; whereas Chaucer, who lived an hundred years later, is not to be underſtood by an Engliſh reader without a Saxon and French gloſſary. And what ſecurity has Dryden himſelf, while things continue on their preſent footing, that he ſhall not in a like ſpace of time become as obſolete as Chaucer is?

Grammars and dictionaries, with whatever care and judgment they are compoſed, will prove but a feeble ſtay to a fleeting language, unleſs they have ſome extraordinary ſanction and authority. And, what is to be lamented, ſuch writings have contributed to the corruption almoſt as much as the perfection of our tongue.

Dr. Gill, Ben. Johnſon, and Hexham, it is certain, by forcing the *Engliſh* tongue to the Latin method, have clogged and perplexed it with abundance of uſeleſs precepts concerning caſes, genders, and declenſions of nouns, tenſes, moods, and conjugations of verbs, and other things, which our language has nothing to do with. Nor have even Dr. Wallis, Greenwood, &c. though ſenſible of the fault in thoſe others, been able wholly to keep clear of it themſelves.

ENGLISH, *Borough*. See BOROUGH.

ENGONASIS, Εγγονασις, in *Aſtronomy*, Hercules; one of the northern conſtellations. See HERCULES.

ENGOUTED, in *Falconry*, is ſaid of a hawk's feathers, when they have black ſpots in them.

ENGRAFTING, GRAFTING, or GRAFFING, in *Agriculture* and *Gardening*, the art, or act, of inſerting, or fixing, a cyon, ſhoot, or bud, of one tree, in the ſtock of another; in order to correct, and improve its fruit.

Engrafting is the art of applying a *graft*, or ſhoot, of one plant, to the ſtock of another; in ſuch manner, as that the ſap paſſing freely through both, the tree *grafted* on may produce the ſame kind of fruit with that whence the *graft* is taken.

Engrafting only differs from *inoculation*, in this, that the latter is performed when the ſap is at the higheſt, in ſummer; and the former before it riſes, at leaſt, in any quantity.

Engrafting is one of the principal operations in gardening, and that whereon the goodneſs of great part of our fruit greatly depends.

It is very extraordinary, that the ſeeds, or kernels, or ſtones of a fruit, as an apple, pear, peach, plum, cherry, &c. being ſown, degenerate in the ground; ſo that the tree ariſing from it is of another kind, a ſort of wilding, harſher, ſourer, and coarſer, than that of the parent tree. To correct this, trees thus reared muſt always be *grafted* from other better kinds.

Apples are commonly raiſed by *engrafting* the intended kinds on crab-ſtocks, procured by ſowing the kernels; ſo are pears procured by *grafting* on the wild pear-ſtock; though for dwarf, or wall-trees, they generally chooſe to *engraft* on the quince-ſtock.

They will alſo do, if *grafted* on the white-thorn. Peaches are produced by *grafting*, on an almond or plumb-ſtock. Indeed, in this fruit, it ſometimes happens, that the ſtone ſown produces better fruit than that from which it was taken; but this is not common; beſide that the tree in ſuch caſe is long before it comes to bear. Plums are raiſed by *engrafting* on a damaſcene, or wild plum-ſtock; and cherries, on the black cherry, or merry-ſtock, raiſed from ſtones.

Our beſt gardeners, likewiſe, *engraft* their leſs kindly trees from other better of the ſame ſort, to mend them; as alſo, the ſmaller and ſingle flowers, as gilliflowers, &c. from the larger and finer. *To produce ſtocks for* engrafting *on*, ſee STOCK. For the choice of *graffs* or *cyons*, ſee GRAFT.

The curious furniſh us with other extraordinary and anomalous inſtances of *engrafting*; as of apples on plane, elder, thorn, cabbage-ſtalk, &c. and the like of pears, &c. pears on apple-trees, on elms, &c. cherries on the laurel, coral-berries on the plum; beech on the cheſtnut, oak on the elm, gooſeberry on the currant, the vine on the cherry-tree, &c.

Inſeritur lauro ceraſus, partuque coacto
Tingit adoptivus virginis ora pudor. Auſon.

Ev'n Daphne's coyneſs thou doſt mock,
And wedſt the cherry to her ſtock. Cowl. to Evel.

——— *Mutatamque inſita mala*
Ferre pirum, & prunis lapidoſa rubeſcere corna.
Virg. Georg. lib. ii. ver. 33.

———*Steriles platani, malos geſſere valentes;*
Caſtaneæ, fagos; ornuſque incanuit albo
Flore piri; glandemque ſues fregêre ſub ulmis.
Id. ibid. ver. 70, &c.

The origin and invention of *engrafting* is differently related by naturaliſts. Theophraſtus tells us, that a bird, having ſwallowed a fruit whole, chanced to caſt it forth into a cleft, or cavity, of a rotten tree; where mixing with ſome of the putrified parts of the wood, and being waſhed with the rains, it budded, and produced within this tree another tree of a different kind. This led the huſbandman to certain reflections, from which, ſoon afterwards, aroſe the art of *engrafting*.

Pliny ſets the thing in a different light: a countryman having a mind to make a paliſade in his grounds, that it might endure the longer, bethought himſelf to fill up, and ſtrengthen the bottom of the palliſade, by running, or wattling it with the trunks of ivy. The effect of this was, that the ſtakes of the paliſade, taking root, became *engrafted* into the trunks, and produced large trees; which ſuggeſted to the huſbandman the art of *engrafting*.

The reaſon, or philoſophy, of *engrafting* is ſomewhat obſcure; and had not hazard given the firſt hint, all our knowlege of nature would never have led us to it. The effect is ordinarily attributed to the diverſity of the pores, or ducts, of the *graft*, from thoſe of the ſtock, which change the figure of the particles of the juices in paſſing through them to the reſt of the tree.

Mr. Bradley, on occaſion of ſome obſervations of Agricola, ſuggeſts ſomething new on this head: the ſtock *grafted* on, he thinks, is only to be conſidered as a fund of vegetable matter, which is to be filtred through the cyon, and digeſted, and brought to maturity, as the time of growth in the veſſels of the cyon directs. A cyon, therefore, of one kind, *grafted* on a tree of another, may be more properly ſaid to take root in the tree it is *grafted* in, than to unite itſelf with it: for it is viſible, that the cyon preſerves its natural purity and intent, though it be fed and nouriſhed with a mere crab; which is without doubt occaſioned by the difference of the veſſels in the cyon from thoſe of the ſtock; ſo that *grafting* may be juſtly compared to planting.

In proſecution of this view of that ingenious author, we add, that the natural juices of the earth, by their ſecretion and comminution, in paſſing through the roots, &c. before they arrive at the cyon, muſt doubtleſs arrive there half elaborated and concocted; and ſo diſpoſed for a more eaſy, plentiful, and perfect aſſimilation and nutrition; whence the cyon muſt neceſſarily grow and thrive better and faſter than if it were put immediately in the ground, there to live on coarſe diet, and harder of digeſtion; and the fruit produced, by this further preparation in the cyon, muſt be finer and further exalted, than if fed immediately from the more imperfectly prepared and altered juices of the ſtock.

The cyon, to ſay no more, is ſomewhat in the condition of the fœtus in utero, fed from the mother's blood; or, at leaſt, it is in that of the infant after excluſion, fed with the mother's milk.

Tools neceſſary for grafting. In order to *grafting*, a perſon muſt be provided with the following tools. 1. A neat and ſmall hand-ſaw to cut off the heads of large ſtocks. 2. A ſtrong knife with a thick back, to make clefts in the ſtocks. 3. A ſharp pen-knife to cut the *grafts*. 4. A *grafting* chiſſel and a ſmall mallet. 5. Baſs-ſtrings, or elſe woollen yarn, to faſten on the *grafts* with, and, finally, a quantity of clay, which ſhould be prepared a month before it is uſed, and kept turned and worked about every day like mortar. The beſt mixture for this matter is, a quantity of ſtrong, fat, and viſcous loam muſt be got, and into this muſt be well beat and mixed ſome ſtone-horſe dung, and ſome chopped ſtraw cut very ſhort and ſmall; finally, a quantity of common ſalt muſt be thrown in; this muſt be mixed up and beat together into a paſte with water, but it muſt not be expoſed to the froſts. This is equally proper to be employed for all the different ſorts of *grafting*. Miller.

Some perſons have lately uſed a compoſition of turpentine, bees-wax, and roſin, melted together, which, applied round the graft about a quarter of an inch thick, will keep out the air more effectually than clay, be hardened by cold, and reſiſt the froſt, and fall off, when melted by the ſummer heat, without any trouble.

Principal kinds of grafting are, *grafting* in the cleft, *grafting* in the rind, white *grafting*, *grafting* by approach, ſcutcheon *grafting*, root *grafting*, reiterated *grafting*, *grafting* on branches, &c.

GRAFTING *in the cleft*, or *ſtock*, called alſo *ſlit*-GRAFTING, is the moſt ancient and ordinary way. It is chiefly uſed for middle-ſized ſtocks, from one to two inches diameter. Its ſeaſon is in the months of February and March. The method, as now practiſed, is thus: the head of the ſtock being ſawn, or cut off, ſmooth and clean, with a ſlope, a perpendicular cleft is made therein, nearly two inches deep, with a ſtrong knife, or chiſſel, as near the pith as may be to miſs it. In this cleft, the *grafting* chiſſel, or wedge, is put to keep it open. The *graft*, or cyon, is prepared by cutting it aſlope, in form of a wedge, to ſuit the cleft; only leaving a ſmall ſhoulder on each ſide; and, when cut, is to be placed exactly in the cleft, ſo as that the inner bark of the cyon may aptly and cloſely join to the inner part of the bark, or rind, of the ſtock; in the dextrous performance of which the chief ſecret conſiſts. If the cleft pinch too tight, a ſmall wedge may be left in it to bear the ſtreſs. And, laſtly, the cleft is covered over with clay, leaving two eyes of the cyon above the clay for ſhooting; or rather, as M. Gentil adviſes, with moſs, or the freſh bark of a tree bound on with oſier.

The reader, who would have this in more elegant terms, may be furniſhed from Virgil, Georg. ii. ver. 78, &c.

Aut rurſum enodes trunci reſecantur & altè
Finditur in ſolidum cuneis via: deinde feraces
Plantæ immittuntur: nec longum tempus, & ingens
Exiit ad cœlum ramis felicibus arbos,
Miraturque novas frondes, & non ſua poma.

GRAFTING *in the rind*, or *ſhoulder*-GRAFTING, called alſo *ſlicing*, and *packing*, is practiſed in the latter end of March, or beginning of April. The method is as follows:

The top of the ſtock is cut off in a ſmooth, ſtrait place; then the cyon, or *graft*, is prepared by cutting on one ſide from the joint, or ſeam, down ſlopewiſe, making the ſlope about an inch long, and obſerving its bent, that ſo, when the cyon is fixed to the ſtock, it may ſtand nearly upright. At the top of the ſlope, they make a ſhoulder, whereby it is to reſt on the ſlope of the ſtock. The whole ſlope is to be plain and ſmooth, that it may lie even to the ſide of the ſtock. As to the length of the cyon, for a ſtandard-tree, it may lie about four inches from the ſhoulder; but for a dwarf, or wall-tree, ſix inches. The cyon being prepared, the outſide is applied to the weſt, or ſouth weſt ſide of the ſtock, and its length and breadth meaſured thereon; which done, the bark of the ſtock is cut away to thoſe dimenſions, that the cut part of the cyon may fit it. Wherein, regard is to be had to the bigneſs of the ſtock, and the thickneſs of the bark, to proportion the length and breadth of the chip thereto; otherwiſe the paſſages of the juice in the ſtock and cyon will not meet. Laſtly, laying the cut-part of the cyon on that of the ſtock, they bind them together with woollen yarn, and cover the whole with clay an inch above, and as far below the ſtock's head; working it round the cyon, till it become ſharp at top, that the rain may run down it.

This method has ſeveral advantages over the former: as that the wound heals up ſooner; and that, in the mean time, it is in leſs danger from the weather; that it does leſs injury to the ſtocks and *grafts*, as avoiding thoſe ſevere ſplittings and pinchings; that the bark is more eaſily placed in the paſſage of the ſap here, than in the cleft; that the *graft* thrives and ſhoots with greater vigour, and bears ſooner, in this way than in that; and that it is practicable on ſmaller ſtocks than the other, which muſt have a good body and conſiſtence, before they can bear cleaving. See *Crown*-GRAFTING.

GRAFTING *in the bark* is performed thus: prepare the ſtock, and cyon, as in *grafting in the rind*; but, inſtead of cutting the bark of the ſtock, ſlit the ſame on the ſouth-weſt ſide, from the top, almoſt as long as the ſloped part of the cyon, and at the top of the ſlit looſen the bark with the top of your knife. Thruſt an inſtrument, made of ivory, ſilver, or the like, and formed at the end like the ſlope-end of the cyon, but much leſs, down between the bark and wood, to make room for the cyon; which being put in, the bark is to be ſo managed, as that it may fall cloſe to the ſtock, and edges of the cyon.

GRAFTING by approach or ablactation. See ABLACTATION and INARCHING.

All thoſe trees which are of the ſame tribe, that is, which agree in their flower and fruit, will take upon one another; thus all the nuts may be *engrafted* on one another; as may alſo all the plums, and all that are allied to them; as the almond, peach, nectarine, and the like; but as theſe generally loſe a great deal of gum in the *grafting*, the operation of inoculation is much more proper for them.

All the trees which bear cones will ſucceed very well on one another, even though ſome ſhed their leaves in winter, and others do not. Thus the cedar of Lebanon and the larch tree do very well on one another; but theſe, becauſe they abound ſo greatly in reſin, muſt be *grafted* by approach, becauſe the reſin of the *graft* being loſt from it before it is ſet into the ſtock, makes it otherwiſe often miſcarry.

Bad weather will often deſtroy the hopes of the beſt operator; otherwiſe with theſe regulations the whole generally ſucceeds very well; and is not only of uſe for the propagating many exotic plants, but even will make very tender ones bear our climate, by placing them on the hardier ſtocks of the ſame kind.

Whip-GRAFTING, or *Tongue*-GRAFTING, is a ſort of *grafting* in the rind, proper for ſmall ſtocks, from an inch diameter to a quarter of an inch. Mr. Miller ſpeaks of it as the moſt effectual way of any, and that moſt in uſe.

In this, the ſtock and cyon are always to be of the ſame bigneſs. The cyon to be ſloped off a full inch, or more; and the like is to be done to the ſtock; and ſo the one to be tied to the other. Otherwiſe, the top of the ſtock being cut off, a ſhoulder is to be made in the *graft*; and the reſt to be performed as already ſhewn under *grafting in the rind*.

This method is alſo improved by what they call *tipping*, or *tonguing*; which is, the making a ſlit with a knife in the bare part of the ſtock, downwards; and the like in the ſloped face of the cyon, upwards; then joining them, by thruſting one ſlice into the other, till the bare place of the cyon cover that of the ſtock; then there ſhould be a ligature of baſs to faſten the cyon, ſo that it may not eaſily be diſplaced, which ſhould be covered with clay.

Side-GRAFTING. In this, the cyon is prepared as in *whip-grafting*; but the head of the ſtock is not cut off. Only, from a ſmooth part on the weſt ſide, ſo much of the bark is pared off as the cyon will cover; then ſlitting both cyon and ſtock, as in the laſt article, they bind the two together, and cloſe them up with clay. At the year's end, the top of the ſtock is cut off at the grafted place, ſlopewiſe; and the place is covered with clay.

Scutcheon-GRAFTING, is another method of *grafting* in the rind, practiſed in June, July, and Auguſt, when the bark will not part from the ſtock. It is performed by ſlitting the bark of the ſtock in form of the capital letter T, looſening it with the point of a knife, and clapping in a cyon, prepared as above. See INOCULATION and SCUTCHEON.

Crown-GRAFTING, is when four or more *grafts* are placed round the ſtock, between the bark and the rind, ſomewhat in the manner of a crown. This is only practiſed in the larger trees, which are capable of receiving a number of *grafts*, and are too big to be cloven. The method is in all reſpects the ſame as that already delivered for *grafting in the rind*.

Root-GRAFTING, is a modern invention, treated of at large by Agricola: its intention is ſomewhat different from the former, being for the propagation, or multiplication, of plants.

To perform this, take a *graft*, or ſprig, of a young tree, which you intend to propagate; and a ſmall piece of the root of another tree of the ſame kind, or of a kind very like it; or elſe pieces of roots cut off other trees, in tranſplanting, and *whip-graft* them together; obſerving, that the two butt-ends of the *graft* and root be joined, and that the rind of the root join that of the *graft*. Theſe may, afterwards, be planted out at pleaſure, and the piece of root will draw the ſap, and feed the *graft*, as the ſtock does in the other way.

This way of propagation is very eaſy and expeditious; roots being more plentiful than ſtocks: by this method the pieces of roots of one crab-ſtock, or apple-ſtock, will ſerve for twenty or thirty apple *graffs*, and the like of other trees. The ſame is alſo an excellent way for raiſing of tender trees, that will hardly bear being *grafted* in the ſtock. Add, that trees thus *grafted*, bear ſooner, and are more eaſily dwarfed, than thoſe done in any other way.

Reiterated GRAFTING, or *grafting by a double, or triple inciſion*, is another method mentioned by Agricola: to perform which, firſt *graft* a good cyon on a ſtock, and cut it away to one half, or a third part; then fix another *graft* to it, of a better kind, and a third to that; for ſtill the oftener a tree is *engrafted*, the finer fruit it produces.

By this method, that author aſſures us, he produced muſcat pears, that were admirable; making, at firſt, uſe of a ſtock *grafted* with a pound-pear, on which he *grafted* a ſummer bon chretien; and when the branch of this latter had ſhot, he *grafted* on it a cyon of bergamot; which he alſo cut, and *grafted* on it a cyon of a muſcat pear.

ENGRAFTING *of branches*, Agricola mentions as a very certain and profitable operation, beſt practiſed on large, full grown, and even old trees.

To do this, half or more of the branches muſt be lopped off, and *grafts* of three or four years old applied to them; taking care to have ſtakes, or other things, to ſupport them againſt the wind, &c.

He adds, that by this method, you will have, perhaps, the ſame year, at leaſt the ſecond or third, ſuch a quantity of fruit, as the youngeſt and ſoundeſt tree would hardly produce.

The facility with which *grafts* take place, and grow on proper ſubjects, is well known; there are, however, many accidents and uncertainties attending them in their different periods. Some periſh immediately, ſome after appearing healthy for many months, ſome even after years of health. Of theſe laſt ſome die without the ſtocks ſuffering any thing; others periſh together with it. It is very certain, that the greater part of *grafted* trees do not live ſo long as they would have done in their natural ſtate, yet this is no unexceptionable rule, for there are ſome which evidently live the longer for this practice; nay, there are inſtances of *grafts*, which being placed on ſtocks naturally of ſhort duration, live longer than when placed on thoſe which are more robuſt and laſting. Theſe are irregularities which have been little conſidered hitherto, though they happen in a practice, the advantages of which are very great. One great requiſite for the ſucceeding of any *graft* is, that it be in its own nature capable of ſo cloſe and intimate an union with the ſubſtance of the ſtock, that it becomes, as it were, a natural branch of it. If all trees reſembled one another in their ſtructure and juices, if their ſolid parts were all of the ſame figure, and their ſap all of the ſame nature and conſiſtence, their veſſels all of the ſame diameters, and their elaſticity, and the number of the tracheæ equal in all, and in all filled with the ſame quantities of air; if trees were alike in theſe particulars, probably *grafts* of all trees would ſucceed upon one another, but this is by no means the caſe.

The *grafts* of the almond on the plum, and of the plum on the almond, always grow very vigorouſly for the firſt year, and give all the appearance imaginable of ſucceeding entirely, yet they always periſh in the ſecond, or elſe in the third year. The almond *graft* upon the plum-ſtock always puſhes out very vigorouſly at firſt, but the part of the ſtock immediately under the *graft* grows ſmaller, and periſhes; the *graft* abſorbing too much of its juices, and the *graft* neceſſarily periſhes with it. The decay of the whole generally happens early in the ſpring, and that plainly from the different ſeaſon of the natural ſhooting of the two trees, the almond puſhing very vigorouſly, and conſequently draining the ſtock of its juices, at a time when, according to its nature, the juices are but in ſmall quantity in it, and the ſap does not begin to aſcend. The *grafts* of the plum on the almond are, from the ſame cauſe, furniſhed with an abundance of ſap, which they have at that time no occaſion for, and conſequently they as certainly periſh of repletion, as the other of inanition. Mem. Acad. Par. 1730.

The peach *grafted* on the plum ſucceeds excellently, and lives longer than it would have done in its natural ſtate. The reaſon of which is this: the peach is a tender tree, it ſhoots with great vivacity, and produces more branches than the root is able to maintain, which is the reaſon why peach-trees are uſually full of dead wood, and often their large branches periſh, and ſometimes their whole trunk; on this occaſion, the plum being a ſlow ſhooting tree, communicates its virtue to the *graft*; and the peach conſequently ſends out ſhoots, which are more robuſt and ſtrong, and are no more in number than the root is able to ſupply with nouriſhment; hence the tree is more ſtrong and laſting. Miller.

See an account of methods of *engrafting* for improving and haſtening the fruit, under FRUIT-*trees*.

ENGRAFTING *of the ſmall pox*. See INOCULATION.

ENGRAILED, or INGRAILED, in *Heraldry* (from the French *grêle, hail*) is when a thing is repreſented with its edges ragged, or notched, ſemicircularly, as if broken by ſomething falling on it. See *Tab*. II. *Herald. fig*. 57. See INDENTED, and INVECTED.

Spelman expreſſes it in Latin by *imbricatus*; others by *ingrediatus*; and others by *ſtriatus*.

ENGRAVERS. See ENGRAVING.

By 8 Geo. II. cap. 13. *engravers* that ſhall invent, deſign, and engrave prints, have the ſole right of printing them for fourteen years, which are to be engraved with the names of the proprietors; and others copying and ſelling ſuch prints, though by varying, &c. without their conſent, ſhall forfeit 5*l*. for every print, and alſo the plates and ſheet, &c. This privilege was continued for twenty-eight years by 7 Geo. III. cap. 38. And by 17 Geo. III. cap. 57. double coſts are given.

ENGRAVING, or GRAVING, the art, or act, of cutting metals, and precious ſtones, and repreſenting figures, letters, and other matters, thereon.

The word is a compound of the prepoſition εν, *in*, and γραφω, *I write*. Though Menage, after Salmaſius, derives it from the Latin *cavare, to hollow*; others from the Latin, *graphiare*; and others from the German, *graben*, q. d. *effodere, to dig out*. In Latin it is called *ſculptura*, and *cælatura*.

Engraving is properly a branch of ſculpture; though with us it generally ſtands contradiſtinguiſhed from ſculpture; as the latter, popularly called *carving*, expreſſes the forming of figures, &c. emboſſed, or in relievo; and the latter, thoſe indented, or in creux.

Among the French, the term *engraving, graveure*, is of larger extent. It includes all kinds of ſculpture, both that performed with the chiſſel and knife, on marbles and woods in relievo; and that in metals, ſtones, &c. with the graver indented.

Engraving is divided into ſeveral branches, according to the matters it is practiſed on, and the manner of performing it. The original way of *engraving* on wood is now diſtinguiſhed by the name of CUTTING *in wood*; that on metals with aqua fortis, is called ETCHING; that by the knife, burniſher, punch, and ſcraper, MEZZOTINTO; that on ſtones, for tombs, &c. *carving*, or *ſtone-cutting*; and laſtly, that performed with the graver on metals, as copper, braſs, ſteel, ſilver, &c. as alſo on precious ſtones, cryſtals, &c. retains alone the primitive denomination of *engraving*.

Engraving is an art, for the greateſt part, of modern invention; having its riſe no earlier than the middle of the fifteenth century. The ancients, it is true, practiſed *engraving* on precious ſtones and cryſtals, with very good ſucceſs; and there are ſtill many of their works remaining, equal to any production of the later ages. But the art of *engraving* on plates, and blocks of wood, to afford prints, or impreſſions, was not known till after the invention of painting in oil.

The diſcovery is aſcribed to Muſo Finiguerra, a goldſmith of Florence, about the year 1460; who having uſed to take impreſſions of every thing he cut, in clay, and to caſt melted ſulphur in this mould, at length perceiving that what came out of the mould was marked with the ſame prints as his plate, by the black which the ſulphur had taken from his graving, he tried to do as much on ſilver plates, with wet paper, by rolling it ſmoothly with a roller, which alſo ſucceeded. This was the origin of producing impreſſions upon paper in lines, as prints are now done; but the art of *engraving* them ſeems to have been of earlier date. See PRINTING.

By him it is ſaid to have been communicated to Baldini, a goldſmith of the ſame city, who engraved ſeveral plates from drawings of Boticelli, and was afterwards aſſiſted by Andrea Mantegna, of Padua, who improved the art. However, the Germans pretend that this art was practiſed among them by Luprecht Ruſt, the maſter of Schoen, as early as the year 1450. Other German writers aſcribe the invention of it to Francis à Bocholt, who was immediately ſucceeded by Iſrael al Meckenick, and Martin Stock, Albert Durer's maſter. The Dutch pretend

tend that the art of taking off impreſſions on wood was diſcovered by Lawrence of Harlem, who died between the years 1435 and 1440; and that of *engraving* on copper by Peter Schoeffer, a printer of Metz; and that it was carried into Germany and Italy by his workmen, when Metz was taken in 1462. However, the ſecret ſoon got abroad, and coming to the hands of Martin Schoen, of Colmar, in Germany, who is ſaid to have practiſed this art from the year 1460 to 1470; Albert Durer, who was born at Nuremberg in 1470, and died in 1528; Lucas, of Leyden, born in 1494, and who died in 1533; and Marco Antonio of Bologna, in the beginning of the ſixteenth century; they greatly improved it, and began to engrave on wood and copper, in which they ſucceeded to admiration. See Evelyn's Hiſtory of Chalcography.

Engraving *in copper*, is employed in repreſenting diverſe ſubjects, as portraits, hiſtories, landſcapes, foliages, figures, buildings, &c. either after paintings, or after deſigns made for this purpoſe.

It is performed with the graver, dry point, or with aqua fortis. For the firſt, there needs but little apparatus, and few inſtruments. The plate you work on being well poliſhed (for the method of preparing which, ſee Copper-*plates*), is covered over with a thin ſkin of virgin-wax, and on this the draught, or deſign, done in black lead, red chalk, or other ungummed matter, is laid; and rubbed down for the wax to take off. The deſign thus transferred upon the wax, is traced through on the copper, with a point, or needle; then heating the plate, and taking off the wax, the ſtrokes remain; to be followed, heightened, &c. according to the tenor of the deſign, with the GRAVER, which is to be very ſharp, and well tempered.

The dry point, or needle, which has been of late much uſed in *engraving*, is a tool like an etching point, which being drawn hard on the copper, cuts a ſtroke, and raiſes a burr; the burr is ſcraped off, and there remains a ſtroke more ſoft and delicate than can can be produced in any other way.

In the conduct of the graver and dry point conſiſts all the art; for which there are no rules to be given; all depending on the habitude, diſpoſition, and genius, of the artiſt. However, ſome general obſervations and directions may not be improper. As the principles of *engraving* are the ſame with thoſe of painting, a perſon cannot expect to attain any conſiderable degree of perfection in this art who is not a good maſter of deſign; and therefore he ought to be well acquainted both with perſpective and architecture: for the former, by the proper degradations of ſtrong and faint colours, will enable him to throw backwards the figures and other objects of the picture or deſign which he propoſes to imitate; and the latter will teach him to preſerve the due proportion of its ſeveral orders, which the painter often entruſts to the diſcretion of the engraver. In order to preſerve equality and union in his works, the engraver ſhould always ſketch out the principal objects of his piece before he undertakes to finiſh them. Care ſhould be taken that the graver be carried level upon the plate, and be preſſed, as occaſion requires, with greater or leſs force, carrying the hand as evenly as poſſible. In drawing ſtrait lines, a leſs degree of preſſure ſerves for thoſe that are finer, and a greater is required to form the broader and deeper lines. In forming circular or curved lines, the hand and graver muſt be held ſteady, and the plate is to be moved upon the cuſhion under the graver. In large works a cuſhion is uſeleſs. The engraved work may be rendered more viſible, by rubbing it over with a roll of felt, dipt in oil. The ſtrokes of the graver ſhould never be croſſed too much in a lozenge manner, particularly in the repreſentation of fleſh, becauſe ſharp angles produce the unpleaſing effect of lattice-work, and take from the eye the repoſe which is agreeable to it in all kinds of pictureſque deſigns: we ſhould except the caſe of clouds, tempeſts, waves of the ſea, the ſkins of hairy animals, or the leaves of trees, where this method of croſſing may be admitted. But in avoiding the lozenge, it is not proper to get entirely into the ſquare, which would give too much of the hardneſs of ſtone. In conducting the ſtrokes, the action of the figures, and of all their parts, ſhould be conſidered; and it ſhould be obſerved how they advance towards, or recede from the eye; and the graver ſhould be guided according to the riſings or cavities of the muſcles or folds, making the ſtrokes wider and fainter in the light, and cloſer and firmer in the ſhades. Thus the figures will not appear jagged; and the hand ſhould be lightened in ſuch a manner, that the outlines may be formed and terminated without being cut too hard: however, though the ſtrokes break off where the muſcle begins, yet they ought always to have a certain connection with each other, ſo that the firſt ſtroke may often ſerve by its return to make the ſecond, which will ſhew the freedom of the engraver.

In *engraving* the fleſh, the effect may be produced in the lighter parts, and middle tints, by long pecks of the gravers, rather than by light lines, or by round dots, or by dots a little lengthened by the graver, or, beſt of all, by a judicious mixture of theſe together.

In *engraving* the hair and the beard, the engraver ſhould begin his work by laying the principal grounds, and ſketching the chief ſhades in a careleſs manner, or with a few ſtrokes; and he may finiſh it at leiſure with finer and thinner ſtrokes to the extremities. When architecture, or ſculpture, is to be repreſented, except it be old and ruinous buildings, the work ought not to be made very black; becauſe, as edifices are commonly conſtructed either of ſtone or white marble, the colour, being reflected on all ſides, does not produce dark or brown ſhades, as in other ſubſtances. White points muſt not be put in the pupils of the eyes of figures, as in *engravings* after paintings; nor muſt the hair or beard be repreſented as in nature, which makes the locks appear flowing in the air; becauſe in ſculpture there can be no ſuch appearances.

In *engraving* cloths of different kinds, linen ſhould be done with finer and cloſer lines than other ſorts, and be executed with ſingle ſtrokes. Woollen cloth ſhould be engraved wide, in proportion to the coarſeneſs or fineneſs of the ſtuff, and with only two ſtrokes; and when the ſtrokes are croſſed, the ſecond ſhould be ſmaller than the firſt, and the third than the ſecond. Shining ſtuffs, which are generally of ſilk or ſattin, and which produce flat and broken folds, ſhould be engraved more hard and more ſtrait than others, with one or two ſtrokes, as their colours are bright or brown; and between the firſt ſtrokes other ſmaller muſt be joined, which is called interlining. Velvet and pluſh are expreſſed in the ſame manner, and ſhould always be interlined. Metals, as armour, &c. are alſo repreſented by interlining, or by clear ſingle ſtrokes. In architecture, the ſtrokes which form the rounding objects ſhould tend to the point of ſight; and when whole columns occur, it is proper to produce the effect as much as poſſible, by perpendicular ſtrokes. If a groſs ſtroke is put, it ſhould be at right angles, and wider and thinner than the firſt ſtroke. In *engraving* mountains, the ſtrokes ought to be frequently diſcontinued and broken, for ſharp and craggy objects; and they ſhould be ſtrait, in the lozenge manner, and accompanied with long points or dots; and rocks ſhould be repreſented by croſs ſtrokes more ſquare and even. Objects that are diſtant towards the horizon ſhould be kept very tender, and ſlightly charged with black Waters that are calm and ſtill are beſt repreſented by ſtrokes that are ſtrait, and parallel to the horizon, interlined with thoſe that are finer; omitting ſuch places as, in conſequence of gleams of light, exhibit the ſhining appearance of water; and the form of objects, reflected from the water, at a ſmall diſtance upon it, or on the banks of the water, are expreſſed by the ſame ſtrokes, retouched more ſtrongly, or faintly, as occaſion may require, and even by ſome that are perpendicular. For agitated waters, as the waves of the ſea, the firſt ſtrokes ſhould follow the figure of the waves, and may be interlined, and the croſs ſtrokes ought to be very lozenge. In caſcades, the ſtrokes ſhould follow the fall, and be interlined. In *engraving* clouds, the graver ſhould ſport, when they appear thick and agitated, in turning every way according to their form, and their agitation. If the clouds are dark, ſo that two ſtrokes are neceſſary, they ſhould be croſſed more lozenge than the figures, and the ſecond ſtrokes ſhould be rather wider than the firſt. The flat clouds, that are loſt inſenſibly in the clear ſky, ſhould be made by ſtrokes parallel to the horizon, and a little waving; if ſecond ſtrokes are required, they ſhould be more or leſs lozenge; and when they are brought to the extremity, the hand ſhould be ſo lightened, that they may form no outline. The flat and clear ſky is repreſented by parallel and ſtrait ſtrokes, without the leaſt turning. In landſcapes, the trees, rocks, earth, and herbage, ſhould be etched as much as poſſible; nothing ſhould be left for the graver but perfecting, ſoftening, and ſtrengthening. The dry point produces an effect more delicate than the graver can, and may be uſed to great advantage in linen, ſkies, diſtances, ice, and often in water, eſpecially in ſmall *engravings*. In moſt things it is proper to etch the ſhadows, only leaving the lighter tints for the dry point, graver, &c. Encyclopedie, art. Gravure; and Handmaid to the Arts, vol. ii. p. 63, &c.

The other inſtruments, beſides the graver and dry point, are, a CUSHION, or ſand-bag, to lay the plate on, to give it the neceſſary turns and motions: a burniſher, round at one end, and uſually flattiſh at the other, to rub out ſlips and failures, and to ſoften the ſtrokes, &c. A ſcraper, to pare off the ſurface, on occaſion; and a rubber of black cloth, or hat, to fill up the ſtrokes, that it may appear how the work proceeds.

To take off printed cuts, ſo that the outlines and principal ſtrokes may be exactly copied for graving, may be thus performed: if the *print* be not above a year or two old, the paper need only be moiſtened with water in the manner uſually practiſed for *printing* cuts; but if it be more ancient, it ſhould be laid to ſoak all night in water, and afterwards hung in the air till it becomes dry enough for the preſs. The paper thus prepared, is to be laid with its *printed* ſide next the plate, thinly caſed over with white wax, which is thus to be committed to the rolling preſs, whereby an impreſſion of the cut will be obtained. Boyle's Works abr. vol. i. p. 136.

Engraving *in copper with aqua fortis.* See Etching.

Engraving *in chalks* is the art of imitating or counterfeiting upon copper, drawings made with chalks on paper. This method of *engraving* was invented by M. Francis, to whom the king of France granted a penſion for the diſcovery. It is intended to form a kind of deception, ſo that the connoiſſeur may not be able, on the firſt inſpection, to diſtinguiſh between the original drawing, and the engraving made in imitation of it; and it is extremely uſeful, as it ſerves to multiply copies of drawings left by thoſe maſters who excelled in the uſe of chalks, and thus to form and improve young artiſts, who could not have acceſs to the originals in the practice of drawing. This kind of *engraving* is not performed with the points of the graver, as is the uſual manner in copper-plate *engraving*, but by a mixture of varied and irregular dots, as being more proper to reſemble the grain produced by the chalks on paper, more or leſs ſoft. Every ſtroke of the chalks on paper may be conſidered as an infinite number of adjoining points, which are the ſmall eminences of the grain of the paper, touched by the chalk in paſſing over it. When the copper-plate has been poliſhed and varniſhed, or properly prepared, as in the common method of *engraving*, the drawing to be imitated may be counterproved on the varniſh of the plate. If this cannot be conveniently done, black lead pencil, or red chalk, muſt be applied to varniſhed or oiled paper, and by means of this chalk, or pencil, all the traces of the original will be tranſmitted to the varniſh. See Calquing and Engraving, *above*.

The outlines of the object muſt be formed in the etching by points, whoſe magnitude and diſtance muſt be determined by the quality of the ſtrokes in the original drawing. The artiſt may be provided with pointed inſtruments, or needles, of various ſizes, with ſingle or double points. In forming the light and ſhade, he ſhould diſtinguiſh between thoſe hatches which ſerve to expreſs the perſpective of the object, and thoſe which form the ground of it. The principal hatches ſhould be more ſtrongly marked; the middle tints, if etched, ſhould be marked lightly, or they may be left till the varniſh is taken off, and be perfected with a greater degree of ſoftneſs, by needles, or the point of the graver, as the original may require. There is nothing peculiar in the method of applying the aqua fortis in this kind of *engraving*; but it may be obſerved, that it ſhould not be left ſo long as to corrode the lighter parts too much: if the light parts are ſufficiently corroded, they may be ſtopped out with turpentine, varniſh, and lamp-black, mixed together, and the aqua fortis may be applied again to the ſtronger parts; for it will be no detriment to them, if the points which compoſe the ſhade burſt into one another, provided the extreme be avoided. When the work of the aqua fortis is finiſhed, and the varniſh taken off the copper, it will be neceſſary in the ſofteſt parts, ſuch as the fleſh, &c. to interſtipple with proper points; as an effect will be thus produced more delicate than it is poſſible to attain with the aqua fortis only; and the ſtrongeſt ſhades will require additional ſtrength, to be given them with ſmall ſtrokes of the graver. This ſort of *engraving* ſhould be ſcraped before it is finiſhed.

Drawings made with chalks of different colours may be imitated in this manner, if a plate be provided for every colour. Encyclopedie.

Engraving *in aqua tinta* is the art of imitating upon copper drawings made with biſtre, or Indian ink.

Engraving *in mezzotinto.* See Mezzotinto.

Engraving *on precious ſtones*, is the repreſenting of figures, or devices, either in relievo, or indented, on diverſe kinds of hard, poliſhed ſtones.

The art of *engraving* on precious ſtones is one of thoſe wherein the ancients excelled; there being diverſe antique agats, cornelians, and onyxes, which ſurpaſs any thing of that kind the moderns have produced. Pyrgoteles among the Greeks, and Dioſcorides under the firſt emperors of Rome, are the moſt eminent engravers we read of: the former was ſo eſteemed by Alexander, that he forbad any body elſe to engrave his head; and Auguſtus's head, engraven by the latter, was found ſo beautiful, that the ſucceeding emperors choſe it for their ſeal.

All the polite arts having been buried under the ruins of the Roman empire, the art of *engraving* on ſtones ſhared the ſame fate. It was retrieved in Italy, at the beginning of the fifteenth century; when one John of Florence, and after him Dominic of Milan, performed works of this kind far from being contemptible.

From that time, ſuch ſculptures became common enough in Europe, and particularly in Germany, whence great numbers were ſent into other countries; but they came ſhort of the beauty of thoſe of the ancients, eſpecially thoſe on precious ſtones; for as to thoſe on cryſtal, the Germans, and after their example, the French, &c. have ſucceeded well enough in them.

In this branch of *engraving* they make uſe either of the diamond or emery. The diamond, which is the hardeſt and moſt perfect of all precious ſtones, is only cut by itſelf, or with its own matter.

The firſt thing is to cement two rough diamonds to the ends of two ſticks, big enough to hold them ſteady by, in the hands; and to rub or grind them againſt each other, till they be brought to the figure deſired. The duſt, or powder, rubbed off, ſerves afterwards to poliſh them; which is performed with a kind of mill, that turns a wheel of lead, pewter, or copper.

The diamond is fixed in a braſs diſh, and thus applied to the wheel, which is covered with a diamond duſt, mixed up with oil of olives; and when the diamond is to be cut facet-wiſe, they apply firſt one face, then another, to the wheel.

Rubies, ſapphires, and topazes, are cut and formed the ſame way, on a copper wheel; and poliſhed with tripoli, diluted in water.

As to emeralds, hyacinths, amethyſts, garnets, agats, and other of the ſofter ſtones, they are cut on a leaden wheel, moiſtened with emery and water, and poliſhed with tripoli, on a pewter wheel. Lapis lazuli, opal, &c. are poliſhed on a wooden wheel.

To faſhion and engrave vaſes of agat, cryſtal, lapis lazuli, or the like, they have a kind of lathe, like that of the pewterers; excepting, that whereas the latter is to hold the veſſels, which are to be wrought with proper tools; the former generally holds the tools, which are turned by a wheel, and the veſſel is held to them to be cut and engraved, either in relievo, or otherwiſe; remembering from time to time to moiſten the tools with diamond-duſt and oil, or, at leaſt, with emery and water.

To engrave figures or devices on any of theſe ſtones, when poliſhed, ſuch as medals, or ſeals, &c. they uſe a little iron wheel, the two ends of whoſe axis are received within two pieces of iron placed upright, as in the turners lathe, and to be brought cloſer, or ſet farther apart, at pleaſure. At one end of one of the axes are fitted the proper tools, being kept tight by a ſcrew. Laſtly, the wheel is turned by the foot, and the ſtone applied by the hand to the tool; and thus ſhifted and conducted as occaſion requires.

The tools are generally of iron, ſometimes of braſs. As to their form, it is various, but it generally bears ſome reſemblance to chiſſels, gouges, &c. Some have ſmall round heads like buttons; others like ferrels, to take the pieces out; others flat, &c. Theſe tools are not applied directly againſt the ſtones, but, as it were, ſidewiſe; thus wearing, and, as it were, grinding off the ſubſtance. And ſtill, whether it be figures, or letters, or characters, the manner of application is the ſame. The tools, as above obſerved, are to be frequently moiſtened with diamond duſt, and oil of olives. When the ſtone is engraven, they poliſh it on a wheel of bruſhes, made of hog's briſtles, with tripoli. For the larger, and leſs delicate works, they have copper, or pewter tools, on purpoſe to poliſh the ground, or plain parts, with tripoli, &c. which they apply after the ſame manner as thoſe wherewith the graving is performed.

Engraving *on ſteel*, is chiefly employed in cutting punches, matrices, and dies, proper for ſtriking coins, medals, and counters.

The method of *engraving*, with the inſtruments, &c. are the ſame for coins, as for medals and counters: all the difference conſiſts in their greater, or leſs relievo; the relievo of coins being much leſs conſiderable than that of medals; and that of counters ſtill leſs than that of coins. The engraver in ſteel uſually begins with punches, or punchions, which are in relievo, and ſerve for making the creux, or cavities of the matrices, and dies; though ſometimes he begins immediately with the creux; but it is only when the intended work is to be cut very ſhallow. The firſt thing is to deſign his figures; then he moulds them in white wax, of the ſize and depth required; and from this wax he graves his punch.

This punch is a piece of ſteel, or, at leaſt, of iron and ſteel mixed; on which, before they temper, or harden it, the intended figure, whether a head, or a reverſe, is cut, or carved, in relievo. The inſtruments uſed in this *graving* in relievo, which are much the ſame as thoſe wherewith the finiſhing of the work in creux is effected, are of ſteel: the principal are, gravers of divers kinds, chiſſels, flatters, &c. when the punch is finiſhed, they give it a very high temper, that it may the better bear the blows of the hammer, wherewith it is ſtruck, to give the impreſſion to the matrice.

What they call *matrice*, or *matrix*, is a piece of good ſteel, of a cubic form, called alſo the *dye*, whereon the relievo of the punch is ſtruck in creux: it is called *matrix*, becauſe in the cavities, or indentures, thereof, the coins, or medals, ſeem formed, or generated, as animals are in the matrix of their mother. To ſoften this ſteel, that it may more eaſily take the impreſſions of the punch, they make it red-hot; and, after ſtriking the punch thereon in this ſtate, they proceed to touch up, or finiſh, the ſtrokes and lines, where, becauſe of their fineneſs, or the too great relievo, they are in any reſpect defective, with ſome of the tools above mentioned.

The figure thus finiſhed, they proceed to engrave the reſt of the medal; as the mouldings of the border, the engrailed ring, letters, &c. all which, particularly the letters, and graining, or engrailment, are performed with little ſteel punches, well tempered, and very ſharp. Add, that as they ſometimes make uſe of puncheons to engrave the creux of the matrix, ſo, on ſome occaſions, they make uſe of the creux of the matrix to engrave the relievo of the punch.

To ſee and judge of the *engraving* in creux, divers means have been deviſed to take the impreſſions therefrom, as the work proceeds; ſometimes they make uſe of a compoſition of common wax, turpentine, and lamp-black; which, always retaining its ſoftneſs, eaſily takes the impreſſion of the part of the *graving* it is applied to; but this only ſerving to ſhew the work piece-meal, they have had recourſe to other ways, to ſhew the whole figure. The firſt, by pouring melted lead on a piece of paper, and clapping the matrice thereon; the ſecond, with melted ſulphur, managed the ſame way; and the third, proper only where the *graving* is ſhallow, by laying a piece of ſoft paper on the *graving*, and over the paper a leaf of lead; when, giving two or three blows with a hammer on the lead, the paper takes the impreſſion of the work.

When the matrix is quite finiſhed, they temper it, rub it well with a pumice-ſtone, and clean out the ſtone again with a hair-bruſh; and, laſtly, poliſh it with oil and emery: in this condition it is fit for the mill, to be uſed to ſtrike coins, medals, &c.

After the like manner are the matrices for caſting of printing letters engraven. See *Letter* FOUNDERY.

ENGRAVING *of ſeals*, *ſtamps*, *puncheons*, *marking irons*, *gilding irons*, and other matters, for goldſmiths, pewterers, bookbinders, &c. either in relievo, or indenture, is performed after the manner laſt deſcribed.

ENGRAVING *in wood*. See CUTTING *in wood*.

ENGRAULIS, in *Zoology*, a name given, by ſome authors, to the ANCHOVY, called alſo, by ſome, lycoſtomus, and, by others, halecula. See ENCRASICOLUS.

ENGROSSING, the writing a deed over fair, and in proper legible characters. Among lawyers it more particularly means the copying of any writing fair upon parchment, or ſtamped paper. See COPY, CALLIGRAPHUS, &c.

ENGROSSING, in *Commerce*, ſignifies the buying up any commodity in the groſs, or foreſtalling the market. See FORESTALLING.

ENGUICHE, in *Heraldry*, is applied to the great mouth of a hunting horn, when it has a rim of a different colour from the horn itſelf.

ENGYSCOPE, from εγγυς, *near*, and σκοπεω, *I obſerve*, a machine better known under the name of *microſcope*. See MICROSCOPE.

ENGYTHECA, from εγγυς, *near*, and θηκη, *repoſitory*, in *Antiquity*, a cup-board, or place where cups and other veſſels uſed to be laid.

ENHARMONIC, in *Muſic*, according to the diviſion of the ancients, the laſt of the three *genera*, or kinds, of muſic.

The *enharmonic* genus is ſaid to have been thus called, becauſe of its ſuperior excellence; though wherein that conſiſts, ſays Mr. Malcolm, we do not ſee. It was by all acknowleged ſo difficult, that few could practiſe it.

The ſeveral genera are divided into diaſtems, upon which the differences depend. Thoſe of the *enharmonic* are, the *dieſis*, and the *ditonum*; thoſe of the *chromatic*, the *hemitonium*, and *trihemitonium*; and, in the *diatonic*, the *hemitonium*, or *limma*, and the *tonus*.

But under theſe general names, which diſtinguiſh the *genera*, there are ſeveral different intervals, or ratios, which conſtitute the *chroai*, or *colores generum*, which were the different ſpecies of *enharmonic*, CHROMATIC, and DIATONIC.

According to ſome, the intervals, conſtituting the *enharmonic* genus, are the ſemitone minor, the *enharmonic* dieſis, and the third major. Phil. Tranſ. N° 481. p. 272.

This is to be underſtood of what the *enharmonic* ought, accurately ſpeaking, to be. Salinus has thus defined it, and others after him. This diviſion is alſo approved of by Dr. Pepuſch. The ancients do not agree in the numbers, by which they expreſs theſe diviſions of the *enharmonic* genus; but the differences that occur are not ſufficient to conſtitute any ſubordinate ſpecies of the *enharmonic*; and therefore they agree in not ſubdividing it. Phil. Tranſ. ibid. Vid. Wallis, Appendix ad Ptolem. p. 165, 166.

ENHARMONICAL *dieſis*. See DIESIS.

ENHERITANCE. See INHERITANCE.

ENHYDRI, in *Natural Hiſtory*, a genus of cruſtated ferrugineous bodies, formed into large, and, in great part, empty caſes, encloſing a ſmall quantity of an aqueous fluid. Of this genus we have only two ſpecies.

Some of the ancients have ſuppoſed this ſtone ſo called, becauſe its ſurface was always wet, as if by the effect of water oozing from within. The word itſelf expreſſes this notion, as being compounded of εν and ὑδωρ. But Pliny tells us directly the contrary, that the water was contained within, and made no ſhew on the outſide, and that the ſurface of the ſtone was white and ſmooth. From this it appears, that the *enhydrus* of the Romans, or at leaſt the kind known to Pliny, was not the ferrugineous one, common in our time, but the flinty kind. Of theſe we alſo have ſome in England. They are, as he ſays, white and ſmooth on the ſurface, and are flints perfectly round, covered with a white cruſt, of the bigneſs of a large apple, and containing a quantity of water, lodged in their central cavity, and rattling in it on ſhaking.

ENHYDRIS, the ancient Greek name for the OTTER.

ENIF, a fixed ſtar of the third magnitude, in Pegaſus's mouth.

ENIGMA. See ÆNIGMA.

ENIXUM *Sal*, among many of the *Chemiſts*, a neutral ſalt, neither acid nor alkaline, but participating of both.

Such are *common* SALT, NITRE, ALUM, VITRIOL, &c. Others apply it to peculiar ſalts, of this general kind.

The *ſal enixum* of Paracelſus is the caput mortuum of ſpirit of nitre, diſtilled in a retort with oil of vitriol; it is of a white colour, and pleaſant acid taſte. If this be diſſolved in hot water, and cryſtallized, it will be a more pleaſant medicine, poſſeſſing ſimilar virtues with vitriolated tartar. It is diuretic, and may be given from a ſcruple to a dram, in broth, or water-gruel.

ENLARGE, in the *Manege*, is uſed for making a horſe go large, that is, making him embrace more ground than he before covered. This is done when a horſe works upon a round, or upon volts, and approaches too near the center, ſo that it is deſired he ſhould gain more ground, or take a greater compaſs. To *enlarge* your horſe, you ſhould prick him with both heels, or aid him with the calves of your legs, and bear your hand outwards. If your horſe narrows, he is enlarged by pricking him with the inner heel, and ſuſtaining him with the outer leg, in order to preſs him forwards, and make his ſhoulders go. Upon ſuch occaſions the riding-maſters cry only *large*, *large*. See IN.

ENLARGING *ſtatute*. See STATUTE.

ENMANCHE', in *Heraldry*, is when a chief has two lines drawn from the middle of the upper edge, to the ſides, the depth of half the chief; the two lines including an obtuſe angle, whoſe vertex is the center of the top of the chief. See *Tab.* II. *Herald. fig.* 49.

The heralds conceive this, as bearing ſome reſemblance to *ſleeves*; whence the etymology of the word, from the French *manche*, *ſleeve*. It differs from *chappe*, where the lines come from the top to the bottom of the chief.

ENNEACTIS, in *Natural Hiſtory*, a name given, by Linkius, to a ſort of ſtar-fiſh, of the more branched or aſtrophyte kind, which has only nine rays, where they firſt part from the body, but theſe divide into a vaſt number of others afterwards.

ENNEADECATERIS, in *Chronology*, a cycle, or period, of nineteen ſolar years.

The word is formed of εννεα, *nine*; δεκα, *ten*; and ετος, *year*.

Such is the lunar cycle invented by Meton, at the end whereof the moon returns nearly to the ſame point from which it departed. Whence the Jews, Athenians, and other nations, who were diſpoſed to accommodate the lunar months to the ſolar years, made uſe of the *enneadecaeteris*; allowing to ſeven of the years thirteen months apiece, and to the reſt twelve. See Cycle, and Embolismic.

Enneadecateris, *the Jewiſh*, is properly a cycle of 19 lunar years, beginning from *molad tohu*, and returning again and again; whereof every 3d, 6th, 8th, 11th, 14th, 17th, and 19th, are emboliſmic, or of 383 days 21 hours apiece; the reſt common, or of 354 days 8 hours apiece. See Year.—Conſequently, the Jewiſh *enneadecateris* is 6939 days 18 hours.

ENNEAGON, in *Geometry*, a figure of nine angles, and nine ſides.

The word is formed of *εννεα*, *nine*; and *γωνια*, *angle*.

Enneagon, in *Fortification*, denotes a place with nine baſtions. See Fortified *Place*.

ENNEAHEDRIA, in *Natural Hiſtory*, the name of a genus of ſpars.

The word is derived from the Greek *εννεα*, *nine*, and *ἑδρα*, a *ſide*.

The bodies of this genus are ſpars, compoſed of nine planes, in a trigonal column, terminated at each end by a trigonal pyramid. Of this genus there are four known ſpecies. Hill's Hiſt. of Foſſ. p. 208.

ENNEANDRIA, in *Botany*, the ninth claſs of plants, with hermaphrodite flowers, and nine ſtamina, or male parts, in each.

The word is derived from the Greek *εννεα*, *nine*, and *ανηρ*, *male*.

This claſs comprehends three orders; viz. the *monogynia*, having one ſtyle, of which there are four genera; the *trigynia*, having three ſtyles, including one genus; and *hexagynia*, having ſix ſtyles, and containing one genus. The plants of this claſs are the bay-tree, rhubarb, &c.

ENNEATICAL *days* are every ninth day of a ſickneſs; which, ſome imagine, naturally occaſion a great alteration, either for the better, or worſe.

Enneatical *years* are every ninth year of a man's life. See Climacteric.

ENNEEMIMERIS is one kind of the *cæſura* of a Latin verſe, where, after the fourth foot, there is an odd ſyllable ending a word, which helps to make the next foot with the following word; as in this inſtance,

Ille latus niveum molli fultus hyacintho.

where all the four kinds of the *cæſura* occur.

ENNEOPHTHALMOS, from *εννεα*, *nine*, and *οφθαλμος*, *eye*, in *Zoology*, a name given, by ſome, to the lamprey.

ENNERIS, in the *Ancient Ship-Building*, a name given to thoſe galleys, or veſſels, which had nine tires of rowers. Theſe were of a very conſiderable ſize; though Meibom has found ſo convenient a method of placing the rowers, that he has taken off very much from that immenſe height others ſuppoſed they had above the water. We read of the teſſaracontes, and other amazing veſſels of this fabric; that of Philopator having forty rows of oars, and that of Ptolemy Philadelphus thirty; and ſome others which are ſpoken of, twenty. It has been diſputed by many, whether ſuch large veſſels as thoſe were ever actually built, or uſed; but Meibom gives great reaſon to believe, that they really were, though he, at the ſame time, alleges againſt Salmaſius, and the more ſanguine admirers of the works of the ancients, that very few veſſels were built larger than theſe *enneres*, or nine tiered ones, and proves it from Livy and Plutarch, and from Polybius. We are apt to admire, in many caſes, what we ought alſo to imitate, but never attempt it. This is the caſe in theſe galleys; and Meibom, who has given the rules of this ancient naval architecture, is of opinion, that by imitating it at preſent, modern galleys and galleaſſes might be built much more conveniently both for ſtrength and celerity, and alſo at leſs expence, than they are at preſent. Meibom. de Trirem.

The modern form is indeed allowed to be better than theirs, but if, in the ſtructure, the proportion of the long ſhips of the ancients were obſerved, they might be greatly improved; in the modern way of five men ſitting at one oar in the galleaſſes, much ſtrength is waſted to no purpoſe, becauſe they ſit too near to the fulcrum, or ſtay, whereas a ſmaller number of rowers, at a greater diſtance from the ſtay, would give more ſtrength, and throw the veſſel along much more ſwiftly, and would require leſs charge. Galleys of this ſort, thus managed at a ſmall expence, would be found of great uſe in the larger rivers, and in the ſhallow ſeas, and therefore convenient for the Baltic, the Britannic, and the Mediterranean ſeas, and would be the moſt uſeful of all veſſels for tranſporting great numbers of forces.

ENOLMIS, Ενολμις, in *Antiquity*, a deſignation given to Apollo's prieſteſs at Delphi, becauſe ſhe ſat on the tripod which was called *olmos*, *ολμος*. Hence alſo Apollo is called *Enolmos*, Ενολμος. Pott. Archæol. Græc. lib. ii. cap. 9. tom. i. p. 275.

ENORAINE, in the *Manege*, a wither-wrung horſe, or one that is ſpoiled in the withers. The word is obſolete.

ENORCHIS, in *Natural Hiſtory*, the name given, by many authors, to that ſpecies of *ætites*, or eagle-ſtone, in which the callimus, or internal nucleus, is not looſe, ſo as to rattle in it when ſhaken, but remains fixed to one ſide. The Germans call this *bodenſtein*. The outer cruſt is uſually of a whitiſh colour, and the internal nucleus is yellowiſh or browniſh, and it is uſually of the ſize of a pigeon's egg, and of the ſhape of the human teſticle; whence the name.

ENORMOUS, ſomething exceſſive, or monſtrous, eſpecially in bulk. The colossus of Rhodes was of an *enormous* ſtature.

The word is formed of the privative *e*, and *norma*, *rule*; q. d. *void of*, *or contrary to*, *rule or meaſure*; *contra normam*. In the corrupt ages of Latinity, they uſed *innormis*, and *inormis*.

In the French *juriſprudence*, *læſio enormis*, *enormous damage*, is that which exceeds half the value of the thing ſold.

ENQUEST, or Inquest, in *Law*, denotes an inquiſition of a jury by hearing of witneſſes.

This is the moſt uſual manner of trial, in all cauſes, both civil and criminal, within this realm. In civil cauſes, after proof is made, on either ſide, of ſo much as each party thinks good for himſelf; if the doubt be in the effect, it is referred to the diſcretion of twelve indifferent men, impanelled by the ſheriff for that purpoſe; and as they bring in their verdict, ſo judgment paſſeth: for the judge ſaith, *the jury findeth the fact thus*. For the *enqueſt* in criminal cauſes, ſee Jury.

ENRICHED *column*. See Column.

ENRICHING *plants*, a term uſed, by the Engliſh farmers, to expreſs ſuch plants as are found to do good to land, rather than to exhauſt it, and in conſequence of which the ſame piece of land will produce a good crop of corn, though it would, without the aſſiſtance of their having been planted on it, have yielded a very poor one. The myſtery of this difference between plants, ſome of which are found to burn up, that is, impoveriſh lands, while others enrich it, and leave it fitter for ſucceeding crops than they found it, is explained by Mr. Tull. This author having obſerved, that breaking the earth, by digging, or horſe-hoeing, between the plants, gave them great increaſe, found that it was this practice that enriched the earth; and that, while corn and ſuch plants as ſtand cloſe, and cannot be hoed between, impoveriſh the ground, and ſuffer no means of *enriching* it again to be uſed, there were ſome other things, the crops of which being planted thinner, gave room to the earth to be ploughed, dug, or hoed between, and that theſe were the plants which were called the *enriching* kind by the farmers; and the whole ſecret lay in this, that the hoeing, ploughing, or otherways breaking the earth between them, in order to kill the weeds, enriched the ground greatly more, in proportion, than theſe plants exhauſted it; and the conſequence was, that though they had thriven very well, yet the earth was left richer than before, notwithſtanding all that they had imbibed from it. Tull's Horſehoeing Huſbandry, p. 37.

On this obſervation, this excellent author ſeems to have founded the ſyſtem of what he calls horſehoeing huſbandry, concerning which he has written a large and uſeful treatiſe. He found that this ſtirring up of the earth enriched it ſo greatly, that, where it was uſed in a proper manner, the kind of plant need not be changed, but that the ſame earth would yield a ſucceſſive ſeries of crops of the ſame plant, and that even without dunging, or ever lying fallow, and every crop, for a long time, would be better than the former ones. The method of ſowing, to this purpoſe, is not by ſcattering the corn with the hand, but ſowing it in rows, and leaving large intervals between, the naked earth of which might be turned up by the hoe. See Alley and Hoeing.

ENROLLMENT. See Inrollment.

Clerk of the Enrollment *of fines*. See Clerk *of the Inrollments*.

ENS, Entity, *Being*, in *Metaphyſics*, is applied, in a general ſenſe, to every thing which the mind any way apprehends, and whereof it affirms, denies, proves, or diſproves, any thing. This other philoſophers call *cogitable*, and *intelligible*; and the logicians, *thema*.

Ens, in a leſs general ſenſe, ſignifies ſomething that is, or exiſts, ſome way farther than by being conceived, or being capable of being conceived, in the mind. This is particularly called *ens poſitivum*, or *reale*; poſitive, or real, being. In oppoſition to which ſtands *non ens*.

Ens, in its proper, or reſtrained ſenſe, is that to which there are real attributes belonging; or that which has a reality, not only out of the intellect, but in itſelf. This is what is properly meant by *res*, *thing*; and what we otherwiſe call *ens*, *reale*, and alſo *ſubſtance*.

Ens *rationis*, is that which depends wholly on the mind, or which exiſts only in the imagination: of which they diſtinguiſh three kinds: *ens rationis affectivum*, which is done or produced by the mind, as knowledge; *ens rationis ſubjectivum*, which is received into the mind, as ſcience; and *ens rationis objectivum*, which is repreſented by the mind, as a chimæra, a golden mountain, or the like. Which laſt, if it have no other manner of being, i. e. if it be repreſented ſo as it does not, or cannot be, is what we moſt properly call, *ens rationis*. The generality of ſchool philoſophers, and the Peripatetics among the reſt, aſſert, that there are of theſe *entia rationis objectiva*. Others deny there are, or can be, any ſuch things.

Ens, or Ens *primum*, in *Chemiſtry*, denotes the moſt efficacious part of any natural mixt body, whether animal, vegetable, or foſſil, wherein all the qualities or virtues of the ingredients of the mixt are comprehended in a ſmall compaſs.

Paracelſus pretends to have been able to ſeparate the *ens primum* from bodies, and with it to effect prodigious things towards the renovation and reſtoration of youth; but his proceſſes are ſo obſcurely delivered, that no body has been induced to try them.

Mr. Boyle gives us a proceſs from M. le Febure, whereby the *ens primum*, or eſſence of baum, is eaſily obtained; he adds, that the effects of an *ens* of baum thus drawn, are no ways inferior to thoſe of Paracelſus; and inſtances in a ſpecial friend of his, upon whoſe taking it only for a fortnight, the nails of his hands and feet fell off, and were ſucceeded by a ſet of new ones; which convinced him ſo far of its efficacy, that he left off taking it himſelf; but, giving ſome of it to an old woman of ſeventy years of age, who ſerved in the houſe, it produced the menſes again; and that ſo copiouſly, as wonderfully to ſtartle the woman.

Upon giving a little of it to an old hen, her feathers began to moult on the ſixth day, and ſhe grew ſtark-naked; but before a fortnight was over, ſhe had others in their room, which were fairer, and better coloured than the former.

The relation is odd enough; yet, conſidering the authority from which we have it, and how eaſily the thing is tried, it is ſurpriſing no body has yet attempted to proſecute it. The proceſs is this:

Having gathered, e. gr. ſome baum, or other proper plant, at the proper ſeaſon and time, beat it into a pulp in a marble mortar; and, putting it into a bolt-head hermetically ſealed, digeſt it forty days on a dunghil, or other analogous heat: this done, take out the matter, which will now be more liquid than before; and ſeparating from it the dregs or groſſer parts, digeſt it anew in a gentle bath, that the remaining groſſer parts may alſo ſubſide; filtrate it, and add to it the fixed ſalt drawn from the former dregs, dried and calcined; to the liquor thus prepared, add equal parts of the liquor of good ſea-ſalt, well purified and melted, and then let it run *per deliquium*; laſtly, ſeal up the mixture in a bolt-head, and expoſe it to the ſun ſix weeks longer; at the end of which term, the *ens primum* of the plant will be found ſwimming on the liquor, in a liquid, tranſparent form, ſometimes of a green, and ſometimes a reddiſh colour, according to the plant uſed.

Ens *primum ſalium*, a name given by Paracelſus to a preparation of ſea-ſalt, which he calls alſo a perpetual oil, and sal *circulatum*, which ſee.

Ens *Veneris*, or *flower of Venus*, a chemical preparation from vitriol, firſt publiſhed by Mr. Boyle, held as a ſpecific in the rickets, and much commended in nervous caſes, obſtinate cachexies, loſs of appetite, and obſtructions of all kinds.

It is prepared by ſubliming equal parts of the powder of Cyprus vitriol (calcined till it is of a dark colour) and of ſal ammoniac, into the form of yellow flowers. It has its name from the particles of Venus, copper, imparted to it by the vitriol.

Ens *martis*, is the flower of iron ſublimed with the ſame ſalt.

ENSAL, in the *Materia Medica*, a name uſed by ſome authors for the common ſmall cardamom of the ſhops.

ENSCONCED, in the *Military Art*. See Insconced.

ENSEELED, in *Falconry*, a term uſed for a hawk which has a thread drawn through her upper eyelids, and made faſt under her beak, to obſcure her ſight.

ENSEMBLE, a French term, ſometimes uſed in our language, literally ſignifying *together*, or *one with another*; being formed from the Latin, *in*, and *ſimul*.

In *Architecture*, we ſay, the *enſemble*, or *tout enſemble* of a building; meaning the work or compoſition, conſidered together, and not in parts; and ſometimes alſo the relative proportion of the parts to the whole. All thoſe pieces of building make a fine *enſemble*.

To judge well of a ſtatue, or other work of ſculpture, one muſt firſt examine whether the *enſemble* be good.

The *tout enſemble* of a painting, is that harmony which reſults from the diſtribution of the ſeveral objects or figures whereof the whole is compoſed. This picture is good, taking the parts ſeparately; but the *tout enſemble* is bad.

ENSIFORM *Leaf*, in *Botany*. See Leaf.

ENSIFORMIS, of *enſis*, *ſword*, and *forma*, *ſhape*, *Cartilago*. See Xiphoides.

ENSIGN, in the *Military Art*, a banner or colours, under which the ſoldiers are ranged, according to the different companies or parties to which they belong. When a battalion is encamped, they are placed in its front; but in garriſon they are lodged with the commanding officer.

There is a ſmaller ſort, called camp-colours, placed on the right and left of the parade of a regiment when in the field. See Flag and Standard.

The Turkiſh *enſigns* are horſes tails; the number of which diſtinguiſhes the rank of their commanders; the ſultan has ſeven, the grand vizier only three, &c. Thoſe of the Europeans are pieces of taffetty, with divers figures, colours, arms, and devices, thereon. Xenophon tells us, that the *enſign* borne by the Perſians was a golden eagle on a white flag; the Corinthians bore the winged horſe, or Pegaſus; the Athenians, an owl; the Meſſenians, the Greek letter M; the Lacedæmonians, the Λ.

The Romans had a great diverſity of *enſigns*; the wolf, minotaur, horſe, boar, and at length the eagle. See Signa.

A military *enſign*, on a medal of a Roman colony, denotes it a colony peopled with old ſoldiers.

Ensigns, in a *Ship*, are thoſe colours which are hoiſted on a long pole erected over the poop, and called the *enſign-ſtaff*. There are few ſhips, whether men of war or merchants, but have their *enſigns*. Their chief uſe is, that when any ſtrange ſhips meet at ſea, or make into any harbour, by heaving out the colours in the poop, that is, putting theſe *enſigns* abroad, they diſcover of what part and country they are, and ſerve to characteriſe the different ſquadrons of the navy. Thus, the Britiſh heave out their colours with a double croſs, viz. that of St. George and St. Andrew, formed into an union, upon a field which is either red, white, or blue; and ſo all other countries with ſome particular diſtinction, whereby they may be known. The *enſigns* ſerve alſo for many other uſes. See Flag.

Ensign, is alſo uſed for an officer in the infantry, who bears the *enſign* or colours; by the Latins called *ſignifer* and *vexillifer*.

He has the charge of the *enſign* in battle; and, if he be killed, the captain is to take it in his ſtead. The *enſign* is the loweſt commiſſioned officer in a company of foot, under the command of the lieutenant; and, in his abſence, ſupplies his poſt. In cavalry, the enſign is termed a cornet. See Cornet.

ENSTASIS, Ενϛασις, of ἐν and ἵϛημι, *ſtatuo*, in *Logic*, a manner of replying to an opponent, either by confuting his argument, or denying the juſtneſs of his concluſion. Voſſ. Rhet. lib. iii. p. 380.

Enstasis, in *Medicine*, a term uſed to expreſs the ingreſs of moleculæ into the vacuity of the pores which obſtruct them, and thereby cauſe diſeaſes. It is a word familiar with Eraſiſtratus and Aſclepiades, who was a follower of Democritus, and taught that moſt diſeaſes were cauſed by ſuch an ingreſs of matter into the pores. Thus Aſclepiades defined a phrenſy to be ſuch an *enſtaſis* in the membranes of the brain. Plutarch, in his Precepts of Health, alſo mentions this *enſtaſis*; and Galen and Caſſius, who is ſuppoſed to have been of the ſect of the Rationaliſts, expreſſes the ſame ſenſe by the ſame word.

ENTABLATURE, in *Architecture*, is that part of an order of column which is over the capital, comprehending the architrave, frize, and corniche.

The word ſeems formed of *tabulatum*, or *intabulamentum*.

The *entablature* is alſo called the *trabeation*, and by Vitruvius and Vignola, *ornament*. It is different in the different orders: indeed, it conſiſts of the three grand parts or diviſions above mentioned, in all; but thoſe parts conſiſt of a greater or leſs number of particular members or ſubdiviſions, as the orders are more or leſs rich.

Vignola makes the *entablature* a quarter of the height of the whole column, in all the orders.

In the Tuſcan and Doric, the architrave, frize, and corniche, are all of the ſame height; in the Ionic, Corinthian, and Compoſite, the whole *entablature* being fifteen parts, five of them are allowed for the architrave, four for the frize, and ſix for the corniche. See Ionic, Corinthian, &c. and Column.

Entablature, or Entablament, is ſometimes alſo uſed for the laſt row of ſtones on the top of the wall of a building, whereon the timber and covering reſt.

As this is frequently made to project beyond the naked of the wall to carry off the rain, ſome authors call it in Latin, *ſtillicidium*, or *drip*. Such an *entablature* does not ſtand out far enough; it lets the water fall on the foot of the wall.

ENTABLER, in the *Manege*, is ſaid of a horſe whoſe croupe goes before his ſhoulders, in working upon volts; for, in the regular manege, one half of the ſhoulders ought to go before the croupe. Thus we ſay, your horſe *entables*; for, in working to the right, he has an inclination to throw himſelf upon the right heel; which fault you may prevent, by taking hold of the right rein, keeping your right leg near, and removing your left leg as far as the horſe's ſhoulder. A horſe cannot commit this fault without committing that called, *aculer*; but *aculer* may be without *entabler*. See ACULER.

ENTAIL, in *Law*, ſignifies FEE TAIL, or *fee entailed*, that is, abridged, curtailed, or limited to certain conditions. For the docking of an *entail*, ſee DOCKING and RECOVERY.

ENTALI, in the *Materia Medica*, a name given by ſome authors to foſſile alum.

ENTALIUM, the *pipe-ſhell*, in the *Materia Medica*, a ſhell of the ſame genus with the *dentalia*, being a ſpecies of the *tubuli marini*. It is frequent in the Eaſt Indies, and ſometimes is found on our own ſhores. The virtues aſcribed to it are the ſame with thoſe of the *dentalium*; but neither of them have any title to more than thoſe of alkaline abſorbents, like the other teſtaceous powders.

ENTASIS, *diſtenſion*, from εν and τεινω, *I ſtretch*, a word uſed in various ſenſes by different authors in *Medicine*, but by moſt applied to the parts of generation; and thence *entatica* were medicines, in whatever form, meant as provocatives.

ENTÉ, in *Heraldry*, literally implies *engrafted*, and is uſed by foreign heralds to expreſs a method of marſhalling, little known among us: yet we have an inſtance of it in the fourth grand quarter of his majeſty's royal enſign, whoſe blazon is Brunſwick and Lunenburgh, impaled with ancient Saxony, *enté in pointe*.

ENTELECHIA, Εντελεχεια, of εντελεχης, *perfect*, a Greek term, by which Ariſtotle defines the ſoul; and which, not occurring in any other author, has given the critics and philoſophers infinite perplexity to diſcover its true meaning. See SOUL.

Hermolaus Barbarus is even ſaid to have conſulted the devil about it; after which, in his Paraphraſe on Themeſtius, whether from the devil or himſelf, we know not, he renders it by *perfectihabia*, which is not a whit the clearer.

Cicero, whoſe interpretation ſhould be preferable to that of any modern, defines *entelechia* (Tuſc. Queſt. lib. i. cap. 1.) to be, *a certain, continued, and perpetual motion*; whence it ſhould ſeem, that Ariſtotle took the ſoul for the mode of the body; a *continuous motion* being, doubtleſs a mode of body.

The common Peripatetics hold *entelechia* to ſignify *act*, and under it ſuppoſe the form of the compound or animal to be underſtood.

Laſtly, other, and thoſe the lateſt Peripatetics, agree, that the *act*, or *entelechia*, whereby Ariſtotle meant to explain the nature of the ſoul, is either ſome mode of the body, as motion, or it is nothing.

ENTENDEMENT, in *Law*. See INTENDMENT.

To ENTER *a Hawk*, among *Sportſmen*, is uſed of a hawk when ſhe begins to kill.

To ENTER *a hound*. See ENTRANCE *of hounds*.

ENTERADENES, of εντερον, *inteſtine*, and αδην, *gland*, in *Anatomy*, a name by which many authors have called the inteſtinal glands.

ENTERENCHYTÆ, of εντερα, *the viſcera*, and εγχυω, *I infuſe*, in *Medicine*, a name given by authors to the ſeveral inſtruments contrived for throwing clyſters into the bowels, ſuch as the bladder and pipe, the ſyringe, and the like, for liquid clyſters; and the box with the double pipe for conveying the ſmoak of tobacco. See CLYSTER and FUMIGATOR.

ENTERFERING, in the *Manege*. See CUTTING.

ENTERMEW. See FALCON.

ENTEROCHELE, in *Medicine*, a rupture, or deſcent of the inteſtines.

The word is formed of εντερον, *inteſtine*, and κηλη, *tumor*.

The *enterocele* is a kind of hernia, or rupture, wherein the inteſtines, and particularly the ilium, fall either into the groin or the ſcrotum. See HERNIA.

There are two kinds of *enterocele*; the *perfect*, which happens when the inteſtine falls into the ſcrotum; and the *imperfect*, when it only falls into the groin.

The next cauſe of the *enterocele* is, the relaxation, or extenſion of the lower part of the peritonæum, wherein the inteſtines are contained. The remote cauſes are, great lifts, too violent exerciſes, great coughs, frequent vomiting, much crying, &c. whence it is that children are much ſubject to it. The remedy is chiefly by external applications, as truſſes and bolſters.

ENTERO-EPIPLOCELE, a kind of rupture, wherein the inteſtines, and *epiploon* or caul, fall together into the *ſcrotum*. See HERNIA. The cauſes are the ſame as thoſe of the ENTEROCELE.

ENTERO-EPIPLOMPHALUS, a kind of exomphalus, wherein the inteſtines, and epiploon or caul, bunch out at the navel.

The word is compoſed of εντερον, *inteſtine*, επιπλοον, *caul*, and ομφαλος, *umbilicus*, *navel*.

ENTERO-HYDROMPHALUS, in *Medicine*, a kind of exomphalus, wherein, beſide a diſplacing and bunching out of the inteſtine, there is a quantity of watery humours collected along with it.

The word is formed of the Greek, εντερον, *inteſtine*, ὑδωρ, *water*, and ομφαλος, *navel*.

ENTEROLOGY, (from εντερον, *inteſtinum*, *a gut*, and λογος, *ſermo*, *diſcourſe*) is properly a treatiſe of the bowels. Though the word is generally underſtood to include the contents of three cavities, head, breaſt, and all the viſcera, or belly.

ENTEROMPHALUS, Εντερομφαλος, in *Medicine*, a kind of exomphalus, wherein the inteſtines, being fallen out of their place, occaſion a tumor in the navel. See EXOMPHALUS and HERNIA.

The word is formed of the Greek, εντερον, *inteſtine*, and ομφαλος, *umbilicus*.

ENTERORAPHE, of εντερον and ῥαφη, *ſuture*, in *Surgery*, a name given to the ſutures of the inteſtines.

To ENTERPEN, in *Falconry*, is a term applied to a hawk, when her feathers are wrapped up, ſnarled or entangled.

ENTERPLEADER, in *Law*, the diſcuſſing or trying a point, incidentally falling out before the principal cauſe can be determined.

Thus, two perſons being found heirs to land by two ſeveral offices in one county, the king is brought in doubt to which of them livery ought to be made. Before livery, therefore, they muſt *enterplede*; that is, formally try between themſelves which is the right heir.

ENTERPRISE, denotes an undertaking attended with ſome difficulty and danger: in the *Military Art*, this kind of ſervice is aſſigned to the light-infantry, light-horſe, and huſſars.

ENTERRMENT, or INTERRMENT. See INTERRMENT.

ENTERSOLE. See MEZANINE.

ENTERTAINMENTS, *epulæ*, among the ancients, were of various kinds, as 1. *Funeral entertainments*, *epulæ funebres*. 2. *Entertainments* given by the huſband on bringing home his wife, called *epulæ geniales*. 3. Thoſe beſtowed on the ſoldiers, called *epulæ militares*; which was done before or after an engagement, or on occaſion of proclaiming the general *imperator*. 4. *Birth-day entertainments*, *epulæ natalitiæ*.

There were many other kinds, denominated either from the place where, the perſons by whom, or the occaſion for which they were given.

ENTERVIEW, in *Falconry*, a term uſed for the ſecond year of a hawk's age.

ENTHALIUM, in *Natural Hiſtory*, a name given by ſome to a ſpecies of the *tubuli marini*, more uſually known by the name of *penicillum marinum*, and *pinceau de mer*. See PENICILLI *Marini*.

ENTHEMATA, from εντιθημι, *I put in*, in *Medicine*, a word uſed to expreſs ſuch medicines as were immediately put into large freſh wounds to ſtop the hæmorrhage, and prevent inflammation, or other bad conſequences.

ENTHETOS, from εντιθημι, in the writings of the old *Phſicians*, a name given to certain applications intended to be thruſt up the noſtrils to ſtop hæmorrhages.

ENTHUSIASM, Ενθουσιασμος, a poetic, or prophetic rage or fury, which tranſports the mind, inflames and raiſes the imagination, and makes it conceive and expreſs things extraordinary and ſurpriſing.

The word is derived from the Greek, ενθεος, or ενθους, a man animated in an extraordinary manner with the ſpirit of God; in whom God is, or whom God animates. Whence the verb ενθουσιαζω, or ενθουσιαω, and the noun ενθουσιασμος, *enthuſiaſm*: and ενθουσιαστης, *enthuſiaſt*, a perſon ſubject to ſuch tranſports.

M. de Piles defines *enthuſiaſm* to be a tranſport of the mind, whereby it is led to think and imagine things in a ſublime, ſurpriſing, yet probable manner.

The ſublime he thinks a neceſſary ingredient in the definition, as being the proper effect and production of *enthuſiaſm*.

This is the *enthuſiaſm* felt in poetry, oratory, muſic, painting, ſculpture, &c. but this *enthuſiaſm* which belongs to the works of art, is very different from that attributed to the ſibyls and prieſteſſes of the oracles, and heathen gods, which was little elſe but fanaticiſm, and conſiſted principally in grimace, and contorſions of the body. See ORACLE and PYTHIAN.

There is a degree of aſſent, ſays Mr. Locke, which, with ſome men, has the ſame authority as either faith or reaſon; and that is *enthuſiaſm*, which, laying by reaſon, would ſet up revelation without it; whereby, in effect, it takes away both reaſon and revelation, and ſubſtitutes in the room of it the ungrounded fancies of a man's own brain, and aſſumes them for a foundation, both of opinion and conduct.

Immediate revelation being a much eaſier way for men to eſtabliſh their opinions, and regulate their conduct by than the tedious labour of ſtrict reaſoning; it is no wonder, that ſome have been very apt to pretend to it; eſpecially in ſuch of their actions and opinions as they cannot account for by the ordinary methods of knowlege and principles of reaſon. Hence we ſee, that in all ages men, in whom melancholy has mixed with devotion, or whoſe conceit of themſelves has raiſed them into an opinion of a greater familiarity with God than is allowed others, have often flattered themſelves with the perſuaſion of an immediate intercourſe with the Deity, and frequent communications with the Divine Spirit.

Their minds being thus prepared, whatever groundleſs opinion comes to ſettle itſelf ſtrongly upon their fancies, is an illumination from the Spirit of God; and whatſoever odd action they find in themſelves an inclination to do, that impulſe is concluded to be a call or direction from heaven, and muſt be obeyed.

This we take to be properly *enthuſiaſm*; which, though riſing from the conceit of a warm or over-weening brain, works where it once gets footing, more powerfully on the perſuaſions and actions of men than either reaſon or revelation, or both together; men being moſt forwardly obedient to the impulſes they receive from themſelves.

When men are once got into this way of immediate revelation, of illumination without ſearch, and certainty without proof, reaſon is loſt upon them; they are above it; they ſee the light infuſed into their underſtanding, and they cannot be miſtaken: like the light of bright ſun-ſhine, it ſhews itſelf, and needs no other proof but its own evidence; they feel the hand of God moving them within, and the impulſes of the ſpirit, and cannot be miſtaken in what they feel. But, of this ſeeing and feeling, is it a preception of an inclination to do ſomething, or of the Spirit of God moving that inclination? theſe are two very different perceptions, and ſhould be carefully diſtinguiſhed.

If they know the thing to be a truth, they muſt do it, either by its own ſelf-evidence, or by the rational proofs that make it out to be ſo; if they know it to be a truth, either of theſe two ways, they in vain ſuppoſe it to be a revelation; for thus, all truths, of what kind ſoever, which men uninſpired are enlightened with, come into their minds. If they ſay, they know it to be true, becauſe it is a revelation from God, the reaſon is good; but then it will be demanded, how they know it to be a revelation from God? if they ſay, by the light it brings with it, they ſhould conſider, whether this be ſaying any more than that it is a revelation, becauſe they believe it to be true; for all the light they ſpeak of is but a ſtrong perſuaſion of their own minds that it is a truth, which is a very unſafe ground to proceed on, either in our tenets or actions. True light in the mind, is nothing elſe but the evidence of the truth of any propoſition; and if it be not ſelf-evident, all the light it can have is from the clearneſs of thoſe proofs upon which it is received. See EVIDENCE.

God, when he makes the prophet, doth not unmake the man; he leaves his faculties in their natural ſtate, to enable him to judge of his inſpirations, whether they be of divine original or not. If he would have us aſſent to the truth of any propoſition, he either evidences that truth by the uſual methods of natural reaſon, or elſe makes it known to be a truth which he would have us aſſent to by his authority; and convinces us, that it is from him, by ſome marks which reaſon cannot be miſtaken in. Eſſay on Hum. Underſt. book iv. chap. 19.

The holy men of old, who had revelations from God, had ſomething elſe beſides internal light, of aſſurance in their own minds, to teſtify to them, that it was from God; they had outward ſigns to convince them of the Author of thoſe revelations; and when they were to convince others, they had a power given them to juſtify the truth of their commiſſion from heaven; and, by viſible ſigns, to aſſert the Divine authority of the meſſage they were ſent with. Moſes ſaw the buſh burning without being conſumed, and heard a voice out of it. God, by another miracle, of his rod turned into a ſerpent, aſſured him likewiſe of a power to teſtify his miſſion, by the ſame miracle repeated before thoſe to whom he was ſent.

Devotion, undirected and unreſtrained by reaſon, degenerates into *enthuſiaſm*, or a religious phrenſy, founded in an apprehenſion of a preſent Divine energy on the mind, to which all its powers are ſuppoſed to be ſubject, and by which a perſon is carried on, without attention to any thing elſe as his guide, and producing not only great perturbation of mind, but moſt amazing agitations of body. Many inſtances of this kind occur, both in ancient and modern times, to the diſgrace and injury of rational religion.

ENTHUSIAST, Ενθουσιαςης, a perſon poſſeſſed with *enthuſiaſm*. See ENTHUSIASM, FANATIC, &c.

The word is uſually underſtood in an ill ſenſe. It was applied by the ancients to a ſect of heretics, called alſo *Maſſalians* and *Euchites*; who, as Theodoret expreſſes it, were denominated *enthuſiaſts*, becauſe, being poſſeſſed by the devil, they believed themſelves divinely inſpired. See MASSALIANS and EUCHITES.

Among us, *enthuſiaſt* is ſometimes of like import with *fanatic*, and is applied to the Quakers and ancient Anabaptiſts, and modern prophets, from their pretences to extraordinary lights, revelations, viſions, impulſes, &c. from heaven.

ENTHYMEME, in *Logic* and *Rhetoric*, an argument conſiſting only of two propoſitions, an antecedent, and a conſequent deduced from it.

The word is Greek, ενθυμημα, formed of the verb ενθυμεισθαι, *to think, conceive*, a compound of εν and θυμος, *mind.*

Ariſtotle calls it the *rhetorical* or *probable argument*; the ſchools, the *imperfect ſyllogiſm*, in contradiſtinction to the perfect, which conſiſts of three propoſitions, and is called the *dialectical argument*.

It muſt be obſerved, however, that the *enthymeme* is really a perfect ſyllogiſm in the mind, and only imperfect in the expreſſion, becauſe one of the premiſes is ſuppreſſed, as being ſufficiently clear and obvious, and eaſily ſupplied by the underſtanding of thoſe with whom we diſcourſe.

Thus, in every right-lined triangle, the three angles are equal to two right ones; and conſequently, they are ſo in an iſoſceles triangle, is an *enthymeme*; the propoſition, that an iſoſceles triangle is a right-lined triangle being omitted, as being ſufficiently known and granted.

The *enthymeme* is the moſt ſimple and elegant of all argumentations; being what a man, in arguing cloſely, commonly makes, without attending at all to the form. Thus, that verſe remaining of Ovid's tragedy, intitled, Medea, contains an *enthymeme*: *Servare potui, perdere an poſſum rogas: I was able to ſave you; conſequently, to have deſtroyed you.* All the beauty would have been loſt, had all the propoſitions been expreſſed; the mind is diſpleaſed with a rehearſal of what is no ways neceſſary.

Sometimes, alſo, the two propoſitions of an *enthymeme* are both included in a ſingle propoſition, which Ariſtotle calls an *enthymematical ſentence*, and gives this inſtance thereof: *Mortal, do not bear an immortal hatred.* The whole *enthymeme* would be, *Thou art mortal*; *let not, therefore, thy hatred be immortal.*

ENTIER, in the *Manege*, is uſed for a ſort of reſty horſe, that refuſes to turn, and is ſo far from following or obſerving the hand, that he reſiſts it. If your horſe is *entier*, and refuſes to turn to what hand you will, provided he flies, or parts from the heels, you have a remedy, by putting the Newcaſtle on him; that is, a caveſſon, made after the Duke of Newcaſtle's way.

The word is French, and is alſo uſed among them to denote a ſtone-horſe.

ENTIERTIE, from the French, *entier*, is uſed in our *Law-books*, in contradiſtinction to *moiety*, and denotes the whole. Thus a bond, damages, &c. are ſaid to be entire, when they cannot be divided or apportioned.

ENTIRE *Tenancy*, in *Law*, is contradiſtinguiſhed to *ſeveral tenancy*, and ſignifies a ſole poſſeſſion in one man; whereas the other denotes a joint, or common one, in ſeveral. See TENANT and JOINT-TENANT.

ENTIRE *arms*. See ARMS.

ENTITATIVELY, ENTITATIVE, implies an abſtraction, or ſeparation, of all the circumſtances, from a thing under conſideration.

Thus, a thing is ſaid to be taken or conſidered *entitatively*, or *ſecundum entitatem*, when conſidered nakedly and preciſely, according to what it is in itſelf, without any thing extrinſic. E. gr. Peter *entitatively* taken, is Peter, as a thing, a ſubſtance, a man, &c. without any regard to his being a lord, a huſband, learned, &c.

ENTITY, in the *School-philoſophy*, a phyſical ens, or being, conſidered according to what it is in its natural capacity.

Some dealers in diſtinctions give us ſeveral kinds of *entity*.

Or, *entity* denotes the actual eſſence or exiſtence of any thinking thing. See Ens.

ENTORSES, in the *Manege*. See Pastern.

ENTOYER, or Entoire, in *Heraldry*, is uſed to expreſs a bordure, charged entirely with things without life. See Bordure.

ENTRAILS, the inteſtines or guts of an animal. See Inteſtines.

Menage derives the word from the barbarous Latin, *interalia*, formed of the Greek, εντερον, *inteſtine*.

Entrails, is alſo uſed in a more extenſive ſenſe, for the viſcera, or all the parts contained in the cavities of the bodies of animals. See Viscera.

The aruſpicina of the ancients was employed in conſidering the *entrails* of victims; as the heart, lungs, liver, &c. See Aruspices, &c.

ENTRANCE, in *Sea-language*, is a name often given to the foremoſt part of a ſhip under the ſurface of the ſea.

Entrance *of hounds*, a phraſe uſed by our *Sportſmen*, to expreſs the inſtruction of theſe creatures in the art of hunting. They are ſaid to be entered when they are thoroughly taught this.

The time of entering of hounds, is, when they are ſeventeen or eighteen months old, they are then to be taught to take the water and ſwim; they are to be laid abroad in the heat of the day, to enure them to fatigue and exerciſe; and they muſt be frequently led through flocks of ſheep, and warrens, to uſe them to be under command, and to know that they are to run at nothing but what the huntſman orders. They muſt be carefully inſtructed each to know his own name, and to underſtand the voice of the huntſman, and the notes of the horn uſed in hunting; and finally, to uſe their own language in a proper manner.

The beſt time of entering them is about noon; and it ſhould be in a fair warm day; for, if they be entered in the morning, they will give out when the heat of the middle of the day comes on. Take the moſt advanced, that the game may not ſtand long before them, and let them be well rewarded when all is over. This ought to be repeated at leaſt once a week, for two months ſucceſſively; by this means they will be ſo fleſhed and ſeaſoned with what game you may enter them at, that they will never afterwards leave off the purſuit. The new hounds ſhould always be entered with the beſt and ſtauncheſt hounds that can be had; and there is not to be one barking dog ſuffered in the field on this occaſion.

Whatever chace the hounds are intended for, the hare is the beſt game to enter them at, becauſe, in this chace, they will learn all the turns and doubles that they can poſſibly meet with in any other kind, and how to come to the hollo. They will learn alſo, from this chace, to have a perfect and nice ſcent, and hard feet, by being uſed to highways, beaten paths, and dry hills. The hounds, when firſt entered, muſt have all the advantages given them that can be. When the hare is put up, from her form, it muſt be obſerved which way ſhe went, and the ſcent muſt be left to cool a while, and then they muſt be laid in and helped as much as can be, by wind, view, hollo, or pricking the paſſage; nor will it be amiſs for the firſt time, to give them a hare tired the ſame morning in her courſe.

Some are of opinion, that the beſt way to enter young hounds, is, to take a live hare, and trail her upon the ground, ſometimes one way, and ſometimes another, and then to draw her off to a convenient diſtance, and hide her, that the dogs, taking the ſcent may follow all the traces through which ſhe was drawn, and at length find her.

The huntſman ought very well to underſtand the nature and diſpoſition of his hounds, in finding out the game; for ſome hounds are of that temper, that when they have found the ſcent, they will run forward with it, not making any noiſe, nor ſhew of the tail; others, when they have found a head, will ſhew the game; and ſome, having found the footings of the beaſt, will prick up their ears a little, and either bark, or only wag their ears, or the hinder part of their bodies. This difference of natural diſpoſition the huntſman is particularly to obſerve in the young and newly entered pack, otherwiſe he will never underſtand them, nor ever be able to hunt them to any credit or advantage.

For entering the hound at hart or buck, he ſhould be in the prime of greaſe, for then he cannot ſtand up, or hold the chaſe ſo long. The foreſt pitched upon ſhould have all the relays at equal diſtances, as nearly as may be; but then the young hounds ſhould always have ſome old ſtaunch ones to enter them, and they ſhould be led to the fartheſt and laſt relay, and the hart or buck ſhould be hunted to them. Being come up, the old hounds ſhould be uncoupled; and when they have found the hart, and well entered the cry, then the young ones are to be uncoupled alſo; and if any of them are found to lag behind, they muſt be whipped and beaten forward. In whatever place the hart is killed, the neck ſhould be immediately flayed, and the hounds rewarded; for it is beſt always to do this while the fleſh is hot. Another very good method of entering hounds at the buck, is to take one in the toils or nets, and wound one of his legs, ſo as to diſable him from running either very ſwiftly or very far; then let him looſe, and firſt let a blood-hound trace the creature, then let looſe all the young hounds; and when they have run down the animal, reward them with the neck.

Some enter their hounds within a toil; but this is a bad way; for the hart being in this caſe always in ſight, and not able to run an end, makes a great number of doubles and turnings: this is very different from the chaces they are to meet with afterwards; and when they find a hart run in the common way, ſtraight forward, and out of ſight, they will leave the chace, as unlike that by which they were taught.

ENTRAVES, *entravons*, in the *Manege*. See Locks.

ENTREPAS, in the *Manege*, is a broken pace, or going, properly a broken amble, that is neither walk nor trot, but has ſomewhat of an amble. This is the pace, or gait, of ſuch horſes as have no reins or backs, and go upon their ſhoulders, or of ſuch as are ſpoiled in their limbs.

ENTRICHOMA, from εν and θριξ, *hair*, in *Anatomy*, the name of the outer edge of the eye-lid, on which the hairs grow.

ENTRIES, amongſt *Hunters*, thoſe places in thickets through which deer are found lately to have paſſed; by means whereof their bigneſs or ſize is gueſſed at; and at which the hounds or beagles are put to them for the view.

Entries, *books of*, in *Law*, are ancient and modern, and contain tranſcripts of proceedings that have been had in ſome particular actions: the principal of ſuch are neceſſary for gentlemen educated to the profeſſion of the law.

ENTRING *a ſhip*, in the *Sea-language*, the ſame with boarding her. See Boarding.

Entring-*ladder*, in a *Ship*, is of two ſorts; one is uſed by the ſhips ſides, in a harbour, or in fair weather, for perſons to go in and out of the ſhip; the other is made of ropes, with ſmall ſtaves for ſteps, and is hung out of the galley to enter into the boat, or to come aboard the ſhip from thence, when the ſea runs ſo high that they dare not bring the boat to the ſhip's ſide, for fear of ſtaving her. See Gang-way.

Entring-*ropes*, in a *Ship*. See Rope.

ENTROCHUS, in *Natural Hiſtory*, the name of a genus of foſſils of a very regular figure and ſtructure, ſuppoſed by many authors to be *lapides ſui generis*, and ſtones in their native ſtate. They are, however, in reality, the foſſile remains of ſome marine animal, probably either of the echinus, or of the ſtar-fiſh kind, filled like the foſſile ſpecies of the echini, with a plated ſpar. Our imperfect knowlege in the animal hiſtory has not yet been able to aſcertain to what creature they really belong; but their analogy, with the other animal remains, found in the foſſile world, plainly evince, that they are of that origin. They are cylindric columns, uſually about an inch in length, and are made up of a number of round joints, like ſo many ſmall wheels or ſegments of cylinders. Theſe joints, when found ſeparate, and naturally looſe, as they ſometimes are, are called *trochitæ*. They are all ſtriated, from the center to the circumference, and have a cavity in their middle, which is ſometimes found empty, but more frequently filled up with various matter, of the nature of the ſtratum, in which they have lain, or of other of the native foſſile ſubſtances.

The *entrochi* are compoſed of the ſame ſort of plated ſpar with the aſteriæ, and the ſpines and ſhells of the foſſile echini; and this is in theſe uſually of a bluiſh grey colour, and very bright and gloſſy, where freſh broken. They are ſubject to accidental injuries, like the other extraneous foſſils, which have been formed in animal moulds, and are frequently met with, compreſſed, or crooked. See Trochitæ.

That the *entrochi* are of marine origin, is evident from this, that they have not unfrequently ſea-ſhells found adhering to them; and when theſe are broken off, there remain on the *entrochi* no deficiencies, but the ſhells themſelves ſhew that they have been formed upon, and have grown to the *entrochi*, there being always natural hollows in them to anſwer to that part of the *entrochus* from which they havebeen ſeparated; whence it appears very plainly, that theſe *entrochi*, however altered ſince in their ſubſtance, were, however, exiſting in their preſent

ſent ſhape, in thoſe very ſeas where theſe ſhells had their growth.

There are not unfrequently found among the *entrochi*, larger or ſmaller fragments of plated bodies.

We meet with the *entrochi* of all the ſizes, from that of a pin's head to a finger's length, and the thickneſs of one's middle finger. They are, in ſome plaees, found looſe upon ploughed lands; in others, they are lodged in great quantities in the ſtrata of clay, and very often in ſtones of different kinds, and different hardneſs. The Derbyſhire marble is extremely full of them, and owes its beauty, when poliſhed, principally to them. Hill's Hiſt. of Foſſ. p. 653. Phil. Tranſ. N° 100. See SPAR, BELEMNITES, OSTRACITES, &c.

ENTROCHO-*aſteriæ*, in *Natural Hiſtory*, the name given by authors to a peculiar kind of *entrochus*, differing from the common kind, in having a ſtellar cavity inſtead of a round one, in its center. See ENTROCHUS.

ENTROCHUS *pyramidalis*, a name given by ſome of the writers in *Natural Hiſtory*, to the ortho-ceratites, or tubulus marinus concameratus, a ſpecies of ſhell-fiſh, not known to us in its recent ſtate, but very common in the ſtones brought over from Sweden for pavements. Klein. de Tubul. Marin. p. 7. See TUBULI *concamerati*.

ENTROCHUS *ramoſus*, in *Natural Hiſtory*, the name of a foſſile body, the ſeveral parts of which reſemble the *entrochi*; but as they are joined together in this body, when perfect, they ſhew themſelves in their proper light, and a ſight of them in this ſtate is ſufficient to explode the opinion advanced by ſome perſons, of the *entrochi* being of a vegetable nature; or, as they have pleaſed to call them, *rock-plants*. This foſſil has evidently once been a *ſtella-marina*, or *ſea ſtar-fiſh*, conſiſting of twenty rays at the extremity of the body. The manner of inſertion of theſe has been this: the body is of a pentagonal figure, and from this there have ariſen five rays; theſe, at their extremity, have been divaricated, each into two, ſo as to make the number ten in the ſecond progreſſion; and each of theſe laſt being again divaricated into two at its extremity; the third and laſt progreſſion is of twenty rays. All this is eaſily diſtinguiſhable in the foſſil, when perfect, and ſeems to have been the whole figure of the animal while living. The prototype, or living animal, however, is not found; but this is not an accident peculiar to this foſſil, the cornua ammonis, and conchæ anomiæ, with many other bodies that have been once evidently ſhell-fiſh, being no where at this time found in their recent ſtate, though ſo very numerous in the foſſile world. This remarkable foſſile ſtar-fiſh is the body called by ſome authors, *lilium lapideum*. Keppeler's Epiſt. ad Klein de Entrochis.

ENTROCHORUM *radix*, in *Natural Hiſtory*. See RADIX.

ENTRUSION, or INTRUSION, in *Law*, denotes a violent or unlawful entrance into lands or tenements void of a poſſeſſor, by a perſon who has no right to them.

Thus, when a man ſteps into lands, the owner whereof lately died, before the right heir, either by himſelf, or any other, hath taken poſſeſſion, it is *entruſion*.

Entruſion and *abatement* are ſometimes taken for the ſame thing, though there is a difference. See ABATEMENT, in *Law*.

ENTRUSION, in the *Canon Law*. See INTRUSION.

ENTRY, or ENTRANCE, in its general ſenſe, denotes a door, gate, paſſage, &c. through which to *enter*, or arrive within a place.

ENTRY, in *Book-keeping*. See BOOK-KEEPING.

ENTRY, *bill of*. See BILL.

ENTRY, is ſometimes alſo uſed to denote a duty or impoſt laid on commodities imported into a ſtate, either by land or ſea.

The duties of *entry*, or importation, are paid according to a tariff ſettled for that purpoſe. Where the duty of *entry* of any commodity is not fixed by the tariff, it is paid by eſtimation, i. e. in proportion to what ſome other commodity of nearly the ſame quality and value uſes to pay. In making *entries* inwards, it is uſual for merchants to include all the goods they have on board the ſame ſhip in one bill, though ſometimes there may happen to be upwards of twenty ſeveral kinds; and in caſe the goods are ſhort entered, additional or port *entries* are now allowed; though formerly the goods ſo entered were forfeited. As to bills of *entry* outwards, or including goods to be exported, upon delivering them, and paying the cuſtoms, you will receive a COCKET, which teſtifies your payment thereof, and of all duties for ſuch goods. If ſeveral ſorts of goods are exported at once, of which ſome are free, and others pay cuſtoms, the exporter muſt have two cockets, and therefore muſt make two *entries*. *Entries* of goods, on which a DRAW-BACK is allowed, muſt likewiſe contain the name of the ſhip in which the goods were imported, the importer's name, and time of *entry* inwards. The *entry* being thus made, and an oath taken, that the cuſtoms for thoſe goods were paid as the law directs, you muſt carry it to the collector and comptroller, or their deputies; who, after examining their books, will grant a warrant, which muſt be given to the ſurveyor, ſearcher, or land-waiter, that they may certify the quantity of goods; after which the certificate muſt be brought back to the collector and comptroller, or their deputies, and oath made, that the ſaid goods are really ſhipped, and not landed again in any part of Great Britain. See DEBENTURE, IMPORTATION, and EXPORTATION.

ENTRY, alſo denotes a ſolemn reception, or a ceremony performed by kings, princes, embaſſadors, legates, &c. upon their firſt *entering* a city, or their return in triumph from ſome expedition.

ENTRY, in *Law*, ſignifies alſo the taking poſſeſſion of lands or tenements, in virtue of a title thereto. See POSSESSION.

ENTRY, *forcible*. See FORCIBLE.

ENTRY, is alſo uſed for a writ which grants poſſeſſion of lands or tenements to a perſon, on account of a legal right thereto.

Writs of entry, ſays Briton, ſavour much of the right of property: ſome, e gr. are to recover cuſtoms and ſervices; and in theſe are contained the two words, *ſolet* and *debet*. Such are the writs, *quo jure*, *rationalibus diviſis*, *rationabili eſtoverio*, &c. In the *plea of entry*, there are three degrees: the firſt, where a man demandeth lands or tenements of his own ſeiſin, after the term is expired. The ſecond, where one demandeth lands or tenements lett by another, after the term is expired. The third, where one demandeth lands or tenements of that tenant who had *entry* by one to whom ſome anceſtor of the plaintiff did lett for a term now expired; and according to theſe degrees, the writs for remedy are varied. Beſide which, there is a fourth form, without degrees, and in caſe of a more remote ſeiſin, to which the other three degrees do not extend.

The writ in the ſecond degree is called a *writ of entry in le per*. In the third, *in le per & cui*. And in the fourth, without degrees, a *writ of entry in le poſt*; that is, after diſſeiſin, made by ſuch a one to ſuch a one. The words, *in le per*, *in le per & cui*, and *in le poſt*, denote the different forms of this writ, applied to the caſe upon which it is brought, and each form taking its name from the words contained in the writ. There are five things which put the *writ of entry* out of the degrees, viz. intruſion, as when the diſſeiſor dies ſeiſed, and a ſtranger enters; diſſeiſin upon diſſeſin, when the diſſeiſin is diſſeiſed by another; ſucceſſion, when the ſucceſſor in office or religious profeſſion enters; judgement, when a perſon recovers againſt the diſſeiſor; and eſcheat, when the diſſeiſor dies without heir, or commits felony, &c. on which account the lord enters. There are ſeveral other writs of *entry*: ſee CASU *conſimili*, CASU *proviſo*, *Communem* LEGEM, AD *terminum*, SINE *aſſenſu capitali*.

If a *writ of entry* be conceived out of the right caſe, ſo that one form is brought for another, it is abatable.

A *writ of entry* differs from an *aſſiſe*, in that it lies for the moſt part againſt him who entered lawfully, but holdeth againſt law: whereas an aſſiſe lieth againſt him who unlawfully diſſeiſed; yet, ſometimes, a *writ of entry* lieth upon an entruſion. See ASSISE.

ENTYPOSIS, from εντυποω, *I make an impreſſion*, in *Anatomy*, the articulation of the ſhoulder with the arm.

ENVELOPE, in *Fortification*, denotes a mount of earth, ſometimes raiſed in the ditch of a place, and ſometimes beyond it, being either in form of a ſimple parapet, or of a ſmall rampart bordered with a parapet.

Theſe *envelopes* are made where weak places are only to be covered with ſingle lines, without advancing towards the field, which cannot be done but by works which require a great deal of room; ſuch as horn-works, half-moons, &c. *Envelopes* are ſometimes called *ſillons*, *contregards*, *conſerves*, *lunettes*, &c.

ENVIRONNE′ in the *French Heraldry*, is when a lion or other figure is *environed*, or encompaſſed round with other things. *Environné* with ſo many BEZANTS, &c. in orle.

ENULA, in *Botany*. See ELECAMPANE.

ENULION, from εν and ȣλον, *the gums*, a word uſed by ſome *Medical Writers* for the fleſh of the gums.

ENUMERATION, the act of numerating, or counting.

At the time of our Saviour's birth, Auguſtus Cæſar had commanded an *enumeration* to be made of all the world, or rather of all the people under his empire. Though ſeveral able authors are of opinion, that the CENSUS, tax, or *enumeration*, mentioned by St. Luke, did not extend to the whole empire, but only to the people of Judæa. See Perizonius de Cenſu Judaico, and Berger de Viis Militaribus.

At Rome, it was an uſual thing to have an *enumeration* made of all the families: the firſt of theſe was under Servius Tullus, when the men amounted to eighty thouſand. Pompey and Craſſus made another, when they reached to four hundred thouſand. That of Cæſar did not exceed one hundred thouſand; ſo that the civil wars muſt have deſtroyed three hundred thouſand Roman citizens. Under Auguſtus, in the year 725, the Roman citizens throughout the empire were numbered at four million ſixty-three thouſand. In the year of Rome 746, the citizens being numbered again, were found four million two hundred and thirty-three thouſand. In the year 766, being the laſt year of Auguſtus's reign, that prince, together with Tiberius, made another *enumeration* of the citizens of Rome, when they were found four millions one hundred and thirty-ſeven thouſand perſons. Claudius made a new computation in the year of Chriſt 48, when, as Tacitus relates it, the Roman citizens throughout the whole empire amounted to ſix millions nine hundred and ſixty-four thouſand; though others repreſent the number as conſiderably greater. A very rare, yet indiſputable medal of Claudius, never yet made public, expreſſes the preciſe number in this liſt made by Claudius, which was called *oſtenſio*, to be ſeven millions of people fit to bear arms, beſide all the ſoldiers on foot in the armies, which amounted to fifty legions, fifty-ſeven cohorts, and ſixty ſoldiers. After this *enumeration*, we find no more till that of Veſpaſian, which was the laſt.

ENUMERATION, in *Rhetoric*, denotes a part of the peroration, wherein the orator, collecting the ſcattered heads of what has been delivered throughout the whole, makes a brief and artful rehearſal or recapitulation thereof. See APARITHMESIS and SYNATHROISMUS.

ENUMERATION *of the parts*, in *Rhetoric*, amounts to the ſame with what we more uſually call *diſtribution*. See DISTRIBUTION.

ENUNCIATION, a ſimple expreſſion or declaration of a thing, in terms either of affirmation or denial.

The ſchoolmen uſually diſtinguiſh three operations of the underſtanding; apprehenſion, *enunciation*, and reaſoning.

ENUNCIATION, among *Logicians*, denotes the ſame as *propoſition*. See PROPOSITION.

ENVOICE. See INVOICE.

ENVOY, a perſon deputed, or ſent purpoſely to negociate ſome particular affair with a foreign prince or republic.

Thoſe ſent from the courts of England, France, &c. to Genoa, the princes of Germany, and other petty princes and ſtates, do not go in quality of embaſſadors, but of *envoys*.

Add, that thoſe ſent from one great prince or ſtate to another, as from the king of England to the emperor, &c. when the affair they go upon is not very ſolemn and important, have frequently no other character but that of *envoys*. See EMBASSADOR.

Envoys are either *ordinary* or *extraordinary*.

Both kinds are under the protection of the law of nations, and enjoy all the privileges of embaſſadors, only differing from them in this, that the ſame ceremonies are not performed to them.

The quality of *envoy* extraordinary, Wicquefort obſerves, is very modern; more modern than that of reſident: the miniſters inveſted therewith, at firſt, took on them moſt of the airs of embaſſadors; but they have ſince been taught otherwiſe.

In the year 1639, the court of France made a declaration, that the ceremonies of conducting *envoys* extraordinary to their audience in the king and queen's coaches, with diverſe others, ſhould no longer be practiſed to *envoys*.

S. Juſtiniani, the firſt *envoy* extraordinary from Venice, after that regulation, offered to cover in ſpeaking to the king, but it was refuſed him; and the king of France himſelf declared, that he did not expect his *envoy* extraordinary at the court of Vienna ſhould be regarded any otherwiſe than as an ordinary reſident. Since this time, thoſe two kinds of miniſters have been treated alike. Wicquefort.

ENUR, a word uſed by ſome of the *Chemical Writers*, to expreſs the occult, or unſeen vapour of water, of which they ſuppoſe ſtones to be produced.

ENURE, in *Law*, ſignifies to take place, or be available, and is as much as to have effect. Thus, for inſtance, a releaſe made to tenant for life ſhall *enure*, and be of force and effect to him in the reverſion.

ENVY, in *Ethics*, is defined by Mr. Locke, to be an uneaſineſs of mind, occaſioned by the conſideration of a good we diſcover in poſſeſſion of another perſon, whom we deem leſs worthy of it than ourſelves. It is a compoſition of ſorrow and hatred, and ſtands in direct oppoſition to congratulation. *Envy*, in its nature and effects, is the baſeſt, moſt miſchievous, and moſt tormenting of all paſſions.

ENVY, in *Mythology*, is repreſented by the Greek and Roman poets as an infernal divinity, with ſquinting eyes, lean body, pale countenance, diſturbed air, head encompaſſed with ſerpents, &c.

ENURNY, is the herald's term for the bordure of a coat of arms being charged with any kind of beaſts.

ENXYLON, of εν and κυλον, *wood*, a name uſed by the Greek authors for a ſpecies of worm or maggot, hatched from the egg of a beetle, and having its habitation in wood; which, in this ſtate, it erodes and burrows into, in various directions. The old Greeks called it alſo *dex* and *thrips*, and uſed the pieces of wood eroded by it in remarkable figures, as ſeals. See THRIPS.

ENYSTRON, of εν and ύςερος, *poſterior*, a word uſed by Ariſtotle for the ſecond ventricle in ruminating quadrupeds, in which the food is elaborated and concocted.

EOLIC, or rather ÆLIC. See ÆOLIC.

EOLIPILE. See ÆOLIPILE.

EOLUS, and EOLUS'*s harp*. See ÆOLUS.

EON, or ÆON. See ÆON.

EON, a word uſed by ſome anatomical writers to expreſs the whole ambit, or compaſs of the eye.

EONIANS, in *Church Hiſtory*, the followers of Eon, a wild fanatic of the province of Bretagne, in the twelfth century, whoſe brain was diſordered. He concluded from the reſemblance between *eum*, in the form for exerciſing malignant ſpirits, viz. *Per eum, qui venturus eſt judicare vivos & mortuos*, and his own name, Eon; that he was the ſon of God, and ordained to judge the quick and dead. Eon, however, was ſolemnly condemned by the Council at Rheims in 1148, at which pope Eugenius III. preſided, and ended his days in a miſerable priſon. He left behind him a number of followers and adherents, whom perſecution and death, ſo weakly and cruelly employed, could not perſuade to abandon his cauſe, or to renounce an abſurdity, which, ſays Moſheim, one would think could never have gained credit but in ſuch a place as Bedlam. Eccl. Hiſt. vol. ii. p. 458.

EORIA, in *Mythology*, a feaſt celebrated by the Athenians in honour of Erigonus, who, by way of puniſhment, for their not avenging the death of his father Icarus, engaged the gods to inflict the curſe on their daughters, that they ſhould love men who never returned their paſſion. The feaſt was inſtituted by the order of Apollo.

EOSTRE, in *Mythology*, a Saxon goddeſs, to whom they ſacrificed in the month of April, called the month of Eoſtra; and thence the name EASTER, which the Saxons retained after their converſion to Chriſtianity, applying it to the feſtival celebrated in commemoration of our Saviour's reſurrection. Bed. de Rat. Temp. cap. 13.

EPACTHES, Επαχθης, in *Antiquity*, a feſtival celebrated in honour of Ceres, named Αχθεια, from αχθος, i. e. *grief*, in memory of her ſorrow, when ſhe had loſt her daughter Proſperine.

EPACTS, in *Chronology*, the exceſſes of the ſolar month above the lunar ſynodical month; and of the ſolar year above the lunar year of twelve ſynodical months; or of ſeveral ſolar months above as many ſynodical months; and ſeveral ſolar years above as many dozen of ſynodical months.

The *epacts*, then, are either *annual* or *menſtrual*.

EPACTS, *menſtrual*, are the exceſſes of the civil or calendar month above the lunar month.

Suppoſe, e. gr. it were new-moon on the firſt day of January; ſince the lunar month is 29 days, $12^h\ 44'\ 3''$; and the month of January contains 31 days; the menſtrual *epact* is 1 day $11^h\ 15'\ 57''$.

EPACTS, *annual*, are the exceſſes of the ſolar year above the lunar.

Hence, as the Julian year is 365 days 6^h, and the Julian lunar year 354 days $8^h\ 48'\ 38''$, the annual *epact* will be 10 days $21^h\ 11'\ 22''$; that is, nearly 11 days. Conſequently, the *epact* of 2 years is 22 days; of 3 years, 33 days; or rather 3, ſince 30 days make an EMBOLISMIC, or intercalary month.

Thus, the *epact* of 4 years is 14 days, and ſo of the reſt; and thus, every 19th year, the *epact* becomes 30 or 0; conſequently the 20th year the *epact* is 11 again; and ſo the cycle of *epacts* expires with the golden number or lunar cycle of 19 years, and begins with the ſame, as in the following table:

Gold. Numb.	Epacts.	Gold. Numb.	Epacts.	Gold. Numb.	Epacts.
1	XI	7	XVII	13	XXIII
2	XXII	8	XXVIII	14	IV
3	III.	9	IX	15	XV
4	XIV	10	XX	16	XXVI
5	XXV	11	I	17	VIII
6	VI	12	XII	18	XIX
				19	XXX

Again, as the new moons are the ſame, that is, as they fall on the ſame day every 19 years, ſo the difference between the lunar and ſolar years is the ſame every 19 years. And becauſe the ſaid difference is always to be added to the lunar year, in order to adjuſt or make it equal to the ſolar year; hence the ſaid difference reſpectively belonging to each year of the moon's cycle is called the *epact of the ſaid year*, that is, the number to be added to the ſaid year, to make it equal to the ſolar year, the word being formed from the Greek, *επαγω*, *induco, intercalo.*

Upon this mutual reſpect between the cycle of the moon and the cycle of the *epacts*, is founded this rule for finding the Julian *epact*, belonging to any year of the moon's cycle. Multiply the year given of the moon's cycle into 11; and if the product be leſs than 30, it is the *epact* ſought; if the product be greater than 30, divide it by 30, and the remainder of the dividend is the *epact*. For inſtance, I would know the *epact* for the year 1712, which is the third year of the moon's cycle. Wherefore 3 is the *epact* for 1712, for 11×3=33, and 33 being divided by 30, there is left 3 of the dividend for the *epact*.

But the difference of the Julian and Gregorian years being equal to the exceſs of the ſolar above the lunar year, or 11 days, it happens that the Gregorian *epact* for one year is the ſame with the Julian *epact* for the preceding year.

By the help of the *epact* may be found what day of any month in any year the new moon falls on, thus: to the number of the month, from March incluſively, add the *epact* of the year given; if the ſum be leſs than 30, ſubtract it out of 30; if greater, ſubtract it out of 60; and the remainder will be the day whereon the new moon will fall.

If the new moon be ſought for in the month of January or March, then nothing is to be added to the *epact*; if for February or April, then only 1 is to be added.

For example: I would know what day of December the new moon was on A. D. 1711, the *epact* whereof is 22. By the aforeſaid rule, I find it will be December the 28th; for 22+10=32, and 60−32=28. See MOON. The day whereon the new moon falls being thus found, it is eaſy to infer from thence what the age of the moon is on any day given. See MOON.

However, there is a peculiar rule commonly made uſe of to this purpoſe, which is this: add the *epact* of the year, the number of the month, from March incluſively, and the given day of the month all into one ſum; this, if it be leſs than 30, ſhews the age of the moon; if it be greater than 30, divide it by 30, and the remainder of the dividend ſhews the age of the moon, or how many days it is from the laſt new moon: this method will never err a whole day.

For inſtance; what was the age of the moon on December 31ſt, A. D. 1711? By this rule, I find, that the moon was then three days old; that is, it was then three days from the laſt new moon. For 22+10+31=63, and 63 being divided by 30, there will remain of the dividend 3. And this exactly agrees to the other foregoing rule, whereby it was found, that the new moon was on December 28, 1711.

It muſt be obſerved, that at the time of the general council of Nice in 325, it was thought, that 19 Julian ſolar years were exactly equal to a CYCLE of 19 lunar years, or to 235 ſynodical months; and therefore, that at the end of 19 years, the new moons would happen exactly at the ſame time as they did 19 years before: but this is a miſtake;

	days	h.	′	″	‴
For 19 Julian ſolar years contain	6939	18	0	0	0
Whereas 235 ſynodical months contain only	6939	16	31	56	30
And are therefore leſs than 19 Julian ſolar years, by	0	1	28	3	30

Hence it appears, that the cycle of 19 years anticipates the new moons by one day in 310.7 years very nearly; and therefore the ſame cycle of *epacts* will not always hold; the moon's anticipation leſſening the ſeveral *epacts* by one every 310.7 years.

To have the *epacts*, therefore, point out the new moons perpetually; that *epact* given in the calendar is not ſufficient; but all the 30 *epacts* ſhould be beſtowed throughout the whole year, that the calendar may exhibit all the cycles of *epacts*. See a table of this kind in Wolfius's Elementa Chronologiæ, apud Opera, tom. iv. p. 133.

It is plain, that whenever the forementioned anticipation takes place, or it becomes neceſſary to ſet the *golden numbers* one day back in the calendar, the *epact* muſt be increaſed by an unit more than uſual, e. g. 12 muſt be added inſtead of 11, to the *epact* of the preceding, in order to form the *epact* of the current year; and thus the ſubſequent *epacts*, increaſing conſtantly by 11, will be greater by unit than the correſponding *epacts* of the preceding 19 years. If the *epacts* were once properly prefixed in the calendar, to denote the days on which the new moons fall in thoſe years, of which thoſe numbers are the *epacts*, they might remain in the calendar without ſhifting their places; ſince the augmentation of each *epact* by an unit extraordinary would anſwer the purpoſe, and preſerve the Julian account tolerably exact. But the Gregorian account is not ſo eaſily adjuſted; for it will require more conſideration to determine, when the *epacts* are to be more than ordinarily augmented, and at what times they are to continue in their uſual courſe; nay, to know when they are to be diminiſhed by an unit, which will moſt commonly be the caſe; becauſe, in every Gregorian ſolar year, conſiſting of any number of entire centuries not diviſible by four, the equinox is ſuppoſed to have anticipated one whole day; and therefore the biſſextile, or intercalary day is omitted; conſequently the preceding ſolar year, where one day was loſt, exceeded the lunar year by 10 days only inſtead of 11.

Lord Macclesfield has given the following directions for this purpoſe:

In the years 1800, 2100, 2700, 3000, &c. where the nnmber of centuries is diviſible by 3 only, the Gregorian ſolar, as well as the lunar year, will have loſt a day; and conſequently the difference between them will be the ſame as uſual: therefore in thoſe years the *epacts* and golden numbers will remain unaltered; the former will go on in the ſame manner, and the latter ſtand prefixed to the ſame days in the calendar, for another century, as they did for the laſt. The caſe will be the ſame in the years 2000, 2800, 3200, &c. where the number of centuries are diviſible by 4 only. But in the years 2400 and 3600, whoſe number of centuries is diviſible both by 3 and 4, the Gregorian ſolar year remains as uſual, and the lunar year has loſt a day: the difference betwixt them being 12, the *epact* of the preceding year muſt be augmented by that number inſtead of 11, in order to form the *epact* of the then preſent year; and thus a new ſet of *epacts* will be introduced, each exceeding the precedent correſponding *epacts* by unit; and the golden numbers muſt be ſet one day back in the calendar. Again, in the years 1900, 2200, 2300, 2500, &c. where the number of centuries is diviſible neither by 3 nor 4, the Gregorian ſolar year loſes one day, and the lunar none, and the difference between them, viz. 10, and not 11, muſt be added to the *epact* of the preceding for that of the current year; and thus a new ſet of *epacts* will be introduced, leſs by unit than their precedent correſponding *epacts*; and the golden numbers muſt be ſet a day forwarder in the calendar. By this method the new moon might be pointed out, either by the golden numbers or by the *epacts*, placed in the calendar for that purpoſe; according to the Julian account for ever, and according to the Gregorian account till the year 4199 incluſive. Phil. Tranſ. vol. xlvi. p. 417. or N° 495. art. 5.

Rule for finding the Gregorian EPACT.

Divide the centuries of any year by 4; multiply the remainder by 17, and to this product add the quotient multiplied by 43 and the number 86, and divide this whole ſum by 25: multiply the golden number by 11, from which product ſubtract the laſt quotient, and the remainder, rejecting the thirties from it, will be the *epact*.

Example for 1779.

1. 17÷4=4−Remr. 1.
2. 1×17=17.
3. 43×4+17+86=275.
4. 275÷25=11.
5. 13 (G. N°)×11=143.
6. 143−11=132. And,
7. 132÷30.

leaves a remainder 12 for the *epact* required.

The reaſon of the operation may be evinced in the following manner:

If the new moons returned exactly at the ſame time after the expiration of 19 years, the product of the golden number, or year of the lunar cycle, multiplied by 11, would give the Gregorian *epact*; but we have already ſhewn, that they anticipate a day in 310.7 years, and therefore in a Julian century they muſt anticipate $\frac{100}{310.7}$, or nearly $\frac{8}{25}$ of a day; and in a Gregorian common century, which is one day ſhorter than a Julian century, they happen 1 day $-\frac{8}{25}$, or $\frac{17}{25}$ of a day later; and $3\times\frac{17}{25}=\frac{51}{25}$ of a day in 3 common centuries; but in four Gregorian centuries, one of which is biſſextile, they will happen later by $\frac{51}{25}-\frac{8}{25}=\frac{43}{25}$ of a day; and in this proportion muſt the *epacts* be decreaſed. At preſent the Gregorian *epact* is 11 days ſhort of the Julian; but the quotient of the number of centuries divided by 4, which at this time is 4, multiplied (as the rule directs) by $\frac{43}{25}$, with the addition of the remainder 1 multiplied by $\frac{17}{25}$ amounts only to $\frac{189}{25}$, or 7 days $+\frac{14}{25}$; therefore, $\frac{86}{25}$ i. e. 3 days $+\frac{11}{25}$ muſt be added to complete the 11 days.

The *epact* may be found till the year 1900, by ſubtracting one from the golden number, multiplying the remainder by 11, and rejecting the thirties; becauſe the laſt quotient, mentioned in the foregoing rule, will be always 11 till the year 1900.

In the following table, the golden numbers, with their correſponding *epacts*, till the year 1900, may be ſeen at one view:

Gold. Numb.	Epact	Gold. Numb.	Epact.	Gold. Numb.	Epact.	Gold. Numb.	Epact.
1	—	6	XXV.	11	XX	16	XV
2	XI	7	VI.	12	I	17	XXVI
3	XXII	8	XVII	13	XII	18	VII
4	III	9	XXVIII	14	XXIII	19	XVIII
5	XIV	10	IX	15	IV		

To find Eaſter by the *epact*, ſee EASTER.

To find the moon's age by the *epact*, ſee MOON.

EPAGOMENÆ. See YEAR, *Egyptian.*

EPANALEPSIS, Επαναληψις, called alſo EPANADIPLOSIS, in *Rhetoric*, the repetition of the ſame word in the beginning of one ſentence, and at the end of another. Thus Virgil,

Ambo florentes ætatibus, Arcades ambo.

See ANADIPLOSIS.

EPANAPHORA, Επαναφορα, in *Rhetoric*, the ſame with *anaphora*. See ANAPHORA.

EPANASTASIS, from επανιστημι, *I cauſe to riſe*, a word uſed by Hippocrates, and others of the old phyſicians, for a critical tumour or tubercle in certain diſeaſes. Thus Hippocrates obſerves, that the tumours about the eyes, upon the recovery of the patient, prognoſticate diarrhœas.

EPANASTROPHE, Επαναστροφη, in *Rhetoric*, the ſame what is otherwiſe called *anadiploſis*. See ANADIPLOSIS.

EPANCYLOTOS, of αγκυλος, *crooked*, a ſort of wreathed bandage, deſcribed by Oribaſius.

EPANODUS, Επανοδος, in *Rhetoric*, a repetition of the ſame words in an inverted order; thus,

Nox brevis nimis, ah! nimis brevis nox. Voſſ. Rhet. lib. v. p. 298.

EPANORTHOSIS, in *Rhetoric*, a figure whereby the orator revokes and corrects ſomething before alleged, as too weak, and adds ſomething ſtronger and more conformable to the paſſion he is agitated by.

The word is formed of ορθος, *right, ſtrait*; whence ορθοω, *I ſtraiten*, ανορθοω, επανορθοω, *I redreſs, ſtraiten, correct*, and επανορθωσις, *correction.* Accordingly the Latins call it *correctio* and *emendatio.*

Such, e. gr. is that of Cicero for Cœlius: *O ſtultitia! ſtultitiamne dicam, an impudentiam ſingularem? Oh folly! folly did I call it, or rather intolerable impudence?* And in the firſt Catilinarian: *Quanquam quid loquor? Te ut ulla res frangat? Tu ut unquam te corrigas? Tu ut ullam fugam meditere? Tu ut ullum exilium cogites? Utinam tibi iſtam mentem dii immortales donarent.* Thus alſo Terence, in the Heautontimo-rumenos, introduces his old man Menedemus, ſaying,

Filium unicum adoleſcentulum
Habeo. Ah! quid dixi habere me? imo habui, Chreme.
Nunc habeam necne, incertum eſt.

EPAPHERESIS, from επι, denoting *repetition*, and αφαιρησις, *removal*, a term uſed by Galen, for frequently repeated evacuations of the veſſels by plebotomy.

EPARCHUS, Ἔπαρχος, an officer under the Greek emperors of Conſtantinople, who had the command of the guards, or government of a province.

EPARER, in the *Manege*, is uſed to ſignify the flinging of a horſe, or his yerking or ſtriking out with his hind legs. In caprioles, a horſe muſt yerk out behind with all his force; but in ballottades he ſtrikes but half out; and in croupades he does not ſtrike out his hind legs at all. All horſes that yerk are reckoned rude. See YERKING.

EPARITA, in the *Materia Medica*, a name given by Paracelſus to a ſort of fine earth, of a liver-colour, ſeemingly the ſame with the Tokay bole.

EPARMATA, of αιρω, *I elevate*, in *Medicine*, are tumours of the glandules, called *parotes*, behind the ears.

EPARSIS, in the *Medical Writings of the Ancients*, a word ſometimes applied indifferently to any tumour, but more uſually appropriated to a parotis.

EPAULE, or ESPAULE, in *Fortification*, the ſhoulder of the baſtion, or the angle made by the face and flank, otherwiſe called the *angle of the epaule.* See BASTION and ANGLE.

The word is pure French, and literally ſignifies *ſhoulder.*

EPAULEMENT, in *Fortification*, a ſide-work haſtily thrown up, to cover the cannon or the men.

It is made either of earth thrown up, of bags filled with ſand or earth, or of gabions, faſcines, &c. with earth: of which latter ſort the *epaulements* of the places of arms for the cavalry behind the trenches uſually are.

EPAULEMENT, is alſo uſed for a demi-baſtion, conſiſting of a face and flank, placed at the point of a horn or crown-work. Alſo for a little flank added to the ſides of a horn-work, to defend them when too long. Alſo for the redoubts made on a right line to fortify it. And laſtly, for an orillon, or maſs of earth almoſt ſquare, faced and lined with a wall, and deſigned to cover the cannon of a caſemate. See BASTION and ORILLON.

EPAULETTES, are a kind of ſhoulder-knots choſen for the ſoldiers, which are to be of the colour of the facing, with a narrow yellow or white tape round it, and worſted fringe: thoſe for the officers are made of a gold or ſilver lace, with a rich fringe; they are badges of diſtinction worn on one or both ſhoulders. Theſe of the dragoon-guards, horſe, and dragoons, are worn on the left ſhoulder: the light-dragoons, and officers of grenadiers, have one on each ſhoulder: thoſe of the battalion wear one on the right ſhoulder only, which is to be made of embroidery or lace, with a gold or ſilver fringe. Thoſe of the royal regiment of artillery are to be gold embroidery, with gold fringe on ſcarlet cloth, and worn on the right ſhoulder.

EPEMBOLE, Επεμβολη, in *Rhetoric*, the ſame with *parembole.* See PAREMBOLE.

EPENCRANIS, a name by which ſome of the old authors, particularly Eraſiſtratus, have called the cerebellum.

EPENDYTES, Επενδυτης, among the Greeks, a garment worn under the *pallium*, and above the *interula* or inner-coat, called in Greek, ὑποδυτης.

EPENTHESIS, in *Grammar*, the addition, or inſertion of a letter or ſyllable, in the middle of a word; as *relligio* for *religio*, *Mavors* for *Mars*, *alituum* for *alitum.* Virg. Æn. lib. vii. ver. 27.

The word is formed of επι, εν and τιθημι, q. d. επεντιθημι, *inſero, immitto.*

EPERLANUS, in *Ichthyology*, a name ſometimes given, on account of its pearl colour, to the SMELT.

EPERON, in *Natural Hiſtory*, the ſpur-ſhell, ſo called from its reſembling in ſome degree the rowel of a ſpur. It is a ſpecies of ſnail, of the round-mouthed kind, or claſs of the *cochleæ lunares*; all its volutæ are ſurrounded with double rows of prickles. See LUNARIS *cochlea.*

EPERVIERS, in *Natural Hiſtory*, a name given by the French authors to a claſs of butterflies, which make the ſixth in Reaumur's method. They have a way of poizing themſelves on the wing in the manner of kites, and other birds of prey; and always live upon the wing, never ſettling themſelves upon the flowers they feed upon, but keep flying with a humming noiſe like a humble-bee, while they thruſt in their trunk and ſuck the juices of the flower.

EPHA, a dry MEASURE in uſe among the Hebrews.

The *epha* was the moſt common meaſure they uſed, and that whereby the reſt were regulated. It is commonly ſuppoſed that the *epha*, reduced to the Roman modius, contained four modii and a half. Now the Roman modius of grain, or flour, contained twenty libræ or pounds, conſequently the *epha* weighed ninety pounds. Dr. Arbuthnot reduces the *epha* to three pecks, three pints, Engliſh meaſure.

EPHÆTIUM, in *Botany*, a name by which ſome authors have called the ranunculus, or crow-foot.

EPHEBÆUM, Εφηβαιον, in *Antiquity*, the place where the ephebi or youth exerciſed; or, as ſome ſay, where thoſe who deſigned to exerciſe, met, and agreed what kind of exerciſe they ſhould contend in, and what ſhould be the victor's reward.

EPHEBI, Εφηβοι, among the Athenians, a deſignation given to their young men when they arrived at eighteen years of age, at which time they had their names entered in a public regiſter. Pott. Archæol. Græc. lib. i. cap. 9. tom. i. p. 48.

EPHEDRA, in *Botany*, See HORSE-*tail.*

EPHELÆUM, in *Anatomy*, is the place from the hypogaſtrum,

gaſtrum, or lower part of the abdomen, to the ſecret parts.

EPHELCIS, from ἑλκος, *ulcer*, a word uſed by the ancient Greek *Phyſicians*, ſometimes for the cruſt of an ulcer, and ſometimes for a ſmall abraſion or bloody fragment, brought up by coughing, in an hæmoptyſis.

EPHELIS, from ἐπι and ἥλιος, *ſun*, a name uſed by the ancient writers on *Medicine*, for a diſorder of the face, brought on by the ſun and drying winds, and of the nature of what we call ſun-burning. It was a certain roughneſs, hardneſs, and bad colour of the ſkin.

The *ephelis*, or ſun-burning, is removed by an application of reſin, to which a third part of foſſile ſalt, and a little honey are added; but all theſe diſorders, as alſo the unnatural colour of cicatrices, are remedied by the following preparation, aſcribed to Trypho the elder:

Take equal quantities of myrobolans, crocomagna, cimolian earth of a bluiſh colour, bitter almonds, the meals of barley and bitter vetch, dyer's weed (*ſtruthium album*); all theſe are to be triturated together, and made up with the moſt ſharp honey. With this preparation the parts affected are to be anointed at night; and the medicine carefully to be waſhed off the next morning. James Med. Dict. See FRECKLES.

EPHEMERA, in *Medicine*, an epithet applied to ſomething that only laſts a day; particularly to a ſort of fever, which terminates in the compaſs of twenty-four hours, called by Galen, ἐφημερος πυρετος, *febris ephemera*, by the Latins, *diaria*. See FEVER.

The word, and the following one, *ephemerides*, are formed of the prepoſition ἐπι, *de*, *of*, and ἡμερα, *dies*, *day*.

Some medical writers expreſs themſelves by *ephemera ſimplex vel plurium dierum*. It is, properly, an attempt of nature to eaſe herſelf of the load of a plethora, either by an abſolute diſcharge of part of the blood by an hæmorrhage, or by reſolving it into ſerum, and expelling it in that form, the ſecretory, and excretory motions, being increaſed beyond their natural degree. The diary fever, properly ſo called, laſts only twenty-four hours; but this differs in nothing, except the time of its duration, from the *ephemeron plurium dierum*, which commonly laſts four days. To this it is to be added, that ſome authors have called the ſudor Anglicus, *ephemera maligna*, a malignant diary fever, as it generally deſtroyed the patient in the ſpace of one day.

The ſimple diary fever uſually ſeizes the patient without any preceding ſhivering, and immediately is attended with a degree of heat of the fleſh, which continues the ſame without intermiſſion or exacerbation, till the cloſe. This is uſually not very violent, and is always attended with pains in the head, ſometimes heavy and dull, ſometimes pulſative and very acute. Such perſons as fall into this fever, from drinking large draughts of cold liquors while they are hot, as is very frequently the caſe, always have a pain in the right hypochondrium. The face is red and inflated in this diſeaſe, and there is a laſſitude and wearineſs in all the limbs, the pulſe is ſtrong and quick, the urine is of a deep orange colour, and depoſits a reddiſh ſediment.

This fever uſually goes off in a moderate ſweat, and ſometimes, though leſs frequently, by a hæmorrhage at the noſe. It is ever of ſhort duration; for if it exceeds the firſt day, it is always terminated, at the utmoſt, on the fourth or fifth. There is either very little, or very bad ſleep, during the whole time. The patient often never cloſes his eyes at all, or, if he ſleeps a little, is never ſenſible himſelf that he has ſlept.

The perſons moſt ſubject to this fever are young men, who have much blood, and feed heartily; and ſuch as have had any habitual diſcharge of blood ſtopped upon them, whether natural, as in the hæmorrhoidal, or menſtrual diſcharges; or artificial, ſuch as frequent bleeding, cupping, and the like: and thoſe who have thrown their blood into violent emotions, by the too free uſe of ſpirituous liquors, too violent exerciſe, unuſual watchings, long ſtay by large fires, a ſudden repreſſion of ſweats by cold water, or by violent paſſions, particularly anger.

Cauſes of it. The principal general cauſes of this fever, are a plethoric diſpoſition, and a commotion of the blood; the accidental ones are a high diet, and ſedentary life, great heat of the body from violent exerciſe, and from the ſun in hot weather; violent ſweating, or heating medicines, injudiciouſly adminiſtered; and ſudden chilling of the body, when much heated.

Prognoſtics in it. The ſimple *ephemera*, when wholly left to itſelf, is of no danger, if the perſon be kept warm, and in a ſtate of reſt; and all that need be done in common caſes, to aſſiſt nature in it, is the frequent drinking of warm diluting liquors. When it is improperly treated, or diſturbed by a wrong regimen, it often has worſe conſequences; and, indeed, the doctor often changes this into an inflammatory or ſynochal fever, properly ſo called. It is known, that matters are properly managed, and that nature is taking her due courſe, if the urine and ſweat are properly excreted.

Method of treatment. When the peculiar diſpoſition of the blood, or other accidents, render this fever worſe than it naturally ſhould be, the proper courſe is to attemperate the violent emotions of the blood with nitrous, and the fixed antimonial medicines, and occaſionally, with the gentle acids, ſuch as lemon-juice, and the like: and indeed, in all caſes of this kind, the frequent uſe of warm and weak liquors, with lemon-juice among them, is highly to be commended. The free eruption of the ſweat, by which nature attempts to eaſe herſelf of the diſeaſe, is to be promoted by the gentle ſudorifics; nitre, crabs-eyes, and a ſmall quantity of juice of lemons, juſt enough to ſaturate the alkali of the crabs-eyes, prove an excellent medicine, to be repeated in ſmall doſes every three or four hours; and toward night, the ſudorifics ſhould be joined to theſe, ſuch as the contrayerva-root, or the like; and when it is over, there ſhould be given a few doſes of ſome gentle purge, as an infuſion of rhubarb and ſena, or the like. Bleeding is unneceſſary in this fever. Juncker's Conſp. Med. p. 264.

EPHEMERA, or EPHEMERON, in *Natural Hiſtory*, a name given by authors to a ſmall fly, called by us the *day-fly*. It is an inſect found about the mouths of the Rhine, and ſome other rivers in Germany, and ſeems a ſort of middle ſpecies between the May-fly, common with us, and bred from the cadew worm, and the libella, or DRAGON-*fly*. It has four wings, two long, and two ſhort; two ſhort horns, ſix legs, and two very long ſtraight hairs iſſuing from the tail. They are ſeen flying about the ſurface of the water about mid-ſummer, for three days, and no longer; they eat nothing, and their only buſineſs is to drop their eggs on the ſurface of the water, after they have copulated. Theſe eggs, ſinking to the bottom, produce a ſort of worms, or maggots; theſe ſoon hollow themſelves cavities in the clay, where they remain three years, growing every year about an inch in length. When the worm is come to its full growth, it riſes to the ſurface of the water about ſix o'clock in the morning, and there iſſues from it this fly, which lays its eggs, and dies about ſix o'clock the ſame night; ſo that the life of the creature in the fly-ſtate is only about five hours. Swammerdam, Hiſt. Inſ.

Though Swammerdam ſays, that the life of this creature is no more than five hours, yet his own account plainly ſhews that it really lives three years; for it is certainly as much alive in the worm-ſtate as when afterwards it becomes a fly. Baker's Micr. 1743. p. 305.

EPHEMERA, in the Linnæan ſyſtem, makes a diſtinct genus of the *neuroptera* order, diſtinguiſhed by two gibbous protuberances above the eyes, erect wings, and briſtly tail. He enumerates eleven ſpecies of this genus, diſtinguiſhed by their different colours, and the number of hairs in their tail; ſome having two, and others three.

EPHEMERA, is alſo applied among *Botaniſts*, to a kind of flowers which open and expand themſelves at ſun-riſing, and wither or cloſe up again at his ſetting. Such are the dent-de-lion, vulgarly dandelion, and diverſe others.

EPHEMERIDES, in *Aſtronomy*, tables calculated by aſtronomers, ſhewing the preſent ſtate of the heavens for every day at noon; that is, the places wherein all the planets are found at that time.

It is from theſe tables that the eclipſes, conjunctions, and aſpects of the planets, are determined; horoſcopes, or celeſtial ſchemes, conſtructed, &c.

We have *ephemerides* of Origan, Kepler, Argoli, Heckerus, Mezzaracchis, Wing, De la Hire, Parker, &c. S. Caſſini has calculated *ephemerides* of the ſidera medicæa, or ſatellites of Jupiter, which are of good uſe in determining the longitude.

In England the Nautical Almanac, or Aſtronomical *Ephemeris*, publiſhed annually by anticipation, under the direction of the Commiſſioners of Longitude, is the moſt conſiderable. See ALMANAC.

In France, celeſtial *Ephemerides* have been publiſhed by M. Deſplaces, every ten years, from 1715 to 1745: they were afterwards continued by the abbé Caille, with many additions; of which an account may be ſeen in the Hiſtory of the Academy of Sciences for 1743. The Academy of Sciences have likewiſe publiſhed annually, from the beginning of the preſent century, a kind of *ephemeris*, under the title of Connoiſſance des Tems.

EPHEMERUM. See SPIDER-*wort*.

EPHESIA, in *Mythology*, a feaſt inſtituted at Epheſus, in honour of Diana.

EPHESTIA, in *Mythology*, a feaſt celebrated in honour of Vulcan, in which three young *lads run for a prize*.

EPHESTRIA, were feaſts celebrated at Thebes, in honour of Tyreſias.

EPHESUS, *temple of.* See DIANA.

EPHETÆ, of εφιημι, *I ſend forth*, in *Antiquity*, a ſort of magiſtrates among the Athenians, inſtituted by king Demophoon, to take cognizance of murder, manſlaughter, and chance-medley.

Their number was one hundred, whereof fifty were Athenians, and fifty Argians: they were not admitted to the poſt till upwards of fifty years of age. Draco new modelled it, excluded the Argians out of it, and made it to conſiſt of fifty-one Athenians, each above fifty years of age: Ubbo Emmius de Rep. Athen. ſays, he transferred to them part of the juriſdiction of the Areopagites. See AREOPAGUS.

EPHIALTES, of επι and αλλομαι, *I leap.* See INCUBUS.

EPHIDROSIS, from εφιδροω, *I ſweat*, in the *Medical Writings of the Ancients*, a word uſed to expreſs a ſweat, ſometimes ſlight, and not critical; and at others, a ſymptomatic one, appearing only on the head, neck, and breaſt. Theſe are both bad ſymptoms in many diſeaſes, though they are often miſtaken by the injudicious for good ſigns, and forwarded by hot medicines, to the deſtruction of the patient. See SWEAT and SWEATING.

EPHIPPIA, of επι and ἵππος, *horſe*, denoted certain cloths or houſings, which were faſtened on a horſe by a girth or ſurcingle, in ancient Greece, before the uſe of ſaddles were known. They were compoſed of different materials, as leather, cloth, and the ſkins of wild beaſts, and ſometimes adorned with gold, ſilver, and precious ſtones. Berenger's Art of Horſemanſhip, vol. i. p. 41.

EPHIPPITES. See HIPPURITES.

EPHIPPIUM, Εφιππιον, in *Anatomy*, a part of the SPHENOIDES, called alſo *ſella equina* and *ſella turcica.*

EPHOD, אפד, derived from אפד, *aphad*, *to clothe*, a ſacerdotal garment, in uſe among the ancient Jews, ſuppoſed to have been a kind of linen alb, or ſurplice, wore by perſons of diſtinction, of various characters; the ſame with what the Latins call *ſuper-humerale.*

It is very hard to ſay preciſely what the *ephod* was; and there is room enough for the interpreters to be divided about it. The only point they are agreed upon is, that it was an upper garment worn over all the reſt, immediately under the pectoral or breaſt-plate. Some hold it had ſleeves, others deny it. The generality agree, that it was very ſhort, though ſome maintain that it hung down to the feet behind.

There were two kinds of *ephods*; the one, common to all who aſſiſted in the temple, being only made of common linen, mentioned in the firſt book of Samuel, ii. 18; the other, peculiar to the high-prieſt, mentioned Exod. xxviii. 6. 15. to be made of gold, of blue, and of purple, of ſcarlet, and fine twined linen, with cunning work; having two ſhoulder-pieces, with a curious girdle of the ſame matter, whereon were two onyxes, with the names of the children of Iſrael engraved thereon.

It is alſo expreſſed in the ſecond book of Samuel, vi. 14. that upon the removal of the ark of the covenant from the houſe of Obed-Edom, David danced for joy, girt with a linen *ephod*; whereas ſome authors have concluded, that the *ephod* was alſo a regal garment, worn on ſolemn occaſions.

EPHORI, Εφοροι, magiſtrates eſtabliſhed in ancient Sparta, to balance and check the power and authority of the kings; as at Rome, there were tribunes created to controul the power of the conſuls.

The word is formed of the Greek, εφοραω, *intueor*, formed of the prepoſition επι, and the verb οραω, *to ſee*; whence εφορος, q. d. *inſpector, overſeer.*

Lycurgus, being ſenſible that a perfect underſtanding between the prince and the people, was the baſis and foundation of both their happineſs, to maintain that good underſtanding, eſtabliſhed *ephori*, or inſpectors, as a kind of mediators, who ſhould have an eye to the meaſures and conduct of both ſides, and preſerve ſo equal a balance between them, that the regal power ſhould never decline into ſeverity and tyranny, or the liberty of the people run into licence and rebellion.

This is the account of their inſtitution given by Herodotus and Xenophon. Her. lib. i. Xen. de Rep. Lacedem. The authority of the *ephori* was very great: they preſided in popular aſſemblies, collected their ſuffrages, declared war, made peace, treated with foreign princes, determined the number of forces that ſhould be raiſed, appointed the funds to maintain them, and diſtributed rewards and puniſhments in the name of the ſtate: they likewiſe held a court of juſtice, enquired into the behaviour of all magiſtrates, inſpected the education and conduct of youth, had a particular juriſdiction over the *helotes*, and by degrees drew the whole adminiſtration into their own hands. On certain occaſions, they expelled, and even put to death the kings; and aboliſhed or ſuſpended the power of the other magiſtrates, calling them to account at pleaſure. Ageſilaus, in the height of all his conqueſts, which even ſtruck terror on the great king of Perſia, ſtopped, and turned back, out of deference to the *ephori*, when they recalled him.

Some authors deny, that the *ephori* were eſtabliſhed by Lycurgus, dating their origin 130 years after the time of that legiſlator.

Thus Plutarch, in his Life of Cleomenes, aſcribes their inſtitution to Theopompus, king of Sparta, which is alſo confirmed by the authority of Ariſtotle. Polit. lib. v. The *ephori* were five in number, and annually choſen by the people out of their own body. The year was denominated from the firſt election of theſe magiſtrates; and the Lacædemonian armies took their names from the principal *ephori*, as thoſe of Athens did from their firſt ARCHON.

EPHYDOR, Εφυδωρ, in *Antiquity*, an officer in the Athenian courts of juſtice, who was to provide the plaintiff and defendant with equal water hour-glaſſes. When the glaſs was run out, they were not permitted to ſpeak any farther; and therefore we find them very careful not to loſe or miſpend one drop of their water. Whilſt the laws quoted by them were reciting, or if any other buſineſs happened to intervene, they gave order that the glaſs ſhould be ſtopped. Pott. Archæol. Græc. lib. i. cap. 21. lib. i. p. 118.

EPHYDRUM, Εφυδρὸν, in *Botany*, a name given by ſome of the Greek writers, to the plant now called *equiſetum*, or HORSE-*tail.*

EPIALOS, from ηϖιος, *gentle*, and ἁλς, *ſea*, in the *Medical Writings of the Ancients*, the name of a fever, in which the patient labours under a preternatural internal heat, while he at the ſame time ſhivers with cold. It has by ſome been called the *ſhivering-fever*; and the Romans named it *quercera.* Galen ſays it proceeds from a putrified acrid phlegm. The word is, by ſome, alſo applied to any gentle fever, or feveriſh complaint; and by others, to the cold or ſhivering fit preceding a fever. Hippocrates calls by this name that peculiar fever which attends young women, whoſe menſes are ſtopped by taking cold, or other accidents.

EPIBATÆ, Εϖιϐαται, among the Greeks, marines or ſoldiers who ſerved on board the ſhips of war. They were armed in the ſame manner as the land-forces, only that more of them wore full or heavy armour. Pott. Archæol. Græc. tom. ii. p. 140.

EPIBATERION, a poetical compoſition, in uſe among the ancient Greeks. When any perſon of condition and quality returned home after a long abſence or journey, into another country, he called together his friends and fellow-citizens, and made them a ſpeech, or rehearſed them a copy of verſes, wherein he returned ſolemn thanks to the immortal gods for his happy return; and ended with an addreſs by way of compliment to his fellow-citizens.

Theſe verſes made what the Greeks call εϖιϐατηριον, *epibaterium*, of εϖιϐαινω, *I go abroad.* At going away they had another, called *apobaterium.*

EPIC *poem*, an heroic poem, or a poem reciting ſome great and ſignal tranſactions of a hero; called alſo *epopœia.*

Such are the Iliad and Odyſſey of Homer, the Æneid of Virgil, the Gieruſalemme of Taſſo, the Paradiſe Loſt of Milton, and the Henriade of Voltaire, which are the principal poems of the *epic* kind.

An *epic* poem, according to Boſſu, is a diſcourſe invented with art, to form the manners, by inſtructions diſguiſed under the allegory of an important action related in verſe, in a probable, entertaining, and ſurpriſing manner.

The *epic* poem is diſtinguiſhed from comedy, in that the action of the latter is not important, nor is related by the poet, but acted by the perſons introduced for that purpoſe; which circumſtance, likewiſe, diſtinguiſhes it from tragedy. It differs alſo from tragedy in the event, or concluſion; which, in the latter, is generally unfortunate, but never ſo in the former.

Nor is it a philoſophical poem, as that of Lucretius, or the Creation of Sir R. Blackmore; nor a treatiſe of agriculture, or the like, as the Georgics of Virgil; thoſe poems not being intended to form the manners; beſide, that the inſtructions they contain are naked, ſimple, and direct, without any diſguiſe or allegory. Which ſecond circumſtance likewiſe diſtinguiſhes it from a treatiſe of morality, written in verſe; or a ſimple hiſtory in verſe, as the Pharſalia of Lucan, the Punic War of Silius, or the Civil Wars of Sam. Daniel; add, that its being confined to one important action, diſtinguiſhes it from a poem which relates all the actions of a perſon's life, as the Theſeid and Achilleid of Statius, which are what we properly call *heroic poems.*

M. de la Motte, indeed, in his controverſy with Madam

Dacier, on the ſubject of Homer, maintains, that the whole life of a hero may juſtly be made the ſubject of an *epic* poem; and even that the Lutrin of M. Boileau might paſs for an *epic* poem; but he ſeemed afterwards to return to the common ſentiment. In effect, the queſtion is not as to the ſenſe which may be annexed to the words *epic poem*, but the ſenſe which cuſtom has actually annexed to them.

If we had only regard to the etymology of the word *epic*, of εϖος, *verſe*, *poetry*, from ειϖω, *dico*, *I ſpeak*, *relate*) all poems wherein the poet ſpeaks or rehearſes things himſelf, without making the perſons of his poems ſpeak, except at ſecond-hand, as he relates what they ſpoke on this or that occaſion, would be properly *epic* poems; and ſo there is not an epigram, ſonnet, or madrigal, but would come under that denomination: but this were wild.

In effect, the term *epic* poem is only attributed to a compoſition whoſe ſubject is great, inſtructive, and ſerious; that only comprehends one ſingle principal event, to which all the reſt refer; which principal action is to be terminated in a certain ſpace of time, ordinarily about a year. It is true, all this is arbitrary; but the ſenſe of all words is ſo too; and in matters of language we muſt be guided by cuſtom.

If M. de la Motte had only pretended, that one might make a fine inſtructive poem on the whole life of a hero, or an agreeable and diverting poem on ſome humorous adventure, all the world would have been on his ſide. But it is enough that cuſtom has not thought good to aply the term *epic* either to ſubjects of too much extent, and that are crouded with two many incidents no-way connected together; or to burleſque poems, as the Batrachomyomachia of Homer, the Secchia Rapita of Taſſoni, the Défaite de Dulot, the Lutrin of Boileau, the Hudibras of Butler, the Rape of the Lock of Mr. Pope, or the Diſpenſary of Dr. Garth.

The *epic* poem, then, as appears from what was above obſerved bears a relation or analogy to four things, hiſtory, morality, fable, and poetry. To *hiſtory*, as both of them relate one or more actions; but then the actions of hiſtory are ſingular, ſo that the epopœia is no hiſtory, nor kind of hiſtory.

To *moral philoſophy*, as both of them conſiſt of inſtructions for forming the manners; but the action and allegories diſtinguiſh it herefrom.

But it relates entirely to poetry and fable, as being ſtrictly a poem and a fable.

The nature of the *epic* poem is finely drawn by the great critic abovementioned: the *epic* poets, ſays father Boſſu, have done that with regard to morality which the ancient heathen divines did with regard to divinity. The too great diverſity of divine actions and perfections, ſo very diſproportionate to our comprehenſion, obliged the latter to divide a ſingle idea of a ſimple eſſence, God, into ſeveral perſons, to whom they attributed ſeveral names, Jupiter, Juno, Neptune, &c. And, on the contrary, the nature of moral philoſophy, which never preſcribes rules for particular things, led the poets to collect into one ſingle idea, or into one and the ſame perſon, and one apparently ſingular action, whatever of that kind was found in different perſons and different actions.

Thus Ariſtotle, Ου ςοχαζεται η ϖοιησις ονοματα, &c. Poetry, ſays he, teaches moral philoſophy, not by relating only in the manner of an hiſtorian, what Alcibiades, for inſtance, did or ſuffered; but by propoſing what ſome perſon, named as the poet thinks fit, would probably or neceſſarily have done on the like occaſion: and thus it is that he ſhews either the unhappy conſequences uſually attending imprudent ſchemes or ill actions; or the reward of good actions, and the ſatisfaction reſulting from a deſign laid in virtue, and conducted with prudence. So that in the *epic* poem, according to Ariſtotle's ſentiment, the perſons and actions, however named, are all to be feigned, allegorical and univerſal, not hiſtorical and ſingular.

But the poets, thus taking on them the office of moral philoſophers, did not ceaſe to be divines. On the contrary, their morality itſelf frequently obliges them to introduce the deity in their works; as the knowlege, fear, and love of God, are the firſt and moſt ſolid foundations of all morality. The preſence of the divinity, and the ſhare ſo auguſt a perſonage was ſuppoſed to have in the action, obliged the poet to make the action great and important, and to have it tranſacted by kings and princes. The ſame likewiſe obliged them to think and ſpeak in a manner elevated above the common pitch of men, and equal, in ſome meaſure, to the dignity of the divine perſons introduced. To which end ſerves the poetical and figurative language, with the majeſty of heroic verſe. Add, that as ſo much of the divine and miraculous might ruin the probability, they were hereby obliged to have recourſe to ſeveral rules to maintain the ſame.

Thus much the poets were driven to by the ſubſtance of the things they had choſen for the matter of their poems and inſtructions. The manner of delivering them uſefully and methodically, obliged them to ſeveral other neceſſary rules.

The *epic* poem is intended more for the manners and habits, than for the paſſions. Theſe latter riſe all at once, and their violence is but of ſhort duration; but the habits are more calm and impreſſed, or quitted more leiſurely. Conſequently, the *epic* action could not be included in the ſpace of a day, as that of the theatrical. A longer time was neceſſary than is required for tragedy, which is altogether for the paſſions.

This diſtinction has introduced great difference between tragedy and *epic* poety. The tragic violence requires a more lively and animated repreſentation than a mere recital: accordingly, it is wholly thrown into action, and the poet never ſpeaks at all, as he does in the epopœia, where there are no actors. An *epic* poem, properly ſo called, ſhould be written in honour of the country and religion of the author, between which and the hero there is a near relation, and therefore he ought at leaſt to come off in triumph. See farther of the nature of the *epic* poem under FABLE. For its matter, ſee ACTION. For its form, ſee NARRATION. For its verſification, ſee HEXAMETER. See alſo MANNERS, CHARACTERS, MACHINE, &c.

EPICALYMMA, a word uſed by ſome of the *Old Writers on Shell-fiſh*, and not well underſtood by their commentators.

EPICARPIUM, Eϖικαρϖιον, formed of εϖι, *on*, and καρϖος, *wriſt*, in *Medicine*, a kind of remedy, uſually in form of a cataplaſm or plaſter, conſiſting of ſharp, penetrating ingredients, as garlick or onion, ſpider's-web, hellebore, camphor, Venice treacle, &a. applied round the wriſt, at the beginning of the acceſs of a fever, to prevent the growth of the ſame.

EPICAUMA, from καιω, *I burn*, in *Medicine*, a cruſty ulcer that ſometimes happens to the black of the eye.

EPICEDION, Eϖικηδιον, formed of εϖι, *upon*, and κηδος, *funeral*, in the *Greek and Latin Poetry*, a poem, or poetical compoſition, on the death of a perſon.

At the obſequies of any man of figure, there were three kinds of diſcourſes uſually made; that rehearſed at his buſtum or funeral pile, was called *nenia*; that engraven on his tomb, *epitaph*; and that ſpoken in the ceremony of his funeral, *epicedion*. We have two beautiful *epicedions* in Virgil, that of Euryalus, and that of Pallas.

EPICERASTICS, Eϖικεραςικα, formed of εϖι and κεραννυμι, *I moderate*, in *Medicine*, remedies, which, by their temperate moiſture, ſoften the acrimony of a humour, and aſſuage the painful ſenſation of a part irritated or afflicted by it; ſuch are the roots of althæa, mallows, liquorice; leaves of lettuce, mallows, water-lily, purſlain; the ſeeds of flax, poppy, &c. See EMOLLIENTS.

EPICHIREMA, Eϖιχειρημα, in *Logic*, an argumentation, conſiſting of four or more propoſitions, ſome whereof are proofs of others.

Thus, that oration of Cicero for Milo may be reduced to the *epichirema*: "Thoſe who way-lay a man to kill him, " it is lawful for him to kill, as is allowed by the laws of " nature and nations, and by the practice of the beſt " men; but Clodius way-laid Milo with that view, as " appears from his forming an ambuſcade before his " country-houſe, and from his proviſion of weapons, " ſoldiers," &c. Therefore it was lawful for Milo to kill Clodius.

EPICHIROTONIA, among the Athenians. It was ordained by Solon, that once every year the laws ſhould be carefully reviſed and examined; and if any of them were found unſuitable to the preſent ſtate of affairs, they ſhould be repealed. This was called εϖιχειροτονια των νομων, from the manner of giving their ſuffrages, by *holding up their hands*. See a farther account of this cuſtom in Pott. Archæol. Græc. lib. i. cap. 26. tom. i. p. 142.

EPICHORDIS, from χορδη, *an inteſtine*, in *Anatomy*, a name given by ſome to the meſentery.

EPICLEROS, Eϖικληρος, among the Athenians, a daughter that had no brothers, and therefore inherited her father's whole eſtate. See EPIDICASIA.

EPICŒNE, Eϖικοινον, in *Grammur*, a term applied to nouns, which, under the ſame gender and termination, mark, indifferently, two kinds of ſexes. See GENDER.

Such, in Latin, is, *aquila*, *veſpertilio*, &c. which ſignify equally a male or female eagle, or bat.

Grammarians diſtinguiſh between *epicœne* and common. A noun is ſaid to be common of two kinds, when it may be joined either with a maſculine or a feminine article; and *epicœne*, when it is always joined to ſome one of the two articles, and yet ſignifies both genders.

EPICOLIC *regions* (from εϖι, *ſupra*, *upon*, and *colon*, the *gut*, ſo called) a name given by Dr. Gliſſon to that ſpace on both ſides, over the colon.

EPICRANIUM, in *Anatomy*, a name given by Albinus to the fleſhy covering of the head, divided by authors into ſeveral different muſcles. The head is covered with a thin coat: the hinder parts of this coat are called the occipital muſcles, and the forepart the frontal muſcles.

EPICRASIS, in *Medicine*, is a gradual evacuation of ill humours in the blood.

EPICRISIS, 'Επικρισις, in *Rhetoric*. a clear and brief declaration of the ſpeaker's judgment concerning the ſubject in hand. Thus, *ego ſic ſtatuo, in optimo imperatore quatuor has res ineſſe oportere*, &c. Voſſ. Rhet. lib. vi. p. 495.

EPICUREANS, a ſect of ancient philoſophers, who adhered to the doctrines and opinions of Epicurus.

Epicurus was an Athenian, and the ſon of Neocles, born in the third year of the 109th Olympiad, and conſequently 341 years before Chriſt. He ſpent his youth partly in the iſle of Samos, and partly at Teos, and did not return to Athens till he was eighteen years old: whence he removed at the age of twenty-three to Colophon, and ſojourned in ſeveral places before he fixed again at Athens, in the thirty-ſeventh year of his age. He was the diſciple of Pamphilus the Platonick; and he ſtudied the writings of Anaxagoras, Archelaus, Metrodorus, and Democritus. He began to form his ſchool at Mitylene and Lampſachus about the thirty-ſecond of his life; though he afterwards removed to Athens, where he philoſophized chiefly in his garden, teaching a great number of diſciples, who flocked to him from all the cities of Greece and Aſia, and even from Egypt, and who lived in common with their maſter. His own life was exemplary, though it has not eſcaped calumny. He died of the ſtrangury at ſeventy-two years of age. His memory was greatly reſpected by his followers, and his doctrine reverenced as an oracle; and as long as learning flouriſhed in Greece, and Rome was preſerved from the Barbarians, the ſchool and diſcipline of Epicurus continued eminent.

His birth-day continued to be obſerved in Pliny's time; and the whole month in which he was born was obſerved as a perpetual feſtival. Cicero de Fin. lib. v. init. and Plin. lib. xxxv. cap. 2.

The noble poet Lucretius, who has given us a beautiful ſyſtem of *Epicureaniſm* in fine Latin verſe, prefers its father Epicurus to all other philoſophers, whom, he makes no ſcruple to ſay, he obſcured as much as the ſun does the other ſtars. It is ſaid he firſt taught grammar; till, upon reading Democritus's books, he began to apply himſelf to philoſophy.

From Democritus he learned the doctrine of atoms, or corpuſcles, which he afterwards made the baſis of his phyſics. Clem. Alexand. Strom. 6. advances, that Epicurus ſtole his chief doctrines from Democritus: but it is certain he greatly improved and illuſtrated them. Diog. Laertius aſſures us, he compoſed an infinite number of volumes. Diog. Laert. in Prœom. lib. x. p. 26.

This philoſophy conſiſted of three parts; *canonical*, κανονικον; *phyſical*, φυσικον; and ηθικον, *ethical*, which he explained briefly in three epiſtles.

The firſt, as Laertius relates, was about the canons, or rules of judging; wherein, rejecting the uſe of logic, he eſtabliſhed the ſenſes, paſſions, and anticipations, as the criterions, or judges of truth.

The canons of ſenſe are the following four: ſenſe is never deceived; and therefore every ſenſation, and every perception of an appearance is true. Opinion ſucceeds ſenſe, and is ſuperadded to ſenſation, and capable of truth or falſhood: all opinion atteſted, or not contradicted by the evidence of ſenſe, is true, and the contrary opinion is falſe. The canons of anticipation are alſo four: all anticipation, which is in the mind, depends on the ſenſes, by incurſion, proportion, ſimilitude, or compoſition. Anticipation, or prenotion, is, as it were, the definition of the thing, without which we cannot enquire, doubt, think, nor ſo much as name any thing. Anticipation is the principle in all diſcourſe, as being that to which we have regard, when we infer that one thing is the ſame or different, joined with or disjoined from another; that which is not manifeſt ought to be demonſtrated out of the anticipation of a thing that is manifeſt. The canons of paſſion likewiſe are four: all pleaſure, which hath no pain in it, is to be embraced; all pain, that hath no pleaſure with it, is to be ſhunned; all pleaſure, which hindereth a greater pleaſure, or procureth a greater pain, is to be ſhunned; all pain, which putteth away a greater pain, or procureth a greater pleaſure, is to be embraced.

In the ſecond, he laid down atoms, ſpace or vacuum, and gravity, as the firſt principles of all things. The univerſe he taught, conſiſted of atoms or corpuſcles, of various forms, magnitudes, and weights, which having been diſperſed at random through the immenſe inane, or ſpace, fortuitouſly concurred into innumerable ſyſtems or worlds, which were thus formed, and afterwards, from time to time increaſed, changed, and diſſolved again, without any certain cauſe or deſign; without the intervention of any deity, or the intendance of any providence. See Atomical and Corpuscular *philoſophy*.

Not that he denied the exiſtence of a God; on the contrary, he aſſerted it; but he thought it beneath the majeſty of the Deity to concern himſelf with human affairs.

Thus Epicurus denied a providence, and every kind of natural and moral adminiſtration of the Deity. But though he adopted the notion of Leucippus and Democritus, concerning the formation of the world by the fortuitous concourſe of atoms, he rejected the opinion of fate. In this particular, he abandoned the ſyſtems of atoms, and the neceſſitating deſtiny, ariſing from the external and innumerable laws of motion, to which Democritus aſcribed the production of the world, and maintained the liberty of human actions. But nothing can be more abſurd than his reaſoning on this ſubject. He gave his atoms a motion of declination, wherein he eſtabliſhed the ſeat, ſource, and principle of free actions; pretending, that by this means, there were events independent of fatal neceſſity. Before him, no other motion was admitted in atoms but that reſulting from their weight and their reflexion; the firſt of which was always in perpendicular lines, and *in vacuo* ever the ſame; nor was it changed, except when one atom ſtruck againſt another. Epicurus on the contrary, ſuppoſed, that even in the midſt of the vacuum atoms did ſomewhat decline from the direct line; and hence, he ſaid, proceeded liberty. Thus alſo he accounts for the concourſe of various atoms in the production of the world. Cicero has expoſed the abſurdity of this notion of declination in his book De Fato, cap. 10. See alſo De Fin. lib. i. cap. 6.

The theology of Epicurus was not only eſſentially defective in his diſbelief of providence, but likewiſe in his notion of the mortality of the ſoul, and rejection of a future ſtate. Death, according to his ſyſtem, was a mere privation of ſenſe; when the body was diſſolved, the ſoul was diſſipated, had no longer the ſame faculties, nor was any longer moved, nor had any ſenſe. The ſoul was diſſipated into the principles and little bodies of which its contexture was compoſed; and he argued this diſſipation of the ſoul from its being compounded, and having a beginning. Moſheim has, therefore, juſtly obſerved, that of all the philoſophers, the *Epicureans* enjoyed the greateſt reputation, and had undoubtedly the greateſt number of followers, becauſe their opinions tended to encourage the indolent ſecurity of a voluptuous and effeminate life, and to baniſh the remorſe and terrors that haunt vice, and naturally incommode the wicked in their ſenſual purſuits. Eccl. Hiſt. vol. i. p. 138. 8vo.

As to ethics, his firſt principle, or the ſupreme felicity of man, he held, was pleaſure: which ſome, as hereafter obſerved, underſtand of mental, and others of carnal pleaſure.

The *Epicureans* have, in all ages, been decried for their morals, and their attachment to the pleaſures of ſenſe: ſeveral authors, particularly Cicero among the ancients, and Gaſſendus among the moderns, have endeavoured to vindicate them from this charge; by ſhewing that the pleaſure wherein their maſter Epicurus places the ſummum bonum, or ſupreme happineſs of this life, was not any ſenſual, or brutal pleaſure, but a contentment, and tranquillity of mind, exempt from all tumultuary paſſions, &c.

This opinion ſeems juſt, and well-grounded; but, without entering into the queſtion, which Gaſſendus, Du Rondel, and others, have exhauſted, it is certain, that in the common uſe of the word, *Epicurean* is underſtood to ſignify an indolent, effeminate, and voluptuous perſon, who only conſults his particular and private pleaſure, without concerning himſelf with any thing ſerious.

In effect, there were always two kinds of *Epicureans*; the rigid, and remiſs; the rigid *Epicureans* were thoſe ſtrictly attached to the ſentiments of Epicurus, who placed all their happineſs in the pure pleaſures of the mind, reſulting from the practice of virtue. The looſe or remiſs *Epicureans*. taking the words of that philoſopher in a more groſs ſenſe, placed all their happineſs in pleaſures of the body, in eating, drinking, loving, &c. The former kind, who were the genuine *Epicureans*, called the other the *ſophiſts of their ſect*. Stanley's Hiſt. of Philoſophy, part xiii. Gaſſendus de Vita & Moribus Epicuri. Bayle, art. Epicurus.

EPICYCLE, in *Aſtronomy*, a circle whoſe center is on the circumference of another circle which bears it, and which for that reaſon is called its *deferent*.

The word is formed of the Greek επι, *upon*, and κυκλος, *circle*, q. d. *a circle on a circle*.

As aſtronomers invented an eccentric circle to ſolve the apparent irregularity of the planets, and their different diſtances from the earth; they likewiſe invented a little circle to ſolve the ſtations and retrogradations of the planets: this circle, which they call *epicycle*, has its center in the circumference of another greater, which is the eccentric of a planet.

In this eccentric the center of the *epicycle* moves; carrying with it the planet fixed in its circumference, the center of the planet, all the way, moving regularly along the circumference of the *epicycle*, when downwards, according to the order of the ſigns, and when upwards, contrary to it.

The higheſt point of the *epicycle* is called the *apogee*, and the loweſt the *perigee*.

The great circle, in whoſe circumference the center of the *epicycle* is placed, is alſo called the *deferent of the epicycle*, whoſe center is in the orbit of the earth, according to the hypotheſis of Copernicus; but in that of Ptolemy, who ſuppoſed the heavens ſolid, the *epicycle* was a ſphere, which revolved with the moon, of the thickneſs allowed its heaven or orbit; and which ſometimes ſhewed it higher, and ſometimes lower. See *Ptolemaic* SYSTEM.

"The aſtronomers, who deny the motion of the earth, in order to render the phænomena of the motions of the planets more conſiſtent with the motion of the ſun, have affixed the orbit of the earth, as an *epicycle* to the orbit of the planets; ſo that the planet ſhould proceed in an *epicycle*, while it is carried through its orbit round the ſun; but this is far from anſwering their expectations." Wolf. Elem. Math. tom. ii. p. 501.

"Ricciolus, though a zealous enemy of the motion of the earth, could not make any aſtronomical tables that ſhould but tolerably agree with obſervation, without ſuppoſing the earth to move; not, though he called in all the foreign and forced aſſiſtances of changeable *epicycles*, liable to continual increaſe and decreaſe, and variouſly inclined to the ecliptic." De Chales Aſtron. Reform. lib. x. cap. 1. fol. 353, &c.

Epicycles have likewiſe been introduced by Dr. Halley and Mr. Machin, to account for the inequalities of the moon's motion. See MOON.

EPICYCLOID, in *Geometry*, denotes a curve generated by the revolution of a point of the periphery of a circle, along the convex or concave part of another circle.

A point of the circumference of a circle, proceeding along a plane in a right line, and at the ſame time revolving on its center, deſcribes a cycloid.

And if the generating circle, in lieu of moving on a right line, moves along the circumference of another circle, whether equal or unequal, the curve deſcribed by any point in its circumference is called an *epicycloid*.

If the generating circle proceeds along the convexity of the periphery, it is called an *upper*, or *exterior epicycloid*: if along the concavity, a *lower*, or *interior epicycloid*.

In an *epicycloid*, the part of the circle the generating point moves along, is called the *baſe of the epicycloid*: thus in *Tab. Geom. fig.* 58. DB is the baſe of the *epicycloid*, V its vertex; VB its axis; DPV half of the *exterior epicycloid*, made by the revolution of the ſemicircle VLB (which is called the *generant*) along the convex ſide of the baſe DB; as DPU is the *interior epicycloid*, formed by the generant's revolving along the convex ſide of the baſe.

The length of any part of the curve, which any given point in the revolving circle has deſcribed, from the time it touched the circle whereon it revolved, is to double the verſed ſine of half the arch which all that time touched the quieſcent circle, as the ſum of the diameters of the circles to the ſemidiameter of the quieſcent circle; provided the revolving circle moves upon the convex ſide of the quieſcent circle; but if upon the concave ſide, as the difference of the diameters to the ſemidiameter.

Dr. Halley gives us a general propoſition for the meaſuring of all *cycloids* and *epicycloids*: thus, the area of a cycloid, or *epicycloid*, either primary, or contracted, or prolate, is to the area of the generating circle; and alſo the areas of the parts, generated in thoſe curves, to the areas of analogous ſegments of the circle; as the ſum of double the velocity of the center, and velocity of the circular motion, to the velocity of the circular motion. The demonſtration hereof, ſee in Phil. Tranſ. Nº 218.

Spherical epicycloids are formed by a point of the revolving circle, when its plane makes an invariable angle with the plane of the circle on which it revolves. Meſſrs. Bernouilli, Maupertuis, Nicole, and Clairaut, have demonſtrated ſeveral properties of theſe *epicycloids*, in Hiſt. Acad. Sc. for 1732.

EPICYEMA, from κυω, *I conceive*, a word uſed by Hippocrates to ſignify a fœtus, or a falſe conception, or mole coming on after the conception of a former or regular fœtus.

EPIDAURIA, Επιδαυρια, in *Antiquity*, a feſtival celebrated by the Athenians, in honour of Eſculapius.

EPIDELOS, a word uſed by Hippocrates, for a youth in the time of his growth, from the age of ſeven to that of fourteen. The ſame author alſo uſes it in a very different ſenſe, expreſſing by it the obſervable days in a diſeaſe, ſuch as the fourth, eighth, and eleventh, which indicate what ſort of criſis is to be reaſonably expected on the great critical day.

EPIDEMIA, Επιδημια, in *Antiquity*, feaſts of Apollo at Delphos, and Miletus; and of Diana at Argos.

Theſe feaſts bore the name *epidemia* (from επι, *in*, and δημος, *people*) becauſe theſe gods were imagined to be preſent on thoſe days among the people. Accordingly, on the laſt day of the *epidemia* they ſung an hymn called αποπεμπτικος, to bid them adieu, and ſet them forwards on their journey.

As thoſe gods could not be every where, and yet were honoured in many different places, there were times allowed them to paſs from one place to another, to receive the vows of their adorers. See Scaliger, Poet. lib. iii. cap. 114.

EPIDEMIA were alſo private feſtivals, and times of rejoicing, when a friend, or a relation, had returned from a journey. Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 394.

EPIDEMIC, Επιδημιος, denotes a general or ſpreading diſorder, as a plague, ariſing from ſome corruption or malignity in the air, which ſeizes great numbers of people in a little time.

The word is Greek, formed of επι, and δημος, *populus*, *people*; ſuch diſeaſes running among all kinds of people, of whatever age, ſex, quality, &c. as ariſing from a common or general cauſe.

The Latins call them *populares morbi*, *popular diſeaſes*; in oppoſition to thoſe called *ſporadici*, which are only here and there, as ariſing from private or particular cauſes. See SPORADIC.

Epidemic diſeaſes differ from endemial; which imports diſeaſes peculiar to ſome particular country, region, or people; whereas *epidemic* diſeaſes are ſuch as are peculiar to certain ſeaſons.

Pertinent to the preſent ſubject are the obſervations of the celebrated Boerhaave on *epidemical* diſeaſes. We muſt remark, ſays this author, that though every particular diſeaſe of the fluids in various *epidemical* conſtitutions, appear to inattentive obſervers, the ſame with regard to their names, ſigns, and, in ſome meaſure, in their conſequences; yet the ſame diſeaſes appearing in one *epidemical* conſtitution, differ exceedingly from thoſe produced in another, with reſpect to their obſcure natures; their appearances not obſervable, except by the judicious; the various times of their increaſe, ſtate, coction, criſis, effect, event, and method to be purſued in their cure. Hence it is evident that they require a different adminiſtration of the non-naturals, different treatment and medicines. This variety, however, in *epidemical* diſtempers, is ſo obſcure, that phyſicians have not yet been able to deduce it from any abuſe of the non-naturals; and yet there are many circumſtances that render it highly probable, that the cauſes reſide in the air, but depend more upon the inexplicable variety of exhalations contained therein, which by their mixture with the fluids of the body, or their ſtimulus, injure the human machine, than upon any change in the ſenſible qualities thereof. But it is very ſurpriſing, that theſe *epidemical* diſorders ſhould be principally propagated by contagion, received from one, by another perſon unaffected.

Upon the invaſion of any unknown *epidemical* diſtemper, the phyſician will receive ſome information with reſpect to the cure; firſt by reducing the diſtemper to ſome more known ſpecies, which it moſt reſembles; ſecondly, by obſerving its tendency at the vernal and autumnal equinoxes, at which ſeaſons it is generally moſt prevalent; thirdly, by attending to the ſpontaneous phænomena, which precede, accompany, or follow, the recovery or death of the patient, and the different ſtates of the diſorder; fourthly, by diligently remarking the benefit or injury received, from whatever the patients are unavoidably obliged to do, as from whatever is taken into, or diſcharged out of the body; fifthly, by comparing the caſes of many patients labouring under the diſtemper, at the ſame time; ſixthly, by abſtaining from all remedies which are dubious, which exagitate, and induce a conſiderable change in the humours, and thereby obſcure the genius of the diſeaſe.

From theſe circumſtances, duly attended to, the curative indication may be diſcovered. See *Peſtilential* DISEASES.

EPIDENDRA, from επι, *upon*, and δενδρον, *tree*, in *Natural Hiſtory*, a word uſed by Sir Hans Sloane, and ſome other authors, to expreſs thoſe plants which grow upon others, ſuch as the MISLETOE, which grows upon the apple-trees, &c. Theſe are more commonly diſtinguiſhed by the name of paraſitical plants. See DODDER.

EPIDENDRUM, in *Botany*. See VANILLA.

EPIDERMIS, in *Anatomy*, the cuticle, or ſcarf-ſkin.

The word is formed of the Greek επι, *on*, *over*; and δερμα, *ſkin*.

Some hold the *epidermis* to be formed of the excrements of the *derma*, or true ſkin. Hippocrates is of opinion, it is engendered by cold; as on blood, broth, or the like, when cold, we ſee a pellicle formed.

But it is now paſt doubt, that it is produced at the ſame time, and after the ſame manner, with the other parts: it being found in fœtuſes of all ages, in the womb: it has neither veins, arteries, nor nerves; whence it is inſenſible. See CUTICULA.

EPIDICASIA, Επιδικασια, among the Athenians. Daughters inheriting their parents eſtate, were obliged to marry their neareſt relation; which gave occaſion to perſons of the ſame family to go to law with one another, each pretending to be more nearly allied to the heireſs than the reſt. The ſuit was called επιδικασιας δικη; and the virgin, about whom the relations conteſted, επιδικος. Pott. Archæol. Græc. lib. i. cap. 24. tom. i. p. 147.

EPIDIDYMIS, in *Anatomy*, a little, round body, on the back of each TESTICLE; called alſo PARASTATA.

The word is formed of επι, *upon*, and διδυμος, *twin*, *teſticle*. See FISTULA.

EPIDOTES, from εϖιδιδωμι, *I cauſe to grow*, in *Mythology*, deities which were ſuppoſed to preſide over the growth of infants.

EPIDROMUS, of εϖι and δρομος, *courſe*, in the *Ancient Shipping*, a ſail near the ſtern, which was the largeſt but one in the ſhip.

EPIGÆA, *Trailing Arbutus*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower hath a double empalement, the outer compoſed of three, and the inner of one leaf, divided into five parts; the flower is of a ſalver-ſhape, and hath ten ſlender ſtamina of the length of the tube. In the center is ſituated a globular germen, which afterward becomes a depreſſed five-cornered fruit, with five cells, containing ſeveral ſeeds. There is one ſpecies, a native of North America.

EPIGASTRIC *region*, in *Anatomy*, is a name given to the upper part of the ABDOMEN; reaching from the cartilago xiphoides, almoſt to the navel.

It is uſually divided into three parts: the ſides, or lateral parts, called *hypochondria*; and the middle, the *epigaſtrium*.

There are alſo two *epigaſtric* veins, and as many arteries. The arteries are branches of the iliac external arteries; the veins diſcharge themſelves into the iliac external veins. See *Tab. Anat.* (*Angeiol.*) *fig.* 1. N° 57. *fig.* 6. N° 3.

EPIGASTRIUM, of εϖι, *upon*, and γαστηρ, *belly*, in *Anatomy*, the middle part of the *epigaſtric* region.

EPIGINOMENA, of εϖιγινομαι, *I ſupervene*, in *Medicine*, are new ſymptoms which occur in the progreſs of a diſeaſe. See EPIPHÆNOMENA.

EPIGLOTTIS, of εϖι, *upon*, and γλωσσα, or γλοττα, *tongue*, in *Anatomy*, the cover, or lid, of the LARYNX.

The *epiglottis* is a thin, moveable cartilage, made in form of a leaf of ivy, or a little tongue, and therefore likewiſe called lingula; ſerving to cover the cleft, or rima, of the larynx, called *glottis*.

Galen takes the *epiglottis* to be the principal organ, or inſtrument, of voice; ſerving to vary, modulate, and render it harmonious.

Its baſe, which is pretty broad, is in the upper part of the cartilago ſcutiformis, and its point, or tip, turned towards the palate. It is only ſhut by the weight of the piece in ſwallowing; though not ſo exactly, but that a crum, or a drop, ſometimes eſcapes through the trachea.

EPIGLOUTIS, a word uſed, by ſome of the old writers in *Medicine*, to expreſs the upper part of the buttock.

EPIGONATIS, a name given, by ſome anatomiſts, to the PATELLA.

EPIGONIUM, Εϖιγονιον, a muſical inſtrument among the ancients, with forty ſtrings, ſo called from its inventor Epigonius, a native of Ambracia, a city of Epirus. Mem. Acad. Inſcript. vol. v p. 167.

EPIGRAM, in *Poetry*, a ſhort poem, or compoſition in verſe, treating only of one thing, and ending with ſome point, or lively ingenious thought.

The word is formed of εϖιγραμμα, *inſcription*, of εϖιγραφειν, *to inſcribe*, or *write upon*.

Epigrams then, originally, ſignify *inſcriptions*, and they derive their origin from thoſe inſcriptions placed by the ancients on their tombs, ſtatues, temples, triumphal arches, &c. See INSCRIPTION.

Theſe, at firſt, were only ſimple monograms: afterwards increaſing their length, they made them in verſe, to b the more eaſily retained: Herodotus, and others, have tranſmitted to us ſeveral of them.

Such little poems retained the name of *epigrams*, even after the deſign of their firſt inſtitution was varied, and people began to uſe them for the relation of little facts and accidents, the characterizing of perſons, &c.

The Greeks confine their *epigrams* to a very narrow compaſs; for though, in the Anthology, we here and there meet with a very long one; yet, ordinarily, they do not exceed ſix, or, at moſt, eight verſes. The Latins were not always ſo ſcrupulous, and the moderns much leſs, as to theſe bounds.

M. le Brun, in the preface to his *Epigrams*, defines an *epigram* a little poem, ſuſceptible of all kinds of ſubjects, and ending with a lively, juſt, and unexpected thought; which are three qualifications eſſential to the *epigram*; particularly the firſt and laſt of them, viz. brevity, and the point or cloſe of the *epigram*.

To attain brevity, only one thing is to be aimed at in the poem, and that to be purſued in the conciſeſt terms poſſible. Authors are much divided, as to the length the *epigram* is to be confined to: the ordinary limits are from two to twenty verſes; though we have inſtances, both among the ancients and moderns, where they extend to fifty. But ſtill it is allowed, that the ſhorter the better, and more perfect, as it partakes more of the nature and character of this kind of poem. The point or turn is a quality much inſiſted on by the critics, who require the *epigram* conſtantly to cloſe with ſomething poignant and unexpected, to which all the reſt of the compoſition is only preparatory. Others there are, who exclude the point, and require the thought to be equally diffuſed throughout the whole poem, without laying the whole ſtreſs on the cloſe: the former is uſually Martial's practice, and the latter that of Catullus. Which is the moſt beautiful and perfect manner, is diſputed by a third claſs of critics.

The Greek *epigrams* have ſcarce any thing of the point, or briſkneſs, of the Latin ones: thoſe collected in the Anthology, have moſt of them a remarkable air of eaſe and ſimplicity, attended with ſomething juſt and witty; ſuch as we find in a ſenſible peaſant, or a child that has wit. They have nothing that bites, but ſomething that tickles. Though they want the ſalt of Martial, yet to a good taſte they are not inſipid; except a few of them, which are quite flat and ſpiritleſs. However, the general faintneſs, and delicacy of the pleaſantry in them, has given occaſion for a *Greek epigram*, or *epigram à la Greque*, to denote, among the French, an *epigram* void of ſalt or ſharpneſs.

It is principally the point that characterizes the *epigram*, and diſtinguiſhes it from the madrigal. See POINT.

In the modern verſification, as obſerved by F. Mourgues, the *epigram* and madrigal are diſtinguiſhed by the number of verſes, and the cloſe. 1. By the number of verſes, which in the modern *epigram* does not go beyond eight, nor in the modern madrigal, comes ſhort of ſix; and, 2. In that the cloſe, or period, of the *epigram*, has always ſomething more lively and ſtudied than that of the madrigal.

The *epigram* is the loweſt, and leaſt conſiderable, of all the productions of poetry; and it is in general rather an effect of good luck, than of art, to ſucceed therein. The fineſſe, and ſubtilty, of the *epigram*, M. Boileau obſerves, ſhould turn on the words, rather than the thought; which ſeems very little to the credit of this kind of compoſition, as it reduces it to the nature of the pun, or equivoque. F. Bouhours confirms the hint, in adding, that the equivoque is what uſually ſhines the moſt in the *epigram*.

One great beauty of the *epigram* is, to leave ſomething for the reader to gueſs, or ſupply. Nothing pleaſes the mind ſo much, as to find ſomething of itſelf in the objects preſented it; nor does any thing diſguſt it more than to preclude it from ſhewing and exerciſing a faculty it values itſelf for. Segrais.

The *epigram* admits of great variety of ſubjects: ſome are made to praiſe, and others to ſatirize, which laſt are much the eaſieſt; ill-nature ſerving inſtead of point and wit. Boileau's *epigrams* are all ſatires on one or another. Thoſe of des Reaux are all made in honour of his friends; and thoſe of Mad. Scudery are ſo many eloges. The *epigram* being only a ſingle thought, it would be ridiculous to expreſs it in a great number of verſes; it muſt have its unity like the drama. The comedy has an action for its ſubject, and the *epigram* a thought.

EPIGRAPHE, Εϖιγραφη, *Superſcription*, an inſcription on a building, to ſignify its uſe, occaſion, the time when, and the perſons by whom it was built.

EPIGRAPHES, Εϖιγραφεις, among the Athenians, officers that rated all thoſe of whom taxes and contributions

tions were required, according to every man's ability, kept the public accounts, and proſecuted ſuch as were behind-hand with their contributions. Potter, Archæol. Græc. lib. i. cap. 14. tom. i. p. 81.

EPILEPSY, formed of επιλαμβανω, *I ſurpriſe*, or *ſeize hold of one*, in *Medicine*, a convulſion, either of the whole body, or ſome of its parts; attended with a deprivation of the ſenſes and underſtanding; and returning from time to time in fits, or paroxyſms.

In Engliſh it is uſually called the *falling ſickneſs*, becauſe people fall down when attacked by it. The Latins call it *comitialis morbus*, becauſe when any body was ſeized with it in a comitia, or aſſembly of the Roman people, they preſently broke up the aſſembly, as deeming it an unhappy preſage.

Some call it the *morbus ſacer*, as ſuppoſing it ſent by way of immediate puniſhment from God. Others, *morbus caducus*; others *Herculeus*, *ſonticus*, *lues deifica*, &c.

The *epilepſy* is generally preceded by uncommon wearineſs, pain of the head, dullneſs, giddineſs, noiſe in the ears, dimneſs of ſight, palpitation of the heart, diſturbed ſleep, difficult breathing, inflation of the bowels with wind, the evacuation of great quantities of thin urine, pale complexion, coldneſs at the extremities, and a ſenſation of cold air, aſcending in a kind of ſteam towards the head.

The patient ſeized with this diſorder, falls inſtantly and ſuddenly down; or rather throws and precipitates himſelf violently to the ground. When down, he grinds his teeth, foams at the mouth, makes an unuſual noiſe, and frequently ſhakes his head; his arms, legs, neck, back, &c. either becoming rigid, or variouſly diſtorted; his thumbs are drawn on towards the palm of his hands; and as all the parts are in a violent contraction, there is frequently an involuntary flux of urine, ſeed, and fecal matter. After ſome time he returns to himſelf; only retaining a head-ach, heavineſs, wearineſs of the limbs, &c.

Etmuller more accurately diſtinguiſhes the diſeaſe into three degrees: the firſt, or loweſt, is much the ſame with the higheſt degree of a vertigo.

In the ſecond, there ariſe various agitations and geſticulations; and the ſenſes, both external and internal, either remaining, or being tranſported into a delirium, they dance, ſing, laugh, weep, talk idly, ſhriek, and beat their breaſts. Sometimes they remember all after the fit is over, and ſometimes nothing at all of what has paſſed.

In the third degree, which alone is ordinarily called the *epilepſy*, they loſe the uſe both of reaſon and ſenſe; fall, or fling themſelves down, foam, grind their teeth, and bite their lips, with the other circumſtances above related. Thoſe affected with the ſecond degree, have been often ſuppoſed to be *poſſeſſed by the devil*. See DÆMONIAC.

The paroxyſms, according to the diverſity of cauſes, are longer or ſhorter, and fewer or more frequent. Some have obſerved that they generally return at ſtated periods, as on certain days, hours, or months, or on the changes of the moon, eſpecially at the new and full moon; but there is reaſon to think, from later obſervations, that this is a vulgar error. See LUNATICS.

Women are uſually ſeized with theſe paroxyſms at the time of the return of the menſes; and what is moſt obſervable is, that they are frequently occaſioned by ſeemingly ſlight cauſes; commotions of the mind, a colder ſeaſon than ordinary, the uſe of ſtrong liquors, cloſe application of the mind to any thing, and, finally, the uſe of venery often bring on theſe fits. Infancy and youth are the times of life moſt ſubject to this diſorder, which often goes off at the time of puberty: it more frequently attacks men than women, and is very difficult of cure, eſpecially if the patient is more than twenty years of age; and after forty a cure is hardly to be expected. When *epileptic* fits continue long, and return frequently, there is little proſpect of relief; and it is a very unfavourable ſymptom, when the patient is ſeized with the fits in his ſleep.

The cauſe of this diſeaſe, Boerhaave attributes to too much action of the brain on the motory nerves, and none on the ſenſative ones. Some are pleaſed to account for it, from the abundance of ſharp humours mixing with the animal ſpirits, and giving them extraordinary and irregular motions, and directions; whence ariſes its diſtinction from a ſyncope, and apoplexy, which take away all motion as well as ſenſe. See SYNCOPE, and APOPLEXY.

The cauſe of this terrible diſorder appears to be a ſtricture of that membrane which ſurrounds the brain and the ſpinal marrow. The cauſes are very various, and thence alſo the diſeaſe varies in its ſpecies and appearance. The moſt terrible and mortal *epilepſies* have been brought on by external violence, by blows, wounds, fractures, and depreſſions of the cranium. Theſe are generally preceded by pains of the head, and a torpor of the ſenſes; and in theſe, after the patient's death, corrupted blood or ſerum is always found either between the dura and pia mater, or between the dura mater and cranium. Chronical *epilepſies*, returning at ſtated periods, are alſo frequently occaſioned by certain acute bony protuberances ariſing internally in the baſis of the cranium, and ſometimes in the lateral ſinus. It is eaſy to ſee that this ſpecies of *epilepſy* is incurable; yet medicine can do great ſervice in it, by keeping the brain in ſuch a condition, that its preſſure on theſe protuberances may not be enough to produce a violent fit.

Polypoſe concretions in the jugular veins, and obſtructions of the ſinuſes of the dura mater, are alſo cauſes of incurable *epilepſies*. The paſſions of the mind alſo, as anger, fear, and the like, contribute greatly to bring on *epilepſies*, as they act immediately upon the nervous parts, and either conſtringe or dilate them preternaturally, which cannot be done very often without inducing a bad habit. Infants are often rendered *epileptic* either from ſucking the milk of a nurſe in a violent fit of paſſion, or from the violent commotions of mind the mother was ſubject to while pregnant. The terror of the ſight of one perſon in an *epileptic* fit, has frequently thrown another into the ſame diſorder; and it has been often known, that a ſtrong propenſity to venery, from a natural redundancy of ſemen, being ſuppreſſed by chaſtity, has brought on this diſeaſe. Women have fallen into it from violent love alſo, and have, in that caſe, found their cure in marriage. Exceſſive drinking, intenſe ſtudy, worms, teething, and the infection of the ſmall-pox, &c. may be reckoned among the cauſes of this diſorder.

M. Poupart, from a diſſection of an *epileptic* perſon, wherein, immediately under the dura mater, was found a deal of white, thick, viſcid, pituita, glued, and, as it were, incorporated with the membrane, thinks, that this might be the cauſe of the diſeaſe; the exceſſive quantity of ſuch thick lympha, loading the brain, and obſtructing its neceſſary motions. The firſt cauſe, he judges, might be the ſpongeouſneſs of the dura mater, which imbibed the ſeroſities of the brain.

He adds, that he knew an *epileptic* perſon, who, upon the firſt approach of his diſorder, rubbed his forehead with his hand, and bent his head as far backward as he could, reſting it againſt a wall, and by that means ſecured himſelf againſt the convulſion. It is probable, that by this he gave a motion to the lympha, and drove it from the place which before it diſturbed.

The *epilepſy* is either *idiopathic*, or *ſympathetic*: it is idiopathic, when it ariſes merely from a diſorder of the brain, or ſpirits; and ſympathetic, when it is preceded by ſome other diſeaſe which brings it on.

In the cure of an *epilepſy*, the firſt intention muſt be to correct and expel from the body the remote material cauſes of the diſorder; ſecondly, to mitigate the ſpaſms of the dura mater, and nervous parts, by medicines of a ſedative and corroborating nature; the former to check and allay the violent motion of the fluids, the other to reſtore the due tone and natural elaſticity to the parts, the weakneſs of which, occaſioned by a former fit, gives frequent occaſions for ſucceeding ones. Of the firſt kind are poppy ſeeds, or flowers, ſaffron, nutmeg, and the like; and among the chemical medicines, the *ſpiritus nitri dulcis*, when truly prepared. Of the corroboratives to be given in *epileptic* caſes, roſemary, rue, lavender, cardamom ſeeds, and ambergriſe, ſpirit of hartſhorn, and the oil of hartſhorn, made pure by frequent rectifications, are alſo greatly beneficial. The decoctions of the woods, as guaiacum, ſaſſafras, and the like, are alſo good remedies; and ſeveral *epilepſies* have been known to be perfectly cured by taking half a pint of a ſtrong decoction of guaiacum twice a day, with a few drops of ſpirit of vitriol in each doſe, and making all the while a weaker decoction ſerve for the common drink. It is neceſſary, however, if there be a redundance of blood, to begin the cure with frequent bleedings. Cupping on the parts near the head is alſo of great ſervice, and ſometimes opening the jugular vein is neceſſary, by which alone patients have ſometimes been cured.

But though theſe are the methods of cure, in ſome caſes, yet in others, where the diſeaſe has had a different origin, very different means are required. When the diſeaſe is hereditary, or proceeds from a wrong formation of the brain, a cure is not to be expected. When it is owing to a debility, or too great an irritability of the nervous ſyſtem, ſuch medicines as tend to ſtrengthen the nerves may be uſed, as the Peruvian bark and ſteel, or the *anti-epileptic* electaries, recommended by Fuller and Mead. The electary may be made by mixing an ounce of powdered bark, and half an ounce of powdered tin, and as much of wild valerian root, with ſimple ſyrup.

Dr. Mead directs a dram of an electary, ſimilar to this, to be taken evening and morning, in the *epilepſy*, for the ſpace of three months. The powdered tin is added, becauſe the *epilepſy* often proceeds from worms.

When an *epilepſy* ariſes from an impure ſerum, lodged in the veſſels and membranes of the head; which too often happens from the ſudden drying up of old ulcers, ſtopping of iſſues, or the like means; then the intention of cure conſiſts in the diſcuſſion, evacuation, and derivation of the ſerum to other parts. For this purpoſe cathartics are to be exhibited, and ſetons. Iſſues and bliſters are of ſingular ſervice. Nature has been known to cure *epilepſies* of this kind, by an eruption of pimples all over the body. And there is recorded in Willis a memorable inſtance of a girl, ſubject to frequent returns of *epileptic* fits; who, in one of them, happening to fall with her head into the fire, and ſo accidentally cauteriſing it, remained well ſo long as the ulcers diſcharged any thing; but when they dried up, the former fits returned.

In *epilepſies* ariſing from violent emotions of the mind, in which acrid, bilious, and acrimonious humours are conveyed into the nervous ſyſtem, the uſe of whey, mineral waters, and proper regimen, added to the ſweetening powders, uſually produce a cure. Acidulated medicines are alſo highly proper, and ſpirit of vitriol, or *ſpiritus nitri dulcis*, are of very ſingular efficacy. When an *epilepſy* ariſes merely from pain, as that of the ſtone, the tooth-ach when violent, or ſpaſms of the ſtomach or inteſtines, then clyſters of oil are of very great uſe; and after theſe, bleeding is uſually very proper.

In the *epilepſies* of infants, ariſing from gripes, corrupted milk, or difficult dentition, great benefit is to be had from clyſters of milk, with a little Venice ſoap diſſolved in it. A few grains of cinnabar, given internally, often prove alſo of ſingular benefit; and muſk is known to be a remedy ſecond to none in theſe caſes. When *epilepſies* are cauſed by worms eroding the inner coats of the inteſtines, after the uſe of the common *anti-epileptic* remedies, the medicines for worms muſt be given, and their uſe continued, till, by the ſymptoms ceaſing, there is reaſon to think theſe pernicious animals are deſtroyed.

When an *epilepſy* returns at ſtated periods, or at the changes of the moon, the cauſe is uſually in the ſtomach or duodenum, or its adjacent parts, the biliary ducts and pancreas. In this caſe therefore there ſhould always be a clyſter given, and afterwards a vomit, before the expected fit.

In the time of the paroxyſms of *epilepſies*, people ought to abſtain from the uſe of ſubſtances that are too volatile, ſpirituous, fragrant, or fetid; for all theſe fill the head with vapours; nor ſhould ſuch things be exhibited as promote ſneezing or vomiting, ſince they derive the humours to the head, and often recal the paroxyſms. The moſt uſeful means, in the fit, are to keep the patient in an erect poſture, to rub his hands and feet. In all kinds of *epilepſies* it is proper to abſtain from wine and malt liquors, and to drink only water. Opiates, and too volatile medicines, muſt be very cautiouſly given to children, and perſons of tender habits; and when *epilepſies* return from the ſlighteſt cauſes, it is proper to abſtain from a load of medicines, and truſt to nature and a proper regimen alone. In this regimen the patient muſt abſtain from all ſtrong liquors, from great heat, or exceſſive cold, from venery, from ſeeing any terrible ſight, from anxiety of mind, and from buſineſs. Young perſons are to abſtain from fruit; and all violent emotions of the mind are carefully to be avoided.

Many phyſicians have preſcribed the root of the wild valerian, as a remedy which is alone capable of curing this terrible diſeaſe. Hoffman extols the uſe of ambergriſe in this diſorder. Oper. tom. iii. § 1. cap. 1. § 4. as alſo of muſk, ib. § 9. Ten or twelve grains of it, with the ſame quantity of factitious cinnabar, may be made up into a bolus, and taken every night and morning. He recommends alſo the ſpirit of hartſhorn, or of ivory, either ſimple or ſuccinated. The decoctions of the woods guaiacum, ſaſſafras, ſantals, &c. are alſo uſeful, ib. § 4. He adviſes great caution in the uſe of opiates, in caſes of children, and weak perſons. Ib. Cautel. Pract. § 5.

Sir John Colbatch has an expreſs treatiſe on the MISLETOE of the oak, to prove that it is a ſpecific in this diſeaſe.

The *epilepſy* has been ſometimes cured by ELECTRICITY.

EPILESMON, from επιληϑω, *I cauſe to forget*, a term uſed, by the old writers in *Medicine*, to expreſs loſs of memory.

EPILOBIUM, in *Botany*. See WILLOW-*herb*.

EPILOGUE, EPILOGUS, in *Oratory*, &c. The peroration, or laſt part of a diſcourſe, or treatiſe; containing ordinarily a recapitulation of the principal matters delivered.

The word is Greek, επιλογος, formed of the verb επιλεγω, *I ſay after*; the *epilogue* being the end, or concluſion, of a diſcourſe.

EPILOGUE, in *Dramatic Poetry*, is a ſpeech addreſſed to the audience, when the play is over, by one of the principal perſonæ, or actors in the piece; containing uſually ſome reflections on certain incidents in the play, particularly thoſe of the part of the perſon who ſpeaks it.

In the modern tragedy, the *epilogue* has uſually ſomewhat of pleaſantry in it; intended, perhaps, to compoſe the paſſions raiſed in the courſe of the repreſentation, and ſend the audience away in good humour; though how far that deſign is good and laudable, will bear ſome diſpute: an ingenious author in the Spectator compares it to a merry jig on the organ, after a good ſermon, to obliterate any impreſſions that might have been made thereby, and ſend the people away juſt as they came.

In effect, though the *epilogue*, in this ſenſe, may ſeem an abuſe, yet has it the countenance of antiquity; the Romans had ſomething of the ſame nature, though under another name. Their exodium was a kind of farce, brought on the ſtage when the tragedy was over: *ut quicquid lacrymarum ac triſtitiæ cepiſſent ex tragicis affectibus, hujus ſpectaculi riſus detergeret*, ſays the ſcholiaſt of Juvenal.

The *epilogue* is but of modern date, much later than the prologue. Many, indeed, have taken the exodium of the ancient Greek drama for an *epilogue*, becauſe Ariſtotle defines it, to be a part rehearſed after the chorus had ſung for the laſt time; but, in reality, it was of a quite different nature. The exodium was the laſt of the four parts of the tragedy; containing the unravelling and cataſtrophe of the plot, and anſwering to our laſt, or fifth act.

EPIMEDIUM, in *Botany*. See BARRENWORT.

EPIMELIS, a name given, by the old writers in *Medicine*, to a ſpecies of medlar, or, as ſome will have it, to a kind of ſummer-apple.

EPIMETRON, of επι, and μετρον, *meaſure*, in *Antiquity*, an allowance given the tax-gatherers in the Roman provinces, over and above the juſt quantity of wine or grain they were obliged to furniſh. The *epimetron*, or over-meaſure, in different provinces, was different, being always greater in thoſe that were remote, than in the nearer provinces. The different kinds of things wherein it was given, made likewiſe a difference in the quantity allowed. The reaſon of allowing an *epimetron*, or over-meaſure, was to make good the leakage of the wine, and waſte of grain, that would neceſſarily happen by tranſporting it to Rome.

The provinces whoſe taxes were converted into money, and paid in ſpecie, were free from the *epimetron*.

EPIMORIOS, Επιμοριος, *ſuperparticular*, of μειρω, *I divide*, an epithet given, by Galen, to certain differences in the pulſes, with reſpect to their ineqality as to the time of their beating. All times, rythms, or modulations of the pulſe, according to number, conſiſt, he obſerves, of equal, or unequal proportions. Of equal, when the time of the diſtention is equal to that of contraction; and of unequal, when the one of theſe exceeds the other; and this inequality may be from certain or uncertain exceſſes. The certain exceſſes may be either in multiple proportion, or as number to number, which is the *epimorion*.

EPIMULIS, of επι, *upon*, and μυλη, *whirle bone on the top of the knee*, a name given, by ſome anatomiſts, to the patella, or knee-pan.

EPIMYTHION, Επιμυθιον, in *Rhetoric*. See FABLE.

EPINENEUCOS, from νευω, *I nod*, in the old writers of *Medicine*, a word uſed to denote a ſort of unequal pulſe, beating differently in the different parts of the ſame artery; as when it riſes ſtrongly againſt the two middle fingers of the phyſician who feels it, and weaker at the extremes; this ſort of pulſe is deſcribed by Galen as common to hectic patients, and is called alſo perineneucos.

EPINEPHELOS, of επι and νεφελη, *cloud*, in the writings of the *Ancient Phyſicians*, a term uſed to expreſs the cloudy matter ſeen floating in the urine in fevers, &c. See ENEOREMA.

EPINEUX *des lombes*, in *Anatomy*, a name given by Winſlow, and ſome other of the French authors, to certain ſmall muſcles of the loins, not mentioned by the old anatomiſts; but called, by Albinus, *inter ſpinales lumborum*.

EPINICION, Επινικιον, from επι, *on*, and νικη, *victory*, in the Greek and Latin *Poetry*, denotes, 1. A feaſt, ceremony, or rejoicing, on occaſion of a victory obtained. 2. A poem, or compoſition, on the ſame ſubject. Scaliger treats expreſly of the *epinicion* in his Poetics, lib. i. cap. 44.

EPINYCTIS, of επι and νυξ, *night*, in the writings of the *Ancient Phyſicians*, a term uſed to expreſs a ſort of malignant puſtule, which commonly breaks out in the night. It is uſually of about the bigneſs of a large pea, and is ſometimes white, ſometimes black, according to the nature of the humour it contains, and always has a violent inflammation all round it; when it is opened there is an efflux of ſanies, and a mucous exulceration is found within; it is attended with violent pain, and uſually breaks out in the upper parts of the body. This is the account Celſus gives of the *epinyctis*; but Paulus and Aetius underſtand it rather to be a puſtule, which gives no great pain in the day, but is very troubleſome in the night. Both accounts, however, may be right, and it may both firſt appear, and be moſt painful in bed.

EPIPACTIS, in *Botany*, a name uſed, by ſome, for the helleborine, or wild, or baſtard black hellebore. Rondeletius alſo uſes the ſame word as the name of the herniaria, or rupture-wort.

EPIPEDOMETRY, of *επι*, *ϖυς*, *foot*, and *μετρεω*, *I meaſure*, in *Mathematics*, ſignifies the meaſuring of figures that ſtand on the ſame baſe.

EPIPETRON, in *Botany*, a name given, by Theophraſtus and Ariſtotle, to a plant, ſuppoſed by many to be the ſame with the empetrum of Dioſcorides. But there is great reaſon to doubt whether the *epipetron* of the two older authors be the ſame plant; and whether, if they mean two different plants by this name, either of them agree with the empetrum of Dioſcorides. Theophraſtus ſays, that his *epipetron* never flowers; and Ariſtotle ſays, that his *epipetron* grows on rocky places, and continues to grow after it is taken up, as the orpin and ſome other plants will do.

EPIPHÆNOMENA, of *επι* and *φαινομενον*, *ſymptom*, in the writings of the *Ancient Phyſicians*, a term uſed to expreſs ſuch of the ſymptoms, in certain diſeaſes, as did not uſually appear till the time that the diſeaſe was actually formed, called alſo epiginomena.

EPIPHANES, of *επι* and *φαινομαι*, an epithet given to Jupiter, becauſe he manifeſted his preſence by lightning and thunder, &c.

EPIPHANIA, a word uſed, by ſome of the ancient phyſicians, to expreſs the external habit of the body.

EPIPHANY, in *Eccleſiaſtical Antiquity*, the feaſt of kings; a double feſtival, of the firſt rank, ſolemnized on the ſixth of January, commonly called *twelfth day*, in honour of the appearance of Jeſus Chriſt to the three kings, or magi, who came to adore, and bring him preſents.

The *feaſt of Epiphany*, now held in honour of the adoration of the magi, had its firſt inſtitution among the Greeks, from a different object, viz. our Saviour's birth; and was called *theophany*, and *epiphany*, that is, appearance, and manifeſtation, of God.

Pope Julius, who reigned from the year 337, to 352, was the firſt who taught the church to diſtinguiſh the feaſts of the nativity, and *epiphany*. Papebroch. Paral. ad Conat. p. 23. Act. SS. Maii, tom. vii.

The word in the original Greek, *επιφανεια*, ſignifies *appearance*, or *apparition*; and was applied, as ſome critics will have it, to this feaſt, on account of the ſtar which appeared to the magi. St. Jerom, and St. Chryſoſtom, take the *Epiphany* for the day of our Saviour's baptiſm, when he was declared to men by the voice, *Hic eſt Filius meus dilectus, in quo mihi complacui: This is my beloved Son, in whom I am well pleaſed.* And accordingly it is ſtill obſerved by the Cophtæ and Ethiopians in that view. See Ludolph. Hiſt. Æthiop. lib. xxi. cap. 2. Others contend, that the feaſt of Chriſtmas, or the nativity of our Saviour, was held in diverſe churches on this day; which had the denomination *Epiphany*, or *appearance*, becauſe of our Saviour's firſt appearance on earth, as at that time. And it muſt be allowed, that the word is uſed among the ancient Greek fathers, not for the appearance of the ſtar to the magi, but for that of our Saviour to the world. In which ſenſe, St. Paul uſes the word *επιφανεια*, *epiphania*, in his ſecond epiſtle to Timothy, chap. i. ver. 10. Ammianus Marcellinus makes mention of this feaſt, lib. xxi. cap. 2. and obſerves that it was held in January. Upon which paſſage, Valeſius, in his notes, endeavours to ſhew, that the hiſtorian meant by *Epiphany* the feaſt of the nativity.

The heathen writers uſed the word *epiphania* in the like ſenſe, viz. to expreſs the appearance of their gods on earth. And the Chriſtians, after their example, applied it, in the general, to expreſs any appearance, or manifeſtation, of the Deity.

EPIPHONEMA, *Επιφωνημα*, *Acclamation*, in *Rhetoric*, a ſententious ſort of EXCLAMATION, which is frequently added after a narrative, or rehearſal of any thing remarkable; containing uſually a lively, cloſe reflection on the ſubject there ſpoken of, and intended to give it greater force, and render it more affecting to the hearers.

Such is that of St. Paul, when, after diſcourſing of the rejection of the Jews, and the vocation of the Gentiles, he cries out,

O the depth of the wiſdom and knowlege of God!

Such alſo is that of Lucretius, after relating the ſtory of Agamemnon's ſacrificing his daughter Iphigenia:

Tantum religio potuit ſuadere malorum!

The *epiphonema* is uſually expreſſive of the milder and more gentle paſſions, and is not ſo vehement and impetuous as EXCLAMATION.

EPIPHEOS, in *Botany*, the name given by the ancients to the DODDER, or cuſcuta, which grew upon the ſhrub they called phæos. This was the ſtæbe of the modern Greeks, deſcribed by Honorius Bellus. It was a cuſtom, among the old writers, to name the cuſcuta, or dodder, from the plant it was found growing upon, as they ſuppoſed that it in ſome degree partook of the virtues of that plant. Thus that which grew upon thyme was called epithymum, and that upon the nettle, epiurtica, and that upon flax, epilinum; ſo of many others.

The ſhrub pheos was alſo called ſtæbe by Dioſcorides and Theophraſtus; and hence this dodder was ſometimes called EPISTÆBE.

EPIPHLEBOS, of *επι* and *φλεψ*, a *vein*, in the writings of the *Old Phyſicians*, a term uſed to denote ſuch perſons as were lean, and of a hot temperament, and whoſe veins, for that reaſon, appeared uſually very turgid and prominent in the hands, &c.

EPIPHORA, *Επιφορα*, in *Medicine*, a diſeaſe of the eyes; conſiſting in a preternatural defluxion of rheum, or the matter of tears, occaſioned by the partial or total obſtruction of the puncta lachrymalia, or the ſuccus lachrymalis, or the *ductus ad naſum*, and accompanied, frequently, with heat, redneſs, and twitching.

The word is Greek, formed of *επιφερειν*, *inferre*, *to draw* or *bring into*, becauſe of the pain it occaſions.

Pitcairn calls it a *catarrh of the glands of the eye*. See CATARRH.

The internal cauſes of the *epiphora*, or rheum in the eyes, are, a relaxation of the glands of the eyes, and a too great acrimony, or ſharpneſs, of the ſerous humour ſeparated thereby; which, fretting and vellicating the eye, draws an unuſual quantity of blood and lympha thereto; by which, at length, the cheek becomes excoriated, &c. Children are moſt liable to it, from the frequent uſe and ſtraining of the glands of the eye in crying.

The external cauſes of the *epiphora*, are ſharp duſts, ſtreams, &c. entering the eye, and irritating the ſame; alſo a too cold and ſharp air has frequently the like effect. An inveterate *epiphora* often degenerates into a FISTULA *lachrymalis*.

The cure of the *epiphora* is, 1. By cauſing a revulſion, or derivation of the peccant humour, to ſome other parts, as by veneſection, cupping, bliſtering, or cathartics. 2. By correcting its acrimony by proper remedies. And, 3. By applying aſtringents externally. Lapis calaminaris is much commended.

The term *epiphora* is uſed more generally to denote any impetuous influx of the humours, or an inflammation of the blood to any part of the body; and in this ſenſe it may be applied to any inflammatory tumor.

EPIPHYLLOSPERMOUS *plants*, of *επι*, *φυλλον*, *leaf*, and *σπερμα*, *ſeed*, are the ſame with the capillaries, herbs which bear their ſeed on the back part of their leaves. See CAPILLARY.

EPIPHYSIS, *Επιφυσις*, in *Anatomy*, a leſſer bone, or bony ſubſtance, adhering, or growing to another, by the intervention of a cartilage.

The word is formed of the Greek, *επι*, *on*; and *φυειν*, *to grow*, *adhere*. The Latins call it *appendix*, *additamentum*, *adnaſcentia*, &c.

The ſubſtance of the *epiphyſis* is rare and lax; in young children it is merely cartilaginous; but hardens as they grow in age, and, at length, becomes quite bony.

It is commonly laid down, that there is no regular articulation between the *epiphyſis* and the bone; though it is certain, that there is a reciprocal admiſſion of the heads or extremities of each, into the cavities of the other. See ARTICULATION.

There are ſome bones that have no *epiphyſes* at all, as the lower jaw; others have no leſs than five, as the vertebræ.

The deſign of adding *epiphyſes* to bones, was, to ſupply their defects, and render them longer and bigger at the extremes; and thus to render the articulation more firm, and to give greater force to the action of the muſcles.

EPIPHYSES *vermiformes*, are two eminences of the cerebellum, ſhaped like worms, which keep open the paſſage from the third to the fourth ventricle.

In dilating the third ventricle of the brain, we perceive four eminences, two upper and bigger, called *orbicular protuberances*; and two lower and leſs, called *epiphyſes* of the orbicular protuberances. Dionis.

EPIPLASMA, the ſame with *cataplaſma*. See CATAPLASM.

EPIPLOCE, *Επιπλοκη*, in *Rhetoric*, the ſame with CLIMAX.

EPIPLOCELE, *Επιπλοκηλη*, in *Surgery*, a kind of hernia, or tumor, occaſioned by the deſcent of the epiploon, or caul, into the ſcrotum. See HERNIA, and ENTERO-EPIPLOCELE.

EPIPLOIC, or EPIPLOID, a term applied to the arteries and veins, diſtributed through the ſubſtance of the *epiploon*, or caul. See *Tab. Anat. (Angeiol.) fig.* 1. *n.* 37. See EPIPLOON, and GASTREPIPLOICA.

EPIPLOIS *dextra*, is a branch of the cœliac artery, which runs through the right ſide of the inner, or hinder leaf of the caul.

EPIPLOIS *poſtica*, is a branch of the cœliac artery, ſpringing out of the lower end of the ſplenica, and running to the hinder leaf of the caul.

EPIPLOIS *ſiniſtra*, is a branch of the cœliac artery, which is beſtowed on the lower and left ſide of the caul.

EPIPLOMPHALUS, or EPIPLOOMPHALON, compounded of επιπλοον, *caul*, and ομφαλος, *navel*, in *Surgery*, a ſpecies of exomphalus, or navel-rupture; being a tumor or ſwelling of the part, occaſioned by the epiploon's falling into it. See EXOMPHALUS, and ENTERO-EPIPLOMPHALUS.

EPIPLOON, in *Anatomy*, a fatty membrane, ſpread over the inteſtines, and entering even into the ſeveral ſinuoſities thereof; called alſo the OMENTUM, and popularly the *caul*.

The word is formed of the Greek επιπλεειν, *to ſwim upon*, becauſe it ſeems to float on the inteſtines.

EPIPLOSARCOMPHALUS, compounded of επιπλοον, *epiploon*; σαρξ, *fleſh*; and ομφαλος, *umbilicus*, *navel*, in *Surgery*, a ſort of tumor, of the exomphalous kind. It is formed of the epiploon, and the fleſh. See EXOMPHALUS.

EPIPOROMA, from πωρος, *callus*, a word uſed, by Hippocrates, and the other old writers, for a callous concretion happening at, and moleſting the joints.

EPISARCIDIUM, from επι and σαρξ, *fleſh*, a name given, by many of the old authors, to an ANASARCA.

EPISCAPHIA, from επι and σκαφη, *boat*, feaſts celebrated by the Rhodians.

EPISCENIA, from επι and σκηνη, *tent*, feaſts celebrated by the Lacedæmonians.

EPISCENIUM, Επισκηνιον, in *Antiquity*, a place upon the top of the theatre, where all the machines for moving the ſcenes were kept. Potter, Archæol. Græc. lib. i. cap. 8. p. 42.

EPISCEPSIS, Επισκηψις, in *Antiquity*, an action brought to prove the *diamartyria*, or proteſtation, that the perſon deceaſed had left an heir, to be falſe and groundleſs. Potter, Archæol. Græc. lib. i. cap. 24. tom. i. p. 128.

EPISCIRA, Επισκιρα, in *Antiquity*, a feſtival celebrated at Scira in Attica, in honour of Ceres and Proſerpine. Potter, Archæol. Græc. lib. ii. cap. 20. tom. i. p. 395.

EPISCHION, from επι and ισχιον, *iſchium*, a name given, by the old Greek writers, to the pubes.

EPISCIROSIS, Επισκιρωσις, the ſame with *epiſcira*.

EPISCOPACY, the quality of epiſcopal government, or that form of church diſcipline, wherein dioceſan biſhops are eſtabliſhed, diſtinct from, and ſuperior to, prieſts or preſbyters. See BISHOP, EPISCOPAL, EPISCOPALIANS, and HIERARCHY.

Epiſcopacy, and *preſbytery*, have been alternately eſtabliſhed and aboliſhed in Scotland.

EPISCOPACIDE, from επισκοπος, *biſhop*, and *cædo*, *I kill*, the crime of murdering a biſhop by one of his own clergy. By the ancient laws of England, the ſame obedience is due from a clergyman to his biſhop, as from a ſervant to his maſter; and therefore the offences of murdering either, are made equal, that is, they are both *petty*-TREASON.

EPISCOPAL, ſomething that belongs to a biſhop.

The word is formed of the Greek επισκοπος, *overſeer*, derived from επισκοπεω, *inſpicio*, *I inſpect*, or *overlook*.

Epiſcopal government, is the government of a dioceſe, wherein one ſingle perſon, legally conſecrated, preſides over the clergy of a whole diſtrict, in quality of head, or ſuperintendent thereof; conferring orders, and exerciſing a ſort of juriſdiction.

The preſbyterians reject the *epiſcopal* eſtabliſhment, and condemn the *epiſcopal* order as a human inſtitution, the mere reſult of pride and ambition.

Among the *epiſcopal* functions, the principal part is that of holding frequent viſitations of the dioceſe.

EPISCOPALES *valvulæ*, called alſo, by ſome, *valvulæ mitrales*, two valves in the pulmonary vein, which prevent the reflux of the blood to the heart.

EPISCOPALIA, is ſometimes uſed in the ſame ſenſe with PONTIFICALIA.

EPISCOPALIA, is alſo uſed to denote ſynodals, or cuſtomary payments, due to the biſhops from the clergy of their dioceſe.

Theſe cuſtomary payments have been otherwiſe called *onus epiſcopale*; and were remitted, by ſpecial privilege, to free churches and chapels of the king's foundation, which were exempt from epiſcopal juriſdiction.

EPISCOPALIANS, or EPISCOPISTS, a name given to thoſe who adhere to the church of England, and particularly to the eccleſiaſtical hierarchy, ſuch as it was in the Romiſh church before the Reformation; who affect the diſcipline of biſhops, prieſts, canons, the office, or liturgy, &c. and retain the greateſt part of the canon law, with the decretals of the popes, more cloſely than the catholics themſelves of ſeveral countries; though, as to matters of doctrine, or faith, they agree in moſt points with the Calviniſts, or Reformed.

In Scotland, the principal diſſenters are the *Epiſcopalians*; lay *Epiſcopalians* enjoy all the ſame civil privileges with thoſe of the eſtabliſhed church. They are under no reſtrictions; tied to no teſts; but are employed in all places of truſt, upon taking the oaths to the government. But the *epiſcopal* miniſters are liable to ſeveral penal laws; many of them being nonjurors.

EPISCOPI *multa*. See MULTA.

EPISCOPISSA, a word uſed by writers of the middle ages, to denote a biſhop's wife.

EPISCOPUS *puerorum*, *biſhop of the boys*, a ludicrous kind of office, formerly exerciſed in churches, in that called the *feaſt of fools*, or the feaſt of the kalends.

The cuſtom was for ſome youth in the feaſt of Epiphany to plait his hair, that he might ſeem to have the tonſure, and to put on epiſcopal garments, and then to exerciſe a ſhew of juriſdiction, and do ſeveral ludicrous actions; for which reaſon he was called the *biſhop of the boys*. This cuſtom obtained among us, long after ſeveral conſtitutions were made to aboliſh it. See INNOCENTS-*Day*. See diverſe curious particulars concerning this *epiſcopus puerorum*, in John Gregory's Poſthumous Works; and in the Antiquities of the Cathedral Church of Saliſbury, p. 71.

EPISPEMASIA, from επισημαινω, *I ſignify*, in *Medicine*, is the very time that a diſeaſe firſt ſeizes a perſon, and is properly called *ſignificatio*. Blancard.

EPISODE, Επεισοδιον, from επι, *upon*, and εισοδος, *entry*, is commonly conceived to be a ſeparate incident, ſtory, or action, which an hiſtorian, or poet, inſerts, and connects with his principal action; to furniſh out the work with a greater diverſity of events; though, in ſtrictneſs, all the particular incidents, whereof the action or narration is compoſed, are called *epiſodes*.

EPISODE, in *Dramatic Poetry*, was the ſecond part of the ancient tragedy.

The origin and uſe of *epiſodes* is deſcribed by M. Hedelin, and F. Boſſu. Tragedy, in its original, being only a hymn, ſung in honour of Bacchus, by ſeveral perſons, who made a kind of chorus, or concert of muſic, with dancing, and the like; to diverſify the repreſentation a little, and divert the audience, they determined at length to divide the ſinging of the chorus into ſeveral parts, and to have ſomething rehearſed in the intervals.

At firſt, a ſingle perſon, or actor, was introduced, then two, then more; and what the actors thus rehearſed, or entertained the audience with, being ſomething foreign, or additional to, or beſide, the ſong of the chorus, and no neceſſary part thereof, was called επεισοδιον, *epiſode*.

And hence tragedy came to conſiſt of four parts, the *prologue*, *epiſode*, *exode*, and *chorus*. The *prologue* was all that preceded the firſt entrance of the chorus. The *epiſode*, all that was interpoſed between the ſingings of the chorus. The *exode*, all that was rehearſed after the chorus had done ſinging. And the *chorus*, was the grex, or company, that ſung the hymn.

And as this recitation of the actors was in ſeveral parts, and inſerted in ſeveral places, it might either be conſidered together, as a ſingle *epiſode*, conſiſting of ſeveral parts; or each part might be called a diſtinct *epiſode*.

Theſe ſeveral *epiſodes* in the ſame tragedy might either be taken from ſo many different ſubjects, or from the ſame ſubject divided into a proper number of recitations, or incidents.

To conſider only the firſt occaſion, and inſtitution, of theſe foreign, or additional pieces, it appears no ways neceſſary, that they ſhould all be taken from one and the ſame ſubject; three or four recitations of different actions, no wiſe related, or connected to each other, would eaſe the actors, and amuſe the people, in the intervals of the chorus, as well as if they were all ſo many parts of the ſame action. By degrees, what was at firſt only an addition to the tragedy, became the principal part thereof. Then the ſeveral pieces, or *epiſodes*, began to be conſidered as one ſingle body, which was not to have parts, or members of different nature, and independent of each other.

The beſt poets took the thing in this light, and drew all their *epiſodes* from the ſame action; which practice was ſo fully eſtabliſhed in Ariſtotle's time, that he lays it down as a rule. Thoſe tragedies wherein this unity and connexion was not obſerved, he calls *epiſodic pieces*.

Episode, in *Epic Poetry*. The term *epiſode*, by being tranſplanted from the ſtage to the *epopœia*, did not change its nature. All the difference Ariſtotle makes between the tragic and epic *epiſodes*, is, that the latter are more ample than the former.

Ariſtotle uſes the word in three different ſenſes: the firſt taken from the enumeration already made of the parts of the tragedy, viz. *prologue*, *chorus*, *epiſode*, and *exode*. Whence it follows, that in tragedy, every thing is *epiſode* that is none of the other parts; ſo that as, among us, there are tragedies without either *prologue*, *chorus*, or *epilogue*, the tragic *epiſode* includes the whole tragedy; conſequently, the epic *epiſode* muſt be the whole poem, in like manner; all there is to retrench from it being the propoſition, and invocation, which ſtand in lieu of the prologue. In this ſenſe, the epopœia, and tragedy, have each only one *epiſode*; and if the parts, or incidents, be ill connected together, the poem will be *epiſodic*, and defective.

But farther; as all that was ſung in the tragedy was called the *chorus*, in the ſingular number, yet this ſingularity did by no means prevent every part or diviſion of the ſame from being called a *chorus*, without making ſeveral *choruſes*; ſo it was with the *epiſode*; each incident, and part of the fable and action, is not only a part of the *epiſode*, but is an *epiſode* itſelf.

The term *epiſode*, therefore, in this ſenſe, ſignifies every part of the action expreſſed in the plan, or firſt draught, of the fable; as the abſence and wanderings of Ulyſſes, the diſorders in his family, and his preſence, which retrieved and ſet all to rights again.

Ariſtotle furniſhes us with a third kind of *epiſode*; in ſhewing, that what is contained and expreſſed in the firſt plan of the fable is proper, and that all the reſt is *epiſode*.

By *proper*, he means what is abſolutely neceſſary; and by *epiſode* what in one ſenſe is neceſſary, and in another not; ſo that the poet is at liberty to uſe, or let it alone.

Thus, Homer, having made the firſt draught of the fable of his Odyſſey, was not at liberty either to make Ulyſſes abſent from his country, or not. His abſence was eſſential; and therefore Ariſtotle ranks it among the things he calls *proper*. But he does not beſtow that appellation on the adventures of Antiphates, Circe, the Sirens, Scylla, Charybdis, &c. The poet was at liberty to have left theſe alone, and to have choſen others in their room; ſo that they are *epiſodes*, diſtinct from the firſt action, to which they are not immediately neceſſary.

This third ſenſe of the word *epiſode* comes to the ſecond: all the difference between them is, that what we call *epiſode*, in the ſecond ſenſe, is the ground, or plan, of the *epiſode*, in the third; and that the third adds to the ſecond certain circumſtances which are only probable, and not neceſſary, as the places, princes, and people, among whom Ulyſſes was caſt by Neptune.

It muſt be added, that in an *epiſode* in the third ſenſe, the incident, or *epiſode* in the firſt ſenſe, whereon it is grounded, is to be extended and amplified; otherwiſe, an eſſential part of the action and fable does not become an *epiſode*.

Laſtly, it is in this third ſenſe that we are to underſtand that precept of Ariſtotle, not to make the *epiſodes*, till after the names of the perſons have been choſen. Homer would not have ſpoken of the fleets and ſhips as he has done; if, in lieu of the names of Achilles, Agamemnon, and Iliad, he had choſen thoſe of Adraſtus, Capaneus, and Thebaid.

Upon the whole, the term *epiſode*, in the epic poem, as uſed by the father of the critics, Ariſtotle, does not ſignify any foreign, or accidental adventure; but the whole narration of the poet, or a neceſſary and eſſential part of the action and ſubject, amplified with probable circumſtances.

Thus, Ariſtotle enjoins, that the *epiſode* be not added to the action, or fetched from elſewhere; but that it be a part of the action; and never uſes the word *adding*, in ſpeaking of *epiſodes*, though it occurred ſo naturally to his interpreters, that they have generally uſed it in their tranſlations and comments. He does not ſay, that after laying the plan, and chooſing the names, the poet is to add the *epiſodes*; but uſes a derivative of the word *epiſode*, ἐπεισοδιῦν, as if in Engliſh we ſhould ſay, *epiſodify* his action.

From what has been ſaid, we may venture to define *epiſodes* to be neceſſary parts of the action, extended and filled up with probable circumſtances. Now, an *epiſode* is only a part of an action, and not a whole action; and this part of the action, which is the baſe, or ground of the *epiſode*, muſt not, when *epiſodified*, retain any thing of the ſimplicity which it had when firſt expreſſed in general, in the plan of the fable.

The ſubject of a poem may be lengthened two ways; either by the poet's making uſe of a great many of his *epiſodes*; or by his amplifying, and giving a greater extent to every one. By this latter method, chiefly, it is, that the epic poets lengthen their poems much beyond the dramatic. It muſt be added, that there are certain parts of an action, which, of themſelves, do not naturally preſent or afford more than one *epiſode*; ſuch as the death of Hector, of Turnus, or the like; whereas there are other parts of the fable more copious and fertile, and which oblige the poet to make diverſe *epiſodes* on each, though laid down in the firſt plan with as much ſimplicity as the reſt: ſuch are the battles of the Trojans and Grecians; the abſence of Ulyſſes; the wanderings of Æneas, &c. For Ulyſſes's abſence ſo many years from his own country, required his preſence elſewhere; and the deſign of the fable was to throw him into ſeveral dangers, and different countries. Now each peril, and each new country, furniſhed an *epiſode*, which the poet might uſe, if he pleaſed.

The reſult of the whole is, that *epiſodes* are not actions, but parts of actions; that they are not added to the action and matter of the poem, but make the action and matter themſelves, as the members make the body; that, of courſe, they are not to be fetched from elſewhere, but raiſed from the ground, or baſis, of the action; that they are not united and connected with the action, but with one another; that all the parts of an action are not ſo many *epiſodes*, but only ſuch as are amplified, and extended with particular circumſtances; and, laſtly, that their union with each other is neceſſary in the ground of the *epiſode*, and probable in the circumſtances.

EPISODIC, in *Poetry*. A fable is ſaid to be *epiſodic*, when it is ſwelled with unneceſſary incidents; and its epiſodes are not neceſſarily, nor properly, connected with each other.

Ariſtotle lays it down, that thoſe tragedies are moſt defective, whoſe epiſodes have no connexion, or dependence on each other, which he calls *epiſodic*, q. d. *ſuperabundant in epiſodes*; becauſe ſo many little epiſodes can never compoſe one whole one, but neceſſarily remain in a vicious plurality.

If an epiſode be uſed, the names and circumſtances whereof are unneceſſary, and whoſe ground and ſubject make no part of the action, that is of the matter of the poem, ſuch an epiſode renders the fable *epiſodic*. This irregularity is diſcovered, when one may take away a whole epiſode, without ſubſtituting any thing in its room; and yet leave no chaſm, or defect, in the poem. The hiſtory of Hypſipyle, in Statius's Thebaid, affords an inſtance of theſe faulty epiſodes. If the whole ſtory of that illuſtrious nurſe were retrenched, the ſequel of the principal action would be the better for it. Nor would any body imagine he had forgot any thing, or that there was any member of his action wanting. Boſſu, and Ariſt. Poet. cap. 9.

EPISPASTIC, formed of ἐπι and σπαω, *traho*, *I draw*, in *Medicine*. See Blister.

EPISPHÆRIA, from ἐπι and σφαιρα, *a ſphere*, in *Anatomy*, are windings and turnings in the outer ſubſtance of the brain, that the ſanguiferous veſſels may paſs more ſecurely.

EPISTÆBE, in *Botany*, a name given to the cuſcuta, or dodder, found growing on the plant ſtæbe of the ancient Greeks. See Epiphæos.

EPISTAPHILINS, in *Anatomy*, a name given by Winſlow, and other of the French authors, to a muſcle called by Morgagni, the *columellæ muſculus teres*, and the *azygos uvulæ*, which laſt name has been continued to it by moſt authors. Douglas calls it the *palatoſtaphilinus*, and ſome of the French, the *muſcle de la luette*.

EPISTATES, Επιςατης, derived from ἐπι, *over*, and ἵςημι, *I ſtand*, in *Antiquity*, a perſon who has the command and direction of an affair, or of a people.

The term is of conſiderable uſe, in ſpeaking of the government of Athens, where the *epiſtates* was the ſenator in command for that day, or whoſe turn it was to preſide that day. The conſtitution was this: the ten tribes of Athens formed by Cliſthenes, elected every year by lot, each of them, fifty ſenators, which made a ſenate of five hundred. Every tribe had the precedence in its turn, and ſurrendered it again ſucceſſively to another. The fifty ſenators in office were called *prytanes*; the particular place where they aſſembled, *prytaneum*; and the term, or duration of their office, viz. thirty-five days, *prytanea*. During theſe thirty-five days, ten of the fifty *prytanes* preſided weekly, under the name of *proedri*; and of theſe *proedri* there was one to preſide each day of the week, under the title of *epiſtates*.

No perſon was allowed to hold this office more than once in his whole life, leſt he ſhould acquire too much the taſte of dominion: the ſenators of all the other tribes ſtill voted, according to the order the lot had given them; but the *prytanes* laid the buſineſs before them, and the *epiſtates* took their votes and opinions.

It muſt be added, that of the ten *proedri*, of each week, there were but ſeven that would preſide, each his day, in quality of *epiſtates*; the ten *proedri* elected the ſeven *prytanes*.

EPISTEMONARCH, derived from επιϛημη, *knowlege*, and αρχη, *command*, a dignitary, in the *Ancient Greek Church*, appointed to watch over the actions of the church, and to inſpect or ſuperintend every thing relating to the faith, in quality of a cenſor. His office anſwered pretty much to that of *magiſter ſacri palatii* at Rome.

EPISTITES, from εφιϛημι, *I keep off*, in *Natural Hiſtory*, the name of a ſtone, deſcribed by the writers of the middle ages, as being of a beautiful red, and ſhining very elegantly. It was renowned for its many magical virtues, according to the idle tradition of thoſe times; they ſaid it drove away all noxious animals, and kept off ſtorms from the place where any one was who had it about him.

EPISTLE, a Letter *miſſive*.

The word is formed of επιϛελλω, *I ſend*.

The term *epiſtle* is now ſcarce uſed, but for letters wrote in verſe, and letters dedicatory.

In ſpeaking of letters written by moderns, or rather in the modern languages, we never uſe the word *epiſtle*. Thus, we ſay, the letters, not *epiſtles*, of the cardinal D'Oſſat, of Voiture, of Balzac, of Howel, of Pope, &c. but thoſe wrote by the ancients, or rather in the ancient languages, we call *epiſtles*: as the *epiſtles*, not letters, of Cicero, Pliny, Seneca. The *epiſtles* of St. Paul, St. Peter, St. John, &c. to the Romans, Corinthians, &c.

A Table of St. Paul's *Epiſtles* in the Order of Time, with the Places where, and the Times when they were written.

Epiſtles.	*Places.*		*A. D.*
1 Theſſalonians 2 Theſſalonians	Corinth		52
Galatians	Corinth, or Epheſus	Near the end of or the beginning of	52 53
1 Corinthians	Epheſus	The beginning of	56
1 Timothy	Macedonia		56
Titus	Macedonia, or near it	Before the end of	56
2 Corinthians	Macedonia	About October	57
Romans	Corinth	About February	58
Epheſians	Rome	About April	61
2 Timothy	Rome	About May	61
Philippians	Rome	Before the end of	62
Coloſſians	Rome	Before the end of	62
Philemon	Rome	Before the end of	62
Hebrews	Rome, or Italy	In the ſpring of	63

A Table of the Seven Catholic *Epiſtles*, ſo called, becauſe they were written to Chriſtians in general, and the Revelation, with the Places where, and the Times when they were writ.

Epiſtles.	*Places.*		*A. D.*
The *Epiſtle* of St. James	Judæa	61 or beginning of	62
The 2 *Epiſtles* of St. Peter	Rome		64
St. John's 1ſt *Epiſtle*	Epheſus	About	80
His 2d and 3d *Epiſtles*	Epheſus	Between	80 and 90
The *Epiſtle* of St. Jude	Unknown		64 or 65
The Revelation of St. John	Patmos, or Epheſus		95 or 96

See Lardner's Credibility of the Goſpel Hiſtory, vol. xvi. and vol. xvii.

Learned writers are not abſolutely agreed as to the dates of theſe ſeveral *epiſtles*, nor the places whence they were written. It would lead us too far to examine and produce the various authorities and arguments that have been uſed for ſettling theſe particulars: we ſhall only mention that Dr. Doddridge dates the 1ſt *Epiſtle* to the Corinthians about the year 57; and the 2d *Epiſtle* in 58; thoſe to the Epheſians, Philippians, Coloſſians, and Philemon, in 63; the 1ſt to Timothy, in 58 or 65; the 2d to Timothy, in 66 or 67; the *Epiſtle* to Titus, between St. Paul's firſt and ſecond impriſonment at Rome; the *Epiſtle* of St. James, in 60 or 61; the 1ſt of Peter, in 61; the 2d, in 67; that of St. Jude, ſome time after the 2d of Peter, according to Dr. Mills, in the year 90.

As to the general deſign of theſe ſeveral *epiſtles*, it is obſerved by Dr. Doddridge, who is deſervedly eſteemed an excellent and uſeful expoſitor, that the *Epiſtle* to the Romans is intended to fix in the minds of the Chriſtians to whom it is addreſſed a juſt ſenſe of the excellency of the goſpel, and to engage them to act in a manner agreeable to their profeſſion of it: the *Epiſtles* to the Corinthians are deſigned to reſolve ſome important queries propoſed by them, and to correct the various criminal irregularities and diſorders, of which they were guilty: the principal deſign of the *Epiſtle* to the Galatians was to aſſert and vindicate the apoſtle's authority and doctrine, and to confirm the churches of Galatia in the faith of Chriſt, eſpecially with reſpect to the important point of juſtification; to expoſe the errors that were introduced among them, and to revive thoſe principles of Chriſtianity which he had already taught them. In the *Epiſtle* to the Epheſians, the apoſtle endeavours to eſtabliſh them in the faith; and to this end to give them more exalted views of the divine love and the excellence of Chriſt; to ſhew them that they were now, though Gentiles, made partakers of equal privileges with the Jews; to encourage them, by his own example and concern for their welfare; and to engage them to the practice of duties becoming their Chriſtian character. The *Epiſtle* to the Philippians is deſigned to comfort them under the concern they felt on his account; to check a party-ſpirit that had broke out among them, and to promote union and affection; to guard them againſt the ſeduction of judaizing teachers; to ſupport them under their trials, and to inſpire them with an ambition of excelling in ornamental and diſtinguiſhed attainments. The *Epiſtle* to the Coloſſians is deſigned to excite them to a temper and conduct worthy of their ſacred character, and to ſecure them from the influence of thoſe pagan ſophiſts or Jewiſh bigots, who endeavoured to ſeduce them from the purity of the Chriſtian faith. The two *Epiſtles* to the Theſſalonians are intended to confirm them in their adherence to the Chriſtian faith, and to engage them from the ſufferings they had already endured, and the extraordinary character they had hitherto maintained, to make great advances, and to excel ſtill more in religion and virtue; and alſo to rectify ſome erroneous apprehenſions they entertained about the coming of Chriſt, and to direct them in the proper exerciſe of Chriſtian diſcipline. The firſt *Epiſtle* of Timothy was partly intended to direct him in managing the affairs of the church, and chooſing proper perſons for the various offices it required; and partly to caution him againſt the influence of judaizing teachers, to urge him to pay a conſtant regard to the intereſts of practical religion, and to animate him to diligence, fidelity, and zeal. The ſecond *Epiſtle* prepares Timothy for the ſufferings that awaited him, forewarns him of the apoſtacy that was beginning to appear in the church, and animates him to the perſevering diſcharge of every part of the miniſterial office. The *Epiſtle* to Titus contains a variety of prudential inſtructions and cautions. The deſign of the *Epiſtle* to the Hebrews was to confirm the Jewiſh Chriſtians in the faith and practice of the goſpel, which they might be in danger of deſerting through the inſinuations or ill-treatment of their perſecutors. St. James, in his *Epiſtle*, aims to correct thoſe errors both in doctrine and practice into which the Jewiſh Chriſtians had fallen, which might otherwiſe have produced fatal conſequences; and then to eſtabliſh the faith and animate the hope of ſincere believers under their preſent and approaching ſufferings. The *Epiſtles* of St. Peter are deſigned to induce the Chriſtian converts in various parts of the world to maintain a conduct inoffenſive and amiable; to ſupport them under their trials, and to encourage their conſtancy, notwithſtanding the artifices of falſe teachers, and the perſecution of their moſt inveterate enemies. The leading deſign of St. John in his firſt *Epiſtle*, is to evince the vanity of faith ſeparate from morality; to inſpire the minds of Chriſtians with mutual charity, and to guard them againſt the ſnares and efforts of Antichriſt, and of all who were endued with his ſpirit. The *Epiſtle* of Jude deſcribes the characters of the falſe teachers, repreſents the divine judgments which ſuch perſons had reaſon to expect, and thus cautions Chriſtians againſt being perverted by them. See Doddridge's Fam. Expoſitor, vol. iv, v, and vi. in the general introduction prefixed to each *epiſtle*.

EPISTOLARES, among the Romans, under-ſecretaries to the *magiſter ſcrinii epiſtolorum*, or ſecretary who wrote the emperor's letters. They were thirty-four in number. See Magister.

EPISTOLARY, a term uſed in the phraſe *epiſtolary ſtyle*.

As the matter of an epiſtle is the ſame with that of converſation, it ſhould not differ in the manner of expreſſion; and therefore, all pomp and ſtudy of language is not only needleſs but very improper: the moſt plain and eaſy way of conveying our thoughts muſt certainly be beſt, as being moſt natural. Purity in the choice of words, and juſtneſs of conſtruction, joined with perſpicuity, are the chief properties of this ſtyle: to which purpoſe Cicero obſerves, that in writing letters we make uſe of common words and expreſſions. Ad Fam. lib. ix. cap. 21. And Seneca ſays, I would have my letters be like my diſcourſes, when we either ſit or walk together, unſtudied and eaſy. Ep. 75. ad Lucill. However, as the ſubjects of epiſtles are various, they will neceſſarily acquire ſome variety in the manner of expreſſion. If the ſubject be weighty and momentous, the language ſhould be ſtrong and ſolemn; in things of a lower nature, more free and eaſy; and upon lighter matters, jocoſe and pleaſant. In exhortations, it ought to be lively and vigorous; in conſolations, kind and compaſſionate; and in adviſing, grave and ſerious. In narratives, it ſhould be clear and diſtinct, in requeſts, modeſt; in commendations, friendly, without adulation; in proſperity, chearful; and mournful in adverſity. In a word, the ſtyle ought to be accommodated to the particular nature of the ſubject about which it is converſant. Beſides, the different character of the perſon to whom the letter is written, requires a like difference in the modes of expreſſion. Superiors ſhould be addreſſed with reſpect; inferiors, with courteſy; and equals, with civility. Old men and young, the grave and facetious, courtiers and philoſophers, friends and ſtrangers, require ſome variety in the mode of addreſs. The Epiſtles of Cicero, the ſtyle of which is plain and ſimple, and yet pleaſant and engaging, furniſh a proper model in this reſpect. Ward's Or. vol. ii. p. 213, &c. See Style.

Epistolary, is ſometimes alſo applied to authors who have wrote epiſtles or letters. The principal *epiſtolary* authors are Sidonius Apollinaris, Tully, the younger Pliny, Seneca the philoſopher, Petrarch, Politian, Buſbequius, Eraſmus, Lipſius, Muretus, Aſcham, Milton, Petau, Launoi, Sarau, Balzac, Voiture, &c.

EPISTOMIA, in *Anatomy*, are the utmoſt gapings and meetings of veſſels.

EPISTOMIUM, Επιςομιον from επι, *upon*, and ςομα, *mouth*, in *Hydraulics*, a plug, or inſtrument, by the application whereof the orifice of a veſſel may be opened and ſhut again at pleaſure.

EPISTROPHE, Επιςροφὴ, in *Rhetoric*, a figure wherein that which is ſuppoſed of one thing is ſtrongly affirmed of another, and the repetition of the ſame word occurs at the end of each member or ſentence.

Since concord was loſt, friendſhip was loſt, fidelity was loſt, liberty was loſt, all was loſt. Auct. ad Herenn. lib. iv. cap. 13. See alſo 2 Cor. xi. 22.

EPISTROPHEUS, in *Anatomy*, from επιςρεφω, *converto, I turn about*, the ſame with *cardo*.

EPISTYLE, Επιςυλιον, from επι, *upon*, and ςυλος, *column*, in the *Ancient Architecture*, a term uſed by the Greeks for what we call *architrave*, viz. a maſſive ſtone, or a piece of wood, laid immediately over the capital of a column.

The *epiſtyle* is the firſt or loweſt member of the Entablature.

EPITAPH, Επιταφιον, from επι, *upon*, and ταφος, *ſepulchre*, a monumental inſcription, in honour or memory of a perſon defunct; or an inſcription engraven or cut on a tomb, to mark the time of a perſon's deceaſe, his name, family, and uſually ſome eloge of his virtues or good qualities.

At Sparta, *epitaphs* were only allowed to people who died in battle. Boxhornius has made a collection of *epitaphs*, not very ample, but exceedingly well choſen. Fa. Labbe has likewiſe given a collection of the like kind in French, intituled, Treſor des Epitaphes. Camden, Weaver, and Toldervy, have done ſomething in the ſame way with our Engliſh *epitaphs*.

In *epitaphs*, the dead perſon is ſometimes introduced by way of proſopopœia, ſpeaking to the living; of which we have a fine inſtance, worthy the Auguſtan age, wherein the dead wife thus beſpeaks her ſurviving huſband.

Immatura perî: ſed tu, felicior, annos
Vive tuos, conjux optimo, vive meos.

The French have a proverb, *Menteur comme une epitaphe*; *He lyes like an epitaph*; in alluſion to the eloges ordinarily contained therein, which are not always over-juſt.

Epitaph, is alſo applied to certain eloges, either in proſe or in verſe, compoſed without any intent to be engraven on tombs.

In the Anthologies, or collections of epigrams, we have abundance of ſuch *epitaphs*, ſome of them ludicrous and ſatirical, others grave. For a ſpecimen, we ſhall here add a very beautiful one, compoſed by Mr. Cowley, on himſelf, to be put in a little country-houſe, whither he retreated from the court and town to ſpend his laſt days.

Hic, O viator, ſub lare parvulo,
Couleius *hic eſt conditus, hic jacet*
Defunctus humani laboris
Sorte, ſupervacuaque vita;
Non indecora pauperie *nitens,*
Et non inerti nobilis otio,
Vanoque dilectis popello,
Divitiis, animoſus *hoſtis.*
Poſſis ut illum dicere mortuum,
En terra jam nunc quantula *ſufficit?*
Exempta ſit curis, viator,
Terra ſit illa levis, precare.
Hic ſparge flores, *ſparge breves* roſas;
Nam vita gaudet mortua floribus;
Herbiſque odoratis corona
Vatis adhuc cinerem calentem.

The following *epitaphs*, beſides many others, are worth recording. That of Alexander:

Sufficit huic tumulus, cui non ſufficeret orbis.

That of Newton:

Iſaacum Newton
Quem immortalem
Teſtantur tempus, Natura, Cælum,
Mortalem hoc marmor
Fatetur.

That of Dryden:

Dryden.

Similar to which is that which the Italians have annexed to the Tomb of Taſſo:

Les os du Taſſe.

We may alſo add that of the ingenious and laborious author of this Dictionary, from his tomb in the cloyſters of Weſtminſter Abbey, on the north-ſide, written by himſelf:

Multis pervulgatus,
Paucis notus;
Qui vitam inter lucem et umbram,
Nec eruditus, nec idiota,
Literis deditus tranſegit; *ſed ut homo*
Qui humani nihil a ſe alienum putat,
Vitâ ſimul et laboribus functus,
Hic requieſcere voluit
EPHRAIM CHAMBERS,
R. S. S.
Obiit 15 *Maij*, 1740.

In Engliſh thus:

Heard of by many,
Known to few;
Who led a life between fame and obſcurity;
Neither abounding nor deficient in learning;
Devoted to ſtudy; *but as a man*
Who thinks himſelf bound to all offices of humanity;
Having finiſhed his life and labour together,
Here deſires to reſt.
EPHRAIM CHAMBERS.

EPITASIS, formed of επιτεινω, *intendo, I heighten*, in the *Antient Poetry*, denoted the ſecond part or diviſion of a dramatic poem, wherein the plot or action propoſed and entered upon in the firſt part or protaſis was carried on, heightened, warmed, and worked up, till it arrives at its ſtate or height called the *cataſtaſis*.

This diviſion is laid aſide in the modern drama; in lieu whereof our plays are divided into acts. See Act.

The *epitaſis* might ordinarily take up about our ſecond or third act.

Epitasis, in *Medicine*, denotes the increaſe or growth, and heightening of a diſeaſe; or the beginning of a paroxyſm, particularly in a fever.

EPITHALAMIUM, Επιθαλαμιον, formed of επι and θαλαμος, *bride-chamber*, in *Poetry*, a *nuptial ſong*, or a compoſition, uſually in verſe, on occaſion of a marriage between two perſons of eminence.

The topics it chiefly inſiſts on are the praiſes of matrimony, and of the married couple, with the pomp and order of the marriage ſolemnity: it concludes with prayers to the gods for their proſperity, their happy offspring, &c. This kind of poetry is very ancient: the forty-fourth Pſalm, and the book of Canticles have been conſidered as ſpecimens of the *epithalamium*. Steſichorus, who flouriſhed in the forty-ſecond Olympiad, has been uſually eſteemed the inventor of the *epithalamium*, among the Greeks, though it is known that Heſiod compoſed the *epithalamium* of Thetis and Peleus, a work now loſt; but a fragment of which is preſerved by an ancient ſcholiaſt. Catullus exceeded all antiquity in his *epithalamiums*, and the cavalier Marino all the moderns.

Among the Greeks, the *epithalamium* was ſung by young men and maids at the door of the bed-chamber of the married pair in the evening and morning. The former ſort were called επιθαλαμια κοιμητικα, and the latter εγερτικα.

EPITHEM, Epithema, from επι, *upon*, and τιθημι, *pono, I put*, in *Pharmacy*, a kind of fomentation or remedy, of a ſpirituous or aromatic kind, applied externally to the regions of the heart, liver, &c. to ſtrengthen and comfort the ſame, or to correct ſome intemperature thereof. See Fomentation.

There are principally three kinds of theſe external applications, the liquid, the ſolid, and the ſoft or pultice kind.

The liquid *epithems* are ſometimes conſiderably thick; but when they are intended to penetrate deep, they are much better if very thin and fluid; and as the part to which the *epithem* is immediately applied is not what it is always intended to act upon, but ſomething lying deep within, the *epithems* intended for this purpoſe ſhould conſiſt of the moſt penetrating ingredients; for which reaſon aſtringents and inſpiſſating remedies can be of no uſe in this form, ſince they cannot be abſorbed ſo deep, and indeed prevent their own ingreſs by bracing up the mouths of the pores. Hot wine alone is ſometimes uſed as an *epithem*; and frequently ſuch medicines as are not to be ſafely taken inwardly, ſuch as highly rectified ſpirits, preparations of lead, henbane, mandrake, and other poiſonous plants, and the like. But we are carefully to remember in regard to theſe, that the pores are capable of abſorbing them, and ought therefore to know the effect they are capable of producing when thus abſorbed in the body. As to the vehicles of liquid *epithems*, they are various, ſuch as linen or woollen cloths, ſilk, ſtupes, toaſted bread, crumb of untoaſted bread: the dry *epithems* or bags, and ſometimes the hot liquor, is tied up in a bladder, and that only applied to the part. When a great quantity of the liquor is to be uſed, flannel ſtupes do beſt; but when the heat is to be long retained, and only the finer particles of the liquor admitted, then the bladder preſerves and retains beyond all other means.

Epithems are in ſome caſes to be applied hot, and in others cold; when the intention is powerfully to reſolve, penetrate, and attract, then thoſe of the hot kind are greatly to be preferred; but heat is injurious to parts conſtricted by intenſe cold; and thoſe that are cold, or at leaſt tepid, are to be uſed. Spirituous and volatile liquors are alſo eaſily diſſipated by heat, and all ſuch ought therefore to be applied either cold, or barely tepid.

The dry *epithems* are medicated powders, uſually ſewed up in a cloth, and applied to different parts of the body; for this purpoſe the powders muſt be coarſe, ſince otherwiſe their particles would fall through the cloth; and ſometimes the liquid *epithems* are added to the dry, to reduce the whole to a conſiſtence, ſuch as may be ſpread upon cloth.

The ancients uſed chaff of wood to mix with their powders in the *epithems* of the coarſer kind, and cotton in thoſe which were finer. Among the dry *epithems* is alſo to be accounted the uſe of a bag of hot ſand: this is of ſingular ſervice where heat is to be retained a long time; and ſometimes the liquid *epithems* are added to this, its heat being of power to throw them much farther in than they otherwiſe would reach. The bags in which any of theſe dry *epithems* are put, muſt not be filled hard, but only the matter muſt be lightly put in, that that they may remain pliant and ſpungy. Some make the bags for dry *epithems* of ſilk, and ſome of woollen cloth; but linen, which has been much worn, is greatly preferable on all occaſions. The figure of the bag is to be accommodated to the part it is to be applied to, and the intention it is to anſwer. For the head, it is commonly made in the form of a hood; for the forehead, ſquare; for the heart, pyramidal; for the ſtomach, in form of a ſhield; for the liver, in form of a creſcent; and for the ſpleen, in ſhape of an ox's tongue. When the bags are ſmall, it is ſufficient to ſew up the end when the matter is put in; but when they are large, they muſt be ſewed acroſs in ſeveral places in the manner of quilting, to keep the matter equally diſtributed. When they are thus prepared, they are to be applied either alone, being firſt warmed, or moiſtened with any proper liquor. Pigeons applied to the feet are alſo a ſort of *epithem*.

Epithem, *volotile*, *epithema volatile*, a form of medicine preſcribed in the late London Pharmacopœia, and ordered to be made of equal weights of common turpentine and ſpirit of ſal armoniac. The turpentine is to be kept continually ſtirring in a mortar, and the ſpirit gradually dropt in till the whole is reduced to a white maſs.

The ſpirit of ſal armoniac uſed in this mixture muſt not be that made in the common way, with the addition of quick-lime, but with the alkali ſalt. Pemberton's Lond. Diſp. p. 377.

EPITHESIS, in *Surgery*, a word uſed by ſome writers to expreſs the reducing or rectification of crooked limbs, by means of proper inſtruments.

EPITHET, Επιθετον, a noun adjective, expreſſing ſome quality of a ſubſtantive to which it is joined.

The word is formed of επι, *upon*, and θεσις, *poſitio*, *putting*. As a fruitful vine, a ſtately pile, an echoing vault, &c.

Epithets are of great uſe and conveniency among poets and orators, who ſupply in *epithets* what they want in other requiſites. Card. Perron even blames Homer on the head of *epithets*, obſerving, that he frequently hooks in *epithets* without any ſenſe or ſignificancy at all, to help out his meaſures; and that he equips every hero with an *epithet*, not according to the exigence of the caſe, but the meaſure of the verſe.

Epithet, is alſo uſed for a ſurname, or a perſon's ſecond appellation.

Epithets were anciently beſtowed very frankly, either on account of excellencies or defects of the body or mind; kings themſelves were not exempted from them. Hence thoſe *epithets* ſo frequent in hiſtory, as Edward Longſhanks, Richard Cœur de Leon, Edmund Iron-ſide, Richard Crook-back, John Lack-land, &c.

Nor have the French uſed their kings any better; witneſs their Charles the Simple, Louis the Lazy, *faineant* (Ludovicus *nihil faciens*) Pepin the Short, Louis the Stammerer, *le begue*.

EPITHRICADIA, in *Antiquity*, a feſtival in honour of Apollo.

EPITHYME. See Dodder, and Epitheos.

EPITOME, an *abridgment*, or a reduction of the principal matters of a larger book into a little compaſs. See Abridgment.

The word is Greek, επιτομη, formed of επιτεμνειν, *reſecare*, *to retrench*, *abridge*, or *cut off*.

The *Epitome* of Baronius's Annals is done by De Sponde (Spondanus). Bernier has given an *Epitome* of the philoſophy of Gaſſendus.

It is a popular objection againſt the *epitomizing* of authors, that it frequently occaſions the loſs of the originals. Thus the loſs of the hiſtorian Trogus Pompeius is attributed to his epitomizer Juſtin, and the loſs of a great part of Livy to Luc. Florus.

EPITRITES, from επι and τριτος, *third*, in *Proſody*, a foot conſiſting of four ſyllables, three long, and one ſhort.

Grammarians reckon four ſpecies of *epitrites*; the firſt, conſiſting of an iambus and ſpondee, as ſălūtāntēs; the ſecond, of a trochee and ſpondee, as cōncĭtātī; the third, of a ſpondee and an iambus, as cōmmūnĭcāns; and the fourth, of a ſpondee and trochee, as īncāntārĕ.

Epitrites, among the Greek *Muſicians*, denoted a ratio, called alſo the *ſeſquitertial ratio*, the ſame with that of 3 to 4. See Fourth.

EPITROCHASMUS, in *Rhetoric*, a figure wherein we ſlightly paſs over ſeveral things of great moment, by only mentioning them in general. Such is the ſaying of Cæſar, *Veni*, *vidi*, *vici*.

EPITROPE, in *Rhetoric*. See Concession.

EPITROPUS, a kind of judge, or rather an arbitrator, which the Greek Chriſtians under the dominion of the Turks elect in the ſeveral cities, to terminate the differences that ariſe among them, and avoid carrying them before the Turkiſh magiſtrates. See Arbitrator.

There are ſeveral *epitropi* in each city: M. Spon, in his Travels, obſerves, that at Athens there are eight taken out of the ſeveral pariſhes, and called *vecchiardi*, i. e. old men. But Athens is not the only place where there are *epitropi*; they are in all the iſlands of the Archipelago.

Some Latin authors of the ſixth century call *epitropi* thoſe who more anciently were called *villici*, and ſince *vidames*.

In times ſtill earlier, the Greeks uſed the term επιτροπος, in the ſame ſenſe as the Latins did *procurator*, viz. for a commiſſioner or intendant.

Thus the commiſſioners of proviſions in the Perſian army are called by Herodotus and Xenophon *epitropi*. In the New Teſtament, επιτροπος, denotes the ſteward of a houſhold, rendered in the vulgate *procurator*.

EPIZEUXIS, in *Rhetoric*, a figure where the ſame word is repeated in the ſame ſenſe, without any others intervening, and ſuited to expreſs anger, ſurprize, ſorrow, and ſeveral other paſſions: thus *age*, *age*; *adeſte*, *adeſte*; and that of Virgil, *nunc*, *nunc inſurgite remis*, are inſtances of it. See Matthew xxiii. 37.

EPLOYE', in *Heraldry*. An eagle *eployé* is what in Engliſh we more uſually call an *eagle diſplayed*, or *a ſpread eagle*. See Displayed.

EPNEUMATOSIS, from πνευματοω, *I breathe*, in *Medicine*, the ſame with expiration.

EPOBOLIA, in *Antiquity*, a fine laid upon thoſe that could not prove the indictment they had brought againſt their adverſaries.

It was ſo called, becauſe they were obliged to pay the ſixth part of the value of the thing they contended for, viz. an obolus out of every drachm. Some of theſe ſums were depoſited in all law-ſuits, a very few excepted, before the trial could proceed. Potter, Archæol. Græc. lib. i. cap. 21. tom. i. p. 117.

EPOCHA, in *Chronology*, a term or fixed point of time, whence the ſucceeding years are numbered or accounted.

The word is εποχη, q. d. *inhibitio*, *repreſſio*, formed of επεχειν, *to ſuſtain*, *ſtop*, becauſe the *epocha* defines or limits a certain ſpace of time.

Different *epochas* obtain in different nations; and no wonder; for there being no aſtronomical conſideration to render one preferable to another, their conſtitution is purely arbitrary. That principally regarded among Chriſtians, is, the *epocha* of the *Nativity* or incarnation of Jeſus Chriſt; that of the Mahometans, the *Hegira*; that of the Jews, &c, the *Creation of the World*; that of the ancient Greeks, the *Olympiads*; that of the Romans, the *Building of the City*; that of the ancient Perſians and Aſſyrians, the *Epocha* of Nabonaſſar, &c.

The doctrine and uſe of *epochas* is of very great extent in chronology.

To reduce the years of one *epocha* to thoſe of another, i. e. to find what year of one correſponds to a given year of another; a period of years has been invented, which, commencing before all the known *epochas*, is, as it were, a common receptacle of them all, called the *Julian period*. To this period all the *epochas* are reduced, i. e. the year of this period whereon each *epocha* commences is determined. All that remains, therefore, is, to add the given year of one *epocha* to the year of the period correſponding with its riſe; and from the ſame to ſubtract the year of the ſame period correſponding to the other *epocha*; the remainder is the year of that other *epocha*.

Epocha *of Chriſt*, or *of our Lord*, is the *vulgar epocha* throughout Europe, commencing from the ſuppoſed time of our Saviour's nativity, December 25, or rather according to the uſual account, from his circumciſion, that is, from the firſt of January.

Now, the year of the Julian period wherein Chriſt was born and circumciſed, is uſually computed to be the 4713th; conſequently, the firſt year of the æra of Chriſt correſponds to the year 4714 of the Julian period.

Hence, 1. If to any given year of Chriſt you add 4713, the ſum will be the year of the Julian period correſponding thereto. E. gr. If to the year 1779 be added 4713, the ſum 6492 is that year of the Julian period.

2. On the contrary, ſubtracting 4713 from any given year of the Julian period, the remainder is the current year of Chriſt. E. gr. From the year of the Julian period 6492 ſubtracting 4713, the remainder is the year of Chriſt 1779.

In effect, the *epocha* of our Lord ſerves not only for the computation of the years elapſed ſince the *epocha* commenced, but even of thoſe before it.

Now, to find the year of the Julian period correſponding to a given year before Chriſt, ſubtract the given year from 4713, the remainder is the correſpondent year required. Thus, e. gr. the year before Chriſt 752 is the year 3961 of the Julian period. On the contrary, ſubtracting the year of the Julian period from 4713, the remainder is the year before Chriſt.

The author of the vulgar *epocha*, or way of computing from Chriſt, is an abbot of Rome, one Dionyſius Exiguus, by nation a Scythian, who flouriſhed under Juſtinian about the year 507, or, according to others, 527, though this Dionyſius borrowed the hint from Panodorus, an Egyptian monk. Till his time, the generality of Chriſtians computed their years either from the building of Rome, or according to the order of the emperors and conſuls, and other ways in uſe with the people among whom they lived.

This diverſity occaſioning a great diſtraction between the churches of the Eaſt and Weſt; Dionyſius, to compoſe the ſame, firſt propoſed a new form of the year, with a new general æra, which in a few years time was generally admitted.

Dionyſius began his account from the conception or incarnation, by us popularly called *Lady-day*, or the *Annunciation*; which method obtained in the dominions of Great Britain till the year 1752, before which time the Dionyſian and Engliſh *epocha* was the ſame; but in that year the Gregorian calendar having been admitted by act of parliament, they now reckon from the firſt of January, as they do in the other countries of Europe, except in the court of Rome, where the *epocha* of the incarnation ſtill obtains for the date of their bulls.

It muſt be added, that this *epocha* of Dionyſius is charged with a miſtake: the common opinion is, that it places our Saviour's nativity a year too late; or, that he was born the winter preceding the time preſcribed by Dionyſius for his conception.

But the truth is, the fault lies on Beda, who miſinterpreted Dionyſius, and whoſe interpretation we follow, as has been ſhewn by Petavius from Dionyſius's own epiſtles; for Dionyſius began his cycle from the year 4712, but his *epocha* from the year 4713, wherein the vulgar æra ſuppoſes Chriſt to have been incarnate.

The year, therefore, which, according to the vulgar *epocha*, is the firſt year of Chriſt, according to Dionyſius's æra, is the ſecond; ſo that the year which we call 1779, ſhould, in juſtice, be 1780, though ſome chronologers, inſtead of one year, will have the error two.

Others ſuppoſe that the Dionyſian æra is four years too late; which ſuppoſition is confirmed by conſidering that our Saviour was born before the death of Herod; and according to the teſtimony of Joſephus, lib. xvii. cap. 18. there was an eclipſe of the moon in the time of Herod's laſt illneſs; which eclipſe appears to have happened in the year of the Julian period 4710, March 13, at Jeruſalem. Now, as our Saviour muſt have been born ſome months before Herod's death, ſince in the interval he was carried into Egypt, the lateſt time in which we can fix the true æra of his birth is about the end of the 4709th year of the Julian period. Ferg. Aſtr. p. 269.

To this vulgar æra, as a ſure fixed point, chronologers have been accuſtomed to reduce all the other *epochas*, though there is not one of them but what is controverted; ſo much uncertainty there is in the doctrine of time. We ſhall exhibit them as reduced to the Julian period.

Epocha *of the creation*, *orbis conditi*, according to the computation of the Jews, called alſo the Jewiſh *epocha*, is the year of the Julian period 953, anſwering to the year before Chriſt 3761, and commencing on the ſeventh day of October. Hence, ſubtracting 952 years from any given year of the Julian period, the remainder is the year of the Jewiſh *epocha* correſponding thereto. Thus, e. gr. the year 1779 being the 6492d year of the Julian period, it is the 5540th year of the Jewiſh *epocha*, or ſince the creation of the world.

This *epocha* is ſtill in uſe among the Jews.

The Epocha *of the creation*, uſed by the Greek hiſtorians, is the year before the Julian period 787, anſwering to the year before Chriſt 5500.

Hence, to any given year of the Julian period, adding 787, the ſum gives the year of this *epocha*. E. gr. 1779 being the 6492d year of the Julian period, 7279 is that year of this *epocha*, or the year of the world, according to this computation.

The author of this *epocha* is Julius Africanus, who collected it from the hiſtorians: but when it came to be admitted into civil uſe, 8 years were added to it, that ſo every year thereof divided by 15 might exhibit the indiction, which the eaſtern emperors uſed in their charters and diplomas.

The *epocha of the creation* uſed by the latter Greeks and Ruſſians is the year 795 before the Julian period, or the year 5508 before Chriſt, commencing from the firſt day of September. Though the Ruſſians having lately admitted the Julian calendar, begin their year from the firſt of January.

Hence, adding 795 to the year of the Julian period, the ſum gives the year of this *epocha*. Thus, e. gr. the Julian period of the year 1779 being 6492, that year of this *epocha*, i. e. the years from the creation on this footing are 7287. Again, from that year 7287 ſubtracting 5508, the remainder is the year of the common æra 1779.

This æra was uſed by the emperors of the Eaſt in their diplomata, &c. and thence alſo called the *civil æra of the Greeks*. In reality, it is the ſame with the *epocha* of the Conſtantinopolitan period; whence ſome call it the *epocha of the period of Conſtantinople*.

The Alexandrian Epocha *of the creation* is the year 780, before the Julian period, anſwering to the year before Chriſt 5493, and commencing on the 29th day of Auguſt.

Hence, adding 5493 to the year of Chriſt 1779, the ſum 7272 gives that year of this *epocha*, or years elapſed ſince the creation, according to this computation.

This *epocha* was firſt concerted by Panodorus, a monk of Egypt, to facilitate the computation of Eaſter; whence ſome call it the *Greek eccleſiaſtical epocha*.

The Euſebian Epocha *of the creation*, is the year of the Julian period 486, anſwering to the year before Chriſt 4228, and commencing in autumn.

Hence, ſubtracting 486 from the year 6492 of the Julian period, or adding 4228 to the year of Chriſt 1779, the reſult 6006 will be that year of this *epocha*.

This *epocha* is uſed in Euſebius's Chronicon, and the Roman Martyrology.

The Epocha *of the creation*, according to Mr. Bedford and Mr. Kennedy, is the year of the Julian period 706, anſwering to the year before Chriſt 4007; but it muſt be allowed, that all the *epochs* of the creation are uncertain. See Strauchius's Brev. Chron. by Sault. p. 152, &c.

Epocha *of the Olympiads*, is the year of the Julian period 3938, anſwering to the year 775 before Chriſt, and the year 3232 from the creation, commencing at the full moon next the ſummer ſolſtice, and each Olympiad containing four years.

This *epocha* is very famous in ancient hiſtory; it was uſed principally by the Greeks, and had its origin from the Olymic games, which were celebrated at the beginning of every fifth year.

Epocha *of the building of Rome*, or *urbis conditæ, U. C.* is the year of the Julian period 3961, according to Varro; or 3962, according to the Faſti Capitolini, anſwering to the years before Chriſt 753 or 752, and beginning on the 21ſt of April. Hence, if the years of this *epocha* be fewer than 754, ſubtracting them from 754 or 753, you have the year before Chriſt; and, on the contrary, if they be more than 754, you muſt ſubtract 754 to have the year of Chriſt, and add the year of Chriſt to 754 to have the year of this *epocha*, or the time ſince the building of Rome. Thus, e. gr. the year 1779, according to Varro, is the year of Rome 2533.

Epocha *of Nabonaſſar*, is the year of the Julian period 3967, anſwering to the year before Chriſt 746, commencing on the 26th day of February.

This æra takes its denomination from its inſtitutor Nabonaſſar king of Babylon, and is that uſed by Ptolemy in his Aſtronomical Obſervations, by Cenſorinus, and others.

Epocha, *Diocleſian*, or **Epocha** *of martyrs*, is the year of the Julian period 4997, anſwering to the year of Chriſt 284, called the *æra of martyrs*, from the great number of Chriſtians who ſuffered martyrdom under the reign of that emperor.

The Abyſſinians, among whom it is ſtill uſed in all eccleſiaſtical computations, call it the *year of grace*; though they do not reckon their years in a continued ſeries from this *epocha*. But when the Dionyſian period of 534 years is expired, they begin their computation afreſh from 1, 2, &c.

Epocha *of the hegira*, or *Mahometan* **Epocha**, is the year of the Julian period 5335, anſwering to the year of Chriſt 622. It commences on the 16th of July, the day of Mahomet's flight from Mecca to Medina.

This *epocha* is uſed by the Turks and Arabs, and even all who profeſs the Mahometan faith. It was firſt introduced by Omar, the third emperor of the Turks. The aſtronomers Alfraganus, Albategnius, Alphonſus, and Ulugh Beigh, refer Mahomet's flight to the 15th of July; but all the people who uſe the *epocha* agree to fix it on the 16th. See Hegira.

Epocha *of the Seleucidæ*, which is uſed by the Macedonians, is the year of the Julian period 4402, anſwering to the year before Chriſt 311. See Selucidæ.

Epocha, *Perſian*, or *Yezdegerdic*, is the year of the Julian period 5344, anſwering to the year of Chriſt 631, and commencing on the 16th of June.

This *epocha* is taken from the death of Yezdegerdis, the laſt king of Perſia, ſlain in battle by the Saracens.

Epocha, *Gelalæan*, called alſo *Royal Epocha*, and *Epocha of the Sultans*, began in the year of the Julian period 5792, on the 14th day of March, at the time of the equinox, and was eſtabliſhed for the convenience of finding the vernal equinox, at which time the Perſians celebrated their great feaſt, called *Neurur*.

Epocha, *Julian*, or **Epocha** *of Julian years*, is the year of the Julian period 4667, anſwering to the year before Chriſt 46.

This *epocha* had its origin from the year of the reformation of the calendar under Julius Cæſar, called the *year of confuſion*.

Epocha, *Gregorian*. See Gregorian.

Epocha, *Spaniſh*, is the year of the Julian period 4676, anſwering to the year before Chriſt 37. See Æra.

Epocha, *Actiac*, or *Actian*, is the year of the Julian period 4684, anſwering to the year before Chriſt 29, commencing on the 29th day of Auguſt.

Other memorable *epochas* are that of the Deluge, in the year of the creation 1656; that of the birth of Abraham, in 2008 or 2002; the Iſraelites exodus, or departure out of Egypt, in 2516 or 2511; the building of the temple of Jeruſalem, in 2995; and the deſtruction of the ſame in the year of Chriſt 70; the taking of Conſtantinople by the Turks, in 1453, &c. See *Sacred* Chronology.

A Table of the moſt remarkable *Epochas* or *Æras*, and *Events*.

N. B. The years before Chriſt are thoſe before the reputed year of his birth, and not reckoned back from the firſt year of his age, as is generally done in ſuch tables.

	Julian Period.	Year of the World.	Years before Chriſt.
The creation of the world	706	0	4007
The deluge, or Noah's flood	2362	1656	2351
Aſſyrian monarchy, founded by Nimrod	2537	1831	2176
The birth of Abraham	2714	2008	1999
The deſtruction of Sodom and Gommorah	2816	2110	1897
Kingdom of Athens founded by Cecrops	3157	2451	1556
Moſes receives the Ten Commandments	3222	2516	1491
The entrance of the Iſraelites into Canaan	3262	2556	1451
The deſtruction of Troy	3529	2823	1184
The beginning of king David's reign	3650	2944	1063
Solomon's temple founded	3701	2995	1012
The Argonautic expedition	3776	3070	937
Lycurgus formed his excellent laws	3829	3103	884
Arbaces, the firſt king of the Medes	3838	3132	875
Mandaucus, the ſecond	3865	3159	848
Soſarmus, the third	3915	3209	798
The beginning of the Greek Olympiads	3938	3232	775
Artica, the fourth king of the Medes	3945	3239	768
The Catonian *epocha* of the building of Rome	3961	3255	752
The æra of Nabonaſſar	3967	3261	746
The deſtruction of Samaria by Salmaneſer	3992	3286	721
The firſt eclipſe of the moon on record	3993	3287	720
Cardicea, the fifth king of the Medes	3996	3290	717
Phraortes, the ſixth	4058	3352	655
Cyaxares, the ſeventh	4080	3374	633
The firſt Babyloniſh captivity, by Nebuchadnezzar	4107	3401	606
The long war ended between the Medes and Lydians	4111	3405	602
The ſecond Babyloniſh captivity, and birth of Cyrus	4114	3408	599
The deſtruction of Solomon's temple	4125	3419	588
Nebuchadnezzar ſtruck with madneſs	4144	3438	569
Daniel's viſion of the four monarchies	4158	3452	555
Cyrus begins to reign in Babylon	4177	3471	536
Eſtabliſhment of Roman conſuls	4206	3500	507
The battle of Marathon	4223	3517	490
Artaxerxes Longimanus [Ahaſuerus] begins to reign	4249	3543	464
The beginning of Daniel's ſeventy weeks of years	4256	3550	457
The beginning of the Peloponneſian war	4282	3576	431
Beginning of Daniel's weeks, according to Scaliger	4292	3586	421
Alexander's victory at Arbela	4383	3677	330
His death	4390	3684	323
The captivity of 100,000 Jews by Ptolemy	4393	3687	320
The Coloſſus of Rhodes thrown down by an earthquake	4491	3875	222
Antiochus defeated by Ptolemy Philopater	4496	3790	217
Archimedes murdered at Syracuſe	4506	3800	207
Jaſon butchers the inhabitants of Jeruſalem	4543	3837	170
Corinth plundered and burnt by conſul Mummius	4567	3861	146
Julius Cæſar invaded Britain	4659	3953	54
He corrected the calendar	4667	3961	46
Was killed in the ſenate-houſe	4671	3965	42
Herod made king of Judea	4673	3967	40
Agrippa builds the Pantheon at Rome	4688	3982	25
The true year of Chriſt's birth	4709	4003	4
The death of Herod	4710	4004	3
The Chriſtian Æra begins here.			Years ſince Chriſt.
Dionyſian, or vulgar æra of Chriſt's birth	4713	4007	0
The true year of his crucifixion [Friday April 3d]	4746	4040	33
The deſtruction of Jeruſalem	4783	4077	70
The long wall in Britain, built by Adrian	4833	4127	120
Epocha Diocleſian, or of Martyrs	4997	4291	284
The Picts defeated in Britain by Conſtantius	5019	4313	306
The council of Nice	5038	4332	325
The death of Conſtantine the Great	5050	4344	337
The Saxons invited into Britain	5158	4452	445
Papal Hierarchy, commenced by Boniface III. who aſſumed the title of Oecumenical Biſhop	5319	4613	606
Arabian Hegira, or flight of Mohammed	5335	4629	622
The death of the falſe prophet Mohammed	5343	4637	630
The Perſian Yeſdegerd	5344	4638	631
The art of printing diſcovered	6153	4447	1440
The Reformation begun by Martin Luther	6230	5524	1517
Reformation of the calendar by Gregory	6295	5589	1582
Oliver Cromwell died	6371	5665	1658
Sir Iſaac Newton born, December 25th	6355	5649	1642
Elected fellow of Trinity Coll. Cambr.	6380	5674	1667
Invented the fluxions	6382	5676	1669
Made preſident of the Royal Society	6416	5710	1703
Knighted by queen Anne	6418	5712	1705
Died March 20th	6440	5734	1727

See Ferguſon's Aſt. p. 273.

EPOCHETEUSIS, from εποχετευω, *I draw through a canal*, of οχετος, *canal*, a word uſed by Hippocrates, and others of the old writers in *Medicine*, to expreſs the derivation of the blood, or juices, from one part to another.

EPODE, Επωδος, in *Lyric Poetry*, the third or laſt part of the ode; the ancient ode, or ſong, being divided into ſtrophe, antiſtrophe, and *epode*.

The *epode* was ſung by the prieſts, ſtanding ſtill before the altar, after all the turns and returns of the ſtrophe and antiſtrophe.

The *epode* was not confined to any preciſe number, or kind of verſes; as the ſtrophe and antiſtrophe were. But when the ode contained ſeveral *epodes*, ſtrophes, &c. they were all alike.

As the word *epode*, then, properly ſignifies the end of the ſong; and as in odes, what they called the *epode*, finiſhed the ſinging, it became cuſtomary, as M. Dacier ſhews, for any little verſe, which, being put after another, cloſed the period, and finiſhed the ſenſe which had been ſuſpended in the firſt verſe, to be called *epode*, επωδος.

And hence it is, that the ſixth book of Horace's Odes is entitled *Liber Epodon*, *Book of Epodes*, becauſe the verſes thereof are all alternately long and ſhort; and the ſhort one, generally, though not always, cloſes the ſenſe of the long one. But the ſignification of the word is extended ſtill farther; *epode* being become a general name for all kinds of ſhort verſes, that follow one or more long ones; and in this ſenſe, a pentameter is an *epode*, after an hexameter, which in reſpect thereof is a proode.

EPODOS, from επι and ωδη, *ſong*, in *Medicine*, a word uſed to expreſs the curing of diſeaſes by incantation.

EPOICODOMESIS, from εποικοδομεω, *I build upon*, in *Rhetoric*, is ſometimes uſed for what is otherwiſe called CLIMAX.

EPOMIS, Επωμις, in *Anatomy*, the upper part of the ſhoulder, reaching up to the neck.

The word is Greek, επωμις, which primarily ſignifies a ſhort cloak or mantle made to cover the ſhoulders.

Some authors apply the word *epomis* to the upper part of the os humeri; but the ancient Greek phyſicians only uſe it for the muſcular, or fleſhy part, placed as above mentioned. See DELTOIDES.

EPOMPHALION, from επι, *upon*, and ομφαλος, *navel*, any medicine which purges, on being applied to the navel.

EPOPOEIA, Εποποιια, in *Poetry*, the hiſtory, action, or fable, that makes the ſubject of an epic poem.

The word is derived from the Greek επος, *carmen*, *verſe*; and ποιω, *facio*, *I make*.

In the common uſe of the word, however, *epopoeia* is the ſame with *epos*, or *epic* poem itſelf: in which ſenſe it is defined a diſcourſe invented with art, or a fable agreeably imitated from ſome important action, and related in verſe, in a probable and ſurpriſing manner; with a view to form the manners, &c. See EPIC *Poem*.

EPOPS, in *Zoology*, a name by which ſome of the ancient writers have called the bird we call the *upupa*, or HOOPOE.

EPOSILINGA, a word uſed, by ſome chemical writers, to expreſs the ſcales which fly off from iron, when hammered at the ſmith's forge.

EPOTIDES, in the *Ancient Ship-Building*, two large thick pieces of wood on each ſide of the prow of a galley, which reſembled two ears, whence they had their name.

The *epotides* were chiefly deſigned to ward off the blows of the roſtra of the enemies veſſels.

EPSOM *ſalt*. What we now meet with, in the ſhops of chemiſts, under this name, is no other than a ſalt made from the bittern, or remaining brine, after the making of common ſalt; but when the world was firſt made acquainted with a purging ſalt, under this name, it was truly what its name expreſſed, being really made from the purging waters of that place. This ſalt is bitter, and of a ſtrongly purging quality, and, when ſuffered to ſhoot freely, and its cryſtals at a due diſtance, it always formed them into rectangular priſms, with four parallelogramic planes; by this, and by divers other properties, it appeared evidently different from all other ſalts known at that time. It was ſuppoſed to partake of the nature of alum, and the waters of the place were called aluminous waters; but Dr. Grew has evidently proved the error of that opinion; others ſuppoſed this ſalt the ſame thing with the ſalt of lime, or the nitre of old walls, but this was equally erroneous. The beſt method of taking it was found to be diſſolving it in a proper quantity of its own water; by this means the water was made to work both more quickly and more effectually; and it proved of great ſervice in diſorders of the ſtomach, as want of appetite, and the like; and in colics, diabetes, the ſcurvy, and rheumatiſm, and many other chronic diſeaſes. Phil. Tranſ. Nº 216. p. 76.

Mr. Boulduc has given much the ſame deſcription of the manner of making *Epſom ſalt*, as Mr. Brown had done in Phil. Tranſ. Nº 337. § 10. and Nº 378. § 11. that it is the ſalt which cryſtalizes, after boiling to a due conſiſtence the bittern, which is the liquor remaining in the ſalt-pans, after the ſea-ſalt is ſeparated. See Mem. Acad. Scienc. 1731.

EPSOM *water*. This is a water eaſily imitated by art; i. e. by only diſſolving half an ounce of *Epſom ſalt* in a quart of pure water, made ſomewhat briſk or quick by a few drops of ſpirit of vitriol and oil of tartar, ſo as to let the alkali prevail. Shaw's Lectures, p. 90.

EPTACTIS, in *Natural Hiſtory*, a name given by Linkius, and ſome other authors, to a ſpecies of ſtar-fiſh, of the *aſtrophyte* kind, whoſe rays, or branches, at their firſt going out from the body, are only ſeven in number; but which very ſoon ſpread into more. See STAR-*fiſh*.

EPULÆ. See ENTERTAINMENTS.

EPULARES, in *Antiquity*, an epithet given to thoſe who were admitted to the ſacred *epulæ* or entertainments, it being unlawful for any to be preſent at them who were not pure and chaſte.

EPULETIC *medicines*, the ſame with *cicatrizantia*. See CICATRISIVE.

EPULIDES, from επι, *upon*, and ουλα, *the gums*, in *Surgery*, certain fleſhy tubercles, or excreſcences of the gums: theſe are of two kinds, ſome being of a mild nature, others painful, malignant, and inclining to be cancerous. Surgeons diſtinguiſh them alſo into the larger and the ſmaller, and the harder and ſofter; they are ſometimes ſupported by a broad, ſometimes by a narrow root. Theſe excreſcences not only deform the mouth, but hurt the ſpeech and maſtication, and are always beſt ſpeedily extirpated.

When they grow to a ſmall root, they are beſt extirpated by ligature, or tying a thread firmly about the root; but when the root is broad, they are beſt eaten off by cauſtics, as the oil of tartar, ſpirit of ſal armoniac, and the like; and when theſe mild ones prove ineffectual, it is beſt not to have recourſe to ſtronger, but to raiſe the tubercle with the hook or pliers, and carefully extirpate it with the knife, not cutting off the gums, ſo as to uncover the roots of the teeth, which would be probably attended with a caries of the bone. The blood ſhould be permitted to flow from theſe for ſome time; but if the hæmorrhage continues too long, the patient muſt waſh his mouth with hot red wine, with alum diſſolved in it, repeating it till it ceaſes; and afterwards tincture of myrrh, and honey of roſes, ſhould be uſed, till the parts are perfectly well; and if the tubercles ſhould ſprout up again, they ſhould be taken down in time by the ſame methods. Heiſter's Surgery, p. 462. See alſo Schelhammer, De Epulide. See GUM-*boils*.

EPULIS, *gums*, in *Anatomy*. See GINGIVA and MOUTH.

EPULO, in *Antiquity*, the name of a miniſter of ſacrifice among the Romans.

The pontifices, not being able to attend all the ſacrifices, performed at Rome, to ſo many gods, as were adored by that people, appointed three miniſters, whom they called *epulones*, becauſe they conferred on them the care and management of the *epula*, feaſts in the ſolemn games and feſtivals.

To them belonged the ordering and ſerving the ſacred banquet, offered on ſuch occaſions to Jupiter, &c. They wore a gown bordered with purple, like the pontifices. Their number was at length augmented from three to ſeven, and afterwards by Cæſar to ten.

Their firſt eſtabliſhment was in the year of Rome 558, under the conſulate of L. Furius Purpureo, and M. Claudius Marcellus.

EPULONES. See EPULO.

EPULOTICS, Επουλωτικα, in *Medicine*, drying, aſtringent remedies, proper to harden, cicatrize, and incarnate wounds, and ulcers.

The word is formed of the Greek επι, *ſuper*; and ουλη, *cicatrix*, *eſchar*; whence the verb επουλοω, *cicatricem infero*, *I cicatrize*.

Such are emplaſters of ceruſs, and diapalma; the unguent of pompholyx, &c.

EPULUM, in *Antiquity*, *banquet*; a holy feaſt prepared for the gods.

The ſtatues of the gods were commonly laid upon a bed, and ſerved in the *epula* as if they had been very hungry; to perform which, was the function of the miniſters of ſacrifice, hence called *epulones*.

EQUABLE *motion*, is that whereby the moveable body proceeds with the ſame continued velocity; neither accelerated nor retarded.

EQUABLE *pulſe*. See PULSE.

EQUABLE *ſtyle*. See STYLE.

EQUAL, a term of relation between two or more things of the ſame magnitude, quantity, or quality.

Wolfius defines *equals* to be thoſe things which may be ſubſtituted for each other, without any alteration of their quantity. It is an axiom in geometry, that two things which are *equal* to the ſame third, are alſo *equal* to each other. And again, if, to or from *equals*, you add or ſubtract *equals*, the ſum or remainder will be *equal*.

EQUAL *circles*, in *Geometry*, are thoſe whoſe diameters are *equal*. See CIRCLE.

EQUAL *angles*, are thoſe whoſe containing lines are inclined alike to each other; or which are meaſured by ſimilar arches of their circles.

EQUAL *arches*. See ARCH.

EQUAL *figures*, are thoſe whoſe areas are equal; whether the figures be ſimilar, or not.

The ſegments of a ſphere, or circle, are of an *equal* concavity, or convexity, when they have the ſame ratio, or proportion to the diameters of the ſpheres, or circles, whereof they are parts.

EQUAL *ſolids*, are thoſe which comprehend, or contain, each as much as the other; or whoſe ſolidities, or capacities, are *equal*. See SOLID.

EQUAL *hyperbolas*, are thoſe, all whoſe ordinates to their indeterminate axes, are *equal* to each other; taken at *equal* diſtances from their vertices.

EQUAL *hours*. See HOUR.

EQUAL *geometrical ratios*, are thoſe whoſe leaſt terms are ſimilar, aliquot, or aliquant parts of the greater.

EQUAL *arithmetical ratios*, are thoſe wherein the difference of the two leſs terms is equal to the difference of the two greater. See RATIO.

EQUAL, in *Optics*. We ſay, that things ſeen under *equal* angles, are *equal*. *Equal* parts of the ſame interval, or magnitude, if unequally diſtant from the eye, appear unequal. *Equal* objects, and at *equal* diſtances, only the one placed directly, and the other obliquely, ſeem unequal; and that placed directly, the bigger.

Maſonry by EQUAL *courſes*. See MASONRY.

EQUALITY, in *Aſtronomy*. *Circle of* EQUALITY, or the *equant*. See CIRCLE, and EQUANT.

EQUALITY, *ratio*, or *proportion of*, in *Geometry*, is that between two equal numbers, or quantities.

Proportion of EQUALITY *evenly ranged*, or *ex æquo ordinata*, is that wherein two terms in a rank, or ſeries, are proportional to as many terms in another ſeries, compared to each other in the ſame order, i. e. the firſt of one rank to the firſt of another; the ſecond to the ſecond, &c.

Proportion of EQUALITY *evenly diſturbed*, called alſo *ex æquo perturbata*, is that wherein more than two terms of a rank, are proportional to as many terms of another compared to each other, in a different and interrupted order; viz. the firſt of one rank to the ſecond of another; the ſecond to the third, &c.

EQUALITY, in *Algebra*, is a compariſon of two quantities, that are equal both really, and repreſentatively, i. e. which are ſo both in effect and letters.

A compariſon of two quantities, equal in effect, but unequal in letters, to render them equal, is called an *equation*.

Equality, in *Algebra*, is uſually denoted by two parallel lines, as $=$: thus, $2+2=4$, i. e. 2 plus 2, are equal to 4.

This character was firſt introduced by Harriot. Des Cartes, and ſome after him, in lieu thereof, uſe $\propto$: thus, $2+2 \propto 4$; ſo $z-y \propto b+c$, ſignifies that z minus y, is equal to b plus c.

From an equation we arrive at an *equality*, by changing an unknown letter into another, whereby the two members of the equation, i. e. the two quantities compared together, and connected by the ſign of *equality*, are rendered equal.

Thus, in the equation $aax=bcd$; ſuppoſing $x=\dfrac{bcd}{aa}$, we change x into $\dfrac{bcd}{aa}$, and by this ſubſtitution arrive at the *equality* $bcd=bcd$.

In the ſolution of a numerical problem, which is to be rendered rational, if there be only one power to be equalled to a ſquare, or other higher power, it is called *ſimple equality*.

When there are two powers to be equalled, each to a ſquare, it is called *double equality*, &c.

Diophantus hath given us a method for *double equalities*, and F. de Billy, another for *triple equalities*, in his Diophantus Redivivus.

EQUALITY, *union of*. See UNION.

EQUALITY, in *Law*. The law delights in *equality*; ſo that when a charge is laid upon one, and divers ought to bear it, he ſhall have relief againſt the reſt. 2 Rep. 25.

EQUANIMITY, in *Ethics*, denotes an even, uniform temper of mind, amidſt all the varieties and revolutions of time and chance. This virtue, together with prudence, forms the character which Horace gives of Ariſtippus:

> *Omnis Ariſtippum decuit color & ſtatus & res.*

EQUANT, or ÆQUANT, in *Aſtronomy*, a circle, formerly imagined by aſtronomers, in the plane of the deferent, or eccentric; for regulating and adjuſting certain motions of the planets, and reducing them more eaſily to a calculus. See APOGEE, CIRCLE, DEFERENT, and EXCENTRIC.

EQUATED *anomaly*. See ANOMALY.

EQUATED *bodies*. On Gunter's SECTOR there are ſometimes placed two lines, anſwering to one another, and called the *lines of equated bodies*: they lie between the lines of ſolids and ſuperficies, and are noted with the letters D, I, C, S, O, T, for dodecahedron, icoſihedron, cube, ſphere, octahedron, and tetrahedron.

The uſe of theſe lines are, 1. When the diameter of the ſphere is given, to find the ſides of the five regular bodies, ſeverally equal to that ſphere. 2. From the ſide of any of the bodies being given, to find the diameter of the ſphere, and the ſides of the other bodies, which ſhall be equal ſeverally to the firſt body given.

If the ſphere be firſt given, take its diameter, and apply it over in the ſector in the points S, S: if any of the bodies be firſt given, apply the ſide of it over in its proper points; ſo the parallels taken from between the points of the other bodies, ſhall be the ſides of thoſe bodies, equal ſeverally to the firſt body given.

EQUATION, or ÆQUATION, in *Algebra*, an expreſſion of the ſame quantity, in two different, that is, diſſimilar, but equal terms or denominations.

As, when we ſay, $2\times3=4+2$; that is, twice three is equal to four and two.

Stifelius defines *equation* to be the ratio of equality between two quantities differently denominated; as when we ſay 3 ſhill. = 36 pence. Or 50 ſhill. = 2*l.* 10*s.* = 600 pence, = 2400 farth. Or, $b=d+e$. Or, $12=\dfrac{a+b}{5}$, &c.

Hence, the reduction of two heterogeneous, or diſſimilar quantities to the ſame value, i. e. to an equality, is called the *bringing them to an equation*. See EQUALITY.

The character, or ſign of an *equation*, is $=$ or $\propto$.

The reſolving of problems, by means of *equations*, is the buſineſs of algebra.

EQUATION, *terms of an*, are the ſeveral quantities, or parts, of which an *equation* is compoſed, connected together by the ſigns $+$ and $-$. Thus, in the *equation* $b+c=d$; the terms are b, c, and d. And the tenor or import of the *equation* is, that ſome quantity, repreſented by d, is equal to two others repreſented by b and c.

EQUATION, *root of an*, is the value of the unknown quantity in the *equation*. E. gr. if $a^2+b^2=x^2$, the root will be $\sqrt{a^2+b^2}$. See ROOT *of an equation*.

Equations are divided, with regard to the powers of the unknown quantities, into *ſimple*, *quadratic*, *cubic*, &c.

EQUATION, *ſimple*, is that wherein the unknown quantity is only of one dimenſion, or in the firſt power. As, $x=a+b$.

EQUATION, *quadratic*, is that wherein the unknown quantity is of two dimenſions, or in the ſecond power. As, $x^2=a^2+b^2$.

Quadratic equations are of two kinds; *ſimple* or *pure*, and *adfected*.

Simple, or *pure quadratics*, are thoſe where the ſquare of the unknown root is equal to the abſolute number given: as in $aa=36$; $ee=146$; $yy=133225$.

The reſolution of theſe is eaſy; it being apparent that nothing more is required than to extract the ſquare root out of the number or known quantity.

Thus the value of a in the firſt *equation* is equal to 6; in the ſecond $e=12$, and a little more, as being a ſurd root; and in the third example $y=365$.

Adfected quadratics, are thoſe which between the higheſt power of the unknown number, and the abſolute number given, have ſome intermediate power of the unknown number: as, $xx+2ax=100$.

All *equations* of this rank are in one or other of the following forms; viz. $xx+ax=R$. $xx-ax=R$. $ax-xx=R$.

There are ſeveral methods of extracting the roots of *adfected quadratics*; the moſt convenient is that of Harriot. Suppoſe $x^2+ax=+b^2$; here x being aſſumed as a part of the root; a, the known quantity of the ſecond term, will be double the other part, and therefore half of a is the other part—The ſquare thereof will be completed, by adding one fourth of aa; which done, the root of the ſquare may be extracted thus:

$$\begin{array}{l} x^2+ax=b^2 \\ \text{add. } \tfrac{1}{4}aa=\tfrac{1}{4}aa \\ \hline x^2 . ax . \tfrac{1}{4}a^2=b^2 . \tfrac{1}{4}a^2 \\ \hline x^2 . \tfrac{1}{2}a=\sqrt{b^2 . \tfrac{1}{4}a^2} \\ \hline x= . \tfrac{1}{2}a . \sqrt{b^2 . \tfrac{1}{4}a^2} \end{array}$$

In lieu of the characters $+$ and $-$, we here uſe points, to avoid the neceſſity of diſtinguiſhing ſeveral caſes.

EQUATION, *cubic*, is that wherein the unknown quantity is of three dimenſions: as, $x^3=a^3-b^3$, &c.

The ſecond terms of a cubic *equation* being taken away, they may be all reduced to this form, $x^3+ax+b=0$. Where $x=\sqrt[3]{-\frac{1}{2}b+\sqrt{\frac{1}{4}bb+\frac{1}{27}a^3}}+\sqrt[3]{-\frac{1}{2}b-\sqrt{\frac{1}{4}bb+\frac{1}{27}a^3}}$.

This rule is commonly aſcribed to Cardan, and from him has been called *Cardan's rule*; but it is ſaid by ſome, that Tartalea was the inventor, and, by others, Scipio Ferreus, to whom, it is ſaid, Cardan himſelf aſcribes the invention. Lagni, Elem. d'Arithmet. & d'Algebr. p. 479. Wolf. Elem. Matheſ. tom. i. p. 336. edit. 2. and Saunderſon's Algebra, p. 702.

When in a cubic *equation*, $x^3-ax\pm b=0$, a is negative, the expreſſion $\sqrt{\frac{1}{4}bb+\frac{1}{27}a^3}$, will be transformed into $\sqrt{\frac{1}{4}bb-\frac{1}{27}a^3}$, which becomes impoſſible, or imaginary, when $\frac{1}{27}a^3$ is greater than $\frac{1}{4}bb$; for $\sqrt{\frac{1}{4}bb-\frac{1}{27}a^3}$ will then be the ſquare root of a negative quantity, which is impoſſible. And yet, in this caſe, the root x may be a real quantity; but algebraiſts have not yeen able to find a real expreſſion of its value. This caſe is called the *irreducible*, *irreductible*, or impracticable caſe. See IRREDUCIBLE.

The irreducible caſe may be ſolved by the triſection of an arc, for which the reader may conſult Saunderſon's Algebra, p. 713. This method requires a table of ſines; and if ſuch be not at hand, we may have recourſe to Dr. Halley's univerſal method of extracting the roots of *equations*, in the Philoſophical Tranſactions, or in Lowthorp's Abridgment, vol. i. cap. 1. § 20. Vid. infra.

There are ſeveral other methods of extracting the roots of cubic *equations*, extant in books of algebra.

Mr. Cotes obſerves, in his Logometria, p. 29. that the ſolution of all cubic *equations* depends either upon the triſection of a ratio, or of an angle. See this method explained and demonſtrated in Saunderſon's Algebra, p. 718.

EQUATION, *biquadratic*, is that whoſe unknown quantity is of four dimenſions; as $x^4=a^4+b^4$. See BIQUADRATIC.

Des Cartes gave a method of reducing biquadratic *equations* to cubic. This method is explained in moſt treatiſes of algebra, ſince his time; and very clearly by the marquis de l'Hôpital in his Conic Sections, art. 356. See alſo Maclaurin's Algebra, p. 228, ſeq.

Hence a biquadratic *equation* being propoſed, it may be ſolved, by reducing it firſt to a cubic *equation*; and then finding the roots of this new *equation*, by the triſection of an angle, or of a ratio. Theſe roots, ſo found, having a given relation to the roots of the propoſed biquadratic, will alſo be given.

EQUATIONS *of higher degrees*. If the unknown quantity in an *equation* is of five dimenſions, it is called a *surſolid*, &c. We have no univerſal rule to expreſs, algebraically, the roots of *equations*, higher than biquadratic; but ſuch *equations* may be ſolved univerſally in numbers, by Dr. Halley's method of approximation.

This method proceeds by aſſuming the root deſired, nearly true to one or two places; which may be done by a geometrical conſtruction, or by a few trials; and then correcting the aſſumption, by comparing the difference between the true root and the aſſumed, by means of a new *equation*, whoſe root is that difference, and which he ſhews how to form from the *equation* propoſed, by ſubſtitution of the value of the root ſought, partly in known, and partly in unknown terms.

Dr. Brook Taylor found that this method was capable of a greater degree of generality, and that it was applicable, not only to *equations* of the common form, that is, to ſuch as conſiſt of terms, wherein the powers of the root are poſitive and integral, without any radical ſign, but alſo to all expreſſions in general, wherein any thing is propoſed as given, which by any known method might be computed; if, *vice verſa*, the root were conſidered as given. Such are all radical expreſſions of binomials, trinomials, or of any other nominal, which may be computed by the root given, at leaſt, by logarithms, whatever be the index of the power of the nominal; as likewiſe expreſſions of logarithms, of arches by the ſines or tangents, of arcs of curves by the abſciſſæ, or any other fluents, or roots of fluxional *equations*. See Phil. Tranſ. Nº 352. Jones's Abridg. vol. iv. cap. 1. § 17.

The method of finding the roots of *equations* by approximation, extends to all kinds of *equations*; and though it be not accurately, yet it is practically true; as it gives the value ſought to a very great degree of exactneſs, nay to any aſſignable degree, if any one will take the pains of computation.

The method of Sir Iſaac Newton, and of Mr. Raphſon, is, in effect, the ſame as that mentioned under the head APPROXIMATION. See farther in Newt. Meth. of Flux. and Mr. Colſon's Comment. p. 186. But Dr. Halley's method is more expeditious in practice. See Phil. Tranſ. Nº 210. or Lowthorp's Abridg. vol. i. cap. 1. § 20.

The principles of theſe methods may alſo be found in Mr. Maclaurin's Algebra, part ii. cap. 9. or in Mr. Simpſon's Algebra, p. 147, ſeq. who gives ſeveral formulæ for approximating to the roots of *equations*. This gentleman has alſo another method for this purpoſe, which we ſhall mention farther on.

Mr. Daniel Bernouilli, in the Acta Petropolitana, tom. iii. p. 92, ſeq. has given a new and ingenious method of approximating to the roots of *equations*, without any previous trials. The method is deduced from the nature of recurring ſeries. The book wherein it is publiſhed being in few people's hands, we ſhall here give a full account of this method.

Let the propoſed *equation* be put into this form:

$$1=ax+bxx+cx^3+ex^4+,\ \&c.$$

Then form a ſeries, beginning with as many arbitrary terms as the *equation* has dimenſions, but with this condition, that if A, B, C, D, E, &c. denote the terms following each other in direct order, then muſt $E=aD+bC+cB+eA+$, &c. and let there be two proximate terms, M and N, in this ſeries ſufficiently continued; then will the antecedent M, divided by the conſequent N, be nearly equal to the required root.

For inſtance, let $1=-2x+5xx-4x^3+x^4$. Form a ſeries, beginning with four arbitrary numbers, 1 . 1 . 1 . 1 (as the propoſed *equation* is of four dimenſions) and let a new term always be formed from the double of the laſt preceding taken negatively, more the quintuple of the penultimate, leſs the quadruple of the antepenultimate, more the penantepenultimate. This ſeries will be 1 . 1 . 1 . 1 . 0 . 2 . −7 . 25 . −93 . 341 . −1254, &c. and the approximated root of the *equation* propoſed will be nearly $=-\frac{341}{1254}$.

Again, let $1=x+2xx+3x^3+4x^4+5x^5$. Form a ſeries, beginning with five arbitrary terms, 1 . 1 . 1 . 1 . 1 . 15 . 29 . 71 . 183 . 477 . 1239 . 3171, &c. Here $\frac{1239}{3171}$, or $\frac{50}{151}$, will be nearly equal to one of the roots of the *equation*.

The root here found is the leaſt of the roots, without attending to the ſigns; that is, the root ſo determined is that which is leaſt diſtant from nothing.

To find the greateſt root of a propoſed *equation*, let it be diſpoſed in the following manner:

$$x^m=ax^{m-1}+bx^{m-2}+cx^{m-3}\ \ldots\ldots+d.$$

Then form a ſeries, beginning with as many arbitrary terms as there are dimenſions in the *equation*, ſo that if A, B, C, D, E, &c. denote ſo many contiguous terms directly following each other in the ſeries, E muſt be every where $=aD+bC+cB+dA$, &c. Laſtly, let there be two proximate terms, M and N, in this ſeries ſufficiently continued, then will the conſequent term N, divided by the antecedent M, be nearly equal to the required root.

For inſtance, let us take one of the foregoing *equations*, the root of which was found to be $-\frac{341}{1254}$; and let the *equation* be thus diſpoſed:

$$x^4=4x^3-5xx+2x-1.$$

Then form this ſeries,

1 . 1 . 1 . 1 . 0 . −4 . −15 . −41 . −97 . −209.

And $\frac{209}{97}$ will be nearly equal to the greateſt root of the propoſed *equation*.

In the application of the rule for finding the leaſt root, the author obſerves, that ſome difficulties may ariſe in two caſes. Firſt, when the leaſt root of the *equation* may be taken either affirmatively, or negatively. Secondly, when the leaſt root is imaginary, as if the *equation* had theſe roots, $+\sqrt{-4}$, $-\sqrt{4}$, and 5; of which the laſt is to be conſidered as greateſt, that is, according to his definition, as fartheſt diſtant from nothing.

In the firſt caſe, the alternate terms only are to be conſidered; and if they tend towards a conſtant ratio, while the contiguous terms deviate, it will argue an equality between the affirmative and negative root. And, in this caſe, a term in the ſeries muſt be divided by the alternate term following; and the ſquare root of the quotient will be the root of the *equation*. For inſtance, if we had, $1=-y+4yy+4y^3$; then forming a ſeries according to the firſt rule, we ſhall have 1 . 1 . 0 . 8 . −4 . 36 . −20 . 148 . −84 . 596 . −340 . 2388, &c.

And the tenth term 596, divided by the alternate term following, or the twelfth, 2388, gives $\frac{596}{2388}$, or $\frac{149}{597}$, nearly equal to the ſquare of the required root, which will therefore be, nearly, $\pm\sqrt{\frac{149}{597}}$. This example ſhews that the rule approximates ſufficiently faſt; for the number found $\frac{596}{2388}$ differs from the truth only by $\frac{1}{2388}$, the true root being $\pm\frac{1}{2}$. The inconvenience, here mentioned, might alſo be remedied, by taking $x=y\pm a$; and then finding the root of the transformed *equation* by the firſt rule.

In the ſecond caſe, when the leaſt root is imaginary or impoſſible, it is to be conſidered whether the root will be affirmative or negative; if the former, put $x=y+a$, if the latter, $x=y-a$. And then the value of y may always be found by the rule; provided that a be aſſumed greater than x. But though we ſhall never be diſappointed by taking any greater number for a; yet it is to be obſerved, that the leſs $a-x$ is, the more eaſily and quickly will the ſeries tend to the required root. Some circumſpection is therefore requiſite.

For inſtance, let $1=\frac{x+xx-x^3}{2}$.

If we form a ſeries without any previous examination, ſuch as $1.1.1.\frac{1}{2}.\frac{1}{4}.-\frac{1}{8}.-\frac{3}{16}.-\frac{9}{32}.-\frac{11}{64}.-\frac{17}{128}$, &c. we ſhall never find any root, as the terms of the ſeries do not tend to any conſtant ratio. But ſuppoſing $x=y-2$ (for it is viſible that the negative root cannot be great) we ſhall have

$$1=\frac{15y-7yy+y^3}{8}$$

or to avoid fractions, ſuppoſe, $y=8z$, that is, $x=8z-2$. Then we have

$$1=15z-56zz+64z^3.$$

From this *equation* the following ſeries ariſes:

$$1.1.1.23.353.4071.42769.436151.\ \&c.$$

Hence $z=\frac{42769}{436151}$; and $x=-\frac{530150}{436151}$.

For a ſecond example, take this *equation*:

$1=\frac{-x-xx+x^3}{2}$; from whence this ſeries ariſes,

$1.1.1.-\frac{1}{2}.\frac{1}{4}.\frac{5}{8}.\frac{-11}{16}.\frac{5}{32}.\frac{37}{64}.\frac{-91}{128}$, &c.

Which gives no root; but taking $x=y+3$ (as it appears that x muſt be affirmative) this *equation* will ariſe, $1=\frac{-20y-8yy-y^3}{13}$, or rather taking $y=13z$, that is, $x=13z+3$, we ſhall have $1=-20z-104zz-169z^3$.

This laſt *equation* gives the following ſeries:

$$0.0.1.-20.296.-4009.52776.-688608.$$

Whence $z=-\frac{52776}{688608}$; and $z=\frac{1379736}{688608}=2{,}0036$ nearly; x being exactly $=2$.

As to the caſe before mentioned, of the equality of two roots, it is alſo to be obſerved, that a like rule may be applied, where more than two roots are equal, providing they be real. But in caſe ſome of theſe equal roots ſhould be impoſſible, and the reſt real; as if $x^4-1=0$, where $x=1$, $x=-1$, $x=\sqrt{1}$, and $x=-\sqrt{-1}$, all which roots, by our author's definition, are to be conſidered as equal, or equally diſtant from nothing: we may obviate this inconvenience, by ſuppoſing $x=y\pm a$; which is therefore an univerſal remedy.

This will lead us to a method of extracting the roots of powers. For inſtance, if we wanted the cube root of 2.

Then $x^3=2$ or $1={*}{*}\frac{1}{2}x^3$

The ſeries, formed according to this *equation*,

$1.1.1.\frac{1}{2}.\frac{1}{2}.\frac{1}{2}.\frac{1}{4}.\frac{1}{4}.\frac{1}{4}.\frac{1}{8}.\frac{1}{8}.\frac{1}{8}$, &c.

only ſhews, that $x^3=2$. But taking $x=y+1$, the propoſed *equation* will be transformed into the following, $1=3y+3yy+y^3$. From whence this ſeries may be derived,

$$1.1.1.7.25.97.373.1435.5521.$$

Therefore $y=\frac{1435}{5521}$; and $x=\frac{6956}{5521}=1.2597$ nearly.

Again, let it be required to extract the biquadrate root of 20; then $x^4=20$, and ſuppoſing $x=y+2$, we ſhall have $1=8y+6yy+2y^3+\frac{1}{4}y^4$; from whence this ſeries is obtained

$$0.0.0.1.8.70.610.5316.\frac{1}{4}.46332.$$

This gives $y=\frac{21265}{185348}\left(=\frac{5316\frac{1}{4}}{46332}\right)$ and $x=2\frac{21265}{185328}$.

Which root approaches very near to the truth; ſo that it is much to be doubted whether the ſame could be obtained ſo quickly, and ſo accurately, by any other method.

Suppoſe again, that the ſquare root of 26 were required. Then $xx=26$. Let $x=y+5$. And $1=10y+yy$. Hence we have the ſeries

$$0.1.10.101.1020.10301.104030.$$

Therefore $y=\frac{10301}{104030}$; and $x=\sqrt{26}=5\frac{10301}{104030}=5.09901951360$, differing only by unit from 5.09901951359, found by the common method.

In the caſe where the greateſt root of the *equation* is required, the like obſervations may be made, as when we ſeek the leaſt root, viz. that we may obviate all inconveniencies by ſuppoſing $x=y\pm a$. Both methods often take place without any preparation; ſometimes only one, and ſometimes neither; but this rarely. Both will ſucceed by a proper ſubſtitution of $x=y\pm a$, providing the *equation* have equal roots. To avoid fractions in both caſes, ſuppoſe, firſt, the general *equation* $a=bx+cxx+dx^3+$, &c. where a, b, c, d, &c. are integers; to which form all *equations* may be reduced. Then we avoid fractions by ſuppoſing $x=ay$. In the ſecond method, we have the general *equation* $ax^m=bx^{m-1}+cx^{m-2}\ldots\ldots+d$, where we may put $x=\frac{y}{a}$; but this ſubſtitution may often be well omitted.

It is to be obſerved, that this method may be ſometimes uſefully extended to literal *equations*. Thus in the general cubic *equation*, $1=ax+bxx+cx^3$, form the ſeries $0.0.0.1.a.aa+b.a^3+2ab+c.a^4+3aab+2ac+bb.a^5+4a^3b+3aac+3abb+2bc$, &c. then will the proximate value of $x=\frac{a^4+3aab+2ac+bb}{a^5+4a^3b+3aac+3abb+2bc}$.

The learned author of theſe methods afterwards applied them to the reſolution of infinite *equations*; for which we muſt refer the reader to the Acta Petropol. tom. v. p. 63. 82.

The ingenious Mr. Simpſon gives us the following method for the ſolution of *equations* in numbers, when only one *equation* is given, and one quantity (x) to be determined.

Take the fluxion of the given *equation*, ſuppoſing x to be the variable quantity; and having divided the whole by $\dot{x}$, let the quotient be repreſented by A. Eſtimate the value of x pretty near the truth, ſubſtituting the ſame in the *equation*, as alſo the value of A, and let the error, or reſulting number, in the former, be divided by this numerical value of A, and the quotient be ſubtracted from the ſaid former value of x; and from thence will ariſe a new value of that quantity, much nearer the truth than the former, wherewith proceeding as before, another new value may be had, &c. till we arrive to any degree of accuracy deſired.

For inſtance, ſuppoſe $300x-x^3-1000=0$. To find x, take the fluxion of the given *equation*, and expunging $\dot{x}$, we have, $300-3xx=A$. It appearing, by inſpection, that $300x-x^3$, when $x=3$, will be leſs, and when $x=4$, will be greater than 1000, eſtimate x at 3.5, and ſubſtitute it inſtead thereof both in the *equation*, and in the value of A. The error in the former $=7.125$, and the value of the latter $=263.25$; wherefore taking $\frac{7.125}{263.25}=0.027$ from 3.5, there remains 3.473 for a new value of x. With this proceeding as before, the next error, and the next value of A will be 0.00962518 and 263.815 reſpectively. Hence the third value of $x=3.47296351$; which is true to 7 or 8 places.

The propoſed *equation* need not always be delivered from radicals, though this be ſometimes convenient, yet it is alſo ſometimes inſupportably tedious. Thus, if we had the *equation* $\sqrt{1-x}+\sqrt{1-2xx}+\sqrt{1-3x^3}-2=0$; the clearing it from ſurds would be very tedious; but Mr. Simpſon's method gives the root without any previous reduction.

The like is to be obſerved, when two *equations* are given, and as many unknown quantities (x and y) are to be determined. For all which we refer to the author himſelf, in his Eſſays, printed 1740, p. 82, ſeq.

The old method of Vieta, for ſolving adfected *equations*, was extremely tedious. It was formed by analogy, from the common method of extracting the roots of pure powers. See Vietæ Oper. Math. ap. Elzev. p. 173. or Wallis's Algebra, Oughtred's Clavis, De Lagny Elemens d'Arithm. & d'Algebr. p. 515, &c.

Equations are conſidered two ways: either as the ultimate concluſions we arrive at in the ſolution of problems; or as means, by the help whereof, we arrive at thoſe final ſolutions.

An *equation* of the firſt kind conſiſts only of one unknown quantity, which is intermixed with other known quantities. Thoſe of the latter kind conſiſt of ſeveral unknown quantities, which are to be compared, and connected together, till out of them all ariſe a new *equation*, wherein there is but one unknown quantity mixed with the known. To obtain the value of which unknown quantity, the *equation* is generally turned, and transformed various ways, till it be brought as low, and rendered as ſimple, as poſſible.

The doctrine and practice of *equations*, that is, the ſolution of queſtions by *equations*, conſiſts of ſeveral ſteps, or parts; viz. 1. The denominating of the ſeveral quantities,

ties, or expreſſing them in proper ſigns, or ſymbols. 2. The bringing the quantities thus denoted to an *equation.* 3. The reducing that *equation* to its loweſt and ſimpleſt terms. To which, 4. May be added the conſtructing of the *equation,* or repreſenting it in geometrical lines.

With regard to the firſt; a queſtion, or problem, being propoſed, we conceive the thing ſought, or required, as already done; and accordingly note or expreſs it by one of the laſt letters of the alphabet, x, y, or z; noting the other known quantities by the firſt letters of the alphabet, a, b, c, d, &c.

The queſtion being thus ſtated in ſpecies, it is conſidered whether, or no, it be ſubject to any reſtrictions, i. e. whether it be determinate, or no; which is found by theſe rules.

1. If the quantities ſought be more than the number of *equations* given, or contained in the queſtion, it is indeterminate, and capable of innumerable ſolutions. The *equations* are found, if they be not expreſly contained in the problem itſelf, by the theorems of the equality of quantities.

2. If the *equations* given, or contained in the problem, be juſt equal in number to the unknown quantities, the queſtion is determinate, or admits but of a limited number of anſwers.

3. If the unknown quantities be fewer than the given *equations,* the queſtion is yet more limited; and ſometimes it diſcovers itſelf impoſſible, by ſome contradiction between the *equations.* See Reduction *of equations.*

Now, *to bring a queſtion to an* EQUATION, that is, to bring the ſeveral mediate *equations* to one final one, the principal thing to be attended to, is to expreſs all the conditions thereof by ſo many *equations.* In order to which, it is to be conſidered, whether the propoſitions, or ſentences, wherein it is expreſſed, be all of them fit to be noted in algebraic terms; as our conceptions uſe to be in Latin, or Greek characters. And if ſo, as is generally the caſe in queſtions about numbers, or abſtract quantities, then let names be given both to known and unknown quantities, as far as occaſion requires; and thus the drift of the queſtion will be couched, as we may call it, in the *algebraical language*; and the conditions, thus tranſlated to algebraic terms, will give as many *equations* as are neceſſary to ſolve it. To illuſtrate this by an inſtance: ſuppoſe it required to find three numbers, in continual proportion, whoſe ſum is 20, and the ſum of their ſquares 140; putting x, y, z, for the names of the three numbers ſought, the queſtion will be tranſlated out of the verbal to the ſymbolical expreſſion, thus:

The queſtion in words.	*In ſymbols.*
Required three numbers, on theſe conditions:	x, y, z?
That they be continually proportional.	$x : y :: y : z$, or $xz = yy$
That the ſum be 20.	$x + y + z = 20.$
And the ſum of their ſquares 140.	$xx + yy + zz = 140.$

Thus is the queſtion brought to theſe *equations,* viz. $xz = yy$, $x + z + y = 20$, and $xx + yy + zz = 140$, by the help whereof, x, y, and z, are to be found by the rules already laid down.

The ſolutions of queſtions are, for the moſt part, ſo much the more expedite and artificial, by how much the unknown quantities, you have at firſt, are the fewer. Thus, in the queſtion propoſed, putting x for the firſt number, and y for the ſecond, $\frac{yy}{x}$ will be the third continual proportional; which being put for the third number, bring the queſtion into *equations,* as follows:

The queſtion in words.	*Symbolically.*
There are ſought three numbers in continual proportion.	$x, y, \frac{yy}{x}$?
Whoſe ſum is 20.	$x + y + \frac{yy}{x} = 20.$
And the ſum of their ſquares 140.	$xx + yy + \frac{y^4}{xx} = 140.$

You have therefore the *equations* $x + y + \frac{yy}{x} = 20$, and $xx + yy + \frac{y^4}{xx} = 140$, by the reduction whereof, x, and y, are to be determined.

Take another example: a merchant increaſes his eſtate annually by one third part, abating 100*l.* which he ſpends yearly in his family; and after three years he finds his eſtate doubled. *Query,* What is he worth? To reſolve this, it muſt be obſerved, that there are (or lie hid) ſeveral propoſitions, which are all thus found out, and laid down.

In words.	*Algebraically.*
A merchant has an eſtate —	x
Out of which the firſt year he ſpends 100*l.*	$x - 100$
And augments the reſt by one third —	$x - 100 + \frac{x - 100}{3}$, or $\frac{4x - 400}{3}$
And the ſecond year he ſpends 100*l.*	$\frac{4x - 400}{3} - 100$, or $\frac{4x - 700}{3}$
And augments the reſt by one third	$\frac{4x - 700}{3} + \frac{4x - 700}{9}$, or $\frac{16x - 2800}{9}$
And ſo the third year he ſpends 100*l.*	$\frac{16x - 2800}{9} - 100$, or $\frac{16x - 3700}{9}$
And by the reſt gains likewiſe one third.	$\frac{16x - 3700}{9} + \frac{16x - 3700}{27}$, or $\frac{64x - 14800}{27}$
And he becomes at length twice as rich as at firſt.	$\frac{64x - 14800}{27} = 2x$

Therefore the queſtion is brought to this *equation,* $\frac{64x - 14800}{27} = 2x$, by the reduction whereof you will find the value of x.

Viz. Multiply it into 27, and you have $64x - 14800 = 54x$; ſubtract $54x$, and there remains $10x - 14800 = 0$, or $10x = 14800$; and dividing by 10, you have $x = 1480$. So that the value of his eſtate at firſt was 1480*l.*

It appears then, that to the ſolution of queſtions about numbers, or the relations of abſtract quantities, there is ſcarce any thing more required, but to tranſlate them out of the common into the algebraic language, i. e. into characters, proper to expreſs our ideas of the relations of quantities. Indeed, it may ſometimes happen, that the language wherein the queſtion is ſtated, may ſeem unfit to be rendered into the algebraical; though by making a few alterations therein, and attending to the ſenſe, rather than the ſound of the words, the tranſlation becomes eaſy enough. The difficulty here reſults merely from the difference of idioms, which is as obſervable between moſt languages as between the common and ſymbolical. However, to render the ſolution of ſuch problems a little more eaſy and familiar, we ſhall add an example or two of them.

1. *Given the ſum of two numbers* a, *and the difference of the ſquares* b; *to find the numbers themſelves.* Suppoſe the leſſer, x; the other will be $a - x$; and their ſquares xx and $aa - 2ax + xx$; whoſe difference, $aa - 2ax$ is called b. Conſequently, $aa - 2ax = b$. Whence, by reduction, $aa - b = 2ax$; or $\frac{aa - b}{2a} \left(= \frac{1}{2}a - \frac{b}{2a}\right) = x$.

E. gr. Suppoſe the ſum of the numbers, or a, to be 8, and the difference of their ſquares, or b, 16; then will $\frac{1}{2}a - \frac{b}{2a} (= 4 - 1) = 3 = x$. And $a - x = 5$. Therefore the numbers are 3 and 5.

2. *To find three quantities* x, y, *and* z, *the ſum of each pair whereof is given.* Suppoſe the ſum of the pair x and y be a; that of x and z, b; and that of y and z, c. To determine the three numbers required, x, y, and z, we have three *equations* $x + y = a$; $x + z = b$; and $y + z = c$. Now, to exterminate two of the unknown quantities, e. gr. y and x, take away x, both from the firſt and ſecond *equations,* and we ſhall have $y = a - x$, and $z = b - x$. Which values being ſubſtituted for y and z in the third *equation,* there will ariſe $a - x + b - x = c$; and by reduction $x = \frac{a + b - c}{2}$. Having found x, the former *equations,* $y = a - x$, and $z = b - x$, will give y and z.

Thus, e. gr. if the ſum of the pair x and y be 9; of x and z, 10; and of y and z, 13; then, in the value of x, y, and z, write 9 for a, 10 for b, and 13 for c; and you will have $a + b - c = 6$; and conſequently $x \left(= \frac{a + b - c}{2}\right) = 3$, $y\ (= a - x) = 6$, and $z\ (= b - x) = 7$.

3. *To divide a given quantity into any number of parts, ſo as that the greater parts ſhall exceed the leaſt by any given differences.* Suppoſe a to be a quantity which is to be divided into four ſuch parts, the firſt and ſmalleſt whereof is x; the exceſs of the ſecond part above this, b, of the third, c, and the fourth d; then will $x + b$ be the ſecond part, $x + c$ the third, and $x + d$ the fourth; the aggregate of all which $4x + b + c + d$ is equal to the whole line a. Now, taking away from each, $b + c + d$, and there remains $4x = a - b - c - d$, or $x = \frac{a - b - c - d}{4}$.

Suppoſe, e. gr. a line of 20 feet to be divided into 4 parts, in ſuch manner, as that the exceſs of the ſecond above the firſt may be 2 feet, of the third 3 feet, and of the fourth 7 feet. Then the four parts will be $x \left(= \frac{a - b - c - d}{4}, \text{ or } \frac{20 - 2 - 3 - 7}{4}\right) = 2$, $x + b = 4$, $x +$

$c=5$, and $x+d=9$. And after the ſame manner, may a quantity be divided into a greater number of parts on the like conditions.

4. *A perſon diſpoſed to diſtribute a little money among ſome beggars, wants eight pence of three pence for each of them: he therefore gives them two pence a-piece, and has three pence left: the number of beggars is required.* Let the number of beggars be called x; and the perſon wants 8 pence of giving them all $3x$ pence. Conſequently he has $3x-8$; out of which he gives $2x$ pence; and the remaining pence $+3x-8-2x=3$. That is, $x-8=3$, or $x=11$.

5. *The power or ſtrength of one agent being given, to determine how many ſuch agents will produce a given effect* a, *in a given time* b. Suppoſe the power of the agent ſuch, as that it may produce the effect c, in the time d; then, as the time d is to the time b, ſo is the effect c, which the agent can produce in the time d, to the effect it can produce in the time b, which accordingly will be $\frac{bc}{d}$. Then, as the effect of one agent $\frac{bc}{d}$ is to the joint effect of them all, a; ſo is that one agent, to all the agents. Conſequently the number of agents will be $\frac{ad}{bc}$.

Thus, e. gr. if a clerk, or writer, in 8 days time tranſcribe 15 ſheets; how many ſuch clerks are required to tranſcribe 405 ſheets in 9 days? *Anſ.* 24. For if 8 be ſubſtituted for d, 15 for c, 405 for a, and 9 for b, the number $\frac{ad}{cd}$ will become $\frac{405\times 8}{9\times 15}$, that is $\frac{3240}{135}$, or 24.

6, *The powers of ſeveral agents being given; to determine the time* x, *wherein they will jointly perform a given effect.* Suppoſe the powers of the agents, A, B, C, ſuch as that in the times e, f, g, they would produce the effects a, b, c, reſpectively; and theſe, in the time x, would produce effects $\frac{ax}{e}$, $\frac{bx}{f}$, $\frac{cx}{g}$. Conſequently $\frac{ax}{e}+\frac{bx}{f}+\frac{cx}{g}=d$, and by reduction $x=\frac{d}{\frac{a}{e}+\frac{b}{f}+\frac{c}{g}}$.

Suppoſe, e. gr. that three workmen could finiſh a certain work in ſuch and ſuch times, viz. A once in three weeks, B thrice in eight weeks, and C five times in twelve weeks; and it is required in what time they will finiſh it together? Here, the powers of the agents A, B, C, are ſuch as in the times 3, 8, and 12, reſpectively produce effects 1, 3, 5; and it is inquired in what time they will produce the effect together. For a, b, c, d, e, f, g, write 1, 3, 5, 1, 3, 8, 12; and there will come out $x=\frac{1}{\frac{1}{3}+\frac{3}{8}}+\frac{5}{12}$ or $\frac{8}{9}$ of a week, that is, 6 days, $5\frac{1}{3}$ of an hour, the time they will finiſh it in together.

7. *Given the ſpecific gravities of a mixture, and of the ſeveral ingredients thereof; to find the proportion of the ingredients therein.* Suppoſe e the ſpecific gravity of the mixture A+B; a that of A, and b that of B; ſince the abſolute gravity, or weight, is compounded of the bulk of the body, and its ſpecific gravity; aA will be the weight of A; bB, that of B; and eA+eB the weight of the aggregate A+B. Conſequently, $aA+bB=eA+eB$; and therefore $aA-eA=eB-bB$, or $e-b:a-e::A:B$.

Thus, e. gr. ſuppoſe the ſpecific gravity of gold to be as 19, that of ſilver as $10\frac{1}{3}$, and that of king Hiero's crown, compoſed of gold and ſilver, as 17; then will $A:B::e-b:a-e::17-10\frac{1}{3}:19-17::7-\frac{1}{3}:2::20:6::10:3::$ the bulk of gold in the crown, to the bulk of ſilver: or $190:31$ ($::19\times 10:10\frac{1}{3}\times 3::a\times\overline{e-b}:b\times\overline{a-e}$) :: the weight of the gold in the crown, to the weight of the ſilver, and $221:31::$ the weight of the crown to the weight of ſilver. See ALLIGATION.

Dr. Halley's method for the ſolution of *equations* is thus: Let the root z of any *equation* be taken equal to $a\pm e$; where a is ſuppoſed to be taken near to the true value. Then from the quantity $a\pm e$ let all the powers of z found in the propoſed *equation*, be formed; and to theſe let their reſpective coefficients be prefixed. Let the power to be reſolved be ſubducted from the ſum of the parts of the firſt column where e is not found; and let the difference be $\pm b$. Then take the ſum of all the coefficients of e in the ſecond column, which call s; and having added all the coefficients of ee, the ſum of which is called t; the root ſought z, will, in a rational form, $=a\pm\frac{sb}{ss\pm tb}$; and, in an irrational form, $=a\frac{\mp\frac{1}{2}s\mp\sqrt{\frac{1}{4}ss+bt}}{t}$.

For inſtance, let it be ſuppoſed to find a root of the *equation* $z^4-\underset{d}{3}zz+\underset{c}{75}z=10000$, where 10000 is the reſolvend.

For a firſt ſuppoſition let $a=10$; we ſhall therefore have the *equation*

$$\begin{aligned}
&z^4=a^4\pm 4a^3e+6a^2ee\pm 4ae^3+e^4\\
&-dzz=-da^2\pm 2dae-dee\\
&+cz=+ca\pm ce\\
&=10000\pm 4000e+600e^2\pm 40e^3+e^4\\
&-\ 300\ \pm\ 60e-3e^2\\
&+\ 750\ \pm\ 75e\\
&-10000\\
\hline
&+450\mp\underset{s}{4015}e+\underset{t}{597}ee\mp\underset{u}{40}e^3+e^4=0.
\end{aligned}$$

The ſigns + and −, with reſpect to e and e^3, are left doubtful, till it be known whether e be affirmative or negative; in which there is ſome difficulty, as in *equations* having ſeveral roots, the *homogenea comparationis*, as they are called, are often increaſed by diminiſhing a, and, on the contrary, diminiſhed by increaſing a. But the ſign of e is determined by the ſign of the quantity b; for the reſolvend being ſubtracted from the *homogeneum* formed from a, the ſign of se, and therefore of the parts prevailing in its compoſition, will always be contrary to the ſign of the difference b. Hence it will appear whether e be affirmative or negative, or whether a has been aſſumed greater or leſs than the true root. But e is always equal to $\frac{\frac{1}{2}s-\sqrt{\frac{1}{4}ss-bt}}{t}$, as often as b and t have the ſame ſign; but when they are connected with different ſigns, e becomes $=\frac{\sqrt{\frac{1}{4}ss+bt}-\frac{1}{2}s}{t}$. After that e has been found to be negative, e, e^3, e^5, &c. muſt be made negative in the affirmative members of the *equation*, and affirmative in the negative members; that is, they muſt be writ with a contrary ſign; but if e be affirmative, then muſt e, e^3, e^5, &c. be affirmative in the affirmative members, and negative in the negative.

In the propoſed example we have 10450 inſtead of the reſolvend 10000, or $b=+450$; from whence it appears that a was taken greater than the true root, and conſequently that e is negative. Hence the *equation* becomes $10450-4015e+597ee=4e^3+e^4=10000$; that is, $450-4015e+597ee=0$. Therefore, $450=4015e-597ee$, or $b=se-tee$; the root of which is $e=\frac{\frac{1}{2}s-\sqrt{\frac{1}{4}ss-bt}}{t}$, or $\frac{s}{2t}-\sqrt{\frac{ss}{4tt}-\frac{b}{t}}$, that is, in the preſent caſe, $e=\frac{2007\frac{1}{2}-\sqrt{3761406\frac{1}{4}}}{597}$, from whence the approximated root is found to be $=9.886$. Now this root being taken for a ſecond ſuppoſition, and the operation being repeated, we ſhall have $a+e=z=9.8862603936495$, which is very exact, ſcarcely [illegible] the truth by above 2 the laſt figure.

This is ſufficient to give a notion of Dr. Halley's method: thoſe who deſire more examples, and farther inſtructions, may conſult the Phil. Tranſ. Nº 210. or Lowthorp's Abridg. vol. i. p. 85, ſeq.

EQUATION, *differential.* See DIFFERENTIAL.

EQUATIONS, *to bring geometrical problems to.* Geometrical queſtions, or thoſe relating to continued quantities, are ſometimes alſo brought to *equations*, after the ſame manner as arithmetical ones. So that the firſt rule to be here preſcribed is, to obſerve every thing directed for the ſolution of numerical problems.

Suppoſe, e. gr. it were required to cut a right line, as AB (*Tab. Algebra, fig.* 6.) in mean and extreme proportion in C; that is, ſo as that BE, the ſquare of the greater part, ſhall be equal to the rectangle BD, contained under the whole and the leſſer part.

Here ſuppoſing $AB=a$, and $CB=x$; then will $AC=a-x$; and $xx=a\times\overline{a-x}$. An *equation* which, by reduction, gives $x=-\frac{1}{2}-a+\sqrt{\frac{5}{4}aa}$.

But it is very rare that geometrical problems are thus brought to *equation*; as being generally found to depend on various complex poſitions, and relations of lines; ſo that here ſome farther artifice, and certain ſpecial rules, will be required, to bring them to algebraic terms. Indeed, it is very difficult to preſcribe any thing preciſe in ſuch caſes; every man's own genius ſhould be the rule of his procedure.

Something, however, ſhall be ſaid in the general, for the ſake of ſuch as are not at all verſed in ſuch operations, and that principally from Sir Iſaac Newton.

Obſerve then, 2. That problems concerning lines related to each other in any definite manner, may be variouſly ſtated, by ſuppoſing ſuch or ſuch quæſita, or things ſought, to be required from ſuch or ſuch data; yet ſtill, with whatever data and quæſita the queſtion is propoſed, its ſolution will ariſe after the very ſame manner, without the leaſt alteration of any circumſtance, except in the imaginary ſpecies of lines, or in the names whereby the data are diſtinguiſhed from the quæſita.

Suppoſe, e. gr. the queſtion were about an iſoceles triangle, BCD (*fig.* 7.) inſcribed in a circle, whoſe ſides BC, BD, and baſe CD, were to be compared with the diameter of the circle AB. Here the queſtion may be either propoſed, of inveſtigating the diameter from the given ſides and baſe, or inveſtigating the baſe from the ſides and diameter given. Or, laſtly, of finding the ſides from the baſe and diameter given; and propoſe it under which form you will, it will be brought to an *equation*, by the ſame algebraic ſeries.

Thus, if the diameter be ſought, put $AB=x$, $CD=a$, and BC, or $BD=b$. Then, drawing AC, as the triangles ABC and CBE are ſimilar; $AB:BC::BC:BE$, or $x:b::b:BE$. Wherefore $BE=\frac{bb}{x}$, and $CE=\frac{1}{2}CD$, or $\frac{1}{2}a$. And becauſe the angle CEB is a right angle, $CE^2+BE^2=BC^2$, that is, $\frac{1}{4}aa+\frac{b^4}{xx}=bb$. Which *equation* being reduced, gives the diameter required, x. Again, if the baſe be ſought, put $AB=c$, $CD=x$, and BC, or $BD=b$. Then drawing AC, as the triangles ABC and CBE are ſimilar; $AB:BC::BC:BE$, or $c:b::b:BE$. Wherefore $BE=\frac{bb}{c}$. And $CE=\frac{1}{2}CD$, or $\frac{1}{2}x$. And ſince the angle CEB is right, $CE^2+BE^2=BC^2$, that is, $\frac{1}{4}xx+\frac{b^4}{cc}=bb$; an *equation* which, reduced, gives the baſis ſought, x. Laſtly, if the ſide BC, or BD, were ſought, put $AB=c$; $CD=a$, and BC, or $BD=x$. Then drawing AC, the triangles ABC, and CBE, being ſimilar, we have $AB:BC::BC:BE$; or $c:x::x:BE$. Wherefore, $BE=\frac{xx}{c}$. And $CE=\frac{1}{2}CD$, or $\frac{1}{2}a$; and the angle CEB being right, $CE^2+BE^2=BC^2$. That is, $\frac{1}{4}aa+\frac{x^4}{cc}=xx$. An *equation* which, by reduction, gives x required.

Thus is the calculus for arriving at the *equation*, as well as the *equation* itſelf, the ſame in all the caſes; except that the ſame lines are deſigned by different letters, according as they are data, or quæſita. Indeed, as the data or quæſita differ, there ariſes a difference in the reduction of the *equation* found; but there is no difference in the *equation* itſelf. So that we need make no difference between given and ſought quantities; but are at liberty to ſtate the queſtion with ſuch data and quæſita, as we think moſt favourable to the ſolution of the queſtion.

3. A problem then being propoſed, compare the quantities it includes; and, without making any difference between data and quæſita, conſider what dependences they have on each other, that you may learn which of them will, by compoſition, give the reſt; in the doing of which, it is not neceſſary you ſhould at firſt contrive how ſome may be deduced out of others, by an algebraic calculus: it ſuffices you remark in the general, that it may be deduced by ſome direct connexion. Thus, e. gr. if the queſtion be about the diameter of a circle, AD (*fig.* 8.) and three lines AB, BC, CD, inſcribed in a ſemicircle; whereof, the reſt being given, BC is required: it is evident, at firſt ſight, that the diameter AD determines the ſemicircle; as alſo, that the lines AB and CD, by inſcription, determine the points B and C, and conſequently BC required, and that by a direct connexion. Yet does not it appear how BC is deduced from the ſame data, by any analytical calculus.

4. Having conſidered the ſeveral ways wherein the terms of the queſtion may be explained and decompounded, chooſe ſome of the ſynthetic methods; aſſuming ſome lines, as given, from which there is the moſt eaſy acceſs, or progreſſion to the reſt, and to which the regreſſion is the moſt difficult. For, though the calculus may be carried on diverſe ways, yet muſt it begin with theſe lines; and the queſtion is more readily ſolved, by ſuppoſing it to be of theſe data, and ſome quæſitum readily flowing from them, than by conſidering the queſtion as it is actually propoſed.

Thus, in the example already given, if from the reſt of the quantities given, it were required to find AD; perceiving that this cannot be done ſynthetically; yet that if it were ſo done, I could proceed in my reaſoning on it in a direct connexion from one thing to others, I aſſume AD as given, and begin to compute as if it was really given, and ſome of the other quantities, viz. ſome of the given ones, as AB, BC, or CD, were ſought; and thus, by carrying on the computation, from the quantities aſſumed to the others, as the relations of the lines to one another direct, there will always be obtained an *equation* between two values of ſome one quantity; whether one of thoſe values be a letter ſet down as a repreſentation, or name, at the beginning of the work, for that quantity; and the other, a value of it found out by computation; or whether both be found by computation made different ways.

5. Having thus compared the terms of the queſtion in general, there is ſome farther thought and addreſs required, to find the particular connexions, or relations of the lines, fit for computation. For thoſe quantities which, to a perſon who does not ſo thoroughly conſider them, may ſeem immediately, and by a very near relation, connected together, when we come to expreſs that relation algebraically, are often found to require a longer circuit, and ſhall even oblige you to begin your ſchemes anew, and carry on your computation ſtep by ſtep, as may appear by finding BC, from AD, AB, and CD. For you are only to proceed by ſuch propoſitions, or enunciations, as can be fitly repreſented in algebraic terms, whereof there are ſeveral ariſing from Euclid, ax. 19. prop. 4. book vi. and prop. 47. lib. i. Elem.

To facilitate this diſcovery, of the relations of the lines in the figure, there are ſeveral things that contribute; as firſt, the addition and ſubtraction of lines; ſince from the values of the parts you may find the value of the whole; or from the value of the whole, and one of the parts, you may obtain the value of the other part. Secondly, by the proportionality of lines; ſince, as above ſuppoſed, the rectangle of the mean terms, divided by either of the extremes, gives the value of the other; or, which is the ſame thing, if the values of all four of the proportionals be firſt had, we make an equality (or *equation*) between the rectangles of the extremes and means. But the proportionality of lines is beſt found out by the ſimilarity of triangles; which, as it is known by the equality of their angles, the analyſt ought in particular to be converſant in. In order to which, it will be neceſſary that he be maſter of Euclid, prop. 5. 13. 15. 29. and 32. lib. i. and of prop. 4, 5, 6, 7, 8. lib vi. and of the 20, 21, 22. 27. and 31. lib. iii. To which may be added the 3d prop. lib. vi. or the 35th and 36th prop. lib. iii. Thirdly, the calculus is promoted by the addition or ſubtraction of ſquares; viz in right-angled triangles we add the ſquares of the leſſer ſides, to obtain the ſquare of the greater; or from the ſquare of the greater ſide we ſubtract the ſquare of one of the leſſer, to obtain the ſquare of the other. On which few foundations, if we add to them prop. 1. of the ſixth Elem. when the buſineſs relates to ſuperficies, and alſo ſome propoſitions taken out of the eleventh and twelfth books of Euclid, when ſolids come in queſtion, the whole analytic art, as to right-lined geometry, depends. Indeed, all the difficulties of problems may be reduced to the ſole compoſition of lines out of parts, and the ſimilarity of triangles; ſo that there is no occaſion to make uſe of other theorems, becauſe they may all be reſolved into theſe two, and conſequently into the ſolutions that may be drawn from them.

6. To accommodate theſe theorems to the ſolutions of problems, the ſchemes are oft times to be farther conſtructed, by producing out ſome of the lines, till they cut ſome others, or become of an aſſigned length; or by drawing lines parallel or perpendicular, from ſome remarkable point; or by conjoining ſome remarkable points; as alſo, ſometimes, by conſtructing them after other methods, according as the ſtate of the problems and the theorems, which are made uſe of to ſolve it, ſhall require.

As for example: if two lines that do not meet each other, make given angles with a certain third line, we may produce them ſo, that when they concur, or meet, they ſhall form a triangle, whoſe angles, and conſequently the ratio of their ſides, ſhall be given; or if any angle be given, or be equal to any one, we often complete it into a triangle given in ſpecie, or ſimilar to ſome other, and that by producing ſome of the lines in the ſcheme, or by drawing a line ſubtending an angle. If the triangle be an oblique angled one, we often reſolve it into two right-angled ones, by letting fall a perpendicular. If the buſineſs concern multilateral or many-ſided figures, we reſolve them into triangles, by drawing diagonal lines, and ſo in others; always aiming at this end, viz. that the ſcheme may be reſolved either into given, or ſimilar, or right-angled triangles.

Thus, in the example propoſed, draw the diagonal BD, that the trapezium ABCD may be reſolved into two triangles, ABD, a right-angled one, and BDC an oblique angled one (*fig.* 8.); then reſolve the oblique angled one into two right-angled triangles, by letting fall a perpendicular from any of its angles, B, C, or D, upon the oppoſite ſide; as from B upon CD produced to E, that BE may meet it perpendicularly. But ſince the angles BAD and BCD, make in the mean while two right ones (by 21. prop. 3. Eucl.), as well as BCE and BCD, the angles BAD and BCE are perceived to be equal; conſequently the triangles BCE and DAB to be ſimilar. And ſo the computation (by aſſuming AD, AB, and BC, as if CD were ſought) may be thus carried on; viz. AD and AB (becauſe of the right-angled triangle ABD) give you BD. AD, AB, BD, and BC (becauſe of the ſimilar triangles ABD and CEB) give BE and CE. BD and BE (becauſe of the right angled triangle BED) give ED; and ED−EC gives CD; whence there will be obtained an *equation* between the value of CD ſo found out, and the algebraic letter that denotes it. We may alſo (and for the greateſt part it is better ſo to do, than to follow the work too far in one continued ſeries) begin the computation from different principles, or at leaſt promote it by diverſe methods, to one and the ſame concluſion, that at length there may be obtained two values of any of the ſame quantity, which may be made equal to one another. Thus AD, AB, and BC, give BD, BE, and CE, as before; then CD+CE gives ED; and laſtly, DB, and ED (becauſe of the right-angled triangle BED) give BE.

7. Having concerted your method of procedure, and drawn your ſcheme, give names to the quantities that enter the computation (that is, from which aſſumed, the values of others are to be derived, till you come to an *equation*) chooſing ſuch as involve all the conditions of the problem, and ſeem beſt accommodated to the buſineſs, and which may render the concluſion (as far as you can gueſs) more ſimple, but yet not more than what ſhall be ſufficient for your purpoſe; wherefore do not give new names to quantities which may be nominated from names already given. Thus, of a whole line given, and its parts, of the three ſides of a right-angled triangle, and of three or four proportionals, ſome one of the leaſt conſiderable we leave without a name; becauſe its value may be derived from the names of the reſt. As in the example already brought, if I make $AD=x$, and $AB=a$, I denote BD by no letter, becauſe it is the third ſide of a right-angled triangle ABD, and conſequently its value is $\sqrt{xx-aa}$. Then if I ſay $BC=b$, ſince the triangles DAB and BCE are ſimilar, and thence the lines AD : AB :: BC : CE, to three whereof, viz. to AD, AB, and BC, there are already names given; for that reaſon I leave the fourth CE without a name, and in its room I make uſe of $\frac{ab}{x}$, diſcovered from the foregoing proportionality. And ſo if DC be called c, I give no name to DE, becauſe from its parts DC and CE, or c and $\frac{ab}{x}$, its value $c+\frac{ab}{x}$ comes out.

8. By this time the problem is almoſt reduced to an *equation*. For after the aforeſaid letters are ſet down from the ſpecies of the principal lines, there remains nothing elſe to be done, but that out of thoſe ſpecies the values of other lines be made out, according to a pre-conceived method, till after ſome foreſeen way they come to an *equation*. And there is nothing wanting in this caſe, except that by means of the right-angled triangles BCE and BDE, I can bring out a double value of BE, viz. $BC^2-CE^2\left(\text{or } bb-\frac{aabb}{xx}\right)=BE^2$; as alſo $BD^2-DE^2\left(\text{or } xx-aa-cc-\frac{2abc}{x}-\frac{aabb}{xx}\right)=BE^2$. And hence $\left(\text{expunging on both ſides } \frac{aabb}{xx}\right)$ you ſhall have the *equation* $bb=xx-aa-cc-\frac{2abc}{x}$; which being reduced, becomes $x^3=+aax+bbx+2abc+ccx$.

9. For the geometry of curve lines: we denote them either in deſcribing them by the local motion of right lines, or by uſing *equations* indefinitely expreſſing the relation of right lines diſpoſed in order, according to ſome certain law, and ending at the curve lines. See CONIC *Sections*.

The ancients did the ſame by the ſections of ſolids; but they effected it leſs commodiouſly. The computations which regard curves, deſcribed after the firſt manner, are performed as above directed: thus, ſuppoſe AKC (*fig.* 9.) a curve line, deſcribed by K, the vertical point of the right angle AKφ, whereof one leg, AK, freely ſlides through the point A given in poſition, while the other Kφ of a determinate length is carried along the right line AD, alſo given in poſition; and it is required to find the point C, in which any right line CD, given alſo in poſition, ſhall cut this curve: draw the right lines AC, CF, which may repreſent the right angle in the poſition ſought, and CB perpendicular to AF, and the relation of the lines (without any difference or regard of what is given or ſought, or any reſpect had to the curve) being conſidered, you perceive the dependency of the others upon CF, and any of theſe four, viz. BC, BF, AF, and AC, to be ſynthetical; two whereof you aſſume as $CF=a$, and $CB=x$; and beginning the computation from thence, you preſently obtain $BF=\sqrt{aa-xx}$, and $AB=\frac{xx}{\sqrt{aa-xx}}$, becauſe of the right angle CBF; and that the lines BF . BC :: BC . AB are continual proportionals. Moreover, from the given poſition of CD, AD is given, which therefore call *b*; there is alſo given the ratio of BC to BD, which ſuppoſe as d to e, and you have $BD=\frac{ex}{d}$, and $AB=b-\frac{ex}{d}$.

Therefore $b-\frac{ex}{d}=\frac{xx}{\sqrt{aa-xx}}$, an *equation*, which (by ſquaring its parts, and multiplying by $aa-xx$) will be reduced to this form.

$$x^4=\frac{2bdex^3+a^2e^2x^2-b^2d^2x^2-2aabdex+aabbdd}{dd+ee}.$$

Whence, laſtly, from the given quantities, a, b, d, and e, *x* may be found; and at that interval, or diſtance, *x* or BC, a right line drawn parallel to AD will cut CD in the point ſought, which is C.

If, inſtead of geometrical deſcriptions, we uſe *equations* to denote the curve lines by, the computations will thereby become as much ſhorter and eaſier, as the gaining of thoſe *equations* can make them. Thus, ſuppoſe the interſection C of the given ellipſis ACE, (*fig.* 10.) with the right line CD given in poſition, ſought; to denote the ellipſis, take ſome known *equation* proper to it, as $rx-\frac{r}{q}xx=yy$, where *x* is indefinitely put for any part of the axis Ab, or AB, and y for the perpendicular bc, or BC, terminated at the curve; and r and q are given for the given ſpecies of the ellipſis. Since therefore CD is given in poſition, AD will alſo be given, which call *a*; and BD will be $a-x$; alſo the angle ADC will be given, and thence the ratio of BD to BC, which call r to e; and BC (y) will be $=ea-ex$, whoſe ſquare $eeaa-2eeax+eexx$, will be equal to $rx-\frac{r}{q}xx$. And thence by reduction there will ariſe $xx=\frac{2aeex+rx-aaee}{ee+\frac{r}{q}}$, or $x=\frac{aee+\frac{1}{2}r\pm e\sqrt{ar+\frac{rr}{4ee}-\frac{aar}{q}}}{ee+\frac{r}{q}}$. Add, that tho' a curve be denominated by a geometrical deſcription, or by a ſection of a ſolid, yet thence an *equation* may be obtained, which ſhall define the nature of the curve, and conſequently all the difficulties of problems propoſed about it, may be reduced hither. Thus, in the former example, if AB be called *x*, and BC, y, the third proportional BF will be $\frac{yy}{x}$, whoſe ſquare, together with the ſquare of BC, is equal to CF^2; that is, $\frac{y^4}{xx}+yy=aa$; or $y^4+xxyy=aaxx$. And this is an *equation*, by which every point C, of the curve AKC, agreeing or correſponding to any length of the baſe (and conſequently the curve itſelf), is defined; and from whence conſequently you may obtain the ſolutions of problems propoſed concerning this curve.

After the ſame manner almoſt, when a curve is not given in ſpecie, but propoſed to be determined, you may feign an *equation* at pleaſure, that may contain its general nature; and aſſume this to denote it, as if it was given; that from its aſſumption you may ſome way arrive at *equations*, by which the aſſumptions may be determined.

What remains of the doctrine and practice of *equations*, relates to their reduction to the loweſt and ſimpleſt terms, the better to come at the value of the unknown quantity in the *equation*, and their geometrical conſtruction. See REDUCTION *of equations*.

EQUATIONS, *extraction of the roots of*. See EXTRACTION *of roots of equations*.

EQUATIONS, *conſtruction of*. See CONSTRUCTION *of equations*, and CURVE.

EQUATIONS, *converſion of*. See CONVERSION.

EQUATIONS, *adfected*, *eminential*, *exponential*, and *tranſcendental*. See the adjectives.

EQUATION *of payments*, in *Arithmetic*, is the method of reducing ſeveral debts payable at different times, and bearing no intereſt till after the term of payment to a ſingle debt or payment, to be diſcharged at once, without loſs either to debtor or creditor, allowing ſimple intereſt; or, it is the method of finding the equated term at which theſe ſeveral debts ſhould be paid in one ſum. Cocker, Hatton, Kerſey, Sir Samuel Moreland, and Ward, have given rules for this purpoſe, which Mr. Malcolm has examined and found to be erroneous; and though the error reſulting from any of the rules which they have propoſed is not very conſiderable, the following proceſs furniſhes one more accurate:

Let the debt firſt payable be called	d	The laſt payable debt	D
The diſtance of the term of payment	t	The diſtance of the term	T

The diſtance of the equated time x

The rate of intereſt, or 1 year's intereſt of 1*l.* r

The diſtance of the time t and x is $x-t$ } for x lies be-

The diſtance of the time T and x is $T-x$ } tween them.

Then the intereſt of d for the time $x-t$ is $dr\times\overline{x-t}$, or $drx-drt$, dr being one year's intereſt of d; and $\frac{DTr-Drx}{1+Tr-rx}$ is the diſcount of D for the time $T-x$, becauſe $Tr-rx$ is the intereſt of 1*l.* for that time, which is conſequently the diſcount of $1+Tr-rx$ for the ſame time; conſequently, from the nature of the queſtion we ſhall have $drx-drt=\frac{DTr-Drx}{1+Tr-rx}$; which, being reduced, gives $T+t+\frac{D+d}{dr}\times x-x^2=\frac{DT+dt}{dr}+Tt$. Then make $T+t+\frac{D+d}{dr}=a$, and $\frac{DT+dt}{dr}+Tt=s$, and $ax-x^2=s$; and, reſolving this quadratic equation, $x=\frac{a}{2}\pm\sqrt{\frac{a^2}{4}-s}$.

E. gr. Suppoſe 100*l.* payable one year hence, and 105*l.* payable three years hence; what is the equated time, allowing ſimple intereſt at 5 *per cent. per annum?*

Here $\begin{matrix}d=100\\t=1\end{matrix}\left\{\begin{matrix}D=105\\T=3\end{matrix}\right\}r=.05$.

Then $D+d=205$, $dr=5$, and $\frac{D+d}{dr}=\frac{205}{5}=41$.

And $T+t+\frac{D+d}{dr}$, or $a=4+41=45$.

And s or $\frac{DT+dt}{dr}+Tt=\frac{315+100}{5}+3=83+3=86$.

Conſequently,

$$x=\frac{45}{2}\pm\sqrt{\frac{2025}{4}-86}=\frac{45}{2}\pm\sqrt{506.25-86}=22.5\pm\sqrt{420.25}=22.5\pm20.5=43 \text{ or } 2:$$

but 43 cannot be the true anſwer by the conditions of the queſtion, ſince it is greater than the diſtance of the laſt term in the queſtion; and therefore 2 is the anſwer required.

If there are more debts than two, you muſt firſt find an equated time for the two that are firſt payable; then conſider their ſum as a debt payable at that equated time, and find another equated time for that debt and the next of the given debts, &c. See Malcolm's Arithm. book vi. § 5. or p. 616—621.

Equation *of time*, in *Aſtronomy*, denotes the difference between mean and apparent time, or the reduction of the apparent unequal time, or motion of the ſun or a planet, to equable and mean time, or motion.

Time is only meaſured by motion; and as time in itſelf flows ever equably, to meaſure it, ſuch a motion muſt be uſed as is equable, or which always proceeds at the ſame rate.

The motion of the ſun is commonly uſed for this purpoſe, as it is the moſt eaſy to be obſerved; yet it wants the great qualification of a chronometer, which is equability. In effect, the aſtronomers find, that the ſun's apparent motion is no ways equal; that he now and then ſlackens his pace, and afterwards quickens it again; and conſequently equal time cannot be meaſured thereby. See Sun.

Hence the time which the ſun's motion ſhews, called the *apparent time*, becomes different from the true and equable time, ſhewn by a well-regulated clock, wherein all the celeſtial motions are to be eſtimated and accounted; ſo that the time ſhewn by ſuch a clock and a true ſun-dial is never the ſame, but on the 15th of April, the 16th of June, the 31ſt of Auguſt, and the 24th of December. See the annexed table.

This inequality of time is thus accounted for: the natural or ſolar day is meaſured not properly by one entire revolution of the equinoctial, or 24 equinoctial hours, but by the time which paſſes while the plane of a meridian, paſſing through the center of the ſun, does, by the earth's converſion round its axis, return again to the ſun's center, which is the time between one midday and the next.

Now, had the earth no other motion but that round its axis; all the days would be preciſely equal to each other, and to the time of the revolution of the equinoctial; but the caſe is otherwiſe; for while the earth is turning round its axis, it is likewiſe proceeding forward in its orbit. So that when a meridian has completed a whole revolution from the ſun's center, its plane has not yet arrived at the ſun's center again, as will appear from the figure.

Let the ſun be S (*Tab. Aſtron. fig.* 50.); and let A B be a portion of the ecliptic; let the line M D repreſent any meridian, whoſe plane produced, paſſes through the ſun when the earth is in A. Let the earth proceed in its orbit; and in making one revolution round its axis, let it arrive at B; then will the meridian M D be in the poſition m d parallel to the former M D; and conſequently this has not yet paſſed through the ſun, nor have the inhabitants under that meridian yet had their midday: but the meridian d m muſt ſtill proceed with its angular motion, and deſcribe the angle d B f before its plane can paſs through the ſun.

Hence, it appears that the ſolar days are all longer than the time of one revolution of the earth round its axis.

However, were the planes of all the meridians perpendicular to the plane of the earth's orbit, and did the earth proceed with an equal motion in its orbit, the angle d B f would be equal to the angle B S A, and the arches *d* f and A B would be ſimilar; conſequently, the times would be always equal, the arch A B, and the angle d B f, of the ſame quantity, all the ſolar days equal to each other, and the apparent and real time agree.

But as it is, neither of thoſe is the caſe; for the earth does not proceed in its orbit with an equable motion; but in its aphelion deſcribes a leſs arch, and in its perihelion a greater, in the ſame time; beſides, the planes of the meridians are not perpendicular to the ecliptic, but to the equator; conſequently, the time of the angular motion d B f, which is to be added to the entire revolution in order to make a whole day, is not always of exactly the ſame quantity.

The ſame will be found, if ſetting aſide the conſideration of the real motion of the earth, we conſider the apparent motion of the ſun in lieu thereof, as being what we meaſure time by. On this principle we obſerve, that the day not only includes the time of one revolution of the globe on its axis, but it is increaſed by ſo much as anſwers to that part of the ſun's motion performed in that time: for when that part of the equinoctial, which, with the ſun, was at the meridian yeſterday at noon, is come thither again to-day, it is not yet noon, the ſun not being now at the place where he yeſterday was, but gone forward near a degree, more or leſs; and this additament above the 24 equinoctial hours is upon a double account unequal.

1. In that the ſun, becauſe of his apogee and perigee, does not at all times of the year diſpatch an equal arch of the ecliptic in one day, but greater arches near the perigæum, which, in the preſent century, is on the 30th of December; and leſſer nearer the apogæum, which is on the 30th of June.

2. In that though the ſun ſhould always move equably in the ecliptic, yet equal arches of the ecliptic do not, in all parts of the zodiac, anſwer to equal arches of the equator, by which we are to eſtimate time, becauſe ſome parts thereof, as the two ſolſtitial points, lie nearer to a parallel poſition to the equinoctial than others, e. gr. thoſe about the equinoctial points where the ecliptic and equinoctial interſect. Whereupon an arch of the ecliptic near the ſolſtitial points anſwers to a greater arch of the equinoctial than an arch equal to it near the equinoctial points.

The apparent motion of the ſun to the eaſt then being unequal, the natural and apparent days are no ways proper to be applied to meaſure the celeſtial motions, which have no dependence on that of the ſun.

And hence aſtronomers have been obliged to invent other days for the uſe of their calculations; thoſe others are equal, and are a mean between the ſhorteſt and longeſt of the unequal ones.

Theſe are had by conſidering the number of hours in the whole revolution of the ſun in the ecliptic, and dividing the whole time into as many equal parts as there are hours, 24 of which conſtitute the day; and the reduction of the days conſtitutes the *equation* of natural days.

Conſequently, computing theſe motions according to equal time, it is neceſſary to turn that time back again into apparent time, that they may correſpond to obſervation: on the contrary, any phenomenon being obſerved, the apparent time thereof muſt be converted into equal time, to have it correſpond with the times marked in the aſtronomical tables. As we do not know of any body in nature that moves equably, yet ſuch a motion being alone proper to meaſure equal days and hours; it has been thought fit to imagine ſome body, e. gr. a ſtar moving in the equator eaſtward, and never quickening or ſlackening its pace, but going through the equator in preciſely the ſame time as the ſun finiſhes his period in the ecliptic.

The motion of ſuch a ſtar will repreſent equal time, and its diurnal motion of the equator will be 59′ 8″, the ſame as the mean or equated motion of the ſun in the ecliptic; conſequently, the mean or equable day is determined by the arrival of the ſtar at the meridian, and is equal to the time wherein the whole circumference of the equator or 360° paſs the meridian, and 59′ 8″ more: which addition of 59′ 8″ remaining always the ſame, theſe mean or equated days will be conſtantly equal.

Since then the ſun goes unequally eaſtwards with reſpect to the equator, it will ſometimes arrive at the meridian ſooner than this imaginary ſtar, and ſometimes later: the difference is the difference between true and apparent time; which difference is known by having the place of the imaginary ſtar in the equator, and the point of the equator which comes to the meridian with the ſun; for the arch intercepted between them being converted into time, ſhews the difference between equal and apparent time, which, as before, is called the *equation of time.*

The *equation of time,* then, may be defined: the time that flows while the arch of the equator intercepted between the point determining the right aſcenſion of the ſun, and the place of the imaginary ſtar, paſſes the meridian; or as Tycho, and after him Street, ſtate it, it is the difference between the ſun's true longitude and his right aſcenſion.

To EQUATE *ſolar days,* that is, *to convert apparent into mean time, and mean into apparent time.* 1. If the ſun's right aſcenſion be equal to his mean motion, the imaginary and true ſun will paſs the meridian at the ſame time; conſequently, the true coincides with the apparent time.

2. If the right aſcenſion be greater than the mean motion, ſubtract the latter from the former; and turning the difference into ſolar time, either ſubtract it from the apparent time to find the mean time; or add it to the mean time to find the apparent.

3. Laſtly, if the right aſcenſion be leſs than the mean motion, ſubtract the former from the latter; and turning the difference into ſolar time, either add it to the apparent time to find the mean time, or ſubtract it from the mean time to find the apparent.

This method of *equation* obtains, if the calculus be progreſſive; if it be retrogade, that is, if the time be reckoned backwards, the operation muſt be juſt the reverſe.

Or, find the mean and true anomalies for any propoſed day; their difference will be the EQUATION *of the center.* The true anomaly gives the ſun's longitude, with which, and the obliquity of the ecliptic, compute the right aſcenſion; then add or ſubtract the difference between the longitude and right aſcenſion to or from the *equation* of the center, and the ſum or difference converted into time, gives the *equation* ſought.

This doctrine of the inequality and *equation* of natural days is not only of uſe in aſtronomical obſervations, but alſo in the adjuſting and directing of clocks, watches, and other time-keepers: hence we ſee why a pendulum or other movement, which meaſures apparent equal time, does not keep pace with the ſun, which meaſures apparent time, but is ſometimes before, and ſometimes later than the ſame. Whence ſuch automata and ſun-dials are neceſſarily found almoſt perpetually at variance.

The variations of the two kinds of time are exhibited in the following tables for every day throughout the year. Mr. Flamſteed was the firſt who fully demonſtrated and cleared this inequality of natural days; though others, and even Ptolemy, had a partial notion of it.

The uſe of the tables is obvious; a clock or watch that is to be kept to true or equal time, muſt be ſo many minutes and ſeconds faſter or ſlower than a ſun-dial, as is aſſigned in the tables for the reſpective day; or if you would have it go by the ſun-dial, it goes well if it gains or loſes each day the number of minutes and ſeconds in the tables. See CLOCK.

TABLES of the EQUATION of natural Days, for regulating Clocks and Watches by the Sun.

TABLE I. for Biſſextile or Leap-Year.

Days	Jan.		Feb.		March		April		May		June		July		Auguſt		Sept.		Oct.		Nov.		Dec.	
	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.
1	4	0	14	3	12	31	3	44	3	13	2	34	3	25	5	50	0	28	10	35	16	14	10	18
2	4	28	14	10	12	19	3	25	3	20	2	24	3	36	5	46	0	47	10	54	16	14	9	55
3	4	56	14	17	12	5	3 Clock too faſt	7	3	27	2 Clock too ſlow	15	3	47	5	41	1 Clock too ſlow	6	11	12	16	13	9	31
4	5	24	14	23	11	51	2	49	3	33	2	5	3	58	5	35	1	28	11	30	16	12	9	6
5	5	51	14	27	11	37	2	31	3	39	1	55	4	8	5	29	1	45	11	48	16	9	8	40
6	6	17	14	32	11	23	2	13	3	43	1	44	4	18	5	23	2	5	12	5	16	6	8	12
7	6	43	14	35	11	8	1	56	3	48	1	33	4	28	5	16	2	25	12	21	16	2	7	48
8	7 Clock too faſt	9	14 Clock too faſt	37	10 Clock too faſt	52	1	39	3	52	1	22	4	37	5	8	2	46	12 Clock too ſlow	38	15 Clock too ſlow	57	7	21
9	7	34	14	39	10	36	1	22	3	55	1	10	4	46	5	0	3	6	12	53	15	51	6	54
10	7	58	14	40	10	20	1	5	3	57	0	58	4	54	4	51	3	27	13	9	15	45	6	26
11	8	22	14	40	10	4	0	49	3	59	0	46	5	2	4	42	3	47	13	23	15	37	5	58
12	8	46	14	39	9	47	0	33	4	1	0	34	5	10	4	32	4	8	13	38	15	29	5	29
13	9	8	14	38	9	30	0	18	4 Clock too ſlow	1	0	21	5 Clock too faſt	17	4 Clock too faſt	22	4	29	13	52	15	19	5	0
14	9	31	14	36	9	13	0	2	4	1	0	9	5	24	4	11	4	49	14	5	15	9	4	31
15	9	52	14	33	8	56	0 *	13	4	1	0 *	4	5	30	3	59	5	10	14	17	14	58	4	2
16	10	13	14	30	8	38	0	27	4	0	0	17	5	36	3	47	5	31	14	29	14	47	3	32
17	10	33	14	26	8	20	0	41	3	58	0	30	5	41	3	35	5	52	14	41	14	34	3	3
18	10	53	14	21	8	2	0 Clock too ſlow	55	3	56	0 Clock too faſt	43	5	46	3	22	6	13	14	52	14	21	2	33
19	11	11	14	15	7	44	1	8	3	54	0	56	5	50	3	8	6	34	15	2	14	7	2	3
20	11	29	14	9	7	26	1	21	3	50	1	9	5	54	2	54	6	55	15	12	13	52	1	33
21	11	47	14	2	7	8	1	34	3	47	1	22	5	57	2	39	7	16	15	21	13	36	1	3
22	12	3	13	54	6	49	1	46	3	42	1	35	5	59	2	24	7	36	15	29	13	20	0	33
23	12	19	13	46	6	31	1	57	3	38	1	48	6	1	2	9	7	57	15	37	13	2	0	3
24	12	34	13	37	6	12	2	9	3	32	2	1	6	2	1	53	8	18	15	44	12	44	0 *	27
25	12	48	13	28	5	54	2	19	3	26	2	13	6	3	1	37	8	38	15	51	12	25	0 Clock too faſt	57
26	13	1	13	18	5	35	2	29	3	20	2	26	6	3	1	20	8	58	15	56	12	6	1	26
27	13	14	13	7	5	16	2	39	3	14	2	38	6	2	1	3	9	18	16	1	11	46	1	56
28	13	25	12	56	4	58	2	48	3	6	2	50	6	1	0	45	9	38	16	5	11	25	2	25
29	13	36	12	44	4	39	2	57	2	59	3	2	5	59	0	28	9	57	16	9	11	46	2	54
30	13	46			4	20	3	5	2	51	3	14	5	57	0	9	10	16	16	11	10	41	3	23
31	13	55			4	2			2	42			5	54	0 *	9			16	13			3	52

TABLE II. for the Firſt Year after Leap-Year.

Days	Jan.		Feb.		March		April		May		June		July		Auguſt		Sept.		Oct.		Nov.		Dec.	
	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.
1	4	20	14	8	12	34	3	47	3	12	2	37	3	21	5	50	0	23	10	30	16	13	10	22
2	4	48	14	15	12	21	3	29	3	20	2	28	3	33	5	47	0	42	10	49	16	13	9	59
3	5	16	14	21	12	8	3 Clock too faſt	11	3	26	2	18	3	44	5	42	1 Clock too ſlow	1	11	7	16	12	9	35
4	5	43	14	26	11	54	2	53	3	32	2	8	3	55	5	37	1	20	11	25	16	11	9	10
5	6	10	14	30	11	40	2	35	3	38	1	57	4	6	5	31	1	40	11	42	16	9	8	45
6	6	36	14	34	11	26	2	18	3	43	1	47	4	16	5	25	1	59	11	59	16	6	8	19
7	7	2	14	37	11	11	2	0	3	47	1	36	4	26	5	18	2	19	12	16	16	2	7	53
8	7 Clock too faſt	28	14 Clock too faſt	39	10	56	1	43	3	50	1 Clock too ſlow	24	4	35	5	11	2	40	12	32	15	57	7	20
9	7	53	14	40	10	41	1	27	3	54	1	13	4	44	5	3	3	0	12	48	15	51	6	59
10	8	17	14	41	10	25	1	10	3	56	1	1	4	53	4	54	3	21	13	4	15	45	6	31
11	8	41	14	41	10	9	0	54	3	58	0	49	5	1	4	45	3	41	13	19	15	38	6	3
12	9	4	14	39	9	52	0	38	4	0	0	36	5	9	4	36	4	2	13	33	15	30	5	35
13	9	26	14	38	9 Clock too faſt	35	0	22	4 Clock too ſlow	1	0	24	5 Clock too faſt	16	4 Clock too faſt	25	4	23	13 Clock too ſlow	47	15 Clock too ſlow	21	5 Clock too ſlow	7
14	9	48	14	35	9	18	0	7	4	1	0	12	5	23	4	14	4	44	14	1	15	11	[illegible]	38
15	10	9	14	32	9	1	0 *	8	4	1	0 *	1	5	29	4	2	5	5	14	14	15	1	4	9
16	10	29	14	27	8	43	0	23	4	0	0	13	5	35	3	50	5	26	14	26	14	50	3	39
17	10	45	14	22	8	25	0	37	3	59	0	26	5	40	3	37	5	47	14	38	14	37	3	10
18	11	7	14	17	8	7	0 Clock too faſt	51	3	57	0 Clock too faſt	39	5	44	3	24	6	8	14	49	14	24	2	40
19	11	25	14	11	7	49	1	5	3	55	0	52	5	48	3	11	6	29	15	0	14	10	2	10
20	11	43	14	4	7	31	1	18	3	52	1	5	5	52	2	57	6	50	15	6	13	56	1	40
21	11	59	13	56	7	12	1	31	3	48	1	17	5	55	2	42	7	11	15	19	13	40	1	10
22	12	15	13	48	6	54	1	43	3	44	1	31	5	57	2	27	7	32	15	28	13	24	0	40
23	12	30	13	39	6	35	1	55	3	40	1	43	5	59	2	12	7	53	15	36	13	7	0	10
24	12	44	13	29	6	16	2	7	3	35	1	56	6	1	1	56	8	13	15	43	12	49	0 *	20
25	12	57	13	19	5	58	2	18	3	29	2	9	6	1	1	40	8	33	15	49	12	30	0	50
26	13	1	13	9	5	39	2	28	3	23	2	21	6	1	1	23	8	53	15	55	12	11	1 Clock too faſt	20
27	13	2	12	58	5	20	2	38	3	17	2	39	6	1	1	6	9	13	16	0	11	50	1	49
28	13	32	12	46	5	1	2	47	3	10	2	46	6	0	0	49	9	33	16	4	11	29	2	19
29	13	42			4	43	2	56	3	2	2	58	5	59	0	31	9	52	16	7	11	8	2	48
30	13	52			4	24	3	5	2	54	3	19	5	56	0	14	10	11	16	10	10	45	3	18
31	14	0			4	6			2	46			5	54	0 *	4			16	12			3	47

TABLE III. for the Second Year after Leap-Year.

Days	Jan.		Feb.		March		April		May		June		July		Aug.		Sept.		Octob.		Nov.		Dec.	
	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.
1	4	15	14	8	12	38	3	53	3	10	2	38	3	19	5	52	0	18	10	25	16	12	10	28
2	4	43	14	15	12	25	3	34	3	17	2	29	3	31	5	48	0	37	10	44	16	13	10	5
3	5	11	14	21	12	12	3	16	3	24	2	20	3	42	5	43	0 Clock too ſlow	56	11	3	16	13	9	41
4		38	14	26	11	59	2	58	3	30	2	10	3	53	5	38	1	16	11	21	16	12	9	17
5	6	5	14	31	11	45	2 Clock too faſt	40	3	36	2	0	4	3	5	33	1	35	11	38	16	10	8	52
6	6	32	14	34	11	30	2	23	3	41	1	49	4	13	5	26	1	55	11	56	16	7	8	26
7	6	58	14	37	11	16	2	5	3	45	1 Clock too ſlow	38	4	23	5	19	2	15	12	13	16	4	8	0
8	7	23	14	39	11	1	1	48	3	50	1	27	4	32	5	12	2	36	12	29	15	59	7	34
9	7	48	14	41	10	45	1	31	3	53	1	16	4	41	5	4	2	56	12	46	15	54	7	7
10	8	14	14 Clock too faſt	41	10	29	1	14	3	56	1	5	4	50	4	55	3	17	13	1	15 Clock too ſlow	48	6 Clock too ſlow	39
11	8 Clock too faſt	36	14	41	10 Clock too faſt	13	0	57	3	58	0	53	4	58	4	46	3	37	13 Clock too ſlow	16	15	41	6	11
12	8	59	14	40	9	56	0	41	4	0	0	41	5 Clock too faſt	6	4	36	3	58	13	31	15	33	5	43
13	9	21	14	38	9	39	0	25	4 Clock too ſlow	1	0	29	5	13	4 Clock too faſt	26	4	19	13	45	15	24	5	15
14	9	43	14	35	9	22	0	9	4	2	0	16	5	20	4	15	4	40	13	59	15	15	4	46
15	10	4	14	32	9	5	0 *	6	4	2	0	4	5	26	4	4	5	1	14	12	15	4	4	16
16	10	24	14	28	8	47	0	21	4	2	0 *	9	5	32	3	52	5	22	14	24	14	53	3	47
17	10	44	14	23	8	29	0	35	4	1	0	22	5	37	3	40	5	43	14	36	14	40	3	17
18	11	2	14	18	8	11	0 Clock too ſlow	42	3	59	0	35	5	4	3	27	6	4	14	47	14	27	2	47
19	11	21	14	12	7	53	1	3	3	56	0 Clock too faſt	48	5	47	3	14	6	24	14	58	14	14	2	17
20	11	38	14	5	7	35	1	16	3	53	1	1	5	50	3	0	6	45	15	7	13	59	1	47
21	11	55	13	58	7	16	1	29	3	50	1	14	5	54	2	46	7	6	15	17	13	43	1	17
22	12	11	13	50	6	58	1	41	3	46	1	27	5	57	2	31	7	26	15	25	13	27	0	47
23	12	26	13	41	6	39	1	53	3	41	1	40	5	59	2	16	7	47	15	33	13	10	0	17
24	12	41	13	32	6	21	2	4	3	36	1	53	6	0	2	0	8	8	15	4	12	52	0 *	13
25	12	54	13	22	6	2	2	15	3	31	2	6	6	1	1	44	8	28	15	47	12	34	0	44
26	13	7	13	12	5	43	2	26	3	25	2	18	6	2	1	28	8	48	15	53	12	15	1 Clock too faſt	13
27	13	19	13	1	5	25	2	35	3	18	2	31	6	2	1	11	9	8	15	58	11	55	1	43
28	13	31	12	50	5	6	2	45	3	11	2	43	6	1	0	54	9	27	16	2	11	34	2	12
29	13	41			4	48	2	54	3	8	2	56	6	0	0	37	9	47	16	6	11	13	2	42
30	13	51			4	29	3	2	2	55	3	7	5	58	0	19	10	6	16	9	10	51	3	11
31	13	60			4	11			2	47			5	55	*	1			16	11			3	39

TABLE IV. for the Third Year after Leap-Year.

Days	Jan. M.	Jan. S.	Feb. M.	Feb. S.	March M.	March S.	April M.	April S.	May M.	May S.	June M.	June S.	July M.	July S.	Aug. M.	Aug. S.	Sept. M.	Sept. S.	Octob. M.	Octob. S.	Nov. M.	Nov. S.	Dec. M.	Dec. S.
1	4	8	14	5	12	40	3	57	3	8	2	40	3	16	5	52	0	14	10	22	16	14	10	35
2	4	36	14	12	12	28	3	38	3	15	2	31	3	28	5	49	0	33	10	41	16	14	10	12
3	5	3	14	18	12	15	3 Clock too faſt	20	3	22	2	22	3	39	5	44	0	52	10	59	16	14	9	48
4	5	31	14	24	12	1	3	2	3	29	2	12	3	50	5	39	1	11	11	17	16	13	9	24
5	5	57	14	28	11	47	2	44	3	35	2	2	4	0	5	34	1 Clock too ſlow	31	11	35	16	11	8	59
6	6	24	14	32	11	33	2	26	3	40	1 Clock too ſlow	52	4	11	5	28	1	51	11	52	16	8	8	33
7	6	50	14	35	11	18	2	9	3	45	1	41	4	21	5	31	2	11	12	9	16	5	8	7
8	7	15	14	38	11	3	1	51	3 Clock too ſlow	49	1	30	4	30	5	14	2	31	12	26	16	1	7	40
9	7	40	14	39	10	48	1	34	3	52	1	18	4	39	5	6	2	51	12 Clock too ſlow	42	15	55	7	13
10	8	5	14	40	10	32	1	17	3	55	1	7	4	48	4 Clock too faſt	58	3	11	12	57	15 Clock too ſlow	49	6	46
11	8 Clock too faſt	29	14	40	10	16	1	1	3	58	0	55	4 Clock too faſt	57	4	49	3	32	13	12	15	42	6	18
12	8	52	14	39	9 Clock too faſt	59	0	45	3	59	0	43	5	5	4	39	3	53	13	27	15	35	5	50
13	9	15	14 Clock too faſt	38	9	43	0	29	4	1	0	30	5	12	4	29	4	13	13	41	15	26	5	21
14	9	37	14	36	9	26	0	14	4	1	0	18	5	19	4	19	4	34	13	55	15	17	4	52
15	9	58	14	33	9	9	0	1	4	1	0	5	5	26	4	8	4	55	14	8	15	6	4	23
16	10	19	14	29	8	51	0	16	4	0	0	8	5	32	3	56	5	16	14	20	14	55	3	54
17	10	39	14	25	8	34	0	31	3	59	0	21	5	38	3	44	5	37	14	32	14	43	3	24
18	10	58	14	20	8	16	0 Clock too ſlow	45	3	57	0	34	5	43	3	3	5	58	14	44	14	31	2	55
19	11	17	14	14	7	58	0	58	3	55	0 Clock too faſt	47	5	47	3	18	6	19	14	55	14	17	2	25
20	11	37	14	7	7	40	1	12	3	52	1	0	5	51	3	4	6	40	15	0	14	3	1	55
21	11	52	14	0	7	22	1	24	3	49	1	13	5	55	2	50	7	1	15	15	13	48	1	25
22	12	8	13	52	7	3	1	37	3	45	1	26	5	57	2	36	7	22	15	24	13	32	0	55
23	12	23	13	44	6	45	1	49	3	41	1	38	6	0	2	20	7	42	15	33	13	15	0	25
24	12	38	13	35	6	26	2	0	3	36	1	51	6	1	2	4	8	3	15	39	12	58	0	5
25	12	52	13	25	6	7	2	12	3	31	2	4	6	2	1	48	8	23	15	46	12	40	0	35
26	13	5	13	15	5	49	2	22	3	25	2	16	6	2	1	32	8	44	15	52	12	21	1	4
27	13	17	13	4	5	30	2	32	3	19	2	29	6	2	1	15	9	4	15	58	12	1	1	34
28	13	28	12	52	5	11	2	42	3	12	2	41	6	1	0	58	9	24	16	3	11	41	2	4
29	13	38			4	52	2	51	3	5	2	53	6	0	0	40	9	43	16	7	11	20	2	33
30	13	48			4	34	3		2	57	3	5	5	58	0	22	10	3	16	10	10	58	3	2
31	13	57			4	15			2	49			5	55	0	4			16	12			3	31

N. B. No tables of this kind can be perpetual, becauſe the preceſſion of the equinox, and the variation of the ſun's apogee produce a change in the inequality of his motion at the end of every year; but this change is ſo ſmall, that the ſame tables will ſerve without any ſenſible error for many years.

See tables of *equation of time* computed for every year, in the Nautical Almanac, by a method propoſed and illuſtrated by Mr. Maſkelyne, the aſtronomer royal, viz. by taking the difference of the ſun's true right aſcenſion and his mean longitude, corrected by the *equation* of the equinoxes in right aſcenſion, and turning it into time at the rate of 1′ of time to 15′ of right aſcenſion. Phil. Tranſ. vol. liv. art. 56. p. 336.

EQUATION, *abſolute.* See ABSOLUTE.

EQUATION *of the center*, called alſo *proſthaphæreſis*, and *total proſthaphæreſis*, is the difference between the true and mean place of a planet, or the angle made by the lines of the true and mean place; or which amounts to the ſame, between the mean and equated ANOMALY.

The greateſt *equation of the center* may be obtained by finding the ſun's longitude at the times when he is near his mean diſtances, the difference will give the true motion for that interval of time: then find the ſun's mean motion for that interval of time, and half the difference between the true and mean motions will ſhew the greateſt *equation of the center.* E. G.

By obſervations made at the Obſervatory at Greenwich, it appears that

	d.	h.	′	″		ſ	°	′	″
1769, Oct. 1, at	23	49	12		mean time, ſun's long. was	6	9	32	0.6
1770, March 29, at	0	4	50		mean time, ſun's long. was	0	8	50	27.5
The difference of time	178	0	15	38	True difference of long.	5	29	18	27

		d.	h.	′	″		
The tropical year	=	365	5	48	42	=	365,2421527.
The obſerved interval	=	178	0	15	38	=	178,01085648.

Then 365,2421527 : 178,01085648 :: 360° : 175,455948 mean motion. Therefore, 175° 27′ 21″ of mean motion anſwers to 179° 18′ 27″ true motion. Their difference = 3° 51′ 6″, and half this difference, viz. 1° 55′ 33″ is the greateſt *equation of the center* according to theſe obſervations.

To find the *equation of the center*, or to ſolve (what is called) *Kepler's* PROBLEM, is a very difficult operation, particularly in orbits, whoſe excentricity bears a conſiderable proportion to the mean difference: how this is to be done has been ſhewn by Newton, Gregory, Keil, Machin, La Caille, and others, by methods little differing from one another, which conſiſt chiefly in finding an intermediate angle, called the *excentric anomaly*; the mean anomaly and the dimenſions of the ſun's orbit being known. The mean anomaly is eaſily found, by determining the exact time of the ſun's paſſage through the aphelion, and uſing the following proportion, viz. as the time of a tropical revolution or ſolar year is to the interval between the aphelion and given time, ſo is 360° to the degrees of the mean anomaly; or, it may be found by taking the ſun's mean motion at the given time out of tables.

To find the excentric anomaly, let ADP (*Tab.* II. *Aſtronomy, fig.* 73.) be the excentric, AEP the earth's orbit, C the center, S the ſun, A the aphelion, P the perihelion, E the true place, D the correſponding place in the excentric, and B the mean place. In orbits of ſmall excentricities the true and mean places E and B approach one another, and the lines CD and SB approach to parallelism or coincidence; and therefore they may be conſidered as parallel, eſpecially in the earth's orbit, where CS is only about $\frac{1}{60}$ of CP: conſequently, ASB = ACD the excentric anomaly.

Then, in the triangle BCS, BC + CS = SA, and BC − CS = SP, and the angle BCS = ſupplement of ACB, are known, and therefore the angle CSB may be found; for, by a well-known trigonometrical theorem, CS + BC (= SA) : BC − CS (= SP) :: tang. $\frac{CSB+B}{2}$, or $\frac{1}{2}$ ACB : tang. of $\frac{CSB-B}{2}$, or of an arc, which added to $\frac{1}{2}$ ACB, will give CSB, the excentric anomaly; therefore, it may be found by the following proportion, as the aphelion diſtance is to the perihelion diſtance, ſo is the tangent of half the mean anomaly to the tangent of an arc, which, added to half the mean anomaly, will give the excentric anomaly. Then,

To find the true anomaly from the given excentric anomaly, and the dimenſions of the orbit, let a ſemicircle be deſcribed from E through the other focus *s*, interſecting AP in *s*, I, and SE, produced in G and H. Then, by Euclid, lib. iii. prop. 36. SH : SI :: S*s* : SG $= \left(\frac{SI \times Ss}{SH} = \frac{\overline{Ss + SI} \times Ss}{SE + Es}, =\right) \frac{2CF \times 2CS}{2CA}$, the chord *s*I being biſected by the perpendicular from the center DF. Therefore, CF × CS = ($\frac{1}{2}$SG =) $\frac{1}{2}$SE − $\frac{1}{2}$E*s*; CA (= $\frac{1}{2}$SE + $\frac{1}{2}$E*s*) being radius; or conſequently, SE = ($\overline{1 + CS} \times$ CF, ſince the half difference of two quantities added to their half ſum gives the greater of them, =) $\overline{1 + CS} \times$ coſine, or Σ, ACD. Again, in the triangle SFE, SE : R :: SF : Σ, ASE $= \left(\frac{SF}{SE} =\right) \frac{SC + \Sigma, ACD}{1 + SC \times \Sigma, ACD}$. Then 1 + Σ, ASE : 1 − Σ, ASE $:: 1 + \frac{SC + \Sigma, ACD}{1 + SC \times \Sigma, ACD} : 1 - \frac{SC + \Sigma, ACD}{1 + SC \times \Sigma, ACD}$: or,

$$\frac{1 - \Sigma.\, ASE}{1 + \Sigma.\, ASE} = \left(\frac{1 + SC \times \Sigma.\, ACD - SC - \Sigma.\, ACD}{1 + SC \times \Sigma.\, ACD + SC + \Sigma.\, ACD} = \frac{1 - SC + SC \times \Sigma.\, ACD - \Sigma.\, ACD}{1 + SC + SC \times \Sigma.\, ACD + \Sigma.\, ACD} = \frac{SP + \overline{CS - 1} \times \Sigma.\, ACD}{SA + \overline{CS + 1} \times \Sigma.\, ACD} = \frac{SP - \Sigma.\, ACD \times SP}{SA + \Sigma.\, ACD \times SA} =\right) \frac{1 - \Sigma.\, ACD \times SP}{1 + \Sigma.\, ACD \times SA}.$$

But it is demonſtrated by trigonometrical writers, that radius leſs the coſine of an arc divided by radius more the coſine of an arc is equal to the ſquare of the tangent of half that arc divided by the ſquare of the radius; therefore,

$\frac{1-\Sigma.\,ASE}{1+\Sigma.\,ASE}=T^2,\ \frac{1}{2}\,ASE$; and $\frac{1-\Sigma.\,ACD}{1+\Sigma.\,ACD}\times\frac{SP}{SA}=T^2,\ \frac{1}{2}\,ACD\times\frac{SP}{SA}$.

Then, $\frac{SP}{SA}\times T^2,\ \frac{1}{2}\,ACD=T^2.\ \frac{1}{2}\,ASE$, or $\frac{SP}{SA}=\frac{T^2.\ \frac{1}{2}\,ASE}{T^2.\ \frac{1}{2}\,ACD}$.

Therefore, $\frac{\sqrt{SP}}{\sqrt{SA}}=\frac{T.\ \frac{1}{2}\,ASE}{T.\ \frac{1}{2}\,ACD}$; and $\sqrt{SA}:\sqrt{SP}::T\frac{1}{2}\,ACD:T\frac{1}{2}\,ASE$.

Whence we have the following theorem; as the ſquare root of the aphelion diſtance is to the ſquare root of the perihelion diſtance, ſo is the tangent of half the excentric anomaly to the tangent of half the true anomaly.

The difference between the true and mean anomaly, or the angle CQS=ACB−ASE, is the *equation of the center*, which muſt be ſubtracted, from the aphelion to the perihelion, or in the firſt ſix ſigns of anomaly, and added, from the perihelion to the aphelion, or in the ſix laſt ſigns of anomaly, and hence called PROSTHAPHÆRESIS.

For the lines CB, SE, C*b*, SE, which coincide in SA, SP, will in every other poſition croſs one another; in Q, while revolving from A to P, and in *q*, while revolving from P to A: in the firſt half revolution, the mean anomaly, or the external angle ACB exceeds the angle ASE, the true anomaly, by the angle CQS; in the latter half, the true anomaly, or external angle PS*a*, exceeds the mean anomaly or the angle PC*b* by the angle S*q*C.

By this problem a table may be eaſily formed: when the *equations of the center* for every degree of the firſt ſix ſigns of mean anomaly are found, theſe will alſo ſerve for the degrees of the laſt ſix ſigns, becauſe equal anomalies are at equal diſtances on both ſides of their apſides: then ſet theſe *equations* orderly to their ſigns and degrees of anomaly; the firſt ſix being reckoned from the top of the table downwards, and ſigned *ſubtract*; the laſt ſix, for which the ſame *equations* ſerve, in a contrary order, being reckoned from the bottom upwards, and marked *add*; and let the difference between every adjacent two *equations*, called *tabular differences*, be ſet in another column: from theſe *equations of the center*, augmented or diminiſhed by the proportional parts of their reſpective tabular differences for any given minutes and ſeconds, may be eaſily deduced *equations of the center* to any given mean anomaly.

TABLE of the EQUATION of the *Sun's Center* to each Sign and Degree of Mean Anomaly.

Deg.	0 Subt.	Diff.	I. Subt.	Diff.	II. Subt.	Diff.	III. Sub.	Diff.	IV. Sub.	Diff.	V. Subt.	Diff.	Deg.
	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	
0	0 0 0	1 59	0 56 47	1 43	1 39 6	1 1	1 55 37	0 2	1 41 12	1 0	0 58 53	1 46	30
1	1 59	58	58 30	42	40 7	0 59	55 39	1	40 12	0 2	57 7	48	29
2	3 57	59	1 0 12	41	41 6	57	55 38	2	39 10	4	55 19	49	28
3	5 56	58	1 53	40	42 3	56	55 36	5	38 6	6	53 30	50	27
4	7 54	58	3 33	39	42 59	53	55 31	7	37 0	8	51 40	51	26
5	9 52	58	5 12	38	43 52	52	55 24	9	35 52	9	49 49	52	25
6	0 11 50	1 58	1 6 50	1 37	1 44 44	0 50	1 55 15	0 12	1 34 43	1 11	0 47 57	1 52	24
7	13 48	58	8 27	35	45 34	48	55 3	13	33 32	13	46 5	54	23
8	15 46	57	10 2	34	46 22	46	54 50	15	32 19	15	44 11	55	22
9	17 43	57	11 36	33	47 8	45	54 35	18	31 4	17	42 16	55	21
10	19 40	57	13 9	32	47 53	42	54 17	20	29 47	18	40 21	56	20
11	21 37	56	14 41	30	48 35	40	53 57	21	28 29	20	38 25	57	19
12	0 23 33	1 56	1 16 11	1 29	1 49 15	0 39	1 53 36	0 24	1 27 9	1 21	0 36 28	1 58	18
13	25 29	56	17 40	28	49 54	36	53 12	26	25 48	23	34 30	58	17
14	27 25	55	19 8	26	50 30	35	52 46	28	24 25	25	32 32	59	16
15	29 20	55	20 34	25	51 5	32	52 18	30	23 0	26	30 33	2 0	15
16	31 15	54	21 59	23	51 37	31	51 48	33	21 34	28	28 33	0	14
17	33 9	53	23 22	22	52 8	28	51 15	34	20 6	30	26 33	0	13
18	0 35 2	1 53	1 24 44	1 21	1 52 36	0 27	1 50 41	0 36	1 18 36	1 31	0 24 33	2 1	12
19	36 55	52	26 5	19	53 3	24	50 15	39	17 5	32	22 32	2	11
20	38 47	52	27 24	17	53 27	23	49 26	40	15 33	34	20 30	2	10
21	40 39	51	28 41	16	53 50	20	48 46	43	13 59	35	18 28	2	9
22	42 30	50	29 57	14	54 10	18	48 3	44	12 24	37	16 26	2	8
23	44 20	49	31 11	13	54 28	16	47 19	47	10 47	38	14 24	3	7
24	0 46 9	1 48	1 32 24	1 11	1 54 44	0 14	1 46 32	0 48	1 9 9	1 40	0 12 21	2 3	6
25	47 57	48	33 35	10	54 58	12	45 44	51	7 29	40	10 18	4	5
26	49 45	47	34 45	8	55 10	10	44 53	52	5 49	42	8 14	3	4
27	51 32	46	35 53	6	55 20	8	44 1	54	4 7	43	6 11	4	3
28	53 18	45	36 59	4	55 28	6	43 7	57	2 24	45	4 7	3	2
29	55 3	1 44	38 3	1 3	55 34	3	42 10	0 58	0 39	46	2 4	4	1
30	0 56 47		1 39 6		1 55 37		1 41 12		0 58 53		0 0 0		0
	XI. Add.	Diff.	X. Add.	Diff.	IX. Add.	Diff.	VIII Ad.	Diff.	VII. Ad.	Diff.	VI. Add.	Diff.	

Robertſon's Elem. of Navig. book v. p. 286—290. 295—308.

Mr. Euler has particularly conſidered this ſubject in Mem. de l'Acad. de Berlin. tom. ii. p. 225. ſeq. where he ſolves the following problems:

1. To find the true and mean anomaly correſponding to the planet's mean diſtance from the ſun; that is, when the planet is in the extremity of the conjugate axis of its orbit.

2. The excentricity of a planet being given, to find the excentric anomaly correſponding to the greateſt *equation*.

3. The excentricity being given, to find the mean anomaly correſponding to the greateſt *equation*.
4. From the ſame data to find the true anomaly correſponding to this *equation*.
5. From the ſame data to find the greateſt *equation*.
6. The greateſt equation being given to find the excentricity. Mr. Euler obſerves, that this problem is very difficult, and that it can only be ſolved by approximation and tentatively in the manner he mentions; but, if the excentricity be not great, it may be then found directly from the greateſt *equation*. Thus, if the greateſt *equation* $=m$, and the excentricity $=n$, then,

$$m=2n+\frac{11}{48}n^3+\frac{599}{5120}n^5+,\ \&c.$$

Whence by converſion,

$$n=\frac{1}{2}m-\frac{11}{768}m^3-\frac{587}{2^{10}.15}m^5-,\ \&c.$$

Where the greateſt *equation m*, muſt be expreſſed in parts of the radius, which may be done by converting the angle *m*, into ſeconds, and adding 4,6855749 to the logarithm of the reſulting number, from this will be the logarithm of the number *m*.

The mean anomaly to which this greateſt *equation* correſponds will be $x=90°+\frac{5}{8}m-\frac{5}{2^9.3}m^3-\frac{1}{2^9.5}m^5-$, &c.

Whence, if to 90° we add $\frac{5}{8}$ of the greateſt *equation*, we ſhall ſufficiently approximate to this mean anomaly.

Mr. Euler gives us a table, in which may be found the greateſt *equations*, the excentric and mean anomalies correſponding to theſe greateſt *equations* for every hundredth part of unity, which he ſuppoſes equal to the greateſt excentricity, or when the diſtance of the foci and the tranſverſe axis become infinite. The laſt column of his table alſo gives us the logarithm of that diſtance of the planet from the ſun where its *equation* is greateſt. By the help of this table, any excentricity being given, we may find the greateſt correſponding *equation* by interpolation. But the principal uſe of the table is to determine the excentricity when the greateſt *equation* is known; and Mr. Euler thinks the queſtion inſoluble without this help. See the Table, lib. cit. p. 245, ſeq.

The motions of the ſun and moon are affected with various inequalities, whence ariſes the neceſſity of ſo many *equations.*

From theſe inequalities, the moon's place became exceeding difficult to be determined; to remove which difficulty, is the great deſign of Sir Iſaac Newton's New Theory of the moon, wherein we are furniſhed with *equations* for all the inequalities of the mean motion. The principal of theſe are,

EQUATIONS, *annual, of the mean motion of the ſun and moon, and of the apogee and nodes of the moon.*

The annual *equation* of the ſun's center being given, the three other correſponding annual *equations* will be alſo given, and therefore a table of that will ſerve for all. For if the annual *equation* of the ſun's center be taken from thence for any time, and be called P, and let $\frac{1}{10}P=Q$, $Q+\frac{1}{30}Q=R$, $\frac{1}{6}P=D$. $D+\frac{1}{20}D=E$, and $D-\frac{1}{60}D=2F$; then ſhall the annual *equation* of the moon's mean motion for that time be R, that of the apogee of the moon will be E, and that of the node F.

Only obſerve, that if the *equation* of the ſun's center be required to be added, then the *equation* of the moon's mean motion muſt be ſubtracted, that of her apogee muſt be added, and that of the node ſubducted; and, on the contrary, if the *equation* of the ſun's center were to be ſubducted, the moon's *equation* muſt be added, the *equation* of her apogee ſubducted, and that of her node added.

There is alſo an *equation of the moon's mean motion*, depending on the ſituation of her apogee in reſpect of the ſun, which is greateſt when the moon's apogee is in an octant with the ſun, and is nothing at all when it is in the quadratures or ſyzygies. This *equation*, when greateſt, and the ſun in perigæo, is 3 min. 56 ſeconds. But if the ſun be in apogæo, it will never be above 3 min. 34 ſeconds. At other diſtances of the ſun from the earth, this *equation*, when greateſt, is reciprocally as the cube of that diſtance. But when the moon's apogee is any where but in the octants, this equation grows leſs, and is moſtly at the ſame diſtance between the earth and ſun, as the ſine of the double diſtance of the moon's apogee from the next quadrature or ſyzygy to the radius. This is to be added to the moon's motion while her apogee paſſes from a quadrature with the ſun to a ſyzygy; but is to be ſubtracted from it, while the apogee moves from the ſyzygy to the quadrature.

There is, moreover, another *equation of the moon's motion*, which depends on the aſpect of the nodes of the moon's orbit with reſpect to the ſun; and this is greateſt when her nodes are in octants to the ſun, and vanquiſhes quite when they come to their quadratures or ſyzygies. This *equation* is proportional to the ſine of the double diſtance of the node from the next ſyzygy or quadrature; and at the greateſt, is but 47 ſeconds. This muſt be added to the moon's mean motion while the nodes are paſſing from the ſyzygies with the ſun to their quadratures with him, but ſubtracted while they paſs from the quadratures to the ſyzygies.

From the ſun's true place take the equated mean motion of the lunar apogee as was above ſhewed, the remainder will be the annual argument of the ſaid apogee; from whence the excentricity of the moon and the ſecond *equation* of her apogee may be compared. See *Theory of the* MOON'S *Motions*, &c.

EQUATION, *excentric.* See EXCENTRIC.

EQUATION, *lunar and ſolar*, in *Chronology.* See METEMPTOSIS.

EQUATOR, or ÆQUATOR, in *Aſtronomy* and *Geography*, a great circle of the ſphere, equally diſtant from the two poles of the world, or having the ſame poles with thoſe of the world.

Such is the circle D A (*Tab. Aſtron. fig.* 52.) its poles being P and Q. It is called the *equator*, becauſe when the ſun is in it the days and nights are *equal*; whence alſo it is called the *equinoctial*; and when drawn on maps and planiſpheres, the *equinoctial line*, or ſimply, the *line*.

Every point of the *equator* is a quadrant's diſtance from the poles of the world; whence it follows, that the *equator* divides the ſphere into two hemiſpheres, in one of which is the northern, and in the other the ſouthern pole.

By the paſſages or tranſits of arcs of the *equator* over the meridian, equal or mean time is eſtimated; hence we have frequent occaſion for the converſion of degrees of the *equator* into time; and again, for the re-converſion of parts of time into degrees or parts of the *equator.*

For performance whereof, we ſubjoin the following table; wherein are exhibited the arcs of the *equator*, which paſs the meridian in the ſeveral hours, minutes, &c. of equated or mean time.

Converſion of the Parts of the *Equator* into Time, and *vice verſa.*

Deg. of *Equat.*	Hours.	Min.	Hours.	Deg. of *Equat.*	Hour. Min.	Deg. of *Equat.*	′
Min.	Min.	Sec.	Min. ′	Min.	Sec.	Min. ′	″
Sec.	Sec.	Third.	Sec ″	Sec. ″	Third.	Sec. ″	‴
Third.	Third.	Fourth.	Th. ‴	Th. ‴	Fourth.	Th. ‴	⁗
1	0	4	1	15	1	0	15
2	0	8	2	30	2	0	30
3	0	12	3	45	3	0	45
4	0	16	4	60	4	1	0
5	0	20	5	75	5	1	15
10	0	40	6	90	6	1	30
15	1	0	9	135	10	2	30
30	2	0	12	180	20	5	0
60	4	0	15	225	30	7	30
90	6	0	18	270	40	10	0
180	12	0	21	315	50	12	30
360	24	0	24	360	60	15	0

The conſtruction of this table is very eaſy; for the *equator* being divided into 360 degrees, and revolving always in 24 hours, any point of it moves through 15° in one hour, and in one minute through the 60th part of 15°, or 15′ of a degree, and in one ſecond through 15″ of a degree, &c. and therefore nothing more is neceſſary beſides ſimple addition, in order to have the number of degrees, minutes and ſeconds, which it deſcribes in any given time.

The uſe of the table is obvious; ſuppoſe, e. gr. it were required to turn 19° 13′ 7″ of the *equator* into time: againſt 15 deg. in the firſt column we have 1ʰ 0′ 00″; againſt 4 deg. we have 16′ 0″; againſt 10 minutes, 40″; againſt 3 minutes, 12″ 0″; againſt 5 ſeconds, we have 0′ 20‴; and againſt 2 ſeconds, 8‴; which, added together, give 1ʰ 16′ 52″ 28‴.

Again, ſuppoſe it were required to find how many degrees, minutes, &c. of the *equator* anſwers to 23 hours 25 min. 17 ſec. and 9 thirds. Againſt 21ʰ in the fourth column of the table, you have 315°; and againſt 2 hours, 30; againſt 20′, 5°; againſt 5′, 1° 15′; againſt 10 ſec. 2′ 30″; againſt 5 ſec. 1′ 15″ 0‴; againſt 2 ſec. 30″ 0‴; againſt 6 thirds, 1″ 30‴; and againſt 3 thirds, 45‴; which, added together, givs 351° 19′ 17″ 15‴. See EQUINOCTIAL.

EQUATOR, *elevation* or *altitude of the.* See ELEVATION *of the equator.*

EQUATOREAL, *univerſal*, in *Aſtronomy*, is the name of an excellent inſtrument lately conſtructed by Mr. Ramſden, an ingenious philoſophical inſtrument-maker in London. The principal parts of this *equatoreal* (ſee *Tab.* II. *Aſtronomy, fig.* 74.) are 1. The azimuth or horizontal circle A, which repreſents the horizon of the place, and moves on a long axis B, called the vertical axis. 2. The *equatoreal* or hour-circle C, repreſenting the equator, placed at right angles to the polar axis D, or the axis of the earth, upon which it moves. 3. The ſemicircle of declination E, on which the teleſcope is placed, and moving on the axis of declination, or the axis of motion of the line of collimation F. Theſe circles are meaſured and divided as in the following table:

Meaſures of the ſeveral circles and diviſions on them.	Radius. In. dec.	Limb divided to	Nonius of 30 gives ſeconds.	Divided on limb into parts of inc.	Divided by Nonius into parts of inch.
Azimuth or horizontal circle	5 1	15′	30″	45th	1350th
Equatoreal or hour circle	5 1	15′ 1′ in time	30″ 2″	45th	1350th
Vertical ſemicircle for declination or latitude	5 5	15′	30″	42d	1260th

4. The teleſcope, which is an achromatic refractor with a triple object glaſs, whoſe focal diſtance is 17 inches, and aperture 2,45 inches, and furniſhed with 6 different eye-tubes; ſo that its magnifying powers extend from 44 to 168. The teleſcope in this *equatoreal* may be brought parallel to the polar axis, as in the figure, ſo as to point to the pole-ſtar in any part of its diurnal revolution; and thus it has been obſerved near noon, when the ſun has ſhone very bright. 5. The apparatus for correcting the error in altitude occaſioned by refraction, which is applied to the eye-end of the teleſcope, and conſiſts of a ſlide G moving in a groove or dove-tail, and carrying the ſeveral eye-tubes of the teleſcope, on which ſlide there is an index correſponding to 5 ſmall diviſions engraved on the dove-tail; a very ſmall circle, called the refraction circle H, moveable by a finger-ſcrew at the extremity of the eye-end of the teleſcope; which circle is divided into half-minutes, one entire revolution of it being equal to 3′ 18″, and by its motion raiſes the

center of the croſs-hairs on a circle of altitude; and wiſe a quadrant I of 1½ inch radius, with diviſions on h ſide, one expreſſing the degree of altitude of the ect viewed, and the other expreſſing the minutes and onds of error occaſioned by refraction, correſponding hat degree of altitude: to this quadrant is joined a all round level K, which is adjuſted partly by the ion that turns the whole of this apparatus, and partly the index of the quadrant; for which purpoſe the fraction circle is ſet to the ſame minute, &c. which e index points to on the limb of the quadrant; and if e minute, &c. given by the quadrant exceed the 18″ contained in one entire revolution of the refraction rcle, this muſt be ſet to the exceſs above one or more of s entire revolutions; then the center of the croſs-hairs ill appear to be raiſed on a circle of altitude to the ad-itional height which the error of refraction will occa-ion at that altitude.

This inſtrument ſtands on three feet L diſtant from each other 14,4 inches; and when all the parts are horizontal is about 29 inches high: the weight of the *equatoreal* and apparatus is only 59 lb. avoirdupoiſe, which are contained in a mahogany caſe weighing 58 lb.

The principal adjuſtment in this inſtrument is that of making the line of collimation to deſcribe a portion of an hour-circle in the heavens; in order to which, the azimuth circle muſt be truly level, the line of collimation or ſome correſponding line repreſented by the ſmall braſs rod M parallel to it, muſt be perpendicular to the axis of its own proper motion; and this laſt axis muſt be perpendicular to the polar axis: on the braſs rod M there is occaſionally placed a hanging level N, the uſe of which will appear in the following adjuſtments:

The azimuth circle may be made level by turning the inſtrument till one of the levels is parallel to an imaginary line joining two of the feet ſcrews; then adjuſt that level with theſe two feet ſcrews; turn the circle half round, i.e. 180°; and if the bubble be not then right, correct half the error by the ſcrew belonging to the level, and the other half error by the two foot ſcrews; repeat this till the bubble comes right; then turn the circle 90° from the two former poſitions, and ſet the bubble right, if it be wrong, by the foot ſcrew at the end of the level; when this is done, adjuſt the other level by its own ſcrew, and the azimuth circle will be truly level. The hanging level muſt then be fixed to the braſs rod by two hooks of equal length, and made truly parallel to it: for this purpoſe make the polar axis perpendicular or nearly perpendicular to the horizon; then adjuſt the level by the pinion of the declination ſemicircle; reverſe the level, and if it be wrong, correct half the error by a ſmall ſteel ſcrew that lies under one end of the level, and the other half error by the pinion of the declination ſemicircle; repeat this till the bubble be right in both poſitions. In order to make the braſs rod on which the level is ſuſpended at right angles to the axis of motion of the teleſcope or line of collimation, make the polar axis horizontal, or nearly ſo; ſet the declination ſemicircle to 0°, turn the hour-circle till the bubble comes right; then turn the declination-circle to 90°; adjuſt the bubble by raiſing or depreſſing the polar axis, (firſt by hand till it be nearly right, afterwards tighten with an ivory key the ſocket which runs on the arch with the polar axis, and then apply the ſame ivory key to the adjuſting ſcrew at the end of the ſaid arch till the bubble comes quite right); then turn the declination-circle to the oppoſite 90°; if the level be not then right, correct half the error by the aforeſaid adjuſting ſcrew at the end of the arch, and the other half error by the two ſcrews which raiſe or depreſs the end of the braſs rod. The polar axis remaining nearly horizontal as before, and the declination-ſemicircle at 0°, adjuſt the bubble by the hour-circle; then turn the declination-ſemicircle to 90°, and adjuſt the bubble by raiſing or depreſſing the polar axis; then turn the hour-circle 12 hours; and if the bubble be wrong, correct half the error by the polar axis, and the other half error by the two pair of capſtan ſcrews at the feet of the two ſupports on one ſide of the axis of motion of the teleſcope; and thus this axis will be at right angles to the polar axis. The next adjuſtment is to make the center of croſs hairs remain on the ſame object, while you turn the eye-tube quite round by the pinion of the refraction apparatus: for this adjuſtment, ſet the index on the ſlide to the firſt diviſion on the dove-tail; and ſet the diviſion marked 18″ on the refraction-circle to its index; then look through the teleſcope, and with the pinion turn the eye-tube quite round; and if the center of the hairs does not remain on the ſame ſpot during that revolution, it muſt be corrected by the four ſmall ſcrews, two and two at a time, which you will find upon unſcrewing the neareſt end of the eye-tube that contains the firſt eye-glaſs) repeat this correction till the center of the hairs remains on the ſpot you are looking at during an entire revolution.

In order to make the line of collimation parallel to the braſs rod on which the level hangs, ſet the polar axis horizontal, and the declination circle to 90°, adjuſt the level by the polar axis; look through the teleſcope on ſome diſtant horizontal object, covered by the center of the croſs hairs; then invert the teleſcope, which is done by turning the hour-circle half round; and if the center of the croſs hairs does not cover the ſame object as before, correct half the error by the uppermoſt and lowermoſt of the four ſmall ſcrews at the eye-end of the large tube of the teleſcope; this correction will give a ſecond object now covered by the center of the hairs, which muſt be adopted inſtead of the firſt object; then invert the teleſcope as before; and if the ſecond object be not covered by the center of the hairs, correct half the error by the ſame two ſcrews which were uſed before: this correction will give a third object, now covered by the center of the hairs, which muſt be adopted inſtead of the ſecond object; repeat this operation till no error remains; then ſet the hour-circle exactly to 12 hours, (the declination-circle remaining at 90° as before); and if the center of the croſs hairs does not cover the laſt object fixed on, ſet it to that object by the two remaining ſmall ſcrews at the eye-end of the large tube, and then the line of collimation will be parallel to the braſs rod. For rectifying the Nonius of the declination and *equatoreal* circles, lower the teleſcope as many degrees, minutes, and ſeconds, below 0° or Æ on the declination-ſemicircle as are equal to the complement of the latitude; then elevate the polar axis till the bubble be horizontal, and thus the *equatoreal* circle will be elevated to the co-latitude of the place; ſet this circle to 6 hours; adjuſt the level by the pinion of the declination-circle; then turn the *equatoreal* circle exactly 12 hours from the laſt poſition; and if the level be not right, correct one half of the error by the *equatoreal* circle, and the other half by the declination-circle; then turn the *equatoreal* circle back again exactly 12 hours from the laſt poſition; and if the level be ſtill wrong, repeat the correction as before till it be right, when turned to either poſition; that being done, ſet the Nonius of the *equatoreal* circle exactly to 6 hours, and the Nonius of the declination-circle exactly to 0°.

The principal uſes of this *equatoreal* are,

1. To find your meridian by one obſervation only: for this purpoſe, elevate the *equatoreal* circle to the co-latitude of the place, and ſet the declination-ſemicircle to the ſun's declination for the day and hour of the day required; then move the azimuth and hour-circles both at the ſame time, either in the ſame or contrary direction, till you bring the center of the croſs hairs in the teleſcope exactly to cover the center of the ſun; when that is done, the index of the hour-circle will give the apparent or ſolar time at the inſtant of obſervation; and thus the time is gained, though the ſun be at a diſtance from the meridian; then turn the hour-circle till the index points preciſely at 12 o'clock, and lower the teleſcope to the horizon, in order to obſerve ſome point there in the center of your glaſs, and that point is your meridian mark found by one obſervation only; the beſt time for this operation is three hours before or three hours after 12 at noon.

2. To point the teleſcope on a ſtar, though not on the meridian, in full day-light. Having elevated the *equatoreal* circle to the co-latitude of the place, and ſet the declination-ſemicircle to the ſtar's declination, move the index of the hour-circle till it ſhall point to the preciſe time at which the ſtar is then diſtant from the meridian, found in tables of the right aſcenſion of the ſtars, and the ſtar will then appear in the glaſs. Beſides theſe uſes peculiar to this inſtrument, it is alſo applicable to all the purpoſes to which the principal aſtronomical inſtruments, viz. a tranſit, a quadrant, and an equal altitude inſtrument, are applied. See the deſcription and drawing of an *equatoreal* teleſcope, or portable obſervatory, invented by Mr. Short, in the Phil. Tranſ. N° 493. or vol. xlvi. p. 242, &c. And another by Mr. Nairne, vol. lxi. part i. art. 14. p. 107.

EQUERY, or Ecury, a grand ſtable or lodge for horſes, furniſhed with all the conveniencies thereof; as ſtalls, manger, rack, &c.

The word is formed from the French, *eſcurie*, which ſignifies the ſame thing. Some again derive *eſcurie* from the Latin, *ſcuria*, which not only denotes a place for beaſts to be put up in, but alſo a grange or barn. But a more probable derivation is from *equile, a ſtable for horſes*, of *equus, horſe*.

Some hold that the word *ſtable*, in propriety, relates only to bullocks, cows, ſheep, hogs, &c. and *equery*, to horſes, mules, &c.

A *ſimple equery* is that provided for one row of horſes; a *double equery* that provided for two, with a paſſage in the middle, or two paſſages; the horſes being placed head to head, as in the little *equery* at Verſailles.

Under *equery* are ſometimes alſo comprehended the lodgings and apartments of the *equeries*, grooms, pages, &c.

EQUERY, *eſcuyer*, is alſo an officer who has the care and management of the horſes of a king or prince.

EQUERIES, or QUERRIES, popularly called QUERRIES, are particularly uſed among us for officers of the king's ſtables, under the maſter of the horſe, ſeven in number, who, when his majeſty goes abroad, ride in the leading-coach, are in waiting one at a time monthly, and have a table with the gentlemen-uſhers during the time, and a ſalary of 300*l.* a year each.

They uſed to ride on horſeback by the coach-ſide when the king travelled; but that being more expenſive to them than neceſſary to the ſovereign, it has been diſcontinued.

EQUERIES *of the crown ſtable* have that appellation, as being employed in managing and breaking the ſaddle-horſes, and preparing them for the king's riding.

Theſe are two in number; the firſt having an annual ſalary of 256*l.* and the ſecond 200*l.* whereof one is, or always ſhould be, in cloſe waiting at court; and when his majeſty rides, holds the ſtirrup, while the maſter of the horſe, or one of the *equeries* in his abſence, aſſiſts in mounting him; and when his majeſty rides, they uſually attend him.

EQUES *auratus*, is uſed to ſignify a knight bachelor, called *auratus*, q. d. *gilt*, becauſe anciently none but knights might gild or beautify their armour, or other habiliments of war, with gold.

In law, this term is not uſed, but inſtead of it *miles*, and ſometimes *chevalier*.

EQUESTRIA, among the Romans, a place in the theatre where the equites or knights ſat.

EQUESTRIS, EQUESTRIAN, a term chiefly uſed in the phraſe, *equeſtrian ſtatue*, which ſignifies a ſtatue repreſenting a perſon mounted on horſeback.

The word is formed of the Latin, *eques*, *knight*, *horſeman*, of *equus*, *horſe*.

The *Fortuna equeſtris*, in ancient Rome, was a ſtatue of the goddeſs on horſeback. We ſometimes alſo ſay, *Equeſtrian* COLUMN.

EQUESTRIAN *cohort*, in *Antiquity*. See COHORS *equitata*.

EQUESTRIAN *games*, *ludi equeſtres*, among the Romans, horſe-races, of which there were five kinds, the *prodromus*, or *plain horſe-race*, the *chariot race*, the *decurſory race*, about funeral piles, the *ludi ſevirales*, and the *ludi neptunales*.

EQUESTRIAN *order*, among the Romans, ſignified the order of knights or *equites*.

EQUIANGULAR, or ÆQUIANGULAR, in *Geometry*, is applied to figures whoſe angles are all equal. See ANGLE.

A ſquare is an *equiangular* figure. See SQUARE. All equilateral triangles are alſo *equiangular*.

EQUICRURAL, or ÆQUICRURAL *triangle*, is what we more uſually call an ISOSCELES *triangle*.

EQUICULUS, EQUULEUS, or EQUUS *minor*, a conſtellation of the northern hemiſphere. See EQUULEUS.

EQUIDIFFERENT, or ÆQUIDIFFERENT, in *Arithmetic*. If in a ſeries of three quantities there be the ſame difference between the firſt and ſecond as between the ſecond and third, they are ſaid to be *continually equidifferent*; but, if in a ſeries of four quantities, there be the ſame difference between the firſt and ſecond as between the third and fourth, they are ſaid to be *diſcretely equidifferent*.

Thus, 3, 6, 7, and 10, are diſcretely *equidifferent*, and 3, 6, and 9, continually *equidifferent*.

EQUIDISTANT, or ÆQUIDISTANT, in *Geometry*, a term of relation between two things which are every where at an equal or the ſame diſtance from each other. See DISTANCE.

Thus, parallel lines are ſaid to be *equidiſtant*, as they neither approach nor recede.

EQUILATERAL, or ÆQUILATERAL, of *æquus*, *equal*, and *latus*, *ſide*, is applied to any thing whoſe ſides are all equal.

Thus, an *equilateral* triangle is that whoſe ſides are all of equal length. In an *equilateral* triangle all the angles are likewiſe equal.

All regular polygons and regular bodies are *equilateral*. See POLYGON, REGULAR, &c.

EQUILATERAL *hyperbola*, is that wherein the conjugate axes, as A B and D E are equal. *Tab. Conics*, *fig.* 20.

Hence, as the parameter is a third proportional to the conjugate axes, it is alſo equal thereto; conſequently, if in the equation $y^2 = bx \frac{\pm bx^2}{a}$, we make $b = a$: the equation $y^2 = ax + x^2$, defines the nature of an *equilateral hyperbola*. See HYPERBOLA.

EQUILIBRIUM, or ÆQUILIBRIUM, in *Mechanics*, a term implying an exact equality of momentum or between two bodies compared with each other; a takes place when their directions are equally op and their maſſes are reciprocally proportional to locities with which they tend to move. See Fo

A balance is in *equilibrio* when the two ends are actly poiſed that neither of them aſcends or deſ but both retain their parallel poſition to the ho From this circumſtance the word is originally tak being a compound of *æquus*, *equal*, and *libra*, *ba* whence we frequently uſe the word *balance* in lieu th of.

The *equilibrium* of fluids make a conſiderable part of doctrine of hydroſtatics. See FLUID.

EQUILIBRIUM, is alſo uſed figuratively on other occa

A painter muſt take care to obſerve the *equilibrium* of figures, i. e. diſpoſe them well on their center of gra that they may not ſeem ill-ſupported, or ready to tu Thus, e. gr. if one arm be moved forward, the o muſt be proportionably backward to poiſe the figure. In a picture there ſhould always be an *equilibrium* tween one part and another; that is, the objects are be diſtributed ſo as to balance and contraſt each oth and not too many, e. gr. be crouded on one ſide, a the other be left bare.

EQUIMULTIPLE, in *Arithmetic* and *Geometry*, is appli to ſimple magnitudes when multiplied equally, i. e. equal quantities or multipliers.

Thus, taking A as many times as B, or multiplyi them equally, there will ſtill remain the ſame ratio b tween the magnitudes thus multiplied as between t primitive magnitudes before multiplication.

Now, thoſe magnitudes thus equally multiplied a called *equimultiples* of the original ones A and B; whenc we ſay, that *equimultiples* have the ſame ratio as th ſimple quantities. In arithmetic, we generally uſe th term *equimultiples* for numbers which contain equally o an equal number of times their *ſubmultiples*.

Thus 12 and 6 are *equimultiples* of their *ſubmultiples* 4 an 2, inaſmuch as each of them contains its *ſubmultip* three times.

EQUINA *ſella*. See the article SELLA.

EQUINOCTIAL, or ÆQUINOCTIAL, in *Aſtronomy*, great and immoveable circle of the ſphere, under which the equator moves in its diurnal motion.

The *equinoctial* or *equinoctial line*, is ordinarily confounded with the equator; but there is a difference, the equator being moveable, and the *equinoctial* immoveable; and the equator being drawn about the convex ſurface of the ſphere, but the *equinoctial* on the concave ſurface of the magnus orbis.

The *equinoctial* is conceived by ſuppoſing a ſemidiameter of the ſphere produced through a point of the equator, and there, by the rotation of the ſphere about its axis, deſcribing a circle on the immoveable ſurface of the primum mobile.

Whenever the ſun, in his progreſs through the ecliptic, comes to this circle, it makes equal days and nights all around the globe; as then riſing due eaſt and ſetting due weſt, which he never does at any other time of the year. And hence the denomination from *æquus* and *nox*, *night*, *quia æquat diem nocti*.

The *equinoctial*, then, is the circle which the ſun deſcribes, or appears to deſcribe, at the time of the equinoxes; that is, when the length of the day is every-where equal to that of night, which happens twice a year. See EQUINOX.

EQUINOCTIAL, in *Geography*. See EQUATOR.

The ſhadows of thoſe who live under this circle are caſt to the ſouthward of them for one half of the year, and to the northward of them during the other half; and twice in a year, viz. at the equinoxes, the ſun at noon caſts no ſhadow, being in their zenith.

From this circle is the declination or latitude of places accounted in the degrees of the meridian.

EQUINOCTIAL *points*, are the two points wherein the equator and ecliptic interſect each other: the one being in the firſt point of Aries, is called the *vernal point*, or *equinox*; and the other in the firſt point of Libra, the *autumnal point*, or *equinox*.

EQUINOCTIAL *colure*, is that paſſing through the *equinoctial* points. See COLURE.

EQUINOCTIAL *dial*, is that whoſe plane lies parallel to the *equinoctial*. See DIAL.

EQUINOCTIAL *hours*, *line*, *orient*. See the ſubſtantives.

EQUINOX, or ÆQUINOX, in *Aſtronomy*, the time when the ſun enters one of the EQUINOCTIAL *points*.

The *equinoxes* happen when the ſun is in the *equinoctial* circle; when of conſequence the days are equal to the nights throughout the world, which is the caſe twice a year, viz. about the 20th of March and the 23d of September, the firſt of which is the *vernal*, and the ſecond the *autumnal equinox*.

As the ſun's motion is unequal, that is, ſometimes ſwifter and ſometimes ſlower (from the cauſes already explained under the article EQUATION) it comes to paſs, that there are about eight days more from the vernal to the autumnal *equinox* than from the autumnal to the vernal, the ſun ſpending ſo much more time in travelling through the northern than the ſouthern ſigns.

According to the obſervations of M. Caſſini, the ſun is 186^d 14^h 53′ in the northern ſigns, and only 178^d 14^h 56′ in the ſouthern. The difference of which is 7^d 23^h 57′.

The ſun, continually advancing forwards in the ecliptic and gaining a degree every day, makes no ſtay in the equinoctial points, but the moment he arrives in them he alſo leaves them.

Of courſe, therefore, though the day the ſun enters the equinoctial point is called the *equinox*, as being reputed equal to the night; yet it is not preciſely ſo, unleſs the ſun enter the equator at mid-day: for if the ſun riſing, ſhould enter the vernal *equinox* at ſetting, he will have departed from it, and have got northwards about 12′; conſequently, that day will be ſomewhat longer than 12 hours, and the night proportionably ſhorter.

The time of the *equinoxes*, i. e. the moment in which the ſun enters the equator, is found by obſervation, the latitude of the place of the obſervation being given.

Thus, in the equinoctial day, or near it, take the juſt meridian altitude of the ſun; if this be equal to the altitude of the equator, or the complement of the latitude, the ſun is that very moment in the equator: if it be not equal, the difference is the ſun's declination. The next day obſerve the meridian altitude as before, and find his declination; if the declination be of different kinds, viz. the one north and the other ſouth, the *equinox* has happened in the interval of time between them; otherwiſe, the ſun has not entered the equinoctial, or had paſſed it at firſt. From theſe obſervations a trigonometrical calculus gives the time of the *equinox*.

Thus, let DG (*Tab.* II. *Aſt. fig.* 75.) repreſent the equator, AC the ecliptic, E the equinoctial point; the points A, B, C, the places of the ſun at the times of obſervation; the arcs AD, BF, CG, the correſponding declinations; in the right-angled ſpherical triangles CEG, BEF, the obliquity of the ecliptic, and the declinations are known; whence may eaſily be found EC, EB; then BC, the ſum or difference of EC, EB is the ecliptic arc deſcribed in 24 hours: then ſay as BC : BE :: 24 hours for BC : time for BE; and this time ſhews the diſtance of the *equinox* from the time of the middle obſervation.

It is found by obſervation, that the equinoctial points, and all the other points of the ecliptic, are continually moving backward, or in antecedentia, that is, weſtward. This retrograde motion of the equinoctial points, is that famous and difficult phænomenon called the *preceſſion of the equinoxes*. See PRECESSION *of the equinoxes*.

EQUINUS *barbatus*, a kind of comet. See HIPPEUS.

EQUINUS *ellipticus* and *quadrangularis*. See HIPPEUS.

EQUINUS *venter*. See VENTER *equi*.

EQUIPAGE, in the *Military Art*, denotes all ſorts of utenſils, artillery, &c. neceſſary for commencing and proſecuting with eaſe and ſucceſs any military operations.

Camp and field *equipage* conſiſts of tents, kitchen furniture, ſaddle-horſes, baggage, waggons, bat-horſes, &c.

EQUIPAGE, in *Navigation*. See CREW and FITTING-OUT.

To **EQUIP**, in *Naval language*, a term borrowed from the French marine, and frequently applied to the buſineſs of fitting a ſhip for ſea, or arming her for war. See FITTING-OUT.

EQUIPOLLENCE, in *Logic*, is when there is an equivalence between any two or more terms or propoſitions; i. e. when they ſignify one and the ſame thing, though they expreſs it differently. Such propoſitions, &c. are ſaid to be *equipollent*.

EQUIPPE′, in *Heraldry*, expreſſes a cavalier equipped, i. e. armed at all points.

EQUIRIA, in *Antiquity*, a feſtival inſtituted by Romulus, and celebrated on the 27th of February, in honour of Mars, at which there were horſe-races.

EQUISELIS, in *Natural Hiſtory*, the name of a large fly, of the ſize of a hornet, but having only two wings and no ſting: it otherwiſe much reſembles the common hornet in ſhape. This fly is found only in Macedonia. We have alſo in England flies which nearly reſemble the hornet, waſp, and bee, but in their wanting ſtings and having only two wings.

EQUISELIS, in *Ichthyology*, a name uſed by ſome authors for the Hippuris, a ſea-fiſh, caught on the Spaniſh ſhores, and ſuppoſed by many to be the ſame with the DORADA, or CORYPHÆNA with the forked tail of Artedi. See HIPPURIS.

EQUISETUM, in *Botany*. See HORSE-*tail*.

EQUITATA *cohors*, in *Antiquity*. See COHORS *equitatâ*.

EQUITY, ÆQUITAS, denotes juſtice or right, mitigated and tempered by the conſideration of particular circumſtances; or a correction and abatement of the ſeverity of ſome law; or a temperament, which, without being unjuſt, abates the rigour of ſome juſt law.

This is what the Greeks call επιεικεια. The utmoſt ſeverity of a good law is frequently contrary to juſtice; it ſhould always have *equity* for its rule and guide. *Summum jus, ſæpe ſumma injuria.*

The foundation of *equity* is not that there is any miſtake in the law, but that the law was laid down univerſally, becauſe all circumſtances could not be conſidered or taken in under one law.

For an inſtance, ſuppoſe it an expreſs law, that the city being now beſet with an enemy, the gates be all ſhut; and ſuppoſe it fall out that the enemy is then in purſuit after ſome of the citizens by whom it is defended, ſo that it would be highly prejudicial thereto not to open for them the gates; *equity* here decrees the gates to be opened, contrary to the expreſs word of the law.

Equity is of two kinds, and thoſe of contrary effects; the one abridges, and takes from the letter of the law; and the other enlarges, and adds thereto.

The firſt is defined the correction of a law, made generally in that part wherein it fails; as ſuppoſe a ſtatute made, "That whoſoever does ſuch a thing ſhall be a "felon, or ſuffer death:" yet if a mad-man, or an infant, who hath no diſcretion, do the ſame, he ſhall neither be a felon nor ſuffer death.

The other is defined an extenſion of the words of the law to caſes which are not expreſſed, which yet come under the ſame reaſon; ſo that when one thing is enacted, all other things which are of the like degree are ſo too.

Thus, the ſtatute which ordains, that in action of debt againſt executors, he who appears by diſtreſs ſhall anſwer, extends by *equity* to adminiſtrators; and ſuch of them as ſhall appear firſt by diſtreſs, ſhall anſwer by the *equity* of the ſaid act, *quia ſunt in æquali genere.*

EQUITY is alſo uſed for the virtue of juſtice. See JUSTICE.

EQUITY, in our *Laws*, &c. is alſo frequently uſed for the court of chancery, where controverſies are ſuppoſed to be determined according to the exact rules of *equity* and conſcience, by mitigating the rigour of the common law.

Æquitas ſequitur legem, is an old maxim in law; but, from the great increaſe of ſuits in chancery, ſome have thought fit to give it this conſtruction, that in all caſes after a man has been at law, he muſt go to *equity*.

EQUITY *of redemption*, on mortgages, is that right which a mortgager has of redeeming his eſtate upon payment of the money borrowed. If where money is due on a mortgage, the mortgagee is deſirous to bar the *equity of redemption*, he may oblige the mortgagor either to pay the money, or be foreclosed of his *equity*; which is done by proceedings in the court of chancery. But the chancery cannot ſhorten the time of payment of the mortgage money, where it is limited by expreſs covenant, though it may lengthen it; and then upon non-payment, the practice is to foreclose the *equity of redemption* of the mortgagor. 2 Vent. 364.

To foreclose the *equity*, a bill in chancery is exhibited, to which an anſwer is put in, and a decree being obtained, a maſter in chancery is to certify what is due for principal, intereſt, and coſts, which are to be prefixed by the decree, whereupon the premiſes are to be re-conveyed to the mortgagor; or in default of payment, the mortgagor is ordered to be foreclosed from all *equity of redemption*, and to convey the premiſes abſolutely to the mortgagee. Law of Securities, p. 129. 133.

By ſtat. 7 Geo. II. cap. 20. after payment or tender by the mortgagor of principal, intereſt, and coſts, the mortgagee can maintain no ejectment, but may be compelled to re-aſſign his ſecurities.

EQUITY, in *Mythology*, ſometimes confounded with Juſtice, a goddeſs among the Greeks and Romans, repreſented with a ſword in one hand and a balance in the other.

EQUIVALENT, is underſtood of ſomething that is equal in value, force, or effect, to another.

Equivalence is of various kinds, in propoſitions, in terms, and in things.

EQUIVALENT *propoſitions*. See EQUIPOLLENCE.

EQUIVALENT *terms* are where ſeveral words that differ in ſound have yet one and the ſame ſignification; as *every body was there*, and *nobody was abſent*, *nihil non*, and *omne*.

EQUIVALENT *things*, are either *moral*, *phyſical*, or *ſtatical*. *Moral*, as when we ſay that the commanding or adviſing a murder is a guilt *equivalent* to that of the murderer.

Phyſical, as when a man who has the ſtrength of two men is ſaid to be *equivalent* to two men. *Statical*, whereby a leſs weight becomes of equal force with a greater, by having its diſtance from the center increaſed.

EQUIVOCAL, Equivocum, denotes a word or expreſſion that is dubious and ambiguous, or that may have ſeveral ſenſes, one true and another falſe.

Equivocal terms anſwer to what are otherwiſe called *homonyma*, or *homonymous terms*.

Such is the word *emperor*, which is both the name of a dignity, the proper name of a perſon, and the name of a plant. So alſo the Latin *gallus*, which ſtands indifferently for a *cock* and a *Frenchman*.

In theſe caſes, one word denotes two or more different ideas, or different ſorts of objects; whence that common definition of *equivocals* in the ſchools, *quorum nomen eſt commune, ratio vero eſſentiæ ſecundum illud nomen diverſa.*

Philoſophers diſtinguiſh *equivocals* into *active* and *paſſive*; or *æquivoca æquivocantia*, and *æquivocata*.

Æquivoca æquivocantia, or thoſe that denominate and ſignify things, are words common to ſeveral things in a very different ſignification, i. e. to ſeveral things which have a ſimilar eſſence correſpondent to the ſimilar denomination. E. gr. The word *taurus*, which ſtands for a ſign, a mountain, and an animal; and in one ſignifies a lowing animal; in another, a heap of ſtones and earth; and in the third, a conſtellation or ſyſtem of ſtars.

Æquivoca æquivocata, or thoſe that are called or denominated, are the things ſignified by ambiguous names, e. gr. a ſign, a mountain, and an animal: which laſt ſpecies of *equivocals* alone Ariſtotle ſeems to have had in view in his definition, which agrees to theſe, and theſe only.

Equivocal *action* and *cauſe*. See Action and Cause.

Equivocal *generation*, is a method whereby animals and plants are ſuppoſed to be produced, not by the uſual way of coition between male and female, but by ſome ſuppoſed plaſtic power or virtue in the ſun, &c.

Thus, inſects, maggots, flies, ſpiders, frogs, &c. have uſually been ſuppoſed to be produced by the heat of the ſun warming, agitating, and impregnating the duſt, earth, mud, and putrified parts of animals.

This method of generation, which we alſo call *ſpontaneous*, was commonly aſſerted and believed among the ancient philoſophers; but the moderns, from more and better obſervations, unanimouſly reject it, and hold that all animals, nay, and vegetables too, are univocally produced; that is, from parent animals, and vegetables of the ſame ſpecies and denomination.

It were a thing, one would imagine, ſufficient to diſcredit the Ariſtotelian, or rather the Egyptian doctrine of *equivocal generation*, to find flies, frogs, lice, &ce. to be male and female, and accordingly to ingender, lay eggs, &c.

The doctrine of *equivocal generation* we call an *Egyptian doctrine*, as having in all probability had its riſe in Egypt, to ſolve the hypotheſis of the original production of men, and other animals, out of the earth, by the help of the ſun's heat.

To prove which, the Egyptians, as Diodorus Siculus obſerves, produce this obſervation, that about Thebes, when the earth is moiſtened by the Nile, and afterwards impregnated by the intenſe heat of the ſolar rays, an innumerable ſwarm of mice do come forth; whence he infers, that all kinds of animals might equally have ariſen out of the earth at the beginning of things; and from theſe biſhop Stillingfleet takes the other writers and adherents to the doctrine of *equivocal generation*, Mela, Pliny, Ovid, &c. to have borrowed the hypotheſis without enquiring into its truth. Derham's Phy. Theol. lib. iv. cap. 15.

EQUIVOCATION, Æquivocatio, the uſing a term or expreſſion that has a double ſignification.

Equivocations are expedients to ſave telling the truth, and yet without telling a falſity. The fathers are great patrons of *equivocations* and mental reſervations, holding, that the uſe of ſuch ſhifts and ambiguities is in many caſes allowable.

St. Auguſtine, particularly, is reproached with endeavouring to vindicate Iſaac for ſaving his wife from a crime by an *equivocation*; *tacuit aliquid veri, & non dixit aliquid falſi.* To advance a dubious propoſition, knowing it will be underſtood in a ſenſe different from that you give it in your mind, is an *equivocation*, and a breach of good faith and ſincerity.

In moral theology, it is ſtrictly underſtood of a term or phraſe with two different ſignifications, the common and obvious, the other more unuſual and remote; the latter of which being underſtood by the ſpeaker, but the former by the hearers, they conceive ſomething different from one another.

Of this we have an inſtance in St. John, chap. xi. where our Saviour is repreſented as ſaying, *Lazarus ſleepeth*; for the diſciples who took the word *ſleeping* in the uſual ſignification, concluded that Lazarus, whom, they had been told, was ſick, began to take reſt, and would ſoon recover; but Jeſus, uſing the word in a leſs direct and uſual ſignification, meant that Lazarus was dead.

When the *equivoque* conſiſts of ſeveral words, it is properly called an *amphibology*; of which we have an inſtance in St. John, chap. ii. *Deſtroy this temple*, ſays Jeſus, ſpeaking to the Jews, *and I will raiſe it again in three days.*

The lawfulneſs of the uſe of *equivocations* has been greatly diſputed among the modern caſuiſts; many grave authors deny that it is allowable to uſe them on any occaſion whatever. Their reaſon is, that an *equivoque* is to all intents and purpoſes the ſame thing with a lye.

EQUULEUS, or Eculeus, in *Antiquity*, a kind of rack, or engine of torture, uſed for extorting the truth; at firſt chiefly on ſlaves, but afterwards turned againſt the Chriſtians.

The patient's arms and legs being faſtened on the *equuleus* with cords, he was hoiſted aloft, and extended in ſuch manner that all his bones were diſlocated. In this ſtate, red-hot plates were applied to his body; and he was alſo goaded in the ſides with an iron-forked inſtrument, called *ungula*.

The *equuleus* was of wood, and had holes at certain diſtances, with a ſcrew, by which the criminal was ſtretched to the third, ſometimes to the fourth or the fifth hole: at intervals, the ſcrew was ſlackened again, by which he had ſome reſpite; but then he was tormented with queſtions.

The *equuleus* in more ancient times was conſtructed in the form of a horſe; the criminal was laid on his back, and his arms were turned under the breaſt of the *equuleus*, his hands were bound, and his feet ſtretched out towards his tail. A rope faſtened to the feet, was made to paſs over a ſmaller pulley between the hind-legs of the *equuleus*, and made to coil over another larger pulley fixed under the belly by means of a handle, which the executioner turned round till all the bones, &c. were diſlocated. See a learned diſſertation on the form and uſe of this inſtrument, by Dr. Ward, in the Phil. Tranſ. vol. viii. part iv. p. 32, &c.

Hieronymus Magius, when a priſoner among the Turks, wrote an expreſs treatiſe De Equuleo; and another of Bells, merely as it is ſaid from his memory, without any aſſiſtance of books. Sigonius had another treatiſe on the ſame ſubject.

Equuleus, Equiculus, and **Equus** *minor*, *equi ſectio*, the *Horſe's Head*, in *Aſtronomy*, a conſtellation of the northern hemiſphere, whoſe ſtars in Ptolemy's Catalogue are 4, in Tycho's 4, in Hevelius's 6, and in Mr. Flamſteed's 10. The longitudes, latitudes, magnitudes, &c. are as follow:

Names and ſituations of the ſtars.	Bayer's Cha.	Signs.	Longit. °	′	″	Latitude North. °	′	″	Magnitude
		♒	14	12	57	20	32	56	5
			15	59	37	23	2	36	6
			16	2	30	21	16	1	6
			16	25	37	21	38	31	6
Preced. of two in the mouth.	γ		19	6	24	25	13	12	4
5.			19	7	7	25	6	52	6
Subſeq. of the ſame.	δ		20	7	50	24	47	57	4
Preced. of two in the head.	α		18	47	48	20	9	9	4
			20	51	5	21	42	53	6
Subſeq. in the ſame.	β	♒	21	7	2	21	3	6	4

Equuleus, in *Arts* and *Manufactures*. See Horse.

EQUUS, in *Zoology*. See Horse.

Equus *marinus*, in *Zoology*, a name given by ſome to an animal very different from the hippopotamus, or river-horſe, and more uſually known by the name of the morse.

ERA, in *Chronology*. See Æra.

ERANDGAAS, in *Zoology*, the name of a fowl, of the gooſe kind, deſcribed by ſome authors. It is ſaid to be ſomewhat ſmaller than the common wild-gooſe: its head grey, and its neck adorned with a red-ring: its breaſt, wings, and neck, are grey, and its feet red. Mr. Ray much ſuſpects the account of this bird. Ray's Ornithol. p. 308.

ERADICATIVE, in *Medicine*. See Radical.

ERANARCHA, a public officer among the ancient Greeks, whoſe buſineſs was to preſide over and direct the alms given, and proviſions made for the poor.

The word is formed of ερανος, *alms, contribution*, and αρχη, *command.*

The *eranarcha* was properly the adminiſtrator or ſteward of the poor: when any perſon was reduced to poverty, taken captive, or had a daughter to marry, which he could not effect for want of money, &c. this officer called an aſſembly of friends and neighbours, and taxed each, according to his means and eſtate, to contribute towards his relief. This is what we learn from Cornelius Nepos, in his Life of Epaminondas.

ERANTHEMUM, in *Botany*, a name given by ſome authors to the flos Adonis, or red maithes. See PHEASANT's *eye*.

ERARIUM. See ÆRARIUM.

ERASED, in *Heraldry*, expreſſes any thing that ſeems violently torn off from its proper place. It is uſed in contradiſtinction to *couped*, which ſignifies a thing clean cut off. The family of Card bears ermine, a demy lion rampant *eraſed*, azure, &c.

ERASTIANS, a religious ſect or faction, which aroſe in England during the time of the civil wars in 1647, thus called from their leader Thomas Eraſtus, whoſe diſtinguiſhing doctrine it was, that the church had no right to diſcipline, that is, no regular power to excommunicate, exclude, cenſure, abſolve, decree, or the like.

ERATO, from ερaω, *I love*, in *Mythology*, the name of one of the nine Muſes who preſided over love-poetry. To this Muſe ſome have aſcribed the invention of the lyre and lute; and ſhe is repreſented with a garland of myrtles and roſes, holding a lyre in one hand, and a bow in the other, and at her ſide a Cupid with his torch. There is alſo a NEREID of the ſame name.

ERCEUS, of ερκος, *ſeptum*, in *Mythology*, the name by which thoſe who were appointed to guard the walls of a city invoked Jupiter.

EREBENNUS, Ερεϐεννὸς, a name given by Galen and ſome other of the Greek writers, as a diſtinctive epithet for the black chamæleon thiſtle, which was eſteemed poiſonous, and was by this word diſtinguiſhed from the ægleus or ἀιγληὲς, or white chamæleon, which was an eſculent plant, and uſed by ſome as an antidote. It has happened, however, that the white chamæleon thiſtle has been by ſome called a poiſon, as well as the black; but this is only owing to a miſtake of Pliny, in ſuppoſing the effects of birdlime to have been attributed to this plant, becauſe of its yielding a viſcous, but ſafe gum, at its root. It was called by ſome *ixias chamæleon*. See IXIAS and CHAMÆLEON *thiſtle*.

EREBUS, Ερεϐος, from ערב, *night*, in *Mythology*, a term denoting darkneſs. According to Heſiod, *Erebus* was the ſon of Chaos and the night, and the father of the day. This was alſo the name of part of the *inferi* among the ancients: they had a peculiar expiation for thoſe who were detained in *Erebus*.

Erebus was properly the gloomy region, and diſtinguiſhed both from Tartarus, the place of torment, and Elyſium, the region of bliſs: according to the account given of it by Virgil, it forms the third grand diviſion of the inviſible world beyond the Styx, and comprehends ſeveral particular diſtricts, as the *limbus infantum*, or receptacle for infants; the *limbus* for thoſe who have been put to death without cauſe; that for thoſe who have deſtroyed themſelves; the fields of mourning, full of dark groves and woods, inhabited by thoſe who died for love; and beyond theſe, an open champaign country for departed warriors. Æn. lib. vi. p. 427, &c.

ERECT *flowers*, are ſuch as grow upright, without hanging or reclining the head. See FLOWER.

ERECT *leaf*, *erectum folium*, among *Botaniſts*. See LEAF.

ERECT *viſion*. See VISION.

ERECT, *direct*, and *declining*, &c. *dials*, &c. See DIAL.

ERECTION, the act of raiſing or elevating a thing in a right line.

The *erecting* a perpendicular on a line given, is a popular problem in geometry.

The term *erection* is alſo uſed figuratively; as the *erection* of a marquiſate into a duchy; biſhopricks can only be *erected* by the king.

ERECTION is particularly uſed in *Medicine*, for the ſtate of the penis when ſwelled and diſtended by the action of the muſcles, called *erectores*.

There is alſo an *erection* of the clitoris, which is performed by muſcles provided for that purpoſe. See CLITORIS and ERECTORES.

An alternate ſtate of *erection* and flaccidity in the penis, Dr. Drake obſerves, is of abſolute neceſſity; the firſt to the performance of its office, the ſecond for the ſecurity of the part.

Without an *erection* it were impoſſible to emit and lodge the ſeed where it ought to be; and with a conſtant one, almoſt as impoſſible to ſecure the part from external injuries. To ſay nothing of the loſs of inſtigation, which muſt be a neceſſary conſequence of conſtant *erection*.

The *erection* of the penis conſiſts in a diſtenſion of its corpora cavernoſa, by an extraordinary quantity of blood pent up therein.

That the blood is the matter which diſtends the penis in *erection*, is evident from abundance of experiments; though the moſt convincing is that of firmly tying the penis of an animal (as has been frequently done to a dog) in coitu, wherein nothing has been found but blood to diſtend it. Hence, in the bodies of criminals, that hang long after death, the penis becomes *erected*; the blood in that poſition falling to the inferior parts, and ſtopping there. By blowing into the blood-veſſels of the penis after death, the part becomes *erected*. This was firſt diſcovered by Mr. Cowper, upon viewing its veins, after he had diſtended them with wind; whence it plainly appeared, that the external trunks paſſed, ſome under its ſkin only, and ſome over the oſſa pubis; beſides, that a vaſt number of other veins on the dorſum penis unite and empty themſelves into one trunk, called *vena penis*, which paſſes immediately under a tranſverſe ligament of the oſſa pubis, which is compreſſed by the approximation of the dorſum penis to the ligament of the pubis. This application of the dorſum penis is affected by its muſculi directores pulling down the crura of the corpora cavernoſa penis, which are tied up at their juncture in the body of the penis to the os pubis by the ligamentum ſuſpenſorium. Now, this cannot happen to the cavernous body of the urethra, becauſe there is no bone whoſe poſition can give riſe to a ligament which can have that effect on its veins; wherefore, the muſculi acceleratores embracing the veins of the bulb, do that office, though not ſo effectually as in the penis itſelf.

Accordingly the glans is not always perfectly diſtended with the penis, and it is this part that ſooneſt becomes flaccid on an *erection*.

The blood by ſuch means being precluded from its return, the corpora cavernoſa muſt of neceſſity become diſtended, if we conſider their ſtructure above mentioned with reſpect to the veins. The arteries, which before were flaccid, have now their trunks alſo diſtended, and do more plentifully import blood into the corpora cavernoſa.

But ſince it is abſolutely neceſſary ſome part of the detained blood ſhould be ſtill paſſing off, leſt it become grumous, and unfit for a reflux; the venæ præputii communicate with thoſe of the penis itſelf, whereby part of the blood may be returned from the penis during its *erection*, and give way to a freſh ſupply from the arteries, and preſerve the circulation uninterrupted.

ERECTORES *clitoridis*, in *Anatomy*, a pair of muſcles ariſing from the protuberances of the iſchium, and inſerted into the ſpongious body of the clitoris, which they ſerve to erect in coition. See CLITORIDIS *muſculus* and CLITORIS.

ERECTORES *penis*, in *Anatomy*, a pair of muſcles, ariſing fleſhy from the protuberances of the iſchium below the beginning of the cavernous bodies of the yard, into whoſe thick membranes they are inſerted.

Their uſe is to pull the yard upwards towards the os pubis, whereby the greateſt vein is compreſſed, and the refluent blood denied its paſſage under thoſe bones, which makes it ſwell. See ERECTION.

EREGMOS, from ερεικω, *I break*, a word uſed by the ancients, to expreſs a bean decorticated and broken into ſmall pieces, in order to be boiled in ptiſans. This name was not, however, kept ſtrictly to this ſenſe, but they applied it indifferently to all the leguminous fruits broken in the ſame manner. Fœſius will have it to ſignify *bean-meal*, but others are againſt this; and Galen in ſome places uſes it only to expreſs a bean divided into two parts.

EREMIT. See HERMIT.

ERETHISMOS, from ερεθιζω, *I irritate*, a word uſed by Galen and Hippocrates to expreſs any thing that irritates. Galen ſays that Hippocrates means by it alſo every thing that reduces the habit of body to an infirm ſtate, among which are to be reckoned before all other things, irritating, acrimonious, and pungent humours in the ſtomach and bowels, particularly in the mouth of the ſtomach, worms aſcending from the inteſtines into the ſtomach, nocturnal itchings of the whole ſkin, or of ſome part of it, which, by their irritation and prevention of ſleep, greatly exhauſt ſtrength.

ERETRIA *terra*, *Eretrian earth*, in the *Materia Medica*, the name of a very peculiar kind of alkaline bole, dug in the Negropont, near the ancient *Eretria*, and once in great uſe as an aſtringent and a ſudorific.

The ancient writers in medicine all mention the *Eretrian* earth, and Dioſcorides and Galen deſcribe two kinds of it, a grey and white. The grey is what is properly diſtinguiſhed by this name, being an earth of a different kind from all the other boles. The white, though the ancients ſeem not to have obſerved it, yet was plainly, from their own deſcriptions, the ſame with the white bole armenic, though found in a different place. Hill's Hiſt. of Foſſ. p. 5.

The grey or genuine *Eretrian* earth is a fine and pure greyiſh white earth, moderately heavy, naturally of a ſmooth ſurface, of a friable texture, eaſily crumbling to pieces between the fingers, but not ſtaining the ſkin in handling; it ſticks firmly to the tongue, but melts to a butter-like ſubſtance in the mouth; it burns to a perfect ſnow-white, and effervеſces violently with aqua fortis. But what abundantly diſtinguiſhes it from all other earths, is, that if a little be wetted, and drawn over a plate of braſs or copper, ſo as to mark a line, the mark will in a little time appear bluiſh. This is recorded of it ſo early as in the writings of Dioſcorides, and experiment proves it to be true. It ſeems plainly to be owing to an alkaline quality in the earth; this it plainly manifeſts by its fermenting ſo ſtrongly with acids; and it is a well-known that alkalines draw a blue tincture from copper.

The ancients all eſteemed it a great medicine, and were particularly careful in their way of preparing it for uſe, by frequent waſhing, It is now unknown in the ſhops; but its highly alkaline quality, in which it is ſo much ſuperior to all the earths now in uſe, might make it worth the bringing into uſe again; and it may ſtill be had in its old place, in almoſt any quantities.

ERGALIA, of *εργον*, *opus*, a word uſed by the *Alchemiſts*, to expreſs that part of their treatiſes which explains the inſtruments employed in their operations.

ERGASIMA, a name given by Dioſcorides and other of the ancients to a very foul and coarſe kind of myrrh.

ERGASTERIUM, a word uſed by the writers in *Chemiſtry*, ſometimes to expreſs the whole elaboratory, and ſometimes that part of a furnace on which the bottom of the retort, copel, or crucible, is to reſt in an operation.

ERGASTINÆ, Εργαςιναι, in *Antiquity*, a ſelect number of virgins employed in weaving Minerva's peplos or robe, which was carried in proceſſion at the Athenian feſtival, *Panathanæa*. See PEPLOS, and PANATHANÆA.

ERGASTULUM, among the ancients, a houſe of correction, or work-houſe, where ſlaves, by the private authority of their maſters, were confined, and kept at hard labour for ſome offence. It was likewiſe called *ſophroniſterium*.

ERGATIA, Εργατια, in *Antiquity*, a Laconian feſtival, in honour of Hercules.

ERGOT, in the *Manege*, is a ſtub like a piece of ſoft horn, about the bigneſs of a cheſnut, placed behind and below the paſtern joint, and commonly hid under the tuft of the fetlock. To *diſ-ergot*, or take it out, is to cleave it to the quick with an inciſion-knife, in order to pull up a bladder full of water that lies covered with the *ergot*. This operation is ſcarcely practiſed at Paris, but in Holland is frequently performed upon all four legs, with intent to prevent watery ſores and foul ulcers.

ERGOT, in *Medicine*, the name given by the French to a diſeaſe ſimilar to one in England, proceeding from eating vitiated rice. See Phil Tranſ. vol. lii. part ii, and vol. lv. art. 17. p. 106. See BLIGHT and SMUT.

ERIACH, in *Antiquity*, the name of a recompenſe aſſigned by the high BREHON *law* in caſe of murder, to the friends, or to the child or wife of him that was ſlain, as a kind of compoſition between the murderer and his proſecutors.

ERICA, in *Botany*. See HEATH.

ERICA *marina*, *ſea-heath*, a name given by many authors to a very beautiful ſea-plant of the fucus kind, called by Mr. Ray and ſome others the FUCUS *ericæ folio*. This differs ſo much in bigneſs in different places, that it has been ſuſpected to be of two diſtinct ſpecies; thoſe plants of it which are found about the ſhore ſeldom exceeding ten inches in length, and thoſe in deeper water often growing to three foot.

It is compoſed of a vaſt number of ramifications; the bottom ſtalk is woody, and often of the thickneſs of a man's little finger; yet even in theſe there is no diſtinction of nerves or fibres; the large branches are rough and knotty, and ſend off many other ramifications, the larger of which are round, but the extreme ones flat.

At different ſpaces over this plant, one obſerves certain knots or tumours; theſe are no other than the branch in that part ſwelled, and the uſe of the ſwelling is to contain the capſules which incloſe the ſeed; theſe, and their arrangement in theſe ſwellings, are wholly like thoſe of the common fucus, and there are uſually ten or twelve capſules contained in every ſwelling or bladder of the ſtalk. They are not arranged with any regularity in the ſwelling, but are always found nearer the upper than the lower extremity of it. The ſeeds are round, and a very great number of them are contained in every capſule.

The ſwellings which contain theſe capſules are ſometimes placed at conſiderable diſtances from one another on the ſtalks of the plant, and ſometimes they ſtand ſo cloſe as to repreſent the beads of a necklace. Some branches of the plant alſo are very full of them, and others ſcarce have any at all upon them. Sometimes the bladders are found empty on this plant, as they are in the common ſea-wrack; but in this caſe there may always be ſeen the marks of the places where the capſules have once been, though ſince periſhed by ſome accident. Mr. Reaumur, who gives this deſcription of this plant, never ſaw its flowers; but there ſeems no doubt but that they are compoſed of ſhort filaments, like thoſe of the other plants of this kind; and his not examining the plant at a proper ſeaſon was probably the reaſon of his not finding them; for the flowers and ſeeds of theſe plants are uſually both large enough to be ſeen by the naked eye; and when the ſeed is ſo, in moſt caſes the flower is alſo. Mem. Acad. Par. 1712.

ERICA, in *Ichthyology*, a name given by Gaza and ſome others, as the interpretation of the chalcis of Ariſtotle, that is, as the name of the common HERRING.

ERICERUM, a name given by Aëtius and other authors, to a ſort of collyrium, uſed in weakneſſes of the eyes, in which the herb *erica*, or *heath*, was an ingredient.

ERICHTHONIUS, in *Aſtronomy*, a conſtellation, the ſame as AURIGA.

ERIDANUS, in *Aſtronomy*, a conſtellation of the ſouthern hemiſphere, in form of a river.

The ſtars in the conſtellation *Eridanus*, in Ptolemy's Catalogue, are 34; in Tycho's, 19; in the Britiſh Catalogue, 84; the longitudes, latitudes, magnitudes, &c. whereof are as follow:

Names and ſituations of the ſtars.	Bayer's Cha.	Signs.	Longit.			Latitude South.			Magnitude.
			°	′	″	°	′	″	
Firſt from the turn of the river to the breaſt of Cetus.	τ	♈	27	43	50	32	46	3	4
A ſecond.	τ		28	17	41	35	32	44	4
Firſt in the river before the breaſt of Cetus.	η	♉	4	24	50	24	33	38	3
		♈	28	40	53	38	43	48	6
		♉	7	23	4	18	42	23	6
5.									
		♈	28	59	23	38	33	16	6
		♉	7	31	58	19	10	50	6
Preced.	ς		6	2	44	23	45	20	6
Middle.	ς		6	26	39	23	54	37	5
Second before the breaſt of Cetus.	ς		6	52	9	23	57	16	4
10.									
Third of thoſe following turn of river.			0	25	0	39	0	1	3.4
Inform. within the laſt ſinus.			0	11	14	44	45	1	3
Third before the breaſt of Cetus.	ζ		9	29	25	25	57	22	3
			9	35	13	26	19	46	6
			5	6	36	39	8	28	6
15.									
Fourth behind the turn of the riv.			5	45	3	38	32	17	4
			14	30	20	23	22	27	4.5
Fourth before the breaſt of Cetus.	ε		13	55	20	27	46	30	3.4
Fifth behind the turn.			9	51	32	39	28	14	4
			12	8	57	35	40	15	5.6
20.									
			16	34	14	24	25	20	6
			17	6	37	24	8	18	5.6
Fifth before the breaſt of Cetus.	δ		16	30	56	28	46	16	3.4
			19	11	36	20	27	17	5
			19	30	50	19	38	34	6
25.									
Subſeq. and more ſouth.	π		16	37	28	31	9	15	4
Sixth behind the turn.			13	4	15	41	53	9	4
More ſouth, but contiguous to this.			13	0	52	42	34	32	6.5
			20	18	16	24	42	25	7.6
			20	16	20	25	0	38	5.6
30.									
			20	33	37	24	59	47	5.6
Subſeq. inform. over the river.			21	17	38	22	45	43	4.5
Eighth behind the turn.			14	31	20	43	40	50	5.4
In the ſecond bend of the river.	γ		19	31	34	33	13	35	2
			23	32	24	21	47	28	5
35.									
Ninth beyond the turn.			16	38	37	43	30	44	4
			24	40	24	27	29	56	6
North. of two beyond the firſt bend.	ο		25	5	51	27	30	0	3.4
Next before the ſecond bend.	A		25	00	50	30	57	28	5
South. beyond the firſt bend.			26	07	45	28	13	03	5
Preced. of two beyond the 2d bend.			18	07	00	53	58	54	4.3
40.									
Preced. in the firſt bend.	ξ		28	59	47	25	01	01	4.3
Subſeq. beyond the ſecond bend.			20	06	30	54	33	15	5
		♊	1	15	15	20	11	57	5.6
			1	53	24	21	43	53	5.6
			1	12	3	28	24	50	5
45.									
			1	00	3	29	53	52	4
Subſeq. in the firſt bend.	ι		2	29	15	25	08	39	4
			3	35	35	20	54	06	5.6

Names and ſituations of the ſtars.	Bayer's Cha.	Signs.	Longit.			Latitude South.			Magnitude.
			°	′	″	°	′	″	
North. in the ſecond bend toward the eaſt.	υ	♉	25	08	20	50	56	43	4
Small one contiguous to the ſubſeq. in the firſt bend.	c	♊	2	59	03	24	20	37	4
50. South. in the ſecond bend.	υ	♉	25	32	21	51	51	1	3
		♊	0	56	10	36	1	48	3.4
			0	23	41	41	25	3	3.4
			3	33	10	30	49	18	6
			3	45	58	30	28	21	6
55. Preced. before the firſt bend.	μ		5	00	53	25	24	13	4
			3	11	25	30	1	49	5.6
			3	36	38	38	27	13	6
			4	07	46	38	24	20	6
Middle before the firſt bend.	ω		6	43	03	27	50	40	5
60. Small one contiguous to it.	b		7	43	46	27	30	49	6
			7	59	51	32	49	13	6
			7	41	00	35	4	52	6
Subſeq. before the firſt bend.	ψ		8	53	02	29	48	30	5
That next the riſe of the river.			10	41	18	27	16	56	6
65. North. in the riſe of the river towards Orion's leg.	b		10	57	20	25	53	48	3
			11	15	40	27	17	50	6
South. in the riſe of the river.	λ	♊	10	52	55	31	34	10	4
		♉	10	9	25	53	15	26	
			7	56	29	54	19	1	4
70.			6	42	35	55	33	22	4
			5	4	58	54	50	10	4
			1	6	33	57	4	48	5
		♈	22	53	15	58	2	36	5
	θ		19	19	17	53	44	52	3
75.			14	45	56	51	43	3	4
	l		11	59	23	54	13	13	4
	κ		3	57	45	56	57	53	4
	φ	♓	27	1	3	58	56	48	4
	χ		22	9	13	56	58	17	4
80. Archernar.	α		11	19	46	59	19	6	1
Inform. between the laſt bend of the river.		♉	0	42	41	44	44	32	4
Between the river and tail of Xiphias.			11	57	58	61	43	43	4

ERIFFS, a name given to canary birds when about two years old. See CANARY *bird*.

ERIGENS *penis*. See ERECTOR *penis*.

ERIGERON, or SENECIO. See GROUNDSEL.

ERINACEA, in *Botany*, the name of a genus of plants, the characters of which are theſe: the flowers and fruit are the ſame with thoſe of the broom; but the whole plant is ſo beſet with prickles as to reſemble a hedge-hog. Tourn. Inſt. p. 646.

According to Mr. Tournefort there are two ſpecies.

ERINACEUS, in *Zoology*. See *Hedge*-HOG.

ERINACEUS, is alſo a name given by Dillenius and ſome other botaniſts to the pectinated agarics, called by others *hydnum*. Theſe differ from the agarics, properly ſo called, which are lamellated underneath, and from others which are porous, for theſe are echinated, or beſet with pointed prickles.

ERINGO, in *Botany*. See ERYNGO.

ERINOPTERUS. See PRIVET-*fly*.

ERINUS, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower hath a five-leaved empalement, and one tubulous petal, which is of the ringent kind, cut into five equal ſegments, and is ſhort and reflexed: it hath four ſtamina ſituated within the tube, two of which are a little longer than the other. In the bottom of the tube is ſituated an oval germen, which afterwards becomes an oval capſule, with two cells filled with ſmall ſeeds. Miller.

ERIOCAULON, in *Botany*, a genus of the *triandria trigynia* claſs. The characters of which are, that the calyx is common; that it has a ſmall imbricated head, three equal petals, and the ſtamina above the germen.

ERIOCEPHALUS, in *Botany*, Dill. Hort. Elth. 110. a genus of the *ſyngeneſia polygamia neceſſaria* claſs. Its characters are theſe: it hath a radiated flower, compoſed of female half florets, which form the rays, and hermaphrodite florets which form the diſk: the hermaphrodite flowers are funnel-ſhaped, and cut into five parts at the brim, and have five ſtamina, with a naked germen. The female florets have their petals ſtretched out on one ſide like a tongue, divided at the end into three ſmall lobes; they have no ſtamina, but an oval naked germen: they have one naked ſeed ſitting on the naked plain receptacle. There is but one ſpecies. Theſe plants retain their leaves all the year, and ſo add to the variety of exotics in the winter ſeaſon.

ERIOPHORUM, in the Linnæan ſyſtem of *Botany*, the name of the cotton-graſs, or cotton-ruſh, common in marſhy places, and called *linagroſtis* by other writers. This is by that author, made a diſtinct genus of plants, of the *triandria monogynia* claſs, whoſe characters are, that the flower-cup is an imbricated ſpike, made up of oblong oval ſcales a little bent in, and ſeparating the flowers: it has no petals. The ſtamina are three capillary filaments; the antheræ are erect and oblong. The germen of the piſtil is extremely ſmall; the ſtyle is thread-like, and of the ſame length with the ſcales of the cup; the ſtigmata are three, longer than the ſtyle, and bent backward. The ſeed is three-cornered, pointed, and covered with hairs longer than the ſpike.

ERIOPHORUS, in *Botany*, a name given by Vaillant to a genus of plants, ſince deſcribed by Linnæus under the name of *andryala*. See ANDRYALA and *Sow*-THISTLE.

ERIOX, or EROX, in *Ichthyology*, a name given by Albertus and ſome other authors to the common ſalmon, called by others, *anchorago*, and *ſalmo*. See SALMON.

ERISTALIS, in *Natural Hiſtory*, the name of a ſtone, mentioned by Pliny and the ancients, and of which a very memorable quality is recorded by them, which is, that though it was naturally white, it would occaſionally turn red.

ERISTICI, from ερις, *diſpute*, in *Botany*, ſuch authors as have attempted the ſtudy of that ſcience in a philoſophical way, and have been publicly engaged in diſputes about the true foundation of its ſeveral diſtinctions, &c.

ERITHACE, a name given by the ancients to the yellow matter collected on the hinder legs of the bees after their excurſions in ſearch of the materials for their hives; we uſually eſteem this to be real wax, and the French call it *cire brute*, or *rough wax*: it is certain, however, that though the matter of which wax is to be formed is contained in this ſubſtance; yet the Dutch and ſome other nations have the moſt juſt idea of it, in calling it *pain de abeilles*, or *the food of the bees*.

This ſubſtance is only the farina of flowers, and no experiment has been able to ſeparate real wax from it. The moſt probable opinion concerning it, is, that it ſerves the bees as food, and that after this it is converted in their bowels into the ſubſtance called wax.

ERITHALIS, in *Botany*, a genus of the *pentandria monogynia* claſs. The corolla is divided into five ſegments; the calyx is arceolated, and the fruit is a berry conſiſting of ten cells.

ERMESIA, a name given to a compoſition uſed among the ancients, and famous for its effects in making people beget handſome children. It conſiſted of honey, myrrh, ſaffron, and palm-wine, all beat together. This maſs was to be taken mixed in milk. The women took it as well as the men, and many had great faith as to its effects.

ERMIN, or ERMINE, in *Heraldry*, denotes a white field or fur, powdered or interſperſed with black ſpots, called powdering. See FUR.

It is ſuppoſed to repreſent the ſkin of an animal of the ſame denomination. In effect, there is no animal whoſe ſkin naturally correſponds to the herald's *ermin*.

The animal is milk white; and ſo far is it from having ſpots, that tradition reports, that it will rather die, or be taken, than ſully its whiteneſs. Whence its ſymbolical uſe.

But white ſkins having for many ages been uſed for the linings of the robes of magiſtrates and great men; the furriers at length, to add to their beauty, uſed to ſew bits of the black tails of thoſe creatures upon the white ſkins, to render them the more conſpicuous. Which alteration was introduced into armoury. See *Tab.* II. *Herald. fig.* 60.

The ſable ſpots in *ermin* are not of any determinate number, but they may be more or leſs, at the pleaſure of the painter or furrier.

ERMIN, an order of knights, inſtituted in 1450, by Francis I. duke of Bretagne, and formerly ſubſiſting in France. The collar of this order was of gold, compoſed of ears of corn in ſaltier; at the end of which hung the *ermin*, with this inſcription, *a ma vie*. But the order expired when the dukedom of Bretagne was annexed to the crown of France.

ERMINE'. A *croſs erminé* is a croſs compoſed of four *ermine* ſpots, placed in the figure repreſented *Tab.* II. *Herald. fig.* 62.

It muſt be obſerved, that the colours in ſuch arms are not to be expreſſed, becauſe neither the croſs nor the arms can be of any colour but a white and black.

Colombiere blazons it *quatre queues d'ermine en croix*. The editor of Guillim deſcribes it thus; a croſs of four *ermines*; or, more properly, four *ermine* ſpots in croſs. It is the coat of Hurſton in Cheſhire.

Ermine, *timbre of*. See Timbre.

ERMINES, is uſed by ſome Engliſh writers for the reverſe of *ermine*, i. e. for white ſpots on a black field; but on what foundation nobody can tell; for the French, from whom we have our heraldry, have no ſuch term; but call this black powdered with white, *contre-ermine*; as denoting the counter, or reverſe of *ermine*; which is white powdered with black. See *Tab.* II. *Herald. fig.* 63.

ERMINEUM *animal*, *ſtoat*, or *ermine*, the creature whoſe ſkin is the *ermine*, ſo much eſteemed as a fine fur.

This creature is properly a ſpecies of weaſel, and is called by Mr. Ray, and other authors, *muſtela candida*, the *white weaſel*, and by Linnæus *muſtela erminea*. It is in all reſpects like the common weaſel, and is all over of a pure ſnow white, except the tip of the tail, which is of as beautiful a black, and that it has a little yellowiſh grey about the eyes, and a mark, or ſpot, of the ſame colour, on the head, another on the ſhoulders, and a third near the tail. Its colour is, however, very different in degree and elegance, according to the ſeaſon of the year. It is frequent about rivers, and in meadows, in thoſe countries which produce it, and feeds on moles, mice, and other ſmall animals. The ſkins and tails are a very valuable article of commerce in Norway, Lapland, and Ruſſia, and other cold countries, where they are found in prodigious numbers, and regularly change their colour in winter, becoming white. In Siberia, they burrow in the fields, and are taken in traps, baited with fleſh. In Norway they are ſhot with blunt arrows, or taken in traps. The *ſtoat* is ſometimes found white in Great Britain, and called the *white weaſel*.

ERMINITES ſhould ſeem a diminutive of *ermines*, and naturally to ſignify little *ermines*; but it is otherwiſe. *Erminites* expreſſes a white field powdered with black; only that every ſpot has a little red hair therein.

Some authors uſe the word *erminites*, for a yellow field powdered with black; which the French expreſs much better by *or ſemée d'ermines de ſable*.

ERMINOIS expreſſes an or field, with ſable powdering.

ERNES, in our *Old Writers*, ſignify the looſe ſcattered ears of corn that are left on the ground, after the binding or cocking of it.

It is derived from the old Teutonic *ernde*, *harveſt*; *ernden*, *to cut* or *mow corn*. Hence *ern* is, in ſome places, to glean.

ERODINUM, a word uſed, by ſome of the enthuſiaſtic writers in alchemy, to ſignify the prognoſtic, good or bad, of any operation.

EROS, of ερως, *love*, in *Mythology*, one of the two chiefs over all the other Cupids, being the cauſe of love. See Anteros.

EROSION, in *Medicine*, the act of ſharp, acrid fluids, or humours, gnawing and tearing off parts from the fleſh, and other ſubſtances. Arſenic, and other poiſons, make *eroſions* in the inteſtines. See Corrosion.

EROSUM *folium*, among *Botaniſts*. See Leaf.

EROTESIS, Ερωτησις, in *Rhetoric*, the ſame with Interrogation.

EROTIA, Εροτια, a feſtival among the Greeks, in honour of Cupid, being celebrated every fifth year with ſports and games.

EROTIC, derived from ερως, *love*; whence ερωτικος, is applied to any thing which has a relation to the paſſion of love.

In *Medicine*, we particularly uſe the phraſe *delirium eroticum*, for a kind of melancholy contracted through exceſs of love.

Though, among the ſeveral ſpecies of pulſes, there be no amorous pulſe, that is, no pulſe peculiar to that paſſion; yet we can certainly diſcover where the diſorder is *erotic*, by the beating of the pulſe, which, in that caſe, is changeable, unequal, turbulent, and irregular. Speak to the patient of the perſon he loves, and his pulſe inſtantly changes, becoming higher and quicker; and the minute you change the converſation, the pulſe is loſt again, and is diſturbed anew.

EROTIDIA, Ερωτιδια, the ſame with *erotia*.

EROTYLOS, in *Natural Hiſtory*, the name of a ſtone, of which we have no deſcription left us, but which the ancients are ſaid to have uſed in divination.

EROWA, the name of a kind of nettle, which grows in the mountains at Otaheite in the South Sea, with which the inhabitants make fiſhing lines, which ſerve to hold the ſtrongeſt and moſt active fiſh, and are much ſtronger than our ſilk lines of twice the thickneſs.

ERRANT, in *Law*, the ſame with *itinerant*; the term is attributed to judges who go the circuit; and to bailiffs at large.

Errants, *knight*. See Knight.

ERRATA, a liſt uſually placed at the beginning or end of a book, containing the faults that have eſcaped in the impreſſion, and, ſometimes, even in the compoſition of the work.

Lindenberg has an expreſs diſſertation on typographical errors, De Erroribus Typographicis; wherein he obſerves, that there is no book exempt from them, not even the ſacred books. He ſets himſelf to enquire into all the cauſes thereof; and propoſes means to prevent them. But he advances nothing on that article, but what is either common, or impracticable.

ERRATIC, in *Aſtronomy*, an epithet applied to the planets, which are called *erratic*, or wandering ſtars, in contradiſtinction to the fixt ſtars.

Erratic *fevers*, in *Medicine*, a term uſed to expreſs ſuch fevers as, according to the language of medical writers, obſerve no regular type, that is, are not determinate either in their attacks, or in their general period. They are thus called by way of diſtinction from the typic fevers, which are regular in both. See Fever.

Erratic *winds*. See Wind.

ERRHINA, Ερρινα, from εν, *in*, and ριν, *noſe*, in *Medicine*, are remedies taken by the noſe to enliven the ſpirits, ſtop bleeding, &c. but principally to purge the humidities of the head, and, by the general ſhock they occaſion, to remove the moſt diſtant obſtructions. Hence reſults their uſe in lethargies, epilepſies, palſies, apoplexies, headachs, vertigoes, catarrhs, gutta ſerena, &c.

Of theſe, ſome are taken in powders, as betony, tobacco, marjoram, iris, white hellebore, euphorbium, &c. Others in a liquid form, made of the juice of marjoram, ſage, beer, cyclamen, iris, &c. Others in form of liniments, incorporated with unguent. roſat. Others, ſolid, formed like pyramids, to ſtop bleeding at the noſe; compoſed of Armenian bole, terra ſigillata, maſtic, human or hogsblood dried, &c. Such *errhines* as are dry, and made up in powders, to excite ſneezing, are properly called *ſternutatories*. Some moderns call them *caputpurgia*.

ERRIPSIS, from ριπτω, *I precipitate*, in *Medicine*, is uſed in different ſenſes, ſometimes for a weakneſs of the whole body, ſometimes only of ſome one part. When applied to the whole body, it expreſſes that utter dejection and proſtration of ſtrength which makes a man fall down like a dead carcaſs; and, when applied to the eyes, it expreſſes ſuch a debility, as renders it impoſſible to keep them open.

ERROR, a miſtake of the mind, in giving aſſent to a thing, or propoſition, which is not true. See Fallacy.

Some philoſophers define *error* an act of the mind, whereby things that ſhould be joined, are ſeparated; or, things that ſhould be ſeparated, are joined; or a wrong judgment, diſagreeing with the things whereon it is paſſed.

Error ſtands in oppoſition to *truth*, which conſiſts in an agreement between the propoſition, and the thing whereof it is affirmed, or denied.

However, a bare failure, or non-attainment of truth, does not conſtitute *error*; that being common both to ignorance and doubting.

Error only ſtands diſtinguiſhed from *falſhood*, in that the former is in the mind, and the latter only in the propoſition.

The great origin of all *error*, i. e. of believing that to be true, which is falſe, is a liberty, or power, in the human mind, of giving its aſſent to ideas, or propoſitions, that are obſcure, as if they were perſpicuous and plain.

Particular cauſes of *error* are, inadvertency, ignorance, impatience, intereſt, authority, education, &c. See Faith, Probability, Opinion.

Againſt all which, there is this one general rule or caution laid down, by F. Malebranche and others; viz. never to give our full aſſent to any propoſition, unleſs the evidence for it be ſo ſtrong, as that we can no longer with-hold it, without incurring the ſecret reproaches of our own reaſon.

Mr. Locke reduces the cauſes of all our *errors* to theſe four; viz. 1. Want of proofs. 2. Want of ability to uſe them. 3. Want of will to uſe them. And, 4. Wrong meaſures of probability.

F. Malebranche conſiders five occaſional cauſes of *error*, or rather five different kinds of *errors*, accommodated to the different manners we have of perceiving things. 1. *Errors of ſenſe*. 2. Of the *imagination*. 3. Of the *underſtanding*. 4. Of our *inclinations*. And, 5. Of the *paſſions*. See Sense, Imagination, Understanding, Inclination, and Passion.

Errors, *popular*. See Popular.

Error, in *Law*, generally denotes a fault, or overſight, either in pleading, or in proceſs; upon either of which is brought a writ, by way of remedy, called a *writ of error*; in Latin, *de errore corrigendo*.

Fitzherbert defines a writ of *error* to be, that which lies to redreſs falſe judgment given in any court of record, having power by charter, or preſcription, to hold plea of debt or treſpaſs of above twenty ſhillings. There is alſo a *writ of error* for reverſing a fine, &c.

ERROR, *to aſſign.* See ASSIGNING.

ERRORS, *clerk of the.* See CLERK.

ERROR *loci*, a term often uſed by Boerhaave. This author obſerves, that in the body there is a decreaſing ſeries of veſſels; by which he means, that the firſt orders of the veſſels are adapted to receive the red globules of the blood, while the reſt are, perhaps, ſmaller, and receive only the ſerum, the next in order the lymph, and the next the yet finer fluids. Now when the red globules of blood are propelled into the veſſels deſtined only to receive the ſerum, or when the ſerum gets into thoſe veſſels in which a finer fluid ought only to circulate; this he calls an *error loci*, and attributes much to it.

ERUCA, in *Zoology.* See CATERPILLAR.

ERUCA *marina griſeo fuſca.* See APHRODITA.

ERUCA, in *Botany.* See ROCKET.

ERUCAGO, in *Botany.* See BUNIAS.

ERUCTATION, *Belching*, the ſame as RUCTATION.

ERUDITION, denotes learning, or knowlege; and chiefly that of hiſtory and antiquity, of languages and of books, which is the reſult of hard ſtudy, and extenſive reading. The Scaligers were men of deep *erudition:* the writings of M. Launoy, a prieſt of the Oratory, are full of *erudition.*

Mr. Locke ſays, it is of more uſe to fill the head with reflections, than with points of *erudition.* If the mind be not juſt and right, ignorance is better than *erudition*, which only produces confuſion and obſcurity. M. Balzac calls a heap of ill choſen *erudition*, the luggage of antiquity.

ERUPTION, in general, a burſting forth, or excluſion of ſomething which was before covered, or concealed.

In *Medicine*, it denotes a ſudden and copious excretion of humours, as pus or blood, and any breaking out of puſtules or ſpots in various diſorders; as in the ſmall-pox, meaſles, plague, fevers, &c. See EXANTHEMA.

The *eruption* of volcanos, or burning mountains, is frequently the effect, and iſſue, of earthquakes. See EARTHQUAKE, &c.

The *eruptions* of mount Ætna, and Veſuvius, are obſerved to be ſomewhat periodical: they are of two kinds; the one leſs violent, happening once in two or three months, and laſting uſually three or four days, without much damage to the adjacent country. The other more furious, and of longer continuance, happening to mount Veſuvius about once in eighty years. That in 1362 was ſo violent, that, by the beſt of S. Peccacio's obſervations, it caſt the rocks three miles into the air. Hartop, in Phil. Tranſ. Nº 202.

The honourable Mr. Hamilton has communicated ſeveral accounts of later eruptions of Veſuvius to the Royal Society, which may be ſeen in the Phil. Tranſ. for 1767, 1768, and 1769. He obſerves, that the violent *eruption* in 1767, is reckoned to be the twenty-ſeventh ſince that which deſtroyed Herculaneum and Pompeii, in the time of Titus. See VOLCANOS.

Mr. Oldenburg gives us an hiſtorical account of the ſeveral *eruptions* of mount Ætna, recorded in authors. The firſt, whereof we have any credible account, was at the time of the expedition of Æneas, deſcribed by Virgil, Æneid. lib. iii. The ſecond, deſcribed by Thucydides, was four hundred and ſeventy-ſix years before Chriſt. In the time of the Roman conſuls there were four; another in Cæſar's time, ſo fierce, that Diodorus aſſures us, the ſhips near the iſland of Lipara were injured with the extreme heat of the water; another under Caligula; another at the time of the martyrdom of St. Agatha, ſaid to have been ſtopped at her interceſſion; another in the year 812; ſeveral between the years 1160, and 1169; others in 1284, 1329, 1408, 1444, 1536, 1633, 1650. Phil. Tranſ. Nº 48.

Another extraordinary *eruption* happened in 1669, particularly deſcribed in the ſaid Tranſactions, Nº 51. It was preceded, for the ſpace of eighteen days, with a dark thick ſky, thunder, lightning, and frequent concuſſions of the earth; the place of the *eruption* was twenty miles from the old mouth.

The matter here yielded, was a ſtream, or river, of melted metals and minerals, rendered liquid by the fierceneſs of the fire, and boiling up, and guſhing forth, as water does at the head of ſome great river; till having run in a full body for a ſtone's caſt, or more, the extremity thereof began to cruſt and curdle, and turned, when cold, into hard, porous ſtones, called *ſciarri*, as reſembling huge cakes of ſea-coal, full of a fierce fire. Theſe came rolling and tumbling over one another, and where they met a bank, wall, building, &c. would fill up, and ſwell over; by their weight bearing down any common building, and burning up what was combuſtible. The progreſs of this inundation was at the rate of a furlong a day; which it continued for fifteen or twenty days, running, at firſt, into the ſea, but afterwards into the city of Catanea; in its courſe it overwhelmed fourteen towns and villages, containing three or four thouſand inhabitants. The noiſe of the *eruption* at the mouth was heard ſixty miles.

Dr. St. Clair, in the Philoſophical Tranſactions, gives an account of a conſtant *eruption* of fire on one ſide of one of the Apennines, between Bologna and Florence; a ſpot of ground three or four miles in diameter, he obſerves, inceſſantly ſends up a flame, riſing very high, without noiſe, ſmoke, or ſmell, though it gives a very great heat. In great rains it ſometimes intermits, but rekindles with greater vigour and heat. Within three or four yards of it, he adds, there grows corn. The flame he conjectures to ariſe from a vein of bitumen, or naphtha. There are three other ſuch fires on the ſame hills.

ERUPTIONS *in infants.* See INFANTS.

ERUPTIVE *fevers.* See FEVER.

ERVUM, *Bitter Vetch*, in *Botany*, a genus of the *diadelphia decandria* claſs: the characters of which are, that the empalement of the flower is divided into five equal parts, which end in acute points; the flower is of the butterfly kind, having a large, roundiſh, plain ſtandard, two obtuſe wings of half the length of the ſtandard, and a ſhorter keel, which is pointed; it hath ten ſtamina, nine joined, and one ſeparate, terminated by ſingle ſummits. It hath an oblong germen, ſupporting a riſing ſtyle, crowned by an obtuſe ſtigma; the germen afterwards becomes an oblong, taper pod, jointed between each ſeed.

ERVUM *orientale.* See SOPHORA.

ERYCINA, in *Mythology*, a ſurname given to Venus, from Erix, a mountain in Sicily, where ſhe had a temple. Venus *Erycina* has alſo a temple at Rome, which was deemed very ancient even in the time of Thucydides.

ERYNGO, or SEA-HOLLY, *Eryngium*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it hath many ſmall flowers, ſitting upon one common conical receptacle; the flowers have a five-leaved erect empalement, ſitting upon the germen, and form a roundiſh general umbel, which is uniform; each flower has five oblong petals, and five ſtamina, ſtanding above the flowers. Under the empalement is ſituated a prickly germen, which afterward becomes an oval fruit divided in two parts, each having one oblong, taper ſeed.

There are ſeveral ſpecies of the *eryngium* plant propagated in the gardens of the curious; but the common ſea-kind is the only one of any uſe. The roots of this are, in great quantities, both dried and candied in the ſhops; they may all be propagated, either by parting their roots, or ſowing their ſeeds; but the firſt is the moſt convenient and expeditious method. This is to be done in autumn, when the leaves decay; and the ſoils they moſt delight in are gravel and ſand; but in dry ſeaſons they require a great deal of watering. The ſecond year after their removal from the old plant, they will flower; but the flowers are not ſo ſtrong as in the older plants. They ſpread very much at the root.

The true *eryngo* has creeping roots, which run deep into the ground; the leaves are roundiſh, ſtiff, and of a grey colour, ſet with ſharp ſpines on the edges; the ſtalks riſe a foot high, and divide upwards into two or three; they are ſmooth, and garniſhed at each joint with leaves of the ſame form as the lower, but ſmaller, and embrace the ſtalks with their baſe; at the end of the branches come out the flowers in roundiſh prickly heads; under each is ſituated a range of narrow, ſtiff, prickly leaves, ſpreading like the rays of a ſtar; the flowers are of a blue whitiſh colour; they appear in July, and the ſtalks decay in autumn.

The root of *eryngium* is attenuant and deobſtruent, and is therefore eſteemed a good hepatic, uterine, and nephritic. Its whole virtue, it is to be obſerved, conſiſts in the external or cortical part. Their virtues, however, appear to be but weak; and they are now ſcarcely otherwiſe uſed than as made into a ſweetmeat.

The London College directs it to be candied in the following manner: boil the roots till the rind will eaſily peel off; when peeled, ſlice them through the middle, and the pith being taken out, waſh them three or four times in cold water; then for every pound of roots thus prepared, take two pounds of double refined ſugar; diſſolve the ſugar in water, ſet it on a fire, and as ſoon as it begins to boil, put in the roots, and continue the boiling till they become ſoft.

Theſe candied roots are an ingredient in artificial aſſes milk, which is thus made: take of candied *eryngo* root one ounce, pearl barley half an ounce, liquorice root three drams; boil them in two pints of water to one pint, to which add a pint of new milk from the cow;

boil them gently together, then ſtrain the liquor for uſe, of which half a pint ſhould be drank three times a day.

ERYNGIUM is alſo a name given, by ſome of the old authors, to aloes; a medicine as different from the root of this name as any one thing can well be from another.

ERYNNIS, or FURIOUS, a name given to Ceres by the Sicilians.

ERYSIMUM. See *Hedge* MUSTARD.

ERYSIPELAS, Ερυσιπελας, in *Medicine*, a diſeaſe of the ſkin, called alſo *ſacer ignis*, and *St. Antony's fire*; and in many parts of Great Britain, the *roſe*.

In an ancient inſtrument belonging to the church of St. Antony at Marſeilles, this diſorder is called *ignis infernalis*, or *fire of hell*.

The word is formed of the Greek, ερυειν, *trahere*, *to draw*, and πελας, *prope*, *near*; whence it is alſo called by the Latins *vicinitraha*, and *vicinirubia*. Others derive it from ερυθρος, *red*, and πελος, *livid*, or *black*.

The ſanguine and plethoric, young people, and pregnant women, are moſt ſubject to this diſorder.

Dr. Quincy accounts for the *eryſipelas*, from a too ſizy blood, which, obſtructing the capillaries, occaſions inflammations; others, from a too ſharp and bilious blood, which, on account of its great ſubtility, occaſions no ſenſible tumor, but ſpreads, or diffuſes itſelf, all around; and from the humours not being duly diſcharged by perſpiration. The colour of the tumor, though red, generally inclines towards a yellow, on account of the mixture of the bile; and always the more there is of the bile, the more dangerous the diſeaſe.

This diſorder may be occaſioned by any thing that overheats the blood, checks perſpiration, and obſtructs or diminiſhes either the natural or artificial evacuations.

In *eryſipelatous* fevers, which are juſtly ranked among the exanthematous kind, the blood and humours being in an intenſe motion, an acrid ſerum of a ſulphureous and cauſtic nature is, by that means, propelled to the ſurface of the body, and produces a ſwelling, accompanied with redneſs, heat, and pain.

This fever is far from being innocent and ſimple, as it is generally thought, and is often violent and dangerous, nay mortal, and, in ſome caſes, appears to be nearly allied to peſtilential fevers, the moſt formidable of all diſorders. The ſymptoms in both are of the ſame kind; and on the third or fourth day the morbid matter in both is thrown out to the ſurface, and the violence of the ſymptoms on this ſomewhat abates. But the great difference is, that the one is contagious, the other not ſo; and the peſtilential is much more fatal than the other uſually is found to be.

Phyſicians diſtinguiſh the *eryſipelas* into two kinds, the ſimple, and the ſcorbutic. The ſimple or genuine *eryſipelas* affects only the ſurface of the body, and eaſily gives way to proper remedies, in a ſhort time; but the ſpurious, or ſcorbutic kind, is more deeply rooted, and hard to be removed. There is alſo a third kind, called an exulcerated *eryſipelas*, in which the eruptions are yellow, and contain an acrid pungent humour, which gives a terrible gnawing pain. This diſeaſe affects every part of the body, but particularly the legs and face, eſpecially the latter; and happens at all times of the year, but moſt frequently at the cloſe of ſummer. It ſometimes ſpreads over the whole face, and ſwells and inflames it in ſuch a manner as to endanger ſuffocation; being attended with an intenſe pain, and a number of little puſtules, which, as the inflammation increaſes, become veſiculæ. It often ſeizes people in a moment, while they are abroad, and is called by the country people a *blaſt*, or *ſideratio*; becauſe they imagine it proceeds from foul air, or ill wind; but it is generally occaſioned by cold caught after the body has been greatly heated or fatigued. It, in reality, differs very little from the effects of the ſtings of waſps and bees, except that the heats often riſe into puſtules. One kind of *eryſipelas* wholly reſembles the ſtinging of nettles; this is uſually brought on by drinking, and is very troubleſome, the pimples appearing and diſappearing at times, ſometimes for a long while together.

Etmuller gives it as the diſtinguiſhing character of an *eryſipelas*, that when preſſed very lightly by the finger, there follows a white ſpot, which preſently after becomes red again; which does not happen in an ordinary inflammation, unleſs when violently preſſed. Scorbutic people are moſt ſubject to this diſeaſe. It is diſputed, whether purging be good in the *eryſipelas*? Sydenham recommends it the next day after bleeding. Etmuller cautions us againſt them both, and recommends diaphoretics. Dr. Freind obſerves, that in the laſt ſtage of an *eryſipelas* of the head, attended with a coma, delirium, &c. unleſs cathartics will do good, the caſe is deſperate. All unctuous, aſtringent, and cold applications, externally, are dangerous, and ſometimes make the *eryſipelas* degenerate into a gangrene.

However mild the more common kinds of this diſord may naturally be, yet ill management will make even t ſlighteſt of them dangerous; and the ſtriking the eru tions in has been often known to be of fatal conſequenc Hoffman mentions a patient he knew, who by taking vomit, and a draſtic purge, in the time of the eruptio had an inflammation of the ſtomach brought on, a died in a few days. In many kinds of the *eryſipelas*, n ture does much, and, with a little proper aſſiſtance, th whole terminates kindly in a ſhort time; but the b kinds, nay, and too often the beſt, when treated unſki fully, turn to violent burning fevers, and the eruptio to gangrenes.

The true method of curing an *eryſipelas* conſiſts in thre intentions: firſt, that the febrile motion of nature be b no means hindered, but rather promoted, if it be foun defective, and only reduced to a due temperament, exceſſive. Secondly, that the ſubtile cauſtic matter b corrected and prepared for ſecretion and excretion; an thirdly, that the inflammatory ſtagnation of putrid an cauſtic lymph in the external parts be diſcuſſed, and per fectly expelled. Bleeding in an *eryſipelas* is ſometimes be neficial, ſometimes hurtful, and a good general rule i to order it in plethoric habits, and for perſons accu tomed to drink ſpirituous liquors, and when the diſea attacks the head, but to forbid it in others. In caſe where bleeding is neceſſary, the body ſhould be kep open by emollient clyſters, or ſmall doſes of nitre an rhubarb. When the inflammation is mild and gentle, i may ſometimes be removed by external warmth alone but when it is more violent, it requires the help of internal, and ſometimes external remedies. Of the internal kind, the *mixtura ſimplex* is one ſtanding good medi cine; and of the external, an ointment made of elder bark, or the rob of elder, is known to have performed great cures; though ointments and plaſters tend rather to obſtruct and repel, than to promote any diſcharge from the affected part. Fine wool, or ſoft flannel, are the ſofteſt applications, which, by defending from the cold air, and promoting perſpiration, have a great tendency to remove the diſeaſe. Bathing the feet and legs in warm water is of conſiderable ſervice, when the diſorder has ſeized the face or brain; and if theſe fail, pultices, or ſharp ſinapiſms applied to the ſoles of the feet, may be more effectual.

In the ſcorbutic *eryſipelas*, gentle laxatives will be proper, and ſuch things as purify the blood, and promote the perſpiration. When the inflammation has been checked by opening medicines, a decoction of ſarſaparilla root, ſhavings of guaiacum, ſaſſafras, and liquorice, may be drank, and ſucceeded by a courſe of bitters.

There is, beſide the common kinds of the *eryſipelas*, yet one more to be mentioned, which is always very terrible, and often fatal; this is an *eryſipelas* of the lungs. In this caſe the patient is ſeized with a highly burning fever, and an acute pain both in the anterior and poſterior parts of the body, but eſpecially about the ſpine. He always holds his neck ſtraight upright when he breathes, and his noſtrils dilate with an exceſs of heat and pain, and, in the more advanced ſtages, his tongue hangs out of his mouth like that of a dog that pants with heat and wearineſs. He vomits ſometimes bile, and at other times phlegm, and is ſubject to very frequent faintings; he coughs much, and either ſpits not at all, or elſe a yellowiſh or bloody matter. This diſeaſe almoſt always proves mortal; and the only accident that can give the patient the leaſt hope, is its quitting the internal parts, and ſhewing itſelf on the ſurface.

Heiſter thinks that the grand intention, in the curing this diſorder, muſt be to dilute the inſpiſſated blood, and break and divide it where it ſtagnates, and is obſtructed. Plenty of thin and weak drinks are therefore to be adminiſtered, by which a gentle and laſting ſweat may be excited, and the teſtaceous powders, and nitrous medicines, are frequently found alſo to have great and good effects. If the inflammation be but very ſlight, it is often cured by external warmth; but when warmth alone does not prove ſufficient, cloths, with the rob of elder ſpread upon them, are found of great benefit, being laid warm on the part, and kept on by warm compreſſes, and the proper bandages. Ointments made of the middle green bark of elder, are alſo very beneficial; and notwithſtanding that many do not approve the practice, yet ſpirit of wine camphorated, with a mixture of ſaffron and Venice treacle, are found often of very great ſervice, applied warm with coarſe paper, or with linen rags; and a mixture of lime-water, and ſpirit of wine camphorated, often does great ſervice. It ſometimes happens, that an *eryſipelas* comes to ſuppuration; and from this generally ariſe the moſt untractable ſpreading and eating ulcers. In this caſe, the ulcer is to be carefully cleanſed, and dreſſed with ointments of ceruſs, red lead, or litharge, and plaſters of the ſame ingredients; and the patient muſt, at the ſame time, take internal remedies to ſweeten the blood, ſome gentle purges, and obſerve a ſtrict regimen in regard to diet. Heiſter's Surgery, p. 193.

If the black, livid, or blue colour of the diſeaſed part ſhews a tendency to mortification, the Peruvian bark may be given in the quantity of a dram every two hours, when the ſymptoms are threatening; and cloths dipped in warm camphorated ſpirits of wine, or the tincture of myrrh and aloes, or pultices of the bark, may be applied to the part, and often renewed; or it may be fomented with a ſtrong decoction of bark.

Thoſe who are ſubject to frequent attacks of the *eryſipelas* ſhould guard againſt violent paſſions, ſtrong liquors, and fat, viſcid, and highly nouriſhing food. They ſhould uſe ſufficient exerciſe, and avoid the extremes of heat and cold. Their food ſhould be chiefly milk and vegetables; and their drink ſmall beer, whey, butter-milk, &c. They ſhould prevent too long a ſtate of coſtiveneſs, either by ſuitable diet, or by often taking a gentle doſe of rhubarb, cream of tartar, lenitive electary, or ſome other mild purgative. See Tiſſot's Advice, p. 288, &c. Buchan's Dom. Med. p. 270, &c.

ERYSIPELATOIDES, from ερυσιπελας, and ειδος, *likeneſs*, in *Medicine*, is a ſwelling like that of the *eryſipelas*, though with eaſier ſymptoms; and therefore may be taken for a kind of *baſtard eryſipelas*; in this the ſkin is of a more dark colour.

ERYTHREAN, an appellation given to Hercules, from a temple which he had at Erythres, in Arcadia.

Erythrean *Sibyl*. See Sibyls.

ERYTHREMA, a word uſed, by the old writers in *Medicine*, to expreſs a redneſs of the cheeks, occaſioned by the violent heat in fevers. Some alſo have applied the ſame word, in the plural number, to the red inflammatory eruptions in an ERYSIPELAS.

ERYTHRINA, in *Botany*, a name given, by Linnæus, to a genus of ſuppoſed vegetables, called by Tournefort, Dillenius, and the generality of other writers, CORALLODENDRON, and CORAL.

ERYTHRINUS, in *Ichthyology*, the name of a fiſh, called by ſome authors alſo the *rubellio*, *travolino*, and *alboro*, or *arboro*, by the Venetians. It is a ſmall fiſh, ſomething like the aurata, or gilt-head, in ſhape, but much ſmaller, and of a pale red colour all over. Its tail is forked, its noſe ſharp, and its eyes large, with ſilvery iriſes, and ſometimes a ſlight tinge of red amongſt the white. The mouth is ſmall, the fore-teeth broad, and the hinder ones are rather tubercles than teeth; the coverings of the gills are ſcaly. It has one back-fin, the anterior rays or nerves of which are prickly, the other ſoft and ſmooth to the touch. Rondelet. de Piſc. lib. v. cap. 13. p. 144.

ERYTHROCYANEUS, in *Ornithology*, the red and blue maccaw, with a wedge-like tail, and the ſides of the head naked and rough. See Maccaw.

ERYTHRODANUM, in the *Materia Medica*, a name by which ſome authors have called the rubia tinctorum, or MADDER.

ERYTHROIDES, in *Anatomy*, the firſt of the proper membranes that incloſe the teſticles.

It is interſperſed with fleſhy fibres, derived to it from the cremaſter muſcle, which makes it appear reddiſh. And hence its name from ερυθρος, *red*, and ειδος, *form*.

ERYTHRONIUM, in *Botany*. See Dog's *Tooth*.

ERYTHROPHTHALMUS. See Red *Eye*.

ERYTHROXYLON, in *Botany*, a genus of the *decandria trigynia* claſs: the calyx is turbinated, the corolla has a ſcaly, nectariferous, emarginated baſe, to which the ſtamina are joined; the fruit is a ſingle-celled drupe. Linnæus enumerates two ſpecies.

ERZ, or Erzi, in the botanical writings of the *Ancients*, a word uſed originally by the Hebrews, and by them made the name of the CEDAR.

ESAPHE, from εσαφαω, *I feel with the fingers*, a word uſed by Hippocrates, to expreſs the touching the mouth of the uterus, in order to diſcover its ſtate or diſeaſes.

ESCALADE, or Scalade, a furious attack of a wall or a rampart; carried on with LADDERS, to paſs the ditch, or mount the rampart; without proceeding in form, breaking ground, or carrying on regular works to ſecure the men.

When the troops are prepared to paſs the ditch, either with the aſſiſtance of boards, hurdles, and faſcines, when it is muddy, or with ſmall boats of tin, or baſkets covered with ſkins, or oil-cloth, when it is deep, and filled with water, a party muſt be placed on the counterſcarp, oppoſite to the landing-place, ready to fire at the garriſon, if they are alarmed, and oppoſe the mounting on the rampart. If the ditch is dry, the ladders are fixed in ſome place fartheſt diſtant from the centry; and as ſoon as they get upon the rampart, they put themſelves in order to receive the enemy; if the centry ſhould be ſurpriſed, and ſilently overcome, the detachment haſtens to break open the gate, and to let in the reſt of the party. If the ditch is wet, the rampart high, and provided with a revetement, it will be difficult to ſurpriſe the town in this way; but if there is no revetement, the troops may hide themſelves along the outſide of the rampart, till all are over. Since the invention and uſe of gun-powder, and the walls of cities have been flanked, they are ſeldom taken by *eſcalade*.

ESCALLION, in *Botany*. See Scallion.

ESCAMBIO, from the Spaniſh *cambier*, *to change*, was anciently a licence granted any one for the making a remittance, or giving a bill of exchange, to another beyond ſea.

For, by ſtat. 5 Rich. II. no perſon might exchange, or return money beyond ſea, without the king's licence.

ESCAPE, in *Law*, an evaſion out of ſome lawful reſtraint, either by violence or ſtealth.

Eſcapes are either *voluntary*, or *negligent*.

Voluntary, as when one arreſts another for felony, or other crime, and afterwards lets him go; in which *eſcape*, the party that permits it, is by law to ſuffer puniſhment as if guilty of the fault committed by the perſon who *eſcapes*, be it felony, treaſon, or treſpaſs; after the original delinquent is actually found guilty or convicted.

Negligent eſcape is, when one is arreſted, and afterwards *eſcapes* againſt his will that arreſted him; and is not purſued by freſh ſuit, and taken again, before the party purſued hath loſt ſight of him.

Keepers of priſons conniving at *eſcapes* ſhall forfeit 500*l.* and in civil caſes, the ſheriff is anſwerable for the debt.

Escape *warrant*, in *Law*. If any perſon committed or charged in cuſtody in the king's bench or Fleet priſon in execution, or on meſne proceſs, &c. go at large; on oath thereof before a judge of the court where the action was brought, an *eſcape warrant* ſhall be granted, directed to all ſheriffs, &c. throughout England, to retake the priſoner, and commit him to goal when taken, there to remain until the debt is ſatisfied; and a perſon may be taken on a Sunday upon an *eſcape warrant*. Stat. 1 Anne, cap. 6.

ESCAPEMENT, in *Horology*. See Pallet, and Time-keeper.

ESCARTELE', in *Heraldry*, *quartered*, or QUARTERLY. See Quartering.

ESCH, in *Ichthyology*, a name given by Hildegard and others, to the fiſh we call the grayling, or umber, and the generality of authors, the thymallus. It is of the coregonous kind, and is diſtinguiſhed by Artedi by the upper jaw being longer, and the back-fin containing twenty-three bones. The Germans call it *aſch*, and the Italians *temello*.

ESCHALLOT, *Cepa Aſcalonica*, in *Botany*, a ſpecies of onion, cultivated in gardens for its uſe in cookery, and nearly reſembling the *Welch* ONION.

ESCHAR, in *Surgery*, a hard cruſt, or ſcab, formed on the fleſh, by means of a hot iron, or a cauſtic medicine, or ſome ſharp corroſive humour within.

The word εσχαρα ſignifies *cruſt*, or *ſcab*; which ſome authors derive from ες and καιω, *I burn*; but this comes with ſome difficulty, becauſe καιω is written with a κ, and εσχαρα with a χ.

The cauſtic ſtone, or lapis infernalis, produces a round *eſchar* in the place where it has burnt. See Escharotics, Caustic, and Cautery.

ESCHARA, in *Natural Hiſtory*, the name of a ſpecies of coralline, &c. the characters of which are theſe: they are of a ſtony, or coral-like hardneſs, and reſemble a woven cloth in their texture; and the microſcope informs us that they conſiſt of arrangements of very ſmall cells, whoſe ſurfaces appear much in that form. Linnæus makes it a ſpecies of *millepora*, in the claſs of lithophytes. See *Tab.* II. *Corallines*, *fig.* 9. and 10.

ESCHAROPEPA, a word uſed, by the old writers in *Medicine*, to expreſs a coarſe kind of barley-meal, which had been torrified over the fire.

ESCHAROTICS, from εσχαρα, *eſchar*, medicines, which, being applied externally, produce *eſchars*, or ſcabs, by burning the fleſh. See Eschar.

Such are the lapis infernalis, red precipitate, &c. Theſe are alſo called *cauſtics*.

A compoſition of ſulphur, reſin, and honey, proves an *eſcharotic*, with little or no pain.

ESCHATON, in *Muſic*, the difference between the dieſis enharmonica and the hyperoche; that is, what remains, after taking the difference between the ſemi-tone minor and dieſis enharmonica, from the latter. Henſling, in Miſc. Berolin. vol. i. p. 279, 280.

Thus the difference between the ſemi-tone minor and the enharmonic dieſis is $\frac{25}{24} : \frac{128}{125} = \frac{3125}{3072}$, and this taken from the dieſis, is $\frac{128}{125} : \frac{3125}{3072} = \frac{393216}{390625}$. This interval is about $\frac{53}{100}$ of a comma, as will eaſily appear by logarithms. Mr. Henfling has taken notice of this interval. He calls it *eſchaton*, from its being the leaſt and the laſt interval that occurs in his ſyſtem.

The word is Greek, εσχατον. See INTERVAL.

ESCHEAT, from the French *eſcheoir*, *to happen*, in *Law*, ſignifies lands, or other profits, falling to a lord within his manor, either by way of forfeiture, or the death of his tenant dying without heir general or ſpecial, or leaving his heir within age, and unmarried.

The civilians call ſuch *eſcheats*, or forfeitures, *bona caduca*; and in the ſame ſenſe as we ſay the fee is *eſcheated*, they ſay *feudum aperitur*.

The word *eſcheata* ſometimes alſo ſignifies a lawful inheritance deſcending on the heir. But then it is uſually diſtinguiſhed by the addition of *recta*; as *recta eſcheata*.

ESCHEAT is alſo uſed for the place or circuit within which the king, or other lord, hath *eſcheats* of his tenants.

ESCHEAT is alſo ſometimes uſed for a writ, lying where the tenant having eſtate of fee-ſimple, in any lands or tenements holden of a ſuperior lord, dies ſeiſed, without heir general, or ſpecial: in which caſe, the lord brings this writ againſt him that poſſeſſes the lands, after the death of his tenant; and thereby recovers the ſame in lieu of his ſervices.

ESCHEATOR, an officer, who anciently took care of the king's eſcheats in the county, and certified them into the exchequer, or chancery.

He was appointed by the lord-treaſurer; held his office only for one year; nor could any perſon be *eſcheator* above once in three years. But this office, having its chief dependence on the court of wards, is now out of date.

ESCHEL, in *Mineralogy*, a term uſed, by the ſmalt-workers, to expreſs a ſort of grey ſubſtance reſembling aſhes, which is uſually mixed with the ſmalt when in fuſion. This is carefully ſeparated from it, before it is powdered for uſe, otherwiſe it would debaſe the colour. Phil. Tranſ. Nº 396.

ESCHEQUER. See EXCHEQUER.

ESCHEVIN, or ECHEVIN, *Scabinus*, in the French and Dutch *Polity*, a magiſtrate elected by the inhabitants of a city, to take care of their common concerns, the good order, conveniency, and decoration of the city, &c.

At Paris, there is a prevot, and four *eſchevins*; in moſt other cities, a maire, or mayor, and *eſchevins*. In Languedoc, Provence, and Dauphiné, they are called *conſuls*; at Toulouſe, *capitouls*; and *jurats* at Bourdeaux.

Anciently, the *eſchevins* were the aſſeſſors, and counſellors of the comites, or judges of cities; on which account they were called, in ſome places, *pairs*, *pares*; they even took cognizance of petty cauſes themſelves.

Du-Cange obſerves, that the judges, and their aſſeſſors, who were choſen by the inhabitants, were called *ſcabini*, *eſchevins*, and their college, *ſcabinagium*, or *eſchevinage*. He adds, that ſome authors call them *paciarii*, becauſe their office and juriſdiction extended to the ſecuring peace in their city and banlieue, called *pax villæ*.

In Holland, the *ſcabins*, or *eſchevins*, judge of all civil affairs at firſt hand. They alſo take cognizance of criminal matters; and if the criminal confeſs himſelf guilty, they can ſee their ſentence executed without appeal. They can even give torture. The number is not the ſame in all cities; at Amſterdam there are nine, at Rotterdam ſeven, &c.

ESCHRAKITES, or ESRAKITES, a ſect of philoſophers, among the Mahometans, who adhere to the doctrines and opinions of Plato.

The word is derived from the Arabic שרק, *ſchraka*, which in the fourth conjugation אשרק, *aſchraka*, ſignifies *to ſhine, glitter like the ſun*; ſo that *Eſchrakite* ſeems to import *illumined*.

The *Eſchrakites*, or Mahometan Platoniſts, place their higheſt good and happineſs in the contemplation of the Divine Majeſty; deſpiſing the groſs imaginations of the Alcoran touching paradiſe. See MAHOMETANISM.

They are very careful in avoiding all vice; they preſerve an equal and eaſy temper, love muſic, and divert themſelves with compoſing little poems, or ſpiritual ſongs. The ſheics, or prieſts, and the chief among the preachers of the imperial moſques, are *Eſchrakites*.

ESCHYNOMENOUS *plants*. See ÆSCHYNOMENOUS.

ESCLAIRCISSEMENT, a French term, which we find retained in ſome late Engliſh writers: it properly ſignifies the act, or effect, of clearing a thing, or rendering it more bright and tranſparent; being formed from the verb *eſclaircir*, *to clear*, &c.

It is chiefly uſed in a figurative ſenſe, for an explanation of an obſcurity, or difficulty. The *eſclairciſſement* of difficult paſſages in the Bible, is to be ſought for from ſimilar paſſages, or paſſages of the like kind occurring in other places.

ESCLAME, in the *Manege*, an obſolete French word, formerly uſed to ſignify a light-bellied horſe.

ESCLATTE', in *Heraldry*, is applied to a thing violently broken. Thus a bend, or other partition, *eſclatté*, is repreſented torn, or broken off, like a ſhield ſhattered with the ſtroke of a battle-ax.

ESCORT, a French term, ſometimes uſed in Engliſh authors, to denote a convoy, or company of armed men, attending ſome perſon or thing, in a journey or voyage, to defend or ſecure it from inſults.

Some derive the word from the Latin *cohors*. See CONVOY.

ESCOUADE, or SQUAD, is uſually the third or fourth part of a company of foot; ſo divided for mounting guards, and for the more convenient relieving of one another. It is equivalent to a brigade of a troop of horſe. See BRIGADE.

ESCROL, or SCROLL, in *Heraldry*, a long ſlip, as it were, of parchment, or paper, whereon a motto is placed. Leigh obſerves, that no perſon, under the degree of a knight, might, long after king Henry V. place his creſt on a wreath, as is now uſually done, but only on an *eſcrol*.

ESCROW, a deed delivered to a third perſon, to be the deed of the party making it, upon a future condition, when ſuch thing is performed; and then it is to be delivered to the party to whom made. It is to be delivered to a ſtranger, mentioning the condition; and has relation to the firſt delivery. 2 Roll. Abr. 25, 26. 1 Inſt. 31. See DEED.

ESCU, or ECU, the French crown, of ſixty ſols, or three livres. The *eſcu* was thus called, becauſe the eſcutcheon, or arms of France, which they call *eſcu*, was ſtruck thereon. See COIN.

*Emaux de l'*ESCU. See EMAUX.

ESCUAGE, or SCUTAGE, an ancient kind of knight's ſervice, called alſo *ſervice of the ſhield*; the tenant holding by which, was obliged to follow his lord to the Scottiſh or Welſh wars, at his own expence. But perſonal attendance being inconvenient, the tenants compounded for it, by a pecuniary ſatisfaction, which was levied by aſſeſſments at a certain rate for every knight's fee; and thus it became a pecuniary, in lieu of a military ſervice. The firſt inſtance that occurs was in 5 Hen. II. on account of his expedition to Toulouſe; it afterwards became more general and oppreſſive; ſo that king John was obliged to conſent, by his Magna Charta, that no *ſcutage* ſhould be impoſed without conſent of parliament; but the clauſe was omitted in the charter of Henry III. which directs that it ſhould be taken as it uſed to be in the time of Henry II. or in a reaſonable and moderate manner. However, it was afterwards enacted by ſtat. 25 Edw. I. cap. 5 and 6. and many ſubſequent ſtatutes, that the king ſhould take no aids or taſks, but by the common aſſent of the realm; and it appears that *ſcutages* were the ground-work of all ſucceeding ſubſidies, and of the land-tax of later times. Blackſt. Comm. vol. ii. p. 74.

ESCUAGE was alſo a reaſonable aid, demanded by the lord of his tenants, who held of him by knight's ſervice. See AID.

Conceſſerunt domino regi ad maritandum filiam ſuam de omnibus qui tenent de domino rege in capite de ſinglis ſcutis 20 *ſolidos ſolvendos*. Matt. Paris. anno 1242.

ESCULAPIUS, in *Mythology*, the god of medicine. He was the ſon of Apollo, by the nymph Coronis, born at Epidaurus, where he had a famous temple; in which his image, made of gold and ivory, was placed on a throne of the ſame materials; it was crowned with rays, had a knotty ſtick in one hand, and the other arm leaned upon a ſerpent, and a dog lay at his feet. The Epidaurians inſtituted ſolemn games, which were celebrated in honour of him once every five years. This god was brought to Rome, by order of Apollo, when a peſtilence raged in that city, in the times of the republic, and was honoured as one of the chief of their made-gods. He is ſaid to have ſtolen away from his old worſhippers under the ſhape of a ſerpent. He is repreſented with a mild look, and with hair and beard not unlike thoſe of the mild Jupiter; his right arm is bare, in order to denote his readineſs for any operation; his left holds a ſtick, with a ſerpent twiſted round it. The dog and cock have been reputed ſacred to this deity, on account of their vigilance; and the raven for his forecaſt. Statius, lib. iii. Sylv. 4. ver. 25. Ovid. Met. xv. ver. 662.

ESCULENTS, from *eſculentus*, *eatable*, a term uſually applied to vegetables which are fit for food, as artichokes, carrots, turneps, parſneps, cabbages, cauliflowers, &c.

ESCULUS, in *Botany*, a name given, by many authors, to the phagus, or ſweet oak, called alſo the eſculent oak.

ESCULUS, or ÆSCULUS. See *Horſe* CHESTNUT.

ESCURIAL, by the Spaniards written ESCORIAL, a term that occurs pretty frequently in our gazettes, and newspapers, for a place of reſidence of the kings of Spain.

Eſcurial originally denotes a little village in Spain, ſituate in the kingdom of Toledo, ſeven leagues to the weſt of Madrid, and nine to the eaſt of Avila, on the ſide of a chain of mountains, called by ſome the Carpetane, or Carpentanian mountains, and by others the Pyreneans, as being the branch of the Pyrenean ridge. Here king Philip II. built a ſtately monaſtery of the order of St. Jerom, held by the Spaniards for one of the wonders of the world, and called the *Eſcurial*. It was begun in 1557, and finiſhed in about twenty-two years.

Fa. Franciſco de los Padros, in a deſcription thereof, intituled, Deſcription breve del Monaſterio de S. Lorenzo el real del Eſcorial, &c. aſſures us it was built by that prince in memory of the battle of St. Quintin, gained on the day of St. Laurence, Lorenzo, a famous Spaniſh ſaint, and at his interceſſion; accordingly the plan of the work reſembles a gridiron, the inſtrument of the ſaint's martyrdom.

The king and queen have their apartments there; the reſt being poſſeſſed by the monks. Whence many of the great tranſactions of that court are dated from the *Eſcurial*.

The *eſcurial* has a very fine church, to which Philip IV. built a beautiful chapel, called the Pantheon, or Rotondo, wherein the kings and queens of Spain, who leave any poſterity, are interred; the reſt being laid in another vault of the ſame church, together with the infantas, and other princes.

It has eleven thouſand windows, fourteen thouſand doors, one thouſand eight hundred pillars, ſeventeen cloiſters or piazzas, and twenty-two courts; with every convenience and ornament that can render a place agreeable in ſo hot a climate; ſuch as an extenſive park, groves, fountains, caſcades, grottoes, &c. This palace contains three libraries, in which are eighteen thouſand volumes, and three thouſand Arabian manuſcripts. Part of this ſuperb palace was burnt in 1671.

ESCUTCHEON, or **Scutcheon**, in *Heraldry*, the field, or coat, wherein the bearing, or arms, of any perſon, are repreſented.

The word *eſcutcheon* is formed of the French *eſcuſſon*, and that from the Latin *ſcutum*, *ſhield*; which was the place arms were originally borne on, before ever they came on banners; and ſtill, where-ever they are placed, it is on ſomething repreſenting the form of a ſhield. The Latin *ſcutum*, no doubt, came originally from the Greek, σκυτος, *leather*, wherewith the ſhields were uſually covered. See Shield.

The *eſcutcheon* is of a ſquare figure, excepting the bottom part, which is uſually a little rounded, ending in a point in the middle. See *Tab. Herald. fig.* 38.

Till within a few hundred years, the *eſcutcheons* of the French and Engliſh were triangular: thoſe of the Spaniards are ſtill quite round at bottom, without any point; thoſe of the Italians are oval; and thoſe of the Germans in form of cartoozes.

The ancient *eſcutcheons* were generally couched, or inclined; and they only began to place them upright, when crowns, &c. were put over them by way of creſt.

In France, eſcuſſon, *eſcutcheon*, was formerly reſtrained to a ſhield, or coat, pointed at bottom; by which it was diſtinguiſhed from the *eſcu*, which was quite ſquare, and was only allowed to be borne by the counts and viſcounts. Thoſe of inferior quality were confined to the eſcuſſon, or pointed eſcu.

The ſeveral parts and points of the *eſcutcheon* have their proper names: the point A, for inſtance, is the *dexter chief point*; B the *middle chief*; and C the *ſiniſter chief point*; D is the *honour point*; E the *feſſe point*; F the *nombril point*; G the *dexter baſe*; H the *middle*; and I the *ſiniſter baſe* point.

The *dexter ſide* of the *eſcutcheon* anſwers to the left-hand, and the *ſiniſter ſide* to the right hand of the perſon that looks on it.

The *eſcutcheon* is differently denominated, according to its diviſions. It is called *dextered*, when the perpendicular line that divides it, is to the right of a third part of the *eſcutcheon*; *ſiniſtered*, when on the left; *tierced in pale*, when this line is double, and divides the whole *eſcutcheon* into three equal parts; *paled*, when increaſed to the number of ſix, eight, or ten. A horizontal line makes the *chief*, when at one third part from the top; the *plein*, when at a third from the bottom; and when double, in the middle, at an equal diſtance from both extremes, it makes the *feſſe*, and the *tierced in feſſe*; when it is multiplied, it denominates it *feſſed*; when there are eight or ten equal ſpaces, *burrellé*. A diagonal from the dexter point of the chief to the ſiniſter of the baſe, makes it *tranché*; the contrary, *doublé*; if it be doubled at equal diſtances, the firſt makes *bandé*, and the *tierce in bend*; and the other *barré*, or *tierce in bar*; increaſing the number of the firſt makes *bandé*, and *cotticé*; and increaſing that of the ſecond, *barré*, and *traverſe*.

Escutcheon *of pretence*, is an *ineſcutcheon*, or little *eſcutcheon*, which a man, who has married an heireſs, and has iſſue by her, may bear over his own coat of arms, and in it the arms of his wife; and, in this caſe, the ſurviving iſſue will bear both coats quarterly. See *Tab.* II. *Heraldry*, *fig.* 64.

Escutcheon-*grafting*, in *Gardening*. See Engrafting.

ESDRAS. See Ezra.

ESEBON, a name given, by ſome of the chemical writers, to common ſea ſalt.

ESNECY, *Æſnecia*, *dignitas primogeniti*, in *Law*, a private prerogative, allowed to the eldeſt *coparcener*, where an eſtate is deſcended to daughters for want of heirs male, to chuſe firſt after the inheritance is divided. Fleta, lib. v. cap. 10. *Jus eſneciæ* is *jus primogenituræ*; in which ſenſe it may be extended to the eldeſt ſon, and his iſſue, holding firſt. In the ſtatute of Marlbridge, cap. 9. it is called *initia pars hereditatis*.

ESOTERIC, in *Antiquity*. See Exoteric.

ESOX, in *Ichthyology*, the name of a genus of fiſhes, of the claſs of abdominales, in the Linnæan ſyſtem; the characters of which are theſe: they are of the malacopterygious, or ſoft-finned kind. The branchioſtege membrane contains from ſeven to twelve bones. The body is oblong; the back-fin not large, and is placed very near the tail. The ſpecies of this genus, enumerated by Artedi, are three, and by Linnæus nine.

The word *eſox* is truly Roman. Pliny, and other of the ancient Latin authors, have uſed it as the name of the ſame fiſh. It ſeems to have been derived from the verb *eſito*, *to eat*; for all the ſpecies of this fiſh are very voracious.

ESPALIER, in the *French Gardening*, a wall-tree; or a fruit-tree, which is not left to grow at liberty in full air, but has its branches nailed, or faſtened, to a wall, or ſome other flat ſurface, near which it is planted; and, thus growing, it is made to conform itſelf to the flat, though unnatural, figure thereof. See Fruit-*Tree*, Wall, &c.

Espaliers, in our *Gardening*, are rows of trees, planted regularly round the outſide of a garden, or plantation, for the general ſecurity thereof from the violence and injury of the winds; or elſe only round ſome part of a garden, for the particular ſecurity of a plantation of orange-trees, lemon-trees, myrtles, or other tender plants; or, laſtly, for the bounding of borders, walks, avenues, &c.

Eſpaliers are now come into great uſe, with reſpect to the firſt of theſe intentions: in effect, it is found, by experience, that the beſt brick, or ſtone walls, are not of themſelves ſufficient ſecurity to fruit-trees, from the ravages of blighting winds.

The reaſon may be, that, being built cloſe and compact, they repel the winds, and, by that means, damage the tender plants, that lie within the reach of the repulſion; but theſe *eſpaliers* ſerve to deaden the violence of the winds, ſo that the tender greens, or plants, encompaſſed by them, reſt ſerene and quiet.

Thus, if the *eſpaliers*, for inſtance, be of ſpruce, fir, holly, or yew, they give way to the force of tempeſtuous winds beating againſt them, without occaſioning any reſilition thereof. Meſſrs. London and Wiſe direct them to be planted at ſome diſtance, without the outmoſt bounds, or walls, of gardens, &c. Two or three rows of trees they think ſufficient, from eighteen or twenty to twenty-five feet apart; and as to the method, or order, of diſpoſing the trees, the moſt commodious is, where the middle row makes every where equilateral triangles with the extreme rows, in the following manner. See Quincunx.

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The trees recommended for making, or planting, theſe *eſpalier* fences, are, the elm, lime, beech, Scotch fir, oak, pine, and ſycamore; but, particularly, the two firſt.

Eſpaliers are moſt commonly made of fruit-trees trained up to a lattice of wood-work, formed either out of aſh-poles, or ſquare pieces of fir-wood; and their moſt uſual office is the ſheltering, and at the ſame time hiding the quarters of kitchen gardens.

The trees principally planted for *eſpaliers* now, are apples and pears, and ſome plums. The apples intended for *eſpaliers* ſhould be grafted on crab-ſtocks, for large gardens, and for ſmaller on codling-ſtocks. The trees for the ſame hedge in an *eſpalier*, ſhould be all ſuch as are of the ſame age, from the grafting, and produced from the ſame ſtocks, that ſo the hedge may be the more regular. The more quick growing, and ſpreading ones, muſt be planted at thirty or thirty-five feet aſunder, and thoſe of ſmaller growth, at twenty-five feet; the walk between them in a large garden ſhould be ſixteen feet wide; and if the *eſpaliers* are intended to be carried up high, it ſhould be more, that both hedges may have the benefit of the ſun.

The beſt ſorts of apples for *eſpaliers*, are the golden pippin, the nonpareil, the rennet griſe, the aromatic pippin, the Holland pippin, the French pippin, Wheeler's ruſſet, and Pile's ruſſet; for the choice and pruning of theſe trees, ſee APPLES and PRUNING.

The pears fitteſt for *eſpaliers*, are the ſummer and autumn kind; for the winter ones ſeldom ſucceed well. Theſe trees, if deſigned for a ſtrong moiſt ſoil, ſhould be on quince-ſtocks; but if for a dry ſoil, upon free ſtocks. The diſtance for pears grafted on free ſtocks ſhould be thirty feet, for moderately growing trees, and for the moſt vigorous ſhooters, it ought to be, at leaſt, forty feet. And the beſt kinds of pears for this purpoſe, are the jargonelle, the blanquette, the poire ſans peau, the ſummer boncretien, Hamden's burgamot, the poire du prince, autumn burgamot, l'ambrette, gros rouſſelet, chaumontelle, beurre du roy, the le marquis, and the creſſane.

The third year after the trees are planted, the framework of the *eſpalier* ſhould be made. Till this time the young ſhoots need only be trained to upright ſtakes, as nearly as can be in an horizontal direction. The beſt way of making the wood-work is of aſh-poles, which are not only cheap, but ſtrong and durable. Theſe are of two kinds; the largeſt poles, deſigned for upright ſtakes, ſhould be cut about ſeven feet and a half long, and placed at a foot diſtance, in a right line, and about ſix feet above the ground, at the ſame height; a row of ſtrait ſlender poles ſhould be nailed along the tops of the upright ſtakes, in order to keep them even, and the ſtakes ſhould be croſſed with the ſmaller poles, at about nine inches diſtance, row from row, from the top to the bottom, and theſe rows of poles ſhould be well faſtened to the ſtakes with wire. Then the branches of the fruit-trees are all to be trained horizontally to theſe, and none ſhould be ſuffered to croſs one another, nor to come too near, and faſtened to them with ſmall oſier twigs, or rope yarn. In the trees which produce large fruit, no branches ought to be nearer to each other than ſix or eight inches; in the ſmaller fruited ones, four or five inches will be ſufficient; the advantages of the trees planted in *eſpaliers*, above thoſe propagated as dwarfs, in the room of which theſe have been introduced, are many and very great. They take up very little room in a garden, and are of no injury to the plants cultivated in the quarters; and the fruit is always more regularly ripened and better taſted, as the ſun and air can have every way free acceſs to it. Miller.

To prevent the diſorders that might befal *eſpalier* fruit-trees, when in bloſſom, Mr. Bradley mentions a nurſeryman, who, having moſt ſorts of fruit in *eſpaliers*, had portable hedges made of reeds in frames, which he ſet both at the back and front of his *eſpaliers*, as he ſaw occaſion.

ESPAULE, ESPAULEMENT, &c. in *Fortification.* See EPAULE, EPAULEMENT, &c.

ESPHLASIS, from εσφλαομαι, *to recede inwards*, a term uſed by the old writers in *Medicine*, for the receding inward of the ſkull in depreſſions from contuſions.

ESPLANADE, in *Fortification*, called alſo GLACIS; a part which ſerves the counterſcarp, or covert way, for a parapet; being a declivity, or ſlope of earth, commencing from the top of the counterſcarp, and loſing itſelf, inſenſibly, in the level of the champaign.

ESPLANADE alſo ſignifies the ground which has been levelled from the glacis of the counterſcarp, to the firſt houſes; or the vacant ſpace between the works and the houſes of the town.

The term is alſo applied, in the general, to any piece of ground which is rendered flat, or level, and which before had ſome eminence that incommoded the place.

ESPLEES, *Expletiæ*, from *expleo*, in *Law*, the products which ground or land, &c. yield; as the hay of the meadows, the herbage of the paſture, corn of the arable, rents, ſervices, &c. and of an advowſon, the taking of tithes in groſs by the parſon; of wood, the felling of wood; of an orchard, the fruit growing there; of a mill, the taking of toll, &c. Theſe and ſuch like iſſues are termed *eſplees*. And it is obſerved, that in a writ of right of land, advowſon, &c. the demandant ought to allege in his court, that he or his anceſtors took the *eſplees* of the thing in demand; otherwiſe the pleading will not be good.

Sometimes this word hath been applied to the farm, or land, &c. themſelves—*Dominus E. habebit omnia expletias & proficua de corona emergentia.* Plac. Parl. 30 Edw. I.

ESPOUSALS, *Sponſalia*, in *Law*, a contract or mutual promiſe between a man and a woman to marry each other. Marriage or matrimony is ſaid to be an *eſpouſal de preſenti*.

ESQUADRILLE. See QUADRILLE.

ESQUADRON. See SQUADRON.

ESQUIAVINE, in the *Manege*, an old French word, ſignifying a long and ſevere chaſtiſement of a horſe in training him.

ESQUINANCY, in *Medicine*, a diſeaſe called alſo *angina*, *ſquinancy*, and, popularly, QUINZY.

ESQUIRE, a title of diſtinction, next below that of knight, and above that of a ſimple gentleman.

The origin, both of the name, and the thing, *eſquire*, is very obſcure: the Engliſh denomination is confeſſedly borrowed from the French, *eſcuyer*; and that from the Latin *ſcutum*, *ſhield*, as ſome will have it; or, as others, from *ſcutarius*, or *ſcutiger*, *ſhield-bearer*; or from *ſcuria*, *ſtable*; or from *equiſo*, *groom*. So many different opinions of the formation of the word, have given riſe to as many about the primitive office of *eſquires*; unleſs, perhaps, the latter hath given occaſion to the former. Paſquier, in his Recherches, liv. ii. chap. 15. maintains the title of *eſquire*, *eſcuyer*, *ſcutarius*, to be very ancient. From the time of the declenſion of the Roman empire, he obſerves, there were two extraordinary kinds of ſoldiery in the Roman army; the one called *gentiles*, and the other *ſcutarii*.

Ammian. Marcellin. lib. xiv. cap. 7. and lib. xvi. cap. 4. ſpeaks of theſe *ſcutarii* as men of redoubted proweſs, and even deemed invincible: it is added, that Julian the Apoſtate ſet a mighty value on thoſe troops, when he was among the Gauls; and hence, probably, it was, that the Gauls, or, perhaps, only the Franks, finding the braveſt among the Roman forces were called *gentiles*, and *ſcutarii*, gave the like names to the boldeſt and braveſt among themſelves: ſuch, according to that curious antiquary, is the original of *eſquires*.

Eſquire, however, afterwards came to be uſed in a ſomewhat different ſenſe; viz. for a gentleman who attended a knight in the wars, and on other military occaſions; bearing his ſhield, *ſcutum*, before him (whence he was called *ſcutarius*, *ſcutiger*, or *ſcutifer*), as alſo his lance, and other weapons; whence his other Latin appellation, uſual among us, *armiger*, q. d. *armour-bearer*. And hence, likewiſe, it is, that, in all our ancient romances, the hero is conſtantly attended by a gentle and truſty *ſquire*.

After all, the moſt probable derivation of *eſcuyer* is not from *eſcu*, *ſcutum*, as is the common opinion; but from *equus*, *horſe*; the primitive *eſquires* being no other than what the Latins call *equiſones*, who had the care and intendance of the equerries, or ſtables, only.

Be this as it will, the title *eſquire*, *armiger*, as now eſtabliſhed among us, is next below that of knight, *eques*. They who bear this title, are all younger ſons of noblemen, and the eldeſt ſons of ſuch younger ſons; the eldeſt ſons of knights, and their eldeſt ſons ſucceſſively; both which ſpecies of *eſquires* Sir Henry Spelman entitles *armigeri natalitii*; the four *eſquires* of the king's body, and *eſquires* created by the king, by putting about their necks a collar of SS's, and beſtowing on them a pair of ſilver ſpurs; letters patent, or other inveſtiture, and their eldeſt ſons. Laſtly, divers others, in the ſuperior public offices, are reputed *eſquires*, or equal to *eſquires*; as ſheriffs of counties, ſerjeants at law, juſtices of peace, mayors of towns, counſellors at law, lieutenant-colonels, majors, captains, &c. during the time of their commiſſion. Laſtly, the heads of ſome ancient families are likewiſe *eſquires* by preſcription. To theſe may be added the *eſquires* of knights of the Bath, each of whom conſtitutes three at his inſtallation; and all foreign, nay, Iriſh peers; for not only theſe, but the eldeſt ſons of peers of Great Britain, though frequently titular lords, are only *eſquires* by the law, and muſt be ſo named in all legal proceedings. See GENTLEMAN.

ESQUISSE, in the French *Painting*, a term ſignifying the firſt ſlight ſketch, or draught, of a picture; the firſt thought of a deſign drawn haſtily with a crayon, or in colours, on paper, canvas, or the like; in order to be finiſhed, and painted, or engraven, afterwards.

He had not the trouble of making a finiſhed and correct deſign, but went to work upon the *eſquiſſe*.

The word is formed of the Italian *ſchizzo*, a *ſplaſh*; becauſe an *eſquiſſe* of a painting only repreſents, as it were, ſplaſhes, or dabs, of colours.

ESRAKITES. See ESCHRAKITES.

ESSÆANS. See ESSENI.

ESSART, or ASSART. See ASSART.

Du-Cange derives the word from ſome of the barbarous Latin words, *exartus*, *exartum*, *eſſartum*, *aſſartum*, *ſartum*, and *ſartus*; which all ſignify a foreſt cut down, or dug up; though Spelman chooſes to deduce it from the Latin *exertum*, *torn up*, or *unrooted*. Others from *ſarrire*, *to weed*;

weed; and others, laſtly, from *exaro, I plow*; whence *exarare*; and, by contraction, *exartum*. In our ancient law-books, *exartum facere in ſylva*, is to *eſſart* a place in a foreſt.

To *eſſart*, is to grub up, or extirpate, buſhes, trees, old roots, ſtumps, or the like; in order to fit the ground for tillage.

ESSATUM, a word uſed by ſome of the chemical writers, to expreſs the medicinal power or ſanative property reſiding in ſimple medicines.

ESSAY, a trial, or experiment, to prove whether a thing be of the requiſite quality, or goodneſs.

The word is French, *eſſai*; which ſome authors derive farther from the Latin *examen*.

ESSAY is alſo uſed for an attempt, or tentative, to learn whether or no a thing will ſucceed.

Eſſays of machines ſhould be made in large; it is not enough that they ſucceed in little.

ESSAY, in *Monaſteries*, is particularly uſed for a trial which a perſon makes of the monaſtic life, in a ſecular habit. This *eſſay* is of one, two, and, in ſome monaſteries, of three months. The *eſſay* is not reckoned in the noviciate. See PROBATION.

ESSAY, or ASSAY, or ſimple SAY, in *Coinage*. See ASSAY.

ESSAY, in matters of learning, is a peculiar kind of compoſition; whoſe character is to be free, eaſy, and natural, not tied to ſtrict order, or method, nor worked up, and finiſhed, like a formal ſyſtem.

The matter of an *eſſay* is ſuppoſed to conſiſt principally of ſudden and occaſional reflections, which are to be wrote much at the rate, and in the manner, a man thinks; ſometimes leaving the ſubject, and then returning again, as the thoughts happen to ariſe in the mind.

At leaſt, this has hitherto been the practice; and Montagne, who has acquired no ſmall reputation by this way of writing, ſeldom keeps many lines to the ſubject he propoſes; though it is our opinion, that lord Bacon, in many of his works, is a better pattern in the *eſſay* kind. Mr. Locke, however, and a few other authors, uſe *eſſay* in a ſeverer ſenſe: the Eſſay of Human Underſtanding, every body knows, is a regular, artful, and laboured work; though perhaps ſo called, to guard againſt too ſevere ſtrictures, by pleading the title.

ESSAY-*hatch*, is the miners term for a little trench or hole, which they dig to ſearch for *ſhoad*, or ore. See TIN.

ESSAY-*maſter*. See MINT, and ASSAY.

ESSE, in the *School Philoſophy*, is uſed in the ſame ſenſe with eſſence; principally for that which is actual, or actually exiſting.

The word is pure Latin; being the infinitive of the verb *ſum, I am*; whence *eſſe, to be*.

From *eſſe* ariſes *eſſatum*, a barbarous term, now almoſt obſolete, ſignifying that which is endued with eſſence, or nature; or affected with the virtue, or efficacy, of another. Some diſtinguiſh *eſſe* into *real* and *intentional*; and, again, into *eſſatum* and *volitum*.

ESSEDARIUS, among the Romans, a gladiator, who fought in a car, or chariot. See Hiſt. Acad. Inſcript. vol. ii. p. 376, ſeq.

ESSENCE, that which conſtitutes, or determines, the nature of a thing; or which is abſolutely neceſſary to its being what it is. This Mr. Locke calls the nominal *eſſence*, in contradiſtinction to the real *eſſence* or conſtitution of ſubſtances, on which this nominal *eſſence* depends: thus, the nominal *eſſence* of gold is that complex idea which the word gold repreſents; e. g. a body, yellow, heavy, malleable, fuſible, and fixed; but its real *eſſence* is the conſtitution of its inſenſible parts, on which thoſe qualities, and all its other properties depend; which is wholly unknown to us.

In philoſophy, the *eſſence* of a thing is defined to be, that whereby a thing is diſtinguiſhed from every other thing.

The Carteſians hold the *eſſence of matter* to conſiſt in extenſion; and, on that principle, deny that there is any ſuch thing as mere ſpace, or vacuity; but the hypotheſis is falſe, as is ſhewn under the articles MATTER, SPACE, VACUITY, PLENUM, &c.

Gaſſendus, and moſt of the corpuſcular philoſophers, hold the *eſſence* of matter to conſiſt in ſolidity, or impenetrability, or reſiſtance, or, more adequately, in a ſolid impenetrability reſiſting the touch; which, it muſt be allowed, of all the properties of matter, ſeems to have the faireſt title to it.

The ſchool philoſophers give us two ſignifications of the word *eſſence*: the firſt denotes the whole eſſential perfection of a being, and, conſequently, its entity, with all its intrinſic, or eſſential, and neceſſary attributes, taken together: in which ſenſe, *eſſence* may be defined to be, all that whereby a thing is, and what it is. In which caſe, the *eſſence* of a thing is to the thing itſelf, what humanity, e. gr. is to man.

The ſecond ſignification of *eſſence* is, that whereby it denotes the principal, and moſt intimate, of all the attributes of a thing; or that which agrees to every ſuch thing, and ſuch alone, and that always, and in ſuch manner, as that the mind, with all its attention, cannot perceive any thing prior thereto; by which, *eſſence* is diſtinguiſhed from the eſſential attributes, i. e. from ſuch as flow from its *eſſence*, or firſt attribute. Thus, the *eſſence* of the human mind is commonly ſuppoſed to conſiſt in the power of thinking; becauſe all its other perfections ſeems to pre-ſuppoſe this; but this pre-ſuppoſes none. And thus the powers of underſtanding, doubting, aſſenting, willing, &c. do all flow from the power of thinking; and cannot exiſt without it, though this may without any of them.

It muſt be allowed, however, that the eſſential properties of a thing do ſo cloſely cohere, nay, and inhere, in the *eſſence* itſelf, that it is ſcarce poſſible to diſtinguiſh the one from the other. Hence, what ſome urge, that, ſetting aſide all the attributes and properties of a thing, and what remains is its *eſſence*; is a mere chimera. For ſet aſide, e. gr. from the mind, the powers of underſtanding and willing, with the reſt of its attributes, and what will there remain to call its *eſſence*?

It is greatly diſputed, in the ſchools, whether the *eſſences* of created things be eternal? or, whether the *eſſences*, as well as the exiſtences, had their origin in time? The Carteſians hold, that the *eſſences* of things depend abſolutely on the free concurring will of God.

ESSENCE, in *Medicine* and *Chemiſtry*, denotes the pureſt, moſt ſubtil, and balſamic part of a body, extracted from the reſt by means of fire.

Of theſe there is a great variety, drawn from flowers, fruits, and the like, uſed on account of their agreeable ſmells, and taſtes, by the apothecaries, perfumers, &c. The principal are, *eſſence* of roſemary; of turpentine; of aniſe; of cloves; of cinnamon; and of citron.

The *eſſences* commonly ſold by the perfumers, are only the diſtilled oils of behn, and of bitter almonds; to which they give the ſmell of certain flowers, or ſpices; as violets, jeſſamine, cinnamon, &c.

The *eſſences* to be drank, or mixed, with liquors, are of a more elaborate compoſition: the moſt uſual, and beſt, is prepared with ſpirit of wine, cloves, cinnamon, mace, long-pepper, and coriander. The whole, being put up in a very cloſe veſſel, is expoſed to the ſun for ſix weeks, or two months, during the day-time, and in the night ſet near the fire.

In winter they uſe the fire alone. This *eſſence* being exceedingly ſtrong, is frequently uſed only to give a ſtrength to other weaker liquors. After the ſame manner may the *eſſences* of ambergriſe, muſk, &c. be drawn.

The *eſſence* of odoriferous flowers, to give a fine ſmell to liquors, is drawn by diſpoſing ſtrata, or lays, of the flowers, and of ſugar, alternately, in a proper veſſel, and leaving them to infuſe, in a cellar, for twenty-four hours; and, after that, as long in the ſun; and, laſtly, ſtraining, or percolating, the whole through a ſieve, without ſqueezing the flowers.

ESSENCE *of wine*, a term uſed by Paracelſus, and ſome of the German chemiſts ſince his time, to expreſs what is called ſometimes the philoſophical ſpirit of wine, or the ſpirit of wine of the ancients. It is not a diſtilled ſpirit like what we call ſpirit of wine, but approaches more to what Stahl has greatly recommended to the world, under the name of concentrated wine, or wine whoſe ſtrength has been reduced to a ſmaller compaſs, by ſeparating its aqueous part only by freezing. Stahl recommends the immediately expoſing wine to the froſty air on this occaſion; but the proceſs ordered by Paracelſus for the preparation of this liquor is more tedious. He orders that the fineſt and beſt flavoured wine be choſen; that it be put into a glaſs, filling it up three parts in four; and the neck being then ſealed hermetically, it is to be put into horſe-dung for three months, and then expoſed to the froſty air for a month, after which the ice is to be thrown away, and the liquid part, which is the *eſſence*, preſerved. Shaw's Chemical Eſſays.

ESSENDO *quietum de tollonio*, in *Law*, a writ to be quit of toll, and lies for citizens and burgeſſes of any city or town that by charter or preſcription ought to be exempted from toll, where the ſame is exacted of them. Reg. Orig. 258.

ESSENI, ESSENES, or ESSÆANS, an ancient ſect among the Jews.

As to the etymology of the name, critics have been much divided. Philo derives it from οσιος, *holy*; Epiphanius from ישי, *Jiſhai, Jeſſe*, the father of David; Salmaſius from a city called *Eſſa*, mentioned by Joſephus; whence he apprehends this ſect firſt ſprung; Godwin derives it from the Syriac word אסא, *aſa*, which ſignifies *to heal*; becauſe Philo calls one branch of the *Eſſenes* therapeutæ:

and Serrarius enumerates at leaſt a dozen different etymologies. Philo in Tract. Omnis probus Liber. Oper. p. 678. Colon. Allobr. 1613. Epiphan. Hæreſ. xix. lib. i. Salmaſ. Plin. exercit. in Solin. cap. 35. Serar. Trihæres. Jud. lib. iii. cap. 1. p. 106. 110. edit. Trigland. 1703. The principal ancient writers, who give any conſiderable account of the *Eſſenes*, are Joſephus, Philo, and Pliny. Joſ. de Bell. Jud. lib. ii. cap. 1. cap. 8. & 12. and Antiq. lib. cxiii. cap. 9. 13. 19. lib. xviii. cap. 1. & cap. 2. & alibi. Philo, ubi ſupra, & De Vitâ contemplativâ, p. 688. ed. Col. Allobr.

As to the origin of this ſect, Pliny aſſerts, without mentioning his authority, that it had ſubſiſted for ſeveral thouſand years. The moſt probable opinion is, that this ſect was formed by Jewiſh exiles, a little before the time of the Maccabees, who were forced to fly from the perſecution of their enemies into caves and deſerts. The firſt *Eſſenes* we read of are mentioned in the fourth book of Maccabees, under the name of Haſdanim, and by Joſephus; both which accounts agree, that they were already ſettled in Judæa, in the time of Jonathan, the brother and ſucceſſor of Judas Maccabæus, about a hundred and fifty years before Chriſt. Philo and Joſephus agree, that their number in Judæa was about four thouſand; but Philo makes the number in Egypt much greater. Some have expreſſed their ſurprize, that no mention ſhould be made of this ſect in the New Teſtament. This proceeded, as ſome imagine, from their retired mode of living, by reaſon of which they never came under our Saviour's obſervation, as the Phariſees and Sadduces often did. Others ſuppoſe, that, being very honeſt and ſincere, without guile or hypocriſy, they gave no reaſon for that reproof and cenſure, which the others very juſtly merited. Prid. Conn. vol. iii. p. 384. However, it has been ſuppoſed, that they are referred to by the apoſtle Paul in his Epiſtle to the Coloſſians, ch. ii. 18, 21, 23.

Joſephus, making mention of the ſeveral ſects among his countrymen, diſtinguiſhes three; viz. the Phariſees, Sadducees, and *Eſſeni*; which laſt he prefers to the two former, as to their manner of life. He aſſures us, farther, that they were Jews, by original; from which it ſhould appear, that St. Epiphanius was miſtaken, in ranking them among the Samaritans.

In effect, the *Eſſeni* appear to have been true Pythagorean philoſophers, in every thing that related to their manner of living; for they greatly affected ſolitude and retirement, and avoided all converſation with women, to devote themſelves more entirely to the contemplative life.

Grotius will have the *Eſſeni* the ſame with the ancient חסדים, *Haſidim*, or *Haſidæi*; thus called, according to Philo, from their ſingular piety, humility, and devotion. Among theſe, Gale obſerves, it was, that the Hebrew philoſophy chiefly flouriſhed. Porphyry is very prolix in his praiſes of the *Eſſeni*: Εισι τοινυν οι Εσσαιοι Ιουδαιοι μην το γενος φιλαλληλον, &c. He repreſents them as deſpiſers of pleaſures, riches, glory, and delicacy; and ſtrenuous retainers to continency, auſterity, ſtudy, &c. He adds, they decline marriage, and adopt and educate other people's children in the principles of religion and philoſophy; they are all on a level, hold every thing in common, neither buy nor ſell, &c. By long habit, they arrived at ſuch a degree of patience, that Porphyry aſſures us, flames and tortures had not the leaſt effect on them. They ſcorned to intreat their tormentors; nor ever ſhed a tear; but would ſmile under all their agonies, &c. As to their learning, Philo Judæus, in his treatiſe, That every good Man is free, tells us, that they deſpiſed logic, as uſeleſs to the acquiring of virtue; phyſics they left to the ſophiſts and diſputants, as judging it to tranſcend the human faculties; and applied themſelves wholly to morality. Porph. de Abſtin. lib. iv. § 11. ſeq. Gale, Philoſ. Gener. lib. i. cap. 1. § 11.

Both Joſephus and Philo give a ſurpriſing account of their auſtere way of life, which the curious reader may ſee at large in Prideaux's Conn. ubi ſupra. Their houſes were mean; their cloaths made of wool, without any dye; they never changed their cloaths or ſhoes, till they were quite worn out; their food was plain and coarſe, and their drink water; they neglected all bodily ornaments, and would by no means anoint themſelves with oil, according to the faſhion of thoſe times. They lived in ſodalities, and had all their goods in common; their morals were very exact and pure, and they kept the Sabbath more ſtrictly than any of the Jews: Before any of them were admitted to the common table, they bound themſelves by a ſolemn oath to obſerve the rules of the ſociety, which were very ſtrict and exemplary.

Some have ſaid that the *Eſſenes*, as well as the Pythagoreans, prohibited oaths; that they uſed only inanimate ſacrifices, and that they not only worſhipped towards the riſing ſun, but worſhipped the ſun itſelf. But it has been urged, that neither of theſe charges ſeem to be well founded; or, at leaſt, that it is difficult to reconcile them with their known veneration for the writings of Moſes, and other inſtances of their conduct. Pliny, and others on his authority, have aſſerted, that they wholly declined marriage; and Pliny (lib. v. cap. 17.) with more wit than juſtice, ſays, that for ſeveral thouſands of years, this people is perpetually propagated without any being born among them, ſo fruitful and prolific unto them is the repentance of others. But Joſephus informs us (De Bell. Jud. lib. ii. cap. 1.) that there was one ſort of *Eſſenes*, who agreed with the others, except in the article of marriage. For they reckoned, that thoſe that do not marry cut off a great part from the number of the living, and that thus the whole race of mankind would ſoon be extinguiſhed. Accordingly they made choice of thoſe women, who, after three years trial, were found fit to bear children, and never cohabited with them after they were known to be with child; conſulting the propagation of their ſpecies, and not their own gratification in this buſineſs.

With reſpect to the religious opinions of the *Eſſenes*, they believed the exiſtence of angels, the immortality of the ſoul, and a future ſtate of rewards and puniſhments, but denied the reſurrection of the body. They maintained, that fate governs all things, and that nothing happens to man but by its appointment.

The *Eſſeni* ſeem to have been, among the Jews, what the moſt retired and auſtere monks are, or were, among the Chriſtians; which was what gave them their denomination of Ιουδαικοι ασκηται, *Jewiſh aſcetics*.

Many catholic writers have even deduced the origin of monks from them; building, principally, on what Philo relates of them, who divides them into two branches, or ſects; the one who married, and the other who lived in celibacy.

Joſephus ſeems likewiſe to have had an eye to theſe two ſorts of *Eſſeni*. Serrarius, who has wrote very amply on the ſubject, follows Philo, in making two claſſes of *Eſſeni*. The firſt are thoſe whom he calls *Practici*, and who lived in community; the ſecond, thoſe called *Theoretici*, who lived in ſolitude, and led a life of pure contemplation. He adds, that Joſephus only makes mention of the firſt; omitting the contemplative kind, whom Philo calls *Therapeutæ*, and who were principally found in Egypt. See THERAPEUTÆ.

Euſebius holds, that the *Eſſeni*, called *Therapeutæ*, were real Chriſtians, or Jews converted by St. Mark, who had embraced this kind of life. Scaliger, on the contrary, maintains, that theſe *Therapeutæ* were no Chriſtians, but real *Eſſeni*, who made profeſſion of Judaiſm: however, he allows of the two kinds of *Eſſeni* above mentioned. But Valeſius, in his notes on Euſebius, abſolutely rejects any ſuch diſtinction: he denies, that the *Therapeutæ* were any real *Eſſeni*; and that chiefly on the authority of Philo himſelf, who never calls them *Eſſeni*, and who places the *Eſſeni* in Judæa and Paleſtine; whereas the *Therapeutæ* were ſpread throughout Greece, Egypt, and other countries.

Some traces of the *Eſſenes* are found under the emperor Trajan, and under Juſtinian; but they were much degenerated from their primitive purity both of doctrine and manners; and the ſect about that time became extinct. Though the *Therapeutæ*, as well as the *Eſſenes*, were ſtrictly Jews, and not Chriſtians, it is not impoſſible, that ſome of them, becoming Chriſtians, might ſtill affect their former recluſe way of living; and being imitated by others, lay the foundation of monkery among Chriſtians.

ESSENTIA *dulcis*, in *Chemiſtry*, a name given by Kunkel, and ſome others of the German authors, to a menſtruum of which they relate wonderful effects; but the preparation of which ſeems hitherto a ſecret. They ſay this menſtruum has nothing acid or corroſive in it, but that it approaches to the nature of ſpirit of wine, yet that it is capable of diſſolving the moſt denſe metals, and of converting any of them into a pure white ſalt, which has all their virtues, but nothing of that vitriolic acrimony, which they have when prepared in the common way. The ſalts of mercury and of gold thus prepared, have great praiſes beſtowed on them, and are ſaid to cure epilepſies, the venereal diſeaſe, and many other diſtempers, without any violence or danger. Kunkel, De Salis Metal. See METAL.

ESSENTIAL, ſomething that is neceſſary to conſtitute a thing, or that has ſuch a connexion with the nature and reaſon of a thing, that it is found, or ſuppoſed, whereever the thing itſelf is.

Thus, it is *eſſential* to God to be juſt. Mr. Locke has laboured to overturn that great principle of the Carteſians, that thinking is *eſſential* to the ſoul.

The heart, brain, and ſpinal marrow, are parts ordinarily tily ſuppoſed *eſſential* to life, or without which life cannot be; yet we have inſtances, in hiſtory, of children being found, and alive, without almoſt any of thoſe parts. See Brain, &c.

Essential *oils* are ſuch as are really contained in a plant, and are drawn from it, by diſtillation, in an alembic, with water: they are thus called, in contradiſtinction to empyreumatic oils, which are raiſed by a naked fire, without water. See Oils.

Essential *properties*, are ſuch as neceſſarily depend on, and are connected with, the nature and *eſſence* of any thing, ſo as to be inſeparable from it; in diſtinction from *accidental*.

Essential *ſalts*, are thoſe prepared from decoctions, or thoſe which are found cryſtallized in the juices or infuſions of plants; in contradiſtinction to thoſe made by incineration. See Salt.

Essential *Fever, Form, Mode, Part, Perfection.* See the ſubſtantives.

ESSERE, Sora, and Sare, in *Medicine*, are little puſhes or wheals, ſomewhat red and hard, which quickly infect the whole body with a violent itching, as if one were ſtung with bees, waſps, flies, or nettles; and therefore called the nettle-raſh; yet they vaniſh after a little time, and leave the ſkin as ſmooth and well-coloured as before. It differs from an *epinyctis* in this, that an *epinyctis* ſweats out matter, but an *eſſere* does not.

ESSES, in *Military Language*, are fixed to draught chains, made in the form of an S; one end of which is faſtened to the chain, and the other to hook to the horſe's harneſſes, or to a ſtaple; they ſerve likewiſe to lengthen and piece chains together.

ESSLISORS, in *Law*, perſons appointed by a court of law, to whom a writ of *venire facias* is directed, to impanel a jury, on challenge to the ſheriff and coroners. They are to return the writ in their own names, with a panel of the jurors names. 15 Edw. IV. 24. pl. 4.

ESSOIGN, or Essoin, in *Law*, an excuſe for him who, being ſummoned to appear and anſwer to an action real, or to perform ſuit to a court baron, &c. cannot attend, becauſe of ſome legitimate hindrance.

The word is formed of the French *eſſoine*, or *exoine*; and that from the barbarous Latin *eſſonia*, or *exonia*, which ſignifies the ſame.

The cauſes that ſerve to *eſſoin*, are diverſe; yet they may be reduced to five heads. The firſt is, *eſſoin de ultra mare, when the party is beyond ſea*; the ſecond, *de Terra Sancta, when on an expedition in the Holy Land*; the third, *de malo veniendi, when he is infirm of body, and cannot come*; which is alſo called the *common eſſoin*; the fourth, *eſſoin de malo lecti, when the defendant is ſick a-bed*; the fifth, *de ſervito regis, when he is in the king's ſervice.* Horn mentions ſeveral other *eſſoins* touching the ſervice of the king celeſtial, &c.

Essoign *day of term*, is the firſt day of that term, when the court ſits to take *eſſoigns*, or excuſes, for ſuch as do not appear according to the ſummons of the writ. But the perſon ſummoned hath three days grace beyond the return of the writ, in which to make his appearance; and if he appears on the fourth day incluſive, the *quarto die poſt*, it is ſufficient.

Essoign *de malo villæ*, in *Law*, is when the defendant is in court the firſt day, but gone without pleading; and being afterwards ſurpriſed with ſickneſs, &c. cannot attend, but ſends two *eſſoiners*, who openly proteſt in court that he is detained by ſickneſs in ſuch a village, that he cannot come *pro lucrari & pro perdere*; and this will be admitted: for it lieth on the plaintiff to prove, whether the *eſſoign* is true or not.

Essoigns, *clerk of the.* See Clerk.

ESSORANT, from the French *eſſorer, to air, in order to dry*, in *Heraldry*, a term uſed to expreſs a bird ſtanding on the ground with the wings expanded, as if it had been wet, and were drying itſelf.

ESTABLISHMENT *of dower*, in *Law*, is the aſſurance and ſettlement of *dower*, made to the wife by the huſband, on marriage; and *aſſignment of dower*, ſignifies the ſetting it out by the heir afterwards, according to the *eſtabliſhment*.

ESTACHE is uſed, in our *Old Writers*, for a bridge or ſtank of ſtone and timber.

ESTANDARD. See Standard.

ESTATE, in *Law*, the title, or intereſt, a man hath in lands, or tenements.

Eſtates are acquired divers ways, viz. by deſcent from a father to the ſon, &c. conveyance, or grant, from one man to another; by gift or purchaſe, deed, or will; and a fee-ſimple is the largeſt *eſtate* that can be in law. 1 Litl. 541.

Eſtates are real, of lands, &c. or perſonal, of goods and chattels; otherwiſe diſtinguiſhed into freeholds that deſcend to the heir, and chattels, which go to the executors.

Eſtate likewiſe is either ſimple or conditional. See Fee-*ſimple*, and Fee-*tail*.

The word *eſtate* generally, in deeds and grants, comprehends the whole, in which the party hath an intereſt or property; and will paſs the ſame. 3 Mod. 46. See Fee, and Tail.

Estate, *additions of.* See Addition.

Estate, *baſe.* See Base.

Estate, *que.* See Que *eſtate.*

Estate, or ſimply State, denotes alſo the empire, kingdom, provinces, or extent of lands, under the government of any ſovereign.

The *eſtates* of the grand ſeignior, of the king of Spain, &c. are very extenſive; thoſe of the king of France are compact, and well peopled. Italy is cantoned out into a great number of petty *eſtates*. We ſay, miniſters of *eſtate*, ſecretaries of *ſtate*, &c.

Estate, or State, is alſo generally applied in the ſame ſenſe with claſs or order: thus, the lay part of his majeſty's ſubjects, or ſuch of the people as are not comprehended under the denomination of clergy, may be divided into three diſtinct *eſtates*, or *ſtates*, the civil, the maritime, and the military.

Estate is more particularly applied to the ſeveral ranks, or claſſes, of a people aſſembled together, for concerting meaſures, reforming public abuſes, or compoſing the diſturbances of a ſtate.

In England, the three *eſtates*, viz. king, lords, and commons, meet ordinarily in parliament. In France, the *eſtates* conſiſt of the churchmen, the nobility, and the people, or third *eſtate*. Some will have theſe aſſemblies of *eſtates* to be a very ancient conſtitution: all we know is, that there were general aſſemblies held, among the Gauls, before Cæſar's conqueſt; but then the people, or third *eſtate*, had no ſhare in them. Under the firſt and ſecond race of the French kings, there were alſo ſolemn convocations, called *parliaments*; but the great lords of the realm were the only perſons that were called to them. See Parliament.

Estates *General.* }
Estates *of Holland.* } See States *General*, &c.

ESTERLING, or Easterling. See Sterling.

ESTETE', in *Heraldry*, is uſed by the French to ſignify a beaſt whoſe head has been, as it were, torn off by force; and, conſequently, the neck left rough and rugged; in contradiſtinction to *deffait*, or *decapité*, where the neck is left ſmooth; as if the head had been cut off.

ESTHER, a canonical book of the Old Teſtament; denominated from a celebrated Jewiſh captive of that name, in Perſia, whoſe beauty preferred her to the bed of Ahaſuerus (ſuppoſed by ſome to have been Darius Hyſtaſpes, by others Xerxes, but probably Artaxerxes Longimanus, though Jacob. Capellus makes him to be Ochus, called in Perſia *Achaſch-Veroſh*), and the throne of Perſia; and who, in that quality, ſaved her countrymen, the Jews, from the death to which Ahaſuerus had doomed them, by the counſels of his favourite Haman; the hiſtory of which tranſaction makes the ſubject of the book of *Eſther*.

The critics are divided about the author of this book: St. Epiphanius, St. Auguſtine, and Iſidore, attribute it to Ezra; but Euſebius will have it to be of a later date. Some aſcribe it to Joachim, high-prieſt of the Jews, and grandſon of Joſedek; others will have it compoſed by an aſſembly, or ſynagogue, of the Jews, to whom Mordecai wrote letters, informing them of what happened. Eſth. ix. 29.

But the generality of interpreters, Hebrew, Greek, Latin, &c. aſcribe the book to Mordecai himſelf; Elias Levita, in his Maſſ. Hamum. pref. 3. mentions this opinion as unqueſtionable.

It is chiefly founded on that paſſage, chap. ix. ver. 20. where it is ſaid, that *Mordecai wrote theſe things, and ſent letters unto all the Jews, that were in all the provinces*, &c. It is alſo ſuppoſed, that queen *Eſther* herſelf might have ſome ſhare therein; it being expreſſed, in the ſame chapter, ver. 29. that *Eſther* and Mordecai wrote a ſecond letter, by the king's authority, to ordain the ſolemnizing a yearly feaſt, called *purim*, that is, *day of lots*, in commemoration of the Jews being delivered from the lots, or ſortes, whereby they had been condemned.

Some will have this book to be only deuterocanonical, or apocryphal; others contend for its being canonical, as far as chap. x. ver. 3. incluſive; and all the reſt deuterocanonical. Of this ſentiment are, St. Jerome, De Lyra, Dionyſius the Carthuſian, Cajetan, and others. The council of Trent turned the ſcale for its being canonical throughout; ſo that the matter is determined for the Catholic countries.

But the proteſtants retain the old opinion, and only admit it as far as the third verſe of the tenth chapter; the reſt, to the end of the ſixteenth chapter, is thrown among the apocryphal books. See DEUTEROCANONICAL, and APOCRYPHAL.

ESTIÆA, Εϛιαια, in *Antiquity*, ſolemn ſacrifices to Veſta, called in Greek εϛια, of which it was unlawful to carry any away, or communicate any part to any beſides the worſhippers. Potter, Archæol. Græc. lib. ii. cap. 20. tom. i. p. 396.

ESTIATORES, Εϛιατορες, among the Athenians, perſons appointed by lot to provide an entertainment for the whole tribe. Beſides thoſe appointed by lot to this office, others voluntarily undertook it to ingratiate themſelves. Potter, Archæol. Græc. lib. i. cap. 15. tom. i. p. 86.

ESTIMIONE, in *Natural Hiſtory*, a name by which ſome call the *barmeſion*.

ESTIVAL *occident*. See OCCIDENT.

ESTIVAL *orient*. See ORIENT.

ESTIVAL *ſolſtice*. See ÆSTIVAL, and SOLSTICE.

ESTOILE'. A *Croſs* ESTOILE' is a ſtar with only four long rays, in manner of a croſs; and, accordingly, broad in the center, and terminating in ſharp points.

ESTOPPEL, formed of the French *eſtouper*, *oppilare*, *obſtipare*, *to ſtop*, or *block up*, in *Law*, an impediment, or bar, of action, ariſing from a man's own act, or deed; againſt which a man is forbidden, by law, to ſpeak, though it be to ſay the truth. See BAR.

Goddard defines an *eſtoppel* to be, any bar, or hindrance, to one to plead the truth; and extends it not only to the impediment given by his own act, but by another's alſo. There are three kinds of *eſtoppel*; viz. *matter of record*, by *matter in writing*, and by *matter in pais*.

ESTOVERS, in *Law*, is uſed, by Bracton, for that ſuſtenance which a man, committed for felony, is to have out of his lands, or goods, for himſelf and his family, during impriſonment.

In ſtat. 6 Edw. I. it is uſed for an allowance in meat, or cloaths. In ſome manors, the tenants have *common of eſtovers*; that is, neceſſary botes, or allowances, out of the lord's wood: in which laſt ſenſe, *eſtovers* comprehends *houſe-bote*, *hay-bote*, and *plow-bote*; ſo that if a man have in his grant theſe general words, *de rationabili eſtoverio in boſcis*, &c. he may thereby claim all three.

Eſtovers is alſo uſed for ALIMONY, which, if the huſband refuſes to pay, there is, beſides the ordinary proceſs of excommunication, a writ at common law, *de eſtoveriis habendis*, in order to recover it.

ESTRAC, in the *Manege*, ſignifies a horſe that is light bodied, lank-bellied, thin-flanked, and narrow-cheſted. See BELLY.

ESTRADE, a French term, literally ſignifying a *public road*, or *high-way*. Hence the military phraſe, *battre l'eſtrade*, *to beat the eſtrade*, that is, to ſend ſcouts, or horſemen, to get intelligence, to learn the diſpoſitions of the enemy, and inform the general of every thing likely to fall in the way. An army never marches, without ſending *batteurs d'eſtrade* on every ſide.

The word is formed of the Italian *ſtrada*, *ſtreet*, or *road*; which is derived from the Latin *ſtrata*, a *paved ſtreet*. Some derive it from *eſtradiots*, who were cavaliers anciently employed in *beating the eſtrade*.

ESTRADE is alſo uſed for a little elevation on the floor of a room, frequently encompaſſed with an ALCOVE, or rail, for placing a bed in; and ſometimes, as in Turky, only covered with fine carpets, for receiving viſitors of diſtinction.

ESTRANGEL, ESTRANGELUS, in the Syriac *Grammar*. *Eſtrangel character*, is a particular ſpecies, or form, of Syriac letters; ſerving as the majuſcule letters in that language.

Abraham Ecchellenſis takes the *eſtrangel* character for the true, ancient Chaldee character; and it is certain, the Abyſſinians, who call themſelves Chaldeans, ſtill occaſionally uſe the *eſtrangel* character, if we may credit Hottinger, in his Theſaur. Philol. p. 286. Biſhop Walton, in his Prolegomena, gives us an *eſtrangel alphabet*.

ESTRAPADE, in the *Manege*, is the defence of a horſe that will not obey, but to get rid of his rider, riſes much before, and while his fore-hand is yet in the air, yerks furiouſly with his hind-legs, ſtriking higher than his head was before; and during this countertime goes back rather than advances.

ESTRAY, or STRAY, ſignifies any tame beaſt, as ſheep, oxen, ſwine, and horſes, or ſwans, found within a lordſhip, and not owned by any man; in which caſe being cried, according to law, in the church, and two market-towns adjoining, if it be not claimed by the owner, within a year and a day, it becomes the lord's of the ſoil where found. If the owner claims it within the year and day, he muſt pay the charges of finding, keeping, and proclaiming them; and he may ſeize it, without telling the marks, or proving his property, which may be done at the trial, if conteſted. If the beaſt ſtray within the year to another lordſhip, the firſt lord cannot retake it. An *eſtray* muſt be fed and kept, uninjured, and without labour, till it is reclaimed, or the limited time expires.

ESTREAT, *Extractum*, in *Law*, is uſed for the true copy, or duplicate, of ſome original writing, eſpecially of amercements, or penalties, ſet down in the rolls of a court, to be levied by the bailiff, or other officer, on every offender.

ESTREATS, *clerk of the*. See CLERK.

ESTREPEMENT, in *Law*, an impoveriſhing, or making of land barren, by continual plowing and ſowing, without due manuring, reſt, and other huſbandry.

The word is derived from the French *eſtropier*, *to maim*; or the Latin *extirpare*, *to extirpate*, *root up*.

ESTREPEMENT is alſo uſed for any waſte, or ſpoil, made, by the tenant for life, upon lands, or woods, to the prejudice of him in reverſion; as the cutting down of trees, or lopping them farther than the law allows, &c.

ESTREPEMENT is alſo a writ which lies in two caſes: the one, when a man having an action depending, as a formedon, writ of right, or the like, ſues, to inhibit the tenant from making waſte during the ſuit.

The other is for the demandant, who is adjudged to recover ſeiſin of the land in queſtion; and before execution, for fear of waſte to be made till he can get poſſeſſion, ſues out this writ.

ESULA, in *Botany*, a name given by many authors to ſome of the ſmall ſpecies of SPURGE.

ESULA *rara*, in *Botany*, a name given by John Bauhine, and ſeveral other authors, to a plant, called alſo by ſome *alypum*, but properly a ſpecies of dog's bane, and diſtinguiſhed by Mr. Tourneſort by the name of *apocynum maritimum Venetum ſalicis folio flore purpureo*, or the purple-flowered ſea dog's bane of Venice, with willow-like leaves. See DOG'*s Bane*.

ESULÆ *radix*, in the *Materia Medica*, the name of a root of a plant of the ſpurge kind, ſometimes uſed in medicine. The root conſiſting of a cortical part, and an inner ſticky one, the bark only is uſed; and ſuch ſhould be choſen as is new dried, and of a reddiſh colour without and within, and ſuch as when held in the mouth affords a very diſagreeable taſte, with very great acrimony. It is a very violent purge, and has been ſaid to have performed cures in dropſical caſes, when more gentle medicines have proved ineffectual. It is a good method to macerate it a day or two in vinegar before it is uſed.

The plant which produces it, is the *eſula riveri et officinarum* of Mr. Ray: it is cultivated by ſome curious people in their gardens.

ESURINE *ſalts*, in ſome authors, denote thoſe of a fretting, eating, or corroding nature; which chiefly abound in places near the ſea-ſide, and where a great quantity of ſea-coal is burnt; as appears, from the ſpeedy ruſting of iron in ſuch places.

ESUS, in *Mythology*, a deity among the Gauls, to which they ſacrificed after victory whatſoever came alive into their poſſeſſion. They ſometimes ſprinkled the altars of this deity with the blood of their women and children.

ETAPPE, in *War*, an allowance of proviſions and forage, made to the ſoldiers, upon march through a kingdom, or province, to or from winter-quarters.

Hence, he that contracts with the country, or territory, for furniſhing the troops in their march, is called *etappier*.

ETCH. See EDDISH.

ETCH-*crop*, among *Farmers*, the third crop of corn upon land newly broke up. Dict. Ruſt.

ETCHING, a method of engraving on copper; wherein the lines, or ſtrokes, inſtead of being cut with a tool, or graver, are eat with aqua fortis.

Etching was invented about forty or fifty years after ENGRAVING on copper, properly ſo called, probably by Albert Durer and Lucas. It has ſeveral advantages peculiar to itſelf, and which renders it, on ſome accounts, preferable to engraving: as, that it is done with greater eaſe and expedition; that it requires fewer inſtruments; and even that it repreſents divers kinds of ſubjects better and more agreeably to nature, as landſchapes, ruins, grounds, and all ſmall, faint, looſe, remote objects, buildings, &c. The inſtruments employed in *etching* are needles, ſtifts, oil-ſtones, ſcrapers, and bruſh pencils. The needles are of the common kind, mounted on ſticks about ſix inches long; and the artiſt ſhould be provided with ſeveral of various ſizes and ſharpneſs. The ſtift is a needle, the point of which is blunted and poliſhed, that it may glide freely over the paper, without ſcratching or cutting it: this is uſed for calking and overtracing the deſign on the varniſh. The oil-ſtones are well known; with reſpect to which it may be remarked, that they ſhould be ſo ſoft, as not to take too faſt hold of the needles, but to give a keen, ſmooth edge. See SCRAPER.

The bruſh pencil ſhould be large and ſoft, of camel's hair, and is uſed for cleaning the ſurface of the varniſh after the engraving, and for other purpoſes.

The method of *etching* is thus: the plate, being well poliſhed (ſee COPPER-*plates*) is put upon a chafing-diſh, and heated over the fire; or, if ſmall, is held with a hand-vice, the poliſhed ſide being upwards, and heated with the flame of paper burning under it; when hot, it is rubbed over with ſoft varniſh (ſuch as is deſcribed in the ſequel of this article) wrapped up in taffety, which ſhould be gently paſſed from one ſide to the other in a right line, ſo as to form ſeveral rows, till the plate is every where moderately covered; then with a cotton ball, tied up in taffety, let every part of the plate be beat gently, while the varniſh is in a fluid ſtate; and, in order to give it a fine grain, continue to beat it with the ball, after the plate is taken from the fire, till it attains a harder conſiſtence in cooling; but the uſe of the ball ſhould be diſcontinued before the varniſh is quite cold, leſt it ſhould be made to riſe from the plate.

When the plate is thus uniformly and thinly covered with the varniſh, it muſt be blackened by a piece of flambeau or of a large wax-candle, which affords a copious ſmoke; two, or even four ſuch candles are uſed together for the ſake of diſpatch, that the varniſh may not grow cold during the operation, which ſhould be performed, if poſſible, at one heating of the plate, for repeated melting of the varniſh does it much damage. Large plates may be ſuſpended from the cieling of a room by four cords and iron rings, with the varniſhed ſide downwards, for the greater convenience of being blackened. Care ſhould be taken that the flambeau or candles be kept at a proper diſtance from the plate, that the wick may not touch the varniſh. The varniſh may be made white, if that colour is preferred to black, by grinding white lead in water, and putting it into a glazed earthen diſh with a little good glue diſſolved, and melting the whole together. This mixture is ſpread with a bruſh or pencil of hog's hair thinly and evenly on the varniſh laid on the plate and ſmoothed. The colour is then left to dry; if it fixes with difficulty on the varniſh, the compoſition ſhould be mixed with a drop or two of ox-gall. On this ground, thus prepared, the back of the deſign or draught is laid. When this is done, the deſign remains to be calked, or transferred upon the plate, which is more eaſily effected than in the common graving; for the back of the deſign having been before rubbed over with red chalk, or flake-white, or, when the varniſh is whitened, with powdered black-lead, nothing remains but to trace over all the lines and ſtrokes of the draught with a needle or point; which, preſſing the paper cloſe down to the ground, occaſions the wax thereon to lay hold of the chalk, and ſo bring off the marks of the ſeveral lines, ſo as at length to ſhew a copy of the whole deſign in all its correctneſs. Inſtead of rubbing the back of the deſign with the red chalk or black lead, it may be proper in ſome caſes to ſpread the one or the other upon a piece of very thin paper of the exact ſize of the drawing, which ſhould be laid on the plate with the daubed ſide towards the varniſh under the drawing. The draught being thus calked, the artiſt proceeds to draw the ſeveral lines and contours with a point through the ground upon the copper. See CALQUING. When a picture or drawing is deſigned to be engraven on the ſame ſize, and turned the ſame way on the plate, ſo that the print will be turned to the oppoſite or contrary ſide to that of the original, a thin piece of paper varniſhed with the Venetian varniſh very dry and tranſparent, or thin fan-paper oiled with linſeed-oil, and perfectly dry, muſt be fixed to it: on this paper the lines of the original, which will appear through it, muſt be marked with a common *etching* point on the varniſhed paper, and with a black-lead pencil on the oiled paper, and afterwards calked upon the varniſh, by reddening the back of this paper with red chalk, or by interpoſing another very thin paper, not oiled but reddened, between the oiled paper and the varniſhed plate. To finiſh his work, the artiſt makes uſe of points of various ſizes, and preſſes on them, ſometimes more ſtrongly, and ſometimes more lightly, as the ſeveral parts of the figures, &c. require a greater or leſs ſtrength or boldneſs; ſome of the points being as fine as needles for the tender fair ſtrokes, and the remoter fainter objects; and others again as big as bodkins, ſometimes made with oval points, for the deeper ſhadows and the figures in the front of the work. Theſe oval-pointed needles have been rejected by ſeveral artiſts in working on the ſoft varniſh; they are uſeful only in engraving architecture: thoſe who are accuſtomed to the uſe of them may make the fineſt and ſmalleſt as well as the larger ſtrokes, and *etch* a whole plate without any other inſtrument, by furrowing it more or leſs, according to the magnitude of the intended ſtrokes. Some engravers uſe needles that do not cut at all, nor make any perceptible impreſſion on the copper. Care ſhould be taken to preſerve the ſoft varniſh on the plate, for which artiſts have various contrivances. The moſt eaſy way is to lay the plate on a table in form of a deſk, and to cover that part of the varniſh which allows of being covered in the engraving with a ſoft napkin of diaper or damaſk, folded evenly in four doubles, or with a piece of ſheep-ſkin dreſſed in oil, having the ſoft ſide turned towards the varniſh; or with a board called a bridge, ſuſpended at the ends by two pieces of wood about one-fourth of an inch thick, juſt ſo as to let the plate lie freely under it. After all, if the varniſh ſhould be injured, the injury may be repaired by taking turpentine varniſh; and having tempered it with a little lamp-black, covering, by means of a ſmall pencil, the ſcratches, flaws, or falſe ſtrokes, with the mixture. The plates, thus repaired, may be equally well engraved upon with others, and therefore this modern invention is extremely uſeful. The ſame compoſition may alſo be applied to thoſe flaws occaſioned by the ſcaling of the varniſh, which ſometimes happens in the operation.

Things being thus prepared, a rim or border of wax, compoſed of four parts of common bees wax and one part of Burgundy pitch melted together, is raiſed round the circumference of the plate covered with the varniſh, and aqua fortis poured on, which is kept by the ſaid border from running off at the edges. The ground being impenetrable to that corroſive water, the plate is defended from it every where but in the lines or hatches cut through it with the points, which lying open, the water paſſes through them to the copper and eats into it to the depth required; and when this is done it is poured off. Of *etching* grounds there are two kinds, the one ſoft and the other hard: the latter was formerly much uſed, being better accommodated to the intention of imitating the engraving with the tool; but the former has now wholly ſuperſeded the uſe of the other, as it gives a power of expreſſion incompatible with the greater inflexibility of the hard varniſh that confines the lines and hatches to ſuch a ſameneſs and regularity as give a ſtiffneſs of manner and coldneſs of effect to the work. There are various directions for preparing the ſoft varniſh. Le Boſſe recommends the following: take of virgins wax, very white and clean, and of grains of maſtic, very clear and pure, each one ounce; and of calcined aſphaltum, half an ounce; grind the maſtic and aſphaltum ſeparately, very ſmall, and melt the wax over the fire in an earthen pot well glazed. When the wax is thoroughly melted, and very hot, ſprinkle the maſtic into it gradually that it may melt, and ſtir the mixture that the ingredients may incorporate. Then ſprinkle the aſphaltum into the mixture, ſtirring the whole compoſition over the fire till the aſphaltum be entirely melted: take the pot from the fire, and let the mixture cool; and pour the varniſh into clean water, and by working it with the hand, form it into a roll of about an inch in diameter, or into ſmall balls, which may be wrapt up in taffety and kept for uſe. The quantity of wax ſhould be increaſed in winter.

The following ſoft varniſh is uſed by many of the engravers at Paris: take of virgin's wax, and aſphaltum of each one ounce; half an ounce of black pitch, and a quarter of an ounce of Burgundy pitch: the aſphaltum muſt be pounded in a mortar, and the wax melted over a ſlow fire in a pot of glazed earthen ware, and the reſt of the ingredients added by little and little, ſtirring the mixture, till the whole be well melted and incorporated. Then throw the whole maſs into a veſſel of clean water, and proceed as before. The following preparation has been well approved: take of virgin's wax two ounces and a half; of Burgundy pitch, three ounces; of reſin, half an ounce; of aſphaltum, two ounces; and of turpentine, one pennyworth: the proceſs of making it is the ſame as the former.

Rembrandt prepared a white varniſh to be laid over a thin coat of any of the other kinds in the following manner; take of virgin's wax, one ounce; of maſtic, half an ounce; of calcined aſphaltum, or of amber, half an ounce: pound the maſtic and aſphaltum ſeparately in a mortar; and having melted the wax in a new earthen pot well glazed, ſprinkle them into it gradually, and ſtir the mixture, till the whole be incorporated. Pour the melted maſs into clean water, and form it into a ball for uſe. When this varniſh is uſed, the plate ſhould not be too much heated; the firſt coat of varniſh ſhould be laid very thin; and inſtead of blackening the varniſh with ſmoak, take a piece of flake white, and having ground it fine and tempered it with gum water, lay a thin coat of it with a pencil over the plate when it is quite cold. In this way Rembrandt varniſhed his plates.

There are alſo two kinds of aqua fortis; the one white, which is only uſed with the ſoft ground, and applied as above directed: this is ſpirit of nitre, ſuch as is uſed by the reſiners, except that it is not purified with ſilver. It may be prepared thus: take of the white kind of crude nitre, or of refined ſalt-petre, twenty-four pounds; put it into a retort, and add twelve pounds of oil of vitriol: place the retort in a ſtrong ſand heat, and lute on to the retort a large receiver, containing about a gallon of water: diſtil over all that will riſe with a heat gradually increaſing; when the whole is cold, take off the receiver, and pour the aqua fortis into a bottle, and ſecure it with a glaſs ſtopper. This ſpirit of nitre is bought ready prepared of the chemiſts for four ſhillings a pound, and muſt be lowered with water; about one part of nitre to four or five parts of water is in general the proper mixture; but the nature of the work will indicate how much ſtronger or weaker it ſhould be. The green aqua fortis is not at all in uſe. It is to be obſerved that the aqua fortis muſt not continue equally long on all the parts of the deſign; the remote parts muſt be bitten more ſlightly than thoſe which are nearer to the view. To manage this they have a compoſition, which Le Boſſe directs to be made thus: oil-olive is heated in a varniſhed earthen-ware pot, and the tallow of a candle is added to it; and the proportion of oil and tallow is adjuſted by trying the mixture, and dropping it on any hard and cold ſubſtance till the drops are found to be moderately fixed and firm. It ſhould then be well boiled for an hour, till the mixture acquires a reddiſh colour. The following mixture is recommended by M. Cochin as a ſubſtitute for the oil and tallow, which is never uſed now: take equal parts of wax and turpentine, as much olive-oil as both of them together, with the ſame quantity of hogs lard: melt the whole in an earthen veſſel, mixing the ingredients, and leave them to boil for ſome time till they are well incorporated. With this compoſition, or with the turpentine varniſh and lamp-black mentioned before, they cover the parts that are to be bitten no farther. The conduct of the aqua fortis is one of the principal concerns in the whole art, and that on which the effect of the whole very much depends. The operator is alſo to be very attentive to the ground, that it do not fail or give way in any part to the water; and where it does, to ſtop up the place with the above compoſition. Laſtly, let it be remembered, that whenever the aqua fort is taken off, fair water muſt be poured upon the plate; and it ſhould be dried with a very gentle heat, ſo as not to melt the varniſh. The aqua fortis may be applied as often as neceſſary, with this precaution. When the aqua fortis has done its part, the ground is taken off, by warming the plate at the fire, and removing the border of wax; it is then more heated till the compoſition and varniſh melt, and wiped well with a clean linen cloth, and rubbed in every part with oil of olives. When the varniſh is taken off, pour upon it a ſmall quantity of olive-oil, rubbing the oil ſtrongly over every part of it, and clean the plate with a freſh linen cloth: after which, nothing remains but for the artiſt to examine the work with his graver in his hand, to touch it up, and heighten it where the aqua fortis, &c. has miſſed. The editor is indebted for the inſpection and correction of this article to the ingenious artiſt who executes the plates for this Dictionary. For the laws relating to *etching*, ſee ENGRAVERS.

ETERNAL *flower*, *xeranthemum*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe; the flower is compoſed of hermaphrodite and female florets, which have one common ſcaly empalement. The hermaphrodite florets which form the diſk are funnel-ſhaped, and cut into five points: the female florets, which form the border or rays, are tubulous, and cut into five leſs equal points: the hermaphrodite florets have five ſhort ſtamina terminated by cylindrical ſummits, and a ſhort germen ſupporting a ſlender ſtyle, crowned by a bifid ſtigma: the germen becomes an oblong ſeed crowned with hairs, which ripens in the empalement. There are ſix ſpecies.

We have ſeveral ſpecies of this plant cultivated in our gardens, and known in Engliſh by the name of *everlaſting flowers*, a name common to all the ſpecies of this plant, and of the amaranthoides.

Theſe flowers are of ſo dry and durable a ſtructure, that if gathered juſt when they are ripe they will laſt many years in perfection, and appear as freſh as while growing: they are alſo capable of ſeveral tinges, and hence are often ſeen of fine blues and greens, colours not natural to them.

They are all propagated by ſowing their ſeeds in Auguſt in a warm border, obſerving to water and ſhade them till they come up if the weather proves too dry. When the young plants are two inches high they ſhould be removed to another warm border under the ſhelter of a wall, and there planted at five inches diſtance from each other. They will here ſtand the winter very well, and in ſpring will be ready to grow up for flowering without any farther tranſplanting; they are only to be kept clear of weeds, and in June they will flower. The flowers ſhould be gathered in July for drying, and ſome of the fineſt ſhould be ſuffered to ſtand for ſeed; for the plants periſh as ſoon as they have perfected their ſeeds, and muſt be renewed by ſowing every year.

ETERNITY, duration which is conceived incommenſurable with time, and excluſive of beginning, progreſs, ending, &c. See GOD.

Authors are much at a loſs for a proper and juſt definition of *eternity*: that of Boethius, De Conſol. Philoſ. lib. v. part 6. viz. *Interminabilis vitæ tota ſimul & perfecta poſſeſſio*, i. e. *a perfect poſſeſſion of a whole endleſs exiſtence altogether*, though retained by S. Thomas and others, is faulty in divers reſpects.

Cenſorinus, De Die Natal. defines *eternity* by infinite duration, that is, duration which has always been, and always will be. Others more fully deſcribe it by a duration that exiſts all together, without any flux or ſucceſſion of parts prior or poſterior to each other: where the word *duration*, taken abſtractedly, imports no more than the perſeverance of a thing in its exiſtence, the τȣ *durare* being here oppoſed to the το *ceſſare, in exiſtendo*.

But ſoften the word duration how you will, it is ſcarce conceivable but by conceiving a quantity thereof, nor a quantity without conceiving a ſucceſſion. Others, therefore, define *eternity* by a *perpetuum nunc*, a *perpetual now*, or a *nunc ſemper ſtans*, an *ever-ſtanding now*; but neither are theſe unexceptionable, the words *perpetuum* and *ſemper ſtans* importing an obſcure ſort of duration. See DURATION.

ETERNITY, in *Mythology*, a divinity among the Romans, who had neither temples nor altars. They repreſented it under the figure of a woman, who held the ſun in one hand and the moon in the other: her ſymbols were a phœnix, globe, and elephant.

ETESIÆ, or ETESIAN *winds*, are ſuch as blow at ſtated times of the year, from what part ſoever of the compaſs they come. They are ſo called from the Greek word ἐτος, *year*, being yearly or anniverſary winds, ſuch as our ſeamen call monſoons and trade-winds, which, in ſome parts of the world continue conſtantly blowing for certain ſtated ſeaſons of the year. Thus, the north winds, which, during the dog-days, conſtantly blow upon the coaſts of Egypt, and hinder all ſhips from ſailing out of Alexandria for that ſeaſon, are called *eteſiæ* in Cæſar's Commentaries. In other authors, the weſt and eaſt-winds are called *eteſiæ*, when they continue blowing for certain ſeaſons of the year. Vid. Salmaſ. Exercit. in Solin. p. 421.

Cellarius endeavours to prove that thoſe winds are properly *eteſian* which blow from that part of the horizon which is between the north and weſt about the time of the ſolſtice. Geog. Antiq. lib. i. cap. 8. See MONSOON and WIND.

ETHELING, or ÆTHELING. See ATHELING.

ETHER. See the article ÆTHER.

ETHERIAL *oil*. See ÆTHERIAL *oil*.

ETHESIUS *lapis*, a name given by ſome authors to the chryſolite.

ETHICAL *good*, ETHICAL *poſſible*. See the reſpective articles.

ETHICS, Εθικη, the doctrine of manners, or the ſcience of moral philoſophy. See PHILOSOPHY and MORALITY.

The word is formed of ηθος, *mores*, *manners*, becauſe the ſcope or object thereof is to form the manners.

Gale makes *ethics* only the firſt part or branch of moral philoſophy, viz. that which regards private perſons, or in a private capacity.

By manners or morals is here meant, a way or manner of living confirmed by cuſtom or habit, or certain habitudes of doing, or actions which are often repeated, which, if they be according to right reaſon, the morals or manners are ſaid to be good, otherwiſe, evil and vicious.

Hence the object of *ethics* is the exerciſe of right reaſon in all our affairs, actions, and relations; or it is man himſelf conſidered as dirigible, and to be conducted according to reaſon; and the end of *ethics* is to make him good and happy: ſo that if a man conducted himſelf according to right reaſon in all the circumſtances of his actions, affairs, and relations, he would arrive at the higheſt pitch of moral perfection and beatitude.

Whence *ethics* may be defined a right manner of thinking in order to attain to human felicity, or a ſcience whereby man is directed to conduct his will, and the actions thereof, ſo as to live well and happily. See WILL.

The principal, nay, the only topics thereof, are happineſs and manners, whence ariſe two parts or branches of *ethics*; the firſt, on moral happineſs, conſidered as the end; and the ſecond on moral virtues or good manners, as the means to arrive at that end.

ETHICOPROSCOPTÆ, formed of ηθος, *manners*, and προσκοπτω, *offendo*, *I offend*, in *Antiquity*, the name of a ſect. Damaſcenus, in his Treatiſe of Hereſies, tells us, that the denomination of *Ethicoproſcoptæ* was given to ſuch as erred in matters of morality and things relating to practice that were to be done or to be avoided, &c. who blamed things laudable and good in themſelves, or recommended or practiſed things evil. On this footing the *Ethicoproſcoptæ*, though a numerous body, were no particular ſect.

ETHIOPIC *verſion*. See BIBLE *Ethiopic*.

ETHIOPIC *year*, See YEAR.

ETHMOIDAL, ETHMOIDALIS, in *Anatomy*, a denomination given to one of the ſutures of the human cranium.

The common ſutures are thoſe which ſeparate the bone of the cranium from thoſe of the cheeks, and are four; the tranſverſal, *ethmoidal*, ſphenoidal, and zygomatical. See SUTURE.

The *ethmoidal* takes its denomination from its turning round the os ethmoides.

ETHMOIDES, Εθμοειδης, in *Anatomy*, a bone ſituate in the middle of the baſis of the forehead or os frontis, and at the top of the root of the noſe, filling almoſt the whole cavity of the noſtrils.

It has its name from εθμος, *cribrum*, *ſieve*, and ειδος, *form*, becauſe all ſpongy and porous.

By its cribrous part, it is joined to the head; by the ſpongious part, to the cavity of the noſtrils; and by the plain and broad part, to the orbits of the eyes.

In the cribrous part is an apophyſis, which jets out in a point into the cavity of the ſkull, called from its figure *criſta galli*, or the *cock's comb*. From its under-ſide there goes a thin bone, which divides the cavity of the noſtrils into two, called the *vomer*. It is perforated by a number of ſmall holes, through which the fibres of the olfactory nerves paſs.

J. Philip Ingraſſias, a Sicilian, who was born in Sicily in 1510, and died in 1580, was the firſt who gave a juſt account of the ſtructure of the *os ethmoides*, or *cribroſum*, in a work printed at Palermo in 1603. fol.

The figure of this bone is very ſingular, and may be ſaid to be in ſome meaſure cubical. This bone may be divided into a middle and two lateral portions; in the middle three parts may be diſtinguiſhed, an upper, a middle, and a lower. The upper part of the middle portion is an eminence, called *criſta galli*, which is often ſolid; ſometimes, however, it has been found hollow in ſeveral degrees, and perforated by a ſmall opening which communicates with the frontal ſinuſes: a groove is ſometimes alſo met within its anterior edge, which leads to the ſpinal or blind hole in the os frontis. The middle part of this portion is a ſmall horizontal plate perforated by ſeveral holes, and called *lamina cribroſa*; and in its back part it has a little notch for its articulation with the ſphenoidal bone; this lamina may be called the body of the bone, as being what principally ſupports all the other parts of it.

The lower part is a perpendicular lamina, which makes part of the ſeptum narium: the edge of this is rough and uneven, for its better connection with the verna. The lateral portions of the *ethmoidal* bone are by far the moſt conſiderable, if we regard ſize only; each of theſe may be divided into two, one ſuperior, which is the largeſt, and which may be called the labyrinth of the noſtrils, it being full of turnings and windings, and irregularly cellular; and one inferior, in the ſhape of a ſhell. It is of a very tender and delicate ſtructure, though compact, and without any diploe, being almoſt all compoſed of thin bony plates. It is joined to the os frontis, os ſphenoides, oſſa naſi, oſſa maxillaria, oſſa unguis, oſſa palati, and verna; the uſes of it are to be a very principal part in the organ of ſmell, and to give a very great extent to the pituitary membrane in a ſmall compaſs. Winſlow's Anatomy, p. 29.

ETHNARCHA, ETHNARCH, formed of εθνος, *nation*, and αρχη, *command*, a governor or ruler of a nation.

There are ſome medals of Herod I. ſurnamed the *Great*, on one ſide whereof is found Ἡρωδου, and on the other Εθναρχου, q. d. *Herod the Ethnarch*. After the battle of Philippi, we read that Antony paſſing over into Syria, conſtituted Herod and Phaſael his brother tetrarchs, and in that quality committed to them the adminiſtration of the affairs of Judea, Joſ. Ant. lib. xiv. cap. 23. Herod therefore had the government of the province before ever the Parthians entered Syria, or before Antigonus's invaſion, which did not happen till ſix or ſeven years after Herod was commander in Galilee. Joſ. lib. xiv cap. 24, 25. Conſequently, Herod was then truly *ethnarch*, for he can be no otherwiſe denominated; ſo that it muſt have been in that ſpace of time that the medals were ſtruck, which only give him this title: which medals are a confirmation of what we read in hiſtory of the government which that prince was intruſted with before he was raiſed to the royalty.

Joſephus gives Herod the appellation of *tetrarch* in lieu of that of *ethnarch*; but the two terms come ſo near to each other, that it is eaſy to confound them together.

Though Herod the Great left by will to Archelaus all Judea, Samaria, and Idumea, yet Joſephus tells us he was then only called *ethnarch*.

ETHNOPHRONES, in *Antiquity*, a ſect of heretics in the ſeventh century who made a profeſſion of Chriſtianity, but joined thereto all the ceremonies and follies of paganiſm, as judicial aſtrology, ſortileges, auguries, and other divinations.

They derive their denomination from εθνος, *nation*, and φρην, *thought*, *ſentiment*, q. d. *paganizers*, or perſons whoſe thoughts or ſentiments were ſtill heathen or gentile.

They practiſed all the expiations of the gentiles, celebrated all their feaſts, and obſerved all their days, months, times, and ſeaſons. See Damaſcenus, Hæreſ. Nº 94.

ETHOLOGUS, among the ancients, a mimic or actor, who could repreſent all the various habits and diſpoſitions of the mind.

ETHOPŒIA, or ETHOPEA, in *Rhetoric*, called alſo ETHOLOGY, a draught or deſcription, expreſſing the manners, paſſions, genius, tempers, aims, &c. of another perſon.

The word is of Greek original, being formed of ηθος, *mos*, *conſuetudo*, and ποιεω, *facio*, *fingo*, *deſcribo*. Quintilian, lib ix. cap. 2. calls this figure *imitatio morum alienorum*; and in Greek, μιμησις, *imitation*. In Engliſh we denominate it a *picture* or *character*.

Such is that beautiful paſſage in Salluſt, in his Bellum Catilinarium, wherein he gives us a picture of Catiline: "He had an uncommon ſtrength both of body and "mind, but an ill-turned and wicked diſpoſition. "When very young, his great pleaſure was in inteſtine "broils, rapine, ſlaughter, and civil diſcord. His body "was formed to undergo faſting, cold, and watching, "beyond all belief. His mind was daring, deceitful, "and various, and could imitate or accommodate itſelf "to every body: he was extremely covetous of other "people's goods, and profuſe of his own. His luſts "and deſires were very high; his ſtock of eloquence "conſiderable; but he had little or no diſcretion."

The *ethopœia* is divided into *proſopographia* and *ethopœia*, properly ſo called; the former of which is a picture of the body, countenance, make, dreſs, gait, &c. and the latter of the mind.

ETHULIA, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. The receptacle is naked, and the ſeed has no down.

ETIQUETTE, a French term, primarily denoting a ticket or title affixed to a bag or bundle of papers, expreſſing its contents. It is alſo uſed when applied to the Spaniſh and ſome other courts, to ſignify a particular account of what is to be done daily in the king's houſhold, and in the chief ceremonies relating to it. It likewiſe denotes thoſe forms that regulate the decorum of conduct towards perſons of various ranks and ſtations.

ETRUSCA *terra*, in the *Materia Medica*, a kind of bole of which there are two ſpecies, the white and the red; theſe are called by many authors the *terra ſigillata alba & rubra magni ducis*, as they are brought to us ſealed with different impreſſions.

The *white Tuſcan earth* is a denſe and compact ſubſtance of a dull deadiſh white, which in drying acquires ſome degree of yellowneſs; it is of a ſmooth ſurface, and does not ſtain the fingers in handling. It is not eaſily broken, and but ſlightly adheres to the tongue, and freely melts into a ſubſtance like butter in the mouth. It makes a ſlight effervescence with acid menſtruums.

The *red Tuſcan earth* is a pure bole, very heavy, and of a compact texture, and of a dull browniſh red colour. It is naturally of a ſmooth ſurface, breaks eaſily between the fingers, and does not ſtain the hands; it adheres ſtrongly to the tongue, and melts freely in the mouth, and has a ſtrong aſtringent taſte, and leaves no ſandy harſhneſs between the teeth. It makes an effervescence with acid menſtrua. This is made up of ſmall flat cakes, and impreſſed with a ſhield bearing a ducal coronet, &c. Theſe are the characters by which both theſe earths may be known from others of the ſame colour: they are both dug in ſeveral parts of Italy, particularly in the neighbourhood of Florence; they are kept in the ſhops there, and preſcribed with ſucceſs in fevers of many kinds, and in diarrhœas, dyſenteries, and the like caſes.

ETYMOLOGICON, is uſed for a book containing the etymologies of any language. See ETYMOLOGY.

ETYMOLOGY, Ετυμολογια, that part of grammar which conſiders, deduces, and explains the origin, reaſon, and derivation of words, in order to arrive at their firſt and primary ſignification.

The word is formed of the Greek, ετυμος, *verus*, *true*, and λεγω, *dico*, *I ſpeak*; whence λογια, *diſcourſe*, &c. and thence Cicero calls the *etymology*, *notatio* and *veriloquium*, though Quintilian chooſes rather to call it *originatio.*

In all ages there have been people curious in *etymologies*: Varro has written on the *etymology* of the Latin Words; and we have a Greek *Etymologicon*, under the name of Nicas.

The *etymologies* of our Engliſh words have been deduced from the Saxon, Welſh, Walloon, Daniſh, Latin, Greek, &c. by Somner, Camden, Verſtegan, Spelman, Caſaubon, Skinner, Henſhaw, Junius, &c.

Thoſe of the French and Italian words by Menage, Henry Stephens, Tripot, Borel, Caſeneuve, Guichard, F. Thomaſſin, Poſtel, and Falconet.

We have a Latin *Etymologicon* of Gerard Voſſius, another of Martinius, &c. Octavio Ferrari has given a Body of *Etymologies* of the Italian Tongue, and Bernard d'Aldretta another of the Spaniſh.

A ſtrict and ſolicitous inquiry into *etymologies*, is no frivolous and impertinent deſign, but has conſiderable uſes. Nations who value themſelves on their antiquity have always looked on the antiquity of their language as one of the beſt titles they could plead. The *etymologiſts*, by ſeeking the true and original reaſon of the notions and ideas annexed to each word and expreſſion, may often furniſh an argument of antiquity from the veſtigia or traces remaining thereof, and from the indices ſtill ſubſiſting in the preſent uſe of the words compared with the ancient uſes.

Add, that *etymologies* are neceſſary to the thorough underſtanding of a language; for, to explain a term preciſely, there ſeems a neceſſity of recurring to its firſt impoſition, in order to ſpeak juſtly and ſatisfactorily thereof. The force and extent of a word is generally better conceived and entered into when a perſon knows its origin and *etymology*.

It is objected, however, that the art is arbitrary and built altogether on conjectures and appearances; and the *etymologiſts* are charged with deriving their words from what originals they pleaſe; but the ſcience is certainly real, and as regular as diverſe others, having its proper principles and method.

It muſt be owned, indeed, that it is not eaſy to return into the ancient Britiſh and Gauliſh ages; to follow, as it were, by the track, the diverſe imperceptible alterations a language has undergone from age to age. A ſober *etymologiſt* has need of all the lights he can come at, to conduct and bring down words variouſly diſguiſed in their paſſage, and remark all the changes that have befallen them; and as thoſe alterations have ſometimes been owing to caprice or hazard, it is eaſy to take a mere imagination or conjecture for a regular analogy; ſo that it is not ſtrange the public ſhould be prejudiced againſt a ſcience which ſeems to ſtand on ſo precarious a footing.

EVACUANTS, in *Medicine*, remedies proper to expel or carry off any ill peccant or redundant humours in the human body, by the proper outlets or emunctories.

Of *evacuants*, there are diverſe kinds, diſtinguiſhed according to their various humours and emunctories. Some, e. gr. carry off their matters by ſtool, called *purgatives* or CATHARTICS; others by urine, called DIURETICS; others by perſpiration, called DIAPHORETICS; others by ſweat, called SUDORIFICS; others by the mouth, called *vomitories* or EMETICS; others by the ſalival glands, as SIALOGOGUES; and others, laſtly, by the menſes and lochia, as EMMENAGOGUES and *ariſtolochics*.

EVACUATION, in *Medicine*, a diminution of the animal fluids, in order to a diſcharge of ſome morbid or redundant matters; or only for the ſake of thinning, attenuating, and their promoting motion and circulation.

The matter of a diſeaſe, or what is preſcribed by art to remove or eaſe it, is evacuated two ways: 1. By the natural emunctories or outlets of the ſkin; the noſtrils, mouth, fauces, oeſophagus, ſtomach, inteſtines, bladder, and urethra.

And 2. By artificial outlets, made either in the blood-veſſels, as by phlebotomy, arteriotomy, ſcarifications, and leeches; or in the lymphatic veſſels, as by cauſtics and veſicatories; or laſtly, in both, as by iſſues, ſetons, ulcers, fiſtulas, &c. Hence the firſt diviſion of *evacuants* is derived from the different emunctories; and the ſecond, from the diverſity of matters evacuated through them.

Moſt of the chronical diſeaſes, the infirmities of old age, and the ſhort periods of the lives of Engliſhmen, Dr. Cheyne obſerves, are owing to repletion. This is evident from hence, that *evacuation* of one kind or another is nine parts in ten of their remedy; for not only cupping, bleeding, bliſtering, iſſues, purging, vomiting, and ſweating, are manifeſt *evacuations* or drains to draw out what has beee ſuperfluouſly taken down; but even abſtinence, exerciſe, alteratives, cordials, bitters, &c. are but ſeveral means to diſpoſe the groſs humours to be more readily evacuated by inſenſible perſpiration. Eſſay on Health.

For the periodical *evacuations* of women, ſee MENSES.

For the *evacuations* of women after delivery, ſee LOCHIA.

EVACUATION, is likewiſe uſed in the *Art of War*, where, to *evacuate a place* is to make the garriſon quit or march out of it, in order for another power to take poſſeſſion of it, or to make room for another garriſon.

EUCŒMIA, of ευ, *well*, and αιμα, *blood*, is uſed by Tremelius and ſome other writers to denote a good and healthy ſtate of the maſs of blood.

EVANGELICAL *harmony* and *œconomy*. See the ſubſtantives.

EVANGELISTS, the inſpired authors of the Goſpels.

The word is derived from the Greek, ευαγγελιον, formed of ευ, *bene*, *well*, and αγγελος, *angel*, *meſſenger*.

The denomination *evangeliſts* was likewiſe given in the ancient church to ſuch as preached the goſpel up and down, without being attached to any particular church, being either commiſſioned by the apoſtles to inſtruct the nations, or of their own accord, abandoning every worldly attachment, conſecrated themſelves to the ſacred office of preaching the Goſpel.

In which ſenſe ſome interpreters think it is that St. Philip, who was one of the ſeven deacons, is called the *evangeliſt*, in the twenty-firſt chapter of the Acts of the Apoſtles, ver. 8. Again, St. Paul writing to Timothy, Ep. ii. cap. iv. ver. 5. bids him do the work of an *evangeliſt*. The ſame apoſtle, Eph. iv. 11. ranks the *evangeliſts* after the apoſtles and prophets.

EVANID, a name which ſome authors give to thoſe colours which are tranſient, or not of long duration; as thoſe in the rainbow, in clouds before and after ſun-ſet, &c.

Evanid colours are the ſame with thoſe otherwiſe called *fantaſtical* and *emphatical* colours. Some authors alſo uſe the ſame term to expreſs thoſe flowers of plants whoſe petals fall off as ſoon as they are opened.

EVANTES, in *Antiquity*, the prieſteſſes of Bacchus, thus called, becauſe in celebrating the orgia they ran about as if diſtracted, crying, *evan*, *evan*, *obé evan!*

The word is formed from Ευαν, a title or appellation of Bacchus.

EUANTHI *colores*, in *Painting*, a term uſed by the Greeks to expreſs what the Romans call the *floridi colores*; theſe were ſuch colours as had a remarkable brightneſs in their works. The other coarſer and duller colours the Romans called *auſteri colores*, and the Greeks *bathyci*. Of the firſt ſort were cinnabar, lapis armenus, chryſocolla, minium, indigo, and purpuriſſa, according to the Romans; but the Greeks, as we find by Dioſcorides, made cinnabar one of the auſtere colours.

EVAPORATION, in *Philoſophy*, the act of diſſipating the humidity of a body in fumes or vapour.

Evaporation and exhalation, though often uſed indiſcriminately as ſynonymous terms, differ from each other. See EXHALATION.

Common ſalt is formed by evaporating all the humidity in the ſalt-water or brine; which *evaporation* is either performed by the heat of the ſun, as in the ſalt-works by the ſea-coaſt, &c. or by means of fire, as at the ſalt-ſprings, &c.

By the obſervations of M. Sedileau, it appears, that what is raiſed in vapour exceeds that which falls in rain.

Though the *evaporation* of fluids be generally looked on as an effect of the heat and motion of the air, yet M. Gauteron, in the Memoires de l'Acad. des Scienc. an. 1705, ſhews, that a quite oppoſite cauſe may have the ſame effect, and that fluids loſe more of their parts in the ſevereſt froſt than when the air is moderately warm. In the great froſt of the year 1708, he found, that the greater the cold ſtill the more conſiderable the *evaporation*; and that ice itſelf loſt full as much as the warmer liquors that did not freeze.

There are few ſubjects of philoſophical inveſtigation that have occaſioned a greater variety of opinion than the theory of *evaporation*, or of the aſcent of water in ſuch a fluid as air, between eight and nine hundred times lighter than itſelf, to different heights according to the different denſities of the air; in which caſe it muſt be ſpecifically lighter than the air through which it aſcends. The Carteſians account for it by ſuppoſing, that by the action of the ſun upon the water, ſmall particles of the water are formed into hollow ſpheres and filled with the *materia ſubtilis*, which renders them ſpecifically lighter than the ambient air, ſo that they are buoyed up by it.

Dr. Nieuwentyt, in his Religious Philoſopher, cont. 19. and ſeveral others have alleged, that the ſun emits particles of fire which adhere to thoſe of water, and form *moleculæ*, or ſmall bodies, lighter than an equal bulk of air, which conſequently aſcend till they come to an height, where the air is of the ſame ſpecific gravity with themſelves; and that theſe particles, being ſeparated from the fire with which they were incorporated, coaleſce and deſcend in dew or rain. Dr. Halley has advanced another hypotheſis, which has been more generally received: he imagined, that by the action of the ſun on the ſurface of the water, the aqueous particles are formed into hollow ſpherules filled with a finer air highly rarefied, ſo as to become ſpecifically lighter than the external air. Phil. Tranſ. N° 192. or Abr. vol. ii. p. 126. Dr. Deſaguliers, diſſatisfied with theſe two hypotheſes, propoſes another in the Phil. Tranſ. N° 407. or Abr. vol. vii. p. 61. See alſo his Courſe of Experimental Philoſophy, vol. ii. p. 336, &c. He ſuppoſes that heat acts more powerfully on water than on common air; that the ſame degree of heat which rarefies air two-thirds will rarefy water near 14,000 times; and that a very ſmall degree of heat will raiſe a ſteam or vapour from water, even in winter, whilſt it condenſes the air; and thus the particles of water are converted into vapour by being made to repel each other ſtrongly, and deriving electricity from the particles of air to which they are contiguous, are repelled by them and by each other, and form a fluid, which, being lighter than the air, riſes in the air, according to their relative gravities. The particles of this vapour retain their repellent force for a conſiderable time, till, by ſome diminution of the denſity of the air in which they float, they are precipitated downwards and brought within the ſphere of each other's attraction of coheſion, ſo that they join again into drops of water. Many objections have been urged againſt this opinion by Mr. Clare, in his Treatiſe of the Motion of Fluids, p. 294, &c. and by Mr. Rowning in his Syſtem of Philoſophy, part. ii. diſſ. 6. to which Dr. Hamilton has added the two following, viz. that if heat were the only cauſe of *evaporation*, water in a warm cloſe room would evaporate faſter than when expoſed in a colder place, where there is a conſtant current of air, which is contrary to experience; and that the *evaporation* of water is ſo far from depending on its being rarefied by heat, that it is carried on even whilſt water is condenſed by the coldneſs of the air, for water is gradually condenſed by cold till it freezes; and ſince it evaporates even when frozen into hard ice, it muſt alſo evaporate in all the leſſer degrees of cold. Heat, therefore, does not ſeem to be the principal, much leſs the only cauſe of *evaporation*.

Others have attempted to account for the phænomena of *evaporation* on another principle, viz. that of ſolution; and ſhewn, from a variety of experiments, that what we call *evaporation* is nothing more than a gradual ſolution of water in air, produced and ſupported by the ſame means, or by attraction, heat, and motion, by which other ſolutions are effected.

The abbé Nollet ſeems to have been the firſt who ſtarted this opinion, without much purſuing it, in his Leçons de Phyſique Experimentale, the firſt edition of which was publiſhed in 1743: he offers it as his conjecture, that the air of the atmoſphere ſerves as a ſolvent or ſponge with regard to the bodies that encompaſs it, and receives into its pores the vapours and exhalations that are detached from the maſſes to which they belong in a fluid ſtate; and he accounts for their aſcent on the ſame principles with the aſcent of liquors in capillary tubes: on his hypotheſis, the condenſation of the air contributes, like the ſqueezing of a ſponge, to their deſcent. See the work above cited, ſixth edit. 1767, tom. ii. p. 199, and p. 440.

Dr. Franklin, in a Paper of Philoſophical and Meteorological Obſervations, Conjectures, and Suppoſitions, delivered to the Royal Society about the year 1747, and read in 1756, ſuggeſted a ſimilar hypotheſis: he obſerves, that air and water mutually attract each other; and hence concludes, that water will diſſolve in air, as ſalt in water; every particle of air aſſuming one or more particles of water; and when too much is added it precipitates in rain. But as there is not the ſame contiguity between the particles of air as of water, the ſolution of water in air is not carried on without a motion of the air, ſo as to cauſe a freſh acceſſion of dry particles. A ſmall degree of heat ſo weakens the coheſion of the particles of water, that thoſe on the ſurface eaſily quit it, and adhere to the particles of air: a greater degree of heat is neceſſary to break the coheſion between water and air. Air moderately heated will ſupport a greater quantity of water inviſibly than cold air; for its particles being by heat repelled to a greater diſtance from each other, thereby more eaſily keep the particles of water that are annexed to them from running into coheſions that would obſtruct, refract, or reflect the light; and hence it happens, that when we breathe in warm air, though the ſame quantity of moiſture may be taken up from the lungs as when we breathe in cold air, yet that moiſture is not ſo viſible. On theſe principles he accounts for the production and different appearances of fogs, miſts, and clouds. He adds, that if the particles of water bring electrical fire when they attach themſelves to air, the repulſion between the particles of water electrified joins with the natural repulſion of the air to force its particles to a greater diſtance, ſo that the air being more dilated, riſes and carries up with it the water; which mutual repulſion of the particles of air is increaſed by a mixture of common fire in the particles of water. When air, loaded with ſurrounding particles of water, is compreſſed by adverſe winds, or by being driven againſt mountains, &c. or condenſed, by taking away the fire that aſſiſted it in expanding, the particles will approach one another, and the air with its water will deſcend as a dew; or if the water ſurrounding one particle of air comes in contact with the water ſurrounding another, they coaleſce and form a drop, and we have rain; and ſince it is a well-known fact, that vapour is a good conductor of electricity as well as of common fire, it is reaſonable to conclude with Mr. Henly, that *evaporation* is one great cauſe of the clouds becoming at times ſurcharged with this fluid. Phil. Tranſ. vol. lxvii. part i. p. 134. See Phil. Tranſ. vol. lv. art. 24. p. 182. or Franklin's Letters and Papers on Philoſophical Subjects, p. 42, &c. and p. 182, &c. Ed. 1769. M. le Roi, of the Academy of Sciences at Paris, hath alſo advanced the ſame opinion, and ſupported it by a variety of facts and obſervations in the Memoires, &c. for the year 1751. He ſhews, that water does undergo in the air a real diſſolution, forming with it a tranſparent mixture, and poſſeſſing the ſame properties with the ſolutions of moſt ſalts in water; and that the two principal cauſes which promote the ſolution of water in the air are heat and wind; that the hotter the air is within a certain limit, the more water it will diſſolve; and that at a certain degree of heat the air will be ſaturated with water; and by determining at different times the degree of the air's ſaturation, he eſtimates the influence of theſe cauſes on which the quantity ſuſpended in the air in a ſtate of ſolution depends. Accordingly, the air, heated by evaporating ſubſtances to which it is contiguous, becomes more rare and light, riſes, and gives way to a denſer air; and, by being thus removed, contributes to accelerate the *evaporation*. The non-elaſtic air contained in the internal parts of evaporating bodies, put into action by heat, ſerves alſo to increaſe their *evaporation*, as is evident in the caſe of the ÆOLIPYLE. The wind is another cauſe of the increaſe of *evaporation*, principally by changing and renewing the air which immediately encompaſſes the evaporating ſubſtances; and from the conſideration of theſe two cauſes combined, it appears why the quantity of vapour raiſed in the night is leſs than that of the day, ſince the air is then both leſs heated and leſs agitated. M. le Roi farther ſhews, that winds blowing in particular directions are more favourable to *evaporation* than others; thus the north and north-weſt winds accelerate *evaporation* in Languedoc, and probably in other parts of Europe, and the ſouth-eaſt wind retards it. To the objection urged againſt this hypotheſis, on account of the *evaporation* of water in a vacuum, this ingenious writer replies, that the water itſelf contains a great quantity of air, which gradually diſengages itſelf and cauſes the *evaporation*; and that it is impoſſible that a ſpace containing water which evaporates ſhould remain perfectly free from air. To this objection a late writer, Dr. Dobſon of Liverpool, replies, that though air appears by unqueſtionable experiments to be a chemical ſolvent of water, and as ſuch, is to be conſidered as one cauſe of its *evaporation*, heat is another cauſe, acting without the intervention of air, and producing a copious *evaporation* in an exhauſted receiver; agreeably to an experiment of Dr. Irving, who ſays, that water in an exhauſted receiver riſes in vapour more copiouſly at 180° of Farenheit's thermometer than in the open air at 212° its boiling point. Dr. Dobſon farther adds, that water may exiſt in air in three different ſtates; in a ſtate of perfect ſolution, when the air will be clear, dry, and heavy, and its powers of ſolution ſtill active; in a ſtate of beginning precipitation, when it becomes moiſt and foggy, its powers of ſolution are diminiſhed, and it becomes lighter in proportion as its water is depoſited; and alſo, when it is completely precipitated, which may happen either by a more ſlow proceſs, when the diſſolved water falls in a driſling rain, or by a more ſudden proceſs, when it deſcends in briſk rain. Phil. Tranſ. vol. lxvii. part. i. p. 257. and Phipps's Voyage to the North Pole, p. 211.

Dr. Hamilton, profeſſor of philoſophy in the univerſity of Dublin. tranſmitted to the Royal Society in 1765, a long Diſſertation on the Nature of *Evaporation*, in which he propoſes and eſtabliſhes this theory of ſolution; and though other writers had been prior in their conjectures, and even in their reaſoning on this ſubject, Dr. Hamilton aſſures us, that he has not repreſented any thing as new which he was conſcious had ever been propoſed by any one before him, even as a conjecture. Some of the facts alleged by profeſſor Hamilton, and ſome of the concluſions deduced from them, are ſimilar to thoſe of M. le Roi; but the ſimilarity appears to be merely accidental. The editor, having laid before the public a fair and impartial account of the hiſtory of the new theory, as it may be called, of *evaporation*, which is the moſt plauſible, and now the moſt generally received, will terminate this article with a brief view of Dr. Hamilton's arguments in ſupport of it, and the application of it to the phænomena of the atmoſphere. By ſolution, Dr. Hamilton underſtands with other writers, ſuch an intimate union between the particles of a body and thoſe of a fluid, that the whole ſhall appear an homogeneous maſs, as tranſparent as the fluid was before ſuch union, and ſhall continue ſo, till ſome external cauſe produces a change: he conſiders the tranſparence of the fluid as the criterion of a true ſolution, and that which diſtinguiſhes it from a mixture. He proceeds to ſhew, that there is a mutual attraction between the water and air of the ſame kind with that which is obſerved between the particles of any two bodies, one of which diſſolves the other. All water contains a conſiderable quantity of air which may be ſeparated from it; and as it retains its elaſticity, we may reaſonably ſuppoſe, that it is prevented from eſcaping by the force of attraction, juſt as the particles of gold are ſuſpended in aqua regia, by their attraction towards the particles of that fluid. Beſides, water exhauſted of its air will again imbibe a certain quantity, gradually drawing it into its pores till it is ſaturated, juſt as a lump of ſugar draws water into its pores. Air, likewiſe, evidently contains a quantity of water, which will be drawn from it even in its pureſt and drieſt ſtate by dry ſalt of tartar, ſo that the ſalt will become entirely fluid; and yet in this caſe the air is perfectly tranſparent. There is alſo a remarkable ſimilarity between the properties of common ſolutions and thoſe of *evaporation*. As ſalt beginning to diſſolve in water appears at firſt to thicken the water that ſurrounds it, and the ſolution of it to be promoted by agitation, the air that lies at reſt over water appears thick, and loaded with aqueous particles, in which caſe the *evaporation* proceeds very ſlowly, which is greatly promoted by a current of freſh air paſſing over the exhaling ſurface.

When a lump of any ſalt is diſſolved in clear cold water, the water that is firſt ſaturated with it will riſe on agitation in curled wreaths though the other water, render it ſomewhat opake, and give an apparent tremulous motion to an object ſeen through it, till by degrees the ſolution is complete, and the tranſparency of the water is reſtored: the caſe is the ſame when any two fluids of different denſities that will incorporate, are mixed together; thus, ſmoak or ſteam, when it firſt riſes into the air, exhibits ſimilar appearances; and the vapour riſing in a hot day from moiſt ground will make the air and any objects ſeen through it appear to have a tremulous motion, which is ſtill more obſervable when a teleſcope is uſed, that magnifies the floating vapours. Farther, heat, by expanding bodies, enlarging the pores, and leſſening the mutual coheſion of their particles, promotes, and cold, on the contrary, in ſome meaſure retards and checks both ſolution and *evaporation*. As very hot water diſſolves ſalt ſooner, and in a greater quantity than cold water, and when cooled, depoſits part of the ſalt after a ſtrong ſolution, which was before diſſolved; ſo water will evaporate faſter in warm than in cold air; and therefore, the air is generally clearer in cold than in hot weather. Thus the aqueous vapours ſuſpended in the air during the heat of the day, fall down at night, and form themſelves into drops of DEW, or if the night be very cold, appear next morning cryſtallized in a HOAR-FROST. If a bottle of very cold liquor be expoſed to the warm air in a hot day, the air contiguous to it being cooled, will let go part of its water, which will form a dew on the outer ſurface of the glaſs: by an experiment ſimilar to this M. le Roi was firſt led to conclude that water is really diſſolved in air: for the ſame reaſon a dew is formed on the inſide of the windows of a warm room, which on their outſide are expoſed to the cold air. Again, the quantity of a body diſſolved, and of a fluid evaporated, depends, *cæteris paribus*, on its quantity of ſurface. Chemiſts produce cold by ſolution: thus, by diſſolving pounded ice or ſnow in ſpirit of nitre, a degree of cold has been produced ſufficient to freeze quickſilver. See FREEZING and THERMOMETER. Cold is alſo produced by *evaporation*: ÆTHER, or ſpirit of wine, of the ſame temperature with the air, rubbed lightly (with a feather) over the ball of a thermometer, will make the quickſilver ſink as they evaporate; and the quicker they evaporate, the faſter will the quickſilver ſink: any volatile ſpirit rubbed over the hand feels much colder than water of the ſame temperature; and æther feels colder than ſpirit, on account of their more ſudden *evaporation*.

M. Amontons, in a Memoir of the Academy of Paris, 1699, and M. Richman, in a Memoir of the Academy of Peterſburgh, 1747, have obſerved, that cold is produced by evaporating fluids; and Dr. Cullen has found, that the cold thus produced is nearly in the proportion of the volatility of the fluids, and that it is conſiderably greater *in vacuo* than in air. Eſſ. Phyſ. and Art. Edinb. vol. ii. 1756. See THERMOMETER.

Dr. Franklin mentions a practice recorded in Bernier's Travels through Indoſtan, written near a hundred years ago, to this purpoſe: in travelling over dry deſarts in that hot climate, they carry water in flaſks wrapt in wet woollen cloths, and hung on the ſhady ſide of the camel or carriage in the free air, whereby, as the cloths gradually grow drier, the water contained in the flaſks is made cool. Franklin's letters, &c. p. 364.

Again, there is a ſtronger attraction or affinity between ſpirit of wine and air than between water and air; and, ſince the ſpirit evaporates much faſter than the water, the *evaporation* of fluids ſeems to ariſe from an attractive force between their particles and thoſe of air. Finally, after diſſolving a body in any proper menſtruum, if another be added that has a greater affinity to the menſtruum than the firſt, this will be diſſolved, and the firſt will be precipitated; and in the ſame manner, any fluid will let go the air which it contains on the addition of another body to which it has a greater affinity than it has to the air; from which fact it may be inferred, that the air, imbibed by any fluid, is, properly ſpeaking, diſſolved in that fluid, and therefore, that any fluid which evaporates, or is imbibed by the air, is alſo, properly ſpeaking, diſſolved in air.

Dr. Hamilton, having evinced the agreement between ſolution and *evaporation*, concludes, that *evaporation* is nothing more than a gradual ſolution of water in air, produced and promoted by attraction, heat, and motion, juſt as other ſolutions are effected.

In order to account for the aſcent of aqueous vapours into the atmoſphere, this ingenious writer obſerves, that the loweſt part of the air being preſſed by the weight of the upper againſt the ſurface of the water, and continually rubbing upon it by its motion, attracts and diſſolves thoſe particles with which it is in contact, and ſeparates them from the reſt of the water. And ſince the cauſe of ſolution in this caſe is the ſtronger attraction of the particles of water towards the air than towards each other, thoſe that are already diſſolved and taken up will be ſtill farther raiſed by the attraction of the dry air which lies over them, and thus will diffuſe themſelves, riſing gradually higher and higher, and thereby leave the loweſt air, not ſo much ſaturated but that it will ſtill be able to diſſolve and take up freſh particles of water; which proceſs is greatly promoted by the motion of the wind. When the vapours are thus raiſed and carried by the winds into the higher and colder parts of the atmoſphere, ſome of them will coaleſce into ſmall particles, which ſlightly attracting each other, and being intermixed with air, will form CLOUDS; and theſe clouds will float at different heights, according to the quantity of vapour borne up, and the degree of heat in the upper parts of the atmoſphere. Thus clouds are generally higher in ſummer than in winter. When the clouds are much increaſed by a continual addition of vapours, and their particles are driven cloſe together by the force of the winds, they will run into drops heavy enough to fall down in RAIN. If the clouds are frozen before their particles are gathered into drops, ſmall pieces of them being condenſed and made heavier by the cold, fall down in thin flakes of SNOW. If the particles are formed into drops before they are frozen, they become HAIL-*ſtones*. When the air is replete with vapours, and a cold breeze ſprings up, which checks the ſolution of them, clouds are formed in the lower parts of the atmoſphere, and compoſe a MIST OR FOG, which uſually happens in a cold morning, and is diſperſed when the ſun has warmed the air, and made it capable of diſſolving theſe watry particles. Southerly winds generally bring rain, becauſe, being commonly warm and replete with aqueous vapours, they are cooled by paſſing into a colder climate; and therefore part with ſome of them, and ſuffer them to precipitate in rain: whereas northerly winds, being cold, and acquiring additional heat by coming into a warmer climate, are ready to diſſolve more vapour than they before contained; and therefore, by long continuance, they are dry and parching, and uſually attended with fair weather.

Changes of the air, with reſpect to its denſity and rarity, as well as its heat and cold, will produce contrary effects in the ſolution of water and the conſequent aſcent or fall of vapours. Several experiments prove, that air, when rarefied, cannot keep as much water diſſolved as it does in a more condenſed ſtate; and therefore, when the atmoſphere is ſaturated with water, and changes from a denſer to a rarer ſtate, the higher and colder parts of it will let go ſome of the water before diſſolved, form new clouds, and diſpoſe them to fall down in rain: but a change from a rarer to a denſer ſtate will ſtop the precipitation of the water, and enable the air to diſſolve either in whole or in part, ſome of thoſe clouds that were formed before, and render their particles leſs apt to run into drops and fall down in rain: on this account, we generally find, that the rarefied and condenſed ſtates of the atmoſphere are reſpectively attended with rain or fair weather. See more on this ſubject in the Phil. Tranſ. vol. lv. art. 23. p. 146, &c. or Hamilton's Philoſophical Eſſays. 8vo. 1766. p. 33, &c.

Dr. Halley furniſhes us with ſome experiments of the quantity or meaſure of the *evaporation* of water. The reſult is contained in the following articles:

1. That water ſalted to about the ſame degree as ſalt-water, and expoſed to a heat equal to that of a ſummer's day, did, from a circular ſurface of about 8 inches diameter, evaporate at the rate of ſix ounces in 24 hours. Whence, by a calculus, he finds that the thickneſs of the pellicle or ſkin of water, evaporated in 2 hours, was the 53d part of an inch; but, for a round number, he ſuppoſes it only a 60th part; and argues thence, that if water as warm as the air in ſummer evaporates the thickneſs of one 60th part of an inch in 2 hours from its whole ſurface; in 12 hours it will evaporate the 10th of an inch: which quantity, he obſerves, will be found abundantly ſufficient to furniſh all the rains, ſprings, dews, &c.

In effect, on this principle, every 10 ſquare inches of the ſurface of the water yield in vapour *per diem* a cubic inch of water; and each ſquare foot half a wine pint; every ſpace of 4 feet ſquare, a gallon; a mile ſquare, 6914 tons; and a ſquare degree of 69 Engliſh miles will evaporate 33 millions of tons a day; and the whole Mediterranean, computed to contain 160 ſquare degrees, at leaſt 5280 millions of tons. Phil. Tranſ. N° 189. or Abridg. vol. ii. p. 108, &c.

2. A ſurface of 8 ſquare inches, evaporated purely by the natural warmth of the weather without either wind or ſun, in the courſe of a whole year, 16292 grains of water, or 64 cubic inches; conſequently, the depth of water thus evaporated in one year amounts to 8 inches. But this being too little to anſwer the experiments of the French, who found that it rained 19 inches of water in one year at Paris; or thoſe of Mr. Townley, who found the annual quantity of rain in Lancaſhire above 40 inches; he concludes, that the ſun and wind contribute more to *evaporation* than any internal heat or agitation of the water.

It has ſince been diſcovered, that there was a ſource of error in Mr. Townley's experiments, with which the world was not at that time acquainted: his rain-gage was fixed 10 yards above the ſurface of the earth; but Dr. Heberden has found, that a rain-gage fixed below the top of a houſe received above a fifth part more rain than another of the ſame ſize above the top of the ſame houſe; and that there fell upon Weſtminſter Abbey not much above one-half of that which fell in the ſame ſpace below the tops of the houſes; and by ſeveral experiments made by Dr. Dobſon of Liverpool, it appears, that the quantity of rain received in a veſſel placed on the ground exceeded that received by another of the ſame dimenſions 18 yards higher more than one-third, and leſs than one-half. Phil. Tranſ. vol. lix. art. 47. and vol. lxvii. art. 13. p. 256.

With regard to the cauſe of this difference, it may be obſerved, that as in chemical precipitations a greater portion of the precipitating ſubſtance will be received on the real bottom of a veſſel containing the ſolution than on a ſuppoſed falſe bottom placed any where above it, and that in proportion to its height above the real bottom; ſo a greater quantity of water, conſidering rain as a precipitation of water before diſſolved in air, ought, on parting with its former ſolvent, to fall on the ſurface of the earth than on an imaginary horizontal plane of the ſame dimenſions above it; and though the caſes are not exactly parallel, yet the drops of rain in their deſcent muſt be ſomewhat increaſed either in number or ſize; partly by ſucceſſively impinging on the aqueous particles contained in the air through which they paſs, and by attracting others in virtue of their being poſſeſſed of a different electricity; and partly by the ſpontaneous ſeparation and precipitation of that moiſture, which is known to be contained in conſiderable quantities in the air at all times, and the appearance of which, dripping down the walls of our houſes, &c. is one of the popular ſigns of approaching rain. Monthly Review, vol. xliv. p. 322.

Dr. Dobſon ſtates the annual *evaporation* at Liverpool, taking the medium of 4 years at 36.78 inches. Dr. Halley fixes the annual *evaporation* of London at 48 inches. See Phil. Tranſ. vol. lxvii. part i. p. 252.

3. The effect of the wind is very conſiderable, on a double account; for the ſame obſervations ſhew a very odd quality in the vapours of water, viz. that of adhering and hanging to the ſurface that exhaled them, which they clothe as it were with a fleece of vaporous air; which once inveſting the vapour, it thenceforward riſes in much leſs quantity. Whence, the quantity of water loſt in 24 hours, when the air was very ſtill from wind, was very ſmall, in proportion to what went away when there was a ſtrong gale of wind abroad to diſſipate the fleece, and make room for the emiſſion of vapour; and this, even though the experiment was made in a place as cloſe from the wind as could be contrived.

Add, that this fleece of water hanging on the ſurface of waters in ſtill weather is the occaſion of very ſtrange appearances, by the refraction of the vapour's differing from and exceeding that of common air: whence every thing appears raiſed, as houſes like ſteeples, ſhips as on land above the water, the land raiſed, and as it were lifted from the ſea, &c.

4. The ſame experiments ſhew, that the *evaporation* in May, June, July, and Auguſt, which are nearly equal, are about three times as great as thoſe in the months of November, December, January, and February. Phil. Tranſ. N° 212. or Abr. vol. ii. p. 110, &c.

Dr Brownrigg, in his Art of making Common Salt, p. 189, fixes the *evaporation* of ſome parts of England at 73.8 inches during the months of May, June, July, and Auguſt; and the *evaporation* of the whole year at more than 140 inches. The *evaporation* of the four ſummer months at Liverpool, on a medium of four years, was found to be only 18.88 inches. Dr. Hales calculates the greateſt annual *evaporation* from the ſurface of the earth in England at 6.66 inches; and therefore the annual *evaporation* from a ſurface of water, is to the annual *evaporation* from the ſurface of the earth in Liverpool as 36 to 6, or as 6 to 1. Phil. Tranſ. vol. lxvii. ubi ſupra.

EVAPORATION, in *Pharmacy*, *Chemiſtry*, &c, denotes an operation by which the more aqueous and volatile parts of fluids are ſpent, or driven away in ſteam, ſo as to leave the remaining part ſtronger, or of a higher conſiſtence than before.

Evaporation is effected by ſetting a liquor over a gentle heat, to carry off the moſt fluid and volatile parts, without leſſening the quantity of the other matters with which the liquor is impregnated.

The veſſels uſed for this purpoſe are baſons, teſts, or crucibles, which are made of glaſs, metal, or earth, according to the nature of the bodies on which the operation is to be performed. They are flat, ſhallow, and wide, ſo that the body from which the *evaporation* is to be made may preſent a large ſurface to the air. In all *evaporations* the degree of heat ought to be proportioned to the volatility of the ſubſtance to be evaporated, and to the degree of fixity of the ſubſtance intended to be left, and of its adheſion to the volatile parts. In ſome caſes, as in obtaining oil from rectified ſpirit of wine and æther, the liquors ought to be evaporated upon the ſurface of water in open air, without any other heat than that of the atmoſphere; in others, when the part to be evaporated is not very volatile, and when the remaining ſubſtance is very fixed, and does not adhere much to the volatile part, as in the purification of gold by antimony, a ſtrong heat may be applied, and a current of air directed upon the ſurface of the body. Macquer.

EVASION, *evaſio*, in *Law*, is uſed for any ſubtile endeavour to ſet aſide truth, or to eſcape the puniſhment of the law, which will not be endured. Thus, if a perſon ſays to another that he will not ſtrike him, but will give him a pot of ale to ſtrike him firſt: and accordingly he ſtrikes, the returning of it is puniſhable; and if the perſon firſt ſtriking be killed, it is murder; for no man ſhall evade the juſtice of the law by ſuch a pretence to cover his malice. 1 Hawk. P. C. 81.

EVATES, a branch or diviſion of the ancient Celtic philoſophers the DRUIDS.

Strabo diſtributes the philoſophers among the Britons and Gauls into three ſects; Βαρδοι, *Bards*; Ουατεις, *Evates*, and Δρυιδαι, *Druids*. He adds, that the *Bardi* were poets and muſicians: the *Evates*, prieſts and naturaliſts; and the *Druids*, moraliſts as well as naturaliſts. But Marcellinus, Voſſius, and Hornius, reduce them all to two ſects, viz. *Bardi* and *Druids*. Laſtly, Cæſar, lib. vi. comprehends them all under the name of *Druids*.

The *Evates* or *Vates* of Strabo might probably be what other authors, and particularly Ammian. Marcellin. calls *Eubages*; but Mr. Bouche, in his Hiſt. de Provence, lib. ii. chap. 2. diſtinguiſhes between them. The *Vates*, he ſays, were ſuch as took care of the ſacrifices and other ceremonies of religion; and the *Eubages*, thoſe who ſpent their time in the ſearch and contemplation of the great myſteries of nature.

EUBAGES, an order of prieſts or philoſophers among the ancient Celtæ or Gauls. Chorier takes the *Eubages* to be the ſame with the *Druids* and *Saronidæ* of Diodorus: others will have the *Eubages* to be thoſe whom Strabo, lib. iv. p. 197. calls Ουατεις, *Evates*, or *Vates*, on which principle there is room to conjecture, that the word ſhould be written Ουαγεις, it being eaſy to miſtake a Γ for a T.

Be this as it will, the *Eubages* appear to have been a different order from the *Druids*. See DRUID.

EUCHARIST, *Euchariſtia*, the Sacrament of the Supper, or a participation of the body and blood of Chriſt, under the ſpecies or figures of bread and wine. See COMMUNION, SACRAMENT, SPECIES, TRANSUBSTANTIATION, and CONSUBSTANTIATION.

The word in its original Greek, Ευχαριστια, literally imports *thankſgiving*, being formed of ευ, *bene*, *well*, and χαρις, *gratia*, *thanks*.

EUCHITES, or EUCHITÆ, a ſect of ancient heretics, who were firſt formed into a religious body towards the end of the fourth century, though their doctrine and diſcipline ſubſiſted in Syria, Egypt, and other eaſtern countries before the birth of Chriſt; they were thus called becauſe they prayed without ceaſing, imagining that prayer alone was ſufficient to ſave them.

Their great foundation were thoſe words of St. Paul, Epiſt. i. to the Theſſalonians, cap. v. ver. 17. *pray without ceaſing*.

The word is formed of the Greek, ευχη, *prayer*, whence ευχιται, the ſame with the Latin, *precatores*, *prayers*. They were alſo called *Enthuſiaſts* and *Meſſalians*, a term of Hebrew origin, denoting the ſame as *Euchites*.

The *Euchites* were a ſort of myſtics who imagined, according to the oriental notion, that two ſouls reſided in man, the one good, and the other evil; and who were zealous in expelling the evil ſoul or dæmon, and haſtening the return of the good ſpirit of God, by contemplation, prayer, and ſinging of hymns. They alſo embraced the opinions nearly reſembling the Manichean doctrine, and which they derived from the tenets of the oriental philoſophy. The ſame denomination was uſed in the twelfth century, to denote certain fanatics who infeſted the Greek and Eaſtern churches, and who were charged with believing a double Trinity, rejecting wedlock, abſtaining from fleſh, treating with contempt the ſacraments of Baptiſm and the Lord's Supper, and the various branches of external worſhip, and placing the eſſence of religion ſolely in external prayer, and maintaining the efficacy of perpetual ſupplications to the Supreme Being for expelling an evil being or genius, which dwelt in the breaſt of every mortal. This ſect is ſaid to have been founded by a perſon called Lucopetrus, whoſe chief diſciple was named Tychicus. By degrees it became a general and invidious appellation for perſons of eminent piety and zeal for genuine Chriſtianity, who oppoſed the vicious practices and inſolent tyranny of the prieſthood; much in the ſame manner as the Latins comprehended all the adverſaries of the Roman pontiff under the general terms of WALDENSES and ALBIGENSES. Moſh. Eccl. Hiſt. Eng. edit. 8vo. vol. i. p. 350. and vol. ii. p. 441.

St. Cyril of Alexandria, in one of his letters, takes occaſion to cenſure ſeveral monks in Egypt, who, under pretence of reſigning themſelves wholly to prayer, led a lazy, ſcandalous life. A cenſure likewiſe applicable to monaſteries in general.

EUCHOLOGIUM, Ευχολογιον, a Greek term, ſignifying literally, *a diſcourſe on prayer*.

The word is formed of ευχη, *prayer*, and λογος, *diſcourſe*.

The *Euchologium* is properly the Greek RITUAL, wherein are preſcribed the order and manner of every thing relating to the order and adminiſtration of their ceremonies, ſacraments, ordinations, &c.

Fa. Goar has given us an edition of the Greek *Euchologium* in Greek and Latin, with notes, at Paris.

EUCHYMIA, from ευ, *good*, and χυμος, *juice*, in *Medicine*, a good temper of the blood, or other juices and fluids in an animal body.

EUCLABRIS, in *Antiquity*, a table whereon the ſlaughtered victim was ſpread, in order to have its inteſtines carefully inſpected. It was from this table that the veſſels uſed in ſacrifices were called *euclabria*.

EUCRASY, of ευ, *well*, and κρασις, *temperature*, an agreeable, well-proportioned mixture of qualities, whereby a body is ſaid to be in good order, and diſpoſed for a good ſtate of health.

EUDIOMETER, in *Pneumatics*, is an inſtrument lately invented, in conſequence of the experiments and diſcoveries of Dr. Prieſtly, for determining the ſalubrity of different kinds of AIR. The name is formed of ευδια, ſignifying the *good quality of air*, derived from ευ, *good*, and δια, denoting, in compoſition a *medium*, and μετρω, *I meaſure*.

The reader will find under the article AIR, *nitrous*, an account of the principle on which the conſtruction of theſe inſtruments depends. Dr. Prieſtley, having diſcovered that when nitrous air is mixed with any other air, their original bulk is diminiſhed; and that the diminution is nearly, if not exactly, in proportion to its ſalubrity, was led to adopt nitrous air as a true teſt of the purity of reſpirable air; and nothing more ſeemed to be neceſſary than an eaſy, expeditious, and accurate method of eſtimating the degree of diminution in different caſes; and for this purpoſe the *eudiometer* was contrived. The diſcovery of Dr. Prieſtley was announced to the public in the year 1772; and the abbé Fontana and the chevalier Landriani, both of Italy, were the firſt who availed themſelves of this diſcovery in the conſtruction of *eudiometers*. One of theſe inſtruments invented by Landriani, conſiſts of a glaſs tube ground to a cylindrical veſſel, with two glaſs cocks and a ſmall baſon, all fitted in a wooden frame. In this inſtrument quickſilver is uſed inſtead of water; and that part of it which replaces the bulk loſt by the diminution of the two mixed airs, is conducted either through a kind of glaſs ſiphon, or through the capillary holes of a glaſs funnel; ſo that by its fall the whole mixture of the two kinds of air is more readily made. Dr. Falconer of Bath accurately divided a glaſs tube, in order to exhibit the quantity of diminution produced by the mixture of nitrous air with air of another kind, agreeably to the method uſed by Dr. Prieſtley in the purſuit of this curious diſcovery. See EFFLUVIA. Mr. J. H. de Magellan, F. R. S. has deſcribed three different *eudiometers* of his own contrivance. One of theſe conſiſts of the following parts, viz. a glaſs tube *m n e d*, (ſee *Tab.* IX. *Pneumatics*, *fig.* 8.) about 12 or 15 inches long, and of an equal diameter, with a ground glaſs ſtopple *m*; a veſſel *c*, the neck of which is ground air-tight to the lower end *d* of the tube; and two equal phials, *a* and *b*, whoſe necks are alſo ground air-tight to the reſpective mouths of the veſſel *c*: both theſe veſſels contain nearly as much as the whole tube *m n e d*. There is alſo a ſliding braſs ring *z*, which ſlides in the tube *n d*, and may be made tight at pleaſure by a finger ſcrew; and laſtly, a ruler *q*, either of braſs or of wood, repreſented *fig.* 9. which is divided into equal parts, and indicates the contents of both the phials *a* and *b* when thrown into the tube, by the number of parts which is engraved or ſtamped about the middle of it. The two bent pieces of braſs *z*, *t*, ſerve to hold it eaſily by the ſide of the tube *n d*, (*fig.* 10. and *fig.* 11.) keeping it cloſe to its neck *n* by the notch *i*. In uſing this inſtrument, it will be convenient to have a tall glaſs receiver like that repreſented *fig.* 10. or a tube or trough *fig.* 11. made with ſtrait boards of elm-wood one inch thick; the inſide dimenſions are 25 inches long, 13½ wide, and 11 deep: the two end boards, *c d* and *e f*, are fitted into a groove cut in the other three boards: it ſhould be daubed with thick white paint as a cement, for retaining the water, and the whole faſtened with nails from the outſide. The ſhelf *w a n o* is 8 inches wide, and ½ inches thick, in which are 3 holes of 3 tenths of an inch diameter, with as many ſeparate cavities underneath, ſo as to ſerve like ſo many funnels; or a glaſs funnel *t* cemented to the middle hole *n* is equally convenient. This ſhelf is ſupported by 4 metallic hooks *V w z z*, which may be raiſed or lowered at pleaſure by means of wooden wedges. A trough of this kind is the moſt commodious for experiments on different kinds of air.

Let ſuch a trough or tub be nearly filled with water, take out the ſtopple *m* of the *eudiometer* and fill it with water in the poſition exhibited *fig.* 8. or *fig.* 11. then cloſe it with the ſtopple *m*, without leaving any air in the inſide; and put the lower part *c* under the ſurface of the water in the tub, *fig.* 11. in the poſition there repreſented. Let the phial *a*, filled with water, be kept with its mouth downwards under the ſurface of the water, and filled with that air, the ſalubrity of which it is required to aſcertain. This is done either by putting the phial *a* on the ſhelf *n o* of the tub, *fig.* 11. and throwing the air into the glaſs funnel *t*, which is there cemented to the ſhelf; or by holding in the left hand the ſame phial *a*, together with a glaſs funnel without a pipe applied to the mouth of the phial, whilſt the air is poured with the right hand into it. But leſt the heat of the hand ſhould produce any conſiderable expanſion in the air, the glaſs funnel may be held cloſe to the mouth of the phials by wooden tongs with bent wires *x x*, *fig.* 12. unleſs they are made with a ſolid lump at their bottoms as they are here repreſented. If a glaſs bottle with a ground glaſs ſtopple be filled with water or mercury, and emptied in the place whoſe atmoſpherical air is to be tried, it will be filled with that air; and being cloſed with the glaſs ſtopple, may be carried to any diſtant place, in order to determine its comparative ſalubrity. When the phial *a* is filled with air in the manner already deſcribed, it is put moderately tight into the mouth of the veſſel *c*; and for greater ſecurity againſt accidents, the necks of the phials *a*, *b*, and of the veſſel *c*, as well as the glaſs ſtopple *m*, are always rubbed with tallow previouſly to every experiment. Then take the phial *b* filled with water, and by the ſame proceſs fill it with nitrous air, and replace this phial *b* in the other mouth of the veſſel *c*. Let the *eudiometer* be carefully inverted, ſo that the two phials may be downwards, as exhibited in *fig.* 10. by this operation the two kinds of air come up to *x* from the phials *a*, *b*, and thus are mixed together: when this is done, dip the *eudiometer* in the water of the trough, *fig.* 11. leaving the mouth of the inſtrument above its ſurface; ſo that no more water may enter into it than it had at firſt. Then attentively obſerve the moment when the mixture *x*, (*fig.* 10.) of the two kinds of air comes to its greateſt diminution; after which, as Mr. Magellan has obſerved, its bulk will begin to increaſe again: for this purpoſe ſlide down the braſs ring *z* of the inſtrument as the ſurface of the water in the tube falls; and when this becomes ſtationary, which it will do in a few minutes, if the nitrous air has a proper ſtrength, we ſhall have the greateſt diminution. Then fill up the whole tube of the *eudiometer* with water, ſhut it up with the ſtopple *m*, and incline the top of the inſtrument forwards till the air comes from *x* up to the top *n* of the tube: keep the lower part of the inſtrument dipped in the water; take off the glaſs veſſel *c* with the two phials *a*, *b*, and raiſe or lower the tube of the *eudiometer* ſo as to ſee the ſurface of the water in the inſide even with that on the outſide, which mark by ſliding to it the braſs ring *z*. Or apply the ruler (*fig.* 9.) to the ſide of the *eudiometer* whilſt it is immerſed in the water of the trough, and thus you will ſee the true dimenſion of the remaining bulk of the two kinds of air already diminiſhed. The number marked about the middle of this ruler, e. g. $**=96$, denotes that the contents of both phials *a* and *b* are equal to 96 diviſions of the ruler when put into the tube of that *eudiometer*; or they are equal to a ſolid cylinder, as thick as the inſide of the glaſs tube, and whoſe length is 96 diviſions of the ruler divided into tenths of an inch. When e. g. the remaining bulk of mixed air correſponds to the 56th diviſion of the ruler, it ſhews, that out of 96 parts only 40 $(=96-56)$ have been loſt or contracted; and in this caſe the wholeſomeneſs of that air called A will be $\frac{40}{96}$. If another equal quantity of different air called B, be tried by the ſame *eudiometer*, and its reſiduum be equal to 60 parts of the ſame ruler, the relative ſalubrity of the air B will be to that of A, as 36 $(=96-60)$ to 40: But if the air B had been tried by another *eudiometer*, whoſe proportional dimenſions, marked about the middle of its ruler, were $**=108$, then the comparative ſalubrity of theſe two kinds of air A and B would be in the compound ratio of $\frac{36}{108}$ to $\frac{40}{96}=\frac{36\times 96 \text{ to } 40\times 108}{108\times 96}=$ 3456 to $4320=54$ to 67.5; or the wholeſomeneſs of the air B would be to that of A as 54 to $67\frac{1}{2}$. If the operator be provided with a tall glaſs receiver, as *fig.* 10. he need only dip the *eudiometer* inverted into the water contained in the veſſel *V S q l*; put the two kinds of air into the phials *a* and *b* in the manner already directed; turn the inſtrument upright as in *fig.* 10. and finiſh the proceſs in the method juſt deſcribed: but he ſhould take care that every part of the proceſs be conducted in the ſame temperature, ſince air is apt to expand or contract by heat and cold; and therefore, he ſhould keep a good thermometer as *K*, ſuſpended by the wire *y r*, and immerſed in the water of the glaſs veſſel *fig.* 10. or in the trough *fig.* 11. during the progreſs of theſe experiments.

Another *eudiometer* of a more ſimple kind conſiſts of a ſtrait glaſs tube *e n* (*fig.* 13.) of an uniform diameter, about two or three feet long, with a large ball *s*, and a glaſs ſtopple *m* fitted air-tight to the mouth *n*, which ſhould be wide open in the ſhape of a funnel. There is alſo a ſmall ſiphon *k l*, *fig.* 14. with a braſs ring *x*; a ſmall phial *z*, *fig.* 15. the contents of which may occupy a third part of the ball *s*, or half the length of the glaſs tube *n s*: to this inſtrument alſo belongs a ruler divided and ſtamped, like that already deſcribed. When this inſtrument is uſed it is filled with water, and placed in a vertical poſition with the mouth *n* under the ſurface of the water in a tub or trough: the phial *z* (*fig.* 15.) is filled firſt with nitrous air, which is thrown into the tube either by a glaſs funnel applied to its mouth, or when its mouth is wide enough, without any funnel: the phial is next filled with the air to be tried, which is thrown into the ſame tube. Then the ſiphon (*fig.* 13.) is immediately applied to the mouth of the *eudiometer* under the ſurface of the water; ſome of which is to be poured into it. Having watched the ſtationary moment of the greateſt diminution of the mixed air at *s* by means of the ring *x*, at that moment remove the ſiphon *k l*, and lay the *eudiometer* for ſome minutes under water in an horizontal poſition, or nearly ſo, that no part of the incloſed air may eſcape; ſhut the mouth *n* with the glaſs ſtopple *m*, and invert the inſtrument with the mouth *n* upwards. Laſtly, meaſure the ſpace occupied by the reſiduum of the diminiſhed air by applying to its ſide the divided ruler or ſcale, and eſtimate the reſult as before.

Eudiometers are uſed with water or with quickſilver; but the latter ſuffering a ſenſible action from the contact with nitrous air, and being both heavier and dearer than water, is leſs eligible than the former. An inſtrument of this kind is capable of being applied to important and uſeful purpoſes in determining the comparative ſalubrity of the air in different climates and ſituations. See Magellan's Letter to Dr. Prieſtley, containing the Deſcription of a Glaſs Apparatus, &c. and of New *Eudiometers*, &c. 1777, p. 15—47. and Prieſtley's Exp. and Obſ. on Air, vol. iii. Preface and Appendix. See alſo an account of eaſy methods of meaſuring the diminution of bulk, occaſioned by the mixture of common and nitrous air, by Dr. Ingenhouſz, in the Phil. Tranſ. vol. lxvi. part i. art. 15. See EFFLUVIA.

EUDOXIANS, a party or ſect of heretics in the fourth century, ſo denominated from their leader Eudoxius, patriarch of Antioch and Conſtantinople, a great defender of the Arian doctrine.

The *Eudoxians* adhered to the errors of the Arians and Eunomians, maintaining that the Son was created out of nothing; that he had a will diſtinct and different from that of the Father, &c.

EVE. See VIGIL.

EVECTION, is uſed by ſome aſtronomers for the libration of the moon. See LIBRATION.

The term *evection* is uſed by ſome aſtronomers to denote that equation of the moon's motion, which is proportional to the ſine of double the diſtance of the moon from the ſun, diminiſhed by the moon's anomaly: this equation is not yet accurately determined; ſome ſtate it at 1° 30′, others at 1° 16′, &c. It is the greateſt of all the moon's equations except the EQUATION *of the center*.

EVEN *foot*, in *Poetry*. See FOOT.

EVEN *number*, is that which may be divided into two equal parts or moieties. See NUMBER.

EVENING *ſtar*. See VESPER.

EVENLY *even number*, is that which is exactly diviſible by an even number taken an even number of times; ſuch is 32, ſince diviſible by 8, taken four times.

EVENLY *odd number*, is that which an even number meaſures by an odd one; as 30, which is meaſured by 6, taken five times.

EVERARD'S *ſliding rule*. See SLIDING.

EVERGETES, Ευεργετης, a Greek term, ſignifying *benefactor*, being formed of ευ, *bene*, *well*, and εργον, *opus*, *work*. It is ſtill retained in our language by way of addition or epithet given to two princes or kings of Syria and Egypt who ſucceeded Alexander. Thus we ſay Ptolemy *Evergetes* king of Egypt, Antiochus *Evergetes* king of Syria.

EVER-GREENS, a claſs of perennials, which continue their verdure, leaves, &c. all the year.

Of theſe our gardeners reckon twelve, which are peculiarly fit for Engliſh air, viz. the alternus, arbutus, bay-tree, box-tree, holly, juniper, lauruſtinus, phyllirea, pyracantha, or *ever-green* thorn, Italian green privet, and the yew-tree.

EVERLASTING *flower*. See ETERNAL *flower*.

Everlasting *pea*. See *Chichling* VETCH.

EVERRIATOR, derived from *ex* and *verro*, *I cleanſe*, in *Antiquity*, an officer who was obliged in a ſolemn manner to cleanſe ſuch houſes as were defiled by dead bodies, called *domus funeſtæ*.

EVERRICULUM, in *Surgery*, the name given by Paré to a ſort of ſpecillum or ſpoon, uſed to clear the bladder of gravel and grumes of blood left in it after the operation of lithotomy.

EVES-DROPPERS, in *Law*. See EAVES-*droppers*.

EUEXIA, from εὖ, *well*, and ἕξις, *habit*, in *Medicine*, a good ſound habit of body.

EUGENIA, in *Botany*, the name given by Micheli and Linnæus to a genus of plants of the *icoſandria monogynia* claſs, deſcribed in the Hortus Malabaricus. The characters are theſe: the perianthium conſiſts of one leaf divided into four, oblong, obtuſe, concave, and permanent ſegments. The flower is compoſed of four oblong and hollow obtuſe petals twice as large as the ſegments of the cup; the ſtamina are a great number of ſlender filaments inſerted in the cup, and reaching the length of the flower; the antheræ are ſmall. The germen is of a turbinated form, and is placed below the cup. The ſtyle is ſimple, and of the length of the ſtamina; the ſtigma is ſimple; the fruit is a coronated drupe of a quadrangular figure, containing only one cell, in which is contained a large roundiſh and ſmooth nut.

EVICTION, from *evinco*, *I overcome*, in *Law*, ſignifies a RECOVERY of lands or tenements by law.

EVIDENCE, a quality in things whereby they become viſible and apparent to the eyes, either of the body or the mind.

The ſchoolmen diſtinguiſh *evidence* into *formal* and *objective*.

Evidence, *formal*, is the act of the intellect, conſidered as clear and diſtinct.

Evidence, *objective*, conſiſts in the clearneſs and perſpicuity of the object; or it is the object itſelf ſo conſtituted as that it may be clearly and diſtinctly known.

Others divide *evidence* into *moral*, *phyſical*, and *metaphyſical*. A thing is ſaid to be *morally evident*, ſo far as we have a diſtinct notion or knowledge thereof, by unexceptionable witneſſes; *phyſically*, ſo far as natural ſenſe and reaſon, pointing out any thing, convinces us thereof; *metaphyſically*, when we enter fully and clearly into the eſſence of any thing.

Evidence is the eſſential and infallible character or criterion of truth, and is that in effect which with us conſtitutes truth.

If *evidence* ſhould be found in propoſitions that are falſe, we ſhould be compelled into error, ſince the aſſent we give to *evidence* is neceſſary: whence would follow this impious poſition, that God who made us is the author of our errors, as he has conſtituted us ſo as to put us under a neceſſity of falling into them.

It may be added, that as we neceſſarily love truth and hate error, it ſeems inconſiſtent with the nature of a beneficent being to form us with a love of what we could not obtain, or not know whether we did obtain it or not; beſides, that if we ſhould err in things that are evident, as well as in thoſe that are not ſo, we ſhould ſometimes find contradictions in *evident* propoſitions, as we commonly do in things that are obſcure.

Evidence, therefore, muſt be allowed the mark of truth; and thoſe things muſt be allowed true which carry with them ſuch a degree of *evidence* as obliges us to aſſent to them. Whatever we ſee *evidently* agreeable to things whereof we ſpeak, that we muſt acknowledge to be true.

The Epicureans allow of no other *evidence* but that of ſenſe, or that ariſing from ſenſe, it being a fundamental principle with them, that ſenſe is the firſt and primary criterion of all truth.

By *evidence* of ſenſe, they mean that ſpecies or image exhibited by the ſenſe or phantaſy; which, when all impediments to a juſt judging, as diſtance, motion, medium, &c. are removed, cannot be contradicted or gainſaid; wherefore, the queſtion being put, whether or no a thing be ſuch as it appears; the anſwer is not to be given, till it has been tried and examined in all the ways, and by all the ſenſes, that it can be an object of. See ERROR.

There are certainly other ſuperior and leſs fallible ſources or grounds of *evidence* than ſenſe; ſuch is that inward conſciouſneſs by which we learn what belongs to the mind, or that which Mr. Locke calls reflection; of which ſuch are intelligence, intuition, and common ſenſe, principally relating to thoſe abſtracted, or other propoſitions that carry their own *evidence* with them, and admit no doubt about them; whence we derive our aſſent to propoſitions called axioms and maxims: ſuch is alſo reaſoning, whereby we infer one truth from others by natural and juſt methods of argument, whence reſults ſcience: ſuch is likewiſe the teſtimony of others, on which we found the *evidence* of FAITH; to which we may alſo add inſpiration, or that impreſſion made on the mind by God himſelf, which gives a convincing and indubitable *evidence* of the truth of any propoſition, and atteſted to others either by prophecy or miracles. Watts's Logick, part ii. chap. ii. § 9.

By thus conſidering the various ſources whence our perception and belief of any truth are derived, we may be led to diſtinguiſh *evidence* into INTUITIVE and DEDUCTIVE, and that founded on TESTIMONY. See Campbell's Phil. of Rhet. book i. chap. 5.

The *evidences* of the Chriſtian religion are diſtinguiſhed into two kinds, the direct and collateral: the direct *evidences* are external and internal; the external are MIRACLES and PROPHECY; the internal *evidence* is deduced from its excellence, conſidered in reference to the main and principal end of CHRISTIANITY. Whatever does not either belong to its excellence conſidered in this light, or fall under the head of miracles wrought on purpoſe to atteſt it, or of prophecies fulfilled, and yet affords a proof or any real preſumption of its truth and divinity, is a collateral *evidence* for it. All the collateral evidences of the truth of Chriſtianity are in one ſenſe internal *evidences*, becauſe they all ariſe from ſome particulars in the nature of this religion, from ſome circumſtances which have attended its reception or ſprung from it, or from ſome remarkable facts connected with it, and related in the Goſpel hiſtory. Of this kind is the argument deduced from its great efficacy at its firſt appearance, in baniſhing polytheiſm, idolatry, ſuperſtition, and the arts of magic; in ſoftening the rigour of deſpotiſm, introducing moderation into government, excluding many inconvenient civil laws once generally prevalent, giving riſe to others of a very happy tendency, refining the laws of war, humanizing the manners and improving the cuſtoms of nations, and reforming the temper and conduct of thoſe who embraced it.

Another claſs of collateral arguments for the truth of the Chriſtian religion, ariſes from particulars in its nature or effects produced by it, or from facts in the Goſpel hiſtory, which cannot be at all accounted for but on the ſuppoſition of a Divine original; or which are, at leaſt, moſt naturally explicable on that ſuppoſition. To this claſs may be referred thoſe preſumptive arguments deduced from the character of Jeſus, ſo exalted, and yet ſo uniformly ſupported; the nature of his laſt diſcourſes with his diſciples; the character of ſome of his apoſtles; that of Judas the traitor; the controverſies among Chriſtians in the Apoſtolic age; and the method uſed by Chriſt and his apoſtles, of referring their claims to the impartial inquiries of men. Other collateral arguments have an affinity to the external *evidences* of Chriſtianity: ſuch are thoſe derived from the miraculous converſion of the apoſtle Paul and his ſubſequent conduct; from the character of the man of ſin foretold by Paul; from the quick and extenſive propagation of the Goſpel; from the continuance and preſent ſtate of the nation of the Jews. Some of theſe arguments have an immediate relation to the proof of Chriſtianity from prophecies; others are related to the proof from miracles. Other arguments have an equal relation to the internal and external *evidence* of Chriſtianity; ſuch is that dedcued from the manner in which Chriſt and his apoſtles propoſed the *evidences* of their miſſion, and the advantage they have gained in conſequence of the oppoſition and ſcrutiny of unbelievers. See on this ſubject Lord Lyttelton's Obſervations on the Converſion and Apoſtleſhip of St. Paul, Duchal's Preſumptive Arguments for the Truth of the Chriſtian Religion, and Gerard's Diſſertation on the Genius and *Evidences* of Chriſtianity.

Evidence, in *Law*, is any proof, whether by teſtimony of men on oath, or by writings and records; the former called *parol evidence*, and the latter *written evidence*.

It is thus called becauſe the point in iſſue is hereby made *evident* to the jury.

With regard to parol *evidence* or witneſſes, we may obſerve in general, that a party intereſted in a ſuit, or a wife for or againſt her huſband, a huſband againſt his wife, except in caſes of treaſon, an alien, infidel, perſons *non ſanæ memoriæ*, thoſe that are attainted of conſpiracy, or in a præmunire upon ſtat. 5 Eliz. cap. 1. Popiſh recuſants convict on ſtat. 3 Jac. I. cap. 5. perſons convicted of felony, perjury, &c. thoſe who by judgment have ſtood on the pillory, or been whipped, whilſt the judgment is in force, are diſabled from giving *evidence*: but kinſmen, though ever ſo near, tenants, ſervants, maſters, attornies for their clients, one of the jurors upon trial, and all others that are not infamous, who want not underſtanding, or are no parties in intereſt, may give *evidence* in a cauſe; though the credit of ſervants is left to the jury. If an action is brought againſt many perſons for taking of goods, one of them may be admitted as an *evidence* againſt the reſt. And in criminal caſes, as of robbery on the highway, in an action againſt the hundred, and rapes of women, &c. a man or woman may be an *evidence* in their own cauſe: ſo likewiſe in private notorious cheats, where none elſe can be witneſs of the circumſtances of the fact but he who ſuffers. When perſons that are competent witneſſes are ſerved with a writ of *ſubpœna ad teſtificandum*, they are bound to appear at the trial on pain of 100*l.* to be forfeited to the king, to which the ſtat. 5 Eliz. cap. 9. has added a penalty of 100*l.* to the party aggrieved, and damages equivalent to the loſs ſuſtained by want of their *evidence*: but no witneſs, unleſs his reaſonable expences be tendered him, is bound to appear at all; nor if he appears, is he bound to give *evidence* till ſuch charges are actually paid him, except he reſides within the bills of mortality, and is ſummoned to give *evidence* within the ſame.

One credible witneſs is ſufficient *evidence* to a jury of any ſingle fact in all civil actions; but in caſes of high treaſon, petit treaſon, and miſpriſion of treaſon, by ſtatutes 1 Edw. VI. cap. 12. 5, and 6. Edw. VI. cap. 11. and 1 and 2 Ph. and Mar. cap. 10. *two* lawful witneſſes are required to convict a priſoner, except in caſes of coining and counterfeiting the ſeals, or unleſs the party ſhall willingly and without violence confeſs the ſame: and by ſtat. 7 W. III. cap. 3. the confeſſion of the priſoner muſt be in open court; and both witneſſes muſt be to the ſame overt act of treaſon, or one to one overt act and the other to another overt act of the ſame ſpecies of treaſon. Baron Monteſquieu, indeed, lays it down for a rule, Spirit of Laws, book xii. cap. 3. that thoſe laws which condemn a man to death *in any caſe* on the depoſition of a ſingle witneſs, are fatal to liberty.

All *evidence* is to be given in open court, in the preſence of the parties, their attornies, the counſel, and all byſtanders, and before the judge and jury: many advantages attend this way of giving teſtimony, *ore tenus*, a method familiar among the ancient Romans, as may be collected from Quintilian, Inſt. Orat. lib. v. cap. 7. and it was continued as low as the time of Hadrian; but the civil law, as it is now modelled, rejects all public examination of witneſſes. Poſitive proof is always required whenever the nature of the caſe poſſibly admits of it.

Sometimes violent preſumption will be admitted for *evidence* without witneſſes; as where a perſon is run through the body in a houſe, and one is ſeen to come out of the houſe with a bloody ſword, &c but on this the court ought not to judge haſtily, 1 Inſt. 6. 673; and though preſumptive and CIRCUMSTANTIAL *evidence* may be ſufficient in felony, it is not ſo in treaſon. State Trials.

Though all preſumptive *evidence* of felony ſhould be admitted cautiouſly, for the law holds, that it is better that ten guilty perſons eſcape than that one innocent ſuffer.

Evidence by writings and records, is where acts of parliament, ſtatutes, judgments, fines and recoveries, proceedings of court, and deeds, &c. are admitted as *evidence*. The printed Statute Book is good *evidence* upon a general act of parliament, which need not be pleaded; but in the caſe of a private act, it is otherwiſe; for there it muſt be pleaded and examined by the records of parliament before it can be admitted in *evidence*. Records and enrolments prove themſelves; and a copy of a record ſworn to may be given as an *evidence*. A record of an inferior court has been rejected in *evidence*; and the proceedings in county-courts, courts baron, &c. may be denied, and then tried by a jury. A copy of copyhold lands ſhall be an *evidence* where the rolls are loſt. An ancient deed of thirty years ſtanding proves itſelf; but modern deeds, and other writings, muſt be atteſted and verified by parol *evidence* of witneſſes. The counterpart of a deed is no *evidence*, when the original is in being, and can be procured. Although a witneſs ſwear to the hand and contents of a letter, if he never ſaw the party write, it will not be good *evidence*. And a ſhop-book may not be given in *evidence* for goods ſold, &c. by 7 Jac. I. cap. 12. after one year, before the action brought, except there be a bill, &c. for the debt; unleſs between merchant and merchant in the uſual intercourſe of trade. In order to make books *evidences*, if the ſervant who was accuſtomed to make entries in it be dead, his hand muſt be proved; and this, when accompanied with other collateral proofs of fairneſs and regularity, is the beſt *evidence* that can then be produced. In debt, a releaſe may be given in *evidence*; ſo may any matters of fact, tampering with witneſſes or fraud. See Baron Gilbert's Treatiſe of *Evidence*, or the Introduction to the Law of *Niſi Prius*, 4to. 1767.

Sir Thomas Smith reſtrains *evidence* to authentic writings of contracts, written, ſealed, and delivered. De Rep. Angl. lib. ii.

Evidence, *demurrer to.* See Demurrer.

Evidence, *exception to.* See Exception.

EVIL, *malum*, in *Ethics*, a privation or abſence of ſome proper or neceſſary good, or of ſome meaſure or degree thereof.

Evil is either *natural* or *moral*; between which there is this relation, that moral *evil* produces natural.

Evil, *moral*, is defined a deviation from right reaſon; a diſcernment of right from wrong, being given us as a guide of our actions; or it is the diſagreement between the actions of a moral agent and the rule of thoſe actions, whenceſoever it is derived and howſoever made known; and no action can be morally evil unleſs the agent be properly ſuch, intelligent and free, and capable of diſtinguiſhing, chooſing, and acting for himſelf. This the philoſophers call *inhoneſtum*, and *turpe*, as ſtaining the image of God, and ſullying our original beauty, likewiſe *malum culpæ*.

Evil, *natural*, is a want of ſomething neceſſary to the *bene eſſe*, or perfection of a thing, or to its anſwering all its purpoſes: ſuch are defects of the body, blindneſs, lameneſs, hunger, diſeaſes, death. This ſpecies is denominated *triſte*, *injucundum*, *noxium*, and *malum pœnæ*.

Again, *evil* is either *abſolute*, as envy, impiety, &c. or *relative*, as meat, which in itſelf being good, may be *evil* to a man on account of ſome diſeaſe; as wine to a feveriſh perſon, &c

A late ingenious author ſets the thing in another light, and furniſhes a theory of moral good and *evil*, in his Enquiry into the Origin of our Ideas of Beauty and Virtue.

Moral evil, according to this philoſopher, denotes our idea of a quality apprehended in actions which excites averſion and diſlike towards the actor, even from perſons who receive no diſadvantage thereby; as moral goodneſs denotes our idea of a contrary quality which procures approbation and love towards the actor, even in perſons unconcerned in its natural tendency. This notion ſuppoſes an univerſally acknowledged difference of good and *evil* from natural. Moral good, we all know, procures love towards thoſe we apprehend poſſeſſed of it; whereas natural good does not. How differently, for inſtance, are we affected towards thoſe we ſuppoſe poſſeſſed of honeſty, faith, generoſity, &c. when we expect no benefit from thoſe qualities, and thoſe poſſeſſed of the natural goods, as houſes, lands, gardens, health, ſtrength, &c. So whatever quality we apprehend morally *evil*, raiſes our hatred towards the perſon in whom we obſerve it; as treachery, cruelty, ingratitude, &c. whereas we love and pity many expoſed to natural *evils*, as pain, hunger, ſickneſs, &c.

The origin of theſe different ideas of actions has greatly puzzled the moraliſts: ſome make ſelf-intereſt, or ſelf-love, the ſource of them all; we approve the virtue of others as it has ſome ſmall tendency to our happineſs, either from its own nature or from this general conſideration, that a conformity to nature and reaſon is in the general advantageous to the whole, and to us in particular; and on the contrary, diſapprove the vice of others, as tending at the long run to our particular detriment.

Others ſuppoſe an immediate *natural evil* in the actions called *vicious*, that is, that we are determined to perceive ſome deformity or diſpleaſure in ſuch actions, without reflecting on any diſadvantage that may any way redound to us from the action; and that we have a ſecret ſenſe of pleaſure accompanying ſuch of our own actions as are called *virtuous*, when we expect no farther advantage from them; but then they add, that we are excited to perform thoſe actions, even as we purſue or purchaſe pictures, ſtatues, landſcapes, &c. from ſelf-intereſt, to obtain the pleaſure which accompanies the action.

But the author juſt mentioned has ſhewn the miſtake: ſome actions, he proves, have to men an immediate goodneſs, and others an immediate *evil*, i. e. we perceive pleaſure in ſome and pain in others, and are determined to love or hate the doers, without any view of natural advantage, without any view to future rewards or puniſhments, or even without any intention to obtain the ſenſible pleaſure of the good, but from a very different principle, viz. an internal moral ſenſe, or a natural determination of the mind to receive amiable or diſagreeable ideas of actions, when they ſhall occur to our obſervation, antecedently to any opinion of advantage or loſs to redound to ourſelves from them, even as we are pleaſed with a regular form or an harmonious compoſition, without any knowledge of the mathematics, or ſeeing any advantage in that form or compoſition different from the immediate pleaſure. But according to this account of Dr. Hutcheſon, however plauſible, *moral good* and *evil* ſignify nothing in the objects themſelves, to which they are applied, any more than agreeable and harſh, ſweet and bitter, &c. but only certain effects in us; and virtue is a mere affair of taſte; whereas it is much more juſt to conclude, that right and wrong, or good and *evil*, are real qualities of actions, and not merely of our minds; and that the power whereby we perceive theſe qualities is not any arbitrary ſenſe but the underſtanding. Price's Original of our Ideas, &c. p. 13. and p. 59, &c. See farther under Deformity, Sense, Good, Virtue, and Vice.

Evil, or *King's* **Evil**, in *Medicine*, a diſeaſe by the phyſicians, called *ſtrumæ* and *ſcrophulæ*, conſiſting in ſchirrhous tumours, ariſing moſt commonly about the neck; but ſome alſo on the other glandulous parts, as the breaſt, arm-pits, groin, &c.

The kings of England and France have for a long time pretended to the privilege of curing the *king's-evil* by *touching*. The right or faculty, it is ſaid by ſome, was originally inherent in the French kings; and thoſe of England only claimed it as an appendage or appurtenant to that crown, to which they had a claim.

Stephen de Conti, a religious of Corbie, who lived in the year 1400, and wrote a Hiſtory of France, ſtill preſerved in MS. in the library of St. Germains des Prez, deſcribes the practice of *touching* for the *evil:* after the king had heard maſs a veſſel of water was brought him, and his majeſty having put up his prayers before the altar, *touched* the diſeaſed part with his hand, and waſhed it with water.

Matthew Paris will have St. Louis the firſt who practiſed it; others contend, that king Robert was the firſt who was gifted this way. It is certain, we find no mention of any ſuch prerogative before the kings of the eleventh century when that prince reigned. Fa. Daniel, Hiſt. de France, tom. i. p. 1032. Polydore Virgil endeavours to prove the ſame virtue in the kings of England. Favyn. Hiſt. de Navarre, 1062.

The author of a late treatiſe tells the following ſtory, which may, perhaps, in ſome degree, account for the miraculous cures ſuppoſed to have been performed by the royal touch. "An old man who was witneſs in a cauſe, had by his evidence fixed the time of a fact by Queen Anne having been at Oxford, and touched him whilſt a child, for the cure of the *evil*. When he had finiſhed his evidence, the relator had an opportunity of aſking him whether he was really cured. Upon which he anſwered with a ſignificant ſmile, that he believed himſelf never to have had a complaint that deſerved to be conſidered as the *evil*; but that his parents were poor, *and had no objection to the bit of gold.*" Obſerv. on the Statutes. 4to. Lond. 1776, p. 65. n.

The ſame virtue, we know not on what grounds, is commonly attributed to a ſeventh ſon, born without any daughter between; as alſo to the chiefs of certain particular families, particularly, to the eldeſt perſon of the houſe of Aumont in Burgundy.

The glands are the moſt remarkable ſeat of this diſtemper; and whenever the outward glands appear ſwelled, thoſe of the meſentery may be concluded to be ſo too, the meſentery being uſually the part firſt attacked by this malady.

The particulars to be conſidered in the prognoſtics, are, whether the tumours be many or few; in cluſters, or more diſtinct, great or ſmall, deep or ſuperficial, moveable or immoveable, benign or malignant, ſoft or hard; the ſituation, whether near great veſſels, joints, nerves, tendons, or bones; alſo the habit of the body, and age of the patient.

If the habit of body be tolerable, the patient young, the ſtrumæ recent, and but moderately hard, the reſolution and ſuppuration may be eaſily effected; but if they have been of long continuance, are hard, and lie deep among the veſſels, the cure becomes difficult; yet in both caſes it is promoted by accidental ferments, which often either reſolve or ſuppurate them. If the ſtrumæ be moveable, and free from remarkable veſſels, the extirpation is not difficult; but if the habit of body be bad, and the ſtrumæ immoveable, they are not to be meddled with: if they are moveable, and yet lie deep among the great veſſels, the extirpation is dangerous: beſides, in the beſt habits of body, new ſtrumæ are ready to riſe, while the old ones are extirpating.

Method of cure. In the cure three things are required: 1. A regimen of diet, and the other non-naturals. 2. Pharmacy, or internal preſcriptions. 3. The application of externals, either to diſcuſs, ſuppurate, or extirpate the glands.

With reſpect to regimen of diet, regard ought to be had to the conſtitution of the patient, whether it be hot or cold, dry or moiſt, old or young, robuſt or delicate. If the body be cold or moiſt, we generally ſuppoſe a ſurfeit preceded, and crudity to abound; in which caſe, abſtinence from meat and drink, or at leaſt great moderation is requiſite. Their diet ought to be moderately heating and drying, as mutton, kid, rabbit, pullet, chicken, partridge, pheaſant, and other poultry, roaſted, avoiding all aliments which yield groſs phlegmatic nouriſhment, ſuch as water-fowl, fiſh, eſpecially thoſe of ſtanding-waters, herbage, cheeſe; all ſmoaked, ſeaſoned, or dried meats. Their bread ought to be of wheat, well baked, and their drink medicated ale or beer. Wine is allowable, but water prohibited.

In hot and dry conſtitutions, tending to a hectic, diet of a more humid nature may be allowed; meat boiled with lettuce, ſpinnage, purſlain, wood-ſorrel, and the like: to ſome of theſe the eating of any fleſh is ſcarcely to be allowed, but rather a milk diet; though where milk is not found agreeable, medicated broths are to be preſcribed. Pork is by ſome prohibited to ſtrumous people. Air is a great help to the cure, which ought to be mild and gentle; in cold weather, heating and attenuating; and in the hot, cooling. Exerciſe ought to be enjoined, it being neceſſary to waſte ſuperfluities. Sleep in the day is forbidden, unleſs where the caſe is painful, to which it is an anodyne. The paſſions of the mind ought alſo to be moderated.

The internal preſcriptions muſt be qualified according to the habit of the body. If cold and phlegmatic, abounding with cold viſcous humours, the preſcriptions ought to be heating and attenuating; in plethoric conſtitutions, the ſtronger cathartics ought to be exhibited, or the milder often repeated. The purgatives are, the ſpecies hieræ with agaric, diaturbeth, pulvis cornachini, pillulæ cochiæ, e duobus, Rudii, de hermodactylis, aloephanginæ, imperiales, e ſuccino, trochiſci, alhandal, diagrydium, reſina jalapii, and mercurius dulcis, with all thoſe medicines preſcribed in the lues venerea.

Alteratives are alſo uſually taken on thoſe days in which the patient does not purge. Among theſe, a decoction of the woods claims a preference; to which are added one or other of the ſpecifics ſo called; ſuch as the roots of figwort, dropwort, devil's bit, ſoapwort, burdock, the bark of the walnut-tree; the herbs ragwort, crane's bill, herb Robert, the greater celadine, hound's tongue, white horehound, fox glove, and the like. In theſe decoctions it is very common alſo to put a lump of crude antimony of four ounces or half a pound weight, groſly powdered, and tied up in a rag; a ſpecimen of which is in Dr. Fuller's Decoctio Liberans, and his Decoctum Edulcorans; of diet, in his Cereviſiæ ad Scrophulas, and his Decoctum ad Scrophulas.

Such as are not able to be at the expence of theſe, or unwilling to be at the trouble of preparing them, which muſt be continued for a long time, may take a ſolution of quick-lime, one pound to a gallon of ſpring-water; which being decanted, two or three ounces of the ſhavings of ſaſſafras wood, with half an ounce or an ounce of liquorice wood, ſliced, may be ſteeped therein: theſe not only taking off the brackiſh taſte, and changing it for one more pleaſant, but communicating likewiſe a very agreeable colour and ſmell to the ſolution.

The *lapis ſpongiæ*, or *ſponge-ſtone*, with ſponge itſelf calcined, Dr. Turner ſays, he has often experienced to be ſucceſsful. James Med. Dict. See Lancarim *ſpring*.

A courſe of bathing in ſalt-water in the warm ſeaſon, and drinking it in ſuch quantities as to keep the body gently open, have in ſome inſtances effected a cure. The patient may be bathed in freſh water where ſalt-water cannot be obtained, and his body kept open by any mild purgative. Next to cold bathing and drinking the ſalt-water, the uſe of the bark has been recommended; the cold bathing to be uſed in ſummer, and the bark in winter. The Moffat and Harrowgate waters uſed for a conſiderable time, are likewiſe very proper medicines for the ſcrophula. The extract of freſh juice of hemlock may alſo be adminiſtered with advantage. External applications are of little uſe. The beſt dreſſing for the ſores is yellow baſilicon, mixed with about a ſixth or eighth part of its weight of red precipitate of mercury, applied twice a day. Buchan's Dom. Med. p. 436, &c.

Evil, *falling*, in *Horſes*. See Falling-*evil*.

Evil, *hungry*. See Hungry and Bulimy.

EULOGY, **Eulogia**, in *Church Hiſtory*. When the Greeks have cut a loaf, or piece of bread, to conſecrate it, they break the reſt into little bits, and diſtribute it among the perſons who have not yet communicated, or ſend it to perſons that are abſent; and theſe pieces of bread are what they call *eulogies*.

The word is Greek, ευλογια, formed of ευ, *bene*, *well*, and λεγω, *dico*, *I ſay*, *ſpeak*; q. d. *benedictum*, *bleſſed*.

The Latin church has had ſomething like *eulogies* for a great many ages; and thence aroſe the uſe of their holy bread.

The name *eulogy* was likewiſe given to loaves or cakes brought to church by the faithful to have them bleſſed.

Laſtly, the uſe of the term paſſed hence to mere preſents made a perſon, without any benediction. See the Jeſuit Gretſer, in his Treatiſe de Benedictionibus & Maledictionibus, lib. ii. cap. 22, 24, &c. where he treats of *eulogies* thoroughly.

From a paſſage in Bollandus, on the Life of S. Melaine, cap. 4. it appears, that *eulogies* were not only of bread, but any kind of meat bleſſed and hallowed for that purpoſe. Add, that almoſt every body bleſſed and diſtributed *eulogies*; not only biſhops and prieſts, but even hermits, though laymen, made a practice of it. Women alſo would ſometimes ſend *eulogies*.

The wine ſent as a preſent was alſo held an *eulogy*. Bollandus remarks farther, that the Euchariſt itſelf was alſo called *eulogy*.

Eulogy, likewiſe means an encomium on any perſon, on account of ſome virtue or good quality.

EUMARIDES, of ευμαρης, *eaſy*, among the *Ancients*, a kind of ſhoes common to men and women.

The *eumarides* were uſed for pomp and delicacy, being neat, and painted with various colours.

EUMECES, in the *Writings of the ancient Naturaliſts*, the name of a ſtone, which Pliny tells us reſembled a flint, and was found in Bactria; the ancients had an idle opinion, that, if laid under the head, it occaſioned true and prophetic dreams, foretelling to the perſon the more remarkable future events of his life. Hiſt. Nat. lib. xxxvii. cap. 10.

EUMENIDES, in *Antiquity*. See Furies.

EUMENIDEIA, Ευμενιδεια, in *Antiquity*, an annual feſtival obſerved in honour of the Furies. It was otherwiſe called σεμνων ἑορτη, becauſe the Athenians called the Furies σεμναι θεαι, i. e. *venerable goddeſſes*.

EUMETRES *Beli*, in *Natural Hiſtory*, the name given by the ancients to a gem which the Aſſyrians held ſacred to their god, and which many other nations learned from them to ſuppoſe very powerful againſt magic. Many have ſuppoſed this to be the ſtone we now call oculus Beli; but this is an error, ſince Pliny, in his account of the *eumetres*, ſays, that it was of a very fine green. It was probably a gem of the emerald-kind, that ſtone having ever been in very high eſteem in the eaſtern part of the world, as it is alſo to this day.

EUMOLPIDES, in *Antiquity*, prieſts of Ceres, who had the power among the Athenians of initiating into the myſteries of this goddeſs, or excluding from them.

EUNOFIUS, a name given by ſome authors to the ætites or eagle-ſtone.

EUNOMIANS, a ſect denominated from Eunomius, biſhop of Cyzicus, who, in the fourth century maintained moſt of the errors of Arius, and added others to them.

He rebaptized ſuch as had already been baptized in the name of the Trinity: he had diſſembled his errors for ſome time; but having at length made a diſcovery, he was expelled his ſee.

The Arians endeavoured to have put him into that of Samoſata, but could not effect it; in lieu thereof the emperor Valens reſtored him to Cyzicus.

EUNOMIŒUPSYCHIANS, a ſect of heretics of the fourth century, mentioned by Nicephorus, lib. xii. cap. 30. being the ſame with thoſe called *Eutychians* by Sozomen, lib. vii. cap. 17. See Eutychians.

EUNUCH, Ευνουχος, a term applied in the general to all who have not the faculty of generating, either through imbecillity or frigidity; but more particularly to ſuch as have been caſtrated, or have loſt ſome of the parts neceſſary for that purpoſe.

The word is formed of ευνην εχει, q. d. *lecti curam habet*, *guardian*, or *keeper of the bed*.

In England, France, &c. *eunuchs* are never made but on occaſion of ſome diſeaſe which renders ſuch an operation neceſſary; but in Italy they make *eunuchs* for the ſake of preſerving the voice; and in the Eaſt they make *eunuchs* to be guards or attendants on their women.

Great numbers of children, from one to three years of age, are yearly caſtrated in Italy to ſupply the operas and theatres, not only of Italy but other parts of Europe with ſingers; though it is not one in three, that after having loſt their virility, have a good voice for a recompence. See Conservatorios.

Tavernier aſſures us, that in the kingdom of Boutan in the Eaſt Indies, there are every year made twenty thouſand *eunuchs*, and ſold thence into other countries.

The ſeraglios of the eaſtern emperors are chiefly ſerved and guarded by *eunuchs*; and yet we have very good teſtimonies, that the rich *eunuchs* in Perſia and other countries keep ſeraglios for their own uſe. This is a puniſhment of crimes in ſome countries. See Adultery.

By an arret of the grand chamber of Paris in 1665, it is adjudged that an *eunuch* could not marry, not even with the conſent of the woman, and all the parties on both ſides.

Claudian has a very ſevere ſatire againſt the *eunuch* Eutropius, who had been elected conſul of Rome. He repreſents him as an old woman, dreſſed up in the honours of the conſulate.

In the council of Nice thoſe were condemned, who, out of an indiſcreet zeal, and to guard themſelves from ſenſual pleaſures, ſhould make themſelves *eunuchs*. Such as thus mutilated their bodies were excluded from holy orders; witneſs Leontius, biſhop of Antioch, who was depoſed for having practiſed this cruelty on himſelf: and the biſhop of Alexandria excommunicated two monks who had followed his example, on pretence of ſecuring themſelves from the impetuous motions of concupiſcence. Several of the emperors made very ſevere prohibitions againſt the making of *eunuchs*, or people's caſtrating themſelves. See Castration.

Eunuchs, Eunuchi, is alſo the denomination of a ſect of heretics in the third century, who had the folly or madneſs to caſtrate not only thoſe of their own perſuaſion, but even all they could lay hands on.

They took their riſe from the example of Origen, who, upon a miſunderſtanding of our Saviour's words in St. Matthew, chap. xix. ver. 12. made himſelf an *eunuch*, by cutting off the offending part, as ſome ſay; or, as others (particularly St. Ephiphanius), by the uſe of certain medicines. Theſe heretics were alſo called Valesians.

EVOCATI, among the Romans, ſoldiers, who having ſerved their time in the army, went afterwards volunteers at the requeſt of ſome favourite general.

EVOCATION, *Evocatio*, among the Romans, a religious ceremony always obſerved by them at undertaking the ſiege of a town, wherein they ſolemnly called upon the gods and goddeſſes of the place to forſake it and come over to them. Without the performance of this ceremony, they either thought that the place could not be taken, or that it would be a ſacrilege to take the gods priſoners.

The form of *evocation* uſed at taking the city of Carthage is related by Macrob. Sat. III. 9.

They always took it for granted that their prayer was heard, and that the gods had deſerted the place and came over to them, provided they were able to make themſelves maſters of it.

EVOCATORIÆ *epiſtolæ*, among the Romans, letters ſent by the emperors to command the attendance of any perſon; or letters granting licence to any one to wait on the emperor; every perſon not being allowed this privilege till they had deſired and obtained the *evocatoriæ epiſtolæ*.

EVOLVENT, in *Geometry*, a term which ſome writers uſe for the curve reſulting from the evolution of a curve; in contradiſtinction to the *evolute*, which is the curve ſuppoſed to be opened or evolved.

The evolute always both touches and cuts the *evolvent* at the ſame time: the reaſon is, that it has two of its infinitely ſmall ſides in common with the *evolvent*; or, rather, exactly placed on two equal ſides thereof; one of them within-ſide that of the *evolvent*, i. e. on the concave ſide thereof; and the other on the convex ſide of its correſpondent ſide; ſo that the evolute touches the *evolvent* in two points; whence, inſtead of being a tangent, it is ſaid to oſculate the *evolvent*; and, hence, it is alſo called *oſculator*, and *circulus oſculator*.

There is one, and but one oſculator, to each point of the *evolvent*; but, to the ſame point, there are an infinity of other circles which only touch, and do not oſculate. The oſculator, and the evolute, make no angle in the place where they touch and cut; nor can any curve line be drawn between, as there may between a tangent and a curve.

EVOLUTE, Evoluta, in the *Higher Geometry*, a curve firſt propoſed by Mr. Huygens, and ſince much ſtudied by the later mathematicians.

The *evolute* is a curve, ſuppoſed to be evolved, or opened; and which, in opening, deſcribes other curves.

To conceive its origin and formation, ſuppoſe a flexible thread, wound exactly over the convexity of any curve, as ABCG (*Tab.* II. *Geometry*, *fig.* 34.) and ſuppoſe the thread fixed in G, and every where elſe at liberty, to A. Now, beginning to unwind the thread from the point, and continuing it to D, and, throughout, keeping it tight on the curve ſurface ABCG, when the thread is become quite ſtrait, and is only a tangent, FG, to the curve in the point G, it is evident the extremity A, in its progreſs to F, has deſcribed another curve line ADEF.

Here, the firſt curve ABCG, is called the *evolute*; each of its tangents BD, CE, &c. comprehended between it, and the curve ADEF, called the *involute*, is called a *radius of the evolute*, or *radius oſculi*, *radius oſculator*, or radius of curvature, of the curve ADEF, in the reſpective points D, E, &c. And the circles, whereof the oſculators BD, CE, &c. are radii, are called *circuli oſculatores*

tores of the curve ADEF, in D, E, &c. And, laſtly, the new curve reſulting from the evolution of the firſt curve begun in A, is called the *curve of evolution*, or *curve deſcribed by evolution*.

EVOLUTE, *the radius of the*, then, is the part of the thread compriſed between any point where it is a tangent to the *evolute*, and the correſpondent point where it terminates in the new curve. Which appellation, *radius*, is the more proper, as one may actually conſider this part of the thread, in every ſtep it takes, as if it deſcribed an arc of an infinitely ſmall circle, making a part of the new curve, which thus conſiſts of an infinite number of ſuch arcs, all deſcribed from different centers, and with different radii.

Every curve, therefore, may be conceived as formed by the evolution of another. And we are to find that, whoſe evolution formed it; which amounts to the finding of the radius of the *evolute* in any point; for, as it is always a tangent to the generating curve, it is, properly, no more than one of its infinitely ſmall parts, or ſides, prolonged; and all its ſides, whoſe poſitions are determined of courſe, are no other than the generating curve itſelf.

The ſame thread is alſo called *radius curvedinis*, or *radius oſculi*, becauſe a circle deſcribed hereby, from the center G, is ſaid to oſculate, or kiſs it, as both touching and cutting at the ſame time, i. e. touching both the inſide and the out.

Hence, 1. The *evolute* BCF (*fig.* 35.) is the place of all the centers of the circle that oſculate the curve AM, deſcribed by evolution. 2. When the point B falls on A, the radius of curvature, or radius of the *evolute*, MC, is equal to the arch BC; or to the aggregate of AB, and the arch BC. 3. Since the element of the arch M*m*, in the curve deſcribed by evolution, is an arch of a circle deſcribed by the radius CM; the radius of the *evolute* CM is perpendicular to the curve AM, or to a tangent at the point M. 4. Since the radius of the *evolute*, MC, is always a tangent to the *evolute* BCF, curves by evolution may be deſcribed through innumerable points, if only tangents be produced in the ſeveral points of the *evolute*, till they become equal to their correſpondent arcs.

The finding of the *radii of evolutes*, is a thing of great importance in the higher ſpeculations of geometry; and even, ſometimes, is of uſe in practice; as the inventor of the whole theory, Huygens, has ſhewn, in applying it to the pendulum. Horol. Oſcill. part 3. The doctrine of the *oſcula of evolutes* is owing to M. Leibnitz, who firſt ſhewed the uſe of *evolutes* in the meaſuring of curves.

We ſhall here ſubjoin a brief account of the method of finding the radius of the *evolute* in different kinds of curves and equations expreſſing the nature of *evolutes*:

1. To form a general expreſſion for (BE) the radius of the *evolute*, or of curvature at any point B in the involute curve ABY, whoſe axis is AX, and *evolute* DE. *Tab.* II. *Geometry*, *fig.* 36.

With the radius EB deſcribe the circular arc BK, which will have the ſame CURVATURE with the involute curve AB at the point B. Draw the radius EK parallel to the axis AX, and produce the ordinate BC to L, to which draw AN parallel: let the abſciſs AC be $=x$, the ordinate $CB=y$, radius EB or $EK=r$, $KN=a$, and $NA=b$; then $LE=r-a-x$. If the abſciſs x be ſuppoſed to increaſe uniformly, and Bm to be a tangent at the point B; and mn be drawn parallel to BC, and Bn parallel to AX; Bn, nm, and mB, which are the contemporary increments of the abſciſs, ordinate, and curve, will be as their FLUXIONS reſpectively; or Bn will be as $\dot{x}$, nm as $\dot{y}$, and Bm ($=\overline{Bn^2+nm^2}|^{\frac{1}{2}}$) as $\overline{\dot{x}^2+\dot{y}^2}|^{\frac{1}{2}}$. Farther, the triangles Bnm and BLE are ſimilar; therefore, $Bn:nm::BL:LE$, i. e. $\dot{x}:\dot{y}::y+b:r-a-x$; conſequently, $r\dot{x}-a\dot{x}-x\dot{x}=y\dot{y}+b\dot{y}$: the fluxion of which equation (ſuppoſing $\dot{x}$ invariable, and therefore, the direction of the curve AB continually approaching towards a paralleliſm with its axis, the fluxion of $\dot{y}$ as negative) is $-\dot{x}^2=\dot{y}^2-y\ddot{y}-b\ddot{y}$; and $\dot{x}^2+\dot{y}^2=\overline{b+y}\times\ddot{y}$. Again, $LB:BE::nB:Bm$, i. e. $b+y:r::\dot{x}:\overline{\dot{x}^2+\dot{y}^2}|^{\frac{1}{2}}$; therefore $b+y=\frac{r\dot{x}}{\overline{\dot{x}^2+\dot{y}^2}|^{\frac{1}{2}}}$, and ſubſtituting this expreſſion for $b+y$, the above equation will become $\dot{x}^2+\dot{y}^2=\frac{r\dot{x}\ddot{y}}{\overline{\dot{x}^2+\dot{y}^2}|^{\frac{1}{2}}}$; conſequently, $\overline{\overline{\dot{x}^2+\dot{y}^2}\times\dot{x}^2+\dot{y}^2}|^{\frac{1}{2}}=r\dot{x}\ddot{y}$, i. e. $\overline{\dot{x}^2+\dot{y}^2}|^{\frac{3}{2}}=r\dot{x}\ddot{y}$, and $\frac{\overline{\dot{x}^2+\dot{y}^2}|^{\frac{3}{2}}}{\dot{x}\ddot{y}}=r=BE$. In deducing this expreſſion, the increment of the ordinate y, or the velocity or fluxion with which it flows is ſuppoſed continually to decreaſe, therefore its ſecond fluxion is negative: but when y increaſes with an accelerated motion, its ſecond fluxion will be affirmative; and the above expreſſion will be $\frac{\overline{\dot{x}^2+\dot{y}^2}|^{\frac{3}{2}}}{-\dot{x}\ddot{y}}$. By ſubſtituting 1 for $\dot{x}$, which is invariable in theſe expreſſions, they will become $\frac{\overline{1+\dot{y}^2}|^{\frac{3}{2}}}{\ddot{y}}$ and $\frac{\overline{1+\dot{y}^2}|^{\frac{3}{2}}}{-\ddot{y}}$ reſpectively; the former taking place when the curve is concave, and the latter when it is convex towards the axis, and the ſign of $\ddot{y}$ ſhewing the poſition of the *evolute* and radius of curvature with reſpect to the curve and axis. By reducing theſe expreſſions from the nature and properties of the curve, and always ſubſtituting 1 for $\dot{x}$, we ſhall obtain the value of BE, or the radius required. The vertical diſtance or radius AD may be eaſily obtained by ſubſtituting for $\dot{x}$, 1 and for $\dot{y}$ its proper value in the expreſſion for the ſubnormal CH, which is evidently $\frac{y\dot{y}}{\dot{x}}$. E. gr. 1. To find the radius of curvature at any point B in the PARABOLA AY, *fig.* 37. Let the parameter be $=a$, abſciſs $AC=x$ and ordinate $CB=y$: then, by the nature of the curve $ax=y^2$, and therefore $a\dot{x}=2y\dot{y}$ (ſee FLUXION), and making $\dot{x}=1$, $a=2y\dot{y}$, and $\dot{y}=\frac{a}{2y}=\frac{a}{2\times\overline{ax}|^{\frac{1}{2}}}$. But the fluxion of this equation will be $-\ddot{y}=\frac{-a^2}{4\times\overline{ax}|^{\frac{3}{2}}}$, or $\ddot{y}=\frac{a^2}{4\times\overline{ax}|^{\frac{3}{2}}}$, and $\dot{y}^2$ being equal to $\frac{a^2}{4ax}=\frac{a}{4x}$, we ſhall have, by ſubſtituting theſe values in the expreſſion $\frac{\overline{1+\dot{y}^2}|^{\frac{3}{2}}}{\ddot{y}}$ for $\dot{y}^2$ and $\ddot{y}$,

$$\frac{\overline{1+\frac{a}{4x}}|^{\frac{3}{2}}\times4\cdot\overline{ax}|^{\frac{3}{2}}}{a^2}=\frac{4}{a^2}\times\overline{\frac{4x+a}{4x}}|^{\frac{3}{2}}\times\overline{ax}|^{\frac{3}{2}}=\frac{4}{a^2}\times\overline{\frac{4ax^2+a^2x}{4x}}|^{\frac{3}{2}}=\frac{4}{a^2}\times\overline{\frac{1}{4}}|^{\frac{3}{2}}\times\overline{4ax+a^2}|^{\frac{3}{2}}=\frac{4}{a^2}\times\frac{1}{8}\times\overline{4ax+a^2}|^{\frac{3}{2}}=\frac{\overline{4ax+a^2}|^{\frac{3}{2}}}{2a^2}.$$

Then if a ſemicircle be deſcribed through the point B, Cn be biſected in H, and Hr be made equal 2AC, and rE be a perpendicular at r, produced till it meets a line BE, drawn from B through H, this line BE will be the radius of curvature required: for $BC^2=AC\times Cn$ 35 E. 3. or $\frac{BC^2}{AC}=Cn$, i. e. $\frac{ax}{x}=a=Cn$, and $CH=\frac{1}{2}a$, and $Cr=\frac{1}{2}a+2x$; and by 47 E. 1. $\overline{CH^2+CB^2}|^{\frac{1}{2}}=BH$, i. e. $\overline{\frac{1}{4}a^2+ax}|^{\frac{1}{2}}=BH$; and by 4 E. 6. $CH:HB::Cr:BE$; i. e. $\frac{1}{2}a:\overline{\frac{1}{4}a^2+ax}|^{\frac{1}{2}}::\frac{1}{2}a+2x:\frac{a+4x}{a}\times\overline{\frac{1}{4}a^2+ax}|^{\frac{1}{2}}=\frac{\overline{a^2+4ax}|^{\frac{3}{2}}}{2a^2}=BE$ as before. AD the vertical diſtance, or $\frac{y\dot{y}}{\dot{x}}$, is in this caſe, putting $\frac{a}{2y}$ for $\dot{y}$, and 1 for $\dot{x}$, equal to $\frac{a}{2}$; and this likewiſe appears, by conſidering, that in the expreſſion for the radius, when the radius becomes equal to the vertical diſtance, the abſciſs x vaniſhes, and it becomes $\frac{\overline{a^2}|^{\frac{3}{2}}}{2a^2}=\frac{a^3}{2a^2}=\frac{a}{2}$.

E. gr. 2. To find the radius of curvature at any point B in the cycloid ABD. *fig.* 38.

Put the radius OF or $OD=a$, abſciſs $AC=x$, ordinate $CB=y$, ſine $IG=s$, and arc $FG=z$. Now, by 35 E. 3. $IG=\overline{DI\times IF}|^{\frac{1}{2}}$, that is, $s=\overline{2ay-y^2}|^{\frac{1}{2}}$; the fluxion of which equation is $\dot{s}=\frac{a\dot{y}-y\dot{y}}{\overline{2ay-y^2}|^{\frac{1}{2}}}$; and by the nature of the cycloid, arc $DG=GB$; and therefore, arc $FG=GI+AC$, or $AC=$ arc $FG-GI$, that is, $x=z-s=$ (by ſubſtituting for s its above value,) $z-\overline{2ay-y^2}|^{\frac{1}{2}}$; and the fluxion of this equation, making $\dot{x}=1$, is $1=\dot{z}+\frac{y\dot{y}-a\dot{y}}{\overline{2ay-y^2}|^{\frac{1}{2}}}$. But $\dot{z}=\overline{\dot{s}^2+\dot{y}^2}|^{\frac{1}{2}}=$ (by writing for $\dot{s}$ its above value,) $\overline{\frac{\overline{a\dot{y}-y\dot{y}}|^2}{2ay-y^2}+\dot{y}^2}|^{\frac{1}{2}}=\frac{a\dot{y}}{\overline{2ay-y^2}|^{\frac{1}{2}}}$; which, ſubſtituted for $\dot z$, makes the above equation $1 = \frac{a\dot y}{\overline{2ay-y^2}|^{\frac{1}{2}}} + \frac{y\dot y - a\dot y}{\overline{2ay-y^2}|^{\frac{1}{2}}}$; that is, $1 = \frac{y\dot y}{\overline{2ay-y^2}|^{\frac{1}{2}}}$; therefore, $\dot y = \frac{\overline{2ay-y^2}|^{\frac{1}{2}}}{y}$; and the fluxion of this equation (the fluxion of $\dot y$ being negative,) is $-\ddot y = \frac{\frac{ay\dot y - y^2\dot y}{\overline{2ay-y^2}|^{\frac{1}{2}}} - \dot y . \overline{2ay-y^2}|^{\frac{1}{2}}}{y^2} = \frac{-a\dot y}{y . \overline{2ay-y^2}|^{\frac{1}{2}}} =$ (by writing for $\dot y$ its equal,) $-\frac{a}{y^2}$; that is, $\ddot y = \frac{a}{y^2}$.

Now, by ſubſtituting $\frac{2ay-y^2}{y^2}$ for $\dot y^2$, and $\frac{a}{y^2}$ for $\ddot y$, we have $\frac{\overline{1+\dot y^2}|^{\frac{1}{2}}}{\ddot y} = \frac{\overline{1+\frac{2ay-y^2}{y^2}}|^{\frac{3}{2}} \times y^2}{a} = \frac{\overline{2ay}|^{\frac{3}{2}}}{ay} = \frac{2ay \times \overline{2ay}|^{\frac{1}{2}}}{ay} = 2 . \overline{2ay}|^{\frac{1}{2}} =$ BE, the radius of curvature required.

Conſtruction. Make FH = GB; and through the point H draw the right line BE, making BH = HE = chord FG; then will BE be the radius of curvature at the point B; for a tangent to the point B is parallel to the chord DG, and the radius of curvature is always perpendicular to the tangent; therefore, becauſe by 31 E. 3. the ∠ DGF is right, BE muſt be parallel to the chord FG. Now, by 4 and 8 E. 6. DF : FG :: GF : FI, or CB, ∵ GF $= \overline{\mathrm{DF} \times \mathrm{CB}}|^{\frac{1}{2}} = \overline{2ay}|^{\frac{1}{2}}$, and 2 GF $= 2 . \overline{2ay}|^{\frac{1}{2}} =$ BE

2. To form a general expreſſion for the radius of curvature in SPIRALS, or curves whoſe ordinates are referred to a fixed or central point:

Let CBY, *fig.* 39. be the curve, C the central point, or that from which all the ordinates iſſue; and BE the radius of curvature at the point B, that is, let the point E be ſuppoſed in the *evolute* curve: conceive C*b* and E*b* indefinitely near to CB and EB, that is, let the points B and *b* be ſuppoſed indefinitely near to each other; and let CF and C*f* be perpendicular to EB and E*b* reſpectively, then will the points F and *r* be indefinitely near to a coincidence; and therefore B*r* and C*r* may be taken as equal to BF and CF. Now, if with the ordinate CB as a radius, the little circular arc B*n* be deſcribed and conſidered as a little right line perpendicular to C*b*, and the increment B*b* be conſidered as coinciding with a tangent to the point B, then the little right-angled triangle B*nb* will be ſimilar to the right-angled triangle BFC; (for ∠ CB*n* = ∠ EB*b*; and therefore, ∠ EB*n* being common, the ∠ CBF = ∠ *n*B*b*; and conſequently, the angles at F and *n* being right, ∠ BCF = ∠ B*bn*;) therefore, by 4 E. 6. *b*B : B*n* :: CB : BF; that is, (if we put the ordinate CB $= y$, B*n* $= x'$, and *nb* $= y'$, when by 47 E. 1. B*b* will be $= \overline{x'^2+y'^2}|^{\frac{1}{2}}$,) $\overline{x'^2+y'^2}|^{\frac{1}{2}} : x' :: y : \frac{x'y}{\overline{x'^2+y'^2}|^{\frac{1}{2}}}$ = BF or B*r*; and B*b* : *bn* :: BC : CF, that is, $\overline{x'^2+y'^2}|^{\frac{1}{2}} : y' :: y : \frac{yy'}{\overline{x'^2+y'^2}|^{\frac{1}{2}}}$ = CF or C*r*; the increment of which is *rf*; that is, (ſuppoſing x' to be invariable) $\frac{\overline{y'^2+yy''} \times \overline{x'^2+y'^2}|^{\frac{1}{2}} - \frac{y'y'' \times yy'}{\overline{x'^2+y'^2}|^{\frac{1}{2}}}}{x'^2+y'^2} = \frac{x'^2y'^2+y'^4+yx'^2y''}{\overline{x'^2+y'^2}|^{\frac{3}{2}}} = rf$. Again, the triangles EB*b* and E*rf* being ſimilar, B*b* − *rf* : B*b* :: (BE − *r*E, or, *r*B : BE; that is, $\overline{(x'^2+y'^2}|^{\frac{1}{2}} - \frac{x'^2y'^2+y'^4+yx'^2y''}{\overline{x'^2+y'^2}|^{\frac{3}{2}}} =) \frac{x'^4+x'^2y'^2-yx'^2y''}{\overline{x'^2+y'^2}|^{\frac{3}{2}}} : \overline{x'^2+y'^2}|^{\frac{1}{2}} :: \frac{x'y}{\overline{x'^2+y'^2}|^{\frac{1}{2}}} : \frac{y \times \overline{x'^2+y'^2}|^{\frac{3}{2}}}{x'^3+x'y'^2-yx'y''}$ = BE, or BE $= \frac{y \times \overline{\dot x^2+\dot y^2}|^{\frac{3}{2}}}{\dot x^3+\dot x\dot y^2-y\dot x\ddot y}$; which is a general expreſſion for the radius of curvature of all curves referred to a fixed or central point, when x' or $\dot x$ is invariable.

Hence, if $\dot x$ be made = 1, the general expreſſion for the radius of curvature will be $= \frac{y \times \overline{1+\dot y^2}|^{\frac{3}{2}}}{1+\dot y^2-y\ddot y}$. Wherefore, if we put the equation of the given ſpiral into fluxions, making $\dot x = 1$, and put this fluxonial equation into fluxions again; and from thence, or from the nature of the curve, find the values of $\dot y^2$ and $\ddot y$: then, if for $\dot y^2$ and $\ddot y$ we ſubſtitute theſe their values, in this general expreſſion, we ſhall have BE the radius of curvature required.

E. g. To find the radius of curvature at any point B in the ſpiral of Archimedes, CB, &c. *fig.* 40.

Put the circumference of the generating circle AF, &c. $= a$, and its radius CA $= b$, ordinate CB $= y$, arc AF $= z$. Let C*f* be ſuppoſed indefinitely near to CF, that is, let the ∠ FC*f* be ſuppoſed indefinitely ſmall; and with the ordinate CB as a radius deſcribe the little circular arc B*n*, which put $= x'$; alſo put F*f* $= z'$. Now, by the nature of the curve, $a : b :: z : y$, or $z = \frac{ay}{b}$, the fluxion of which equation is $\dot z = \frac{a\dot y}{b}$; and by the ſimilar ſectors CB*n* and CF*f*, $y : x' :: b : z' = \frac{bx'}{y}$, or, $\dot z = \frac{b\dot x}{y}$. Hence, $\frac{a\dot y}{b} = \frac{b\dot x}{y}$; that is, (making $\dot x = 1$,) $\frac{a\dot y}{b} = \frac{b}{y}$; from which equation we have $\dot y = \frac{b^2}{ay}$; therefore, $\dot y^2 = \frac{b^4}{a^2y^2}$, and $\ddot y = \frac{-ab^2\dot y}{a^2y^2} =$ (by writing for $\dot y$ its value,) $\frac{-b^4}{a^2y^3}$; and if we ſubſtitute for $\dot y^2$ and $\ddot y$ theſe their values, we ſhall have $\frac{y \times \overline{1+\dot y^2}|^{\frac{3}{2}}}{1+\dot y^2-y\ddot y} = \frac{y \times \overline{1+\frac{b^4}{a^2y^2}}|^{\frac{3}{2}}}{1+\frac{b^4}{a^2y^2}+\frac{b^4}{a^2y^2}} = \frac{\overline{a^2y^2+b^4}|^{\frac{3}{2}}}{a^3y^2+2ab^4}$ = BE, the radius of curvature ſought.

Conſtruction. Through the center C draw the indefinite right line H*v* perpendicular to the ordinate CB; draw the tangent TB, perpendicular to which draw BH; produce BC to V, making BR = TH, and RV = CH; with BV and BR as radii, deſcribe the arcs V*v* and R*r*; draw the right line *v*B; and from the interſecting point *r* draw *r*E parallel to *v*H; then will BE be the radius of curvature at the point B: for, CT $= \frac{yz}{b}$, that is, by ſubſtituting $\frac{ay}{b}$, for z, CT $= \frac{ay^2}{b^2}$; and by 8 and 4 E. 6. TC : CB :: CB : GH, that is, $\frac{ay^2}{b^2} : y :: y : \frac{b^2}{a}$ = CH; therefore, TH = BR = B*r* $= \frac{ay^2}{b^2} + \frac{b^2}{a}$, and BV = B*v* $= \frac{ay^2}{b^2} + \frac{2b^2}{a}$; and by 47 E. 1. HB $= \overline{\mathrm{BC}^2+\mathrm{CH}^2}|^{\frac{1}{2}} = \overline{y^2+\frac{b^4}{a^2}}|^{\frac{1}{2}} = \frac{\overline{a^2y^2+b^4}|^{\frac{1}{2}}}{a}$: again, by 4 E. 6. B*v* : BH :: B*r* : BE, that is, $\frac{ay^2}{b^2} + \frac{2b^2}{a} : \frac{\overline{a^2y^2+b^4}|^{\frac{1}{2}}}{a} :: \frac{ay^2}{b^2} + \frac{b^2}{a} : \frac{\overline{a^2y^2+b^4}|^{\frac{1}{2}}}{a} \times \frac{a^2y^2+b^4}{a^2y^2+2b^4} = \frac{\overline{a^2y^2+b^4}|^{\frac{3}{2}}}{a^3y^2+2ab^4}$ = BE.

3. To find an equation that ſhall expreſs the nature of the *evolute* of a given involute curve.

Let BE be the radius of evolution or curvature at any point B in the involute curve AB, *fig.* 41. whoſe abſciſs is AC $= x$, and ordinate CB $= y$. Parallel to HA draw EN; produce BC to L; and equal and parallel to CL, draw DN from the vertex of the *evolute* DE: then will the triangles BHC and BEL be ſimilar; and therefore, by 4 E. 6. BH : HC :: BE : EL, that is, $\frac{y}{\dot x} \times \overline{\dot x^2+\dot y^2}|^{\frac{1}{2}} : \frac{y\dot y}{\dot x} :: \frac{\overline{\dot x^2+\dot y^2}|^{\frac{3}{2}}}{\dot x\ddot y} : \dot y \times \frac{\dot x^2+\dot y^2}{\dot x\ddot y}$ = EL; and HC : CB :: EL : LB, that is, $\frac{y\dot y}{\dot x} : y :: \dot y + \frac{\dot x^2+\dot y^2}{\dot x\ddot y} : \frac{\dot x^2+\dot y^2}{\ddot y}$ = LB. Now, theſe are general expreſſions for EL and LB when $\dot x$ is conſidered as invariable, and the fluxion of $\dot y$ as negative. Hence therefore,

If $\dot x = 1$, and the fluxion of $\dot y$ be negative, the general expreſſion for BL will be $= \frac{1+\dot y^2}{\ddot y}$; and this multiplied by $\dot{y}$ is $\dot{y} \times \frac{1 + \dot{y}^2}{\ddot{y}} =$ the general expreſſion for L E. Now, by help of the equation of the given involute curve, exterminate $\dot{y}$, $\dot{y}^2$, and $\ddot{y}$, out of theſe expreſſions, and find the vertical diſtance A D. Then, if we put the abſciſs of the *evolute* $DN = u$, and its ordinate $NE = v$; by help of theſe two equations, $u = BL - BC$, and $v = AC - AD + LE$, we may get the nature of the *evolute* curve D E required.

Note. If the given involute be convex towards its axis, and x and y increaſe together, or the fluxions of x and $\dot{y}$ be both affirmative, then the general expreſſions for B L and L E will be $\frac{1 + \dot{y}^2}{-\ddot{y}}$, and $\dot{y} \times \frac{1 + \dot{y}^2}{-\ddot{y}}$ reſpectively; wherein the negative ſign ſhews, that the points L and E muſt be taken on the concave ſide of the involute curve, that is, on the other ſide of it with regard to x and y.

E. gr. To find the nature of the curve A E P, *fig.* 42. by whoſe evolution the cycloid A B D is deſcribed.

Put $AC = x$, $CB = y$, arc $FG = z$, and OD or $OF = a$; then by Ex. 2. art. 1. above $\dot{y} = \frac{\overline{2ay - y^2}|^{\frac{1}{2}}}{y}$, $\dot{y}^2 = \frac{2ay - y^2}{y^2}$, and $\ddot{y} = \frac{a}{y^2}$; wherefore, $BL = \frac{1 + \dot{y}^2}{\ddot{y}} = \frac{\overline{1 + \frac{2ay - y^2}{y^2}} \times y^2}{a} = 2y$, and $LE = \dot{y} \times BL = \frac{\overline{2ay - y^2}|^{\frac{1}{2}}}{y} \times 2y = 2.\overline{2ay - y^2}|^{\frac{1}{2}}$. Hence, if we put the abſciſs $AN = u$, and ordinate $NE = v$, we have u $(= BL - CB =)$ $2y - y = y$, and $v = (AC + LE =)\ x + 2.\overline{2ay - y^2}|^{\frac{1}{2}}$, that is, (becauſe $x = z - \overline{2ay - y^2}|^{\frac{1}{2}}$,) $v = z + \overline{2ay - y^2}|^{\frac{1}{2}}$, or, (writing u for y its equal,) $v = z + \overline{2au - u^2}|^{\frac{1}{2}}$. Wherefore, the *evolute* curve A E P is a cycloid, and equal to the given cycloid A B D; for, let $AS = SV = a$, then (AN being $= FI$,) $AT = FG = z$, and $NT = \overline{2au - u^2}|^{\frac{1}{2}} = IG$; and therefore, $AT + TN = z + \overline{2au - u^2}|^{\frac{1}{2}}$, that is, $AT + TN = NE$, which is the property of the cycloid; therefore, the *evolute* A E P is a cycloid; and becauſe $AV = FD$, therefore the cycloids A E P and A B D are equal. See Cycloid.

The *evolute* of a ſpiral, or indeed of any other curve, may be deſcribed by finding the radii of curvature at ſeveral points in the involute; for then we ſhall have as many points in the *evolute*, through which if a curve line be drawn, it will be the *evolute* ſought.

Wolf. Elem. Math. tom. i. p. 524, ſeq. or the Infinim Petites of M. le Marquis de l'Hôpital. Simpſon's Fluxions, vol. i. p. 71. &c. And Rowe's Fluxions, edit. 3. 1767, chap. vi and vii. p. 103—132.

Since the radius of an *evolute* is either equal to an arch of the *evolute*, or exceeds it by ſome given quantity, all the arches of *evolutes* may be rectified geometrically, whoſe radii may be exhibited by geometrical conſtructions; whence we ſee why an arch of a cycloid is double its chord; the radius of the *evolute* being double the ſame, and the *evolute* of a cycloid being itſelf a cycloid, equal and ſimilar to the involute.

M. Varignon has applied the doctrine of the radius of the *evolute* to that of central forces; ſo that having the radius of the *evolute* of any curve, one may find the value of the central force of a body; which, moving in that curve, is found in the ſame point where that radius terminates; or reciprocally, having the central force given, the radius of the *evolute* may be determined. Hiſt. de l'Acad. Roy. des Sciences, an. 1706.

The variation of curvature of the line deſcribed by the *evolution* of a curve, is meaſured by the ratio of the radius of curvature of the *evolute*, to the radius of curvature of the line deſcribed by the *evolution*. See Maclaurin's Flux. art. 402. prop. 36.

Evolute, *imperfect*. M. Reaumur has given a new kind of *evolute*, under this denomination. Hitherto the mathematicians had only conſidered the perpendiculars let fall on the points of the convex ſide of the curve: if other lines not perpendicular were drawn upon the ſame points, provided they were all drawn under the ſame angle, the effect would be the ſame; that is, the oblique lines would all interſect within the curve; and, by their interſections, form the infinitely ſmall ſide of a new curve; whereof they would be ſo many tangents.

This curve would be a ſort of *evolute*, and would have its radii; but an imperfect *evolute*, ſince the radii are not perpendicular to the firſt curve. Hiſt. de l'Acad. &c. an. 1709.

EVOLUTION, in *Geometry*, the unfolding, or opening, of a curve, and making it deſcribe an Evolvent.

The word *evolutio* is formed of the prepoſition *e*, *out*; and *volvo*, *I roll*, or *wind*; q. d. an *unwinding*, or *unrolling*.

The equable *evolution* of the periphery of a circle, or other curve, is ſuch a gradual approach of the circumference to rectitude, as that its parts do all concur, and equally evolve, or unbend; ſo that the ſame line becomes ſucceſſively a leſs arc, of a reciprocally greater circle; till, at laſt, they change into a ſtrait line. In the Philoſophical Tranſactions, N° 260. a new quadratix to the circle is found by this means, being the curve deſcribed by the equable *evolution* of its periphery.

Evolution, is alſo uſed for the Extraction of roots out of powers.

In which ſenſe it ſtands oppoſed to *involution*.

Evolution, in the *Art of War*, is a term applied to the diverſe figures, turns and motions, made by a body of ſoldiers, either in ranging themſelves in form of battle, or in changing their form; and this, whether in the way of exerciſe, or in the time of an actual engagement.

It is by the *evolutions* that the form and poſture of a battalion, ſquadron, &c. are changed, either to make good the ground they are upon, or to poſſeſs themſelves of another, that they may attack the enemy or receive an onſet more advantageouſly.

The *military evolutions* are converſions, countermarches, or wheelings, doublings of rank or file, &c. See Exercise.

Fa. Hoſte, a Jeſuit, in 1697, printed a Treatiſe of *Naval Evolutions*, in folio. By *naval evolutions* he means the motions made by a fleet, ſquadron, or naval armament, in order to put themſelves in a proper diſpoſition for attacking the enemy, or defending themſelves with the moſt advantage.

EVOLVULUS, in *Botany*, a genus of the *pentandria tetragynia* claſs, having a five-leaved calyx, a rotated corolla divided into five ſegments, a three-leaved capſule, and a ſingle ſeed.

EUONYMOIDES, in *Botany*. See Staff-*tree*.

EUONYMUS, in *Botany*. See Spindle-*tree*.

EUPATORIUM, in *Botany*. See *Hemp* Agrimony.

EUPETALOS, in *Natural Hiſtory*, the name of a gem deſcribed by the ancients as famous for its variety of colours. Pliny, lib. xxxvii. cap. 10. tells us, that it ſhewed at once blue, fire-colour, red-lead colour, and yellow. It ſeems to have been the opal, and that Pliny's deſcription of it in this place was taken from ſome author he did not perfectly underſtand, as is the caſe in many of his accounts from the Greeks.

EUPHEMISMUS, Ευφημισμος, of ευ, *well*, and φημι, *I ſpeak*, in *Rhetoric*, a figure which expreſſes things in themſelves diſagreeable and ſhocking, by terms implying the contrary quality; thus, the Pontus or Black Sea, having the epithet of ἄξενος (i. e. *inhoſpitable*) given it on account of the ſavage cruelty of thoſe who inhabited the neighbouring countries; this name, by *Euphemiſm*, was changed into that of *Euxinus*. Thus Ovid. Triſt. lib. iii. eleg. 13.

Dum me terrarum pars pene noviſſima Ponti
Euxinus falſo nomine dictus habet.

In which ſenſe it only makes a ſpecies of irony. But every *euphemiſm* is not irony; for we ſometimes uſe improper and ſoft terms in the ſame ſenſe with the proper and harſh. See Voſſ. Rhet. lib. iv. cap. 186, ſeq.

EUPHONIC *accent*. See Accent.

EUPHONY, Ευφωνια, in *Grammar*, an eaſineſs, ſmoothneſs, and elegancy of pronunciation.

The word is formed of ευ, *bene*, *well*, and φωνη, *vox*, *voice*. Quintillian calls *euphonia*, *vocalitas*; Scaglier, *facilis pronuntiatio*.

Euphonia is properly a kind of figure whereby we ſuppreſs a too harſh letter, or convert it into a ſmoother, contrary to the ordinary rules. There are examples enough in all languages.

EUPHORBIA, in *Botany*. See Spurge.

EUPHORBIUM, Ευφορϐιον, in *Pharmacy*, a gum brought from Africa, in little roundiſh pieces, whitiſh when new, and yellowiſh when old; very pungent to the taſte, and void of ſmell.

The principal uſe of *euphorbium* is external; it is a great ingredient in divers reſolutive plaſters as well as in tincture and powder for ſtopping of gangrenes, cleanſing of foul ulcers, and exfoliating carious bones.

Internally taken, it is a purgative; but ſo violent a one, that it is almoſt out of uſe, as tearing off the neceſſary mucus, or covering of the ſtomach or bowels, and occaſioning dyſenteries. Yet, we are told the Africans uſe it very commonly; but they firſt quench its fire in purſlain-water.

Its powder is a violent ſternutatory, and to be uſed very cautiouſly, and never alone, but mixed with a ſmall quantity of ſome other powder, to guard againſt its intolerable acrimony.

The gum we call *euphorbium* is formed of the juice of a plant of the ſame name, pretty frequent in Mauritania, though the ſpecies of the plant has been greatly controverted. The generality of our lateſt botaniſts make it a thorny, ſucculent plant; and Mr. Profeſſor Hermannus calls it the *tithymalus Mauritanus aphyllos anguloſus & ſpinoſus.* Hort. Acad. Lug. Batav. 598.

The plant is the *euphorbia aculeata nuda multangularis, aculeis ſeminatis* of Linnæus.

It has no leaves; but in lieu thereof puts forth along its ſtem a kind of long, prickly eyes, or buds; which buds yield that gummy juice, called *euphorbium officinarum.* See Bradl. Hiſt. of Succul. Plants, dec. ii. p. 4. and dec. v. p. 12.

Some authors will have it, that the gum is drawn from the plant by inciſion; others, on the contrary, ſay it ouſes ſpontaneouſly. The juice, we are told, is ſo very ſubtile and penetrating, that the perſon who taps the plant is forced to ſtand at a good diſtance, and make the inciſion with a long pike; otherwiſe it gets to the brain, and occaſions dangerous inflammations. It ouſes out in great abundance, and is gathered in ſheep's ſkin, wrapped round the plant.

Pliny tells us, that the firſt diſcovery of *euphorbium* is attributed to Juba king of Lybia, who denominated it from Euphorbus his phyſician, brother of Muſa, phyſician to Auguſtus. Etmuller aſſures us, that the plants which yielded the *euphorbium* of the ancients is now unknown to us; but if we follow Pliny's deſcription, the plant called *ſchadida calli*, in the Hortus Malabaricus, muſt be the ancient *euphorbium.* This diſcovery is owing to Commelinus, a burgo-maſter of Amſterdam, and profeſſor of botany.

EUPHORY, ſignifies the ſame as EUCRACY.

EUPHRASIA, in *Botany.* See EYE-BRIGHT.

EUPHROSYNUM, in *Botany*, a name uſed by Pliny and ſome others, for the common borage. See BORRAGE.

EUPNŒA, of ευ, *well*, and ϖνεω, *I breathe*, in *Medicine*, is a right and natural reſpiration.

EUPORIA, of ευ and ϖορος, *paſſage*, in *Medicine*, is an eaſy preparation of medicines, or the eaſineſs of their operation.

EUPSYCHIANS. See EUNOMIOEUPSYCHIANS.

EUREOS, in *Natural Hiſtory*, the name of a ſtone, deſcribed by Pliny, and ſeeming plainly to be the ſame with the tecolithus, which he mentions in another place, and to be the ſtone now called *lapis Judaicus*, and known at this time to be the petrified ſpine of a ſort of echinus marinus, or ſea urchin.

EURIPUS, Ευριπος, in *Hydrography*, properly ſignifies a certain ſtreight of the ſea between Bœotia and Eubœa, where the currents are ſo ſtrong, that the ſea is ſaid to ebb and flow ſeven times a day; in which place, as the ſtory commonly goes, Ariſtotle drowned himſelf out of chagrin, for not being able to account for ſo unuſual a motion.

EURIPUS has ſince become a general name for all ſtreights, where the water is in great motion and agitation.

The ancient circuſes had their *Euripi*, which were no other than pits or ditches, on each ſide of the courſe, into which it was very dangerous falling with their horſes and chariots as they ran races. The term *Euripus* was more particularly applied by the Romans to three canals or ditches which encompaſſed the circus on three ſides, and which were filled occaſionally, to repreſent naumachiæ or ſea-battles.

The ſame people called their ſmaller fountains or canals in their gardens *Euripuſes*; and their largeſt, as caſcades, &c. *Niles.*

EUROCLYDON, of Ευρος, *eaſt-wind*, and κλυδων, *wave*, is a ſpecies of wind, of which we have an account only in Acts xvii. 14. and concerning the nature of which critics have been much divided. Bochart, Grotius, Bentley, and others, ſubſtitute another reading, ſupported by the Alexandrian MS. and the Vulgate, viz. Ευρακυλων, or *Euroaquilo*; but Mr. Bryant defends the common reading, and conſiders the *Euroclydon*, i. e. Ευρος κλυζων, as an eaſt-wind that cauſes a deep ſea or vaſt inundation. He maintains, in oppoſition to Dr Bentley's reaſoning, who ſuppoſes that the mariners in the ſhip, the voyage of which is recited in this paſſage, were Romans, that they were Greeks of Alexandria, and that the ſhip was an Alexandrine ſhip, employed in the traffic of carrying corn to Italy; and therefore, that the mariners had a name in their own language for the particular typhonic or ſtormy wind here mentioned. He alſo ſhews from the paſſage itſelf, that the tempeſtuous wind called *Euroclydon*, beat (κατ' αυτης) upon the iſland of Crete; and therefore, as this is a relative expreſſion, referring to the ſituation of the perſon who ſpeaks of it, who was at that time to the windward or ſouth of it, the wind blew upon ſhore, and muſt have come from the ſouth or ſouth-eaſt; which, he adds, is fully warranted from the point where the ſhip was, and the direction it ran in afterwards, which was towards the north and north-weſt. Bryant's Obſervations, &c. 1767, p. 1, &c.

EURO-*Auſter.*
EURO-*Notus.* } See WINDS.
EURUS.

EUROPEAN *Hours.* See HOUR.

EUROPEAN *Ocean.* See OCEAN.

EURYALE, in *Mythology*, one of the Gorgons, daughter of Phorcys, and ſiſter of Meduſa: ſhe was ſubject neither to old age nor death.

EURYDICE, in *Mythology*, the wife of Orpheus, who, flying from Ariſtæus that endeavoured to raviſh her, was ſlain by a ſerpent. Her huſband went down to the ſhades, and by the force of his muſic perſuaded Pluto and Proſperine to give him leave to carry back his wife; which they granted, provided he did not look on her till he came to the light; but he breaking the condition, was forced to leave her behind him.

EURYNOMIA, Ευρυνομεια, in *Antiquity*, an anniverſary ſolemnity in honour of Eurynome, by ſome thought to be the ſame with Diana, by others one of Oceanus's daughters.

EURYTHMY, Ευρυθμια, in *Architecture*, *Painting*, and *Sculpture*, a certain majeſty, elegance, and eaſineſs, appearing in the compoſition of divers members, or parts of a body, building, or painting, and reſulting from the fine proportions thereof.

The word is Greek, and ſignifies literally a *conſonance*, or *fine agreement*, or, as we may call it, a *harmony of all the parts*, being compounded of ευ, *well*, and ῥυθμος, *rythmus*, *cadence*, or *agreement of numbers*, *ſounds*, or the like things.

Vitruvius ranks *eurythmia* among the eſſential parts of architecture: he deſcribes it as conſiſting in the beauty of the conſtruction or aſſemblage of the ſeveral parts of the work, which renders its aſpect or whole appearance graceful; e. gr. when the height correſponds to the breadth, and the breadth to the length, &c.

"From theſe three ideas or deſigns, viz. orthography, " ſcenography, and profile, it is that *eurythmy*, *majeſtica*, " and *venuſta ſpecies ædificii*, do reſult, which creates that " agreeable harmony between the ſeveral dimenſions, ſo " as nothing ſeems diſproportionate, too long for this, " or too broad for that, but correſponds in a juſt and " regular ſymmetry, and conſent of all the parts with " the whole." Evelyn's Account of Archit. &c.

EUSEBES, the name of a ſpecies of marble mentioned by Pliny: he has given us no deſcription of it, but only tells us, that there was a ſeat made of it in the temple of Hercules at Tyre, from which the prieſts pretended that the gods uſed to ariſe.

EUSEBIANS, a denomination given to the ſect of Arians, on account of the favour and countenance which Euſebius, biſhop of Cæſarea, ſhewed and procured for them at their firſt riſe. See ARIANS.

EUSTATHIANS, a name given to the Catholics of Antioch in the fourth century, on occaſion of their refuſal to acknowlege any other biſhop beſide St. Euſtathius, biſhop of Sebaſtia in Armenia, depoſed by the Arians.

The denomination was given them during the epiſcopate of Paulinus, whom the Arians ſubſtituted for St. Euſtathius, about the year 330, when they began to hold their aſſemblies apart. About the year 350, Leontius of Phrygia, called the Eunuch, who was an Arian, and was put in the ſee of Antioch, deſired the *Euſtathians* to perform their ſervice in his church; which they accepted; and the church of Antioch ſerved indifferently thus both for the Arians and Catholics.

This, we are told, gave occaſion to two inſtitutions, which have ſubſiſted in the church ever ſince: the firſt was pſalmody in two choirs; though Mr. Baillet thinks, that if they inſtituted an alternate pſalmody between two choirs, it was between two Catholic choirs, and not by way of reſponſe to an Arian choir. The ſecond was the doxology, *Glory be to the Father, and the Son, and the Holy Ghoſt.*

This conduct, which ſeemed to imply a kind of communion with the Arians, gave great offence to abundance of Catholics, who began to hold ſeparate meetings, and thus formed the ſchiſm of Antioch. Upon this the reſt, who continued to meet in the church, ceaſed to be called *Euſtathians*; and that appellation became reſtrained to the diſſenting-party.

St. Flavianus, biſhop of Antioch, in 381, and one of his ſucceſſors, Alexander, in 482, brought to paſs a coalition

tion or re-union between the *Euſtathians* and the body of the church of Antioch, deſcribed with much ſolemnity by Theodoret, Eccl. lib. iii. cap. 2.

EUSTATHIANS were alſo a ſect of heretics in the fourth century, denominated from their founder Euſtathius, a monk ſo fooliſhly fond of his own profeſſion, that he condemned all other conditions of life. Whether this Euſtathius was the ſame with the biſhop of Sebaſtia and chief of the Semi-arians, is not eaſy to determine.

He excluded married people from ſalvation; prohibited his followers from praying in their houſes, and obliged them to quit all they had, as incompatible with the hopes of heaven.

He drew them out of the other aſſemblies of Chriſtians to hold ſecret ones with him, and made them wear a particular habit: he appointed them to faſt on Sundays; and taught them, that the ordinary faſts of the church were needleſs, after they had attained to a certain degree of purity which he pretended to. He ſhewed great horror for chapels built in honour of martyrs, and the aſſemblies held therein.

Several women, ſeduced by his reaſons, forſook their huſbands, and abundance of ſlaves deſerted their maſters houſes.

He was condemned at the council of Gangra, in Paphlagonia, held between the years 326 and 341. Socr. lib. ii. cap. 43. and Sozom. lib. iv. cap. 24. Hard. Concil. Coll. tom. i. p. 530.

EUSTYLE, formed of ευ, *bene*, *well*, and ϛυλος, *column*, in *Architecture*, a kind of edifice, where the columns are placed at a moſt convenient diſtance one from another, the intercolumniations being all juſt two diameters and a quarter of the column, except thoſe in the middle of the fronts, before and behind, which are three diameters diſtant. See *Tab. Archit. fig.* 40. C.

The *euſtyle* is a medium between the pycnoſtyle, and areoſtyle.

Vitruvius, lib. iii. cap. 2. obſerves, that the *euſtyle* is the moſt approved of all the manners of intercolumniation, and that it ſurpaſſes all the reſt in conveniency, beauty, and ſtrength.

EUTERPE, of ευ, *well*, and τερπω, *I delight*, in *Mythology*, one of the nine Muſes, which preſided over wind-inſtruments: ſhe is repreſented with a crown of flowers, playing on a double flute, with Cupid at her knees. To her the invention of tragedy is aſcribed.

EUTHYMIA, Ευθυμια, among the Greeks, ſignified ſuch a diſpoſition, or ſtate of the mind, as could not be ruffled either by good or bad fortune, by ſickneſs or health, good or evil. Mem. Acad. Inſcript. vol. xiv. p. 131.

EUTYCHIANS, ancient heretics, who denied the duplicity of natures in Chriſt; thus denominated from Eutyches, the archimandrite, or abbot of a monaſtery at Conſtantinople, who began to propagate his opinion A. D. 448.

The averſion Eutyches bore to the hereſy of Neſtorius, threw him into another extreme, not leſs dangerous than that he ſo warmly oppoſed; though ſome paſſages in St. Cyril, which raiſed the unity of the perſon of Jeſus Chriſt very high, contributed, likewiſe, to his deluſion.

At firſt he held, that the *Logos*, *Word*, brought his body down with him from heaven; which was a near approach to the hereſy of Apollinarius; and, though he afterwards teſtified the contrary, in a ſynod at Conſtantinople, wherein he was condemned, yet he could not be brought to acknowlege, that the body of Jeſus Chriſt was conſubſtantial with ours.

In effect, he did not ſeem quite ſteady and conſiſtent in his ſentiments; for he appeared to allow of two natures, even before the union; which was apparently a conſequence he drew from the principles of the Platonic philoſophy, which ſuppoſes a pre-exiſtence of ſouls; accordingly, he believed that the ſoul of Jeſus Chriſt had been united to the divinity before the incarnation; but then he allowed no diſtinction of natures in Jeſus Chriſt ſince his incarnation.

See the diſſertation of F. Hardouin, De Sacramento Altaris; wherein that Jeſuit endeavours to unfold all the ſentiments of the *Eutychians*.

This hereſy was firſt condemned in a ſynod held at Conſtantinople, by Flavian, in 448, approved by the council of Epheſus, called *Conventus latronum*, in 449, and re-examined, and fulminated, in the general council of Chalcedon, in 451. The legates of pope Leo, who aſſiſted at it, maintained, that it was not enough to define, that there were two natures in Jeſus Chriſt, but inſiſted ſtrenuouſly, that, to remove all equivocations, they muſt add theſe terms, *without being changed, or confounded, or divided*.

The hereſy of the *Eutychians*, which made a very great progreſs throughout the Eaſt, at length became divided into ſeveral branches. Nicephorus makes mention of no fewer than twelve; ſome called *ſchematici*, or *apparentes*, as only attributing to Jeſus Chriſt, a phantom, or appearance of fleſh, and no real fleſh; others *Theodoſians*, from Theodoſius, biſhop of Alexandria; others *Jacobites*, from one James, *Jacobus*, of Syria; which branch eſtabliſhed itſelf principally in Armenia, where it ſtill ſubſiſts. Others were called *Acephali*, q. d. *without head*; and *Severians*, from a monk called Severus, who ſeized on the ſee of Antioch in 513.

Theſe laſt were ſubdivided into five factions, viz. *Agnoetæ*, who attributed ſome ignorance to Jeſus Chriſt; the followers of Paul; Μελαινοι, that is, the *black Angelites*; thus called from the place where they were aſſembled; laſtly, *Adrites*, and *Cononites*.

EUTYCHIANS was alſo the name of another ſect, half Arian, half Eunomian; which aroſe at Conſtantinople, in the fourth century.

It being then a matter of mighty controverſy among the Eunomians at Conſtantinople, whether or no the Son of God knew the laſt day and hour of the world, particularly with regard to that paſſage in the goſpel of St. Mathew, chap. xxiv. ver. 36. or, rather, that in St. Mark, xiii. 32. where it is expreſſed, that *the Son did not know it, but the Father only*; Eutychius made no ſcruple to maintain, even in writing, that the Son did not know it; which ſentiment diſpleaſing the leaders of the Eunomian party, he ſeparated from them, and made a journey to Eunomius, who was then in exile.

That heretic acquieſced fully in Eutychius's doctrine, and admitted him to his communion; Eunomius dying ſoon after, the chief of the Eunomians at Conſtantinople refuſed to admit Eutychius; who, upon this, formed a particular ſect of ſuch as adhered to him, called *Eutychians*.

This ſame Eutychius, with one Theophronius, as was ſaid in Sozomen's time, were the occaſions of all the changes made by the Eunomians in the adminiſtration of baptiſm; which conſiſted, according to Nicephorus, in only uſing one immerſion, and not doing it in the name of the Trinity, but in memory of the death of Jeſus Chriſt.

Nicephorus calls the chief of that ſect, not Eutychius, but Eupſychius, and his followers Eunomioeupſychians.

EWAGE, *Ewagium*, in our *Old Writers*, the ſame with *aquage*, which is toll paid for water-paſſage. It is derived from the French *eau*, *water*.

EWE, the Engliſh name for a female SHEEP.

EWRY, an office in the king's houſhold, where they take care of the linen for the king's table; lay the cloth, and ſerve up water in ſilver *ewers* after dinner; whence the office takes its name.

EXACERBATION, the ſame as PAROXYSM.

EXACHORD. See HEXACHORD.

EXACTION, in *Law*, a wrong done by an officer, or one pretending to have authority; in taking a reward, or fee, for that in which the law allows not of any.

The difference between *exaction* and extortion, conſiſts in this; that extortion is, where the officer takes more than his due; and *exaction*, where he wreſts a fee, or reward, where none is due.

EXACTIS, in *Natural Hiſtory*, a name given by Linkius, and ſome other authors, to a ſpecies of ſtar-fiſh, of the more branched kind, whoſe rays are ſix in number, when they firſt part from the body, but very ſoon branch out into a great number more. See STAR-*fiſh*.

EXACTOR *regis*, in *Law*, the king's exactor, or collector. Sometimes it is taken for the ſheriff. But generally, *quicunque publicas pecunias, tributa, victigalia & res fiſco debitas exigit, proprie nominatur exactor regis*.

EXACUM, in *Botany*, a genus of the *tetrandria monogynia* claſs: the calyx has four leaves; the corolla is divided into four ſegments, and has a globoſe tube; the capſule is bilocular, marked with two furrows, opens at the top, and contains many ſeeds.

EXAGON. See HEXAGON.

EXÆRESIS, Εξαιρεσις, of εξαιρεω, *I take off*, in *Surgery*, an operation, whereby ſomething foreign, uſeleſs, and even pernicious, is taken from the human body.

The *exæreſis* is performed two ways; by extraction, when ſomething formed in the body is drawn out of the ſame; and by detraction, when ſomething is taken away, that had been introduced into the body, from without. See LITHOTOMY, &c.

EXAGGERATION, in *Rhetoric*, a figure, whereby we enlarge, or heighten things; making them appear more than they really are, whether as to goodneſs, badneſs, or other qualities.

The word is formed of the Latin *exaggero*, *I exaggerate*; which is a compound of *ex*, and *agger*, a *mound*, or *elevation of earth*. See HYPERBOLE.

EXAGGERATION, in *Painting*, is a method of repreſenting things, wherein they are loaded too much, or marked too ſtrongly; whether in reſpect of the deſign, or the colouring, or the poſition of the object.

Exaggerating differs from caricaturing; in that the latter perverts, or gives a turn to the features, &c. of a face, which they had not; whereas the former only improves, or heightens, what they had.

The latter is a kind of burleſque on the object, and is generally meant to ridicule: the former is uſually an exalting or enlivening of the beauties of the object, beyond what nature allows. The painter is obliged to have recourſe to an *exaggeration* of colours, both on account of the ſurface of his ground, the diſtance of his work, and of time, and the air, which diminiſh and weaken the force of the colours; but this *exaggeration* muſt be conducted in ſuch manner, as not to put the objects out of their natural characters.

EXALTATION, *Elevation*, is chiefly uſed in a figurative ſenſe, for the raiſing or advancing a perſon to ſome eccleſiaſtical dignity; and, particularly, to the papacy.

The term *exaltation* is, in ſome meaſure, appropriated to the pope; and expreſſes his INAUGURATION, coronation, taking poſſeſſion, and the beginning of his pontificate.

Exaltation *of the Croſs*, Exaltatio Crucis, is a feaſt of the Romiſh church, held on the fourteenth of September; in memory, as is generally ſuppoſed, of this, that the emperor Heraclius brought back the true croſs of Jeſus Chriſt on his ſhoulders, to the place on mount Calvary, from which it had been carried away fourteen years before, by Coſroes, king of Perſia, at his taking of Jeruſalem, under the reign of the emperor Phocas. See Croſs.

The croſs was delivered up by a treaty of peace made with Siroe, Coſroes' ſon. The inſtitution of this treaty is commonly ſaid to have been ſignalized by a miracle; in that Heraclius could not ſtir out of Jeruſalem with the croſs, while he had the imperial veſtments on, enriched with gold, and precious ſtones; but bore it, with eaſe, in a common dreſs.

But, long before the empire of Heraclius, there had been a feaſt of the ſame denomination obſerved both in the Greek and Latin churches, on occaſion of what our Saviour ſaid in St. John xii. 32. *And I, if I be* exalted, *or lifted up, will draw all men unto me.* And again, in ch. viii. ver. 28. *When ye have* exalted, *or lifted up, the Son of man, then ſhall ye know that I am he.* F. Du Soulier aſſures us, that M. Chaſtelain was of opinion, this feaſt had been inſtituted, at leaſt at Jeruſalem, two hundred and forty years before Heraclius.

The feaſt of the dedication of the temple built by Conſtantine was held, ſays Nicephorus, on the fourteenth of September, the day on which the temple had been conſecrated, in the year 335; and this feaſt was alſo called the *exaltation of the croſs*, becauſe it was a ceremony therein, for the biſhop of Jeruſalem to aſcend a high place, built by Conſtantine for that purpoſe, in manner of a pulpit, called by the Greeks, the *ſacred myſteries of God*, or *the holineſs of God*, and there hoiſt up the croſs, for all the people to ſee it.

Exaltation, in *Phyſics*, denotes the act, or operation, of elevating, purifying, ſubtilizing, or perfecting, any natural body, its principles and parts; alſo the quality, or diſpoſition, which bodies acquire by ſuch operation.

The term *exaltation* has been peculiarly affected by the chemiſts and alchemiſts; who, imagining it to have ſome extraordinary emphaſis, are employing it on every occaſion.

Exaltation, in *Aſtrology*, is a dignity which a planet acquires in certain ſigns, or parts, of the zodiac; which dignity is ſuppoſed to give it an extraordinary virtue, efficacy, and influence. The oppoſite ſign, or part of the zodiac, is called the dejection of the planet.

Thus, the 15th degree of Cancer, is the *exaltation* of Jupiter, according to Albumazar, becauſe it was the aſcendant of that planet at the time of the creation; that of the ſun is in the 19th degree of Aries; and its dejection in Libra; that of the moon is in Taurus, &c. Ptolemy gives the reaſon of this in his firſt book De Quadrup.

EXAMEN, or Examination, an exact and careful ſearch, or inquiry, in order to diſcover the truth, or falſhood, of a thing.

Self-**Examination** is a point much inſiſted on by divines, and particularly the ancient fathers, by way of preparation to repentance. St. Ignatius reduces it to five points; viz. 1. A returning of thanks to God for his benefits. 2. A begging of grace and light, to know and diſtinguiſh our ſins. 3. A running over all our actions, occupations, thoughts, and words, in order to learn what has been offenſive to God. 4. A begging of pardon, and conceiving a ſincere ſorrow for having diſpleaſed him. And, 5. Making a firm reſolution not to offend him any more; and taking the neceſſary precautions to preſerve ourſelves from it.

EXAMILION, &c. See Hexamilion, &c.

EXAMINERS, in *Chancery*, are two officers, whoſe buſineſs is to *examine*, on oath, the witneſſes produced on both ſides, upon ſuch interrogatories as the parties to the ſuit do exhibit for the purpoſe.

EXAMPLE, in *Rhetoric*, denotes an imperfect kind of induction, or argumentation; whereby it is proved, that a thing which has happened on ſome other occaſion, will happen again, on the preſent one, from the ſimilitude of the caſes.

EXANNUAL *Roll.* In the old way of exhibiting ſheriff's accounts, the illeviable fines and deſperate debts were tranſcribed into a roll, under this name; which was yearly read, to ſee what might be gotten by it.

EXANTHEMA, formed of εξανθεω, *I flower*, in *Medicine*, a preternatural eruption, or effloreſcence, on the ſkin.

Exanthemata are of two kinds; the one only a diſcolouring of the ſkin; ſuch are the meaſles, the purple ſpots in malignant fevers, &c. The other are little eminences, or papillæ, ſtanding out from the ſkin; ſuch are puſtules, ſmall-pox, &c.

EXARCH, Εξαρχος, in *Antiquity*, an appellation given, by the emperors of the Eaſt, to certain officers ſent into Italy, in quality of vicars, or rather prefects, to defend that part of Italy which was yet under their obedience; particularly the city of Ravenna, againſt the Lombards, who had made themſelves maſters of the greateſt part of the reſt.

The reſidence of the *exarch* was at Ravenna; which city, with that of Rome, were all that was left the emperors. The firſt *exarch* was the patrician Boetius, famous for his treatiſe, De Conſolatione Philoſophiæ; appointed in 568, by the younger Juſtin. The *exarchs* ſubſiſted about a hundred and eighty-five years, and ended in Eutychius; under whoſe *exarchate* the city of Ravenna was taken by the Lombard king Aſtulphus, or Aſtolphus.

F. Papebroch, in his Propylæum ad Acta Sanct. Maii, has a diſſertation on the power and office of the *exarch* of Italy, in the election and ordination of the pope.

The emperor Frederic created Heraclius, archbiſhop of Lyons, a deſcendant of the illuſtrious houſe of Montboiſſier, *exarch* of the whole kingdom of Burgundy; a dignity, till that time unknown any where but in Italy, particularly in the city of Ravenna. Meneſtrier. Hiſt. de Lyons.

Homer, Philo, and other ancient authors, give, likewiſe, the name *exarchus* to the choragus, or maſter of the ſingers, in the ancient choruſes, or him who ſung firſt: the word αρχω, or αρχομαι, ſignifying equally *to begin*, and *to command.*

Exarch *of a dioceſe* was, anciently, the ſame with *primate.* This dignity was inferior to the patriarchal, yet greater than the metropolitan.

Exarch alſo denotes an officer, ſtill ſubſiſting in the Greek church; being a kind of deputy, or legate *a latere* of the patriarch, whoſe office it is to viſit the provinces allotted him, in order to inform himſelf of the lives and manners of the clergy; take cognizance of eccleſiaſtical cauſes; the manner of celebrating divine ſervice; the adminiſtration of the ſacraments, particularly confeſſion; the obſervance of the canons; monaſtic diſcipline; affairs of marriages, divorces, &c but, above all, to take an account of the ſeveral revenues which the patriarch receives from ſeveral churches; and, particularly, as to what regards the collecting the ſame.

The *exarch*, after having greatly enriched himſelf in his poſt, frequently riſes to the patriarchate itſelf.

Exarch is alſo uſed, in the *Eaſtern Church Antiquity*, for a general, or ſuperior over ſeveral monaſteries; the ſame that we otherwiſe call archimandrite; being exempted, by the patriarch of Conſtantinople, from the juriſdiction of the biſhops; as are now the generals of the Romiſh monaſtic orders.

In 493, Sebas was eſtabliſhed *exarch*, or chief, of all the anchorets within the territory of Jeruſalem. Du Bois.

EXARTICULATION, a dislocation of ſome of the jointed bones; or a breach of articulation. See Luxation.

EXAUCTORATIO, among the Romans, differed from *miſſio*, or a diſcharge. In the latter, the ſoldiers were quite diſmiſſed from the ſervice; and this was done after they had ſerved twenty years; but in the former caſe, they only loſt their pay, being ſtill kept under their colours or *vexilla*, though not under the eagle, *aquila*, which was the ſtandard of the legion. Whence, inſtead of *legionarii*, they were called *ſubſignani*, and were ſtill retained till they had either ſerved out their time, or had lands aſſigned them. The *exauctoratio* commonly took place after they had ſerved ſeventeen years.

EXCALCEATION, *ex*, *off*, and *calcus*, *ſhoe*, *diſcalceation*, or the act of putting off the ſhoes.

Among the Hebrews there was a particular law, whereby a widow, whom her huſband's brother refuſed to marry, had a right to ſummon him into a court of juſtice; and, upon his refuſal, might *excalceate* him, i. e. pull off one of his ſhoes, and ſpit in his face; which were both actions of great ignominy among that people.

The houſe of the perſon who had undergone them, was, thenceforward, called the houſe of the *excalceated.*

EXCAMBIATOR. See ESCAMBIO, and EXCHANGE.

EXCAVATION, formed of *ex,* and *cavus, hollow,* or *cave,* a *pit,* &c. the act of hollowing, or digging a cavity, particularly in the ground.

The *excavation* of the FOUNDATIONS of a building, by the Italians called *cavatione,* is ſettled, by Palladio, at a ſixth part of the height of the whole building; unleſs there be cellars under-ground, in which caſe he would have it ſomewhat more.

EXCELLENCY, a quality, or title of honour, given to embaſſadors, and other perſons, who are not qualified for that of highneſs, as not being princes; and yet are to be elevated above the other inferior dignities.

In England, and France, the title is now peculiar to embaſſadors; but it is very common in Germany and Italy. Thoſe to whom it was firſt appropriated were the princes of the blood, of the ſeveral royal houſes; but they quitted it for that of highneſs, upon ſeveral great lords aſſuming *excellency.*

The embaſſadors have only borne it ſince the year 1593, when Henry IV. of France, ſent the duke de Nevers embaſſador to the pope, where he was firſt complimented with *excellency.* After that, the ſame appellation was given to all the other embaſſadors reſiding at that court; from whence the practice ſpread through the other courts.

The embaſſadors of Venice have only had it ſince the year 1636, when the emperor and king of Spain conſented to allow it them.

The embaſſadors of the crowned heads diſpute the giving that title to the embaſſadors from the princes of Italy; where the practice is not eſtabliſhed.

The court of Rome never allows the quality of *excellency* to any embaſſador who is a churchman, as judging it a ſecular title. The common rules and meaſures of *excellency* are a little variable, with reſpect to the court of Rome. The embaſſadors of France, at Rome, anciently gave the title of *excellency* to all the relations of the pope then reigning; to the conſtable Colonna; to the duke de Bracciano, and the eldeſt ſons of all thoſe lords; as alſo the dukes Savelli, Ceſarini, &c. But they are now more reſerved in this reſpect; though they ſtill honour all the Roman princeſſes with *excellency.*

The court of Rome, in their turn, and the Roman princes, beſtow the ſame title on the chancellor, miniſters, and ſecretaries of ſtate, and preſidents of the ſovereign courts of France; the preſidents of the councils in Spain; the chancellor of Poland; and thoſe of the firſt dignities of other ſtates, if they be not eccleſiaſtics.

The word *excellency* was, anciently, a title of kings and emperors; accordingly Anaſtaſius the library-keeper calls Charlemagne his *excellency.* The ſame title is ſtill given to the ſenate of Venice; where, after ſaluting the doge under the title of *ſereniſſimo,* the ſenators are addreſſed under thoſe of your *excellencies.* The Liber. Diurnis Pontif. Rom. gives the title *excellency* to the exarchs and patricians.

The Italians and French have improved on ſimple *excellency*; and made *excellentiſſimo,* and *excellentiſſime*; which have been beſtowed on certain popes, kings, &c.

EXCELSIS. See GLORIA *in excelſis.*

EXCENTRIC, in *Geometry,* is applied where two circles, or ſpheres, though contained, in ſome meaſure, within each other, yet have not the ſame center; and, conſequently, are not parallel; in oppoſition to *concentric,* where they are parallel, having one and the ſame common center.

The ſun's orbit is *excentric,* with regard to the globe of our earth: Mars is very *excentric,* with regard to the ſun; that is, his motion is about a very different center.

EXCENTRIC, in the *New Aſtronomy,* or *excentric circle,* is a circle; as PDAE (*Tab. Aſtronom. fig.* 1.) deſcribed from the center of the orbit of the planet C, with half the axis CE, as a radius.

EXCENTRIC, or *excentric circle,* in the ancient Ptolemaic *Aſtronomy,* was the very orbit of the planet itſelf, which it was ſuppoſed to deſcribe about the earth, and which was conceived *excentric* thereto; called alſo the DEFERENT.

In lieu of *excentric circles* round the earth, the moderns make the planets deſcribe elliptic orbits round the ſun; which accounts for all the irregularities of their motions, and their different diſtances from the earth, &c. more juſtly and naturally.

EXCENTRIC, *anomaly of the,* is an arch of the *excentric circle*; as AK, intercepted between the aphelion A, and the right line KL, which, paſſing through the center of the planet K, is drawn perpendicularly to the line of the apſides AP.

EXCENTRIC *equation,* in the *Old Aſtronomy,* is an angle made by a line drawn from the center of the earth, with another drawn from the center of the *excentric,* to the body, or place, of any planet; the ſame with the proſthaphæreſis, and equal to the difference (accounted in an arch of the ecliptic) between the ſun's, or a planet's, real, and apparent place. See EQUATION *of the center.*

EXCENTRIC *place of a planet,* in its orbit, is the PLACE wherein the planet is ſeen from the ſun.

EXCENTRIC *place,* in the ecliptic, is the point of the ecliptic to which the planet, viewed from the ſun, is referred. This coincides with the heliocentric place.

EXCENTRICITY, the diſtance between the centers of two circles, or ſpheres, which have not the ſame center.

EXCENTRICITY, in the *Old Aſtronomy,* is the diſtance of the center of the orbit of a planet from the center of the earth.

That the five planets have ſuch an *excentricity,* is allowed on all ſides, and may be evinced from ſeveral conſiderations; chiefly this, that Saturn, Jupiter, Mars, Venus, and Mercury, at ſometimes appear larger, and at others leſs; which can only proceed from hence, that their orbits being *excentric* to the earth, in ſome parts thereof they are nearer us, and in others more remote: but as to the *excentricities* of the ſun and moon, ſome diſpute has been made.

Many of the moderns hold, that the ſun and moon appear ſometimes larger, and ſometimes leſs; not that they are nearer us at one time than another, but becauſe they are viewed through different columns of air, which, producing a difference in the refraction of their light, may occaſion thoſe different appearances. Accordingly, we find very ſudden alterations of the apparent magnitude of the moon, where nothing but a change in the air can take place.

Thus Kepler, on the 2d of March, in the year 1588, found the moon's apparent diameter 31 minutes, preſently after 32′ 2″, then 30′ 3″; and the preceding day it had been 33′. And again, on the 22d of February, 1591, he obſerved the moon's diameter twice 31′, ſix times 32′, ſeven times 33′, and ſix times 34′.

They add, that when the ſun and moon are in the ſouthern ſigns, and conſequently lower, being then ſeen through a longer column of denſe air, they muſt appear bigger; conſequently, in the winter-time, when the ſun is in Capricorn, being ſeen through a greater quantity of air, he muſt appear larger than in ſummer, when, being nearer our zenith, the quantity of air he is ſeen through is leſſer. And the like may be ſaid of the moon.

But others take the *excentricities* of the ſun and moon to be ſufficiently proved, from eclipſes; from the moon's greater and leſs parallax, at the ſame diſtance from the zenith; and from the ſun's being obſerved to continue longer in the northern hemiſphere than in the ſouthern; viz. 186 or 187 days in the firſt, and only 178 or 179 days in the latter.

If we ſuppoſe the mean diſtance of every planet from the ſun to be divided into 1000 equal parts, the *excentricities* of their orbits, both in ſuch parts, and in Engliſh miles, will be as follow: Mercury's 210 parts, or 7,730,000 miles; Venus's 7 parts, or 482,000 miles; the earth's 17 parts, or 1,618,000 miles; Mars's 93 parts, or 13.486,000 miles; Jupiter's 48 parts, or 23,760,000 miles; Saturn's 55 parts, or 49,940,000 miles.

EXCENTRICITY, in the *New Aſtronomy,* is the diſtance of the center of the orbit of a planet, as C, from the center of the ſun S, i. e. the diſtance between the center of the ellipſis and the focus thereof; called alſo *ſimple* or *ſingle excentricity.*

If the greateſt EQUATION *of the center* be given, the *excentricity* of the earth's orbit may be found by the following proportion: as the diameter of a circle in degrees is to the diameter in equal parts, ſo is the greateſt equation of the center in degrees to the *excentricity* in equal parts: thus circumference 3.1415926 : 1 its diameter : : 360° : 114°, 591599, the diameter in degrees; and if the greateſt equation of the center be 1° 55′ 33″ = 1°,9268166, &c. we ſhall have 114°.591599 : 1.00, &c. : : 1,9268166 : 0,168061, the *excentricity.*

Hence 1,016806 (= 1,000000 + 0,016806) = the aphelion diſtance:

And 0,983194 (= 1,000000 − 0,016806) = the perihelion diſtance. Robertſon's Elem. of Navig. book v. p. 286.

EXCENTRICITY, *double,* is the diſtance between the two foci in the ellipſis; which is equal to twice the *ſingle excentricity.*

To find the *excentricity* of the ſun: ſince the ſun's greateſt apparent ſemidiameter is to his leaſt, as 32′ 43″ to 31′ 38′, or as $1963''$ to $1898''$; the ſun's greateſt diſtance from the earth will be to his leaſt as 1963 to 1898. Since then $PS+SA=PA=3861$ (*Tab. Aſtron. fig.* 1.); the radius of the *excentric* CP will be found 1930; and conſequently $SC=PC-PS=32$. Wherefore CP being 10000, CS will be found $=165,8$.

Hence, as the earth's *excentricity* SC is ſo ſmall a part of the radius of the *excentric* CP, the earth's elliptic orbit does not deviate much from a circular one; ſo that it is no wonder a calculus, made on the ſuppoſition of an *excentric* circle, ſhould anſwer near enough to obſervation.

EXCEPTION, ſomething reſerved, or ſet aſide, and not included in a rule.

It is become proverbial, that there is no rule without an *exception*; intimating, that it is impoſſible to comprehend all the particular caſes under one and the ſame maxim. But it is dangerous following the *exception* preferably to the rule.

Exception, in *Law*, is a ſtop or ſtay to an action.

The term is uſed indifferently both in the civil, and common law; and in each, *exceptions* are divided into *dilatory* and *peremptory*.

In law proceedings, *exception* is a denial of a matter alleged in bar to the action; and in chancery it is that which is alleged againſt the ſufficiency of an anſwer, &c. *Exception*, in a general ſenſe, includes all the kinds of defence, or vindication, which a perſon, againſt whom a proceſs is brought, makes uſe of to prevent or retard its effect.

The civilians reckon three kinds of *exceptions*; viz. *declinatory*, whereby the authority of the judge, or court, is diſallowed; *dilatory*, intended to defer, or prevent the thing from coming to an iſſue; and *peremptory*, which are proper and pertinent allegations, founded on ſome preſcription that ſtands for the defendant; as want of age, or other quality, in the party; or other matter, that may be decided without entering into a full diſcuſſion of the merits of the cauſe.

Exception *to evidence*, in *Law*, is where a demurrer is offered in any civil cauſe, on account of the inſufficiency of the evidence given, and the court does not agree to it; in which caſe the court or judge are required to ſeal a *bill of exceptions*, by ſtat. Weſtm. 2. 13 Edw. I. cap. 31. which is in the nature of an appeal, examinable in the next immediate ſuperior court, upon a writ of error, after judgment given in the court below. See Demurrer.

Exception *in deeds and writings*, is the ſaving of a particular thing out of a general one granted by deed, as a room, ſhop, or cellar, out of a houſe; a field, or timber trees out of land, &c. *Exceptions* of this kind muſt not croſs the grant, nor be repugnant to it, or elſe they are void of courſe; yet there may be a kind of *exception*, or ſaving out of an *exception*, ſo as to make a thing as if never excepted; as where a leaſe is made of a rectory, excepting the parſonage houſe, ſaving to the leſſee a chamber, this ſhall paſs by the leaſe.

EXCEPTIVE *conjunctions*. See Conjunction.

Exceptive *propoſitions*, are thoſe wherein ſomething is affirmed of a whole ſubject, abating ſome one of the parts thereof, which is *excepted* by a particle, thence called an *exceptive* particle, or particle of *exception*.

Thus, "All the ſects of the ancient philoſophers, except the Platoniſts, held God to be corporeal. Covetouſneſs is inexcuſable in reſpect of every thing, but time."

EXCESS is diſtinguiſhed into *natural* and *moral*: the *firſt*, is a part whereby one quantity is greater than another.—Thus, we ſay, this line is longer than that; but the *exceſs* is inconſiderable.

The *latter*, is an intemperance, or going beyond the juſt bounds and meaſures preſcribed for any thing. Thus, we ſay, *exceſs* in wine, women, &c. is prejudicial to the health.

EXCHANGE, in *Arithmetic*, is the reduction of different coins, or any denominations of money, whether there be real coins anſwering to them, or no, from one to another; or the method of finding how many of one ſpecies, or denomination, are equal in value to a given number of another; in order to which it is neceſſary to know the value of the coins and monies of account of different countries, and their proportion to each other, according to the ſettled rate of *exchange*. See Coin. The ſeveral operations in this caſe are only different applications of the Rule *of three*.

Ex. 1. England *exchanges* with France on the crown or *ecu* of three livres Tournois, allowing a certain number of pence ſterling, more or leſs, according to the rate of *exchange*, for this crown. Accounts are kept in France in livres, ſols, and deniers. See Coin. Suppoſe then that a remittance is made from Paris to London of 1006 livres 14 ſols, at 29*d.* ſterling *exchange*, what is the amount in pounds, &c.? Divide the livres, ſols, and deniers by 3, in order to reduce them into French crowns; then multiply the crowns by 29, the number of pence in a crown, and take the aliquot parts for the fractional parts, according to the ſubdenominations of the integers, or reduce them into decimals, and reduce the pence into ſhillings and pounds, as below:

$$\begin{array}{rl}
\text{Divide by 3.} & 1006\ .\ 14 \\ \hline
\text{Cr.} & 335\ .\ 11.4 \\
\text{Mult. by 8.} & 29 \\ \hline
 & 3015 \\
 & 670 \\
 & 14\tfrac{1}{2} \\
 & 1\tfrac{1}{2} \\
 & \tfrac{1}{2} \\ \hline
 & 12|9732 \\ \hline
 & 20|811 \\ \hline
 & 40\,l.\ 11\,s.
\end{array}$$

When ſterling money is to be reduced into French *exchange* crowns, reduce the ſum given, and price of *exchange*, into the ſame denomination, and divide the former by the latter; and the crowns may be reduced to livres by multiplying the quotient by 3. The rate of *exchange* may be had by dividing the number of pence ſterling by the number of French crowns, &c. in the given ſum.

Ex. 2. England exchanges with Holland, Antwerp, and Hamburgh, at ſo many ſchellings or ſcalins and groots Flemiſh per pound ſterling. See *Dutch* Coins.

If London draws on, or remits to Amſterdam 852*l.* 12*s.* 6*d.* ſterling, at 34 *ſc.* 4½ *gr.* Flemiſh per £. ſterling, how many guilders, ſtivers, and pennings, muſt be paid or received in bank money in Amſterdam? i. e. if 1*l.* ſterling gives 34 *ſc.* 4½ *gr.* what will 852*l.* 12*s.* 6*d.* give? Reduce the price of *exchange* to ½ groots, which, multiplied by the pounds ſterling, gives the half groots contained in that ſum; and, for the 12*s.* 6*d.* take 10*s.* as the half of 825, and 2*s.* 6*d.* as the fourth of that quotient; add the whole together, and the ſum total is the number of half Flemiſh groots contained in the ſterling money; which, being divided by 80, the half groots in a guilder gives the anſwer in guilders; and the remaining half groots muſt be reduced to ſtivers and pennings. The operation is as follows:

$$\begin{array}{lrcccccc}
 & \pounds. & s. & d. & & Sc. & gr. & \\
 & 852 & 12 & 6 & \text{at} & 34 & 4\tfrac{1}{2} & \\
 & 825 & & & & 12 & & \\ \cline{2-2}\cline{6-6}
 & 4260 & & & & 412 & & \\
 & 1704 & & & & 2 & & \\ \cline{6-6}
 & 6816 & & & \text{half gr.} & 825 & = & 1\,l.\ \text{ſterling.} \\
10s. = & 412\tfrac{1}{2} & & & & & & \\
2s.\ 6d. = & 103\tfrac{1}{8} & & & & & & \\ \cline{2-2}
8\,|\,0 &)\,70341\,|\,5\tfrac{5}{8} & & & & & & \\ \cline{2-2}
\end{array}$$

8792 guilders, 55 half groots ⅝. But 55 half groots are = 27½ groots = 13 ſtivers 12 pennings and ⅝ of the half groot = 2½ pennings; therefore the whole ſum will be 8792 guilders 13 ſtivers 14½ pennings bank money.

This example may be eaſily reverſed, by reducing the Dutch money, and price of *exchange*, into one denomination, and dividing the ſum by the price; the quotient will give the anſwer in pounds ſterling.

Ex. 3. England *exchanges* with Spain upon the piaſtre, or dollar of 8 rials, for an uncertain number of pence ſterling. See *Spaniſh* Coins.

Suppoſe Cadiz remits to London 3537 dollars, 6 rials, at 40⅞ per dollar, what will this remittance amount to in England? Multiply the dollars by 40⅞; take the half of 40⅞ for 4 rials, and the fourth for 2 rials; add the whole, which will give the ſum in pence: thus,

$$\begin{array}{rl}
 & 3537\ :\ 6 \\
 & 40\tfrac{7}{8} \\ \hline
 & 141480 \\
 & 3094\tfrac{7}{8} \\
 & 20\tfrac{7}{16} \\
 & 10\tfrac{7}{32} \\ \hline
12\ | & 144605\tfrac{1}{2} \\ \hline
2|0(& 1205|0.5\tfrac{1}{2} \\ \hline
 & 602\,l.\ 10\,s.\ 5\,d.\tfrac{1}{2}\ \text{ſterling.}
\end{array}$$

Ex. 4. England *exchanges* with Portugal on the milrea, and gives pence, more or leſs, for it. See *Portugueſe* Coins.

Suppoſe that Liſbon, or Oporto, remits to London 4366 milreas, 183 reas, at 5*s.* 5*d.* $\frac{5}{8}$ *exchange*, how much ſterling muſt be paid in London for this remittance? The milrea, containing 1000 reas, theſe may be conſidered as decimals; then 5*s.* being $\frac{1}{4}$ of a pound, 5*d.* $\frac{1}{12}$ of 5*s.* and $\frac{5}{8}$ the $\frac{1}{8}$ of 5*d.* divide accordingly, and ſum up the whole; then reduce decimals of a pound into ſhillings, &c. The operation is as follows:

$$\begin{array}{lcr}
 & & 4366{,}183 \\ \hline
5s. = \frac{1}{4} & - & 1091{,}54575 \\
5d. = \frac{1}{12} & - & 90{,}962145,\ \&c. \\
\frac{5}{8} = \frac{1}{8} & - & 11{,}370265,\ \&c. \\ \hline
 & & £.1193{,}87815,\ \&c. \\
 & & 20 \\ \hline
 & & 17{,}563 \\
 & & 12 \\ \hline
 & & 6{,}756 \\
 & & 4 \\ \hline
 & & 3{,}024
\end{array}$$

The anſwer is 1193*l.* 17*s.* 6*d.* $\frac{3}{4}$ ſterling.

The foregoing examples illuſtrate the general method of ſettling the *exchange* between England and any other countries to which its commerce extends. But as conſiderable advantages may often be made by arbitrating the *exchanges* between different countries with accuracy, the following examples will explain the method of doing this in all common caſes.

Ex. 5. Suppoſe London *exchanges* on Amſterdam at $35-2\frac{1}{2}$.
And on Paris at $32\ \frac{1}{8}$.

What is the proportional arbitrated price between Amſterdam and Paris?

1 Paris crown = $32\frac{1}{8}$*d.* London.

240*d.* London = $422\frac{1}{2}$ groots Amſterdam = $35\times12+2\frac{1}{2}$. See COINS.

Then if 240*d.* gives $422\frac{1}{2}$ groots, what will $32\frac{1}{8}$*d.* give? But as the multiplication and diviſion of quantities, partly integral and partly fractional, requires a knowlege of vulgar and decimal fractions, which ſome men of buſineſs are not poſſeſſed of, there are methods which may be recurred to in practice, that will obviate ſuch difficulties. It is well known, that if equal quantities are multiplied and divided by equal quantities, the numbers reſulting from ſuch operations will bear the ſame proportion to each other with the numbers firſt given.

Thus, in the preceding example, $\frac{422\frac{1}{2}\,gr.\ \times\ 32\frac{1}{8}\,d.}{240d.} =$

$$\frac{2\times422\frac{1}{2}\times32\frac{1}{8}\times8}{2\times240\times8}=\frac{845\times257}{240\times2\times8}=\frac{\frac{845}{5}\times257}{\frac{240}{5}\times2\times8}=\frac{169\times257}{48\times2\times8}$$

= 56 grots Amſterdam $\frac{425}{768}$.

Ex. 6. Let Paris *exchange* on London at $32\frac{1}{8}$.
On Amſterdam at $56\frac{425}{768}$.

What is the proportional arbitrated price between London and Amſterdam?

1*l.* ſterling = 240*d.*
$32\frac{1}{8}$*d.* = $56\frac{425}{768}$ groots.

$32\frac{1}{8}$*d.* : $56\frac{425}{768}$ :: 240 : $\frac{240\times56\frac{425}{768}}{32\frac{1}{8}}$ = (multiplying numerator and denominator by 768 and 8) $\frac{240\times8\times43433}{257\times768}$ = (dividing both by 8 and 48) $\frac{43433\times5}{257\times2}$ = $422\frac{1}{2}$ groots = $35-2\frac{1}{2}$.

Ex. 7. Let Amſterdam *exchange* on Paris at $56\frac{425}{768}$.
On London at $35-2\frac{1}{2}$.

What is the proportional arbitrated price between London and Paris?

1 Paris crown = $56\frac{425}{728}$ groots.
$422\frac{1}{2}$ groots = 240*d.* ſterling.

$$422\tfrac{1}{2}\,gr. : 240d. :: 56\tfrac{425}{768}\,gr.\ \frac{240\times56\frac{425}{768}}{422\frac{1}{2}} =$$

$$\frac{\frac{242}{5}\times56\frac{425}{768}\times768\times2}{\frac{422\frac{1}{2}\times2}{5}\times768}=\frac{96\times43433}{169\times768}=\frac{\frac{96}{96}\times43433}{169\times\frac{768}{96}}=$$

$\frac{43433}{169\times8}$ = $32\frac{1}{8}$*d.* ſterling.

Ex. 8. Suppoſe that 100*l.* ſterling is circulated from London to Amſterdam at the price of *exchange* in the preceding examples, viz. at $35-2\frac{1}{2}$, how many guilders of Holland will this ſum produce? 100*l.* ſterling, at $422\frac{1}{2}$ groots Amſt. per £. ſterling, will produce 1056—10 guilders of Amſterdam, by Ex. 2. Theſe 1056—10 guilders, circulated from Amſterdam to Paris, will produce at the arbitrated price of *exchange*, viz. $56\frac{425}{768}$ groots per French crown, 747 crowns—1—$7\frac{1}{2}$ of France; and theſe crowns drawn home to London, at the above *exchange* of $32\frac{1}{8}$*d.* ſterling, per French crown, will produce the ſame 100*l.* ſterling. Whence it follows, that if the real price of *exchange*, at the time when theſe computations are made, is more or leſs between Amſterdam and Paris than the exact arbitrated price, in example 5, you may draw home more or leſs than your 100*l.* ſterling. In all tranſactions of this kind, the ſkilful merchant will watch the occaſion to buy bills of *exchange* when they are cheapeſt, in order to diſpoſe of them at ſuch places, where, at the ſame time, they are deareſt. See next article.

EXCHANGE, *Permutation*, in *Commerce*, an agreement, whereby one thing is trucked, or given for another.

The firſt commerce carried on among men, was by *exchange*; people furniſhing each other mutually with what things they wanted; but ſuch *exchanges* were clogged with two conſiderable difficulties. 1. On account of the unequal values of commodities; and, 2. Becauſe every body had not juſt what might accommodate the perſon with whom he would *exchange*.

To remove theſe inconveniencies, money was invented for a common medium; and inſtead of *exchanging*, buying and ſelling were introduced.

Yet there are nations among whom the primitive way of *exchange* ſtill obtains; and even among the moſt civilized people, there are frequent occaſions, in which they have recourſe to this method. Such, for inſtance, is the trade of ſeveral cities of the North, and Baltic Sea, where the French *exchange* their wines and brandies for woods, metals, hemps, and furs.

The commerce of bills of *exchange* is, itſelf, a mere trading by *exchange*; a truck of money for money.

Exchange, therefore, properly denotes the buſineſs, or trade of money, as carried on between one place and another, by means of bills of *exchange*, i. e. by giving money in one city, and receiving a bill to intitle the giver to receive the value in another city. See BILL *of Exchange*.

There is alſo another ſpecies called *dry exchange*, *cambium ſiccum*, or *uſurer's exchange*, which conſiſts in giving money at one place, to be repaid it, after a certain time, in the ſame place, with a certain ſum over, which is uſually more than common intereſt.

The ceremony of a real *exchange* is obſerved in this fictitious kind, which is only a method of borrowing money. The borrower draws a bill of *exchange* on any imaginary perſon, perhaps at Amſterdam, at the price the *exchange* then goes at, and delivers it to the lender. After the time affixed comes a proteſt from Amſterdam for non-payment, with the *re-exchange* of the money from thence to London; all which, with coſts, beſides a deduction perhaps at the making of the bargain, the borrower muſt pay.

EXCHANGE is alſo uſed for the profit which a merchant, negociant, or broker, makes of a ſum of money received, and for which a bill of *exchange* is drawn, payable in ſome other place, and by ſome other perſon, for the intereſt of his money, or the ſalary and reward of his negociation. This profit is exceedingly various; being ſometimes 2, ſometimes 3, 4, or even 10 and 15 per cent. according as the alloy of the ſpecies differs, or as money is more or leſs plentiful, or bills of *exchange* more or leſs ſcarce, in the places. This kind is ordinarily called *real exchange*, and ſometimes *mercantile* and *mixed exchange*.

The price of *exchange* is regulated according to the courſe of the place where the bill is drawn, or that of the place where the remittance is to be made: ſome pretend that it is the city of Lyons gives the law, or rule, for the price of *exchange*, to moſt of the other cities of Europe.

The word *exchange*, according to ſome, is derived from that perpetual alteration obſerved in the price of this *exchange*, which is ſometimes higher, and ſometimes lower; there being ſometimes ſomewhat to get, and ſometimes to loſe, thereby; and ſometimes nothing to be either got or loſt; as is the caſe when the *exchange* is at par.

From this diverſity in the price of *exchange*, ariſes that common proverb, *The* exchange, *and the wind, are often varying*. But the more natural way of deriving the word *exchange* is from this, that a man here *exchanges* his money for a bill; or that he changes preſent money for abſent money; or changes his debtor.

Exchange is not to be looked on as a loan, from which it differs; becauſe in the one, the riſque, or danger, lies on the perſon who borrows; and in the other, on him who lends. It likewiſe differs from intereſt, becauſe *exchange* is not paid in proportion to the time, as INTEREST is.

EXCHANGE is alſo uſed in diverſe places for the profit allowed for exchanging one ſort, or ſpecies, of money for another.

This is particularly called *ſmall exchange*, *natural exchange*, *pure exchange*, &c.

Exchange is ſometimes alſo uſed for the AGIO, or profit allowed for the monies advanced in any one's behalf.

Exchange is a fixing the actual and momentary value of money. Silver as a metal has a value like all other merchandiſe; and an additional value, as it is capable of becoming the ſign of other merchandiſe. If it was no more than a mere merchandiſe, it would perhaps loſe much of its nominal value. As a money, ſilver has a value which the prince in ſome reſpects can fix, but in others he cannot.

The prince eſtabliſhes a proportion between a quantity of ſilver, as metal, and the ſame quantity, as money. He fixes the proportion between the ſeveral metals made uſe of as money; he eſtabliſhes the weight and ſtandard of every piece of money; in fine, he gives to every piece that ideal value already ſpoken of. We ſhall call the value of money in theſe four reſpects, its poſitive value, becauſe it may be fixed by law.

The coin of every ſtate has, beſide this, a relative value, as it is compared with the money of other countries. This relative value is eſtabliſhed by the *exchange*, and greatly depends on its poſitive value. It is fixed by the current courſe of commerce, and by the general opinion and conſent of merchants, but never by the decrees of the prince, becauſe it is liable to inceſſant variations, depending on the accidental circumſtances of trade, the money tranſactions between nations, and the ſtate of public credit, &c.

The ſeveral nations in fixing this relative value, are chiefly guided by that which poſſeſſes the greateſt quantity of ſpecie. If ſhe has as much ſpecie as all the others together, it is then moſt proper for the others to regulate their's by her ſtandard; and this regulation between all the others, will nearly agree with the regulation made with this principal nation.

The relative abundance or ſcarcity of ſpecie in different countries, forms what is called the courſe of *exchange*; and this plenty or ſcarcity, on which the mutability of the courſe of *exchange* depends, is not real but relative: e. gr. when France has greater occaſion for funds in Holland than the Dutch of having funds in France, ſpecie is ſaid to be common in France, and ſcarce in Holland; and *vice verſâ.* See BALANCE *of Trade.*

We may obſerve, in general, that there is much ſpecie in a place, when there is more ſpecie than paper; there is little, when there is more paper than ſpecie; and in order to judge of the ſcarcity or plenty of ſpecie, we muſt know, for example, that if there are more bills from Holland than there are from France, then ſpecie is ſcarce in France, and common in Holland; and therefore it becomes neceſſary that the *exchange* ſhould riſe, and the Dutch give more for ſpecie of the ſame value in France, than the French for that of an equivalent value in Holland. When money of the ſame ſtandard and weight in France yields money of the ſame ſtandard and weight in Holland, the *exchange* is then ſaid to be at PAR. Thus in the year 1744, the par was nearly at 54 gros to the French crown of three livres; when the *exchange* is above 54 gros, the French would ſay it is high; when below 54 gros, they ſay it is low. When the *exchange* is below par between one country and another, the former loſes as debtor and buyer, and gains as creditor and ſeller. Thus if France owes Holland a certain number of gros, the more of theſe there are in a crown, the more crowns ſhe has to pay; and as there muſt be the ſame number of gros to buy the ſame quantity of merchandiſe, while the *exchange* is low, every French crown is worth fewer gros. On the contrary, if France is creditor for a certain number of gros, the leſs of them there are in a crown, the more crowns ſhe will receive; and if France ſells her merchandiſe in Holland for a certain number of gros, the more crowns will ſhe receive, in proportion as each crown contains fewer of theſe gros. The ſame reaſoning will apply, *mutatis mutandis,* to the commercial intercourſe of other countries, and to any par of *exchange.*

It is evident, that a merchant may ſend his ſtock into a foreign country, when the *exchange* is below par, without injuring his fortune; becauſe when it returns, he recovers what he had loſt; but a prince, who ſends only ſpecie into a foreign country, which can never return, is always a loſer. When merchants have great dealings in any country, the *exchange* there infallibly riſes, on account of their numerous engagements, buying great quantities of merchandiſe, and drawing on foreign countries to pay for them. The arbitration of *exchanges* is an article of great importance in the diſcuſſion of this ſubject: this is a kind of truck, which two bankers or merchants mutually make of their bills upon different parts, at a conditional price and courſe of *exchange.*

In order to underſtand this branch of commerce, it is neceſſary to know how to reduce the ſterling money of England into the foreign monies of *exchange* and of account of all places through Europe, according to the direct courſes of *exchange* eſtabliſhed for theſe purpoſes, and *vice verſâ*; and alſo thoſe of other places, with which England has no direct eſtabliſhed courſes of *exchange,* but is under the neceſſity of making uſe of the intermediate changes of other places. The nature of the AGIOS, and the manner of converting bank monies into current, and the reverſe, ſhould likewiſe be well underſtood. The method of reducing the foreign monies of Europe into thoſe of every other diſtant country, according to the direct or intermediate *exchange,* ſhould be thoroughly known: beſides, it is neceſſary to know the intrinſic value of foreign monies, according to the moſt accurate aſſays that have been made for that purpoſe; and alſo the general natural cauſes of the riſe and fall of the courſes of *exchange* between one nation and one city, and another; which depend on the balance of trade being either in favour of or againſt ſuch trading nation or city.

By an accurate obſervation and compariſon of the courſes of *exchange* between various countries and cities, the merchant will have an opportunity of profit, which ſhould not eſcape his cognizance. He will find that they ſeldom ebb and flow in an exact equality of proportion, ſince the balance of trade differs between different nations. The greateſt profit may be made by ſeizing the opportunity of drawing and remitting to certain places preferably to others. Farther, when the *exchange* is lower than the ſpecie of a country, a profit may be made by ſending it abroad; when it is higher, there is a profit in cauſing it to return; but there is a caſe in which profit may be made, by ſending the ſpecie out of the kingdom, when the *exchange* is at par; that is, by ſending it into a foreign country, to be received; when it returns, an advantage may be made of it, whether it be circulated in the country, or paid for foreign bills. See farther on this ſubject, Poſt. Dict. Com. articles *Arbitration* and *Exchange.*

Exchange alſo denotes a public place, in moſt conſiderable cities, wherein the merchants, negociants, agents, bankers, brokers, interpreters, and other perſons concerned in commerce, meet, on certain days, and at certain times thereof; to confer, and treat together of matters relating to *exchanges,* remittances, payments, adventures, aſſurances, freightments, and other mercantile negociations both by land and ſea.

In Flanders, Holland, and ſeveral cities of France, theſe places are called *burſes*; at Paris and Lyons, *places de change*; and in the Hanſe towns, *colleges of merchants.*

Theſe aſſemblies are held with ſo much exactneſs, and merchants and negociants are ſo indiſpenſably required to attend at them, that a perſon's abſence alone makes him be ſuſpected of a failure or bankruptcy.

The moſt conſiderable *exchanges* in Europe, are that of Amſterdam; and that of London, called the Royal *Exchange.* For an account of the latter, ſee ROYAL *Exchange.*

The former is a large building, two hundred and thirty feet long, and a hundred and thirty broad, round which runs a periſtyle or portico, twenty feet wide. The columns of the periſtyle, amounting to forty-ſix, are numbered, for the convenience of finding perſons.

That of Antwerp was little inferior to either of them, till a variety of circumſtances concurred to effect its ruin, and to transfer its trade to Amſterdam; the æra of this important event in commercial hiſtory is about the year 1585.

Even in the time of the ancient Romans, there were places for the merchants to meet, in moſt of the conſiderable cities of the empire. That ſaid by ſome to have been built at Rome, in the year of the city 259, 493 years before our Saviour, under the conſulate of Appius Claudius, and Publius Servilius, was called *collegium mercatorum*; whereof it is pretended there are ſtill ſome remains, called by the modern Romans *loggia,* the *lodge*; and now, uſually, the *Place of St. George.*

This notion of a Roman *exchange* is ſuppoſed to be founded on the authority of Livy, whoſe words are as follow; viz. *Certamen conſulibus inciderat, uter dedicaret Mercurii ædem. Senatus a ſe rem ad populum rejecit: utri eorum dedicatio juſſu populi data eſſet, eum præeſſe annonæ, mercatorium collegium inſtituere juſſit.* Liv. lib. ii. But it muſt be here remarked, that *collegium* never ſignified a building for a ſociety in the purer ages of the Latin tongue; ſo that *collegium mercatorum inſtituere* muſt not be rendered to build an *exchange* for the merchants, but to incorporate the merchants into a company. As Mercury was the god of traffick, this *ædes Mercurii* ſeems to have been chiefly deſigned for the devotions of this company or corporation.

Exchange, in *Law,* is a mutual grant of equal intereſt in lands or tenements, the one in *exchange* for the other; and in our common law it more particularly denotes the compenſation which the warrantor muſt make the warrantee, value for value, if the land warranted be recovered from the warrantee. Bracton. lib. ii. See Warranty.

Exchange, *the king's*, is the place appointed by the king for *exchange* of plate, or bullion for the king's coin.

Theſe places have formerly been diverſe; but now there is only one, viz. that of the Tower of London, joined with the Mint.

Exchange, *bill of*. See Bill *of exchange*.

What we call *re-exchange*, is the due, or premium of a ſecond *exchange*, when a bill is proteſted. See Re-exchange.

Exchange-*brokers*, are perſons who make it their buſineſs to know the alteration of the courſe of *exchange*, to inform merchants how it goes, and to notify to thoſe who have money to receive or pay beyond ſea, who are proper perſons for executing their orders.

Exchangers are thoſe who return money beyond ſea, by bills of *exchange*, &c. called anciently alſo *excambiators*, and ſince *remitters*.

EXCHEQUER, or ſimply Chequer, originally denotes a cheſs-board; or a frame divided into ſixty-four ſquares, of two colours, whereon to play at draughts, cheſs, &c. See Chess, &c.

The word is formed from the French *eſchequier*, which ſignifies the ſame. Hence, trees are ſaid to be planted *chequer*-wiſe, *in quincuncem*, when diſpoſed ſo as to form diverſe ſquares repreſenting a *chequer*.

Exchequer is more particularly uſed for a chamber, or apartment, in Weſtminſter-hall, conſiſting of two parts; the *court of exchequer*, and the *lower exchequer*. See Court *of Exchequer*.

Exchequer-*bills* are a ſpecies of paper firſt eſtabliſhed by Mr. Montague, in 1696, to ſupply the want of circulating caſh, during the re-coinage at that period. They were then taken at the *exchequer* for all payments of the revenue, and, when re-iſſued, they were allowed 7*l.* 12*s.* *per cent.* intereſt. They have ſince been iſſued yearly; and the bank of England, ever ſince the year 1706, have been the contractors for their circulation, at a certain premium. The commiſſioners of the treaſury are empowered, by various ſtatutes, to borrow money, within a ſpecific ſum, limited by thoſe ſtatutes, by iſſuing *exchequer* bills on the credit of certain duties; which bills, by 12 Anne, cap. 11. & 12 Geo. I. cap. 11. bear an intereſt of 2*d.* a day *per cent.* payable to the bearers. Theſe bills are numbered arithmetically, and regiſtered accordingly, ſo that the principal ſums may be paid off in courſe, and the intereſt ſhall be payable every three months. The ſaid *exchequer* bills ſhall be current to all receivers and collectors of the cuſtoms, exciſe, or any revenue, and at the receipt of the *exchequer*; and as any of them are paid or lent into the *exchequer*, the officers there ſhall cauſe tallies to be levied and delivered to the payers or lenders, as if they had made ſuch payments or loans in ſpecie. If any *exchequer* bills be loſt, upon affidavit before a baron of the *exchequer*, and certificate from him, and ſecurity given to pay the ſame if found, duplicates are to be made out; and when bills are defaced, new ones ſhall be delivered. Forging of theſe bills, or of the indorſements on them, is felony.

Exchequer, *meſſengers of the*. See Messenger.

Exchequer, *Black Book of the*, is a book under the keeping of the two chamberlains of the *exchequer*; ſaid to have been compoſed in 1175, by Gervais of Tilbury, nephew of king Henry II. and divided into ſeveral chapters.

Herein is contained a deſcription of the court of England, as it then ſtood, its officers, their ranks, privileges, wages, perquiſites, power, and juriſdiction; and the revenues of the crown, both in money, grain, and cattle. Here we find, that for one ſhilling, as much bread might be bought, as would ſerve a hundred men a whole day; that the price of a fat bullock was only twelve ſhillings, and a ſheep, four, &c. Larrey, p. i. p. 394. See alſo Domesday.

EXCIPIENT, in *Pharmacy*, a term uſed to expreſs that ingredient in a compound medicine, the buſineſs of which is to receive all the reſt; ſuch is the conſerve in electaries, the ſyrup in boluſſes, &c.

EXCISE, a duty, or impoſition, charged on beer, ale, cyder, liquors made for ſale, and other commodities, within the kingdom of Great Britain, and town of Berwick upon Tweed.

The duty of *exciſe*, as well as the term, was firſt introduced in 1643, and afterwards granted to king Charles II. by act of parliament, in the year 1660, during the life of that prince: it has ſince been continued and augmented by diverſe parliaments, under the ſeveral ſucceeding princes, and extended to Scotland.

The ſeveral commodities that are liable to the duty of *exciſe*, are ale, beer, cyder, perry, mum, metheglin, mead, ſweets, verjuice, vinegar, candles, coaches, coffee, tea, and chocolate; glaſs, hops, leather, linen-cloth, ſilks, and cottons; malt, paper, plate, ſalt, ſoap, ſpirituous liquors, ſtarch, and hair powder, and wire. See the ſeveral articles.

Beſides the particular duties, there is an addition of 5 *per cent.* on all cuſtomed and exciſed goods, except candles, ſoap, &c. by 19 G. III.

The *exciſe* is one of the moſt conſiderable branches of the king's revenue. The amount of the *exciſe* in England, including the malt-tax, eſtimated at a medium of three years, ending in 1773, was 4,649,892*l.* and the expence of collecting, being the average of the years 1767 and 1768, when their produce was 4,531,075*l.* per ann. 6 *per cent.* of the groſs produce, or 297,887*l.*; and in Scotland, eſtimated in the ſame manner, 95,229*l.* and the expence of collecting, being the medium of 1772 and 1773, and the difference between the groſs and nett produce, 31 *per cent.* of the groſs produce, or 43,254*l.* It was formerly farmed out, but is now managed for the king by nine commiſſioners, in England, who ſit in the *general exciſe-office*, receive the whole product of the *exciſe* of beer, ale, and other liquors, and malt, collected all over England, and pay it into the Exchequer.

Their ſalary is 1000*l.* per annum each, and they are obliged by oath, to take no fee, or reward, but from the king only. From the commiſſioners of *exciſe* there lies an appeal to four others, called *commiſſioners of appeals*. The commiſſioners of *exciſe* in Scotland are five, and each has a ſalary of 500*l.* per annum.

The number of officers employed in this branch of the revenue, is very great. Beſide the commiſſioners abovementioned, and their ſubordinate officers, as regiſters, meſſengers, &c. there is an auditor of the *exciſe*, and an auditor of hides, with their clerks, &c. A comptroller of caſh, and another of accompts, with their clerks; a regiſter; ſecretary; ſolicitor; receiver general, with his clerks; clerk of ſecurities; ſtore-keeper; houſe-keeper; door-keepers; general accompants, with their aſſiſtants; accomptant for fines, and two accomptants for the London brewery; clerk of the bills of exchange; examiners; clerk for ſupervisors diaries; five general ſurveyors; general ſurveyors of diſtillery and brandy; examiners of the diſtillery; of the brewery, and of ſoap and candles; ſurveyors of glaſs, of coaches, and plate licences; inſpector of ſpirituous liquors, licences, and coaches; inſpectors general of coffee, tea, &c. and of brewery through England and Wales. Beſide which, there are in England and Wales, excluſive of the bills of mortality, forty-nine collectors, who go their reſpective rounds once in ſix weeks; the province of a collector comprehends ſeveral diſtricts, within each of which there is a ſuperviſor, under the inſpection of the collector; and each diſtrict is parcelled out into out-rides and foot-walks, within each of which there is an inferior officer, conſtituted under the hands and ſeals of the commiſſioners, or ſub-commiſſioners, in their reſpective diviſions, as neceſſity requires, and called gauger, or *exciſeman*, under the inſpection of the ſuperviſor, who every ſix weeks draws out a diary of every day's buſineſs, with remarks, and tranſmits it to the chief officer. Every perſon, previous to his appointment to the office of gauger, muſt procure a certificate of his age, which muſt be between twenty-one and thirty; he muſt underſtand the four firſt rules of arithmetic, be of the communion of the church of England, and, if married, not have more than two children; he muſt nominate two able perſons to be his ſureties; and the certificate, containing theſe particulars, and written by himſelf, muſt be ſigned by the ſuperviſor of the diſtrict where he lives, and accompanied with an affidavit, that he has uſed no bribes for obtaining this office. He is then ordered for inſtruction, under the care of an experienced officer, and to wait till a vacancy happens. Upon admiſſion of officers of every kind relating to the *exciſe*, the oaths of allegiance and ſupremacy, and an oath of faithfulneſs in the execution of the particular office, muſt be taken, and the declaration againſt tranſubſtantiation muſt be ſubſcribed. Officers of *exciſe*, taking a bribe, are liable to a forfeiture of 10*l.* 15 Car. II. cap. 11. and a perſon liable to *exciſe* duties, offering them a bribe, &c. ſhall forfeit 500*l.* 11 Geo. cap. 30. Officers meddling in elections are ſubject to a penalty of 100*l.* and an incapacity of holding any office under the king. 5 W. cap. 20. The concealment of exciſeable goods is ſubject to a forfeiture of thoſe goods, and treble value. 11 Geo. cap. 30. Any perſon obſtructing an officer in the execution of his duty ſhall forfeit 10*l.* 6 Geo. cap. 21. And an officer, either of the *exciſe* or cuſtoms, dealing in exciſeable liquors, ſhall forfeit 50*l.* and be incapable of any office in the revenue. 12 Geo. cap. 28.

EXCISION, in *Surgery*, the cutting out, or cutting off any part of the body.

EXCLAMATION, in *Rhetoric*, a figure, wherein, by raiſing the voice, and uſing an interjection either expreſly or underſtood, we teſtify an uncommon warmth, and paſſion of mind; and expreſs the magnitude of the thing, or the importance of the occaſion.

Such is, O heavens! O earth! &c. ſuch alſo is that of Cicero againſt Cataline: O times! O manners! this the ſenate knows, the conſul ſees—and yet he lives! Lives, ſaid I? nay, and comes into the ſenate!

In Engliſh, the interjections O! or oh! alas! or good God! are generally adjoined in an *exclamation*. In Latin they uſe *O! heu! eheu! ah! vah! pro ſuperi! pro ſuperûm atque hominum fidem!* Sometimes, however, the interjection is underſtood, as, Woe is me! *Miſerum me! hoccine ſæculum!*

EXCLUSION, the act whereby a perſon or thing is excluded, i. e. ſhut out, or ſet aſide. A crown imports an *excluſion* from the papacy: he appointed a ſtranger his heir, in *excluſion* of his own relations.

Great efforts were made towards the cloſe of the reign of king Charles II. to procure a *bill of excluſion*, for ſetting aſide the duke of York, the king's brother, on account of his being a papiſt. See CROWN.

EXCLUSIONS, in *Mathematics*. The *method of excluſions*, is a way of coming at the ſolution of problems (in numerical caſes) by previouſly ejecting, or *excluding* out of conſideration, ſuch numbers, as are of no uſe in ſolving the queſtion; whereby, of conſequence, the proceſs may be regularly, and judiciouſly abbreviated.

EXCLUSIVE, is ſometimes uſed adjectively, for the force, or power, of *excluding*: as, a patent carries with it an *excluſive* privilege.

Sometimes it is alſo uſed adverbially: as, he ſent him all the Gazettes, from N° 195, to N° 300; *excluſive*; i. e. all between thoſe two numbers, which themſelves were excepted.

EXCLUSIVE *propoſitions*, are thoſe wherein the predicate ſo agrees with its ſubject, as to agree with no other. See PROPOSITION. E. gr. Virtue alone makes nobility: nothing elſe renders a man truly noble.

EXCLUSORIUM, in *Medicine*, a name uſed, by ſome, for ſuch drugs, or compoſitions, as are capable of producing abortion.

EXCŒCARIA, in *Botany*, a genus of the *dioecia triandria* claſs, bearing male and female flowers, each of which has a naked catkin, without calyx or corolla; the female flowers have three ſtyles, and a capſule with three cells, and a ſingle ſeed in each cell.

EXCOMMUNICATION, an anathema, or eccleſiaſtical cenſure, and puniſhment; whereby a heretic is cut off from the ſociety of the faithful, or an obſtinate ſinner from the communion of the church, and the participation of the ſacraments.

This cenſure of *excommunication* was originally inſtituted for preſerving the purity of the church; but ambitious eccleſiaſtics converted it by degrees into an engine for promoting their own power, and inflicted it on the moſt frivolous occaſions.

The power of *excommunication* properly belongs to the biſhop; but he may delegate it to any grave prieſt, with the chancellor.

Every *excommunication* ſhould be preceded by three public admonitions, two days, at leaſt, diſtant from each other; but this is to be underſtood of *excommunications* impoſed by the eccleſiaſtical judge; for thoſe impoſed by the law are incurred to all intents and purpoſes the moment the action is committed.

Theſe latter are called *excommunications by the canon*, or *latæ ſententiæ*; and are ſo very numerous, that it would be difficult, even for the beſt canoniſts, to give an exact liſt of them; there are fifty in the Clementines; twenty in the bull *Cæna Domini*, &c. Wilkins's Mag. Conc. vol. iv. p. 664. Rebuffe, on the Concordat, reckons up ſixty penalties accruing upon *excommunication*.

Excommunication is founded on a natural right which all ſocieties have, of excluding out of their body ſuch as violate the laws thereof.

Excommunication is either *major* or *minor*, i. e. *greater* or *leſs*; the firſt, which is that underſtood when we ſay, ſimply, *excommunication*, ſeparates, or cuts off, the delinquent from all communion and fellowſhip with other Chriſtians; diſables him from defending his rights, bringing an action at law, be a witneſs, &c. The ſecond, or leſſer, only excludes from the communion of the Lord's ſupper.

The greater *excommunication*, called alſo *ab homine*, is when a prelate, or his deputy, *excommunicates* any man perſonally, and interdicts him all ſociety with the faithful, all uſe of ſacraments, &c.

In the ancient church, the ſentences of the greater *excommunication* were ſolemnly promulged four times in the year, with candles lighted, bells tolling, the croſs, and other ſolemnities.

The leſſer *excommunication* is incurred *pleno jure*, by having any communication with a perſon *excommunicated* in the greater *excommunication*. And this too imports a privation of communion, but not an interdiction from entering the church, nor having commerce with the faithful.

Anciently, the *excommunicated* were obliged to procure abſolution from their biſhop, and make ſatisfaction to the church, in forty days time; otherwiſe they were compelled to it by the ſecular judge, by a ſeizure of their effects, impriſonment of their perſons, &c. See EXCOMMUNICATO *capiendo*. In France they were allowed a whole year.

By an edict of St. Louis, in the year 1228, vaſſals, tenants, &c. were diſpenſed, or freed from the oath of fidelity, homage, &c. they had taken to their lords, or ſuperiors, when excommunicate, till they had made their ſubmiſſion.

In Spain, to this day, a perſon who is not abſolved from his *excommunication* in a year's time, is deemed a heretic.

There was a time, when the people were fully convinced, that the bodies of *excommunicated* perſons, unleſs they were firſt abſolved, would not rot, but remain entire for ſeveral ages, a horrible ſpectacle to poſterity! as is atteſted by Matthew Paris, and other writers. And the Greeks are ſtill of the opinion; and affirm, they have many proofs thereof, as is ſhewn by Du-Cange, from the teſtimony of a vaſt number of authors.

By the laws, an *excommunicated* perſon was not to be buried, but the body flung into a pit, or covered with a heap of ſtones; which was called *imblocare corpus*. And by the rubric, in the Book of Common Prayer, the burial office ſhall not be read for any that die *excommunicated*. See FUNERAL, &c.

In the ancient church, there were diverſe degrees of *excommunication*. In effect, *excommunication* did not always import an interdiction of the ſacraments; but frequently, a ſeparation, or kind of ſchiſm, between the ſeveral churches, or a ſuſpenſion of ſpiritual communication between the biſhops.

But, afterwards, the occaſions of *excommunications* growing more frequent, they began to uſe it with leſs circumſpection and reſervedneſs.

In the ninth century, the eccleſiaſtics were continually making uſe of this ſpiritual weapon, to repel any violences, or affronts, offered them; and time and familiarity rendering offenders more and more obdurate, they proceeded, by degrees, to rigours unknown to antiquity; as the *excommunicating* of whole families, or provinces; prohibiting the exerciſe of all religion therein; and even accompanying the *excommunications* with horrible ceremonies, and direful imprecations.

In the tenth and eleventh centuries, the ſeverity againſt the *excommunicated* was carried to its higheſt pitch: nobody might come near them, not even their own wives, children, or ſervants; they forfeited all their natural and legal rights and privileges, and were excluded from all kinds of offices. Thus was an *excommunicated* king reduced to the condition of a private man. By thus ſtretching the power of the church to extravagance, they rendered it contemptible. Gregory VII. tempered it a little; exempting the wives and children of *excommunicated* perſons from incurring *excommunication*, by holding converſation with their huſbands and parents.

To render the *excommunicated* ſtill more odious, the prieſt was obliged to ſtop, and break off divine ſervice, if an *excommunicated* perſon entered the church; nothing of which averſion is any where diſcovered in the practice of the primitive church. At preſent we have but little of the terror or reſpect of our forefathers for *excommunication*; and it is even judged, and proclaimed, an abuſe, whenever impertinently employed.

The form of *excommunication* in the Romiſh church, as related by Fevret, is to take lighted torches, throw them on the ground with curſes and anathemas, and trample them out under-foot to the ringing of the bells.

Auctoritate Dei Patris omnipotentis, & Filii, & Spiritus Sancti, & beatæ Dei genetricis Mariæ, omniumque ſanctorum, excommunicamus, *anathematizamus, & a limitibus ſanctæ matris eccleſiæ ſequeſtramus illos malefactores,* N. *conſentaneos quoque & participes; & niſi reſipuerint, & ad ſatisfactionem venerint, ſic extinguetur lucerna eorum ante viventem in ſæcula ſæculorum. Fiat: Amen: Amen: Amen.* Ex Emendat. Leg. Will. Conquæſt.

We have now none of this folly; the ſentence is gravely read, and the perſon remains *excommunicated* without farther ceremony.

See the form of *excommunication* of the Engliſh church in Concilia M. Brit. & Hib. vol. iv. p. 663, &c.

Petrus Bleſenſis aſſures us, that in England it was anciently the practice only to *excommunicate* ſuch as had killed an eccleſiaſtic; whereas they were put to death who had killed a layman. But the reaſon was, they held *excommunication* a greater puniſhment than death.

The cauſes with us are contempt of the biſhop's court, hereſy, neglect of coming to church, and of receiving the ſacrament, incontinency, adultery, ſimony, &c.

We have inſtances of biſhops, who have pronounced formal *excommunications* againſt caterpillars, and other inſects, after a formal juridical proceſs againſt them, wherein thoſe animals were allowed an advocate, and proctor, to defend their cauſe. See Exorcism.

Fevret relates divers inſtances of ſuch *excommunications* againſt rats, mice, and other animals, for infeſting a country. See the form of theſe *excommunications* in that author, Traité de l'Albus.

In the ancient church there were two different kinds of *excommunications* in uſe; the one called *medicinal*, whereby perſons convicted of a crime by their own confeſſion, were removed from communion; the other, called *mortal*, was fulminated againſt rebels, who perſiſted obſtinately in their errors and impieties.

The power of *excommunicating* was lodged in the whole church in general; that is, the biſhops and prieſts had the adminiſtration thereof, by and with the conſent of the people; which was practiſed even in St. Cyprian's time. But afterwards they ceaſed to conſult the people about the matter; the biſhop and clergy arrogated the whole power to themſelves. Recourſe, however, might ſtill be had to a ſynod of the province, to judge of the validity of an *excommunication*.

Excommunication was alſo practiſed among the Jews, who uſed to expel from their ſynagogue ſuch as had committed any grievous crime. See the Goſpel according to St. John, ix. 22. xii. 42. xvi. 2. And Joſeph. Antiq. Jud. lib. ix. cap. 22. and lib xvi. cap. 2.

The Eſſeni, when *excommunicated*, durſt not ſo much as receive food at any perſon's hand, for fear of violating their oath, but contented themſelves to live on herbs; inſomuch that they frequently periſhed, and died for want. See Joſeph. de Bell. lib. ii. cap. 12.

Godwyn, in his Moſes and Aaron, diſtinguiſhes three degrees, or kinds, of *excommunication* among the Jews. The firſt he finds intimated in St. John ix. 22. The ſecond in St. Paul, Epiſt. 1 Cor. v. 5. And the third, in the 1ſt Ep. to Corinth. xvi. 22. See Niddui.

The rule of the Benedictines gives the name *excommunication* to the being excluded from the oratory, and the common table of the houſe, in our inns of court called *diſcommoning*. This was the puniſhment of ſuch monks as came too late.

Excommunication, or a being ſecluded, or cut off from a participation in the myſteries of religion, was alſo in uſe under paganiſm.

Such as were thus *excommunicated* were forbidden to aſſiſt or attend at the ſacrifices, or to enter within the temples; and were afterwards delivered over to the demons and furies of hell, with certain imprecations; which was called among the Romans, *diris devovere*. See Execration.

The Druids among the ancient Britons and Gauls, likewiſe, made uſe of *excommunication* againſt rebels; and interdicted the communion of their myſteries to ſuch as refuſed to acquieſce in their deciſions. See Druids.

That this is the true origin of the extenſive and horrid influence of the European and papal *excommunication*, will appear evident by the following paſſage of Cæſar, De Bello Gallico, lib. vi. cap. 13. *Si qui aut privatus aut publicus Druidum decreto non ſtetit, ſacrificiis interdicunt. Hæc pœna apud eos eſt graviſſime. Quibus ita eſt interdictum, ii numero impiorum & ſceleratorum habentur, iis omnes decedunt, aditum eorum ſermonemque defugiunt, ne quid ex contagione incommodi accipiant; neque iis potentibus jus redditur, neque honos ullus communicatur.*

EXCOMMUNICATO *Capiendo*, or *Significavit*, a writ directed to the ſheriff, for the apprehenſion of one who ſtands obſtinately *excommunicated* the ſpace of forty days.

Such a one, not ſeeking abſolution, hath, or may have, his contempt certified into the chancery; whence this writ iſſues for laying him up, without bail or mainprize, until he conform himſelf.

Excommunicato *Deliberando*, is a writ directed to the under ſheriff, for the delivery of an *excommunicated* perſon out of priſon; upon certificate of the ordinary of his conformity to the eccleſiaſtical juriſdiction.

Excommunicato *Recipiendo*, is a writ whereby perſons *excommunicated*, being for their obſtinacy committed to priſon, and unlawfully delivered from thence before they have given ſecurity to obey the authority of the church, are commanded to be ſought for, and laid up again.

EXCORIATION, in *Medicine* and *Surgery*, the galling or rubbing off of the cuticle; eſpecially of the parts between the thighs, or about the anus.

In adults, it is occaſioned by riding, much walking, or other vehement exerciſe, and may be cured by vulnerary applications.

In children, there is often an *excoriation* of the parts near the pudenda, chiefly of the groin and ſcrotum, but likewiſe in the wrinkles of the neck, under the arms, and in other places, proceeding from the acrimony of the urine and ſweat, and occaſioning itching pains, crying, watching, and reſtleſſneſs.

To remedy this, the parts affected may be waſhed often with warm water, and ſprinkled with drying powders, as chalk, hartſhorn, but eſpecially tutty, lapis calaminaris, and ceruſſe; which may be tied looſely in a rag, and the powder ſhook out on the diſordered places. If the parts tend to a real ulceration, it will be proper to add a little ſugar of lead to the powder, or to anoint the place with unguent. alb. camphor. Likewiſe a little vitriol diſſolved in ſpring water, and daubed upon the part, will dry and heal it very powerfully.

We alſo ſay, an *excoriation* in the throat, &c. when the membrane that covers it, or lines it, is torn by the acrimony of a humour, a medicine, or the like; which is ordinarily the caſe in what we call a *ſore throat*.

EXCORTICATION, the act of ſtripping off the cortex, or bark, from any thing; called alſo Decortication.

EXCREMENT, that which is evacuated, or *excreted*, out of the body of an animal, after digeſtion; being what in other reſpects is ſuperfluous and prejudicial thereto. See Excretion.

Excrement is all that matter taken in by way of food, which cannot be aſſimilated; and which, of conſequence, not growing or adhering to the body, wanders about through the laxer, and more patent parts thereof, till it be ejected.

The urine and fæces, or fæcal matter, are the *great excrements*, expelled from the bladder, and the inteſtines, by ſtool, &c.

The matter of inſenſible perſpiration is alſo an *excrement*, and a more conſiderable one than either of the others.

Among *excrements* are likewiſe ordinarily ranked diverſe humours and matters, ſeparated from the blood by the ſeveral ſtrainers, or emunctories of the body, though far from being uſeleſs, but ſerving diverſe valuable purpoſes of the œconomy. Such are the cerumen, or ear-wax; the mucus of the noſe; lachrymæ, or tears; ſaliva, bile, lympha, menſes, lochia, &c. See Cerumen, Mucus, Tears, Saliva, Bile, Menses, &c.

Unleſs the excretions are regular, health cannot be maintained; and therefore if they are too plentiful, defective, or ſuppreſſed, they will occaſion various diſorders. Hence if a perſon be coſtive, it is generally the forerunner of ſome diſeaſe. As a man generally takes more aliment than is neceſſary to generate blood and ſerum, and the common excretions are not ſufficient to carry off ſuperfluous humours, extraordinary ones ſometimes happen at ſtated times; as the piles, hæmorrhages, &c.

Excrement is alſo attributed, by way of analogy, to plants. Thus gums, diverſe juices, balms, &c. iſſuing ſpontaneouſly from their reſpective trees, are ſometimes called *excrements*.

EXCRESCENCE, in *Surgery*, denotes ſuperfluous, or luxurious fleſh, or other matter, growing on certain parts of the bodies of animals, contrary to, or beyond the ordinary ſtructure, and diſpoſition of nature.

The word is formed of the Latin *ex*, and *creſco*, *I grow*; q. d. ſomething that grows from, or out of another.

Such are wens, warts, ficuſes, polypuſes, &c.

Natural, or cuſtomary *excreſcences*, as thoſe of bones, &c. are called by phyſicians *apophyſes*.

EXCRETION, formed of *excernere*, *to ſeparate*, in *Medicine*, the act of expelling or ejecting out of the body ſome humour that is uſeleſs, or even hurtful thereto.

Moſt criſes are effected by *excretion*; as fluxes of blood and urine, ſweat, vomitings, looſeneſſes, &c.

EXCRETORY, in *Anatomy*, is applied to certain little ducts, or veſſels, in the fabric of the glands.

Excretory ducts are the tubes through which the humours ſeparated in the ſeveral glands, are emitted, or diſcharged out of the gland, into ſome convenient receptacle, or emunctory.

A capillary artery, to which a capillary vein is joined, with an *excretory* duct, convolved, or wound together, make up the body of the glands, the organs of ſecretion. The *excretory* ducts ſpring from the extremities of the arteries and veins, and carry off a liquor ſeparated from the blood. Drake.

The lymphatic glands have either lymphæducts for their *excretory ducts*, or lacteal veſſels, as in the meſentery. Idem.

EXCURSION, in *Aſtronomy*. See Elongation.

Excursion, *circles of*. See Circles.

EXCUSATI, in *Church Hiſtory*, a term uſed to denote ſlaves, who flying to any church for ſanctuary, were excuſed and pardoned by their maſters; but theſe were obliged to take an oath to that purpoſe before they could have them again; and, if they broke the oath, they were puniſhed and fined as perſons guilty of perjury.

EXCUTIA *ventriculi*, the *ſtomach-bruſh*, a name given, by modern ſurgeons, to an inſtrument made of ſoft briſtles, formed into a bundle, and fixed upon a flexible braſs wire, for cleanſing the throat, or even the ſtomach.

The *ſtomach-bruſh* is compoſed of ſoft hair, faſtened together into a bundle by a twiſted braſs or ſteel wire, and the handle or ſtem of it is inveſted with ſilk. This has been greatly recommended, by ſome, to remove foreign bodies out of the fauces and œſophagus, and to ſcour the ſtomach. The method of uſing it is this.

The patient is firſt to drink a ſmall draught of warm water, then the bruſh is to be received into the œſophagus, and gently protruded down into the ſtomach, by twiſting round and round its handle, and, when in the ſtomach, it is to be drawn up and down many times, like the ſucker in a ſyringe, and at length wholly extracted. The advantages ſaid to ariſe from this are very great, ſuch as the prolonging life to a great age, and the like; but few people have been willing to try the effects of ſo diſagreeable and troubleſome an operation. Wedelius and Teichmeir have written expreſs treatiſes on this inſtrument; and one of them has attempted to prove it no new contrivance, but a thing very early known, deſcribed, and uſed in phyſic. Heiſter's Surgery, part ii. p. 2.

EXEAT, in *Church Diſcipline*, a Latin term, uſed for a permiſſion, which a biſhop grants a prieſt to go out of his dioceſe; or an abbot, to a religious, to go out of his monaſtery.

The word is alſo uſed in ſeveral great ſchools for leave given a ſcholar, or ſtudent, to go out. His maſter has given him an *exeat*.

EXECRATION, *Execratio*, among the *Ancients*, a kind of puniſhment, conſiſting of direful curſes and marks of infamy. Livy relates an inſtance of it, which was uſed againſt Philip, king of Macedon, by the Athenians. A general aſſembly of the people being called, they made a decree, that all the ſtatues and images of that king, and of all his anceſtors, both of the male and female ſex, ſhould be demoliſhed, and their very names raſed; that all the feſtivals, ſacred rites, prieſts, and whatever elſe had been inſtituted in honour of him, ſhould be profaned; that the very places where there had been any monument or inſcription to his honour, ſhould be deteſtable, and that nothing ſhould be ſet up, or dedicated in them, which could be done in clean places; and, laſtly, that the public prieſts, as often as they prayed for the Athenian people, allies, armies, and fleets, ſhould as many times deteſt and execrate Philip, his children, kingdom, land and ſea forces, and the whole race and name of the Macedonians.

Cornelius Nepos, in his Life of Alcibiades, calls it *devotion*.

At the taking and demoliſhing of a city, it was frequent to pronounce direful curſes and *execrations* upon any perſon who ſhould endeavour to rebuild it; which ſome imagine was the reaſon that Troy could never be raiſed out of its aſhes, though ſeveral perſons attempted it, being devoted to eternal and irreparable ruin by Agamemnon. This ſeems to have been a very ancient cuſtom, and derived from the eaſtern nations; for we find Joſhua, at the deſtruction of Jericho, to have fixed an imprecation upon the perſon who ſhould rebuild it, which was thought to be accompliſhed in Hiel the Bethelite many ages after. Potter, Archæol. tom. ii. p. 97.

EXECUTED *fine*. See Fine.

EXECUTION, the act of executing, i. e. of accompliſhing, finiſhing, or atchieving any thing, to be done.

We ſay, the *execution* of a teſtament; of a law; of a treaty; of a building, or the like.

Execution is particularly uſed, in the French *Muſic*, for the manner of ſinging, or of the performance of a ſong.

As to the manner of ſinging, called in France *execution*, no nation may, with any probability, diſpute it with the French. If the French, by their commerce with the Italians, have gained a bolder compoſition, the Italians have made their advantage of the French, in learning of them a more polite, moving, and exquiſite *execution*. St. Evremont.

Execution, in *Common Law*, ſignifies the laſt performance of an act; as of a writ, a judgment, or the like.

Execution *of a judgment*, is the obtaining the poſſeſſion of any thing recovered by judgment of law.

There are two ſorts of *executions*; one *final*, another *with a quouſque*, as only tending to an end.

Execution, *final*, is that which maketh money of the defendant's goods, or extendeth his lands, and delivers them to the plaintiff; for this the party accepts in ſatisfaction; and this is the end of the ſuit, and all that the king's writ commands to be done.

Execution *with a quouſque*, is that which only tends to an end; as in the caſe of a *capias ad ſatisfaciendum*, &c.

This is not final; but the body of the party is to be taken, to the intent and purpoſe to ſatisfy the plaintiff; and his impriſonment is not abſolute, but till he doth ſatisfy; ſo that the body is but a pledge for the debt.

Executions are either in perſonal, real, or mixed actions. In a perſonal action, the *execution* may be made three ways, viz. by the writ of Capias *ad ſatisfaciendum*, againſt the body of the defendant; Fieri *facias*, againſt his goods; or Elegit, againſt his lands. In a real and mixed action, the *execution* is by writ of Habere *facias ſeiſinam*, and *habere facias poſſeſſionem*.

Execution, *tenant by*. See Tenant.

Execution, *military*, is the pillage or plundering of a country by the enemies army.

Execution, *military*, alſo denotes every kind of puniſhment inflicted on an army by ſentence of a court martial. This is of various kinds; as tying up to three halberts, and receiving a number of laſhes with a whip, compoſed of nine cord-laſhes, and each laſh of nine knots, from the drummer; or running the gantlope through the parade at guard-mounting, drawn up in two lines for that purpoſe. On this occaſion the provoſt marches through with twigs or ſwitches, and every ſoldier takes as many as there are criminals to be puniſhed; the criminal then marches through the two lines, and each ſoldier gives him a hard ſtroke, the major riding up and down to ſee that the men lay on properly. When a ſoldier is to be puniſhed with death, a detachment of about two hundred men from the regiment to which he belongs forms the parade, and a file of grenadiers ſhoots the priſoner to death.

Execution *of criminals* muſt be according to judgment; and the king cannot alter a judgment from hanging to beheading, becauſe no *execution* can be warranted, unleſs it be purſuant to the judgment. 3 Inſt. 52. 211. H. P. C. 252. But there are ancient precedents wherein men condemned to be hanged for felony, have been beheaded by force of a ſpecial warrant from the king. Bract. 104. Staundf. 13. And the king may pardon part of the *execution* in judgment for treaſon, viz. all but beheading. The court may command *execution* to be done without any writ; though ſometimes *execution* is commanded by writ. 2 Hawk. P. C. 463. Judgment belongs to the judge; but the *execution* muſt be done by the ſheriff, &c. and an *execution* cannot be lawfully made by any but the proper officer; who may do it by the precept of the judge under his ſeal; and if the ſheriff, or other officer, alters the *execution*, or any other executes the offender, or if he is killed without the authority of law, it is felony. 2 Hawk. ib.

In caſe a man condemned to die, come to life after he is hanged, as the judgment is not executed till he is dead, he ought to be hung up again. Finch, 389. The body of a traitor, or felon, is forfeited to the king by the *execution*.

EXECUTIONE *facienda*, a writ commanding execution of a judgment.

Executione *facienda in withernamium*, lies for taking the cattle of one who had formerly conveyed out of the county the cattle of another.

Executione *judicii*, in *Law*, a writ directed to the judge of an inferior court, to do *execution* upon a judgment therein, or to return ſome reaſonable cauſe wherefore he delays the *execution*. F. N. B. 20.

If *execution* be not done on the firſt writ, an *alias* ſhall iſſue, and a *pluries*, with this clauſe, *vel cauſam nobis ſignifices quare*, &c. And if, upon this writ, *execution* be not done, or ſome reaſonable cauſe returned why it is delayed, the party ſhall have an attachment againſt him who ought to have done the *execution*, returnable in B. R. or C. B. New Nat. Br. 43.

EXECUTIVE *power*, *ſupreme*, is by the conſtitution of theſe kingdoms lodged in a ſingle perſon, the king or queen, for the time being. See Crown.

EXECUTOR, a perſon nominated by a teſtator, to take care to ſee his will and teſtament *executed* or performed, and his effects diſpoſed of according to the tenor of the will.

The teſtaments made in Latin in the fourteenth century, call *executors*, *proviſores teſtamentarii*.

All perſons are capable of being *executors*, that are capable of making wills, and others beſides; as feme-coverts and infants, and infants unborn; but no infant can act, as *executor*, till he is ſeventeen years of age. This appointment of an *executor*, either by expreſs words, or by ſuch as ſtrongly imply the ſame, is eſſential to the making of a will; but if the teſtator names no *executors*, or names incapable perſons, or if the *executors* that are named refuſe to act, the ordinary muſt grant letters of adminiſtration. See Administrator.

A perſon appointed to be *executor* is not compellable to execute the will; he may refuſe the charge, before he has adminiſtred as *executor*, or performed ſuch acts, as paying debts due by the teſtator, or receiving debts due to him, or giving acquittances for the ſame; but if he meddles with the goods of the teſtator, as *executor*, his ſubſequent refuſal is void, and he ſhall be charged as *executor*. A perſon to whom a legacy is left may be compelled either to ſtand the executorſhip, or to reſign his legacy. The refuſal of executorſhip muſt be entered and recorded in court. If ſeveral *executors* are named in a will, and ſome of them refuſe, and others prove the will, they who refuſe may afterwards adminiſter and act; and they muſt be joined in all ſuits, where the *co-executors* are plaintiffs; but not where they are defendants, becauſe the plaintiff in the action is not bound by law to take notice of any beſides thoſe who have proved the will.

As to the office or duty of an *executor*, it is to be obſerved that he may do many things before he proves the will, which an adminiſtrator cannot do; becauſe the former derives his power from the will, and not from the probate, or appointment of the ordinary, as the latter does. He may maintain actions of treſpaſs, replevin, or detinue; releaſe an action, aſſent to a legacy, be ſued, alien, or otherwiſe intermeddle with the goods of the teſtator: by adminiſtering, the *executor* is entitled to receive all debts due to the teſtator, and all payments made to him are good, though he ſhould die, and never prove the will; but he cannot maintain a ſuit or action of debt, or the like, before he has proved the will. The ordinary, &c. may cite the *executor*, either to prove the will, or refuſe the office; and he may ſequeſter the goods of the deceaſed, till the *executor* has proved it; and if he does not appear on the proceſs, the ordinary may excommunicate him. On the other hand, the ordinary is compellable by mandamus to proceed to PROBATE, when the will is not controverted. The *executor* muſt bury the deceaſed in a manner ſuitable to the eſtate he leaves behind him; neceſſary funeral expences are allowed, previous to all other debts and charges; but if he be extravagant, he is chargeable with devaſtation, or waſte of th ſubſtance of the deceaſed, which ſhall be only prejudicial to himſelf, and not to the creditors or legatees of the deceaſed. He is then to make an inventory of all the goods and chattels, whether in poſſeſſion or action of the deceaſed, which he is to deliver in to the ordinary upon oath, if lawfully required, at the time of probate. He is then to collect all the goods and chattels ſo inventoried; for which purpoſe the law confers on him ample powers, as the repreſentative of the deceaſed; and having the ſame property in his goods as the principal had when living, and the ſame remedies to recover them; and if there be two or more *executors*, a ſale or releaſe by one of them ſhall be good againſt all the reſt. The *executor* muſt in the next place pay the debts of the deceaſed, in the order of their priority. See Debts, and Debtee *executor*.

If no ſuit is commenced againſt him, the *executor* may pay any one creditor in equal degree his whole debt, though he has nothing left for the reſt; for, without a ſuit commenced, the *executor* has no legal notice of the debt. After the debts, the *executor* is to pay the legacies, which he is to pay as far as his aſſets will extend; but he may not give himſelf the preference herein, as in the caſe of debts. In caſe of a deficiency of aſſets, all the *general* legacies muſt abate proportionably, in order to pay the debts; but a *ſpecific* legacy, as of a piece of plate, houſe, &c. is not to abate at all, unleſs there be not ſufficient without it. If the legatees have been paid their legacies, and debts come in more than enough to exhauſt the reſiduum, they are afterward bound to refund a ratable part. See Legacy, and Donation *cauſa mortis*.

When all the debts and legacies are diſcharged, the ſurplus or reſiduum muſt be paid to the *reſiduary* LEGATEE, if any be appointed by the will; if there be none, it was formerly underſtood to belong to the *executor*; but it ſeems to be now the general opinion, that, if there be an expreſs legacy given to an *executor*, and no deviſe of the ſurplus, ſuch ſurplus ſhall not go to the *executor*, but be diſpoſed to the next of kin, according to the ſtatute of diſtributions; the *executor* ſtanding on the ſame footing as an ADMINISTRATOR. See Intestate.

Where no expreſs legacy is given to the *executor*, the ſurplus ſhall go to the *executor*, if not otherwiſe diſpoſed of by WILL. When there are ſeveral *executors*, and ſome of them are dead, the legatary muſt ſue the ſurviving *executors*, and not the *executors* or adminiſtrators of thoſe that are dead. And if all the *executors* are dead, he muſt ſue the *executors* or adminiſtrators of thoſe that died laſt, and not thoſe of the reſt.

By the French law, an *executor* ſhould be ſeiſed of all the moveables of the deceaſed during one year; at the end whereof he is to account for them. To the validity of a teſtament, it is not neceſſary there be an *executor* nominated therein.

Executor *de ſon tort*, or of his own wrong, is he who takes on him the office of an *executor* by intruſion, not being conſtituted thereto by the teſtator, or deceaſed, nor authoriſed by the ordinary to adminiſter.

If an *executor* in his own wrong takes upon himſelf the office of an *executor* without lawful authority, he is chargeable to the rightful *executor*, and to all the creditors of the teſtator, and likewiſe to the legatees, ſo far as the goods amounted to, which he wrongfully poſſeſſed; and ſuch an *executor* is made by any act of acquiſition, transferring, or poſſeſſing himſelf of any of the eſtate or goods of the deceaſed; but not by acts of neceſſity, piety, or charity. 2 Nelſon abr. 793. Such an *executor* cannot bring an action in right of the deceaſed; neither can he retain for his own debt or legacy. In caſe of his death, his *executors* or adminiſtrators are liable to the ſuit of the lawful *executor*, creditors, and legatees, by 30 Car. II. cap. 7.

Executor, *Debtee*. See Debtee.

EXECUTORY, that which has, or carries with it a ſufficient authority for being executed.

A contract is only *executory*, when it is in form, and ſealed: the great ſeal of England is *executory* throughout the whole iſland.

Executory *deviſe*, is where a future intereſt is deviſed, that veſts not at the death of the teſtator, but depends on ſome contingency which muſt happen before it can veſt. Thus, if a particular eſtate is limited, and the inheritance paſſed out of the donor, this is a CONTINGENT *remainder*; but where the fee by a deviſe is veſted in any perſon, and to be veſted in another upon contingency, this is an *executory* deviſe. And in all caſes of *executory* deviſes, the eſtates deſcend until the contingencies happen.

Executory *eſtate* is an eſtate in fee, created by deed or FINE, which is to be afterwards executed by entry, livery, writ, or the like; and eſtates executed are thoſe which paſs preſently to the perſon to whom they are conveyed, without any ſubſequent act.

Executory *fine*. See Fine.

EXEDENS *herpes*. See Herpes.

EXEDRÆ, Ἐξέδραι, among the *Ancients*, were places wherein the philoſophers, ſophiſts, rhetors, &c. uſed to hold their conferences and diſputes.

M. Perrault is of opinion, the *exedræ* were a ſort of little academies, where the men of learning met together. See Academy.

Budæus rather thinks, that what the ancients called *exedræ*, might anſwer to what we call *chapters* in the cloiſters of monks, or collegiate churches.

EXEGESIS, Ἐξήγησις, a term ſometimes uſed by the learned, to ſignify *explication*.

Several interpreters of the Bible are of opinion, that in the paſſages of Scripture, where we meet with Abba Pater, two words, the firſt Syriac, and the ſecond Greek or Latin, but both ſignifying the ſame thing; the ſecond is only an *exegeſis*, or explanation of the firſt.

Exegesis is alſo uſed for an entire diſcourſe by way of explication, or comment, on any thing.

Exegesis *numeroſa*, or *linealis*, ſignifies the numeral, or lineal ſolution, or extraction of roots, out of adfected equations, firſt invented by Vieta. Ozanam calls it *la rhetique*. See Extraction *of roots*.

EXEGETES, formed of ἐξηγέομαι, *I explain*, among the Athenians, perſons learned in the laws, whom the judges uſed to conſult in capital cauſes.

EXEGETICA, in *Algebra*, the art of finding, either in numbers or lines, the roots of the equation of a problem, according as the problem is either numerical, or geometrical. See Root, and Equation.

EXEMPLAR, a MODEL, or original, to be imitated, or copied.

Exemplar alſo denotes the idea, or image, conceived, or formed in the mind of the artiſt, whereby he conducts his work. Such is the idea of Cæſar, which a painter has in his mind when he goes to make a picture of Cæſar.

The *exemplar* is ordinarily numbered among the cauſes. See Cause.

EXEMPLIFICATION *of letters patent*, denotes an exemplar, or copy of letters patent, made from the inrolment thereof, and ſealed with the great ſeal of England. Such *exemplifications* are as effectual to be ſhewed, or pleaded, as the letters patent themſelves.

EXEMPLIFICATIONE, in *Law*, is a writ granted for the exemplification of an original record. Reg. Orig. 290.

EXEMPTION, a privilege, or diſpenſation, whereby a perſon is excepted out of ſome general rule.

Exemption is particularly applied to churches, chapels, and monaſteries, which have a privilege given them by the popes, or princes, whereby they are exempted from the juriſdiction of the biſhop, or ordinary.

The council of Conſtance revoked all *exemptions*, to reſtore to the general law, weakened and diminiſhed by a relaxation of ſeveral ages, its ancient force and vigour, and make it every where obtain in all its latitude.

The council of Trent prohibited, and declared them null for the future; confirming only ſuch as were well founded on legal conceſſions from the holy ſee.

Exemption, in *Law*, denotes a privilege to be free from ſervice or appearance; thus, knights, clergymen, &c. are exempted from appearing at the county courts by ſtatute, and peers from ſerving on inqueſts. Perſons ſeventy years of age, apothecaries, &c. are alſo exempted by law from ſerving on juries, and juſtices of peace, attornies, &c. from pariſh offices.

EXERCISE, a repetition of any operation, for the ſtrengthening, or retaining of a habit.

Thus, we uſe *exerciſe* of the body for acquiring, or maintaining of health; as it contributes both to the expulſion of the excrements, and preſerving the tone and ſpring of the ſolids.

People who live a ſedentary life, and do not uſe *exerciſe*, are liable to an univerſal relaxation of the ſolids, which brings on other diſorders, glandular obſtructions, weak nerves, and defect of perſpiration. Games of hazard are to be diſcountenanced, and thoſe of *exerciſe* to be promoted.

Exerciſe and quiet make one of the phyſicians NON-NATURALS. See GYMNASTICS.

Labour, or *exerciſe*, Dr. Cheyne obſerves, is indiſpenſibly neceſſary to preſerve the body any time in due plight. Let any diet be purſued, however adjuſted, both in quantity and quality; let whatever evacuations be uſed to leſſen the malady, or any ſuccedaneum be propoſed to prevent the ill effects, ſtill our bodies are ſo made, and the animal œconomy is ſo contrived, that, without due labour and *exerciſe*, the juices will thicken, the joints will ſtiffen, the nerves will relax; and, from theſe diſorders, chronical diſeaſes, and a crazy old age, muſt enſue. Eſſay on Health, p. 90.

Of all the *exerciſes* that are, or may be, uſed for health, as walking, riding on horſeback, or in a coach, fencing, dancing, bowling, digging, pumping, ringing, &c. walking is the moſt natural, and would be the moſt uſeful, if it did not ſpend too much of the ſpirits of the weakly. But riding is certainly the moſt manly, the moſt healthy, and is leſs laborious and expenſive of ſpirits than any.

It is generally ſaid that riding is a more healthful *exerciſe* than walking; which appears to be an aſſertion a little too general; for walking is much more effectual in promoting an increaſe of muſcular ſtrength, and in imparting to the fibres a due elaſticity, than riding. But where any of the viſcera are much obſtructed, and a patient is too weak to ſupport ſufficient walking *exerciſe*, in ſuch caſe riding may be more beneficial. Upon the whole it may be ſaid, that walking is beſt for the preſervation of health, but riding for the relief of chronical diſtempers; for in thoſe which are acute, neither of them is adviſeable.

Thoſe organs of the body that are moſt uſed, always become ſtrongeſt; ſo that we may ſtrengthen any weak organ by *exerciſe*. Thus, the legs, thighs, and feet of chairmen; the arms and hands of watermen; the backs and ſhoulders of porters, grow thick, ſtrong, and brawny, by time and uſe. It is certain, alſo, that ſpeaking ſtrong and loud will ſtrengthen the voice, and give force to the lungs. To the aſthmatic, therefore, and thoſe of weak lungs, I would recommend, ſays Dr. Cheyne, talking much, and loud; walking up eaſy aſcents, &c. to thoſe of weak nerves, and digeſtion, riding on horſeback; to thoſe troubled with the ſtone, riding over rough cauſeways in a coach; to thoſe troubled with rheumatic pains, playing at billiards, cricket, or tennis; to thoſe of weak arms, or hams, playing at tennis, or foot-ball; to thoſe of weak backs, or breaſts, ringing a bell, or working at the pump. Walking through rough roads, even to laſſitude, will beſt recover the uſe of the limbs to the gouty; though riding will beſt prevent the diſeaſe; but the ſtudious, the contemplative, the valetudinary, and thoſe of weak nerves, muſt make *exerciſe* a part of their religion. A condition neceſſary to render *exerciſe* as beneficial as may be, is, that it be uſed on an empty ſtomach. Under the head of *exerciſe*, cold bathing, and the fleſh-bruſh, &c. come alſo to be recommended. Id. ibid. p. 103, 104,

Proper *exerciſe* conduces much to the health of ſoldiers in camp.

The *exerciſe* of a ſoldier may be conſidered under three heads; the firſt relating to his duty, the ſecond to his living more commodiouſly, and the third to his diverſions.

The firſt, conſiſting chiefly in the *exerciſe* of his arms, will be no leſs the means of preſerving health, than of making him expert in his duty; and frequent returns of this, early and before the ſun grows hot, will be made more advantageous than repeating it ſeldom, and ſtaying too long out at a time; for a camp affording little convenience for refreſhment, all unneceſſary fatigue is to be avoided.

As to the ſecond article, cutting boughs for ſhading the tents, making trenches round them for carrying off the water, airing the ſtraw, cleaning their cloaths and accoutrements, and aſſiſting in the buſineſs of the meſs, ought to be no diſagreeable *exerciſe* to the men for ſome part of the day.

Laſtly, as to diverſions, the men muſt be encouraged to them either by the example of their officers, or by ſmall premiums to thoſe who ſhall excel in any kind of ſports, as ſhall be judged moſt conducive to health; but herein great caution is neceſſary, not to allow them to fatigue themſelves too much, eſpecially in hot weather, or ſickly times; and above all, that their cloaths be kept dry, wet cloaths being the moſt frequent cauſe of camp-diſeaſes.

Exercise, in the *Art of War*, denotes the ranging a body of ſoldiers in form of battle, and making them practiſe the ſeveral motions, and military evolutions, with the diverſe management of their arms, &c. to make, or keep them expert therein, againſt occaſion.

This is what Vegetius, and other Latin writers, call *meditatio*.

Exercise, *infantry*, or *manual*, conſiſts in the obſervance of certain words of command appointed for this purpoſe. When a regiment is drawn up, or paraded for *exerciſe*, the men are placed three deep, either by companies, or divided into platoons, with the grenadiers on the right. When ſoldiers are drawn up for *exerciſe*, the ranks and files ſhould be exactly even, and each ſoldier ſhould be inſtructed to carry his arms well, to keep his firelock ſteady and even upon his ſhoulder, with the right hand hanging down, and the whole body without conſtraint. The diſtances between the files muſt be equal, and the ranks eight feet diſtant from each other. Every motion ſhould be performed with life, and the greateſt exactneſs obſerved in all firings, wheelings, and marching; and therefore a regiment ſhould never be under arms longer than two hours.

The following is an abſtract of the words of command at the manual *exerciſe*, with their explanations. 1. *Poiſe your firelock*, i. e. ſeize the firelock with your right hand, and turn the lock outwards, keeping the firelock perpendicular; then bring up the firelock with a quick motion from the ſhoulder, and ſeize it with the left hand, juſt above the lock, ſo that the fingers may lie upon the ſtock, with the elbows down, and the thumb upon the ſtock; the firelock muſt not be held too far from the body, and the left hand muſt be of an equal height with the eyes. 2. *Cock your firelock*; i. e. turn the barrel oppoſite to your face, and place your thumb upon the cock, raiſing your elbow ſquare at this motion; then cock your firelock, by drawing your elbow down, placing your right thumb on the breech pin, and the fingers under the guard. 3. *Preſent*; i. e. ſtep back about ſix inches to the rear with the right foot, bringing the left toe to the front; at the ſame time the butt-end of the firelock muſt be brought to an equal height with the ſhoulder, placing the left hand on the ſwell, and the fore-finger of the right hand before the trigger, ſinking the muzzle a little. 4. *Fire*; i. e. pull the trigger briſkly, and immediately after bringing up the right foot to the inſide of the left, come to the priming poſition, with the lock oppoſite to the right breaſt, the muzzle to the height of the hat, keeping it firm and ſteady; and at the ſame time ſeize the cock with the fore-finger and thumb of the right hand, the back of the hand being turned up. 5. *Half-cock your firelock*; i. e. half-bend the cock briſkly with a draw-back of the right elbow, bringing it cloſe to the butt of the fire-lock. 6. *Handle your cartridge*; i. e. bring your right hand with a ſhort round to your pouch, ſlapping it hard; ſeize the cartridge, and bring it with a quick motion to your mouth; bite the top well off, and bring the hand as low as the chin, with the elbow down. 7. *Prime*; i. e. ſhake the powder into the pan, placing the three laſt fingers behind the rammer, with the elbow up 8. *Shut your pans*; i. e. ſhut your pans briſkly, drawing your right arm at this motion towards your body, holding the cartridge faſt in your hand, as before; then turn the piece nimbly round to the loading poſition, with the lock to the front, and the muzzle to the height of the chin, bringing the right hand behind the muzzle, with both feet kept faſt in this motion. 9. *Charge with cartridge*; i. e. turn up your hand, and put the cartridge into the muzzle, ſhaking the powder into the barrel; place your hand, cloſed, with a quick and ſtrong motion, upon the rammer. 10. *Draw your rammer*; i. e. draw the rammer with a quick motion half out, ſeizing it at the muzzle back-handed; draw it quite out, turn it, and enter it into the muzzle. 11. *Ram down your charge*; i. e. ram the cartridge well down in the barrel, inſtantly recovering and ſeizing the rammer back-handed at the center, turning it, and entering it as far as the lower pipe, placing at the ſame time the edge of the hand on the butt-end of the rammer, with fingers extended. 12. *Return your rammer*; i. e. return the rammer, bringing up the piece with the left hand to the ſhoulder, ſeizing it with the right hand under the cock, keeping the left hand faſt at the ſwell, turning the body ſquare to the front. 13. *Shoulder your firelock*; i. e. quit the left hand, and place it ſtrong upon the butt; quit the right hand, and throw it down the right ſide. 14. *Reſt your firelock*; i. e. ſeize the firelock with the right hand, turning the lock outwards; raiſe the firelock from the ſhoulder, and place your left hand with a quick motion above the lock, holding the piece right up and down in both hands before you, and your left hand even with your eyes; ſtep briſkly back with your right foot, placing it a hand's-breadth diſtance from your left heel, and the ſame time bring down your firelock as quick as poſſible to the reſt, ſinking it as far down before your left hand as your right hand will permit without conſtraint; your left hand being at the feather-ſpring, and your right, with fingers extended, held under the guard, taking care to draw in the muzzle well towards your body, and to dreſs in a line with the butt end. 15. *Order your firelock*; i. e. place your firelock nimbly with your left hand againſt your right ſhoulder; quit the firelock with the right hand, ſinking it at the ſame time with your left; ſeize it at the muzzle, which muſt be of an equal height with your chin, and hold it cloſe againſt your right ſide; lift up your right foot, and place it by your left; at the ſame time throw back your left hand by your left ſide, and with your right bring down the butt-end ſtrong upon the ground, placing it even with the toe of your right foot; the thumb of your right hand lying along the barrel, and the muzzle kept at a little diſtance from your body. 16. *Ground your firelock*; i. e. half face to the right upon your heels, and at the ſame time turn the firelock, ſo that the lock may point to the rear, and the flat of the butt-end lie againſt the inſide of your foot; at the ſame time ſlipping the right foot behind the butt of the firelock, the right toe pointing to the right, and the left to the front: ſtep directly forward with your left foot, about as far as the ſwell of the firelock, and lay it upon the ground, your left hand hanging down by your left leg, and your right kept faſt, with the butt-end againſt it; raiſe yourſelf up again nimbly, bringing back your left foot to its former poſition, keeping your body faced to the right; face again to the left upon your heels, and come to your proper front, letting your hands hang down without motion. 17. *Take up your firelock*; i. e. face to the right upon both heels; ſink your body down, and come up to the poſition deſcribed in the ſecond motion of grounding; raiſe yourſelf and firelock, bringing it cloſe to your right right ſide; come to your proper front, ſeizing your firelock at the muzzle, as in *Explanation* 15. 18. *Reſt your firelock*; i. e. bring your right hand as far as the ſwell; raiſe the firelock high up in a perpendicular line from the ground with your right hand, and ſeize it with your left above the ſpring, the cock being at the height of the waiſt-belt; ſtep back with your right foot, placing it behind your left heel, and come to the reſt. 19. *Shoulder your firelock*; i. e. lift up your right foot, and place it by your left; bring the firelock at the ſame time to your left ſhoulder, and ſeize the butt-end with the left hand, keeping it in the ſame poſition as above deſcribed; throw your right hand briſkly back. 20. *Secure your firelock*; i. e. bring the right hand briſkly up, and place it under the cock, keeping the firelock ſteady in the ſame poſition; quit the butt with the left hand, and ſeize the firelock with it at the ſwell, bringing the elbow cloſe down upon the lock; the right hand being kept faſt in this motion, and the piece ſtill upright: quit the right hand, and bring it down your right ſide, bringing the firelock nimbly down to the *ſecure*; the left hand in a line with the waiſt-belt. 21. *Shoulder your firelock*; i. e. bring the firelock up to a perpendicular line, ſeizing it with the right hand under the cock; quit the left hand, and place it ſtrong upon the butt; quit the right hand, and bring it ſmartly down the right ſide. 22. *Fix your bayonet*; i. e. firſt and ſecond motions, as in the two firſt of the *ſecure*; quit the right hand, and bring the firelock ſmartly down to the left ſide with the left hand, as far as it will admit without conſtraint, ſeizing the bayonet at the ſame time with the right hand, and fixing it, placing that hand juſt below the braſs, with the piece kept cloſe to the hollow of the ſhoulder. 23. *Shoulder your firelock*; i. e. quit the right hand, and bring up the firelock with the left; ſeize it again under the cock with your right, as in the ſecond motion of the *ſecure*; quit the left hand, and place it ſtrong upon the butt; quit the right hand, and bring it down the right ſide. 24. *Preſent your arms*; i. e. as explained in the three motions of the fourteenth word of command. 25. *To the right face*; i. e. bring up the firelock with a quick motion high before you, till your left hand comes even with your eyes, with the fingers of that hand extended along the ſtock, juſt above the feather-ſpring; the right foot to be brought cloſe up to the left heel in this motion: face to the right, taking care in facing to hold the firelock right up and down, and ſteady in your hands: ſtep back with your right foot, and come down to your *preſent*, as in the foregoing explanation. 26. *To the right face*; i. e. as in the foregoing explanation, facing to the right. 27. *To the right-about face*; i. e. as in the twenty-fifth explanation, only coming to the right-about inſtead of to the right. 28. *To the left face*; i. e. bring the right foot briſkly to the hollow of your left with the firelock in the ſame poſition as in the firſt motion of *facing to the right*; face to the left; come down to the *preſent*, as before. 29 *To the left face*; i. e. as in the foregoing explanation. 30. *To the left-about face*; i. e. as before, coming to the left-about inſtead of to the left. 31. *Shoulder your firelock*; i. e. as in the two motions of the nineteenth explanation. 32. *Charge your bayonet*; i. e. as in the firſt explanation; bring the ſwell of the firelock down ſtrong upon the palm of the hand, graſping the piece at the ſmall, behind the lock, and as high as the waiſt-belt; the firelock upon a level with the barrel upwards. 33. *Shoulder your firelock*; i. e. bring up the firelock to the ſhoulder, place the left hand upon the butt, bringing the feet ſquare to the front; quit the right hand, and throw it down the right ſide. 34. *Advance your arms*; i. e. firſt and ſecond motions, as in the firſt explanation; bring the firelock down the right ſide, with the right hand, as low as it will admit without conſtraint, ſlipping up the left hand at the ſame time to the ſwell, the guard between the thumb and forefinger of the right hand, the three laſt fingers under the cock, with the barrel to the rear; quit the left hand. 35. *Shoulder your firelock*; i. e. bring up the left hand, and ſeize it at the ſwell; come ſmartly up to the poiſe; ſhoulder. 36. *Prime and load*; i. e. come ſmartly to the *recover*, by ſpringing the firelock ſtraight up with the left hand, turning the barrel inwards to the proper height of the recover; at the ſame time that the left hand ſprings the firelock, the right hand is raiſed briſkly from the right ſide, and ſeizes the firelock acroſs the breaſt; as it riſes below the cock, the left hand comes with a quick motion from the butt, and ſeizes the firelock ſtrong above the lock, the little finger of the left hand at the ſpring of the lock, the left hand at an equal height with the face, the butt cloſe to the body, but not preſſed, the firelock perpendicular, oppoſite the left ſide of the face: bring the firelock down with a briſk motion to the priming poſition, the left hand holding the firelock, as in priming; the thumb of the right hand placed againſt the face of the ſteel, the fingers clinched, and the elbow a little turned out, that the wriſt may be clear of the cock; open the pan by throwing up the ſteel with a ſtrong motion of the right arm, turning the elbow in, and keeping the firelock ſteady in the left hand: handle your cartridge; prime; ſhut your pan; caſt about; load; draw rammers; ram down the cartridge; return the rammers; ſhoulder. N. B. The motion of recover, and coming down to the priming poſition and opening pans, are to be done in the uſual time. The motions of handling cartridge to ſhutting the pans, are to be done as quick as poſſible: when the pans are ſhut, a ſmall pauſe is to be made, and then caſt about together; then the loading motions are to be done as quick as poſſible; but before the rammer is returned, another ſmall pauſe is to be made, counting 1, 2, between each motion, till the firelock is ſhouldered. *Front rank, make ready*; i. e. ſpring the firelock briſkly to the *recover*, keeping the left foot faſt in this motion; as ſoon as the firelock is at the *recover*, without any ſtop, ſink the body briſkly without ſtooping forward, with a quick motion down upon the right knee; the butt-end of the firelock at the ſame time falls upon the ground; the front part of the butt being in a line with the heel of the left foot. As ſoon as the butt comes to the ground the firelock is to be cocked, immediately ſeizing the cock and ſteel in the right hand; the firelock to be held firm in the left hand, about the middle of that part of the firelock between the lock and the ſwell of the ſtock; the point of the left thumb to be cloſe to the ſwell, pointing upwards. As the body is ſinking, the right knee is to be thrown as far back as the left leg may be right up and down; the right foot to be thrown a little to the right; the body to be kept ſtraight; the head up, looking to the right along the rank, the ſame as if ſhouldered; the firelock to be upright, and the butt about four inches to the right of the inſide of the left foot. *Preſent*; i. e. bring the firelock briſkly down to the *preſent*, by extending the left arm to the full length with a ſtrong motion; at the ſame time ſpring up the butt by the cock with the right hand, and raiſe up the butt ſo high upon the right ſhoulder, that you may not be obliged to ſtoop too much with the head; the right cheek to be cloſe to the butt, and the left eye ſhut, and look along the barrel with the right eye from the breech-pin to the muzzle; keep the left elbow down in an eaſy poſition, and ſtand as ſteady as poſſible; the thumb of the right hand to remain in the poſition as deſcribed in the third explanation of the manual. *Fire*; i. e. pull the trigger as directed in the manual; and as ſoon as the piece is fired, give yourſelf a ſtrong ſpring upon your left leg, raiſing your body briſkly, and ſtraight up, keeping your left foot faſt, and bringing the right heel to the inſide of the left; at the ſame time the firelock is to be brought up to the priming-poſition, and half-cocked immediately; a ſhort pauſe is to be made, then handle cartridge, and go on with the loading motions deſcribed in the explanation of *prime* and *load*. *Centre rank, make ready*; i. e. ſpring the firelock briſkly to the *recover*; ſo ſoon as the left hand ſeizes the firelock above the lock, the right elbow is to be nimbly raiſed a little, placing the thumb of that hand upon the cock; the fingers open by the plate of the lock, and as quick as poſſible force the piece to the cock, by dropping the elbow, and forcing down the cock with the thumb, ſtepping at the ſame time a moderate pace to the right, keeping the left foot faſt; as the firelock is cocked, the thumb is to fall below the cock, the right hand ſeizing the firelock cloſe under the cock, firmly; the fore-finger not to be before the trigger; the piece to be held in this poſition perpendicular, oppoſite the left ſide of the face, the butt cloſe to the left breaſt, but not preſſed; the body to be ſtraight, and as full to the front as poſſible; the head kept up, looking to the right of the rank, that the body and the firelock may not ſtoop forward, nor lean much out of the rank. *Preſent*; i. e. ſpring the firelock from the body to the arm's length with a quick motion, preſſing down the muzzle with the left hand, and ſpring up the butt with the right hand, as in the foregoing explanation of the *front-rank*. *Fire*. As in explanation 4, in the manual, with this difference, that the left foot is to be brought up to the right, at the ſame time that the firelock is brought down to the priming poſition. The loading motions as in the explanations of priming and loading, and at the laſt motion of ſhouldering, to ſpring to the left again, and cover the file-leaders. *Rear rank make ready*; i. e. recover the firelock, and cock as before directed for the centre rank; as the firelock is recovered and cocked, ſtep briſkly ſtraight to the right, with the right foot a full pace; bring the left heel about ſix inches before the right foot; the body ſtraight, and as ſquare to the front as poſſible, as in explanation of the *centre rank*. *Preſent*. As in explanation *preſent*, before. *Fire*. As in explanation of the *centre rank*, and as the firelock is coming down to the priming poſition, the left is to be brought back to the right; and at the laſt motion of ſhouldering, to ſpring to the left again, and cover the file-leader.

There are ſome peculiar words of command at the manual *exerciſe* of the grenadiers, when apart from the battalion; and alſo for the cavalry and artillery.

Exercise, *cavalry*, is of two ſorts; on horſeback and on foot. When a regiment is formed into ſquadrons, the ranks are to be arranged at the diſtance of twenty-four feet, and the files muſt keep boot-top to boot-top. In all wheelings, the flank which wheels, muſt come about in full gallop.

Exercise, *artillery*, is the method of teaching the regiments of artillery the uſe and practice of all the various machines of war, as of the light field-pieces, of the garriſon and battering artillery, of the mortar and howitz. See Smith's Milit. Dict. art. Exercise, and Words *of command*. See *Exerciſe of* Guns.

Exercise, in a *Naval Senſe*, is the preparatory practice of managing the artillery and ſmall arms, in order to make the ſhip's crew perfectly ſkilled therein, ſo as to direct its execution ſucceſsfully in time of battle. The words of command introduced, during the late war, for the *exerciſe* of the great guns, are the following: *Silence*; *caſt looſe your guns*; *level your guns*; *take out your tompions*; *run out your guns*; *prime*; *point your guns*; *fire*; *ſpunge your guns*; *load with cartridge*; *ſhot your guns*; *put in your tompions*; *houſe your guns*; and *ſecure your guns*. Falconer's Marine Dict. art. Exercise.

Exerciſe may alſo denote the execution of the movements, which the different orders and diſpoſitions of fleets occaſionally require, and which the ſeveral ſhips are required to perform, by means of ſignals.

Exercises, in the plural, are particularly underſtood of what is taught young gentlemen in the academies, or riding-ſchools, &c. As, riding the great horſe, dancing, fencing, vaulting, drawing fortifications, &c.

EXERGASIA, Εξεργασια, *Expoſition*, in *Rhetoric*, a figure, conſiſting of ſeveral equivalent expreſſions, or ſuch as are nearly ſo, in order to repreſent the ſame thing in a ſtronger manner.

EXERGUM, Exergue, or Exerge, among *Medalliſts*, a word, motto, date, or the like, ſometimes found under the ground, whereon the figures are repreſented.

The word is derived from the Greek εξ, and εργον, *opus*, *work*. Evelyn often writes it *exurge*.

Exergues are moſt commonly placed on the reverſes, though ſometimes, alſo, on the fronts, or face-ſides, of medals.

EXFOLIATION, compounded of *ex*, and *folium*, *leaf*, in *Surgery*, the ſcaling of a bone; or its riſing, and ſeparating in leaves, or laminæ.

Any part of the ſurface of the cranium that has been bared, is liable to *exfoliation*. The wound muſt not be ſtopped too much, but the bone left at liberty to recover itſelf, which it ſometimes does, without *exfoliaiing*, particularly in children.

EXFOLIATIVE. An *exfoliative* trepan is a trepan proper to ſcrape, and at the ſame time pierce, a bone, and ſo to *exfoliate*, or raiſe, ſeveral leaves, or ſcales, one after another.

The uſe of the *exfoliative* trepan is very dangerous; as being apt to ſhake and diſorder the brain. See Raspatory, and Trepan.

EXFREDIARE, in our *Old Writers*, denotes the breaking of the peace, or committing open violence. Leg. Hen. I. cap. 31.

The word is formed from the Saxon *frede*, *peace*.

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This he aſſumes in the proof of prop. 1. book x. which imports, into the muzzle, ſhaking the powder into the barrel; place your hand, cloſed, with a quick and ſtrong motion, upon the rammer. 10. *Draw your rammer*; i. e. draw the rammer with a quick motion half out, ſeizing it at the muzzle back-handed; draw it quite out, turn it, and enter it into the muzzle. 11. *Ram down your charge*; i. e. ram the cartridge well down in the barrel, inſtantly recovering and ſeizing the rammer back-handed at the center, turning it, and entering it as far as the lower pipe, placing at the ſame time the edge of the hand on the butt-end of the rammer, with fingers extended. 12. *Return your rammer*; i. e. return the rammer, bringing up the piece with the left hand to the ſhoulder, ſeizing it with the right hand under the cock, keeping the left hand faſt at the ſwell, turning the body ſquare to the front. 13. *Shoulder your firelock*; i. e. quit the left hand, and place it ſtrong upon the butt; quit the right hand, and throw it down the right ſide. 14. *Reſt your firelock*; i. e. ſeize the firelock with the right hand, turning the lock outwards; raiſe the firelock from the ſhoulder, and place your left hand with a quick motion above the lock, holding the piece right up and down in both hands before you, and your left hand even with your eyes; ſtep briſkly back with your right foot, placing it a hand's-breadth diſtance from your left heel, and the ſame time bring down your firelock as quick as poſſible to the reſt, ſinking it as far down before your left hand as your right hand will permit without conſtraint; your left hand being at the feather-ſpring, and your right, with fingers extended, held under the guard, taking care to draw in the muzzle well towards your body, and to dreſs in a line with the butt end. 15. *Order your firelock*; i. e. place your firelock nimbly with your left hand againſt your right ſhoulder; quit the firelock with the right hand, ſinking it at the ſame time with your left; ſeize it at the muzzle, which muſt be of an equal height with your chin, and hold it cloſe againſt your right ſide; lift up your right foot, and place it by your left; at the ſame time throw back your left hand by your left ſide, and with your right bring down the butt-end ſtrong upon the ground, placing it even with the toe of your right foot; the thumb of your right hand lying along the barrel, and the muzzle kept at a little diſtance from your body. 16. *Ground your firelock*; i. e. half face to the right upon your heels, and at the ſame time turn the firelock, ſo that the lock may point to the rear, and the flat of the butt-end lie againſt the inſide of your foot; at the ſame time ſlipping the right foot behind the butt of the firelock, the right toe pointing to the right, and the left to the front: ſtep directly forward with your left foot, about as far as the ſwell of the firelock, and lay it upon the ground, your left hand hanging down by your left leg, and your right kept faſt, with the butt-end againſt it; raiſe yourſelf up again nimbly, bringing back your left foot to its former poſition, keeping your body faced to the right; face again to the left upon your heels, and come to your proper front, letting your hands hang down without motion. 17. *Take up your firelock*; i. e. face to the right upon both heels; ſink your body down, and come up to the poſition deſcribed in the ſecond motion of grounding; raiſe yourſelf and firelock, bringing it cloſe to your right right ſide; come to your proper front, ſeizing your firelock at the muzzle, as in *Explanation* 15. 18. *Reſt your firelock*; i. e. bring your right hand as far as the ſwell; raiſe the firelock high up in a perpendicular line from the ground with your right hand, and ſeize it with your left above the ſpring, the cock being at the height of the waiſt-belt; ſtep back with your right foot, placing it behind your left heel, and come to the reſt. 19. *Shoulder your firelock*; i. e. lift up your right foot, and place it by your left; bring the firelock at the ſame time to your left ſhoulder, and ſeize the butt-end with the left hand, keeping it in the ſame poſition as above deſcribed; throw your right hand briſkly back. 20. *Secure your firelock*; i. e. bring the right hand briſkly up, and place it under the cock, keeping the firelock ſteady in the ſame poſition; quit the butt with the left hand, and ſeize the firelock with it at the ſwell, bringing the elbow cloſe down upon the lock; the right hand being kept faſt in this motion, and the piece ſtill upright: quit the right hand, and bring it down your right ſide, bringing the firelock nimbly down to the *ſecure*; the left hand in a line with the waiſt-belt. 21. *Shoulder your firelock*; i. e. bring the firelock up to a perpendicular line, ſeizing it with the right hand under the cock; quit the left hand, and place it ſtrong upon the butt; quit the right hand, and bring it ſmartly down the right ſide. 22. *Fix your bayonet*; i. e. firſt and ſecond motions, as in the two firſt of the *ſecure*; quit the right hand, and bring the firelock ſmartly down to the left ſide with the left hand, as far as it will admit without conſtraint, ſeizing the bayonet at the ſame time with the right hand, and fixing it, placing that hand juſt below the braſs, with the piece kept cloſe to the hollow of the ſhoulder. 23. *Shoulder your firelock*; i. e. quit the right hand, and bring up the firelock with the left; ſeize it again under the cock with your right, as in the ſecond motion of the *ſecure*; quit the left hand, and place it ſtrong upon the butt; quit the right hand, and bring it down the right ſide. 24. *Preſent your arms*; i. e. as explained in the three motions of the fourteenth word of command. 25. *To the right face*; i. e. bring up the firelock with a quick motion high before you, till your left hand comes even with your eyes, with the fingers of that hand extended along the ſtock, juſt above the feather-ſpring; the right foot to be brought cloſe up to the left heel in this motion: face to the right, taking care in facing to hold the firelock right up and down, and ſteady in your hands: ſtep back with your right foot, and come down to your *preſent*, as in the foregoing explanation. 26. *To the right face*; i. e. as in the foregoing explanation, facing to the right. 27. *To the right-about face*; i. e. as in the twenty-fifth explanation, only coming to the right-about inſtead of to the right. 28. *To the left face*; i. e. bring the right foot briſkly to the hollow of your left with the firelock in the ſame poſition as in the firſt motion of *facing to the right*; face to the left; come down to the *preſent*, as before. 29 *To the left face*; i. e. as in the foregoing explanation. 30. *To the left-about face*; i. e. as before, coming to the left-about inſtead of to the left. 31. *Shoulder your firelock*; i. e. as in the two motions of the nineteenth explanation. 32. *Charge your bayonet*; i. e. as in the firſt explanation; bring the ſwell of the firelock down ſtrong upon the palm of the hand, graſping the piece at the ſmall, behind the lock, and as high as the waiſt-belt; the firelock upon a level with the barrel upwards. 33. *Shoulder your firelock*; i. e. bring up the firelock to the ſhoulder, place the left hand upon the butt, bringing the feet ſquare to the front; quit the right hand, and throw it down the right ſide. 34. *Advance your arms*; i. e. firſt and ſecond motions, as in the firſt explanation; bring the firelock down the right ſide, with the right hand, as low as it will admit without conſtraint, ſlipping up the left hand at the ſame time to the ſwell, the guard between the thumb and forefinger of the right hand, the three laſt fingers under the cock, with the barrel to the rear; quit the left hand. 35. *Shoulder your firelock*; i. e. bring up the left hand, and ſeize it at the ſwell; come ſmartly up to the poiſe; ſhoulder. 36. *Prime and load*; i. e. come ſmartly to the *recover*, by ſpringing the firelock ſtraight up with the left hand, turning the barrel inwards to the proper height of the recover; at the ſame time that the left hand ſprings the firelock, the right hand is raiſed briſkly from the right ſide, and ſeizes the firelock acroſs the breaſt; as it riſes below the cock, the left hand comes with a quick motion from the butt, and ſeizes the firelock ſtrong above the lock, the little finger of the left hand at the ſpring of the lock, the left hand at an equal height with the face, the butt cloſe to the body, but not preſſed, the firelock perpendicular, oppoſite the left ſide of the face: bring the firelock down with a briſk motion to the priming poſition, the left hand holding the firelock, as in priming; the thumb of the right hand placed againſt the face of the ſteel, the fingers clinched, and the elbow a little turned out, that the wriſt may be clear of the cock; open the pan by throwing up the ſteel with a ſtrong motion of the right arm, turning the elbow in, and keeping the firelock ſteady in the left hand: handle your cartridge; prime; ſhut your pan; caſt about; load; draw rammers; ram down the cartridge; return the rammers; ſhoulder. N. B. The motion of recover, and coming down to the priming poſition and opening pans, are to be done in the uſual time. The motions of handling cartridge to ſhutting the pans, are to be done as quick as poſſible: when the pans are ſhut, a ſmall pauſe is to be made, and then caſt about together; then the loading motions are to be done as quick as poſſible; but before the rammer is returned, another ſmall pauſe is to be made, counting 1, 2, between each motion, till the firelock is ſhouldered. *Front rank, make ready*; i. e. ſpring the firelock briſkly to the *recover*, keeping the left foot faſt in this motion; as ſoon as the firelock is at the *recover*, without any ſtop, ſink the body briſkly without ſtooping forward, with a quick motion down upon the right knee; the butt-end of the firelock at the ſame time falls upon the ground; the front part of the butt being in a line with the heel of the left foot. As ſoon as the butt comes to the ground the firelock is to be cocked, immediately ſeizing the cock and ſteel in the right hand; the firelock to be held firm in the left hand, about the middle of that part of the firelock between the lock and the ſwell of the ſtock; the point of the left thumb to be cloſe to the ſwell, pointing upwards. As the body is ſinking, the right knee is to be thrown as far back as the left leg may be right up and down; the right foot to be thrown a little to the right; the body to be kept ſtraight; the head up, looking to the right along the rank, the ſame as if ſhouldered; the firelock to be upright, and the butt about four inches to the right of the inſide of the left foot. *Preſent*; i. e. bring the firelock briſkly down to the *preſent*, by extending the left arm to the full length with a ſtrong motion; at the ſame time ſpring up the butt by the cock with the right hand, and raiſe up the butt ſo high upon the right ſhoulder, that you may not be obliged to ſtoop too much with the head; the right cheek to be cloſe to the butt, and the left eye ſhut, and look along the barrel with the right eye from the breech-pin to the muzzle; keep the left elbow down in an eaſy poſition, and ſtand as ſteady as poſſible; the thumb of the right hand to remain in the poſition as deſcribed in the third explanation of the manual. *Fire*; i. e. pull the trigger as directed in the manual; and as ſoon as the piece is fired, give yourſelf a ſtrong ſpring upon your left leg, raiſing your body briſkly, and ſtraight up, keeping your left foot faſt, and bringing the right heel to the inſide of the left; at the ſame time the firelock is to be brought up to the priming-poſition, and half-cocked immediately; a ſhort pauſe is to be made, then handle cartridge, and go on with the loading motions deſcribed in the explanation of *prime* and *load*. *Centre rank, make ready*; i. e. ſpring the firelock briſkly to the *recover*; ſo ſoon as the left hand ſeizes the firelock above the lock, the right elbow is to be nimbly raiſed a little, placing the thumb of that hand upon the cock; the fingers open by the plate of the lock, and as quick as poſſible force the piece to the cock, by dropping the elbow, and forcing down the cock with the thumb, ſtepping at the ſame time a moderate pace to the right, keeping the left foot faſt; as the firelock is cocked, the thumb is to fall below the cock, the right hand ſeizing the firelock cloſe under the cock, firmly; the fore-finger not to be before the trigger; the piece to be held in this poſition perpendicular, oppoſite the left ſide of the face, the butt cloſe to the left breaſt, but not preſſed; the body to be ſtraight, and as full to the front as poſſible; the head kept up, looking to the right of the rank, that the body and the firelock may not ſtoop forward, nor lean much out of the rank. *Preſent*; i. e. ſpring the firelock from the body to the arm's length with a quick motion, preſſing down the muzzle with the left hand, and ſpring up the butt with the right hand, as in the foregoing explanation of the *front-rank*. *Fire*. As in explanation 4, in the manual, with this difference, that the left foot is to be brought up to the right, at the ſame time that the firelock is brought down to the priming poſition. The loading motions as in the explanations of priming and loading, and at the laſt motion of ſhouldering, to ſpring to the left again, and cover the file-leaders. *Rear rank make ready*; i. e. recover the firelock, and cock as before directed for the centre rank; as the firelock is recovered and cocked, ſtep briſkly ſtraight to the right, with the right foot a full pace; bring the left heel about ſix inches before the right foot; the body ſtraight, and as ſquare to the front as poſſible, as in explanation of the *centre rank*. *Preſent*. As in explanation *preſent*, before. *Fire*. As in explanation of the *centre rank*, and as the firelock is coming down to the priming poſition, the left is to be brought back to the right; and at the laſt motion of ſhouldering, to ſpring to the left again, and cover the file-leader.

There are ſome peculiar words of command at the manual *exerciſe* of the grenadiers, when apart from the battalion; and alſo for the cavalry and artillery.

Exercise, *cavalry*, is of two ſorts; on horſeback and on foot. When a regiment is formed into ſquadrons, the ranks are to be arranged at the diſtance of twenty-four feet, and the files muſt keep boot-top to boot-top. In all wheelings, the flank which wheels, muſt come about in full gallop.

Exercise, *artillery*, is the method of teaching the regiments of artillery the uſe and practice of all the various machines of war, as of the light field-pieces, of the garriſon and battering artillery, of the mortar and howitz. See Smith's Milit. Dict. art. Exercise, and Words *of command*. See *Exerciſe of* Guns.

Exercise, in a *Naval Senſe*, is the preparatory practice of managing the artillery and ſmall arms, in order to make the ſhip's crew perfectly ſkilled therein, ſo as to direct its execution ſucceſsfully in time of battle. The words of command introduced, during the late war, for the *exerciſe* of the great guns, are the following: *Silence*; *caſt looſe your guns*; *level your guns*; *take out your tompions*; *run out your guns*; *prime*; *point your guns*; *fire*; *ſpunge your guns*; *load with cartridge*; *ſhot your guns*; *put in your tompions*; *houſe your guns*; and *ſecure your guns*. Falconer's Marine Dict. art. Exercise.

Exerciſe may alſo denote the execution of the movements, which the different orders and diſpoſitions of fleets occaſionally require, and which the ſeveral ſhips are required to perform, by means of ſignals.

Exercises, in the plural, are particularly underſtood of what is taught young gentlemen in the academies, or riding-ſchools, &c. As, riding the great horſe, dancing, fencing, vaulting, drawing fortifications, &c.

EXERGASIA, Εξεργασια, *Expoſition*, in *Rhetoric*, a figure, conſiſting of ſeveral equivalent expreſſions, or ſuch as are nearly ſo, in order to repreſent the ſame thing in a ſtronger manner.

EXERGUM, Exergue, or Exerge, among *Medalliſts*, a word, motto, date, or the like, ſometimes found under the ground, whereon the figures are repreſented.

The word is derived from the Greek εξ, and εργον, *opus*, *work*. Evelyn often writes it *exurge*.

Exergues are moſt commonly placed on the reverſes, though ſometimes, alſo, on the fronts, or face-ſides, of medals.

EXFOLIATION, compounded of *ex*, and *folium*, *leaf*, in *Surgery*, the ſcaling of a bone; or its riſing, and ſeparating in leaves, or laminæ.

Any part of the ſurface of the cranium that has been bared, is liable to *exfoliation*. The wound muſt not be ſtopped too much, but the bone left at liberty to recover itſelf, which it ſometimes does, without *exfoliating*, particularly in children.

EXFOLIATIVE. An *exfoliative* trepan is a trepan proper to ſcrape, and at the ſame time pierce, a bone, and ſo to *exfoliate*, or raiſe, ſeveral leaves, or ſcales, one after another.

The uſe of the *exfoliative* trepan is very dangerous; as being apt to ſhake and diſorder the brain. See Raspatory, and Trepan.

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It is founded on what Euclid ſays in his tenth book; viz. that thoſe quantities whoſe difference is leſs than any aſſignable quantity, are equal; for if they were unequal, be the difference never ſo ſmall, yet it may be ſo multiplied, as to become greater than either of them; if not ſo, then it is really nothing.

This he aſſumes in the proof of prop. 1. book x. which imports, that if, from the greater of two quantities, you take more than its half, and from the remainder more than its half, and ſo continually, there will, at length, remain a quantity leſs than either of thoſe propoſed.

On this foundation it is demonſtrated, that if a regular polygon of infinite ſides be inſcribed in, or circumſcribed about, a circle; the ſpace, which is the difference between the circle and the polygon, will, by degrees, be quite exhauſted, and the circle become equal to the polygon.

EXHEBENUM, in *Natural Hiſtory*, the name of a white and ſmooth ſtone, uſed by the ancient artificers in poliſhing gold. It ſeems to be the ſame with the lapis Samius, a ſmall ſmooth ſtone which they often found in the Samian earth.

EXHEREDATION, Exhæredatio, in the *Civil Law*, with us ordinarily called *diſinheriting*, is the father's excluding his ſon from inheriting his eſtate.

There are fourteen cauſes of *exheredation* expreſſed in Juſtinian's Novel; without ſome one of which cauſes, he decrees the *exheredation* null, and the teſtament inofficious, as the civilians call it.

Indeed, by the ancient Roman law, the father might pronounce *exheredation* without any cauſe; but the rigour of this law was reſtrained, and moderated, by Juſtinian.

EXHIBIT, in *Law*. When a deed, acquittance, or other writing, is, in a chancery ſuit, *exhibited* to be proved by witneſs; and the examiner writes on the back, that it was ſhewed to the witneſs at the time of his examination: this is called an *exhibit*.

EXHIBITION, a producing, or ſhewing, of titles, authorities, and other proofs, of a matter in conteſt.

Anciently, they uſed the phraſe, *exhibition* of a tragedy, comedy, or the like; but now we ſay *repreſentation*, in lieu thereof.

Exhibition, *Exhibitio*, in our *Old Writers*, is uſed for an allowance of meat and drink, ſuch as was cuſtomary among the religious appropriators of churches, who uſually made it to the depending vicar. The benefactions ſettled for the maintaining of ſcholars in the univerſities, not depending on the foundation, are alſo called *exhibitions*.

EXHORTATION, *Hortatio*, in *Rhetoric*, differs only from *ſuaſion*, in that the latter principally endeavours to convince the underſtanding, and the former to work on the affections.

EXHUMATION, of *ex*, *out of*, and *humus*, *ground*, the act of digging up a body interred in holy ground, by the authority of the judge.

In France, the *exhumation* of a dead body is ordered, upon proof that he was killed in a duel. By the French laws, a parſon has a right to demand the *exhumation* of the body of one of his pariſhioners, when interred out of the pariſh, without his conſent.

EXIGENCE, or Exigency, that which a thing requires, or which is expedient and ſuitable thereto.

EXIGENT, in *Law*, a writ which lies where the defendant, in a perſonal action, cannot be found, nor any thing of his within the county, whereby to be attached, or diſtrained.

It is directed to the ſheriff, ordering him to proclaim and call the party five county-court days ſucceſſively, and charge him to appear, under pain of outlawry.

The ſame writ alſo lies in an indictment of felony, where the party indicted cannot be found.

It is called an *exigent*, becauſe it *exigit*, i. e. *exacts*, or requires the party to appear, or, by forthcoming, to anſwer the law. If he appear not at the laſt day's proclamation, he is ſaid to be *quinquies exactus*, and then is outlawed. See Outlawry.

EXIGENTERS, four officers of the court of common pleas, who make all *exigents* and proclamations, in all actions where the proceſs of outlawry lies.

Anciently, the making writs of *ſuperſedeas* upon ſuch *exigents* as paſſed in their offices, did likewiſe belong to them; but this branch of buſineſs was taken from them under king James I. and committed to a particular officer in the court of common-pleas, created by patent. See Supersedeas.

EXILE, *baniſhment*. See Banishment.

Among the Romans, the word *exile*, *exilium*, properly ſignified an interdiction, or excluſion from water and fire; the neceſſary conſequence of which was, that the interdicted perſon muſt betake himſelf into ſome other country, ſince there was no living without fire and water. Thus, Cicero, Ad Herenn. obſerves, that the form of the ſentence did not expreſs *exile*, but only *aquæ & ignis interdictio*. See Interdiction.

The ſame author remarks, that *exile* was not properly a puniſhment, but a voluntary flying, or avoiding the puniſhment decreed: Exilium *non eſſe ſupplicium, ſed perfugium, portuſque ſupplicii*. Pro Cæcina.

He adds, that there was no crime among the Romans, as among other nations, puniſhed with *exile*; but *exile* was a recourſe people flew voluntarily to, in order to avoid chains, ignominy, ſtarving, &c.

The Athenians frequently ſent their generals, and great men, into *exile*, out of envy of their merits, or diſtruſt of their too great authority.

Exile is ſometimes alſo uſed for the relegating a perſon into a place, whence he is obliged not to ſtir without leave.

The word is derived from the Latin *exilium*, or from *exul*, a baniſhed perſon; and that, probably, from *extra ſolum*, out of his native ſoil.

Figuratively, we uſe the phraſe, *honourable exile*, for an office, or employment, which obliges a man to reſide in ſome remote or diſagreeable place.

Under the reign of Tiberius, remote employments were a kind of myſterious *exiles*. A biſhoprick, or even a lord-lieutenancy, in Ireland, has been ſometimes deemed a kind of *exile*. A reſidence, or embaſſy, in ſome barbarous country, is alſo a ſort of *exile*.

EXILIUM, in *Law*, ſignifies a ſpoiling; and, by the ſtatute of Marlbridge, it ſeems to extend to the injury done to tenants, by altering their tenure, ejecting them, &c. And this is the ſenſe that Fleta determines; who diſtinguiſhes between *vaſtum*, *deſtructio*, and *exilium*. For he tells us, that *vaſtum* and *deſtructio* are almoſt the ſame, and are properly applied to houſes, gardens, or woods; but *exilium* is when ſervants are enfranchiſed, and afterwards unlawfully turned out of their tenements. Flet. lib. i. cap. 11. Stat. Marlb. cap. 25.

EXINANITION, the ſame as Evacuation.

EXISTENCE, that whereby a thing has an actual eſſence, or is ſaid *to be*, *eſſe*.

The notion of *exiſtence* is applicable not only to a created but an uncreated ſubſtance: but it muſt be added, that the *exiſtence* of created ſubſtances, and eſpecially corporeal ones, implies a reſpect to place, time, and even an efficient cauſe; whence the ſchoolmen generally define it, that whereby a thing is formally and extrinſically without [*extra*] its cauſes, and that here, and now.

Exiſtence and eſſence come very near the nature of each other; in effect, they only differ in that we have different manners of conceiving the ſame thing.

For, 1. Eſſence is uſually explained either by the firſt, nobleſt, and radical attribute of the thing, e. gr. that of body, by extenſion; that of mind, by thinking, &c. or by ſpecifying all the intrinſic attributes; and *exiſtence*, either by ſpecifying all place, and all time, as in that of God; or by ſpecifying ſome definite place, and time, together with the cauſe, as in the creatures.

2. The foundation and occaſion of this diſtinction is this; that eſſence belongs to the queſtion, *What is it? Quid eſt?* but *exiſtence* to the queſtion, *Is it? An eſt?*

3. *Exiſtence* neceſſarily pre-ſuppoſes eſſence, and cannot be conceived without it; but eſſence may be conceived without *exiſtence*; in that eſſence belongs equally to things that are in *potentia*, and in *actu*; but *exiſtence* only to thoſe in *actu*. Note, however, that this does not obtain in God, about whoſe nature and eſſence the mind cannot think without conceiving his *exiſtence*.

We have divers ways of arriving at the knowledge of the *exiſtence* of things. Our own *exiſtence* we know by intuition; the *exiſtence* of a God, by demonſtration; and that of other things, by ſenſation.

As for our own *exiſtence*, we perceive it ſo plainly, that it neither needs, nor is it capable of any proof. In every act of ſenſation, reaſoning, or thinking, we are conſcious to ourſelves of our own being, and in this matter come not ſhort of the higheſt degree of certainty.

As to our knowledge of the *exiſtence* of a god, though he has given us no innate ideas of himſelf, yet, having furniſhed us with faculties of ſenſe, perception, and reaſon, we can never want a clear proof thereof. See God.

The knowledge of the *exiſtence* of other things, i. e. of external objects, bodies, a world, &c. we only have by ſenſation; for there being no neceſſary connection of real *exiſtence* with any idea a man hath in his memory, nor of any other *exiſtence* but that of God, with the *exiſtence* of any particular man; no particular man can know the *exiſtence* of any other being, but only when, by actually operating upon him, it makes itſelf be perceived by him. The having the idea of any thing in our mind, no more proves the *exiſtence* of that thing than the picture of a man evidences his being in the world, or the viſions of a dream make a true ſtory. It is, therefore, the actual receiving of ideas from without that gives us notice of the *exiſtence* of other things, and makes us know that ſomething doth *exiſt* at that time without us, which cauſes that idea in us, though we neither know nor conſider how it doth it.

This notice which we have by our ſenſes, of the *exiſtence* of things without us, though it be not altogether ſo certain as intuition and demonſtration, yet deſerves the name of knowledge, if we perſuade ourſelves, that our faculties act and inform us right concerning the *exiſtence* of thoſe objects that affect them.

Now, beſides the aſſurance of our ſenſes themſelves, that they do not err in the information they give us of the *exiſtence* of things without us, we have other concurrent reaſons; as. 1. It is plain thoſe perceptions are produced in us by exterior cauſes affecting our ſenſes; becauſe thoſe that want the organs of any ſenſe never have the ideas belonging to that ſenſe produced in their minds. 2. Becauſe we find we cannot avoid having thoſe ideas produced in our minds. When our eyes are ſhut, we can at pleaſure recal to our mind the ideas of light or the ſun, which former ſenſations had lodged in our memories; but if we turn our eyes towards the ſun, we cannot avoid the idea which the light or the ſun then produces in us, which ſhews a manifeſt difference between thoſe ideas laid up in the memory, and ſuch as force themſelves upon us, and we cannot avoid having; beſides, there is no one who doth not perceive the difference in himſelf between actually looking upon the ſun, and contemplating the idea he has of it in his memory; and therefore he hath certain knowledge, that they are not both memory or fancy. 3. Add to this, that many ideas are produced in us with pain, which we afterwards remember without the leaſt offence; thus, the pain of heat, or cold, when the idea of it is received in our minds, gives us no diſturbance, which, when felt, was very troubleſome; and we remember the pain of hunger, thirſt, head-ach, &c. without any pain at all, which would either never diſturb us, or elſe conſtantly do it, as often as we thought of it, were there nothing more but ideas floating in our minds, and appearances entertaining our fancies, without the real *exiſtence* of things affecting us from abroad. 4. Our ſenſes, in many caſes, bear witneſs to the truth of each others report concerning the *exiſtence* of ſenſible things without us: he that doubts, when he ſees a fire, whether it be real, may feel it too if he pleaſes; and, by the exquiſite pain, may be convinced, that it is not a bare idea or phantom. Such is Mr. Locke's demonſtration of the *exiſtence* of external bodies.

The ingenious Dr. Berkeley has a different ſyſtem: external bodies, he contends, have no *exiſtence*, but in a mind perceiving them; that is, they only *exiſt*, *quatenus*, they are perceived; and of this he has given us what he and many others account a demonſtration.

In reality, "that neither our thoughts, paſſions, nor ideas, formed by the imagination, exiſt without the mind, he obſerves, is allowed; and that the various ſenſations impreſſed on the mind, whatever objects they compoſe, cannot exiſt otherwiſe than in a mind perceiving them, is not leſs evident. This appears from the meaning of the term *exiſt*, when applied to ſenſible things. Thus, the table I write on, *exiſts*, i. e. I ſee and feel it; and were I out of my ſtudy, I ſhould ſay it *exiſted*; i. e. that were I in my ſtudy I ſhould ſee and feel it as before. There was an odour; i. e. I ſmelt it, &c. but the *exiſtence* of unthinking beings, without any relation to their being perceived, is unintelligible, their *eſſe* is *percipi*." The notion of bodies, he endeavours to ſhew, is founded on the doctrine of abſtract ideas: "What are light and colours, heat and cold, extenſion and figure; in a word, the things we ſee and feel, but ſo many ſenſations, notions, ideas, or impreſſions on the ſenſe? And is it poſſible to ſeparate, even in thought, any of theſe from perception? The ſeveral bodies, then, that compoſe the frame of the world, have not any ſubſiſtence without a mind: their *eſſe* is to be perceived or known; and as long as they are not perceived by me, nor any other thinking being, they have no ſhadow of *exiſtence* at all. The things we perceive, are colour, figure, motion, &c. that is, the idea of thoſe things; but has an idea any *exiſtence* out of the mind? To have an idea is the ſame thing as to perceive; that, therefore, wherein colour, figure, &c. exiſt, muſt perceive them. It is evident, therefore, there can be no unthinking ſubſtance or ſubſtratum of thoſe ideas: but you may argue, if the ideas themſelves do not exiſt without the mind, there may be things like them, whereof they are copies or reſemblances which exiſt without the mind; it is anſwered, an idea can be like nothing but an idea; a colour or figure can be like nothing elſe but another figure or colour. It may be farther aſked, whether thoſe ſuppoſed originals, or external things, whereof our ideas are the pictures, be themſelves perceivable or not? If they be, they are ideas; if they be not, I appeal to any one, whether it be ſenſe to ſay, a colour is like ſomewhat which is inviſible; hard or ſoft, like ſomewhat intangible, &c. Some diſtinguiſh between primary and ſecondary qualities; the former, viz. extenſion, ſolidity, figure, motion, reſt, and number, they maintain have a real *exiſtence* out of the mind; as for the latter, under which come all other ſenſible qualities, as colours, ſounds, taſtes, &c. they allow the ideas we have of them are not reſemblances of any things exiſting without the mind, or unperceived, but depend on the ſize, texture, motion, &c. of the minute particles of matter. Now, it is certain, that thoſe primary qualities are inſeparably united with the other ſecondary ones, and cannot even in thought be abſtracted from them, and therefore muſt only exiſt in the mind. Can any man conceive the extenſion and motion of a body without its other ſenſible qualities? For my part, I find it impoſſible to frame an idea of a body extended and moving, without giving it ſome colour, &c. In effect, extenſion, figure, and motion, abſtracted from all other qualities, are inconceivable; where the others, therefore, are, there theſe too muſt be, i. e. in the mind, and no where elſe. Again, great and ſmall, ſwift and ſlow, are allowed to exiſt no-where without the mind, being merely relative and changing, as the frame or poſition of the organ changes: the extenſion, therefore, that exiſts without the mind, is neither great nor ſmall, the motion neither ſwift nor ſlow; i. e. they are nothing. That number is a creature of the mind, is plain (even though the other qualities were allowed to exiſt) from this; that the ſame thing bears a different denomination of number, as the mind views it with different reſpects; thus, the ſame extenſion is 1, or 3, or 36, as the mind conſiders it, with reference to a yard, a foot, or an inch. Nay, many of the modern geometricians hold, that a finite line may be divided into an infinite number of parts, and each of thoſe infiniteſimals into an infinity of others; and ſo on, *in infinitum*; ſo that the ſame thing is either unity or infinity, either no number or all number. In effect, after the ſame manner as the modern philoſophers prove colours, taſtes, &c. to have no *exiſtence* in matter, or without the mind; the ſame thing may be proved of all ſenſible qualities whatſoever: thus, they ſay, heat and cold are only the affections of the mind, not at all patterns of real beings exiſting in corporeal ſubſtances; becauſe the ſame body which ſeems cold to one hand ſeems warm to another. Now, why may we not as well argue, that figure and extenſion are not patterns or reſemblances of qualities exiſting in matter; becauſe to the ſame eye, at different ſtations, or to eyes of different ſtructure, at the ſame ſtation, they appear various? Again, ſweetneſs, it is proved, does not exiſt in the thing ſapid, becauſe the thing remaining unaltered, the ſweetneſs is changed to bitterneſs, as in a fever, or by an otherwiſe vitiated palate. Is it not as reaſonable to ſay, that motion does not exiſt out of the mind? ſince, if the ſucceſſion of ideas in the mind become ſwifter, the motion, it is acknowledged, will appear ſlower, without any external alteration. Again, were it poſſible for ſolid figured bodies to exiſt out of the mind, yet it were impoſſible for us ever to know it: our ſenſes, indeed, give us ſenſation of ideas, but do not tell us that any things exiſt without the mind, or unperceived, like thoſe which are perceived: this the materialiſts allow. No other way therefore remains, but that we know them by reaſon's inferring their *exiſtence* from what is immediately perceived by ſenſe. But how ſhould reaſon do this, when it is confeſſed, there is not any neceſſary connection between our ſenſations and theſe bodies? It is evident, from the phenomena of dreams, phrenſies, &c. that we may be affected with the ideas we have now, though there were no bodies exiſting without them; nor does the ſuppoſition of external bodies at all forward us, in conceiving how our ideas ſhould come to be produced. The materialiſts own themſelves unable to conceive in what manner body can act on ſpirit, or how it ſhould imprint any idea on the mind. To ſuppoſe, therefore, bodies exiſting without the mind, is little elſe than to ſuppoſe God has created innumerable beings entirely uſeleſs, and ſerving to no purpoſe at all. On the whole, it appears, that the *exiſtence* of bodies out of a mind perceiving them, is not only impoſſible, and a contradiction in terms; but were it poſſible, nay real, it were impoſſible we ſhould ever know it. And again, that ſuppoſing that there are no ſuch things, yet we ſhould have the very ſame reaſon to ſuppoſe there were that we now have. Suppoſe, e. gr. an intelligence affected with the ſame train of ſenſations, impreſſed in the ſame order, and with the ſame vivid-

“ neſs, would it not have all the reaſon to believe the *exiſtence* of bodies repreſented by his ideas that we have? All our ideas and ſenſations are viſibly inactive; nay, the very being of an idea implies paſſiveneſs and inertneſs; ſo that it is impoſſible for an idea to do any thing, or, in ſtrictneſs, be the cauſe of any thing; it cannot, therefore, be the reſemblance or pattern of any active being, unleſs oppoſites can be ſaid to reſemble one another. Now, we find a continual ſucceſſion of ideas in the mind; but theſe, it has been proved, do not depend on any external body as their cauſe; it remains, therefore, that their cauſe is an incorporeal active ſubſtance or ſpirit: for that I am not the cauſe of my own ideas, is plain from this, that when I open my eyes in broad day-light, I cannot help ſeeing various objects. Now, the fixed rules or methods wherein the mind we depend on excites in us the ideas of ſenſe, are called *laws of nature*; theſe we learn by experience, which teaches us, that ſuch and ſuch ideas are attended with ſuch and ſuch other ideas in the ordinary courſe of things. Ideas are not any how, and at random, produced; there is a certain order and connection eſtabliſhed among them like that of cauſe and effect; and there are ſeveral combinations of them made in a very regular artful manner, which we call *bodies*; and the ſyſtem of thoſe, *the world.* In ſtrictneſs, however, the connection of ideas does not imply the relation of cauſe and effect, but only of a mark or ſign of the thing ſignified: the fire I ſee is not the cauſe of the pain I feel, but the mark that forewarns me of it; the noiſe I hear is not the effect of this or that motion or colliſion of natural bodies, but the ſign thereof. The Carteſians own ſomewhat like this: the action of bodies in our organs, ſay they, is not the efficient cauſe of our ideas and perceptions, but only the occaſional cauſe, which determines God to act on the mind, according to the laws of the union of the ſoul and body.” See CAUSE.

Dr. Berkeley, indeed, taking away bodies, takes away what theſe philoſophers account the occaſions of their ideas: “ by an occaſion, he ſays, muſt either be meaut the agent that produces an effect, or ſomething obſerved to accompany or go before it in the ordinary courſe of things; but matter is allowed to be paſſive and inert, and cannot therefore be an agent or efficient cauſe; and this matter primitively, and in itſelf, is allowed imperceivable, and devoid of all particular ſenſible qualities; i. e. it has not this or that particular colour, this or that particular figure, &c. but has colour in the general, figure in the abſtract, &c. but an abſtract is no object of ſenſe; matter, therefore, cannot be the occaſion of our ideas in the latter ſenſe.” See Berkel. Princip. of Human Knowl. See ABSTRACTION.

How far the great argument of the maintainers of a material world from the impoſſibility of God's deceiving us, and from the evidence that he does ſo, if there be no ſuch thing, will go againſt this reaſoning, we leave to the reader. See Stanl. Hiſt. Philoſoph. part xii. p. 8 6. where the objections of the ancient Pyrrhoniſt to the *exiſtence* of bodies are recited.

As to the *exiſtence* of ſpirits, Mr. Locke allows, that our having ideas of them does not make us know that any ſuch things do exiſt without us; or that there are any finite ſpirits, or any other ſpiritual beings, but God. We have ground from revelation, and ſeveral other reaſons, to believe with aſſurance that there are ſuch creatures; but our ſenſes being not able to diſcover them, we want the means of knowing their particular *exiſtence*; for we can no more know that there are finite ſpirits really exiſting by the idea we have of ſuch beings, than by the ideas any one has of fairies or centaurs, he can come to know that things anſwering to thoſe ideas do really exiſt.

EXIT, properly expreſſes the departure of a player from off the ſtage, when he has acted his part.

The word is alſo uſed in a figurative ſenſe, to expreſs any kind of departure, even death.

EXITERIA, Εξιτηρια, in *Antiquity*, oblations or prayers to any of the gods for a proſperous expedition or journey.

There were alſo feaſts under this denomination, which were celebrated by the Greeks with ſacrifices and prayers, when their generals undertook expeditions againſt any enemy.

EXITUS, in *Law*, *iſſues*, the yearly rents or profits of lands or tenements. See ISSUE, &c.

EXLEGALITUS, in *Law*, the ſame with an outlawed perſon. See OUTLAW.

EX MERO MOTU, formal words uſed in the king's charters and letters patent, ſignifying that he does what is contained therein of his own will and motion.

The effect of theſe words is to bar all exceptions that might be taken to the inſtrument, by alledging that the prince in paſſing ſuch charter was abuſed by falſe ſuggeſtion.

EXOCATACŒLUS, in *Antiquity*, a general denomination, under which were included ſeveral grand officers of the church at Conſtantinople; as, the grand œconomus, grand ſacellarius, grand maſter of the chapel, grand ſcevo-phylax or keeper of the veſſels, grand chartophylax, the maſter of the little chapel, and the protecdicus, or firſt advocate of the church.

There are many opinions with reſpect to the etymology of this term. F. Goar apprehends, that all the interior prieſts were called Κατακοιλοι, *catacœli*, q. d. people of a low condition; and that their ſuperiors were called *exocatacœli*, q. d. people out of the number of *catacœli*, or above them. Upon the whole, however, he adheres to the ſentiment of G. Coreſius, who ſays, that the patriarchal palace, and the apartments of the ſyncellus, and of the monks in the patriarch's ſervice, were in a very low part of the city, which, with regard to the reſt, ſeemed a valley or pit; and that the officers above mentioned had their ſeveral houſes or palaces εξω, out of the valley; whence the name *exocatacœli*. M. Du-Cange derives the appellation from their being above the level or rank of the other clerks, and ſeated at church, &c. in more honourable places erected for that purpoſe on either ſide of the patriarch's throne.

The *exocatacœli* were of great authority: in public aſſemblies they had the precedence of biſhops; and in the patriarchate of Conſtantinople did the office of deacons, as the cardinals originally did in the church of Rome. Accordingly, in the letter of John IX. to the emperor Baſilius Leo, they are called *cardinales*.

At firſt they were prieſts; but ſome patriarchs of Conſtantinople, whom Codin does not mention, would have them for the future to be no more than deacons. The reaſon was, that being prieſts, each of them had their ſeveral churches, wherein they were to officiate on all the grand feſtival days; ſo that it unhappily fell out, the patriarch on the moſt ſolemn days was deſerted by all his chief miniſters.

EXOCIONITÆ, EXOCIONITES, in *Church Antiquity*. The Arians were firſt called *Exocionites*; becauſe, when expelled the city by Theodoſius the Great, they retired into a place called *Exocionium*, and there held their aſſemblies. Juſtinian gave the orthodox all the churches of the heretics, excepting that of the *Exocionites*.

The word is derived from Εξακιονιον, or Εξωκιονιον, the name of the place above-mentioned. Codin, in his Origines, ſays, that the *Exocionium* was a place encompaſſed with a wall, built and adorned by Conſtantine; and that without the circumference of the wall there was a column, with a ſtatue of that emperor, whence the place took its name, viz. from εξω, *without*, and κιων, *column*.

EXOCŒTUS, in *Ichthyology*, the name of a genus of fiſhes, of the order of *abdominales* in the Linnæan ſyſtem, and in the Artedian, of the malacopterygious or ſoft finned kind; the characters of which are theſe: the branchioſtege membrane contains ten bones, four of which are broad, and are covered by the opercula of the gills, and all of them are very difficult to be counted. The pectoral fins are very long: there is but one fin on the back, and that is placed toward the lower part of it. The ſcales are large. Artedi and Linnæus enumerates only two ſpecies of this genus. See Tab. Fiſh. No. 41. and art. FLYING-*fiſh*.

EXODIARY, EXODIARIUS, in the *Ancient Roman Tragedy*, was a droll, or mime, who appeared on the ſtage when the tragedy was ended, and performed what they called the *exodium*, or concluſion of the ſhew, to divert the company.

EXODIUM, Εξοδιον, in the *Ancient Greek Drama*, was one of the four parts or diviſions of a tragedy.

The word is formed from the Greek, εξοδος, *going out, digreſſion*, of εξ and οδος, *way, road.* Feſtus, lib. v. calls it *exitus*.

The *exodium*, according to Ariſtotle, was ſo much as was rehearſed after the chorus had ceaſed to ſing for the laſt time; ſo that *exodium* with them was far from being what the epilogue is with us, as ſeveral people have imagined it was.

The *exodium* was ſo much of the piece as included the cataſtrophe and unravelling of the plot; which cataſtrophe, &c. in pieces regularly compoſed, always began after the laſt ſinging of the chorus, anſwering nearly to our fourth and fifth acts. M. Dacier's Comment. on Ariſtotle's Poetics, chap. 12. See CATASTROPHE and CHORUS.

Among the Romans the *exodium* was a different thing; it was pretty nearly what farces are with us. After the tragedy was over, came a pantomime on the ſtage, called ed the *exodiarius*, who, by his grimace, jeſting and buffoonery, diverted the people, compoſed their minds, and wiped away the tears which the tragic ſpectacle had occaſioned to be ſhed.

Viginere on T. Livy, ſays, the *exodium* conſiſted of certain humorous, drolling verſes, rehearſed by the youth at the end of the *fabulæ atellanæ*, and anſwering to our farces. In another place, the ſame author ſays, that the *exodia* were a kind of interludes in the intervals between the acts, partly ſable and pleaſantry, partly muſic, &c. to give time both for the ſpectators and actors to recover breath. The paſſage in Livy whence he takes the notion is lib. vii. dec. 1. *Ridicula intexta verſibus, quæ juventus inter ſe more antiquo jactare cœpit, eaque conſerta ſunt fabulis potiſſimum atellanis.* See alſo Juvenal:

> *Urbicus* exodio *riſum movet atellanæ*
> *Geſtibus Antonoes.*

Exodium, in the *Septuagint*, ſignifies the end or concluſion of a feaſt.

The Hebrew text calls the day עערת, which the ſeventy render Εξοδιον.

In particular, *exodion* is uſed for the eighth day of the feaſt of tabernacles, which, it is ſaid, had a ſpecial view to the commemoration of the Exodus, or departure out of Egypt, though there is nothing of it expreſſed in ſcripture.

Exodium, was alſo the name of a ſong ſung at the concluſion of a meal or feaſt.

EXODUS, the ſecond of the five books of Moſes.

The word in its original Greek, Εξοδος, literally imports a *going out*, or *journey*; and was applied to this book, becauſe the hiſtory of the Iſraelites' paſſage out of Egypt is related therein. Beſide this, it contains the ſtory of what was tranſacted in Egypt from the death of Joſeph to the delivery of the Jews; as well as what paſſed in the wilderneſs, and particularly at mount Sinai, to the building of the tabernacle.

The Hebrews call it *veelle ſemoth*, q. d. *hæc nomina*, theſe are the initial words of the book; for the ſame reaſon they call Geneſis, *bereſith*, q. d. *in principio*, *in the beginning*.

EX OFFICIO, denotes the power a perſon has in virtue of his office, to do certain things without being applied to.

By a branch of ſtatute 1 Eliz. the queen, by her letters patent, might authoriſe any perſons exerciſing eccleſiaſtical juriſdiction to adminiſter an oath, *ex officio*, whereby ſuppoſed offenders were forced to confeſs, accuſe, or clear themſelves of any criminal matter, &c. but this branch relating to this oath is repealed by 17 Car. I. cap. 11.

Ex officio *Informations*. See Informations.

EXOLICETUS, in *Natural Hiſtory*, a name uſed among the writers of the middle ages, to expreſs a ſmall ſtone which had ſuch a variety of colours that it dazzled, as they ſay, people's eyes in looking at them. It is ſaid to have been found in Lybia. The name is probably only a corruption of the hexacontalithos of Pliny and the older writers; and this ſeems to have been no other than a name for the opal.

EXOMIS, of εξ, *out of*, and ωμος, *ſhoulder*, in *Antiquity*, a ſtrait narrow garment through which the ſhoulders appeared. It had ſomething in common with the tunic, and ſomething with the pallium. It was worn by ſlaves, ſervants, and the lower claſſes of people among the Romans.

EXOMOLOGESIS, Εξομολογησις, formed of Εξομολογεω, *I confeſs*, a term little uſed but in ſpeaking of the ancient ceremonies of repentance, whereof the *exomologeſis*, by us called *confeſſion*, was a part.

Some of the ancients, and particularly Tertullian, de Pœnit. cap. 9. uſe the word in a greater latitude, as comprehending the whole of repentance.

A public *exomologeſis* was never commanded by the church for ſecret ſins, as may be ſeen in the capitulars of Charlemagne, and the canons of divers councils.

EXOMPHALUS, Εξομφαλος, of εξ, *out*, and ομφαλος, *navel*, in *Surgery*, a general name, comprehending all kinds of navel-ruptures. The firſt are tumours or ſwellings of the ſolid parts, whereof there are three varieties, denominated from the ſeveral parts affected, as the *enteromphalus*, *epiplomphalus*, and *entero-epiplomphalus*. The ſecond are tumours formed by collections and gatherings of humours, of which there are four varieties, diſtinguiſhed by the particular humours they are formed of, as the *hydromphalus*, *pneumatomphalus*, *ſarcomphalus*, and *varicomphalus*. The third are thoſe compounded of both the other, viz. the *enterohydromphalus* and *epiploſarcomphalus*. See each ſpecies under its ſeveral head.

In one of thoſe caſes which Mr. Mery has given an account of, the infant was born alive, but died after fourteen hours; the tumour was very large; and on opening it the liver, ſpleen, ſtomach, and inteſtines, were found all incloſed in it; yet its aperture at the navel was but little more than an inch in diameter. The moſt natural conjecture in this caſe, ſeemed that the viſcera had been forced out of the body by ſome accident during pregnancy, and that the peritoneum, as they enlarged in growth, had extended itſelf by degrees to the dimenſions of this ſack: but, on a ſtrict enquiry, the ſack was found to be compoſed of a double membrane; ſo that it could not be a production of the peritoneum, which is ſingle, but it muſt neceſſarily have been an extenſion of the membranes of the placenta, which, uniting, form the umbilical cord; and it was not leſs eaſy to determine that the viſcera could not have been forced out of the body when at any conſiderable growth, as the aperture was ſo ſmall, the liver alone being of ſix times its diameter. It appears, therefore, that in theſe caſes the viſcera get out while very ſmall, and grow and enlarge in their unnatural ſituation. The parent of the infant being aſked if ſhe had received any injury during her pregnancy, could not recollect any; but only obſerved, that while young with child, ſhe had been very ſtrongly affected by the ſight of the entrails of an ox hanging out of its belly at a butcher's. Mem. Acad. Par. 1716. See Hernia.

EXONEIROSIS, from εξ, *out*, and ονειρὸς, *dream*, a nocturnal pollution or emiſſion of the ſemen in dreams. This, if it happens but rarely, is uſually a ſign only of redundant vigour; but if it happens frequently, is a ſign of weakneſs of the ſeminal veſſels, which is moſt frequently the caſe.

EXONERATIONE *ſectæ*, in *Law*, a writ that lay for the king's ward, to be freed from all ſuit to the county-court, hundred-court, leet, &c. during the wardſhip. F. N. B. 158.

EXONYCHOS, of εξω, *without*, ονυξ, and *nail*, in *Botany*, a name given by ſome of the ancient writers, among whom are Dioſcorides and Pliny, to the GROMWELL or lithoſpermum. See Œgonychus.

EXOPHTHALMIA, of εξ, *out*, and οφθαλμος, *eye*, in *Surgery*, is a protuberance of the eye out of its natural poſition.

EXORCISM, Εξορκισμος, prayers or conjurations wherewith to *exorciſe*, i. e. drive out devils or demons from perſons apprehended to be poſſeſſed, or to preſerve from danger. The word is derived from the Greek, εξορκιζειν, *adjurare*, *conjurare*, *to adjure*, or *conjure*. In moſt dictionaries, *exorciſm* and conjuration are uſed as ſynonymous; but, in reality, conjuration is only a part of the *exorciſm*; and the *exorciſm* the ceremony entire. The conjuration is properly the formula, where the devil is commanded to come forth, &c.

Exorciſms are of great uſe in the Romiſh church: their prelates, &c. are frequently exorciſing dæmoniacal perſons. The prieſts make holy water by exorciſing common water a certain number of times. In reality, the *exorciſm* is a part in moſt of their conſecrations.

Exorciſms had anciently another and farther purpoſe; being applied by way of trial or purgation to extort the truth from the accuſed.

The *exorciſm*, in this ſenſe, was a ſort of bread conjured and exorciſed for the purpoſe; and the opinion was, that if the perſon was criminal he could not ſwallow the bread.

This, it ſeems, was a frequent practice in the time of our Edward III. and the bread thus exorciſed was ſaid to be corsned.

Linderbroeck gives inſtances of *exorciſms* with barley-bread, and others with cheeſe; and hence, probably, might ariſe that popular imprecation, "May this bread "choak me, if I tell a lye." See Ordeal and Judicium *Dei*.

EXORCIST, in the *Romiſh Church*, a prieſt, or tonſured clerk who has received the four leſſer orders, one of which is that of *exorciſt*.

The term is likewiſe applied to a prelate, or to a prieſt delegated by a prelate, who actually exorciſes a perſon poſſeſſed.

It is a diſpute among divines whether ever the Greeks had any ſuch order as that of *exorciſt*. Fa. Goar, in his Notes on the Greek Euchologion, has made it probable they had, from ſeveral concurring paſſages in St. Dionyſius and St. Ignatius Martyr.

The ordination of *exorciſts* is performed in the time of maſs, their principal office being to expel devils. The fourth council of Carthage, can. 7. appoints, that in the ordination of *exorciſts*, the biſhop, putting the book of exorciſms in their hands, ſhall ſay theſe words: "Receive it, and keep it in remembrance, and have power "to lay hands on *energumeni*, whether baptiſed or catechumens;" which form ſtill obtains.

M. Fleury mentions certain people among the Jews who travelled round the country, making profeſſion of driving out devils by invocations, which, they pretended, had been taught them by Solomon: theſe were alſo called *exorciſts*. See Joſeph. Antiq. Jud. lib. viii. cap. 2. Origen. Tract. xxxv. in Matt. 35. 63.

EXORDIUM, in *Oratory*, the preamble, or beginning of a diſcourſe or ſpeech, ſerving to prepare the audience, and introduce the matter in hand.

The word is formed from the Latin, *ordiri*, *to begin*, by a metaphor taken from the weavers, who are ſaid, *ordiri telam*, *to begin* or *warp* a web by diſpoſing and ordering the threads in a certain manner for the future work. See WARP.

The *exordium*, on other occaſions, is called the *prologue*, *prælude*, *and proem*.

Cicero defines *exordium*, a part of an oration, whereby the minds of the audience are duly prepared for what remains to be ſaid. The *exordium* is a part of principal importance, and is to be laboured with extraordinary care; whence Tully calls it *difficillima pars orationis*.

Exordiums are of two kinds; either juſt and formal, or vehement and abrupt. In the firſt, the audience is prepared and conducted by due and eaſy ſteps; in the ſecond, the orator, as if ſeized with ſome ſudden paſſion, breaks out upon his audience at once. Such is that *exordium* of Iſaiah; *Hear, Oh heavens! and give ear, Oh earth!* Or that of Cicero againſt Catiline: *Quouſque tandem abutere patientia noſtra, Catilina?* Abrupt *exordiums* are the moſt ſuitable on occaſions of extraordinary joy, indignation, or the like; though we have inſtances of panegyrics of the greateſt orators, begun abruptly, without any ſuch occaſions. Such is that of Gorgias, who began his eloge of the city and people of Elis with Ηλις, ϖολις ευδαιμων, *Elis beata civitas*. Abrupt, haſty, *exordiums*, were more to the taſte and manner of the Greeks than of the Latins. The objects which the orators ſhould have in view in this part of his diſcourſe are to gain the good opinion of his hearers, to ſecure their attention, and to give them ſome general notion of his ſubject; and therefore, the requiſites in an *exordium* are, 1. *Propriety*, whereby the *exordium* appears eaſy and natural, becomes of a-piece with the whole diſcourſe, and matches it, as a part does the whole; ſo that it could not be accommodated to any other, or, perhaps, a contrary occaſion. The ancient orators were very defective in this point; their *exordiums* had frequently nothing in common with the ſubject.

2. *Modeſty*, or an ingenious baſhfulneſs, which recommends the orator exceedingly to the favour of his audience. This is what Cicero extols ſo much in L. Craſſus, *Fuit enim in L. Craſſo pudor quidnam, qui non modo non obeſſet ejus orationi, ſed etiam probitatis commendatione prodeſſet.* The ſame Tully owns of himſelf, that at the beginning of his oration every limb trembled, and his whole mind was in a flutter. The vain-glory of that author ſhould be carefully avoided, of whom Horace ſpeaks, and who began his poem *Fortunam Priami cantabo & nobile bellum.*

3. *Brevity*, not amplified or ſwelled with a detail of circumſtances, or a long circuit of words; and in this reſpect it ſhould be accommodated to the length of the diſcourſe.

4. The ſtyle of the *exordium* ſhould be juſt, eaſy, and pleaſant. Quintilian facetiouſly compares a faulty *exordium* to a ſcarred face, which is preſently diſcerned, and very diſagreeable. Thus Cicero, *Veſtibula, aditusque ad cauſam facias illuſtres.*

The *exordium* appears an eſſential part of an oration; though anciently, in the Areopagus, Julius Pollux tells us they ſpoke without any *exordium*, and paſſions, and any peroration or epilogue. The like is ſaid to have been done by Xenophon, who began thus: *Darius & Pariſatis duos habuere filios.*

EXORMISTOS, in *Ichthyology*, a name given by ſome of the old writers to that ſpecies of the *petromyzon* which other authors call the *lampetra fluviatilis*, and we in Engliſh the *lampern*. This is diſtinguiſhed by Artedi by the name of the *petromyzon*, with only one ſeries of ſmall teeth in the verge of the mouth, and ſome large ones below. See MUSTELA, LAMPETRA, and PETROMYZON.

EXOS *piſcis*, in *Ichthyology*, a name given by Geſner and Rondeletius to the fiſh which we call the *buſo* or *ichthyocollis piſcis*, from the drug called *ichthyocolla*, or *iſinglaſs*, being procured from it. It is properly a ſpecies of the accipenſer, and is diſtinguiſhed from the common STURGEON by its having no tubercles. See ACCIPENSER.

EXOSTOSIS, from εξ, *out*, and οςεον, *a bone*, in *Anatomy*, is properly an acute eminence or excreſcence, puſhing preternaturally above the bone, but creating ſometimes no diſturbance, pain, or deformity, and unaccompanied with a caries or ſpina ventoſa. When this is the caſe, it is always beſt to let it alone; for the attempt to remedy often proves much worſe than the diſeaſe; and by laying the bone bare, a caries, or other inconvenience is brought on. On the other hand, when this diſorder occaſions pain or deformity, or impedes any action, or produces other miſchief, it may be remedied by taking off the protuberant part of the bone in the ſame manner as in caſes of the SPINA *ventoſa*.

EXOSTRA, in the *Ancient Theatre*, a place where ſuch parts of the play were recited as were ſuppoſed to be acted privately in the houſe.

EXOSTRA, was likewiſe the name of a warlike engine uſed in the ſieges of towns.

EXOTERIC and **ESOTERIC**, are terms denoting *external* and *internal*, and applied to the double doctrine of the ancient philoſophers: the one was public, or *exoteric*; the other ſecret, or *eſoteric*. The firſt was that which they openly profeſſed and taught to the world; the latter was confined to a ſmall number of choſen diſciples. This method was derived originally from the Egyptians, who, according to the united teſtimony of Herodotus, Diodorus Siculus, Strabo, Plutarch, &c. had a twofold philoſophy, one ſecret and ſacred, another public and common. The ſame practice alſo obtained among the Perſian Magi, the Druids of the Gauls, and the Brachmans of India. The Egyptian prieſts, with whom it originated, ſuſtained the character of judges and magiſtrates, and probably introduced this diſtinction with a view to the public welfare, and to ſerve the purpoſes of legiſlation and government. Clement of Alexandria informs us, that they communicated their myſteries principally to thoſe who were concerned in the adminiſtration of the ſtate; and Plutarch confirms the ſame declaration. However, others have ſuppoſed that they invented the fables of their gods and heroes, and the other external ceremonies of their religion, to diſguiſe and conceal natural and moral truths; but whatever was the motive of their practice, it was certainly applied to political purpoſes.

EXOTIC, Εξωτικος, a term properly ſignifying *foreign*, or *extraneous*, i. e. brought from a remote or ſtrange country. In which ſenſe we ſometimes ſay, *exotic*, or *barbarous terms* or *words*, &c.

The word is derived from the Greek, εξω, εξωθεν, *extra*, *without*, *on the outſide*.

EXOTIC, is chiefly applied to plants which are natives of foreign countries, particularly thoſe brought from the Eaſt and Weſt Indies, and which do not naturally grow in Europe.

The generality of *exotics*, or *exotic* plants, do not thrive in England without ſome peculiar care and culture; they require the warmth of their own climates; whence the uſe of hot-beds, glaſs-frames, green-houſes, &c. See GREEN-*houſe*, and STOVE.

In ſending plants from one country to another, great cautions are neceſſary. The plants ſent from a hotter country to a colder ſhould be always put on board in the ſpring of the year, that the heat of the ſeaſon may be advancing as they approach the colder climates; and on the contrary, thoſe which are ſent from a colder country to a hotter ſhould be ſent in the beginning of winter.

The beſt way of packing up plants for a voyage, if they be ſuch as will not bear keeping out of the earth, is to have boxes with handles, filling them with earth, and planting the roots as cloſe together as may be; the plants ſhould be ſet in theſe boxes three weeks before they are to be put on board; and in good weather they ſhould be ſet upon the deck, and in bad removed or covered with a tarpaulin.

If they are going from a hotter country to a colder one, they muſt have very little moiſture; if, on the contrary, they are going from a colder to a warmer, they may be allowed water more largely; and being ſhaded from the heat of the ſun, they will come ſafe.

Many plants, however, will live out of the earth a great while; as the ſedums, euphorbiums, ficoides, and other ſucculent ones. Theſe need no other care than the packing them up with moſs in a cloſe box; and there ſhould be a little hay put between them, to prevent them from wounding or bruiſing one another, and holes bored in the boxes to keep them from heating and putrefying. In this manner they will come ſafe from a voyage of two or three, or even four or five months.

Several trees alſo will come ſafely in the ſame manner, taking them up at a ſeaſon when they have done growing, and packing them up with moſs. Of this ſort are oranges, olives, capers, jaſmines, and pomgranate-trees. Theſe, and many others, are annually brought over thus from Italy; and though they are three or four months in the paſſage, ſeldom miſcarry. And the beſt way of ſending

ing over ſeeds is in their natural huſks, in a bag, or packed up in a gourd-ſhell, keeping them dry, and out of the way of vermin. Miller.

Dr. Liſter has a diſcourſe in the Philoſoph. Tranſ. on *Exotic Diſeaſes*, i. e. ſuch diſeaſes as are never bred among us, but brought, from time to time, by infection, from other countries. Such, according to this author, are, 1. The *plague*, which is properly a diſeaſe of Aſia, where it is epidemic. 2. The *ſmall-pox*, which is an oriental diſeaſe, and not known to Europe, or even Aſia Minor or Africa, till a ſpice-trade was opened to the remoteſt part of the Indies, whence it originally came, and where it ſtill rages more cruelly than among us. 3. The *griping of the guts*, which he takes for a diſeaſe peculiar to the Weſt Indies, and yearly received from thence: for this, he adds, is a quite different diſeaſe from the *tormina ventris* of the ancients, and is ſcarce ever known in the mid-land countries, or far in the North of England.

EXOUCONTII, in *Church Hiſtory*, a kind of Arian heretics, who maintained that the Son of God was made out of nothing: i. e. 'Εκ των ὐκ ὄντων, ſuppoſed by Gothofred to be the ſame with the Exocionitæ; but this opinion is contradicted by the authority of Theodoret.

EXPANSION, in *Metaphyſics*, expreſſes the idea we have of laſting, or preſerving diſtance, i. e. of diſtance, all the parts whereof exiſt together.

Expansion, in *Phyſics*, is the dilating, ſtretching, or ſpreading out of a body; whether from any external cauſe as the cauſe of rarefaction, or from an internal cauſe, as elaſticity. Bodies naturally expand by heat beyond their dimenſions when cold, whence their ſpecific gravities are different at the different ſeaſons of the year. Air compreſſed or condenſed, as ſoon as the compreſſing or condenſing force is removed, expands itſelf by its elaſtic power to its former dimenſions.

Dr. Halley found by experiment, that water expands itſelf by one twenty-ſixth part of its bulk, when made to boil; but a moderate heat does not induce any ſenſible *expanſion* at all. Mercury, with a very gentle heat, expands itſelf one ſeventy-fourth part of its ordinary dimenſions.

Spirit of wine, with a heat leſs than that of boiling water, expanded itſelf by one-twelfth part of its bulk, and then began to boil. The moſt ſenſible *expanſion* of water is in freezing. Mr. Boyle, in his Hiſt. of Cold, aſſures us, that ice takes up one-twelfth part more ſpace than water. Dr. Gregory, in his Aſtrom. p. 407, proves, that a globe of our air, of an inch diameter, if it were removed to the diſtance of a ſemidiameter of the earth, would expand itſelf ſo as to fill all the planetary region as far as, nay, far beyond the ſphere of Saturn. See Air. Solid bodies, as well as fluid, eaſily expand with heat. See Heat, Pendulum, and Pyrometer.

EXPANSUM *Foliaceum.* See Foliaceum.

EXPARTE, i. e. *partly*, or of *one part*. A *commiſſion ex parte* is that taken out and executed by one part only: where both parties join it is called a *joint commiſſion*. See Commission.

EXPARTE TALIS, in *Law*, a writ that lies for a bailiff or receiver, who, having auditors aſſigned to take his account, cannot obtain of them reaſonable allowance, but is caſt into priſon. The courſe in this caſe is to ſue this writ out of chancery, directed to the ſheriff, to take four mainpernors to bring his body before the barons of the exchequer at a certain day, and to warn the lord to appear at the ſame time. F. N. B. 129.

EXPECTANT *Fee*, in *Law*, where lands are given to a man and his wife, and the heirs of their bodies; in which ſenſe it differs from *fee ſimple*, where lands are given to a man and his wife in frank marriage, to hold to them and their heirs.

EXPECTANCY, *eſtates in*, are of two ſorts; one created by act of the parties, called a remainder; the other by act of law, called a reversion.

EXPECTATION, in the *Doctrine of Chances*, is applied to any contingent event, and is capable of being reduced to the rules of computation. Thus, a ſum of money in *expectation*, when a paricular event happens, has a determinate value before that event happens; ſo that if a perſon is to receive any ſum, e. gr. 10*l.* when an event takes place which has an equal probability of happening and failing, the value of the *expectation* is half that ſum or 5*l.* and in all caſes, the *expectation* of obtaining any ſum is eſtimated by multiplying the value of the ſum expected by the fraction, which repreſents the probability of obtaining it. The *expectation* of a perſon who has three chances in five of obtaining 100*l.* is equal to $\frac{3}{5} \times 100$ or 60*l.* and the probability of obtaining 100*l.* in this caſe is equal to $\frac{60}{100} = \frac{3}{5}$.

If the obtaining of any ſum requires the happening of ſeveral events that are independent on each other, the value of the *expectation* of that ſum is found by multiplying together the ſeveral probabilities of happening, and by multiplying the product by the value of the ſum expected. E. gr. Suppoſe, that in order to obtain 90*l.* two events muſt happen, one of which has three chances to happen and two to fail, and the other has four chances to happen, and five to fail; the value of the *expectation* is $= \frac{3}{5} \times \frac{4}{9} \times 90 = \frac{12}{45} \times 90 = \frac{4}{15} \times 90 = \frac{360}{15} = 24$*l.* for if the firſt event had actually happened, the value of the *expectation*, depending ſolely on the ſecond event, would be $\frac{4}{9} \times 90 = 40$*l.* and therefore the happening of the firſt event is the condition of obtaining an *expectation* worth 40*l.* but the probability of the firſt happening is $\frac{3}{5}$, and the *expectation* ſought for is evidently worth $\frac{3}{5} \times 40 = \frac{3}{5} \times \frac{4}{9} \times 90 = 24$*l.* The rule will be the ſame if an *expectation* depends on the happening of one event and the failing of another; and alſo on the failing of two events; and on the happening or failing of any number of events that may be aſſigned. It is here ſuppoſed that the events are independent, or that the happening of one neither forwards nor obſtructs the happening of the other. But if two events are dependent, i. e. if they are ſo connected together as that the probability of either's happening is altered by the happening of the other, the probability of their happening is the product of the probability of the happening of one of them by the probability which the other will have of happening, when the firſt is conſidered as having happened; and the ſame rule will extend to the happening of any aſſigned number of events: thus, in a heap of thirteen cards of the ſame colour, the probability of taking out the ace is $\frac{1}{13}$; and the probability of taking the ace out of another heap of the ſame number is $\frac{1}{13}$; and the probability of both theſe independent events happening will be $\frac{1}{13} \times \frac{1}{13} = \frac{1}{169}$: but the probability of taking the ace firſt out of a ſingle heap of thirteen cards is $\frac{1}{13}$; and that of taking the deux afterwards is $\frac{1}{12}$; and therefore the probability of both happening is $\frac{1}{13} \times \frac{1}{12} = \frac{1}{156}$. If a perſon has ſeveral *expectations* on ſeveral ſums, the value of his *expectation* on the whole is the ſum of his *expectations* on the particulars: thus, let one event be ſuch that the probability of obtaining any ſum, e. gr. 90*l.* in caſe it happens, may be $\frac{3}{5}$; in which caſe the value of the *expectation* is $\frac{3}{5} \times 90 = 54$*l.* Let the probability of another event, on which depends a ſecond ſum of 90*l.* be $\frac{4}{9}$, and the value of the *expectation* in this caſe is $\frac{4}{9} \times 90 = 40$*l.* and the value of the *expectation* on the whole $54 + 40 = 94$*l.* But if a perſon is to receive 90*l.* once for all for the happening of one or other of the two forementioned events, then, the *expectation* of the firſt event being worth 54*l.* as before, yet the *expectation* of the ſecond will be different; becauſe this depends on the happening of the firſt, and takes place only in caſe the firſt happens to fail, the probability of which is $\frac{2}{5}$; and on the ſuppoſition of its having failed the *expectation* of the ſecond will be 40*l.* therefore, $\frac{2}{5}$ is the meaſure of the probability of obtaining an *expectation* worth 40*l.* and conſequently the *expectation* will be worth $\frac{2}{5} \times 40 = 16$*l.* and the value of the *expectation* on the whole will be $54 + 16 = 70$*l.* See the farther illuſtration and application of theſe principles and rules in De Moivre's Doctrine of Chances, edit. 3. 1776. See Gaming.

Expectation *of Life*, in the *Doctrine of Life-annuities*, denotes, according to the moſt obvious ſenſe of the term, that particular number of years which a life of a given age has an equal chance of enjoying, or the time which a perſon of a given age may juſtly expect to continue in being. But Mr. Simpſon has ſhewn, that this period does not coincide with what the writers on annuities call the *expectation of life*, except on the ſuppoſition of an uniform decreaſe in the probabilities of life; and Dr. Price adds, that even on this ſuppoſition, it does not coincide with what is called the *expectation of life*, in any caſe of joint lives: for two lives of 40 have an even chance, according to M. De Moivre's hypotheſis, (ſee Complement *of life*) of continuing together only $13\frac{1}{2}$ years. According to that hypotheſis, the *probability* that a life aged 40 will continue $13\frac{1}{2}$ years, will be expreſſed by $\frac{32.5}{46}$; and this fraction multiplied by itſelf is the probability that two lives of this age ſhall both continue $13\frac{1}{2}$ years; i. e. $\frac{32.5}{46} \times \frac{32.5}{46} = \frac{1056{,}25}{2116} =$ nearly $\frac{1}{2}$, which repreſents an even chance: but the *expectation* of two joint lives being (according to the ſame hypotheſis) always a third of the common complement, will be in this caſe $15\frac{1}{2}$ years. Therefore, the *expectation of life*, or as it may be otherwiſe called, *the ſhare of life due to a perſon*, is uſed to ſignify the mean continuance of any given ſingle, joint, or ſurviving lives, according to any given table of obſervations; or the number of years, which, taking them one with another, they actually enjoy, and may be conſidered as ſure of enjoying; ſo that if 46 perſons are alive, all 40 years of age, and one be ſuppoſed to die every year, according to Mr. De Moivre's hypotheſis, till they are all dead in 46 years, half 46 or 23 will be their *expectation of life*; i. e. the number of years enjoyed by them all will be juſt the ſame as if every one of them had lived 23 years, and then died; ſo that ſuppoſing no intereſt of money, there would be no difference in value between annuities payable for life to every ſingle perſon in ſuch a ſet, and equal annuities payable to another equal ſet of perſons of the ſame common age, ſuppoſed to be all ſure of living juſt 23 years, and no more.

In like manner, the third of 46 years, or 15 years and 4 months, is the *expectation* of two joint lives both 40; and this is alſo the *expectation* of the ſurvivor. The *expectation of life*, in this laſt ſenſe of the terms, coincides with the ſums of the preſent probabilities, that any given ſingle or joint lives ſhall attain to the end of the firſt, ſecond, third, &c. moments, from this time to the end of their poſſible exiſtence; or (in the caſe of ſurvivorſhips) with the ſum of the probabilities, that there ſhall be a ſurvivor at the end of the firſt, ſecond, third, &c. moments, from the preſent time to the end of the poſſible exiſtence of ſurvivorſhip. From theſe principles Dr. Price has ſhewn how to deduce the demonſtrations of Mr. De Moivre's rules for finding the *expectations of lives*, which he has omitted: we ſhall here ſubjoin them for the information and amuſement of our mathematical readers. Let $\dot{x}$ ſtand for a moment of time, and n be the COMPLEMENT of any aſſigned life; then $\frac{n-\dot{x}}{n}$, $\frac{n-2\dot{x}}{n}$, $\frac{n-3\dot{x}}{n}$, &c. will be the preſent probabilities of its continuing to the end of the firſt, ſecond, third, &c. moments; and $\frac{n-x}{n}$ the PROBABILITY of its continuing to the end of x time; therefore, $\frac{n-x}{n}\times\dot{x}$ will be the fluxion of the ſum of the probabilities, or of an area repreſenting this ſum, whoſe ordinates are $\frac{n-x}{n}$, and axis x. The fluent of this expreſſion, or $x-\frac{x^2}{2n}$, is the ſum itſelf for the time x; and this, when $x=n$, becomes $\frac{1}{2}n$, the *expectation* of the aſſigned life, or the ſum of all the probabilities juſt mentioned for its whole poſſible duration. Thus, $\frac{n-x}{n}\times\frac{n-x}{n}$, or $\frac{\overline{n-x}|^{2}}{n^2}$, is the probability that two equal joint lives will continue x time, and $\frac{\overline{n-x}|^{2}}{n^2}\times\dot{x}$ will be the fluxion of the ſum of the probabilities; the fluent of which, or $x-\frac{x^2}{n}+\frac{x^3}{3n^2}$, becomes, when $n=x$, $\frac{n}{3}$, or the *expectation* of two equal joint lives. Again, ſince $\frac{n-x}{n}\times\frac{2x}{n}$ is the probability that there will be a ſurvivor of two equal joint lives at the end of x time, $\frac{n-x}{n}\times\frac{2x}{n}\times\dot{x}$ will be the fluxion of the ſum of the probabilities; and the fluent, or $\frac{x^2}{n}-\frac{2x^3}{3n^2}$ is, when $x=n$, $\frac{1}{3}n$, or the *expectation* of ſurvivorſhip between two equal lives, which appears to be equal to the *expectation* of their joint continuance. The *expectation* of two unequal joint lives found in the ſame way is $\frac{m}{2}-\frac{m^2}{6n}$, m being the complement of the oldeſt life, and n the complement of the youngeſt. The whole *expectation* of ſurvivorſhip is $\frac{n}{2}-\frac{m}{2}+\frac{m^2}{3n}$; and the *expectation* of ſurvivorſhip of the oldeſt will be to that of the youngeſt as $\frac{m^2}{6n}$ to $\frac{n}{2}-\frac{m}{2}+\frac{m^2}{6n}$.

From the definition already given of the *expectation of life*, it follows, that if in a ſociety limited to a fixed number of members, a 28th part of its members dies annually, 28 would appear to be their common *expectation of life* at the time they entered; and if it were found in any town or diſtrict, where the number of births and burials are equal, that a 20th or 30th part of the inhabitants die annually, it would appear that 20 or 30 was the *expectation* of a child juſt born in that town or diſtrict.

Having a table of obſervations, ſhewing the number that die annually at all ages out of a given number alive at thoſe ages, it is eaſy to find the *expectation* for all ſing lives by the following rule: divide the ſum of all the li ing in the table at the age whoſe *expectation* is required and at all greater ages, by the number in the tab of the living at that age, and ſubtract half unity fro the quotient, the remainder will be the *expectation* re quired.

The reaſon of this ſubtraction may be underſtood b conceiving the recruit neceſſary to ſupply the waſte every year to be made always at the end of the year, that the dividend ought to be the medium between th number living at the beginning and the end of the year and therefore it ſhould be taken leſs than the ſum of th living in the table at and above the given age by half th number that die in the year; but as the diviſor is to th dividend as unit to the quotient, the ſubtraction here directed will have the ſame effect as the aforementioned diminution. This rule may be illuſtrated by taking th ſum of all the living at 20 and upwards in *Tab.* I. and dividing it by 360, the number living at that age, and th quotient leſs half unity, will be nearly 28.9 the *expectati* of 20 in *Tab.* II.

TABLE I.

Shewing the Probability of the Duration of Life in London deduced by Mr. Simpſon from Obſervations on the Bill of Mortality in London for ten Years, from 1728 t 1737.

Ages.	Perſons living.	Decr. of life.	Ages.	Perſons living.	Decr. of life.	Ages.	Perſons living.	Decr. of life.
0	1000	320	27	321	6	54	135	6
1	680	133	28	315	7	55	129	6
2	547	51	29	308	7	56	123	6
3	496	27	30	301	7	57	117	5
4	469	17	31	294	7	58	112	5
5	452	12	32	287	7	59	107	5
6	440	10	33	280	7	60	102	5
7	430	8	34	273	7	61	97	5
8	422	7	35	266	7	62	92	5
9	415	5	36	259	7	63	87	5
10	410	5	37	252	7	64	82	5
11	405	5	38	245	8	65	77	5
12	400	5	39	237	8	66	72	5
13	395	5	40	229	7	67	67	5
14	390	5	41	222	8	68	62	4
15	385	5	42	214	8	69	58	4
16	380	5	43	206	7	70	54	4
17	375	5	44	199	7	71	50	4
18	370	5	45	192	7	72	46	4
19	365	5	46	185	7	73	42	3
20	360	5	47	178	7	74	39	3
21	355	5	48	171	6	75	36	3
22	350	5	49	165	6	76	33	3
23	345	6	50	159	6	77	30	3
24	339	6	51	153	6	78	27	2
25	333	6	52	147	6	79	25	
26	327	6	53	141	6			

TABLE II.

Shewing the *Expectations* of Life in London, according to the preceding Table.

Age.	Expectation.	Age.	Expectation.	Age.	Expectation.
1	27.0	28	24.6	55	14.2
2	32.0	29	24.1	56	13.8
3	34.0	30	23.6	57	13 4
4	35.6	31	23.1	58	13.1
5	36.0	32	22.7	59	12.7
6	36.0	33	22.3	60	12.4
7	35.8	34	21.9	61	12.0
8	35.6	35	21.5	62	11.6
9	35.2	36	21.1	63	11.2
10	34.8	37	20.7	64	10 8
11	34.3	38	20 3	65	10.5
12	33.7	39	19 9	66	10.1
13	33.1	40	19.6	67	9.8
14	32.5	41	19.2	68	9.4
15	31.9	42	18 8	69	9.1
16	31.3	43	18.5	70	8.8
17	30.7	44	18 1	71	8 4
18	30.1	45	17.8	72	8.1
19	29 5	46	17.4	73	7.8
20	28.9	47	17.0	74	7.5
21	28.3	48	16.7	75	7.2
22	27.7	49	16.3	76	6 8
23	27.2	50	16.0	77	6.4
24	26.6	51	15.6	78	6.0
25	26.1	52	15.2	79	5.5
26	25.6	53	14.9	80	5.0
27	25.1	54	14.5		

We ſhall here ſubjoin ſome other tables, calculated by Dr. Price, on account of their connection with the ſubject of this article.

Proportion of inhabitants annually dying in

Pais De Vaud	Country Pariſh in Brandenburg	Holy Croſs, near Shrewsbury	London	Vienna	Berlin
1 in 45	1 in 45	1 in 33	1 in 20¾	1 in 19½	1 in 26½

Ages to which half the born live.

Pais De Vaud	Country Pariſh in Brandenburg	Holy Croſs	London	Vienna	Berlin
41	25½	27	2¼	2	2¾

Proportion of the inhabitants who reach eighty years of age.

Pais De Vaud	Country Pariſh in Brandenburg	Holy Croſs	London	Vienna	Berlin
1 in 21½	1 in 22½	1 in 11	1 in 40	1 in 41	1 in 37

The probabilities of living one year in

Odds	Pais De Vaud.	Country Pariſh, Brandenburg	Holy Croſs	London	Vienna	Berlin
At birth	4¼ to 1	3½ to 1	4½ to 1	2 to 1	1⅕ to 1	1¾ to 1
Age 12	160 to 1	112 to 1	144 to 1	75 to 1	84 to 1	123 to 1
25	117 to 1	110 to 1	100 to 1	56 to 1	66 to 1	50 to 1
3	111 to 1	107 to 1	96 to 1	45 to 1	56 to 1	44 to 1
40	83 to 1	78 to 1	55 to 1	31 to 1	36 to 1	32 to 1
50	49 to 1	50 to 1	50 to 1	24 to 1	27 to 1	30 to 1
60	23 to 1	25 to 1	26 to 1	18 to 1	19 to 1	18 to 1
70	9½ to 1	11 to 1	16 to 1	12 to 1	11 to 1	12 to 1
80	4 to 1	6 to 1	8 to 1	7 to 1	7 to 1	7 to 1

Expectations of life.

	Pais De Vaud	Country Pariſh in Brandenburg	Holy Croſs	London	Vienna	Berlin
At birth	37 y^{rs}	32½ years	33¼ years	18 y^{rs}	16½ y^{rs}	18 y^{rs}
Age 12	44⅕	44	43½	33½	35¾	35½
25	34¾	35½	35	26	28⅓	27⅓
30	31¼	31½	32	23½	25½	25¼
35	27½	28	28¼	21½	22½	22¾
40	24	25	25¾	19½	20½	20¾
45	20½	21½	23¼	17¾	17¼	18¾
50	17½	18	20	16	16	16⅓
55	14½	15	17	14⅕	13½	14
60	12	12¼	14½	12½	11¾	12½
65	9½	9¾	11¼	10½	9¾	10½
70	7½	7½	10	8¾	8½	8½
75	5½	5½	8	7	6½	7
80	4½	4½	5	5	5½	6

Dr. Price has applied his reaſoning on this ſubject to the ſolution of a curious queſtion in political arithmetic, or to determine the number of inhabitants in any place from a table of obſervations, or the bills of MORTALITY for that place, on the ſuppoſition that the yearly births and burials are equal. For this purpoſe, find by the table the *expectation* of an infant juſt born; and this, multiplied by the number of yearly births, will be the number of inhabitants.

It appears from Tab. I. that though an infant juſt born in London has not an equal chance (the probability being $\frac{496}{1000}$) of living 3 years, his *expectation* is 20 years. The medium of the yearly births in London for 10 years from 1759 to 1768 was 15,710, multiply 15,710 by 20, and the product, viz. 314,200 will be the number of inhabitants in London, according to the bills, if the yearly burials were no more than equal to the births, or there were no ſupply of inhabitants from the country: but, during the forementioned period, the burials were at an average 22,956, and exceeded the chriſtenings 7,246, which exceſs gives the annual ſupply from other parts; and if each of theſe have an *expectation* of 30 years, or they are all of the age of 18 or 20, when they remove to London, multiply 30 by 7,246, and the product, viz. 217,380 muſt be added to 314,200, and the ſum, or 531,580 gives the number of inhabitants, ſuppoſing that the bills are perfect: but this is certainly not the caſe; the number both of births and burials is for many obvious reaſons too ſmall. If the annual defects in births and burials were 6000, then 20 × 6000 = 120,000 muſt be added to 531,580, and the whole number of inhabitants would be 651,580. If the burials are deficient only two-thirds of this number or 4000, and the births the whole of it, 20 × 6000 muſt be added to 314,200, on account of the defects in the births; and the exceſs of the burials being then only 5246, 30 × 5246 = 157,380 muſt be added on this account; and the number of inhabitants will be 591,580. If the *expectation of life* in London be diminiſhed to 18 or 17, this number muſt be reduced; and Dr. Price concludes on the whole, from a great variety of obſervations, that 591,580 is neareſt to the true number of inhabitants; though Dr. Brakenridge, allowing 6 to a houſe, makes the number of inhabitaats in London 751,800: but the allowance of 6 to a houſe is certainly too large, as Dr. Price has ſhewn in a variety of inſtances from actual ſurveys; and he obſerves, that though 5 perſons to a houſe may not be much too ſmall an allowance for London, it is too large for England in general. If the number of houſes in England and Wales be reckoned a million, the number of people will be 4½ millions, allowing 4½ to a houſe, and 5 millions, allowing 5 to a houſe. In the year 1690, the number of houſes, according to Dr. Davenant, was 1,319,215; at the Reſtoration it was 1,230,000; in 1759, 986,482; in 1766, 980,692; ſo that between the Reſtoration and Revolution the people of England increaſed above 300,000: ſince the year 1690, they have decreaſed near a million and a half. The number of houſes in Ireland in 1754 was 395,439: In 1767, it was 424,046; and allowing 4½ to a houſe, the number of people in Ireland will be 1,908,207; and if a million and a half are ſuppoſed in Scotland, the number of people in Great Britain and Ireland will be about 8 millions. De Moivre's Doctrine of Chances applied to the Valuation of Annuities, p. 288, &c. Simpſon's Select Exerciſes, p. 253, &c. and particularly Dr. Price's Obſervations on Revertionary Payments, eſſ. i. p. 168, &c. p. 364, &c. 374, &c. or Phil. Tranſ. vol. lix. p. 89. See LIFE-*annuities*, MORTALITY, SURVIVORSHIP.

EXPECTATIVE, in the *Canon Law*, a hope founded on a promiſe of obtaining the next benefice that ſhall become vacant, or a right to the reverſion of the next. See BENEFICE.

EXPECTATIVE *canons*. See CANON.

EXPECTATIVE *graces*, *Gratiæ* EXPECTATIVÆ, called alſo *preventions*, were bulls frequently given by the popes or kings for future benefices. The biſhops were exceedingly mortified with them, becauſe they encroached on their privileges; beſides, that ſuch *expectatives* are odious, as they induce people to wiſh for the death of others.

The uſe of *expectatives* is very ancient, though it was not near ſo frequent in the firſt ages as afterwards. Originally they were no more than ſimple requeſts made on the part of kings or popes, which the biſhops conſented to with the more willingneſs, as they only preſented to them perſons fit to ſerve the church: but the frequent exerciſe of this privilege made it at length be deemed a matter of obligation and neceſſity.

The council of Trent annulled all *expectatives*; but the canons relating thereto were never admitted in France, where the right of conferring *expectative* graces is looked on as one of the regalia.

EXPECTORANTS, in *Pharmacy*, are medicines that promote EXPECTORATION.

As all ſubſtances which promote excretion do not operate in the ſame manner, ſince ſome render the matter moveable and diſpoſe it for evacuation; others open the emunctories, that it may be ſeparated from the juices; and others ſtimulate the veſſels and ducts to an excretory motion; ſo *expectorants* operate in the ſame variety of ways; for if the humour ſecreted be thin and acrid, and the pores of the glands from which it is to be thrown be too much conſtricted, theſe medicines are to be given to promote expectoration, which relax ſoften and widen the paſſages, obtund the acrimony of the humours, and coagulate the too thin and fluid parts of them. To this purpoſe liquorice-root, ſpermaceti, ſaffron, mallows, red poppies, oil of almonds, and the ſtyrax pill, may be given; but when a large quantity of thick and viſcid matter is lodged in the bronchia of the lungs, and impedes reſpiration, then ſome ſtimulus to reſpiration becomes neceſſary, and expectoration muſt be aſſiſted by ſubſtances which can reſolve the tough and viſcid matter. For this purpoſe decoctions of ſcabious and the other pectoral herbs, with the terra foliata tartari, ſolutions of crab's eyes, and antimoniated nitre, are very proper. The nervous coats of the bronchia are alſo ſtimulated to an excretory motion by a certain acrid, ſubtle, and oleous principle, found in gum ammoniac and benjamin, and the like ſtimulating gums.

The roots of elecampane, and florentine orris alſo, and all the preparations of ſulphur, ſerve excellently to this purpoſe; and where a yet ſtronger ſtimulus is required, as in a pituitous aſthma, oxymel of ſquills, and the ſpiritus aſthmaticus, which is prepared with gum ammoniacum and cryſtals of copper, are found remedies of very great power. Great caution is neceſſary in the exhibition of *expectorants*, and the practitioner who gives the common medicines, known by that name at random, and without informing himſelf thoroughly of the nature of the caſe, is likely to do great miſchief inſtead of good by them. In coughs of the moiſt and chronical kind, as alſo in a pituitous aſthma, in which large quantities of phlegm fall into the bronchia of the lungs, ſweet ſubſtances, linctuſes, and oily medicines, weaken the ſtomach, whoſe ſtrength and tone are already too much impaired, diminiſh the appetite, digeſtion, and chylifaction, and not only promote the generation of more recrementitious matter, and the increaſe of the diſeaſe, but alſo diſpoſe the patient to a cachexy, or to oedematous tumours, or a dropſy. In theſe caſes, it is therefore much more proper to uſe balſamic pectorals, and ſuch as are grateful to the ſtomach. Hofm. Med. Ration. Syſt.

Expectorants ought to be cautiouſly uſed in a phthiſis, in ſpittings of blood, and in dry coughs, difficulties of breathing, and violent pains in the breaſt, which rather ariſe from a congeſtion of blood than from matter to be expectorated; and *expectorants*, whether of the ſoftening or of the ſtimulating kind, muſt certainly add to the congeſtion of the blood and humours, rather than to the relief of the patient.

In pleuriſies and peripneumonies, *expectorants* are to be very cautiouſly uſed in the beginning, leſt by their means the inflammatory ſtagnation of the blood ſhould be increaſed: but when theſe diſorders are upon the decline, and the greater part of the inflammatory matter is diſcuſſed, then they are very properly and commodiouſly uſed to draw the viſcid and concocted matter out of the pulmonary canals.

EXPECTORATION, of *ex*, *out*, and *pectus*, *breaſt*, the act of evacuating or bringing up phlegm or other matters out of the trachea, lungs, &c. by coughing, hawking, ſpitting, &c. See COUGH.

Expectoration eaſes the lungs of the viſcid or putrid matters which obſtruct their veſſels, and ſtraiten the breaſt.

EXPEDITATION, in the *Foreſt-laws*, ſignifies a cutting out the ball's of a dog's fore-feet for the preſervation of the king's game.

Every one that keeps any great dog, not *expeditated*, forfeits three ſhillings and four-pence to the king. In maſtiffs, not the ball of the feet, but the three claws, are to be cut to the ſkin. Inſtit. part iv. p. 308 *Nullos Dominicos canes abbatis & monarchorum* expeditari *cogat.* Chart. Hen. III. *Et ſin quieti de eſpeditamentis canum.* Ex. Mag. Rot. Pip. de ann. 9. Ed. II.

This *expeditation* was to be performed once in every three years, and was done to every man's dog who lived near the foreſt, and even the dogs of the foreſters themſelves.

EXPEDITION, the march of an army to ſome diſtant place, with a view of hoſtilities.

Such were the *expeditions* of Cyrus againſt Xerxes, and of Bacchus and Alexander from the Indies.

Expeditions for the recovery of the Holy Land were called CROISADES.

EXPENCES, in *Book-keeping*. See BOOK *of expences*.

EXPENDITORS, in *Law*, are the perſons appointed by commiſſioners of ſewers, to pay, diſburſe, or expend the money collected by the tax for the repairs of ſewers, &c. when paid into their hands by the collectors on the reparations, amendments, and reformations ordered by the commiſſioners; for which they are to render accounts when required for that purpoſe.

Theſe officers are mentioned in the ſtatute 37 H. VIII. cap. 11. and other ſtatutes. The ſteward who ſuperviſes the repair of the banks and water-courſes in Romney-Marſh, is likewiſe called the *expenditor*.

EXPENSIS *militum levandis*, was a writ anciently directed to the ſheriff, for levying allowance for the knights of parliament. See PARLIAMENT, and REPRESENTATIVE.

EXPENSIS *militum non levandis*, &c. in *Law*, an ancient writ to prohibit the ſheriff from levying any allowance for knights of the ſhire upon thoſe that hold lands in ancient *demeſne.* Reg. Orig. 261.

EXPERIENCE, a kind of knowledge acquired by long uſe, without any teacher.

Experience conſiſts in the ideas of things we have ſeen or read, which the judgment has reflected on, to form for itſelf a rule or method.

Authors make three kinds of *experience:* the firſt is the ſimple uſes of the external ſenſes, whereby we perceive the phenomena of natural things, without any direct attention thereto, or making any application thereof.

The ſecond is, when we premeditatedly and deſignedly make trials of various things, or obſerve thoſe done by others, attending cloſely to all effects and circumſtances, The third is that preceded by a foreknowledge, or at leaſt an apprehenſion of the event, and determines whether the apprehenſion were true or falſe; which two latter kinds, eſpecially the third, are of great ſervice in philoſophy.

EXPERIMENT, in *Philoſophy*, a trial of the effect or reſult of certain applications and motions of natural bodies. in order to diſcover ſomething of the laws and relations thereof, or to aſcertain ſome phenomenon, or its cauſe. The ſchoolmen define *experiment*, a compariſon of ſeveral things before obſerved by the ſenſes, and retained in the memory in ſome one ſimilar convenient inſtance. The nature of *experiment*, therefore, according to them, conſiſts in comparing ſeveral things by one act; whence they diſtinguiſh two things in every *experiment*, the one *material*, viz. the ſeveral ideas remembered; the other *formal*, viz. the comparing of theſe ideas in the mind. This will be illuſtrated by an example: a phyſician gives a quantity of rhubarb to ten ſeveral perſons, and remembers each of them. Now, coming afterwards to compare the ſeveral remembrances together, and finding the effect of the exhibition of rhubarb to be the ſame in all, viz. a purging; this is an *experiment* of rhubarb. The making of *experiments* is grown into a kind of formed art; and we now abound in ſyſtems of *experiments*, under the denomination of *courſes of experimental philoſophy*. Sturmius has made a curious collection of the principal diſcoveries and *experiments* of the laſt age, under the title of *collegium experimentale.* Dr. Deſaguliers has alſo publiſhed a comprehenſive and uſeful courſe of *experimental* philoſophy. The chemiſts chooſe to call their *experiments*, by way of diſtinction or eminence, *proceſſes* or *operations*.

EXPERIMENTAL *Philoſophy*, by the Greeks called εμπειρια, or εμπειρικη, is that which proceeds on *experiments*, or which deduces the laws of nature, and the properties or powers of bodies, and their actions upon each other, from ſenſible *experiments* and obſervations.

Experiments are of the utmoſt importance in philoſophy; and the great advantages the modern phyſics have above the ancient, is chiefly owing to this; that we have a great many more *experiments*, and that we make more uſe of the *experiments* we have.

Their way of philoſophizing was, to begin with the cauſe of things, and argue to the effects and phenomena; ours, on the contrary, proceeds from *experiments* and obſervations alone.

Lord Bacon firſt paved the way for the new philoſophy, by ſetting on foot the making of *experiments*. His method has been proſecuted with laudable emulation by the Academy del Cimento, the Royal Society, Royal Academy at Paris; and by Mr. Boyle, Sir Iſaac Newton, and many others.

In effect, *experiments*, within the laſt century, are come into ſuch a vogue that nothing will paſs in philoſophy but what is founded on, or confirmed by, *experiment*; ſo that the new philoſophy is almoſt altogether *experimental.* Indeed, the ancients, whatever we commonly ſay to the contrary, ſeem to have thought as well of the *experimental* way as the moderns. Plato miſſes no occaſion of ſpeaking of the advantages of the εμπειρια; and as to Ariſtotle, his Hiſtory of Animals may bear witneſs for him. Democritus's great buſineſs was to make *experiments*; and even Epicurus himſelf owes part of his glory to the ſame cauſe. Plato calls it, in reſpect to its ſubject, ευαισθησια, *ſubtlety of ſenſe*.

Yet there are ſome, even among the learned, who conceive of *experiments* in a different manner. Dr. Keil allows, that philoſophy has received very conſiderable advantages from the makers of *experiments*; but he complains of their diſingenuity, in too often wreſting and diſtorting their *experiments* and obſervations to favour ſome darling theories they had eſpouſed: but this is not all; M. Hartſoeker, in his Recueil de pluſieurs Pieces de Phyſique, undertakes to ſhew, that they who employ themſelves in the making of *experiments* are not properly philoſophers, but, as it were, the labourers or operators of philoſophers, who work under them, and for them, furniſhing them with materials to build their ſyſtems and hypotheſes upon.

The learned M. Dacier, in the beginning of his diſcourſe on Plato, at the head of his tranſlation of the works of that philoſopher, deals ſtill more ſeverely with the makers of *experiments.* He breaks out with a ſort of indignation at a tribe of idly curious people, whoſe ſole employ conſiſts in making *experiments* on the gravity of the air, the equilibrium of fluids, the loadſtone, &c. and yet arrogate to themſelves the noble title of philoſophers. See PHILOSOPHY and PHYSICS. See alſo ANALYSIS and SYNTHESIS.

EXPERIMENTUM *Crucis*, denotes a capital, leading, or deciſive experiment; thus called, either, becauſe like a croſs or direction-poſt, placed in the meeting of ſeveral roads, it guides and directs men to the true knowledge of the nature of the thing they are enquiring after; or, as it is a kind of torture, whereby the nature of the thing is, as it were, extorted by violence.

EXPIATION, the act of ſuffering the puniſhments adjudged to a man's crimes, and thus paying off, or diſcharging the debt or guilt; and it is figuratively applied to the pardon procured for the ſins of the penitent by the interpoſition and death of Chriſt.

The Romaniſts hold, that ſouls after death are ſent to PURGATORY to *expiate* or atone for their ſins.

EXPIATION is alſo applied to ſacrifices offered to the Deity, to implore his mercy and forgiveneſs.

EXPIATION, *the feaſt of*, among the Jews, called by our tranſlators the *day of atonement*, was held on the tenth day of Tiſri, or the ſeventh month of the Jewiſh year, anſwering to part of our September and October. It was inſtituted by God himſelf, Levit. xxiii. 27, &c. On that day the high-prieſt, the figure or type of Jeſus Chriſt, entered into the moſt holy place, and confeſſed his ſins; and, after ſeveral ceremonies, made an atonement for all the people to waſh them from their ſins. Lev. chap. xvi. See SCAPE-*goat*.

EXPIATION, among the *Heathens*, denoted a purification uſed for effacing or aboliſhing a crime, averting any calamity; and on a thouſand other occaſions, as purifying towns, temples, and ſacred places, and armies, before and after battle.

It was practiſed with divers ceremonies: the moſt uſual was ablution.

Expiations were performed for whole cities as well as particular perſons. After the young Horatius had been abſolved by the people from the murder of his ſiſter, he was farther purified by ſeveral *expiations* preſcribed by the laws of the pontifices for involuntary murders. Halicarnaſſ.

EXPILATION, from *expilo*, *I rob*, in the *Civil Law*, the act of withdrawing or diverting ſomething belonging to an inheritance, before any body had declared himſelf heir thereof.

This made a peculiar ſpecies of theft; for there could not properly be a theft in taking a thing not poſſeſſed by any body, or before the inheritance was accepted.

For this reaſon the Roman legiſlature introduced the action of *expilation* for the puniſhment of this crime.

Beſide this meaning, it was uſed in a more ſpecial manner, to ſignify a robbery committed by night; whence an *expilator* was looked upon as a greater criminal than a common thief.

The *expilators* were ſo called from their robbing and ſtripping people of their clothes.

EXPIRATION, in *Medicine*, that motion in an animal whereby the air inſpired into the lungs is expelled or thrown out of the ſame, and the cavity of the breaſt contracted.

Reſpiration conſiſts of two alternate motions or actions of the lungs, correſponding to thoſe of a pair of bellows: *inſpiration*, whereby the air is drawn in; and *expiration*, whereby it is driven out again.

By the means of this alteration, the circulation of the blood, and the motion of the heart, are maintained.

EXPIRATION is alſo uſed figuratively, for the end of a term of time granted, agreed on, or adjudged.

EXPLEES, in *Law*, the rents or profits of an eſtate, &c. See ESPLEES.

EXPLICATIVE *Propoſition*, in *Logic*. See COMPLEX *propoſition*.

EXPLICITE, in the *Schools*, ſomething clear, diſtinct, formal, and unfolded.

The will or intention is ſaid to be *explicite* when it is fully explained in proper terms; and *implicite*, when it is only to be learnt by deductions and conſequences.

The Jews had not all an *explicite* knowledge of Jeſus Chriſt, but they had at leaſt an implicite one.

Such a teſtator has declared his will *explicitely*, i. e. in formal terms; there is no need to have recourſe to explications.

EXPLOSION, from *explodo*, *I drive away with noiſe*, in *Phyſics*, the act of a thing which drives another away out of the place it before poſſeſſed.

The term is chiefly uſed for the going off of gun-powder, and the expulſion of the ball, ſhot, or the like conſequent thereon.

Hence, *exploſion* comes likewiſe to be figuratively uſed to expreſs ſuch ſudden actions of bodies as have ſome reſemblance to theſe; e. gr. thoſe which ferment with violence, immediately upon their mixture, and occaſion a crackling ſound.

EXPOLITION, in *Rhetoric*, a figure whereby we explain the ſame thing in different phraſes and expreſſions, in order to ſhew it more fully.

Expolition was the favourite figure of Balzac.

EXPONAS *Venditioni*. See VENDITIONI.

EXPONENT, from *expono*, *I expreſs*, in *Arithmetic*. *Exponent of a power* denotes the number which expreſſes the degree of the power, or which ſhews how often a given power is to be divided by its root before it be brought down to unity.

Thus, the *exponent* or index of a ſquare number is 2; of a cube, 3; the ſquare being a power of the ſecond degree; the cube, of a third, &c.

Exponents are commonly written above, and ſomewhat towards the right-hand of the number or quantity whoſe power they expreſs. Thus, 3^5, a^5, ſignifies the fifth power of 3, and of *a*. See POWER.

EXPONENT is alſo uſed in *Arithmetic*, in the ſame ſenſe with index or logarithm.

Thus a ſeries of numbers in arithmetical progreſſion being placed under another ſeries in geometrical progreſſion, are called the *exponents*, *indices*, or *logarithms*, thereof. E. gr. in the two progreſſions,

Geom.	1,	2,	4,	8,	16,	32,	64,	128,	256,	512
Arith.	0,	1,	2,	3,	4,	5,	6,	7,	8,	9

0 is the *exponent*, index, or logarithm, of the firſt term 1; 5 that of the ſixth, 32, &c.

Hence, unity is to the *exponent* of a power as the logarithm of the root to the logarithm of its power; conſequently, the logarithm of the power is had by multiplying the logarithm of the root by its *exponent*; and the logarithm of the root is had by dividing the logarithm of the power by its *exponent*.

EXPONENT *of a ratio*, is the quotient ariſing upon dividing the antecedent by the conſequent.

Thus, in the ratio 3 to 2, the *exponent* is $1\frac{1}{2}$, and the *exponent* of the ratio 2 to 3 is $\frac{2}{3}$. See RATIO.

Hence, 1. If the conſequent be unity, the antecedent is the *exponent* of the ratio. Thus, e. gr. the *exponent* of the ratio 4 to 1, is 4; and again, the *exponent* of a ratio is to unity as the antecedent to the conſequent.

2. Since, in a rational ratio, the *exponent* of a ratio is had by dividing a rational number by another rational; the *exponent* of a rational ratio is a rational number.

EXPONENTIAL *Calculus*, *Calculus* EXPONENTIALIS, is a method of differencing *exponential* quantities, and of ſumming up the differences of *exponentials*. See CALCULUS.

EXPONENTIAL *curve*, is that which is defined by an *exponential equation*.

Exponential curves partake both of the nature of algebraic and tranſcendental ones; of the former, becauſe they conſiſt of a finite number of terms, though thoſe terms themſelves are indeterminate; and of the latter, becauſe they cannot be algebraically conſtructed, or repreſented by an algebraic equation. Thus, $a\,y = x^2$ is the equation of an algebraic curve; $y = a^x$ is the equation of an *exponential* curve: this equation $y = a^x$ denotes that any ordinate *y* is to a conſtant ordinate aſſumed equal to 1, as a conſtant quantity *a* raiſed to a power whoſe exponent expreſſes the ratio of the abſciſs *x* to the line equal to 1 is to the line taken for unit or 1, raiſed to the ſame exponent. Let *b* repreſent the line = 1, and the equation $y = a^x$, (ſince $y : b :: a^{\frac{x}{b}} : b^{\frac{x}{b}}$) will become $\frac{y}{b} = \frac{a^{\frac{x}{b}}}{b^{\frac{x}{b}}}$. Note, $y = a^x$ is the equation of the LOGARITHMIC curve.

EXPONENTIAL *equation*, is that wherein there is an *exponential* quantity. See EQUATION, &c.

EXPONENTIAL *quantity*, is a power whoſe *exponent* is an indeterminate, or variable quantity.

Exponential quantities are of ſeveral degrees and orders: when the *exponent* is a ſimple indeterminate quantity, it is called an *exponential of the firſt*, or *loweſt degree*.

When the *exponent* itſelf is an *exponential* of the firſt degree, then the quantity is an *exponential of the ſecond degree*. Thus, z^y is an *exponential* of the firſt degree, becauſe the quantity y is a ſimple flowing quantity; but z^{y^x} is an *exponential* quantity of the ſecond degree; becauſe y^x is an *exponential* of the firſt degree; ſo, alſo, $z^{y^{x^y}}$ is an *exponential* of the third degree, the *exponent* y^{x^y} being one of the ſecond; and univerſally, the *exponential* quantity of any degree has for its *exponent*, the *exponential* quantity of the degree next preceding it. See Bernouilli Oper. tom. i. p. 182, &c.

EXPORTATION, in *Commerce*, the act of ſending commodities out of one country into another.

Exportation is a part of foreign COMMERCE, diſtinguiſhed by the appellation *active*, or *ſelling part*, in oppoſition to *importation*, which is called the *paſſive*, or *buying part*. It is obſerved as a general maxim, that commerce, when active, muſt produce a flow of riches, the balance being received in money; whereas, if it be paſſive, treaſures will be exhauſted, as the BALANCE of *trade* muſt continually be made good out of the remaining coin. Hence, plenty of money in any place implies, that the quantity of goods exported far exceeds that of goods imported;

and wherever money is ſcarce, it may be concluded, that greater quantities of goods have been imported than exported. See Exchange.

The merchandiſes yearly exported from England are immenſe. The principal articles are corn, cattle, cloth, iron, lead, tin, leather, coal, hops, flax, hemp, hats, malt-liquors, fiſh, watches, ribbands, &c.

Wool, fuller's earth, &c. are contraband goods, i. e. they are prohibited to be exported. For the duties of *exportation*, ſee Duty.

EXPOSING, the act of ſetting a thing to public view.

In the Romiſh church, the ſacrament is ſaid to be *expoſed* when it is ſhewn in public, uncovered, on feſtival days, and during the time of plenary indulgences.

Exposing is alſo uſed with a farther latitude; thus, we ſay, it is prohibited to *expoſe* falſe and clipped money.

Such a houſe ſtands very high, and has a delicious proſpect; but it is *expoſed* to all the four winds. Such a city being on the frontiers, and not fortified, is *expoſed* to the inſults of every party of forces.

Exposing *of children*, a barbarous cuſtom practiſed by moſt of the ancients, excepting the Thebans, who had an expreſs law to the contrary, whereby it was made capital to expoſe children, ordaining, at the ſame time, that ſuch as were not in a condition to educate them ſhould bring them to the magiſtrates, in order to be brought up at the public expence. Pott. Archæol. Græc. tom. ii. p. 333.

Among the other Greeks, when a child was born, it was laid on the ground; and if the father deſigned to educate his child, he immediately took it up; but if he forbore to do this, the child was carried away, and *expoſed*. Pitiſc. Lex. Ant. in voc. Expoſitio.

The Lacedæmonians, indeed, had a different cuſtom; for, with them all new-born children were brought before certain tryers, who were ſome of the graveſt men in their own tribe, by whom the infants were carefully viewed; and if they were found luſty and well-favoured, they gave orders for their education, and allotted a certain proportion of land for their maintenance; but if weakly, or deformed, they ordered them to be caſt into a deep cavern in the earth, near the mountain Taygetus, as thinking it neither for the good of the children themſelves, nor for the public intereſt, that defective children ſhould be brought up.

Many perſons *expoſed* their children only becauſe they were not in a condition to educate them, having no intention that they ſhould periſh. It was the unhappy fate of daughters eſpecially to be thus treated, as requiring more charges to educate and ſettle them in the world than ſons.

The parents frequently tied jewels and rings to the children they *expoſed*, or any other thing whereby they might afterwards diſcover them, if Providence took care for their ſafety. Another deſign, in adorning theſe infants, was either to encourage ſuch as found them to nouriſh and educate them, if alive; or to give them human burial, if dead.

The places where it was uſual to *expoſe* children were ſuch as people frequented moſt. This was done in order that they might be found, and taken up by compaſſionate perſons who were in circumſtances to be at the expence of their education. With this intention the Egyptians and Romans choſe the banks of rivers, and the Greeks the highways.

EXPOSITION, the act of *expoſing*. See Exposing.

Exposition is likewiſe applied to the interpretation or explication of an author, or paſſage therein. See Exegesis.

Exposition, *expoſitio*, in *Rhetoric*, is ſometimes uſed for *diviſion*. See Division; and ſee alſo Exergasia.

Exposition, in *Gardening*. See Exposure.

EXPOSITOR, or **Expository**, a title which ſome writers have given to a leſſer kind of dictionaries or vocabularies, ſerving to expound or explain the meaning of the obſcure or difficult words of a language.

It is alſo uſed in the ſame ſenſe with COMMENTARY and PARAPHRASE.

EX POST FACTO, in *Law*, denotes ſomething done after another thing that was committed before. An eſtate granted may be made good by matter *ex poſt facto*, that was not ſo at firſt, by election, &c.

EXPOSTULATION, *expoſtulatio*, in *Rhetoric*, a complaint addreſſed to a perſon from whom we have received ſome injury. It varies according to circumſtances.

EXPOSURE, or **Exposition**, in *Gardening*, the aſpect or ſituation of a garden wall, building, or the like, with reſpect to the ſun, wind, &c.

There are four regular kinds of *expoſures*, viz. *eaſt*, *weſt*, *north*, and *ſouth*; but it muſt be obſerved, that among gardeners theſe terms ſignify juſt the contrary to what they do among geographers.

The gardeners, in effect, do not give the names *eaſt*, *weſt*, &c. to the places where the ſun is, but to thoſe whereon he ſhines; and they conſider the manner wherein he ſhines, whether as to the whole garden, or ſome of its ſides.

If they find, that the ſun at his riſing, and during the firſt half of the day, continues to ſhine on one ſide of a garden or wall, they call that an *eaſtern expoſure*, or *eaſt wall*, &c. and if the ſun begin to ſhine later, or end ſooner, it is not a proper *eaſtern expoſure*.

For the ſame reaſon, they call the *weſt* the ſide the ſun ſhines on in the latter half of the day; i. e. from noon to night; and accordingly, the *ſouth*, or *ſouthern expoſure*, is the place whereon he ſhines from about nine o'clock in the morning till night; or which, in the general, he ſhines longeſt on in the whole day; and the part he ſhines leaſt on is the *north*, or *ſouthern expoſures*, at what hour ſoever it begin or end, being uſually from eleven o'clock to one

The *eaſtern* and *ſouthern expoſures* are, by common conſent of all gardeners, the two principal, and have a conſiderable advantage above the reſt. A *weſt expoſure* is not much amiſs; at leaſt, it is better than a northern one, which is the worſt of all: each has its inconveniencies.

The eaſtern, commencing differently at different ſeaſons of the year, and ending about noon, ſubjects the trees, &c. to the N. E. winds, which wither the leaves and new ſhoots, blow down the fruit, &c. beſide that it has little benefit of rains, which come moſtly from the weſt. Yet does the reverend Mr. Laurence judge the eaſt better than the weſt-wall for all kinds of fruit; not that it has more hours of ſun, or that there are any peculiar virtues in the eaſtern rays, but becauſe the early rays of the ſun do ſooner take off the cold chilly dews of the night.

M Gentil recommends the *eaſtern expoſure* as beſt for all kinds of peaches; adding, that they ripen ſooneſt, grow bigger, are better coloured, and of a finer taſte, than in any other: but Mr. Carpenter reſtrains the rule to the early and middle ſorts; for the backward, he rather chooſes a *ſouthern*, or *ſouth-eaſt expoſure*, which is beſt for all late fruits, becauſe the influence of the ſun is ſtrongeſt, and continues longeſt.

The *weſtern*, accounted from half an hour paſt eleven till ſun-ſet, is backwarder than an *eaſtern* one by eight or ten days; but it has this advantage, that it receives little damage from the froſts, which melt before the ſun comes to ſhine upon the fruit, and fall off like dew, without doing any prejudice; ſo that it may bear apricots, peaches, pears, and plums; but it is incommoded with north-weſt winds in the ſpring, as alſo with the autumnal winds, which blow down a great quantity of fruit.

According to Mr. Miller, the beſt aſpect or *expoſure* for walls in England is the point to the eaſtward of the ſouth; becauſe thoſe will enjoy the benefit of the morning ſun, and be leſs expoſed to the weſt and ſouth-weſt winds, which are very injurious to fruits in England, than thoſe walls which are erected due ſouth; the next beſt *expoſure* is due ſouth, and the next to that ſouth-eaſt, which is preferable to the ſouth-weſt. Other walls, however, may be planted with fruit-trees that ſuit their ſeveral *expoſures*.

The *northern expoſure* is the leaſt favourable of any in England, as having very little benefit from the ſun even in the height of ſummer, therefore can be but of little uſe, whatever may have been advanced to the contrary. For although many ſorts of fruit trees will thrive and produce fruit in ſuch poſitions, yet ſuch fruit can be of little worth, ſince they are deprived of the kindly warmth of the ſun to correct their crude juices, and render them well-taſted and wholeſome. It is therefore to little purpoſe to plant fruit-trees againſt ſuch walls, except it be for fruit intended for baking, &c. in which caſe the fire will ripen and render thoſe juices wholeſome which could not be performed while growing.

In ſuch ſituations, morelli cherries for preſerving may be planted, and white and red currants to come late, after thoſe which were more expoſed to the ſun are gone; and if the ſoil be warm and dry, ſome ſorts of ſummer pears will do tolerably well on ſuch an *expoſure*, and will continue longer in eating than if they were expoſed to the ſun. But winter pears ſhould by no means be planted in ſuch an aſpect, as has been practiſed by many ignorant perſons, if we find that the beſt ſouth walls in ſome bad years are barely warm enough to ripen them. Duke cherries planted againſt walls expoſed to the north will ripen much later in the ſeaſon; and if the ſoil be warm, will be well flavoured, and continue a month later than others. Miller.

The *ſouthern expoſure*, accounted from about nine till four, is recommended for peaches, pears, grapes, and plums.

EXPRESS, ſomething that is preciſe in formal terms, or for ſome particular deſign. I told him as much in *expreſs* terms; he gave me a commiſſion *expreſs*; he had *expreſs* orders; a courier was diſpatched *expreſs*.

We alſo ſay, ſomewhat abuſively, to ſend an *expreſs*, meaning a COURIER.

EXPRESSED *Oils*, are ſuch as are procured from bodies only by preſſing; as the oils of olives, almonds, and the like. See OIL.

EXPRESSED *ſpecies*. See SPECIES.

EXPRESSION, in *Algebra*, denotes the value of a quantity expreſſed or repreſented under an algebraic form: thus, if $x = \sqrt{a^2 + b^2}$, and a and b are known, the value of x is known. See EQUATION.

EXPRESSION, in *Medicine*, *Chemiſtry*, &c. the act of *expreſſing* or extracting the juices or oils of plants, fruits, or other matters, by ſqueezing, wringing, or preſſing them in a preſs. After having let the herbs infuſe a due time, their juice muſt be drawn by *expreſſion* in a linen cloth, or by a preſs.

EXPRESSION, in *Muſic*, denotes the performing of a piece of melody, or a ſingle paſſage, with that energy and feeling which the poetry or paſſion to be impreſſed upon the hearer, requires.

EXPRESSION, in *Oratory*, denotes the manner of delivering or conveying a man's ideas to another.

EXPRESSION is more particularly uſed for the ELOCUTION, diction, and choice of words in a diſcourſe.

It is not enough a that poet or orator have fine thoughts, he muſt likewiſe have a happy *expreſſion*. Defects in the *expreſſion* ordinarily ariſe from defects in the imagination: abundance of the beauties of the ancient writers are annexed either to *expreſſions* which are peculiar to their language; or to relations, which, not being ſo familiar to us as to them, do not give us the ſame pleaſure.

EXPRESSION, *diverſifying of*, in *Rhetoric*. See DIVERSIFYING.

EXPRESSION, in *Painting*, denotes a natural and lively repreſentation of the ſubject, or of the ſeveral objects intended to be ſhewn.

The *expreſſion* conſiſts principally in repreſenting the human body and all its parts in the action ſuitable to them; in exhibiting in the face the ſeveral paſſions proper to the figures, and obſerving the motions they impreſs on the other external parts.

The term *expreſſion* is ordinarily confounded with that of *paſſion*; but they differ in this, that *expreſſion* is a general term, implying a repreſentation of an object, agreeably to its nature and character, and the uſe or office it is to have in the work; whereas paſſion, in painting, denotes a motion of the body, accompanied with certain diſpoſitions or airs of the face, which mark an agitation in the ſoul. So that every paſſion is an *expreſſion*, but not every *expreſſion* a paſſion.

EXPRESSION *in painting, laws or rules of. Expreſſion*, we have ſaid, is a repreſentation of things according to their character, and may be conſidered either with reſpect to the ſubject in general, or to the paſſions peculiar thereto.

I. With regard to the ſubject, it is to be obſerved,

1. That all the parts of the compoſition are to be transformed or reduced to the character of the ſubject, ſo that they may conſpire to impreſs the ſame ſentiment, paſſion, or idea: thus, e. gr. in a repreſentation of joy and peace, every thing is to appear calm and agreeable; of war, turbulent and full of terror, &c.

2. In order to this, if any circumſtance occur in hiſtory or deſcription that would invert or take from the idea, it muſt be ſuppreſſed, unleſs eſſential to the ſubject.

3. To this end the hiſtory or fable is to be well ſtudied in the authors who deſcribe it, in order to conceive its nature and character truly, and impreſs it ſtrongly on the imagination, that it may be diffuſed and carried through all the parts of the ſubject.

4. A liberty is to be taken of chooſing favourable incidents, in order to diverſify the *expreſſion*, provided they be not contrary to the principal image of the ſubject, or the truth of hiſtory.

5. The harmony of the *tout enſemble* muſt be particularly regarded, both with reſpect to the actions and the light and colour.

6. The modes and cuſtoms are to be obſerved, and every thing made conformable to time, place, and quality.

7. The three unities of time, place, and action, ought to be obſerved; that is, nothing ſhould be repreſented in the ſame picture but what paſſes at the ſame time, and may be ſeen at the ſame view.

II. With regard to the particular paſſions and affections of the ſubject: the rules are, 1. That the paſſions of brutes are few and ſimple, and have almoſt all an immediate reſpect, either to ſelf-preſervation, or the propagation of the kind; but in men there is ſcope for greater variety, and accordingly more marks and expreſſions thereof.

2. Children, not having the uſe of reaſon, act much after the manner of brutes, and *expreſs* the motions of their paſſions directly, and without fear or diſguiſe.

3. Though the paſſions of the ſoul may be *expreſſed* by the actions of the body, it is in the face they are principally ſhewn, and particularly in the turn of the eye, and the motions of the eye-brows.

4. There are two ways of lifting up the eye-brows, the one at the middle, which likewiſe draws up the corners of the mouth, and argues pleaſant motions: the other at the point next the noſe, which draws up the middle of the mouth, and is the effect of grief and ſadneſs.

5. The paſſions are all reducible to joy and ſadneſs; each of which is either ſimple or mixed and paſſionate..

6. Simple joy cauſes a dilation of all the parts; the eye-brows riſe in the middle, the eyes half-open, and ſmiling, the pupil ſparkling and moiſt, the noſtrils a little open, the cheeks full, the corners of the mouth drawn a little upwards, the lips red, the complexion lively, and the forehead ſerene.

7. Paſſionate joy, proceeding from love, ſhews the forehead ſmooth and even, the eye-brows a little elevated on the ſide the pupil is turned to, the eyes ſparkling and open, the head inclined towards the object, the air of the face ſmiling, and the complexion ruddy. That proceeding from deſire ſhews itſelf by the body, the arms being extended towards the object in uncertain and unquiet motions.

8. Simple ſadneſs is *expreſſed* by the body being caſt down, the head careleſly hanging aſide, the forehead wrinkled, the eye-brows raiſed to the midſt of the forehead, the eyes half ſhut, the mouth a little open, the corners downwards, the under-lip pointing and drawn back, the noſtrils ſwelled, and drawn downwards. Sadneſs mixed with fear cauſes the parts to contract and palpitate, the members to tremble and fold up, the viſage to be pale and livid, the point of the noſtrils elevated, the pupil in the middle of the eye, the mouth opened at the ſides, and the under-lip drawn back. In that mixed with anger the motions are more violent, the parts all agitated, the muſcles ſwelled, the pupil wild and ſparkling, the point of the eye-brows fixed towards the noſe, the noſtrils open, the lips big, and preſſed down, the corners of the mouth a little open and foaming, the veins ſwelled, and the hair erect. That with deſpair, reſembles the laſt, only it is more exceſſive and diſordered.

9. The hand has a great ſhare in the *expreſſion* of our ſentiments and paſſions: the raiſing of the hands conjoined towards heaven, *expreſſes* devotion; wringing the hands, grief; throwing them towards heaven, admiration; fainting and dejected hands, amazement and deſpair; holding the hands, idleneſs; holding the fingers indented, muſing; holding forth the hands together, yielding and ſubmiſſion; lifting up the hand and eye to heaven, calling God to witneſs; waving the hand from us, prohibition; extending the right hand to any one, pity, peace, and ſafety; ſcratching the head, thoughtfulneſs and care; laying the hand on the heart, ſolemn affirmation; holding up the thumb, approbation; laying the fore-finger on the mouth, bidding ſilence; giving with the finger and thumb, *parcè dare*, or *giving ſparingly*; and the fore-finger put forth, the reſt contracted, *monſtrare, & dicere, to point at, and ſay*; *hic eſt, this is he.*

10. The ſex of the figure is to be regarded; and man, as he is of a more vigorous and reſolute nature, is to appear in all his actions freer and bolder than women, who are to be more reſerved and tender:

11. So alſo the age, the different ſtages whereof incline to different motions both of body and mind.

12. The condition, or honours, with which a perſon is inveſted, render their actions more reſerved, and their motions more grave; contrary to the populace, who obſerve little conduct or reſtraint, giving themſelves for the moſt part up to their paſſions, whence their external motions become rude and diſorderly.

Laſtly, in *ſpirits* we muſt retrench all thoſe corruptible things which ſerve only for the preſervation of life, as veins, arteries, &c. only retaining what may ſerve for the form and beauty of the body. In angels, particularly, as being ſymbolical figures, we are to mark out their offices and virtues, without any draught of ſenſual paſſions, only appropriating their characters to their functions of power, activity, and contemplation.

EXPROBATION, *Exprobatio*, in *Rhetoric*, is the reproaching a perſon with ingratitude, and unmindfulneſs of ſome particular benefit conferred upon him.

EXPULSION, the act of driving a man by force out of a city, community, or the like.

Expulsion is alſo uſed in *Medicine*, for the act of driving out a foreign body with violence from the place it was in.

The uterus has the chief office in the *expulſion* of the fœtus: if the *expulſion* of the fœtus happen very ſoon after conception, it is called a *falſe birth*. See Foetus and Delivery.

EXPURGATION, in *Aſtronomy*, is uſed by ſome authors for that ſtate or action of the ſun, wherein, after having been eclipſed and hid by the interpoſition of the moon, it begins to appear again.

Later aſtronomers call this EMERSION, not *expurgation*.

EXQUIMA, in *Zoology*, the name of a ſpecies of monkey common on the coaſt of Guinea. The hair on its back is of a reddiſh brown, and looks as if it had been ſinged or burnt, and reſembles a ruſty iron colour: among this there are a number of ſmall white ſpots; its belly and chin are wholly white, and it has a very beautiful beard of a ſnow-white, compoſed of hair of two fingers length, and always lying as neatly and regularly as if it were combed. When this creature is provoked, it draws back its lips, and, ſhewing all its teeth, ſhuts its jaws very nimbly, and chatters remarkably loud. It is very nimble, and leaps ſurpriſingly: it feeds on the fruits it finds in the woods. Ray.

There is alſo another ſpecies of this creature in Guinea, of the ſize of the former, and of a blackiſh brown on the greateſt part of the body, but of a bluiſh grey on the belly, and the lower half of its tail is of a ſort of tawney colour; its mouth and noſe are blue, and its cheeks adorned with a multitude of yellow hairs cluſtered together like thoſe of a goat's beard. Its legs and feet are wholly black, it is a ſprightly animal, and ſkips and plays like the other. Beſides theſe, there is alſo a third, of the *exquima* kind, ſmaller than the others, and of a mixt colour of brown, yellow, and grey: this has a long tail, a ſmall head, and no beard.

EXSIBIDANTES, in *Antiquity*, a kind of hiſſers, who, in the theatre and other public auditories, uſed to make a noiſe with their feet, and even ſometimes beat the ſeats with battons.

EXSICCATION, formed of *ex* and *ſiccus*, *dry*, in *Chemiſtry*, &c. the act of drying up or evaporating the moiſture of a thing.

EXSORS *Particula*. See Particula.

EXSUCCATIO, a word uſed by ſome *Chirurgical Writers*, to expreſs an ENCHYMOSIS, or ſuggillation.

EXSUFFLATION, a ceremony obſerved in baptiſm, by which the candidate was ſuppoſed to renounce the devil. See Baptism.

EXTANT, ſomething that ſtill ſubſiſts, or is in being.

It is but part of the Hiſtory of Livy, of the writings of Cicero, Cæſar, &c. that are *extant*, the reſt are loſt. We have nothing *extant* of Socrates, though he wrote a great deal.

EXTACY, Εξϛασις, a rapture, or removal of the mind out of its natural ſtate and ſituation; or a tranſport, whereby a perſon is hurried out of himſelf, and the office of his ſenſes is ſuſpended. See Enthusiasm.

Extacy, in *Medicine*, is conſidered as a diſeaſe, near akin to a catalepſy, only differing from it in this, that the cataleptic patient has no perception of what paſſes in his paroxyſm, nor any remembrance thereof when it is over; whereas the *extatic* is taken up with a very lively idea or imagination, which he remembers afterwards.

In an *extaſy*, there muſt be an unuſual tenſion of the fibres of the ſenſory, as in moſt deliriums, &c.

EXTEMPORANEOUS *Preſcription*. See Prescription.

EXTEND, in the *Manege*. To *extend a horſe*, is an expreſſion uſed by ſome to import the ſame with making a horſe go large. See Large.

Extend, in *Law*. See Extending.

EXTENDENDA *Terra*. See Terra.

EXTENDENTIUM *Interior*, in *Anatomy*, a name given by Spigelius and others to a muſcle of the wriſt, called by Albinus, *ulnaris externus*, and by Winſlow and others, CUBITALIS *externus*. See Ulnaris *extenſor*.

EXTENDI *Facias*, in *Law*, a writ of extent, whereby the value of lands is commanded to be made and levied, &c. Reg. Orig.

EXTENDING, in a *Legal Senſe*, ſignifies the valuing of lands and tenements of one bound by ſtatute, &c. and who hath forfeited his bond at ſuch an indifferent rate, as that by the yearly rent the obligator may in time be fully paid his debt. See Extent.

EXTENSION, in *Phyſics*, that whereby a thing is conſtituted long, broad, or thick, &c. or that property of bodies whereby they occupy a certain portion of ſpace.

Extenſion is uſually deſcribed as conſiſting in the ſituation of parts beyond parts; with which ſome authors cavil, as holding, that we can conceive abſolute *extenſion* without any relation to parts.

If a man conſider the diſtance between two bodies abſtractedly, and without any regard to bodies which may fill that interval, it is called *ſpace*; and when he conſiders the diſtance between the extremes of a ſolid body, it is called *extenſion*.

Extenſion is frequently confounded with quantity and magnitude; and, for what we can perceive, without much harm; the thing ſignified by them all appearing to be the ſame: unleſs we admit a diſtinction made by ſome authors, that the *extenſion* of a body is ſomething more abſolute, and its quantity and magnitude more reſpective, or implying a nearer relation to much and little. See Quantity, Magnitude, Mass, and Matter.

The infinite diviſibility of *extenſion* has been a famous queſtion in all ages. It is not eaſy to reconcile the doctrine of mathematicians on this head with the tenets of ſome philoſophers. They who hold that all *extenſion* and magnitude are compounded of a certain *minima ſenſibilia*; and that a line, for inſtance, cannot increaſe or decreaſe but by certain indiviſible increments or decrements only, muſt conſiſtently with themſelves affirm, thar all lines are commenſurable to each other, contrary to the tenth book of Euclid, who demonſtrates, that the diagonal of a ſquare is commenſurable to its ſide. But if all lines were compoſed of certain indiviſible elements, it is plain one of thoſe elements muſt be the common meaſure of the diagonal and the ſide. This is a gordian knot which none of the philoſophers have yet thought fit to untie.

Biſhop Berkeley obſerves, that the infinite diviſibility of finite *extenſion*, though it is not expreſly laid down either as an axiom or theorem in the elements of geometry, yet is throughout the ſame every where ſuppoſed, and thought to have ſo inſeparable and eſſential a connection with the principles and demonſtrations in geometry, that mathematicians never admit it into doubt, or make the leaſt queſtion of it. And as this notion is the ſource from whence do ſpring all thoſe amuſing geometrical paradoxes, which have ſuch a direct repugnancy to the plain common ſenſe of mankind, and are admitted with ſo much reluctance into a mind not yet debauched by learning; ſo is it the principal occaſion of all that nice and extreme ſubtilty which renders the ſtudy of mathematics ſo difficult and tedious. Hence, ſays he, if we can make it appear, that no finite *extenſion* contains innumerable parts, or is infinitely diviſible, it follows, that we ſhall at once clear the ſcience of geometry from a great number of difficulties and contradictions which have ever been eſteemed a reproach to human reaſon, and withal make the attainment thereof a buſineſs of much leſs time and pains than it hitherto hath been.

Every particular finite *extenſion*, which may poſſibly be the object of our thought, is an idea exiſting only in the mind, and conſequently each part thereof muſt be perceived. If therefore I cannot perceive innumerable parts in any finite *extenſion* that I conſider, it is certain they are not contained in it; but it is evident, that I cannot diſtinguiſh innumerable parts in any particular line, ſurface, or ſolid, which I either perceive by ſenſe, or figure to myſelf in my mind; wherefore, I conclude they are not contained in it. Nothing can be plainer to me, than that the *extenſions* I have in view are no other than my own ideas; and it is no leſs plain, that I cannot reſolve any one of my ideas into an infinite number of other ideas; that is, that they are not infinitely diviſible. If by an infinite *extenſion* be meant ſomething diſtinct from a finite idea, I declare I do not know what that is, and ſo cannot affirm or deny any thing of it. But if the terms *extenſion*, parts, and the like, are taken in any ſenſe conceivable; that is, for ideas; then to ſay a finite quantity or *extenſion* conſiſts of parts infinite in number, is ſo manifeſt a contradiction, that every one at firſt ſight acknowleges it to be ſo. New Theory of Viſion, § 54, 55. Analyſt, § 31.

On the other hand, it is obſerved by an eminent mathematician, that geometricians are under no neceſſity of ſuppoſing that a finite quantity or *extenſion* conſiſts of parts infinite in number, or that there are any more parts in a given magnitude than they can conceive or expreſs: it is ſufficient that it may be conceived to be divided into a number of parts equal to any given or propoſed number; and this is all that is ſuppoſed in ſtrict geometry concerning the diviſibility of magnitude. It is true, that the number of parts into which a given magnitude may be conceived to be divided, is not to be fixed or limited, becauſe no given number is ſo great but a greater than it may be conceived and aſſigned; but there is not therefore any neceſſity for ſuppoſing that number infinite; and if ſome may have drawn very abſtruſe conſequences from ſuch ſuppoſitions, they are not to be imputed to geometry. See Maclaurin's Treatiſe of Fluxions, art. 290.

Dr. Reid, a late writer, in his Inquiry into the Human Mind, on the principles of common ſenſe, endeavours to obviate the difficulties ſuggeſted by Berkeley, by overturning the ſyſtem of ideas eſtabliſhed by Mr. Locke. According to his theory, it is abſurd to deduce from ſenſation the firſt origin of our notions of external exiſtences, of ſpace, motion, and *extenſion*, and all the primary qualities of bodies; they have, he ſays, no reſemblance to any ſenſation, or to any operation of our minds, and therefore they cannot be ideas either of ſenſation or of reflection; nor can he conceive how *extenſion* or any image of *extenſion* can be in an unextended and indiviſible ſubject like the human mind.

Extension *of fractured limbs*, in *Surgery*. When the fractured bones maintain their natural ſituation, the ſurgeon has nothing to do but to apply a proper bandage to keep them in it; but when the fractured parts recede from one another, ſome degree of *extenſion* is neceſſary, which muſt always be ſuited to the diſtortion of the limb. The greater diſtance there is between the extremities of the divided parts of the bone, ſo much the ſhorter will the limb become from the natural contraction of the muſcles, and the *extenſion* muſt be proportionably the greater; but in theſe caſes every thing is to be done tenderly, and with great care. 1, The patient is to be kept very firm and ſteady; the poſture of the body muſt be in this operation different, according to the different circumſtances of the caſe; ſometimes ſitting, and ſometimes lying, are the moſt proper. 2. An aſſiſtant muſt ſupport the limb with his hands, both above and below the fractured part. 3. The perſon who holds the lower part of the limb muſt extend it ſtrongly and equally, till the fractured bone can be replaced; but when the ſurgeon is called at ſome diſtance of time from the accident, and a tumour and inflammation are come on, it is beſt in ſuch caſe to defer the *extenſion* of the parts till theſe ſymptoms are removed, by letting blood, looſening the bowels, giving the patient large quantities of aqueous fluids, and preſcribing the proper internal remedies for abating inflammations, and fomenting the parts with warm diſcutient decoctions. Theſe applications will uſually ſucceed ſo well as to take down the inflammation in twenty-four hours, in ſuch a manner, that the *extenſion* of the limb may be ſafely attempted; but when they do not take place ſo ſuddenly, they are to be repeated till they have the deſired effect; and where the common fomentations fail, the following has often very great and happy ſucceſs: take two or three handfuls of ſcordium, and boil them for about a quarter of an hour in a pint of water, with ſix ounces of rectified ſpirit of wine; afterwards mix with it an ounce of common ſalt, and half an ounce of ſaltpetre, and apply this to the inflamed fractured limb. To make the proper *extenſion* of a limb, the ſurgeon muſt, while it is kept at its proper length by two aſſiſtants, direct it with his hands, ſometimes a little one way, ſometimes another, putting it into different poſitions, as the nature of the caſe ſhall require, till the parts have recovered their natural ſituation. This will be known by the remiſſion or abſence of pain, and by obſerving, that the fractured limb is of the ſame length with the ſound one; and if theſe ſigns of ſucceſs in the operation are wanting, there is great reaſon to ſuppoſe that the operation is as yet ineffectual, and the *extenſion* is to be repeated or continued till the bones are evenly and properly replaced. Heiſter's Surg. p. 108.

EXTENSOR, in *Anatomy*, a name common to diverſe muſcles, ſerving to extend or ſtretch out the parts, and particularly the hands and feet; ſuch are the

Extensor *carpi ulnaris*, called alſo *cubitæus internus*, a muſcle, which, coming from the internal protuberance of the humerus, and paſſing tendinous under the ligamentum annulare, is inſerted into the upper part of the bone of the metacarpium, which anſwers to the little finger: this, and the ulnaris flexor moving together, draw the hand ſidewiſe towards the ulna. See *Tab. Anat. (Myol.) fig.* 1. *n.* 38. and *fig.* 6. *n.* 18.

Extensor *carpi radialis*, called alſo *radiæus externus*, and *bicornis*, is really two diſtinct muſcles. The firſt ariſes from above the external protuberance of the humerus, and the ſecond from the lowermoſt part of the external protuberance. They both lie along the external part of the radius, and, paſſing under the annular ligament, one is inſerted into the bone of the metacarpus that ſuſtains the fore-finger, and the other to that which ſuſtains the middle-finger: theſe two extend the wriſt. See *Tab. Anat. (Myol.) fig.* 1. *n.* 29. and *fig.* 6. *n.* 19.

Extensor *communis digitorum manus*, ariſes from the external protuberance of the humerus, and at the wriſt divides into three flat tendons, which paſs under the annular ligament, to be inſerted into all the bones of the fore, middle, and ring-finger. See *Tab. Anat. (Myol.) fig.* 1. *n.* 36. *fig.* 6. *n.* 20.

It very much reſembles the perforatus and perforans, and lies on the out-ſide of the fore-arm, between the ulnaris externus and radialis externus. It is fixed above, by a tendinous extremity to the poſterior and lower part of the external or great condyle of the os humeri; and, by a tendinous adheſion on each ſide to the ulnaris and radialis externus. It has likewiſe ſometimes a ſmall inſertion in the radius; it is divided into four muſcles, like the perforatus and perforans, and four long ſlender ſmall tendons. Three of theſe tendons paſs through the common external annular ligament of the carpus; and the fourth, which goes to the little-finger, and which has ſometimes its fleſhy portion diſtinct from the reſt, paſſes through a particular ring of the ſame ligament. Afterwards, theſe four tendons ſeparate as they go to the fingers, and in their paſſage communicate with each other by oblique tendinous ſeries, chiefly near the heads of the metacarpal bones. The tendons of the middle and little-finger are ſometimes double, and yet communicate with the reſt.

Each tendon having reached the baſis of the firſt phalanx, is ſlightly inſerted therein by ſome lateral expanſions, fixed in each ſide of the baſis; from thence it advances to the head of the ſame phalanx, where it is divided into two flat portions, which, at the articulation of the firſt phalanx with the ſecond, leave ſome diſtance between them. About the head of the ſecond phalanx they unite again, and are fixed in the convex ſide near the baſis in the third phalanx. The ſeparation of the two portions is in ſome ſort rhomboidal, and each portion is ſtrengthened by a common tendon of the lumbricales and interroſſei; and in the ſmall ſpaces between them are ſmall tendinous fræna, more or leſs tranſverſe. Winſlow's Anatomy, p. 199.

Extrnsor *primi internodii pollicis*, ariſes from the upper and external part of the ulna, and paſſing obliquely over the tendon of the *radiæus externus*, is inſerted near the ſecond joint of the thumb.

Extensor *ſecundi internodii pollicis*, ariſes from the upper and internal part of the radius, and is inſerted into the upper part of the ſecond bone of the thumb.

Extensor *tertii internodii pollicis*, ariſes from the ulna, a little below the firſt *extenſor*, and is inſerted into the third bone of the thumb.

Extensor *indicis*, comes from the middle and external part of the ulna, and paſſing under the annular ligament, is inſerted into the third bone of the fore-finger, where it joins the *extenſor communis*.

Extensor *minimi digiti*, ariſes from the external protuberance of the humerus, and from the upper part of the ulna, and paſſing under the annular ligament, is inſerted into the third bone of the little-finger. See *Tab. Anat. (Myol.) fig.* 1. *n.* 37. and *fig.* 6. *n.* 17.

Extensor *digitorum pedis longus*, is a muſcle derived from the fore-part of the upper epiphyſis of the tibia, and growing tendinous about the middle thereof, it runs in four tendons under the annular ligament to the third bone of every toe, except the pollex. See *Tab. Anat. (Myol.) fig.* 2. *n.* 45. *fig.* 1. *n.* 64.

According to Winſlow, it is a long muſcle, fleſhy in its upper part, but tendinous in the lower, lying between the tibialis anticus and peronæus maximus. It is fixed above by fleſhy fibres in the outſide of the head of the tibia, and inſide of the head of the fibula, in the upper part of the interoſſeous ligament, through three-fourths of the length of the fibula, and through the ſame ſpace in the tendinous ſeptum belonging to the anterior angle of that bone. It ſeems to mix ſome fibres on each ſide with the two firſt peronæi and tibialis anticus, and is very cloſely united with the peronæus maximus. It contracts in breadth a little above the annular ligament, and in paſſing through it is divided into three tendons, the firſt of which is afterwards again divided into two. Theſe four tendons are inſerted along the upper or convex ſide of the bones of the four ſmall toes. Winſlow's Anatomy, p. 222.

Extensor *digitorum pedis brevis*, comes from the exterior and fore-part of the calcaneum, and goes to the ſecond joint of the toes. See *Tab. Anat. (Myol.) fig.* 1. *n.* 73.

It is fixed in the upper and outer-ſide of the anterior apophyſis of the aſtragalus, and in the adjoining part of the upper ſide of that bone. Thence it runs obliquely inwards, and is divided into four fleſhy portions, which terminate in four tendons. The firſt is inſerted in the upper part of the firſt phalanx of the great toe; and the other three, joining with thoſe of the *extenſor longus*, are inſerted along the convex ſides of all the phalanges of the three following toes. When there is a fifth tendon, which ſometimes happens, it goes in the ſame manner to the little-toe. Winſlow's Anatomy, p. 223.

Extensor *indicis proprius*, a ſmall long muſcle, with a long ſlender tendon, lying a little obliquely on the lower and outer half of the fore-arm, between the ulna and the fore-finger. It is fixed by its fleſhy body a little higher than the loweſt third part of the outſide of the ulna, below the inſertion of the *extenſor pollicis*; and it has likewiſe a ſmall adheſion to the interoſſeous ligament. From thence it runs down, ending in a diſtinct tendon, without any communications, which having paſſed through the annular ligament of the *extenſor communis*, afterwards joins that tendon which goes to the index. Winſlow's Anatomy, p. 200.

Extensor *minimi digiti proprius*, a collateral or auxiliary muſcle of the *extenſor communis*, of which it appears almoſt always to be more or leſs a portion. It is fixed along the ſuperior external half of the ulna, from whence its long ſmall tendon runs down in company with the fourth tendon af the *extenſor communis*, all the way to the little-finger, where it joins, and is inſerted with it. Sometimes this muſcle is wanting; in which caſe the *extenſor communis* ſends a double, and ſometimes a treble tendon to the little finger. Winſlow's Anatomy, p. 200.

Extensores *pollicis manus*, two very diſtinct muſcles, the firſt or longeſt of which is ſometimes more, ſometimes leſs, and ſometimes altogether divided into two; in which caſe theſe muſcles are three in number. They are ſituated obliquely between the ulna and the convex ſide of the thumb.

The *extenſor primus* is a long muſcle, more or leſs double, and is fixed above by fleſhy fibres, firſt to the outſide of the ulna, near its upper extremity, below the anconæus minor and inſertion of the ulnaris externus; next to the interoſſeous ligament, under the ſupinator brevis; and laſtly, to the middle part of the outſide of the radius.

From thence it runs down, and paſſes anteriorly over the lower part of the radius, and tendons of the ſupinator longus and radialis externus; and being gradually divided, it terminates in two long flat tendons, more or leſs ſubdivided, which paſs together under a particular annular ligament, being only parted by ſepta or fræna belonging to that ligament. The firſt of theſe two principal tendons is inſerted in the edge of the baſis of the firſt phalanx, near the large tranſverſe ligament of the carpus: when this tendon is ſubdivided, the other portion of it is fixed in that bone of the carpus which ſuſtains the thumb. The other principal tendon, which often belongs to a muſcle entirely diſtinct from the former, is fixed in the convex ſide of the baſis of the ſecond phalanx, where it joins the tendon of the *extenſor ſecundus*. On account of theſe different inſertions of the two tendons, this muſcle is by ſome authors deſcribed as two.

The *extenſor ſecundus* is ſhorter than the firſt; it is fixed to the ulna below the former, and above the inſertion of the *extenſor indicis proprius*, and likewiſe to the neighbouring part of the interroſſeous ligament. From thence it runs down obliquely on the middle part of the radius, where it has alſo a ſmall adheſion; after this it paſſes through the ſmall channel in the ſtyloide apophyſis of the radius through the annular ligament belonging to the tendons of the radialis externus, and over theſe tendons, being parted from them by a ſmall ligamentary ſeptum. It is inſerted in the convex part of the third phalanx near its baſis, having, as it paſſes over the ſecond phalanx, joined the ſecond or collateral tendon of the firſt *extenſor*, more or leſs. Winſlow's Anatomy, p. 196.

Extensor *pollicis pedis longus*, riſes large and fleſhy from the fore-part of the fibula, a little below its upper proceſs; whence, paſſing under the annular ligament, it is inſerted into the upper part of the ſecond bone of the great toe. See *Tab. Anat. (Myol.) fig.* 1. *n.* 71.

It is fixed to the inſide of the fibula, near the interoſſeous ligament, from the neck down to the loweſt quarter of that bone; to the interoſſeous ligament through the ſame ſpace, and a little to the lower extremity of the tibia next the fibula. It there ends in a conſiderable tendon, which paſſing through a diſtinct ring of the common annular ligament, and then through a membranous vagina, is inſerted in the baſis of the firſt phalanx of the great toe, and continued up to the ſecond. Winſlow's Anatomy, p. 221.

Extensor *pollicis pedis brevis*, ſprings fleſhy from the fore-part of the os calcis, and, after a ſhort belly, is contracted into a ſlender tendon; which, running obliquely over the upper part of the foot, is inſerted into the ſecond bone of the great toe. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 75. *fig.* 2. *n.* 51.

Extensor *proprius articularis*, in *Anatomy*, a name given by Albinus, and ſome other late authors, to one of the muſcles of the hand, called by Cowper and others the *extenſor minimi digiti*.

Extensor *tarſi*, in *Anatomy*, a name given by Douglas and ſome others, to a muſcle more generally known by the name of the *plantaris*. See Plantaris.

EXTENT, in *Law*, ſometimes denotes a writ or commiſſion to the ſheriff for the valuing of lands and tenements; ſometimes the act of the ſheriff upon this writ; and ſometimes the eſtimate or valuation of lands, *per proprios viros*; which, when taken at the utmoſt value or *extent*, furniſh our extended, or rack-rents. Fleta, lib. 2.

EXTENUATION, the act of diminiſhing or leſſening the bulk or ſubſtance of a thing, eſpecially of the human body. Fevers, agues, long abſtinences, &c. occaſion great *extenuations* or emaciations.

Extenuation is alſo a figure in *Rhetoric*, oppoſite to the hyperbole. The Greeks call it λιτοτης.

EXTERIOR *Polygon*, *Talus*. See the ſubſtantives.

EXTERMINATION, formed of *ex* and *terminus*, *boundary*, the act of *extirpating*, or totally deſtroying a people, race, family, &c.

The Jews have been *exterminated* out of Portugal, the Moors out of Spain, the Albigenſes out of France, &c. Philip the Fair of France, to be revenged on the Knights Templars, took a reſolution in 1307 to *exterminate* them.

Extermination, or Exterminating, in *Algebra*, is uſed for taking away. Thus algebraiſts ſpeak of *exterminating* ſurds, fractions, and unknown quantities out of equations. See Maclaur. Algebr. part i. chap. 12. where we have ſome general theorems for the *exterminating* unknown quantities in given equations.

EXTERNAL, or Exterior, a term of relation, applied to the ſurface or out-ſide of a body; or that part which appears or preſents itſelf to the eye, touch, &c.

In which ſenſe it is oppoſed to *internal*, or *interior*.

External medicines are alſo called *local medicines*, and *topics*. The ſenſes are divided into *external*, which are thoſe whereby we perceive ideas, or have the perception of *external* objects; as ſeeing, hearing, &c. and internal. See Sense.

External is alſo uſed to expreſs any thing that is without-ſide a man, or that is not within him, and particularly in his mind. In which ſenſe, we ſay *external objects*, &c.

The exiſtence of an *external world*, i. e. of bodies and objects out of the mind, is a thing which has been greatly called in queſtion by Dr. Berkeley, and others. See Existence, Body, and Quality.

External *angles*, are the angles of any right lined figure formed without it, when all the ſides are ſeverally produced. Theſe are all, taken together, equal to four right angles. Particularly, in a triangle, the *external* angle is equal to both the internal and oppoſite ones. See Triangle.

External *Denomination*, *Ear*, *Modes*, *Place*. See the ſubſtantives.

EXTERNUS *auris*, in *Anatomy*, a ſmall muſcle coming from the ſide of the meatus auditorius, to the ſhort proceſs of the malleus; ſerving to draw the handle thereof downwards, and ſo to relax the membrana tympani. See Ear.

Externus *Brachiæus*, *Cubitæus*. See the ſubſtantives.

Externus *Duverni*, a name given by Douglas to one of the muſcles of the ear, called by Cowper and others *obliquus auris*, and by Albinus *externus mallei*.

Externus *Gaſtrocnemius*, *Iliacus*. See the ſubſtantives.

Externus *Mallei*, in *Anatomy*, a name given by Albinus to one of the muſcles of the ear, called by others *obliquus auris*, and *muſculus externus auris*.

Externus *Orbiter*, *Pterygoideus*, *Vaſtus*, *Rectus Capitis*. See the ſubſtantives.

EXTINCTION, the act of *extinguiſhing*, that is, of putting out, or deſtroying, fire, flame, or light.

The Ariſtotelians account for the *extinction* of fire from the principle of contrariety: thus, ſay they, water puts out fire, becauſe the qualities of water are contrary to thoſe of fire; the one being cold and moiſt, and the other hot and dry. But how far this will go, may appear hence, that fire is extinguiſhed by hot water as readily as cold; nay even by oil, earth, &c.

Some of the moderns offer two more plauſible cauſes of *extinction*; viz. *diſſipation*; as when the next, immediate fuel of the flame is diſperſed and blown off by too forcible a wind; and *ſuffocation*, when it is ſo compreſſed, that its free motion cannot be maintained; as happens upon throwing water, &c. thereon. Various preparations and engines have been contrived for extinguiſhing accidental fires. See Fire.

Boerhaave denies, that there is properly any ſuch thing as extinguiſhing of fire: it is a body *ſui generis*, of an immutable nature; and we can no more *extinguiſh* or deſtroy it, than we can create it.

Extinction, in *Chemiſtry* and *Pharmacy*, is when a metal, mineral, or the like body, after having been heated red-hot in the fire, is plunged in ſome fluid; either to ſoften or temper its acrimony, as tutty in roſe-water; or to communicate its virtue to the liquor, as iron or ſteel to common water; or, laſtly, to give it a temper, as in the *extinction* of ſteel in water, or ſome other preparation.

EXTINGUISHMENT, in *Law*, is uſed for a *conſolidation*. Thus, if a man, having a yearly rent due to him out of my lands, afterwards purchaſe the ſame lands; both the property and rent becoming conſolidated, or united in one poſſeſſor, the rent is ſaid to be *extinguiſhed*.

So, where a man has a leaſe for years, and afterwards buys the property, there is a *conſolidation* of the property, and an *extinguiſhment* of the leaſe.

So alſo, if there be lord meſne, and tenant, and the lord purchaſe the tenancy, the meſnalty is *extinct*.

Likewiſe by purchaſing of lands wherein a perſon hath common appendant, the common is *extinguiſhed*. Cro. El. 594. A releaſe of common in one acre, is an *extinguiſhment* of the whole common. Shower's Rep. 350. And where a perſon hath common of *vicinage*, if he incloſes any part of the land, all the common is extinct. 1 Brownl. 174. If a man hath a high-way appendant to land, and afterwards purchaſeth the land wherein the high-way is, the way is extinct: though it is held, that a way of neceſſity to a market or church, or to arable land, is not ſo *extinguiſhed*.

Extinguishment *of a copyhold* takes place on any act of the copyholder's, which denotes his intention to hold no longer of his lord, and amounts to a determination of his will. As if a copyholder in fee accepts a leaſe for years of the ſame land from the lord, or accepts an aſſignment of a leaſe made to another from the leſſee, his copyhold is extinct.

Extinguishment *of debt* happens in a variety of caſes. Thus if a creditor accepts a higher ſecurity than he had before, or accepts a bond for a legacy, the firſt debt or legacy are hereby *extinguiſhed*.

Extinguishment *of liberties*, in *Law*. If liberties and franchiſes granted by the king, come again to the crown, they ſhall not be *extinguiſhed*; but it is otherwiſe in the king's grants of felon's goods, waifs, ſtrays, wrecks, &c. 9 Rep. 25.

Extinguishment *of ſervices*. If the lord purchaſes or accepts any part of the tenancy, out of which an entire ſervice is to be paid, the ſervice becomes thereby extinct; unleſs it be for the public good or homage and fealty, which are not ſubject to *extinguiſhment*.

Extinguishment *of ways*. See Extinguishment.

EXTIRPATION, formed of *ex*, and *ſtirps*, *root*, the act of pulling up, or deſtroying, a thing to the very roots.

Among the prayers of the Romiſh jubilee, there is one for the *extirpation* of hereſy.

Extirpation is alſo uſed, in *Surgery*, for cutting off any part entirely; as a wen, &c. or the eating it away, as a wart, &c. by corroſive medicines. See Amputation, and Corrosion.

EXTIRPATIONE, in *Law*, a judicial writ, either before or after judgment, that lies againſt a perſon, who when a verdict is found againſt him for land, &c. doth maliciouſly overthrow any houſe, or *extirpate* any trees upon it. Reg. Jud. 13. p. 56.

EXTISPEX, formed of *exta*, and *ſpicere*, of *ſpicio*, *I view*, *conſider*, in *Antiquity*, an officer who viewed and examined the entrails of victims; in order to draw preſages from them as to futurity.

This kind of divination, called *extiſpicium*, was much in vogue throughout Greece, where there were two families, the Jamidæ and Clytidæ, conſecrated, or ſet apart, peculiarly for it.

It appears to have been very ancient, and was probably derived from the ancients. Vitruvius, cap. 4. lib. i. gives the following plauſible account of its origin. He ſays that the ancients inſpected the lives of thoſe animals which frequented the places where they intended to build or encamp; and if they commonly found that the liver, to which they attributed ſanguification, was injured, they concluded that the waters and nouriſhment collected near ſuch places were not wholeſome.

In Italy, the firſt *extiſpices* were the Hetrurians; among whom, likewiſe, the art was in great repute. Lucan gives us a fine deſcription of one of theſe operations in his firſt book.

EXTORTION, in *Law*, an illegal manner of wreſting any thing from a man, either by force, menace, or authority.

If an officer, by terrifying another, on pretence of his office, takes more than his ordinary fees, or dues, he commits, and is indictable for *extortion*.

So the exacting of unlawful uſury, winning by unlawful game, and, in fine, all taking of more than is juſtly due, by colour or pretence of right, as exceſſive tolls in millers, exceſſive prices of ale, bread, victuals, wares, &c. come under *extortion*.

Crompton ſays, that wrong done by any man, is properly a treſpaſs, but exceſſive wrong is *extortion*; which is moſt properly applicable to ſheriffs, mayors, bailiffs, and other officers, who, by colour of their office, greatly oppreſs and wrong the king's ſubjects, by taking exceſſive rewards, or fees, for executing their office.

EXTRA-*conſtellary ſtars*. See Sporades.

Extra-*judicial*, ſomething done out of the proper court, or the ordinary courſe of law. As when judgment is given in a cauſe, or caſe, not depending in that court where ſuch judgment is given, or wherein the judge has no juriſdiction.

Extra-*mundane ſpace*, is the infinite, empty, void ſpace, which is by ſome ſuppoſed to be extended beyond the bounds of the univerſe, and conſequently in which there is really nothing at all.

Extra-*parochial*, a place out of the bounds of any pariſh; or privileged and freed from the duties of a pariſh.

EXTRACT, Extractum, in *Pharmacy*, the pureſt and fineſt part of a vegetable, or other body, ſeparated from the coarſer, by diſſolution and digeſtion with a proper menſtruum; and afterwards reduced into a thick, moiſt conſiſtence by diſtillation, or evaporation of the humidity of the menſtruum.

Mr. Geoffroy, who well knew the value of this form of medicine, attempted to improve upon the common method of making *extracts*, and ſucceeded greatly to his wiſhes; the conſequence of which was his preſenting to the academy of ſciences at Paris his method of doing it.

The hint was taken from a method uſed by the count Lagarais, to make what he called his eſſential ſalts of plants; which were only dry *extracts*, prepared by powdering the ſubſtance, and then keeping it in continual motion for ſix or ſeven hours in common water, by means of a chocolate mill, turned by a large horizontal wheel. After the matter had ſubſided for an hour, the remaining liquor was poured off, and evaporated over a balneum Mariæ, or in the ſun, and a valuable dry *extract* prepared. The method of this proceſs made it impracticable in large quantities of medicines; and Mr. Geoffroy removed the great difficulties that attended it, by proving from repeated experiments, that boiling or infuſing the ſubſtances in hot water, extracted from them all that was got out by the long motion of the mill; as was inſtanced in the moſt familiar manner, in the common way of making tea and coffee, which were found to impregnate water with as much of their virtue by the methods of infuſion and decoction, as by ever ſo long an operation in the count's method. The expence of making *extracts* of this kind cannot but be greater than that of managing the ſame medicines any other way; but the eaſe of taking, and the ſmall doſe, cannot but ſufficiently recommend them; and according to Mr. Geoffroy's method, the ſick may prepare them for themſelves. Mr. Geoffroy gives ſome examples of his ſucceſs in theſe preparations: he took a dram of ſena in powder, and pouring on it a quantity of hot water, left it in infuſion twenty-four hours; then filtering the infuſion, he evaporated the liquor in balneo Mariæ, to the conſiſtence of a thin ſyrup, and ſpreading this over the bottoms of two or three broad earthen plates, that it might dry regularly, he evaporated the remaining humidity over the ſame balneum, and procured twenty-four grains of a dry *extract*, wholly reſembling count Lagarais's ſalts, and operating in the ſame manner, and with the ſame virtues, as a dram of ſena, whether taken in powder or bolus, or diſſolved in any fluids; in any of which forms it had nothing of the nauſeous taſte of ſena. See Mem. Acad. Scienc. Par. 1738.

Extracts are prepared from a variety of different drugs; as the bark, gentian, jalap, opium, &c. See Extractum *Catharticum*.

Extract, in *Matters of Literature*, denotes a ſhort abridgment of a book or paper, or of ſome of the matters thereof. The journals, nouvelles, bibliotheques, memoires, and other monthly reviews, or quarterly accounts of the affairs of learning, conſiſt principally of *extracts* of the moſt material paſſages, doctrines, &c. found in the ſeveral books publiſhed in that time.

Extract *ab eccleſia*. See Restitutione *extracti*.

EXTRACTA *curiæ*, in our *Old Writers*, the iſſues or profits of holding a court, ariſing from the cuſtomary fees, &c.

EXTRACTION, in *Pharmacy* and *Chemiſtry*, an operation, whereby eſſences, tinctures, &c. are drawn from natural bodies.

Some will have *extraction* to ſignify any ſolution made by menſtruums; but, in ſtrictneſs, there is this difference, that in *ſolution* the menſtruum abſorbs the whole ſubſtance of the body, but in *extraction* it carries off only a certain part of it; and in this ſenſe, camphire is diſſolved in ſpirit of wine, but jalap is more properly ſaid to be *extracted*; for the reſin is only taken out by the menſtruum, the other particles being left untouched.

Extraction alſo frequently ſignifies ſuch an inſpiſſation, or thickening of a ſolution, as that a certain quantity of the menſtruum being drawn off, the remaining mixture is reduced to the conſiſtence of honey; as in the *extracts* of ſaffron, gentian, and the like.

Extracts are chiefly made from vegetables, and require different menſtruums, according to the different nature of the plants, eſpecially the gummous kind; for ſuch as are mucilaginous, as gum Arabic, and tragacanth, &c. are not eaſily diſſolved but in aqueous liquors; whereas reſinous gums, as galbanum, ſcammony, &c. muſt have burning ſpirits to diſſolve them.

There are others again of a middle nature, which may be diſſolved in either ſort of menſtruums, though not ſo eaſily in one as the other: thus aloes, and rhubarb, which are ſomething reſinous, are better made into *extracts* with ſpirit of wine, than water; but plants, which abound leſs with reſin, ſuch as hellebore, &c. are more commodiouſly *extracted* with water.

To perform *extraction*, therefore, a proper menſtruum is neceſſary, and one which is as near a-kin as poſſible to the body to be *extracted*.

Extraction, in *Surgery*, denotes an operation whereby ſome foreign matter lodged in the body, contrary to the order of nature, is drawn out of the ſame by manual application, or the help of inſtruments.

Such is the *extraction* of a ſtone, formed in the bladder, or in the kidneys, &c.

Extraction *of a cataract*. See **Cataract**.

Extraction belongs to the **exæresis**, as a ſpecies to its genus.

Extraction, or *deſcent*, in *Genealogy*, denotes the ſtock, or family, which a perſon is deſcended from.

In ſome military orders, chapters, &c. a candidate muſt make proof of the nobility of his *extraction* before he is admitted.

Extraction *of roots*, the method of finding the roots of given numbers, or quantities. See **Root**.

The ſquare, cube, and other powers of a number, or root, are formed by multiplying the given number into itſelf a greater or leſs number of times, as the **power** required is higher or lower.

This multiplication compounds the powers; and the *extraction* of the root decompounds them again, or reduces them to their principles or roots. So that the *extraction* of the root is to the multiplication of the power, what the analyſis is to the ſyntheſis.

Thus, 4, multiplied by 4, produces 16; which is the ſquare of 4, or the factum of 4, by itſelf; and 16, multiplied by 4, makes 64, which is the cube of 4, or the factum of 4 by its ſquare. Such is the compoſition of powers.

Again, the ſquare root of 16 is 4, becauſe 4 is the quotient of 16 divided by 4; and the cube root of 64 is likewiſe 4, as 4 is the quotient of 64 divided by the ſquare of 4. Such is the *extraction* of roots.

Hence to *extract* the root out of a given power, is the ſame thing as to find a number, e. gr. 4, which being multiplied a certain number of times into itſelf, produces the given power, e. gr. 16 or 64.

For the *extraction* of ſquare and cube roots, it is neceſſary to have the ſquares and cubes of all the digits in readineſs; as exhibited in the following table.

Roots	1	2	3	4	5	6	7	8	9
Square	1	4	9	16	25	36	49	64	81
Cube	1	8	27	64	125	216	343	512	729

To extract *the ſquare root out of a given number*. 1. Divide the given number into claſſes, of two figures a-piece; and include each claſs between two dots, commencing with the place of units, and proceeding to the left in integers, and to the right in decimals; the root will conſiſt of ſo many parts, or figures, as you have claſſes. By the way obſerve, it may happen, that for the laſt claſs on the left-hand there ſhall only be one figure left.

2. Then the left-hand claſs being the ſquare of the firſt figure of the root ſought, look in the table of roots for the ſquare root anſwering to that number; or, if that ſquare number be not preciſely there, to the next leſſer number: this root write down for the firſt figure of the quotient; and ſubtract its ſquare from the left-hand claſs. To the remainder bring down the next claſs toward the right.

3. Write down the double of the quotient figure under the left-hand figure of the ſecond claſs; and ſeek how oft this duple is contained in the figure over it: the quotient gives the ſecond figure of the root.

4. Write the ſame quotient under the right-hand figure of the ſame claſs; and ſubtract the product of the whole number underwritten, multiplied by the ſecond figure of the root, from the number over it, as in diviſion.

5. The operation being repeated according to the third and fourth ſteps, i. e. the remainder being ſtill divided by the double of the root as far as *extracted*; and from the remainder ſubtract the product of the laſt diviſor, having the laſt found figure of the quotient added to it, multiplied by this figure, you will have the root required.

E. gr. To *extract* the root of 99856, point it after the following manner, 99856: then ſeek a number, whoſe ſquare ſhall equal the firſt figure 9, viz. 3, and write it in the quotient; then having ſubtracted from 9, 3×3, or 9, there will remain 0; to which ſet down the figures as far as the next point, viz. 98, for the following operation. Then, taking no notice of the laſt figure 8, ſay, How many times is the double of 3, or 6, contained in the firſt figure 9? Anſwer, 1. Wherefore having written 1 in the quotient, ſubtract the product, of 1×61, or 61 from 98, and there will remain 37, to which connect the laſt figures 56, and you will have the number 3756, in which the work is next to be carried on. Wherefore alſo neglecting the laſt figure of this, viz. 6, ſay, How many times is the double of 31, or 62, contained in 375 (which may be gueſſed at from the initial figures 6 and 37, by taking notice how many times 6 is contained in 37)? Anſwer, 6; and writing 6 in the quotient, ſubtract 6×626, or 3756, and there will remain 0; whence it appears, that the buſineſs is done, the root coming out 316.

99856 (316
9
———
098
61
———
3756
3756
———
0

Otherwiſe, with the diviſors ſet down, it will ſtand thus:

99856 (316
9
———
6) 98
61
———
62) 3756
3756
———
0

And ſo in others.

Again, if you were to *extract* the root out of 22178791: firſt, having pointed it, ſeek a number, whoſe ſquare (if it cannot be exactly equalled) ſhall be the next leſs ſquare (or neareſt) to 22, the figures to the firſt point, and you will find it to be 4. For 5×5, or 25, is greater than 22; and 4×4, or 16, is leſs; wherefore 4 will be the firſt figure of the root. This, therefore, being writ in the quotient, from 22 take the ſquare 4×4, or 16; and to the remainder 6, adjoin the next figures 17, and you will have 617; from whoſe diviſion, by the double of 4, you are to obtain the ſecond figure of the root, viz. neglecting the laſt figure 7, ſay, how many times 8 is contained in 61? Anſwer, 7; wherefore write 7 in the quotient, and from 617 take the product of 7 into 87, or 609, and there will remain 8, to which join the two next figures 87, and you will have 887; by the diviſion whereof by the double of 47, or 94, you are to obtain the third figure; in order to which ſay, how many times is 94 contained in 88? Anſwer, 0; wherefore write 0 in the quotient, and adjoin the two laſt figures 91, and you will have 88791, by whoſe diviſion by the double of 470, or 940, you are to obtain the laſt figure; viz. ſay, how many times 940 in 8879? Anſwer, 9; wherefore write 9 in the quotient, and you will have the root 4709. But ſince the product 9×9409, or 84681, ſubtracted from 88791, leaves 4110, the number 4709 is not the root of the number 22178791 preciſely, but a little leſs.

22178791 (4709, 43637, &c.
16
———
617
609
———
88791
84681
———
411000
376736
———
3426400
2825649
———
60075100
56513196
———
356190400
282566169
———
73624231

If then it be required to have the root approach nearer, carry on the operation in decimals, by adding to the remainder two cyphers in each operation. Thus the remainder 4110, having two cyphers added to it, becomes 411000; the diviſion whereof, by the double of 4709, or 9418, will give the firſt decimal figure 4. Then having writ four in the quotient, ſubtract 4×94184, or 376736, from 411000, and there will remain 34264. And ſo having added two more cyphers, the work may be carried on at pleaſure, the root at length coming out 4709, 43637, &c.

But when the root is carried on half-way or above, the reſt of the figures may be obtained by diviſion alone: as in this example, if you have a mind to *extract* the root to nine figures, after the five former 4709,4 are *extracted*, the four latter may be had, by dividing the remainder by the double of 4709,4.

Thus if the root of 32976, were to be *extracted* to five places, in numbers; after the figures are pointed, write 1 in the quotient, as being the figure whoſe ſquare 1×1, or 1, is the greateſt that is contained in 3, the figure to the firſt point; and having taken the ſquare of 1 from 3, there will remain 2; then having ſet the two next figures, viz. 29, to it (viz. to 2), ſeek how many times the double of 1, viz. 2, is contained in 22, and you will find indeed that it is contained more than ten times; but you are never to take your diviſor 10 times, nor even 9 times in this caſe; becauſe the product of 9×29, or 261, is greater than 229, from which it would be to be taken, or ſubtracted; wherefore write only 8. And then having written 8 in the quotient, and ſubtracted 8×28, or 224, there will remain 5; and having ſet down to this the figures 76, ſeek how many times the double of 18, or 36, is contained in 57, and you will find 1, and ſo write 1 in the quotient; and having ſubtracted 1×361, or 361, from 576, there will remain 215. Laſtly, to obtain the remaining figures, divide this number 215, by the double of 181, viz. 362, and you will have the figures 59, which, being writ in the quotient, give the root 181, 59.

$\dot{3}2\dot{9}7\dot{6}$ (181,59
1
2)229
224
36) 576
361
362)215(59, &c.

After the ſame manner are roots *extracted* out of decimal numbers. Thus, the root of 329,76 is 18,159; and the root of 3,2976 is 1,8159; and the root of 0,032976, is 0,18159, and ſo on. But the root of 3297,6 is 57,4247; and the root of 32,976 is 5,74247. And thus the root of 9,9856 is 3,16.

To extract *the other, or higher root, out of a given number.* The *extraction* of the cubic root, and all other roots, may be comprehended under one general rule; viz. every third figure, beginning from unity, is firſt to be pointed, if the root to be *extracted* be a cubic one; or every fifth, if it be a quadrato-cubic (or of the fifth power); and then ſuch a figure is to be writ in the quotient, whoſe greateſt power (that is, whoſe cube, if it be a cubic power, or whoſe quadrato-cube, if it be the fifth power, &c.) ſhall either be equal to the figure, or figures, before the firſt point, or next leſs under them; and then having ſubtracted that power, the next figure will be found by dividing the remainder augmented by the next figure of the reſolvend, by the next leaſt power of the quotient multiplied by the index of the power to be *extracted*, that is, by the triple ſquare, if the root be a cubic one; or by the quintuple biquadrate (that is, five times the biquadrate), if the root be of the fifth power, &c. And having again ſubtracted the power of the whole quotient from the firſt reſolvend, the third figure will be found by dividing that remainder, augmented by the next figure of the reſolvend, by the next leſſer power of the whole quotient, multiplied by the index of the power to be *extracted*.

Thus, to *extract* the cube root of 13312053, the number is firſt to be pointed after this manner, viz. $1\dot{3}31\dot{2}05\dot{3}$; then you are to write the figure 2, whoſe cube is 8, in the firſt place of the quotient, as, that which is the next leſſer cube to the figure 13 (which is not a perfect cube number), or as far as the firſt point; and having ſubtracted that cube, there will remain 5; which being augmented by the next figure of the reſolvend 3, and divided by the triple ſquare of the quotient 2, by ſeeking how many times 3×4, or 12, is contained in 53, gives 4, or the ſecond figure of the quotient. But ſince the cube of the quotient 24, viz. 13824, would come out too great to be ſubtracted from the figures 13312, that precede the ſecond point, there muſt only 3 be writ in the quotient; then the quotient 23 being in a ſeparate place multiplied by 23, gives the ſquare 529, which again multiplied by 23, gives the cube 12167; and this taken from 13312, will leave 1145; which augmented by the next figure of the reſolvend 0, and divided by the triple ſquare of the quotient 23, viz. by ſeeking how many times 3×529, or 1587, is contained in 11450, gives 7, for the third figure of the quotient. Then the quotient 237, multiplied by 237, gives the ſquare 56169, which again multiplied by 237, gives the cube 13312053; and this taken from the reſolvend, leaves 0. Whence it is evident, that the root ſought is 237.

$1\dot{3}31\dot{2}05\dot{3}$ (237
Subt. the cube 8
12) rem: 53 (4 or 3
Subtract cube 12167
1587) rem: 11450(7
13312053
Remains 0

So alſo, to *extract* the quadrato-cubical root of 36430820, it muſt be pointed over every fifth figure; and the figure 3, whoſe quadrato-cube, or fifth power 243, is the next leſſer to 364, viz. to the firſt point, muſt be writ in the quotient. Then the quadrato-cube 243 being ſubtracted from 364, there remains 121, which augmented by the next figure of the reſolvend, viz. 3, and divided by five times the biquadrate of the quotient, viz. by ſeeking how many times 5×81, or 405, is contained in 1213, gives 2 for the ſecond figure. That quotient 32, being thrice multiplied by itſelf, makes the biquadrate 1048576; and this again, multiplied by 32, makes the quadrato-cube 33554432, which, being ſubtracted from the reſolvend, leaves 2876388. Therefore 32 is the integral part of the root, but not the true root; wherefore, if you have a mind to proſecute the work in decimals, the remainder, augmented by a cypher, muſt be divided by five times the aforeſaid biquadrate of the quotient, by ſeeking how many times 5×1048576, or 5242880, is contained in 2876388,0, and there will come out the third figure, or the firſt decimal 5. And ſo by ſubtracting the quadrato-cube of the quotient 32,5 from the reſolvend, and dividing the remainder by five times its biquadrate, the fourth figure may be obtained. And ſo on *in infinitum*.

$36\dot{4}3082\dot{0}$ (32, 5
243
405) 1213 (2
33554432
5242880) 2876388, 0 (5

In ſome caſes, it is convenient only to indicate the *extraction* of a root, eſpecially where it cannot be had exactly. Now, the ſign, or character, whereby roots are denoted, is $\surd$; to which is added, the exponent of the power, if it be above a ſquare, and even ſometimes if it be not. E. gr. $\sqrt[2]{\ }$ denotes the ſquare root; $\sqrt[3]{\ }$ the cube root, &c. See **Root**.

When a biquadratic root is to be *extracted*, you may *extract* twice the ſquare root, becauſe $\sqrt[4]{\ }$ is as much as as $\sqrt[2]{\ } \times \sqrt[2]{\ }$. And when the cubo-cubic root is to be *extracted*, you may firſt *extract* the cube root, and then the ſquare root of that cube root, becauſe the $\sqrt[6]{\ }$ is the ſame as $\sqrt[2]{\ } \times \sqrt[3]{\ }$; whence ſome have called theſe roots, not cubo-cubic ones, but quadrato-cubes. And the ſame is to be obſerved in other roots, whoſe indices are not prime numbers.

To prove the extraction *of roots.* 1. For a *ſquare root*: multiply the root found by itſelf, and to the product add the remainder, if there were any: if the ſum be equal to the number given, the operation is juſt.

2. For a *cube root*. Multiply the root found by itſelf; and the product, again, by the ſame root. To the laſt product, add the remainder, if there were any. If the ſum come out the number firſt given, the work is juſt.

After the like manner may the *extraction* of the other roots be proved.

To extract *the roots of equations, or algebraic quantities.* The *extraction* of roots out of ſimple algebraic quantities, is evident, even from the nature, or marks of notation itſelf; as that $\surd\, aa$ is a, and that $\surd\, aacc$ is ac, and that $\surd\, 9aacc$ is 3ac; and that $\surd\, 49a^4xx$ is 7aax. And alſo that $\surd\frac{a^4}{cc}$, or $\frac{\surd a^4}{\surd cc}$ is $\frac{aa}{c}$, and that $\surd\frac{a^4bb}{cc}$ is $\frac{aab}{c}$, and that $\surd\frac{9aazz}{25bb}$ is $\frac{3az}{5b}$, and that $\surd\frac{4}{9}$ is $\frac{2}{3}$, and that $\sqrt[3]{\frac{8b^6}{27a^3}}$ is $\frac{2bb}{3a}$, and that $\sqrt[4]{aabb}$ is $\surd\, ab$: moreover, that $b\surd aacc$, or b into $\surd\, aacc$, is equivalent to b into ac, or abc: and that $3c\surd\frac{9aazz}{25bb}$, is equivalent to $3c \times \frac{3az}{5b}$, or $\frac{9acz}{5b}$. And that $\frac{a+3x}{c}\surd\frac{4bbx^4}{81aa}$ is equivalent to $\frac{a+3x}{c} \times \frac{2bxx}{9a}$, or to $\frac{2abxx+6bx^3}{9ac}$. I ſay all theſe are evident, becauſe it will appear at firſt ſight, that the propoſed quantities are produced, by multiplying the roots into themſelves (as aa from a into a; $aacc$ from ac into ac; $9aacc$ from $3ac$ into $3ac$, &c.) The rule is to *extract* the required root of the numeral co-efficient, if there be any, and to divide the exponents of the literal or algebraic quantities by the number that denominates the root required. It is evident from the application of this rule, that any power which has a poſitive ſign may have either a poſitive or negative root, if the root is denominated by an even number; becauſe + or −, multiplied into themſelves an even number of times will give +. Alſo, that if a power have a negative ſign, no root of it denominated by an even number can be aſſigned. But if the root to be extracted is denominated by an odd number, the ſign of the root will be the ſame as the ſign of the given quantity whoſe root is required. However, it will often happen, that the number denominating the required root will not exactly divide the exponent of the given power, in which caſe the required root will have a fractional exponent: thus, $\sqrt[3]{8a^5}$ is $= 2a^{\frac{5}{3}}$. But when quantities conſiſt of ſeveral terms, the buſineſs is performed as in numbers.

Thus to *extract* the ſquare root out of $aa+2ab+bb$: in the firſt place, write the root of the firſt term aa, viz. a, in the quotient, and having ſubtracted its ſquare $a\times a$, there will remain $2ab+bb$ to find the remainder of the root by. Say, therefore, how many times is the double of the quotient, or $2a$, contained in the firſt term of the remainder $2ab$? I anſwer, b [times]: therefore write b in the quotient, and having ſubtracted the product of b into $2a+b$, or $2ab+bb$, there will remain nothing; which ſhews that the work is finiſhed, the root coming out $a+b$.

$$\begin{array}{l} aa+2ab+bb\ (a+b \\ aa \\ \overline{} \\ 0.+2ab+bb \\ +2ab+bb \\ \hline 0\qquad 0 \end{array}$$

And thus to *extract* the ſquare root out of $a^4+6a^3b+5aabb-12ab^3+4b^4$, firſt ſet in the quotient the root of the firſt term a^4, viz. aa; and having ſubtracted its ſquare $aa\times aa$, or a^4, there will remain $6a^3b+5aabb-12ab^3+4b^4$ to find the remainder of the root. Say, therefore, how many times is $2aa$ contained in $6a^3b$? Anſwer, $3ab$; wherefore write $3ab$ in the quotient; and having ſubtracted the product of $3ab$, into $2aa+3ab$, or $6a^3b+9aabb$, there will yet remain $-4aabb-12ab^3+4b^4$ to carry on the work. Therefore, ſay again, how many times is the double of the quotient, viz. $2aa+6ab$, contained in $-4aabb-12ab^3$? or, which is the ſame thing, ſay, how many times is the double of the firſt term of the quotient, or $2aa$, contained in the firſt term of the remainder $-4aabb$? Anſwer, $-2bb$. Therefore having writ $-2bb$ in the quotient, and ſubtracted the product $-2bb$ into $2aa+6ab-2bb$, or $-4aabb-12ab^3+4b^4$, there will remain nothing.

Whence it follows, that the root is $aa+3ab-2bb$.

$$\begin{array}{l} a^4+6a^3b+5aabb-12ab^3+4b^4\ (aa+3ab-2bb \\ a^4 \\ \text{——}6a^3b+5aabb-12ab^3+4b^4 \\ 0+6a^3b+9aabb \\ \hline \quad 0-4aabb-12ab^3+4b^4 \\ \quad\ \ -4aabb-12ab^3+4b^4 \\ \hline \qquad 0\qquad 0\qquad 0 \end{array}$$

And thus the ſquare root of the quantity $xx-ax+\frac{1}{4}aa$ is $x-\frac{1}{2}a$; and the ſquare root of the quantity $y^4+4y^3+8y^2+8y+4$ is $yy+2y+2$; and the ſquare root of the quantity $16a^4-24aaxx+9x^4+12bbxx-16aabb+4b^4$ is $3xx-4aa+2bb$, as may appear underneath.

1.

$$\begin{array}{l} xx-ax+\frac{1}{4}aa\ (x-\frac{1}{2}a \\ xx \\ \hline 0-ax+\frac{1}{4}aa \\ \hline \quad 0\quad 0 \end{array}$$

2.

$$\begin{array}{l} 9x^4\begin{array}{l}-24aa\\+12bb\end{array}x^2\begin{array}{l}+16a^4\\-16aabb\\+4b^4\end{array}\left(3x^2\begin{array}{l}-4aa\\+2bb\end{array}\right. \\ 9x^4 \\ \hline 0\qquad\ \ \begin{array}{l}+16a^4\end{array} \\ \begin{array}{l}-24aa\\+12bb\end{array}x^2\begin{array}{l}-16a^2b^2\\+4b^4\end{array} \\ \hline 0\qquad\qquad 0 \end{array}$$

3.

$$\begin{array}{l} y^4+4y^3+8y^2+8y+4\ (yy+2y+2 \\ y^4 \\ \hline 0 \\ 4y^3+8yy \\ \hline \quad 0+4yy+8y+4 \\ \quad\ \ +4yy+8y+4 \\ \hline \qquad 0\quad 0\quad 0 \end{array}$$

If you would extract the cube root out of $a^3+3aab+3abb+b^3$, the operation is performed thus:

$$\begin{array}{l} a^3+3aab+3abb+b^3\ (a+b \\ \overline{} \\ a^3 \\ \overline{} \\ 3aa)\ 0+3aab\ (b \\ \hline a^3+3aab+3abb+b^3 \\ \quad 0\qquad 0\qquad 0 \end{array}$$

Extract firſt the cube root of the firſt term a^3, viz. a, and ſet it down in the quotient: then ſubtracting its cube a^3, ſay, how many times is its triple ſquare, or $3aa$, contained in the next term of the remainder $3aab$? and there comes out b; wherefore write b in the quotient, and ſubtracting the cube of the quotient $a+b$, there will remain 0; therefore $a+b$ is the root. After the ſame manner, if the cube root is to be *extracted* out of $z^6+6z^5-40z^3+96z-64$, it will come out $zz+2z-4$. And ſo likewiſe in higher roots.

The general rule for *extracting* any root out of any given quantity, is as follows. Having ranged the quantity according to the dimenſions of its letters, *extract* the ſaid root out of the firſt term, and that ſhall be the firſt member of the root required; then raiſe this root to a dimenſion lower by unit than the number that denominates the root required, and multiply the power that ariſes by that number itſelf; divide the ſecond term of the given quantity by the product, and the quotient ſhall give the ſecond member of the root required. The other members of the root, if there be more than two, are found after the ſame manner. In ſome caſes the exact root cannot be found in finite terms: thus, the ſquare root of a^2+x^2 is found to be $a+\frac{x^2}{2a}-\frac{x^4}{8a^3}+\frac{x^6}{16a^5}-\frac{5x^8}{128a^7}$, &c.

The operation is thus:

$$\begin{array}{l} \qquad\qquad a^2+x^2\ \left(a+\frac{x^2}{2a}-\frac{x^4}{8a^3}+\frac{x^6}{16a^5}\right., \&c. \\ \qquad\qquad a^2 \\ \qquad\qquad\overline{} \\ 2a+\left.\frac{x^2}{2a}\right)*+x^2 \\ \quad\times\left.\frac{x^2}{2a}\right)=x^2+\frac{x^4}{4a^2} \\ \qquad\qquad\overline{\phantom{x^2+\frac{x^4}{4a^2}}} \\ 2a+\frac{x^2}{a}-\left.\frac{x^4}{8a^3}\right)-\frac{x^4}{4a^2} \\ \qquad\times-\left.\frac{x^4}{8a^3}\right)=-\frac{x^4}{4a^2}-\frac{x^6}{8a^4}+\frac{x^8}{64a^6} \\ \qquad\qquad\qquad\overline{\phantom{-\frac{x^4}{4a^2}-\frac{x^6}{8a^4}+\frac{x^8}{64a^6}}} \\ \qquad\qquad\qquad\quad +\frac{x^6}{8a^4}-\frac{x^8}{64a^6}, \&c. \end{array}$$

In the ſame manner the cube root of a^3+x^3 will be found to be $a+\frac{x^3}{3a^2}-\frac{x^6}{9a^5}+\frac{5x^9}{81a^8}-\frac{10x^{12}}{243a^{11}}$, &c. Thus,

$$\begin{array}{l} \quad a^3+x^3\left(a+\frac{x^3}{3a^2}\right. \\ \quad a^3 \\ \quad\overline{} \\ 3a^2)*x^3 \end{array}$$

Then cube $a+\frac{x^3}{3a^2}$, and we ſhall have $a^3+x^3+\frac{x^6}{3a^3}+\frac{x^9}{27a^6}$, which, ſubtracted from the given quantity a^3+x^3, leaves $-\frac{x^6}{3a^3}-\frac{x^9}{27a^6}$ for the next reſolvend; and this divided by $3a^2$ will give $-\frac{x^6}{9a^5}$ for the next term of the quotient, &c. But the roots of quantities of this kind are much more expeditiouſly obtained by means of the **BINOMIAL** *theorem*. For the ſquare root of $a^2+x^2 = \overline{a^2+x^2}|^{\frac{1}{2}}$; and $\overline{a^2+x^2}|^{\frac{1}{2}} = \overline{a^2}|^{\frac{1}{2}}+\frac{1}{2}\times\overline{a^2}|^{\frac{1}{2}-1}\times x^2+\frac{1}{2}\times\frac{\frac{1}{2}-1}{2}\times\overline{a^2}|^{\frac{1}{2}-2}\times\overline{x^2}|^2+\frac{1}{2}\times\frac{\frac{1}{2}-1}{2}\times\frac{\frac{1}{2}-2}{3}\times\overline{a^2}|^{\frac{1}{2}-3}\times\overline{x^2}|^3$, &c. $=\overline{a^2}|^{\frac{1}{2}}+\frac{1}{2}\times\overline{a^2}|^{-\frac{1}{2}}x^2+\frac{1}{2}\times-\frac{1}{4}\times\overline{a^2}|^{-\frac{3}{2}}x^4+\frac{1}{2}\times-\frac{1}{4}\times-\frac{1}{2}\times\overline{a^2}|^{-\frac{5}{2}}x^6$, &c. $=a+\frac{1}{2}\times a^{-1}x^2-\frac{1}{8}\times a^{-3}x^4+\frac{1}{16}\times a^{-5}x^6$, &c. = (bringing the powers of a from the numerators to the denominators, by changing the ſigns of their exponents) $a + \frac{x^2}{2a} - \frac{x^4}{8a^3} + \frac{x^6}{16a^5}$, &c.

Thus alſo the cube root of $a^3 + x^3 = \overline{a^3 + x^3}\rceil^{\frac{1}{3}}$; and $\overline{a^3 + x^3}\rceil^{\frac{1}{3}} = \overline{a^3}\rceil^{\frac{1}{3}} + \frac{1}{3} \times \overline{a^3}\rceil^{\frac{1}{3}-1} \times x^3 + \frac{1}{3} \times \frac{\frac{1}{3}-1}{2} \times \overline{a^3}\rceil^{\frac{1}{3}-2} \times \overline{x^3}\rceil^{2} + \frac{1}{3} \times \frac{\frac{1}{3}-1}{2} \times \frac{\frac{1}{3}-2}{3} \times \overline{a^3}\rceil^{\frac{1}{3}-3} \times \overline{x^3}\rceil^{3}$, &c. $= \overline{a^3}\rceil^{\frac{1}{3}} + \frac{1}{3} \times \overline{a^3}\rceil^{-\frac{2}{3}} x^3 + \frac{1}{3} \times -\frac{1}{3} \times \overline{a^3}\rceil^{-\frac{5}{3}} x^6 + \frac{1}{3} \times -\frac{1}{3} \times -\frac{5}{9} \times \overline{a^3}\rceil^{-\frac{8}{3}} x^9$, &c. $= a + \frac{1}{3} \times a^{-2} x^3 - \frac{1}{9} \times a^{-5} x^6 + \frac{5}{81} a^{-8} x^9$, &c. $= a + \frac{x^3}{3a^2} - \frac{x^6}{9a^5} + \frac{5x^9}{81a^8}$, &c. See Maclaurin's Algebra, part i. ch. viii. p. 50, 51. See ROOT.

EXTRACTOR, in *Midwifery*, an inſtrument contrived to extract children in caſes of difficult births. We have the deſcription of a forceps for extracting children by the head, when lodged low in the pelvis of the mother, in the Medic. Eſſ. Edinb. vol. iii. art. 20. See alſo the abridgment of this book, vol. ii. p. 438, where ſome alteration is mentioned of this inſtrument from Giffard's Midwifery, and an improvement of it by Mr. Freke.

EXTRACTUM *catharticum*, a form of medicine in the London Diſpenſatory, intended as an equivalent for the *extractum Rudii*, commonly called Rudius's pill. It is made in this manner: take Socotorine aloes an ounce and half; pith of coloquintida, ſix drams; ſcammony, and the leſſer cardamom ſeeds huſked, of each half an ounce; proof ſpirit a pint; pour the ſpirit on the coloquintida cut ſmall; then add the ſeeds bruiſed; draw a tincture with a gentle heat, continued four days; then to the tincture preſſed out, add the aloes and ſcammony, firſt ſeparately reduced to powder; and theſe being diſſolved, draw off the ſpirit, and reduce the maſs by evaporation to the conſiſtence of a pill. This for many reaſons is a better compoſition than the Rudius's pill.

EXTRADOS, the outſide of a vault.

EXTRANEOUS *motion*. See MOTION.

EXTRAORDINARII, in *Roman Antiquity*, a body of forces, conſiſting of a third part of the horſe, and a fifth part of the foot, which was ſeparated from the reſt, to prevent any deſign that might be formed againſt the natural forces. See ABLECTI.

EXTRAORDINARY, ſomething out of the common courſe.

EXTRAORDINARY *couriers*, are thoſe ſent expreſs on ſome urgent occaſion.

EXTRAORDINARY *embaſſador*, or *envoy*, is ſuch a one as is ſent to treat or negociate ſome ſpecial and important affair, as a marriage, a treaty, confederacy, &c. or even on occaſion of ſome ceremony, as condolence, congratulation, &c. See EMBASSADOR.

A Gazette, Journal, or other News-paper *extraordinary*, is that publiſhed after ſome great and notable event, containing the detail or particulars thereof, which are not found in the ordinary papers. Our news-writers generally uſe poſtſcripts, or ſupplements, inſtead of *extraordinaries*.

EXTRAORDINARY *culverin*. See CULVERIN.

EXTRAVAGANTES, a part of the canon-law, containing divers conſtitutions of the popes, not included in the body of the canon-law; whence the denomination *extravagantes: quaſi extra corpus juris vagantes*.

The *extravagantes* are divided into two parts: the firſt contains twenty conſtitutions of John XXII. and the ſecond, other later conſtitutions of the ſaid John, and his ſucceſſors. See CANON-*Law*, and DECRETALS.

EXTRAVASATION, formed of *extra*, *without*, and *vas*, *veſſel*, in *Medicine*, a motion of the blood, whereby it breaks out of its ordinary veſſels, the veins or arteries, and either gathers, and ſtagnates in ſome ſoft part, or is thrown quite out of the body.

The ordinary cauſes of *extravaſations*, are unnatural repletions, and diſtenſions of the veſſels; or lacerations, and eroſions thereof. There is a neceſſity for bleeding, to prevent the blood's accumulating ſo as to *extravaſate*. In wounds of the head, particularly, bleeding is neceſſary, to prevent the *extravaſation* of the blood in the brain.

In the contuſions, fiſſures, depreſſions, fractures, and other accidents of the cranium, one or more of the blood-veſſels diſtributed on the dura mater are frequently divided. The blood that is diſcharged from theſe veſſels greatly oppreſſes the brain, and diſturbs its offices; frequently brings on pains and other miſchiefs, and often death itſelf, unleſs the patient be timely relieved. If the quantity of *extravaſated* blood be ever ſo ſmall, it will certainly corrupt and affect the meninges, and the brain itſelf with the ſame diſorder; and from hence will proceed violent inflammations, deliriums, and ulcers, and finally death; and this will frequently be the caſe, after a violent blow upon the cranium, though the bone ſhould eſcape without injury. In theſe injuries of the head, the blood is ſpilt either between the cranium and the dura mater, or between the dura and pia mater, or between the pia mater and the brain, or laſtly into the ſinuſes of the brain. Either of theſe caſes is attended with very great danger; but the deeper the extravaſation happens, ſo much greater muſt the danger be. Blood *extravaſated* in the cavity of the cranium, will be diſcovered from the violence of the ſymptoms that ſucceed a blow on the head; as if the patient lies ſtill without ſenſe or motion, if blood flows from the mouth, ears, or noſe; if the eyes are much inflamed and ſwelled; if vomitings ſucceed; when upon the remiſſion of theſe ſymptoms the patient complains of a remarkable heavineſs of head, ſleepineſs, vertigo, blindneſs, ſpaſms, and diſorders of this kind. When the quantity of *extravaſated* blood on theſe accidents is very conſiderable, and oppreſſes the cerebellum, the patient dies upon the ſpot; but when it is not in a very large quantity, or does not affect the cerebellum, life ſtill remains, but the ſymptoms juſt mentioned come on. In this caſe, if no fiſſure, or contrafiſſure is to be found, nor any external injury on the integuments of the head after a violent blow, it proves very difficult to find in what part of the head the *extravaſation* is ſeated. It will be proper in this caſe firſt to ſhave the head all over, and then thoroughly to examine it; for if any part is ſofter than ordinary, or is enlarged, or red from ſtagnating blood, it is plain that this is the part that has received the injury. But if neither in this way, nor by inquiry among the perſons preſent at the accident, you can get light into the affair, it will be proper to cover the whole head with an emollient plaſter, laying over it medicated bags of herbs, &c. well heated. This application will in a few hours time produce a tumor and ſoftneſs upon the injured part. Sometimes the patient alſo, though he lies ſpeechleſs, and ſeemingly ſenſeleſs, will be continually putting his hand to the injured part; and if either ſide of the patient has loſt ſenſe or motion, and is become paralytic, it is an apparent ſign, whatever ſome might think to the contrary, that the injury has been received on the contrary or ſound ſide. If after accidents of this kind you can diſcover any wound in the ſkin, that muſt be enlarged with the knife till the injury of the cranium, of whatever kind it be, is come at.

When the ſeat of the injury is diſcovered, the firſt intention is to diſcharge the *extravaſated* blood, and then to clean the wound, and remove all ſplinters, or extraneous bodies. Some have recourſe on theſe occaſions to the inſtant uſe of the trepan; but patients have been often very ſucceſsfully recovered without it. It is therefore beſt firſt to open a vein, and take away as much blood as the ſtrength of the patient will permit; this will take off the impetus of the veſſels, and prevent the *extravaſation* of more blood. Preſcribe after this a briſk purge to leſſen the quantity of the fluids; foment the head with medicated bags, and apply a melilot plaſter to it; endeavour to rouſe the patient by volatile applications to the noſtrils, ſuch as ſal volatile, ſpirit of ſal ammoniac, or ſpirit of hartſhorn; and give frequently attenuating fluids, ſuch as the decoctions of betony, ſage, roſemary, lavender-flowers, ſaſſafras, and the like. This method does not immediately produce the deſired effect, but is to be continued for ſome time, and the preſcriptions frequently repeated, particularly when the bad ſymptoms ſeem by degrees to abate; and if the patient finds relief from the firſt bleeding, it will be proper to repeat it a ſecond or third time, eſpecially if he be of an athletic conſtitution. When notwithſtanding this method, the ſymptoms are found however rather to increaſe than abate, it will be neceſſary to make a perforation in the cranium with the TREPAN, to give a paſſage for the diſcharge of the confined grumous blood; and when there is no finding out the part affected, the ſkull muſt be perforated in ſeveral parts till the right is found. Heiſter's Surg. p. 90. See ECCHYMOSIS.

EXTRAVASATION is ſometimes likewiſe uſed in ſpeaking of other humours beſide the blood; as the lympha, urine, &c. The gardeners uſe the term in ſpeaking of gums, juices, &c. which ouſe out of their trees either ſpontaneouſly, or at inciſions.

EXTRAVERSIO, in *Chemiſtry*, a term uſed to expreſs the rendering manifeſt any thing ſaline, alcaline, or acid, concealed in mixed bodies; and is juſt the reverſe to one of the ſpecies of concentration, which hides theſe qualities.

EXTREAM,

EXTREAM, or **Extreme**, is applied to the laſt and outermoſt part of any thing; or that which finiſhes and terminates it on that ſide.

The *extreams* of a line are points. There is no paſſing out of one *extream* into the other, without going through the middle. *Extream* remedies muſt only be had recourſe to in *extream* neceſſity.

Some anatomiſts apply the denomination *extreams*, or *extremities*, to the arms and legs.

The arms, or upper *extremities*, conſiſt of ſixty-two bones; thirty-one in each, viz. the omoplate, humerus, cubitus, radius, eight in the carpus, four in the metacarpus, and fifteen in the fingers.

The *lower extremities*, or legs, conſiſt of ſixty; thirty in each; viz. the femur, rotula, tibia, fibula, ſeven in the tarſus, five in the metatarſus, and fourteen in the toes.

Galen, in his comment on the prognoſtics, obſerves, that theſe parts in acute diſeaſes often afford great matter for prognoſtication; ſince death never happens without ſome alteration in thoſe parts, from their natural ſtate; for in dying perſons the *extream* parts are neceſſarily refrigerated, and turn livid and black; and oftentimes the hands and feet are ſubject to odd and irregular motions.

Extreams, in *Logic*, denote the two *extream* terms of the concluſion of a ſyllogiſm; viz. the predicate and ſubject. They are called *extreams*, from their relation to another term, which is a medium or mean between them.

The predicate, as being likewiſe had in the firſt propoſition, is called the *majus extremum*, *greater extream*; and the ſubject, as being put in the ſecond, or minor, propoſition, is called the *minus extremum*, *leſſer extream*.

Thus, in the ſyllogiſm, man is an animal; Peter is a man, therefore Peter is an animal; the word animal is the greater *extream*, Peter the leſs *extream*, and the man the medium. See Syllogism.

Extream *and mean proportion*, in *Geometry*, is when a line is ſo divided, that the whole line is to the greater ſegment, as that ſegment is to the other.

Or, as Euclid expreſſeth it, when the line is ſo divided, that the rectangle under the whole line, and the leſſer ſegment, is equal to the ſquare of the greater ſegment.

The invention of this diviſion is thus: let the given line be $AB = a$ (*Tab.* II. *Geometry*, *fig.* 43.) and for the greater ſegment put x, the leſſer will be $a-x$. Then, by the hypotheſis, $a : x :: x : a-x$. Therefore $aa-ax = xx$, conſequently $aa=ax+xx$. And, by adding $\frac{1}{4}aa$ on each ſide, to make $xx+ax+\frac{1}{4}aa$ a complete ſquare, the equation will ſtand thus, $\frac{5}{4}aa=xx+xa+\frac{1}{4}aa$. Now, ſince the latter is exactly a ſquare, its root $x+\frac{1}{2}a=\sqrt{\frac{5}{4}aa}$, and by tranſpoſition it will be $\sqrt{\frac{5}{4}aa}-\frac{1}{2}a = x$; which laſt equation is a canon for finding x.

For at the foot of $AB=a$, ſet at right angles $CB=\frac{1}{2}a$; then draw CA, the ſquare of which is equal $ABq+CBq=\frac{5}{4}aa$. And therefore $AC = \sqrt{\frac{5}{4}aa}$; make $CD=CA$. From whence $CB = \frac{1}{2}a$ being taken, as the caſe requires, there remains $BD = x$; which transferred into AB, ſhall give the point E, where AB is cut according to *extream and mean proportion*.

This cannot be exactly done in numbers; but if you would have it tolerably near, add together the ſquare of any number, and the ſquare of its half, and extract, as near as you can, the ſquare root of the ſum; from whence taking half, the remainder is the greater part.

Extreams, in right-angled ſpherical trigonometry. When one of the five circular parts of a right-angled ſpherical triangle, viz. (the three ſides and two oblique angles, for the right angle is neglected) is pitched upon for the middle term, then the two circular parts lying immediately next to it are called *extreams conjunct*; and the two parts remote from the aſſumed middle part, or not immediately next it, *extreams disjunct*. See Circular *parts*, Triangle, and Trigonometry.

Extream-unction, one of the ſacraments of the Romiſh church, the fifth in order, adminiſtered to people dangerouſly ſick, by anointing them with holy oils, and pronouncing ſeveral prayers over them.

It is called *extream unction*, as being only given to perſons in *extremity*. In the thirteenth century, it was called the *unction of the ſick*, and not *extream unction*: for, in the earlier ages, it was given before the *viaticum*; which practice, according to F. Mabillon, was not changed till the thirteenth century.

The reaſons he aſſigns for the change are, that in that age there aroſe divers miſtaken opinions, ſeveral of which we find mentioned and condemned in the Engliſh councils: among the reſt, it was held, that ſuch as had received this ſacrament, in caſe they recovered, might not make uſe of their wives, nor eat meat, nor go barefooted; whence they choſe to forbear it till the laſt extremity; which practice prevailed. See the councils of Worceſter and Exeter, in the year 1287; that of Wincheſter, in 1308; and F. Mabillon, Acta Sanct. Benedict. Sæc. iii. p. 1.

The form of *extream unction* is now deprecative, as the divines call it; formerly it was abſolute, and indicative. This ſacrament is not only in uſe in the Latin, but alſo in the Greek church, and throughout the Eaſt, though under another name, and with ſome difference in the circumſtances; in that the orientals do not wait till their ſick are come to extremity, in order to anoint them; but the ſick generally go to church themſelves; and it is adminiſtered to them as often as they are indiſpoſed: the Greeks taking that direction of St. James, chap. v. ver. 14. which is the foundation of the practice, in a general ſenſe: *Is any ſick among you? let him call for the elders of the church, and let them pray over him, anointing him with oil.* F. Dandini diſtinguiſhes two kinds of *unction* among the Maronites: the one called *unction with the oil of the lamp*; but this he ſuggeſts, is not the ſacramental *unction* ordinarily adminiſtered to ſuch as are in extreme ſickneſs; becauſe the oil is only conſecrated by a prieſt, and it is given to all who are preſent; not to the ſick only, but alſo to the healthy; even the prieſt who officiates partakes of it. The other kind of *unction*, according to that father, is only for the ſick: this is performed with oil conſecrated by the biſhop alone, on Holy Thurſday; and this, it ſeems, is their ſacramental *unction*.

The *unction* with lamp-oil is in uſe, not only among the Maronites, but throughout all the eaſtern church, who uſe it very religiouſly. The truth is, they do not ſeem to have any other ſacrament of *extream unction* beſide this. Yet F. Goar obſerves, though it be only a ceremony, with regard to thoſe in health, it is a real ſacrament to thoſe that are ſick.

In their great churches they have a lamp, wherein this oil for the ſick is preſerved; this lamp they call κανδηλα τȣ ευχελαιου; that is, *the lamp of oil joined with prayer*; for what the Latins call *extream unction*, the Greeks call ευχελαιον, or αγιον ελαιον; that is, *oil with prayer*, or *holy oil.*

EXTREMITIES *of figures*, in *Painting*, is uſed for the head, hands, and feet. Theſe ſhould be drawn with more nicety and exactneſs, or more terminated than other parts; and thus help to render the action more expreſſive.

EXTREMUM *clauſit diem.* See Diem.

EXTRINSIC is applied, in the *Schools*, in various ſenſes. Sometimes it ſignifies a thing's not belonging to the eſſence of another: in which ſenſe, the efficient cauſe, and the end, or ſcope, of a thing, are ſaid to be *extrinſic*, or *extrinſic cauſes*.

Sometimes it implies a thing not being contained within the capacity of another. In which ſenſe, thoſe cauſes are ſaid to be *extrinſic*, which introduce ſomething into a ſubject from without: as when fire introduces heat, &c.

Sometimes it denotes a thing added, or applied to another. Thus, accidents and adherences are ſaid to be *extrinſic* to the ſubject; and thus viſion is *extrinſic* to the object ſeen.

Extrinsic *Argument*, *Service*. See the ſubſtantives.

EXTUBERANCES, in *Medicine*, are ſwellings forth, or riſings up in the fleſh, or other parts of the body.

EXUBERANCE, compounded of *ex* and *uber*, *plentiful*; of *uber*, *udder*, in *Rhetoric*, a redundancy. See Redundance, and Pleonasm.

EXUDATION, the act of ſweating out. In which manner, gums, balſams, &c. are uſually produced from trees.

EXUCONTIANI, a branch of Arian heretics. See Exoucontii.

EXVERRÆ, in *Antiquity*, a kind of bruſh uſed in cleanſing houſes, out of which a dead perſon had been carried.

EXULCERATION, in *Medicine*, the act of cauſing, or producing ulcers.

Thus, arſenic *exulcerates* the inteſtines; corroſive humours *exulcerate* the ſkin.

Exulceration is ſometimes alſo uſed for an ulcer itſelf; but, more generally, for thoſe beginning eroſions which wear away the ſubſtance, and form ulcers.

Exulcerations in the inteſtines are marks of poison.

EXUPORA, in *Botany*, a name by which ſome authors have called the verbena, or common vervain.

EXUSTION, of *ex* and *uro*, *I burn*, the act of burning with fire; uſed in ſome operations by ſurgeons. See Burn.

EXUVIÆ, formed from *exuere*, *to put off*, *to diveſt*, in *Phyſiology*, tranſient parts of certain animals, which they put off, or lay down, and aſſume new ones.

Such, eſpecially, are the ſkins, or ſloughs, of ſerpents; ſhells of lobſters, and the like; which are annually changed, and renewed in the ſpring.

The outer integument of the body, which in man and other larger animals is ſo durably fixed on the body, is in many of the animals of the reptile kind much more looſely fixed, and is changeable ſeveral times during the period of their lives. The ſerpent-kind all ſhift their ſkins ſeveral times in their lives, and the water-newt has been lately obſerved to do the ſame; but no creature in the world does it ſo often as the caterpillar, almoſt every ſpecies of theſe inſects throwing off their old ſkin once in ten or twelve days, or leſs; and this in ſuch a manner as is extremely worthy an attentive obſervation. Malpighi obſerved that the common ſilkworm changed its ſkin four times during its continuance in that ſtate; the firſt of theſe changes happening at eleven or twelve days from its appearance from the egg, and the others at the diſtance of five or ſix days each; and probably the reſt of the caterpillar-kind obſerve nearly the ſame periods.

Neither is this change of the ſkin confined to the few creatures we have mentioned; but among the whole inſect claſs, the moſt numerous of that of all animated beings we know, there is ſcarce one ſpecies every individual of which does not throw off its ſkin, once at leaſt, before it arrives at its full growth. The term changing the ſkin is ſcarce expreſſive enough for this operation in the caterpillar-kinds; for the creature throws off the external covering of every the minuteſt part and organ of its body, and the ſkins they thus depoſite have ſo much the appearance of a complete inſect, that they are very often miſtaken for ſuch, preſenting us with every thing that we ſee in the external appearance of the living animal. If the caterpillar has been one of the hairy kinds, the ſkin which it throws off is hairy, containing the integument as it were of every hair and of each of the legs; and even the claws and other parts, which are not viſible without the aſſiſtance of a microſcope, are as plain in this as in the living animal. But what is moſt of all amazing, is to find that the very ſolid parts which form the head, are alſo found in the *exuviæ*, the ſkull and teeth being plainly diſtinguiſhable in them; it is eaſy to conceive that this muſt be a ſtrange operation, for an animal in this manner to withdraw the ſeveral parts of its body out of their ſheaths and caſes, which they have plainly been fitted into in ſo nice a manner; and particularly the throwing off an old ſkull and teeth to make way for new ones, ſeems an act beyond all comprehenſion. The operation however appears as tedious and painful to the animal as we can expect; if we examine it ſtrictly a day or two before this change happens, the creature always refuſes to eat, and loſes its former activity; either never walking at all, or at the utmoſt but very ſlowly; though they do not move out of their places, however, they are very full of ſome particular motions in their body; they turn themſelves about from ſide to ſide, and often elevate their back, and then gently depreſs it again; they frequently raiſe up their heads, and ſtrike them down rudely againſt the things they ſtand upon, and frequently the anterior half of the body is raiſed from the place, and thruſt very briſkly backwards and forwards from ſide to ſide, for three or four times together. Theſe are the more obvious motions; but beſide theſe there are other leſs ſenſible ones within every ring; theſe are ſeparately inflated and contracted again alternately, and by this means the ſkin is greatly looſened from them; and by theſe motions, and the remaining without food, it is that the body by degrees diſengages itſelf from the ſkin. Reaumur, Hiſt. Inſ. vol. i. part i. p. 225.

M. Reaumur obſerved three or four hairy caterpillars, at the time when they were juſt preparing for their change; and when they ſhewed the very firſt ſigns of its approaching, by ceaſing to eat and move, he cut, with a fine pair of ſciſſars, many of the hairs off, as cloſe to the body as he could. When the change was perfected, and this ſkin thrown off, he examined the hairs of the parts, correſponding to thoſe he had cut them ſhort upon in the old ſkin, while yet upon the animal. If theſe had been the caſes of the new hairs, thoſe muſt certainly have been cut ſhort with them; but, on the contrary, they were found, in the caterpillar, as long in thoſe parts as in any others. It appears from hence, that though all the other parts thrown off are but the ſheaths and caſes to what they covered, yet the hairs are real and ſolid things themſelves; and hence it appears, that the creature, when hatched from the egg, muſt have all its ſkins perfectly formed, one lying under another, and each furniſhed with its covering of hairs, ſo that the old ones are to fall off with the old ſkins, and the new ones to appear with the new; and probably this may be one great means of forcing off and diſlodging the old ſkin from every part, by the creature's erecting them in part. Ibid. p. 241.

Exuviæ is alſo uſed for ſome ſhells, and other marine bodies, frequently found in the bowels of the earth; ſuppoſed to have been depoſited there at the deluge, as being the real ſpoils of once living creatures. See Shell, Fossil, and Deluge.

EY, in our *Old Writers*, the ſame with *inſula*, an *iſland*; from which comes *eyet*, a ſmall iſland or iſlet, vulgarly called *eyght*.

EYE, the organ, or part, of the body, whereby viſion is effected; i. e. whereby viſible objects are repreſented to the mind. The *eye*, or organ of ſight, is generally divided into *internal* and *external* parts; or into the *eye properly ſo called*, and the *appendages* thereof.

Under the latter claſs come the *orbit*, or cavity, wherein the *eye* is placed; the *ſupercilium*, or *eye-brow*, whereby the rays of light are moderated in their paſſage to the *eye*, and ſweat, and other nuiſances, are prevented from falling down into it, though both theſe purpoſes are better anſwered by the anterior and inferior part of the *os frontis*; the *palpebræ*, or *eye-lids*, which cover and defend it in time of ſleep; with their *cilia*, or fringes of hair, to break the too fierce impreſſion of the light, and keep off flies and moats, and by their frequent motions to aſſiſt in diffuſing the tears, and oily ſecretions of the ſebaceous or ciliary glands of the *eye-lids*, equally over the ſurface of the globe of the *eye*; and the *canthi*, or angles.

The *eye*, *properly ſo called*, is of a globular form, and conſiſts of tunics, humours, and veſſels.

In ſome parts it is lined with fat, and it is moved with muſcles; which two latter are by ſome anatomiſts, though ſomewhat inaccurately, reckoned among the conſtituent parts of the *eye*. The *tunics*, *coats*, or *membranes*, *of the eye*, are ſeven; viz. 1. The *adnata*, or *conjunctiva*, covering the whole ball of the *eye*, except the fore-part, called the *ſight*. 2. The *tunica albuginea*, which is placed immediately under the former, and is formed by the expanded tendons of the four ſtrait muſcles of the globe of the *eye*. Theſe two which ſome conſider only as one coat, are called partial coats, becauſe they inveſt only a part of the globe of the *eye*. 3. Immediately under the *adnata* and *abuginea*, is the *ſclerotica*, which covers the whole globe of the *eye*; being opake everywhere but in the fore-part, which covers the ſight, and is tranſparent like horn; which has occaſioned anatomiſts to account this a diſtinct membrane, the fourth in number, and to denominate it the *cornea*. The fifth is the *choroides*, ſituate immediately under the *ſclerotica*: the internal ſurface of the *choroides*, called the *tunica Ruyſchiana*, from profeſſor Ruyſch, or the vaſcular coat from its texture, immediately inveſts the external or poſterior ſurface of the *retina*; its fore-part, like the former, is tranſparent, and therefore accounted a diſtinct, or ſixth coat, and called the *uvea*. Of the duplicature of this part of the tunic, is formed a ſtriped, variegated circle, called the *iris*, which, in different ſubjects, is of different colours, and gives the denomination of this or that colour to the *eye*. Near its middle is an aperture, or perforation, called the *pupil*, or *apple of the eye*, about which the iris forms a ring; from the inſide of this tunic ſpring certain fibres, which ſpreading round the cryſtalline humour, form the *ligamentum ciliare*. The ſeventh tunic, which ſome only make the third, is the *retina*, ſo called, as reſembling a net, and covering only the fund, or bottom, of the *eye*, oppoſite to the ſight.

Of the three proper tunics, the *ſclerotica*, *choroides*, and *retina*, the firſt is derived from the *dura mater*, being detached from the brain as an outer coat, or cover, of the optic nerve, till, arriving at the ball of the *eye*, it is there expanded into a tunic: the ſecond is derived from the *pia mater*, and tranſmitted likewiſe from the brain, along with the optic nerve; the third may be ſaid to be derived from the brain, or *medulla* itſelf, as being an expanſion of the medullary ſubſtance of the optic nerve. See each tunic deſcribed under its proper article. See alſo Iris and Pupil.

The *humours of the eye*, incloſed between theſe tunics, are three; viz. 1. The *aqueous*, a limpid, tranſparent humour, ſituate in the fore-part of the *eye*, immediately under the *cornea*, and occaſioning its protuberance. 2. The *cryſtalline*, ſituate immediately under the aqueous, behind the uvea, oppoſite to the pupil. 3. The *vitreous*, or glaſſy humour, which fills all the hind-part of the cavity of the globe; and is that which gives the ſpherical figure of the *eye*: on its back part is the *retina* ſpread. See each humour under its proper article, Aqueous, Crystalline, and Vitreous.

Some authors, finding theſe humours covered with proper membranes, have given diſtinct names to them; as the *aqueous*, *cryſtalline*, and *vitreous tunics*; but theſe being only productions of the other coats above mentioned, the diſtinction is not much regarded. See the ſituation of the ſeveral coats and humours above deſcribed, repreſented by a figure of the *eye*, in *Tab.* II. *Optics*, *fig.* 20. *a a* is the *ſclerotica*; A A the *cornea*; *c c* the *choroides*; *p p* the *pupil*; *b p*, *b p*, the *iris*; CC the *cryſtalline humour*, ſuſpended by *l*, *l*, the *ligamenta ciliaria*, or *proceſſus ciliares*; NN the optic nerve, the expanſion of which, as far as the *ligamenta ciliaria*, forms the *retina*. The *aqueous humour* is contained in the cavity lying between the *cryſtalline* and the *cornea*; and the larger cavity, beyond the *cryſtalline*, is occupied by the *vitreous humour*.

The *veſſels of the eye* are, nerves, glands, arteries, and veins. 1. The nerves are, the optic pair, which, iſſuing through a perforation in the ſkull, behind the orbit, enter the ball of the *eye*, and diffuſe and loſe themſelves therein; the outer coat, as already obſerved, going to form the *ſclerotica*, the inner to the *choroides*, and the *medulla* to the *retina*.

Beſides which, the *motorii*, *pathetici*, the firſt branch of the fifth pair, called *ophthalmics*, and the ſixth pair, are beſtowed on the muſcles of the *eye*.

2. On the upper part of the ball of the *eye*, near the leſſer or outer canthus, is the *glandula innominata*, or *lachrymalis*, which ſeparates the matter of the tears, to be diſcharged by the continual motion of the *eye-lid* upon the *cornea*, to moiſten it, and facilitate its motion: the tears, falling down the *cornea*, are ſtopped by the edge of the under *eye-lid*, along which they run, till they fall into two ſmall holes in the great angle, one in each *eye-lid*, called *puncta lachrymalia*, which lead to a ſmall bag, called *ſaccus lachrymalis*, from the bottom of which a ſmall tube ariſing, called *ductus ad naſum*, opens into the noſe. Between the two *puncta* is a caruncle, or eminence, which ſerves to ſeparate and keep them open, and which was anciently taken for the *glandula lachrymalis*. Near this *caruncula lachrymalis* is ſituated a ſmall ſemilunar membrane, called *valvula ſemilunaris*, which mutually aſſiſts, and is aſſiſted by, the caruncle, in directing the tears to the *puncta lachrymalia*.

The *glandulæ ciliares*, or *glandulæ ſebaceæ Meibomii*, and their orifices, called *puncta ciliaria*, are ſituated in regular rows, parallel to the borders, or internal edges of the *palpebræ*, formed by the *tarſi*, or their cartilages, compoſing the greater part of the edge of each *eye-lid*. The uſe of the ciliary glands is to ſeparate an oily, ſoft fluid; and the uſe of their *foramina*, or *puncta*, is to convey this fluid, when ſecreted, to the ſurface of the internal parts of the *eye-lids*, and to the external ſurfaces of the globes of the *eyes*.

3. The *eye* receives arteries, both from the internal and external carotids, and returns the blood by veins that go to the jugulars.

The *muſcles of the eye* are ſix; four of which are, from their ſituation, called *recti*, or ſtrait muſcles; and two, *obliqui*. The *recti* come from ſeveral points of the bottom of the orbit, and run immediately between the *ſclerotica* and *adnata*: they derive ſeveral denominations from their ſeveral offices; viz. *attollens*, or *ſuperbus*, which draws the *eye* upwards; *deprimens*, or *humilis*, which caſts it down; *adducens*, and *potator*, which draws the *eye* towards the noſe; and *abducens*, or *indignator*, which draws it the other way towards the leſſer angle. The two oblique muſcles are, the *ſuperior*, called alſo *rotator*, and *trochlearis*, and the *inferior*. Theſe muſcles, together with the optic nerve, are ſurrounded by a conſiderable quantity of fat, which makes an eaſy bed for them, and for the whole globe of the *eye*, and thus greatly aſſiſts the muſcles of the *eye* and the *eye* itſelf, in the variety of motions of which they are capable. See each muſcle in its proper place.

The whole ſtructure and apparatus of the *eye* tend to this; that there be produced a diſtinct and vivid collection in the bottom of the *eye*, directly under the pupil, of the rays which proceeding from any point of an object and entering the *eye*, penetrate the cryſtalline humour; and that ſo many points be painted in the bottom of the *eye* as are conſpicuous in an object, that ſo a ſmall image ſimilar to it may be repreſented on the *retina*.

In order to this, the rays from any radiant or reflecting point ſtriking on the *cornea* are refracted towards the perpendicular, and thus determined to proceed through the aperture of the pupil to the ſurface of the cryſtalline; while other rays, which entered ſo obliquely as to be thrown upon the iris are reflected out again, that they may not diſturb the diſtinctneſs of the ſight; and others, whoſe leſs obliquity threw them between the *uvea* and vitreous humour, are extinguiſhed in the darkneſs thereof, that none may be propagated through the vitreous but ſuch as paſſing through the pupil ſtrike on the cryſtalline.

In the mean time the iris, contracting by its circular, or dilating by its right fibres, the *pupilla* of the *eye* admits fewer or more rays, as the object is nearer or more vivid, or remoter, and more languid. See Pupil.

Now, the flatter the figure of the *cornea* is, the leſs does it collect the rays emitted from any lucid point; whence fewer arrive at the cryſtalline, and thoſe more diverging, unleſs when they come from a very remote object: on the contrary, the rounder it is the more of the rays from any point does it collect, and throw on the cryſtalline, and thoſe the more converging; whence one great cauſe of the defects in the *eyes* both of old men and myopes. Again, the rays tranſmitted through the pupil to the cryſtalline are there refracted a-new, farther collected, and rendered converging; ſo that thoſe which came from the ſame point of the object are now thrown in one point through the vitreous upon the *retina*, where they paint or exhibit that preciſe point of the object whence they flowed. Accordingly, if the cryſtalline be very denſe or ſpherical, the focus, or the point wherein they are united, will be too near; and if too flat, or rare, the point will be too remote; the effect of both which is confuſion. And hence another cauſe of the defects of myopes and preſbytæ.

It is not, however, myopes and old men alone that would labour under theſe defects, and have their viſion in moſt caſes confuſed, as in objects very near or very remote, very ſmall or very great; but this would be the common condition of viſion. Diſtinct viſion, depending abſolutely on the union of all the rays coming from the ſame point of the object on the ſame preciſe point of the *retina*, and rays from the objects at different diſtances being united at different diſtances behind the cryſtalline; it were impoſſible, e. gr. for the ſame *eye* to ſee diſtinctly any two objects differently diſtant from it: but nature has made a proviſion againſt theſe defects; and that principally by bringing the cryſtalline nearer to the *cornea*, or farther from it, occaſionally; which is effected two ways, viz. either by compreſſing the bulk of the *eye* by the four muſcles, all ſtrongly contracted at once, which changes the figure of the aqueous humour, and renders the *eye* oblong; or by the *ligamentum ciliare* augmenting and diminiſhing the convexity of the cryſtalline, and ſetting it nearer or farther from the *retina*. As complex as the mechaniſm of the *eye* may ſeem, and as manifold as the parts are which have a relation thereto, the juſtneſs of viſion ſeems to require an exact habitude in them all: thus, though the pupil be no ſubſtantial part of the *eye*, but only an aperture of the *uvea* almoſt perpetually changing its bigneſs, according to the different degrees of light the *eye* chances to be expoſed to; and therefore ſhould ſeem, while this hole remains open, to perform its office, by giving entrance to the incident rays of light; yet Mr. Boyle ſaw a woman, who, after a fever, not being able to dilate the *pupillæ* of her *eyes* as before, though they were little narrower than ordinary, yet had ſhe thereby almoſt loſt her ſight; and on the other ſide, though a competent wideneſs of the pupil be requiſite to a clear and diſtinct viſion, yet if its dilatation exceeds the due limits, there is thereby produced a conſiderable diſtemper of ſight. It may ſeem alſo but a ſlight circumſtance that the tranſparent coats of the *eye* ſhould be devoid of colour, and of as little moment that the *cornea* ſhould be very ſmooth, provided it remain tranſparent; yet when either of theſe circumſtances is wanting, the ſight is greatly vitiated. Thus, we ſee that in the yellow-jaundice the adventitious colour wherewith the *eye* is tinged makes the patient think he ſees many objects yellow which are of a contrary colour.

It has been of late an opinion, that though both *eyes* be open, and turned towards an object, yet only one of them at a time is effectually employed in giving the repreſentation of it; ſo that the having of the two *eyes* ſhould ſeem in ſome ſort a redundance. But Mr. Boyle furniſhes ſeveral conſiderations which invalidate this opinion, and ſhew that both the *eyes* are of uſe at the ſame time. He aſſures us, he has found by frequent experiment, that his two *eyes* together beheld an object in another ſituation than either of them apart would do: he adds, that he has met with a perſon who had a cataract in his *eye* for two or three years, without finding any impediment in his ſight, though others had, during that time, taken notice of a white film that croſſed his *eye*; till at length happening to rub the ſound *eye*, he was ſurpriſed to find himſelf in the dark; and that a very ingenious perſon, who, by an accident had one of his *eyes* ſtruck out, told him, that for ſome months after he was apt to miſtake the ſituation and diſtances of things; for having frequent occaſion to pour liquors out of one phial into another after this misfortune, he often ſpilt them, and let them run quite beſide the necks of the phials, which he thought he was pouring them directly into.

The like was related to him by another perſon, who had by a wound loſt the uſe of one of his *eyes*, viz. that for ſome time after, he often in pouring out his wine miſſed the mouth of the bottle or glaſs.

A yet more conſiderable inſtance of this kind the ſame author gives us of a noble perſon, who, in a fight had one of his *eyes* ſtrangly mangled by a muſquet-ball, which came out at his mouth; after which accident he could not well pour drink out of one veſſel into another; but had broken many glaſſes by letting them fall out of his hand, when he thought he had given them to another, or ſet them down on the table: he added, that this aptneſs to miſjudge of diſtances and ſituation continued with him, though not in the ſame degree, for two years. See VISION.

It is no uncommon thing for the *eyes* to be terribly moleſted by extraneous bodies accidentally fallen into them, ſuch as a bit of ſand, a ſplinter of wood, the cutting of a quill, or of one's nails, a ſmall inſect, or the like. The moſt eaſy method of getting theſe bodies out is the opening and extending the *eye-lid* with one's fingers, and agitating it, holding the head down; by this means the foreign bodies are often waſhed out of the *eye*, by the increaſed flux of tears, without much difficulty. If this does not ſucceed, the beſt method is next to blow ſome levigated crabs-eyes, or the like fine powder, under the *eye-lids*; that this, being waſhed out by the tears, may carry alſo the other bodies out with it. Heiſter's Surg. p. 364.

The ſeed called *oculus Chriſti*, from its ſuppoſed virtue in clearing the ſight, is very efficacious in ſuch accidents. This it does by its viſcous covering; for when any thing happens to fall into the *eye*, if one of theſe ſeeds is put in at one corner, and the *eye-lid* kept cloſe over it, moving the ſeed gently along the *eye*, whatever happens to be there will ſtick to the ſeed, and ſo be brought out.

If all this fails, the *eye-lid* muſt be gently and carefully lifted up, and the offending body ſought for, and carefully taken out with the end of a probe, or the like inſtrument. Or another method, is the dipping a fine pencil-bruſh, or a ſmall piece of ſpunge, tied to a ſmall ſtick, into warm-water, and paſſing it under the *eye-lid*, and by that means puſhing the offending matter out. Lime, or any other acrid ſubſtance, ſhould always be waſhed out with milk or milk and water, and the *eye* after theſe accidents be waſhed with a collyrium made of roſe-water, with a little of the white of an egg beat up in it, and a ſmall admixture of ſaccharum ſaturni, or powder of tutty; and if there be any conſiderable inflammation, it will be proper to bleed.

It is well known from inſpection, and from the writings of anatomiſts, that there are two veins which run one on each ſide the noſe, through the canthi majores or great corners of the *eyes*; theſe proceed partly from the forehead, and partly from the *eyes*, and, like the frontal vein, diſcharge their blood down into the external jugular veins. Bleeding in theſe canthal veins has been approved of by all oculiſts for inflammations and other diſorders of the *eyes*, though perhaps with very little ſolid foundation. When this operation is to be performed, a ſtricture is made about the neck; and when the inciſion has been made, the patient muſt hold his head in a proper poſition for the blood to flow, without being troubleſome to his *eye* or mouth; and when the neceſſary quantity of blood has been diſcharged, a thick triangular compreſs muſt be applied, and ſecured on with a proper bandage. Heiſter's Surg. p. 282.

EYES, *running of the*, in *Infants*. See INFANT.

EYES, *ſcarification of the*, is a chirurgical operation, by many confounded with that of bleeding in the *eyes*, but improperly enough, ſince the parts of the operation are different; for bleeding is confined in this organ to the white of the *eye* alone, whereas *ſcarification* is practiſed as well upon the inner ſurface of the *eye-lid* as on the white of the *eye*; and they are alſo performed by different inſtruments.

This is no new operation, ſince Hippocrates, Celſus, &c. all preſcribed it; but of latter ages it grew much into diſuſe.

To perform this operation, the patient is to be ſeated in a good light, and his head held ſtill by an aſſiſtant, while the ſurgeon preſſes his thumb and fore-finger on the *eye-lids*, ſo as to open them and turn them outward, that their interior red ſurface may come into view: this is much more conveniently performed on the under than on the upper *eye-lid*. When the ſurface is thus turned up, the ſurgeon draws the ſcarifying inſtrument backward and forward over it with great ſwiftneſs, as alſo over the white of the *eye*, if there be occaſion, and by this means opens all the turgid veſſels, and makes them bleed plentifully: this ſhould be promoted by fomenting the *eye* with a ſpunge dipped in warm water. Heiſter's Surgery, p. 401.

When the operation is over, great care is to be taken that the wounded parts do not cohere together; the patient muſt move the *eye-lids* about at times to prevent this; and the *eye* when bound up at night muſt have a piece of gold-beater's ſkin applied between the *eye-lids* and the *eye*.

Many different inſtruments have been uſed for making the *ſcarification*. Hippocrates uſed a prickle of a thiſtle, and Celſus and Ægineta a ſteel raſp. Others have choſen the ſtalks of the naked horſe-tail, called ſhave-graſs, which do very well; but the beſt of all inſtruments is a beard of barley or rye; theſe beards are furniſhed with rows of ſharp teeth or hooks, and ten, twelve, or fifteen of theſe are to be cut and tied together by a ſtring, ſo as to reſemble a bruſh, the teeth of each beard being turned outward all round: their ſlender ends in this caſe form a ſort of handle, by which the body of the bruſh may be moved about.

EYE, *contuſions of the*. When the *eye* is by any accident contuſed, it will be entirely deprived of ſight, unleſs the contuſion be ſlight, or the proper remedies inſtantly applied. If the *eye* have received a very ſlight contuſion, it will be proper to waſh it frequently for the firſt day with cold ſpring-water, laying on it linen rags, wet with the ſame: on the next day it muſt be rubbed externally with camphorated ſpirit of wine, and covered up with ſtupes wrung out of decoctions made in wine, of *eye-bright*, ſpeed-well, hyſſop, ſage, chamomile-flowers, and fennel-ſeeds; but if theſe things are not to be had, bolſters dipped in warm wine muſt be applied, and renewed very often; and if the patient be of a plethoric habit, bleeding is alſo neceſſary. If the contuſion of the *eye* is ſo violent that you can plainly ſee the extravaſated blood through the cornea, and all objects appear red to the patient, a vein muſt be either opened in the foot or neck: the *eye* muſt be kept continually fomented with warm ſtupes, wrung out of the ſame decoctions as are before mentioned, and the feet muſt be bathed in warm water two or three times a day, and a few drops of pigeons blood muſt be two or three times a day poured into the *eye*; and if all theſe attempts prove fruitleſs, you may very probably ſucceed by making an opening in the cornea with a lancet. Heiſter's Surgery, p. 110.

EYE, *wounds of the*. If the *eye* is wounded, but not ſo as to let out the vitreous or cryſtalline humour, the wound muſt be anointed two or three times a day with a feather or fine rag well dipped in the white of an egg, or elſe in a mucilage made of quince-ſeeds, or of fleawort-ſeeds, in roſe-water; and after each dreſſing a compreſs is to be laid on, well ſaturated with a collyrium made of the whites of eggs; two ounces and a half of roſe-water, half a dram of oil of roſes, and three grains of camphor, well mixed together, and thoroughly ſhook up every time it is to be uſed. If the accident is attended with any great degree of inflammation, as is very frequently the caſe, it will be proper to cover the ſmall compreſs, firſt laid over the *eye*, with a larger, dipped in warm ſpirits of wine, with camphor. The bowels muſt in this caſe be kept open, and the patient blooded, if of a plethoric habit; and if it happen that the cryſtalline humour, or any part of it, ſticks in the orifice of the wound, it muſt in this caſe be pulled out, that it may not bring on a deformity or worſe miſchief to the *eye*. Heiſter's Surgery, p. 90.

EYE, *falling out of the*. See PROLAPSUS *oculi*.

EYE, *diſeaſes of the*, are an opthalmia, or inflammation of the *eyes*; the gutta ſerena, or amauroſis; a ſuffuſion, or cataract; an ectropium; a glaucoma; an amblyopia, or obſcurity of ſight, including the myopia, the preſbytopia, the nyctalopia, and the amauroſis; the ſtrabiſmus, or ſquinting; an unguis pannus, or pterygium of the membrane of the *eye*; the albugo, leucoma, or ſpot in the *eye*; a ſugillation of the *eye*; an epiphora, or rheum in the *eyes*; a trichiaſis; and the fiſtula lachrymalis. See each deſcribed under its peculiar denomination. See Warner's Deſcription of the Human *Eye*, &c. with its principal Diſeaſes, &c. 2d edit. 1775.

The comparative ſtructure and anatomy of the *eye* is very curious; the ſituation, number, conformation, &c. of this organ in different animals, being finely and wonderfully adapted to their different circumſtances, occaſions, and manners of living.

In man, and ſome other creatures, an ingenious author obſerves, the *eye* is placed chiefly to look forward; but withal is ſo ordered as to take in nearly the hemiſphere before it. In birds, and ſome other creatures, the *eyes* are ſo ſeated as to take in near a whole ſphere, that they may the better ſeek their food and eſcape danger. In others they are ſeated ſo as to ſee behind them, or on each ſide, whereby to ſee the enemy purſuing them: thus, in hares and conies, the *eyes* are very protuberant, and placed ſo much towards the ſide of the head, that their two *eyes* take in nearly a whole ſphere; whereas in dogs that purſue them, the *eyes* are ſet more forward in the head, to look that way more than backward.

Generally, the head is contrived to turn this and that way chiefly for the occaſions of the eyes; and generally the *eyes* themſelves are moveable upwards, downwards, backwards, and ſidewiſe, for the more commodious reception of the viſual rays. Where nature deviates from theſe methods, ſhe always makes uſe of very artful expedients to anſwer the ſame end.

Thus, in ſome creatures the *eyes* are ſet out at a diſtance from the head, to be moved here and there, the one this way, and the other that; as in ſnails, particularly, whoſe *eyes* are contained in their four protuberances, like atramentous ſpots fitted to the end of their horns, or rather to the ends of thoſe black filaments or optic nerves ſheathed in the horn. Power, Exper. Phil. Obſ. 31.

And in other creatures, whoſe *eyes* or head are without motion, and in divers inſects, that defect is ſometimes made up by their having more *eyes* than two; as in ſpiders, which having no neck, and conſequently the head being immoveable, the defect is ſupplied by the ſituation and multiplicity of their *eyes*; ſome having four, ſome ſix, and others eight, all placed in the fore-front of their head, which is round, like a locket of diamonds. The reaſon Dr. Power gives, is, that being to live by catching ſo nimble and ſhy a prey as flies, they ought to ſee every way, and ſo take them *per ſaltum*, without any motion of the head to diſcover them.

Again, men, and moſt quadrupeds, are found to have ſeveral muſcles belonging to their *eyes*, by help whereof they can turn them any way, and ſo obvert the organ of ſenſe to the object. But nature not having given that mobility to the *eyes* of flies, ſhe in recompence furniſhes them with a multitude of little protuberant parts, finely ranged upon the convex of their large bulging *eyes*; ſo that by means of theſe numerous little ſtuds numberleſs rays of light are deflected from objects placed on either hand, above or beneath the level of the *eye*, and conveniently thrown upon that organ, to render the objects they come from viſible to the animal; and by the help of a good microſcope, and a clear ſight, ſome hundreds of theſe little round protuberances may be diſcovered, curiouſly ranged on the convexity of a ſingle *eye* of an ordinary fleſh-fly.

So ſcorpions are found to have above a hundred *eyes*; and Swammerdam has obſerved no leſs than two thouſand in the little inſect called *ephemeron*.

In other creatures the like deficiency is ſupplied by having their *eyes* nearly two protuberant hemiſpheres, each conſiſting of a prodigious number of other little ſegments of a ſphere.

The *eyes* of a camelion, Dr. Goddard obſerves, reſemble a lens, or convex-glaſs, ſet in a verſatile globular ſocket, which ſhe turns backward and forward without ſtirring the head, and ordinarily the one a contrary way to the other.

Laſtly, the mole, which the ancients, Ariſtotle, Pliny, Alb. Magnus, &c. ſuppoſed to have no *eyes* at all, is now found to furniſh a notable inſtance of the diverſity of the apparatus of viſion; for that animal living altogether under ground, ſight would generally be uſeleſs to it, and ſo tender a part as the *eye* troubleſome. It has therefore *eyes*, but thoſe ſo exceedingly ſmall, and withal ſituated ſo far in the head, and covered ſo ſtrongly over with hair, that they cannot ordinarily be of ſervice or diſſervice to it. Yet, to guide and ſecure it a little when it chances to be above-ground, Borrichius, Blaſius, Schneider, Dr. Derham, and others, obſerve that it can protend, or put them forth beyond the ſkin, and again draw them back at pleaſure, ſomewhat after the manner of ſnails.

In the *eyes* of nocturnal animals is a part not yet mentioned, viz. a ſort of tapetum at the bottom of the *eye*, which gives a kind of radiation on the pupil, enabling them to ſee and catch their prey in the dark. Thus, Dr. Willis, *Hujus uſus eſt* oculi *pupillam quaſi jubare inſito illuminare—quare in fele plurimum illuſtris eſt*; *at homini, avibus, & piſcibus, deeſt*. De Anima Brutor.

He adds, that in ſome perſons the iris has a faculty alſo of darting out light; and inſtances in a man of a hot head, who after a plentiful drinking of generous wine, could ſee to read in the darkeſt night. Ibid.

The like Pliny tells us of Tib. Cæſar, that upon his firſt waking in the night he could ſee every thing for a little while as if in broad day-light. Nat. Hiſt. lib. xi. cap. 37. and Dr. Briggs gives a parallel inſtance of a gentleman in Bedfordſhire. Ophthal. cap. v. § 12.

Frogs, beſide the parts of the *eye* which they have in common with men, and moſt quadrupeds, have a peculiar membrane or cartilage, which is not commonly perceived, wherewith they can at pleaſure cover the *eye*, without too much hindering the ſight; becauſe the membrane is both tranſparent and ſtrong, ſo that it may paſs for a kind of moveable cornea, or occaſional ſafeguard to the *eye*. A like membrane is alſo found in many birds, as alſo in the crocodile.

Naturaliſts relate wonders of the ſharpneſs and accuracy of the *eye* of ſome animals, as the eagle, &c. beyond thoſe of men.

Yet do thoſe of men ſeem improveable to a ſurpriſing degree. Mr. Boyle inſtances in a major of a regiment of king Charles I. who being afterwards forced abroad, ventured at Madrid to do his king a piece of ſervice of an extraordinary nature and conſequence; which being there judged very irregular, he was committed to an uncommon priſon or rather dungeon, having no window belonging to it, only a hole in the wall, at which the keeper put in proviſions, and preſently cloſed it again on the outſide, but not perhaps very exactly. For ſome weeks this gentleman continued utterly in the dark, very diſconſolate; but afterwards he began to think he ſaw ſome little glimmering of light; and this from time to time increaſed ſo, that he could not only diſcover the parts of his bed, and other ſuch large objects, but at length, amidſt this deep obſcurity, could perceive the mice that frequented his chamber to eat the crums of bread which fell upon the ground, and diſcern their motions very well.

The author juſt mentioned, in his Obſervations on Vitiated Sight, gives us ſome uncommon phenomena that regard the *eyes*. He furniſhes ſeveral inſtances of nyctalopias, or people whoſe *eyes* in the day-time were quite dark, or at leaſt ſo dim that they could hardly diſcern their way; who yet, ſoon after ſun-ſet, and during twilight, ſaw very clearly.

Eyes *of fiſh*. Theſe differ ſo much in their ſeveral kinds, that they make a very eſſential part in their deſcription, and often are characters ſufficient for diſtinguiſhing the ſpecies. Their differences are in regard to their figure, ſituation, proportion, and integuments. In regard to their figure, ſome are flat and depreſſed, as is the caſe in the greater number of fiſhes. 2. Some are convex, as is the caſe in the pleuronecti of many kinds: the *eyes* of theſe much reſemble thoſe of quadrupeds, the others are very different. 3. Some are rounder than ordinary, as in the cyprini, conger, and petromyzon; and laſtly, ſome are oblong, as the *eyes* of the eſoces.

Theſe are the differences of the *eyes* of fiſh as to figure: in regard to their ſituation they alſo differ as much: 1. In moſt fiſh they are placed in the ſides of the head; inſtances of this poſition are ſufficiently common. 2. In ſome they are placed both in the upper part of the head, as in the uranoſcope, or ſtar-gazer. 3. They are in ſome placed very cloſe to one another, as in the pleuronecti; and in others they are ſet at very remarkable diſtances, as in the clariæ. They differ alſo greatly in proportion, in reſpect to the body of the fiſh. Thus they are very ſmall in the whales, and other cetaceous fiſhes; and they are as remarkably large in the apua, boops, and gaſteroſteus.

The *eyes* in fiſh differ alſo greatly in regard to their integuments. In ſome fiſh they are free, and are only covered with their proper membranes, as in the ſalmon, cyprini, &c. 2. They are in ſome covered in part with the ſkin of the head, as in the clupea, mackrel, &c. 3. In ſome they are wholly covered with the ſkin of the head as with a ſort of veil. Examples of this kind there are in the ſyngnathi, pleuronecti, petromyza, and others. The pupil of the *eye* is in moſt kinds of fiſh either round or oblong; but in ſome, as in the ſalmons and coregones, they run out into an acute angle in the anterior part. The colour of the iris in ſeveral fiſh is ſo very diſtinct that it makes a very obvious and diſtinctive character.

The *eyes* of almoſt all fiſh are without eye-lids, properly ſo called; but ſeveral kinds have, beſide the membranes and common tunics, a ſort of tranſparent membrane, with which the *eye* is in part at times covered. The cetaceous fiſhes, in particular, ſeem to have real eyelids: Tyſon has demonſtrated them in his accurate and excellent anatomy of the phocæna.

It is obſerved by Mr. Baker, that if the *eyes* of fiſh are carefully examined when ſwimming in a glaſs veſſel, the cornea or black uvea may be ſeen, ſometimes advancing forwards, and at other times retiring back, juſt as their ſight is directed to near or diſtant objects, through a groſſer or finer medium; the form of their *eyes* altering as occaſion requires to make them diſtinct objects; and their *eyes* have ſo great a liberty in the orbits, that they are able to turn them any way, upwards, downwards, to one ſide or the other, nearly a quarter of a circle, which makes them full amends for the want of motion in their necks, and enables them to change the direction of their optic axis to any deſigned place in a moment. Phil. Tranſ. vol. xlv. p. 153.

Eyes *of flies*. Every naturaliſt has obſerved, that the *eyes* of flies are of a reticulated texture; and each reticulated *eye* of this kind is truly an aſſemblage of multitudes, often of many thouſands, of ſmall but perfect *eyes*. The reticulated *eyes* of flies are large, not only in proportion to the ſize of the creature, but abſolutely, and in themſelves; but the ſeveral ſmall *eyes* of which they are compoſed are remarkably minute in compariſon of thoſe of the butterfly claſs.

Many of the butterfly claſs have in each of their reticulated *eyes* many thouſand ſmall *eyes*; but the fly claſs greatly exceed them in number of theſe, as many of the *eyes* of theſe are three times as large as thoſe of the butterflies; and beſides, that each ſmaller *eye* is vaſtly more minute than the ſmall *eyes* of the butterflies.

Mr. Hook computed 14,000 hemiſpheres in the two *eyes* of a drone; Mr. Lewenhoeck reckoned 6236 in a ſilk-worm's two *eyes* in its fly-ſtate; 3181 in each *eye* of a beetle; and 8000 in the two *eyes* of a common fly. The pearl-*eyes* of the DRAGON-*fly* appear with a common reading-glaſs like ſhagreen; and Mr. Lewenhoeck reckons in each *eye* of this inſect 12,544 lenſes, placed in an hexangular poſition, each lens having ſix others round it. He alſo obſerved in the center of each lens a minute tranſparent ſpot, brighter than the reſt, ſuppoſed to be the pupil, ſurrounded with three circles, and in appearance ſeven times leſs than the diameter of the whole lens. Mr. Puget counted 17,325 in the *eye* of a butterfly, which Malpighi concludes to be diſtinct and ſeparate *eyes*. The abbé Catalan, and others, have ſince ſhewn, that all the eminences diſcoverable in the cornea of inſects have the neceſſary parts, and perform the offices of an *eye*. Lewenhoeck diſcovered the bundles of optic nerves which ſerve theſe ſmall lenſes; and Reaumur ſuppoſes that theſe ſupply the place of all that is wanting behind the lenſes, for the organiſation of an *eye* complete for viſion. Baker's Micr. 1743, p. 228. Reaumur, Hiſt. Inſ. vol. i. p. 261, &c.

That part of each ſide of the head of a fly which is cut, as it were, into a multitude of ſmall facets, is one of the reticulated *eyes* of the creature, and is uſually ſomewhat elevated above the ſurface of the reſt of the head, but differently, and of a different form and extent in the ſeveral different flies. Ibid. vol. iv. p. 239.

It is the cuſtom of nature to allot two of theſe reticulated *eyes* to each fly; and as they each contain ſuch a vaſt multitude of ſmaller, but perfect *eyes*, one would imagine this to be very ſufficient for all the occaſions of the animal. There are, however, notwithſtanding, certain flies of the ephemeron or day-fly kind, which have four of theſe reticulated *eyes*, two of which are placed as is uſual in the fly kind, and are but of ſmall extent; the other two have each the appearance of a ſort of turban, and are placed one beſide the other upon the upper part of the head.

Theſe have each much of the figure of a muſhroom, the head of it extended a little beyond the ſtalk, and the upper convex ſurface cut into almoſt an innumerable quantity of facets. Id. ibid. p. 240.

The firſt pair of the reticular *eyes* of this fly which are placed as thoſe of the creature, are in colour brown; thoſe of the muſhroom form are of a very beautiful citron colour, and as tranſparent as the moſt pellucid reticular *eyes* of the other flies; for, among the various ſpecies of flies, ſome have theſe *eyes* much more tranſparent than others.

The fly thus remarkably furniſhed with *eyes* is produced from a worm of the ſame kind with the common ſpecies of ephemerons; its body is of a pale yellow, and its wings white; the two inferior ones of theſe are ſo ſmall that they are not eaſily diſtinguiſhed.

Among the fly claſs theſe reticular *eyes* are in different ſpecies of different colours; there are ſome which have them brown, others yellow, others green, and others red, and this in all the different ſhades of thoſe colours. Some of them have alſo the gloſs of metals highly poliſhed, others afford us a view of changeable colours, and others have arrangements of different colours, but thoſe fixed and invariable. Id. ibid. p. 241.

The *eyes* of one ſpecies of the gad-fly, ſo troubleſome to oxen, have ſtreaks of red, green, and brown, placed alternately.

One would imagine, that as every fly has two of theſe reticular *eyes*, each compoſed of ſuch a multitude of real *eyes*, they could have no occaſion for any *eyes* beſide theſe; but ſo it has not appeared to the great being that formed them, for they have, many ſpecies of them at leaſt, other *eyes* beſide theſe.

The *eyes* already deſcribed are properly called reticular ones; and to avoid confuſion, it will be neceſſary to know the other *eyes*, which are extremely different from thoſe, by ſome determinate name. Theſe other *eyes*, when examined by the beſt microſcopes, appear of a perfectly ſmooth, gloſſy, and poliſhed ſurface, but plain and ſimple, without the leaſt appearance of a reticulated texture. Theſe are alſo much ſmaller than the reticulated *eyes*, and may therefore be called, by way of diſtinction, the ſmaller *eyes*, or the ſmooth *eyes*.

M. De la Hire ſeems to have been the firſt perſon who diſcovered theſe little ſmooth *eyes* in the fly race. He obſerved three of them diſpoſed in a triangular form, on the back part of the heads of theſe little creatures. When he found that three ſmall convex ſhining bodies were uſually ſituated in this part, he ſoon diſcovered that they were tranſparent, and thence naturally judged them to be of the ſame nature of the corneæ of our *eyes*, and really to ſerve the ſame office to the creature poſſeſſed of them.

We find three of theſe ſmooth *eyes* placed triangularly on the back part of the head of vaſt numbers of the genera of flies, as well of the two-winged as of the four-winged kinds; but there are alſo ſome flies of both theſe claſſes in which they are wanting.

All the ſpecies of gnats, and all the ſpecies of tipulæ, are without theſe ſmooth *eyes*. The heads of theſe ſpecies of flies are very ſmall in proportion to the bulk of their body, and are in a manner covered with their reticular *eyes*, which in ſuch a manner meet and touch one another, as to leave no room nor occaſion for the ſmooth *eyes*.

Theſe flies have the want of their ſmall *eyes* amply made up by the ſize and extent of the larger; but there are ſome other kinds which want them, without having this advantage in their place. Of the two-winged flies with ſhort bodies, the gad-flies want theſe *eyes*; and among the longer bodied and four-winged kinds, the flies produced from the puceron-eaters want them.

Notwithſtanding, therefore, that many ſpecies of flies have theſe *eyes*, there are yet ſo many that want them, that, if M. De la Hire's opinion, that the reticulated *eyes* of flies were not true *eyes*, held good, there muſt be very many of theſe inſects blind.

Though moſt of the flies that have theſe *eyes* have three of them, and thoſe triangularly placed, yet there are ſome that have more, and ſome that have leſs than that number. A certain fly which has two filaments attached to the hinder part of its body, and its hinder pair of legs faſtened to the annular portion of its body, has four of theſe ſmooth *eyes* placed at the four corners of a ſquare; the two anterior tolerably large, and the two poſterior ſo ſmall as to be ſcarce diſtinguiſhable. And other flies, as the papilionaceous ones, produced of water-worms, have only two of them. Ibid.

The poſition of theſe *eyes* varies alſo in the different ſpecies of flies which are poſſeſſed of them; for though their uſual place is in the hinder part of the head, there are ſome which have them before. Some ſpecies of the ephemerons have three of theſe *eyes*, which may be called large in regard to their uſual ſize in other flies; The one of theſe is placed in the middle of the forehead; the other two at the roots of the antennæ, placed ſideways by them, but a little more backward. This ſpecies has two reticular *eyes* beſide theſe, but they are ſmaller than is uſual in that ſpecies of fly.

Theſe *eyes* are not peculiar to the fly claſs alone, ſome other of the inſects which have reticular *eyes* have theſe alſo; among which are the graſshopper, in which they are placed near the noſe.

Notwithſtanding that theſe *eyes* are not well diſtinguiſhed in flies without the aſſiſtance of glaſſes, they may, however, ſerve very well for the diſtinctions of genera among thoſe ſpecies which have them. Id. ibid. p. 245.

Theſe *eyes*, though very ſmall in themſelves, yet, in compariſon with the ſingle *eyes*, which form the reticular ſort, they are very large. See INSECT.

EYES *of horſes*, in the *Manege*, &c. Theſe ſhould be bright, lively, full of fire, pretty large, and full; but not too big, gogling, or ſtaring out of the head: they ſhould alſo be reſolute, bold, and briſk. A horſe, to appear well, ſhould look on his object fixedly, with a kind of diſdain, and not turn his *eyes* another way.

In the *eye* of a horſe are diſcovered his inclination, health, and indiſpoſition. When the *eyes* are ſunk, or the *eye-brows* are too much raiſed up, and as it were ſwelled, it is a ſign of viciouſneſs and ill-nature. When the pits above the *eyes* are extremely hollow, it is for the moſt part a certain ſign of old age: this, however, does not hold of horſes got by an old ſtallion; for theſe have them very deep at the age of four or five years, as alſo their *eye-lids* and *eye-brows* wrinkled and hollow.

Two things are chiefly to be conſidered in the *eye* of a horſe, viz. the cryſtalline part, and the bottom or ground. The cryſtalline, or moſt tranſparent part, ſhould, for clearneſs, reſemble a piece of rock-cryſtal, otherwiſe the *eye* cannot be good. When this part is reddiſh it is a ſign that the *eye* is inflamed, or elſe, as ſome pretend, influenced by the moon. When it is of the colour of a withered or dead leaf upon the lower part, and troubled on the upper, it infallibly ſhews that the horſe is lunatic, which diſtemper continues no longer than while the humour actually poſſeſſes the *eye*.

As to the ground or bottom of the *eye*, which is properly its pupil or apple, it ſhould be large and full, and ought to be carefully inſpected, that there be no *dragon*, as it is called, on it. This is a white ſpot or ſpeck, which at firſt appears no bigger than a grain of millet, but grows to ſuch a bigneſs as to cover the whole apple of the *eye*: it is incurable, never failing to make a horſe blind in the *eye* where it is found. If the whole bottom of the *eye* be white, or of a tranſparent greeniſh white, it is a bad indication, though perhaps the horſe is not as yet quite blind: however, it ought to be obſerved, that if you view a horſe's *eyes* when oppoſite to a white wall, the reflection of it will make their apples appear whitiſh, ſometimes inclining to green, though they be really good. When this is perceived, you may try whether his *eyes* have the ſame appearance in another place.

In caſe you perceive above the bottom of the *eye*, as it were, two grains of chimney-ſoot fixed thereto, it is a ſign the cryſtalline is tranſparent; and if, beſides this, the ſaid bottom be without a ſpot or whiteneſs, then you may infer that the *eye* is ſound.

You ought alſo to examine whether an *eye* which is troubled and very brown be leſs than the other; for if it be, it is irrecoverably loſt.

All *eyes* which are ſmall, narrow, and have long pupils, run a greater riſk of looſing the ſight than any others. See Blindness.

The diſeaſes of the *eyes* in horſes proceed either from a defluxion, or from ſome external hurt. In the former caſe the *eyes* are watery, hot, red, and ſwollen, the diſtemper advancing by degrees; in the latter the malady comes ſpeedily to a height, and the ſkin on the outſide of the *eye* is peeled off.

If the diſtemper takes its riſe from a rheum or defluxion, it is to be conſidered whether it proceeds from the *eye* itſelf, or from another aggrieved part: in the latter caſe, the redreſſing of the part will ſet the *eye* free; in the former, it is proper to cool the horſe's blood with an ounce of ſal prunellæ, mingled every day with his bran; and when it leſſens his appetite, to change it for liver of antimony till he recovers his ſtomach.

For ſore *eyes*, where a ſkin is growing over them, the following receipt is recommended: to the white of an egg add a little fine powdered ſalt; then ſet this on the fire till it be reduced to a powder. This, mixed with a little honey, is to be put into the horſe's *eye* with a feather. If it is found inſufficient to eat off the ſkin, the powder alone muſt be blown into the *eye* with a quill.

In caſe of a blow on the *eye*, take honey; and having added a ſmall quantity of power of ginger, put it into the horſe's *eye*; or elſe take hog's lard, with the oil of roſes and elder, of each an equal quantity; then, having melted them together, anoint the *eye* therewith.

Some horſes have naturally tender weeping *eyes*, which void a ſharp eating humour; theſe are eaſily cured, by waſhing or bathing them every morning or evening with brandy. See Horse.

We ſay alſo, *a horſe unſhod of one eye*, which is a rallying expreſſion, importing that he is blind of an *eye*.

Eye *of the branch of a bridle*, in the *Manege*, is the uppermoſt part of the branch which is flat, with a hole in it, for joining the branch to the head-ſtall, and for keeping the curb faſt.

Eye *of a bean*, in the *Manege*, is a black ſpeck or mark in the cavity of the corner-teeth, which is formed there about the age of five and a half, and continues till ſeven or eight; aod it is from hence that we uſually ſay, ſuch a horſe marks ſtill, and ſuch a one has no mark.

Eye, *artificial*, is an optical machine, wherein objects are repreſented after the ſame manner as in the natural *eye*, of conſiderable uſe in illuſtrating the nature and manner of viſion.

Its conſtruction is thus: provide two hollow hemiſpheres of hard, dry wood, well cemented together, to repreſent the ball of the *eye*; let the interior or fore-hemiſphere be perforated with a round hole in C (*Tab. Optics, fig*, 9. *n*. 2.) to ſupply the place of a pupil, and therein fit a thin, plain glaſs, or, which amounts to the ſame, a concavo-convex glaſs, to ſerve for the cornea. In the inſide put a ſhort draw-tube G, with a lens convex on both ſides, to do the office of the cryſtalline therein. In the hind, or poſterior hemiſphere, fit another draw-tube E F, with a plain glaſs therein, having its inner ſurface ſmooth, though not poliſhed, repreſenting the retina and optic nerve.

If now the aperture C be turned towards any object, and the draw-tube F E be gradually pulled out, you will have the object beautifully and ſtrongly repreſented in all its colours on the retina, only in an inverted order. See Vision.

It being of no conſequence what the figure of the inner cavity is; any room or chamber ſo darkened as only to receive light from a ſingle hole, with a glaſs convex on both ſides fitted therein, will do the office of an *artificial eye*, and exhibit all the objects oppoſed to the aperture on a wall or a white cloth ſtretched at a proper diſtance from the aperture, with this circumſtance, that the leſs ſphere the glaſs is a ſegment of, the larger will the figures appear; and this is the celebrated *camera obſcura*. See Camera *obſcura*.

Eye *in perſpective*. See Perspective.

Eye, *altitude of the*. See Altitude.

Eye, in *Architecture*, is uſed for any round window made in a pediment, an Attic, the reins of a vault, or the like.

Eye, *bullock's*, *Oeil de bœuf*, denotes a little ſky-light in the covering or roof, intended to illumine a granary, or the like.

The ſame term is applied to the little lutherns in a dome; as in that of St. Peter's at Rome, which has forty-eight in three rows. See Luthern.

Eye *of a dome*, denotes an aperture at the top of the dome; as that of the Pantheon at Rome, or of St. Paul's at London. It is uſually covered with a lantern.

Eye *of the volute*, in *Architecture*, is the center of the volute, or that point wherein the helix or ſpiral whereof it is formed, commences; or, it is the little circle in the middle of the volute, wherein are found the thirteen centers for deſcribing the circumvolutions thereof. See *Tab. Archit. fig*. 30. and *fig*. 29.

Eye-*flaps*, thoſe pieces of leather which cover the *eyes* of coach-horſes.

Eye, in *Agriculture* and *Gardening*, denotes a little bud or ſhoot inſerted into a tree by way of Graft.

The term *eye*, *oculus*, is alſo uſed for a gem or bud, as it ſtands on the parent tree. See Bud and Pruning.

Eye *of a pear*, the extremity oppoſite to its ſtalk. See Pear.

Eye *of a tree*, a ſmall pointed knot to which the leaves ſtick, and from which the ſhoots or ſprigs proceed.

Eye, in a *Ship*. The hole wherein the ring of the anchor is put into the ſhank is called the *eye of the anchor*; and the compaſs or ring which is left of the ſtrop to which any block is ſeized is called the *eye of the ſtrop*.

Eye *of a ſtay*, is that part of a ſtay which is formed into a ſort of collar to go round the maſt-head.

Eye-*bolt*, is a long bar of iron with an *eye* in one end of it, formed to be driven into the decks or ſides of a ſhip for divers purpoſes, as to hook tackles, or faſten ropes to, as occaſion requires.

Eye-*let-hole*. See Sail.

Eyes *of a ſhip*, a name frequently given to thoſe parts which lie near the hauſe-holes, particularly in the lower apartments within the veſſel.

Eye-*bright*, in *Botany*, *euphraſia*, a genus of the *didynamia angioſpermia* claſs. This is a medicinal plant which grows naturally in ſterile fields and commons in moſt parts of England. Its characters are theſe: the flower is of the perſonated kind, divided into two lips, and having the upper one placed erect, and divided into ſeveral ſegments: the lower one divided into three principal ſegments, each of which is alſo bifid. The piſtil ariſes from the cup, and is fixed in the manner of a nail to the back part of the flower: this finally ripens into a capſule of an oblong ſhape, containing ſmall ſeeds. There are two ſpecies. Tourn. Inſt. 174.

Theſe plants always grow among heath, furze, graſs, or ſome other cover, nor will they grow when theſe are cleared from about it, nor when ſown in a garden. The herb-women ſupply the markets with it in plenty from the fields.

Eye-bright is much recommended in diſorders of the *eyes*, eſpecially weakneſs and dimneſs of ſight. It is given in ſeveral forms, but the powder of its leaves is thought moſt effectual as well as ſafeſt, the doſe being from one to three drams.

Eye, among *Naturaliſts*, is ſometimes alſo uſed for a hole or aperture: whence it is that the firſt of the larger inteſtines is called *cæcum*, or the *blind gut*, as having no *eye* or perforation. For a like reaſon the chemiſts call a cloſe veſſel uſed in diſtillation, a *blind head*.

Eye, in *Printing*, is ſometimes uſed for the thickneſs of the types and characters uſed in printing; or more ſtrictly, it is the graving in relievo on the top of the letter; otherwiſe called its *face*.

It is the *eye* or *face* that makes the impreſſion; the reſt, which they call the *body*, ſerving only to ſuſtain it.

The *eye* of the *e* is the little aperture at the head of that character, which diſtinguiſhes it from the *c*. See E.

Eye is alſo uſed among Jewellers for the luſtre and brilliance of pearls and precious ſtones, more uſually called the *water*.

EYE-*brows, wounded*. In wounds of this part great care muſt be taken to guard againſt inflammations, leſt the *eyes* ſhould partake of the injury; all hot and ſharp things muſt be avoided in eating and drinking; and the patient ſhould be blooded if plethoric; the wound muſt be dreſſed with vulnerary balſams, and the dreſſings covered with compreſſes dipped in camphorated ſpirit of wine. If the wound be large, and the *eye-brow* entirely divided, it will be neceſſary to uſe the ſuture and dreſs over it with a vulnerary balſam, covering both *eyes*, and keeping them as much as poſſible from motion. Heiſter's Surg. p. 79.

EYE-*brow*, in *Architecture*. See FILLET.

EYE-*lids*, *palpebræ*, in *Anatomy*, thoſe external moveable covers which ſerve to ſcreen and defend the *eyes*.

They conſiſt of a thin muſcular membrane, covered on the outſide with a ſtrong, yet flexible ſkin, and lined withinſide with a production, as ſome think, of the pericranium. Their edges are fortified with a ſoft cartilage, by means whereof they are enabled to cloſe the better.

Out of theſe cartilages grow a paliſade of ſtiff hairs, called *cilia*, of great uſe to warn the *eye* of the approach of danger either in ſleeping or waking; to keep off motes, flies, &c. in the air, and to break the too fierce impreſſion of the rays of light.

Theſe hairs, it is obſerved, only grow to a certain convenient length, and never need cutting, as moſt others do; add to this, that their points ſtand out of the way; thoſe of the upper *eye-lid* being bent upwards, as thoſe of the lower downwards, ſo nice is nature in ſuch ſmall matters.

At the commiſſure, or joining of the upper and under *eye-lids*, are formed two angles called *canthi*.

In the inner of theſe is a gland called *glandula lachrymalis*, from which proceed two or three ducts, which, opening on the inner ſurface of the *eye-lid*, ſerve to moiſten the ball of the *eye*, and keep its membranes from growing harſh and dry.

Near the other angle is a gland called *innominata*, which helping alſo by ſeveral branches to irrigate the *eye*, the overplus is carried to the greater angle, and tranſmitted to the noſe through the puncta lachrymalia.

By theſe glands it is that the humour, called tears, is ſecerned.

The *eye-lids* are both moveable, eſpecially the upper, which has two muſcles to raiſe and depreſs it, called *attollens* and *deprimens*, or *orbicularis*. See ATTOLLENS and ORBICULARIS.

In quadrupeds the lower *palpebra* is moveable, and is the ſmaller; in birds, on the contrary, the lower is moveable, and the greater.

Animals that have hard *eyes*, as lobſters, and the generality of fiſhes, have no *palpebræ*, ſuch *eyes* being ſufficiently ſecured without.

In the generality of brutes there is a kind of a third *eye-lid*, which is drawn like a curtain, to wipe off the humidity which might incommode the *eyes*; it is called the *nictitating membrane*.

The monkey is almoſt the only one that wants it, as being furniſhed, like a man, with hands to wipe the *eye* on occaſion.

EYE-*lids wounded*. Wounds, either of the upper or lower *eye-lid*, will not readily heal, not ſo much from the thinneſs of the parts as from the great quantity of fluids with which the *eye* is continually moiſtened. It is neceſſary, therefore, firſt to foment the part with decoctions of chamomile, hyſſop, or eyebright, till the flux of the blood is ſtopped, and the wound well cleanſed; then if the wound is tranſverſe, it muſt be ſtitched up in the middle with a fine needle, and ſprinkled over afterwards with the powder of comfrey-root, gum arabic, or other ſuch medicines, or anointed with balm of Gilead, or Peru, or Capivi, laying over theſe applications a plaſter of diachylon, and tying it up in ſuch a manner that the *eye* may have very little power to move about. If the wound is made lengthways it will require ſeveral ſtitches, and muſt be dreſſed over them as before. Heiſter's Surgery, p. 79.

EYE-*glaſs*, in our *Double Microſcopes*, is uſually a lens convex on both ſides; but Euſtachia Divini long ſince invented a microſcope of this kind, the power of which he places very greatly above that of the common ſort; and this principally depending on the *eye-glaſs*, which was double, conſiſting of two plano-convex glaſſes, ſo placed as to touch one another in the middle of their convex ſurface. This inſtrument is ſpoken of with great credit by Fabri in his Optics, and is ſaid to have this peculiar excellence, that it ſhews all the objects flat, and not crooked, and takes in a large area, though it magnifies extremely much. Phil. Tranſ. Nº 40.

EYE-*ſucker*, in *Natural Hiſtory*, a ſmall ſea-inſect, which is ſometimes found fixed by the ſnout to the *eyes* of ſprats, whence it has received its name. It is about three inches in length, whereof the head is one quarter part. The body is ſomewhat thicker than a hog's briſtle, and of a pleaſant green colour. Phil. Tranſ. Nº 472, § 7. or vol. xliii. p. 35.

EYE-*water*. See WATER.

EYE, *white of the*. See WHITE.

EYE-*glaſs*, in *Teleſcopes*, is the lens next the *eye*; and if the teleſcope conſiſt of more than two lenſes, all but that next the object are called *eye-glaſſes*.

EYE, *Bull's*, in *Aſtronomy*, a ſtar of the firſt magnitude, in the conſtellation Taurus, by the Arabs called *Aldebaran*. Its longitude, latitude, &c. ſee among thoſe of the other ſtars in the conſtellation TAURUS.

EYE, *cat's*, *Oculus cati*, in *Natural Hiſtory*, a precious ſtone, called alſo *ſun's eye*, *oculis ſolis*, and taken by Dr. Woodward for the aſterias of the ancients.

It is tranſparent, of a glittering grey, interchanged with a ſtraw-colour; uſually oblong as to figure, and not unlike the opal, only much harder. It is found in divers parts of the Eaſt Indies; but thoſe of the iſland of Ceylon are the moſt prized. See ASTERIAS and CAT's *eye*.

EYE, *crab's*, *Oculus cancrorum*. See CRABS-*eyes*.

EYE, *goat's*, *Oculus caprinus*, is when there is a white ſpeck on the pupil of the *eye*, as is ſeen in the *eyes* of goats. Phyſicians call it *ægias*.

EYE, *golden*, in *Ornithology*. See DUCK.

EYE, *hare's*, *Oculus leporinus*, in *Medicine*, a diſeaſe ariſing from a contraction of the upper *eye-lid*, which prevents its being able to cover its part of the *eye*; ſo that the patient is obliged to ſleep with the *eye* half-open, after the manner of *hares*.

Phyſicians call it *lagophthalmia*, a Greek word, ſignifying the ſame thing, being compounded of λαγως, *hare*, and οφθαλμος, *eye*.

EYESS, in *Falconry*. See FALCON.

EYRE, or EIRE, in *Law*, ſignifies the court of juſtices itinerant.

The word ſeems formed of the old French, *irre iter*, *way*, *track*.

Hence juſtices in *eyre*, as thoſe whom Bracton calls *juſticiarii itinerantes*.

EYRE *of the foreſt*, is otherwiſe called *juſtice-ſeat*, which by the ancient cuſtoms was to be held every three years by the juſtices of the foreſt, journeying up and down for that purpoſe.

EYRIE, or AYRIE, among *Falconers*, the neſt where hawks ſit and hatch, and feed their young.

Hence, a young hawk newly taken from the neſt, is called an *eyeſs*.

EZEKIEL, a canonical book of the Old Teſtament, referring chiefly to the degenerate manners and corruptions of the Jews in the times when the author wrote.

It abounds with fine ſentiments and rich compariſons, and diſcovers much learning in profane matters.

Ezekiel was carried captive to Babylon with Jechoniah or Jehoiachin, and began his prophecies in the fifth year of the Captivity, or in the year before Chriſt 595. He was contemporary with Jeremiah, who propheſied at the ſame time in Judea. He foretold many events, particularly the deſtruction of the temple, the fatal cataſtrophe of thoſe who revolted from Babylon to Egypt, and the happy return of the Jews to their own land.

EZEKIEL's *reed*, or *rod*, a ſcripture meaſure, computed by late writers to amount to 1 Engliſh foot 11 inches $\frac{1}{3}$ of an inch.

EZQUADUITL, a name by which ſome authors have diſtinguiſhed the tree from which we have the common dragon's blood of the ſhops.

EZRA, or EZDRAS, in *Divinity*. *The Book of Ezra* is a book of Holy Scripture, compoſed in Hebrew by *Ezra* or *Ezdras*, the high-prieſt of the Jews during the captivity; and particularly about the time when they returned to Paleſtine, under the reign of Cyrus.

This book contains the hiſtory of the Jews from the time of Cyrus's edict for their return, to the twentieth year of Artaxerxes Longimanus. It ſpecifies the number of Jews who returned, and Cyrus's proclamation for rebuilding the temple, the obſtruction it met with, and the finiſhing thereof in the reign of Darius. It is canonical, and allowed as ſuch both by the church and the ſynagogue.

The books of *Ezra*, called in the Engliſh verſion *the Firſt and Second Books of Eſdras*, though held by ſome, particularly the Greeks, for canonical, are thrown by the Engliſh church into the number of apocryphal books, being only extant in Greek.

The *Canon of Ezra* is the collection of the books of Scripture made by that pontiff. It appears, however, that the ſynagogue added other books to *Ezra*'s canon; witneſs the book of *Ezra* itſelf, that of Nehemiah, and ſeveral others. See CANON.

F.

F, The ſixth letter of the alphabet, and the fourth conſonant.

The letter F may be either conſidered abſolutely, and in itſelf, or with regard to the particular languages where it is found. In the firſt view, *F* is generally placed by grammarians among the ſemi-vowels, and diſtinguiſhed in the enumeration of the alphabet by a name beginning with a vowel; though it has ſo far the nature of a mute that it is eaſily pronounced before a liquid in the ſame ſyllable. Joh. Conrad. Amman (in his Diſſertatio de Loquela) divides the conſonants into ſingle and double, and the ſingle into hiſſing and exploſive. Among thoſe called hiſſing, there are ſome pronounced by the application of the upper teeth to the lower lip; and theſe are the *F* and *ph*. The reaſon why ſome account the *F* a ſemi-vowel, and Amman places it among the hiſſers, is, that one may pronounce a little ſound without any other motion of the organs than what is neceſſary to the pronunciation of the *F*.

In Engliſh its ſound is invariable, being formed by compreſſion of the whole lips, and a forcible breath.

This letter is derived to us from the Romans, who borrowed it from the Æolians; among whom it is called *digamma*, or *double gamma*, as reſembling two Γ's, one over the other: add, that the digamma ſeems in its origin to have been no other than the Greek Φ, which being made at three ſtrokes, degenerated at length into the figure *F*. For the letter Φ being compounded of an omicron with a perpendicular drawn through it, if that perpendicular be made firſt, and the O at two ſtrokes afterwards, viz. firſt the upper, then the under part, it may happen, eſpecially in writing faſt, that the two parts ſhall not join; and even inſtead of two arches of circles, haſte and conveniency may naturally enough make two ſtrait lines.

What confirms this tranſmutation of the Φ into *F*, is, that on the medals of Philip, and the kings of Syria, in the words ΕΠΙΦΑΝΟΥΣ and ΦΙΛΑΔΕΛΦΟΥ, the *phi* is frequently ſeen in the form juſt mentioned; i. e. it has no circle or omicron; but acroſs the middle of the perpendicular is a kind of right line, formed only of two dots, the one on the right ſide, and the other on the left, repreſenting a croſs †. Such appears to be the origin of the letter *F*, which of conſequence is no other than a corruption of the Greek Φ; and accordingly, on the medals of the Faliſci the *F* is ordinarily put in lieu of the Greek Φ: but it muſt be added, that though the Greek and Latin letter were thus the ſame thing, yet the ſound was much ſofter among the Latins than among the Greeks, as was long ago obſerved by Terentianus.

The Romans for ſome time uſed an inverted, F Ⅎ, in lieu of a V conſonant, which had no peculiar figure in their alphabet: thus, in inſcriptions we meet with TERMINAℲIT, DIℲI, &c. According to Lipſius, in his Comment on the Annals of Tacitus, lib. xi, Covarruvias and Dauſquius, this inverted digamma Ⅎ was firſt introduced by the emperor Claudius. See Tacit. An. lib. xi. cap. 4. and Suet. in Vit. Claud. cap. 41.

It may be added, that the prounciation of the *F* is almoſt the ſame with that of the V, as will be evident by attending to the manner of pronouncing the following words: *F*avour, *V*anity, *F*elicity, *V*ice, *F*oment, *V*ogue, &c. The French particularly, in borrowing words from other languages, uſually turn the final *v* into an *f*, as cheti*f* of catti*v*o, neu*f* of no*v*us, ne*f* of navis, &c.

In the latter Roman writers we find the Latin *F* and Greek Φ *ph* frequently confounded; as in *F*alanx for *Ph*alanx, *F*iloſophia for *Ph*iloſophia, &c. which abuſe is ſtill retained by many French writers, who write *F*iloſophie, *F*ilippe, Fpi*f*ane, &c. and even ſometimes by the Engliſh, as in *f*antaſy, *f*iltre, &c.

F, in the *Calendar*, is the ſixth dominical letter.

F, in the *Civil Law*. Two ff's joined together ſignify the Pandects: ſee the reaſon of this under PANDECT.

F, in our *Ancient Cuſtoms*, was a ſtigma or brand.

He that ſhall maliciouſly ſtrike any perſon with a weapon in church or church-yard, or draw any weapon there with an intent to ſtrike, ſhall have one of his ears cut off; and if he have no ears he ſhall be marked on the cheek with a hot iron having the letter F, whereby he may be known for a fray-maker, or fighter.

F, or FA, in *Muſic*, denotes the baſs-clef, being placed on the fourth line upwards.

Indeed the character or ſign by which the *f* and *c* clefs are marked bear no reſemblance to thoſe letters. Mr. Malcolm thinks it were as well if we uſed the letters themſelves; but cuſtom has carried it otherwiſe. The ordinary character of the *F* or baſs-clef is 𝄢, which Kepler takes a great deal of pains to deduce by corruption from the letter *F* itſelf.

F, in the *Italian Muſic*, is often uſed inſtead of FORTE.

FF, in the *Italian Muſic*, ſtands for *forte forte*, and intimates to play very ſtrong and loud.

F, in *Phyſical Preſcriptions*, ſtands for *fiat*, *let it be done*, as *F. S. A.* denotes as much as *fiat ſecundum artem*.

F, among ſuch as give us the numeral value of letters, ſignifies 40, according to the verſe

Sexta quaterdenos gerit quæ diſtat ab alpha.

And when a daſh was added over it $\overline{F}$, ſignified 40,000.

F, on the *French Coins*, is the mark of the town of Angers.

FA is one of the notes of muſic, being the fourth, riſing in the order of the gammut, *ut*, *re*, *mi*, *fa*. See NOTE.

FABA, in *Botany*. See BEAN.

FABA *Bengalenſis*, in the *Materia Medica*, a roundiſh compreſſed ſubſtance, about an inch in diameter, brought from Bengal, and thought to be a vitiated fruit of the myrobalans kind. It is a very good aſtringent, and therefore preſcribed with good ſucceſs in fluxes and hæmorrhages.

FABA *Græca*, in *Botany*. See *Indian Date* PLUM.

FABA *St. Ignatii*, in the *Materia Medica*. See NUX *vomica*.

FABA *purgatrix*, in the *Materia Medica*, the fruit of a ſpecies of *ricinus*. See PALMA *Chriſti* and CASTOR-*oil*.

FABACIUM, a word uſed by the ancients to expreſs a ſort of food then in uſe, which was a kind of cake made of bean-meal.

FABAGO, in *Botany*. See BEAN-*caper*.

FABALIS *Lapis*, in *Natural Hiſtory*, a ſtone mentioned by many ancient authors of repute as found in the river Nile, of the ſhape of a common bean, and of a black colour. They ſay it had the virtue of curing dæmoniacs, and that dogs durſt not bark if it was laid before them. Theſe, and many other like virtues, are attributed to this ſtone, to the great diſgrace of the ſober authors who relate them. The ſtone ſeems to have been of thoſe extraneous foſſils which Dr. Hill has ſtiled ICHTHYPERIA, from their having been formerly parts of the boney palates of fiſhes which feed on the ſhell-fiſh kinds; and other authors SILIQUASTRI, from their reſembling the pod of the lupine or bean.

FABARIA, in *Botany*, a name given by ſome authors to the telephium or ORPINE, and by which it is in ſome places called in the ſhops.

FABARIÆ *calendæ*, among the Romans, the calends of June, ſo called becauſe the beans being then firſt ripe, ſome of them were offered to the goddeſs Carna, the wife of Janus.

FABATARIUM, among the ancients, ſignifies, according to ſome, a large veſſel in which beans were kept; others will have it to have been a kind of diſh or plate into which bean-pulſe was put and offered to the houſhold gods.

FABER, in *Ichthyography*. See DOREE.

FABIANS, FABII, in *Antiquity*, a part of the LUPERCI. Thoſe prieſts conſiſted of two colleges, the firſt of which was called the *Fabii*, and the ſecond the Quintilii, from their reſpective chiefs. The *Fabii* were for Romulus, and the Quintilii for Remus.

FABLE, a tale or feigned narration, deſigned either to inſtruct or divert; or, as Monſ. de la Motte defines it, an inſtruction diſguiſed under the allegory of an action.

Fable ſeems to be the moſt ancient way of teaching: the principal difference between the eloquence of the ancients and that of the moderns conſiſts, according to Pere Boſſu, in this; that our manner of ſpeaking is ſimple and proper, and theirs full of myſteries and allegories: with them the truth was uſually diſguiſed under thoſe ingenious inventions, called, by way of excellence, *μυθοι*, *fabulæ*, *fables*; that is, words, as intimating that there was the ſame difference between theſe *fabulous* diſcourſes of the learned and the common language of the people, as between the words of men and the voices of beaſts.

At firſt *fables* were only employed in ſpeaking of the Divine Nature, as then conceived; whence the ancient theology was all *fable*. The Divine attributes were ſeparated as into ſo many perſons, and all the œconomy of the Godhead laid down in the feigned relations and actions thereof; either becauſe the human mind could not conceive ſo much power and action in a ſingle and indiviſible being; or, perhaps, becauſe they thought ſuch things too great and high for the knowledge of the vulgar; and as they could not well ſpeak of the operations of this Almighty Cauſe without ſpeaking likewiſe of its effects, natural philoſophy, and at length human nature, and morality itſelf, came thus to be veiled under the ſame *fabulous* allegoric expreſſion; and hence was the origin of poetry, and particularly of epic poetry.

The critics after Aphthonius and Theon reckon three kinds of *fables*, rational, moral, and mixed.

FABLES, *rational*, are called alſo parables: theſe are relations of things ſuppoſed to have been ſaid and done by men, and which might poſſibly have been ſaid and done, though in reality they were not. Such in the ſacred writings, are thoſe of the ten virgins, of Dives and Lazarus, the prodigal ſon, &c. Of theſe rational *fables* we have likewiſe about a dozen in Phædrus.

FABLES, *moral*, called alſo apologues, are thoſe wherein not only beaſts, but trees, and other inanimate ſubſtances, are introduced as actors and ſpeakers. Theſe are alſo called *Æſopic fables*; not that Æſop was their inventor, for they were in uſe long before him, viz. in the times of Homer and Heſiod, but becauſe he excelled in them. Such was Jotham's *Fable* of the Trees, the moſt ancient of any that are now extant.

The *rational* differs from the *moral fable* in this; that the former, though it be feigned, might be true; but the latter is impoſſible, as it is impoſſible for brutes or ſtocks to ſpeak.

FABLES, *mixed*, are thoſe compoſed of both ſorts, rational and moral, or wherein men and brutes are introduced converſing together. Of theſe we have a fine inſtance in Juſtin, lib. xxxiii. cap. 4. made by a petty king to alarm the ancient Gauls againſt the Maſſilians, who, ariving out of Aſia into Spain, charmed with the place, begged leave of the inhabitants to build a city. To this effect: A bitch big with young begged of a ſhepherd a place to lay her whelps in; which when ſhe had obtained, ſhe farther begged for leave to rear them there. At length the whelps being now grown up, depending on the ſtrength of her own family, ſhe claimed the property of the place. So the Maſſilians, who are now only ſtrangers, will hereafter pretend to be maſters of this country.

As to the laws of *fable*, the principal are, 1ſt. That to every *fable* there be ſome interpretation annexed, to ſhew the moral ſenſe or deſign thereof. This interpretation, if it be placed after the *fable*, is called επιμυθιον, or *affabulatio*; if before it, ϖρομυθιον, *præfabulatio*. 2. That the narration be clear, probable, ſhort, and pleaſant. To preſerve this probability the manners muſt be expreſſed and cloſely kept to, as in poetry. See PROBABILITY and MANNERS.

M. de la Motte has ſome fine remarks on the ſubject of *fables*, at the beginning of his *Fables* Nouvelles, dediées au Roi, 1719. A *fable*, according to this polite writer, is a little epic poem, differing in nothing from the great one but in extent; and in that being leſs confined as to the choice of its perſons, it may take in all ſorts at pleaſure, as gods, men, beaſts, or genii; or even if occaſion be, create perſons; i. e. perſonify virtues, vices, rivers, trees, &c. Thus, M. de la Motte very happily introduces virtue, talent, and reputation, as perſons making a voyage together. See EPOPOEIA and PERSONIFYING.

That author ſuggeſts two reaſons why *fables* have pleaſed in all ages and places. The firſt is, that ſelf-love is ſpared in the inſtruction. The ſecond, that the mind is exerciſed by the allegory. Men do not love direct precepts; too proud to condeſcend to thoſe philoſophers who ſeem to command what they teach, they require to be inſtructed in a more humble manner; they would never amend, if they thought that to amend were to obey: add, that there is a ſort of activity in the mind which muſt be humoured; it pleaſes itſelf in a penetration which diſcovers more than is ſhewn; and in apprehending what is hid under a veil, fancies itſelf in ſome meaſure the author of it. The *fable* muſt always imply or convey ſome truth; in other works, delight alone may ſuffice; but the *fable* muſt inſtruct. Its eſſence is to be a ſymbol, and of conſequence to ſignify ſomewhat more than is expreſſed by the latter. This truth ſhould for the generality be a moral one; and a ſeries of fictions conceived and compoſed in this view would form a treatiſe of morality preferable to any more direct and methodical treatiſe; accordingly, Socrates, we are told, had a deſign to compoſe a courſe of morality in this way. This truth ſhould be concealed under the allegory; and in ſtrictneſs, it ought not to be explained either at the beginning or end.

The truth or idea intended ſhould ariſe in the reader's mind from the *fable* itſelf. However, for the conveniency of the leſs diſcerning readers, it may be a good way to point out the truth or moral in preciſer terms. To have the moral at the end of the *fable* ſeems much better than at the beginning: the mind is apt to be foreſtalled in the latter caſe; I carry the key along with me, ſo that there is no room to exerciſe my mind in finding any thing myſelf.

The image, M. de la Motte obſerves, muſt be juſt, and expreſs the thing intended directly, and without any equivoque: it muſt be one; i. e. all the parts muſt be viſibly acceſſory to one principal end: and it muſt be natural; i. e. founded on nature, or at leaſt on opinion.

The writers of *fables* are not many. If there were any before Æſop, who lived in the time of Solon, about the fifty-ſecond Olympiad, his ſucceſs has quite effaced their memory; and even occaſioned all the good things of that kind to be aſcribed to him. His Life, as written by Planudes, is itſelf a thorough *fable*. It muſt be owned to be very happily imagined to make the inventor of *fables* a ſlave, and his maſter a philoſopher: the ſlave has his maſter's pride and ill humour to deal with throughout. His leſſons were all contained in the *fables* themſelves, and the readers were left the pleaſure of diſcovering them.

It is generally allowed among the learned, that though the matter and invention of the *fables* be Æſop's, the turn and expreſſion is not. The Greek is of Planudes; and bad Greek it is, in the judgment of F. Vavaſſor, De Ludica Dict. Some authors will have Socrates the author of the *Fables* of Æſop; others attribute them to Solomon, and others to Homer.

Phædrus was a ſlave too, and a freed-man of Auguſtus; but he had the advantage over Æſop in education: he is only a fabuliſt, as he tranſlates and copies. Though his *fables* be generally ſhort, yet he is prolix compared with his author. His ſtyle, however, is always florid, his deſcriptions conciſe, and his epithets ſuitable: he frequently adds graces never dreamt of by the inventor, and everywhere enriches the ſimplicity of Æſop in the moſt delicate manner.

Pilpay, another fabuliſt, governed Indoſtan a long time under a powerful emperor; but he was not the leſs a ſlave, for the prime miniſters of ſuch princes are always more ſo than the meaneſt ſubjects. Pilpay compriſed all his politics in his *fables*; and accordingly his work long continued the book of ſtate, or the diſcipline of Indoſtan. It was tranſlated into Perſian and Arabic, and ſince into the modern languages. His *fables*, M. de la Motte obſerves, are rather famous than good; but he is the inventor, and the merit of invention will always compenſate for many faults. His *fables* are often wild and artleſs; and the collection is a ſort of romantic aſſemblage of men and genii, compoſed in its kind like Cyrus or Orlando, where the adventures are continually thwarting and claſhing with each other.

We ſay nothing of the *fables* of Gabrias, or Babrias, Avienus, who lived towards the end of the fourth century, under the empire of Gratian, Abſtemius, &c.

Among the moderns, the moſt celebrated writers are Meſſ. de la Fontaine and De la Motte: the firſt of whom has picked out all the beſt things in Æſop, Phædrus, and Pilpay, and given them anew in French, with a delicacy and ſimplicity peculiar to himſelf; and which, in the judgment of his countrymen, ſets him even above Phædrus. The latter, rather than content himſelf with what De la Fontaine had left, choſe to be an inventor. He has ſucceeded. His *fables* are many of them very happy, though ſome think them too full of thought and reaſoning. His verſification is infinitely more correct than that of La Fontaine, and more ſuitable to the ſubject than that of Le Noble.

We have likewiſe ſome *fables* much eſteemed of Mr. Gay and Mr. Moore.

Fable is alſo uſed for the plot of an epic or dramatic poem, or the action which makes the ſubject of ſuch a poem or romance. See POEM, DRAMA, EPIC, and ACTION.

The *fable*, according to Ariſtotle, is the principal part, and as it were the ſoul of a poem. It muſt be conſidered as the firſt foundation of the compoſition, or the principle which gives life and motion to all the parts. In this ſenſe the *fable* is defined, “ A diſcourſe invented “ with art, to form the manners by inſtructions diſ“ guiſed under the allegory of an action.”

The epic *fable*, according to Boſſu, is confined to the rational kind; i. e. the actors and perſons are to be gods and men; and yet it admits of great latitude: it may be either grave, illuſtrious, and important, or low and popular; either whole or defective, in verſe or in proſe; much epiſodified, or brief; rehearſed by an author, or repreſented by actors on the ſtage; all which are ſo many circumſtances which do not make any alteration in the nature and eſſence of the *fable*.

The characters that ſpecify the epic *fable* are theſe: it is rational and probable; it imitates a whole and an important action; and it is long, and related in verſe: none of which properties affect the nature of the *fable*, or make it leſs a *fable* than thoſe of Æſop.

The *fable*, according to Ariſtotle, conſiſts of two eſſential parts, viz. truth, as its foundation; and fiction, which diſguiſes the truth, and gives it the form of *fable*. The truth is the point of morality intended to be inculcated; the fiction is the action, or words the inſtruction is covered under.

To make a plot or *fable*, the firſt thing, according to the great critic juſt mentioned, is to pitch on ſome moral inſtruction to be exemplified.

E. gr. I would exhort two brothers, or other perſons, who have ſome common intereſt, to live in amity, in order to preſerve it. This is the end of the *fable*, and the firſt thing I have in view. In order to this, I endeavour to impreſs this maxim on our minds, that “ ill “ underſtanding ruins families, and all kinds of ſociety.” This maxim is the moral or truth which is to be the ground of the *fable*; which moral truth is now to be reduced into action, and a general action to be framed from ſeveral ſingle and real actions of ſuch as were ruined by ill underſtanding.

Thus, e. g. I ſay, that certain perſons united together for the preſervation of ſomething that belonged to them in common, coming to diſagree, their diviſion left them open to an enemy who ruined them: ſuch is the firſt plan of a *fable*. The action preſented by this narration has four conditions; it is univerſal, imitated, feigned, and contains a moral truth under an allegory.

The names given to the ſeveral perſons begin to ſpecify the *fable*. Æſop uſes thoſe of brutes. Two dogs, ſays he, appointed to watch a flock, fall out, fight, and leave all open to the wolf, who carries off what he pleaſes.

If you would have the action more ſingular, and render the *fable* rational, take the names of men. Pridamant and Orontes, brothers by a ſecond venter, were left very rich by their father's will; but diſagreeing about the partition of their effects, they engaged themſelves ſo far againſt each other that they took no care of their common intereſt againſt Clitander, their eldeſt brother by the firſt venter; which laſt, artfully inflaming their quarrel, and feigning he had no view but to ſome moderate augmentation, which might be made him without oppreſſing them, in the mean time, gets the judges on his ſide, and the other perſons intruſted with the affair, procures the will to be affirmed, and becomes entitled to the whole eſtate about which the brothers were at variance. Now, this *fable* is rational; but the names being feigned as well as the things, and beſides, the perſons being only of a private rank, it is neither epic nor tragic. However, it may be employed in comedy, it being a rule laid down by Ariſtotle, that epic and tragic poets only invent things, but comic poets invent both names and things. See COMEDY, &c.

To accommodate this comic *fable* more to the mode and taſte of the town, ſome Dorinda muſt be imagined to have been promiſed to Clitander; but her father, finding him diſinherited by the will, changes his reſolution, and will have her marry one of the rich, ſenſeleſs, young brothers, whom ſhe deſpiſes, &c.

But to return. The fiction may be ſo diſguiſed with the truth of hiſtory that there ſhall not appear any fiction at all. To effect this the poet looks back into hiſtory for the names of ſome perſons to whom the feigned action either really or probably did happen, and relates it under thoſe known names, with circumſtances which do not change any thing of the ground of the *fable*.

As for the *fable*, it matters but little whether the perſons be called dogs, or Orontes and Pridamant, or Robert of Artois and Ralph de Neſſe, or Achilles and Agamemnon.

The epic *fable* we ſhall now propoſe in its juſt extent under theſe two names laſt mentioned. It is too ſhort for the epopœia in the two preceding ones. We chooſe the *Fable* of the Iliad, as being the fineſt plan of an epic poem in the world, and at the ſame time the moſt uſeful ſyſtem of the precepts of the art, it being hence that Ariſtotle was furniſhed with all his reflections.

In every diſcreet undertaking the end is the firſt thing propoſed; and by this the whole work and all its parts are regulated; conſequently, the deſign of the epopœia being to form the manners, it is with this firſt view the poet muſt begin. Now, the philoſopher dwelling on virtues and vices in general, the inſtructions he gives ſerve equally for all ſtates and all ages; but the poet has a more immediate regard to his countrymen, and the preſſing occaſions of his fellow-citizens. On this view it is that he chooſes his moral, which he is to inſinuate into the people by accommodating himſelf to their peculiar cuſtoms, genius, and inclinations. See how Homer has acquitted himſelf in theſe reſpects.

He ſaw the Greeks, for whom he wrote, divided into as many ſtates as cities, each whereof was a body apart, and had its government independent of the reſt. Yet were theſe different ſtates frequently obliged to unite into one body againſt their common enemies. Here then were two ſorts of government too different to be commodiouſly treated in one poem; the poet accordingly had recourſe to two *fables*; the one for all Greece, conſidered as confederated together, only conſiſting of independent parts; the other for each particular eſtate, ſuch as they are in time of peace, and without the firſt relation. The firſt is the ſubject of the ILIAD, the ſecond of the ODYSSEY.

For the firſt kind of government, all experience agrees, that the only thing which can render it happy, and its deſign ſucceſsful, is a good underſtanding, and due ſubordination among the ſeveral chiefs that compoſe it; and that miſunderſtandings, a deſire of ſway, &c. are the inevitable bane of ſuch confederacies. The beſt inſtruction therefore that could be given them, was to ſet before their eyes the deſtruction of the people, and even of the princes themſelves, through the ambition and diſcord of theſe latter. Homer therefore, for the ground or moral of his *fable*, choſe this great truth, that the miſunderſtandings of princes ruin their ſtates. “ I ſing, “ ſays he, the wrath of Achilles, ſo fatal to the Greeks, “ and which deſtroyed ſo many heroes, occaſioned by a “ diſagreement between king Agamemnon and that “ prince.”

To enforce this truth, he repreſents divers confederate ſtates firſt at variance and unproſperous; then reconciled and victorious: all which he thus includes in one univerſal action. Several independent princes league againſt a common enemy; he whom they chooſe as their leader affronts the braveſt of all the confederacy; upon which the offended prince withdraws, and refuſes any longer to fight for the common cauſe. This miſunderſtanding gives the enemy ſo much advantage that the confederates are ready to relinquiſh the enterprize. The diſaffected perſon himſelf becomes a ſharer in the calamities of his allies, one of his chief friends and favourites being killed by the chief of the enemies. Thus, both parties grown wiſe by their own injury, are reconciled. Upon which the valiant prince joining again in the war, turns the ſcale to his own party, and kills the enemy's chief.

Such is the firſt general plan of the poem. To render this probable and more intereſting, circumſtances of time, place, perſons, &c. are to be added; that is, the poet looks into hiſtory or tradition for perſons to whom ſuch actions may with truth or probability be attributed.

He pitches on the ſiege of Troy, and ſuppoſes the action to have paſſed there. The brave, cholerie character, he calls Achilles; the general, Agamemnon; the chief of the enemies, Hector, &c. To inſinuate himſelf into his readers, he accommodates himſelf to their manners, genius, views, &c. and to render his *fable* more intereſting,

reſting, makes his chief perſons, and thoſe who remained victorious, to be Greeks, the fathers of thoſe very people. The courſe of the work is filled up and extended with other uſeful leſſons and inſtructions.

That the epopœia in all its glory is juſtly and ſtrictly a mere *fable* in the ſame ſenſe as the fictions of Æſop are, is ſhewn by F. Boſſu, in a parallel between the *fable* of the Iliad and that of Æſop already mentioned. The moral inſtruction is viſibly the ſame in both; ſo is the fiction. All the difference lies in the names and qualities of the perſons.

Homer's are kings; he calls them Achilles, Patroclus, &c. and the general good to be preſerved, he calls the Greeks. Æſop, after his manner, gives his perſons the names of beaſts: the dogs are confederated, the wolf is their enemy; and what Homer calls Greeks, Æſop calls ſheep. One ſays, that while the confederate princes were at variance, Hector ruſhes on the Greeks, and makes them pay dear for the folly of their ſovereigns (*delirant reges, plectuntur Achivi*); but that the allies, brought by misfortunes to themſelves again, re-unite, repulſe Hector, and kill him. The other, that while the dogs are together by the ears the wolf falls on the ſheep; and that the dogs ſeeing the havock he makes, join together, drive him away, and kill him.

The two *fables* were capable of a ſtill nearer reſemblance. Homer has extended his by long ſpeeches, deſcriptions, compariſons, and particular actions; that of Æſop might be amplified after the like manner, without corrupting or altering it. It is neceſſary only to relate what cauſe ſet the dogs at variance, and ſhew the riſe of the fatal wrath in all its circumſtances; to make fine deſcriptions of the plain wherein the ſheep fed, and of ſome neighbouring wood where the wolf was ſheltered; to give this enemy whelps to rear, make them follow their ſire in ſearch of prey, and deſcribe the carnage they made at divers expeditions. Nor ſhould the genealogy of the heroes be forgotten; the wolf ſhall boaſt himſelf a deſcendant of Lycaon, and one of the dogs be ſprung in a direct line from Canicula: which laſt would be the proper hero of the poem, as being hot, and apt to be enraged. He would repreſent the perſon of Achilles to admiration; and the folly of ſome Ajax, his couſin, would afford a good proof of ſo divine an extraction. Nothing more were required to engage heaven in the cauſe, and divide the gods; which, no doubt, have as much right in Æſop's republic as in the ſtates of Homer. Witneſs Jupiter taking care to give a king to the nation of the frogs.

The reader has here field enough for an epopœia; if he have any thing of fancy and expreſſion, and do but take care to repeat as often as Homer does,

Τον δ' απαμειβομενος προσεφη ποδας ωκυς.

FABRIC, the ſtructure or conſtruction of any thing, particularly of a building.

The word is formed of the Latin, *fabrica*, which originally ſignifies a *ſmith's ſhop*, or *forge*.

In Italy the word *fabric* is applied to any conſiderable building; in France it rather ſignifies the manner of building.

FABRIC *lands*, are lands given towards the maintenance, rebuilding, or repair of cathedrals or other churches, mentioned in the Act of Oblivion, 12 Car. II. cap. 8.

In ancient time almoſt every one gave by his will more or leſs to the *fabric* of the cathedral or pariſh-church where he lived.

FABULOUS, denotes ſomething that has a relation to FABLE. Varro divides the duration of the world into two earlier ſtates or periods, called the *dark* and *fabulous*. See AGE.

FACE, the ſurface or firſt ſide which a body preſents to the eye. See SURFACE.

FACE is particularly uſed for the viſage of an animal, and eſpecially of a man, as being in him the only part of the body that ordinarily appears to the eye.

The Latins call it *facies*, *vultus*, *os*, &c.

The great variety obſervable in men's *faces*, voices, and hand-writings, furniſhes a noble argument of a Providence.

The human *face* is called the image of the ſoul, as being the ſeat of the principal organs of ſenſe; and the place where the ideas, motions, &c. of the ſoul are chiefly ſet to view. Pride and diſdain are ſhewn in the eye-brows, modeſty on the cheeks, majeſty on the forehead, &c. It is the *face* which ſhews the ſex, age, temperament, health, or diſeaſe, &c.

The *face*, conſidered as the index of the paſſions, habits, &c. of the perſon, makes the ſubject of phyſiognomy.

Anatomiſts uſually divide the *face* into two parts, the upper and lower: the upper is the front, or forehead; the lower includes the eyes, noſe, ears, mouth, cheeks, and chin. See each part deſcribed under its reſpective article.

FACE, or **FAÇADE**, in *Architecture*, is ſometimes uſed for the front of a building, or the ſide on which the chief entrance is; as alſo for the ſide it preſents to a ſtreet, garden, court, &c. and ſometimes for any ſide oppoſite to the eye.

FACE, **FACIA**, or **FASCIA**, alſo denotes a flat member having a conſiderable breadth, and but a ſmall projecture.

Such are the bands of an architrave, larmier, &c. See FASCIA.

FACE *of a ſtone*, is the ſurface or plain part which is to lie in the front of the work. The *face* is eaſily known when the ſtone is ſcalped, as being always oppoſite to the back, and the back going rough as it comes from the quarry.

The workmen generally chooſe to make one of thoſe ſides the *face*, which, when in the quarry lay perpendicular to the horizon, and conſequently the breaking, and not the cleaving way of the ſtone.

FACE *of a gun*, in the *Artillery*, the ſurface of the metal at the extremity of the muzzle of a piece.

FACE, in *Aſtrology*, is uſed for the third part of a SIGN. Each ſign is ſuppoſed to be divided into three *faces*: the ten firſt degrees compoſe the firſt *face*; the ten following ones the ſecond; and the laſt ten the third. Venus is in the third *face* of Taurus; that is, in the laſt ten degrees thereof.

FACE *of a plant*, in *Botany*, a word uſed by Tournefort and many botaniſts to convey an idea of that general appearance of plants, which ſhew a ſameneſs in thoſe of the ſame *genus*, and a diverſity from other genuſes, though not eaſily charactered in words, yet very obvious to an eye accuſtomed to theſe reſearches. Thus, all the ſpecies of wormwood have the ſame *face*, by which they may be taken to be the ſpecies of the ſame *genus*, and ſo of many more; nay, in ſome caſes, whole *genera*, and even claſſes, have the ſame kind of *family-face*, as it may be called, by which they may be known; as the umbelliferous plants, except the *perfoliata*, and a few other inſtances.

It has been attempted by many to make this general *face* an indicatory note of the virtues of the plant which wears it; and there would certainly be this great advantage in it if it could be brought to any degree of certainty, that the moſt obvious of all diſtinctions would be applied to the moſt valuable office; but though an abſolute certainty cannot be arrived at in an attempt of this kind, yet allowing for the poſſibility of a few exceptions, general conjectures may be made on the following rules, which will rarely fail. The umbelliferous plants beforementioned make a very large claſs; and it is their general and obvious character to have their ſeveral flower-branches ariſe from one center, and expand into an umbrella, every one having a tuft of flowers at the end: theſe flowers conſiſt of five leaves, and the ſeeds are naked and double, and the leaves of the plants are generally deeply divided, as in parſley, carrots, and the like.

This is a general *face* of a plant not eaſy to be miſtaken; and all the plants which have this *face* are endowed with the virtues of carminative medicines. They expel wind, and are good in the colic, and other the like diſeaſes. The ſeeds of moſt of theſe are uſed, and ſome of the roots. The ſeeds of aniſe, caraway, cummin, and the like, are all ſeeds of umbelliferous plants; and the root of *angelica* is another inſtance of their efficacy. But as an exception to this general rule, the hemlock, and hemlock-dropwort may be produced, which are poiſons.

The *verticillate plants* are another claſs, which are eaſily known by their general face; their flowers ſtanding in ringlets round the ſtalks, and being labiated, or of ſome ſuch form. The leaves alſo in moſt of theſe plants ſtand in pairs, and they have generally an aromatic ſmell. As the virtues of the *umbelliferæ* lie in the roots and ſeeds, ſo do theſe in the huſks of the flowers. It has been a common opinion, that the flowers of theſe plants contained their virtues, but this is erroneous. The flowers of ſage are almoſt inſipid, but the huſks taſte very ſtrongly. Theſe plants in general are poſſeſſed of the ſame virtues, and are all of a middle degree between the carminatives before mentioned and the ſpices. They are properly aromatics, and are all good in nervous diſeaſes, as epilepſies, palſies, and the like: one of them, which is called mother of thyme, is alone a remedy for the night-mare, a troubleſome diſeaſe, that often baffles other medicines; and the flowers of roſemary, lavender, ſage, and the like, may ſtand as inſtances of the virtues of this claſs; and mint, pennyroyal, hyſſop, &c. in their leaves are of great virtue, and a pleaſant flavour.

The *ſiliquoſe plants* have alſo a general *face*. Their flowers are compoſed of four leaves, and their ſeeds contained in long pods, or in ſhort and thick ſiliculæ. In theſe plants the ſeeds are found to contain the principal virtue in ſome, and in others the leaves; ſome have alſo virtue in their roots, but the flowers of all are neglected. Muſtard, creſſes, and the like, have their virtue in the ſeeds, and ſcurvy-graſs in its leaves, horſe-radiſh in the roots; yet all have the ſame general virtue; they are hot like the two laſt tribes, but they exert their power in a very different manner; as it conſiſts in a diuretic volatile ſalt; and they are all good in the ſcurvy, dropſy, jaundice, &c. and have been uſed in theſe caſes at all times. Philoſ. Tranſ. N° 255, p. 200. See **Botany**.

Faces *of a baſtion*, in *Fortification*, are the two foremoſt ſides reaching from the flanks to the point of the baſtion where they meet.

Theſe are commonly the firſt undermined, becauſe they reach fartheſt out, and are the leaſt flanked, and therefore weakeſt. They are repreſented by the lines B C and S C, *Tab. Fortif. fig.* 1.

Face *of a place*, denotes the interval between the points of two neighbouring baſtions, containing the curtain, the two flanks, and the two *faces* of the baſtions that look towards one another.

This is otherwiſe called the **tenaille** of the place.

Face *prolonged*, in *Fortification*, is that part of a line of defence raſant, which is between the angle of the epaule or ſhoulder of a baſtion and the curtain; or the line of a defence raſant diminiſhed by the *face* of the baſtion.

Face, *external*, *Facies externa*, in *Ichthyology*, is uſed to expreſs a general form or figure in certain fiſhes, by means of which they agree with ſome and diſagree with others; and according to which likeneſs or diſſimilitude ſome authors of the late ages have arranged them into *genera*. This general figure in fiſhes conſiſts in the ſhape of the head and body, and the ſhape, ſize, and proportion of the fins and tail, and though very obvious, is very indiſtinct; it being in many caſes, where two fiſhes have the ſame general *external face*, yet hard to ſay, on a cloſe examination, in what it is that the likeneſs conſiſts. The authors who founded the diſtinction of the *genera* of fiſhes on theſe external reſemblances ran into very great errors; for it is not enough in a generical diſtinction for the character to be obvious, but it muſt alſo be preciſe and determinate. What this *facies* had in the firſt of theſe requiſites is often wanted in the laſt; and in general, it has been found to be no true baſis of diſtinction.

Many fiſh have the *facies externa*, or general appearance ſo much alike, as to be eaſily coupled at ſight into the ſame genus; and that juſtly, as they really belong to the ſame when more preciſely referred to it, according to their natural and more eſſential character. Of this kind are the gadi, the clupeæ, the ſalmons, the *petromyzæ*, the *coregones*, the *pleuronectæ*, the rays, and many of the *cyprini*. In theſe the *facies externa* is of real uſe, as it is an obvious mark, and leads to the road of truth; but there are beſide theſe many other fiſhes, which, though they are truly of the ſame *genus*, yet differ extremely in their ſeveral external appearances, ſo that any method founded on the *facies externa* muſt ſeparate them, though nature had really joined them in their real characters. The tench and the trutta lacuſtris, or lake-trout, are in regard to their *facies externa* extremely alike one to the other, yet here this obvious character deceives us; for the tench is a ſpecies of the cyprinus, and the other a true and genuine ſalmon, two *genera* of fiſhes eſſentially and very widely different, though this method of judging by the external appearance would have coupled together fiſh belonging to them both. In the ſame manner the *ſcorpæna* and *cottus* are very like one to the other in their external appearance; but when nicely examined, according to the rules of ichthyology, they are found to belong to two very different genera, and to have very little real likeneſs. From theſe, and numerous other examples of a like kind, it evidently appears, that as the *facies externa* cannot be depended on for eſtabliſhing the genera of fiſhes, ſome more eſſential characters muſt be enquired after for the regular and natural completion of this neceſſary buſineſs. Therefore, the generical characters of fiſh are to be ſought after in their external and invariable parts, and they are to be arranged into families and *genera*, according to the agreement of theſe in number, ſituation, figure, and proportion. Among all theſe, the characters taken from the number of the parts, where that is certain and invariable, are moſt valuable, as they moſt readily offer themſelves to the eye, and are leaſt of all liable to errors.

Face, in the *Manege*. See **Chanfrin**.

Face, in the *Military Language*, a word of command: thus, *face to the right*, is to turn upon the left heel a quarter round to the right; *face to the left*, is to turn upon the right heel a quarter round to the left.

Face, among *Painters* and *Artiſts*, is uſed to denote a certain dimenſion of the human body, adopted for determining the proportion which the ſeveral parts ſhould bear to one another; for this purpoſe they commonly divide the height of the body into ten equal parts, called *faces*; becauſe the human *face* is the firſt model of theſe meaſures. Though the Apollo and Venus of Medici have more than ten *faces*. They again ſubdivide each of theſe *faces* into three equal parts; and this ſubdiviſion is founded on the conſideration, that the *face* is made to contain three equal parts; e. g. the firſt commencing above the forehead at the root of the hair, and ending at the root of the noſe, the noſe forming the ſecond part, and the third part ending juſt below the chin. See **Proportion**.

FACET, or **Facette**, a little face or ſide of a body, cut into a great number of angles.

Multiplying-glaſſes are cut in *facets*, or *facet-wiſe*. Diamonds are alſo cut in *facets* or tables.

In brilliants there are two ſorts, *ſkew*, or *ſkill-facets*, and *ſtar-facets*. *Skill-facets* are divided into upper and under. *Upper ſkill-facets* are wrought on the lower part of the bezil, and terminate in the girdle.

Under ſkill-facets are wrought on the pavillions, and terminate in the girdle.

Star-facets are wrought on the upper part of the bezil, and terminate in the table. Jeffries on Diamonds. See **Diamonds**.

FACETANUS *Lacertus*, in *Zoology*, the name of a peculiar ſpecies of lizard, called at Rome and Naples the **tarantula**.

FACIA, in *Architecture*. See **Fascia**.

FACIES *Hippocratica*, in *Medicine*, is when the noſtrils are ſharp, the eyes hollow, the temples low, the tips of the ears contracted and cold, the forehead dry and wrinkled, and the complexion pale or livid.

The *facies Hippocratica* is chiefly obſerved towards the period of phthiſes and other conſumptions, and is held a ſure prognoſtic of death. If it appears within three days after the attack of an acute diſeaſe, it is deemed to indicate death.

FACK, in a *Ship*. See **Fake**.

FACTION, a cabal or party formed in a ſtate to diſturb the public repoſe.

The moſt celebrated *factions* are that of the Guelphs and Gibelins, who kept Italy in alarm for many ages; and with us that of the Whigs and Tories.

Faction was originally an appellation given to the divers troops or companies of combatants in the games of the **circus**.

Of theſe there were four, viz. the *green faction*, the *blue faction*, the *red faction*, and the *white faction*. The emperor Domitian is ſaid to have added two others, viz. the *purple* and the *yellow*.

Theſe *factions*, with their liveries and badges, were at length aboliſhed; the emulation which was at firſt between them growing to ſuch a height, that in Juſtinian's time 40,000 men were killed in a conteſt between the *green* and *blue factions*.

FACTITIOUS, ſignifies any thing made by art, in oppoſition to what is the produce of nature.

De **FACTO**, ſee the article **De** *facto*.

FACTOR, in *Commerce*, an agent or perſon who acts and negociates for a merchant by commiſſion; called alſo commiſſioner, and on ſome occaſion broker, and throughout the Levant, coagis.

Factors are either charged with the buying or the ſelling of goods, or with both.

Thoſe of the firſt kind are uſually eſtabliſhed in places of conſiderable manufactories, or cities of great trade. Their office is to buy up commodities for merchants reſiding elſewhere; to ſee them packed, and ſend them to the perſons for whom they were bought.

Factors *of ſale* are uſually fixed in places where there is a great vent. To theſe, merchants and manufacturers ſend their goods to be ſold for them according to the price and other conditions expreſſed in the orders delivered them.

The wages or allowances for ſelling are uſually clear of all expences of carriage, exchange, remittances, &c. excepting poſtage of letters, which are never put to account.

Factors ſhould ſtrictly obſerve the orders of their principals, or elſe they are liable to the damage accruing from the neglect of them. When *factors* have unlimited commiſſion to do for their conſtituents the beſt they can, they are excuſable, though their tranſactions are attended with loſs to their principals; but no *factor*, who has merely a commiſſion to ſell, &c. for another, is excuſable for entruſting another perſon beyond the uſual time allowed in the ſale of the commodities which he diſpoſes of: in ſuch a caſe he is anſwerable to the principal out of his own eſtate. If a *factor* ſells on the uſual truſt to a perſon of good credit who afterwards becomes inſolvent, he is diſcharged; but not if the man's credit was bad at the time of ſale. A *factor* ſhould always be punctual in the advices of his tranſactions, ſales, purchaſes, freights, and draughts by exchange: he ſhould never deviate from the orders he receives in the execution of a commiſſion for purchaſing goods, either with reſpect to price or quality: if goods that are bought are ſent to a different place from that to which they were ordered, they become the *factor*'s, unleſs the merchant allows them. A *factor* that ſells a commodity under the price ordered by his principal ſhall be obliged to make good the difference; and if he purchaſes goods for another at a limited price, and they riſe in value, and he ſecures to himſelf the advantage, he is obliged to ſatisfy his principal for damages; or if he makes any advantage of the ſale of goods which his principal directed him to purchaſe, the principals ſhall recover it from him, and he is liable to be amerced for the fraud. When *factors* have obtained a profit for their principal, they muſt be cautious how they diſpoſe of it; for if they act without commiſſion they are reſponſible; and if a merchant remits goods to his *factor*, and about a month after draws a bill on him, and the *factor* having effects in his hands, accepts the bill, but the principal breaks, and the goods are ſeized in the *factor*'s hands on behalf of the creditors, it has been judged that the *factor* muſt anſwer the bill, and come in as a creditor for ſo much as he was obliged by reaſon of his acceptance to pay. If one employs a *factor*, and intruſts him with the diſpoſal of merchandiſe, and the *factor* receives the money, and dies, indebted to debts of a higher nature, and it appears by evidence that this money was veſted in other goods, and remains unpaid, thoſe goods ſhall be taken as part of the merchant's, and not of the *factor*'s eſtate; but if the *factor* has the money, it ſhall be conſidered as the *factor*'s eſtate, and muſt firſt anſwer the debts of ſuperior creditors, &c. If a perſon employs a *factor* to ſell goods, who ſells them on credit, and before the money is paid dies indebted more than his eſtate will pay, this money ſhall be paid to the principal merchant, and not to the *factor*'s adminiſtrator, deducting his commiſſion. A *factor* who has money in hand belonging to his principals, and who neglects to inſure a ſhip and goods according to order, ſhall make good the damage if the ſhip miſcarry; and if he make any compoſition with the inſurers after inſurance without orders, he is anſwerable for the whole inſurance. As fidelity and diligence are required from the *factor*, ſo the law requires the like from the principal: if, therefore, a merchant remits counterfeit jewels to his *factor*, who ſells them as true ones, and ſuſtains loſs or damage by impriſonment or other puniſhment, the principal ſhall not make ſatisfaction to the *factor* but to the party who purchaſed them. Buſineſs of this kind is called commiſſion-buſineſs; and traders in this way have current as well as commiſſion accounts conſtantly between them, and draw on, remit to, and ſend commiſſions to each other only by the intercourſe of letters, which, among men of honour, are as obligatory and authoritative as all the bonds and ties of law.

Factors, in *Arithmetic*, is a name given to the two numbers which are multiplied one into another; that is, the multiplicand and multiplier; ſo called becauſe they are to *facere productum*, make or conſtitute the product.

FACTORAGE. The *factorage* or wages, called alſo commiſſion, is different at different places, and for different voyages: at a medium it may be fixed at about three *per cent.* of the value of the goods bought, beſide the charge of package, which is paid over and above.

At Virginia, Barbadoes, and Jamaica, the *factorage* is about eight *per cent.* and the like throughout the greateſt part of the Weſt Indies. In Italy it is two and a half; in Holland one and a half: in Spain, Portugal, France, &c. it is two *per cent.*

FACTORY, a place where a conſiderable number of factors reſide, to negociate and officiate for their maſters or principals.

The term is chiefly uſed in ſpeaking of the Eaſt Indies, and other parts of Aſia, Turky, Italy, Portugal, &c. whither the European nations ſend their ſhips every year, and where they keep factors to buy the commodities of the country, and ſell thoſe brought from Europe.

FACTUM, in *Arithmetic*, the product of two quantities multiplied by each other.

FACULÆ, in *Aſtronomy*, a name given by Scheiner, and others after him, to certain ſpots on the ſun's diſk that appear brighter and more lucid than the reſt of the body.

The word is pure Latin, being a diminutive of *fax*, *torch*, and ſuppoſed to be here applied from their appearing and diſſipating by turns.

The *faculæ* or bright ſpots differ very conſiderably from the maculæ or dark ſpots, both in light, colour, figure, magnitude, and duration.

Hevelius aſſures us, that July the 20th, 1634, he obſerved a *facula* that took up a third part of the ſun's diameter; and from the obſervations of the ſame Hevelius we learn, that the maculæ frequently change into *faculæ*; but the *faculæ* into maculæ rarely, if ever. Some authors even contend that all the maculæ degenerate into *faculæ* before they quite diſappear.

Huygens, however, declares he was never able to diſcover any *faculæ*, though the *maculæ* occurred to him very frequently. All the foundation he could ſee for the notion of *faculæ*, he ſays, was, that in the darkiſh clouds which frequently ſurround the maculæ, one ſometimes diſcerns little points or ſparks brighter than the reſt.

Many authors after Kircher and Scheiner have generally repreſented the ſun's body full of bright, fiery ſpots, which they conceive to be a ſort of volcanos in the body of the ſun; but Huygens, and others of the lateſt and beſt obſervers, finding, that the beſt teleſcopes diſcover nothing of the matter, agree to explode the phenomena of *faculæ*. Their cauſe theſe authors attribute to the tremulous agitation of the vapours near our earth; the ſame as ſometimes ſhews a little unevenneſs in the circumference of the ſun's diſk when viewed through a teleſcope. Strictly, then, the *faculæ* are not eructations of fire and flame, but refractions of the ſun's rays in the rarer exhalations, which, being condenſed in the neighbourhood of that ſhade, ſeem to exhibit a light greater than that of the sun. See Spots.

FACULTY, a power or ability of performing an action.

The term is much uſed by the ancient philoſophers, and ſtill retained in the ſchools for explaining the actions of natural bodies.

Thus, to account for the act of digeſtion, they ſuppoſe a digeſtive *faculty* in the ſtomach; to account for motion, they imagine a motive *faculty* in the nerves, &c. which is only a ſubſtituting of one name of an unknown phenomenon for another.

Yet this practice of attributing effects to their reſpective virtues or *faculties* ſtill obtains in divers things, which our philoſophy has not yet afforded us a better account of. Thus, ſay our medicinal writers, ſenna and rhubarb have a purgative *faculty*, barberries a cooling *faculty*, &c. which amounts juſt to this, that ſenna purges, and barberries cool.

The **Faculties** or *powers of the ſoul* are commonly reputed two, viz. the underſtanding and will.

The **Faculties** *of the body* are uſually diſtinguiſhed with regard to their ſeveral functions, into *vegetative* and *animal*.

Under the *vegetative faculty* are comprehended the divers ſubaltern ones, whereby nutrition and generation are effected.

Under the *animal faculties* are comprehended thoſe relating to ſenſe and motion.

The *vegetative faculty* is ſubdivided into *nutritive* and *generative*, and the nutritive is again ſubdivided into *natural* and *vital*.

To the firſt belong the functions of the lower belly, relating to the preparation of the food; to the latter, the actions of the heart and lungs, wherein life is chiefly concerned.

Others ſubdivide the *vegetative faculty* into *attractive*, *retentive*, *concoctive*, and *expulſive*.

The *animal faculties* being thoſe whereby an animal perceives and moves, become divided into *ſenſitive* and *locomotive*.

Faculty is alſo applied in the *Schools*, to the divers parts or members of an univerſity, divided according to the arts or ſciences taught or profeſſed there.

There are four *faculties* in moſt univerſities; that of arts, which includes the humanities and philoſophy, and is much the moſt ancient and extenſive; the ſecond is that of theology; the third, medicine; and the fourth, juriſprudence, or laws. See each under its proper article.

The degrees in the ſeveral *faculties* in the univerſities are thoſe of Bachelor, Maſter, and Doctor.

The **Faculty** is frequently uſed abſolutely, and by way of eminence, for that chiefly ſtudied and taught in that place.

Thus, the *Faculty* of London and Montpelier is medicine; that of Paris, theology; that of Orleans, law, &c.

Faculty, in *Law*, denotes a privilege or ſpecial power granted to a man by favour, indulgence, and diſpenſation, to do that which regularly by law he cannot; as to eat fleſh upon days prohibited, or to marry without banns firſt aſked, &c.

Faculties, *the Court of*. See Court *of Faculties*.

Faculty *of Advocates*, in Scotland. See Advocate.

FÆCES, or **Feces**, the dregs, ſediment, or impurities, remaining of a mixt body, after the purer, more volatile, and fluid, have been ſeparated from it by evaporation, diſſolution, decantation, derivation, or the like.

Thus we ſay the *fæces* of wine, of oil, &c. Thoſe of wines are properly called *lees*; thoſe of oil, *amurca*; thoſe of malt-liquors, *grounds*.

Fæces, in *Chemiſtry*, denotes the lees, refuſe, dirt, mud, impurities, and heterogeneous matters, remaining in the alembic after the diſtillation of any body: what remains in the retort, inſtead of *fæces*, is properly denominated *caput mortuum*, or *terra damnata*.

Fæces is particularly uſed in *Medicine*, &c. for the groſs, impure mattters found at the bottom of the compoſitions and preparations of either pharmacy.

Fæces is alſo uſed for the EXCREMENTS of an animal voided by ſtool.

The *fæcal* matter is become famous for a chemical operation thereon, by M. Homberg, related at length in the Mem. de l'Acad. R. An. 1711. He had a notion ſuggeſted to him, that the *human fæces* by diſtillation yielded an oil clear as water, without any ſmell, and which had the property of fixing mercury into fine ſilver. Upon this, becauſe he would have as laudable and promiſing a matter as he could, he hired four robuſt healthy young fellows, whom he ſhut up for three months, and agreed with them, that they ſhould eat nothing but the fineſt bread, with which he ſupplied them freſh every day, and drink the beſt Champaign wine as long as they could. After a long proceſs, and numerous eſſays on the excrements they made, he at length got the clear, inodorous oil; but it had no effect at all on mercury, which was the great point aimed at. As the method of working on this diſagreeable matter, however, at length furniſhed him with a very fine phoſphorus, it may be worth the attention of the curious.

FÆCULA. See FECULA.

FÆSTING *Men*. See FASTERMANS.

FÆTOR. See FOETOR.

FÆX *Vitri*, in *Chemiſtry*, a name given by Rulandus and ſome other of the writers, to the common nitre or ſaltpetre, and by others to pot-aſh.

FA FINTO, a *feigned F*, in the *Italian Muſic*, is what we commonly call the FLAT of any note.

FAG, is uſed for a knot or excreſency in cloth. Stat. 4 Edw. IV. cap. 1.

Fag-*end*, in the *Sea-language*, denotes the end of any rope or cord which is become untwiſted and looſened by frequent uſe; to prevent which, the ends of ropes are generally well-faſtened by winding a piece of ſmall line or pack-thread around them, which operation is called whipping.

FAGARA, in *Botany*, a genus of the *tetrandria monogynia* claſs. The calyx is cut into four ſegments; the corolla has four petals; and the capſule is bivalve, and contains a ſingle ſeed.

Fagara, in the *Materia Medica*, the name of a fruit reſembling the cubebs found in the Philippine iſlands. The part of this fruit which contains the principal virtue is the outer rind; this is tender and blackiſh, and of an aromatic and ſomewhat acid taſte. When the berries are ripe they eaſily break, and diſcloſe a black, ſhining, ſolid kernel, void of taſte and ſmell. The berries, according to Aviſenna, are heating and drying, and good for a cold weak ſtomach, to help digeſtion, and are aſtringent to the bowels. They were once much uſed, but of late are ſcarce known in the ſhops.

FAGGOT, in *Agriculture*. There is a thing worth obſerving to the owners of the woods in the article of the making up the underwood into *faggots*. The workmen, when they have bound up the *faggot*, trim off the ſuperfluous branches from the ſides and end to make it more neat, and theſe they add to the middle of the next; but they are of little or no advantage there, and ought to be left on the ground; for being ſmall, they would ſoon rot there, and would manure the ground ſo as to be of more advantage to the next growth than is eaſily imagined. The leaves of the trees falling to the earth, manure it very much; but this is nothing to the advantage of theſe little pieces of wood: any rotten wood, but in a moderate quantity, will turn a common bad earth into good garden mould; and the growth of the young trees is more forwarded by this manure where it is left than by any other means that can be uſed to it. We always ſee the land where wood-ſtacks have ſtood enriched to a ſurpriſing degree by them; and the ſame advantage will be wherever wood of any kind is left to moulder and rot upon the ground.

Faggot, or **Fagot**, in *Fortification*. See FASCINE.

Faggots *for fuel* are required by 43 Eliz. cap. 14. to contain in compaſs, beſides the knot of the bond, twenty-four inches of aſſize; and every *faggot-ſtick* within the bond ſhall contain full three feet of aſſize, except only one ſtick, which is to be but one foot long, to ſtop or harden the binding.

Faggot *of ſteel*, expreſſes the quantity of 120 lb. weight.

Faggot, in the times of Popery in theſe kingdoms was a badge wore on the ſleeve of the upper garment by ſuch as had abjured hereſy; being put on after the perſon had carried a *faggot*, by way of penance, to ſome appointed place of ſolemnity. The leaving off this badge was ſometimes interpreted a ſign of apoſtaſy.

Faggots, among the *Military Men*, are ineffective perſons who receive no regular pay, nor do any regular duty, but are hired occaſionally to appear at a muſter, to fill up the companies, hide the real deficiencies thereof, and cheat the king of ſo much pay, which goes into the officer's pocket.

FAGONA, in *Anatomy*, a conglomerate gland, called alſo THYMUS.

FAGONIA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower hath five heart-ſhaped petals which ſpread open, and are narrow at their baſe where they are inſerted in the empalement, and hath ten erect ſtamina. In the center is ſituated a five-cornered germen, which afterwards becomes a roundiſh capſule, having five lobes ending in a point, and five cells, each having a ſingle roundiſh ſeed. There are three ſpecies. Miller's Gard. Dict.

FAGOPYRUM. See *Buck* WHEAT.

FAGOTTINO, in the *Italian Muſic*, a name uſed for the ſingle curtail, which is a muſical inſtrument ſomewhat like the baſſoon.

FAGOTTO, in the *Italian Muſic*, the name of the double curtail, being as big again as the fagottino, and in reality the ſame with a BASSOON.

FAGUS, in *Botany*. See BEECH *tree*.

FAGUTAL, in *Mythology*, a temple of Jupiter, ſo called from *fagus*, the *beech*, a tree ſacred to Jupiter; becauſe, as ſome ſay, the temple was erected in the neighbourhood of a foreſt of *beech*; and on this account they ſay that part of mount Eſquiline which was formerly called *Mons Appius* was afterwards called *fagutalis*; and that Jupiter *Fagutalis* was the ſame with Jupiter of Dodona.

FAHNELEN, **Fanelen**, or **Vanlehen**, among the Germans, a kind of greater fiefs which the emperor alone could confer.

This was done by the delivery of a ſtandard, whence they had the name of *fahnelen*; i. e. *feuda vexilli.* We find them mentioned in the golden bull of the emperor Charles IV. ann. 1356: *Feudis principum exceptis, & illis quæ* vanlehen *vulgariter appellantur, quorum inveſtituram & collationem ſoli imperatori, vel regi Romano ſpecialiter reſervamus.* Du-Cange Gloſſ. Lat. in voc.

The word is more uſually written *fahnlehn*.

FAIDA, in our *Old Writers*, is uſed for malice or deadly feud. Leg. Hen. I. cap. 88.

FAILIS, in *Heraldry*, a French term, denoting ſome failure or flaw in an ordinary, as if it were broke, and a ſplinter taken from it.

FAILURE, or **Failing**, a ſpecies of BANKRUPTCY, popularly called breaking or ſtopping payment.

Failure *of record*, in *Law*, is uſed when an action is brought againſt a man who alledges in his plea matter of record in bar of the action, and endeavours to prove it by the record. The plaintiff replies, *nul tiel record*; that is, he denies there is any ſuch record. Upon which the defendant has a day given him by the court to bring it in; and if he fails to do it, he is ſaid to fail of his record, and the plaintiff ſhall have judgment to recover.

FAINT, or **Faint-Action**, in *Law*, is as much as *feigned action*; that is, ſuch an ACTION as, though the words of the writ be true, yet, for certain cauſes, the party has no title to recover thereby.

By which it differs from falſe-action, which is that where the words of the writ are falſe.

Yet ſometimes the two are confounded.

Faint *pleader*, in *Law*, a fraudulent, falſe, or colluſive manner of pleading, to the deceit of a third perſon. Againſt which, among other things, was made the ſtatute 3 Edw. I. cap. 29.

FAINTS, in the *Diſtillery*, the weak ſpirituous liquor that runs from the ſtill in rectifying the low wines after the proof-ſpirit is run off.

Faints is alſo the laſt runnings of all ſpirits diſtilled by the alembic. The clearing the worm of theſe is ſo eſſential a point in order to the obtaining a pure ſpirit by the ſucceeding diſtillation, that all others are fruitleſs without it.

FAINTING. See LIPOTHYMIA and SWOONING.

Some people are extremely apt to *faint* during the operation of bleeding. In all caſes, therefore, where plentiful bleeding is indicated, it is beſt to do it in bed, in order to prevent the patient's *fainting*. It is likewiſe obſerved, that a perſon will bear the loſs of a much greater quantity of blood if the ſtream is ſmall than by a large orifice, which ſome think neceſſary, for making a more ſpeedy revulſion. Pringle, Obſerv. on the Diſeaſes of the Army, p. 131.

Fair, a public place, where merchants, traders, and other perſons, from divers parts, meet, on ſome fixed day in the year, to buy and ſell commodities, and to partake of the diverſions uſually accompanying ſuch aſſemblies: or it denotes the concourſe of perſons aſſembled on ſuch occaſions. See Market.

The word *fair* is formed of the French *foire*, which ſignifies the ſame thing; and *foire* ſome derive from the Latin *forum*, *market*; others from the Latin *feriæ*, becauſe *fairs* were anciently always held in the places where the wakes, or feaſts, of the dedications of churches, called *feriæ*, were alſo held. The Romans called them *nundinæ*. Eric Puteanus has a pretty little treatiſe on the *fairs* of the Romans, De Nundinis Romanorum, which he calls *nova faſtorum facula*.

Fairs can only be eſtabliſhed by virtue of the king's grant, or by long and immemorial uſage and preſcription, which ſuppoſes ſuch a grant; he is alſo the ſole judge where *fairs* and markets ought to be kept; and if any perſon ſet up a *fair*, without the king's authority, a *quo warranto* lies againſt him; and the perſons who frequent ſuch *fairs*, &c. may be puniſhed by fine to the king. Every *fair* is ſubject to the regulation of the court *of piepowder*. The duration of *fairs* is determined by proclamation; and if a perſon ſhall ſell any goods after the time of the *fair* expires, he ſhall incur a forfeiture of double the value of the goods ſold, one fourth to the proſecutor, and the reſt to the king. 5 Ed. III. cap. 5. Any citizen of London may carry his goods to any *fair* or market in England at his pleaſure. If any perſon is intitled to hold a *fair* or market, and another is ſet up within the diſtance of a third part of twenty miles, either on the ſame day, or a different day, it is a nuiſance, and an action on the caſe lies; and alſo againſt perſons diſturbing ſuch as are coming to buy or ſell in the *fair* or market, ſo that the perſon holding the *fair*, &c. loſes his toll, or receives prejudice in the profits ariſing from it.

Fairs abroad are either free, or charged with tolls and impoſitions. The privileges of free *fairs* conſiſt chiefly, 1. In that all traders, &c. whether natives, or foreigners, are allowed to enter the place, and are under the royal ſafeguard and protection in coming and returning, they and their agents, with their goods, &c. 2. In that the ſaid perſons, and their effects, are exempt from all duties, impoſitions, tolls, and ſervitudes. 3. That merchants in going to, or returning from the *fair*, &c. cannot be arreſted, or their goods ſtopped, &c. It is the ſovereign alone that has a right, by his letters patent, to eſtabliſh *fairs*, whether free, or ſubject to duties, and the other ordinary laws and penalties.

Several *fairs* are held in the open fields, or on heaths and commons, under tents, booths, and barracks, erected for the purpoſe; as Stourbridge-*fair*, &c. others in places walled in for the purpoſe, and formed into regular ſtreets, lanes, &c. for the occaſion: as the *fair* of St. Laurence at Paris. Laſtly, others are held in the open places and ſtreets of cities; as Briſtol-*fair*, the *fair* of St. Germains, &c.

Fairs, particularly free *fairs*, make a very conſiderable article in the commerce of Europe, eſpecially that of the Mediterranean or inland parts; as Germany, &c. where the continual paſſage and repaſſage of veſſels is impracticable.

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The principal *fairs* in Great Britain are, Stourbridge-*fair*, near Cambridge; the two *fairs* of Briſtol; that of Exeter, Weſt Cheſter, Edinburgh, Weyhill, and Burford *fairs*, for ſheep; Pancraſs *fair*, in Staffordſhire, for ſaddle-horſes; Barnet *fair*, near London, for lean and Welſh black cattle; St. Faith's, in Norfolk, for Scots runts; Yarmouth fiſhing *fair* for herrings; Ipſwich butter *fair*; that of Woodborough Hill, near Blandford in Dorſetſhire, famous for weſt-country manufactures, Devonſhire kerſeys, Wiltſhire druggets, &c. two cheeſe-*fairs* at Atherſton and Chipping Norton; beſides many more *fairs* and weekly markets in different parts of the kingdom.

Fair, in *Sea Language*, is uſed for the diſpoſition of the wind, when it is favourable to a ſhip's courſe, in oppoſition to that which is contrary or foul. The term *fair* is more comprehenſive than large, and includes about ſixteen or eighteen points of the compaſs; whereas large is confined to the beam or quarter, that is, to a wind which croſſes the keel at right angles, or obliquely from the ſtern, but never to one right a-ſtern. Falconer's Marine Dict.

Fair-*curve* is a winding line, uſed in delineating ſhips, whoſe ſhape is varied, according to the part of the ſhip which it is intended to deſcribe.

Fair-*pleading*, in *Law*. See Beau-*pleader*.

remaining of a mixt body, after the purer, more volatile, and fluid, have been ſeparated from it by evaporation, diſſolution, decantation, derivation, or the like.

Thus we ſay the *fæces* of wine, of oil, &c. Thoſe of wines are properly called *lees*; thoſe of oil, *amurca*; thoſe of malt-liquors, *grounds*.

Fæces, in *Chemiſtry*, denotes the lees, refuſe, dirt, mud, impurities, and heterogeneous matters, remaining in the alembic after the diſtillation of any body: what remains in the retort, inſtead of *fæces*, is properly denominated *caput mortuum*, or *terra damnata*.

Fæces is particularly uſed in *Medicine*, &c. for the groſs, impure mattters found at the bottom of the compoſitions and preparations of either pharmacy.

Fæces is alſo uſed for the EXCREMENTS of an animal voided by ſtool.

The *fæcal* matter is become famous for a chemical operation thereon, by M. Homberg, related at length in the Mem. de l'Acad. R. An. 1711. He had a notion ſuggeſted to him, that the *human fæces* by diſtillation yielded an oil clear as water, without any ſmell, and which had the property of fixing mercury into fine ſilver. Upon this, becauſe he would have as laudable and promiſing a matter as he could, he hired four robuſt healthy young fellows, whom he ſhut up for three months, and agreed with them, that they ſhould eat nothing but the fineſt bread, with which he ſupplied them freſh every day, and drink the beſt Champaign wine as long as they could. After a long proceſs, and numerous eſſays on the excrements they made, he at length got the clear, inodorous oil; but it had no effect at all on mercury, which was the great point aimed at. As the method of working on this diſagreeable matter, however, at length furniſhed him with a very fine phoſphorus, it may be worth the attention of the curious.

FÆCULA. See Fecula.

FÆSTING *Men*. See Fastermans.

FÆTOR. See Foetor.

FÆX *Vitri*, in *Chemiſtry*, a name given by Rulandus and ſome other of the writers, to the common nitre or ſaltpetre, and by others to pot-aſh.

FA FINTO, a *feigned F*, in the *Italian Muſic*, is what we commonly call the FLAT of any note.

FAG, is uſed for a knot or excreſency in cloth. Stat. 4 Edw. IV. cap. 1.

Fag-*end*, in the *Sea-language*, denotes the end of any rope or cord which is become untwiſted and looſened by frequent uſe; to prevent which, the ends of ropes are generally well-faſtened by winding a piece of ſmall line or pack-thread around them, which operation is called whipping.

FAGARA, in *Botany*, a genus of the *tetrandria monogynia* claſs. The calyx is cut into four ſegments; the corolla has four petals; and the capſule is bivalve, and contains a ſingle ſeed.

Fagara, in the *Materia Medica*, the name of a fruit reſembling the cubebs found in the Philippine iſlands. The part of this fruit which contains the principal virtue is the outer rind; this is tender and blackiſh, and of an aromatic and ſomewhat acid taſte. When the berries are ripe they eaſily break, and diſcloſe a black, ſhining, ſolid kernel, void of taſte and ſmell. The berries, according to Aviſenna, are heating and drying, and good for a cold weak ſtomach, to help digeſtion, and are aſtringent to the bowels. They were once much uſed, but of late are ſcarce known in the ſhops.

FAGGOT, in *Agriculture*. There is a thing worth obſerving to the owners of the woods in the article of the making up the underwood into *faggots*. The workmen, when they have bound up the *faggot*, trim off the ſuperfluous branches from the ſides and end to make it more neat, and theſe they add to the middle of the next; but they are of little or no advantage there, and ought to be left on the ground; for being ſmall, they would ſoon rot there, and would manure the ground ſo as to be of more advantage to the next growth than is eaſily imagined. The leaves of the trees falling to the earth, manure it very much; but this is nothing to the advantage of theſe little pieces of wood: any rotten wood, but in a moderate quantity, will turn a common bad earth into good garden mould; and the growth of the young trees is more forwarded by this manure where it is left than by any other means that can be uſed to it. We always ſee the land where wood-ſtacks have ſtood enriched to a ſurpriſing degree by them; and the ſame advantage will be wherever wood of any kind is left to moulder and rot upon the ground.

Faggot, or **Fagot**, in *Fortification*. See Fascine.

Faggots *for fuel* are required by 43 Eliz. cap. 14. to contain in compaſs, beſides the knot of the bond, twenty-four inches of aſſize; and every *faggot-ſtick* within the bond ſhall contain full three feet of aſſize, except only one ſtick, which is to be but one foot long, to ſtop or harden the binding.

Faggot *of ſteel*, expreſſes the quantity of 120 lb. weight.

Faggot, in the times of Popery in theſe kingdoms was a badge wore on the ſleeve of the upper garment by ſuch as had abjured hereſy; being put on after the perſon had carried a *faggot*, by way of penance, to ſome appointed place of ſolemnity. The leaving off this badge was ſometimes interpreted a ſign of apoſtaſy.

Faggots, among the *Military Men*, are ineffective perſons who receive no regular pay, nor do any regular duty, but are hired occaſionally to appear at a muſter, to fill up the companies, hide the real deficiencies thereof, and cheat the king of ſo much pay, which goes into the officer's pocket.

FAGONA, in *Anatomy*, a conglomerate gland, called alſo THYMUS.

FAGONIA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower hath five heart-ſhaped petals which ſpread open, and are narrow at their baſe where they are inſerted in the empalement, and hath ten erect ſtamina. In the center is ſituated a five-cornered germen, which afterwards becomes a roundiſh capſule, having five lobes ending in a point, and five cells, each having a ſingle roundiſh ſeed. There are three ſpecies. Miller's Gard. Dict.

FAGOPYRUM. See *Buck* Wheat.

FAGOTTINO, in the *Italian Muſic*, a name uſed for the ſingle curtail, which is a muſical inſtrument ſomewhat like the baſſoon.

FAGOTTO, in the *Italian Muſic*, the name of the double curtail, being as big again as the fagottino, and in reality the ſame with a BASSOON.

FAGUS, in *Botany*. See Beech *tree*.

FAGUTAL, in *Mythology*, a temple of Jupiter, ſo called from *fagus*, the *beech*, a tree ſacred to Jupiter; becauſe, as ſome ſay, the temple was erected in the neighbourhood of a foreſt of *beech*; and on this account they ſay that part of mount Eſquiline which was formerly called *Mons Appius* was afterwards called *fagutalis*; and that Jupiter *Fagutalis* was the ſame with Jupiter of Dodona.

FAHNELEN, **Fanelen**, or **Vanlehen**, among the Germans, a kind of greater fiefs which the emperor alone could confer.

This was done by the delivery of a ſtandard, whence they had the name of *fahnelen*; i. e. *feuda vexilli*. We find them mentioned in the golden bull of the emperor Charles IV. ann. 1356: *Feudis principum exceptis, & illis quæ* vanlehen *vulgariter appellantur, quorum inveſtituram & collationem ſoli imperatori, vel regi Romano ſpecialiter reſervamus*. Du-Cange Gloſſ. Lat. in voc.

The word is more uſually written *fahnlehn*.

FAIDA, in our *Old Writers*, is uſed for malice or deadly feud. Leg. Hen. I. cap. 88.

FAILIS, in *Heraldry*, a French term, denoting ſome failure or flaw in an ordinary, as if it were broke, and a ſplinter taken from it.

FAILURE, or **Failing**, a ſpecies of BANKRUPTCY, popularly called breaking or ſtopping payment.

Failure *of record*, in *Law*, is uſed when an action is brought againſt a man who alledges in his plea matter of record in bar of the action, and endeavours to prove it by the record. The plaintiff replies, *nul tiel record*; that is, he denies there is any ſuch record. Upon which the defendant has a day given him by the court to bring it in; and if he fails to do it, he is ſaid to fail of his record, and the plaintiff ſhall have judgment to recover.

FAINT, or **Faint-Action**, in *Law*, is as much as *feigned action*; that is, ſuch an ACTION as, though the words of the writ be true, yet, for certain cauſes, the party has no title to recover thereby.

By which it differs from falſe-action, which is that where the words of the writ are falſe.

Yet ſometimes the two are confounded.

Faint *pleader*, in *Law*, a fraudulent, falſe, or colluſive manner of pleading, to the deceit of a third perſon. Againſt which, among other things, was made the ſtatute 3 Edw. I. cap. 29.

FAINTS, in the *Diſtillery*, the weak ſpirituous liquor that runs from the ſtill in rectifying the low wines after the proof-ſpirit is run off.

Faints is alſo the laſt runnings of all ſpirits diſtilled by the alembic. The clearing the worm of theſe is ſo eſſential a point in order to the obtaining a pure ſpirit by the ſucceeding diſtillation, that all others are fruitleſs without it.

FAINTING. See Lipothymia and Swooning.

Some people are extremely apt to *faint* during the operation of bleeding. In all caſes, therefore, where plentiful bleeding is indicated, it is beſt to do it in bed, in order to prevent the patient's *fainting*. It is likewiſe obſerved, that a perſon will bear the loſs of a much greater quantity of blood if the ſtream is ſmall than by a large orifice, which ſome think neceſſary, for making a more ſpeedy revulſion. Pringle, Obſerv. on the Diſeaſes of the Army, p. 131.

FAIR, a public place, where merchants, traders, and other perſons, from divers parts, meet, on ſome fixed day in the year, to buy and ſell commodities, and to partake of the diverſions uſually accompanying ſuch aſſemblies: or it denotes the concourſe of perſons aſſembled on ſuch occaſions. See MARKET.

The word *fair* is formed of the French *foire*, which ſignifies the ſame thing; and *foire* ſome derive from the Latin *forum*, *market*; others from the Latin *feriæ*, becauſe *fairs* were anciently always held in the places where the wakes, or feaſts, of the dedications of churches, called *feriæ*, were alſo held. The Romans called them *nundinæ*. Eric Puteanus has a pretty little treatiſe on the *fairs* of the Romans, De Nundinis Romanorum, which he calls *nova faſtorum facula*.

Fairs can only be eſtabliſhed by virtue of the king's grant, or by long and immemorial uſage and preſcription, which ſuppoſes ſuch a grant; he is alſo the ſole judge where *fairs* and markets ought to be kept; and if any perſon ſet up a *fair*, without the king's authority, a *quo warranto* lies againſt him; and the perſons who frequent ſuch *fairs*, &c. may be puniſhed by fine to the king. Every *fair* is ſubject to the regulation of the COURT *of piepowder*. The duration of *fairs* is determined by proclamation; and if a perſon ſhall ſell any goods after the time of the *fair* expires, he ſhall incur a forfeiture of double the value of the goods ſold, one fourth to the proſecutor, and the reſt to the king. 5 Ed. III. cap. 5. Any citizen of London may carry his goods to any *fair* or market in England at his pleaſure. If any perſon is intitled to hold a *fair* or market, and another is ſet up within the diſtance of a third part of twenty miles, either on the ſame day, or a different day, it is a nuiſance, and an action on the caſe lies; and alſo againſt perſons diſturbing ſuch as are coming to buy or ſell in the *fair* or market, ſo that the perſon holding the *fair*, &c. loſes his TOLL, or receives prejudice in the profits ariſing from it.

Fairs abroad are either free, or charged with tolls and impoſitions. The privileges of free *fairs* conſiſt chiefly, 1. In that all traders, &c. whether natives, or foreigners, are allowed to enter the place, and are under the royal ſafeguard and protection in coming and returning, they and their agents, with their goods, &c. 2. In that the ſaid perſons, and their effects, are exempt from all duties, impoſitions, tolls, and ſervitudes. 3. That merchants in going to, or returning from the *fair*, &c. cannot be arreſted, or their goods ſtopped, &c. It is the ſovereign alone that has a right, by his letters patent, to eſtabliſh *fairs*, whether free, or ſubject to duties, and the other ordinary laws and penalties.

Several *fairs* are held in the open fields, or on heaths and commons, under tents, booths, and barracks, erected for the purpoſe; as Stourbridge-*fair*, &c. others in places walled in for the purpoſe, and formed into regular ſtreets, lanes, &c. for the occaſion: as the *fair* of St. Laurence at Paris. Laſtly, others are held in the open places and ſtreets of cities; as Briſtol-*fair*, the *fair* of St. Germains, &c.

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The moſt celebrated *fairs* in Europe are thoſe, 1. of Francfort, held twice a year, in ſpring and autumn; the firſt commencing the Sunday before Palm-Sunday, and the other in September. Each is declared by ſound of bell, and laſts three weeks; the firſt of which is called the week of acceptance, and the ſecond the week of payment; though many bills of exchange are now payable in the third week, but this muſt be mentioned, becauſe every bill payable in the *fair* is, without ſuch a clauſe, deemed payable in the ſecond week. They are famous for the ſale of all kinds of commodities, but particularly an immenſe quantity of curious books, no where elſe to be found; and from whence the bookſellers, throughout all Europe, uſed to furniſh themſelves. Before each *fair* there is a catalogue of all the books to be ſold at it, printed and diſperſed, to call together purchaſers; though the learned have generally complained of divers unfair practices therein; as fictitious titles, names of books purely imaginary, &c. beſide great faults in the names of the authors, and the titles of the real books. 2. The *fairs* of Leipſic, which are held thrice a year; one beginning on the firſt of January, another three weeks after Eaſter, and a third after Michaelmas; they laſt twelve days each, and are, at leaſt, as conſiderable as thoſe of Francfort. 3. The *fairs* of Novi, a little city in the Milaneſe, under the dominion of the republic of Genoa. There are four of theſe in the year; commencing on the firſt of February, the ſecond of May, the firſt of Auguſt, and ſecond of November. Though the commodities bought and ſold here be very conſiderable; yet, what chiefly contributes to render them ſo famous, is the vaſt concourſe of the moſt conſiderable merchants and negociants of the neighbouring kingdoms, for tranſacting affairs, and ſettling accounts in matters of bank and exchange. Each of theſe uſually laſt eight days. 4. The *fairs* of Riga, whereof there are two in the year; one in May, and the other in September. They are much frequented by the Engliſh, Dutch, and French ſhips; as alſo by others from all parts of the Baltic. The beſt time for the ſale of goods at Riga, is during the *fairs*. Since the building of the famous city of Peterſburg, theſe *fairs* have ſuffered ſome diminution. 5. The *fair* of Archangel; during which, all the trade foreigners have with that city, is managed. It continues a month, or ſix weeks, at moſt; commencing from the middle of Auguſt. The Muſcovite merchants attend here, from all parts of that vaſt empire; and the Engliſh, Dutch, French, Swediſh, Daniſh, and other ſhips in the port of that city, on this occaſion, ordinarily amount to three hundred. But this is no free *fair*, as the reſt are: the duties of exportation and importation are very ſtrictly paid, and on a very high footing. 6. The *fair* of St. Germain, one of the ſuburbs of Paris, commencing on the third of February, and holding till Eaſter; though it is only free for the firſt fifteen days. It is frequented by traders with various ſorts of cloths and ſtuffs; and the goldſmiths, jewellers, and toy-men of Paris, have well furniſhed and handſome ſhops in it. 7. The *fairs* of Lyons, which Monſ. Du Cheſne, in his Antiquity of Cities, would inſinuate, from a paſſage in Strabo, were eſtabliſhed by the Romans; though it is certain, the *fairs*, as they now ſtand, are of a much later date. There are four in the year, each laſting twenty days, and free for ever. They begin on the firſt Monday after Low Sunday, the fourth of Auguſt, the third of November, and the firſt Monday after Eaſter. 8. *Fair* of Guibray, a ſuburb of the city of Falaiſe, in the Lower Normandy. It is ſaid to have been eſtabliſhed by our William the Conqueror, in conſideration of his being born at Falaiſe. It commences on the ſixteenth of Auguſt, and laſts fifteen days; free by charter, and longer by cuſtom. 9. *Fair* of Beaucaire, held partly in a city of that name, in Languedoc, and partly in the open country, under tents, &c. It commences on the twenty-ſecond of July, and only continues for three days; yet it is the greateſt, and moſt celebrated, of all the *fairs* in that part of Europe, both for the concourſe of ſtrangers from all parts of the world, and for the traffic of all kinds of goods: the money returned, in theſe three days, amounting ſometimes to above ſix millions of livres. Beſides theſe, there are in France ſeveral other *fairs* of conſiderable note; as the four *fairs* of Rheims, the two of Rouen, two of Bourdeaux, two of Troyes, two of St. Dennis, that of Caen, of Dieppe, and of Toulon, &c.

The *fairs* of Porto-Bello, Vera-Cruz, and the Havannah, are the moſt conſiderable of all thoſe in the Spaniſh Weſt Indies. The two firſt laſt as long as the flota and galleons continue in thoſe parts; and the laſt is opened as ſoon as the flota, or galleons, arrive there, upon their return for Spain; this being the place where the two fleets join.

The principal *fairs* in Great Britain are, Stourbridge-*fair*, near Cambridge; the two *fairs* of Briſtol; that of Exeter, Weſt Cheſter, Edinburgh, Weyhill, and Burford *fairs*, for ſheep; Pancraſs *fair*, in Staffordſhire, for ſaddle-horſes; Barnet *fair*, near London, for lean and Welſh black cattle; St. Faith's, in Norfolk, for Scots runts; Yarmouth fiſhing *fair* for herrings; Ipſwich butter *fair*; that of Woodborough Hill, near Blandford in Dorſetſhire, famous for weſt-country manufactures, Devonſhire kerſeys, Wiltſhire druggets, &c. two cheeſe-*fairs* at Atherſton and Chipping Norton; beſides many more *fairs* and weekly markets in different parts of the kingdom.

FAIR, in *Sea Language*, is uſed for the diſpoſition of the wind, when it is favourable to a ſhip's courſe, in oppoſition to that which is contrary or foul. The term *fair* is more comprehenſive than large, and includes about ſixteen or eighteen points of the compaſs; whereas large is confined to the beam or quarter, that is, to a wind which croſſes the keel at right angles, or obliquely from the ſtern, but never to one right a-ſtern. Falconer's Marine Dict.

FAIR-*curve* is a winding line, uſed in delineating ſhips, whoſe ſhape is varied, according to the part of the ſhip which it is intended to deſcribe.

FAIR-*pleading*, in *Law*. See BEAU-*pleader*.

Fair-*way*, in *Sea Language*, the path or channel of a narrow bay, river, or haven, in which ſhips uſually advance in their paſſage up and down; ſo that if any veſſels are anchored therein, they are ſaid to lie in the *fair-way*. Falconer.

FAIRY, a term frequently occuring in ancient traditions and romances, denoting a kind of genii, or imaginary deities, converſant on earth, and diſtinguiſhed by abundance of fantaſtical actions and offices, either good, or evil.

The *fairies*, according to theſe traditions, are peculiar ſpecies of divinities, that have but little relation to any of thoſe of the ancient Greeks and Romans; unleſs, perhaps, to the larvæ; though others will not have them ranked among deities, but ſuppoſe them an intermediate kind of beings, neither gods, nor angels, nor men, nor devils.

They are of oriental extraction, and ſeem to have been invented by the Perſians and Arabs, whoſe hiſtory and religion abound with tales of *fairies* and dragons. The Perſians call them Peri, and the Arabs Ginn; having a peculiar country, which they ſuppoſe them to inhabit, called Ginniſtian; and, by us, *Fairy Land*. Our famous countryman Spenſer's maſter-work, the *Fairy Queen*, is an epic poem under the perſons and characters of *fairies*.

Fairy *circle*, or *ring*, is a phænomenon pretty frequent in the fields, &c. being a kind of round, ſuppoſed, by the vulgar, to be traced by the *fairies* in their dances.

There are two kinds: one of them ſeven or eight yards in diameter, containing a round bare path, a foot broad, with green graſs in the middle; the others of divers ſizes, being encompaſſed with a circumference of graſs, much freſher and greener than in the middle.

Mr. Jeſſop, and Mr. Walker, in the Philoſophical Tranſactions, aſcribe them to the lightning; which is confirmed, by their being moſt frequently produced after ſtorms of that kind; as well as by the colour and brittleneſs of the graſs-roots, when firſt obſerved. It is no wonder that lightning, like all other fires, moves round, and burns more in the extremity than in the middle.

According to thoſe gentlemen, the ſecond kind of circle ariſes originally from the firſt; the graſs burnt up by the lightning uſing to grow the more plentifully afterwards. Phil. Tranſ. abr. vol. ii. p. 182.

It is not improbable that theſe *fairy* rings may be of the ſame kind with thoſe CIRCULAR *ſpots* produced on the ſurface of metal by large electrical exploſions. The chief objection againſt this hypotheſis is, that in theſe rings there is no appearance of any thing correſponding to the central ſpot in ſuch electrical impreſſions; and that they have no regular concentric circles, nor an invariable circular figure. Mr. Walker, however, found one of theſe rings immediately after a thunder ſtorm, which he could aſcribe to no other cauſe but the lightning. Ubi ſupra.

Other authors have aſſerted, that theſe *fairy-rings* are formed by ants; becauſe thoſe inſects are ſometimes found travelling in troops therein; and others, that they are beds of muſt-worms.

FAIT, *Factum*, in *Law*, is uſed for a writing lawfully executed to bind the parties thereto. See DEED.

FAITH, *Fides*, in *Antiquity*, as denoting honeſty or fidelity, was deified by the Romans, and repreſented with an erect open air, and dreſſed in a thin robe, ſo fine, that one might ſee through it. This deity is alſo repreſented as very old and grey-headed; and ſhe appears on medals as giving her hand, and ſometimes only by two hands joined together.

Faith, in *Philoſophy* and *Theology*, that aſſent which we give to a propoſition advanced by another, the truth of which we do not immediately perceive from our own reaſon or experience; or it is a judgment, or aſſent of the mind, the motive whereof is not any intrinſic evidence, but the authority, or teſtimony, of ſome other, who reveals or relates it.

Hence, as there are two kinds of authorities and teſtimonies, the one of God, and the other of man, *faith* becomes diſtinguiſhed into *divine* and *human*.

Faith, *divine*, is that founded on the authority of God; or it is that aſſent we give to what is revealed by God.

The objects of this *faith*, therefore, are matters of REVELATION.

Faith, *human*, is that whereby we believe what is told us by men.

The object hereof is matter of human teſtimony and EVIDENCE.

Faith, again, may be diſtinguiſhed into *implicit*, and *ſcientific*.

Faith, *implicit*, or *blind*, is that whereby we give our aſſent to a propoſition advanced by another, of whoſe knowlege and veracity we have no certain and evident reaſon, or proof. This is only opinion, under another name.

Faith, *ſcientifical*, or *ſeeing*, is that by which we give our aſſent to a propoſition advanced by one who can neither deceive, nor be deceived; which may be properly referred to ſcience and knowlege.

Divine faith, *cæteris paribus*, is ſtronger than human. When we are fully convinced, that any propoſition comes from God, *faith* becomes aſſurance, or ſcience; it being an ingredient in our idea of God, that he can neither deceive, nor be deceived; but when there is any doubt, whether the propoſition is declared by God, the *faith* can be no ſtronger, or weaker, than the reaſons on which it is founded; divine *faith*, therefore, may either be ſtrong, weak, or none at all. Again, the reaſons or motives of believing men, may be of ſuch weight and force, that being perfectly underſtood, they may equal a mathematical evidence; and then the human *faith* is ſcarce inferior to the divine; there being, as it were, an equal neceſſity of giving our aſſent on each ſide.

Hence it is eaſily obſerved, that all our *faith* or belief has its foundation on reaſon, which cannot deceive us, if we make a due uſe of our liberty, and do not acquieſce, till that neceſſarily compels us.

All our preſent religious *faith* is really human, as depending on the ſecondary teſtimony of men; of whoſe veracity, however, we have the ſtrongeſt proofs. The prophets, or thoſe to whom God immediately revealed his will, believed him, becauſe they knew he could not deceive. We, at this day, believe them, or rather their writings, for other reaſons; viz. the ſame which oblige us to believe all well-atteſted hiſtories. See EVIDENCE.

Beſides the two ſpecies of *faith*, human and divine, the Romaniſts make a third, or intermediate kind, called

Faith, *eccleſiaſtical*, which is the aſſent orthodox perſons give to certain events decided by the church, and enjoined to be believed by all.

As, when the church declares, that ſuch a book contains heretical doctrine, &c.

This term, *eccleſiaſtical faith*, was firſt introduced by Mr. Perefixe, to diſtinguiſh the *faith* whereby we believe matters of divine revelation, from that whereby we believe matters of eccleſiaſtical determination.

Faith, in *Practical Theology*, makes the firſt of the theological virtues, or graces.

Faith in God, in this ſenſe, denotes ſuch a conviction of his being, perfections, character, and government, as produces love, truſt, worſhip, obedience, and reſignation. *Faith* in Chriſt, as it has been defined by ſome, is a mere aſſent to the Goſpel as true; according to others, it ſignifies ſuch a perſuaſion that he is the Meſſiah, and ſuch a deſire and expectation of the bleſſings which he has promiſed in his Goſpel to his ſincere diſciples, as engage the mind to fix its dependence upon him, and ſubject itſelf to him in all the ways of holy obedience; and thus defined it is a very extenſive principle, and includes in its nature and inſeparable effects the whole of moral virtue. In this ſenſe it has been ſaid, that under the Goſpel a man is juſtified by *faith*. *Faith*, likewiſe, in reſpect to futurity, is a moral principle, implying ſuch a conviction of the reality and importance of a future ſtate, as is ſufficient to regulate the temper and conduct.

Faith, *confeſſion of*. See CONFESSION.

Faith and *homage*, in the *Feudal Law*. See FEALTY.

FAITHFUL, an appellation which the Mahometans aſſume to themſelves. See MUSSULMAN.

FAITHFULNESS, in *Ethics*, is an agreement between a man's promiſes and his actions.

FAITIERE, in *Natural Hiſtory*, the name of a ſpecies of ſhell-fiſh, called by many authors, by a much leſs determinate name, *concha imbricata*. The French have thus called it, from the word *faitage*, which, in the ſame language, ſignifies the *roof of a houſe*. The ſhell is of the bucardium, or ox-heart kind, and has ſeven longitudinal ribs, and a great many laminæ running tranſverſely acroſs them, ſo that it greatly reſembles the roof of a houſe, where the rafters and croſs-beams are ſeen while it is not covered with tiles.

FAITOURS is uſed in ſtat. 7. Ric. II. cap. 5. for evil doers; and may be interpreted idle livers, from (ſays the author of the Terms de Ley) *faitardiſe*, which ſignifies a kind of ſleepy diſeaſe, proceeding from too much ſluggiſhneſs. In the forementioned ſtatute it ſeems ſynonymous with vagabond.

FAKE, or **Fack**, in the *Sea Language*, one round or circle of a cable; otherwiſe called a coil.

FAKIR, or **Faquir**, a kind of derviſe, or Mahometan religious, who travels the country, and lives on alms. The word *fakar* is Arabic, and ſignifies a *poor or needy perſon*. It is formed of the word פקר, *fakara*, *to be in need*.

D'Herbelot makes *fakir* and derviſe the ſame thing. The Turks and Perſians uſe the name derviſe for any poor perſon, whether he be ſo out of neceſſity or choice; and the Arabs apply *fakir* in the ſame ſenſe. Whence, in ſome Mahometan countries, the religious are called *derviſes*; and in others, particularly throughout the ſtates of the great Mogul, *fakir*.

The *fakirs* ſometimes travel ſingly, and ſometimes in companies. When they go in companies, they have a ſuperior, who is diſtinguiſhed by his habit. Each *fakir* bears a horn, which he blows at his arrival in any place, as alſo at his departure; and a kind of ſcraper or trowel, to ſcrape the earth in the place where he ſits, or lies down. When they go together, they divide their alms equally amongſt them; give what is left every night to the poor; and never reſerve any thing for the morrow.

There is alſo a kind of idolatrous *fakirs*, who follow much the ſame practice. D'Herbelot reckons in the Indies eight hundred thouſand Mahometan *fakirs*, and twelve hundred thouſand idolatrous ones; to ſay nothing of divers extraordinary ſpecies of *fakirs*, particularly penitents, whoſe mortification and penance conſiſt in very odd obſervances. Some, e. gr. remain night and day, for many years, in certain uneaſy poſtures. Others never ſit or lie down to ſleep, but ſuſtain themſelves by a rope, hung down for that purpoſe. Others bury themſelves in a ditch, or pit, for nine or ten days, without eating or drinking. Others keep their arms lifted up to heaven, ſo long, till they cannot let them down again if they would. Others lay fire on their heads, and burn the ſcalp to the very bone. Others roll themſelves naked on thorns. Tavernier, &c.

Another claſs of *fakirs* retire unto moſques, live on alms, and devote themſelves to the ſtudy of the law, the reading of the Alcoran, &c. to fit themſelves for moulas, or doctors. People of quality ſometimes aſſume the character of *fakirs*. The famous Aurengzeb himſelf, before he aſcended the throne, gave out, that he intended to commence *fakir*.

FALACA, a kind of baſtinado inflicted on the Chriſtian captives in Algiers. The *falaca* is properly a piece of wood, about five feet long, bored with two holes, through which the feet of the patient are put, who is laid on his back on the ground, with his arms tied. Two men are employed to give him fifty or a hundred ſtrokes with a cudgel, or bull's pizzle, on the ſoles of his feet. A very trifling fault often incurs this ſevere puniſhment.

FALACER, in *Mythology*, the name of a Roman deity, recorded by Varro.

FALANG, in our *Old Writers*, is uſed for a jacket or cloſe coat. Blount.

FALANGIE, in the *Materia Medica*, a name given by ſome of the ancients to the ocymum or baſil. The *falangie muſk* is the ſweet-ſcented baſil. Some of the commentators on the works of Avicenna, have ſuppoſed, that the fruit called fel, was the ſeed or fruit of this plant; and that the word was only an abbreviation of *falangie*, but this is by no means right. See Fel.

FALCADE, in the *Manege*. A horſe makes *falcades*, when he throws himſelf upon his haunches two or three times, as in very quick curvets, which is done in forming a ſtop, and half-ſtop. A *falcade*, therefore, is the action of the haunches, and of the legs, which bend very low, as in curvets, when you make a ſtop or half ſtop.

They ſay, this horſe ſtops well, for he makes two or three *falcades*, and finiſhes his ſtop with a peſate. This horſe has no haunches, he will make no *falcades*. The *falcades* are ſo much the prettier, as in making them his haunches are low. Stop your horſe upon the haunches, in making him ply them well, ſo that after forming his *falcades*, he may reſume his gallop without making a peſate, that is, without ſtopping, or making one time. And thus he will make an half STOP. See HAUNCHES and TIME.

FALCANOS, a name given by ſome of the chemical writers to arſenic.

FALCATA, in our *Old Writers*, was uſed for the graſs freſh mowed, and laid in ſwathes.

FALCATED, one of the phaſes of the planets, popularly called horned.

The aſtronomers ſay, the moon, or any planet, is *falcated*, when the enlightened part appears in form of a ſickle, or reaping-hook, by the Latins called *falx*.

The moon is *falcated* whilſt ſhe moves from the third quarter to the conjunction, and from the conjunction, or from new moon, to the firſt quarter; from hence to oppoſition or full, and from full to the third quarter the enlightened part appears gibbous, and the dark *falcated*. See Moon.

FALCATOR, in our *Old Writers*, the ſervile tenant who performed ſervice of falcature.

FALCATURE, *Falcatura*, in our *Old Writers*, ſignifies one day's mowing of graſs; a cuſtomary ſervice to the lord by his inferior tenants. Kennet's Gloſſ. in voc.

FALCINELLUS, in *Zoology*, the name of a bird in ſome ſort reſembling the herons, but with a ſhorter beak. It is of a very beautiful colour, but with a fine gloſſy green, with an admixture of a purpliſh tinge; the head and neck are brown, but the upper part of the throat whitiſh with black ſpots; its beak is like that of the curlew, very long, very ſlender, and crooked; its legs moderately long; as this bird grows older, it becomes of a browner hue. It is called by ſome, *ardea nigra*, the *black heron*, and by the Italians *acion negro*. Ray's Ornithology, p. 218.

FALCON, *Falco*, in the Linnæan ſyſtem of *Zoology*, makes a diſtinct genus of birds of the hawk-kind, the characters of which are, that they have a ſtrong hooked bill, the baſe of which is covered with a *cere*, or naked ſkin; the head is covered with feathers, and the tongue is bifid. Linnæus claſſes no leſs than thirty-two ſpecies under this genus, among which are the eagle, the buzzard, the kaſtrel hawk, the lanner, the goſhawk, &c.

Jo. de Janu, and ſeveral others, take the name *falcon* to have been occaſioned by its crooked talons, or pounces, which reſemble a *falx*, or ſickle. Giraldus derives it *a falcando*, becauſe it flies in a curve.

The *falcon* is a bird of prey of the hawk-kind, much eſteemed for its ſtrength and activity. There are many ſpecies of this bird; but when the word *falco* is uſed ſingly, without any diſtinctive addition, it is meant of that ſpecies, called by authors the *falco peregrinus*, from its travelling into different countries, at different ſeaſons of the year.

It has very long and large wings, reaching when folded to the tip of the tail. Its ſhoulders are very large, its tail very long, and ending like the ſparrow-hawk's in a point, its end being white, variegated with orange-coloured ſtreaks. Its feet are of a greeniſh or bluiſh yellow, its neck is long, and its head and back of a pale dove colour. There is a variety of this bird, which is of a much blacker colour on the back, and has been erroneouſly eſteemed by ſome a different ſpecies; probably it is only owing to the difference of age or ſex. This bird is caught in France, Germany, and elſewhere; but it is not well known where it builds. It feeds on ducks, geeſe, and other large birds.

This ſpecies builds on the rocks of Llandidno, in Carnarvonſhire, and is very common in the north of Scotland. Mr. Pennant mentions a ſurpriſing inſtance of the rapidity of their flight: one that was reclaimed by a gentleman of the ſhire of Angus, on the eaſt ſide of Scotland, eloped from his maſter with two heavy bells to each foot, on the twenty-fourth of September, 1772, and was killed in the morning of the twenty-ſixth, near Moſtyn in Flintſhire. Zoology, vol. i. p. 179.

The *falcon* is of the long-winged hawk-kind, uſed in the diverſion of hawking. There are ſeveral ſpecies of *falcons*. 1. The *falco peregrinus*, or common *falcon*. 2. The ſacre, called *falco ſacer* by authors. 3. The *jerfalcon* or *gyrfalco*. 4. The *mountain-falcon*. 5. The *gentle falcon* or *falco gentilis*, ſuſpected by Mr. Ray to be the ſame with the common or firſt kind. 6. The *haggard-falcon*, remarkable for the ſhortneſs of its neck. 7. The *white falcon*, all over of a pure ſnow-white. 8. The *ſtone-falcon*, of a deep blackiſh blue. 9. The *Tunis* or *Barbary falcon*, which reſembles the common kind, but is ſmaller. 10. The *red falcon*, much reſembling the common kind, but ſpotted with a reddiſh colour; and the red and creſted Indian *falcon*, which ſeem to be the male and female of the ſame ſpecies. Ray's Ornithol. p. 40 to 48. See GYRFALCON, SACRE, LANNARIUS, &c.

To theſe we may add the *ſpotted falcon*, about the ſize of a buzzard; with a black bill, yellow cere and legs, pale yellow irides; the crown and hind-part of the neck white, ſpotted with light reddiſh brown; back and ſcapulars of the ſame colour, edged with white; the quill feathers duſky, barred with aſh colour; the underſide of the neck, breaſt, belly, and thighs, white, and very ſtrong legs; and alſo the *rough-legged falcon*, a native of Denmark, in length about two feet two inches, with a duſky bill, yellow cere, the head, neck, and breaſt, of a yellowiſh white, marked in ſome parts with oblong brown ſtrokes; the belly of a deep brown; the thighs and legs of a pale yellow, marked with brown; the extreme half of the tail brown, tipt with dirty white; that next to the body white; the legs covered with feathers as low as the feet, and the feet yellow. Pennant's Britiſh Zoology, vol. i. p. 190; and vol. ii. p. 623.

It muſt be added, that the name *falcon* is reſtrained to the female; for as to the male, it is much ſmaller, weaker, and leſs courageous, than the female; and is denominated a *taſſel* or *tiercelet*.

The gentle *falcon*, with yellow legs, aſh-coloured body ſpotted with brown, and four or five blackiſh bars on the tail, is the moſt valuable of all theſe, as being the moſt tame and manageable, and the moſt hardy, enduring all weathers without hurt. It makes its neſt in rocks, and inhabits the north of Scotland. This kind of *falcon* has a natural inclination to make the heron fly every way, and is moſt excellent at the brook or river fowling, and eſpecially at the larger birds, as at the ſhovel, wild-gooſe, and the like. If ſhe be an eyeſſe ſhe may be ventured at the crane, otherwiſe ſhe will not be ſo hardy.

Hawks in general prove courageous or cowardly all their lives, as they are firſt quarried; and if they are taken out of the eyrie before they are fully ſummed and well penned, their wings will never grow to perfection. Their legs, alſo, will grow crooked, and their train will be full of taints. *Falcons* of one and the ſame kind are called by the ſportſmen by very different names, and eſteemed of ſeveral different kinds according to the places and time of their reclaiming, and the countries from whence they came. Thus the names mewed-hawk, ramaged hawk, ſoar-hawk, and eyeſſe, firſt commenced; and theſe are again divided into large hawks, wean hawks, and ſlender hawks. All theſe have different mails and plumes, according to the country from whence they come; ſome are black; ſome brown; they have alſo each its different diſpoſition, ſome being beſt for the field, and others for the brook or river. Different names are alſo given to *falcons*, according to their different age and time of taking. The *falcon* is called an eyeſſe, as long as ſhe remains in the eyrie; theſe are always troubleſome in their feeding; they cry very much, and they are not entered without great difficulty; but being once well entered, they prove excellent hawks for the heron and all the large fowl, and are very hardy and full of courage. The ſecond name given this bird is the *ramage-falcon*. This name ſhe retains from the time of her leaving the eyrie, during the months of June, July, and Auguſt. Theſe are always hard to be manned; but being reclaimed, they are not inferior to any hawk. The third is the ſoar-hawk, ſo called in September, October, and November. Theſe birds keep for a whole twelvemonth the firſt feathers, which they have on when they leave the eyrie, and do not molt them. Theſe are therefore called the ſoar-feathers. The fourth is termed the murzarolt or carviſt, *quaſi* carry-fiſt; for they muſt at this time be almoſt continually carried on the fiſt. They are thus called from January to the middle of May. Theſe are uſually great baters, and very little eaters; they are ſubject to ſeveral troubleſome diſorders, particularly to the filanders, more than any other hawk, and they are very ſeldom brought to be good for any thing. The fifth name is the entermew. They are called by this name from May till December, becauſe all that time they are caſting their coats. Theſe would be excellent hawks if they could be truſted; but they are unſteady. They muſt be kept hard under, and the falconer muſt make his fiſt their perch. The hawk newly taken muſt be ſeeled, have all new furniture, and muſt be often ſtroked with a ſtick to accuſtom her to be gentle. She muſt alſo have two good bells, that ſhe may be well heard when ſhe ſtirs or ſcratches; and her beak and talons muſt be cut a little, but not ſo near as to make them bleed. If there be a ſoar-*falcon* taken that has already croſſed the ſeas, ſhe is uſually very hard to be broken; but that being well done, ſhe is the beſt of all hawks. Her food muſt be good and warm, and it muſt be given her at leaſt three times a day. It ſhould be pigeons, larks, or other live birds; for ſhe muſt be broke by degrees from her accuſtomed manner of feeding. The hawk muſt always be fed with hoop and lure, that ſhe may always know when you will give her meat. She muſt then be gently unhooded, and two or three bits being given her, ſhe muſt be hooded again; and in the night let her rooſt on a perch near ſome perſon's bed, that ſhe may be often waked in the night. When by theſe means ſhe becomes tame and gentle, her uſual food may be changed, and a ſheep's heart given her. After this ſhe may be unhooded in the day-time, but not in company; and after giving her a bit or two, ſhe muſt be hooded again, and then a little more given her. After this, by degrees, ſhe will be taught to eat before company, and then the buſineſs of taming her will be ſoon accompliſhed. Till ſhe is thoroughly manned, ſhe muſt be borne continually on the fiſt, and fed in company, giving her in the morning about ſun-riſe the wing of a pullet, and every evening the foot of a hare or rabbit cut off above the joint, flead and laid in water, which having ſqueezed give it her with the pinion of a hen's wing. It is beſt to give the hawk waſhed meat, and after this plumage, according as ſhe ſeems to be foul within. She is then to be hooded, and nothing more ſhould be given her till ſhe gleams after caſting; but when ſhe has gleamed and caſt, ſhe ſhould then have ſome hot meat given her, toward evening eſpecially, and be made to eat it in company. When ſhe is well reclaimed, manned, and ſharp-ſet, ſhe may be fed on the lure.

But three things are to be conſidered before your lure be ſhewed her. 1. That ſhe be bold and familiar in company, and not afraid of dogs and horſes. 2. Sharp-ſet and hungry, having regard to the hour of morning and evening when you would lure her. 3. Clean within, and the lure well garniſhed with meat on both ſides. When you intend to give her the length of a leaſh, you muſt abſcond yourſelf; ſhe muſt alſo be unhooded, and have a bit or two given her on the lure, as ſhe ſits on your fiſt. That done, take the lure from her, and ſo hide it that ſhe may not ſee it; when ſhe is unſeeled, caſt the lure ſo near her, that ſhe may catch it within the length of her leaſh; and as ſoon as ſhe has ſeized it, uſe your voice as falconers do, feeding her upon the lure on the ground.

After having lured your *falcon*, in the evening give her but little meat, and let this luring be ſo timely, that you may give her plumage, &c. next morning on your fiſt; when ſhe has caſt and gleamed, give her a little beaching of warm meat about noon, tie a creance to her leaſh, go into the field, there give her a bit or two upon the lure, and unſeel her. If you find ſhe is ſharp-ſet, and has eagerly ſeized on the lure, let a man hold her, to let her off to the lure; then unwind the creance, and draw it after you a good way, and let him who has the bird hold his right hand on the taſſel of her hood ready to unhood her as ſoon as you begin to lure; to which if ſhe come well, ſtoop roundly upon it, and haſtily ſeize it; let her caſt two or three bits thereon; that done, take her off the lure, and deliver her again to the perſon that held her; and, going farther off the lure, feed her as before; and ſo daily farther and farther off the lure. Afterwards you may lure her in company, but do not fright her; and having uſed her to lure on the foot, do it alſo on horſeback; which may be ſooner accompliſhed, by cauſing horſemen to be about you, when you lure her on foot: it is alſo ſooner done, by rewarding her upon the lure on horſeback among horſemen. And when ſhe is grown familiar this way, let ſomebody a-foot hold her, and he that is on horſeback muſt call, and caſt the lure about his head, while the holder takes off the hood by the taſſel; and if ſhe ſeize eagerly on the lure, without fear of a man or horſe, then take off the creance, and lure at a greater diſtance. Laſtly, if you would have her love dogs as well as the lure, call dogs when you give her plumage. See HAWKING.

FALCON, in *Gunnery*. See FAUCON.

FALCONE, in *Zoology*, a name by which ſome authors have called the *milvus*, or FLYING-*fiſh*.

FALCONER, a perſon who brings up, tames, and makes, that is, tutors and manages birds of prey; as falcons, hawks, &c. The grand ſeignor uſually keeps ſix thouſand *falconers* in his ſervice. The French king has a grand *falconer*, which is an office diſmembered from that of great hunt, grand veneur. The duke of St. Alban's is hereditary grand *falconer* of England.

Hiſtorians take notice of this poſt as early as the year 1250.

One great buſineſs of the *falconer* is to conſider the quality and mettle of the birds, to know which to fly early, and which late. He muſt alſo be buſy and cleanly in freeing them of lice, nits, and vermin. Every night after flying, he ſhould give his bird caſting; nor muſt he forget to water her, unleſs ſhe have been bathed. After this, ſhe muſt be put in a warm room, having a perch, with a candle burning by her; where ſhe is to ſit unhooded, that ſhe may prune and pick herſelf. Next morning ſhe ſhould be weathered, &c.

FALCONET, in *Gunnery*. See FAUCONET.

FALCONRY, or FAUCONRY, the art of taming, managing, and tutoring, birds of prey, particularly falcons and hawks; and employing them with advantage in the purſuit of game; called alſo hawking.

The word is formed of *falco*, *falcon*, or *faucon*, the bird of moſt uſe and eſteem in this kind of ſport.

Falconry, though the principal amuſement of our anceſtors, was unknown among the Greeks and Romans. All their writings do not furniſh ſo much as a proper name to call it by; ſo far are they from teaching us the terms. It is the French language alone, that has particular words for all the parts of *falconry* and hunting; and from them moſt of our terms, as well as what we know of the art itſelf, are borrowed.

This diverſion was in ſuch repute ſo late as the reign of James I. that Sir Thomas Monſon is ſaid to have given a thouſand pounds for a caſt of hawks; and the laws were very rigorous that tended to preſerve this pleaſure. In the 34th of Edw. III. it was made felony to ſteal a hawk; and to take its eggs, even in a perſon's own ground, was puniſhable with impriſonment for a year and a day, beſides a fine at the king's pleaſure; and in the reign of queen Elizabeth, the impriſonment was reduced to three months; but the offender was to find ſecurity for his good behaviour for ſeven years, or to remain in priſon till he did. According to Olearius, the diverſion of *falconry* is more followed by the Tartars and Perſians than ever it was in any part of Europe. Tom. i. p. 217. 328. See Pennant's Britiſh Zoology, vol. i. p. 171, &c.

The writers of reputation on *falconry*, are Deſparon, Franchiere, Tardiffe, Artelouche, Dalagona, Latham, &c. M. de S. Martha has put the principles of the art into fine Latin verſes, in his Hieracoſophion, ſive De Re Accipitraria, libri tres.

There is alſo a treatiſe on hunting, hawking, and heraldry, printed at St. Alban's by Caxton, and attributed to dame Julian Barnes.

FALD-*fee*, or FALD-*fey*, was anciently uſed for a rent or fee paid by ſome cuſtomary tenants, for liberty to fold their ſheep upon their own land.

FALDAGE, an ancient privilege, which ſeveral lords reſerved to themſelves of ſetting up ſheep-folds, or pens, in any fields within their manors, the better to manure them; and this not only with their own, but with their tenants ſheep.

This was alſo termed *ſecta faldæ*; and in ſome old charters *fold-ſoca*; in ſome place a fold courſe, or free-fold.

FALDELLA, a word uſed by ſome of the writers in ſurgery for a ſort of compreſs made of liſt contorted together in ſeveral doubles.

FALDUSTOR was anciently uſed to ſignify the higheſt ſeat of a biſhop, incloſed round with a lattice.

FALDWORTH, among our *Old Writers*, was uſed to ſignify a perſon of age, ſufficient to be reckoned of ſome decennary.

FALL, *Deſcent*, in *Phyſics*, the tendency of any heavy body towards the center of the earth.

Galileo firſt diſcovered the ratio of the acceleration of *falling* bodies; viz. that dividing the whole time of *falling* into equal parts, the body will *fall* thrice as far in the ſecond moment, as in the firſt; five times as far in the third; ſeven times in the fourth, &c. and ſo on in the order of the uneven numbers. See ACCELERATION.

FALL *of bodies, for the cauſe of the.* See GRAVITY.

FALLING *bodies, for the laws of.* See DESCENT.

FALL, *water.* See CATARACT.

FALL is alſo uſed in a moral ſenſe: as, the *fall* of Adam. See ORIGINAL SIN; the *fall* of the Roman empire, &c. Authors contend, that Plato had a notion of Adam's *fall*, which he had learnt from Moſes. Euſeb. De Præparat. Evangel. lib. xii. cap. 11. quotes a fable from Plato's Sympoſ. wherein he thinks he finds the whole hiſtory allegorically related.

FALL, in *Muſic* and *Poetry*. See CADENCE.

FALL, a meaſure of length uſed in Scotland, containing ſix of the ells of that country, each of which is equal to $37\frac{2}{10}$ Engliſh inches. See MEASURE.

FALL, among *Seamen*, denotes that part of the rope of a TACKLE which is haled upon. They ſay alſo that a ſhip hath *falls* when ſhe is not *fluſh*, but hath riſings of ſome parts of her decks more than others. Alſo a ſhip is ſaid to *fall off*, when being under ſail ſhe keeps not ſo near the wind as ſhe ſhould do.

FALL *not off*, at ſea, a word of command from him that conds the ſhip, ſignifying as much as keep the ſhip near the wind.

To FALL *aboard of*, is to ſtrike or encounter another ſhip, when one or both are in motion; or to be driven upon a ſhip by the force of the wind or current.

To FALL *a-ſtern*, is to be driven backwards, or to retreat with the ſtern foremoſt; and is expreſſed of the motion of a ſhip either under ſail, or at anchor.

To FALL *calm*, expreſſes a total ceſſation of the wind.

To FALL *down*, is to ſail or be conducted from any part of a river, towards ſome other part nearer its mouth or opening.

Cat-FALL. See CAT-*heads*.

FALLACY, FALLACIA, a deception, or falſe appearance, or report.

The Epicureans deny, that there is any ſuch thing as a *fallacy* of the ſenſes. According to them, all our ſenſations, and all our perceptions both of ſenſe and phantaſy, are true; they add, that ſenſe itſelf is the firſt grand criterion of truth. That the ſenſes are never deceived, they argue from their being incapable of all ratiocination and remembrance: hence they can neither add, take away, couple, nor disjoin; they cannot, therefore, infer, conclude, or invent; and conſequently they cannot deceive by any inference or invention. This the mind may do, but not the ſenſe, whoſe buſineſs is only to apprehend what is preſent, e. gr. colours; not to diſcern or diſtinguiſh between this body and that. But a thing that barely apprehends, without pronouncing any thing, cannot deceive: add, that there is nothing to convict our ſenſes of falſhood. The right eye, e. gr. cannot convict the left; nor Plato's eyes, thoſe of Socrates; ſince the reaſons or pretenſions of each are equal; and the purblind perſon ſees what he ſees as much as the lynceus. Nor can a ſenſe of one kind convict another; as the ſight the ſmell; becauſe their objects are different, and conſequently their reports or judgments are not of the ſame things. Thus, again, if I ſee a ſtick ſtrait when out of the water, but when in it crooked, my perception is altogether as true in the latter, as in the former caſe; i. e. it is as true that I have the perception or idea of the crooked ſtick, as of the ſtrait one; and this idea is all that the ſenſe ſuggeſts, ſo that it does not deceive. Laſtly, reaſon cannot ſhew our ſenſes miſtaken, ſince all reaſoning depends on previous ſenſations, and the ſenſes muſt firſt be true, before any reaſoning, founded thereon, can be ſo. Thus the Epicureans, whoſe ſyſtem is ſtrongly confirmed by what we have already laid down from Dr. Berkeley, concerning EXISTENCE.

The Carteſians, on the other hand, are continually exclaiming againſt the ſenſes, as the great ſources of all deception. Every thing with which our external ſenſes preſent us, they ſay, ſhould be ſuſpected as falſe, or, at beſt, dubious, till our reaſon has confirmed the report. They add, that our ſenſes, as being fallacious, were never given us by nature for the diſcovery of the truth, but only to point out what things are convenient or hurtful to our bodies.

The Peripatetics keep a middle courſe: they hold, that if a ſenſible object be taken in its common or generical view, the ſenſe cannot be deceived about it; for the ſight can ſee nothing but what is viſible, nor can it err in perceiving what is viſible, *quatenus* ſuch. But they add, that if the object be taken under its ſpecific view, the ſenſe may be miſtaken about it; viz. from a want of the diſpoſitions neceſſary to a juſt ſenſation; as a diſorder in the eye, or ſomething uncommon in the medium, &c.

FALLACY, in *Logic*, or *ſyllogiſtic fallacy*, is a captious argument, called alſo a SOPHISM.

Fallacies either ariſe from words, or things: the foundation of an illuſion and *fallacy* in words, is ambiguity, which is of two kinds; viz. ſimple homonymia, and amphibology.

The kinds of *fallacy* in things are very numerous; but they may be reduced to ſeven general heads; viz. *ignoratio elenchi*, *petitio principii*, *falſa cauſa*, *interrogatio multiplex*, *limitatio vitioſa*, *accidens*, *&* *conſequens*.

FALLING-*off*, in *Sea-Language*, denotes the movement or direction of the ſhip's head to leeward of the point whither it was lately directed, particularly when ſhe ſails near the wind, or lies by. See FALL *not off*.

FALLING-*off* is alſo the angle contained between her neareſt approach towards the ſource of the wind, and her fartheſt declination from it when TRYING.

FALLING *evil* is a diſeaſe to which horſes are ſubject, proceeding from ill blood and cold thin phlegm collected in the fore-part of the head, between the panicle and the brain; which being diſperſed over the whole brain, cauſes the horſe ſuddenly to fall, and bereaves him for a time of all ſenſe. Spaniſh, Italian, and French horſes, are more ſubject to this diſeaſe than the Engliſh.

For the cure of this diſorder, bleed the horſe in the neck, and again in the temple-veins and eye-veins, four or five days after; anoint his body all over with a comfortable friction, and bathe his head and ears with oil of bay, liquid pitch and tar mixed together, and keep his head warm, by covering it with a canvas cap, quilted with wool, and give him a purging or ſcouring.

FALLING-*ſickneſs*. See EPILEPSY.

Dr. Tuberville, in the Philoſophical Tranſactions, gives the hiſtory of a patient much troubled with the *falling*-ſickneſs, in whoſe urine he obſerved a great number of ſhort worms, full of legs, and like millepedes. While theſe continued lively, and full of motion, the fits returned daily; but upon preſcribing her half an ounce of oxymel helleboratum in tanſy-water, the worms and the diſtemper were both effectually deſtroyed.

FALLOPIAN *tubes*, in *Anatomy*, two ducts ariſing from the womb, one on each ſide of the *fundus*, and thence extended to the ovaries; having a conſiderable ſhare in conception.

They are called *tubæ*, i. e. *trumpets*, in reſpect of their form; becauſe in their riſe, or opening into the womb, they are exceedingly ſmall, ſo as ſcarce to admit a knitting-needle, but in their progreſs towards the ovaries, they grow much bigger, and at length are capable of receiving the finger; from whence they contract again, and at the extremity next the ovaries are expanded into a ſort of foliage, which is fringed round with innumerable little fibres, bearing ſome reſemblance to the mouth of a trumpet.

The *Fallopian* tubes are four or five inches long; they conſiſt of a double membrane, derived from the outer and inner membranes of the uterus. The extremity next the ovary, at the time of impregnation, at which time the whole tube is expanded, reaches to, and embraces the ovary; though at other times it ſeems to fall a little ſhort of it, and is only ſlightly tied by the fringe to the under ſide of the ovary.

The uſe of the tubes is, to convey the ſeed, or rather *ova* of women, and other animals, from the teſticles or ovaries, into the *uterus*. See OVARY, and UTERUS.

Their inner ſubſtance is compoſed, in good meaſure, of ramifications of veins and arteries, which form a kind of reticular or cavernous body, not unlike that of the clitoris. This ſtructure makes them capable of dilatation and contraction, according to the quantity and ſtop of the blood; and conſequently of being, as it were, erected *in coitu*, and of embracing the ovary at that time, which in their ſtate of flaccidity they did not. See GENERATION.

They take their denomination, *Fallopian*, from Gabriel Fallopius, a Modeneſe, who died in 1562, and who is commonly reputed the firſt obſerver of them; though we find them deſcribed long before him by Rufus of Epheſus.

The *ova*, or embryoes, are ſometimes detained in the *tubæ Fallopianæ*, and cannot make their way into the womb. Inſtances of this kind have been frequently met with in diſſections. One of the moſt remarkable is that related by Abraham Cyprianus, a celebrated phyſician of Amſterdam, in a letter addreſſed to Sir Thomas Millington, wherein he deſcribes the manner in which he drew a fœtus, twenty-one months old, out of the tuba of a woman, who lived and had ſeveral children after the operation. See *Tab. Anat. (Splan.) fig.* 9. *c c*, and *fig.* 11. *c e*.

FALLOPII *ligamentum*, called alſo *ligamentum Poupartii*, is the lower border of the tendon of the external oblique muſcle of the belly, ſtretched from the fore-part of the *os ileum* to the pubis.

FALLOW, a colour of a paliſh red, like that of a brick half burnt: ſuch is that of a *fallow* DEER, &c.

FALLOW-*field*, or *fallow-ground*, is land laid up, or that has lain untilled for a conſiderable time.

To *fallow*, is to prepare land by ploughing, long before it be ploughed for ſeed. To do this twice, is to *twifallow*, and thrice, to *trifallow*. See PLOUGHING *of fallows*.

FALLOW-*finch*, or FALLOW-*ſmick*, in *Zoology*, a name of the oenanthe, more commonly called the WHEAT-*ear*, and by ſome authors *octiflora*.

FALLOW-*cleanſing machine*, in *Agriculture*, was invented by Mr. Aaron Ogden, a ſmith, at Aſhton-under-Line, near Mancheſter, in Lancaſhire. It is intended for cleanſing *fallows* from weeds, &c. which exhauſt the riches of the ſoil. The conſtruction and uſe of this machine will be underſtood from the following deſcription, and the figure in *Tab. Agriculture, fig.* 1. A, A, is the frame; B, the firſt roller; C, the ſecond ditto, in which laſt are two cranks to move the arms D, D, which work the rake up the directors fixed on the plank E. The under ſide of the lower ends, or ſhares, of theſe directors, are ſharp to cut the clods, and let them come on the upper ſide. Each alternate heel of the ſhare is longer than the intermediate one, that they may not have more than one half to cut at once. At the back of the plank E, are two ſcrews to let it looſe, that the directors may be ſet higher or lower. The ſhares are to penetrate the ground two or three inches, to raiſe the quicks till the rake I, I, fetches them into the cart H, where a man muſt be ready with a muck-hook to clear them backward when gathered. In the rake I, are two teeth for every ſpace of the directors, that ſtones, &c. may be gathered without damage. K, K, are two ſtaples, by which the machine is drawn: under them at *h*, are two hooks, placed low to raiſe the machine in turning, by the help of the traces; and the axle-tree of the cart ſhould be fixed upon a pin, that it may turn like a waggon. F, F, are the triggers to throw the rake behind the roots. The long teeth at G, G, are to cleanſe the roller C. I, I, is the rake which gathers up the weeds into the cart H, and is drawn above the trigger F, by the working of the arms D, expreſſed by the dotted lines at *d d*, *i i i*. The triggers F, of which there is one on each ſide, move on the pivots *a*; ſo that when the points *b*, of the rake I, have been drawn up by the directors E, to the part marked *c*, the trigger, giving way, permits the rake to paſs; but immediately falling, the rake returns along the upper ſurface of the trigger marked *e*, *e*, and of courſe falls on the weeds when it comes to the end, a little beyond the pivot *a*. The reader will obſerve, that the boarding is taken away on one ſide, in the plate, in order to give a more perfect view of the inner parts of the machine; and, in fact, it would, perhaps, be better if all the boarding, marked L, L, L, was taken away, and frame work put in its ſtead. The cart H, might undoubtedly alſo be made lighter. The wheels M, M, appear, in the plate, to be made of ſolid wood; but there is no neceſſity they ſhould be ſo. At N, is another view of the roller C, by which the diſpoſition of the ſpikes may be eaſily comprehended. Suppoſe the circle O, deſcribed by the end of the roller N, to be divided by four ſtrait lines into eight equal ſegments, as repreſented at P. Let the ſame be done at the other end of the roller, and parallel lines be drawn from one correſponding point to the other, the length of the roller; mark the points with figures 1, 2, 3, 4, 5, 6, 7, 8; afterwards draw oblique lines, as from 1, at the end O, to 2, at the other end, and from 2 to 3, &c. on theſe oblique lines the ſpikes are to be fixed, at equal diſtances, in eight circles, deſcribed on the circumference of the roller. The ſpikes of the ſmall roller B, are fixed in the ſame manner, except that the diameter being ſmaller, there are only ſix inſtead of eight rows. R, is another view of the directors, with the plank E, on which they are fixed; and S is a ſection of a part of the plank, with one of the directors as fixed, in which may be ſeen the heel *m*, from whence to the point of the ſhare *n*, is a ſharp cutting edge. See the ſame letters in figure R. At T, is one of the long teeth to be ſeen at G; it is bent towards the roller C, which it ſerves to cleanſe. When the end of the rake *b*, after riſing above *c*, is puſhed, by the motion of the arms D, D, along the upper part *e*, *e*, of the trigger F, and comes to the end beyond *a*; as it falls, the part of the arm, marked *o*, reſts in the notch *p*, till it is again raiſed by the motion of the roller C, with the rake. The roller C, is to be one foot diameter, the ſpikes nine inches long, that they may go through the furrow (if the ſoil ſhould be looſe) into the hard earth, the more effectually to work the rake, which otherwiſe might be ſo overcharged as to cauſe the roller to drag without turning. In the rake-ends *b*, there ſhould be pivots, with rollers or pullers on, to go in the groove, to take off the friction; and they would likewiſe take the triggers more ſurely as the rake comes back. The rake ſhould alſo be hung ſo far backwarder, that when it is fallen, the arms of it may lie in the ſame plane, or parallel, with the directors, on which it comes up (which will require the frame to be two inches longer in the model). This will cauſe the rake to fall heavier, and drive the teeth into the roots, and bring them up without ſhattering. Theſe teeth muſt be made of ſteel, very fine, and ſo long as to reach down to the plank on which the directors are fixed, that is to ſay, ſix inches long (the directors are alſo to be made ſix inches broad above the plank). The rake-head ſhould alſo fall a little before the crank is at its extremity, which will cauſe the rake to puſh forward to let the teeth come into the roots. The rake-teeth muſt drop in the ſame plane with the roller and wheels, or on the ſurface of the earth. No more ſpace ſhould be given from the roller C, to the long teeth at G G, than that the rake may juſt miſs the ſpikes of the roller C, and fall on the places before mentioned. As the firſt roller B, was intended to cleanſe the ſecond C, more than for any other uſe, it may be omitted when the machine is made in large, as Mr. Ogden has lately found that the long teeth at G, G, anſwer the end alone, and this renders the machine about a ſixth part ſhorter. Now, to ſuit any ſort of earth, there ſhould be to each machine three planks, with directors at different ſpaces, to uſe occaſionally; in the firſt, the ſpaces between the directors ſhould be eight inches wide, in the ſecond ſix, and the third four. This will anſwer the ſame end as having ſo many machines.

As there may be ſome objections to the rake not leaving the roots when it has brought them up, Mr. Ogden has ſeveral methods of cleanſing it; but as he would make it as ſimple as poſſible, he chuſes to let it be without them at preſent; but ſuppoſe it ſhould bring ſome roots back again with it, it will probably loſe them before it gets back to the extremity; whence they will lie light, and be of but little detriment to the others coming up.

Mr. Ogden would have the firſt machine made four feet ſix inches wide, the teeth divided into equal ſpaces, the outſides into half ſpaces.

FALLOW-*hounds*. See HOUNDS.

FALLUM, in ſome of our *Law Lexicographers*, is ſaid to be a ſort of land; and for proof of this they quote the Monaſticon Anglicanum. *De duobus acris & viginti* fallis *in*, &c. Jacob. But from this paſſage it would rather ſeem that *fallum* ſignified a meaſure of land, as well as *acra*. And to this day a FALL is a meaſure of length in Scotland.

FALSE *alarm*, in *War*, a feigned, or a miſtaken ALARM.

FALSE *arms*, in *Heraldry*, are thoſe wherein the fundamental rules of the art are not obſerved: as if metal be put on metal, or colour on colour. See ARMS.

FALSE *attack*, in *War*. See ATTACK, *falſe*.

FALSE *braye*, in *Fortification*. See FAUSSEBRAYE.

FALSE *claim*, in the *Foreſt Laws*, is where a man claims more than his due, and is amerced or puniſhed for the ſame.

FALSE *conception*. See CONCEPTION.

FALSE *flower*, a flower which does not ſeem to produce any fruit, as thoſe of the hazel, mulberry-tree, &c.

A FLOWER of this kind does not ariſe from any embryo, and does not knit; ſuch are the male flowers of the melon, cucumber, &c.

FALSE *galena*. See BLIND and GALENA.

FALSE *gallop*, in the *Manege*. See GALLOP.

FALSE *impriſonment*, is a treſpaſs committed againſt a man, by impriſoning him without ſufficient authority; which authority may ariſe either from ſome proceſs from the courts of juſtice, or from ſome warrant from a legal officer, having power to commit, under his hand and ſeal, and expreſſing the cauſe of ſuch commitment; or from ſome other ſpecial cauſe, warranted, on account of the neceſſity of the thing, either by common law, or act of parliament; ſuch as the arreſting of a felon by a private perſon without warrant, the impreſſing of mariners for the public ſervice, or the apprehending of waggoners for miſbehaviour in the public highways. Stat. 7 Geo. III. cap. 42. *Falſe* impriſonment alſo may ariſe by executing a lawful warrant or proceſs on an unlawful day, as on a Sunday, ſtat. 29 Car. II. cap. 7. or in a place privileged from arreſts, as in the verge of the king's court. The means of removing the actual injury of *falſe* impriſonment are fourfold; viz. by a writ of MAINPRIZE, by writ *de* ODIO *& atia*, by writ *de* HOMINE *replegiando*, and by writ of HABEAS *corpus*. The ſatisfactory remedy for this injury is by an action of treſpaſs, *vi & armis*, uſually called an action of *falſe* impriſonment; which is generally, and almoſt unavoidably, accompanied with a charge of aſſault and battery alſo; and therein the party ſhall recover damages for the injury he has received; and alſo the defendant is, as for all other injuries committed with force, or *vi & armis*, liable to pay a fine to the king for the violation of the public peace.

FALSE *judgment*. See FALSO *judicio*.

FALSE *keel*, in a ſhip, is a ſecond keel, which is ſometimes put under the firſt, to make the veſſel deeper, and to preſerve the lower ſide of the main keel. In our largeſt ſhips of war, the *falſe* KEEL is generally compoſed of two pieces, which are called the upper and the lower *falſe* keels. See *Tab. Ship. fig.* 2. *n.* 54. and *n.* 118.

FALSE *muſter*, is when ſuch men paſs in review, as are not actually liſted as ſoldiers. See FAGGOT, &c.

FALSE *news*, *ſpreading of*, in order to make diſcord between the king and nobility, or concerning any great man of the realm, is puniſhable by common law with fine and impriſonment; which is confirmed by ſtatutes Weſtm. 1. 3 Edw. I. cap. 34. 2 Ric. II. ſtat. 1. cap. 5. & 12 Ric. II. cap. 11.

FALSE *oath*. See PERJURY.

FALSE, or *falſe poſition*, in *Arithmetic*. See POSITION.

FALSE *prophecies*. See PROPHECIES.

FALSE *quarters of a horſe*. See *Falſe* QUARTERS.

FALSE *ribs*. See *Spurious* RIBS.

FALSE *roof of a houſe*, is that part between the upper room and the covering.

FALSE *return*. On a *falſe* return by a mayor, &c. to a mandamus, or by a ſheriff, &c. to a writ, a ſpecial action on the caſe will lie.

FALSE *root*, is that of which the value is negative. E. gr. in the equation $a^2+b^2=x^2$, if *x* be a negative quantity as -5, the *root* is ſaid to be *falſe*; if it be a poſitive quantity it is called a real or true *root*; if it be the *root* of a negative quantity, it is ſaid to be imaginary; as $\sqrt{-5}$.

FALSE *ſheat*, on board a ſhip. See SHEAT.

FALSE *ſtem*, in a ſhip. See STEM.

FALSE *tokens*, in *Law*, is uſed where perſons get money or goods into their hands by forged letters, or other counterfeit means. This is puniſhable by impriſonment by ſtat. 33 Hen. VIII. cap. 1. By 30 Geo. II. cap. 24. a farther penalty is inflicted on thoſe who obtain money or goods by falſe tokens and pretences. See CHEATS.

FALSE *tone*, in *Muſic*. Some call the INTERVAL of two ſemi-tones major by this name; but others more properly call it a diminiſhed third.

FALSE *verdict*. See ATTAINT.

FALSE *weights*. See WEIGHTS.

FALSHOOD, FALSITY, in *Philoſophy*, an act of the underſtanding, repreſenting a thing otherwiſe than it is, as to its accidents; or a falſe enuntiation, or judgment of any thing.

The circumſtance, as to its accidents, is of abſolute neceſſity in the definition, becauſe a thing cannot be repreſented otherwiſe than it is as to eſſentials; for in ſuch caſe the eſſence of the thing would not be repreſented; and ſince the eſſence is the thing itſelf, it would not be that thing which is repreſented, but another.

There is no *falſhood* in apprehenſion or ſenſation; our ideas of ſenſe are all juſt and true, ſo far as they go; and all our deluſions ariſe from our reaſonings and concluſions from them.

FALSI, *Crimen*, in the *Civil Law*, is a fraudulent ſubornation or concealment, with deſign to darken or hide the truth, and make things appear otherwiſe than they are.

The *crimen falſi* is committed three ways. By words, as when a witneſs ſwears falſly. By writing, as when a man frames or alters ſomething, antedates a contract, or the like. See FORGERY. And by deed, as when he ſells by falſe weights and meaſures, debaſes the coin, &c.

FALSIFY, in *Law*, is uſed for proving any thing to be falſe. Hence we find

FALSIFYING *a record*, for ſhewing it to be erroneous. Thus lawyers teach, that a perſon purchaſing land of another, who is afterwards outlawed of felony, &c. may *falſify* the record, not only as to the time wherein the felony is ſuppoſed to have been committed, but alſo as to the point of the offence. But where a man is found guilty by verdict, a purchaſer cannot *falſify* as to the offence; though he may for the time where the party is found guilty generally in the indictment, becauſe the time is not material upon evidence. 2 Hawk. Pl. Crown, 459. We alſo meet with

FALSIFYING *a recovery*. Thus, it is ſaid, the iſſue in tail may *falſify* a recovery ſuffered by a tenant for life, &c.

FALSO *bordone*, in the *Italian Muſic*, is uſed to denote the burden or ground-baſs of a ſong, when it is not exact to the rules of harmony, i. e. when the notes move all the ſame way, as is often the caſe in the Pſalms, and other parts of divine office. The name is more particularly given to a certain harmony produced by the accompanyments of ſeveral ſixths following one another, which make ſeveral fourths between two higher parts; becauſe the third part is obliged to make thirds with the baſs.

FALSO *judicio*, a writ which lies for falſe judgment, given in the county-court, court-baron, or other court, not of record.

FALSO *retorno brevium*, a writ which lies againſt the ſheriff, who has execution of proceſs, for making falſe returns of writs.

FALUN, a word uſed in many parts of France, as the name of a particular ſort of manure of lands, which is dug out of the earth, and is no other than fragments of ſea-ſhells buried at conſiderable depths, and amaſſed in prodigious ſtrata in many parts of that kingdom. Theſe they ſpread upon the lands in the manner of dung; and being as it were calcined and very friable, they readily diſſolve, and are the fineſt manure of any for ſome ſoils.

FALX, in *Anatomy*, a part of the dura mater, deſcending between the two hemiſpheres of the brain, and ſeparating the fore-part from the hinder.

It is called *falx*, i. e. *ſickle*, becauſe of its curvature, occaſioned by the convexity of the BRAIN. It divides the brain as low as the corpus calloſum.

FALX, the *ſickle-fiſh*, in *Ichthyology*, a ſmall fiſh of the tænia kind, common about the ſhores of the Mediterranean, but ſeldom brought to ſale, becauſe of its glutinous nature, being wholly converted into a ſort of glue, when dreſſed. It is a ſoft and ſmooth oblong fiſh, and has its name from reſembling a ſickle in figure. It is often found an ell long, and with that length is not above the breadth of one's hand. It is of a ſilvery colour, but its back-fin is red. Its eyes are large, and its head very ill ſhaped. The common people call it the marmot-fiſh.

FAMES *canina*, by the Greeks called *cynodes orexis*, q. d. *dog-appetite*, is ſuch an inſatiable hunger, as is not to be ſatisfied with eating, but continues even when the ſtomach is full.

This is a caſe much talked of by the ancients, and ſometimes met with amongſt us. It may be ſuppoſed to ariſe from ſharp fretting juices in the ſtomach, which by their continued vellications excite a ſenſe like that of hunger. See BULIMY.

FAMILIA, FAMILY, commonly implies all the ſervants belonging to a particular maſter.

In another ſenſe, *family* is taken for a portion of land, viz. ſo much as is ſufficient to maintain one *family*.

The term HIDE is by our writers ſometimes rendered a manſe, ſometimes a *family*, and ſometimes *carucata*, or plough-land; containing as much as one plough and oxen could cultivate in a year.

FAMILIA, in *Natural Hiſtory*, a term uſed by authors to expreſs a certain order of animals, or other natural productions, agreeing in their principal characters, and containing numerous individuals, not only different from one another, that in whole ſets, ſeveral numbers being to be collected out of the ſame family, all of which have the *family* character, and all ſome ſubordinate diſtinction peculiar to that whole number; or though found in every individual of it, not found in thoſe of any others.

It has been too common to confound the words, claſs, *family*, order, &c. in natural hiſtory. But the determinate meaning of the word *familia* ſeems to be that larger order of creatures, under which claſſes and genera are ſubordinate diſtinctions. Among the quadrupedes, the ſeveral genera of the unguiculated creatures agree one with another in many general characters common to all; and in which they differ from the ungulated animals, which have alſo their ſeveral peculiar characters common to all, and yet different from all thoſe of the others. Theſe naturally conſtitute certain larger diviſions into *families*, and no one would ever break through theſe, or bring the cat and the horſe into the ſame *family*.

In the ſame manner, in *Ichthyology*, there are ſeveral genera of fiſhes, which agree perfectly in certain common characters, and diſagree from all others in them.

The arrangement of natural bodies into theſe *families*, or general and larger claſſes, is of the utmoſt uſe to natural hiſtory, when it is properly done, and the diviſions are genuine and natural; when otherwiſe, it is hurtful.

Theſe diviſions of animals into *families* are of two kinds, the one artificial or hypothetical, the other natural.

FAMILIARS *of the Inquiſition*, perſons who aſſiſt in apprehending ſuch as are accuſed, and carrying them to priſon. They are aſſiſtants to the inquiſitor, and called *familiars*, becauſe they belong to his family. In ſome provinces of Italy they are called croſs-bearers, and in others the ſcholars of St. Peter the Martyr; and they wore a croſs before them on the outſide garment. They are properly bailiffs of the inquiſition; and the vile office is eſteemed ſo honourable, that noblemen in the kingdom of Portugal have been ambitious of belonging to it. Nor is this ſurpriſing, when it is conſidered that Innocent III. granted very large indulgences and privileges to theſe *familiars*; and that the ſame plenary indulgence is granted by the pope to every ſingle exerciſe of this office, as was granted by the Lateran council to thoſe who ſuccoured the Holy Land. When ſeveral perſons are to be taken up at the ſame time, theſe *familiars* are commanded to order matters, that they may know nothing of one another's being apprehended; and it is related, that a father and his three ſons, and three daughters, who lived together in the ſame houſe, were carried priſoners to the inquiſition without knowing any thing of one another's being there till ſeven years afterwards, when they that were alive were releaſed by an act of faith. Geddes's Tracts, vol. i. p. 425—429. Limborch's Hiſt. of the Inquiſ. by Chandler, p. 187.

FAMILY *of curves*. See *Family of* CURVES.

FAMILY *of love*, in *Eccleſiaſtical Hiſtory*, the name of an anabaptiſt ſect, founded in Holland, in 1555, by Henry Nicholas, a Weſtphalian. This deluded fanatic maintained, that he had a commiſſion from heaven to teach men, that the eſſence of religion conſiſted in the feelings of divine love; that all other theological tenets, whether they related to objects of faith, or modes of worſhip, were of no moment; and that it was a matter of perfect indifference what opinions Chriſtians entertained concerning the Divine nature, provided their hearts burned with the pure and ſacred flame of piety and love. Dr. Henry More wrote againſt this ſect, in his Grand Explanation of the Myſtery of Godlineſs, book vi. cap. 12—18. George Fox, the founder of the ſect of quakers, alſo expoſed them, and called them a motley tribe of fanatics, becauſe they took oaths, danced, ſung, and made merry. The principles of this ſect were propagated in England, and produced no ſmall confuſion. The form of abjuration tendered to them, and the ſevere proclamation iſſued againſt them by queen Elizabeth, in 1580, may be ſeen in Wilkins's Concilia Magnæ Brit. &c. vol. iv. p. 296, 297.

FAN, *Flabellum*, a machine uſed to raiſe wind, and cool the air, by agitating it.

The effect of fanning ourſelves when warm, in order to cool us, though the air is itſelf warm which we drive with the *fan* upon our faces, may be thus explained: the atmoſphere round, and next to our bodies, having imbibed as much of the perſpired vapour as it can well contain, receives no more, and the evaporation is therefore checked and retarded till we drive away that atmoſphere, and bring drier air in its place, that will receive the vapour, and thereby increaſe and facilitate the EVAPORATION, and thus contribute to cool us.

That the uſe of the *fan* was known to the ancients is very evident from what Terence ſays,

> *Cape hoc* flabellum, *& ventulum huic ſic facito*;

and from Ovid, Art. Amand. i. 161.

> *Profuit & tenues ventos moviſſe* flabello.

The *fans* of the ancients were made of different materials; but the moſt elegant were compoſed of peacock's feathers, or perhaps painted, ſo as to repreſent a peacock's tail.

The cuſtom which now prevails among the ladies, of wearing *fans*, was borrowed from the Eaſt, where the hot climate renders the uſe of *fans* and umbrellas almoſt indiſpenſable.

In the Eaſt they chiefly uſe large *fans* made of feathers, to keep off the ſun, and the flies. In Italy and Spain they have a large ſort of ſquare *fans*, ſuſpended in the middle of their apartments, and particularly over the tables: theſe, by a motion at firſt given them, and which they retain a long time, on account of their perpendicular ſuſpenſion, help to cool the air, and drive off flies.

In the Greek church, a *fan* is put into the hands of the deacons in the ceremony of their ordination, in alluſion to a part of the deacon's office in that church, which is to keep the flies off the prieſts during the celebration of the ſacrament.

Wicquefort, in his tranſlation of the embaſſy of Garcias de Figueroa, gives the name *fans* to a kind of chimneys or ventiducts in uſe among the Perſians, to furniſh air, and wind, into their houſes; without which the heats would be inſupportable. What is called a *fan* amongſt us, and throughout the chief parts of Europe, is a thin ſkin, or piece of paper, taffaty, or other light ſtuff, cut ſemicircularly, and mounted on ſeveral little ſticks of wood, ivory, tortoiſe-ſhell, or the like.

If the paper be ſingle, the ſticks of the mounting are paſted on the leaſt ornamental ſide: if double, the ſticks are placed betwixt them. Before they proceed to place the ſticks, which they call *mounting the fan*, the paper is to be plaited in ſuch manner, as that the plaits may be alternately inward and outward.

It is in the middle of each plait, which is uſually about half an inch broad, that the ſticks are to be paſted; and theſe again are to be all joined and rivetted together at the other end; they are very thin, and ſcarce exceed one third of an inch in breadth; and where they are paſted to the paper, are ſtill narrower, continuing thus to the extremity of the paper. The two outer ones are bigger and ſtronger than the others. The number of ſticks rarely exceeds twenty-two. The ſticks are uſually provided by the cabinet-makers or toy-men; the *fan*-painters plait the papers, paint, and mount them.

The common painting is either in colours or gold-leaf, applied on a ſilvered ground, both prepared by the gold-beaters. Sometimes they paint on a gold ground, but it is rarely; true gold being too dear, and falſe too paltry.

To apply the ſilver leaves on the paper, they uſe a compoſition, which they pretend is a great ſecret, but which appears to be no other than gum Arabic, ſugar-candy, and a little honey melted in common water, and mixed with a little brandy. This compoſition is laid on with a ſponge; then laying the ſilver leaves thereon, and preſſing them gently down with a linen ball ſtuffed with cotton, they catch hold, and adhere together. When, inſtead of ſilver, gold ground is laid, the ſame method is obſerved.

The ground being well dried, a number of the papers are well beaten together on a block, and by this means the ſilver or gold get a luſtre, as if they had been burniſhed.

FAN is alſo an inſtrument to winnow corn. See WINNOW.

FAN, *ſea*. See GORGONIA.

FANATIC, a wild, extravagant, viſionary, enthuſiaſtical perſon; who pretends to revelation and inſpiration, and believes himſelf poſſeſſed with a divine ſpirit.

The word is formed of the Latin *fanum*, a *heathen temple*; for which reaſon the Chriſtians called all the Gentiles *fanatics*; and accordingly, the ancient chronicles of France call Clovis, *fanatic* and pagan.

Among the heathens themſelves, there were a ſort of prophetic prieſts, called *fanatici*; from whom the denomination ſince paſſed to all the reſt. They had their name from the Latin *fanum*, *temple*, becauſe they lived all together in temples. Struv. Antiq. Rom. Synt. cap. 6. p. 312.

Of this kind, particularly, were the prieſts of Iſis, of the mother of the gods, of Bellona, and ſome others, who were called *fanatici*. In Gruter, p. 312. n. vii. we have an inſcription, wherein one L. Cornelius Januarius is is called *Fanaticus*, AB. ISIS. SERAPIS. ABAEDEM BELLONE. And, p. 645. n. vii. *Fanaticus de æde Bellonæ.*

What might give occaſion to the appellation of *fanatics* was, that they performed their ſacrifices in a wild, enthuſiaſtical manner; and the appellation has been generally applied in modern times to thoſe who have made pretences to inſpiration, and who have conducted their worſhip or practice in an extravagant and licentious manner. Such were ſome of the German anabaptiſts and

Engliſh quakers, at their firſt riſe, and the modern prophets, Muggletonians, Behmeniſts, &c. And the name *fanatics*, as well as ſectaries, has been generally and invidiouſly applied to diſſenters from the church of England.

FANATIO, in our *Ancient Cuſtoms*, the fawning time, or FENCE-months in foreſts.

FANCY. See PHANTASY, and IMAGINATION.

FANIONS, in *Military Language*, ſmall flags carried along with the baggage. See FLAG.

FANTASIA, in the *Italian Muſic*, ſignifies *fancy*, and is uſed for a compoſition, wherein the compoſer ties himſelf to no particular time, but ranges according as his fancy leads, amidſt various movements, different airs, &c. This is otherwiſe called the *capricious ſtyle:* before ſonnatas were uſed there were many of this kind, ſome of which remain even now.

FANTASTICAL *colours*, are the ſame with thoſe called EMPHATICAL *colours*.

FANTOME *corn*, in *Huſbandry*, a term uſed by the farmers in ſome of our counties for lean, light, and lank corn; as they call in the ſame places *fantome* fleſh, that which is lean and poor, and can hardly hang on the bones.

FANUM, among the Romans, a temple or place conſecrated to ſome deity. The deified men and women among the heathens had likewiſe their *fana*; even the great philoſopher Cicero erected one to his daughter Tullia. Mem. Acad. Inſcrip. vol. i. p. 488, ſeq.

FAPESMO, in *Logic*, one of the moods of ſyllogiſms.

A ſyllogiſm in *fapeſmo* has its firſt propoſition an univerſal affirmative, the ſecond an univerſal negative, and the third a particular negative.

FAQUIR. See FAKIR.

FAR, in *Horſemanſhip*, an appellation given to any horſes right ſide: thus the *far* foot, the *far* ſhoulder, &c. is the ſame with the right foot, right ſhoulder, &c.

FARAND-MAN, in our *Old Writers*, a traveller or merchant ſtranger, to whom by the law of Scotland juſtice ought to be done with all expedition, that his buſineſs or journey be not hindered.

FARCE was originally a droll, petty ſhew, or entertainment, exhibited by charletans, or quacks, and their buffoons, in the open ſtreet, to gather the croud together.

The word is French, and ſignifies literally, *force-meat* or *ſtuffing*. It was applied on this occaſion, without doubt, on account of the variety of jeſts, jibes, tricks, &c. wherewith the entertainment was interlarded. Some authors derive *farce* from the Latin *facetia*; others from the Celtic *farce*, *mockery*; others from the Latin *farcire*, *to ſtuff*.

At preſent, *farce* is of a little more dignity. It is removed from the ſtreet to the theatre; and inſtead of being performed by merry-andrews, to amuſe the rabble, is now acted by our comedians, and become the entertainment of the politeſt audiences.

The poets have reformed the wildneſs of the primitive *farces*, and brought them to the taſte and manner of comedy. The difference between the two on our ſtage, is, that the latter keeps to nature and probability; and, in order to that, is confined to certain laws, unities, &c. preſcribed by the ancient critics.

The former diſallows of all laws, or rather ſets them all aſide on occaſion. Its end is purely to pleaſe, or to make merry; and it ſticks at nothing which may contribute thereto, however wild and extravagant. Hence the dialogue is uſually low, the perſons of inferior rank, and the fable or action trivial or ridiculous; and nature and truth are every-where heightened and exaggerated to afford the more palpable ridicule.

FARCIMINALIS *Tunica*, the ſame with ALLANTOIS.

FARCIN, FARCY, or FASHIONS, a diſeaſe in horſes, and ſometimes in oxen, &c. ſomewhat of the nature of a ſcabies or mange.

Geſner derives the word from *varices*, by changing the *v* into a digamma or *f*.

The *farcin* is infectious, and ſpreads like a true plague. Vegetius calls it *morbus farcinimoſus*. It conſiſts in a corruption of the blood, which ſhews itſelf in eruptions of hard puſtules, knots, or ſtrings along the veins, and in ulcers, which are not cured without great difficulty, by running hot irons into them.

There is a *ſpreading farcin* which diffuſes itſelf over the whole body; an *inner farcy*, a *ſtringed farcy*, &c.

The *farcy* is ordinarily occaſioned by exceſſive heats and colds, ſometimes by ſpur-galling with ruſty ſpurs, ſnafflebit, or the like; or by the bite of another horſe infected with it; or if in the leg, by cutting or interfering.

For the cure, firſt bleed the horſe well; then give him four ounces of cream of tartar and lenitive electary made into balls every other day for a week; and then give him three ounces of nitre every day for three weeks or a month; and anoint the buds and ſwelling twice a day with the following ointment, viz. ointment of elder, four ounces; oil of turpentine, two ounces; ſugar of lead, half an ounce; white vitriol powdered, two drams; and let theſe ſeveral ingredients be mixed together in a galley-pot. By this proceſs the tumours will ſometimes diſperſe; but if they break and diſcharge a well-digeſted matter, they will ſoon be well, by giving liver of antimony in the quantity of two ounces a day for a fortnight, and one ounce a day for another fortnight. This will be the caſe when the diſeaſe affects only the ſmaller veſſels; but if it affects the larger blood-veſſels, the cure will be more difficult. When the plate, thigh, or neck-veins appear chorded, bleed immediately on the oppoſite ſide, and apply to the diſtempered vein the following compoſition, viz. ſix ounces of oil of turpentine, and three ounces of oil of vitriol: the oil of vitriol muſt be dropped gently into the turpentine-oil, or elſe the bottle in which it is contained will burſt. Let the diſeaſed parts be firſt rubbed with a woollen cloth, and then apply ſome of this mixture twice a day. Let the cooling phyſic and nitre, and liver of antimony be uſed, as above directed; and let the ſores be dreſſed with bees-wax and oil.

If the diſeaſe is ſituated near the flanks and lower belly, and does not yield to the compound oil, it may be neceſſary to bathe the parts with the following mixture as far as the center of the belly, and to give a courſe of antimonial medicines. Take four ounces of ſpirits of wine; oil of vitriol and turpentine, of each two ounces; white-wine vinegar, or verjuice, ſix ounces. When the diſtemper becomes inveterate, notwithſtanding the preceding application, Gibſon recommends the following mixture, viz. half a pint of linſeed oil; oil of turpentine and nitre, of each three ounces; tincture of euphorbium and hellebore, of each two drams; the ſoldier's ointment, or oil of bays, two ounces; oil of origanum, half an ounce; double aqua fortis, half an ounce: when the ebullition is over, add two ounces of Barbadoes tar. With this mixture rub the tumours and chorded veins once in two or three days, opening a paſſage to the matter iſſuing from the ulcers if they are choaked up, with a ſmall hot iron, and deſtroying with vitriol the proud fleſh, which may be kept down by touching with oil of vitriol, aqua fortis, or butter of antimony. Dr. Bracken recommends the mercurial ointment for rubbing the chords and tumours before they break, in order to diſperſe them; and when they are broke, to dreſs the ſores with equal parts of Venice turpentine and quickſilver. Mercurials have been likewiſe given internally in various ways; two ounces of quickſilver divided with an ounce of turpentine, and made up into four balls with diapente and gum guaiacum, of each two ounces, and a ſufficient quantity of honey, have been ſucceſsfully given in the quantity of one ball twice a week; but when mercurials are adminiſtered either internally or externally, gentle purgatives ſhould be interpoſed to prevent a ſalivation.

The *water-farcin*, which is a kind of dropſy, proceeds from a horſe's feeding on low watry grounds, and in pits or holes where the graſs grows above the water; for the horſe in picking out the graſs licks up the water, which occaſions him to ſwell under the belly or chaps.

The *water-farcin* is of two kinds; one produced by a feveriſh diſpoſition, terminating on the ſkin; and the other a true dropſy, in which the water is not confined to the belly and limbs, but is found in different parts of the body, where a great number of ſoft ſwellings appear, which yield to the preſſure of the finger. The firſt ſpecies may be relieved by ſlight ſcarifications in the inſide of the leg and thigh with a ſharp penknife; but in the other ſpecies the water muſt be diſcharged and the craſis of the blood recovered by a purge given every week or ten days, and immediately after the firſt the following balls: take of nitre, two ounces; ſquills powdered, three drams, or half an ounce; camphor, one dram, and a ſufficient quantity of honey to bring them of a due conſiſtence for balls. This ball ſhould be given once a day, and waſhed down with a horn or two of the following drink: take of black hellebore, freſh gathered, two pounds; waſh, bruiſe, and boil it in ſix quarts of water till it is reduced to four; ſtrain off the liquor, and pour on the remaining hellebore two quarts of white-wine; place it in a gentle heat, and let it infuſe forty-eight hours; ſtrain it off, and mix both together, and give the horſe a pint night and morning. When the horſe begins to recover, complete the cure by giving him half a pint of the following infuſion every night and morning for a fortnight, and let him faſt two hours after it: take gentian-root and zedoary, of each four ounces; chamomile-flowers and the tops of centaury, of each two handfuls; of Jeſuit's bark, powdered, two ounces; of juniper-berries, four ounces; of filings of iron, half a pound; infuſe the whole in two gallons of ale for a week, ſhaking the veſſel often.

We have in the Philoſophical Tranſactions an account of a horſe a horſe being cured of this diſeaſe by hemlock. The diſcovery was accidental; the maſter of the horſe riding near a place where hemlock grew abundantly, ſuffered his horſe to eat greedily of it, and he became better from that time, and in a few days was wholly cured. We generally eſteem hemlock a poiſon; but beſide this proof of its ſalutary effect, it is well known that its ſeeds are eaten by ſome birds, particularly by the buſtards, in very great quantities, without any harm.

FARDEL *of Land*, is, according to ſome authors, the fourth; according to Noy, only the eighth part of a yard-land. See YARD-LAND.

Decem acræ faciunt ferdellam, *quatuor ferdellæ faciunt* virgatam, & *quatuor virgatæ faciunt* hidam, & *quatuor hidæ faciunt* ſeudum *militare*.

FARDING-*Bag*, the firſt ſtomach of a cow or other ruminating animal.

FARDING-*deal*, or **FARDING-LAND**, in our *Ancient Cuſtoms*, ſignifies the fourth part of an acre, now called a *rood*. In the regiſter of writs we have alſo *denariata*, *obolata*, *ſolidata*, and *librata terra*, which muſt probably riſe in proportion of quantity from the *farding-deal*, as an half-penny, penny, ſhilling, and pound, riſe in value; on which footing *obolata* muſt be half an acre; *denariata*, an acre; *ſolidata*, twelve acres; and *librata*, twelve-ſcore acres.

Yet we find *viginti libratas terræ, vel reditus*. Reg. fol. 94. *a*, and 284 *b*. where *librata terra* ſhould ſeem to be as much as yields xx *s*. *per annum*; and *centum ſolidatas terrarum, tenementorum, & redituum*, fol. 249. *a*. Others hold *obolata* to be but half a perch, and *denariata* a perch.

FARDINGDEL was the fourth part of a yard-land, or of a plough-land, according to Spelman.

FARE, a voyage or paſſage, or the money paid for paſſing by water, &c.

For the *fares* of hackney-coachmen, watermen, &c. ſee *Hackney*-COACHES.

FARE *of pigs*, the number which a ſow brings forth at one time.

FAREN, in *Ichthyology*, a name given by the Swedes to a fiſh peculiar to their country. It is of the genus of the *cyprini*, and is diſtinguiſhed by Artedi by the name of the *yellow eyed cyprinus*, with twenty-ſeven bones in the *pinna ani*.

FARFARA, a name given by ſome of the ancient *Botaniſts* to the plant we call COLT'*s-foot*, from the river Farfarus, mentioned by Ovid as remarkable for its ſhady banks, which afforded a very large quantity of this plant. Pliny mentions this plant with much confuſion, calling it alſo *farfano* and *farfugio*, and forgetting that he had before deſcribed it under the name of *tuſſilago* or belchion.

FARFRUGUM, in *Botany*, a name by which ſome authors have called the caltha paluſtris, or *marſh*-MARYGOLD.

FARFUGIUM, in *Botany*, a name by which ſome authors call COLT'*s-foot*.

FARINA, the flour or powder of ſome ſort of grain or pulſe, ground and ſifted from the bran.

The word is formed of *far*, *corn-wheat*; and *far*, according to Guichard, comes from the Hebrew, בר, *bar*, ſignifying the ſame thing.

FARINA *fœcundans*, or *pollen*, among *Naturaliſts*, is a fine duſt prepared in the male flowers, or the male parts of flowers of plants; which, being afterwards ſhed on the female, does the office of a ſperm or ſemen, by impregnating the ſame.

The *farina fœcundans*, called alſo the *male duſt* and *male ſeed*, is formed and ſecreted in the apices or antheræ of the ſtamina; where, when it becomes mature and copious enough, burſting its capſula, it is ſplit on the head of the piſtil, and thence conveyed to the matrix or utricle thereof, to fecundify the ova or female ſeed contained therein.

This duſt in any one plant being viewed with a microſcope, every particle thereof appears of the ſame ſize and figure; but in different plants the figure, ſize, colour, &c. of the duſt are very different.

It may be obſerved, however, that the colour of the *farina* varies in the ſame ſpecies, according to the colour of the flower; and even ſometimes the *farina* of the ſame flower is of different colours, as is eaſily obſerved in the caryophyllus arvenſis.

The figures of the divers kinds of *farinæ* are much harder to deſcribe. The moſt general figure is the oval, more or leſs ſharp at the ends, with one or more channels or furrows running lengthwiſe; ſo that through the microſcope they look not unlike the ſtone of a date, a grain of wheat, a coffee-berry, or an olive.

The manner of gathering and preſerving the *farinæ* of plants for microſcopic obſervations is this: gather the flowers in the midſt of a dry ſunſhiny day, when the dew is perfectly off; then gently ſhake off the *farina*, or lightly bruſh it off with a ſoft hair-pencil upon a piece of white paper; then take a ſingle talc or iſinglaſs between the nippers, and breathing on it, apply it inſtantly to the *farinæ*, the moiſture of the breath will make that light powder ſtick to it. If too great a quantity be found adhering to the talc, blow a little of it off; and if there be too little, breathe on it again, and take up more. When this is done, put the talc into the hole of a ſlider, and applying it to the microſcope, ſee whether the little grains are laid as you deſire; and if they are, cover them with another talc, and fix the ring; but be careful that the talcs do not preſs upon the *farina*, ſo as to alter its form. Baker's Microſcope, p. 249.

For the appearances of the *farinæ* of a great many plants, ſee *Tab. of Microſcopical Objects*, *Claſs* 2.

Of *farinæ* ſome are very hard, others ſoft, and eaſily broken. They all contain a great deal of ſulphureous matter more than the other parts, whence they are very odorous. Thoſe of the lily are ſo full of oil that they greaſe the paper they are put in as if it had been oiled. The *farinæ* of moſt aromatic plants ſwim in an eſſential oil, or ſort of liquid turpentine; others are involved in a dry reſin, as thoſe of the lycopodium or muſcus terreſtris clavatus. Others, as thoſe of fumitory, are incloſed in a little, viſcid, mucilaginous matter; and all, in effect, have ſomething ſo glutinous, that they ſtick to any thing that touches them, ſo that it is difficult to ſeparate the grains from each other.

Mr. Bradley ſuppoſes a magnetic virtue lodged in the *farina fœcundans*, or *male duſt*, by means whereof, when depoſited in the utricle of the female, it draws the nouriſhment from the other parts of the plant into the ova or rudiments of the fruit, and makes them ſwell. The reality of this virtue, he argues, from the ſame being found in wax, which is chiefly or wholly gathered hence by the bees.

The *farina* of plants has been ſometimes found to have an effect on neighbouring plants. Thus, we read of ruſſetings changed by the *farina* of a neighbouring tree; and we have obſervations of peaſe of different colours infecting one another in the like manner. Phil. Tranſ. N° 477. § 7.

This duſt was for many ages looked upon as an excrement of the plant; but it has of later times been found to conſiſt wholly of organical bodies, which are in reality the embryo-plants; and entering into the ſeeds into the capſules, while yet buried in the ſtyle, they fecundate them, and put them in a ſtate to vegetate and produce their ſpecies. On the moſt accurate examination, however, with microſcopes, the *farina* or *pulvis fœcundans* of plants has never been found to carry any likeneſs to a *plantula ſeminalis*, or the rudiments of the plants which was to be produced by it. All that the microſcope does in this caſe is but increaſing the apparent magnitude of the particles of the powder; but they are found, when thus viewed, to be no other than a congeries of globules, which are all alike in the ſame ſpecies, and compoſed of fibres and vaſicules wrought together in ſuch a curious manner to the keeping whole as long as neceſſary, and burſting when neceſſary, that it appears evident they are deſtined for ſome very great uſes.

Verdreſius, in the Acta Eruditorum, has given a very curious detail, and has figured and deſcribed fifty kinds of this duſt, moſt of which are conſiderably different from one another, though ſome are nearly alike. He obſerves, that in all the number of flowers that he examined he found no *farina* or *pulvis fœcundans* that did not reſemble one of theſe fifty; and that, therefore, whoever engages in this curious reſearch, ſhould firſt obſerve theſe, and then refer the others to one or other of them as they next approach them, and mention their differences, if any, by way of characters by which they might always be known. Act. Erudit. ann. 1724. p. 410.

The author of theſe curious obſervations has given good figures of theſe and of the other of the fifty of his *farinæ*, to which we refer the reader. See *Generation of* PLANTS.

FARINAGIUM, in our *Old Writers*, denotes toll of meal or flour.

FARIO, in *Zoology*, a term for SALMON when about half grown, after it is paſt the ſtate in which it is called a *ſalar*, and before it is of the full growth.

FARLEU, money paid by tenants in the weſt of England in lieu of a heriot. In ſome manors of Devonſhire, *farleu* is often diſtinguiſhed to be the beſt goods, as heriot is the beſt beaſt payable at the death of a tenant.

FARM, or **FERM**, **FIRMA**, in *Law*, ſignifies a little country meſſuage or diſtrict, containing houſe and land, with other conveniencies, hired or taken by leaſe, either in writing or by word, under a certain yearly rent.

This in divers parts is called differently; in the North, it is a *tack*; in Lancaſhire, a *fermeholt*; in Eſſex, a *wike*. In the corrupted Latin, *firma* ſignified a place incloſed or ſhut in; whence, in ſome provinces, Menage obſerves,

ſerves, they call *cloſerie* or *cloſure*, what in others they call *farm*.

Spelman and Skinner derive the word *farm* from the Saxon, *fearme*, or *feorme*; that is, *victus*, or *proviſion*, becauſe the country-people and tenants anciently paid their rents in victuals and other neceſſaries, though this was afterwards converted into the payment of a ſum of money. Whence a *ferm* was originally a place that furniſhed its owner or lord with proviſions. And among the Normans they ſtill diſtinguiſh between *farms* that pay in kind; i. e. proviſions; and thoſe which pay in money, calling the former ſimply *fermes*, and the latter *blanche ferme*, *white ferm*.

Spelman ſhews, that the word *firma* anciently ſignified not only what we now call a *farm*, but alſo a feaſt or entertainment which the farmer gave the proprietor or landlord for a certain number of days, and at a certain rate, in conſideration of the lands, &c. he held of him. Thus *fearm*, in the laws of king Canutus, is rendered by Mr. Lombard, *victus*; and thus we read of *reddere* firmam *unius noctis*, and *reddebat unam diem de* firma, which denote proviſion for a night and day, the rents about the time of the Conqueſt being all reſerved in proviſions; the cuſtom whereof is ſaid to have been firſt altered under Henry I.

It is commonly allowed that a *farm* ſhould make three rents, as they expreſs it, one for the landlord, one for the charges, and one for the farmer to live upon; but it is very ſeldom that a *farm* will conſtantly do this, or is to be maintained at that charge. In a *farm* of one hundred pound a year, if the land is worth twenty ſhillings an acre, a hundred pound may defray the charges of it; but if in a *farm* of the ſame rent the land be worth but ten ſhillings an acre, a hundred and thirty pounds a year muſt be allowed for the charges of this, or nearly ſo, and two hundred and fifty acres of ſuch land muſt be reckoned to a *farm* of a hundred pounds a year, or elſe the farmer will be ruined if it be not very improveable land.

By ſtatute no parſon or ſpiritual perſon ſhall take *farms* or leaſes of land, on pain of forfeiting 10*l.* per month, &c. 21 Hen. VIII. cap. 18. And no perſon whatſoever ſhall take above two *farms* together in the ſame pariſh, under the forfeiture of three ſhillings and four-pence a week. 25 Hen. VIII. cap. 13. 32 Hen. VIII. cap. 28.

We alſo ſay, to *farm* duties, impoſts, &c.

FARMER, he that tenants a farm, or is leſſee thereof.

Alſo generally every leſſee for life, years, or at will, is called *farmer*.

As this word implies no myſtery, except it be that of huſbandry, huſbandman is the proper addition for a *farmer*.

Farmer, in *Mining*, is the lord of the field, or one that *farms* the lot and cope of the king.

FARNIA, or **Farnia** *Italorum*, a name by which ſome authors have called the bitter oak; the *cerrus*, *ægylops*, and *aſpris* of other writers.

FARNOVIANS, in *Eccleſiaſtical Hiſtory*, a ſect of *Socinians*, ſo called from Staniſlaus Farnovius, who ſeparated from the other Unitarians in the year 1568, and was followed by ſeveral perſons eminent for their learning. This ſect did not laſt long; for having loſt their chief, who died in 1615, it was ſcattered abroad and reduced to nothing. Farnovius was engaged by Goneſius to prefer the Arian ſyſtem to that of the Socinians, and conſequently aſſerted, that Chriſt had been produced out of nothing by the Supreme Being before the creation of this terreſtrial globe. His ſentiments concerning the Holy Ghoſt are not certainly known; however, it appears that he warned his diſciples againſt paying the tribute of religious worſhip to the Divine Spirit.

FARRA, in *Ichthyology*, a name given by authors to a ſpecies of the *coregonus*, not differing eſſentially from the *lavaretus* or *bezola*. This ſpecies has had a great number of different names, and been deſcribed as five or ſix different fiſh. But all the deſcriptions of the ſeveral authors agree to prove it to be that ſpecies only of the *coregoni*, which Artedi has diſtinguiſhed by the name of the *coregonus*, with the upper jaw longer and flat, and with fourteen rays in the back-fin. This name equally agrees with the ſeveral deſcriptions of the *farra* or *ferro*, *bezola*, *lavaretus*, &c. and they agree in all the eſſential characters with one another. See **Lavaretus**.

FARREATION, **Farreatio**, in *Antiquity*, the ſame with **confarreation**.

FARRIER, a perſon whoſe office is to ſhoe horſes, and cure them when diſeaſed or lame.

Farrier's *pouch*, in the *Manege*, a leathern bag, in which they carry drivers, nippers, ſhoes for all ſizes of feet, good ſharp nails, and all that is proper for new-ſhoeing a horſe that has loſt his ſhoe upon a road.

FARTHEL, or **Farthelling**, among *Seamen*, was uſed for the ſame with what they commonly call *furl*, or *furling*, which is taking up the ſails, and binding them cloſe to the yards.

FARTHING, a ſmall Engliſh copper coin, amounting to one-fourth of a penny.

It was anciently called *fourthing*, as being the fourth of the integer or penny.

Farthing *of gold*, a coin uſed in ancient times, containing in value the fourth part of a noble, or 20*d.* ſilver, and in weight the ſixth part of an ounce of gold. It is mentioned in the ſtat. 9 Hen. V. cap. 7. where it is enacted, that there ſhall be good and juſt weight of the noble, half-noble, and *farthing of gold*.

Farthing *of land* ſeems to differ from **farding**-*deal*. For in a ſurvey-book of the manor of Weſt-Hapton in Devonſhire, there is an entry thus: A. B. holds ſix *farthings of land* at 126*l.* *per ann.* Blount. So that the *farthing of land* muſt have been a conſiderable quantity, far more than a rood.

FARUNDEL *of Land*, the ſame with **farding**-*deal*.

FASCE, *Faſcia*, in *Heraldry*. See **Fesse**.

FASCES, in *Antiquity*, axes tied up together with rods or ſtaves, and borne before the Roman magiſtrates as a badge of their office and authority.

Florus, lib. i. cap. 5. aſſures us, that the uſe of *faſces* was introduced by the elder Tarquin, the fifth king of Rome, and that they were then the mark of the ſovereign dignity. In after-times they were borne before the conſuls, but by turns only, each his day; *ne, ſi ambo* faſces *haberent, duplicatus terror videretur*. Livy, lib. ii. cap. 1. They had each of them twelve, borne by ſo many uſhers, called lictors. See **Lictor**. Dionyſ. Halicarn. lib. iii. cap. 84.

Others will have Romulus the author of the inſtitution, and aſcribe the number twelve to the number of birds which foretold him his kingdom. Others hold that he borrowed it from the Hetrurians, and that the number twelve anſwered to the twelve nations of Hetruria, who, in creating him king, gave him each an officer to ſerve him as lictor. Silius Italicus aſcribes their firſt invention to a city of Hetruria, called Vetulonia.

Theſe *faſces* conſiſted of branches of elm; in the middle whereof was a ſecuris or ax, the head whereof ſtood out beyond the reſt. Plutarch relates the reaſons of this diſpoſition. Publicola took the ax out of the *faſces*, as Plutarch aſſures us, to remove from the people all occaſion of terror. After the conſuls the prætors aſſumed the *faſces*. Cenſorin. De Die Natal. obſerves, that the prætors had only two, though Polybius and Plutarch give them ſix.

In the government of the decemviri it was the practice at firſt for only one of them to have the *faſces*; afterwards each of them had twelve, in the ſame manner as the kings.

In funeral proceſſions it was the cuſtom to carry the *faſces* reverſed, as a token of grief.

FASCETS, in *Glaſs-making*, the irons thruſt into the mouths of the bottles when made to remove them into the annealing-tower.

FASCIA, in *Architecture*, by the workmen called **Facia**, **Facio**, or **Face**, a broad liſt, fillet, or band, particularly uſed in architraves and pedeſtals.

The architrave conſiſts of three *faſciæ* or bands; thus called by Vitruvius, as reſembling ſwaths, called in Latin *faſciæ*.

That author admits no *faſciæ* in the Tuſcan and Doric architrave; i. e. he makes it all plain, without any diviſion or cantoning into parts or *faſciæ*; but the modern architects take the liberty to differ from him in this particular. See *Tab. Archit. fig.* 25. N° 25.

In brick-buildings, the jutting out of the bricks beyond the windows in the ſeveral ſtories, except the higheſt, are called *faſcias* or *faſciæ*.

Theſe are ſometimes plain, and ſometimes moulded; but the moulding is only a *cima reverſa*, or an ogee, at the bottom, with two plain courſes of bricks over it; then an aſtragal; and laſtly a boultine.

Fascia *lata*, in *Anatomy*, a large membranous, tendinous, or ligamentary covering, very conſiderable both for its extent and ſtrength, being made up chiefly of two planes of fibres, of which the external are more or leſs longitudinal, the internal more or leſs tranſverſe. It is farther ſtrengthened in ſome places by a great number of other fibres, which augment its thickneſs, and form particular expanſions. The tranſverſe fibres are much ſtronger than the longitudinal. It is fixed above to the edge of the criſta of the os ilium from the large tuberoſity to the anterior ſuperior ſpine, to the ligamentum fallopii, and to the aponeuroſis of the obliquus externus of the abdomen, on which it runs up by a thin lamina. It is likewiſe fixed in the lateral inferior part of the os ſacrum, and to the neighbouring parts of the ligaments, by which that bone is connected to the oſſa ilium and iſchium; from whence it advances over the glutæi and thigh, between the membrana adipoſa and muſcles, all the way to the anterior and outer parts of the knee. It is very thin on the patella, but may be ſeparated from it. It is alſo continued over the external anterior part of the tibia, covering the muſcles which lie there, and is ſtrongly inſerted in the head of that bone, and in the upper part of the fibula. It ſends off elongations, which, like ſo many ſepta, run in between the muſcles, and ſometimes meet in ſuch a manner as to form vaginæ. It is ſtrongeſt on the anterior and outer parts of the thigh, growing gradually thinner on the inner and back parts. It is ſtrongly inſerted in the linea femoris aſpera, between the vaſtus externus and biceps, forming a ſort of ſeptum between theſe muſcles. It furniſhes particular vaginæ to the muſcles which lie on the inſide of the thigh; and though theſe vaginæ are thin, they are pretty ſtrong, being chiefly made up of tranſverſe fibres. The *faſcia lata* more or leſs ſurrounds all the muſcles that ſerve to move the os femoris on the pelvis, and alſo the pelvis on the os femoris. This name has been ſometimes erroneouſly given to a ſmall anterior ſuperficial muſcle, more properly called *muſculus faſciæ latæ*, or *muſculus* MEMBRANOSUS. Winſlow's Anatomy, p. 204.

Fascia, in *Surgery*, is a fillet, roller, or bandage. It is extremely difficult to form an idea of bandages without ſeeing them made. See Bandage.

Fasciæ, in *Aſtronomy*, two rows of bright ſpots obſerved on Jupiter's body, appearing like ſwathes or belts.

The *faſciæ*, or belts of Jupiter, are more lucid than the reſt of the diſk, and are terminated by parallel lines. They are ſometimes broader, and ſometimes narrower; nor do they always poſſeſs the ſame part of the diſk.

M. Huygens likewiſe obſerved a very large kind of *faſcia* in Mars; but it was darker than the reſt of the diſk, and took up the middle part thereof. See Belts.

FASCIALIS, in *Anatomy*, a muſcle of the leg, called alſo SARTORIUS.

FASCIATION, in *Surgery*, is the binding of ſwathes about a limb that is to be cured.

FASCICULATA *Folia*, among *Botaniſts*. See Leaf.

FASCICULUS, in *Medicine*, a term ſometimes uſed to expreſs a certain quantity or meaſure of herbs.

By *faſciculus* is meant ſo much as may be held in the arm when bent, and reſted on the top of the hip. Phyſicians note it in preſcription by *faſc*.

FASCINATION denotes a ſort of WITCHCRAFT, ſuppoſed to operate by the influence either of the eye or the tongue.

The word is formed from the Greek, βασκαινειν, which ſignifies the ſame.

Ancient writers diſtinguiſh two ſorts of *faſcination*, one performed by looking, or the efficacy of the eye. Such is that ſpoken of by Virgil in his third eclogue:

> *Neſcio quis teneros oculus mihi* faſcinat *agnos*.

The ſecond by words, and eſpecially malignant praiſes. Such is that mentioned by the ſame poet in his ſeventh eclogue:

> *Aut, ſi ultra placitum laudârit, baccare frontem*
> *Cingite, ne vati noceat mala lingua futuro.*

Horace touches on both kinds in his firſt book of epiſtles:

> *Non iſtic obliquo oculo mea commoda quiſquam*
> *Limat, non odio obſcuro, morſuque venenat.*

FASCINES, in *Fortification*, *faggots*, are ſmall branches of trees, or bavins, bound up in bundles, which, being mixed with earth, ſerve to fill up ditches, to ſcreen the men, make the parapets of trenches, &c. See *Tab. Fortif. fig.* 4.

Some of them are dipped in melted pitch or tar; and, being ſet on fire, ſerve to burn the enemy's lodgments or other works.

A pitched *faſcine* is about a foot and a half, or two foot long. Thoſe that are uſed for making epaulements or chandeliers to raiſe works or to fill up ditches are 10 feet long, and 1 or 1¼ foot in diameter. They are formed by fixing ſix ſmall pickets in the ground by pairs, ſo as to make little croſſes, and well faſtened in the middle with willow bindings. On theſe treſtles the branches are laid, which are bound round with withes at the diſtance of every two feet.

In the corrupt Latin they uſe *faſcenina*, *faſcennia*, and *faſcinata*, to ſignify the pales, *faſcines*, &c. uſed to incloſe the ancient caſtles, &c.

FASHION. The word is French, *façon*, which ſignifies *making*.

Fashion is particularly uſed among *Artificers* for the trouble, time, and labour, employed in a piece of work, particularly of ſilver or gold.

It is by the *faſhion* that the workmen's wages or ſalary is regulated.

The word is alſo uſed to denote the prevailing mode or taſte.

Fashions, a name ſometimes given to the FARCIN.

Fashion-*pieces*, in the *Sea language*, two pieces of timber which form the breadth of a ſhip at the ſtern, and are the outmoſt timbers of the STERN on each ſide, forming its ſhape, and united to the ſtern-poſt and to the extremity of the wing-tranſom by a rabbit, and a number of ſtrong nails or ſpikes driven from without.

FASSETS, among *Jewellers*. See Facets.

FASSUS, in our *Old Writers*, is uſed for a faggot of wood.

It ſeems to come from the French, *faiſſeau*.

FAST, a ſpace of time wherein a perſon takes little or no food.

For the advantages of *faſting* with regard to health, ſee Abstinence.

The Bramins never bleed their ſick, but make them *faſt*.

Fast is peculiarly uſed for an abſtinence on account of religion, or a ſpace of time wherein the church prohibits the uſe of food, or at leaſt reſtrains it to certain kinds, and to certain hours.

Faſting has been practiſed by moſt nations from the remoteſt antiquity.

The Jews obſerved *faſts* from their firſt eſtabliſhment. Moſes appointed one ſolemn *faſt* before the feaſt of expiation; and others were inſtituted by the following prophets on different occaſions; ſo that in the time of Zacharias there were four regular *faſts*, viz. in the months June, July, September, and December. To theſe they have ſince added three others, in memory of ſore diſtreſſes they have at different times ſuffered. Beſides theſe, there are various kinds of *faſts*, ſome for devotion, others for the new moons; and ſome among them kept an anniverſary *faſt*, in memory of the tranſlation of the Septuagint, in order to expiate the baſe compliance of their doctors for a foreign prince, and the outrage offered to the dignity of their law, which, in their opinion, was only deſigned for themſelves: *Non fecit taliter omni nationi*.

There is no occaſion to deſcribe exactly the various obſervances that accompanied theſe acts of humiliation, as being generally known. Their abſtinence laſted twenty-ſeven or twenty-eight hours, beginning before ſun-ſet, and not ending till ſome time after ſun-ſet the next day. On theſe days they were obliged to wear white robes, in token of their grief and repentance; to cover themſelves with ſackcloth, to lie on aſhes, to ſprinkle them on their head, and on great occaſions cover the ark of the covenant. In order to complete their abſtinence, they eat nothing at night but a little bread dipped in water, ſeaſoned with ſalt, or bitter herbs and pulſe. Some of them continued the following day and night praying in the temple or ſynagogue, bare-footed, and occaſionally ſcourging themſelves.

Thoſe that would be particularly informed of theſe auſterities may conſult Maimonides, Leo of Modena, and Buxtorf.

The Egyptians, Phœnicians, and Aſſyrians, neighbours to the Jews, had alſo their *faſts*. The *faſt* of the Ninivites, occaſioned by the preaching of the prophet Jonas, is too well known to be inſiſted on.

Nor were the Greeks without their *faſts*. Ariſtotle informs us, that the Lacedæmonians having reſolved to ſuccour a city of the allies, ordained a general *faſt* through the whole extent of their dominions, without excepting the domeſtic animals; and this they did for two ends, one that they might ſpare proviſion in favour of the beſieged, and the other to draw the bleſſing of heaven on their enterprize. The Athenians, among others, had the Eleuſinian and Theſmophorian *faſts*, the obſervation of which was accompanied with ſtrict *faſting*, particularly among the women, who ſpent one whole day ſitting on the ground in a mournful dreſs, without taking any nouriſhment; on which account this day was called νηςεια.

In a word, all the Pagan deities, whether of the male or female ſex, required this duty of thoſe that deſired to be initiated into their myſteries, of their prieſts and prieſteſſes that gave the oracles, and of thoſe that came to conſult them.

In Italy *faſting* was obſerved much in the ſame way. The inhabitants of Tarentum being beſieged by the Romans, demanded ſuccours from their neighbours of Regium, who immediately ordained a *faſt* throughout their whole territories, with the ſame intention as the Lacedæmonians, viz. to render the gods favourable, and to ſpare proviſions for their allies. Their enterprize having had good ſucceſs by their throwing a convoy with proviſions into the town, the Romans were obliged to raiſe the ſiege: and the Tarentines, in memory of this delivery,

livery, inſtituted a perennial *faſt*. So that here we have two *faſts* for the ſame event; that obſerved by thoſe who were the means of obtaining the deliverance, and that obſerved by them who received it. The Roman ſenate, Livy tells us, being alarmed by many prodigies happening in a train one after another, ordered the decemviri to conſult the Sibylline books; who having executed his commiſſion, declared, that to prevent the fatal conſequences it was neceſſary to eſtabliſh a *faſt* in honour of Ceres, to be obſerved every fifth year. That Jupiter had ſtated *faſts* at Rome, appears from the following paſſage of Horace, where a mother is introduced praying to Jupiter for the recovery of her ſon from a quartan ague, and promiſing that the patient ſhould purify himſelf in the Tiber on the morning of the *faſt-day* ſacred to that god:

Frigida ſi puerum quartana reliquerit, illo
Mane die quo tu indicis jejunia, nudus
In Tiberi ſtabit.

Faſting muſt have been very ſacred at Rome, ſince we find it practiſed by kings and emperors. Numa Pompilius, Julius Cæſar, Auguſtus, Veſpaſian, and others, we are told, had their ſtated *faſt-days*; and Julian the apoſtate was ſo exact in this obſervance as even to outdo the prieſts themſelves, and the moſt rigid philoſophers.

In a word, every country, nation, and religion, have had at all times their prieſts, druids, gymnoſophiſts, and philoſophers, who diſtinguiſhed themſelves by their frugality, auſterity, and abſtinence. The practice of the Pythagoreans is well known; their whole life was a continued lent, but with this difference between them and us, that they believed the uſe of fiſh equally unlawful with that of fleſh. They lived entirely on bread, fruits, and pulſe, with great ſobriety, in imitation of their maſter Pythagoras; though in this reſpect they muſt have fallen far ſhort of him, if we may believe Diogenes Laertius, who ſays, that he continued his *faſts* for no leſs than forty days. Apollonius Thyaneus, one of his moſt famous diſciples, could never by all his endeavours equal his maſter in this point, though his *faſts* greatly exceeded the ordinary intervals.

The gymnoſophiſts or brachmans reckoned *faſting* among their religious duties. Father Le Compte, in his Memoirs, tells us, that the Chineſe have at all times had regular *faſts*, with forms of prayer, for preſerving them from barrenneſs, inundations, earthquakes, and ſuch like public calamities. The Mahometans too, who poſſeſs ſo large a part of Aſia and Africa, have times of *faſting*, called by them *ramadan*, as regular as we have lent; and their derviſes are remarkable for their mortification and *faſting*. Comte, Mem. tom. ii. p. 142.

The Turks are ſo ſcrupulous on the point of *faſting*, that they will not at thoſe times ſo much as take the ſmell of any perfume by the noſe. They hold that odours themſelves break *faſt*. If they bathe, it is forbid to put the head under water for fear of ſwallowing any of it; and as for women, they are forbid to bathe at all on *faſt-days*, for a reaſon peculiar to the ſex.

It was not unuſual among the ancients to *faſt* on account of dreams.

Mr. Bayle obſerves, that whole books have been written on long *faſting*. Cyriacus Lentulus has compoſed one, De Prodigioſis Inediis. Fortunius Licetus, profeſſor of medicine at Padua, beſides a great many others, has publiſhed one book in folio, De iis qui diu vivunt ſine Alimento, or De Feriis Altricis Animæ.

Though *faſting* is not poſitively enjoined by Chriſt or his apoſtles, a cuſtom prevailed among the firſt Chriſtians of joining abſtinence with their prayers, eſpecially when they were engaged in affairs of extraordinary importance. But in the moſt ancient times we find no mention of any public and ſolemn *faſts*, except upon the anniverſary of Chriſt's crucifixion. However, in proceſs of time, days of *faſting* were gradually introduced, firſt by cuſtom, and afterwards by poſitive appointment; though it is not certain what thoſe days were, nor whether they were obſerved in the firſt century. Mr. Moſheim acknowledges, that thoſe who affirm, that in the time of the apoſtles or ſoon after, the fourth and ſixth days of the week were obſerved as *faſts*, are not deſtitute of ſpecious arguments in favour of their opinion. Eccleſ. Hiſt. vol. i. p. 106. 8vo.

Towards the cloſe of the third century *faſting* was held in much greater eſteem, from a notion that it ſerved as a ſecurity againſt the power of dæmons, who directed their ſtratagems principally againſt the luxurious. About the end of the fourth century this notion ſtill more generally prevailed; and *faſting* was alſo conſidered as the moſt effectual means of appeaſing the anger of an offended deity. Hence proceeded the eſtabliſhment of this practice as an indiſpenſable duty, by expreſs laws enacted by the rulers of the church. The Quadrageſimal or Lent *faſt* was held more ſacred than all the reſt, though it was not yet confined to a certain number of days. But as *faſting* became more general, it was contrived to render it more eaſy; and therefore a mere abſtinence from fleſh and wine was judged ſufficient; which opinion prevailed from this time, and became univerſal among the Latins. Ib. vol. i. p. 237. 324.

The ſtrict canonical *faſt* only allows of one meal in twenty-four hours. F. Thomaſſin obſerves, that the ancient *faſt* was to ſup without dining; i. e. only to take one meal, and that not till after noon: adding, that to dine without ſupping was a breach of the *faſt*. The practice of the Latin church was to *faſt* thirty-ſix days in the year; which is, as it were, the tithe of the year.

Tertullian wrote an expreſs Treatiſe De Jejuniis, of *faſts*, to ſupport the new laws of *faſting*, which the Montaniſts were for impoſing.

The ancient catholics allowed of no obligatory or commanded *faſts* beſide that preceding Eaſter, ſince called *Lent*; the terms of which were to forbear eating till the evening.

The other *faſts* obſerved were only of devotion; ſuch were the fourth and ſixth feriæ; i. e. Wedneſdays and Fridays.

This Lent *faſt* was called *ſtation*. Beſide theſe, there were occaſional *faſts* enjoined by the biſhops, &c. See ABSTINENCE and LENT.

Some introduced the xerophagy into *faſts*; that is, the uſe of dried fruits for their meals; and made a practice of abſtaining not only from all meats and wines, but alſo from ſucculent fruits, for the whole twenty-four-hours; and ſome reduced themſelves to bread and water: but this was more than was commanded.

FAST-*days* are thoſe appointed by public authority, to be obſerved by *faſting* and humiliation. See ABSTINENCE.

FAST-*ground*, or FAST-*country*, a term uſed by ſome of our *Miners* to expreſs what others call the SHELF.

FASTERMANS, or FASTING-MEN, q. d. *homines habentes*, was uſed in our ancient cuſtoms for men in repute and ſubſtance; or rather for pledges, ſureties, or bondſmen, who, according to the Saxon polity, were *faſt* bound to anſwer for one another's peaceable behaviour.

FASTI, in *Antiquity*, the Roman CALENDAR; wherein the ſeveral days of the year, with their feaſts, games, and other ceremonies were expreſſed.

The Romans had their *greater* and *leſſer faſti*. The *great faſti* were called the *faſti* of the magiſtrates; and the *leſſer*, the *faſti calendares*.

The *faſti calendares*, which were what was properly and primarily called *faſti*, are defined by Feſtus Pompeius to be books containing a deſcription of the whole year; i. e. ephemerides, or diaries, diſtinguiſhing the ſeveral kinds of days, FESTI, PROFESTI; FASTI, NEFASTI, &c. The author hereof was Numa, who committed the care and direction of the *faſti* to the *pontifex maximus*, whom the people uſed to go and conſult on every occaſion. This cuſtom held till the year of Rome 450, when C. Flavius, ſecretary to the pontifices, expoſed in the *forum* a liſt of all the days whereon it was lawful to work; which was ſo acceptable to the people, that they made him curule ædile. Liv. lib. ix. cap. 46. Ed. Crevier, tom. i. p. 573.

Theſe *leſſer faſti*, or *faſti calendares*, were of two kinds, *urbani* and *ruſtici*. The *faſti urbani*, or *faſti* of the city, thoſe which obtained, or were obſerved in the city. Some will have them thus called becauſe they were expoſed publicly in divers parts of the city; though by the various inſcriptions or gravings thereof on antique ſtones, one would imagine that private perſons had them likewiſe in their houſes. Ovid undertook to illuſtrate theſe *faſti urbani*, and comment on them, in his Libri Faſtorum, whereof we have the ſix firſt books ſtill remaining; the ſix laſt, if ever they were written, being loſt. Beſide Ovid, ſeveral other authors had undertaken the ſame ſubject, particularly L. Cincius Alimentatus, Fulvius Nobilior, Maſurius Sabinus, Cornelius Labeo, C. Licinianus, and Niſus; of all whom Macrobius makes mention in his Saturn. and preſerves fragments of each; beſide a work of one Bæbius Marcus, intituled, De Faſtis Diebus, quoted by Fulgentius, De Priſco Sermone.

In the *greater faſti*, or *faſti* of the magiſtrates, were expreſſed the ſeveral feaſts, with every thing relating to the gods, religion, and the magiſtrates; the emperors, their birth-days, offices, days conſecrated to them, and feaſts and ceremonies eſtabliſhed in their honour, or for their proſperity, &c.

With a number of ſuch circumſtances did flattery at length ſwell the *faſti*, when they became denominated *magni*, to diſtinguiſh them from the bare calendar, or *faſti calendares*.

In the *faſti ruſtici*, or *country faſti*, were expreſſed the ſeveral days, feaſts, &c. to be obſerved by the country people; for as theſe were taken up in tilling the ground, fewer feaſts, ſacrifices, ceremonies, and holidays, were enjoined them than the inhabitants of cities; and they had alſo ſome peculiar ones not obſerved at Rome.

Theſe ruſtic *faſti* contained little more than the ceremonies of the calends, nones, and ides; the fairs, ſigns of the zodiac, increaſe and decreaſe of the days, the tutelary gods of each month, and certain directions for rural works to be performed each month.

FASTI was alſo a chronicle or regiſter of time, wherein the ſeveral years were denoted by the reſpective conſuls, with the principal events that happened during their conſulates; theſe were called alſo *faſti conſulares*, or *conſular faſti*.

Onuphrius Panvinius, Pighius, Sigonius, and Janſſen d'Almelooven, have given us the *faſti conſulares*; the two firſt, with long and learned comments, wherein are expreſſed not only the conſuls, but alſo the dictators, magiſtri equitum, triumphs, and ovations. Pighius even adds as many of the other officers as he could find, viz. prætors, tribunes, &c. J. d'Almelooven confines himſelf to the conſuls alone.

FASTI is ſtill applied to the archives and public records, wherein are kept hiſtorical memoirs of public and remarkable events that have happened to a people.

In the like ſenſe the martyrology is called the *ſacred faſti* of the church.

The Jeſuit Du-Londel has compiled the *faſti* of Louis le Grand, &c.

FASTI, or *dies faſti*, alſo denoted court days. See DAY.

The word *faſti*, *faſtorum*, is formed of the verb *fari*, *to ſpeak*, becauſe during thoſe days the courts were open, cauſes might be heard, and the prætor was allowed *fari*, to pronounce the three words, *do*, *dico*, *addico*; the other days wherein this was prohibited were called *nefaſti*: thus Ovid,

> *Ille* nefaſtus *erit, per quem tria verba ſilentur:*
> Faſtus *erit, per quem lege licebit agi.*

Theſe *dies faſti* were noted in the calendar by the letter *F*: but obſerve that there were ſome days *ex parte faſti*, partly *faſti*, partly *nefaſti*; i. e. juſtice might be diſtributed at certain times of the day, and not at others. Theſe days were called *interciſi*; they were marked in the calendar thus; *F. P. faſtus primo*, where juſtice might be demanded during the firſt part of that day.

FASTIDIUM *Cibi*. See NAUSEA.

FASTIGIATI *Furni*, in *Chemiſtry*, furnaces fitted with ſeveral aludels.

FASTIGIUM, in *Architecture*, the ſame with PEDIMENT.

FASTING *Men*. See FASTERMANS.

FAT, in an *Animal Body*, a white, oily, concrete ſubſtance, collected in little membranous loculi or cells in divers parts of the body, ſerving to keep the parts warm, to ſoften and temper the acids of the aliments in the maſs of blood, and probably for the nouriſhment and reparation of the human body. It is well known that animals become lean and live upon their *fat* when they have too little food; and when they have diſeaſes which prevent digeſtion and production of the nutritive juice; in which caſe the *fat* appears to be abſolved by the veſſels deſigned for this uſe, and to be tranſformed into nutritive juice: it is alſo a fact, that the *fatteſt* perſons falling into an atrophy, gradually loſe all their *fat*, which is always quite expended in ſuch caſes before the diſeaſe becomes fatal. See ADEPS.

The vapours which riſe from *fat*, either heated in the open air, or diſtilled in cloſe veſſels, conſiſt of acid and attenuated oil: the acid is extremely penetrating, acrid, and volatile; it irritates and inflames the eyes, throat, and lungs; and excites a cough as much as volatile ſulphureous acid does, though its nature be very different: and yet in this natural ſtate this acid is ſo well combined with the oily part, that none of its properties can be perceived. *Fat*, though very mild in good condition, becomes irritating and cauſtic when its acid is partly diſengaged by fire or time. Spirit of wine, which does not affect pure and unchanged *fat*, diſſolves ſome portion of *fat* which has been ſtrongly heated, or which has become rancid; whence it is inferred, that the acid of the *fat* diſengages itſelf in both theſe caſes.

This *fat* (found immediately under the cutis, incloſed in little bags, called *cellulæ adipoſæ*, adhering to the outer ſurface of a membrane, called *adipoſa*, all over the body, except on the forehead, eye-lids, penis, and ſcrotum) is nothing but the oily part of the aliment or chyle which could not enter into the compoſition of the nutritive juices, ſeparated from the arterial blood by the adipoſe glands, and carried by peculiar ducts to the membranous cells, whence it is tranſmitted again to the blood by the veins. Dr. Grew takes it to be a *coagulum* of the oily parts of the blood, made either by ſome of its own ſaline parts, or by the nitrous particles of the air mingled therewith in the lungs; which ſentiment is confirmed by an experiment of that learned perſon, who made an artificial *fat*, by only mixing oil of olives with ſpirit of nitre for ſome days: and hence it is that divers animals, as rabbits, hares, &c. grow *fat* in winter, and particularly in ſevere froſty weather, the air then abounding moſt in nitre. Hence alſo it is that the *fat* of land animals is much firmer than that of fiſhes, the watry element containing leſs nitrous matter than the air.

In ſome ſubjects the cellulæ are ſo full and diſtended that the *fat* is above an inch thick; in others they are almoſt flat; and in emaciated ſubjects, inſtead of *fat*, we find a ſort of flaccid tranſparent ſubſtance, which is nothing but the bare membrane, the cells being all exhauſted.

Too much *fat* is uſually attended with heavineſs and drowſineſs, not only from the unwieldineſs of an overgrown body, but from the ſtuffing of the cavities and thorax alone, which ſometimes obſtructs the expanſion of the diaphragm and lungs, and produces a dyſpnœa, or an orthopnœa; and it is likewiſe probable that the abundance of *fatty* or oily particles returned into the blood, and implicating the more ſubtle and active parts, may hinder the neceſſary ſecretions of the brain. See CORPULENCY.

Mr. Hunauld has the following obſervations on the *fat* of the body: 1. That though fœtuſes and children have much *fat* under the ſkin, yet they have only a ſmall piece or two *(pelotons)* at the baſe of the heart; whereas lean adult bodies have *fat* all round the baſe on the veſſels that go out of the heart, and accompanying the larger coronary veſſels, and at the point of the heart. 2. That the omentum of very young children has no *fat*, and their meſentery very little. 3. That in many people the *fat* under the ſkin is exhauſted, while the bowels are overcharged with it. 4. The exterior part of the tunica cellularis is the firſt filled with *fat*, and the laſt emptied of it; from which, and becauſe aponeuroſes and membranes ſpread over ſo many muſcles, he concludes, the common opinion of muſcles being lubricated by the *fat*, to be ill founded. See Mem. Acad. Scienc. 1732.

The *fat* of different animals has been repreſented by ſome writers as of conſiderable medicinal uſe: thus,

Calves fat is uſed in pomatums and unguents, being reſolutive and emollient. That of *hogs* and *boars* has the ſame qualities, and is alſo ſtrengthening. *Deers greaſe* is accounted good to fortify the nerves againſt the rheumatiſm, ſciatica, gout, and fractures. *Hares greaſe*, applied externally, promotes digeſtion, and a ſuppuration of abſceſſes. That of *rabbits* is nervous and reſolutive. That of *cocks* and *hens*, reſolves and ſoftens indurations. That of *geeſe* has the ſame qualities; and likewiſe abateth hæmorrhoids, aſſuages pains in the ear, being applied within the ſame; and opens the belly, being taken inwardly. *Eels fat* is eſteemed good againſt the hæmorrhoids and deafneſs, to take away pits of the ſmall-pox, and to make the hair grow. That of the *trout*, beſides its being emollient, is ſaid to be good in diſeaſes of the anus, and in ulcers of the breaſt.

But the ſpecific virtues aſcribed to certain *fats* do not ſeem well warranted; ſome even doubt their being poſſeſſed of any properties different from other ſubſtances of like kind, unleſs what may ariſe out of their different conſiſtencies and degrees of volatility; that of the viper ſeems to have the moſt right to claim ſomething extraordinary upon that account. See ADEPS.

The way of preparing *fat* for medicinal purpoſes is to take out the ſkins, veins, fibres, &c. waſh it till it becomes unbloody; then melt it by a gentle heat, with a little water, till the water is evaporated; ſtrain, put it into an earthen veſſel where it will fix, and preſerve it from air.

FAT *of whales*. See BLUBBER.

FAT, or **VAT**, is a kind of veſſel uſed for holding wine, ale, beer, cyder, or any other liquor, in the time of its preparation.

FAT, or *vat*, alſo expreſſes a large wooden veſſel, which, among brewers and maltſters, is uſed to meaſure MALT for expedition, containing a quarter or eight buſhels, ſtat. 1 Hen. V. cap. 10. and 11 Hen. VI. cap. 8.

FAT is likewiſe a veſſel or pan of lead, uſed in making ſalt, &c. See SALT.

FAT alſo denotes an uncertain meaſure of capacity: thus, a *fat* of iſinglaſs contains from $3\frac{1}{4}$ hundred weight to 4 hundred weight; a *fat* of unbound books half a maund, or 4 bales; of wire, from, 20 to 25 hundred weight; and of yarn, from 220 to 221 bundles.

FATE, **FATUM**, in a general ſenſe, denotes an inevitable neceſſity depending on ſome ſuperior cauſe.

Fate is a term much uſed among the ancient philoſophers.

It is formed *a fando, from ſpeaking*, and primarily implies the ſame with *effatum*, viz. a word or decree pronounced by God; or a fixed ſentence, whereby the Deity has preſcribed the order of things, and allotted every perſon what ſhall beſal him.

The Greeks call it *ειμαρμενη*, *quaſi ειρμος*, *nexus*, *a chain*, or neceſſary ſeries of things indiſſolubly linked together.

All things, ſays Plato, are in *fate*; i. e. within its ſphere or ſcheme, but all things are not *fated*; and he thus explains the diſtinction: it is not in *fate*, ſays he, that one man ſhall *do* ſo and ſo, and another *ſuffer* ſo and ſo, for that would be deſtructive of our free agency and liberty; but if any one ſhould chooſe ſuch a life, and do ſuch or ſuch things, then it is in *fate* that ſuch things and ſuch conſequences ſhall enſue upon it. The ſoul, therefore, is *αδεσποτον*, free and uncontrolled, and it lies within itſelf to act or not; and there is no compulſion or neceſſity here; but what follows upon the action ſhall be accompliſhed, *καθ' ειμαρμενην*, according to *fate*, or the conſtitution of things; e. gr. that Paris ſhould bear off Helen by force was ſomething dependent on himſelf; but that a war ſhould enſue is the conſequence. Ex Alcinoo de Platon. Dogmat.

The ſame philoſopher, as cited by Hierocles, obſerves to this purpoſe: the choice of action is in our own power; but the juſt award or retribution of good or ill which enſues upon the choice, lies in the breaſt of thoſe etherial judges who are appointed under God.

But beſide this ſenſe of the word wherein it is uſed, ſometimes to denote the connection of cauſes in nature, and ſometimes in the divine appointment, the word *fate* has a farther intention, being uſed to expreſs a certain neceſſity or external deſignation of things, whereby all agents, both neceſſary and voluntary, are ſwayed and directed to their ends. See **Necessity**.

Some authors divide *fate* into *aſtrological* and *ſtoical*.

Fate, *aſtrological*, denotes a neceſſity of things and events, ariſing, as is ſuppoſed, from the influence and poſitions of the heavenly bodies, which give law both to the elements and mixed bodies, and to the wills of men.

In which ſenſe the word is often uſed by Manilius, *Certum eſt & inevitabile* fatum: *materiæque datum eſt cogi, ſed cogere ſtellis*.

Fate, *ſtoical*, or *fatality*, is defined by Cicero an order or ſeries of cauſes, wherein cauſe being linked to cauſe, each produces the other; and thus all things flow from one prime cauſe. Chryſippus defines it a natural invariable ſucceſſion of all things *ab æterno*, each involving the other.

To this *fate* they ſubject the very gods. Thus the poet: the Parent of all things made laws at the beginning, by which he not only binds other things, but himſelf. So Seneca: *Eadem* neceſſitas *& deos alligat. Irrevocabilis divina pariter & humana curſus vehit. Ipſe ille omnium conditor & rector ſcripſit quidem* fata, *ſed ſequitur: ſemel ſcripſit, ſemper paret.*

This eternal ſeries of cauſes the poets call Μοιραι and **Parcæ**, or *Deſtinies*.

Fate is divided by ſome later authors into *phyſical* and *divine*.

Fate, *phyſical*, is an order and ſeries of natural cauſes appropriated to their effects.

This ſeries is neceſſary, and the neceſſity is natural. The principle or foundation of this *fate* is nature, or the power and manner of acting which God originally gave to the ſeveral bodies, elements, mixts, &c. By this *fate* it is that fire warms, bodies communicate motion to each other, the ſun and moon occaſion the tides, &c. and the effects of this *fate* are all the events and *phenomena* in the univerſe, except ſuch as ariſe from the human will. See **Nature**.

Fate, *Divine*, is what we more uſually call **Providence**.

Plato in his Phædo includes both theſe in one definition, as intimating, that they were one and the ſame thing, actively and paſſively conſidered. Thus, Fatum *eſt ratio quædam divina, lexque naturæ comes, quæ tranſiri nequeat, quippe a cauſa pendens, quæ ſuperior ſit quibuſvis impedimentis.* Though that of Boethius ſeems the clearer and more juſt, Fatum, ſays he, *eſt inhærens rebus mobilibus diſpoſitio, per quam Providentia ſuis quæque nectit ordinibus.*

FATHER, *Pater*, a term of relation, denoting a perſon who begot a child, either male or female.

Among the ancient Romans the *fathers* of three children had very conſiderable privileges allowed them as ſuch. By the law of Romulus a *father* had an abſolute and unlimited power over his children. Amongſt the Lacedæmonians, as we learn from Ariſtotle's Politics, the *father* of three children was excuſed from the duty of mounting guard for the ſecurity of the city; and a *father* of four children was exempted from every public burden.

Father, *adoptive*, is he who takes the children of ſome other, and acknowleges them as his own. See **Adoption**.

Father, *putative*, is he who is only the reputed or ſuppoſed *father*. Joſeph was *putative father* of our Saviour.

Father, *natural*, is he who has illegitimate children.

Father-*in-law*, is a perſon married to a woman who has children by a former huſband, &c. to which children he is ſaid to be a *father-in-law*.

Father is alſo uſed in *Theology* for the firſt Perſon in the **Trinity**.

Father is alſo uſed in a figurative ſenſe on divers moral and ſpiritual occaſions. Thus, it is applied to the patriarchs; as we ſay Adam was the *father* of all mankind, Abraham the *father* of the faithful, &c.

Fathers, in an *Eccleſiaſtical Senſe*, denote the ancient prelates and doctors of the church.

The *fathers* aſſembled at the council of Nice; Chryſoſtom, St. Baſil, &c. were Greek *fathers*, and St. Auguſtine, St. Ambroſe, &c. were Latin *fathers*.

The appellation of *fathers* is uſually confined to the theological writers of the firſt ſix centuries.

Fathers, *apoſtolical*. See **Apostolical**.

Father is alſo a title of honour given to prelates and dignitaries of the church. The right reverend *father* in God, lord biſhop of, &c. *Ab curæ ſimilitudine patres apellantur*.

Father is alſo applied to the ſuperiors of convents, &c. See **Abbot**. The *father* general; *father* provincial, exprovincial; *father* prior, ſub-prior; *father* definitor, in the order of Benedictines; *father* guardian, in that of the Franciſcans; *father* corrector, among the Minims, &c.

Fathers is alſo applied plurally to all congregations of eccleſiaſtics, whether regular or ſecular; as the *fathers* Cordeliers, Capuchins, Auguſtins, Jacobins, &c. The *fathers* Jeſuits, *fathers* of the Oratory, Barnabites, Theatins of the Miſſion, &c. See each under the proper article.

Fathers *of the Chriſtian doctrine* is a denomination belonging to two religious orders: one inſtituted in France by Cæſar de Bus, and confirmed in 1597, by Clement VIII. and another in Italy founded by Cuſani, a Milaneſe knight, and eſtabliſhed by the authority of Pius V. and Gregory XIII.

Fathers *of Somaſquo*, or *regular clerks of St. Maieul*, is the appellation of a religious order deduced from the name of the place where their founder reſided. It was firſt formed into a diſtinct ſociety by Jerome Æmiliani, a noble Venetian, and confirmed by Paul III. and Pius IV. in 1540 and 1563. Their office was the inſtruction of the young and ignorant, and the relief of orphans.

Fathers is alſo uſed for perſons venerable for their age or quality, or the ſervices they have done the public.

Thus, at Rome the ſenators were called *conſcript fathers*, *patres conſcripti*, &c.

Father-*laſher*, in *Ichthyology*, an Engliſh name given to a fiſh, called by ſome authors, though improperly, **scorpæna**, and *ſcorpius marinus*. It is properly of the **cottus** kind, and is named by Artedi the ſmooth cottus without ſcales, with ſeveral ſpines upon the head, and with the upper jaw a little longer than the under. It more reſembles the ſmall fiſh we call the *bull-head* or *miller's thumb*, than the **scorpæna**. The head is large and armed with ſpines, which it can oppoſe to any enemy that attacks it, by ſwelling out its cheeks and gill-covers to a large ſize. The noſe and ſpace contiguous to the eyes are furniſhed with ſhort ſharp ſpines, and the covers of the gills are terminated by very long ones, which are ſtrong and ſharp-pointed. The mouth is large; the jaws are covered with rows of very ſmall teeth; and the roof of the mouth is furniſhed with a triangular ſpot of minute teeth. The back is more elevated than that of others of this genus; the belly prominent; the ſide-line rough; the reſt of the body very ſmooth, and growing ſlender towards the tail. This kind is very frequent in the Newfoundland ſeas, where it is called *ſcolping*; and it is common on the coaſt of Greenland in deep water, near the ſhore. It is a principal food of the natives, and ſoup made of it is ſaid to be both agreeable and wholeſome. See *Tab. of Fiſh*, *fig.* 4.

FATHIMITES, or **Fathemites**, the deſcendants of Mahomet by Fathima, or Fathema his daughter.

The dynaſty of *Fathimites*; i. e. of princes deſcending in a direct line from Ali and Fathima his wife, Mahomet's daughter, commenced in Africa in the year of the Hegira 296, of Jeſus Chriſt 908.

The *Fathimites* afterwards conquered Egypt, and eſtabliſhed themſelves therein in quality of caliphs.

The *Fathimites* of Egypt ended with Abed, in the year of the Hegira 567, 268 years after their firſt eſtabliſhment in Africa, and 208 years after the conqueſt of Egypt.

FATHOM, a long meaſure containing ſix feet, taken from the utmoſt extent of both arms when ſtretched into a right line.

The *fathom* is uſed at ſea in eſtimating the length of cables and other ſhip-ropes, with the depths and ſoundings of the ſea; as alſo in mines, quarries, wells, and works of fortification.

There are three kinds of *fathoms*, accommodated to the different ranks of veſſels: the firſt, which is that of men of war, contains ſix feet; the *middling*, or that of merchant-ſhips, five feet and a half; and the *ſmall fathom*, uſed in fluyets, fly-boats, and other fiſhing-veſſels, only five feet.

Fathom is alſo uſed in ſeveral countries, particularly Italy, for the common yard or ell whereby things are ordinarily meaſured in commerce.

In this ſenſe it is more commonly called *brace*, or *braccio*, q. d. arm. In Muſcovy the *fathom* contains ſeven Engliſh feet, and about one-tenth of an inch.

FATNESS, in *Medicine*, **corpulency**, or the ſtate of a perſon too much loaded with fleſh and fat. See an account of a remarkable caſe of *fatneſs* in the Med. Obſ. &c. vol. iii. p. 69, &c.

FATTENING *of Colours*, among *Painters*, denotes a coagulation of the oil, which frequently happens on its being mixed with ſeveral kinds of pigments; whence, after being kept for ſome time, it is rendered of ſo viſcid or glutinous a conſiſtence as to be wholly incapable of being worked with either bruſh or pencil. This alſo happens ſometimes after the colours have been ſpread or laid on the proper ground; in which caſe one part of the oil will run off in ſmall ſtreams or drops, while the other will remain with the colour, without ſhewing the leaſt tendency to dry. Oils likewiſe will *fatten* by long keeping, or by being expoſed for a conſiderable time to the ſun and air.

Fattening *of horſes*. See **Horses**.

FATUARII, in *Antiquity*, were perſons who appearing inſpired, foretold things to come.

The word is formed of Fatua, wife of the god Faunus, who was ſuppoſed to inſpire women with the knowlege of futurity, as Faunus himſelf did the men. Fatua had her name from *fari*, q. d. *vaticinari*, *to prophecy*.

FATUUS *Ignis*. See **Ignis** *fatuus*.

FAUCON, or **Falcon**, a name formerly given to a ſmall piece of cannon, whoſe diameter was 2¾ inches; weight, 750 pounds; length, 7 feet; load, 2¼ pound; ſhot, 2½ inches diameter; and 2½ pound weight. See **Cannon** and **Gun**.

FAUCONET, or **Falconet**, a very ſmall piece of ordnance, whoſe diameter at the bore was 2¼ inches; weight, 400 pounds; length, 6 feet; load, 1¼ pound; ſhot, ſomething more than two inches diameter; and 1⅛ pound weight. See **Ordnance** and **Gun**.

FAVIFORMA, in *Surgery*, a term uſed to expreſs certain ulcers, which, when preſſed upon with the finger, emit a ſanies through ſeveral ſmall holes in the manner in which honey, on preſſing the comb, iſſues out of the cells.

FAVILLÆ *Salis*, in *Natural Hiſtory*, a name given by Vitruvius and ſome of the more ancient writers to the natrum or nitre of the ancients. Our chemical writers, who have been uſed to delight much in hard names, have applied the ſame phraſe to expreſs our nitre; but this is a very different ſalt from the other.

FAVISSA, among *Antiquaries*, a hole, pit, or vault, under-ground, wherein is kept ſomething of great value.

The word ſeems formed of *foviſſa*, a diminutive of *fovea*, *a pit* or *ditch*.

The *faviſſa*, according to A. Gellius and Varro, was much the ſame with what the ancient Greeks and Romans called θησαυρος, *theſaurus*, and what in ſome of the modern churches is called *archives* and *treaſury*. In the Capitol there were divers *faviſſæ*. They were ſubterraneous places, walled and vaulted, having no entrance or light but by a hole at the top, which was uſually ſtopped up with a huge ſtone.

They were chiefly deſtined for keeping the old worn ſtatues and other ancient moveables formerly uſed in the temple; ſo religiouſly did that people reſpect and preſerve whatever was conſecrated. Catullus would have lowered the floor of the Capitol, but that the *faviſſæ* prevented him.

Feſtus, however, gives us a different account of the *faviſſæ*. According to that author they were wells or pits of water near the temples, and for the uſe thereof, the ſame with what the Greeks called ομφαλος, *navel*, as being round, &c. Gellius likewiſe gives them the name of ciſterns, as well as Feſtus; but it is apparently for no other reaſon than that they bore a reſemblance to them in figure.

In effect, the two notions are pretty eaſily reconciled, it being certain that the treaſuries of ſome of the ancient Greek temples were the ciſterns or reſervoirs of water wherein people uſed to waſh themſelves before they entered the temple.

FAUNALIA, in *Antiquity*, feaſts celebrated by the Romans in honour of the god Faunus.

The deity Faunus, to whom the ſolemnity was devoted, and from whom it was denominated, was the ſame among the Romans with the Pan of the Greeks.

The *Faunalia* were held on the day of the nones of December; i. e. on the fifth day of that month. The principal ſacrifice was a roe-buck; or rather, according to Horace, a kid attended with libations of wine, and burning of incenſe.

It was properly a country feſtival, being performed in the fields and villages with peculiar joy and devotion. Horace gives us a very gay deſcription thereof in the eighteenth ode of his third book:

> ——*Tener pleno cadit hœdus anno:*
> *Larga nec deſunt Veneris ſodali*
> *Vina crateræ: vetus ara multo*
> *Fumat odore.*

Struvius in his Roman calendar marks the feaſt of Faunus on the day of the ides of February, which is the thirteenth day of that month; and the *Faunalia* he places on the fifth of the ides of December, or the ninth of that month; and in chap. ix. he ſhews, that there really were two *Faunalia*, the one in February, mentioned by Ovid, Faſt. lib. vi. ver. 246. the other on the ninth of December, mentioned by Horace, in the place juſt cited.

FAUNS, **Fauni**, among the ancients, were a ſpecies of demi-gods inhabiting the foreſts; called alſo *Sylvans*, *Sylvani*, and little differing from the **Satyrs**. They delighted more particularly in vineyards, and they generally appear as attendants of Bacchus, in the repreſentations of Bacchanal feaſts and proceſſions. They were repreſented as half men, half goats, having the horns, ears, feet, and tail of a goat, a very flat noſe, and the reſt human.

The Roman *Faunus*, we have obſerved, was the ſame with the Greek Pan. Now, in the poets we find frequent mention made of *Fauns* and Panes in the plural number; in all probability, therefore, the *Fauns* were the ſame with the **Panes**.

Though the *Fauns* were held for demi-gods, yet they were ſuppoſed to die after a long life. Arnobius ſhews that their father or chief, Faunus himſelf, only lived 120 years.

FAVONIUS, among the Romans, the wind which blew directly from the weſt.

FAVORITO, in the *Italian Muſic*, is an epithet given to ſuch parts of any compoſition as are performed to the greateſt advantage. Thus, *choro favorito* is a chorus in which are employed the beſt voices and inſtruments to ſing the recitativos, play the ritornellos, &c. This is otherwiſe called the *little chorus*, or *choro recitante*.

FAVOUR, in *Commerce*. See **Days** *of grace*.

FAUSSE-BRAYE, in *Fortification*, an elevation of earth, about three feet above the level ground; round the foot of the rampart on the outſide, defended by a parapet about four or five fathoms diſtant from the upper parapet, which parts it from the berme, and the edge of the ditch; its uſe is for the defence of the ditch. The *fauſſe-braye* is the ſame with what is otherwiſe called *chemin des rondes*, and *baſſe eincente*.

It is of little uſe where ramparts are faced with wall, becauſe of the rubbiſh which the cannon beats down into it: for this reaſon engineers will have none before the faces of the baſtions where the breach is commonly made, becauſe the ruins falling, the *fauſſe braye* makes the aſcent to the breach the eaſier; beſides, that which flies from the face often kills the ſoldiers placed to defend it.

For theſe reaſons it is generally diſuſed by modern engineers, more eſpecially ſince the invention of ricochet-firing, which renders it extremely eaſy to enfilade the low works of the *fauſſe-braye* from one end to the other.

Fausse *chenille*, in *Natural Hiſtory*, a term uſed by Mr. Reaumur and other of the French writers to expreſs a large claſs of worms produced from the eggs of ſeveral ſpecies of four-winged flies. Theſe worms have greatly the appearance of caterpillars in their general form, ſo that they have deceived many writers on inſects into an opinion that they really were ſo. Their bodies are long, in the manner of the caterpillar, and they are compoſed of ſeveral rings or joints: the ſkin is of the ſame conſiſtence with that of the caterpillar's; and in many ſpecies the creature is variegated with beautiful colours, diſpoſed in the ſame manner as thoſe of the ſmooth caterpillars uſually are. Both theſe kinds of inſects have a great number of legs, and thoſe of two kinds ſome membranaceous, and others ſcaly. Both the worm and the caterpillar have each ſix of the ſcaly legs; but the membranaceous ones are different in number, and are alone ſufficient to conſtitute a difference between them. The caterpillars have never more than ten of theſe, which, with the ſcaly ones, make ſixteen, the utmoſt number of the legs of any caterpillars: but theſe worms have always at leaſt twelve of the latter kind of legs, which, with the ſix ſcaly ones, make the whole number eighteen; and many ſpecies have fourteen, ſixteen, or eighteen of the membranaceous ones alone. The membranaceous legs of the worms differ alſo from thoſe of the genuine caterpillars, in that they are not furniſhed with the hooks at their ends, which thoſe of the latter have. The legs therefore alone give a ſufficient baſis of diſtinction between the caterpillar and the *fauſſe chenille*, or caterpillar worm; but there is yet a more obvious diſtinction between them in the ſhape of their heads; and by this they may always be known from each other at firſt ſight. The heads of the various ſpecies of caterpillars are of ſeveral very different ſhapes; ſome are ſhort, others long; ſome more, ſome leſs flatted; and ſome terminate in a ſharp point, while others are diſtinguiſhed by a ſort of ſlit or diviſion in the back-part. Theſe differences are found in the ſeveral kinds of the genuine caterpillars; but the heads of all the *fauſſe chenilles* are of one ſhape, and that very different from all theſe; they are round and very convex, ſo that they appear a part of a ſmall ſphere. The mouth of theſe, and of the genuine caterpillars are wholly alike, and the ſtigmata are placed in the ſame manner. The eyes, however, of the two kinds ſufficiently diſtinguiſh them, the *fauſſe chenille* having only two, and thoſe very large and prominent, and placed on each ſide of the head; whereas the caterpillar has five eyes on each ſide of its head, and thoſe placed in a circular direction, and too ſmall to be ſeen without the aſſiſtance of glaſſes.

Theſe creatures differ from the common caterpillars in their manner of remaining on the leaves of a plant: the caterpillar is always extended at its full length, whether it is eating or not; but the *fauſſe chenille*, though it extends its body to the full length while eating, always rolls it up into a ſpiral when at reſt, making ſeveral circular turns with it, of which the head is at the end of the outermoſt, and the tail in the very center of the inner one. They give themſelves various odd contortions when they are ſeizing on their food; and it is a very whimſical ſight to obſerve twenty or thirty of them in thoſe kinds which live in ſociety attacking the different portions of the ſame leaf all at once, and each giving its body ſome odd turn at the ſame time. This is a common ſight on the leaves of the oſier, a whitiſh-green kind being very frequent in large companies on that tree, and often ſeen thus feeding in coveys. It is remarkable, that as the caterpillar feeds indifferently on every part of the leaf, this animal uſually attacks only the edges.

The creature, when it finds the time of its change into the nymph ſtate approaching, gives itſelf the trouble of forming a caſe in which it may paſs into that ſtate, and remain in it during the deſtined time without being ſubject to external injuries: it ſpins a web of ſilk for this purpoſe of the ſhape of a little egg. This on the outſide ſhews nothing remarkable; but when cut open, it is found to be compoſed of two different ſubſtances, at leaſt of two ſubſtances of very different workmanſhip, though the materials are the ſame in both. The outer caſe is reticulated, and formed of very ſtrong threads woven into a looſe open net-work; but the inner one is formed of extremely fine threads, and thoſe wove into a cloſer ſtuff than all that the loom can come up to. The outer ſtrong and coarſe web was plainly intended for no other purpoſe but for the better defending and preſerving them from injuries; and theſe two diſtinct caſes do not any where adhere to one another but barely touch; ſo that on pulling aſunder the outer one between the fingers the inner one comes out whole. The ſtrength of this exterior ſhell is extremely neceſſary, as alſo the cloſe texture of the inner one for defending the incloſed animal in the nymph ſtate from ſeveral devouring inſects. The ants in particular are very fond of theſe nymphs, and will hunt out the caſes wherever they are to be found; and if they can eat their way through them, are ſure to make a meal of the incloſed creature.

The flies produced of theſe inſects are of that kind which have no trunks, but have a ſtrong tooth on each ſide of the head, which meeting one with the other in the middle of the mouth, are able to cut any thing to pieces that the creature has occaſion to make its way through. The firſt uſe of theſe is the eating a hole through the double web, in which the creature finds itſelf incloſed at its birth.

All the flies of this kind have a general reſemblance one to another, and may be known to belong to the ſame family, though they are very different in colour and other obvious characters. They are never very handſome, and are all as it were ſtupid, having very little motion, and ſtanding readily at any time to be caught between the fingers. Their wings always are croſſed over the body, and form a ſort of raiſed covering over it; they are not ſmooth and even as thoſe of moſt other flies, but have prominencies and cavities, and ſeem as if they had been but ill expanded at the time of the creature's hatching from the nymph ſtate. Reaumur's Hiſt. Inſ. vol. ix. p. 133.

All the females of theſe flies are oviparous, no one ſpecies producing living worms; and as theſe eggs muſt neceſſarily be lodged in cavities or niches made in the ſtalks or leaves of living plants, nature has provided this creature with two inſtruments which are deſtined for this ſole purpoſe, and which are real ſaws made in the niceſt manner, with extremely ſmall teeth. The creature has the power of uſing both theſe at once, and conſequently can make an aperture with great eaſe that ſhall be ſufficient to lodge its eggs in. Notwithſtanding that there are many different ſpecies of flies which have this ſort of inſtrument, and ſeveral of them are extremely frequent on one of the moſt common of all our garden ſhrubs, the roſe-tree; yet no author had obſerved this elegant and wonderful inſtrument till the time of Vallisnieri, who has deſcribed and figured at length the weapons of a roſe-tree fly, produced from a falſe caterpillar of that ſhrub, with two rows of teeth, one on each ſide in the manner of the ſaw of the *ſerra piſcis*, or *ſaw-fiſh*. See Rose-*fly*.

FAUX-BOURDON, *baſtard humble-bee*, a name given by Reamur and other French naturaliſts to the bees uſually called by us drones, and by the common people of that nation bourdons, confounding them with the common humble-bee under that name. See Drone.

FAUX PUCERON, in *Natural Hiſtory*, a name given by Reamur and others to a genus of inſects much reſembling the *pucerons* in many things, but differing in ſome material circumſtances. The two principal kinds of theſe are found on the back of the leaves of the fig-trees, and in little hollow balls at the ſummits of the branches of box, formed of the upper leaves vitiated by the bitings of theſe creatures. See Fig-*inſect* and Grub *of the box*.

To FAY, in *Ship-building*, is to ſet any two pieces of wood ſo as to join cloſe together: the plank is ſaid *to fay* to the timbers when it bears or lies cloſe to all the timbers.

FAWN, among *Hunters*, is a buck or doe of the firſt year, or the young one of the buck's breed in its firſt year.

FEAL was anciently uſed for *faithful*; hence the tenants by knights ſervice uſed to ſwear to their lords to be *feal* and *leal*; that is, *faithful* and *loyal*.

FEALTY, an oath taken at the admittance of every tenant to be true to his lord, while he holds his land.

Fealty is uſually mentioned as ſynonymous with homage; but it differs from it, as homage conſiſts in taking an oath when the tenant comes to his land, and is done but once, being an obligation which is permanent, and binds for ever, which *fealty* does not.

They differ alſo in the manner of the ſolemnity; for the oath of homage is taken by the tenant kneeling, but that of *fealty* is taken ſtanding, and includes ſix things, which are compriſed in the words *incolume*, *tutum*, *utile*, *honeſtum*, *facile*, *poſſibile*.

Incolume, that he do no bodily injury to the lord; *tutum*, that he do him no ſecret injury in any thing which is for his defence, as in his houſe or caſtle; *honeſtum*, that he do him no injury in his reputation; *utile*, that he do not damage him in his poſſeſſions; *facile* and *poſſibile*, that he make it eaſy and not difficult for the lord to do any good which otherwiſe he might do: all which is likewiſe compriſed in Leg. Hen. I. cap. 5.

He that holds land by this only oath of *fealty*, holds in the freeſt manner; for all, even thoſe that have fee, hold *per fidem & fiduciam*; that is, by *fealty* at the leaſt.

This *fealty* is alſo uſed in other nations, as in Lombardy and Burgundy.

Indeed, as the very firſt creation of this tenure grew from the love of the lord towards his followers, ſo did it bind the tenant to fidelity, as appears by the whole courſe of the feuds, and the breach thereof is loſs of the fee.

Hottoman, in his Commentaries de Verbis Feudalibus, ſhews a double *fealty*; the one *general*, to be performed by every ſubject to his prince, anſwering to our oath of ALLEGIANCE; and the other *ſpecial*, required only of ſuch, as in reſpect of their fee are tied by this oath towards their lords. We read of both alſo in the Grand Cuſtomary of Normandy, &c.

Fealty ſpecial was with us performed either by freemen or villains. By 17 Ed. II. ſtat. 2. the form of this oath is appointed, and as now obſerved it is as follows: "I A. B. will be to you my lord C. true and faithful, "and bear to you *fealty* and faith for the lands and te-"nements which I hold of you; and I will truly do and "perform the cuſtoms and ſervices that I ought to do to "you. So help me God." The oath is adminiſtered by the lord or his ſteward; and though it is neglected in ſome manors, yet in copy-hold manors, where courts are kept, and copy-hold eſtate granted, it is generally uſed.

Every lord, of whom tenements are holden at this day, may, and ought to call upon his tenants to take this oath in his court-baron, becauſe if it be long neglected he may loſe his ſeignory, and the profits ariſing from eſcheats and other contingencies.

Fealty is incident to all ſorts of tenures, except from frank-almoign and tenancy at will.

FEAR, in *Ethics*, is the apprehenſion of ſome evil likely to befal us, attended with a deſire of avoiding it. This paſſion has been found to leſſen PERSPIRATION and urine.

FEAST, or **Festival**, a church ſolemnity, or rejoicing in honour of God or a ſaint.

The word is formed of the Latin, *feſtum*, which ſome derive *a feriari, to keep holiday*; others from the Greek, εϛιαω, *I feaſt* or *entertain*, of εϛια, *hearth*, *fire*.

Feaſts, and the ceremonies thereof, have made great part of the religion of almoſt all nations and ſects; witneſs thoſe of the Greeks, Romans, Hebrews, Chriſtians, and Mahometans. *Feaſts* among us are either *immoveable* or *moveable*.

Feasts, *immoveable*, are thoſe conſtantly celebrated on the ſame day of the year; the principal of theſe are Chriſtmas-day, or the Nativity; the Circumciſion, Epiphany, Candlemas, or the Purification; Lady-day, or the Annunciation, called alſo the Incarnation and Conception; All Saints, and All Souls; beſides the days of the ſeveral apoſtles, St. Thomas, St. Paul, &c. which with us are *feaſts*, though not *feriæ*. See each *feaſt* under its proper article.

Feasts, *moveable*, are thoſe which are not confined to the ſame day of the year. Of theſe the principal is Eaſter, which gives law to all the reſt, all of them following, and keeping their proper diſtances from it; ſuch are Palm-Sunday, Good-Friday, Aſh-Wedneſday, Sexageſima, Aſcenſion-day, Pentecoſt, and Trinity-Sunday. See EASTER, SEXAGESIMA, PENTECOST, TRINITY, &c.

The four *feaſts* which our laws take ſpecial notice of are the Annunciation of the bleſſed Virgin Mary, or Lady-day, the 25th of March; the Nativity of St. John the Baptiſt, held on the 24th of June; the *Feaſt* of St. Michael the Archangel, on the 29th of September; and that of St. Thomas the Apoſtle, on the 21ſt of December: on which quarterly days rent on leaſes is uſually reſerved to be paid, 5 and 6 Ed. VI. cap. 3. 3 Jac. I. cap. 1. 12 Car. II. cap. 30.

Beſide theſe *feaſts* which are *general*, and enjoined by the church, there are others *local* and *occaſional*, enjoined by the magiſtrate, or voluntarily ſet on foot by the people; ſuch are the days of thankſgiving for delivery from wars, plagues, &c. Such alſo are the vigils or wakes in commemoration of the dedications of particular churches. See VIGIL, &c.

The prodigious increaſe of *feaſt-days* in the Chriſtian church commenced towards the cloſe of the fourth century, and was occaſioned by the diſcovery that was then made of the remains of martyrs and other holy men, for the commemoration of whom they were eſtabliſhed. Theſe, inſtead of being ſet apart for pious exerciſes, were abuſed in indolence, voluptuouſneſs, and criminal practices. Many of them were inſtituted on a pagan model, and perverted to ſimilar purpoſes.

The firſt *feaſts* among the Greeks were celebrated in ſolemn aſſemblies of the whole nation, on occaſion of their games, as the Olympic, the Pythian, the Iſthmian, and Nemæan; in proceſs of time they had many others, the principal of which are enumerated in the courſe of this work. See Potter's Arch. vol. i. cap 19, 20.

The Romans alſo had abundance of ſtated *feaſts* in honour of their deities and heroes: ſuch were the Saturnalia, Cerealia, Lupercalia, Liberalia, Neptunalia, Conſualia, Portumnalia, Vulcanalia, Palilia, Divalia, &c. See SATURNALIA, &c.

They had alſo *feaſts* inſtituted occaſionally; as Carmentalia, Quirinalia, Terminalia, Floralia, Compitalia, Lemuria, Vernalia, beſide other moveable and occaſional ones; as to give thanks to the gods for benefits received; to implore their aſſiſtance, or to appeaſe their wrath, &c. as the Paganalia, Feralia, Bacchanalia, Ambarvalia, Amburbalia, Suovetaurilia, and divers others, particularly denominated *feriæ*; as Sementinæ, Latinæ, &c. See each of theſe *feaſts* and *feriæ* in its proper place.

The *feaſts* were divided into days of ſacrifice, and days of banqueting and feaſting; days of games, and days of reſt, or *feriæ*.

There being but little hiſtory wrote, or at leaſt publiſhed in thoſe days; one end of *feaſts* was to keep up the remembrance of paſt occurrences.

The principal *feaſts* of the Jews were the *feaſts* of trumpets, that of the expiation, of tabernacles, of the dedication, of the paſſover, of pentecoſt, and that of purification.

The modern Jews have other *feaſts* marked in their calendar of modern inſtitution. The Mahometans, beſides their weekly *feaſt*, or ſabbath, which is kept on Friday, have two ſolemn *feaſts*, the firſt of which is called the *Feaſt* of Victims, and celebrated on the tenth day of the laſt month of their year; and the ſecond, called BAIRAM. The Chineſe have two ſolemn *feaſts* in the year, in memory of Confucius, beſides others of leſs note on other days of the year.

Feast *of the dead*, is a ſolemn religious ceremony in uſe among the ſavages of America, ſome of whom thus teſtify their reſpect for the deceaſed every eight years; and others, as the Hurons and Iroquois, every ten years.

Feast is alſo uſed for a banquet, or a ſumptuous meal, without any immediate view to religion.

The uſe of the word, in this ſenſe, ariſes hence; that a part of the ceremony of many of the ancient feſtivals, both thoſe of the Heathens and the *agapæ* of the Chriſtians was good eating; though Mr. Huet chooſes to derive the word from *feſtinare*, which, in an ancient Latin verſion of Origen's Comment on Matthew, ſignifies to *feaſt*: *Ut veniens illus Jeſus feſtinet cum diſcipulis ſuis.*

In all antiquity, both ſacred and prophane, ſacrifices were little more than religious *feaſts*.

It has been often obſerved by authors, that there is no nation in the world comes near the Engliſh in the magnificence of their *feaſts*. Thoſe made at our coronations, inſtallments, conſecrations, &c. tranſcend the belief of all foreigners; and yet it is doubted whether thoſe now in uſe are comparable to thoſe of our forefathers.

The Perſians never diſcourſe and deliberate of their moſt important affairs but in the middle of their *feaſts*.

FEATHER, *Pluma*, that part in birds which covers them, and by which they are enabled to fly.

Feathers make a conſiderable article in commerce, particularly thoſe of the oſtrich, heron, ſwan, peacock, gooſe, &c. for plumes, ornaments of the head, filling of beds, writing-pens, &c.

Geeſe are plucked in ſome parts of Great Britain five times in the year; the firſt plucking is at Lady-day for *feathers* and quills; and the ſame is renewed for *feathers* only four times more between that and Michaelmas. See FEN and GOOSE. In cold ſeaſons many geeſe die by this barbarous cuſtom. Thoſe *feathers* that are brought from Somerſetſhire are eſteemed the beſt, and thoſe from Ireland the worſt. Eider down is imported into this country from Denmark, and is furniſhed by thoſe DUCKS that are inhabitants of Hudſon's Bay, Greenland, Iceland, and Norway: Hudſon Bay alſo affords a very fine *feather*, ſuppoſed to be of the gooſe-kind. The down of the ſwan is brought from Dantzick, whence we have alſo a great quantity of cock and hen *feathers*. The beſt method of curing *feathers* is to lay them in a room in an expoſure to the ſun, and when dried to put them in bags, and beat them well with poles to diſcharge the duſt.

Feathers ſeem to be only productions and expanſions of the laſt extreme fibrillæ of the cutis; and hence, upon ſtripping off the cutis, the *feathers* are likewiſe always taken away; juſt as the leaves and fruit follow, upon peeling the bark off a tree: add, that *feathers* as well as hairs ariſe out of pores in the cutis; which pores are not mere apertures or foramina, but a kind of vaginulæ, wove of the fibres of the ſkin, which terminate in the oſcula or anaſtomaſes of the internal fibres of the *feather*.

Feathers, Dr. Derham obſerves, are a very commodious dreſs for the inhabitants of the air, being not only a guard againſt wet and cold, and a means for hatching and brooding their young, but moſt commodious for flight; to which purpoſe they are nicely placed over the body to give an eaſy paſſage, and every-where neatly poſited from the head towards the tail in cloſe uniform order; ſo that being pruned and dreſſed by an unctuous matter ſecreted in a proper gland, and depoſited in an oil-bag placed therein for that purpoſe, they afford as eaſy a paſſage through the air as a boat new cleaned and dreſſed has through the waters. Without all this nicety they would have been apt to be ruffled and diſcompoſed, and would have gathered air, and proved an obſtruction to the paſſage of the body.

Moſt of the *feathers* tend backwards, and are laid over each other in an exact method, armed with a warm and ſoft down next the body, and more ſtrongly made, as well as more curiouſly cloſed next the air and weather; to which purpoſe the *apparatus* nature has made, and the inſtinct ſhe has given them to prune or dreſs their *feathers*, are admirable.

The mechaniſm of the *feather* is wonderful; the ſhaft or rib is exceeding ſtrong, but hollow below, for ſtrength and lightneſs ſake; and above, not much leſs ſtrong, and filled with a *parenchyma* or pith both ſtrong and light.

But the vanes or webs in the flag-part of the wing are nicely gaged, broad on one ſide, and narrower on the other, the edges of the exterior vanes bending downwards, and thoſe of the interior or wider upwards; by which means they catch hold and lie cloſe to each other when the wing is ſpread, ſo that not one *feather* may miſs its full force and impulſe upon the air: the tips are all made ſloping; thoſe of the interior vanes ſloping to a point towards the outer-part of the wing, and the exterior vanes towards the body; ſo that the wing, whether extended or ſhut, is as neatly ſloped and formed as if conſtantly trimmed with a pair of ſciſſars.

Dr. Derham has ſeveral new obſervations on the mechaniſm of the vanes or webs of the *feathers* as they preſent themſelves to the microſcope, by which the wonderful care and accuracy of the Creator in ſo ſmall a part are excellently illuſtrated.

The vane conſiſts not of one continued membrane (becauſe, if once broken, it would then be ſcarce reparable), but of many *laminæ*, admirably contrived to hook and hang together. On the under-ſide they are thin and ſmooth; but on their upper outer edge, (repreſented *Tab. Nat. Hiſt. fig.* 3.) they are parted into two hairy edges, each ſide having a different ſort of hairs, laminated or broader at the bottom, and ſlenderer and bearded towards the top. Thoſe bearded hairs on one ſide of the *laminæ* have ſtrait beards, as repreſented in *fig.* 4. thoſe on the other have hooked beards on one ſide of the ſlender part of the briſtle and ſtrait ones on the other, as in *fig.* 5. Both kinds are repreſented as they grow on the upper edge of the lamina in *fig.* 3. in the vane; the hooked beards of one lamina always lie next the ſtrait beards of the next lamina, by which means they lock and lay hold on each other, and by a pretty mechaniſm brace the laminæ cloſe to one another.

FEATHER-*bed*.
FEATHERS, *dry-pulled*. } See BED.
FEATHERS, *ſcalded*.

FEATHER-*edged boards and planks*, are thoſe which are thicker on one ſide than on the other.

FEATHER, in the *Manege*, a ſort of natural frizling of the hair found in many parts of a horſe's body, but more commonly between the eyes. In ſome caſes it reſembles an ear of barley, and in others an oilet-hole. Many are of opinion, that when the *feather* is lower than the eyes it is a ſign of a weak eye-ſight; but this remark is not certain.

FEATHER, *prince's*, in *Botany*. See AMARANTH.

FEATHER, *Roman*, called in French *epée Romaine*, is a *feather* upon a horſe's neck, being a row of hair turned back and raiſed, which forms a mark like a ſword-blade juſt by the mane.

FEATHER, *mid*, in the *Engliſh Salt-works*. See MID.

FEATHER, *ſea*. See GORGONIA.

FEAZING, at *Sea*, is the ravelling out of the cable or any great rope at the ends.

FEBRIFUGE, in *Medicine*, a remedy efficacious for the cure of FEVERS.

The word is a compound of *febris* and *fugo*, *I drive away*.

The *quinquina*, or Jeſuit's bark, is the greateſt and ſureſt of all the claſs of *febrifuges*.

The little centaury is ſometimes alſo called *febrifugum*, on account of its virtues.

The Chineſe ginſeng is alſo particularly famed as a *febrifuge*. For ſuch as cannot take the Peruvian bark in ſubſtance, Dr. Fuller preſcribes a *febrifuge* clyſter, made of a decoction thereof. The inner bark of the aſh-tree, with a little ſalt of wormwood, taken like the Peruvian bark, is ſaid to equal, or even exceed it, as a *febrifuge*.

The like is aſſerted of the bark of the elm, near the root.

The flowers of *ſal armoniac* are held an excellent *febrifuge*, eſpecially in intermitting fevers. Cold water has been much extolled as a *febrifuge*. Dr. Handcock gives it the emphatical denomination of *febrifugum magnum*.

M. Reneaume, in the Hiſt. de l'Academ. R. Sciences, an. 1711, propoſes a new *febrifuge* of his own diſcovery, viz. galls. From a great number of experiments he has learnt, that galls alone will frequently cure an intermitting fever as well as the *quinquina*, over which this medicine has ſome advantage in other things, in that it is not ſo bitter, does not heat ſo much, is taken in a leſſer doſe, and ſeldomer, and is cheaper. At his motion ſeveral other phyſicians tried it with ſucceſs, particularly M. Homberg, though it did not ſucceed ſo well with M. Boulduc, Lemery, and Geoffroy. If the flowers of antimony, made with ſal ammoniacum and antimony ſublimed together, are expoſed to the air, they produce a liquid called *febrifuge* oil. The Germans call the pulvis ſtypt. Helv. the *febrifuge* powder; and the ſame name is given in England to a mixture of ocul. cancr. ʒ ſs. and tart. emet. gr. ij. This is adminiſtered in doſes of gr. iij to vi. The *febrifuge* ſalt is the ſal marin. regen. The *febrifuge* ſpirit of Mr. Clutton is prepared by digeſting together for a month equal parts of oil of ſulphur by the bell, rectified oil of vitriol and ſpirit of ſalt, with three times the whole quantity of rectified ſpirit of wine, and diſtilling them to dryneſs. This ſpirit mixed with water, ſo as to render it agreeably acid, is given with common drink in ardent and inflammatory fevers, and with any cordial or antiſeptic liquors in the nervous and putrid kinds.

FEBRIS, in *Medicine*. See FEVER.

FEBRIS, *ephemera*. See EPHEMERA.

FEBRIS *inteſtinalis*. See *Inteſtinal* FEVER.

FERRUA, or FEBRUATA, in *Mythology*, an appellation given to Juno as the goddeſs of purification, and as preſiding over women in the pains of labour and child-birth.

FEBRUA, in *Antiquity*, a feaſt held by the Romans in the month of February, in behalf of the MANES of the deceaſed. Macrobius tells us that ſacrifices were here performed, and the laſt offices paid to the ſhades of the defunct. Saturn. lib. i. cap. 13. And from this feaſt it was that the month of February took its name.

The deſign of theſe ſacrifices is ſomewhat controverted: Pliny ſays they were performed to render the infernal gods propitious to the deceaſed; though ſome of the moderns have imagined that they were intended to appeaſe the deceaſed themſelves, and were offered immediately to them as a ſort of deities. What confirms the former ſentiment is, that Pluto himſelf is ſurnamed *Februus*. They laſted twelve days.

The word is of an ancient ſtanding in the Latin tongue: from the very foundation of the city we meet with *februa* for *purifications*, and *februare*, *to purge* or *purify*. Varro, De Ling. lib. v. derives it from the Sabines; Voſſius, and others, from *ferveo*, *I am hot*, becauſe purifications were chiefly performed with fire and hot water. Some go higher, and even deduce the words from פור, *phur*, or *phavar*, which, in the Syriac and Arabic, has the ſame ſignification with *ferbuit*, or *efferbuit*, and might probably likewiſe ſignify *to purify*; for *phavar*, in Arabic, denotes a preparation given to women in child-bed to bring away the after-birth, and other impurities remaining after delivery, much as among the Romans, who gave the name *Februa* to the goddeſs ſuppoſed to preſide over the delivery of women. Ovid. Faſt.

FEBRUARY, *Februarius*, in the *Roman Chronology*, the ſecond month of their year, ſo called from FEBRUA, a feaſt held therein.

In the firſt ages of Rome, *February* was the laſt month of the year, and preceded January, till the decemviri made an order that *February* ſhould be the ſecond month of the year, and come after January. See BISSEXTILE.

FECES. See FÆCES.

FECIALES, or FOECIALES, an order of prieſts or officers, conſiſting of twenty perſons, among the ancient Romans, appointed to proclaim war, negociate peace, &c.

Feſtus derives the word from *ferio*, *I ſtrike*, as *ferire fœdus* ſignifies *to conclude a treaty*; and accordingly, inſtead of *feciales* he would have it wrote *feriales*. Others derive it from *fœdus*, which was anciently written *fedus*; or from *fides*, *faith*; others from *facio*, *feci*, *I make*, &c. becauſe they made war and peace. Voſſius chooſes to derive it from *fatu*, of the verb *fari*, *to ſpeak*; in which ſenſe the *feciales* ſhould be the ſame with *oratores*; which ſentiment is alſo confirmed by the authority of Varro, who ſays they were called indifferently, *feciales* and *oratores*. De Vit. Popul. Roman. lib. ii.

The *feciales* were a ſort of heralds or kings at arms, who, when the Romans had any diſpute with their neighbours, were ſent firſt to demand the thing pretended to be uſurped, or require ſatisfaction for the injury alledged to be done. If an anſwer was not returned by them that was ſatisfactory to the people and the ſenate, they were diſpatched again to declare war, and the like in treating of peace, the *feciales* being the only perſons appointed to negociate between the ſenate, &c. and the enemy.

Plutarch, in the Life of Numa, and Halicarnaſſeus, lib. ii. obſerve, that they were firſt inſtituted by that prince. The latter adds, that they were choſen out of the beſt families in Rome; that their office, which was reputed a ſort of ſacerdotium, or prieſthood, only ended with their life; that their perſons were ſacred and inviolable, as thoſe of other prieſts; that they were even charged to ſee the republic did not declare war unjuſtly; that they were to receive the complaints and remonſtrances of nations who pretended to have been any way injured by the Romans; that if thoſe complaints were found juſt, they were to ſeize the criminals, and deliver them up to thoſe they had offended; that they were inveſted with the rights and privileges of ambaſſadors; that they concluded treaties of peace and alliance, and took care they were executed; and laſtly, aboliſhed them, if they were found not to be equitable. Livy, lib. i. cap. 24. aſcribes their inſtitution to Ancus Martius, in the year of Rome 114. See alſo Aul. Gell. lib. xvi. cap. 4.

But Varro aſſures us, that in his time moſt of theſe functions of the *feciales* were ſet aſide; as thoſe of the ancient heralds at arms are among us at preſent; though Plutarch obſerves, that they had ſtill ſome authority in his time.

The *feciales* were crowned with *verbena*, *vervain*, when they went to declare war; their head was covered with a veil, over which the crown was applied; in this equipage they proceeded to the frontiers of the new enemy's country, and threw a bloody dart or javelin into the ground within the ſame. In Livy, and other ancient authors, we have the formula uſed in ſuch declarations.

FECULA, or FÆCULA, in *Pharmacy*, a white, mealy ſubſtance or powder which ſubſides and gathers at the bottom of the expreſſed juices of divers roots; as thoſe of briony, arum, iris, &c.

The word *fæcula* is a diminutive of FÆCES.

This ſubſtance or ſediment they dry in the ſun, after having poured off the liquors, and it ſerves for divers remedies, &c.

FECULENT, or FÆCULENT, is applied to the blood and other humours, when they abound in fæces or dregs, or have not the proper and uſual degree of purity.

FECUNDITY, or FOECUNDITY, *fertility*, or that quality of a thing which denominates it fruitful.

The *fecundity* of divers plants is very extraordinary. M. Dodart has an expreſs diſcourſe on this ſubject, in the Memoirs of the Academy of Sciences; wherein he ſhews, that, at a moderate computation, an elm, one year with another, yields 329,000 grains or ſeeds, each of which, if properly lodged, would grow up into a tree: now, an elm ordinarily lives 100 years, conſequently, in the courſe of its life it produces near 33,000,000 ſeeds, all which ariſe from one ſingle ſeed.

He ſhews farther, that the ſame elm by frequently cutting off its head, &c. might be brought to produce 15,840,000,000 ſeeds, and conſequently that there are ſo many actually contained in it.

FECUNDITY *of fiſh*. See FISH.

FEDOA, in *Zoology*, a name uſed by Geſner and ſome other authors for the GODWIT, more commonly called ÆGOCEPHALUS. See VETOLA.

FEE, FEUD, FEUDUM, FEODUM, or FIEF, an eſtate, land, tenement, lordſhip, or the like, held of a ſuperior lord, on condition of fealty, homage, or other acknowledgment.

The word is derived by ſome authors from *fœdus*, as ariſing from a treaty or alliance made with the lord; but the opinion of Selden ſeems the beſt authoriſed, who brings it from the Saxon, *feoh*, *ſtipendium*, the *fee* being a kind of prebend to live upon; and accordingly we find, that in ancient times it was uſed for the wages and appointments of officers. It is obſerved by Pontopiddan, in his Hiſtory of Norway, that in the Northern languages *odh* ſignifies *property*, and therefore *feedoh*, or *feudum*, will denote *ſtipendiary property*.

The term *fee* is properly applied to lands and tenements, which we hold in perpetual right, on condition of an acknowlegment of ſuperiority in a higher lord. See TENURE.

The writers on this ſubject divide all lands and tenements wherein a man has a perpetual eſtate to him and his heirs into ALLODIUM and FEUDUM.

Allodium is defined to be a man's own land, which he poſſeſſes merely in his own right, without acknowlegement of any ſervice or payment of any rent to another; and this is property in the higheſt degree.

Feudum is that which we hold by the benefit of another, and for which we do ſervice or pay rent, or both to the chief lord.

Originally a *feud* was only an eſtate for life; and thoſe to whom it was granted were called *vaſſalli*, who by ſuch means were brought to a ſtricter diſcipline and obedience to the princes, and were bound to ſerve them in wars.

The origin of *fees* or *feuds* is one of the darkeſt and moſt intricate points in modern hiſtory. Some attribute the invention to the Lombards. Sir Thomas Craig inclines to this opinion, and ſays, that the Lombards, after they were ſubdued by Charlemagne, not only retained their ancient cuſtoms, but at the return of that emperor into France tranſmitted them with him into the remoteſt parts of that kingdom. In reality, the conſtitution of *feuds* had its original from the military policy of the Northern or Celtic nations, the Goths, Hunns, Franks, Vandals, and Lombards, who ſpread themſelves over Europe at the declenſion of the Roman empire. This is rendered probable by the demand which the Cimbri and Teutones, nations of the ſame original, are recorded to have made on the Romans on their firſt irruption into Italy, about a century before the Chriſtian æra. They demanded of the Romans, *Ut martius populus aliquid ſibi terræ daret, quaſi ſtipendium: cæterum, ut vellet, manibus atque armis ſuis uteretur*; i. e. they deſired *feuds* to be allowed them, which they were to hold by military and other perſonal ſervices. L. Florus, lib. iii. cap. 3. Having brought this conſtitution from their own countries, they continued it in their reſpective colonies as the moſt likely means to ſecure their new acquiſitions; and for this purpoſe the victorious general allotted large diſtricts of land to the ſuperior officers of the army; and theſe again diſtributed ſmaller parcels to the inferior officers and more deſerving ſoldiers. However, the *feudal* policy was only brought by degrees into that ſtate, which we find eſtabliſhed in the empire under Conrade the Salic, and in France under Hugh Capet. Sir Thomas Craig has diſtinguiſhed four ſtates of the *feudal* law; its infancy, comprehending the period between the firſt overflowing of the Northern nations and the year 650; its childhood, the time in which *fiefs*, which were before annual, or at moſt for life, were extended to the ſons of the vaſſal, and no farther, viz. from the year 650 to the year 800, when Charlemagne was crowned emperor; its adoleſcence, from the times of Charlemagne to thoſe of Conrade II. or the Salic, who began his reign in the year 1024, and not only confirmed the inheritance of *fiefs* to the ſons and grandſons of the vaſſals, but permitted one brother to ſucceed another in his paternal eſtate: but even after the alteration made by Conrade, it was not uncommon in Germany to grant *fiefs* only for life; a charter of this kind occurs as late as the year 1376; and its maturity from this period forward, when *feuds* were permitted to deſcend to collaterals as far as the ſeventh degree. Others find ſome appearance of the duties of a vaſſal to his lord, in the ancient relations between the patron and his client; and others look for its riſe in the Roman *Beneficia*.

The emperors, it ſeems, diſtributed lands among the ancient legions on condition of their holding themſelves ready at all times to take up arms in defence of the frontiers of the empire, which affords us a good image enough of *feuds*, though in all probability their firſt origin ſhould be traced higher; but in proceſs of time their nature was changed, and duties were annexed to them which originally were not.

Du-Moulin makes no doubt, but that theſe diſtributions of land, called *benefices*, were the firſt matter of *fees*; for which reaſon he uſes the terms *benefice* and *feud* promiſcuouſly, as if they were the ſame thing; and yet there was a good deal of difference between them, as there was neither fealty nor homage, nor the other *feudal* rights annexed to the benefice; and that the benefice was not hereditary.

Probably benefices began then to be called *feuds*, when they became hereditary; and when thoſe of whom the benefices were held began to demand faith or fealty from them. This fealty ſeems to conſtitute the *fee*; the word *fee* itſelf ſignifying, in the ancient Norman language, *faith*.

There is no fixing the preciſe æra when theſe changes commenced; for *fees*, ſuch as they now are, were not eſtabliſhed all at once; but in different countries they took place at different times, and in different manners. The great lords, after the deſtruction of the Roman empire, having in ſeveral parts uſurped the property of their benefices, laid likewiſe hold of the juriſdiction, and made their vaſſals their ſubjects; ſo that each became a ſort of petty ſovereign in his own territory.

Mezeray obſerves, that the donation of *fees* to the nobleſſe of France commenced under the reign of Charles Martel.

Hugh Capet, when he came to the crown, was himſelf ſo little eſtabliſhed that he durſt not oppoſe thoſe uſurpations, and was forced to ſuffer what he could not redreſs. See Le Fevre, De l'Origine des Fiefs, and Altaſerra's Origines Feudorum primoribus Galliæ. See FEUDUM.

The origin of *fees* in England, Camden carries as far back as the time of Alexander Severus. That prince having built a wall in the North of England to prevent the incurſions of the Picts, he ſome time after began to neglect the defence thereof, and gave, as Lampridius, in Vita Alex. Severi, aſſures us, the lands conquered from the enemy to thoſe of his captains and ſoldiers, whom that author calls *limitarios duces, & milites*; i. e. captains and ſoldiers of the frontiers; but it was on this condition, that their heirs ſhould continue in the ſervice, and that the lands ſhould never deſcend to private perſons; i. e. to ſuch as did not bear arms. That prince's reaſon was, that people, who in ſerving defended their own, would ſerve with a great deal more zeal than any others. Such, according to Camden, was the riſe of *fees* in our nation. Britan. p. 651.

However, the *feudal* polity originally derived from the Northern nations, and gradually eſtabliſhed on the continent of Europe, was not univerſally received in England, though ſome traces of it may be diſcerned in the times of the Saxons, who were firmly ſettled in this iſland as early as the year 600, and incorporated with the national conſtitution till the reign of William the Norman; and this was done not by the mere arbitrary will and power of the conqueror, but by the univerſal conſent of the common council of the kingdom, on the ſame principle of ſelf-ſecurity which had before induced the other nations of Europe to adopt it. The æra of formally introducing the *feudal* tenures by law was probably the latter end of the year 1086, when the king was attended by all his nobility at Sarum, and all the principal landholders ſubmitted their lands to the yoke of military tenure, became the king's vaſſals, and did homage and fealty to his perſon. This ingraftment of the *feudal* tenures and other cuſtoms of Normandy upon the ancient Saxon laws of Edward the Confeſſor produced a different political ſyſtem in this country, and changed both power and property in many reſpects; for thoſe hereditary eſtates of the Saxon nobility and gentry which were allodial, and not ſubject to any *feudal* ſervice, were converted into *feuds* and other lands which were of a *feudal* nature, and holden by military ſervice, having been granted only at will, or for a certain number of years, or at moſt for life or lives, and the grants of which were called benefices, were made hereditary *fiefs*. The *feudal* rights claimed in conſequence of this eſtabliſhment by the king over his tenants, and by them over their's, were conſiderably mitigated by the charter of Henry I. See MAGNA *charta*. Lord Lyttleton's Hiſt. of King Henry II. vol. i. p. 59, &c. vol. iii. p. 97, &c. Blackſtone's Comm. vol. ii. chap. 4.

All our lands in England (the crown-land, which is in the king's own hand in right of his crown, excepted) are of the nature of *feud* or *fee*. For though many have land by deſcent from their anceſtors, and others have bought lands, yet land cannot come to any, either by deſcent or purchaſe, but with the burden that was laid on him who had the novel *fee*, or who firſt received it as a benefice from his lord to him, and ſuch as ſhould deſcend from him, or to whom it ſhould be otherwiſe conveyed and transferred; ſo that no man has *directum dominium*; i. e. the very property or demain in any land but the prince in right of his crown. Camd. Britan. p. 93.

Though he who has *fee* has *jus perpetuum* and *utile dominium*, yet he owes a duty for it; ſo that it is not ſtrictly his own. Indeed, as much as is imported by the terms in which we expreſs our higheſt right in lands, &c. the moſt a man can ſay, is, "I am ſeiſed of this land in my "demain or demeſne as of *fee*."

It ſhould be obſerved, that our Engliſh lawyers do very rarely (of late years eſpecially) uſe the word *fee* in this its primary original ſenſe, in contradiſtinction to *allodium* or abſolute property, but generally uſe it to expreſs the continuance or quantity of an eſtate; ſo that a *fee* in general ſignifies an eſtate of inheritance, being the higheſt and moſt extenſive intereſt that a man can have in a *feud*. Blackſtone's Comm. vol. ii. p. 106.

In the ſtat. 37 Hen. VIII. cap. 16. *fee* is alſo uſed for lands veſted in the crown; but it is from ignorance of the import of the word; for *fee* cannot be without fealty ſworn to a ſuperior; but the king owns fealty to no ſuperior but God alone.

Fee is divided in our laws into *fee-abſolute*, called alſo *fee-ſimple*; and *fee-conditional*, alſo called *fee-tail*. See FEUD.

FEE, *frank*. See **FRANK**.

FEE-*ſimple*, *feudum ſimplex*, is that whereof we are ſeiſed to us and ours heirs for ever. Or it denotes an abſolute inheritance, clear of any condition, limitation, or reſtriction to particular heirs, but deſcendible to the heirs general, whether male or female, lineal or collateral. It is a general rule, that the word *heirs* is neceſſary in the grant or donation, in order to make a *fee* or inheritance: but this rule does not extend to deviſes by will, nor to fines and recoveries conſidered as a ſpecies of conveyance, nor to creation of nobility by writ, though in creations by patent, the word *heirs* muſt be inſerted; nor to grants of lands to ſole corporations and their ſucceſſors; nor finally, to the caſe of the king, in whom a *fee-ſimple* will veſt, without the words *heirs or ſucceſſors* in the grant.

FEE-*tail*, *feudum taliatum*, is that whereof we are ſeiſed with limitation to us and the heirs of our body. See TAIL.

Fee-tail is of two kinds, *general* and *ſpecial*.

Fee tail general, is where lands and tenements are given to a man and the heirs of his body begotten. So that if a man ſeiſed of ſuch land by ſuch gift marry one or more wives, and have no iſſue by them, and at length marry another, by whom he hath iſſue, this iſſue ſhall inherit the land.

Fee-tail ſpecial, is where a man and his wife are ſeiſed of lands to them and the heirs of their two bodies; where, in caſe the wife die without iſſue, and he marry another by whom he have iſſue, this iſſue cannot inherit the land, and therefore it is called *ſpecial tail*.

This *fee-tail ſpecial* has its origin from the ſtat. of Weſtm. 2. 13 Edw. I. cap. 1. Before that ſtatute, all land given to a man and his heirs, either *general* or *ſpecial*, was reputed in the nature of a *fee*; and therefore ſo firmly held to him, that, any limitation notwithſtanding, he might alienate it at pleaſure: for redreſs of which inconvenience the ſtatute provides, that if a man gives lands in *fee*, limiting the heirs to whom it ſhall deſcend, with a reverſion to himſelf and his heirs for default of ſuch former heirs, the form and meaning of the gift ſhall be obſerved.

Eſtates, in *general* and *ſpecial tail*, are farther diverſified by the diſtinction of ſexes in ſuch entails; for both of them may be in tail-male or female: as if lands be given to a man and *his heirs male of a body begotten*, this is an eſtate in tail-male *general*; but if to a man and the *heirs female of his body on his preſent wife begotten*, this is an eſtate in tail-female *ſpecial*; and in caſe of an entail male, the heirs female ſhall never inherit, nor any derived from them; nor *e converſo*, the heirs male, in caſe of a gift in tail-female. The word *body*, or ſome other words of procreation, are neceſſary to make it a *fee-tail*, and to aſcertain to what heirs in particular the *fee* is limited; though in wills and teſtaments greater indulgence is allowed. The incidents to a tenancy in tail, under the ſtatute Weſtm. 2. are chiefly theſe: 1. That a tenant in tail may commit waſte on the eſtate-tail by felling timber, pulling down houſes, or the like, without being impeached or called to account for the ſame. 2. That the wife of the tenant in tail ſhall have her dower or thirds of the eſtate-tail. 3. That the huſband of a female tenant in tail may be tenant by the courteſy of the eſtate-tail. 4. That an eſtate-tail may be barred or deſtroyed by a FINE, by a common RECOVERY, or by lineal warranty deſcending with aſſets to the heir. By ſubſequent ſtatutes, eſtates-tail may be aliened, are liable to forfeiture for high treaſon, and are chargeable with reaſonable leaſes, and with ſuch debts as are due to the crown on ſpecialties, or have been contracted with fellow-ſubjects in a courſe of commerce.

FEE, *baſe*, or *qualified*, is a conditional *fee* that has a qualification ſubjoined to it, and which muſt be determined whenever this qualification is at an end; as in the caſe of a grant to A. and his heirs, *tenants of the manor of Dale*; whenever the heirs of A. ceaſe to be tenants of that manor, the grant is entirely defeated. Blackſtone's Comm. vol. ii. chap. 7. See ENTAIL.

FEE-*expectant*, *feudum expectativum*,. See **EXPECTANT**.

FEE-*farm*, or **FEE**-*ferm*, *feudi-firma*, or *feo-firma*, ſignifies lands holden to a man and his heirs for ever, under a certain yearly rent.

Fee-farm ariſes when the lord upon creation of a tenancy reſerves to himſelf and his heirs, either the rent for which it was before lett to farm, or at leaſt a fourth part of the rent, and that without homage, fealty, or other ſervices more than are eſpecially compriſed in the feoffment.

Though by Fitzherbert it appears, that the third part of the value may be appointed for the rent, or the finding of a chaplain to ſay divine ſervice, &c. And the nature of it is this: that if the rent be behind, and unpaid for the ſpace of two years, then the feoffer or his heirs have action to recover the lands as their demeſnes.

FEE-*farm rents of the crown*, are ſuch as iſſue to the kings of England from their ancient demeſnes, many of which were alienated from the crown in the reign of king Charles II.

FEE is alſo uſed for the compaſs or circuit of a manor or lordſhip. Thus Bracton, *in eadem villa, & de eodem feodo*.

FEE is alſo uſed for a perpetual right incorporeal; as to have the keeping of perſons in *fee*, rent granted in *fee*, and office held in *fee*, &c.

FEE alſo ſignifies a reward or ordinary due given a perſon for the execution of his office, or the performance of his part in his reſpective art or ſcience.

Thus, the lawyer, barriſter, and phyſician, are ſaid to have their *fees*; i. e. conſiderations for the pains taken with the client or patient. If a perſon refuſe to pay an officer his due *fees*, the court will grant an attachment againſt him, to be committed till the *fees* are paid; and an attorney may bring an action of the caſe for his *fees* againſt the client that retained him in his cauſe.

FEES alſo denote ſettled perquiſites or allowances paid to public officers by perſons who have buſineſs with them. The *fees* due to the officers of the Cuſtom-houſe are expreſsly mentioned in a ſchedule or table, which is hung up to view in the ſaid office, and in all other places where the *fees* are to be paid; and if any officer ſhall offend, by acting contrary to the regulations therein contained, he ſhall forfeit his office and place, and be for ever after incapable of any office in the Cuſtom-houſe.

The ſmallneſs of the ſalaries of divers of the king's ſervants is compenſated by the perquiſites or *fees* of honour. The *fees* paid to the ſeveral officers by every perſon upon his being knighted amount to 78*l.* 13*s.* 4*d.* And if it be done within the verge of the court, there is 3*l.* more to the ſix pages of the bed-chamber, which brings it to 81*l.*

FEE, *knight's*. See KNIGHT's *fee*.

FEEDERS, in *Mining*, a term uſed to expreſs the ſeveral ſmall channels in the ſides of a mine ſeeming to open into it, as brooks into rivers in their courſe. The miners in moſt counties call theſe the *feeders* of the load.

FEEDING, *Foul*, in the *Manege*. See FOUL.

FEEL, in the *Manege*, they ſay to *feel* a horſe in the hand; that is, to obſerve that the will of the horſe is in the rider's hand, that he taſtes the bridle, and has a good *appui* in obeying the bit.

To *feel* a horſe upon the haunches, is to obſerve that he plies or bends them, which is contrary to leaning or throwing upon the ſhoulders.

FEELERS, *Antennæ*, in *Natural Hiſtory*, are the horns, as they are uſually called, upon the heads of inſects.

The word *antennæ* is derived from the Latin, *ante*, *before*, and *teneo*, *to hold* or *carry*; or poſſibly may have been given them from ſome ſort of reſemblance to the part of a ſhip known in navigation by the ſame name. The *antennæ* in various inſects are extremely various, and in moſt very beautiful; they not only differ in the inſects of different claſſes, but frequently in the different genera of the ſame claſs, though never in the ſame ſpecies.

The *antennæ* of flies may ſerve to diſtinguiſh ſeveral genera of thoſe inſects: 1. There are ſome which have articulated ones, formed of ſeveral vertebræ of different ſize, joined end to end, like the beads in a necklace: theſe *antennæ* are thicker at their origin than at their extremity. 2. The *antennæ* of others, formed in the ſame manner, are ſmalleſt at their inſertion and increaſe in ſize towards their extremities. 3. Thoſe of others are in form of feathered beards. 4. Others have priſmatic *antennæ*, which are articulated, and leaſt in both their extremes, and largeſt in the middle. 5. The *antennæ* of another claſs are branched or forked, compoſed of two pieces, and appearing double. 6. Others have extremely ſhort and thick *antennæ*, formed of two or three articulations or beads, terminated by a larger one of the figure of a battledore. 7. The *antennæ* of thoſe two-winged flies that ſuck the blood of oxen or horſes, reſemble the battledore *antennæ*; except that the body which terminates them has ſomewhat of the figure of a creſcent, the end of which appears by means of glaſſes articulated. Reaum. Hiſt. Inſects, vol. iv. p. 138, &c.

The ſize of the *antennæ* of ſome flies may alſo ſerve for a diſtinction, as may alſo the manner in which they carry them. The ichneumon flies have theirs in continual motion, making a kind of inceſſant vibrations with them.

The *antennæ* are of very various forms and ſhapes in different genera of the ſame claſs of animals, and are very judiciouſly made by Reaumur the characters of different genera of the butterfly kinds, among which there are almoſt an infinite variety of them.

The *antennæ* of inſects in general differ from horns, in that they are moveable at the baſe; and have beſide that power a number of articulations all along their ſtructure, by means of which they are alſo capable of being turned about any way at the pleaſure of the animal. The differences of their figure and ſtructure in the butterfly claſs, which are made the marks of the different genera, are ſix. Thoſe of the firſt genus are equally thick throughout, of a cylindric form, but terminated by a large head, altogether reſembling a club: ſome have called them clavated *antennæ*; Reaumur calls them buttoned *antennæ*: the buttons by which they are terminated are of a very different figure in the various ſpecies. The *antennæ* of the ſecond genus are, in general, much ſhorter in proportion to the body of the animal than the former: they gradually increaſe in thickneſs from their inſertion towards their extremity, and are terminated by a ſlender ſpine iſſuing from the lower part, and ornamented with a tuft of hairs: Reaumur calls theſe the club *antennæ*. Thoſe of the third genus firſt increaſe in ſize, and then taper to an oval point, unfurniſhed with a cluſter of hairs: ſome ſpecies have their *antennæ* twiſted like the horns of a ram. The *antennæ* of the fourth genus, at a little diſtance from their origin, become very thick, and continue of the ſame ſize through the greateſt part of their length, where they turn a little, and terminate in a ſharp point, which ſometimes ſupports another point, formed of a cluſter of hairs, in the manner of a pencil: Mr. Reaumur has called theſe the priſmatic *antennæ*. Thoſe of the fifth genus are, from their ſhape, called the conic or quadrated *antennæ*. Thoſe of the ſixth genus are denominated the plumoſe or feathered *antennæ*: they appear to be compoſed of a ſtalk or pedicle, which diminiſhes in ſize from the baſis to the extremity; on each ſide of which there iſſue plumes, placed like thoſe on the barrel of a quill, but not ſo cloſe together. The plumes of the males of this genus are larger and more beautiful than thoſe of the females.

The *antennæ* are many of them put together with great artifice and nicety; but we are yet at a loſs to know to what end or purpoſe theſe nice organizations were given them. Different people have formed very different gueſſes as to their uſes. Some have thought them intended to defend the eyes; but though this might ſeem probable in regard to the ſhort plumoſe ones, it can never hold good in the ſlender and ſmooth ones, which can be of no ſuch ſervice. Others have thought them made for wiping and cleaning the eyes; but this is an unneceſſary office, and one they are wholly unfit for; and the fore-legs of the creature are always ready for ſuch a purpoſe, and are rendered much fitter for it by the hairs with which they are covered, than the *antennæ*, which in moſt caſes are compoſed of joints, and are by no means adapted to ſuch uſes. Others have called them *feelers*, and ſuppoſed that the creature uſed them as a blind man does his ſtaff, to feel out the way, leſt it ſhould run againſt any thing that would hurt it. But theſe creatures have eyes enough to ſee with; and any one who will obſerve them while they walk, will find that they do not protrude theſe before them, but often keep them erect upon the head. If this were their ſole purpoſe, it is alſo eaſy to ſee that all that beautiful variety in their forms could not have been neceſſary. Poſſibly they may be the organs of ſmelling, ſince we evidently find that many inſects have this ſenſe in a very exquiſite degree; and yet we ſee no external organs, except theſe, to ſerve for it. It is poſſible that this may be their uſe, but it is mere conjecture; and indeed the bodies of inſects are throughout made of parts ſo different from ours, that we can probably form no more idea of the uſe of their organs than a man born deaf can of that of the ear. They may have ſenſes different from ours, and theſe may be the organs of them, or the hearing or ſmell may be performed by them.

The pedicles or ſtalks of the ſeveral *antennæ* of butterflies are always hollow, and many of them are ſmooth and gloſſy, reſembling horn. Of this kind are moſt of the plumoſe *antennæ*; and the buttons of the *antennæ* of thoſe kinds which have ſuch are always fleſhy and juicy; ſo that when preſſed, different fluids are forced out of them, firſt a white, then a yellow one, and finally a black. When the creature is held under water with only the *antennæ* above, it is common to ſee bubbles of air diſcharged from the joints and buttons; how far theſe obſervations may aſſiſt in determining their uſe, is left to farther inquiries.

FEELING, *Touching*, one of the external ſenſes, whereby we acquire the ideas of ſolid, hard, ſoft, rough, hot, cold, wet, dry, or other tangible qualities; as alſo of diſtance, itching, pain, &c.

Feeling is the groſſeſt, but at the ſame time the moſt extenſive of our ſenſes, having more objects than all the reſt taken together; and ſome even reduce all the other ſenſes to this one of *feeling*.

Ariſtotle is expreſs, that all ſenſation is only *feeling*; and that the other ſenſes, as ſeeing, hearing, taſting, and ſmelling, are only the more exquiſite ſpecies, or peculiar modes thereof. De Anim. lib. iv. cap. 3. and lib. iii. cap. 12.

Naturaliſts are divided as to the organ or inſtrument of *feeling*. Ariſtotle takes this ſenſe to reſide in the fleſh, *quatenus, fleſh*, inaſmuch as all fleſh is, in ſome meaſure, capable of *feeling*. Hiſt. Anim. lib. i. cap. 4. Others will have it in all the parts that have nervous fibres, which extends it to the ſkin, fleſh, muſcles, membranes, and parenchymas; others reſtrain it to the ſkin or cutis; it being obſerved, that only thoſe parts covered with a cutis have properly the faculty of touching, or perceiving tangible qualities.

But what part of the cutis to aſſign immediately for this office is again diſputed. Some will have it the membranous parts; others the carnous; and others the medullary part, derived from the nerves.

Malpighi, and after him all our lateſt and beſt authors, hold the immediate organ of the ſenſe of *feeling* to be the pyramidal papillæ under the ſkin.

Theſe papillæ are little, ſoft, medullary, nervous prominences,

nences, lodged every where immediately under the cuticula. They are formed of the ſubcutaneous nerves, which, for this purpoſe, firſt lay aſide their outer membrane, and are left exceedingly ſoft and ſenſible; are continually moiſtened by a thin ſubtle humour, and only covered over and defended by the cuticle or ſcarf-ſkin. They are largeſt and moſt conſpicuous in thoſe parts chiefly deſigned for the office of *feeling*, viz. the tongue, the tips of the fingers and toes; and are contractile, and again expanſive at pleaſure.

Feeling, then, is thus effected: the tip of the finger, for inſtance, being applied to an object to be examined, by that intention of the mind the papillæ are emitted or elevated, and being lightly rubbed over the ſurface of the object, a motion is impreſſed on them, which being thence propagated by the nerves communicating with them to the common ſenſory, excites the perception of heat, cold, hardneſs, or the like.

Hence we ſee why *feeling* becomes painful when the cuticle is worn off, burnt, macerated, &c. and why, when the cuticle becomes thick, hard, callous, or cicatrized, &c. the ſenſe of *feeling* is loſt; elſe whence the numbneſs impreſſed by the torpedo? why that exquiſite painfulneſs under and at the roots of the nails? &c.

Feeling is, on many accounts, the moſt univerſal of our ſenſes, there being no animal without it. Pliny obſerves, that all animals have the ſenſe of *feeling*, even thoſe that are generally thought to have no other ſenſe, as oyſters and earth-worms. That naturaliſt declares it his own opinion, that all have the ſenſe of taſting likewiſe: *Exiſtimaverim omnibus ſenſum & guſtatum eſſe.* Nat. Hiſt. lib. x. cap. 71.

Naturaliſts obſerve, that ſpiders, flies, and ants have the ſenſe of *feeling* in a much greater perfection than men, though we have inſtances of perſons who could diſtinguiſh colours by their *feeling*, and others who could perceive what people ſaid by the ſame ſenſe. See DEAFNESS.

FEIGNED *Action*, in *Law*. See FAINT *action*.

Feigned *iſſue*. See *Feigned* ISSUE.

FEINT, in *Fencing*, a falſe attack, or a ſhew of making a ſtroke or puſh in one part, with deſign to bring the enemy to guard that part, and leave ſome other part unguarded where the ſtroke is really intended.

Feints are either ſingle or double, high or low, without or within, &c. in prime, in tierce, in quart, in demi, and in the whole circle; of one, two, or three meaſures.

The *ſimple feint*, is a mere motion of the wriſt, without ſtirring the foot, &c.

Feint, in *Muſic*, a ſemi-tone; the ſame with what we alſo call DIESIS.

Feint, in *Rhetoric*, a figure whereby the ſpeaker touches on ſomething, in making a ſhew of paſſing it over in ſilence. The Latins call this *prætermiſſio*.

FEL, in the *Materia Medica of the Ancients*, the name of a fruit much uſed by them in ſtomachic medicines, but very badly deſcribed to us. All that we know of the matter is, that there were three fruits brought from the Indies at that time, and called *bel*, *fel*, and SEL; they were all of the ſame virtues, and ſeemed nearly allied to each other in all reſpects. Serapio tells us, that the fruit *fel* was about the ſize of the piſtachia nut, and ſomewhat reſembled it in ſhape; and Avicenna obſerves, that it was an Indian medicine, bitter, and hot like ginger; and that it was uſed as a ſtomachic. He alſo ſays the ſame thing of the two other fruits; whence it appears, they were nearly the ſame thing.

Fel, in *Medicine*. See GALL.

Fel *terræ*, *gall of the earth*, a name by which ſome authors have called the ſmall centaury, becauſe of its great bitterneſs.

FELAGUS, in our *Law Books*, was uſed for a companion, or friend, who was bound in the decennary for the good behaviour of another. In the laws of king Ina, it is ſaid, if a murderer could not be found, the parents of the perſon ſlain ſhould have ſix marks, and the king forty; if he had no parents, then the lord ſhould have it; *et ſi dominus non habet*, felagus *ejus*. Leg. Inæ, cap. 15.

Felagus is ſaid to be, *quaſi fide cum eo ligatus*.

FELAPTON, in *Logic*, one of the moods of ſyllogiſms.

In a ſyllogiſm in *felapton*, the firſt propoſition is an univerſal negative; the ſecond, an univerſal affirmative; and the third, a particular negative.

FELE *homagers*, was anciently uſed for the faithful ſubjects. But it ſeems the word ſhould be written FEAL homagers.

FELIA, a name by which ſome of the chemical writers have called the ſulphurated or ſulphureous waters.

FELIS, in the Linnæan ſyſtem of *Zoology*, the name of a large genus of quadrupeds, of the order of the *feræ*; the characters of which are theſe: the fore-teeth are ſmall, obtuſe, and equal; they have three grinders; the tongue is furniſhed with prickles, all pointing backward; and the feet are formed for climbing, with claws which may be drawn in or exerted at pleaſure.

To this genus belong the lion, tiger, leopard, cat of the mountain, lynx, ounce, and domeſtic cat; which ſee under their reſpective heads.

Felis *volans*, the *flying-cat*, in *Natural Hiſtory*, the name of an animal deſcribed by Scaliger, and ſuppoſed to be what we now call the flying SQUIRREL, a ſpecies of ſquirrel which has a looſe membrane on each ſide, connecting the fore with the hinder legs, which it can diſtend at pleaſure, and by means of which it takes ſuch long leaps, that it ſeems to fly.

Felis *zibethicus*, in *Zoology*, a name given by many to the creature which produces the perfume called civet, and which we uſually call the CIVET-*cat*, being, in the Linnæan ſyſtem, a ſpecies of the VIVERRA. See *Tab.* II. *Quadrupeds*, N° 17.

FELLING *of Timber*. See TIMBER.

FELLOWS, or **Fellies**, in *Artillery*, are ſix pieces of wood, each of which forms an arch of a circle, and theſe, joined all together by duledges, make an entire circle; which, with a nave, and twelve ſpokes, form the WHEEL of a gun-carriage.

Their thickneſs is uſually the diameter of the ball of the gun they ſerve for, and their breadth ſomething more. Their dimenſions are as follow: for a 24 pounder, 5 inches thick, and 6 ½ inches broad; for a 12 pounder, 4 ½ inches thick, and ſix inches broad; for a 6 pounder, 4 inches thick, and 5 ½ broad, &c. made of dry elm.

FELLOWSHIP, *Company*, or *Partnerſhip*, in *Arithmetic*, is a rule of great uſe in balancing accounts amongſt merchants, and owners of ſhips; where a number of perſons putting together a general ſtock, it is required to give every one his proportional ſhare of loſs, or gain.

The *golden rule* ſeveral times repeated, is the baſis of *fellowſhip*, and fully anſwers all queſtions of that kind: for, as the whole ſtock is to the total thereby gained, or loſt; ſo each man's particular ſhare is to his proper ſhare of loſs, or gain. Wherefore, the ſeveral ſums of money of every partner are to be gathered into one ſum, for the firſt term; the common gain, or loſs, for the ſecond; and every man's particular ſhare for the third; and the golden rule is then to be wrought ſo many times as there are partners.

There are two caſes of this rule, the one *without*, the other *with time*.

Fellowship *without time*, is where the quantity of ſtock, contributed by each perſon, is alone conſidered; without any particular regard to the length of time that any of their monies were employed. An example will make this proceſs eaſy.

A. B. and C. freight a ſhip with 212 tun of wine; A. laying out 1342*l.* B. 1178*l.* and C. 630*l.* towards the ſame; the whole cargo is ſold at 32*l.* per tun. Query, what ſhall each perſon receive?

Find the whole produce of the wine by multiplying 212 by 32, which yields 6784. Then, adding together the ſeveral ſtocks, 1342, 1178, and 630, which make 3150, the work will ſtand thus:

$$3150 : 6784 \left\{ \begin{array}{l} 1342\text{—Anſw.—}2890{,}1993,\ \&c. \\ 1178\text{ ——— }2537{,}0006,\ \&c. \\ \ \ 630\text{ ——— }1356{,}8. \end{array} \right.$$

Proof 3150 6784

Fellowship *with time*, is where the time wherein the money, &c. were employed, enters into the account. An example will make it clear.

A. B. C. commence a partnerſhip the firſt of January, for a whole year. A. the ſame day diſburſed 100*l.* whereof he received back again, on the firſt of April, 20*l.* B. pays, on the firſt of March, 60*l.* and more, the firſt of Auguſt, 100*l.* C. pays, the firſt of July, 140*l.* and, the firſt of October, withdraws 40*l.* At the year's end their clear gain is 142*l.* Query, what is each perſon's due?

A.'s 100*l.* multiplied by three months, the time it was in, makes 300*l.* and the remaining 80, by nine months $=720$, in all 1020*l.* of A.'s contribution. For B. 60 into 10, gives 600; and 100 into 5, 500; in all 1100*l.* for B. For C. 140 into 3, gives 420; and 100 into 3, is 300; in all 720*l.* for C. Now, $1020+1100+720=2840$ for the common antecedent, and the gain 142, is for the general conſequent; the rule will ſtand thus:

$$2840 : 142 \left\{ \begin{array}{l} 1020\text{ —Anſw. }51 \\ 1100\text{———}55 \\ \ \ 720\text{———}36 \end{array} \right.$$

Proof 2840 142

N. B. All the particular times (if not ſo given) muſt be reduced into one denomination, viz. into years, months, weeks, or days.

FELL-*wort*, in *Botany*. See GENTIAN.

FELO *de ſe*, is he that commits felony, by willingly and deliberately killing himſelf. The Saxons call him *ſelf-bane*. He muſt be of the age of diſcretion, and *compos mentis*.

A *felo de ſe* is to be interred without Chriſtian burial, with a ſtake driven through his corpſe; and is to forfeit his goods and chattels real and perſonal; but he may make a deviſe of his lands, becauſe they are not ſubjected to any forfeiture. However, theſe forfeitures are generally ſaved by the verdict of the coroner's jury, who find lunacy. See SUICIDE.

If a perſon *felo de ſe* is ſecretly made away with, ſo that the coroner cannot view his body, preſentment is to be made of it by juſtices of peace, &c. in order to entitle the king to the forfeiture of goods.

FELON, in *Surgery*. See WHITLOW.

FELON-*wort*. See NIGHTSHADE.

FELONY, FELONIA, was anciently uſed for a violent and injurious action of a vaſſal, or tenant, againſt his lord.

Menage derives the word from *felonia*, formed of *felo*, or *fello*, which occurs in the capitulars of Charles the Bald, and is ſuppoſed to come from the German *fehlen*, or Saxon *faelen*, *to fail*, or *be delinquent*. Others derive it from the barbarous Latin *vilania*. Lord Coke, Nicod, &c. derive it *a felle*, *gall*, as being ſuppoſed to be done maliciouſly. Others derive it from the Greek φηλειν, *to deceive*. But the learned Spelman, with greater probability, deduces it from two northen words, viz. *fee*, which ſignifies *fief*, *feud*, or *beneficiary eſtate*, and *lon*, which ſignifies *price* or *value*; ſo that *felony* is the ſame as *pretium feudi*, the conſideration for which a man gives up his fief; agreeable to the common expreſſion, ſuch an act is as much as your life, or eſtate, is worth.

In this ſenſe *felony* was equivalent to petty-treaſon, or it was a crime next below high-treaſon. The crime of *felony* imported confiſcation of the fee, to the profit of the lord.

All thoſe acts, whether of a criminal nature or not, which at this day are generally forfeitures of copy-hold eſtates, are ſtyled *feloniæ* in the feudal law.

FELONY was alſo applied to an injury of the lord to his vaſſal, which imported a forfeiture of the homage and ſervice thereof, and made it revert to the ſovereign.

Fidelity and *felony* are reciprocal between the LORD and the vaſſal.

FELONY is alſo uſed, in *Common Law*, for any capital offence, perpetrated with an evil intention.

Though capital puniſhment does by no means enter into the true idea and definition of *felony*, the true criterion of which is forfeiture; for in all *felonies* which are puniſhable with death, the offender loſes all his lands in fee-ſimple, and alſo all his goods and chattels; but in ſuch as are not ſo puniſhable, his goods and chattels only.

In a ſtricter ſenſe, *felony* denotes all capital crimes below treaſon.

Felony includes ſeveral ſpecies of crimes, whoſe puniſhment is the ſame, viz. death: ſuch as petit-treaſon, murder, theft, homicide, ſodomy, rape, wilful burning of houſes, receiving of ſtolen goods; breach of priſon, reſcue and eſcape, after one is arreſted or impriſoned for *felony*, and divers others found in the ſtatutes, which are daily making crimes *felony*, that were not ſo before.

Felony by the common law is againſt the life of a man, as murder, manſlaughter, felo de ſe, ſe defendendo, &c. againſt a man's goods, ſuch as larceny and robbery; againſt his habitation, as arſon and burglary; and againſt public juſtice, as breach of priſon.

Piracy, robbery, or murder upon the ſeas, are *felonies* puniſhable by the civil law, and alſo by ſtatute.

Felony is eaſily diſtinguiſhed from treaſon.

From leſſer crimes it is diſtinguiſhed by this, that its puniſhment is death, though not univerſally; for petty-larceny, i. e. ſtealing of a thing under the value of twelve-pence, is *felony*, according to Brook, though the crime be not capital, but only a loſs of goods. The reaſon Brook gives for its being *felony* is, that the indictment runs, *felonice cepit*.

Till the reign of Henry I. *felonies* were puniſhed by pecuniary fines; that prince firſt ordered *felons* to be hanged, about the year 1108.

Felony is of two kinds; the one *lighter*, which for the firſt time is entitled to the benefit of CLERGY; as manſlaughter. The other more heinous, is not allowed the privilege.

Felony is alſo puniſhable by loſs of all lands, not intailed; and all goods and chattels, both real and perſonal; though the ſtatutes make a difference in ſome caſes concerning lands, as appears by ſtat. 37 Hen. VIII.

Felony ordinarily works corruption of blood, unleſs the ſtatute, ordaining the offence to be *felony*, provide otherwiſe; as the ſtat. 39 Eliz. cap. 17.

Perſons indicted of *felony*, &c. where there are ſtrong preſumptions and circumſtances of guilt, are not repleviſable; but for larceny, &c. when perſons are committed, who are of good reputation, they may be bailed.

FELONY, *appeal of*. See APPEAL.

FELONY, *compounding of*. See THEFT-BOTE.

FELONY, *diſcovery of*. See DISCOVEY.

FELONY, *miſpriſion of*. See MISPRISION.

FELT, a kind of ſtuff, either of wool alone, or of wool and hair; neither ſpun, croſſed, nor woven, but deriving all its conſiſtence from its being wrought, and fulled with lees and ſize, and afterwards faſhioned on a block or mould, by help of fire and water.

Caſtors, camels, and coneys hair, lambs, and ſheeps wool, &c. are the moſt uſual ingredients of *felts*; and hats of all kinds are the works they are chiefly employed in.

The *felt* intended for a hat, being ſufficiently fulled, and prepared, is reduced into one piece, ſomewhat in the figure of a large funnel; in which ſtate it remains ready to be put into form, and become a HAT.

FELUCCA, or FELUCCO, a little veſſel with from ten to ſixteen banks of oars, not covered over, much uſed in the Mediterranean as a paſſage boat. The natives of Barbary employ boats of this ſort as cruiſers.

The word is formed from the Arabic *felkon*, *a ſhip*.

It has this peculiarity, that the rudder may be applied either in the head or ſtern; there being diſpoſitions in both to receive it. For ſize, it may be compared to a ſloop or ſhaloop.

FEMALE, the ſex that conceives and bears fruit.

An animal that generates within itſelf, is called *female*; and that which generates in another, MALE.

The *female*, in quadrupeds, and even in birds, is uſually ſmaller and weaker than the male; though in birds of prey, as the falcon, hawk, &c. it is otherwiſe; the *female* being bigger, ſtronger, bolder, hardier, and more courageous.

The like is obſerved in moſt inſects, particularly ſpiders; to that degree, that M. Homberg aſſures us, he has weighed five or ſix male garden-ſpiders againſt one *female* of the ſame ſpecies, which has been equal to them all.

For the numeral proportion of males to *females*, ſee MARRIAGE.

Naturaliſts alſo diſtinguiſh male and *female* plants; male and *female* flowers, &c.

FEMALE *ſcrew*. See SCREW.

FEMBLE, the name given by the common people of Lincolnſhire to the female hemp. There is no country where hemp ſucceeds better than in this, and great quantities are annually raiſed there.

FEME *covert*, in *Law*, denotes a married woman; who is alſo ſaid to be under covert-baron.

By the law of England, a *feme covert* committing a bare theft in company with, or by coercion of her huſband, is not deemed guilty of felony; neither does ſhe become acceſſary to a felony, by receiving her huſband who has been guilty of it, as he does by receiving her. But if ſhe commit a theft by the bare command of her huſband; or treaſon, murder, or robbery, in his company, or by his coercion, or keep a bawdy-houſe with him, ſhe is puniſhable in the ſame manner, as if ſhe was ſole; and generally if ſhe be guilty of any offence not capital, ſhe may be indicted, &c. without making the huſband a party. But if ſhe incur the forfeiture of a penal ſtatute, the huſband muſt be made defendant in the action or information. Hawk. Pl. of the Crown, book i. chap. 1. See COVERTURE.

FEME *ſole*, an unmarried woman, whoſe debts contracted before marriage become thoſe of her huſband after it. See CUSTOM *of London*.

FEMININE, or FOEMININE, in *Grammar*, one of the genders of nouns.

The *feminine* gender is that which denotes the noun or name to belong to a female. In the Latin, the *feminine* gender is formed of the maſculine, by altering its termination; particularly by changing *us* into *a*. Thus, of the maſculine *bonus equus*, *a good horſe*, is formed the *feminine*, *bona equa*, *a good mare*; ſo, of *parvus homo*, *a little man*, is formed *parva fœmina*, *a little woman*, &c.

In French, the *feminine* gender is expreſſed, not by a different termination, but a different article: thus, *le* is joined to a male, and *la* to a female.

In Engliſh, we are generally more ſtrict, and expreſs the difference of ſex, not by different terminations, nor by different particles, but different words; as *boar* and *ſow*, *boy* and *girl*, *brother* and *ſiſter*, &c. though ſometimes the *feminine* is formed by varying the termination of the male into *eſs*; as in *abbot*, *abbeſs*, &c.

FEMININE *rhymes.* See RHYME.

FEMOREUS, in *Anatomy*, a name given by ſome of the authors on theſe ſubjects to a muſcle, more generally called the CRURÆUS or *cruralis.*

FEMORIS *quartus*, in *Anatomy*, a name given by Veſalius and others to one of the muſcles of the thigh, called by the later writers from its ſhape *pyriformis.*

FEMORUS *ſextus*, in *Anatomy*, a name given by Spigelius and others to a muſcle, now generally called the ILIACUS *internus.*

FEM-OWL, an Engliſh name uſed in Shropſhire, and ſome other counties, for the *caprimulgus*, or goat-ſucker, called alſo the *churn*-OWL. It is a very beautiful bird, and more reſembles the cuckow than the owl-kind.

FEMUR, or *Os* FEMORIS, in *Anatomy*, the thigh-bone. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. *n.* 20. and *fig.* 7. *n.* 22. See OS.

Dionis derives the word *femur*, from *fero*, becauſe it bears the whole weight of the body.

The *femur* is the largeſt and ſtrongeſt bone in the body, and its articulations are proportioned to its bulk and ſtrength. Its upper part is jointed with the *iſchium*, by enarthroſis, the head of the *femur* being received into a cavity of the *iſchium*; and the two kept together by a ſtrong cartilage or bandage. The lower end is articulated with the *tibia* by *ginglymus*, two heads of the *femur* being received into two cavities of the *tibia*; beſide a cavity between the two heads, which receives a proceſs of the *tibia.*

The *femur* is pretty much incurvated, or bent, the convex part being before, and the concave behind. It is divided into three parts; the *upper*, the *middle*, and the *lower.*

The *upper* conſiſts of a head and a neck, and two tuberoſities; the extremity or head is round and big, and received into the *acetabulum* of the coxendix, wherein it is tied by two ligaments; the one from the top, the other from the bottom of the *acetabulum*, but both inſerted into the middle of the head. This head is an epiphyſis in children, and in ſome ſubjects remains ſo for a long time, and is therefore liable to be ſeparated from the neck by any violent force. Immediately under the head is the neck of the *femur*, which is a ſmall, long, and a little oval apophyſis, making an angle with the body of the bone; by means whereof the thighs and feet are kept at a due diſtance from each other, to make our ſtanding the firmer; beſide that the obliquity of the neck conduces to the ſtrength of the muſcles, which muſt otherwiſe have paſſed too near the center of motion. The two tuberoſities are called the greater and leſs *trochanters.*

The *middle* part or ſhank of the *femur* is round, ſmooth, and poliſhed, on its fore-ſide, and rough on the hind-ſide; along which there runs a ſmall ridge, the whole length of the bone, called *linea aſpera*, ſerving for the inſertion of muſcles.

The lower part of the *femur* is divided by a ſinus in the middle, into two heads or apophyſes, called *condyli*, which make the *ginglymus* above mentioned; being both received into the ſinus of the *tibia.*

Between the hind-parts of the head is a ſpace for the paſſage of the great veſſels and nerves, which go to the leg.

The *femur* has a very large cavity, running its whole length, filled, like the reſt, with marrow. The curvity of the *femur* makes it ſerve as a buttreſs to the body, to prevent its falling, or bearing too much forward.

Surgeons and bone-ſetters ſhould take care, that in fractures of the *femur* they do not endeavour to ſet it ſtrait, which is againſt nature. See THIGH.

Cartilages of the Os FEMORIS. No part of the *os femoris* is covered, except the uniform convexity of the head, and the articular portion of the lower extremity. The trochanters have no true cartilage, what appears like it being only the remains of tendinous inſertions; the cartilaginous ſubſtance, which to a certain age unites the *apophyſes* to the body of the bone, does not belong to theſe, becauſe it is only found in the time of youth, and in adults is converted into a bone. The cartilaginous matter, by which the head of the *os femoris* is cemented, deſerves, however, to be obſerved here, becauſe that *apophyſis* has been ſeparated by violent falls. The convexity of the head of the *os femoris*, all the way to its ſymphyſis with the neck, is covered with a very ſmooth, ſhining cartilage. A little below the middle of this convexity, and ſomething toward the back part, there is a depreſſion in the ſhape of a creſcent, the cartilage being here interrupted by the inſertion of the internal articular ligament of the head of the *os femoris.* The cartilage which covers the lower extremity of the bone is exactly fitted to the ſemi-oval convexity of the inferior ſurface of each condyle, and to the pulley formed by their union. Winſlow's Anatomy, vol. i. p. 126.

Ligaments of the Os FEMORIS. The *os femoris* is connected by its upper extremity to the *os innominatum*, and by the lower to the bones of the leg, by means of ſeveral ligaments. The ligaments of the upper extremity are two in number, one which ſurrounds the whole articulation thereof, with the cotyloide cavity, and one contained in the articulation. The firſt is termed the orbicular ligament of the head of the *os femoris*; the other the internal ligament; and to theſe may be, though but improperly, added a third, which is of the nature of a capſular ligament. The orbicular ligament is the moſt conſiderable, the largeſt, and the ſtrongeſt, of all the articular ligaments of the human body; it is fixed quite round the border of the cotyloide cavity, and is made up of ſeveral ſorts of fibres, and is much ſtronger and thicker in ſome parts than in others; the other, or internal ligament of the head of the *os femoris*, reſembles a flat cord, and is compoſed of a bundle of flat fibres, cloſely interwoven. The ligaments of the lower extremity of the *os femoris*, by which this bone is connected with the leg, are ſix in number, one poſterior, two lateral, the middle, or crucial, and the capſular. The crucial ligaments lie within the joint, and are fixed by one end to the back part of the notch, or opening, which parts the two condyles: theſe are ſurrounded by the capſular ligament, but all the reſt lie on the outſide thereof, being cloſely joined to it. Of the two lateral ligaments, one is internal, and broad, being fixed to the tuberoſity of the internal condyle; the other is external, and narrow, and is fixed to the tuberoſity of the external condyle. The poſterior ligament is broad and thin, and being fixed a little above the convexity of the external condyle, it thence deſcends obliquely behind the great notch, and external condyle. The capſular ligament is, as it were, glued to the three former, and is fixed quite round the inferior extremity of the *os femoris*; at a ſmall diſtance above the anterior, lateral, and poſterior parts of the cartilage, and above the poſterior part of the great notch; and from the cartilage and notch, through the ſmall ſpace upward already mentioned, it covers the bone, and afterwards is inverted downward, to form the capſula for the mucilaginous liquor of the joint. Winſlow's Anatomy, p. 126, &c.

FEMUR *moventium ſextus*, in *Anatomy*, the name given by Veſalius and ſome others, to the muſcle now called the PSOAS *magnus.*

FEN, in *Geography*, a kind of wet land, or rather moraſs.

Fens are of two ſorts: the firſt of a boggy conſiſtence, compoſed of water and earth intermixed; ſcarce firm enough to ſuſtain the tread of a man.

The ſecond are pools, or collections of waters, with pieces of dry land raiſed here and there, above the ſurface thereof.

The former kind neither receive nor emit any river; but the latter are frequently the heads or ſprings of rivers; ſuch is the head of the Tanais, &c.

What the farmers call *fens* or *fenny* lands, are of two kinds: firſt, thoſe which are only drowned by upland floods and great rains, and are very large and lie upon the levels, ſo that the water cannot run off from them, but muſt be there till the hot weather and winds dry it off; and, ſecondly, thoſe that are conſtantly wet, only that in dry times they are covered with ſhallower water than in others. In draining of theſe ſorts of lands, which is the only means of making them uſeful to the public, two things are to be conſidered, firſt the laying them perfectly dry, which can only be effected by making cuts and drains for carrying off the water from their loweſt parts, and thence from the whole. Or ſecondly, the taking off from them the great additional wetting they have from land floods, and long continued rains. The firſt method makes a perfect cure, the other is only a temporary relief, and makes the lands more ſerviceable in dry times, and leaves leſs for the ſun to dry up.

Whatever is attempted in regard to the draining of *fens*, the loweſt part of the ground is to be found out firſt, and the overflowing from great rains, and from land floods, muſt be provided for, in the carrying off that way; for ſhould this be neglected, all the labour and coſt employed on the other principle would be thrown away. If it is found that this can be done, there muſt afterwards be cut a large drain through the middle of the land, and ſeveral ſmaller drains from all parts communicating with this.

The great drain muſt be dug deep enough to drain the whole level; and this, and all the others, muſt be made narroweſt at the head, and wider all the way to the mouth, where they muſt be wideſt of all.

Theſe drains muſt be all well cleanſed from mud and weeds every ſpring and autumn, and the water from land floods muſt be kept from coming in upon theſe lands, as much as poſſible, that there may be the leſs to be drained off; the lower edges of the *fen* land muſt be for this purpoſe guarded with banks to turn the water into other channels. In Eſſex they have many lands that lie below the high-water mark, and are above the low-water mark, and have land floods or fleets running through them, which make a ſort of ſmall creek. Theſe lands they have a very eaſy way of draining, though they are naturally very moiſt when they firſt encloſe them from the ſea; they do it with a bank, which they extend from one ſide of the land they deſign to take in to the other, excepting a ſpace that they leave, where the creek, or land flood, runs into the ſea. Then they prepare a wooden frame, well planked, and of conſiderable thickneſs, fitted to the head of the creek, and capable of ſhutting it wholly up; in this frame they make ſeveral holes, in which are placed wooden troughs, made each of four boards, and ſuited in ſize and number to the quantity of water that is to be diſcharged through them from the land floods. Each of theſe trunks is open toward the creek; but on the ſea-ſide it has a door or flap, which opens when the land flood preſſes againſt it, and gives it free paſſage out; but when the ſea-water is riſen to the height of it, and preſſes it, is ſhut by the force, and no ſea-water is let in. When this head is prepared, they let it in, and ſtopping up the whole creek, they continue the banks on each ſide till they meet it: thus all the land floods are let out at low water, and not a drop of ſea-water can be admitted, ſo that the lands are kept dry and uſeful, which were before rendered uſeleſs, by being drowned with ſalt-water, at every high-water mark. The freſh-water of the creek is thus kept unmixed with the ſea-water, and therefore affords good drink for the cattle, which is commonly very difficult to be had in this ſort of lands, the tides ſpoiling what freſh waters there are every time they come up.

Several ſtatutes have been made for draining fens, chiefly in Kent, Cambridgeſhire, Bedfordſhire, and Lincolnſhire. 4 Jac. I. cap. 8. & 13. 15 Car. II. cap. 17. 16. 17 Car. II. cap. 11. 11 Geo. II. cap. 34. & cap. 39. 21 Geo. II. cap. 18. & 22 Geo. II. cap. 11. 16 & 19.

The wet grounds called *fens* in Lincolnſhire and elſewhere in England, bring many advantages to the inhabitants of thoſe counties. Fowl and fiſh are very plentiful in them. The pike and eels are large and eaſily caught, but they are uſually coarſe. The duck, mallard, and teal, are in ſuch plenty, as is ſcarce to be conceived; they are taken in DECOYS, by prodigious flocks at a time. They ſend theſe fowl to London from Lincolnſhire, twice a week on horſeback, from Michaelmas to Lady-day; and one decoy will furniſh twenty dozen, or more, twice a week, for the whole ſeaſon, in this manner. The decoy-men contract with the people who bring them to London, at a certain rate, and they are obliged to take the whole number that is catched off their hands. Two teals are uſually reckoned equal to one duck, and ſix ducks and twelve teals are accounted a dozen of wild fowl; and the uſual market-price is about nine ſhillings for ſuch a dozen. About Midſummer, when the moulting ſeaſon is, a great number are deſtroyed alſo by the people of the neighbourhoods. The poor birds at this time are neither able to ſwim nor fly well; and the people going in with boats among the reeds, where they lie, beat them down with long poles. A little before Michaelmas, vaſt flights of theſe birds arrive at the decoys from other places; they ſoon grow fat in them, and continue there a prey to the maſters or owners, as long as the decoys are unfrozen; but when they are iced over, they fly away again, and go to the neighbouring ſeas for food. Phil. Tranſ. N° 223.

The *fens* alſo abound in a ſort of herbage that is very nouriſhing to cattle; ſheep and horſes always grow fat upon it. Theſe *fens* are common, and the owners of cattle mark them, that they may be known. It is remarkable, that though all is open, the cattle uſed to one particular ſpot of ground, ſeldom leave it, but the owner may find them always in or near the ſame place. The people receive great advantage from the geeſe that abound here, beſide the food which they afford; that is, from their feathers and quills; and the produce of theſe is ſo great, that the cuſtom-houſe books in the town of Boſton ſhew, that there are frequently ſent away in one year three hundred bags of feathers; each bag containing a hundred and a half weight. Each pound of feathers brings in the owner two pence; and it may be thought ſtrange by people unacquainted with theſe things, but it is a certain truth, that the owners pluck the geeſe five times a year for the FEATHERS, and once for their quills. Each plucking affords about a pound; and many people have a thouſand geeſe at a time, or more. They are kept at no charge, except in deep ſnowy weather, when they are obliged to feed them with corn. Oats alſo grow well in many of the *fen* countries, and in good ſeaſons bring increaſe and great advantage to the owner. There is alſo another vegetable of great profit to them: this is the *rapum ſylveſtre*, the ſeeds of this they call cole-ſeed; and they make an oil from it, of great uſe in trade. They grind the ſeed between two large ſtones, the one ſtanding perpendicularly on the other. The ſtones are made of a ſort of a black marble, and are brought from Germany. They ſometimes turn them by ſails, and ſometimes by the drains which carry off the water from the *fen* lands.

The *fens* lying low, and being of a vaſt extent, are very ſubject to be overflowed by waters from the neighbouring high countries; and though great care and expence is uſed to keep them dry, they are often like a ſea, and the ſheep are obliged to be carried off in boats, and people to live in their upper rooms, and be ſupplied with proviſions alſo by boats. See BOG and DRAIN.

FEN-*cricket*. See *Mole*-CRICKET.

FEN is alſo the name of a very pernicious diſtemper to which hops are ſubject. It conſiſts of moſs or mould, which ſpreads itſelf with great rapidity, and does great damage in the hop-grounds.

FENCE, in *Agriculture*, is a hedge, ditch, wall, or bank, made round fields, woods, gardens, &c. The incloſures of grounds are in ſome places made by ditches full of water, and in others by walls either of ſtones alone, or of ſtones and earth. Where theſe materials are in plenty, they make very good *fences*, but in other places the common method is by quick-hedges. See EARTH-*banks*, HEDGE, and WALL.

Fences for parks, and ſometimes for gardens, are made of paling; which, if winter-fallen oak be uſed, will laſt many years; the pales ſhould be cleft thin, and the rails cut triangular, and the poſts ſhould not be placed too far aſunder. *Fences* round parks, where fallow-deer are kept, ſhould be ſix feet and a half high; but where there are red deer, the *fence* ſhould be one foot higher. Parks are ſometimes fenced with walls of brick or ſtone.

The white thorn is the beſt of all trees to plant for a *fence*, being a tolerably quick grower, and laſting a long time, and making a very handſome *fence*. It will ſucceed on any ſoil where a ditch and new bank are made, except it be wholly of gravel or ſand, and even in this caſe it will thrive, if there happen a rainy ſeaſon after the planting of it.

Some raiſe it by ſeeds, and others by young plants; the latter is the moſt expeditious way, for the ſeeds lie two years in the ground before they ſhoot, but they grow very faſt after two or three years. Some prepare the haws, or fruit of the white thorn, by tying them up in a hair bag, and ſoaking them all winter; after this, if they are ſown in February or March, they will come up the firſt year, and grow better than any other way.

Where ſets are ſcarce, it is a good way when the underwoods are *felled*, or rather the year before, to ſow haws and ſloes in them, and they will furniſh a ſupply of young plants for hedges, without doing the woods any harm, becauſe they may be drawn before they come to be too large. The white thorn is alſo of conſiderable value in ſome ſort of works; its root becomes very beautifully veined when old, and elegant boxes and combs are made of it. It is uſed by ſome alſo in the buſineſs of inlaying, and would be more ſo, if its beauty were more known. The crab and the ſloe-tree, or black thorn, come next in value to the white thorn, for quicks for *fences*.

The crabs are to be ſown by kernels, pulp and all, and they will come up the firſt year; and a ſet of young crabs planted thick enough, make an excellent *fence*. The black thorn is not ſo much approved, becauſe it is not ſo ſure of growing, and if it does, its roots ſpread, and it is apt to run in too much upon the land. The buſhes of black thorn are however the beſt of any for dead hedges, and for mending of gaps; and they have another advantage over the white thorn, which is, that cattle are not ſo apt to crop them. The black thorn will grow on any ſoil where the white grows, but the richer the mould is, the better it will thrive.

Holly is another excellent ſhrub for a *fence*; it is indeed much the beſt of all the *fence* buſhes; but it grows ſo ſlow, and is ſo uncertain, that the farmers are afraid of waiting for it, or of truſting to it; but where it ſucceeds, it makes amends for the delay in its thickneſs, height, and ſtrength. It is to be raiſed like the white thorn, either by ſets or berries, and the berries in the ſame manner lie two years in the ground before they come up. It will grow on any ſoil, even on the drie gravel, or among ſtones and rocks. It delights moſt in light grounds. If it be raiſed in plants, they ſhould be about the thickneſs of a man's thumb, and planted in a moiſt ſeaſon, either in ſpring or autumn; they muſt be ſhade ſhaded well with ſtraw or halm after they are ſet, and muſt be carefully watered, as ſoon as they begin to ſhoot, otherwiſe they will all periſh.

If any of them ſeem to periſh, they muſt be cut off cloſe at the roots, and they will often ſprout out vigorouſly thence again. The ground muſt be dug up all about them at times, which very greatly promotes their growth; and the farmer muſt keep his ſheep from them, for they are very fond of cropping the young ſprouts.

Field mice are apt to gnaw the roots of holly in hard winters; and many of theſe trees are ſuppoſed to be killed by the froſt, when the teeth of theſe little vermin have really done the miſchief.

The beſt way of raiſing a *fence* of theſe trees, is to plant them with the quick or white thorn, four plants of that to one of holly; theſe will thrive very well together; and while the white thorn grows very ſpeedily, the holly will take its time: as this grows large, the white thorn may be pulled up by degrees, till at length there is only the holly left; and if this is found not thick enough, the boughs of it which grow neareſt the ground may be laid down and covered with earth, and they will ſend up innumerable ſuckers, which will fill up all the gaps.

Beſide theſe there are very good *fences* made of furz, of alder, and even of elder, in ſome places, on proper ſoils. Elder ſticks, or truncheons, ten or twelve foot long, are to be cut and ſtuck in the bank ſlope-wiſe each way, ſo as to make a chequer-work. This makes the ſpeedieſt ſhelter of any. When the trees grow old, they are alſo ſtill of value; their wood is a very fine one for turning, and is at leaſt equal to box, if not ſurpaſſing it. The elder-tree makes an extremely good fence in watery places; and when planted on the banks of rivers is of great uſe in preventing them from being undermined by the current; the roots being very numerous, ſtrong, and compact. It is always ſending ſuckers alſo from its loweſt roots, which makes it very uſeful where ſtreams wear away their banks, and are widening their courſe.

The furze buſh, though an irregular grower, makes an excellent *fence* on dry banks, where nothing elſe will grow. It may be raiſed either by ſeeds, or by ſets; but the ſeeds are the beſt, eſpecially thoſe of the French furze, which grows to the height of fifteen or ſixteen foot, and is not ſubject to ſpread with its roots, and get into the good ground, as our common heath furze will always do. This has the advantage of being a very ſpeedy grower. It will make a very good hedge in three years, if taken care of. It muſt be kept well weeded while young; and the ſheep muſt be kept away from it; for they are very fond of its young ſhoots. But it only requires this care for a little while; for when grown up to any conſiderable height, nothing can hurt it. If a furze-hedge be clipped, it will grow large and thick; but if left to itſelf, it will run up to a conſiderable height, and afford good ſhelter, and yield an excellent fuel. They ſow much of the poor land in Devonſhire with furze, and make a very conſiderable advantage of it. Miller's Gard. Dict. and Mortimer's Huſbandry.

Fences made with the horn-beam plant are very common in Germany. On a parapet of earth, with a ditch on each ſide, the horn-beam ſets are planted in ſuch a manner, that every two plants may be brought to interſect one another, in the form of St. Andrew's croſs. The bark is ſcraped off in the place where they interſect, and they are bound together with ſtraw; the two plants unite together in a kind of indiſſoluble knot, and puſh from thence horizontal ſlanting ſhoots, which form a ſort of paliſado, or CHEVAUX *de friſe*. Hedges of this kind, pruned annually, will, in a few years, render the *fence* impenetrable in every part.

FENCE-*month* *(menſis prohibitionis*, or *menſis vetitus)* is a month wherein the female deer fawn; for which reaſon it is unlawful to hunt in the foreſt during that time.

It begins fifteen days before Midſummer, and ends fifteen days after; being in all thirty days.

There are alſo certain *fence*, or *defence* months, or ſeaſons for fiſh, as well as wild beaſts; as appears by ſtat. Weſtm. 2. cap. 13. in theſe words:

"All waters, where ſalmons are taken, ſhall be in *de-*
"*fence* for taking of ſalmon, from the nativity of our
"Lady, unto St. Martin's day. And likewiſe, young
"ſalmons ſhall not be taken or deſtroyed by nets, &c.
"from the midſt of April, to the nativity of St. John
"Baptiſt," &c.

FENCING, the art of defence; or of uſing the ſword, to wound an enemy, and preſerve one's ſelf from his attacks.

Fencing is one of the exerciſes learnt in the academies, &c.

The art of *fencing* is acquired by practiſing with FOILS, called in Latin *rudes*; whence *fencing* is alſo denominated *gladiatura rudiaria*.

Pyrard aſſures us, that the art of *fencing* is ſo highly eſteemed in the Eaſt Indies, that none but princes and noblemen are allowed to teach it. Theſe maſters wear a badge or cognizance on their right arms, called in their language *eſaru*, which is put on with great ceremony, like the badges of our orders of knighthood, by the kings themſelves.

Montaigne informs us, that when he was a youth, the nobility all ſhunned the reputation of being good *fencers*; as ſomething too ſubtle, and deſigning, and apt to corrupt virtuous manners.

Fencing is divided into two parts, *ſimple* and *compound*. *Simple* is that performed directly and nimbly, on the ſame line; and is either *offenſive*, or *defenſive*. The principal object of the firſt is whatever may be attempted, in puſhing, or making paſſes, from this or that point, to the moſt uncovered part of the enemy. The ſecond conſiſts in parrying, and repelling the thruſts aimed by the enemy.

The *compound*, on the offenſive ſide, includes all the poſſible arts and inventions to deceive the enemy, and make him leave that part we have a deſign on, bare, and unguarded, upon finding we cannot come at it by force, nor by the agility of the ſimple play.

The principal means hereof are FEINTS, appeals, or appels, which conſiſt in a ſudden beat of your blade on the contrary ſide to that on which you join your adverſary, and a quick diſengagement to that ſide again, claſhings, and entanglings of ſwords, half thruſts, &c. and in the defenſive, to puſh in PARRYING.

The proper attitude in *fencing* is to hold the head upright, though the body hath an inclination forward on a longe, and all the weight reſts on the left haunch when on GUARD. The feet, hand, body, arm, and ſword, muſt be to the line. For an explication of other terms in this art, ſee the articles BEAT, CAVEATING, FLANCONADE, GLIZADE, LOCK, LURCH, THRUST, &c.

FEND, in the *Sea Language*, imports the ſame as *defend*.

Hence the phraſe *fending the boat*, &c. that is, ſaving it from being daſhed againſt the rocks, ſhore, or ſhip's ſide. Hence alſo

FENDERS, any pieces of old cable-ropes, or billets of wood, &c. hung over the ſhip's ſide, to *fend* or keep other ſhips from rubbing againſt her; or to prevent her from ſtriking or rubbing againſt a wharf or quay.

FENDER-*bolts*. See BOLTS.

FENDUE *en pal*, in *Heraldry*, a French phraſe, applied to a croſs, to denote it cloven down from top to bottom, and the parts ſet at ſome diſtance from one another.

FENESTRA, in *Anatomy*, a name applied to two holes, or apertures, in the inner EAR.

The *feneſtræ* are two openings in the labyrinth; the firſt of them is incloſed by the baſis of the *ſtapes*, and from its oval figure denominated *feneſtra ovalis*.

The latter, called *rotunda*, is cloſed with a tranſverſe tranſparent membrane, placed a little within the ſurface of its aperture.

Theſe *feneſtræ*, with the whole labyrinth, are comprehended in that part of the *os temporum*, properly called from its hardneſs *petroſum*.

FENGELD, in our *Ancient Writers*, is uſed for a tax or impoſition raiſed for repelling of enemies.

It comes from the Saxon *feind*, an *enemy*, and *geld*, *money*.

FENNEL, *Fœniculum*, in *Botany*. Linnæus has joined this genus to *anethum*. See DILL. Its characters are theſe: it hath an umbellated flower, the great umbel is compoſed of many ſmaller, which have no involucrum; the flowers have five incurved petals, and five ſtamina, terminated by roundiſh ſummits; the germen is ſituated under the flower, ſupporting two ſmall ſtyles, crowned by roundiſh ſtigmas, which afterward turns to an oblong fruit, deeply channelled, dividing into two parts, each containing a ſingle ſeed, flat on one ſide, but convex and channelled on the other. There are three ſpecies.

The common *fennel* is ſo well known, as to need no deſcription. It has a ſtrong fleſhy root, which penetrates deep into the ground, and will continue ſeveral years; it flowers in July, and the ſeeds ripen in autumn. The beſt time to ſow the ſeeds, is ſoon after they are ripe; the plants will come up in the ſpring, and require no other care than to keep them clean from weeds; and it will grow in any ſoil or ſituation. The leaves, ſeed, and root of this, are uſed in medicine; the root is one of the five opening roots, and the ſeed one of the greater carminative ſeeds. There is a ſimple water made from the leaves, and an eſſential oil from the ſeed and leaves. Miller's Gard. Dict.

The oil obtained from the leaves on the upper part of the plant is much finer, lighter, and more ſubtle, than the oil obtained from the lower leaves. The former oil ſwims on water, and the latter oil ſinks. Neumann.

There is alſo a ſtrong water, or brandy, made of the ſeeds of *fennel*, called *fennel-water*. The ingredients are *fennel* ſeed, liquorice, brandy, and white wine, which are diſtilled together; and to the eſſence thereof are added ſpirit of wine, ſugar, and ſweet almonds; the whole is then ſtrained, &c.

The leaves of the ſecond ſort, called ſweet *fennel*, are very long and ſlender, growing more ſparſedly, and not ending in ſo many points as thoſe of the common ſort; the ſtalks do not riſe ſo high; the ſeeds are longer, narrower, and of a lighter colour. The ſeed is generally imported from Germany or Italy, and are by ſome preferred to thoſe of the common ſort, as being much ſweeter. Theſe ſeeds are an uſeful ſtomachic and carminative, and are ſometimes given in powder, from a ſcruple to a dram, and ſometimes candied.

The third ſort is ſuppoſed to have been brought from the Azorian iſlands, and has been long cultivated in Italy as a ſallad herb, under the title of FINOCHIA. There are not many Engliſh palates which reliſh it; nor is it eaſy to be furniſhed with good ſeeds: thoſe which are annually brought from Italy are ſeldom good; and it is difficult to preſerve the plants through the winter in England.

The ſeeds of this ſort are narrow, crooked, and of a bright yellow colour; they have a very ſtrong ſmell, like aniſeed, and are very ſweet to the taſte. Miller.

As to the method of cultivating this plant, ſee FINOCHIA.

FENNEL-*flower*, or *Devil in a buſh*, *Nigella*, in *Botany*, a genus of the *polyandria pentagynia* claſs. Its characters are theſe: the flower has no empalement, but a leafy perianthium; it has five oval, obtuſe, plain petals, which ſpread open, and are contracted at their baſe, and eight very ſhort nectariums, ſituated in a circle, each having two lips, the exterior larger, the inferior bifid, plain, and convex. It has a great number of awl-ſhaped ſtamina, which are ſhorter than the petals, terminated by obtuſe, erect, compreſſed ſummits; and in ſome five, in others ten, oblong, convex, erect germina. The germina afterward become ſo many oblong, compreſſed capſules, divided by a furrow, but connected within, filled with rough angular ſeeds. There are ſeven ſpecies.

All theſe plants may be propagated by ſowing their ſeeds upon a bed of light earth, where they are to remain. The ſeaſon for ſowing theſe ſeeds is March; in July they will produce their flowers, and their ſeeds will ripen in Auguſt, when they ſhould be gathered and dried. Miller.

The ſeed of this plant is uſed to diſſolve the viſcous matters, which, gathering in the ſinuſſes of the head, produce catarrhs. For this purpoſe infuſe a pugil of marjoram leaves in a glaſs of white wine, and add a dram of *nigella* ſeed; ſtrain the whole through a linen cloth, and ſnuff the wine ſtrongly up the noſe. For the colic, a ptiſan is made of the tops of chamomile, melilot, and *nigella* ſeeds. The eſſential oil has the ſame virtues; it is very inciſive and expectorating; the infuſion of the ſame ſeed in wine is diuretic, and provokes the menſes.

FENNEL-*flower of Crete*. See GARIDELLA.

FENNEL-*giant*, *Ferula*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it hath an umbellated flower, the principal umbel of which is compoſed of ſeveral ſmaller, called rays; the involucrum is compoſed of ſeveral narrow leaves, which fall off; the principal umbel is uniform. The flowers have five oblong petals, and five ſtamina of the ſame length, terminated by ſingle ſummits. Under the flower is ſituated a turbinated germen, ſupporting two reflexed ſtyles, crowned by obtuſe ſtigmas, which afterward becomes an elliptical, compreſſed, plain fruit, dividing in two parts, each having a large elliptical plain ſeed, marked with three lines on each ſide. There are eight ſpecies. Miller.

The parts in uſe are the medullary ſubſtance of the ſtalks, the ſeed, and the juice, or gum, which is the SAGAPENUM of the ſhops. Mr. Ray ſays, that the people of Sicily uſe the pith of the *ferula major*, or Pliny's female *fennel-giant*, for tinder to light their fires; and if this was practiſed by the ancients, we may gueſs why the poets feigned, that Prometheus ſtole fire from heaven, and carried it to the earth in a hollow *ferula*.

FENNEL, *hog's*, or *Sulphur-wort*, *Peucedanum*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it hath an umbelliferous flower; the cover of the large umbel compoſed of many linear reflexed leaves; the empalement of the flower is ſmall, and indented in five parts, and the petals of the great umbel are uniform. Each flower is compoſed of five oblong incurved petals, which are equal and entire; they have each five hair-like ſtamina, terminated by ſingle ſummits, with an oblong germen ſituated under the flower, ſupporting two ſmall ſtyles, crowned by obtuſe ſtigmas. The germen turns to an oval channelled fruit, ſplitting in two parts, containing two ſeeds, convex on one ſide, compreſſed on the other; with three raiſed furrows, and a broad membraneous border indented at the top. There are four ſpecies. Miller.

The common *hog's fennel* is found in wet and mooriſh places, and about fen ditches. It flowers in June and July. Its root is eſteemed of great uſe, as an expectorant and attenuant. It is preſcribed in diſeaſes of the breaſts and lungs, particularly in thoſe in which thoſe parts are loaded with a tough phlegm. It is alſo recommended in all obſtructions of the viſcera. It promotes urine, and is recommended in nephritic caſes. The old authors have ſpoke greatly of its efficacy in all nervous caſes, and have recommended it as a ſingular remedy in lethargies, palſies, epilepſies, and the like.

If the roots are wounded, when freſh, in the ſpring or autumn, they yield a yellow juice, which dries into a ſolid gummy reſin, that is recommended as an aperient and antihyſteric. Lewis's Mat. Med.

FENNEL, *ſcorching*, in *Botany*. See THAPSIA.

FENNEL, *ſea*. See SAMPHIRE.

FENUGREEK, *Fœnum Græcum*, *Trigonella*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement of the flower is well ſhaped, of one leaf, cut at the top into five almoſt equal ſegments. The flower is of the butterfly kind; the ſtandard obtuſe, oval, and reflexed; the two wings are oblong, reflexed, and ſpreading flat like the ſtandard, ſo as outwardly to appear like a regular flower of three petals. The keel is very ſhort, obtuſe, and occupies the navel of the flower. It hath ten ſhort riſing ſtamina, nine of which are joined, and one ſtands ſeparate, terminated by ſingle ſummits; and an oval, oblong germen, ſupporting a ſingle ſtyle, crowned by a riſing ſtigma. The germen afterward turns to an oblong oval pod, compreſſed, filled with kidney-ſhaped ſeeds. There are ſix ſpecies.

The firſt ſort is the common *fenugreek*, whoſe ſeed is uſed in medicine. Where this plant grows naturally is uncertain; but it is cultivated in the ſouth of France and in Germany; from whence great quantities of the ſeed are annually imported here for uſe. It is alſo much cultivated in India.

This plant has not yet been cultivated in any quantity for uſe in England, as it has generally proved a very uncertain crop, occaſioned by the inconſtancy of the weather. The ſeed from the continent is therefore always to be preferred. Miller.

The ſeeds of this plant contain an expreſſible oil blended with reſin and mucilage, but no eſſential oil; to rectified ſpirit they communicate the whole of their diſtinguiſhing ſmell and taſte; and afterwards to water a ſtrong favourleſs mucilage. The principal uſe of theſe ſeeds is in cataplaſms and fomentations, for ſoftening, maturating, and diſcuſſing tumours; and in emollient, carminative clyſters. They are an ingredient in the *oleum è mucilaginibus* of the ſhops. Ground in a mill, they are uſed in drinks for horſes. Neumann and Lewis.

The ſeed is leſs than muſtard-ſeed, very hard and ſolid, of a triangular form, and a ſtrong diſagreeable ſmell; when new, it is of a yellow gold-colour, but when long kept, ruddy, or brown.

FEODAL, *Feodalis*, or *Feudalis*, of or belonging to a *feud*, or FEE. Hence *feudal* ſervices, &c.

FEODALITY, the FEALTY paid to the lord by his feudal tenant.

FEODARY, *Feudary*, or *Feudatary*, an officer anciently made and authorized by the maſter of the court of wards. 32 Hen. VIII. cap. 26.

His office was to be preſent with the eſcheator, at the finding any office of lands; and to give evidence for the king, concerning the tenure, and the value thereof; to ſurvey the land of the ward after the office found, and rate it. He alſo aſſigned the kings widows their dowers, and received the rents of wards lands. This office is taken away by ſtat. 12 Car. II. cap. 24.

FEODATARY, or FEUDATARY. See FEODARY and FEUDATARY.

FEODER, a MEASURE for liquids, uſed throughout Germany.

FEODITAS, in *Old Writers*, is ſometimes uſed for *fidelitas*, or FEALTY.

FEODUM, or FEUDUM, the ſame with *fief* or FEE.

FEOFFMENT, derived from the verb *feoffare*, or *infeudare*, *to enfeoff*, *to give one a feud*, in *Common Law*, is the moſt ancient method of conveyance, and ſignifies a gift or grant of honours, caſtles, manors, meſſuages, lands, or the like corporeal or immoveable things, to another in fee-ſimple; that is, to him, and his heirs for ever, by the delivery of ſeiſin, and the poſſeſſion of the thing given. See FEE, and LIVERY.

When this is done by writing, it is called the *deed of feoffment*.

In every *feoffment*, the giver is called the *feoffer*, or *feoffator*; and he that receives, the *feoffee*.

The proper difference in our law, between a *feoffer*, and a donor, is, that the *feoffer* gives in fee-ſimple; and the donor in fee-tail.

FERÆ, in the Linnæan ſyſtem of *Zoology*, one of the orders of animals, of the claſs of *mammalia*; the characters of which are, that they have ſharp teeth; the upper fore-teeth are ſix in number, and the canine or dog-teeth longer than the reſt. Of this order are the bear, the lion, the tyger, the cat, the weaſel, the ferret, the didelphis or philander, the otter, the ſea-calf, the dog, the badger, the hedge-hog, the mole, and the bat, which this author makes not a bird, but a quadruped, with its fore-feet expanded into a ſort of wings, &c.

FERÆ *naturæ*, in our *Law*, ſignifies birds or beaſts that are wild, in oppoſition to ſuch as are tame: ſuch are hares, foxes, wild geeſe, or the like, wherein no man may claim a property. 2 Cro. 293.

FERALIA, in *Antiquity*, a feaſt held by the Romans, on the twenty-firſt of February, in honour of the dead. Vid. Mem. Acad. Inſcript. tom. i. p. 43.

Varro derives the word from *inferi*, or from *fero*; on account of a repaſt carried to the ſepulchres of ſuch as the laſt offices were that day rendered to. Feſtus derives it from *ferio*, on account of the victims ſacrificed. Voſſius obſerves, that the Romans called death *fera*, *cruel*, and that the word *feralia* might ariſe thence.

Macrobius, Saturn. lib. i. cap. 13. refers the origin of the ceremony to Numa Pompilius. Ovid, in his Faſti, goes back as far as Æneas for its inſtitution. He adds, that on the ſame day a ſacrifice was performed to the goddeſs Muta, or *Dumb*; and that the perſons who officiated, were an old woman, attended with a number of young girls.

FER *de fourchette, croix à fer de fourchette*, in *Heraldry*, is a croſs, having a forked iron at each end, like that formerly uſed by ſoldiers to reſt their muſkets on; by which it is diſtinguiſhed from the croſs *fourché*; the ends whereof turn forked; whereas in this, the fork is fixed on the ſquare end; as repreſented in *Tab. Heraldry*, *fig.* 20.

FER *de moulin*, q. d. *iron of the mill*, is a bearing in *Heraldry*; ſuppoſed to repreſent the iron ink, or ink of a mill, which ſuſtains the moving mill-ſtone. See a repreſentation of it in *Tab. Herald. fig.* 21.

FERD-*wit*, or **FERD**-*wite*, in our *Ancient Cuſtoms*, a formulary, by which the king pardoned manſlaughter, committed in the army.

The word is formed of the Saxon *ferd*, *army*, and *wite*, *puniſhment*.

FERDFARE, from the Saxon *ferd*, *army*, and *fare*, *journey*, in our *Old Writers*, is uſed for being diſcharged from going to war.

FERENTARII, or **FERENDARII**, among the Romans, were auxiliary troops, lightly armed; their weapons being a ſword, bow, and arrows, and a ſling; which were much leſs cumberſome than a buckler, battle-ax, pike, &c.

The name ſeems to have been derived *a ferendo auxilio*; theſe being auxiliary forces; though Varro thinks they might be ſo called, becauſe the ſling and ſtones *feruntur*, *non tenentur*.

We have alſo mention of another ſort of *ferentarii*, whoſe buſineſs was, to carry arms after the armies, and to be ready to ſupply the ſoldiers therewith in battle.

Lydius uſes the name *ferentarii* for the *cataphracti equites*, i. e. cavaliers, armed cap-à-pé.

FERETRUM, among the Romans, the bier uſed in carrying out the bodies of the dead; which duty was performed by the neareſt male relations of the deceaſed: thus, ſons carried out their parents, brothers their ſiſters, &c. See **BURIAL**.

FERIÆ, among the Romans, were holy-days, or days wherein they abſtained from work.

The word *feriæ* is uſually derived *a ferendis victimis*, on account of the victims killed on theſe days. Martinius ſays, that *feriæ* were ſo called *velut* ἱεραι ἡμεραι, *dies ſacri*, *holy days*. Others obſerve, that all days in general, though they were not feaſt-days, were anciently called *feſtæ*, or, as Voſſius reads it, *feſiæ*; whence, according to that author, was formed the word *feriæ*.

The *feriæ*, or *dies ferati*, were obſerved and diſtinguiſhed chiefly by reſt; whereas the *feaſts*, or *dies feſti*, beſide a ceſſation from labour, were celebrated with ſacrifices and games; ſo that there were *feriæ*, which were not feaſt-days; though authors frequently confound the *feriæ*, and *feſti*.

Others confound the *feriæ* with the *dies nefaſti*, or *non-court-days*.

The Latin *feria* amounts to the Sabbath of the Hebrews.

The Romans had divers kinds of *feriæ*; their names, at leaſt the principal thereof, are *æſtivales*, or ſummer *feriæ*; *anniverſariæ*, yearly *feriæ*; *compitalitiæ feriæ* of the ſtreets and croſs-ways; *conceptivæ*, votive *feriæ*, which the magiſtrates promiſed every year; *denicales*, for the expiation of a family polluted by the death of any one; *imperativæ*, or *indictivæ*, thoſe decreed by the magiſtrate; *Latinæ*, the Latin *feriæ*, inſtituted by Tarquin the Proud, for all the Latin people, amounting annually, ſays Dion. Hal. to forty-ſeven nations, being celebrated on mount Alba, in memory of the peace concluded by Tarquin with the people of Latium. Theſe *feriæ Latinæ* were either ordinary or extraordinary. They continued at firſt only for a day; but after the expulſion of Tarquin, a ſecond day was added, and a third after the reconciliation between the plebeians and patricians; and in proceſs of time they were prolonged to four days. At theſe feaſts a bull was ſacrificed, and each town contributed a certain quantity of meat, wine, and fruits. *Meſſis feriæ*, were thoſe of harveſt; there were alſo *paganales feriæ*, or **PAGANALIA**; *præcidaneæ*, which were what we properly call the vigils, or eves of the feaſts; *privatæ*, or *propriæ*, thoſe peculiar to the ſeveral families; as the *familiæ Claudiæ*; *Æmiliæ*, *Juliæ*, &c. *publicæ*, thoſe obſerved by all in general, or for the public weal; *ſementinæ*, thoſe held in ſeed-time; *ſtativæ*, thoſe kept conſtantly to the ſame day of the year; *Saturnales*, whereof we ſhall ſpeak in their place; *ſtultorum feriæ*, or *quirinaliæ*, the *feriæ* of fools, held on the ſeventeenth of February; *victoriæ feriæ*, thoſe of victory, in the month of Auguſt; *vindemiales*, thoſe of the vintage, from the twentieth of Auguſt to the fifteenth of October; *Vulcani feriæ*, thoſe of Vulcan, which fell on the twenty-ſecond of May. See **FEAST**.

FERIÆ was alſo uſed among the Romans for fair-days; becauſe it was their cuſtom to hold their fairs on the *dies feriati*, or holidays. Struv. Synt. Antiq. Rom. cap. ix. p. 425. 443, &c.

FERIA is ſtill retained in the Romiſh breviary, though in a ſenſe ſomewhat different from the *feriæ* of the ancients; being applied to the ſeveral days of the week, beginning with Sunday; provided none of thoſe days be a feaſt or faſt-day. Thus, Monday is the ſecond *feria*; Tueſday the third, &c.

The word *feria*, in this ſenſe, is doubtleſs borrowed from the ancient *feria*, a day of reſt. Accordingly, Sunday is the firſt *feria*; for anciently all the days of Eaſter-week were accounted feſtival days, by a decree of Conſtantine; whence thoſe ſeven days were called *feriæ*; Sunday being the firſt, Monday the ſecond, &c. And this week being then accounted the firſt of the eccleſiaſtical year, they afterwards accuſtomed themſelves to call the days of the other weeks after the ſame manner, *firſt*, *ſecond*, *third*, &c. *feriæ*. Though others will have it, that the days of the week were not called *feriæ* from the people's reſting, that is, on account of being obliged to abſtain from ſervile works; but to advertiſe the faithful, that they ought to abſtain from ſin. See Durand, De Off. Div. lib. viii. cap. 1.

Theſe are the *ordinary feriæ*; but beſides theſe, they have *extraordinary*, or *greater feriæ*; viz. the three laſt days of Paſſion-week; the two days following Eaſter-day, and Whitſunday; and the ſecond *feriæ* of Rogation.

FERIAL *days*, *dies* **FERIALES**, or **FERIÆ**, among the *Ancients*, ſignify holidays, or days vacant for labour, and pleading.

But in the ſtat. 27 Hen. VI. cap. 5. and in Forteſcue, De Laudibus LL. Angliæ, *ferial* days are taken for working days. S. Sylveſter ordained—*Sabbati & dominici diei nomine retento, reliquos hebdomadæ dies* feriarum *nomine diſtinctos, ut jam ante in eccleſia vocari cœperant, appellari*.

So that *ferial* days are properly all the days of the week, except Sunday.

FERIJEE, in the dreſs of the Egyptians, is a ſort of ſkirt worn over another garment, and made either of black woollen, or of other coloured cloth furred; this by the more genteel people is left open before. It ſomewhat reſembles a night-gown.

FERISON, in *Logic*, a mood of the third figure of ſyllogiſms. In this mood the firſt propoſition is an univerſal negative, denoted by the vowel *e*; the ſecond a particular affirmative; and the third a particular negative, ſignified by *i* and *o*.

FERLING, in our *Old Statutes*, is uſed for the fourth part of a penny. *Aſſiſ. panis & cerevis*, 51 Hen. III.

FERLINGATA *terræ*, in our *Old Writers*, according to Blount, is the ſame as *ferlingus terræ*, which lord Coke on Littleton ſays, was a quarentine, or thirty-two acres of land. But according to the authorities quoted by Du-Cange, Gloſſ. Lat. voc. *Quarentena*, it contained but forty perches.

FERLINGUS *terræ*. See **FERLINGATA** *terræ*.

FERM, Firma, in *Law*. See Farm.

FERME *a ferme*, in the *Manege*, ſignifies to exerciſe in the ſame place without ſtirring or parting.

FERMENT, of *fervere, to boil*, in *Phyſics*, any body, which being applied to another, produces a *fermentation* therein; or, any thing capable of exciting an inteſtine motion in the parts of another; and of ſwelling or dilating the ſame.

Thus, the acid in leaven is a *ferment*, which makes bread riſe or ſwell. And the moiſture in hay is a *ferment*, which heats, and makes it ſmoke. Thus alſo, rennet is a *ferment*, which curdles and breaks milk; and barm, or yeaſt, is the *ferment* that ſets wort a working, &c.

Thoſe things are called *ferments* in an alluſive ſenſe, which when added to the liquor, only correct ſome fault therein, and by removing ſome obſtacle to the *fermentation*, forward it by ſecondary means; as alſo ſuch as being added in time of *fermentation*, make the liquor yield a larger proportion of ſpirit, and give it a finer flavour; all theſe additions have the name of *ferments* among our diſtillers, but improperly. The primary uſe of *ferments* is, to ſave time, and make diſpatch of buſineſs, while they only occaſionally and accidentally give a flavour, or add to the quantity of the ſpirit; and accordingly all *fermentable* liquors may, without the leaſt addition, only by a due application of heat, be brought to *ferment* more perfectly, though it will be more ſlowly than with the addition of any *ferment*. The general *ferments* uſed on theſe occaſions are the flowers and *fæces* of *fermentable* liquors generated, thrown up, or depoſited, during the time of the *fermentation* in that liquor, or after the end of it. There are two of theſe *ferments*, procurable in large quantities, and at a ſmall price; theſe are beer yeaſt, and wine lees. A prudent and artificial management of theſe, might render the buſineſs of the brewery for diſtillation, as in the buſineſs of the malt-diſtiller, &c. much more eaſy and advantageous. It has always been found a great difficulty to procure theſe *ferments* in proper quantities, and preſerve them always ready for uſe; and this has been a great diſcouragement to the buſineſs, and hence ſome have been obliged to contrive artificial *ferments*, or to form mixtures or compounds of particular *fermentable* ingredients; but this has been attempted without any great ſucceſs, all theſe mixtures falling ſhort even of the common baker's leaven in their uſe.

When the proper ſort of *ferment* is pitched upon, the operator is next to conſider its quantity, quality, and manner of application. The quantity muſt be proportioned to that of the liquor, to its tenacity, and the degree of flavour it is intended to give, and to the diſpatch required in the operation. From theſe conſiderations he will be able to form a rule to himſelf; but till ſuch a rule is formed, or, in order to the forming of it, proper trial will ſhew how much ſuffices for the purpoſe. The way is to begin with a little, and to add more occaſionally, the weight of the whole being noted beforehand; ſo that on weighing the remainder after the proper quantity is taken away, it will be found how much exactly has been uſed out of it for the buſineſs.

Among the ſeveral ingredients of which *fermentable* liquors are made for the ſervice of the diſtillery, treacle requires more *ferment* than almoſt any other. This is not wonderful on a juſt conſideration of the nature of the ſubject, ſince the manner in which that concrete juice is made, muſt render it greatly unfit for *fermentation* afterwards, though the original product of a vegetable juice very much diſpoſed to it in its own nature. The ſtrength of the fire uſed in the ſugar making, and its long continuance and almoſt immediate contact, and the lime and other alkalies uſed in refining the ſugar, that is, in making the treacle, do ſo condenſe, indurate, and ſcorch the body of this juice, and abſorb its acid, that it is ſcarce to be expected that it ſhould *ferment* at all, even with the addition of jalap, or other powerful ſaline and acid or acrid ſtimulators, which tend to break the viſcous and aduſt connections of the particles.

The greateſt circumſpection and care are neceſſary in regard to the quality of the *ferment*, if a pure and well flavoured ſpirit be required. It muſt be choſen perfectly ſweet and freſh, for all *ferments* are liable to grow muſty and corrupt; and if in this ſtate they are mixed with the *fermentable* liquor, they will communicate their nauſeous and filthy flavour to the ſpirit, which will ſcarce ever be got off by any ſubſequent refining. If the *ferment* be ſour, it muſt by no means be uſed with any liquor, for it will communicate its flavour to the whole, and even prevent its riſing to a head, and give it an acetous, inſtead of a vinous tendency. When the proper quantity of a ſuitable and well conditioned *ferment* is got ready, it muſt be put to the *fermentable* liquor in a ſtate barely tepid, or ſcarce lukewarm. The beſt manner of putting them together, ſo as to make the *fermentation* ſtrong and quick, is this. When the *ferment* is ſolid, it muſt be broke to pieces, and gently thinned with ſome of the warm liquor; but a complete or uniform ſolution of it is not to be expected or deſired, as this would weaken its efficacy for the future buſineſs. The whole intended quantity being thus looſely mixed in ſome of the lukewarm liquor, and kept near the fire, or elſewhere, in a tepid ſtate, free from too rude commerce of the external air, more of the inſenſibly warm liquor ought at proper intervals to be brought in, till thus by degrees the whole quantity is ſet at work together.

When the whole is thus ſet at work, and ſecured in a proper degree of warmth, and kept from a too free intercourſe with the external air, it becomes as it were the ſole buſineſs of nature to finiſh the operation, and render the liquor fit for the ſtill. In this eaſy manner the whole end of *fermentation* would be anſwered. But during the whole courſe of the operation, there are ſeveral other things that may be added with ſome particular view, as either to increaſe the quantity of ſpirit, or give it ſome agreeable flavour. Theſe ADDITIONS may ſometimes require ſome alteration in the general method laid down above, though upon the whole it is right. Shaw's Eſſay on Diſtilling.

The force or effect of a *ferment* ariſes hence, that, by its more penetrative and moveable parts, it diſſolves and breaks the texture or combination of the component parts or principles of the body, gives them a new motion, and diſpoſes them to take a new arrangement, or to combine again in a new manner; and ſo to conſtitute a new ſpecies of body.

Thus the bite of a mad dog excites a ſlow *fermentation* in the blood, whereby the divers liquors, or matters it conſiſts of, loſe that nexus, or union, neceſſary to a ſtate of health; and occaſion an irregularity in the ſpirits, from which ariſe the horrors, and other ſymptoms of the diſeaſe.

One way of accounting for DIGESTION, is by ſuppoſing a certain *ferment* in the ſtomach. But what this *ferment* is, or whence it ſhould be derived, is greatly diſputed.

Ferments *in the earth*. It is very probable, that the natural *ferments* in the earth may be of more conſequence than is generally ſuppoſed, and tend to elucidate many things, which at preſent appear very myſterious. The different fruitfulneſs of different ſpots of the ſame ſort of land may be owing to this, as alſo the different temperature of the air at the ſame time in places very little diſtant from one another. The effluvia ſent up by ſome of theſe, not only diſſolve ſnow that falls on them, but even melt it in the air as it approaches, and cauſe it to fall in rain, not in ſnow. And often in two places within a mile or two of each other, there ſhall be a diſparity of heat and cold no way elſe to be accounted for, ſince there is often no difference of ſhade or ſhelter.

In Scotland there are large tracts of land, where the *ferment* is ſo ſtrong, that the earth lets a perſon up to the ankles as he walks; and generally, at about a foot depth under this, there is found a ſtratum of pebbles, ſo cloſe rammed together, that they ſeem an artificial cauſeway. This land, though of no greater depth than a foot, is found very rich for garden plants, and even for fruit-trees. Phil. Tranſ. Nº 110.

Ferment, among *Phyſicians*, is ſometimes uſed in a ſynonymous ſenſe with putrefaction, or rather for a putrid habit of body, conſidered as the cauſe of malignant diſorders.

But theſe authors are, nevertheleſs, very careful not to confound putrefaction with vegetable *fermentation*, accounting them only analogous proceſſes; for which reaſon, they uſe the ſame term for the putrefying and fermenting agent. It were to be wiſhed, to avoid ambiguity, that we had two different words to denote the exciting cauſe of theſe two inteſtine commotions; but this is the leſs to be expected, on account of the tendency of all putrid animal ſubſtances to promote both animal putrefaction, and a vinous *fermentation* in vegetables.

FERMENTARII, or Fermentacei, a denomination which thoſe of the Latin church have given to the Greeks, on account of their conſecrating and uſing leavened or *fermented* bread in the euchariſt.

As the Greeks call the Latins *azymites*, the Latins, in return, call them *fermentarii*.

FERMENTATION, an inteſtine motion, ariſing ſpontaneouſly among the ſmall, inſenſible particles of a mixed body, and producing a new diſpoſition, and a different combination of thoſe parts.

Fermentation differs from diſſolution, as the latter is only a reſult, or effect of the former: *fermentation* is frequently without diſſolution, i. e. the fermentative motion ſeldom goes ſo far as to diſſolve the body; but diſſolution always ſuppoſes an antecedent *fermentation*.

Fermentation differs from ebullition and efferveſcence in this, that the motion, which in the firſt is ſlow, in the two latter is violent; and that, in the firſt, the motion is reſtrained to the minute particles of the body; but, in the latter, it extends to large maſſes thereof.

Indeed it muſt be obſerved, that authors uſually allow of divers kinds of *fermentations*; viz. an inſenſible one, which is only known from its effects; and a ſenſible one; a violent and a moderate one; a hot and a cold one; a natural and an artificial one.

Chemiſts diſtinguiſh three particular kinds of *fermentation*, or three ſtages of the ſame *fermentation*, which refer to the three principal products reſulting from it. The firſt is called the *vinous* or *ſpirituous*, becauſe it changes into WINE the liquors which undergo it, and becauſe from this wine may be obtained an inflammable ſpirit, miſcible with water, called ſpirit of wine. The ſecond kind of *fermentation* is called *acid*, or *acetous*, becauſe the product of it is an acid or VINEGAR. The third kind is called the *putrid* or *putrefactive*, and ſometimes the *alkaline fermentation*, in which caſe the texture of the fermented ſubſtance is deſtroyed, and having loſt its original characters of taſte, colour, and ſmell, it becomes fœtid, rotten, and offenſive; and if committed to diſtillation, yields neither an inflammable nor an acid ſpirit, but a ſharp pungent liquor, being a ſolution of volatile alkaline ſalt, nearly ſimilar to that ſalt which may be obtained by the force of violent heat, from animal ſubſtances, without ſuffering them firſt to become putrid. All matters ſuſceptible of the ſpirituous *fermentation* may afterwards undergo the acid, and, laſtly, the putrid *fermentation*; but ſome ſubſtances are not ſuſceptible of the ſpirituous *fermentation*, but proceed firſt to the acid, and afterwards to the alkaline or putrid *fermentation*; and laſtly, ſome ſubſtances are ſuſceptible of the putrid *fermentation* only. From theſe conſiderations, and others of a ſimilar nature, Stahl and many other chemiſts conſider theſe *fermentations* leſs, as three operations diſtinct and independent of each other, than as three principal and diſtinguiſhed degrees of one and the ſame fermentative motion, by which nature endeavours to reſolve, and to reduce into a ſimilar condition, all the moiſt compound bodies, into the combination of which the oily principle enters, that is, all animal and vegetable ſubſtances. Theſe ſubſtances, as long as they make part of the living vegetable or animal, undergo *fermentation* in a ſlow and inſenſible manner, being preſerved from it by the vital motion; but when the life of organized bodies ceaſes, all theſe ſubſtances ſenſibly acquire the fermentative motion, paſs more rapidly and regularly from one ſtage of it to another, according to the concurrence of circumſtances which generally favour *fermentation*; ſo that *fermentation*, in this view of it, appears, upon the whole, to be nothing elſe than PUTREFACTION. See DIGESTION. Dict. Chemiſtry, art. FERMENTATION.

Plants bruiſed, and left a certain time in a cloſe veſſel, ferment of themſelves; and, if let alone, the *fermentation* will proceed to putrefaction.

In order to *fermentation*, it is neceſſary the ferment have ſomething acid and ſpirituous in it; that its motion be tumultuous; that it be an open, ſpacious place, and aſſiſted by the air; and that it tend to exalt and purify the body, and produce vinous, or inflammable ſpirits. Theſe are the particular properties and conditions of *fermentation*; though, in the general, all required to effect a *fermentation*, in a body, or liquor, which is not homogeneous, that is, which conſiſts of different principles, is, that there be a ſtrong attraction between the particles of the ferment, and the body; that the parts of this latter be moved and agitated irregularly; and that this motion produce ſome alteration in the mixed.

All vegetable and animal ſubſtances, into the compoſition of which enters a certain quantity of fluid oil and earth, rendered perfectly ſoluble in water, by the intervention of a ſaline matter, being diffuſed in a ſufficient quantity of water to become liquid, or at leaſt ſoft, and being expoſed to heat from a few degrees above the freezing point to twenty-five and more, and when the communication with air is not entirely obſtructed, ſuffer ſpontaneouſly the fermentative motion, which entirely changes the nature and proportion of their principles; and, therefore, the *fermentation* of any body may be prevented or ſuſpended by intenſe cold, want of air and water, and a diſproportion of the principles of the body expoſed to *fermentation*.

Fermentation is one of the moſt obſcure proceſſes in all nature. The generality of our later philoſophers allow it in great meaſure a myſtery, to which their principles will not fully reach. Dr. Morgan attempts to account for it, on the Newtonian ſyſtem. His principle is, that the expanſive force of air, rarefied by the action of fire, or the mutual action of fire and air, is the univerſal natural cauſe of *fermentation* and diſſolution.

To ſhew this, he conſiders two great powers, or principles, in bodies; viz. an attractive, coheſive power, in the ſmall particles of matter, as the principle of all reſt, concretion, &c. and the expanſive force of heated air, as the principle of *fermentation*. On the different proportion and adjuſtment of theſe two oppoſite forces, with reſpect to each other, the conſtitution, texture, and coheſion of bodies, are ſaid to depend.

By the attractive force, acting alone, the conſtituent parts of compound bodies muſt be brought to their neareſt and greateſt contacts, and remain there in a degree of firmneſs and coheſion, proportional to the quantities of contact.

On the other hand, by the repulſive, expanſive force, acting alone, all bodies, even the moſt compact and ſolid, muſt be diſſolved and diffuſed into one perfectly fluid, incoherent maſs.

If both be found in the ſame body, and equal in degree, ſuch a body muſt continue in its preſent ſtate of fluidity, or coheſion: if the attractive power prevail, the quantity of contact, or degree of coheſion, will be continually increaſed to a certain pitch, where it will reſt. On the contrary, if the expanſive force of the fire and air, included in any body, or maſs of matter, prevail againſt the attractive power of the contiguous parts, the parts muſt neceſſarily recede from their points of contact.

And this happening through all the ſubdiviſions of which the body or maſs is capable, every ſmall part muſt be divided and ſeparated into other ſmaller parts; and theſe again into others, and ſo on, till we come to the firſt conſtituent particles or atoms, which are ſuppoſed to be perfectly ſolid, and indiviſible.

This receſs of the parts of bodies from their points of contact, and the ſeparation and diviſion conſequent thereon, is what we call *rarefaction*; as, on the contrary, the approach of the parts nearer to the points of contact, is called *condenſation*. Now from the contrary effects of theſe two forces, there neceſſarily ariſes an inteſtine commotion, colliſion, and natural ſtruggle of the parts among themſelves; i. e. the parts acted on by two ſuch oppoſite forces, will fly off, and recoil, recede, and accede, in proportion to the ſtrength and energy of the oppoſite powers, till one or the other prevail, either to fix and condenſe, or to diſſolve and diffuſe it; which alternate motion is what we call *fermentation*.

If the attractive force prevail, the moſt fluid body will be conſolidated, as water into ice.

The circumſtances neceſſary for cauſing a *fermentation* between a ſolid and a fluid, as they are ſtated by Dr. Freind and Dr. Keill, the reader will find under ATTRACTION, art. xvi. and MENSTRUUM.

Dr. Boerhaave makes the following conditions requiſite. 1. That there be a due proportion between the ſize of the particles of the fluid, and the pores of the body to be diſſolved. 2. That the figure of the particles of the fluid have a determinate relation to that of the pores of the ſolid. 3. That the particles of the fluid be ſufficiently ſolid, ſo that their moment or force of action be not too weak. And, 4. That the particles of the fluid, when received into the pores of the ſolid, be fitly diſpoſed to make ſome ſtay there, and not immediately to paſs through; but to act every way upon the ſolid as they move towards the external ſurface thereof. Chemiſtry, by Shaw, p. 344.

Mr. Rowning apprehends, that nothing more is neceſſary, than that the particles of the ſolid attract thoſe of the fluid with a greater degree of force than either thoſe of the fluid or thoſe of the ſolid attract one another; and that this ſingle ſuppoſition will apply to the ſolution of a ſolid by a fluid, and to the *fermentation* occaſioned by the mixture of two fluids. Nat. Phil. part ii. diſſ. 8.

But perhaps a more accurate and complete theory of *fermentation* may be formed by means of the modern diſcoveries relating to air. Air is known to be combined with various ſubſtances, and to adhere to their conſtituent particles in a fixed or non-elaſtic ſtate, forming, according to Dr. Hales and others, the cement or bond of union between them. This principle, which is now generally known by the name of *fixed* AIR, is ſuppoſed to be the immediate cauſe of COHESION, ſince the preſervation of firmneſs and ſoundneſs in bodies depends on reſtraining the eſcape of this air; for as ſoon as it flies off, and reſumes its elaſticity, the other conſtituent particles, viz. the earthy, ſaline, oily, or inflammable and aqueous, being hereby put into motion, immediately begin to exert their ſeveral peculiar attractive and repulſive powers, and run into new combinations, which firſt change, and at length altogether deſtroy the texture of the ſubſtance which they formerly compoſed, provided that this ſubſtance contained in itſelf a ſufficient quantity of water to allow of the inteſtine motion, by giving the proper degree of fluidity or moiſture; for without fluidity there can be no inteſtine motion, and without inteſtine motion there can be no change of combination. Whatever, therefore, in theſe circumſtances, occaſions a releaſe of this air, and ſerves to change its ſtate, from that of a concrete body into an elaſtic repelling fluid, will produce *fermentation*. It is well known, that the particles of bodies attract each other within certain diſtances; and that, when they are placed beyond the ſphere of each other's attraction, they begin to exert a repulſive power. Heat may be one cauſe of expanding bodies, ſo that their conſtituent particles may be removed to ſuch diſtances from each other, that their attraction ſhall ceaſe, and their mutual repulſion commence. A quick vibration, and violent inteſtine motion excited among the minute particles of bodies, will occaſion a ſimilar ſeparation of theſe particles, and a conſequent change from a concrete to a repelling ſtate. Thus, when any two united particles are torn aſunder by the ſuperior attraction or AFFINITY of a menſtruum or ſolvent, they muſt at the inſtant of ſeparation recede from each other with a force equal to that with which their disjunction was reſiſted. And the effect of the violent ſeparations of the particles of bodies, which occur in chemical decompoſitions, ſolutions, and *fermentations*, will appear very great, when we conſider the minuteneſs of the particles engaged in theſe operations, and how much the activity or force of the attraction and repulſion of bodies depends on the ſmallneſs of their ſize. See on this ſubject Macbride's Eſſays, eſſ. 2. Chemical Dict. Eng. ed. 2. vol. iii. p. 80, 81. See PUTREFACTION.

The buſineſs of *fermentation* is one of the great preparations to the diſtillery. What we uſually call vinous *fermentation* in particular, is the kind in which it is principally concerned. By this we uſually underſtand that phyſical action, or inteſtine commotion of the parts of a vegetable juice tincture, or ſolution, which render them fit to yield an inflammable ſpirit on diſtillation.

This *fermentation* in the hands of the diſtiller differs from the common one, that is uſed in the making of potable vinous liquors, as being much more violent, tumultuary, active, and combinatory than that. A large quantity of yeaſt, or other ferment, is added to the diſtiller's *fermentation*; the free air is admitted, and every thing is contrived to quicken the operation, ſo that it is ſometimes finiſhed in two or three days. This great diſpatch, however neceſſary to the large dealer, has its inconveniencies attending it; for the ſpirit is by this means always fouler, more groſs, and really terreſtrial, than it would have been if the liquor had undergone a proper *fermentation* in a ſlower manner. It alſo ſuffers a diminution in its quantity, from the violent and tumultuary admiſſion, conflict, and agitation of the free air, both in the body and upon the ſurface of the liquor, eſpecially if the liquor be not immediately committed to the ſtill as ſoon as the *fermentation* is fairly ſlacked or fully ended. It is a very difficult taſk to render the buſineſs of *fermentation* at once perfect and advantageous. To ferment, in perfection, neceſſarily requires length of time, and careful attendance, and cloſe veſſels, beſide ſeveral other articles of nice management, which cannot be expected to be received and practiſed in the large way, on account of the trouble and expence, unleſs it could be proved to the diſtillers, as poſſibly it ſome time may, that the quantity of ſpirit would be ſo much greater from the ſame quantity of materials managed thus, than by the common way, that it will more than pay its own expence; to which may be added, the very well known advantage of the ſpirit thus procured by perfect *fermentation*, being much finer than that obtained in the common way: till this ſhall be made out, it may not be amiſs to try how much of the more perfect art of vinous *fermentation* is profitably practicable by the diſtiller in the preſent circumſtances of things. The improvements to be made in this affair will principally regard, 1. The preparation or previous diſpoſition of the fermentable liquor. 2. The additions tending to the general, or ſome particular end. 3. The admiſſion or excluſion of the air. 4. The regulation of the external heat or cold; and, 5. A ſuitable degree of reſt at laſt. When proper regard is had to theſe particulars, the liquor will have its due courſe of *fermentation*, and it will thence become fit to yield a pure and copious inflammable ſpirit by diſtillation. The tincture, ſolution, or liquor, intended for *fermentation*, for the ſtill, ſhould be conſiderably thin and aqueous. That ſort of richneſs there is in the twelve ſhilling ſmall beer, is the utmoſt that ought to be allowed to it. This property not only fits it to ferment readily, but alſo to yield a larger quantity in proportion of a pure vinous ſpirit, than it would do if it were more rich or clammy: the groſs, foul, viſcid, and earthy particles of ſuch glutinous liquors, being after *fermentation* apt to riſe up with the boiling heat which muſt neceſſarily be employed to raiſe the ſpirit; and the ſpirit thus of courſe comes over foul and fetid. There is alſo another advantage attending the thinneſs of this liquor, which is, that it will ſooner become fine by ſtanding before *fermentation*; whence it may be commodiouſly drawn off from its fæces or bottom, which muſt always in caſe of corn, malt, or any other mealy ſubſtance, be kept out where the purity of the ſpirit is conſulted. A certain degree of warmth ſeems neceſſary in all the northern climates, to all ſorts of artificial liquors, intended for immediate *fermentation*, eſpecially in winter; but the natural juices of vegetables, which have never been inſpiſſated, as that of grapes, and other fruits, when fully ripened, will uſually ferment, as ſoon as they are expreſſed, without any external aſſiſtance. But as a certain degree of inſpiſſation prevents all tendency to *fermentation* in all vegetable juices, though otherwiſe ſtrongly diſpoſed to ferment; ſo a long continuance, or an increaſe of the inſpiſſating heat, eſpecially if it acts immediately through a metalline or ſolid body upon the juice, will deſtroy its fermenting property; and it will do this the more effectually, as the heat employed approaches to that of ſcorching, or the degree capable of giving an empyreuma. After the ſame manner, ſeveral experiments make it appear that there is a certain degree of heat, the continuance, or leaſt increaſe of which, proves detrimental or deſtructive to *fermentation*; as there is another, which in a wonderful manner encourages and promotes it. Theſe two degrees of heat ought to be carefully noted and ſettled by the thermometer, or other certain methods, for philoſophical and chemical uſes; but for common, or all œconomical occaſions, they may be limited to what we call a tepid and fervid heat: a fervid heat is the bane of all vinous *fermentation*, as a tepid one, or rather an imperceptible warmth, is the great promoter of them. In this neutral ſtate, therefore, with proper contrivances to preſerve and continue it, the liquor is to be put into a ſuitable veſſel for *fermentation*; at which time if it works not of itſelf, it muſt be quickened by additions; and, in general, by ſuch things as are commonly called FERMENTS. See SPIRITS, MAKING *up*, LOWERING, &c.

The juices of plants are ſtrangely altered by *fermentation*, and are ſuſceptible of many, and thoſe very various, changes from it. And it is not only the juices of fruits that are thus to be wrought upon, as thoſe of apples, pears, grapes, and the like, in the common way; but there is an artificial change to be made in the ſeeds of plants by what is called malting. And it is not grain alone that is thus to be wrought upon, but any other ſeed whatever may be made to yield its juices and virtues freely to water by this proceſs. The juices of roots alſo, for inſtance that of liquorice, will be wrought upon in the ſame manner; and the juices of the bodies of trees, as of the birch, and the like. If in the month of March a hole be bored into the body of a birch-tree, and this hole be ſtopped with a cork, through the middle of which there is thruſt a quill open at both ends, the juices of the tree will drop out at the quill at the rate of a large drop every ſecond of a minute, and a great quantity will in time be obtained in this manner. This liquor is not unpleaſant to the taſte, and looks tolerably clear, reſembling water into which a little milk had been ſpilt. There are many ways of fermenting this juice, by all of which it is converted into a ſort of wine. Theſe are well known; but there is another remarkable property in our maples, both the common ſmall kind, and the great one, which we call the ſycamore; theſe being tapped in the ſame manner, will bleed freely in winter; and their juices, after a hard froſt breaks, will flow out in ſo copious a manner, as is ſcarce to be conceived. The willow, the poplar, and the walnut-tree, will all bleed alſo; and *fermentation*, of which their ſeveral juices are eaſily ſuſceptible, will turn them all into palatable and ſtrong wines. See BREWING.

To obtain an idea of theſe changes, we cannot conſider it better, than in the procuring of a ſpirituous liquor from malt, by means thereof.

It is to be obſerved then, that the malt being made, as ſhewn under the article MALT, and then laid to infuſe or maſh in hot water, the reſt of the proceſs of brewing is nothing but a raiſing and directing of a *fermentation*, or inteſtine motion.

How ſuch motion is mechanically affected, and how it brings forth ſuch a ſpirit, may be conceived from what follows; ſuppoſing the reader acquainted with theſe common propoſitions in hydroſtatics; viz.

1. That a body immerſed in any fluid, ſpecifically lighter than itſelf, will ſink; otherwiſe it will emerge, and get to the top.

2. That if two equal bodies of different ſpecific gravities be immerſed in a fluid, lighter than either of them, the celerities of their deſcents will be as their gravities.

3. That if two unequal bodies of unequal ſpecific gravities be immerſed in a fluid, lighter than either, the celerities of their deſcents will be compounded of their gravities and dimenſions together.

The ſame laws, by which bodies deſcend, hold good in the aſcent of thoſe ſpecifically lighter than the fluid.

Hence, in all heterogeneous fluids, the conſtituent parts of which are not fitted to aſſociate and cohere, ſo as to form what is called an uniform homogeneous fluid, the heavier may be accounted as ſolid bodies immerſed in a fluid ſpecifically lighter; and the lighter parts, as ſuch bodies in a fluid ſpecifically heavier; ſince it may be demonſtrated, that the component parts of all fluids, ſeparately conſidered, are ſolid.

The liquor, therefore, called *wort*, which is a decoction of malt, may be conſidered as ſuch an heterogeneous fluid, whoſe parts cannot be interchanged in their poſitions, till each has obtained ſuch an elevation as correſponds to its proper gravity; but leſt this alone ſhould fail of the intention, by not being ſufficient to break thoſe moleculæ and viſcidities, which entangle the ſpirituous parts, and likewiſe to prevent their flying off at the ſurface, ſome portion of an already fermented ſubſtance is mixed with it.

In the fermenting of malt for diſtilling the ſpirit, the meal of unmalted corn is found neceſſary to be mixed with the malt, to prevent its exceſſive *fermentation*, and throwing off the matter of the ſpirit; but as diſpatch is required in this caſe, a good quantity of yeaſt is added to quicken the *fermentation*, ſo that it may be finiſhed in two or three days. More yeaſt is to be added if the weather be cold, and leſs if it be hot: the reverſe of this is to be underſtood of meal, more of which is to be added in hot weather to check, and leſs in cold, to haſten the operation, which in the preſent caſe is deſigned to be violent, contrary to what ought to be obſerved in the *fermentation* of wines, where the ſlower the operation is performed, the better the liquor will prove, and this may indeed hold here alſo in a leſs degree; for it is poſſible to ferment the waſh ſo violently, that it ſhall ſoon end in putrefaction. Shaw's Lectures, p. 216.

This ſubſtance, termed *barm*, or *yeaſt*, conſiſts of a great quantity of ſubtle ſpirituous particles, wrapped up in ſuch as are viſcid. Now, when this is mixed with ſuch a liquor, it cannot but much contribute to that inteſtine motion which is occaſioned by the intercourſe, and occurſions of particles of different gravities; as the ſpirituous particles will be continually ſtriving to get up to the ſurface, and the viſcid ones continually retarding ſuch an aſcent, and preventing their eſcape.

So that by theſe two concurring cauſes the particles extracted from the grain will by ſuch frequent occurſions be ſo comminuted, as continually to increaſe the more ſubtile and ſpirituous parts, until all that can be made ſo by attrition, be ſet looſe from their former viſcid confinements; and this appears by the warmth of the liquor, and the froth driven to the top; juſt at which time, if it be thrown into the ſtill, it affords ſome quantity of a highly inflammable ſpirit.

Moderate warmth much haſtens this proceſs, as it aſſiſts in opening the viſcidities, in which ſome of the ſpirituous parts may be entangled, and unbends the ſpring of the included air, which cannot but contribute to the rarefaction and comminution of the whole.

The viſcid parts, which are raiſed to the top, not only on account of their own lightneſs, but by the continual efforts and occurſions of the ſpirit to get uppermoſt, both ſhew when the ferment is at the higheſt, and prevent the finer ſpirits making their eſcape; for if this inteſtine luctus be permitted to continue too long, a great deal will get away, and the remaining liquor will grow flat and vapid, and raiſe little beſides phlegm in the ſtill.

A quantity of fixed air is extricated in the proceſs of *fermentation*, recovers its elaſticity, and being rarer and lighter than the fermenting liquor, riſes to the top, occaſioning an inteſtine commotion, and bearing with it ſome of the more volatile and ſpirituous parts of the liquor; but being heavier than the atmoſpherical air, reſts on the ſurface. See WORT.

Some of the proceſſes in chemiſtry ſeem to prove, that *fermentation* is not confined to animal and vegetable ſubſtances, but that mineral are alſo liable to it in ſome degree. If an ounce of lead and an ounce of biſmuth be melted together in an iron ladle, and an ounce of quickſilver be heated in another ladle, and all three mixed together, this makes an amalgamation, which appears perfectly homogeneous, and paſſes through leather in a running form, without leaving any thing behind. But this mixture being ſuffered to ſtand quiet for ſome hours, a groſs matter will ſeparate from it by degrees, and float upon the reſt, which will now run eaſily through leather, and leave the groſs matter behind. Here appear all the requiſites of *fermentation*. 1. A fluid form. 2. An uniform matter. 3. An inteſtine motion; and, 4. An actual ſeparation of a groſſer matter leaving a thinner behind. Shaw's Lectures, p. 139.

Fermentation is a point of the utmoſt conſequence in medicine, and the animal œconomy; it is one of the principal means or inſtruments we have for altering, exalting, or calling forth the properties and powers of bodies. See DIGESTION.

The greateſt uſe of the theory of *fermentation* in medicine, will be in teaching what parts of the materia medica are moſt properly brought under this procedure; and how ſuch inteſtine motion does, in ſome things, deſtroy their virtues: for by ſome medicines an intention is aimed at, which is not to be procured, but by their being ſpirituous, whereas, in others, the very contrary property is required: in ſuch caſes, therefore, when by any adventitious cauſe thoſe medicines get into a ferment, they are deſtroyed, and ſhould not be adminiſtered.

FERMENTED *liquors*. All *fermented* liquors abound with a ſuperabundant proportion of water; and if a very conſiderable quantity of it were taken away, they would become not only richer, but more durable, provided that ſo much of the aqueous humidity was retained, as was juſt ſufficient to preſerve the vinous conſiſtence, to keep the ſaline part fluid, and to retain the ſlimy and unctuous parts expanded and mixed among the reſt. But as an actual and truly ſaline matter abounds in WINE and VINEGAR, and that of an acid, auſtere, and tartareous kind, when the ſpirituous part is drawn away, the wine becomes ſurpriſingly more auſtere; and when a large quantity of the watery part is ſeparated, this ſuperabundant ſaline, tartareous matter, coagulates into a cryſtalline form, and either falls to the bottom, or ſticks to the ſides of the caſk. For the ſubtile, oily matter, which makes the ſpirituous part in wine, blunts and takes off from a tartareous acidity, in the ſame manner that the addition of ſpirit of wine blunts, ſheathes, and dulcifies the acid, corroſive parts of ſpirit of nitre in making the ſpiritus nitri dulcis. But this tartareous ſalt abounding alſo with an undue proportion of ſo groſs and unctuous matter, cannot be diſſolved or diluted without a very large proportion of water, which being taken away, it is preſently converted into dry and ſolid cryſtals, as is the known caſe of cream of tartar. Hence it proceeds, that the auſterity and roughneſs of wine are the more preſerved, the more the wine is deprived of its ſpirituous parts. This experiment is familiar in our kitchens, where wine being burnt or boiled into ſauce, is found to have a much greater degree of auſterity, than the ſauce and wine had before it had undergone the action of the fire, and loſt its ſpirituous part.

When the water is even by diſtillation plentifully drawn off from wine, not of a terreſtrial and chalky, but of a tartareous nature, a beautiful tartar will be found to cryſtallize, among the remaining maſs, in a conſiderable proportion. But though this ſuperfluous water, that generally dilutes the wine, and weakens its taſte, might be advantageouſly ſpared from it, and it would then become much more rich and noble, and at the ſame time more ſmooth and ſoft, through the loſs of ſome conſiderable portion of its tartar; yet this ſeparation cannot be effected by diſtillation, becauſe that carries away other parts as well as the water, and damages the whole, by taking off what ought to be the moſt carefully preſerved. The ſpirituous part is the life of all *fermented* liquors, it keeps the whole together, and in a manner embalms and renders them durable and not ſubject to corruption; it alſo in a great meaſure gives them that aromatic refreſhing and reſtorative virtue, and the beſt effects they have on the human body. Nor is this all; but the intimate and ſubtile union of this ſpirituous part with the reſt, is perfectly the ſole and entire cauſe of both the former effects, ſo that it by no means ſuffices to have the ſpirit barely preſent among the other parts, for then it might be drawn off and poured back again, without any damage to the wine; but the eſſential union is here diſſolved by taking it away, and can never be reſtored again by a ſimple re-affuſion. It is therefore deſtructive of the end propoſed, thus to break and diſſolve the texture of the wine, and this entirely ſubverts and deſtroys its nature. This inevitably proves the caſe, whenever wine is evaporated or diſtilled, which conſtantly requires a degree of heat capable of raiſing water into vapour, and hence the ſpirituous part being much lighter than the aqueous, flies off together with it, or before it, and the wine is left diſſolved in its texture, and without its ſoul. Upon this, the remaining ſaline unctuous maſs is ſo diſturbed, as no longer to remain connected, but it becomes thick and turbid, and afterwards runs impetuouſly into a kind of corruption, attended with acidity and ropineſs. All theſe circumſtances ſhew, that though the condenſing of wines, by taking away their ſuperfluous humidity, would be a very deſirable thing, yet it is by no means to be done by evaporation.

Fermented liquors are eſteemed great antidotes to PUTREFACTION; accordingly the abſtinence from them is aſſigned as one cauſe why the Turks are more ſubject than other people to the plague, and other contagious diſtempers. It is likewiſe obſerved, that beer, wine, and ſpirituous liquors, coming more into general uſe, has been one great means of ſuppreſſing putrid diſeaſes. See Pringle's Obſerv. on the Diſeaſes of the Army, p. 286. 294. and Macbride's Eſſ. eſſ. 3. See ANTISEPTIC, CHOWDER, and SPRUCE-*beer*, and WORT.

FERN, *Filix*, in *Botany*, the name of an order of plants belonging to the *cryptogamia* claſs, and comprehending ſixteen genera; among which are the horſe-hair, maiden-hair, adder's tongue, ſpleenwort, polypody, &c. to the laſt of which belong the common male and female *fern*, beſides a great number of other ſpecies. The leaves are compoſed of other leaves affixed on each ſide of the middle rib, and thoſe are ſubdivided, almoſt to their rib, into other pinnulæ, or little leaves. The flowers have not been diſcovered, and the ſeeds grow in cluſters on the under part of the leaves. To this it is to be added, that there is alſo a peculiar face in the *ferns*, which diſtinguiſh them at firſt ſight from the other plants of this kind.

The ſeeds of the ſeveral ſpecies of *fern* were wholly unknown to the ancients. Swammerdam, in his Biblia Naturæ, claims to himſelf the honour of having firſt diſcovered them; but it appears from Hook's works, that Dr. William Cole ſent an account of the ſeeds of ſeveral of the plants of this kind to that author, in 1669, whereas Swammerdam declares his diſcovery of them to have been in 1673; ſo that it is plain that Dr. Cole's was prior to his by ſome years. The ſeed-veſſels of the common *fern*, the Engliſh and foreign maiden-hairs, the wall-rue, harts-tongue, and the like plants, are all ſimilar in their general form, their only differences being in the ſize, and in their arrangement on the plants. The number or quantity of the ſeeds is very different in different plants, but Mr. Miles obſerves, that the fewer ſeeds there are in any ſpecies, there is always the more in quantity of a ſort of ſpungy or fungous matter, which forms a kind of tubercle, not unaptly reſembling what is called jews-ears, which ſeems a ſubſtance intended for the ſheltering of the ſeeds.

In the female *fern* and Engliſh maiden-hair, the whole ſurface of the leaf on the under ſide ſeems covered with a congeries of ſeeds, ſo that they guard one another, and therefore have leſs occaſion for a covering of fungous matter of this kind; yet even on theſe plants, when the ſeeds are fallen off, there are found ſmall membranes, a little curled, looking as if they had been raiſed with the edge of a fine pen-knife from the ſkin of the leaf, not unlike the pieces of ſkin that are raiſed off from the hand, in trying a pen-knife, or other ſharp inſtrument. In the common male *fern* there are found, at the proper ſeaſon, ſeveral brown ſpots placed in a regular manner; theſe are of a pale brown colour, and are principally compoſed of this fungous matter, the feed-veſſels being ſmall and inſerted round it. Phil. Tranſ. N° 461. p. 774.

Theſe ſeed-veſſels conſiſt of a ſtalk, by which they are inſerted into the leaf; this repreſents an elaſtic cord, and is ſurrounded by a great number of annular ribs, reſembling the cartilages of the aſperia arteria; and indeed nothing in nature ſo exactly reſembles this cord or ſtalk, as the wind-pipe of a ſmall bird. This cord encircles the globular membranous pod wherein the ſeed lies, adhering to it, and dividing it into two hemiſpheres. See *Tab. of Microſcopical Objects*, *Claſs* 2.

The pod is compoſed of a fine whitiſh membrane, ſomewhat like that which lines the inſide of a pea-ſhell; the ſeeds are irregular in ſhape, and of a reticulated ſurface. The moſt advantageous way of viewing this is to uſe the common microſcope for opake objects, putting on a ſmall magnifier, and laying the ſeeds with their capſules, &c. as taken from the back of the plant, on a piece of poliſhed ivory. The proper time of the year is in the beginning of September, and then if the plant be newly gathered, the ſeed-veſſels often burſt while they are under inſpection, which is the method nature has taken for diſperſing the ſeed, and ſhew a very elegant appearance. Phil. Tranſ. N° 461. p. 782.

The common *female fern* is a very miſchievous and troubleſome weed to the farmers, being very difficult to deſtroy, where it has any depth of ground to root in. Its roots will often penetrate to eight foot deep, and ſpreading a great way, they will riſe again to the ſurface, and ſend up new plants at a conſiderable diſtance. In graſs land the beſt way of deſtroying them, is mowing the graſs, three times a year, in ſpring, in May, and in Auguſt. Dung and aſhes are very good manure for lands which abound with them; but the beſt of all things for deſtroying them, is urine. *Fern* cut up when the ſap is in it, and laid to rot upon the ground, is a very good manure for land, and will mellow it ſo as to prevent its binding. Trees planted where *fern* grows, are obſerved to thrive very much, even though it be upon a hot gravel; the reaſon of this is, that the *fern* ſhades the roots, and keeps them moiſt and cool. Mortimer's Huſbandry, p. 316.

Scotch ſheep put into a land where there is much *fern* growing among the graſs, generally deſtroy it in a little time, partly by their dung and urine, and partly by treading it down.

The root of the *male-fern* is greatly recommended by medical writers, as a cure for the rickets in children. Some alſo give it in powder, againſt worms; and it has the ſame virtues againſt the ſtone and gravel, with the reſt of the genus of capillary plants, aſcribed to it. It was frequently preſcribed by the ancients in diet drinks, for removing obſtructions, and in chronic caſes of all kinds, but is much diſuſed at preſent. Lemery, Dict. des Drog.

All the ſpecies of *fern*, and other vegetables, which carry their ſeeds on the back of their leaves, as moon-wort, and the like plants, poſſeſs the ſame general virtues of drying and ſtrengthening the viſcera, eſpecially the ſpleen.

FERN-*aſhes*. The poor people in many parts of the north of England, uſe aſhes of *fern* inſtead of ſoap, for waſhing their clothes; they cut the plant green, and then burn it to aſhes, and make them up into balls with water; they dry theſe in the ſun, and keep them ready for uſe.

The aſhes of the common *female-fern* produce a very ſingular phænomenon in the common way of treating them and their ſalt. If a large quantity of theſe aſhes be procured, and the ſalt to the quantity of ſeveral pounds extracted from them in the common way, it will ſucceed better than in ſmaller quantities. The greater part of this ſalt being dried, if the remainder, which is more moiſt, be expoſed to the air to receive ſome of the vapours of it, this will ſoon become fluid, or an oil, as it is very improperly called, by deliquium. The reſt of the lixivium, which will be very heavy, and of a deep blood-red, or claret-colour, being ſet by in a glaſs-veſſel unſtopped for five or ſix months, there will be found at the bottom of the liquor a very large quantity of ſalt precipitated to the thickneſs of about two inches on the bottom of the veſſel. The lower part of this will have all the foulneſs, and appear diſcoloured; but the upper part will be extremely pure and white. From the ſurface of this part there will grow up a number of plants, in appearance ſtanding erect, and at ſmall diſtances from one another. Theſe are only the laſt cryſtallizations of the ſubſiding or ſeparating ſalt, but they have a regularity that is very ſurpriſing; they vary conſiderably in ſize and weight, but are all of the ſame ſhape, exactly reſembling ſo many plants of the common unbranched *fern*, ſending out a great number of regular leaves on each ſide the ſtem. Theſe ramifications of the ſalt will remain many weeks in this perfection, if the veſſel be not ſtirred; but they are ſo tender, that the leaſt motion deſtroys them, and they after this never form themſelves again. Phil. Tranſ. N° 105.

FERN-*oil*, in *Pottery*, a name given by our merchants who have been in China, to a ſort of varniſh, which the Chineſe uſe in their porcelain manufactories. It is alſo called lime-oil, and is a thing ſo eaſily made, that it would be worth attempting what might be done with it, in our imitations of the porcelain. They make it in this manner: they take a large quantity of *fern* well dried, and ſpreading a covering of it over a piece of ground ſufficient for the quantity of oil they intend to make, they lay upon this a coat of large lime-ſtones, newly calcined into lime; on theſe they ſprinkle with the hand a ſmall quantity of water juſt to ſlake them. They cover this bed of lime with another of *fern*, and ſo on, till they have raiſed it to eight or ten foot high; they then ſet fire to the *fern*, this burns away in a little time, and leaves a mixture of the lime and its own aſhes. This mixture is laid in the ſame manner between beds of more *fern*, and burnt again. This operation is repeated five or ſix times. Obſerv. ſur les Coutom. de l'Aſie.

When the laſt calcination is finiſhed, the mixture of lime and aſhes is carefully gathered up, and thrown into large veſſels of water, and with every hundred weight of it, they put in one pound weight of kekio; they ſtir the whole together; and when the coarſer part has ſubſided to the bottom, they take off the finer, which ſwims at the top in form of a fine cream, and putting it into another veſſel of water, they let it ſubſide to the bottom by long ſtanding; they then pour off the water, and ſave the reſiduum in form of a thick oil.

This they mix with the oil of ſtone, prepared by powdering and waſhing in the ſame manner a particular ſort of ſtones, and with this they cover all the veſſels that they intend to varniſh. The *fern* aſhes have a very great ſhare in the advantage that this oil has over our common varniſhes; and the Chineſe tell us, that they once inſtead of *fern* uſed the wood of a tree, called ſe tki, and they ſuppoſe that the ſuperiority of the old porcelain over the preſent, is owing to the uſe of this tree inſtead of the *fern*; but it is now too ſcarce among them. The new manufacture which we have at Briſtol, excels every thing that has been done of the like kind, in the beauty of the varniſhing; and it is ſaid, they have founded their advantage on an imitation of this and the Chineſe oil of ſtone. Theſe two oils, as they are called, are always mixed together; and they muſt be carefully preſerved of the ſame degree of thickneſs, or elſe all the varniſhing will not be even.

FERN, *flowering*. See OSMOND *royal*.

FERN, *common*, or *true mules*, *filicula*. See MILT-*waſte*.

FERN, *dwarf*, in *Botany*, the name of a genus of plants, the characters of which are theſe: the flowers are not diſcovered; the ſeeds grow in cluſters on the backs of the leaves, and the whole plant reſembles the larger or common *ferns*.

FERN, *mules* or *moon*. See HEMIONITIS.

FERN, *ſweet*. See CHERVIL.

FERNAMBUC. See BRAZIL *wood*.

FEROENSIS *Marga*, in *Natural Hiſtory*, a name given by ſome authors to a marley earth, found principally in the fiſſures and cavities of ſtone, and called by the generality of later naturaliſts, *agaricus mineralis* and *lac lunæ*; and by the ancients, *terra*, or *creta ſeleneuſiaca*. See LAC *lunæ*.

FERRA, in *Zoology*, the name of a fiſh, called alſo by ſome *gwiniad* or GUINIAD.

FERRARIA, in *Botany*, a genus of the *gynandria triandria* claſs. Its characters are theſe: the flower is incloſed in a double ſpatha or ſheath, out of each of which is produced one flower. The flower has ſix oblong acute-pointed petals, three of which are alternately longer than the other, and they ſeem to be joined at their tails; their borders are fringed, turned backward, and ſilky. It has three ſtamina which riſe above the petals, and a roundiſh three-cornered germen ſituated under the flower, which afterward turns to an oblong ſmooth three-cornered capſule, crowned by the decayed petals of the flower, with three cells, wrapped in the permanent ſheath of the flower; in each cell are lodged many ſmall round ſeeds. There are two ſpecies, natives of the Cape of Good Hope. There is a great ſingularity in the root of one of theſe ſpecies, that it vegetates only every other year, and ſometimes every third year; in the intermediate time it remains inactive, though very ſound and good. Miller.

FERRARIA is alſo a name uſed by ſome authors for agrimony; and by others, in particular by Lobel, for the ſcrophularia or fig-wort.

FERRET, *Viverra*, in *Zoology*, an animal of the MUSTELA or WEASEL kind, called by ſome alſo MUSTELA *ſylveſtris*, FURO, and FURUNCULUS.

It is of a middle ſize, between the weaſel and pole-cat; its head is ſmall and flattiſh; its ears ſhort, erect, and very wide; its noſe or ſnout long, like that of a hog; and its eyes ſmall and red; its colour is a pale yellowiſh white; the back and ſides a little darker than the belly; and its feet have all five claws each: it breeds very well with us, but is ſaid not to be a native here, but brought from Africa. Ray's Syn Quad. p. 198.

It was originally brought from Africa into Spain, in order to free that country from the multitude of rabbits with which it was over-run; and from thence the reſt of Europe was ſupplied with it.

This creature has but one note in her voice, which is a ſhrill, but ſmall whining cry. The female uſually brings forth ſeven or eight young ones at a time; ſhe carries them in her body forty days; the young ones are blind for a long time after they are littered. When they are tamed they are to be fed with milk, and with barley-bread; they will faſt a long time; when they walk they ſet up their back, which is otherwiſe ſo long that it would be troubleſome to drag it on; when they are touched, they ſmell very diſagreeably; they naturally ſleep very much. The *ferret* is a bold and audacious animal, and is an enemy to almoſt all others. It does not eat the fleſh of the creatures it kills, but ſucks their blood. The uſe we make of this creature is the ſending it into rabbit-holes to drive them out; but we are obliged to faſten up their mouths that they may not tear the rabbits to pieces; but it ſtill is able to annoy them with its claws, and ſoon drives them out. It feeds on milk, ſmall birds, and the fleſh of animals, and is a creature eaſily kept tame, and will breed and bring up its young in that ſtate; and theſe will naturally hunt the rabbit, in the ſame manner as their parents.

When the warrener has occaſion to uſe the *ferret* to catch rabbits, he firſt makes a noiſe in the warren to frighten them all into their holes; then he pitches his nets; and having muzzled the *ferret*, that he may not bite the rabbits, he turns him into their holes to frighten them out; and then the dogs drive them into the nets that are ſet for them. Warreners aſſert, that the FITCHET will mix with the *ferret*; and they are ſometimes obliged to procure an intercourſe between theſe animals to improve the breed of the latter, which, by long confinement, becomes leſs eager after rabbits, and leſs uſeful: Buffon denies this; but Mr. Pennant alleges a fact in proof of it. Zoology, vol. i p. 91.

FERRET, *Indian*, *viverra Indica*, a name by which ſome have called the animal known in America by the name of QUIRPELE and QUIL. See ICHNEUMON.

FERRETS, in *Glaſs-making*, the irons with which the workman tries the melted metal to ſee if it be fit to work.

It is alſo uſed for thoſe irons which make the ring at the neck of bottles.

FERRETES *d'Eſpagne*, in *Natural Hiſtory*, a name given by authors to certain ſtones of a regular figure, found on the ſides of a rock in Spain; and as has been ſince diſcovered very plentifully on the bottom and ſides of the Fontaine de Salut, near Bagneres in France, and in other places in the country thereabout. They are ſmall ſtones of the colour of ruſty iron, and of a regular figure, being either parallelopiped with oblique angles, of which the ſides are unequal, or ſmall ſolid bodies with ſix ſides, only differing from cubes or dice in this, that the ſurfaces are not perfectly perpendicular to one another, but a little inclined; they are alſo commonly longer than they are broad, and broader than they are high. The largeſt of theſe fall ſhort of an inch in meaſure, being about eleven lines in length, nine and a half in breadth, and ſix in height; but they are uſually a great deal ſmaller, and are ſometimes found in cluſters, a hundred or more together; and ſome of them have ſhining ſkins, ſeemingly of a metallic ſubſtance. Theſe ſtones are not only found in the bath, but in the digging a way for a common road from the town of Bagneres to it, they were found lodged in their proper ſtratum. The workmen here met with a bed of a ſoft kind of ſlate of a bluiſh colour, but lighter than that of the common ſlate. The whole rock they worked through was compoſed of layers or beds of this, lying almoſt parallel over one another. The ſubſtance of the ſlate ſeemed to be a compoſition of fibres or ſtrings laid regularly ſide by ſide by one another, and all equally inclined to their beds or layers. Whence it comes, that upon breaking them with a hammer, the pieces ſometimes are pretty like the figure of a regular parallelopiped with oblique angles. Upon a narrower examination of this ſort of ſlate, there are uſually found in it a great number of parallelopiped ſtones like thoſe before ſpoken of, only ſmaller; and ſeveral little black ſpots diſcovered in other parts of the ſtone when they are examined with glaſſes, prove alſo to be regularly figured bodies of the ſame kind.

Every one of theſe ſtones, ſo long as it remains in the rock, is always found between two bundles or cluſters of tranſparent fibres, of which generally one is placed on the one, and the other on the oppoſite ſide; theſe cluſters of fibres are largeſt in the largeſt ſtones; however, they are always found even about the ſmalleſt in ſome quantity. Philoſ. Tranſ. Nº 472. p. 30.

FERRETTO, in the *Glaſs-trade*, a ſubſtance which ſerves to colour glaſs. This is made by a ſimple calcination of copper, but it ſerves for ſeveral colours. There are two ways of making this: the firſt is as follows; take thin plates of copper, and lay them on a layer of powdered brimſtone, in the bottom of a crucible; over theſe lay more brimſtone, and over that another layer of the plates, and ſo on alternately till the pot is full. Cover the pot, lute it well, place it in a wind furnace, and make a ſtrong fire about it for two hours. When it is taken out and cooled, the copper will be found ſo calcined that it may be crumbled to pieces between the fingers like a friable earth; it will be of a reddiſh, and in ſome parts a blackiſh colour. This muſt be powdered and ſifted fine for uſe. Neri's Art of Glaſs, p. 30.

The other way is leſs eaſy, but it makes a more valuable *ferretto*. It is this: make a number of ſtratifications of plates of copper and powdered vitriol alternately in a crucible, which place on the floor of the glaſs-furnace near the eye, and let it ſtand there three days; then take it out, and make a new ſtratification with more freſh vitriol, and calcine it again as before; repeat this operation ſix times, and a moſt valuable *ferretto* is produced.

FERRIFIC *Cauſe*, a term uſed by ſome writers to expreſs that principle to which what they call the production or generation of iron in burnt bodies, in which no iron could be diſcovered before burning, is owing. It is the general opinion of the preſent philoſophers, that this iron thus diſcovered in the aſhes of plants, and the like burnt ſubſtances, really exiſted there before, and only needed the diſunion of the concreted body to the bringing of its parts together. If this be the caſe, there is evidently no production of iron in the caſe, and therefore the term *ferrific* is a word without meaning. Becher, however, in his ſupplement to his Phyſica Subterranea, is of a very different opinion, determining, that the iron is really produced in theſe caſes during the action of the fire; and that by the tranſmutation of ſome other matter into iron; and from this he argues the poſſibility of gold-making among chemiſts by tranſmuting ſomething elſe into gold, as ſome other ſubſtance is in this caſe tranſmuted into iron.

FERRUGINOUS, denotes a thing to partake of the nature of iron, or to contain particles of that metal.

It is particularly applied to certain mineral ſprings, whoſe water in their paſſage along the ſtrata of the earth meets with the ore of this metal, or with pyritæ containing it, part of which they waſh off, and carry with them; and thus become impregnated with the principles thereof. Such are what we call CHALYBEAT WATERS.

The waters of Tunbridge, thoſe of Forges, and of the iron ſpring at Bourges, and many others, are *ferruginous*.

FERRUGO, the ruſt of IRON, or a kind of calx found on the ſurface thereof.

The ruſt of iron is a reſtringent; applied by way of peſſary, it repreſſes the fluor uterinus, and drank, prevents conception: it cures the eryſipelas, and exanthematous eruptions. It is of good uſe in a paronychia, roughneſs of the eye-lids, and a condylema. It alſo ſtrengthens the gums, relieves under the gout, being rubbed on the part affected, and makes the hair grow after an alopecia. Wine or water, in which red hot iron has been quenched, being drank, is good for the cœliac paſſion, dyſentery, diſorders of the ſpleen, cholera morbus, and relaxations of the ſtomach.

FERRUM. See IRON.

FERRUM *equinum*. See *Horſe-ſhoe* VETCH.

FERRY, a liberty by preſcription of the king's grant to have a boat for paſſage upon a river, for the carriage of horſes and men for a reaſonable toll: it is uſually to croſs a large river. Terms de Ley.

A *ferry* is no more than a common highway; and no action will lie for one's being diſturbed in his paſſage, unleſs he allege ſome particular damage, &c. 3 Mod. Rep. 294. The not keeping up a *ferry* has been held to be indictable.

FERTILITY, FRUITFULNESS, that quality which denominates a thing fertile or prolific.

The Egyptian nitre or natron renders the ground exceedingly *fertile*. M. de la Chambre obſerves, that the plants grow in ſuch abundance in Egypt, that they would choak one another if they were not hindered by throwing ſand upon the fields, inſomuch that the Egyptians muſt take as much pains to leſſen the richneſs of their ſoil as other nations do to increaſe that of theirs. Phil. Tranſact. N° 160.

Nothing can produce *fertility* in either ſex but what promotes perfect health; nothing but good blood, ſpirits, and perfect animal functions, that is, high health, can beget perfect FECUNDITY; and therefore, according to Dr. Cheyne, all means and medicines, all noſtrums and ſpecifics to procure *fertility*, different from thoſe which procure good blood and ſpirits, are arrant quackery and cheating. He ſays, that water-drinking males are very rarely infertile; and that if any thing in nature can prevent *infertility*, and bring fine children, it is a milk and ſeed-diet, perſevered in by both parents.

FERULA, a little wooden pallet or ſlice, reputed the ſchoolmaſters ſceptre wherewith he chaſtiſes the boys, by ſtriking them on the palm of the hand.

The word is Latin, and has alſo been uſed to denote the prelates crozier and ſtaff. It is ſuppoſed to be formed of the Latin, *ferire, to ſtrike*; or, perhaps, *ferula* in this ſenſe may be derived from the name of a plant, called in Latin, *ferula*; in Engliſh, *fennel-giant*; the ſtem whereof was anciently uſed to correct children with.

Under the eaſtern empire the *ferula* was the emperor's ſceptre, as is ſeen on divers medals; it conſiſts of a long ſtem or ſhank, and a flat ſquare head. The uſe of the *ferula* is very ancient among the Greeks, who uſed to call their princes ναρθηκοφοροι, q. d. *ferula-bearers*.

In the ancient eaſtern church, *ferula* or *narthex* ſignified a place ſeparated from the church; wherein the penitents or the catechumens of the ſecond order, called *auſcultantes*, ακροαματικοι, were kept, as not being allowed to enter the church; whence the name of the place, the perſons therein being under penance or diſcipline: *ſub* ferula *erant eccleſiæ*.

FERULA, in *Botany*. See FENNEL *giant*.

FERULÆ, a word uſed by the ancients to expreſs t horns growing on the deer or ſtag at the age of tw years.

FERULÆ, among *Surgeons*, called alſo SPLINTERS, a little chips of different matter; as of wood, bark, le ther, paper, &c. applied to bones that have been di jointed when they are ſet again.

The bark of the herb fennel-giant, called by ſome in L tin, *ferula*, was anciently much uſed on this occaſion whence the name *ferula* became common to all.

FERULACOLI, in *Botany*, a name by which ſome autho have called the thlaſpi, or treacle-muſtard.

FERULAGO. See FENNEL-*giant*.

FERZAA, in *Natural Hiſtory*, a name given by the Pe ſians to that gem which we call the turquoiſe or Turke ſtone, a blue, opake, and ſoft gem. See TURCOIS.

FESCENNINE, in *Antiquity*. *Feſcennine verſes* were kind of ſatirical verſes, full of wanton and obſcene e preſſions, ſung or rehearſed by the company, with man indecent geſtures and dances, at the ſolemnizatio of a marriage among the Romans. Hor. ep. i. lib. 145.

The word is borrowed, according to Macrobius, fro *faſcinum, a charm*; the people taking ſuch ſongs to proper to drive away witches, or prevent their effec but its more probable origin is from Feſcennium, a ci of Campania, where ſuch verſes were firſt uſed.

FESOLI, or FIESOLI, *congregation of*. See JERONYMITE

FESSE, in *Heraldry*, one of the nine honourable ordinarie of the eſcutcheon, which it divides horizontally in th middle, and ſeparates the chief from the point. It i ſuppoſed to repreſent a broad girdle or belt of honou ſuch as thoſe with which knights at arms were ancientl girded.

It poſſeſſes the center of the eſcutcheon, and contains i breadth one third part thereof. Thus, he beareth azure a *feſſe*, or, by the name of Eliott. See *Tab. Herald fig.* 22.

When the *feſſe* takes up leſs than its proper breadth, it i called a *bar*.

FESSE-*point* is the exact center of the eſcutcheon.

It is thus called, as being the point through which th *feſſe* line is drawn from the two ſides; and accordingl it divides the eſcutcheon into two equal parts when th eſcutcheon is parted *per feſſe*.

FESSE-*ways*, or *in* FESSE, denotes things borne after th manner of a *feſſe*; i. e. in a line or range, acroſs th middle of the ſhield, which the French call *en feſſe*.

FESSE, *party per*, implies parted acroſs the middle of th ſhield, from ſide to ſide, through the *feſſe* point.

This the French expreſs by one word, *coupé*.

FESSIER, in *Anatomy*, the name given by the French writers to what others call the glutæus, or according to Riolanus, the glautius. There are three muſcles of this name among authors, the glutæus major, medius, and minor, and the French call them the grand, moyen, and petit *feſſier*.

FESTA *in cappis*, in *Middle-age Writers*, grand holidays, in which the whole choir of the cathedrals wore caps.

FESTI *Dies*, among the ancients, were *feaſt-days* or holidays.

Numa diſtinguiſhed the days of the year into *feſti*, *profeſti*, and *interciſi*. The firſt were thoſe dedicated to the gods; the ſecond were thoſe allowed to men for the management of their own affairs; the third were ſhared between the gods and men.

The *feſti dies*, again, were divided, according to Macrobius, Saturn. cap. 16. into *ſacrifices*; *epulæ*, or banquets; *ludi*, or games, and *feriæ*; and the *profeſti* into *faſti*, *comitiales*, *comperendini*, *ſtati*, and *præliares*.

FESTING *Men*. See FASTERMANS.

FESTING-*penny*, earneſt given to ſervants when hired or retained. It is ſo called in ſome northern parts of England, from the Saxon, *feſtnian*, *to faſten*, or *confirm*.

FESTINO, in *Logic*, one of the moods of the ſecond figure of ſyllogiſms.

In a ſyllogiſm *in feſtino*, the firſt propoſition is an univerſal negative; the ſecond, a particular affirmative; and the third, a particular negative.

FESTIVAL. See FEAST and FESTUM.

FESTOON, in a *General Senſe*. See GARLAND.

FESTOON, in *Architecture* and *Sculpture*, is a decoration in form of a garland or cluſter of flowers.

The word is French, *feſton*, which ſignifies a *garland*, formed of the Latin, *feſtum*, *feaſt*.

It conſiſts of a ſtring or collar of flowers, fruits, and leaves, tied together, ſomewhat biggeſt in the middle, and ſuſpended by the two extremes; from which, beſide the main part which falls down in an arch, two leſſer parts hang perpendicularly.

This ornament is made in imitation of the *feſtoons* or long cluſters of flowers, hung by the ancients on the doors of their temples, &c. on feſtival occaſions.

Feſtoons are now chiefly uſed in freezes, tablets, and other vacant places, required to be filled up and adorned. They are ſometimes uſed over or under a niche.

FESTUCA, *Feſcue-graſs*, in the *Linnæan Syſtem of Botany*, the name of a kind of oat-graſs, which makes a diſtinct genus of plants of the *triandria digynia* claſs: the characters of which are, that the calyx is a many-flowered glume, and is bivalve, erect, and contains the flowers ranged together in a ſlender ſpike; the valves are ſtrait, oblong, pointed, without awns or beards, and the lower is the ſmaller. The flower is compoſed of two valves, the lower is the larger: this is of the ſhape of the cup; but it exceeds it in ſize; it is ſomewhat cylindrical and pointed, and is terminated by a ſtrait beard or awn. The ſtamina are three capillary filaments, ſhorter than the flower; the antennæ are oblong; the germen is of a turbinated form; the ſtyles are two in number, and are ſhort and bent backward; the ſtigmata are ſingle; the flower cloſely ſurrounds the ſeed, which is ſingle, oblong, ſlender, extremely ſharp-pointed at each end, and marked with a longitudinal furrow.

FESTUM, in a *General Senſe*. See FEAST.

FESTUM, in our *Law-books*, is frequently uſed for a general court or aſſembly, becauſe ſuch were anciently always kept on the great feſtivals of the year.

Thus, in our chronicles, we read, that in ſuch a year the king kept his *feſtum* at Wincheſter, &c. that is, he kept a court there at that time: *Rex apud Winton. maximum* feſtum & *convivium celebravit, tempore natalis Domini, convocatis ibidem principibus & baronibus totius regni.*

To FETCH *Way*, in *Sea-language*, is to be ſhaken or agitated from one ſide to another. The terms are uſually applied to a maſt, bowſprit, &c. when it is not ſufficiently wedged, being looſe in the partners; or to any body which is moved by the rocking of the ſhip, for want of being well ſecured.

FETCHING *the Pump*, is the act of pouring water into the upper part of it, to expel the air which is contained between the lower box or piſton and the lower end of the pump that reſts on the ſhip's floor; and accordingly, to make the water poured into the chamber communicate with that in the bottom of the pump-well, ſo as to be thrown out above by ſtriking with the brake or handle.

FETSA, in *Modern Hiſtory*, is a name which the Turks give to the written judgments or deciſions of the mufti. The word in the Turkiſh language ſignifies *ſentence*, and in Arabic, the *reply* or *judgments of a wiſe man*.

FETICHE, in *Modern Hiſtory*, a name given in Guinea to their divinities; one of whom is ſuppoſed to preſide over a whole province, and one over every family. This idol is a tree, the head of an ape, a bird, or any ſuch thing, as their fancy ſuggeſts.

FET-*Lock*, in the *Manege*, a tuft of hair growing behind the paſtern-joint of horſes.

Hence, the joint where it grows is called the *fet-lock-joint*.

FETUS. See FOETUS.

FEUD, FEODUM, the ſame with fief or fee.

Eſtates in land were originally at will, and then they were called *munera*; afterward they were for life, and then they were called *beneficia*; and for that reaſon the livings of clergymen are ſo called at this day; and afterward they were made hereditary, when they were called *feoda*; and in our law, *fee-ſimple*.

When Hugh Capet uſurped the kingdom of France, about the year 947, to ſupport himſelf in ſuch uſurpation, he granted to the nobility and gentry, that whereas till then they generally enjoyed their honours for life, or at will only; they ſhould from thenceforth hold them to them and their heirs. However, under the reign of Ludovicus Pius, who ſucceeded his father A. D. 814, grants of hereditary fiefs were frequent in France. Muratori obſerves, that the word *feudum*, which came to be ſubſtituted in place of *beneficium*, does not occur in any authentic charter previous to the eleventh century; and Dr. Robertſon adds, that a charter of king Robert of France, A. D. 1008, is the earlieſt deed in which he has met with the word *feudum*. Hiſt. Ch. V. vol. i. p. 269. This was imitated by William, called the Conqueror, upon his acceſſion to the crown of England; for till his reign *feuds* or fees were not hereditary, but only for life, or for ſome determinate time. See FEE.

Feuds were called by various names, according to their reſpective natures; as *feudum antiquum*, which deſcended to a ſon, &c. from his anceſtors; *apertum*, reſulting back again to the lord of the fee, where the blood of the laſt perſon laſt ſeiſed in fee-ſimple is utterly extinct and gone; *honorarium* and *inviduum*, a title of nobility, not of a diviſible nature, and deſcendible to the eldeſt ſon in excluſion of all the reſt; *improprium*, an improper or derivative *feud*; *maternum*, deſcending to the ſon from the mother; *novum*, one newly acquired by the ſon, to which, in ancient times, only the deſcendents from his body could ſucceed, by the known maxim of the early feudal conſtitutions; *novum* held *ut antiquum*, deſcendible in the ſame manner as a *feudum novum*; *paternum*, deſcendible from father to ſon; and *proprium*, a proper *feud*, diſtinguiſhed from one improper, which are the two grand and general diviſions. Blackſt. Com. vol. ii.

FEUD is alſo uſed in our ancient cuſtoms for a capital quarrel or enmity, not to be ſatisfied but with the death of the enemy; and thence uſually called *deadly feud*.

Feud, called alſo *feida*, and *faida*, in the original German ſignifies *guerram*; i. e. *bellum*, *war*. Lambert writes it *feeth*, and ſaith it ſignifies *capitales inimicitias*, or *implacable hatred*.

In Scotland, and the North of England, *feud* is particularly uſed for a combination of kindred, to revenge the death of any of their blood, againſt the killer and all his race, or any other great enemy.

FEUDAL, or FEODAL, of, or belonging to a *feud* or *fee*.

We ſay, a *feudal* matter, *feudal* juriſprudence, *feudal* ſeiſure, &c. A *feudal* lord, in default of fealty and homage from his vaſſal, may ſeize the fruits of the fee. A Neapolitan lawyer, called Caravita, has a Latin treatiſe of the *feudal* law, intituled, Prælectiones Feodales.

When once the uſe of fees was thoroughly eſtabliſhed in France, they would needs extend it much farther; and almoſt all the great offices of the crown thus became *feudal*; even the courts of juſtice were drawn in; in order to which, they were annexed to certain lands or revenues.

The deſign of theſe infeodations was to render the offices hereditary, after the manner of fees, which were now become ſo; and thus the offices of the grand chamberlain, grand butler, &c. came to be held by hereditary right.

As the Northern nations brought in the uſe of coats of arms, by preſerving down in their families the armorial bearings of their anceſtors ſhields, &c. as hereditary marks of honour, ſo they alſo, according to ſome, brought in the *feudal* law, by means of which arms grew up to farther perfection, as is evident by many armorial figures of ancient families, repreſenting the acknowlegements and ſervices they were obliged to perform to their own lords and ſuperiors.

Thus, roſes, cinquefoils, ſpur-rowels, bow and arrows, hunting-horns, ſhips, and the like figures, were expreſſive of the ſervices they were bound to do their lord; and hence theſe figures have become common in arms throughout all Europe. For inſtance, the old barons of Arran and Lorn were obliged to furniſh their lord with a ſhip in time of war; and thence it is that their arms carry ſhips or lymphods to this time.

FEUDATARY, or FEODATARY, a vaſſal or perſon who holds of a ſuperior in fee; i. e. on condition of yielding him fealty and homage, or other ſervice. See VASSAL.

The electors, princes, and free cities, of Germany, are all *feudataries* of the emperor.

FEUDBOTE, a recompence for engaging in a feud or action, and for the damages conſequent thereon; it having been the cuſtom of ancient times for all the kindred to engage in their kinſmen's quarrels; according to that of Tacitus De Morib. Germanor. *Suſpicere tam inimicitias ſeu patris, ſeu propinqui, quam amicitias, neceſſe eſt.*

FEU *de joie*, in the *Military Art*. See *Running* FIRE.

FEUDIST, a lawyer, or doctor learned, or much converſant in feuds or fees. Du-Moulin is reckoned a great *feudiſt*.

FEVE. See AURELIA.

FEVER, FEBRIS, in *Medicine*, a diſeaſe, or rather claſs of diſeaſes, whoſe characteriſtic is a preternatural heat felt through the whole body, or, at leaſt, the principal parts thereof, attended with other ſymptoms.

Sydenham defines a *fever*, a ſtrenuous endeavour or effort of nature to throw off ſome morbific matter that greatly incommodes the body. Quincy defines it, an augmented velocity of the blood; others, a fermentation of the blood, accompanied with a quick pulſe and exceſſive heat.

Fevers are of various kinds, denominated and diſtinguiſhed from the particular cauſes that produce them; the time they continue; their acceſſes and returns; and their different ſymptoms.

Riverius reckons above thirty different kinds of *fevers*; and Sydenham has increaſed them to double that number; but certainly phyſicians have obſerved ſomething common to all theſe diſeaſes, which made them denominate them *fevers*. A late author thinks, that the conſideration of what conſtitutes a *fever*, which he thinks very ſimple and obvious, with its true cauſes and genuine effects, will give a more juſt and clear notion of the diſeaſe, and lead to a more rational practice than all that has been ſaid by authors at ſo great length on theſe ſubtile and unneceſſary diſtinctions. He thinks the moſt natural and uſeful diviſion of *fevers* is into continued and interrupted; and he conceives they may all, when conſidered ſimply, and not as the effect of another diſeaſe, be reduced to one or other of theſe two ſorts. Medic. Eſſ. Edinb. vol. i. p. 264, 265.

In every *fever* from an internal cauſe, the three chief obſervables are theſe: firſt, an univerſal trembling, and then an increaſed heat and quick pulſe: a *fever* almoſt always begins with a cold or ſhivering; and ſoon after, the pulſe growing quicker, affords the primary diagnoſtic of a *fever*. The health of the patient ſeems to be the primary aim of nature in *fevers*, though they often terminate in death.

By Dr. Brown Langriſh's ſtatical experiments made on the blood of people in acute continual *fevers*, compared with what he ſays of the blood of three young men in perfect health, it appears, that in ſuch *fevers* the ſerum is in leſs proportion, and the craſſamentum is more viſcid and tenacious than in health. The indications of cure from which are plain. See his Modern Theory and Pract. of Phyſ. p. 68. 74.

By the chemical analyſis it is proved, that in acute *fevers* the ſaline and ſulphureous parts abound more than in health; and that the urine is impregnated more and more with theſe ſaline and ſulphureous principles, as the ſymptoms abate upon a criſis by urine.

Fevers, *ſigns of*. Theſe are an accelerated progreſſive motion of the blood, diſtinguiſhed by the quickneſs of the pulſe; this is ſucceeded by an increaſed heat in the body, and immediately after this the tonic motion of the parts is either conſtringed or relaxed. This is ſeen in the face: in the firſt caſe, it becomes red and bloated; in the latter, thin and pale: theſe ſymptoms are ſucceeded by an immoderate thirſt, and a loathing of food of all kinds; an abſence of ſleep, or diſturbed and unrefreſhing ſleep; and a peeviſhneſs or uneaſineſs in the temper, with an extreme ſenſibility of every thing, and a neglect of the common buſineſs of life: after this there is a great loſs of ſtrength, and an inaptitude to any motion; a ſenſation of pain in ſome part; a very uneaſy and difficult reſpiration; a ſweating more than uſual; and finally, there is a change in the urine, its colour being uſually very high, and its conſiſtence thicker than that of perſons in health. When the *fever* comes on gradually, the patient generally complains firſt of languor, liſtleſſneſs, ſoreneſs of the fleſh, or of the bones, as it is vulgarly expreſſed; heavineſs of the head, loſs of appetite, ſickneſs, with clamminеſs of the mouth; after ſome time there ſucceed exceſſive heat, violent thirſt, inability to ſleep, &c. When the *fever* attacks ſuddenly, it always begins with an uneaſy ſenſation of exceſſive cold, accompanied with debility and loſs of appetite; the cold is frequently attended with ſhivering, oppreſſion about the heart, and ſickneſs of ſtomach, or vomiting. Buchan.

Fevers, *general cauſes of*. Theſe are an overheating the blood by exerciſe, and thus throwing it into violent commotions; violent and ſudden cooling of the body when very hot; the abuſe of ſpirituous liquors, and the eating large quantities of foods hard of digeſtion; a watchfulneſs beyond the uſual cuſtom, ſuch as long ſitting up by the ſick, or the like; and the ſuppreſſion of any accuſtomed evacuation, particularly of habitual hæmorrhages by the noſe or other parts. Beſides theſe, the paſſions of the mind very frequently throw people into *fevers*; and it is obſerved alſo, that perſons often accuſtomed to have *fevers* are much more eaſily thrown into them on ſlight accidents than any others. To all theſe cauſes are to be added thoſe of contagion, unwholeſome air, and external or internal injuries.

Fevers, *prognoſtics in*. All *fevers* are in their nature ſalutary, being the means nature uſes to rid herſelf of ſomething that oppreſſes her, yet they are often fatal in the event; but this is rather to be attributed to the fault of the conſtitution than of the *fever*. The cauſe of the diſeaſe being impeded, and other diſeaſes coming on, the patient often dies under them; ſo that the moſt judicious phyſicians obſerve, that people rather die with a *fever* than of a *fever* in theſe caſes.

It is to be obſerved in general, that of the great number of perſons who have *fevers*, very few proportionably die of them.

Fevers very often are cured by nature alone, and go off very happily only by the patient's abſtinence, a quiet ſtate, and keeping up the natural evacuations. In this manner great numbers recover without the help of medicines; a number almoſt as great is deſtroyed by medicines, which, when adminiſtered by perſons who have not ſufficient judgment, interrupt nature, and prevent the neceſſary excretion. *Fevers* go off, according to the language of phyſicians, either by a criſis or lyſis: in the firſt caſe, they leave the patient at once, after the critical days; in the other, they wear off gradually, growing ſlowly leſs and leſs violent. The acute *fever* uſually goes off in the firſt way; the intermittents in the other. Critical evacuations, of whatever kind, when they happen in ſufficient quantity, bring with them a ſort of inſtantaneous cure, the patient becoming well and eaſy from them, though immediately before he was in the utmoſt anxiety and uneaſineſs. No *fever* ever goes off without ſweating, and a change in the urine. But in *fevers* in general the ſweats do not come on at firſt, but afterwards; and in general, the ſweats never come on during the violence of the burning heat, but when that remits a little, the ſweat breaks out. If it appears during the exceſſive heat, the preſage is bad, at leaſt, it is of no uſe or good to the patient. Sweats coming on at a proper time, and flowing to a proper degree, bring on recovery; but when they are ſuppreſſed, the diſeaſe becomes worſe; there is a pain and laſſitude in the limbs, and the diſeaſe is protracted in length, and from an acute, becomes a ſlow *fever*. If alſo there be no change perceived in the urine, and the heat do not exceed the ordinary ſtandard, it is a fatal prognoſtic for the patient; and the old phyſical axiom is uſually verified, that while the pulſe and the urine are well in *fevers*, the patient dies.

A dejection of ſpirits in a *fever*, and a melancholy ſtate coming upon a perſon uſually chearful when well, is always a bad omen.

The ſeveral different kinds of *fevers* have their ſtated times in which each attacks the patient. Tertians uſually ſeize people about dinner-time, and are particularly common about the period of the vernal equinox. Quartans uſually make their firſt attack about four or five o'clock in the afternoon, and are more common in autumn than at any other ſeaſon of the year. The ſynocha, or continent *fever*, expreſsly ſo called, uſually attacks perſons in the morning before day-break. Bilious *fevers* uſually make their firſt attack about the time of ſun-riſe, and are moſt common in the midſt of ſummer. The catarrhal *fevers*, finally, moſt commonly attack perſons in the evening, and they are moſt frequent about the equinoxes. The more any *fever* departs from its uſual courſe, the worſe is the prognoſtic; any *fever*, when it has been improperly treated by medicines, becomes much more ſtubborn and difficult of cure than when it has been left to itſelf. The particular medicines which diſturb the courſe of nature in *fevers*, and by that means render them more difficult of cure, are aſtringents, too powerful abſorbents, opiates, &c. And it is obſerved, that when *fevers* go off happily and eaſily, eſpecially when they go off of themſelves without medicines, the patient always enjoys a better ſtate of health after than he had before. Junker's Conſp. Med. 257.

Fevers, *method of cure in*. The phyſician in all *fevers* is to endeavour to make himſelf the ſervant and aſſiſtant of nature; what nature endeavours in the beginning and increaſe of the diſeaſe, is to prepare, diſpoſe, and ſearch the noxious matter; and in the ſtate and decline of it, to eliminate and evacuate the matter ſo prepared by the proper paſſages. The whole buſineſs of art is, therefore, to aſſiſt nature in theſe two efforts of ſecretion and excretion of the matter.

The method of doing this in every particular ſpecies of *fever*, is to be ſeen under their ſeveral particular heads; but as we are here treating of *fevers* in general, it may be proper to give the method of treating them as *fevers*, without running into the ſeveral ſub-diſtinctions.

The remedies which we are to give to aſſiſt the ſecretion and preparation of the morbid matter, are the diluting and cooling liquors in general: ſuch are a ſufficient quantity of warm and weak fluids, as the common barley-water, and the like; and teas, made of the common herbs of ſage, mint, baum, &c. with the milder alexipharmic roots. Nothing is more likely to abate the heat, attenuate the humours, remove ſpaſms and obſtructions, promote perſpiration, increaſe the quantity of urine, &c. in ſhort, produce every ſalutary effect in an ardent or inflammatory *fever*, than drinking plentifully of water, thin gruel, or any other weak diluting liquor, of which water is the baſis: the neceſſity of ſuch liquors is plainly indicated by the dry tongue, the parched ſkin, and the burning heat, as well as by the thirſt of the patient. Many cooling liquors, very agreeable to patients in *fevers*, may be prepared from fruits, as decoctions of tamarinds, apple-tea, orange-whey, &c. with theſe alſo are to be given the gentle reſolvents, ſuch as are able to break the thick and tough conſiſtence of the humours. Of this kind are the temperate alexipharmic roots eſpecially,

cially, as they are alſo endowed with a diuretic virtue. Such are the roots of elecampane, pimpernel, butterbur, and the like. Scordium is alſo by ſome greatly recommended in this intention. Theſe may be conveniently given in decoctions or infuſions; and with theſe powders are to be given, compoſed of the abſterſive and digeſtive ſalts, ſuch as tartarum vitriolatum, and the like, mixed with ſuch things as have a power of obtunding and incraſſating the acrid and thin ſulphureous ſaline humours; ſuch are the abſorbent powders of oyſter-ſhells, crab's-claws, and the like. Theſe ſhould be firſt ſated with lemon-juice, and then mixed with a little nitre, and with the before mentioned ſalts, they make an excellent medicine. They may be given every three, four, or ſix hours, as the urgency of ſymptoms require, and a draught of the decoction before preſcribed given after them. The abſorbent powders have been commonly preſcribed in *fevers*; but it would be better if they were neglected. Emulſions of ſweet almonds, and the cooling ſeeds, are alſo very proper at convenient intervals. See FEBRIFUGE.

The method of ſuppreſſing *fevers* by means of cold, now commonly adopted, was practiſed by Hippocrates, Galen, Celſus, Avicenna, and the ancients: they expoſed their patients to cold air, and they gave them cold water to drink. Nothing is more deſired by a patient in a *fever* than freſh air; it removes his anxiety, cools the blood, revives the ſpirits, and is in every view beneficial. There ought, therefore, to be a conſtant ſtream of freſh air into his chamber, ſo as to keep it moderately cool. Air that has been repeatedly breathed, when the blood is inflamed, or the humours are in a putrid ſtate, becomes unfit for reſpiration, and acquires a noxious quality. See AIR, *fixed*, and BLOOD.

The medicines by which the phyſician is to aſſiſt nature in her following buſineſs of excretion, are the gentle diaphoretics, among which the diaphoretic antimony, when truly prepared, holds a very high place. The alexipharmics, which have alſo a diuretic virtue, ſuch as the mixtura ſimplex, when faithfully prepared, and lightly camphorated, are very proper; and the bowels are in the mean time to be kept open by emollient glyſters. Theſe things are proper in all *fevers*; but in ſome, alſo vomits, gently laxative medicines and bleeding, are extremely proper: thoſe, however, are not to be admitted at random in all kinds.

At the beginning of a *fever*, the patient generally complains of great laſſitude or heavineſs; and this ſymptom evinces the propriety of keeping him eaſy, and, if poſſible, in bed: lying in bed relaxes the ſpaſms, abates the violence of the circulation, and gives nature an opportunity of exerting all her force to overcome the diſeaſe. The bed alone has often removed an incipient *fever*. The food of the patient in a *fever* ſhould be light, and eaſy of digeſtion, and given in ſmall quantities: it ought chiefly to be of the vegetable kind, as panada, roaſted apples, gruel, and ſuch like. All violent medicines are to be avoided in *fevers*; for nature uſually attempts to do her office placidly and quietly in theſe caſes, and ſuch medicines violently diſturb her motions, and often bring on miſchiefs which ſhe would have wholly avoided. For this reaſon, vomits, though they are by ſome given indiſcriminately in all *fevers*, are to be very cautiouſly meddled with; and there are, in reality, only a few *fevers* in which they can be allowed to be proper; for in acute legitimate *fevers*, the cauſe of the diſeaſe never lies in the primæ viæ; and the violent emotions in vomiting not only dreadfully diſturb the ſtomach and bowels, but occaſion a fullneſs of the veſſels about the head and neck, with various diſorders of the head in particular. In bilious *fevers*, the cauſe is indeed evidently in the primæ viæ; but even in theſe, it is not ſo diſpoſed as to be ſo ſafely thrown up by vomit, nor can the inflammatory ſtate of the patient at that time properly bear ſuch a violent ſhock. In intermittents, vomits are never proper, unleſs in tertians, for the cauſe in the other does not lie in the primæ viæ; and even in tertians, it may be diſpoſed to evacuation by gentler means, and without the violent tumult that a vomit occaſions in the body.

Notwithſtanding the cautions above given with reſpect to the uſe of vomits, they are in many caſes very neceſſary and beneficial on the firſt attack of a *fever*. Antimonial medicines, adminiſtered for this purpoſe, curb the circulation, and promote all the diſcharges. Their influence on the whole nervous ſyſtem is ſuch, that the ſtrength is rarely ſo much reduced when they are duly adverted to as when they are omitted.

Acrid purges are in general to be avoided in *fevers*. The proper medicines of this kind are the ſal Glaub. ver. tart. vitr. ſal polychreſt. or Rupellenſe, tamarind. rhubarb, and manna; and if two or three grains of the emetic tartar is added in caſes that indicate a vomit to be proper, they will operate both ways, and there will be no occaſion for adminiſtering an emetic by itſelf. Bleeding, though abſolutely neceſſary in ſynochal or continent *fevers*, is not adviſable in many others; and very often the opening a vein, and taking away too little blood, is the occaſion of congeſtions of blood in the head, whence ariſe deliriums and other dreadful ſymptoms. The ſtate of diſeaſes in this country is ſo much altered, that true inflammatory *fevers* are very rare; and that there is hardly one *fever* in ten where the lancet is neceſſary. In many caſes bleeding would be very prejudicial; and this general rule may be obſerved, never to bleed at the beginning of a *fever*, unleſs there be evident ſigns of inflammation. The giving of hot ſudorific medicines before the proper time greatly diſturbs nature, and brings on many ill conſequences. Junker's Conſp. Med. p. 261. Buchan's Med. chap. 13.

In all *fevers* the drinking plentifully of warm and cold weak liquors, is attended with many good conſequences; the patient is always refreſhed by it, the febrile heat is mitigated, reſt is promoted, and the proper and neceſſary ſweats forwarded. The ſymptoms of *fevers* are never to be ſo regarded as to prevent the due attention to the principal point, nor is the phyſician to be alarmed at them. Want of appetite, and thirſt, with long watchings, are not to be attacked with particular medicines, but looked upon as mere ſymptoms that will hereafter go off of themſelves; and inquietude of mind ſhould have no other medicine than ſerious advice of the harm it will do. Sudden cooling of the body in all *fevers* is a very dangerous thing. The patient is adviſed to ſwallow his liquids gently, not haſtily. Volatile ſalts have been with many of a long time in great uſe in *fevers*; but they are uſually attended with bad conſequences afterwards, many perſons having been thrown into œdematous ſwelling of the legs and feet, and ſome into an abſolute aſcites, only by the uſe of theſe in *fevers*.

Acids in general are by many very much dreaded in *fevers*; but there is no real ground for this: on the contrary, in ſanguineous *fevers*, during the time of the violent heat and immoderate thirſt, they are found of the greateſt uſe and benefit. Spirit of vitriol, or of ſulphur, lemon-juice, with that of barberries, are all found very beneficial; only in caſes where there is a cough, the vitriolic acid is to be avoided, becauſe it uſually irritates that ſymptom, and lemon-juice ſweetened with ſugar alone is to be given. The uſe of aſtringent medicines, though too common, yet is extremely improper in all *fevers*; for in all theſe caſes the ſecretions and excretions all require to find the ways open; but theſe are all obſtructed by aſtringents, and violent ſymptoms are brought on by this means, and often death. But in ſtubborn intermittents, where the peccant matter is diſcharged, and yet theſe ſymptoms remain merely from their having become habitual, theſe aſtringents may be allowed of, and are indeed not only ſafe, but of the greateſt uſe. Junker's Conſp. Med. p. 263.

Nitre is an admirable medicine in *fevers* in general; it agrees with all temperaments, but principally with the hot; when taken in ſolution with warm and weak liquors, it always gently opens the bowels; and when given in powders, it more than all other things obtunds the acrimony of the humours.

In feveriſh diſorders, accompanied with hæmorrhages, the arnica vera has been recommended. See ARNICA *vera*.

The moſt general and genuine diviſion of *fevers* is into *eſſential* and *ſymptomatic*.

FEVER, *eſſential*, is that whoſe primary cauſe is in the blood itſelf, and which does not ariſe as an effect or ſymptom from any other diſeaſe in the ſolids or other parts.

This is what we abſolutely and properly call a *fever*.

FEVER, *ſymptomatic*, is that which ariſes as an accident or ſymptom of ſome other antecedent diſorder; as an inflammation, phlegmon, eryſipelas, impoſthume, ſmall-pox, pleuriſy, &c.

Whence it is peculiarly denominated inflammatory, eryſipelatous, purulent, variolous, or pleuritic *fever*.

Eſſential fevers are generally diſtinguiſhed into *continued* and *intermitting*; others chooſe to divide them into *diary*, *intermittent*, *continent*, and *continued*.

FEVER, *continual*, is that which gives the patient no reſpite or intermiſſion, or which ſhews no remarkable increaſe or abatement in the ſymptoms.

This is ſubdivided by ſome into the *acute*, *ardent*, or *inflammatory*, the progreſs of which is quick, and the ſymptoms violent; the *ſlow*, or *nervous*, in which theſe are more gentle; and the *malignant*, *putrid*, or *petechial*, when livid or petechial ſpots manifeſt a putrid ſtate of the humours; and by others into *putrid* and *not putrid*.

FEVER *not putrid*, *continual*, is that wherein the parts of the blood are not ſo diſſolved and broken as to give occaſion for the principal parts thereof to be ſecreted; or that wherein there is not any diſcharge of putrid, purulent matter into the blood.

FEVER, *continual putrid*, is that wherein the texture of the blood is rendered ſo lax, or even diſſolved, that its parts or principles ſeparating, ſome of the principal of them are ſecreted and loſt. See *Putrid* FEVER.

FEVER, *ardent* or *inflammatory*, called by the Greeks καυσος, is a very acute *fever*, generally introduced by rigor or chillneſs, and attended with a vehement heat, a frequent and full pulſe, a pain of the head, dry ſkin, redneſs of the eyes, a florid countenance, pains in the back, loins, &c. difficulty of breathing, dry coughs, extreme thirſt, reſtleſſneſs, and commonly a rough and black tongue. The more dangerous ſymptoms are a delirium, laborious reſpiration, ſtarting of the tendons, hiccup, cold clammy ſweats, and an involuntary diſcharge of urine. The perſons moſt ſubject to this *fever* are the young and vigorous, and plethoric; and it is moſt frequent in the ſpring and beginning of ſummer. It is occaſioned by violent exerciſe, ſtrong liquors, and a full diet, with little exerciſe, and by any thing that obſtructs perſpiration, as lying on the damp ground, drinking cold liquor when the body is hot, watching, &c. This *fever* ſeems to have no critical time for its termination, either in recovery or in death. When it is very violent, or very badly conducted, it ſometimes proves fatal on the ninth day. Perſons often die from the eighteenth to the twentieth; and ſometimes about the fortieth day, after having been alternately better and worſe. The general courſe of theſe *fevers* is determinable from the fourteenth to the thirtieth day. The regimen proper for this *fever* ſhould be ſuch as is calculated to dilute the blood, correct the acrimony of the humours, allay the exceſſive heat, remove the ſpaſmodic ſtricture of the veſſels, and promote the ſecretions. The patient ſhould, therefore, drink plentifully of diluting liquors, as water-gruel, clear whey, barley-water, balm tea, &c. which may be ſharpened by juice of orange, currant jelly, &c, orange-whey, made by boiling in milk and water a bitter orange, ſliced, or a lemon, a little cream of tartar, or a few ſpoonfuls of vinegar, till the curd ſeparates, is an excellent cooling drink. Two or three ſpoonfuls of white wine may be added to the boiling liquor. If the patient be coſtive, an ounce of tamarinds, with two ounces of ſtoned raiſins of the ſun, and a couple of figs, may be boiled in three pints of water to a quart, and this liquor may be uſed at diſcretion. His diet ſhould be ſpare and light, and conſiſt chiefly of gruel, panada, roaſted apples, &c. He ſhould be relieved by the admiſſion of freſh air into his chamber, and by ſprinkling it with vinegar, lemon-juice or vinegar and roſe-water, with a little nitre diſſolved in it. His mouth ſhould be often waſhed with a mixture of water, honey, and vinegar; and his feet and hands ſhould be frequently bathed in lukewarm water, eſpecially if the head be affected. To which we may add, that the patient ſhould be kept as ſtill and compoſed as poſſible. Bleeding ſhould be performed as ſoon as the ſymptoms of an inflammatory *fever* appear, and repeated at the diſtance of twelve, eighteen, or twenty-four hours, according to the ſymptoms, till the hardneſs and fullneſs of the pulſe is ſenſibly abated. Hæmorrhages, or bleedings from the noſe, often occur in this *fever*, much to the relief and ſecurity of the patient. If the *fever* and heat be very great, forty or fifty drops of dulcified ſpirit of vitriol may be made into a draught, with an ounce of roſe-water, two ounces of common water, and half an ounce of ſimple ſyrup; and this draught may be adminiſtered every three or four hours while the *fever* is violent. When the patient diſcovers an inclination to vomit, the efforts of nature ſhould be aſſiſted by weak chamomile-tea or lukewarm water. If the belly be bound, a clyſter of milk and water, with a little ſalt, and a ſpoonful of ſweet-oil or freſh butter in it, ſhould be daily adminiſtered; and if this ſhould fail, a tea-ſpoonful of magneſia alba, or cream of tartar, may be frequently added to the patient's drink. If about the tenth, eleventh, or twelfth day, the pulſe becomes more ſoft, the tongue moiſter, and the urine begins to depoſit a reddiſh ſediment, the diſeaſe promiſes a favourable iſſue; but if, on the contrary, the ſpirits of the patient become languid, the pulſe ſinks and yet retains its hardneſs, and his breathing becomes difficult, accompanied with a ſtupor, trembling of the nerves, ſtarting of the tendons, a ſwelling of the belly, wildneſs of the eyes, and conſtant raving, there is great danger. In this caſe bliſtering-plaſters ſhould be applied to the head, ancles, inſide of the legs and thighs; and poultices of wheat-bread, muſtard, and vinegar, may be likewiſe applied to the ſoles of the feet; and the patient ſhould be ſupported with cordials, as white-wine whey, negus, ſago-gruel with wine in it, &c. As this diſeaſe is always attended with danger, the beſt medical advice ſhould be procured as ſoon as poſſible.

Inflammatory *fevers* may be diſtinguiſhed into two ſtages; the firſt, while the pulſe continues hard, in which it is proper to bleed; and the ſecond, when the inflammatory ſymptoms ſtill remaining, the pulſe is too low for that evacuation. In this laſt ſtate, bliſters are the chief remedy, and which, except in a few ſingular caſes, are not to be uſed ſooner. If the bliſters are large, it is better to apply them gradually, than many at a time. It is uſual to begin with the back, and, if neceſſary, to apply them next to the legs or the thighs, reſerving the arms laſt, that the patient may be ſo much the longer conveniently moved. There is no caution more neceſſary to a young phyſician, than to abſtain from all opiates through theſe *fevers*, however much the patient may complain of pain or watchfulneſs. Indeed, if the *fever* be accompanied with a diarrhœa, which is not critical, the looſeneſs is to be gradually checked by diaſcordium, after giving rhubarb, and endeavouring to turn the humours to the ſkin by the uſe of the diaphoretics, omitting the nitre, with the uſe of the white decoction for the common drink. When the patient is beginning to recover, he ſhould avoid exceſs of food, drink, exerciſe, and company, for fear of a relapſe; and if his digeſtion be bad, and he ſhould be troubled with feveriſh heats, an infuſion of Peruvian bark in cold water will be of uſe; and when he has recovered his ſtrength, he ought to take ſome gentle laxative. Buchan's Dom. Med. chap. 15. and Tiſſot's Advice, &c. p. 244, &c. Pringle's Obſ. on the Diſeaſes of the Army, p. 134. 136.

To the claſs of *burning fevers* are reducible the *lipyria*, *aſſodes*, *helodes*, &c.

The *lipyria* is a burning *fever*, wherein the heat is very intenſe within-ſide, and at the ſame time the external parts are cold.

The *aſſodes* is a burning *fever*, attended with great inquietudes, nauſeas, vomiting, &c.

The *helodes* is a *fever* wherein the patient ſweats continually.

The *ſyncopal fever* is that attended with frequent ſwoonings.

The *epialos* is that wherein both heat and cold are felt in the ſame part at the ſame time.

FEVER, *bilious*. When a *fever* is accompanied with bilious diſcharges by vomit or ſtool, whether it be continual, intermitting, or remitting, it is called bilious, and belongs to the claſs of *ardent fevers*. See BILIOUS *fever* and CHOLERIC *fever*.

Dr. Percival, in his Eſſays Medical and Experimental, informs us, that in theſe *fevers* the powder of COLUMBO root, given in doſes of fifteen to twenty grains, with vitriolated tartar, from one to two ſcruples every four, five, or ſix hours, produces both ſpeedy and beneficial effects. Dr. Haygarth of Cheſter farther remarks, that after the primæ viæ are unloaded of their bilious contents, the columbo-root admirably allays the nauſea, conſtantly attendant on this diſorder; and that it anſwers our warmeſt wiſhes, by correcting the bile, reſtoring the proper tone of the ſtomach, and of the whole habit; and that it is an excellent preventative of relapſes to which patients in this diſorder are peculiarly diſpoſed.

Burning bilious fever of the Weſt Indies, called alſo the *yellow fever*, frequently attacks the Europeans, who indulge to exceſs, and are not careful to guard againſt the heats and dews that are common in that part of the world. It attacks with a tranſient chillneſs and ſhivering, which are ſoon ſucceeded by a burning heat all over the body, and more particularly about the præcordia; the pulſe is high and quick, but not hard; the eyes are heavy; a violent head-ach follows, with a ſtrong pulſation of the temporal arteries, and a laborious reſpiration; a nauſea ſucceeds with bilious diſcharges; the anxiety of the patient is very great, and he feels pain in the back and loins, and an uneaſy laſſitude in the limbs. In about twelve hours after the firſt attack, the tongue is very dry, rough, and diſcoloured; the thirſt is exceſſive, a ſoreneſs is felt all over the body, and a delirium comes on. In the laſt ſtage the patient labours under a COMA, manifeſts great oppreſſion about the præcordia; at length the tendons tremble, and cold ſweats and convulſions terminate in death. When the patient recovers, the criſis uſually happens on the fourth day after the attack, and diſcovers itſelf by a ſuffuſion of bile all over the body; and a yellow tinge in the eyes is reckoned a favourable prognoſtic. Inceſſant vomiting, with diſcharges, growing of a darker colour, is a fatal ſign; and if a dry ſkin, which is a threatening ſymptom, accompanies an inflamed redneſs of the eyes, death may be expected in a few hours. Bleeding ſhould be immediately propoſed; but after the third day it is hardly adviſeable. Then one or two grains of tartar emetic ſhould be given for evacuating the bile; and the belly muſt be kept ſoluble by repeated doſes of ſaline purges. When the primæ viæ are evacuated, the bark, either in ſubſtance or infuſed in cold water, muſt be freely uſed, in doſes as large and as often repeated as the ſtomach can digeſt them. It ſhould be given as ſoon as a remiſſion is obſerved, or a diaphoreſis is produced. The columbo-root ſhould be alſo tried. Bliſters may keep off the coma; or if it comes on, they ſhould be applied to the head, arms, and legs, and ſinapiſms to the ſoles of the feet. Cordial medicines, with camphor, ſhould be alſo duly adminiſtered. Motherby's Dict.

Fever, *benign catarrhal*, in *Medicine*, the name given by authors to a *fever* extremely different from the malignant one of the ſame denomination, which is alſo called by way of diſtinction, *petechialis*. This is the diſeaſe deſcribed in the writings of the ancients, under the name of *febris quotidiana continua*. It is properly a continual ſymptomatic *fever*, in which nature is labouring of herſelf to correct the vitiated lymph, whether its faults be in quality or only in motion. This is done by increaſing the ſecretory or excretory motions beyond their natural ſtandard, but yet not to any great violence. The difference between this and the malignant kind, though ſo very great as to make them appear wholly different ſpecies, yet is only in degree. Junker's Conſp. Med. p. 313.

Signs of it. This *fever* always attacks people in an evening, and is principally frequent in the ſpring and autumnal ſeaſons. A gravedo and coryza either preſage it, or are immediately joined with it, and the patient is afflicted with a hoarſeneſs and difficulty of ſwallowing; he feels alſo a kind of inflammation, or, as it were, St. Anthony's fire within his throat, and a weight in the breaſt; and is attended through the whole courſe of the diſeaſe with a violent cough, which brings up nothing, and with a remarkable univerſal languor of the body. Pains in the back, attended with ſhiverings, frequently alſo attend the firſt attacks of this *fever*, and continue half an hour, ſometimes an hour; theſe are ſucceeded immediately by a gentle heat, and this brings on a ſenſe of ſtraitneſs over the breaſt, a difficulty of breathing, and in ſome people a continual reaching to vomit. This heat endures fewer or more hours, according to the degree of the plethora. The pulſe is frequent and quick, the appetite is weak, the ſtrength fails, and the ſleep becomes unquiet and diſturbed; the head rather feels weak than painful; and ſometimes vomitings, often diarrhœas, ſoon ſucceed theſe complaints. Sweats are frequent and copious; and the urine, which is of an orange-colour, as it is in all inflammatory *fevers*, has this peculiar quality in this caſe, that it depoſits a bluiſh white ſkin, beſide the roſe-coloured ſediment.

Perſons ſubject to it. Theſe are principally thoſe of a ſanguine or phlegmatic habit, and ſuch as have a very faulty ſerum; ſuch as are obliged by their uſual occupations to expoſe their head and neck much to the cold; thoſe who have had the itch, or any other violent cutaneous eruption ſtruck in upon them; and thoſe who are watchful long in the night, and drink too much wine.

Cauſes of it. Theſe are frequently violent and ſudden cooling of the body, as when hot with exerciſe, by drinking large draughts of cold liquors; the acrid matter uſed to be thrown off by a coryza, driven back; and all things which any way impede natural and healthful perſpiration.

Prognoſtics in it. The ſimple catarrhal *fever* often goes off very happily without the aſſiſtance of medicines, only by obſerving a good regimen; but notwithſtanding this natural mildneſs, it often becomes dangerous to particular conſtitutions, and by means of improper treatment; but the more it recedes from its natural mildneſs, and the more intenſe the heat is, the greater fear there is of ſome of the viſcera being injured. The happieſt event of it is, by a daily reſolution and ſucceſſive diſſipation of the morbific matter.

Method of treatment. The fault of the lymph in this diſeaſe uſually conſiſting in its viſcous and mucous texture; this is to be relieved by alexipharmics, and the like medicines. The roots of elecampane, pimpernel, and vincetoxicum are famous for doing great ſervice in theſe caſes; and to theſe may very properly be added the ſaline digeſtives, ſuch as nitre, and the tartarum vitriolatum. The mixtura ſimplex is alſo to be given in doſes of twenty-five drops, twice, or oftener in a day. The cough is to be moderated by liquorice, emulſions of ſweet almonds, oil of almonds and barley-water, water-gruel, or the like. The bowels are alſo to be gently kept open by a laxative diet, a frequent drinking of weak and emollient liquors, and by clyſters at proper times. See Catarrh.

Fever, *malignant catarrhal*, in *Medicine*, the name of a *fever* extremely different from the ſimple *catarrhal fever*, and much more dangerous. This is alſo called by ſome the *petechial catarrhal fever*. It is a diſeaſe in which nature is endeavouring, by increaſing the ſecretory and excretory motions, to eliminate the catarrhal, acrid, and active matter. This is unqueſtionably the ſame ſpecies of *fever* with the ſimple one of this name, but extremely different in degree, and is often even epidemical. This is called by ſome the *febris Hungarica*, and *febris caſtrenſis*, or *camp-fever*; but the latter appellation is uſed to expreſs it in its very worſt ſtate, and when attended with its moſt terrible ſymptoms. The petechiæ, or ſpots, in this *fever*, are to be carefully diſtinguiſhed from thoſe in the common ſcorbutic caſes. Junker's Conſp. Med. p. 317.

Signs of it. Theſe are the ſame with thoſe of the ſimple *catarrhal fever*; but with this difference, that in this caſe there are alſo violent anxieties of the mind, a ſudden reſolution of the ſtrength, a continual difficulty of breathing, and a loathing of all kinds of food. This laſt ſymptom uſually continues till the eleventh day. The patients are alſo ſubject to frequent faintings, and are uſually delirious, and complain of very ſharp pains in the back, and at the joints. After theſe ſymptoms the petechiæ uſually appear; theſe are little red ſpots on the breaſt, &c. reſembling flea-bites. When hot medicines are given, the petechiæ are enlarged. Aphthæ and quinſeys are alſo very frequent attendants on this *fever*; and diarrhœas ſeldom fail of appearing at ſome ſtage of the diſeaſe, and are often critical.

This *fever* ſeldom attacks the patient with a ſhivering. It is very contagious, in the manner of other malignant *fevers*, and has this peculiar circumſtance, that it is very often complicated with other diſeaſes, and according to the ſeaſons and other accidents, frequently appears under their form. In February, March, and April, it often has the appearance of a pleuriſy; in May and June, it often affects the ſymptoms of the *cholerica febris*; and at this ſeaſon of the year is frequently, in the beginning, attended with terrible hæmorrhages. In July and Auguſt, a dyſentery is frequently joined with it; and, in the winter months, it generally has a bad cough attending on it. Perſons of tender habits are much more ſubject to this diſeaſe from infection than thoſe who are of a hardy and robuſt make. But as it is contagious, it ſometimes ſpares no age, ſex, or conſtitution, that come in the way.

Cauſes of it. The moſt frequent cauſes of this diſeaſe are a fermentaceous and putrid exhalation in the air, and the contagion from the bodies and effluvia of the ſick; and in this laſt caſe, a natural terror of receiving the infection is often found to make people more ſubject than ordinary to receive it. And to theſe are to be added the eating vitiated and fermenting proviſions, and the ſudden cooling of the body when very hot with labour or exerciſe, and frequent and violent paſſions ſuppreſſed.

The ſpots which appear on certain days in this diſeaſe are not eſſential to it, though common; and hence the *fever* is rather called by accurate writers, *febris petechizans*, than *petechialis*; they are a relief to the patient, if they are not violently repelled, or ſome other way improperly treated. When they appear earlier than the ſeventh day, they are alſo obſerved to be worſe preſages than when they appear on, or after it. When the ſpots appear in very great numbers, they uſually fly back again, and the patient is much endangered by it. And when they are of a bright red, and after three or four days appearance go off again, and leave the patient better than before, they are a ſure good prognoſtic. But if they are of a livid or black colour, they are a very bad omen; and when after the eruption the perſon does not find himſelf relieved, the conſequence is often a miliary purple *fever*. Lightheadedneſs before the ſeventh day is leſs dangerous than if it does not happen till after it. Diarrhœas in all other eruptive *fevers* are a very bad ſymptom, and often preſage the death of the patient. But that is not the caſe in this; they ſometimes prove critical, and carry off the diſeaſe. But when that is not the caſe, they are of no bad effect, and are always better for the patient than an obſtinate coſtiveneſs. But it is to be obſerved, that though theſe diarrhœas, when they come naturally, are of great relief in many caſes, and of no harm in others; yet art is not here to be uſed as nature, and no purging medicines are by any means to be given to bring on a laxity of the bowels.

Method of cure. Gentle evacuations are to be brought on by ſuch medicines as encourage perſpiration, and promote urine. Abſorbents, ſaturated with acids, as crab's-eyes, ſated with lemon-juice, are of ſervice; and to theſe ſhould be joined a ſmall quantity of nitre. Cooling emulſions are alſo to be given at times; and ſpirit of wine, camphorated, is to be rubbed on the head to mitigate the violent head-achs. And Stahl greatly recommends,

commends, in the caſe of a too violent diarrhœa, the uſe of powders made of purified nitre and mountain cryſtal. In caſes of obſtinate coſtiveneſs, clyſters muſt be injected as often as is found neceſſary; and when there is a complaint of ſoreneſs in the fauces, and difficulty of ſwallowing, aſtringent gargariſms are to be uſed. Junker's Conſp. Med. p. 322. See HOSPITAL *fever*, and *Putrid* FEVER.

FEVER, *choleric*, in *Medicine*, the name of a *fever*, called alſo by ſome BILIOUS *fever*, and by others a *cauſus*; though the generality of writers diſtinguiſh the *cholerica febris* from the *cauſus*. All bilious *fevers* are properly ſpecies of acute *fevers*, and owe their origin to diſtemperatures of the bile, at times when the aliments are in a ſtate of fermentation in the ſtomach and inteſtines.

The *cauſus* is diſtinguiſhed from the *cholerica febris*, properly ſo called, by its being ever much more violent and dangerous, and by the excretions which attend it. For in the *choleric fever* the vitiated gall and other bilious excretions are always plentifully voided, ſometimes upwards, ſometimes downward, and ſometimes both ways. In the *cauſus*, the matter is more uſually detained in the body, and rarely voided otherwiſe than by vomiting, and that uſually only in ſmall quantities, and in the beginning of the diſtemper.

Signs of it. The general ſigns of the *cholerica febris* and *cauſus* are a remarkable anxiety, and frequent complaints about the breaſt, as of a ſtraitneſs and painful heat. A violent heat on the inſide of the mouth, and inſatiable and intolerable thirſt, trembling and convulſive motions of the joints, and violent deliriums. Dryneſs of the mouth and tongue are often ſo terrible in this diſeaſe, that the ſkin cracks with it; and often the whites of the eyes, ſometimes the whole body, becomes yellowiſh. The peculiar and appropriated ſymptoms of a *cholerica febris*, ſtrictly ſo called, are an univerſal languor and debility of the limbs.

A ſevere ſhivering firſt ſeizes the patient, and is ſoon ſucceeded by a very violent heat and raging pain in the head; and after the two firſt days, there uſually are very terrible ſtrainings and reachings to vomit. The matter brought up at theſe times is cauſtic, acrid, and bilious, and inflames, and even ulcerates the fauces, and if voided upon a ſtone floor, effervesces violently. If this vomiting abates, there immediately comes on a diarrhœa, attended with a teneſmus, occaſioned by the irritation of this ſharp matter in the rectum. Faintings alſo are very frequent in this diſeaſe, eſpecially where the vomitings do not bring up a ſufficient quantity of the offending matter. The peculiar and appropriated ſigns of the *cauſus*, ſtrictly ſo called, are theſe: a violent and inſatiable thirſt, greater than that in any other *fever*. The bowels are always bound; and it is but very ſeldom that there is any tendency to vomit. The urine is reddiſh and turbid, and after ſtanding ſome time, depoſits a red ſediment. Often there is a ſenſible pain and ſoreneſs in the præcordia, ſo that the patient cannot bear the leaſt touch upon the breaſt; and uſually, in the courſe of the diſeaſe, there are faintings and violent convulſions.

Perſons moſt ſubject to this diſeaſe are ſuch as eat largely, and drink heavy and imperfectly fermented liquors after it. The *cholerica febris*, properly ſo called, is moſt frequent with thoſe of a cholerico-ſanguineous habit, and ſuch as feed on high-ſeaſoned meats, and drink abundance of wine or other ſtrong liquors; and is often brought on ſuch perſons by their falling into a violent paſſion after a full meal. The *cauſus* peculiarly attacks the people of melancholic habits, who are much inclined to paſſion, but ſuppreſs it, and who are naturally coſtive.

Prognoſtics in it. The ſimple *choleric fever* is attended with great danger, if not timely undertaken to be cured. But the *cauſus* is yet more fatal than it, and from Hippocrates's days has been accounted among the *febres lethiferæ*, or *fevers* that very frequently kill the patient.

In many *fevers* nature is able to help herſelf, and ſucceeds beſt of all when left alone. But theſe are of that number of diſtempers in which the aſſiſtance of art is abſolutely neceſſary, and out of which nature very ſeldom brings the patient ſafely when unaſſiſted. The happieſt turn this *fever* can take, is the copious diſcharge of the peccant matter by vomit; for when it goes downward, the febrile heat always increaſes, and the ſymptoms in general uſually grow worſe. When the reachings are violent, and the matter brought up is but ſmall in quantity, then the patient is uſually ſubjected to painful hiccoughs, and dangerous ſyncopes and convulſions. When much bile is thrown up by vomit, and that not very badly coloured, and there is no diarrhœa, there is then little danger from the diſeaſe; and in general, coſtiveneſs in this ſtate of the diſeaſe is more eligible than a tendency to ſtools. The more violent the delirium is in theſe diſeaſes, and the longer continued, always the greater is the danger to the patient. And if the pains and burning heat ſuddenly ceaſe, and a ſhivering and dejection of the ſpirits ſucceed, there is no doubt of a gangrene being coming on within. Junker's Conſp. Med. p. 273. 277.

Method of cure. The cure of theſe diſeaſes conſiſts in mitigating the violent ſharpneſs of the humour, and promoting its evacuation: and finally, in abating the burning heat brought on by it. The utmoſt endeavours are firſt to be made to correct and alter the morbific matter. To this purpoſe, the ſeveral preparations of nitre, with the teſtaceous powders and mucilaginous ptiſans, with ſmall mixtures of lemon-juice, and frequent draughts of cooling and diluting liquors, are to be given moderately warm. If the coſtiveneſs be too violent, clyſters of broth muſt be injected, with the addition of a little oil and ſalt; and, if neceſſary, ſmall doſes of rhubarb. To quell the febrile heat and emotion of the blood, the mixtura ſimplex may be given with great ſucceſs; and there is often a ſenſible good effect from the application of rags wetted in camphorated ſpirit of wine to the pit of the ſtomach. After the morbific matter is evacuated, the reachings to vomit may be allayed by gentle opiates. All hot medicines change the BILIOUS *fevers* into inflammatory ones; and the common ſudorifics drive the morbific matter into the blood, and uſually bring on almoſt immediate diſcolourings of the ſkin like thoſe of the jaundice. Bleeding, though performed ever ſo early in the diſeaſe, ſeldom does any good, except only in remarkably plethoric habits.

FEVERS, *colliquative*, are thoſe wherein the whole body is conſumed and emaciated in no long time; the ſolid parts, with the fat, &c. melted down, and carried off by a diarrhœa, ſweat, urine, &c.

FEVER, *continent*. See SYNOCHUS.

FEVER, *depuratory*. See DEPURATORIA *febris*.

FEVER, *diary*, is that which does not ordinarily hold beyond twenty-four hours. It is the gentleſt of all *fevers*; is frequently got by too much exerciſe, or other external accidents. It is cured by reſt alone, and keeping in bed. If it remain for ſeveral days, it is either called a *continual ephemera*, or *ſimple ſynochus*.

FEVER, *epidemic*. See EPIDEMIC, *Peſtilential* DISEASES, PLAGUE, &c.

FEVERS, *eruptive*, are thoſe which, beſide the ſymptoms common to other *fevers*, have their criſes attended with cutaneous eruptions. Such are thoſe of the ſmall-pox, meaſles, the petechial, the purple or ſcarlet *fever*, and the miliary *fever*; the other ſymptoms are, a grievous oppreſſion of the breaſt, laborious ſhort breath, obſtinate waking, ſpaſms, ſore throat, cough, &c.

FEVER, *goal*. See HOSPITAL *fever*.

FEVER, *hectic*, is a ſlow, durable *fever*, which extenuates and emaciates the body by inſenſible degrees. See HECTIC and CONSUMPTION.

It has three ſtages: the firſt, while it conſumes the juices of the body; the ſecond, when it exhauſts the fleſhy ſubſtance of its humidity; and the third, when it lays hold of, and deſtroys the ſolids themſelves; in which laſt ſtage it is reputed incurable. Its effect is ſomewhat like that of a flame, firſt conſuming the oil of the lamp, then the moiſture of the wick; and laſtly, the wick itſelf. But this *fever* is frequently conſidered as of the *ſymptomatic* or *ſecondary* kind, ariſing in phthiſes, &c.

FEVER, *inflammatory*. See *Ardent* FEVER.

FEVER, *intermitting*, is that which ceaſes and returns again alternately at ſtated periods, and is called alſo an AGUE. Agues are occaſioned by effluvia from putrid ſtagnating water. They are alſo produced by eating too much ſtone-fruit, by a poor watery diet, damp houſes, evening dews, lying on the damp ground, watching, fatigue, depreſſing paſſions, and the like. In a word, whatever relaxes the ſolids, diminiſhes the perſpiration, or obſtructs the circulation in the capillary or ſmall veſſels, diſpoſes the body to this diſeaſe.

In this kind of *fever*, cold and heat, ſhivering and ſweating, ſucceed each other; the paroxyſms are attended with ſickneſs, nauſeas, vomitings, head-ach, pain in the back and loins, &c. the paroxyſms are acute, but the diſeaſe uſually more or leſs chronical.

Sometimes the diſeaſe comes on ſuddenly, when the perſon thinks himſelf in perfect health; but it is more commonly preceded by liſtleſſneſs, loſs of appetite, and the other ſymptoms above recited. The quality of the urine after the fit characteriſes theſe ſeveral ſpecies of intermittents: it is of a reddiſh colour, and lets fall a ſediment exactly reſembling brick-duſt. It is ſometimes frothy, and a pellicle or thin frothy ſkin appears on the top, and adhering to the ſides of the glaſs in which it is contained.

While the fit continues, the patient ought to drink freely of water-gruel, orange-whey, weak chamomile-tea; or, if his ſpirits be low, ſmall wine-whey, ſharpened with the juice of a lemon. His drink ſhould be warm; and if twenty or twenty-five drops of laudanum be put into his drink, and given about half an hour after the commencement of the hot fit, it would promote his ſweat, ſhorten the fit, relieve the head, and tend greatly to remove the diſeaſe. His food between the paroxyſms ſhould be nouriſhing, and eaſy of digeſtion; and his drink be ſmall negus, acidulated with the juice of lemons or oranges, and ſometimes a little weak punch. Moderate exerciſe will alſo be of great uſe.

In the cure of an *intermitting fever*, when it does not go off without medicine, the firſt object is to cleanſe the ſtomach and bowels; for this purpoſe vomits ſhould be taken before any other medicine; a ſcruple or half a dram of the powder of ipecacuanha will be ſufficient for an adult, which may be taken two or three hours before the return of the fit, and repeated at the diſtance of three or four days: during the operation, the patient ſhould drink plentifully of weak chamomile-tea. If he be afraid to take a vomit, he muſt in this caſe cleanſe the bowels by a doſe or two of Glauber's ſalts, jalap, or rhubarb. At the beginning of an *intermitting fever*, when exceſſive heat, a delirium, &c. indicate an inflammation, bleeding may be proper: the intermittents that prevail in cold dry ſprings are ſometimes blended with an inflammatory diſpoſition; but the autumnal *fevers* are frequently combined with a principle of putrefaction, in which caſe bleeding would be improper: as the blood is ſeldom in an inflammatory ſtate in *intermitting fevers*, this operation is rarely neceſſary.

After proper evacuations, the patient may ſafely uſe the Peruvian bark, which, by the general conſent of phyſicians, is allowed to be a ſpecific for theſe *fevers* in all ſeaſons, ages, and conſtitutions. Two ounces of the powder may be divided into twenty-four doſes, and made into boluſſes with ſyrup of lemon, or mixed with red-wine, chamomile-tea, water-gruel, or any other liquor that is moſt agreeable to the patient. In a quotidian *fever*, one of theſe doſes may be taken every two hours during the interval of the fits. In a tertian ague, it will be ſufficient to take a doſe every third hour, and in a quartan every fourth. A ſmaller quantity of bark will ſuffice for a young perſon; and the doſe muſt be adapted to the age, conſtitution, and violence of the ſymptoms. The patient ſhould perſiſt in the uſe of this medicine till the diſeaſe is entirely overcome; and eſpecially in autumnal or winter agues, which are much more obſtinate than thoſe of ſpring and ſummer. A cup of the following infuſion drank three or four times a day will greatly promote the cure: take an ounce of gentian root, half an ounce of calamus aromaticus, and as much orange peel, with three or four handfuls of chamomile-flowers, and a handful of coriander ſeeds; bruiſe them together in a mortar, and uſe them in form of an infuſion or tea. About half a handful of theſe ingredients may be put into a tea-pot, and a pint of boiling water poured on them; or two handfuls of the ſame ingredients may be put into a bottle of white-wine, and a glaſs of it may be drank twice or thrice a day. Thoſe who prefer a decoction of the bark, may boil an ounce of it with two drams of bruiſed ſnake-root, and an equal quantity of ſalt of wormwood, in a quart of water, till it is reduced to a pint: to the ſtrained liquor may be added an equal quantity of red wine, and a glaſs of it taken frequently. In obſtinate agues, and particularly unfavourable circumſtances, it will be neceſſary to mix with two ounces of the bark half an ounce of Virginian ſnake-root, and a quarter of an ounce of ginger, or ſome other warm aromatic; but when the ſymptoms are of an inflammatory nature, the aromatics may be omitted, and half an ounce of ſalt of wormwood or ſalt of tartar may be added to the above quantity of bark. When children are afflicted with this diſeaſe, the bark may be rendered more palatable by mixing it with diſtilled waters and ſyrup, and ſharpening it with the elixir or ſpirit of vitriol. It may be alſo given in the form of a clyſter. Dr. Lind recommends for an adult half an ounce of the extract of bark diſſolved in four ounces of warm water, with the addition of half an ounce of ſweet-oil, and ſix or eight drops of laudanum, to be repeated every fourth hour, or oftener, as occaſion ſhall require. The quantity of extract and laudanum muſt be diminiſhed for children. Children have been ſometimes cured by wearing a waiſtcoat with powdered bark quilted between the folds of it; by bathing them frequently in a ſtrong decoction of the bark, and rubbing the ſpine with ſtrong ſpirits, or with a mixture of equal parts of laudanum and the ſaponaceous liniment. Profeſſor Bergman, in his Opuſcula Phyſica & Chemica, 1779, mentions ſeveral inſtances in which the moſt obſtinate *intermittent fevers* that have raged in Sweden for ſome years paſt, and that would not yield to the bark, have been almoſt conſtantly removed by the artificial Seltzer-water, or other ſimilar impregnations of water with fixed air. The following preventative will be of ſervice to thoſe who live in low marſhy countries, or who are liable to frequent attacks of this diſeaſe: take an ounce of the beſt bark, Virginian ſnake-root, and orange peel, of each half an ounce; bruiſe them all together, and infuſe them for five or ſix days in a bottle of brandy, Holland gin, or any good ſpirit; pour off the clear liquor, and take a wine-glaſs of it twice or thrice a day. Gentian root, or calamus aromaticus may alſo be chewed for the ſame purpoſe: all bitters, eſpecially thoſe that are warm and aſtringent, are antidotes to agues. Buchan. Dom. Med. chap. 14. and Tiſſot's Adv. &c. chap. 18 § 250.

In *intermitting fevers*, it ſeems, from Dr. Langriſh's experiments, that the craſſamentum of the blood is not ſo viſcid and tenacious, neither is the ſerum ſo bilious, ſaline, and acrid, as in acute coninual *fevers*. The red globules abound more, and the cruor is more viſcid and tough in quotidians than in tertians, and in tertians than in quartans. Mod. Theor. and Pract. of Phyſ. p. 229.

The cold bath has been preſcribed with ſucceſs as a ſtrengthener to thoſe who were recovering from obſtinate *intermitting fevers*, to prevent a return of the diſeaſe. See Dr. Huxham's Obſ. de Aere & Morb. Epid.

Intermitting fevers are of divers kinds; as the QUARTAN, QUOTIDIAN, *double* QUOTIDIAN, and TERTIAN. There are alſo *intermitting fevers* which only return every fifth day, or every ſixth, or every ſeventh, and at other intervals.

FEVER, *inteſtinal*, *febris inteſtinalis*, in *Medicine*, a name given by Heiſter to a peculiar ſpecies of acute *fever*, paſſed over in ſilence by the generality of authors, but by ſome called the *meſenteric fever*, and by our Sydenham the *new fever*, *nova febris*. This differs from other acute *fevers*, in that it is attended always with a diarrhœa, which, however, is ſalutary, and which it is very dangerous to ſtop; and in that it is not relieved by the attemperating or diaphoretic medicines uſeful in other *fevers*, much leſs by the hot ſudorifics; all theſe things exaſperate and make it worſe; and the only things that give relief in it are gentle cathartics, and vomits that operate without violence. This *fever*, therefore, evidently ſhews the error of thoſe haſty reaſoners, who declare, that all acute *fevers* are to be cured by diaphoretics.

This peculiar ſpecies of *fever*, though unknown to many of the late writers, and called by Sydenham a new diſtemper, was not unknown to the ancients. Hippocrates has left many things concerning it; as have alſo the later Greeks, and Celſus; and among the moderns, Duret, Sennertus, Foreſtus, Riverius, Etmuller, Baglivi, Stahl, Hoffman, and Lanciſci, have all met with it, though they have given but very ſhort and imperfect deſcriptions of it in their writings.

The generality of thoſe who have written of this *fever* have referred it to the malignant kinds, from its being uſually attended with ſevere and uncommon ſymptoms from the beginning, or from ſuch being brought on in the courſe of an irregular treatment. The common method of curing *fevers* by diaphoretic medicines brings on in this, anxieties and ſtreightneſs of the præcordia, with pains about the ſtomach, loſs of appetite and deliriums, with efflorescences of various kinds, particularly petechial ſpots; and theſe ſymptoms are not unfrequently attended with death. But it is to be obſerved, that diſeaſes are to be carefully diſtinguiſhed in their own ſymptoms; thoſe which the phyſician brings on being often very different from what nature would offer.

Theſe *fevers* have their ſeat in the ſtomach and *inteſtines*; or if they have it any where elſe, it appears at leaſt that their origin, which is in a putrid colluvies, is always much more eaſily educed and evacuated by theſe than by any other paſſages. Many of the diſtempers mentioned by authors under peculiar names, are properly to be referred as to their cauſes to this ſpecies of *fever*. The dyſenteric *fever* is abſolutely of this kind, and many of the petechial ones. The catarrhal *fevers* alſo are referable to this kind; and the continual quotidian and tertian, with the *fevers* deſcribed by the ancients under the names of *hemitritæus*, *aſſodes*, *helodes*, *epiala*, and *lipyria*, with the *tritophyæ*, nearly allied to the *hemitritæi*, and by ſome authors confounded together, the words being uſed as ſynonymous.

Symptoms of inteſtinal fevers. Theſe are frequent ſhiverings when the patient is firſt ſeized with the diſtemper, which return at different and irregular intervals. After theſe, the tongue, teeth, and fauces, are covered with a foul and viſcid phlegm, the tongue, in particular, often looking yellowiſh and blackiſh with it; the patient perceives a continual diſagreeable taſte in his mouth from this, and the people who are about him an ill ſmell. There is always a diarrhœa attending theſe *fevers*, and the fæces voided in it have a peculiarly offenſive ſmell. The hypochondria are always diſtended, and often in pain; the patients are attended with violent tremblings in their ſleep, ſo that they are frequently waked in terrors and uneaſineſs, and in tenderer ſubjects, theſe alſo are very frequent while waking. Pains in the head and neck are alſo conſtant attendants of this diſtemper, and ſeem to take their origin from ſpaſms. The urine, in the beginning of the diſeaſe, is of a natural ſtate and colour, and afterwards becomes turbid, and depoſits a muddy ſediment during the whole courſe of the diſtemper.

Theſe are the conſtant ſymptoms of theſe *fevers*; but beſide theſe, there are ſometimes other violent ones, ſuch as violent anxieties of the præcordia, pains in the ſtomach, and in the ſide reſembling thoſe of a pleuriſy, a loſs of ſtrength, a violent internal heat, and a continual convulſive or tremulous motion of the hands, with a ſubſultus tendinum, hiccough, and cold ſweats; which are extremely dangerous ſymptoms, and preſage a fatal period to the diſtemper.

Beſide theſe, which are the common and the additional ſymptoms of theſe *fevers*, there are yet ſome others often ſeen in them, which are merely accidental, and are owing to the improper management of the patient. It is a common error to give hot and ſudorific medicines in theſe caſes; the conſequence of which is, that the peccant matter which was lodged before in the primæ viæ is propelled into the blood, and not being able to make its way through the pores, it appears under the ſkin in form of petechiæ or purple ſpots, or of papulæ of a purple or reddiſh, ſometimes of a livid or blackiſh colour. Under this circumſtance, which is wholly owing to the ignorance of the preſcriber, the diſtemper gets the name of a petechial or a purple *fever*. Sometimes the ſame methods ſend the matter to the ears, where it occaſions deafneſs; ſometimes to the parotids and maxillary glands, where it forms tumours, inflammations, and abſceſſes of a very bad ſort; and finally, if it be transferred to the brain, violent deliriums and a phrenitis are the certain conſequence. Thus, according as this matter happens to be driven by this improper treatment to a more or leſs noble part of the body, it gives the ſymptoms of a more or leſs dangerous diſeaſe; and very frequently the patient ſeems to have a pleuriſy or peripneumony, or an inflammation in the liver, ſpleen, or inteſtines, while in reality the cauſe of the diſeaſe is all the while the ſame; and there is no difference, but that of the matter's ſettling on one or another part. Heiſter's Compend. Med. p. 83. and 97.

The method of cure. All hot medicines muſt be avoided, and the diſcharge of the peccant matter by the diarrhœa promoted by glyſters, and by purging medicines. Some adviſe aloes, and other medicines of that kind; others ſena and manna; ſome the purging ſalts; but moſt prefer rhubarb, given in often repeated ſmall doſes. Large draughts of the lubricating decoctions, ſuch as barley-water and water-gruel, are to be given, and emulſions of ſweet almonds and of the cold ſeeds. Small quantities of oil of ſweet almonds are alſo to be given at times, and juleps of the cooling waters and ſyrups moderately acidulated, and powders of nitre, cinnabar, and the common abſorbents, as crabs-eyes and the like, are to be given, to take off the pains and ſpaſms, and to attemperate the acrid matter. Bleeding in this *fever* is not neceſſary, unleſs in plethoric habits; and in thoſe caſes it muſt be done on the acceſs of the diſeaſe; for if done after the third or fourth day, it is uſually found to do more harm than good.

The diet in theſe *fevers* is not to be ſo very thin and weak, as in other acute *fevers*, but moderate nouriſhment is to be allowed, that the patient may retain his ſtrength ſufficiently to go through it: in the beginning of the diſeaſe, however, the patient has uſually an averſion for food, and then it is not to be forced upon him; but when the ſtomach begins to require it, then it is to be given in a moderate quantity; and great care muſt be taken that nothing aſtringent or difficult of digeſtion be allowed, but light and innocent meats, and with theſe a little good wine to promote digeſtion. Some alſo have given frequent vomits, by ſmall doſes of ipecacuanha in theſe *fevers*, with very good ſucceſs; and it is remarkable, that the purple *fever* mentioned by Stahl and others, as peculiarly affecting lying-in women, and being very frequent in Saxony for a long time, was by Dr. Wagner and others cured by this method: its origin being found to be a viſcous matter putrifying in the ſtomach and inteſtines; and therefore, the diſtemper being properly one of theſe *inteſtinal fevers*, was curable by the ſame methods with them; that is, by emptying the primæ viæ.

Some, as Baglivi and Burchard, have called theſe *fevers mesenteric fevers*; but improperly, according to Heiſter, lib. c. p. 85.

Fevers, *malignant*, are thoſe in which the danger is much greater than the ſymptoms indicate, or in which the uſual regular ſymptoms do not appear (nature being oppreſſed with the malignity of the *febrile* matter), but other foreign ſymptoms ariſe; as a pain about the ſtomach, and præcordia; a livid complexion, with the face much disfigured, &c. and ſometimes efflореſcences on the ſkin, &c.

Some authors, from microſcopical obſervations, affirm, that in all *malignant fevers*, the blood is ſo corrupted, that ſwarms of little worms are generated therein, which occaſion moſt of the ſymptoms.

In all *malignant fevers* the blood is too fluid. Blood-letting has here no place; emetics do well at firſt, afterwards ſudorifics and alexipharmics: bliſters are commended in the progreſs of the diſeaſe. See *Malignant catarrhal* Fever, *Miliary* Fever, *Putrid* Fever, and Hospital *fever*.

Fever, *meſenteric*. See *Inteſtinal* Fever.

Fever, *miliary*, or *purple*, an acute, continual, and exanthematous *fever*, in which nature ſeems to be endeavouring to drive out the ſubtle morbific matter to the ſurface of the body, by increaſing her ſecretory and excretory motions. It takes its name from the ſmall puſtules or bladders, &c. which appear on the ſkin, reſembling in ſhape and ſize the ſeeds of millet.

This *fever* is divided into two kinds; of the which, one is called *purpura rubra*, or the *red purple fever*; and the other by a very odd form of expreſſion, the *purpura alba*, or *white purple fever*.

The *white purple fever* is uſually malignant; it is eaſily complicated with the petechial *fevers*, and in ſome places has of late years been found often to affect lying-in women.

The *red purpura* is much more benign and mild than this, and indeed often is attended with no danger.

Theſe two ſpecies of *purpura* ſeem to differ as much as the ſmall-pox and meaſles do from one another, the white *fever* of this kind being uſually as much more fatal than the red, as the ſmall-pox is more fatal than the meaſles; but as there are caſes in which the ſmall-pox is mild and benign, and the meaſles are ſometimes dangerous, ſo in theſe diſeaſes, out of the natural courſe, the white is ſometimes mild, and attended but with a ſlight *fever*, while the red is fatal, and attended with a very high one. As the ſmall-pox alſo has white puſtules, and the meaſles only protuberances on the ſkin, ſo the *white purple fever* has alſo white regular puſtules, while the red has only ſuch protuberances as thoſe of the meaſles.

The *miliary fever* is ſometimes a primary diſeaſe; but it is much oftener a ſymptom of ſome other malady, as the ſmall-pox, meaſles, ardent, putrid, or nervous *fever*; and in all theſe caſes it is the effect of a too hot regimen or medicines.

Signs of this diſeaſe. The white kind ſeizes the patient with a general ſhivering and coldeſs, and a ſtraitneſs of the præcordia, with great anxiety of mind, a low, quick pulſe, and loſs of ſtrength; and afterwards ſhews itſelf in alternate changes of heat and cold; and before the appearance of the eruptions, the patients are worſe in reſpect of their anxiety and other ſymptoms; they are very reſtleſs, and ſometimes delirious; the tongue appears white, the hands ſhake, attended frequently with a burning heat in the palms; and in child-bed women the milk generally goes away, and the other diſcharges ſtop; and they complain of a troubleſome pricking or itching under the ſkin. The puſtules uſually firſt appear on the third or fourth day, ſometimes later; and at their approach, there is firſt perceived a general redneſs of the ſkin; and after this the redneſs is collected into ſpots, in the middle of each of which there appears a white puſtule; and theſe are often ſo copiouſly ſpread over the body, that they almoſt touch one another. Theſe puſtules are pellucid, and contain only a clear water, afterwards they grow yellowiſh; in child-bed women they are ſometimes interſperſed with puſtules of a red colour: when theſe appear the diſeaſe is called a raſh; and their eruption is uſually attended with an acute *fever*; when theſe puſtules have ſtood four days, they dry away, and the places appear ſcaly, and the diſeaſe terminates. Sometimes, in people of humid habits, and ſuch as have no *fever*, theſe puſtules ſweat out a white water.

The *red purple fever* ſeizes the patient in nearly the ſame way with the white; that is, with ſhiverings and heat ſucceeding one another. It is alſo attended with a tenſion and pain in the back, and with a ſtraitneſs of the breaſt, and a cough. The *purple* eruptions appear on the fourth, or on the ſeventh day, or later even than that, in form of ſmall protuberances like millet ſeeds, and are attended at the time of their eruption with an itching within the ſkin: they are moſt numerous when the ſweat is moſt abundant, as on the breaſt, back, &c. though the whole body is ſometimes covered with them: the *fever* is not violent, and the ſweat is copious, and of an ill ſmell. In ſome caſes this diſeaſe is attended with no *fever* at all, and people go about their buſineſs with it, only complaining of an itching all over them. Some have violent pains of the head at the time, and are unaccountably ſleepy and anxious; but theſe ſymptoms uſually go off as ſoon as the eruptions appear properly: theſe remain fully out a few days, and then die away of themſelves, and the perſon finds himſelf as well as before.

The *purple fever* of both kinds ſeems to have been more frequent of late than in the times of the earlier writers on medicine. The white kind, in particular, ſome years ago, was in a manner epidemic in Saxony, and carried off great numbers, and particularly ſeized the lying-in women. Wherever the petechial *fevers* are frequent, there the white *purple fever* is uſually alſo common. It often alſo mixes itſelf with the ſmall-pox, and makes the caſe always greatly worſe, and all the ſymptoms more violent. The red *purple fever* is moſt frequent with young men, and ſuch as lead ſedentary lives, and are ſubject to violent paſſions; labouring people are ſcarce ever found affected with this diſeaſe. Among women, thoſe of tenderer conſtitutions are moſt ſubject to it, and eſpecially ſuch as have been before ſubject to hyſteric complaints. And the perſons moſt ſubject of all to it are thoſe of both ſexes who live at eaſe and within doors, and by this means always are ſending off the humours to the ſurface of the body.

Cauſes of it. Theſe are a bad quality in the air, contagion from perſons who have the diſeaſe, the driving back of ſweats, and even the forcing them too violently by hot medicines: this too often happens to women in child-bed, and to perſons in petechial *fevers*. To theſe are to be added alſo, the curing the rheumatic and catarrhal diſorders by a too cold regimen and method, and an omiſſion of habitual bleedings, or by ſuppreſſion of the menſes, or diſcharges by the hæmorrhoidal veins. The *miliary fever* is ſometimes occaſioned by violent paſſions and emotions of the mind; by great evacuations, a weak watery diet, rainy ſeaſons, exceſſive uſe of cold, crude, unripe fruits, impure waters, and unwholeſome proviſions. In child-bed women this diſeaſe is often the effect of great coſtiveneſs during pregnancy, and of immoderate uſe of green traſh, &c. But the more general cauſe is indolence.

Prognoſtics in it. The going back of the eruptions in the white *purpura* is very often fatal, and in the mildeſt circumſtances is uſually attended with aphthæ, alienations of the mind, and terrible anxieties; and if by means of medicines the eruptions appear again, and yet the ſymptoms occaſioned by their going in do not diſappear, there is great reaſon to ſuſpect danger. The white *purpura* attending the petechial *fever* is very dangerous when the eruptions appear on the fourth day, but is leſs ſo when they appear later. The white *purpura*, when not attended with a *fever*, is leſs dangerous than otherwiſe; but it is uſually attended with diſtreſſing anxieties of mind, and with ſpaſtic motions.

The red *purpura*, when the eruptions are ſtruck back, is not attended with ſuch ſudden danger as the white; but people uſually have ſome convulſive motions attending it, and a great languor and debility of motion, and ſometimes inflammations of the fauces, and dangerous quinſeys; ſometimes a dry cough, ſometimes a heat of urine, or arthritic complaints, or a ſpurious pleuriſy, or a hemicrania; but all theſe ſymptoms go off as ſoon as the eruptions appear again.

If a diarrhœa comes on in the progreſs or decline of the diſeaſe, and is ſuddenly checked, it endangers an apoplexy. In child-bed women a diarrhœa is a very dangerous ſymptom; and the change of the colour of the urine from a yellow to a pale-colour is alarming; ſleepineſs is a favourable ſymptom.

Method of cure. This is to be the ſame both in the red and the white *purpura*, and is not different from that in other inflammatory *fevers*; namely, a gentle, but continual perſpiration muſt be kept up, and this alone will often cure the diſeaſe.

The patient's food ſhould be weak chicken-broth with bread, panada, ſago, or groat-gruel, &c. to a gill of which may be added a ſpoonful or two of wine. If his ſpirits are moderately high, his drink ought to be weak, as water-gruel, baum-tea, &c. a decoction of two ounces of the ſhavings of hartſhorn, and the ſame quantity of ſarſaparilla in two quarts of water, ſweetened with white ſugar, may be uſed as his ordinary drink. When the ſpirits are low, wine-whey or ſmall negus, ſharpened with the juice of orange or lemon, ſhould be allowed. If the *fever* has a putreſcent tendency, the patient's ſtrength muſt be ſupported with generous cordials joined with acids; and if the putreſcence increaſe, the bark muſt be adminiſtered. When the head is affected, the body ſhould be kept open by emollient clyſters.

On the days before the eruption of the ſpots, powders are to be given of nitre, diaphoretic antimony, and the abſorbents, as crabs-eyes, and the like; and when the eruptions are out, which uſually happens on the fourth day, the ſame powders muſt be given interchangeably, with gentle ſudorific draughts; from all which, fumitory-water, however, is to be carefully excluded. When the eruptions appear and return, camphor ſhould be added to any other medicines. The moſt proper cordial in this caſe is good wine, and the medicines ſhould be of the cordial and perſpirative kind; and all heating ones ſhould be avoided. A vomiting and diarrhœa, which ſometimes attend this diſorder, are mitigated by the ſaline draughts with ſaffron and crabs-eyes. This method is to be continued, only giving the doſes leſs frequently in the decline of the diſeaſe; and when it is wholly gone off, gentle purges are to be given thoroughly to cleanſe the primæ viæ; and the patient is by degrees to be hardened to the air. It is to be obſerved, that all irritations of the bowels are as bad in theſe caſes as in the ſmall-pox or meaſles, and that even the uſe of the moſt gentle clyſters ſhould be very ſparingly admitted. Bleeding can very rarely, if ever, be proper in this diſeaſe, as it commonly ſeems to be more of a putrid than of an inflammatory nature. Bliſters may be uſed through the whole courſe of the *fever*; but they ſhould be ſmall, and one applied at a time. However, if the pulſe ſhould ſink remarkably, the puſtules fall in, and the head be affected, it will be neceſſary to apply ſeveral bliſtering-plaſters to the moſt ſenſible parts, as the inſide of the legs and thighs, &c. People who are often ſubject to returns of the red or white *purpura*, would be right to uſe cupping with ſcarification frequently, by way of prevention; and when the cauſe of the diſeaſe is the ſuppreſſion of ſome habitual evacuation, great care is to be taken to ſupply the place of that by bleedings, if it cannot be recalled in the accuſtomed way. This is to be done at different times to prevent relapſes; and in general, a method of uſing gentle exerciſe, ſo as to promote a moderate ſweat, is greatly preferable to the method uſed by ſome of clothing too warm, which rather promotes the diſeaſe, by inviting the humours to the ſurface.

Pregnant women ſhould guard againſt coſtiveneſs, uſe regular exerciſe, avoid all green traſhy fruits, and other unwholeſome things; now and then take a gentle laxative of manna or rhubarb, or cream of tartar, and bleed in the firſt months; and when in child-bed, ſtrictly obſerve a cool regimen. Junker's Conſp. Med. p. 327. and 329. Buchan's Dom. Med. chap. 21.

Fever, *milk.* See **Milk**.

Fever, *nervous*, called alſo *ſlow fever* and *fever on the ſpirits*, attacks perſons of a weak relaxed habit, who neglect exerciſe, eat little ſolid food, ſtudy hard, or indulge in ſpirituous liquors. This *fever* may be occaſioned by any thing that depreſſes the ſpirits and impoveriſhes the blood, as anxiety and grief of mind, watching, intenſe thought, poor and irregular diet, unripe fruits, damp and unwholeſome air, exceſſive evacuations, wet cloaths, great fatigue, and whatever obſtructs the perſpiration and cauſes a ſpaſmodic ſtricture of the ſolids.

The preſaging ſymptoms of a *nervous fever* are low ſpirits, want of appetite, laſſitude, watchfulneſs, ſighing, and dejection of mind; theſe are ſucceeded by a low, quick, and unequal pulſe; a dry tongue, without any conſiderable thirſt; alternate chilneſs and fluſhing; giddineſs and pain in the head; nauſea and vomiting; pale urine, reſembling dead ſmall beer; difficult reſpiration, and ſlight alienations of mind. If in the progreſs of this *fever*, towards the ninth, tenth, or twelfth day, the tongue and ſkin become moiſt, with a plentiful ſpitting and gentle purging; or if a ſuppuration happens in one or both ears, or large puſtules break out about the lips and noſe, a favourable criſis may be expected; but the more dangerous and alarming ſymptoms are an exceſſive looſeneſs, waſting ſweats, with frequent fainting fits; a trembling tongue when put out, cold of the extremities, and a fluttering or ſlow creeping pulſe; a ſtarting of the tendons, an almoſt total loſs of ſight and hearing, and an involuntary diſcharge by ſtool and urine. The patient in this diſeaſe ſhould be kept cool and eaſy; his ſtrength and ſpirits muſt be ſupported by nouriſhing diet and generous cordials; and therefore, wine ſhould be mixed with his gruel, panada, &c. and ſtrong wine-whey or ſmall negus, ſharpened with the juice of orange or lemon, or muſtard-whey, will be proper for his ordinary drink. Wine that is good and genuine is a very neceſſary and effectual medicine in this *fever*; patients have been recovered from the moſt dangerous ſtate by uſing in whey, gruel, and negus, a bottle or two of ſtrong wine every day. If a nauſea prevails at the beginning, a gentle vomit ſhould be given; and if the ſymptoms continue, it may be repeated any time before the third or fourth day. Thoſe who cannot take a vomit ſhould have their bowels cleanſed by a ſmall doſe of rhubarb, or an infuſion of ſena and manna. Bleeding is generally improper in this diſeaſe, but bliſtering is highly neceſſary; bliſtering-plaſters may be applied in all ſtages of the *fever* with great advantage; and if the patient be delirious, he ought to be bliſtered on the head and neck. Bliſters, however, are moſt proper towards the beginning, or after ſome degree of ſtupor comes on, in which caſe it will be always proper to bliſter the head. A ſtool ſhould be procured every other day by a glyſter of milk and water, with a little ſugar; to which may be added, if neceſſary, a ſpoonful of common ſalt. A violent looſeneſs, ſhould it happen, may be checked by ſmall quantities of Venice treacle, or by giving the patient for his ordinary drink the white decoction. If a miliary eruption happens, as it ſometimes does about the ninth or tenth day, it ſhould neither be checked by bleeding and other evacuations, nor puſhed out by a hot regimen. In deſperate caſes, large doſes of muſk may be frequently repeated, or fifteen grains of muſk, with three grains of camphire, and ſix grains of ſalt of hartſhorn, may be made into a bolus, with a little ſyrup, and given three or four times a day. In the intermiſſion of the *fever*, the patient ſhould take half a dram, or a whole dram of bark in a glaſs of red port or claret, four or five times a day. The bark may alſo be adminiſtered with other cordials, in the following manner: take an ounce of Peruvian bark, half an ounce of orange peel, two drams of Virginian ſnake-root, and one dram of ſaffron; let them be powdered and infuſed for three or four days in a pint of the beſt brandy; ſtrain the liquor, and give two tea-ſpoonfuls of it three or four times a day in a glaſs of ſmall wine or negus. Buchan's Dom. Med. chap. 19. Edinb. Med. Eſſ. vol. iv. p. 280. vol. vi. p. 28.

FEVER, *peripneumonic*. See PERIPNEUMONY.

FEVERS, *peſtilential*, are acute, contagious, and mortal diſeaſes. Some will have the *fever* to be the diſeaſe or plague itſelf; others only account it a ſymptom of the plague. See *Epidemical* DISEASES, PLAGUE, *Putrid* FEVER, &c.

FEVER, *petechial*, is a malignant *fever*, wherein, beſide the other ſymptoms, on the fourth, or more frequently on the ſeventh day, petechiæ, or red ſpots, like flea-bites, appear chiefly on the breaſt, ſhoulders, and abdomen; the ſpots afterwards turn paler, then yellow, and ſo diſappear. When they grow livid or black, they uſually prove fatal.

This *fever* is contagious, and often epidemical. See *Malignant catarrhal* FEVER and *Putrid* FEVER.

FEVER, *puerperal*, or *child-bed fever*, is that to which women are ſubject in the time of pregnancy, and more eſpecially in their lying-in: it generally makes its attack on the ſecond or third day after delivery. The proximate cauſe of this diſorder is an irritability and inflammation of the abdominal viſcera, and principally of the inteſtines and the omentum; and the remoter cauſes are a ſudden emptying of the womb, in conſequence of which the blood ruſhes into the emptied membranes with an impetuoſity that often excites inflammation; coagulated blood lodged in the uterus after delivery, obſtructed lochia, a putrid air, acceſs of the milk, inflammation of the breaſts, abſorption of acrid milk, and retention of the excrements. But the chief prediſponent cauſe of the inflammation of the inteſtines and omentum in lying-in women to which this *fever* is owing, is the conſtantly increaſing preſſure of the gravid uterus againſt theſe viſcera during the latter months of geſtation, and in the time of labour; the ill effects of which are aggravated by occaſional cauſes occurring after delivery, particularly by keeping the patient hot and coſtive, and giving her warm ſpices and ſpirituous cordials. This *fever* comes on like moſt others, with a cold or ſhivering fit, which is ſucceeded by reſtleſſneſs, pain of the head, great ſickneſs and bilious vomiting. The pulſe is quick, the tongue dry, the ſpirits depreſſed, and ſtrength weakened. A great pain is commonly felt in the back, hips, and region of the womb; a ſudden change takes place with reſpect to the quantity or quality of the lochia; and the patient is frequently troubled with a teneſmus: the urine is very high-coloured, and diſcharged with pain, and in ſmall quantity. The belly ſometimes ſwells to a conſiderable ſize, and is always ſore and tender. When the *fever* has continued for a few days, the ſymptoms of inflammation uſually ſubſide, and the diſeaſe acquires a more putrid form. A bilious or putrid diarrhœa of an obſtinate and dangerous nature comes on, and accompanies the diſeaſe through its future progreſs. In women of plethoric conſtitutions, bleeding will be generally proper at the beginning; but it ſhould be uſed cautiouſly, and not repeated, unleſs the ſymptoms of inflammation riſe high; in which caſe a bliſtering plaſter may alſo be applied to the region of the womb. During the cold fit the patient ſhould drink warm diluting liquors, and warm applications to the extremities of the body, as of heated bricks, bottles or bladders of water, &c. may be uſed with advantage. Emollient clyſters of milk and water, or of chicken-water, ſhould be frequently adminiſtered through the courſe of the diſeaſe. Sometimes a vomit is given for evacuating the bile from the ſtomach; but it will be ſafer to ſubſtitute a gentle laxative; the ſaline draught is proper to be repeated for this purpoſe; and if it runs off by ſtool, or if the patient be reſtleſs, a few drops of laudanum, or ſome ſyrup of poppies may be added: if the ſtools ſhould be ſo frequent as to exhauſt the patient, a ſtarch clyſter, with thirty or forty drops of laudanum in it may be uſed; and her drink may be rice-water, with half an ounce of gum arabic diſſolved in every pint; and if theſe fail, recourſe muſt be had to the columbo-root, or ſome other aſtringent. Dr. Hulme lays the principal ſtreſs in this diſorder on the free and repeated uſe of purgative medicines, ſuch as the ſal catharticus, and oleum Ricini, or the tartarus emeticus, or vinum antimoniale, given in ſmall doſes every two or three hours, till an effectual diſcharge is procured; in conſequence of which, he ſays, that the patient generally finds an immediate relief from pain, kind ſweats come on, gentle ſlumbers ſucceed, and the pulſe becomes more calm and ſlow. When this diſorder has arrived at the putrid ſtate, antiſeptics ſhould be uſed; and particularly the bark, in decoction or infuſion, mixed with tincture of roſes, or other gentle aſtringents; a ſcruple of the extract of bark, with half an ounce of ſpirituous cinnamon-water, two ounces of common water, and ten drops of laudanum, may be made into a draught, and given every ſecond, third, or fourth hour. For a prevention of this *fever*, women in child-bed ſhould be kept very eaſy; their food ſhould be light and ſimple, and their bed-chamber clean, cool, and properly ventilated. To this circumſtance of introducing freſh and cool air into the chamber of the patient Dr. Hulme aſcribes his never having obſerved any petechiæ, exanthemata, or any febrile eruptions attending this *fever*, nor a ſingle inſtance of the *miliary* FEVER in the London lying-in hoſpital, where he has attended more than 1400 women after delivery. Buchan's Dom. Med. p. 587, &c. Hulme's Treatiſe on the Puerperal *Fever*, 1772.

FEVER, *putrid*, is a general denomination, under which may be comprehended the plague, ſpotted or petechial *fevers*, peſtilential, malignant, camp, gaol, &c. Theſe are various names of the ſame kind of diſeaſe, according to the degree in which it prevails, or the different circumſtances that attend it. Thoſe who are moſt ſubject to this *fever* are perſons of a lax habit, cold or phlegmatic conſtitutions, and a melancholy diſpoſition, or who are weakened by watching, faſting, poor or luxurious diet, hard labour, exceſſive venery, &c.

The remote cauſes of this diſeaſe are a ſtagnated and foul air, rendered noxious by putrid animal and vegetable effluvia; and, therefore, it prevails in camps, hoſpitals, gaols, large populous cloſe towns, and low marſhy countries; warm, ſultry weather, with a moiſt atmoſphere; unwholeſome diet, as corrupted grain, putrid fleſh or fiſh, and water which is become putrid by ſtagnation; a long continuance of animal food without a proper mixture of vegetables, whence ſailors in long voyages, and the inhabitants of beſieged cities are peculiarly ſubject to this *fever*; and an exceſſive uſe of alkaline ſalts and other medicines that diſſolve the blood. The proximate cauſe is a diſſolution of the blood, produced by putrid miaſmata that are received into the lungs by inſpiration into the ſtomach with the food, or being generated in ſome part of the body, are abſorbed, as from putrid ulcers, &c.

The ſymptoms of the acceſs of this *fever* are a remarkable weakneſs of body, without any apparent cauſe, and dejection of mind. Theſe are ſucceeded by nauſea, and ſometimes a vomiting of bile; a violent pain of the head, with a ſtrong pulſation or throbbing of the temporal arteries; inflammation of the eyes, with a pain in the bottom of the orbit; noiſe in the ears; difficult reſpiration, accompanied with ſighing; pain in the back and loins, and region of the ſtomach; the tongue at firſt appears white, but afterwards livid and black; and the teeth are covered with a black cruſt. The urine, from being pale, becomes more highly coloured, and at laſt is very brown and blackiſh, and has more or leſs an offenſive ſmell; the ſtools are extremely fœtid, and are ſometimes of a greeniſh, black, or reddiſh caſt. Livid ſpots appear on the ſkin; and there are ſometimes violent hæmorrhages or diſcharges of blood from the mouth, eyes, noſe, &c. Patients in this diſorder void worms both upwards and downwards, are affected with tremors, and become delirious.

Putrid *fevers* may be diſtinguiſhed from the inflammatory by the ſmallneſs of the pulſe, the great dejection of mind, the diſſolved ſtate of the blood, the petechiæ or purple ſpots, and the putrid ſmell of the excrements. They may be diſtinguiſhed from the low or nervous *fever* by greater heat and thirſt, by the higher colour of the urine, and by the greater violence of the ſymptoms. In ſome caſes the inflammatory, nervous, and putrid ſymptoms are combined; and *fevers* of the inflammatory and nervous kind, by improper treatment, are converted into malignant and putrid ones. This *fever* ſeems to have no critical time for its termination; ſometimes it terminates between the ſeventh and fourteenth day, and at other times is prolonged for five or ſix weeks.

The favourable prognoſtics are a gentle looſeneſs after the fourth or fifth day, a warm mild ſweat, ſmall miliary puſtules appearing between the purple ſpots, hot ſcabby eruptions about the mouth and noſe, the riſe of the pulſe after the uſe of wine and other cordials, the abatement of the nervous ſymptoms, abſceſſes in the groin or parotid glands, and within the ears occaſioning deafneſs towards the decline of the *fever*. The unfavourable prognoſtics are an exceſſive looſeneſs, with a hard, ſwelled belly, large black or livid blotches, aphthæ in the mouth, wild ſtaring of the eyes, blindneſs, change of the voice, difficulty of ſwallowing, an inability to put out the tongue, a conſtant inclination to uncover the breaſt, cold clammy ſweats, bloody ſweat and ſaliva, black urine that depoſits a black ſooty ſediment, ſtarting of the tendons, and fœtid, ichorous, involuntary ſtools, attended with a coldneſs of the extremities.

The regimen and medicines proper for patients in this *fever* are ſuch as counteract the putrid tendency of the humours, ſupport their ſtrength and ſpirits, and aſſiſt nature in expelling the cauſe of the diſeaſe, by promoting perſpiration and the other evacuations. For this purpoſe they ſhould be provided with a circulation of freſh air; and their apartments ſhould be ſprinkled with vinegar, lemon-juice, or any other vegetable acid: fumigations of myrrh, and other aromatic and antiſeptic ingredients, may be uſed; and ſtrong ſcented herbs, as rue, tanſy, wormwood, &c. may be diſperſed in different parts of the houſe, both for the relief of the ſick, and for preventing the infection. The food ſhould be light, as panada, &c. mixed with red wine, and ſharpened with acids; and the drink ſhould be orange, lemon, or vinegar-whey, with the addition of wine in ſuch quantity as the patient's ſtrength requires; acidulated negus, or chamomile tea ſharpened with elixir of vitriol or Clutton's FEBRIFUGE ſpirit. If the patient be coſtive, a tea-ſpoonful of cream of tartar may be put into a cup of his drink, or he may drink a decoction of tamarinds. The ſtrength and ſpirits of the patient ſhould be ſupported by frequently taking ſmall quantities of proper aliments. If he be delirious, the hands and feet ſhould be often fomented with a ſtrong infuſion of chamomile flowers, or of the bark.

Bleeding is ſeldom neceſſary, but often hurtful in putrid *fevers*; and in caſes where there are evident ſigns of inflammation in the beginning of the diſeaſe, it ſhould be very cautiouſly admitted. The firſt medicine proper to be preſcribed in this *fever* is an antimonial emetic, the operation of which may be ſucceeded by a doſe of the julep of camphor. Small doſes of the emetic tartar may be repeated every ſecond or third hour, with proper antiſeptics and cordials; the ſafeſt and beſt cordial is good Rheniſh or red wine; and one of the moſt powerful antiſeptics is the Peruvian bark, which ſhould be given early in this diſorder, unleſs ſymptoms of inflammation ſhould appear, and regularly continue. An ounce of the powder may be mixed with half a pint of water, and the ſame quantity of red wine, and ſharpened with the elixir or ſpirit of vitriol; to which may be added two or three ounces of ſyrup of lemon; and two table-ſpoonfuls of this mixture may be taken every two hours, or oftener. Thoſe who cannot take the bark in ſubſtance may infuſe it in wine. If a diarrhœa comes on, the bark ſhould be boiled in red wine, with a little cinnamon, and ſharpened with the elixir of vitriol, or gentle opiates and aſtringents may be uſed. Plenty of acids and medicines that promote a gentle perſpiration are very beneficial in this kind of looſeneſs. If the patient be troubled with a vomiting, a dram of the ſalt of wormwood diſſolved in an ounce and a half of freſh lemon juice, and made into a draught, with an ounce of ſimple cinnamon water and a bit of ſugar, may be given and repeated as often as it is neceſſary. Bliſters are generally uſeful in the early ſtages of theſe *fevers*; when the petechiæ or ſpots ſuddenly diſappear, the pulſe ſinks, and a delirium approaches, they may be applied to the head and inſide of the legs or thighs; but when there is any reaſon to apprehend a gangrene from the uſe of bliſters, warm cataplaſms of muſtard and vinegar may be applied to the feet. When the glands ſwell, as they ſometimes do in this diſeaſe, the ſuppuration of the ſwellings ſhould be promoted by the application of poultices, and at a proper time they ſhould be laid open, and the poultices continued. Ulcerous ſores, of a livid appearance, and putrid ſmell, that break out in the decline of this *fever*, may be gradually healed by the plentiful uſe of Peruvian bark and wine, ſharpened with the ſpirits of vitriol.

Opening and antiputreſcent clyſters, and mild laxative medicines, are proper to be adminiſtered during the progreſs of this diſeaſe. Camphor is uſeful both as an antiſpaſmodic and antiſeptic, particularly in the beginning of putrid *fevers*. *Fixed* AIR is a very efficacious antiſeptic; and the introduction of it into the materia medica, in conſequence of the experiments and diſcoveries of Dr. Macbride, Dr. Prieſtley, and others, promiſes to be of great uſe in a variety of diſorders, and eſpecially in thoſe of the putrid kind. Mr. Hey of Leeds, in the year 1772, adminiſtered it with great ſucceſs in a dangerous caſe of the putrid kind, by impregnating the water which his patient drank with fixed air from the atmoſphere of a large vat of fermenting liquor, and by injecting clyſters of it, collected from a fermenting mixture of chalk and oil of vitriol. Dr. Percival of Mancheſter has alſo found the efficacy of fixed air in wines, &c. impregnated with it, for checking the ſeptic ferment, and ſweetening the putrid colluvies of the primæ viæ in malignant *fevers*. Dr. Dobſon of Liverpool, and Dr. Warren of Taunton, have likewiſe made ſucceſsful trials of this medicine in putrid diſorders. Dr. Hulme has ſucceſsfully preſcribed fixed air in caſes of the gout, hectic *fevers* with conſumption, putrid *fevers*, dyſentery, and worms: he makes uſe of no particular apparatus for impregnating water and other liquors with this air; but he does this by the mere mixture of two liquors: theſe liquors are the ſolution of fixed alcaline ſalt and water, containing as much vitriolic acid as he finds, *a priori*, to be ſufficient to neutralize the alkali, and to expel from it all its fixed air. He gradually and cautiouſly mixes theſe with each other, ſo as to prevent the efferveſcence or the diſſipation of the fixed air as much as poſſible. His uſual mixture conſiſts of fifteen or thirty grains of ſalt of tartar diſſolved in three ounces of water; to which are added three ounces of water properly acidulated by means of the vitriolic acid. In putrid *fevers* he alſo recommends half a dram of ſalt of tartar diſſolved in three ounces of a Peruvian bark, with the ſame addition of acidulated water as before. Hulme's Safe and eaſy Remedy for the Stone, &c. 1778. See PYRMONT *waters*.

Mr. Magellan, in a letter to Dr. Prieſtley, recites a remarkable inſtance of the efficacy of fixed air thus adminiſtered in a putrid *fever* by a phyſician in Holland: the decoction of bark, which had been tried without effect, was afterwards mixed with the ſalt of tartar and vitriolic acid, and in three days the bad ſymptoms were removed, and the patient ſoon recovered. Prince Gallitzin, the Ruſſian ambaſſador to the ſtates of Holland, has found by analyſing the bark, that it contains a large quantity of fixed air; and to this quality he conjectures the antiſeptic virtues of it may be owing. Prieſtley's Exp. and Obſ. in Nat. Philoſ. &c. 1779. p. 472.

Dr. Prieſtley's *nitrous* AIR, which is a more powerful corrector of putrefaction than fixed air, may be found on trial to be of ſtill greater ſervice. For preventing putrid *fevers*, a ſtrict regard to cleanlineſs, a dry ſituation, ſufficient exerciſe in the open air, wholeſome food, and a moderate uſe of generous liquors, may be recommended. The infection alſo ſhould be carefully avoided; and a perſon who is apprehenſive of having caught it, ſhould immediately take a vomit, and work it off by drinking plentifully of chamomile tea; and uſe for his ordinary drink an infuſion of the bark and chamomile flowers, with ſtrong negus, or a few glaſſes of generous wine.

Sir John Pringle obſerves, that the plague, and other peſtilential *fevers*, hot ſcurvies, and dyſenteries, have very much abated in Europe within this laſt century, a bleſſing we can aſcribe to no other ſecond cauſe more than to the improvement of every circumſtance relating to cleanlineſs, and to the more general uſe of ANTISEPTICS. In regard to diet too, it may be obſerved, that hopped beer, wine, and ſpirituous liquors, coming more into general uſe, have been a great means of ſuppreſſing putrid and malignant diſeaſes. Greens and fruit are likewiſe more commonly uſed, and ſalted meats make a much leſs part of diet than they did formerly. To which may be added the more general conſumption of tea and ſugar, which are no inconſiderable antiſeptics. With reſpect to the contagious nature of all putrid diſorders, he thinks that the putrid effluvia received into the blood have a power of corrupting the whole maſs; of which he conceives the reſolution of the blood, and ſometimes even its ſmell in the advanced ſtate of a malignant *fever*, the offenſiveneſs of the ſweats and other excretions, the livid ſpots, blotches, and mortifications incident to this diſtemper to be ſufficient proofs. By the acrimony of theſe effluvia, the nerves are affected with various ſpaſms, the pulſe is always quickened, at firſt raiſed, and ſoon depreſſed. Buchan's Dom. Med. chap. 20. Prieſtley's Exp. and Obſ. on different Kinds of Air, vol. i. Appendix, vol. ii. Ap. Pringle's Diſeaſes of the Army, p. 293. 298, &c. Fordyce's Enquiry into the Cauſes, Symptoms, and Cure of putrid *Fevers*. See BILIOUS *fever*, HOSPITAL *fever*, &c.

FEVER, *remitting*, called alſo a *continual fever*, συνεχης, and a *compound continual fever*, is that which continues ſome time without any gradual increaſe of heat, yet is liable to alternate fits of remiſſion and aggravation, either ſtated and periodical, or irregular.

Of this there are divers kinds, denominated from the periods of returning, as the *remitting*, *continual quotidian*, *continual tertian*, *continual quartan*, &c. which are only a continued *fever*, whoſe acceſſes or ſeverer fits return every day, or every other day, or every third day, or every fourth day.

Some enumerate divers other more complicated continual *fevers*; as the *double* or *triple quotidian*, which has two or three paroxyſms every day; the *double* or *triple tertian*, or *quartan*, which have two or three every third or fourth day; the *ſemi-tertian*, by the Greeks called ἡμιτριταιος, which conſiſts of a *continual*, and two *intermitting fevers*, of different kinds, viz. a *quotidian* and *tertian*; the patient, beſide a *continual fever*, having an extraordinary fit every day, and every other day two.

Others divide the *remitting*, συνεχης, or *compound continual fever*, into *ſimple* and *ſpurious*.

The *ſimple remitter* returns regularly, and is only diſtinguiſhed from an intermitter in that the feveriſh heat in the interval of this latter is never quite extinguiſhed; and that the paroxyſms do not begin with ſo much chillneſs and horror, and go off in profuſe ſweats.

The *ſpurious remitter* is attended with grievous ſymptoms of the nervous kind, reſembling thoſe of the rheumatiſm, cholic, pleuriſy, and other inflammatory and ſpaſmodic diſeaſes; beſide immoderate excretions, vomitings, diarrhœas, &c. whence its returns are uncertain and variable.

The *ſimple* rarely, if ever, kills; the *ſpurious*, frequently: ſometimes it degenerates into a malignant συνοχος.

The firſt is cured with the cortex Peruv. almoſt as infallibly as an intermitter: when it is brought to a regular intermiſſion by bleeding, if there be ſigns of inflammation; or by a vomit, which may be repeated if the nauſea continues, and by clyſters or gentle laxatives: the febrile ferment being much the ſame in both, and the ſame medicine is found almoſt a ſure, though not ſo ſpeedy a remedy of the ſpurious, if properly applied. The diet and medicine in theſe *fevers* muſt be regulated by the predominant ſymptoms, whether they be inflammatory, nervous, or putrid. Whatever is of a heating quality ſhould be avoided, as this *fever* is frequently changed into a continual one by a hot regimen and improper medicines.

Theſe *fevers* prevail in low marſhy countries abounding with wood and ſtagnating water; but they prove moſt fatal in places where great heat and moiſture are combined, as in ſome parts of Africa, the province of Bengal in the Eaſt Indies, &c. where they are generally of a putrid kind, and prove very fatal. The moſt likely way to avoid the *remitting fever*, is to uſe wholeſome and nouriſhing diet, to pay the ſtricteſt regard to cleanlineſs, to keep the body warm, to take ſufficient exerciſe; and in hot countries to avoid damp ſituations, night air, and evening dews. Where it is epidemical, the beſt preventive medicine is the bark, which may be chewed or infuſed in brandy or wine, &c. Buchan's Dom. Med. chap. 22.

FEVER, *ſcarlet*, the name of an eruptive *fever* uſually attacking young perſons, and not attended with any great danger. When it is moderate in degree, it may be left to nature alone, and will go off very well without the aſſiſtance of medicines, only obſerving a good regimen; but if it be more violent, it is to be treated with more care: the patient is to be kept warm in bed, and to be made to drink large quantities of warm diluting liquors, acidulated either with lemon juice or ſpirit of ſulphur or vitriol, and draughts of the attemperating and diluting medicines are to be given every four or ſix hours, together with the attemperating and gently diaphoretic powder; but during the courſe of the cure all hot things are to be carefully avoided, as well in food as medicine, for every thing of this kind renders the diſeaſe worſe, when treated in the proper manner. The *ſcarlet* ſpots, after a few days, dry off, and the ſkin ſcales away, and after this the patient uſually is ſoon well. At this time two or three doſes of ſome gentle purge are to be given; and if the weather be bad, the patient is to be confined to his chamber for ſome days afterwards, that the tranſpiration may be free and uninterrupted; by this means the worſt kinds of this *fever* go well off.

But when this caution is neglected, it is very common to find the patient fall into a ſwelling of the belly after about three weeks, and ſometimes into an anaſarca; ſometimes attended with a *fever*, ſometimes without one, and often with tumours of the glands, and many other dangerous diſorders. The urine in theſe caſes becomes brown and turbid, and many are loſt in this manner. But as this new diſeaſe, as it is uſually called, though it is in reality no other than another period of the *ſcarlet fever*, owes its whole origin to the morbific matter which cauſed the firſt appearance of that, being in part retained in the body, the beſt method of cure is by thoſe remedies which are able to carry thoſe humours out of the body. Gentle purges are to be given at ſhort intervals, and the way nature indicates is to be carefully followed, by giving diuretics in the intermediate days; for the brown turbid urine voided naturally in this caſe is an attempt of nature to carry off the matter that way. The beſt of all diuretics in this caſe is a tincture of ſalt of tartar and ſpiritus nitri dulcis mixed together, and taken twenty drops or more three times a day. In young ſubjects, who will not take purges in the common way, a glyſter made of an infuſion of ſena purges them very well, and anſwers the purpoſe.

The common hot ſudorifics are not to be given in theſe caſes, for ſweat is ſcarce to be obtained by any means in this diſeaſe; and great care is to be taken to keep the tumid parts from the cold air, otherwiſe the patient is often carried off at once by the chilling of them. If there be a *fever* with this ſecond complaint, as is uſually the caſe, the attemperating medicines are to be given in an afternoon and evening, and draughts of gently diuretic liquors to be drank after them.

In this, and in all other eruptive *fevers*, any thing that cools the patient is of the utmoſt conſequence, and the bed is not to be new made, nor the ſhirt changed by any means during the courſe of the diſtemper. Immoderate heat, on the other hand, is almoſt as bad, and the middle regimen is the only proper one to be obſerved. The patient lying quiet, and being kept in an equal and moderate heat in all caſes of eruptive *fevers* as well as in this, may be allowed in the beginning to walk about in his chamber, taking great care to keep out the cold, and need not be confined to his bed ſo long as his ſtrength will permit his keeping up. Heiſter's Compend. Med. p. 83.

FEVERS, *ſlow*, are gentle, but durable ones; they conſume the patient by degrees. They uſually ariſe from diſorders in the lympha or pituita, whence Sylvius calls them *lymphatic fevers*.

The principal of theſe are the catarrhal, attended with a catarrh, cough, hoarſeneſs, &c. and the ſcorbutic *fever*, into which acute *fevers*, and ſometimes intermittent kinds degenerate. See *Nervous* FEVER and HECTIC.

The *ſlow fever*, or *febris lenta*, properly and diſtinctly ſo called, differs from the hectic *fever* in its origin; for it is generally produced by the degeneration of diary *fevers*, ſynochæ, or quotidians improperly treated, and by the common intermittents violently and injudiciouſly ſuppreſſed by aſtringents; but the hectic *fever* is connected with the terrible accidents of vomicæ, empyemas, and apoſtematous inflammations of the viſcera. Nor do they differ leſs in the continent cauſe; for in the *ſlow fever* there is not yet any actual hurt in the viſcera, but only a tendency toward it, and ſuch a diſpoſition as may naturally bring it on; but in the hectic there is always either an obſtinate ſchirrus or an apoſtem, or a ſimple or fiſtulous ulcer. Junker's Conſp. Med.

The ſymptoms of theſe diſeaſes differ alſo as much as their cauſes; for in the *febris lenta* they are all mild, and in the hectic all terrible and violent. The *febris lenta* never is ſo violent a diſeaſe as to confine the patient long to his bed, and uſually grows milder in the continuance than at firſt; but on the contrary, the hectic ever grows worſe by duration; and finally, the *febris lenta* in all caſes, except where it ariſes from the improper uſe of aſtringents in intermittent caſes, is attended with profuſe ſweats; whereas the hectic, unleſs when urged by medicines of a wrong kind, is a dry heat, and never throws out any ſweats till in the laſt ſtages. In *ſlow fevers* of this kind, the ſtools are thin, and not frequent, and uſually have a mucous matter mixed with them. In the hectic, when complete, there uſually come on violent diarrhœas, which carry off the patient. The *lenta febris* is ſubject to degenerate into other diſeaſes, and frequently returns into the diſtemper from which it firſt aroſe; but the hectic is ſubject to no tranſmutations. And finally, the *lenta febris* often goes off happily of itſelf, nature making her way through the obſtruction, and completing the cure. The hectic is uſually fatal.

Signs of the febris lenta. Theſe are a preternatural heat often ſcarce ſenſible to others, but very troubleſome to the patient; a dryneſs of the mouth, and continual thirſt; a loſs of appetite, and waſting of the ſtrength; a general dullneſs of the face, except for a fluſhing of the cheeks; a waſting of the fleſh; violent ſweats in the night; and a redneſs and foulneſs of the urine when firſt made, but afterwards a precipitation of a pale, red ſentiment, and the remainder then is clear above.

Perſons ſubject to it. Theſe are principally young men who are of a plethoric habit, and who have had an ephemera or ſynocha, or ſome other *fever* of that kind, improperly treated with too hot medicines; and ſuch as in *fevers* of other kinds where nature produced copious ſweats, have ſuppreſſed them either by medicines or by an improper regimen; and finally, people worn down and exhauſted by violent hæmorrhages.

Prognoſtics in it. This kind of *fever*, when it ariſes from an intermittent, and in fine returns into its old ſtate again, is attended with very little danger; but there is much more danger where it continues long in its own appearance, or where it degenerates, as it too frequently does, into an acute one. The degeneracy of this *fever* into a hectic is of all other conditions of it the moſt dangerous; and this is not always readily diſtinguiſhed: this is may be ſuſpected to be the caſe when the patient's appetite turns, and yet all the ſymptoms continue; and eſpecially if there be added to them a ſhort cough and a difficulty of reſpiration; and when there is a ſenſation of a weight in the abdomen, and it is painful to lie otherwiſe than on one ſide, or in ſome particular poſture.

Method of cure. The firſt thing to be done is to attempt the reſolving the ſtaſis, as by pimpernel and elecampane roots, by the gentle alexipharmics, and by the neutral ſalts, as the tartarum vitriolatum, and the like. The viſcid foulneſſes left by intermittent *fevers* are to be carried off by firſt attenuating and inciding them by the gums, as ammoniacum and the reſt; and the tone of the viſcera is to be finally re-eſtabliſhed by the gentler chalybeats and ſtomachics.

When the caſe ariſes from an acute *fever*, powders of tartar of vitriol, crabs-eyes, and diaphoretic antimony, with gentle cathartics in the intermediate days, will often complete a cure; when it ariſes from an intermittent, no happier means can be deviſed for the cure than the bringing it back to its old ſtate of the intermittent again. Etmuller ſays, that the volatile alkalis, ſuch as ſpirit of ſal armoniac, have a great power this way; and Stahl propoſes to effect it by an habitual drinking an infuſion of elecampane, pimpernel, centaury, orange-peel, and ſena, with a ſmall quantity of rhubarb and black hellebore in wine.

Finally, when this caſe has been brought on by violent hæmorrhages, the analeptics alone are to be depended upon, with the teſtaceous powders to abate the ſweats, and the lighter tinctures of ſteel to reſtore the loſt tone of the ſolids. Junker's Conſp. Med. p. 384.

It is obſerved in the Periodical Eſſays of Edinburgh, that in the ſlow *fevers* which prevailed in and near that place, November 1731, attended with a violent pain in the head, a ſmall quick pulſe, deliriums, and watchfulneſs; ſeveral of the elder ſort died, but of the younger, many voided worms and recovered. See Med. Eſſ. Abridg. vol. i. p. 66.

Fever, *ſtationary.* See **Stationary.**

Fever, *tooth.* See **Dentition.**

Fever, *yellow.* See *Burning bilious* **Fever.**

Fever, in the *Manege*, is a diſorder to which horſes are very ſubject from a variety of cauſes. The ſymptoms which denote the horſe to be afflicted with a *fever* are great reſtleſſneſs, by reaſon of which he ranges from one end of the rack to another, beating of the flanks, redneſs and inflammation of the eyes, a parched and dry tongue; his breath is hot, and of a ſtrong ſmell; he loſes his appetite, and nibbles his hay without chewing it, and is frequently ſmelling to the ground; he dungs often, but little at a time; and his dung is uſually hard, and in ſmall pieces; he ſometimes ſtales with difficulty, and his urine is highly coloured; he is always craving for water, and drinks often, but little at a time; and his pulſe beats full and hard, fifty ſtrokes and more in a minute. The firſt part of the cure is bleeding; and the quantity, if the horſe is ſtrong and in good condition, ſhould be two or three quarts: then give him four times a day a pint of the following infuſion; take baum, ſage, and chamomile flowers, each a handful; an ounce of liquorice root, ſliced, and three ounces of nitre; and pour on theſe ingredients two quarts of boiling water; when cold, ſtrain it off, and ſqueeze into it the juice of two or three lemons, and ſweeten it with honey: or an ounce of nitre mixed into a ball with honey may be given thrice a day inſtead of the drink, and waſhed down with any ſmall liquor. The horſe's diet ſhould be ſcalded bran in ſmall quantities, or dry bran ſprinkled with water, or a handful of picked hay may be put into his rack. His water ſhould be a little warmed, and given to him often and in ſmall quantities; his covering ſhould be moderate. If the horſe refuſes to feed, in a day or two more blood ſhould be taken away, and the drinks continued, to which may be added two or three drams of ſaffron. If his dung continues hard and knotty, a clyſter may be given, prepared by boiling two handfuls of marſhmallows, one of chamomile flowers, and an ounce of fennel ſeed, in three quarts of water, till it be reduced to two, and adding to the ſtrained liquor four ounces of treacle and a pint of linſeed oil or any common oil. This clyſter ſhould be repeated every other day; and on the intermediate day the following drink may be given: take of cream of tartar and of Glauber's ſalts, of each four ounces; diſſolve them in barley-water, and add an ounce or two of lenitive electary, or a dram or two of powder of jalap. By purſuing this treatment the horſe will begin to recover; and nothing more will be found neceſſary than to give him gentle exerciſe in the air, and plenty of clean litter in the ſtable.

There is another *fever* to which horſes are ſubject, more dangerous than the former: this is a ſlow *fever*, attended with great depreſſion; the horſe is ſometimes inwardly hot and outwardly cold, and at other times hot all over; his eyes appear moiſt and languid; his mouth is continually moiſt, ſo that he has no inclination to drink, and he is ſatisfied with very little. He eats little, moves his jaws in a feeble looſe manner, and grates his teeth; his body is commonly open, his dung ſoft and moiſt; his ſtaling irregular, ſometimes little, and at other times profuſe, and his urine pale, with little or no ſediment. Theſe *fevers* are attended with a running at the noſe, and the matter diſcharged is of a reddiſh or greeniſh duſky colour, and of a conſiſtence like glue. About three pints of blood ſhould be firſt taken away, and bleeding repeated according to the ſtrength and fullneſs of the horſe, the degree of his cough, or any tendency to inflammation. After this the nitre drink already preſcribed may be given, with the addition of an ounce of ſnake-root, and three drams of ſaffron and camphor diſſolved in a little ſpirit of wine.

The horſe's diet ſhould be ſcalded or ſprinkled bran, and the beſt hay, with which he ſhould be fed by hand, as he ſometimes cannot lift up his head to the rack. Drinking plentifully will greatly contribute to dilute the blood; but if the *fever* ſhould increaſe, balls of contrayerva root, myrrh, and ſnake-root, powdered, of each two drams; ſaffron, one dram; mithridate or Venice treacle, half an ounce, mixed with honey, ſhould be immediately given twice or thrice a day, with two or three horns of infuſion of ſnake-root ſweetened with honey; to a pint and a half of which may be added half a pint of treacle water or vinegar: if theſe balls produce no ſenſible effect, let a dram of camphor or of caſtor be added to each of them: or the following drink may be ſubſtituted in their ſtead for ſome days; take a dram of camphor diſſolved in one ounce of rectified ſpirit of wine; then gradually pour on a pint of diſtilled vinegar warmed, and give it at two doſes. If the horſe ſhould be coſtive, recourſe muſt be had to clyſters or the opening drink; and if he purges to a conſiderable degree, diaſcordium may be added to his drinks inſtead of the mithridate. The operation of medicines in this diſeaſe is much promoted by plentiful drinking: the horſe's ſtaling ſhould be reſtrained when it is conſiderable and weakening, by proper aſtringents, or by mixing lime-water with his drinks; and when he is remiſs in this reſpect, and ſtales ſo little as to occaſion a ſwelling of his body and legs, two or three of the following balls may be given at proper intervals, with a decoction of marſhmallows ſweetened with honey: take of ſal prunella or nitre, one ounce; juniper-berries and Venice turpentine, of each half an ounce; and make theſe ingredients into a ball with oil of amber. If with this treatment the horſe's ſkin feels kindly, his ears and feet are moderately warm, his eyes briſk and lively, his noſe becomes clean and dry, his appetite increaſes, he lies down well, and ſtales and dungs regularly, there is a fair proſpect of a ſpeedy recovery; but he ſhould be fed ſparingly, and his diet ſhould be light, and increaſed by degrees as he gains ſtrength.

If the *fever* ſhould intermit, give an ounce of Jeſuit's bark in the interval of the fits, and repeat it every ſix hours till the horſe has taken four or ſix ounces. Bartlet's Farriery, and Farmer's Dictionary.

Fever-*root*, *trioſteum*, in *Botany*. See *Falſe* Ipecacuanha.

Fever-*weed*. See Eryngo.

FEVERFEW, *Matricaria*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: It hath a compound flower; the ray or border is compoſed of female half-florets; and the diſk, which is hemiſpherical, of hermaphrodite florets. The female half-florets are tongue-ſhaped, are indented in three parts at the end, and have a naked germen. The hermaphrodite florets are tubulous, funnel-ſhaped, and cut into five parts at the brim; they have each five hairy ſhort ſtamina, and an oblong naked germen. The germen of both turns to ſingle oblong ſeeds. There are two ſpecies, comprehending ſeveral varieties.

Feverfew grows naturally on banks in ſeveral parts of England, but is frequently cultivated in phyſic gardens to ſupply the markets.

The leaves and flowers of this plant have always been allowed one of the firſt places among the hyſteric and uterine plants, and hence it derives its name from *matrix, the womb*. It is preſcribed in powder from a ſcruple to half a dram for the doſe; but the much better way is in a ſlight infuſion made in the manner of tea. Taken in this eaſy manner for a continuance of time, it will bring the menſes, though ſubject to be interrupted and irregular, to their true period; and will remove a number of complaints, the natural conſequence of ſuch an irregularity.

It is alſo an agreeable warm, aperient, carminative bitter. It ſtrengthens the ſtomach, and diſperſes flatulences; and the expreſſed juice is ſaid to kill worms. Some likewiſe commend it in diſorders of the head, and in all nephritic complaints. Hoffman gives it great praiſes, uſed as a febrifuge. There were formerly kept ſimple water and ſyrup of *feverfew* in the ſhops; but at preſent they are wholly diſuſed, and the dried herb only kept ready for fomentations, and ſometimes as an ingredient in clyſters. The virtues of *feverfew* are in ſome degree ſimilar to thoſe of chamomile.

Many ſpecies of this plant are cultivated in gardens for the beauty of their flowers. They are propagated by ſowing them in March on a bed of light earth; when they are come up, they ſhould be tranſplanted out into nurſery-beds at about eight inches aſunder; and in the middle of May they ſhould be removed into the flower-beds where they are to ſtand. They flower in July and Auguſt; but they ſhould not be permitted to ſeed, which always weakens, and often deſtroys the roots; ſo that the ſtalks ſhould be cut down to the ground when the flower decays.

Feverfew, *baſtard*, *parthenium*, in *Botany*, a genus of the *monoecia pentandria* claſs. Its characters are theſe: it hath a flower compoſed of hermaphrodite florets and female half-florets, which are incloſed in a common five-leaved ſpreading empalement. The hermaphrodite flowers which form the diſk have one tubulous petal cut into five parts at the brim; they have five hair-like ſtamina the length of the tube. The germen is ſituated below the flower, and is ſcarce viſible; ſupporting a ſlender ſtyle having no ſtigma: theſe flowers are barren. The female flowers which compoſe the rays or borders are ſtretched out on one ſide like a tongue; theſe have a large heart-ſhaped compreſſed germen, with a ſlender ſtyle, crowned by two long ſpreading ſtigmas. Theſe flowers are ſucceeded by one heart-ſhaped compreſſed ſeed. There are two ſpecies. Miller.

The firſt ſort grows wild in great plenty in the iſland of Jamaica, and in ſome other of the Engliſh ſettlements in the Weſt Indies, where it is called *wild wormwood*, and is uſed by the inhabitants as a vulnerary herb. The ſecond ſort grows plentifully in ſeveral parts of the Spaniſh Weſt Indies, from whence the ſeeds have been brought to Europe. Theſe plants make no great appearance, ſo are ſeldom cultivated but for the ſake of variety.

FEUILLANS, an order of religious clothed in white, and going bare-foot, who live under the ſtrict obſervance of the rule of St. Bernard.

The name was occaſioned by a reform of the order of Bernardins, firſt made in the abby of *Feuillans*, a village in France, five leagues diſtant from Thoulouſe, by the ſieur Barriere, who eſtabliſhed it about the year 1580.

It was approved of by pope Sixtus V. and the popes Clement VIII. and Paul V. granted it its particular ſuperiors. King Henry II. founded a convent of *Feuillans* in the Fauxbourgh St. Honore at Paris in 1587.

There are alſo convents of nuns who follow the ſame reform, called Feuillantes; the firſt of which was eſtabliſhed near Thoulouſe in 1590.

FEUILLE *de Scie*, in *Heraldry*, expreſſes that an ordinary, as a feſſe, pale, or the like, is indented only on one ſide; becauſe it then looks like the leaf of a ſaw, as the French phraſe imports.

FEWEL. See Fuel.

FEVILLEA, in *Botany*, the name of a genus of plants of the *dioecia pentandria* claſs, called by Plumier *nhandiroba*; the characters of which are theſe: it produces male and female flowers diſtinct on the ſame plant; in the male flower the perianthium is campanulated; it is compoſed of one leaf, and is round at the bottom, but expanded at the mouth, where it is divided into five ſegments. The flower conſiſts of one leaf, and is of the rotated kind. It is lightly divided into five ſegments at the edge; theſe are convex and rounded, and the umbilicus is covered with a double ſtar. The ſtamina are five filaments. In the female flowers the cup is the ſame as in the male; the flower itſelf is alſo the ſame, but that the ſtar which cloſes the baſe is compoſed of five cordated leaves. The fruit is a very large fleſhy berry with a hard bark, and is of an oval obtuſe figure, and ſurrounded with the calyx. The ſeeds are flatted, and of an orbicular form.

FEWMET. See Fumet.

FIANTS, or **Fuants**, the dung of a badger, fox, and other vermin.

FIARSING, in *Ichthyology*, a name given by the Swedes and Danes to the fiſh generally called the *draco marinus* and *araneus marinus*, the ſea-dragon, and the ſea-ſpider. It is a ſpecies of the trachinus, according to Artedi, and is diſtinguiſhed from the others by its lower jaw being longer than the upper, and without beards.

FIAT, in *Law*, is uſed for a ſhort order or warrant of ſome judge for making out and allowing certain proceſſes. Thus, if a certiorari be taken out in vacation, and teſted of the precedent term, the *fiat* for it muſt be ſigned by a judge of the court, ſome time before the eſſoin day of the ſubſequent term, otherwiſe it will be irregular. There is no need for the judge to ſign the certiorari itſelf, but only where it is required by ſtatute.

Fiat *juſtitia*, is an order granted on a petition to the king for his warrant to bring a writ of error in parliament, in which caſe he writes on the top of the petition *fiat juſtitia*, and then the writ of error is made out, &c.

FIATOLA, in *Zoology*, a name given by the Italian fiſhermen to the stromateus.

FIBER, in *Zoology*, or *fiber caſtor* of Linnæus, *beaver*, has ſtrong cutting teeth, ſhort ears hid in the fur, blunt noſe, hair of a deep cheſnut brown, tail broad, almoſt oval, compreſſed horizontally, and covered with ſcales; the fore-feet are ſmall, and the hind feet large: the length of the animal from noſe to tail is about three feet; the tail is eleven inches long and three broad. See Beaver, and *Tab*. II. *Quad. fig*. 13.

FIBRA *auris*. See Ear.

FIBRARIÆ, in *Natural Hiſtory*, the name of a claſs of foſſile bodies, the greateſt part of which have been very improperly called by the writers of foſſils, fibroſe talcs, they being of a very different ſubſtance and ſtructure of parts from the talcs, and having none of their diſtinguiſhing characters.

The word is derived from the Latin, *fibra, a fibre* or *filament*, theſe bodies being all compoſed of arrangements of parallel filaments or fibres. See *Tab. of Foſſils, Claſs* 1. The *fibrariæ* in general are foſſils compoſed of parallel filaments, uſually remaining ſo diſtinct as to preſerve in the whole maſſes a thread-like texture, but ſometimes uniting ſo as to form plates or flakes reſembling thoſe of the talcs in external figure. They are bright, and in ſome degree tranſparent, not giving fire with ſteel, nor fermenting with, or ſoluble in acid menſtrua. Hill's Hiſt. of Foſſ. p. 88.

Of this claſs of bodies there are two diſtinct orders, and under theſe four genera. To this claſs belong the amianthus, aſbeſtos, lachnides, and tricheriæ.

FIBRE, in *Anatomy*, a ſimple part of the animal body, called alſo *filament*; and when very ſmall, *fibrilla* or *capillament*.

A *fibre* is a long, ſlender, white thread; which, being variouſly interwove or wound up, forms the various ſolid parts of an animal body; ſo that the *fibres* are the ſtamen or matter of the animal.

Anatomiſts uſually diſtinguiſh four kinds of *fibres*, viz. *carnous* or *fleſhy*, *nervous*, *tendinous*, and *oſſeous* or *bony*; of one or other of which all the other parts conſiſt. See Flesh, Nerve, Tendon, Bone, Muscle, and Sensation.

Fibres, again, are divided with reſpect to their ſituation into *direct* or *longitudinal*, which proceed in right lines; *tranſverſe*, which cut or go acroſs the former at right angles; and *oblique*, which interſect or croſs them at unequal angles.

Some anatomiſts reduce the animal *fibres* to two ſpecies, viz. *muſcular* or *motive*, and *nervous* or *ſenſitive*.

Fibres, *nervous*, are the minute threads whereof the nerves are compoſed. They ariſe from the medulla of the brain, as that does from the cortex; and that again from the laſt fineſt ramifications of the carotid and vertebral arteries; ſo that, it is probable, theſe nerves are, in reality, only continuations of thoſe arteries.

From every point of the cortex there ariſes a fine medullary *fibrilla*: theſe, uniting in their progreſs, form the medulla of the cerebrum, cerebellum, and oblongata; and *fibrillæ*, ariſing from each point of theſe again, form the ſpinal marrow.

From the medullary ſubſtance of all theſe parts ariſe nerves, which are combinations, or aſſemblages, of a number of theſe minute medullary *fibres* incloſed, after they are got out of the cranium, in a common membrane, or coat, from the pia mater; and it is probable, that, to each nerve, there concur *fibres* from all three; as, alſo, that theſe *fibres* are ſo many fine hollow tubuli, or canals, for the conveyance of a fine juice, or ſpirit, from the brain, throughout the body. See NERVE.

FIBRES, *muſcular*, are thoſe whereof the muſcles, or fleſhy parts of the body, are compoſed. Every muſcle is diviſible into other leſs ones; and theſe into others, ſtill leſs beyond all imagination. The laſt and ſmalleſt are the muſcular *fibres*; concerning which it is queſtioned, whether or no they be vaſcular.

Mr. Lewenhoek ſays, that he could plainly diſtinguiſh the fibrils, of which each muſcular *fibre* is compoſed, to be vaſcular; for, if he cut acroſs their length, the light appeared through the mouths of the veſſels; but if he cut them obliquely, no light was to be ſeen; and he alſo found that each fibril is inveſted with a minute membrane, which is only a congeries of blood-veſſels, conveying juices and nutrition to it, though their fineneſs renders them inviſible; and that the *fibres* are through their whole length encompaſſed with circular wrinkles. Phil. Tranſ. Nº 367. Lewen. Op. tom. i. p. 49. tom. ii. p. 61, &c. ed. 1772.

That the muſcular *fibres* are vaſcular has alſo been ſuppoſed by Malpighius, Borelli, Gorter, and Hooke, to whom they appeared like ſtrings of pearls; and alſo by Dr. A. Stuart, in his treatiſe De Motu Muſculorum, where from ſuch a ſtructure, and by the influx of the nervous fluid, he endeavours to account for the elaſtic force, the contraction, diſtenſion, and all the actions of the MUSCLES.

Now there are nerves propagated to every muſcle, and diſtributed through the body thereof; ſo that there is no aſſignable point wherein there is not ſomewhat of a nerve. Add, that all the nerves here diſappear; and that in other parts of the body, the extremities of the nerves are expanded into membranes. It is therefore probable, that the muſcular *fibres* are only continuations of the nervous ones.

The animal *fibres* have different properties; ſome are ſoft, flexible, and a little elaſtic; and theſe are either hollow, like ſmall pipes; or ſpongious, and full of little cells, as the nervous and fleſhy *fibres* above mentioned.

Others are more ſolid, flexible, and endowed with a ſtrong elaſticity, or ſpring; as the membranous and cartilaginous *fibres*.

A third ſort are hard and inflexible; as the *fibres* of the bones.

Of all theſe, ſome again are very ſenſible, and others wholly deſtitute of ſenſe; ſome ſo very ſmall, as not to be eaſily perceived; and others, on the contrary, ſo big, as to be plainly ſeen; and moſt of them, when examined with a microſcope, appear to be compoſed of ſtill ſmaller *fibrillæ*.

Theſe *fibres* firſt conſtitute the ſubſtance of the bones, cartilages, ligaments, membranes, nerves, veins, arteries, and muſcles. And again, by the various texture, and different combination, of ſome or all of theſe parts, the more compound organs are framed; ſuch as the lungs, ſtomach, liver, legs, and arms, the ſum of all which make up the body.

The great property of *fibres*, is elaſticity, or a power of contraction, after the diſtractile force is removed; upon the knowlege of which that of the animal mechaniſm greatly depends.

To underſtand this, it may be obſerved, that any membrane or veſſel may be divided into very ſmall *fibres*, or threads; and that theſe threads may be drawn out into a very conſiderable length, without breaking; and that when ſuch external force is removed, they will again reſtore themſelves to their proper dimenſions. It is farther alſo manifeſt, that this property is preſerved to them by a convenient moiſture; becauſe if one of thoſe threads be dried, it immediately loſes it; ſo that upon the application of any force to ſtretch it, it will break; its lying ſoaked in liquor too much will, on the other hand, render it flaccid, and deſtroy all its power of reſtitution, when diſtended.

Now, ſome hints of that configuration of parts, upon which this property depends, Dr. Quincy maintains, may be had from the contrivance and properties of a ſyringe; with the reaſon why it is ſo difficult to draw back the embolus, when the pipe is ſtopped; and the neceſſity of any liquor's following it, wherein the pipe is immerſed.

All that is neceſſary hereto, is, that the embolus be ſo exactly adapted to the inner ſurface of the barrel, as to prevent any air paſſing between them, when it is drawn up: it matters not what figure the barrel is of, ſo that the embolus be well fitted to it. A caſe of ſyringes therefore might be contrived, wherein every barrel may alſo ſerve as an embolus to the exterior one, which immediately includes it.

In this manner it is not difficult to imagine a continued ſeries of particles ſo put together, that they may be moved, and drawn upon one another, without ſuffering the air immediately to enter into the interſtices made by their diſtraction; whereupon as ſoon as that force, which drew them, is removed, they will, for the very ſame reaſon as the embolus of a ſyringe, ruſh up again into their former contacts.

As ſuppoſe AB (*Tab. Nat. Hiſt. fig.* 6.) two particles touching one another in *ef*, and CD two others, covering the oppoſite ſides of their contacts. It is alſo to be ſuppoſed, that on the other ſides they are covered with other particles in the ſame manner, as by CD, ſo that the places of their contacts are on all ſides covered from the air, or the inſinuation of any fluid body.

If now AB by an external force, greater than that of their coheſion, be drawn from each other, as far as GI and HK (*fig.* 7.); as ſoon as that force is removed, they will again run into their former contacts in *ef* (*fig.* 6.); that is, if they be not ſo far ſeparated as to bring their tranſverſe ſurfaces to coincide with C and D; for then the air, or circumambient fluid, will interpoſe, and prevent their re-union; ſo that by this contrivance, ſo much of A and B as is incloſed by other ſurrounding particles, is as the embolus of a ſyringe, and the particles ſurrounding them as its barrel. And therefore when A and B are diſtracted from their contacts in *ef*, it will be with ſome difficulty; and when the diſtracting force is taken away, they will again run into their former contacts; juſt as the embolus of a ſyringe, and for the ſame reaſon.

It is not rigidly contended, that this muſt exactly be the contexture of a *fibre*, but only ſomething like this; whereby the interſtices of the interior orders are covered by the exterior in ſuch a manner, that when the thread is diſtended, that is, when its conſtituent parts are drawn from their tranſverſe contacts, neither the air, nor any other external fluid, can get between them, ſo as to hinder their re-union as ſoon as ſuch force is withdrawn; that is, if their diſtraction, as was before ſaid, be not ſo far as to bring their tranſverſe ſurfaces to a coincidence with one another; for then the circumambient fluid will interpoſe, that is, the thread will be broke.

But beſides this peculiar arrangement of a determinate ſet of particles to compoſe the main ſubſtance of an animal *fibre*, endowed with the properties above mentioned; it ſeems not at all unreaſonable to conjecture, that into their compoſition there alſo enters a common capſula, or covering, which aſſiſts in the wrapping up, and holding together, thoſe faſciculi, or aſſemblages of particles already deſcribed, not much unlike the perioſteum of the bones; the contexture of which covering, reſembling that of a net, cannot any ways hinder either the tranſverſe, or longitudinal diſtractions of the other parts.

Suppoſing this, then, the contexture of a *fibre*, it will be neceſſary to conſider, what farther requiſites are needful to put them into that ſtate, which they are in, in a living body; to ſhew how they are maintained in continual motion, and what are the conſequences of it.

And, 1. It is neceſſary to take notice, that all the *fibres* in a living body are in a ſtate of diſtention; that is, they are drawn out into a greater length than they would be in, if ſeparated from the part, and taken out of the body; which is demonſtrable upon any ſolutio continui, as in the tranſverſe diviſion of a nerve, or artery; for immediately the divided parts run up, and leave a great diſtance between them; and the fluids contained between them, upon ſuch contraction, are ſqueezed out. This alſo ſhews, that their natural diſtractions are owing to ſome fluids being propelled into the veſſels which they compoſe, with a force greater than their endeavours of reſtitution, ſo far as to obtain a cloſe contact of all their tranſverſe ſurfaces, but yet leſs than that which is neceſſary to diſtract them, ſo as to bring them into a coincidence; for then the veſſels would break.

2. This ſtate of diſtraction muſt neceſſarily leave vacuola between all the tranſverſe ſurfaces; as between GI and HK (in *fig.* 7.) which may be repreſented by the ſe-

veral ſeries of particles (*fig.* 8.); which vacuola will continue as long as the longitudinal ſurfaces of the component parts continue ſo cloſe to one another, as to prevent the inſinuation of any foreign matter, how ſubtle ſoever, between them.

For the ſame reaſon, therefore, as when the embolus of a ſyringe is drawn, and the pipe is ſtopped, there muſt be continually a *niſus reſtituendi*, or an endeavour of contraction. There is alſo this farther neceſſity of their being continued in a ſtate of diſtraction; becauſe if they were cloſely to touch one another in all parts, they could not be put into, and continue in, thoſe undulatory motions, which they are always in, in a living body, without being altered in their figures and contextures.

3. It being manifeſt, that all animal *fibres* are continued by the perpetual ſucceſſive impulſe of the fluids, in ſuch undulatory motions; beſides this neceſſity of their diſtraction, they muſt alſo neceſſarily be continually moiſtened with ſome convenient fluid; becauſe otherwiſe their continual attritions againſt one another would wear them out, as well as render it difficult to move them; the fluid alſo, for this purpoſe, muſt be very ſoft and ſubtle, becauſe otherwiſe it could not inſinuate itſelf into all the interſtices of the *fibres*, without ſo far ſeparating their parts, as is inconſiſtent with that contexture and mechaniſm here laid down.

Upon this view there ariſes a very natural explication of ſeveral terms, much uſed by mechanical writers; ſuch as *diſtraction*, *contraction*, *vibration*, *undulation*, *tonic motion*, *concuſſion*, *relaxation*, *corrugation*, and *elaſticity* of the ſolids; all which are but different ways of expreſſing the various modifications and diſpoſitions of thoſe machinulæ, whereof all the *fibres* are compoſed.

Thus much being granted of the contexture of a *fibre*, and the requiſites for its office, it is to be conſidered, how it comes firſt to be ſet in motion, and by what mechaniſm that motion is afterwards carried on. Suppoſe then the *fibre* (*fig.* 8.) in ſuch a ſtate of diſtraction, as before mentioned; it is certain by *req.* 2. that in all parts there is a *niſus reſtituendi*; where, then, any external impulſe is made againſt it from R to S, ſucceſſively, thruſting it from P towards Q, it is certain that againſt 1, for inſtance, the thread will be more diſtracted than in any other part; and thus there will be a greater endeavour of reſtitution; and therefore the impulſe paſſing on towards S, all the conſtituent machinulæ, 1, 2, 3, 4, will ſucceſſively move one after another.

To make this matter ſtill more plain, let a portion of an artery be repreſented by *fig.* 9. through which the blood is continually propelled in a direction parallel to its axis; nothing is more certain than that if it were not for the reſiſtance of the ſides of the artery at E, F, the blood ſetting out at A, B, would go on by the pricked lines C, D; and therefore it cannot but ſtrike againſt the ſides of the artery at E, F, and diſtract them there more than any where elſe; whereby their endeavours of reſtitution will be there the greateſt; and therefore, when the impulſe of the blood has raiſed them to a certain meaſure, wherein their endeavours of reſtitution will exceed the impulſe which raiſed or diſtracted them, their contractile powers will draw them again into the ſame dimenſions; and conſequently the blood will be thruſt forward into the next ſection of the artery, and ſo on ſucceſſively from one to another, through the whole courſe of its circulation; the contraction of one ſection of an artery being the true cauſe of the blood's impulſe againſt, and raiſing the next. See MUSCLE and *Muſcular* MOTION.

FIBRE is alſo applied, in *Phyſics*, to thoſe long, fine parts, or threads, whereof other natural bodies are compoſed, and which prevent their being friable or brittle.

Trees, plants, and fruits, have their *fibres*, or capillaments; which are modifications of their woody ſubſtance, penetrating and terminating in the parenchyma, or pith.

In the common ſenſe, *fibre* is chiefly applied to the ſlender capillary roots of plants.

Kepler even gives *fibres* to the ſtars; and explains ſeveral of their motions from the ſituation of their *fibres*.

FIBRILLA, a little FIBRE, or capillament.

FIBROSE *roots*, thoſe which conſiſt wholly of ſmall fibres, ſuch as the roots of the meadow-graſs, pinks, and ſeveral other flowers. When a *fibroſe* root penetrates ſtraight into the ground, it is called *perpendicular*; when it creeps under the ſurface, *horizontal*; when ſomewhat thick, it is called *fleſhy*; when very thin, *capillary*; when it runs all the way undivided, *ſimple*; when divided, or when it ſends off ſmaller roots, *branched*; when its ſurface is covered with extremely ſhort and fine fibres, *hairy*. See ROOT.

FIBULA, in *Anatomy*, one of the bones of the leg, called alſo *perone*, *ſura*, and *focile minus*. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. *n.* 24. 24. *fig.* 7. *n.* 27. 27.

The *fibula* is the outer and ſlenderer of the two bones of the leg; and yet, notwithſtanding its being more expoſed, and its being much weaker, than the inner bone, or tibia, it is not ſo often broken, as being more pliant and flexible; whence the tibia often breaks, leaving the *fibula* entire.

The *fibula* is joined or articulated with the tibia, at both ends. It is divided into three parts. The upper extremity of this bone is a kind of tuberoſity or head, obliquely flatted by a ſmall cartilaginous plane, by which it is articulated with the cartilaginous ſurface, at the lower part of the external condyle of the tibia. It terminates backward by a kind of ſhort blunt point directly upward. The lower extremity is broader, flatter, and more oblong than the upper; it is partly a continuation of the body of the bones, and partly an epiphyſis in children; the marks of which are quite loſt in a more advanced age. It has in a manner three ſides, one rounded like a tuberoſity, one flat, and the third narrow; when it is placed in the lateral cavity of the baſis of the tibia, it makes the outer ankle oppoſite to the inner ankle.

In its natural ſituation, it reaches much lower down than the baſis of the tibia, and ends in a point turned a little backward. The flat ſide is cartilaginous, and turned toward the cartilaginous ſide of the inner ankle, with which, and with the inferior ſide of the baſis of the tibia, it completely forms the cavity by which the leg is articulated with the foot. The narrow ſide is turned backward, and near its lower part is a ſmall, oblong, unequal foſſula, formerly believed to be for the paſſage of a tendon, in which a ſmall mucilaginous gland is lodged. The point by which the baſis of the *fibula* ends, has a ſmall ſmooth ſurface immediately below the narrow ſide, for the inſertion of an annular ligament.

The body of this bone is long and ſmall, more or leſs contorted, and irregularly triangular. Near the two extremities it contracts into a kind of neck, and a little below the middle it is often bent inward; but this curvature ſeems chiefly owing to the method of dreſſing children, for we ſometimes meet with the bone very ſtraight. It is diſtinguiſhed in an irregular manner into three ſides, and three angles, principally towards its lower part. The outſide is the moſt conſiderable; the upper part of it is more or leſs hollowed; afterwards it grows round, and altering its direction, becomes almoſt poſterior in the lower half. The poſterior ſide is more or leſs convex toward the upper part, thence it grows flat, and turning in the ſame manner as the former, it becomes nearly internal toward the lower part. The inner ſide has likewiſe a turn near its middle, and becomes anterior from thence downward; and this turn is marked by an oblique line, which runs down on this ſide, from behind, forwards, and divides it into two. Theſe ſides ſerve partly for muſcles to lie upon, and partly for their inſertions. The internal angle of the *fibula* anſwers to the external poſterior angle of the tibia, and both ſerve for the inſertion of the interoſſeous ligament of the leg; the other two angles are more or leſs acute, eſpecially the anterior, which is ſometimes like a kind of criſta, and terminates below in a ſmall triangular ſurface.

The internal ſtructure of the *fibula*, though a very ſmall bone, is like that of the other long bones; it is articulated by its upper extremity, with the inferior ſurface of the external condyle of the tibia; this articulation is an arthrodia, with a very ſmall degree of motion. The inferior extremity is articulated by its cartilaginous ſide, partly with the lateral depreſſion in the baſis of the tibia, and partly with the firſt bone of the foot, completing the ginglymus between the leg and that bone. Winſlow's Anatomy, p. 95.

FIBULA, *cartilages of the.* The *fibula* has two cartilages, one lying on the upper extremity of that bone, for its articulation with the ſmall cartilaginous ſurface in the head of the tibia; the other cartilage covers the inſide of the inferior extremity, or the outer ankle, near the point of which, poſteriorly, there is a ſuperficial cartilaginous incruſtation for the paſſage of the tendons of the muſculi peronæi. The cartilage at the upper extremity ſeems thicker than that at the lower. Winſlow's Anatomy, p. 128.

FIBULA, *ligaments of the.* This bone is joined to the tibia by nine ligaments, four at each end, and one in the middle, called the interoſſeous ligament. The four at the upper extremity are ſhort, very ſtrong, more or leſs oblique and compound; two of them are anterior and two poſterior, and they lie on each other; the ſuperior ligaments ſurrounding the articulation more cloſely than the inferior, which have a ſmall void ſpace, and are weaker than the former; they are all faſtened to the capſular ligament, which runs in between them and the articulation, and they are inſerted round the edges of the cartilaginous ſurfaces in each bone.

The ligaments of the lower extremity of the *fibula*, which runs below the tibia, and forms the outer ankle, are much ſtronger, thicker, more complex, broader, longer, and more oblique, than thoſe of the ſuperior extremity; and are like thoſe diſperſed, two before, and two behind. They are fixed to the anterior and poſterior edge of the lateral depreſſion at the inferior extremity of the tibia, and from thence they run down on the lower end of the *fibula*. The two inferior ligaments are longeſt, and they are fixed anteriorly and poſteriorly at the lower end of the outer ankle; the two ſuperior are fixed more cloſely, and nearer each other, but there is ſtill a ſmall ſpace between them, which is filled with fat. As the two bones touch each other only by the upper part of the cartilaginous ſurface of the outer ankle, and the ſmall cartilaginous border in the lower edge of the depreſſion of the tibia, the middle ſpace between them is filled by a capſular ligament, which lines each ſide of the bones, and is continued down to the true articulation of the external ankle, with the inferior edge of the baſis of the tibia.

The middle or interoſſeous ligament of the two bones of the leg, ſo called, becauſe it fills up all the ſpace left between them, being ſtretched from one to the other, is fixed along the poſterior external angle of the tibia, and the neighbouring angle of the *fibula*. It is made up chiefly of two planes of very oblique ligamentary fibres, which croſs each other, and at different intervals ſeem to be multiplied. It is perforated both above and below, and ſometimes in ſeveral places beſide, for the paſſage of the blood-veſſels and nerves. It is not a ligament intended for the tying theſe two bones together, but is rather a ligamentary ſeptum for the inſertion of muſcles, ſupplying in this reſpect the place of a bone, and ſeeming indeed to be partly a continuation of the perioſteum of the tibia and *fibula*. At the lower part of each ankle, there are commonly three ſtrong ligaments for the connection of the bones of the tarſus with thoſe of the leg; one of theſe runs downward, one backward, and one forward. Winſlow's Anat. p. 130.

Fibula, *luxation of the*. Sometimes the *fibula* is ſeparated by external violence from the thigh bone, and is then diſtorted either upwards or downwards: this generally happens, when the foot has been luxated outwards. Whenever this happens the bone is to be firſt reſtored to its natural place, and then properly bound up, and left to the aſſiſtance of nature and reſt, till it be grown firm again to the tibia and leg. The patient in this and the like caſes muſt be always ſtrictly cautioned not to uſe or bear any ſtreſs upon the diſordered leg too ſoon; the conſequence of which may be worſe than the firſt misfortune. Heiſter's Surg. p. 172.

Fibula, in *Natural Hiſtory*, a name given to a claſs of the *echinodermata*, which have their mouth in the middle of the baſe, and the aperture of the anus on one edge. Theſe are found principally among the foſſile kinds, and ſeem to have had their ſhells of the aſſulated kind, or compoſed of ſmall plates joined tranſverſely to one another. Of this claſs there are two genera, the CONULUS and DISCOIDES.

Fibula, in *Surgery*, an inſtrument in uſe among the ancients, for the cloſing of gaping wounds.

Celſus ſpeaks of the *fibula*, as to be uſed when the wound was ſo patent as not eaſily to admit of being ſewed. Op. lib. vii. cap. 25. apud fin.

Authors are ſomewhat at a loſs as to the form of the ancient *fibulæ*. Guido ſays, they were iron circles, or ſemicircles, bent backwards both ways; the hooks whereof, being faſtened on both ſides to the wound, anſwered exactly to each other; but as this muſt have been an inſupportable pain to the patient, this deſcription is generally ſet aſide.

Fallopius, Sanctorius, and others, take the word *fibula* to have ſignified, in reality, no more than the ſewing up of the wound with a needle and thread, as uſed at this day.

FIBULÆUS, in *Anatomy*, a muſcle of the leg, called alſo PERONÆUS *primus*.

FICARIA, in *Botany*, a name uſed by ſome authors for the ſmall celandine, pilewort, or figwort.

FICEDULA *cannabina*, in *Zoology*, a name by which ſome authors have called the CANNEVAROLA, or leſſer *reed*-SPARROW.

FICHANT, *Figens*, a French term, uſed in *Fortification*: thus, a flank *fichant*, or a line of defence *fichant*, is a place, whence the ſhots made do not only raſe the oppoſite face to be defended, but alſo enter within it.

The word is formed of *ficher*, *to ſtick a thing in*.

FICHÉ, in *Heraldry*. See FITCHEE.

FICOIDES, a name uſed by different authors in botany for different plants; many underſtanding by it the *opuntia* or Indian fig, as it is vulgarly called. See *Prickly* PEAR. And ſome, as Herman and others, making it the name of the muſa or PLANTAIN-*tree*.

FICTION. See FABLE.

Fiction *of a perſon*, in *Rhetoric*. See PROSOPOPEIA.

Fiction *of law*, *Fictio Juris*. *Fictions* are allowed of in law, in ſeveral caſes, but muſt be framed according to the rules of law, not what is imaginable in the conceptions of man; and there ought to be equity and poſſibility in every legal *fiction*. There are many of theſe *fictions* in the civil law; and by ſome civilians it is ſaid to be an aſſumption of law upon an untruth for a truth, in ſomething poſſible to be done, but not done. Godolphin and Bartol. The ſeiſin of the conuſee in a fine, is but a *fiction* in our law; it being an invented form of conveyance only. 1 Lill. abr. 610. And a common recovery is *fictio juris*, a formal act or device by conſent, where a man is deſirous to cut off an eſtate tail, remainders, &c. 10 Rep. 42. The proceedings in ejectments are alſo grounded on a *fiction of law*.

FICUS, in *Botany*. See FIG-*tree*.

Ficus, in *Conchyliology*, a name given by authors to a peculiar ſpecies of ſea-ſhell. It is of the genus of the *dolium*, and has a remarkably depreſſed clavicle.

Ficus, in *Surgery*, a kind of fleſhy excreſcence, growing ſometimes on the eye, or eye-brows, or chin; but more uſually on the anus, or at the fingers ends.

It is alſo called *ſycoſus*, *ſycoma*, *ficatio*, *ficoſus tumor*, and *mariſca*.

FIDD, an iron pin uſed at ſea to ſplice or faſten ropes together; it is made tapering and ſharp at one end.

There are alſo *fidds* of wood, which are much larger than the iron ones.

The pin alſo in the heel of the topmaſt, which bears it upon the cheſs-tree, is called a *fidd*.

Fidd-*hammer*, is uſed for a hammer, the handle of which is a *fidd*, or made tapering into that form.

FIDDLE. See VIOLIN.

Fiddle *dock*, in *Botany*. See DOCK.

Fiddle-*wood*. See CITHAREXYLON.

FIDE-*juſſores aſſidui*. See ASSIDUUS.

Fide-*juſſor*, in the *Civil Law*, is a ſurety; or one that obliges himſelf in the ſame contract with a principal, for the greater ſecurity of the creditor, or ſtipulator.

FIDEI-*Commiſſum*, in the *Roman Law*, the appointing of an heir, or bequeathing a legacy to a perſon, on this condition, that he ſurrender the inheritance or legacy to another perſon, for whom the ſame is originally meant; or, it is an inheritance left in truſt with any one, for the uſe of another.

Fidei-commiſſa were much uſed among the Romans. In the French law the thing is become odious; as being, ordinarily, no other than an expedient in favour of perſons to whom the laws forbid any thing to be given. In order to this, ſome truſty friend is choſen to be made legal heir, under a tacit agreement, to deliver the inheritance to the perſon incapacitated by law. But of later times the ſame expedient has come in uſe with regard to perſons capable of inheriting; to whom the teſtator, for particular reaſons, does not care to leave the inheritance directly.

As it happened, that the *fidei-commiſſioners* did not always faithfully reſtore what was truſted to them, Auguſtus took proper meaſures to oblige them thereto: to this end a prætor was erected, whoſe buſineſs was reſtrained to the ſingle matter of *fidei-commiſſions*.

As a teſtament was null without the inſtitution of an heir; and it frequently happening, that the *fidei-commiſſioner* refuſed to accept the truſt, upon which the teſtament fell to the ground; to engage ſomebody to accept it from a conſideration of advantage, the Pegaſian ſenatus-conſultum decreed, that the *fidei-commiſſioner* ſhould be at liberty to retain a fourth of the *fidei-commiſſum*.

FIDELES, in *Church Hiſtory*. See BELIEVERS.

FIDICINALES, in *Anatomy*, a name given to ſeveral muſcles of the fingers, called alſo LUMBRICALES.

FIDICULÆ, in *Antiquity*, is often uſed to ſignify the ſame with EQUULEUS, a kind of puniſhment uſed among the ancients.

Fidiculæ, in a more proper ſenſe, denotes the cords wherewith the criminal's limbs were diſtended on the EQUULEUS.

FIEF, the ſame with *feud*, or FEE.

FIELD, in *Agriculture*, a piece of land incloſed, and fit for tillage, to bear corn, hay, &c.

For the method of finding the contents of a *field*, ſee AREA, CHAIN, and SURVEYING.

Field-*ale*, or FILCTALE, in our *Ancient Cuſtoms*, a kind of drinking in the field, by bailiffs of hundreds; for which they gathered money of the inhabitants of the hundred to which they belonged. But this cuſtom has been long ſince prohibited.

Field, *Campus*, in *Antiquity*, is frequently uſed for a public place, or ſquare in a city, &c.

Such were the *Field* of Mars, *Campus Martius*; and *Field* of Flora, *Campus Floræ*, in Rome; and the *Field* of May, *Campus Maii*, among our anceſtors, &c.

Field *of Mars* was denominated from a temple of that deity, built therein: it was the ſcene, or place, of the aſſemblies called *comitia*. Tarquin the Proud at length appropriated it to his own uſes; but after the expulſion of the kings, the conſuls Brutus and Collatinus reſtored it to the public uſe again, for aſſemblies and elections.

Originally it was no more than a meadow on the banks of the Tiber, where horſes grazed, and the Roman youth were exerciſed to war. But it was afterwards erected into a magnificent ſquare, adorned with ſtatues, &c. See Campus *Martius*.

Field *of Flora*, was the place where the laws, edicts, and conſtitutions, were publiſhed.

For **Field** *of May*, ſee Campus *Maii*.

Field *baſil*, in *Botany*. See Clinopodium.

Field *baſil*, *American*. See Monarda.

Field *baſil*, *Syrian*. See Basil.

Field, *cloſe*, was anciently a place encloſed, or railed in with a barrier, for juſts and tournaments to be performed in.

Field, *Elyſian*. See Elysium.

Field *fort*. See *Field* Fort.

Field *works*, in *Fortification*, are thoſe thrown up by an army, in the beſieging of a fortreſs; or elſe by the beſieged, in defence of that place. Such are the fortifications of camps, thoſe of highways, &c.

Field, in *Heraldry*, is the ſurface, or face of the ſhield, or eſcutcheon: thus called, as containing the atchievements anciently acquired in the *field* of battle.

The *field* is the ground whereon the colours, bearings, metals, furs, charges, &c. are repreſented. In blazoning a coat, we always begin with the *field*: he bears ſable, &c.

Among the more modern heralds, *field* is leſs frequently uſed than ſhield, or eſcutcheon.

Field *colours*, in the *Military Art*, are ſmall flags about a foot and a half ſquare, which are carried along with the quarter-maſter-general for marking out the ground for the ſeveral ſquadrons and battalions of an army. They are placed on the right and left of the parade of a regiment when in the field; they are of the ſame colour with the facing of the regiment, and have the number of the regiment upon them. See Flag.

Field-*marſhal* is the denomination of a modern military rank in England, but ſuperior to all others; having the chief command of the whole army.

Field *officers*. See Officers.

Field-*fare*, in *Ornithology*, the Engliſh name of a bird of the thruſh kind, called by authors *turdus pilaris*. It is larger than the common thruſh, and is of a bluiſh grey colour on the neck; the head is ſpotted with black, and the ſhoulders and back are of a yellowiſh brown, variegated with black; the throat is variegated with black and yellow, the lower part of the belly is white, and but a little ſpotted; and on each ſide of the neck, and near each eye, it has a large black ſpot; thoſe on the neck are on its lower part near the inſertions of the wings; its wing-feathers are variegated with black, white, and a yellowiſh brown, and the tail is of a bluiſh black, with ſome variegations of black and white; the legs are black, and the talons very ſtrong. Theſe birds generally weigh about four ounces; their length is ten inches, and their breadth ſeventeen.

It is a bird of paſſage, and viſits us in England toward the end of autumn in vaſt flocks, and leaves us in ſpring; it is not certainly known where they breed. They feed on berries, particularly thoſe of the holly, and are a well-taſted bird.

This bird is eaſily taken with water bird-lime in the following manner: take out a gun, and kill two or three *field-fares* with it; by that time the gun has been diſcharged two or three times, the reſt of theſe birds will be ſo ſhy, that there will be no coming near them; then tie one or two of thoſe that were ſhot to the upper branches of ſome buſhy tree, in ſuch manner, that they may ſeem alive and ſitting there. Then prepare two or three hundred twigs, covering them well with the water bird-lime, made warm for that purpoſe; take a good birchen bough, and in that place all the twigs; tie this faſt to the tree, juſt underneath where the other *field-fares* are tied, and let this be in a place where they come in a morning to feed, for they always uſe one haunt for feeding ſo long as there is any food left there. By this means the *field-fares* will ſettle in whole flocks, near thoſe which they ſee tied to the buſh; and two or three dozen may be in this manner taken at a time. See Bird and Lime.

Field *of a painting*, &c. is more uſually called the GROUND thereof.

Field-*pieces* are ſmall cannon, uſually carried along with an army in the *field*: ſuch as one, one and a half, two, three, ſix, nine, and twelve pounders; which being light and ſmall, are eaſily carried.

The ſmall pieces differ in length and weight: the dimenſions of the others are exhibited in the following table.

Braſs *field-pieces*.

Calibre.	Length.		Weight.		
	Feet.	Inch.	C.	Q.	lb.
12	5	0	8	3	8
6	4	6	4	3	10
3	3	6	2	3	10

See Carriage and Gun.

Field-*ſtaff*, is a ſtaff carried by the gunners, in which they ſcrew lighted matches, when they are on command; which is called arming the *field ſtaffs*. See Linstock.

Field *of viſion*, in *Optics*, is that conical ſpace indefinitely extended before us, ſo as to include all objects that can be ſeen at one view, or without turning the eyes. The preciſe limits of this ſpace are not eaſily aſcertained. In looking at a ſmall diſtance, we have an imperfect glimpſe of objects through almoſt the extent of a hemiſphere, or at leaſt for above ſixty degrees each way from the optic axes; but towards the extremity of this ſpace, objects are very imperfectly ſeen; and the diameter of the *field* of diſtinct viſion does not ſubtend an angle of more than five degrees at moſt, ſo that the diameter of a diſtinct image on the retina is leſs than ,06 of an inch; but it is probably much leſs. See Vision.

Field-*book*, in *Surveying*, a book uſed for ſetting down angles, diſtances, and other things, remarkable in taking ſurveys.

The pages of the *field-book* may be conveniently divided into five columns. In the middle column the angles at the ſeveral ſtations taken by the theodolite are to be entered, with the diſtances from the ſtations. The diſtances taken by the off-ſet ſtaff, on either ſide of the ſtation line, are to be entered into the columns on either ſide of the middle column, according to their poſition with reſpect to that line. The names or characters of the objects, with proper remarks, may be entered in the columns on either ſide of theſe laſt mentioned.

Field, in *War*, the place where a battle was fought. The general remained maſter of the *field* of battle.

FIERI *facias*, in *Law*, a judicial writ, which lies at all times within the year and day, for him that hath recovered in an action of debt and damages: it is directed to the ſheriff, commanding him to levy the debt and damages on him, againſt whom the recovery was had.

FIFE, in *Muſic*, a ſort of wind inſtrument, being a ſmall pipe.

Fife-*major*. See Major.

Fife-*rails*, in a *Ship*, are thoſe that are placed on baniſters on each ſide of the top of the poop, and ſo along with *hances* or falls. They reach down to the quarter-deck, and to the ſtair of the gangway.

FIFTEENTH, *Decima quinta*, or *Quinzieme*, an ancient tribute, or impoſition of money, laid upon any city, borough, or other town, through the realm; not by the poll, or upon this or that man, but in general upon the whole city, or town.

It is ſo called, becauſe it was ſuppoſed to amount to a *fifteenth* part of that which the city hath been valued at of old; or to a *fifteenth* part of every man's perſonal eſtate, according to a reaſonable valuation.

This was impoſed by parliament, and every town through the realm knew what a *fifteenth* for themſelves amounted to, becauſe it was always the ſame; whereas the ſubſidy, which was raiſed of every particular man's lands, or goods, muſt needs be uncertain.

The *fifteenth* ſeems to have been a rate, anciently laid upon every town, according to the land or circuit belonging to it. Camden mentions many of theſe *fifteenths* in his Britan. viz. p. 171. *Bath geldabat pro viginti hidis, quando ſchira geldabat*, &c. And p. 181. *Old Sarum pro quinquaginta hidis geldabat*, &c. Which rates are according to Domeſday. But in after-times the *fifteenth* came to be underſtood as impoſed only on goods and chattels, not on lands. It was firſt granted by parliament, 18 Edw. I. viz. *Computus* quintæ decimæ *reg. an.* 18. *per archiepiſcopos, epiſcopos, abbates, priores, comites, barones, & omnes alios de regno, de omnibus bonis mobilibus conceſſæ.* The city of London paid that year for the *fifteenth*, 2860*l.* 13*s.* 8*d.* and the abbot of St. Edmund's 666*l.* 13*s.* 4*d.* which was by compoſition; and thereupon had all the temporal goods of their diſtrict diſcharged of the *fifteenth*.

In the 8th of Edw. III. it was reduced to a certainty, when, by virtue of the king's commiſſion, new taxations were made of every townſhip, borough, and city, in the kingdom, and recorded in the exchequer; which rate was, at the time, the *fifteenth* part of the value of every townſhip, and the whole amounted to about 29,000*l.*

The way of collecting it was by two aſſeſſors appointed in every county by the king, who appointed twelve more in every hundred to make a true valuation of every man's perſonal eſtate upon which the *fifteenth* part was levied.

FIFTH, in *Muſic*, one of the harmonical intervals, or concords.

The *fifth* is the third, in order, of the concords. The ratio of the chords that produce it, is 3 : 2.

It is called *fifth*, becauſe it contains *five* terms, or ſounds, between its extremes, and four degrees; ſo that in the natural ſcale of muſic it comes in the *fifth* place, or order, from the fundamental.

The ancients called this interval DIAPENTE.

The *imperfect*, or *defective fifth*, by the ancients called *ſemi-diapente*, is leſs than the *fifth* by a mean ſemitone.

FIG-*tree*, *Ficus*, in *Botany*, a genus of the *polygamia polyoecia* claſs. Its characters are theſe: it hath male and female flowers included within the ſkin of the fruit, ſo that they do not appear, unleſs the covering be opened; the male flowers are but few in number, and are ſituated in the upper part of the fruit; the female flowers are numerous, and ſituated in the lower part. The male flowers ſit each upon a ſeparate foot-ſtalk, and have no petals, but three briſtly ſtamina; the female flowers ſit upon diſtinct foot-ſtalks; they have no petals, but a germen, which afterward becomes a large ſeed, ſitting in the empalement. There are eleven ſpecies; ſome of which are cultivated in the gardens of England, but many more in thoſe of France and Italy, where the fruit is in very high eſteem, as it is alſo with the nicer palates here; though ſo much out of favour with the vulgar, that it ſtands ſafe on trees planted in places where every other ſpecies of fruit would be ſtripped by robbers.

One great diſcouragement to their more frequent propagation in England, is the unſkilfulneſs of the generality of our gardeners in their culture and management. To obviate which, it may not be amiſs to ſay ſomewhat at large here, of the proper management of all the ſpecies of this tree.

The common method has been to propagate theſe trees by ſuckers from the roots of the old ones, but they are much more ſucceſsfully raiſed from cuttings. Theſe ſhould be taken from the trees in autumn, and choſen from ſuch branches as are compact, with their joints near each other; they ſhould have a part of the former year's wood at their bottom, and the top of each ſhould be left entire. They then ſhould be planted, eight or nine inches deep, in a bed of loamy earth, warmly ſituated; the ſurface of the ground ſhould be covered with old tanner's bark, three or four inches thick, and in ſevere froſt their tops ſhould be covered with ſtraw, &c. which ſhould be removed in the ſpring, but the tan ſhould be ſuffered to remain. In the following autumn, they will be fit to remove. This is the proper ſeaſon to tranſplant them; and the beſt ſoil is ſuch as has a gravelly, chalky, or ſtony bottom, with a light ſurface; the tree will ſeem to flouriſh indeed more in a better ſoil, but in this poor one it will produce the fineſt and moſt plentiful fruit. They ſhould always be planted in a free open ſituation, not ſhaded by trees or buildings, and will never ripen their fruit well, unleſs againſt a good ſouth, ſouth-eaſt, or ſouth-weſt wall. They ſhould be planted at twenty feet diſtance, and the height for the wall they ſtand againſt is about fourteen feet; the middle ſpaces between the trees may be planted with vines to fill up the vacant part of the wall till the *figs* are grown, and then theſe ſhould be taken up. In the ſummer, as the branches ſhoot, they muſt be trained horizontally againſt the walls, and no foreright ſhoots ſhould be ſuffered to come, but the buds of ſuch ſhould be rubbed off as faſt as they appear. At Michaelmas they ſhould be always pruned and nailed up. The great care to be had in pruning the old trees, is always to have a ſupply of young branches; for thoſe only produce fruit. None of the ſhoots of the former autumn pruning muſt be ſhortened; for it is on the two year old wood, that the fruit is produced; the young branches muſt be always brought very cloſe to the wall, and this will ſcreen them from injuries by froſts, and much forward the early ripening of their fruit. The old branches ſhould never be laid in too thick, which is a great fault among moſt gardeners; the diſtance ought to be at leaſt a foot between branch and branch; and as the young ones grow ſtrong, the old ones ſhould be always cut away. In April, or the beginning of May, ſeveral of the leading ſhoots ſhould be ſtopped, which makes them throw out ſide branches. In autumn the trees may be looſened from the walls, and the branches may be laid down and tied to ſtakes, ſo as to keep them from the damp ground: and thus in very hard weather be covered with ſtraw, peas-halm, or the like; and that not to be removed till the weather is milder, and then not all at once, but only by a little at a time. In mild weather the covering ſhould be removed; or elſe the *figs* will come out too early, and be damaged by the cold of April and May. In the ſpring, when the *figs* begin to puſh out, the trees may be faſtened to the wall again. The higher the wood runs up the wall, uſually ſo much the better taſted is the fruit; and no trees ſucceed better in fruiting, than thoſe which are nailed up againſt chimnies, where, beſide the height, they have ſome advantage from the heat.

Fig-trees are always planted as ſtandards in warm countries; but in England they are generally planted againſt walls; however, ſince ſome of the varieties are found to ripen their fruit well upon the ſtandards, and the crop of *figs* is often greater upon them than on thoſe trees that are planted againſt walls, it is a deſirable object to plant them either in ſtandards or eſpaliers. The latter will be the moſt likely to ſucceed, if they are managed as in Germany, where they untie the *fig-trees* from the eſpalier, and lay them down, covering them in winter with ſtraw or litter; and this covering is gradually removed in the ſpring. They ſhould not be faſtened up again till the end of March.

The principal and moſt valuable varieties of the common ſort of *fig* are the brown or cheſtnut-coloured Iſchia *fig*, the black Genoa *fig*, the ſmall white early *fig*, the large white Genoa *fig*, the black Iſchia *fig*, the Malta *fig*, the Murrey or brown Naples *fig*, the green Iſchia *fig*, the Madona *fig*, commonly called here the Brunſwick or Hanover *fig*, the common blue or purple *fig*, the long brown Naples *fig*, the yellow Iſchia *fig*, the ſmall brown Iſchia *fig*, and the Gentile *fig*. The firſt, ſecond, third, ninth, and tenth ſorts, will ripen their fruits on ſtandards, in a warm ſituation; but the others require the aſſiſtance of walls expoſed to good aſpects, otherwiſe their fruit will not ripen in England. Miller.

Figs contain a great quantity of phlegm, a little volatile, alkali ſalt, and a moderate quantity of oil.

They are moderately nouriſhing, grateful to the ſtomach, eaſier of digeſtion than any of the other ſweet fruits, and ſoften the aſperities of the breaſt, &c. and accordingly are uſed in medicine, to make gargariſms againſt diſorders of the throat and mouth; and as an ingredient in pectoral decoctions, and in lenitive electaries. They are alſo applied externally, to ſoften, digeſt, and promote maturation.

Figs are dried either by a furnace, or in the ſun, having firſt dipped them in ſcalding hot lye, made of the aſhes of the *fig-tree*. The Latins call them *caricæ*, or *ficus paſſæ*, when thus dried.

In this condition they are uſed both as medicine and food; being both the wholſomer, and eaſier of digeſtion, when thus cleared of a quantity of their aqueous and viſcid parts.

The beſt *figs* are the produce of Turky, Italy, Spain, Provence, &c. The iſlands of the Archipelago yield *figs* in great abundance; but they are much inferior in goodneſs to thoſe of Europe. Yet the Greeks in thoſe iſlands cultivate them with wonderful care and attention; as making the principal food, and a conſiderable part of the riches of the country.

They have two kinds of *fig-trees*; the firſt called *ornos*, or the *wild fig-tree*; the ſecond, the *domeſtic fig-tree*.

The method of cultivating and ripening theſe *figs*, makes a peculiar art, by the ancients called *caprification*; often ſpoken of among them in terms of admiration. Some of the modern naturaliſts have looked on it as a chimera; but Monſ. Tournefort has aſſured us of the contrary, and given us that proceſs, as he learned it upon the ſpot. See CAPRIFICATION.

The generation of the *fig* is ſomewhat anomalous; the parts ſubſervient to the office in other plants, i. e. the flower, not being here apparent. But the anatomy of the fruit helps us out of the difficulty.

Monſ. de la Hire the younger, in the Memoirs of the French Academy, ſhews, that the *fig* is a flower, as well as a fruit. By diſſection, it diſcovers all the eſſentials of a flower, viz. ſtamina, apices, and farina fœcundans.

The common dried *figs* afford two very curious phænomena; the one is, that within thoſe which are ſomewhat decayed, and indeed often in thoſe which appear moſt ſound, there are a peculiar ſort of mites, which live on the pulp of the fruit, and we eat millions of theſe unknowingly in this fruit.

Theſe are different from the common mites, in that they are rounder bodied and more tranſparent, and are very beautiful little creatures when examined.

The other object is the ſeed, in which the plantula ſeminalis is very elegantly to be ſeen. For this purpoſe the largeſt *fig* muſt be choſen, for the ſmaller are commonly ſuch as are pulled off the tree before they are ripe. Out of one of theſe large and ripe *figs* a fair ſeed is to be ſelected; and on cutting this carefully, the whole pulpy part may be ſeparated from the hard huſk; and on examining it, there will be found lodged in it a very perfect and beautiful little plant, conſiſting of two leaves, and of a part which is to be the root, and another which is to be the ſtalk, and in fine the trunk of the tree. The pulpy matter of this ſeed is covered with a delicate thin membrane, and this muſt be carefully taken off, before the plantule can be ſeen. After this, all the reſt is only a ſort of pith, deſtined to give place and nouriſhment to the young ſhoot, before it is committed looſe to the earth.

Fig-*tree cloth of Otaheite*, in the South ſea, is a coarſe and harſh cloth, of the colour of the darkeſt brown paper, made of the bark of a tree which reſembles the wild *fig-tree* of the Weſt Indies. This cloth has the quality of reſiſting water; and the greater part of it is perfumed, and worn by the chiefs as a morning dreſs. For the method of manufacturing and colouring this cloth, ſee Aouta. Hawkeſworth's Voyag. vol. ii. p. 210, &c.

Figs, in *Antiquity*, were uſed in divination. See Sycomantia.

Fig, in the *Manege*, is a ſort of wart on the fruſh, and ſometimes all over the body of a horſe. The *figs* that appear in the fruſh or ſole, make an evacuation of ſtinking malignant humours, that are very hard to cure.

Fig, *Indian*, in *Botany*. See *Prickly* Pear.

Fig, *infernal*. See *Prickly* Poppy.

Fig, *marygold*. See Mesembryanthemum.

Fig, *Pharaoh's*. See Plantain-*tree*.

Fig-*inſect*, in *Natural Hiſtory*, a name given by the Engliſh to the creature called by the French, after Mr. Reaumur, the *faux puceron*, or *falſe puceron*, from its very much reſembling the puceron in external appearance, but being extremely different from it when nearly examined. Theſe inſects are when at their full growth of the bigneſs of the head of a pin of the largeſt ſize, but there are uſually found among them ſeveral that are ſmaller, down to ſuch as are ſcarce perceivable to the naked eye. They are found in great plenty on the back, or underſide of the leaves of the *fig-tree*, but they never are ſeen in cluſters like the pucerons.

The body and breaſt of this inſect are green, and the caſes of the wings are white, and beſet with hairs. This creature has two antennæ or horns, which it can exert at pleaſure; but they uſually are lodged under the furrows of the wings, and are not to be ſeen, unleſs the animal be turned belly upwards; the head alſo is bent downwards, and the eyes ſeem directed to look at objects only placed under them.

It has ſix legs, and a fine ſmall trunk iſſuing from the extremity of the head; this is but ſhort, and is of a lively green; it is terminated by a ſharp point, and has a fine brown filament like a hair, which it thruſts out of the body of the trunk at pleaſure, and which ſeems a ſort of engine or organ deſtined to convey into the body the juices extravaſated by the wound and ſuction of the trunk. The creature uſually remains in perfect quietneſs on the leaf on which it is found; but has this peculiarity in its poſition, that it is always found with its head reſting upon one of the ribs of the leaf, and its body on the plain part; by this means the anterior part of the head is raiſed above the ſurface of the plain part of the leaf, and the creature can by that advantage move his trunk about at pleaſure, and fix it into different parts of the leaf, while his body is perfectly ſtill at the time.

Theſe creatures throw off their ſkins many times in their growth, the furrows marking the places where their wings are, and the protuberances made by their caſes are always ſeen, however young they are examined.

In the months of May and June theſe inſects all become winged, and afford a peculiar ſpecies of a four-winged fly, which is remarkable for hopping; but as its hinder legs are not greatly larger than the reſt, it leaps but a little way at a time. The body of this fly is green, its wings are bordered with yellow, and its legs are white; it has a trunk of the ſame nature with that of the creature before its winged ſtate, and with this it continues to ſuck the juices of the leaves of the *fig-tree* as it did before.

The manner in which theſe animals propagate their ſpecies is not yet known. The pucerons, to which they more approach in figure than to any other animals, have always young ones found within them; but theſe, if examined in whatever ſtate, never have any ſuch appearance, not even ſo much as eggs being found in them; it ſhould ſeem that their eggs are too minute for our inſpection, but that they are oviparous, not viviparous animals. Reaumur's Hiſt. vol. vi. p. 98.

Fig-*ſhell*. See Dolium.

Fig-*wort*, in *Botany*, *Scrophularia*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower has a permanent empalement, cut into five parts at the top; it hath one unequal petal, with a large globular tube. The brim is cut into five ſmall parts, the two upper large and erect, the two ſide ones ſpread open, and the under one reflexed. It hath four ſlender deflexed ſtamina, two of which are the length of the petal, and two ſhorter, terminated by twin ſummits; and an oval germen ſupporting a ſingle ſtyle, crowned by a ſingle ſtigma. The germen afterward turns to a roundiſh pointed capſule, with two cells, which open at the top, and are filled with ſmall ſeeds. There are eighteen ſpecies. Miller.

The root and leaves of *ſcrophularia* have been eſteemed externally as a remedy for the piles, inflammation, ſcrophulous tumors, and cold ulcers. It is generally made into an ointment for theſe purpoſes; but ſome give it alſo internally in diet drinks. At preſent they are both among us diſregarded.

This root is of a very ſingular figure, by which it is eaſily diſtinguiſhed at ſight from all other medicinal roots. It is uſually of the thickneſs of a man's finger, or more, of an oblong figure, nearly as thick at the one end as the other, and full of protuberances on the ſurface, reſembling a kind of little kernels; and between theſe there are a great many fibres, which ſtrike deep into the ground. The root itſelf has no great ſmell, but its taſte is ſomewhat acrid and diſagreeable.

Fig-*wort worm*, in *Natural Hiſtory*, the name of an inſect, which feeds on the leaves of the *ſcrophularia*, or *fig-wort*, and which is uſually eſteemed a caterpillar, but is one of thoſe inſects called by the French fausse *chenilles*.

FIGHT. See Battle and Engagement.

FIGHTS, in a *Ship*, are the waſte-cloths which hang round about her in a fight, to hinder the men from being ſeen by the enemy.

Fights, *cloſe*, denote thoſe bulkheads afore or abaft the ſhip, which are put up for men to ſtand ſecure behind, and fire on the enemy, in caſe of boarding.

Fights, *running*, at *Sea*, thoſe where the enemy do not ſtand the battle, but are continually chaſed.

FIGHTWITE, *Fihthwita*, in the Saxon times, ſignified a mulct for making a quarrel, to the diſturbance of the peace. *Mulcta ob commiſſam pugnam in perturbationem pacis, quæ in exercitu regis* 10 *ſolidorum erat.* Blount and Jacob in tranſcribing this paſſage, have inſerted 120 ſols.

FIGURAL, or Figurate *numbers*, ſuch as do or may repreſent ſome geometrical figure, in relation to which they are always conſidered; as triangular, pentagonal, pyramidal, &c. numbers.

FIGURATE, or Figurative, that which has a relation to figure, or that teaches under ſome obſcure reſemblance.

Thus a *figurative ſtyle* is that which abounds in figures. The *figurative* ſtyle, F. Bouhours obſerves, is neither the moſt juſt, nor the beſt. For this reaſon Cicero directs us to the ancients, who, not having yet bethought themſelves to uſe *figurative* expreſſions, but keeping to the moſt proper and natural way, have almoſt all wrote well. *Sunt enim illi veteres, qui nondum ornare poterant ea, quæ dicebant, omnes prope præclare locuti.*

Long uſe, ſay the grammarians, renders that proper in all languages, which at firſt was *figurative.* The ſame thoughts appear more lively when expreſſed by a figure, than when in ſimple terms. The reaſon is, that *figurative* expreſſions denote not only the principal matter, but alſo the emotion and paſſion of the perſon who ſpeaks.

Figurative is alſo much uſed in ſpeaking of the myſteries and figures of the old law. In this ſenſe manna is ſaid to be *figurative* of the euchariſt.

Figurative is alſo uſed in the Greek grammar for what we otherwiſe call characteriſtic, viz. a letter that characterizes certain tenſes of the Greek verbs; or that diſtinguiſhes and ſpecifies them.

In the firſt conjugation of the barytonous verbs, the φ is characteriſtic, or *figurative* of the præter tenſe, and the ψ of the future.

Figurative, or Figurative *counter-point*, in *Muſic*, is that wherein there is a mixture of diſcords along with the concords. See Counter-point and Supposition.

Where the diſcords are uſed as a ſolid and ſubſtantial part of the harmony, the *counter-point* is properly called the harmony of diſcord.

FIGURE, Figura, in a general ſenſe, denotes the ſurface or terminating extremes of a body.

All bodies have ſome *figure*; whence, figurability is generally ranked among the eſſential properties of body, or matter. A body without *figure*, would be an infinite body.

The corpuſcular philoſophers account for every thing from the *figure*, bulks, and motions of the atoms, or primary corpuſcles of bodies.

For the *figures* of bodies, conſidered as objects of ſight, ſee **VISION**.

The ſchoolmen diſpute, whether or no the quality of *figure* be the ſame with that of form; and if they differ, what it is that conſtitutes the difference? Boethius will have *figure* only predicated of inanimate bodies, and form of animate. Others extend *figure* to all natural things, and form to all artificial ones: whence the verſe,

> *Formam viventis, picti dic eſſe* figuram.

Others apply *figure* indifferently to all kinds of bodies, but not in all relations. If only the bare circumference, or circumſcription, be conſidered, they call it *figure*; but if the circumference be conſidered as endowed with colour, then they call it FORM.

FIGURES, in *Architecture* and *Sculpture*, denote repreſentations of things made in ſolid matters; ſuch as ſtatues, &c.

We ſay, *figures* of braſs, of marble, of ſtucco, of plaiſter, &c.

But, in this ſenſe too, the term is more uſually applied to human repreſentations than to other things. Thus we ſay, an equeſtrian *figure*, for a man on horſeback.

Daviler obſerves, that thoſe, either repreſented ſitting, as popes, &c. or kneeling, as on monuments, &c. or laid all along, as rivers, &c. are more properly called *figures* than ſtatues.

Figures, in *Architecture*, are ſaid to be detached, when they ſtand ſingly, in oppoſition to thoſe compoſitions which are called GROUPES.

FIGURES, in *Arithmetic*, are the numeral characters; or the characters whereby numbers are expreſſed, or written. Thus the number four hundred and fifty is written, or expreſſed, by three *figures*, 450.

The *figures* in arithmetic are the nine digits; 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0.

Theſe *figures* were firſt brought into Europe by the Moors of Spain, and into England, as Dr. Wallis apprehends, about 1130. See ARITHMETIC and CHARACTER.

However, from ſome ancient dates, ſuppoſed to conſiſt wholly or in part of Arabian *figures*, ſome have concluded, that theſe *figures*, originally Indian, were known and uſed in this country at leaſt as early as the tenth century. The moſt ancient date diſcovered by Dr. Wallis was that on a chimney-piece, at Helmdon, in Northamptonſhire, M 133, i. e. 1133. Other dates diſcovered ſince, are 1090, at Colcheſter, in Eſſex, 1016, with the Roman M for a thouſand, at Widgel-hall, near Buntingford, in Hertfordſhire, 1011 on the north front of the pariſh-church of Rumſey in Hampſhire, and 975 over a gate-way at Worceſter. Dr. Ward has urged ſeveral objections againſt the antiquity of theſe dates. As no example occurs of the uſe of theſe *figures* in any ancient manuſcript, earlier than ſome copies of Johannes de Sacro Boſco, who died in 1256, he thinks it ſtrange, that workmen ſhould have made uſe of theſe *figures* ſo long before they appear in the writings of the learned; and he alſo diſputes the fact. The Helmdon date, according to him, ſhould be 1233; the Colcheſter date 1490; that at Widgel-hall has in it no Arabian *figures*, the 1 and 6 being I and G, the initial letters of a name; and the date at Worceſter, he ſuppoſes to conſiſt of Roman numerals, and to be really MXV. Martyn's Abridg. of Phil. Tranſ. vol. ix. p. 420, &c.

FIGURE, in *Aſtrology*, a deſcription, or draught, of the ſtate and diſpoſition of the heavens, at a certain hour; containing the places of the planets and ſtars, marked down in a *figure* of twelve triangles, called *houſes*.

This is alſo called a HOROSCOPE and THEME.

FIGURE *of an eclipſe*, in *Aſtronomy*, denotes a repreſentation of the path or orbit of the ſun, and the moon, during the time of the eclipſe, upon paper; with the number of digits eclipſed, and the beginning, middle, and end, of darkneſs.

FIGURE *of the diameter*. The rectangle under any diameter, and its proper parameter, is in the ellipſis and hyperbola called the *figure of that* DIAMETER.

FIGURE, or *Delineation*, of the full moon, ſuch as, viewed through a teleſcope with two convex glaſſes, is of conſiderable uſe in obſervations of eclipſes, and conjunctions of the moon with other luminaries. In this *figure* of the moon are repreſented the maculæ, or ſpots, of the moon, marked by numbers; beginning with the ſpots, which uſually enter firſt within the ſhade at the time of the great eclipſes, and alſo emerge the firſt.

FIGURE, in *Conics*, denotes the rectangle, made under the latus rectum and tranſverſum, in the hyperbola and ellipſis.

FIGURE, in *Dancing*, denotes the ſeveral ſteps which the dancers make in order, and cadence; conſidered as they mark certain *figures* on the floor.

FIGURES, in *Fencing*, are the divers guards, poſtures, attitudes, or diſpoſitions, of the body, arm, or ſword. See FENCING.

FIGURE, in *Fortification*, is the plan of any fortified place; or the interior POLYGON, &c.

When the ſide and angles are equal, it is called a *regular*; when unequal, an *irregular figure*.

FIGURE, in *Geomancy*, is applied to the extremes of points, lines, or numbers, thrown, or caſt at random: on the combinations or variations whereof the ſages of this art found their fantaſtical divinations.

FIGURE, in *Geometry*, denotes a ſurface incloſed, or circumſcribed with one or more lines.

Such are triangles, ſquares, polygons, circles, ellipſes, &c.

Wolfius defines *figure* a continuum terminated by a perimeter. In which ſenſe *figure* is applicable both to ſuperficies and ſolids. In the former caſe, the perimeter is of lines; in the ſecond, of ſurfaces.

Figures are either rectilinear, curvilinear, or mixt, according as the perimeter conſiſts of right lines, curve lines, or both.

The ſuperficial parts of a *figure* are called its *ſides*; the loweſt ſide, its *baſe*; and the angle oppoſite to the baſe, the *vertex*.

The height of a figure is the diſtance of the vertex from the baſe.

FIGURE, in *Grammar*, is an expreſſion that deviates from the common and natural rules of grammar; either for the ſake of elegance or brevity.

The beſt grammarians only reckon four *figures*; the ELLIPSIS, PLEONASM, SYLLEPSIS, and HYPERBATON. Others add two more; viz. ANTIPTOSIS, and ENALLAGE.

FIGURE, in *Heraldry*, a bearing in a ſhield. Of theſe *figures* there is almoſt an infinite variety: ſome are natural; ſuch as the celeſtial *figures* of the ſun, moon, ſtars, &c. and their parts; the effigies of men, women, &c. and their parts; animals, as lions, ſtags, foxes, boars, &c. and their parts; birds, as eagles, ſwans, ſtorks, pelicans, &c. and their parts; fiſhes, as dolphins, whales, ſturgeons, trouts, &c. and their parts; reptiles and inſects, as tortoiſes, ſerpents, graſhoppers, &c. and their parts; vegetables, as trees, plants, flowers, herbs, &c. and their parts; and ſtones, as diamonds, rubies, pebbles, rocks, &c. Theſe charges, as well as ordinaries, have divers attributes or epithets, which expreſs their qualities, poſitions, and diſpoſition. Thus, the ſun is ſaid to be *in his glory*, *eclipſed*, &c. the moon *in her complement*, *in creſcent*, &c. Animals are ſaid to be *rampant*, *paſſive*, &c. BIRDS have alſo their denominations; fiſhes are deſcribed to be *hauriant*, *naiant*, &c. Beſides theſe natural *figures*, there are alſo artificial *figures*; the principal of which are warlike inſtruments, as ſwords, arrows, battering rams, gauntlets, helmets, ſpears, pole-axes; ornaments uſed in royal and religious ceremonies, as crowns, coronets, mitres, wreaths, croſiers; towers, caſtles, arches, columns, plummets, battlements, churches, portcullis, borrowed from architecture and fortification; and ſhips, anchors, rudders, pendants, ſails, oars, maſts, flags, gallies, lighters, &c. derived from navigation; all theſe bearings have different epithets, denoting their poſition, ſtructure, &c.

There are likewiſe chimerical or imaginary *figures* uſed in heraldry, that are the reſult of fancy and caprice; ſuch as centaurs, hydras, phœnixes, griffons, dragons, &c. Porny's Elem. Herald. p. 132, &c. 172, &c.

FIGURE, in *Logic*, denotes a certain diſpoſition of the terms of a ſyllogiſm; particularly of the medium, with regard to the extremes.

Hence it follows, that there are as many *figures* of ſyllogiſms, as there are different connexions of the extremes with the medium; ſo that, though the ſchoolmen ordinarily only reckon three, yet a fourth might be admitted.

In the *firſt figure* the medium or middle term is the ſubject of the major propoſition, and the predicate of the minor. This contains four MOODS, and applies to the proof of all ſorts of queſtions, whether univerſal or particular, affirmative or negative. In the *ſecond figure* the middle term is the predicate of both the premiſſes, and this contains four moods, admitting only of negative concluſions.

The *third figure* requires that the middle term be the ſubject of both the premiſſes, and has ſix moods, admitting only of particular concluſions. The ſpecial rules of theſe three *figures* are the following: in the firſt, the major propoſition muſt always be univerſal, and the minor affirmative; in the ſecond alſo the major muſt be univerſal, and one of the premiſſes, together with the concluſion, muſt be negative; in the third *figure* the minor muſt be affirmative, and the concluſion always particular.

In the *fourth figure*, called by the Peripatetics the *indirect*, and by others, the *Galenical figure*, as varying too much ſrom the natural form, the middle term is predicated in the major propoſition, and ſubjected in the minor. Some logicians will allow this to be nothing elſe but a mere inverſion of the *firſt figure.* It has five moods. Watts's Logic, part iii. chap. 2. § 3.

Figure, in the *Manufactures*, is applied to the various deſigns repreſented or wrought on velvets, damaſks, taffaties, ſattins, and other ſtuffs and cloths.

The moſt uſual *figures* for ſuch deſigns are flowers, imitated from the life; or groteſques, and compartiments of pure fancy. Repreſentations of men, beaſts, birds, and landſcapes, have only been introduced ſince the taſte for the Chineſe ſtuffs, particularly thoſe called *furees*, began to prevail among us.

It is the woof of the ſtuff that forms the *figures*; the warp only ſerves for the ground. In working *figured* ſtuffs, there is required a perſon to ſhew the workman how far he muſt raiſe the threads of the warp, to repreſent the *figure* of the deſign with the woof, which is to be paſſed acroſs between the threads thus raiſed. This ſome call *reading the* DESIGN.

For the *figures on tapeſtry, brocade*, &c. ſee Tapestry, &c.

For thoſe given by the *calenders, printers*, &c. ſee Calender, &c.

Figure, *Figura*, Σχημα, in the *Ancient Muſic*, is uſed for the different diſpoſitions of the tones and ſemitones in a conſonance.

Figure, *apparent*, in *Optics*, that figure, or ſhape, which an object appears under when viewed at a diſtance, being often very different from the true figure; for a ſtraight line viewed at a diſtance may appear but as a point; a ſurface as a line; and a ſolid as a ſurface; and each of theſe of different magnitudes, and the two laſt of different *figures*, according to their ſituation with regard to the eye. Thus an arch of a circle may appear a ſtraight line; a ſquare or oblong, a trapezium, or even a triangle; a circle, an ellipſis; angular magnitudes, round; a ſphere, a circle, &c.

Alſo any ſmall light, as a candle, ſeen at a diſtance in the dark, will appear magnified, and farther off than really it is. Add to this, that if ſeveral objects are ſeen at a diſtance, under angles that are ſo ſmall as to be inſenſible, as well as each of the angles ſubtended by any one of them, and that next to it; then all theſe objects will appear not only to be contiguous, but to conſtitute, and ſeem but one continued magnitude.

Figure, in *Painting* and *Deſigning*, denotes the lines and colours, which form the repreſentation of a man, or other animal.

But the term *figure* is in a more immediate and peculiar manner underſtood of human perſonages: thus, a painting is ſaid to be full of *figures*, when it abounds with repreſentations of men; and a landſcape is ſaid to be without *figures*, when there is nothing but trees, plants, mountains, &c.

Figure is alſo applied to repreſentations, or images of things in prints, &c.

Some readers chooſe to have the *figures*, eſpecially the mathematical ones, in wood, for the convenience of having them immediately annexed to the matter they refer to: others rather chooſe to be at the pains of turning over, and having recourſe to another part of the book, that they may have the *figures* more neat and accurate on copper.

The author of a collection of diſſertations, printed at Paris, in 1715, ſhews, in the firſt diſſertation on the Hebrew medals, p. 66. that the Jews were allowed to make any kind of *figures*, or images of trees, plants, flowers, buildings, &c. but not thoſe of animals, or of the ſun, moon, and ſtars.

Figures, *brimſtone.* See Brimstone.

Figures, *caſting of.* See Casting.

Figure *circumſcribed*, and *inſcribed.* See Circumscribing, and Inscribed.

Figures, *equal.* See Equal.

Figure, *equilateral.* See Equilateral.

Figures, *plain.* See Plain.

Figure, *regular* and *irregular.* See Regular and Irregular.

Figures, *ſimilar.* See Similar.

Figure, in *Rhetoric*, is a phraſe, or turn of ſpeech or diſcourſe, more beautiful and emphatical than what is uſed in common or ordinary ſpeaking.

Figures, by the Greeks called σχηματα, *ſchemata*, are the enrichments of diſcourſe, and we only uſe them when raiſed and moved with the conſideration of ſomething extraordinary.

There are two kinds of *figures*; the one of *ſentences*, and contained in the ſenſe itſelf, without any immediate dependence on any particular words; the other are only in the *words* themſelves.

Figures *of ſentences, of the*, ſome are principally adapted for reaſoning and inſtruction, and others to move the paſſions.

Among the ancients, Demoſthenes is moſt celebrated for expreſſing the force and energy of the former, and Iſocrates excelled in the beauties and delicacies of the latter.

Cicero lays ſo great ſtreſs on theſe *figures*, that he repreſents them as the brighteſt parts of oratory; and makes the power and efficacy of the art to depend in a great meaſure on a thorough knowlege and application of them.

Of the firſt kind the moſt conſiderable are ſix; viz. PROLEPSIS, or *anticipation*; HYPOBOLE, or *ſubjection*; ANACOINOSIS, or *communication*; *epitrope*, or CONCESSION; *parabole*, or SIMILITUDE; and ANTITHESIS, or *oppoſition.* Thoſe of the ſecond kind are EPANORTHOSIS, or *correction*; PARALEPSIS, or *omiſſion*; PARRHESIA, or *reprehenſion*; APARITHMESIS, or *enumeration*; EXERGASIA, or *expoſition*; HYPOTYPOSIS, or *imagery*; APORIA, or DOUBTING; APOSIOPESIS, or *concealment*; *eroteſis*, or INTERROGATION; *ecphoneſis*, or EXCLAMATION; EPIPHONEMA, or *acclamation*; APOSTROPHE, or *addreſs*; PROSOPOPEIA, or *the fiction of a perſon.*

Of Figures *of words*, ſome are tropes, i. e. tranſlations of words from their proper ſignification, to ſome more remote and extraordinary one. See Tropes.

Others are *figures of words*, more properly ſo called, and not tropes; being ſo inherent in the words, that upon changing of the words, or ſometimes only their ſituation, the *figure* is deſtroyed: as in *amantes ſunt amentes*, where the *figure* would be loſt, if inſtead of *amentes* you ſhould put *ſtulti.*

Thus alſo, *to loſe all reliſh of life*, is *in effect to loſe life*; the *figure* is loſt by changing the order of the words; as, *to loſe all reliſh of life*, is *to loſe life in effect.*

The principal of theſe verbal *figures* may be arranged into three claſſes; ſuch as conſiſt in a deficiency of words, in a redundancy, or a repetition. To the firſt claſs belong the ELLIPSIS and ASYNDETON. Under the ſecond diviſion are comprehended the PLEONASMUS and POLYSYNDETON. The third kind of verbal *figures* include thoſe by which the ſame word in ſound, or ſenſe, is repeated; or one of a like ſound or ſignification, or both. Of the firſt ſort in this ſubdiviſion there are ten, called ANTANACLASIS, PLOCE, EPIZEUXIS, CLIMAX, ANAPHORA, EPISTROPHE, SYMPLOCE, EPANALEPSIS, ANADIPLOSIS, and EPANODOS. To the ſecond claſs belong the PARONOMASIA, the HOMOIOPTOTON, the SYNONYMIA, and DERIVATIO; the two firſt of which reſpect words that are ſimilar in ſound only, the third in ſenſe, and the laſt in both. With regard to the proper uſe of *figures*, we may obſerve, that they ſhould always be accommodated to the ſentiments, and riſe in proportion to the images deſigned to be conveyed by them; it is alſo better, in general, to be nervous than copious, that the images, by their cloſer union, may impreſs the mind with greater energy, though in ſuch *figures* as are deſigned for ornament or illuſtration, a more diffuſive way of painting is ſometimes agreeable. The too frequent uſe of *figures* ſhould be avoided; and they ſhould be ſo interwoven in a diſcourſe as not to render the ſtyle rough and uneven, ſometimes high and at other times low; now dry and jejune, then pompous and florid. In every caſe they ſhould ſeem to ariſe more from nature than *art*, to offer themſelves rather than to be the effect of ſtudy. Ward's Orat. Lect. 30, 31, 32, 33, 34.

Of theſe the principal are, repetition, converſion, complexion, gradation, ſynonymy, polyſyndeton, and polyptoton, reticency, disjunction, ſimilitude, paronomaſy, and tranſition. See each *figure* under its proper article, as Metaphor, &c.

To Figures *of proſody* belong the SYNALOEPHA, ECTHLIPSIS, CRASIS, SYNÆRESIS, DIÆRESIS, SYSTOLE, and DIASTOLE.

Figure is uſed, in *Theology*, for the myſteries repreſented or delivered obſcurely to us under certain types or actions in the Old Teſtament.

Thus manna is held a *figure* or type of the euchariſt; and the death of Abel a *figure* of the ſuffering of Chriſt. Many divines and critics contend, that all the actions, hiſtories, ceremonies, &c. of the Old Teſtament, are only *figures*, types, and prophecies, of what was to happen under the New. The Jews are ſuppoſed to have had the *figures* or ſhadows, and we the ſubſtance.

Figure is alſo applied in a like ſenſe to profane matters; as the emblems, enigmas, fables, ſymbols, and hieroglyphics, of the ancients.

FIGURED, in *Heraldry*, is an epithet applied to thoſe bearings which are depicted with a human face.

FIGURED, in the *Manufactures*. A *figured* CAMLET, ſtuff, tabby, &c. is that whereon there are divers deſigns of flowers, figures, branches, &c. impreſſed by means of hot irons.

FIGURED *ribbands* firſt came into faſhion about the year 1680. The method of performance was by ſucceſſively applying ſteel plates engraven with divers ornaments, as flowers, birds, groteſques, &c.

But one Chandelier, a ribband-maker of Paris, invented a much better and readier way of doing it, by a machine not unlike the flatter uſed in coining to flatten the pieces of metal, only much ſimpler.

The principal parts thereof were two ſteel cylinders, engraven with the figures intended to be repreſented. Theſe cylinders were placed over each other like the rolls of a rolling-preſs, having each of them, at one of its extremes a little dented wheel, one of which catching into the other, the whole was put in motion by means of a winch or handle faſtened to the firſt.

The machine thus prepared, the workman heats the cylinders, and places the ribband in the little place remaining between the two, which he contracts yet farther by a ſcrew that preſſes the upper part down upon the lower; then turning the rolls by the handle, a whole piece of RIBBAND was *figured* in leſs time than a ſingle yard could be done in the ordinary way.

FIGURED *velvet*. See VELVET.

FILACEOUS, in *Botany*, a term applied to ſuch roots of plants as are full of filaments. See FILAMENT.

FILACIUM. See FILE.

FILAGO, in *Botany*. There are ſeveral ſpecies of this genus, ſome of which grow naturally on barren land in moſt parts of England. They are called by ſome cotton-weed; by others cud-weed, their leaves being white, and when broken, appearing to conſiſt of cottony threads. Moſt botaniſts have ranged them under the genus of *gnaphalium*. See CUDWEED. Linnæus makes the *filago* a diſtinct genus of the *ſyngeneſia polygamia neceſſaria* claſs, with a naked receptacle, no down, an imbricated calyx, and ſmall female flowers placed between the folds of the calyx.

FILAMENT, in *Medicine*, *Anatomy*, *Natural Hiſtory*, *&c.* a term uſed in the ſame ſenſe with FIBRE for thoſe fine threads whereof fleſh, nerves, ſkins, plants, roots, &c. are compoſed.

FILANDERS, in *Falconry*, a diſeaſe in hawks, &c. conſiſting of filaments or ſtrings of blood coagulated and dried, occaſioned by a violent rupture of ſome vein, by which the blood extravaſating, hardens into the figures above mentioned, to the great annoyance of the reins, hips, &c.

The word is French, *filandres*, formed from *fil*, *thread*.

FILANDERS are alſo a ſort of fine ſmall worms which greatly incommode the hawk in the gorge, and about the heart, liver, and lungs; but which, on ſome occaſions, are ſuppoſed to be of ſervice, and to feed on the ſuperfluities of certain parts. See BACK-*worm*.

There are four kinds of theſe *filanders* or *vermiculi*. The firſt, in the gorge or throat; the ſecond, in the belly; the third, in the reins; the fourth are called needles, on account of their exceeding fineneſs. The ſymptoms that diſcover the diſeaſe are the bird's gaping frequently, ſtraining the fiſt or perch with her pounces, croaking in the night, ruffling her train, rubbing her eyes, wings, noſtrils, &c. As the worms are very reſtleſs, the bird is frequently endeavouring to caſt them up; and in opening its mouth you will readily diſcover them. From the throat, &c. they will aſcend to the larynx, brain, &c. and finally over the whole body.

The ordinary cauſe is bad food. The proper remedy, they ſay, is not by killing them, for fear of impoſthumes from their corruption; but chiefly by ſtupefying them, that they may be offenſive but ſeldom.

This is beſt effected by making the bird ſwallow a clove of garlic, after which ſhe will feel nothing of the *filanders* for forty days. Others uſe rue, worm-ſeed, aloes, vervain, ſaffron, &c.

FILAWS, among the modern Ægyptians, villages inhabited by the original natives of the country.

FILAZER, FILACER, or FILIZER, an officer in the court of common pleas, ſo called becauſe he *files* the writs whereon he makes out proceſs.

Of theſe there are ſixteen in the ſeveral diviſions and counties of England. They make out all writs and proceſs upon original writs, iſſuing out of the chancery as well real as perſonal and mixed, returnable in that court. In actions merely perſonal, where the defendants are returned ſummoned, they make out pones or attachments, which, being returned and executed, if the defendant appears not, they make out a diſtringas, and ſo *ad infinitum*, or till he does appear.

If he be returned *nihil*, then proceſs of capias infinite if the plaintiff will; or after the third capias the plaintiff may proceed to outlawry in the county where his original is grounded, and may have an exigent with proclamation.

The *filazers* likewiſe make out all writs of view in real actions where the view is prayed; and upon replevins and recordaris, writs of retorno habendo, ſecond deliverance, and writ of withernam. In real actions they make out writs of grand and petite cape before appearance.

They enter all appearances and ſpecial bails upon any proceſs made by them. They make the firſt ſcire facias upon ſpecial bails, writs of habeas corpus, diſtringas nuper vicecomitem vel balivum, and duces tecum; and all ſuperſedeaſes upon ſpecial bail or appearance, &c. writs of habeas corpus cum cauſa upon the ſheriff's return that the defendant is detained with other actions, and writs of adjournment of a term, in caſe of peſtilence, war, or public diſturbance.

Till an order of court made 14 Jac. I. which limited the *filazers* to all matters and proceedings before appearance, and the prothonotaries to all after, they alſo entered declarations, imparlances, judgments, and pleas, whereto a ſerjeant's hand was not requiſite, and made out writs of execution and divers other judicial writs after appearance.

FILBERDS, or FILBUDS, the beſt ſort of ſmall nuts, proper for planting in orchards or gardens.

They are raiſed from nuts ſet in the earth, or ſuckers from the roots of an old tree, or they may be grafted on the common HAZLE-*nut*.

They delight in a fine, mellow, light ground, but will grow almoſt any where, eſpecially if defended from violent and cold winds.

The tree is eaſily propagated, bears well, and is of two ſorts, the *white* and the *red*, but the former is the beſt.

FILE, an inſtrument of ſteel, cut in little hatches or furrows, uſed by the workman in metals, to ſmooth, poliſh, and otherwiſe faſhion the ſame.

The word is French, *file*, literally ſignifying a long ſeries or ſucceſſion of any kind of things, of *fil*, *thread*.

Files bear a near reſemblance to raſps: the only difference between them is, that the former are cut with edged tools, and the latter are punched with pointed ones. See RASP.

The *file* is a principal inſtrument in all the kinds and parts of ſmithery. It ſhould be forged of the beſt ſteel; after which, rubbing it with greaſe, to make it more ſoft under the chiſſel, they cut it with chiſſels and a mallet this and that way, and of this or that depth, according to the grain or tooth required.

After cutting the *file*, it remains to be tempered; which, being the principal myſtery in the making of *files*, will deſerve to be particularly deſcribed.

Files, then, are tempered with a compoſition of chimney-ſoot, very dry and hard, diluted and worked up with urine and vinegar, to which is added common ſalt: the whole is to be reduced to the conſiſtence of muſtard.

The *files* being cut, and rubbed over with vinegar and ſalt to ſcour off the greaſe laid on for the cutting, they cover them over with this compoſition; and having laid ſeveral of them together in a packet, and covered them in loam, they put them in a charcoal fire; from which they are taken out again by that time they have acquired a cherry-colour, which is known by a little red rod of the ſame ſteel put in along with them. Upon taking them out, they caſt them into the coldeſt ſpring water they can get.

Iron *files* require a more intenſe heat than ſteel ones. When the *files* are cold, they clean them with charcoal, a rag, &c. to take away any of the ſoot or fæces left in the cuttings; then, drying them before the fire, they put them up carefully in a box of wheat bran, to keep them from ruſting.

Files are of different forms, according to the different uſes and occaſions they are made for. Thoſe in common uſe are the ſquare, flat, triangular, half-round, round, thin *file*, &c. all which are made of different ſizes, as well as different cuts and degrees of fineneſs, to take place according as the work is more or leſs advanced; ſome cutting faſter, as the *rough-toothed file*, &c. others more ſlowly, as the *fine-toothed file*, &c.

FILE is alſo a thread or wire whereon writs or other exhibits in courts or offices are faſtened or filed, for the more ſafe keeping and ready turning to the ſame.

A *file* is a record of the court, and the filing of the proceſs of a court makes a record of it.

FILE, or *label*, in *Heraldry*, a bearing repreſented in *Tab. Herald. fig.* 23. though ſometimes of more, and ſometimes of fewer points, being the difference or diſtinction of the eldeſt ſon.

It is ſometimes alſo born as a charge in a coat-armour, of which Guillim gives many inſtances; but it is oftener the difference or mark of diſtinction which the elder brother bears in his coat during his father's life.

Some diſtinguiſh *file* and *label*, calling the *file* the upper horizontal line, and the *label* the points which iſſue from it.

FILE *of three*, or more, *labels*. See LABEL.

FILE, in a *Military Senſe*, is a row of men ſtanding one behind or below another from front to rear.

Or, *file* is a line or ſeries of ſoldiers, placed one before another, and thus compoſing the DEPTH of a battalion or ſquadron. The *files* which bind the right and left are called the flanks.

They ſay, *cloſe the files*; that is, bring the men nearer each other. *Double the files*; that is, double the depth of the battalion, and diminiſh its breadth or front by one half. The laſt or hindermoſt perſon is ſaid *to bring up the file*. To *file off*, is to wheel off from marching in a ſpacious front, and to march in length by *files*.

FILE-*leaders* are the foremoſt men in each *file*.

FILE-*leaders, half*, are the men of the fourth rank; the fourth, fifth, and ſixth ranks being called the *rear half-files*, as the firſt, ſecond, and third are the *front half-files*.

FILIAL, ſomething belonging to the relation of a ſon.

The divines uſually diſtinguiſh between a ſervile and a *filial* fear. The moſt abandoned may have a ſervile fear of God, ſuch as that of a ſlave to his maſter; but not a *filial* fear, i. e. a fear reſulting from love and reſpect.

FILICULA, in *Botany*. See *Dwarf* FERN.

FILIGRANE, or FILLIGREE, *work*, a kind of enrichment on gold or ſilver, wrought delicately, in manner of little threads or grains, or both intermixed.

The word is compounded of *fil* or *filum*, *thread*, and *granum*, *grain*.

In Latin it is called *filatim elaboratum opus*, *argentum*, *aurum*.

We have vaſes, &c. of *filligree* work.

FILING, one of the principal operations in ſmithery, &c. ſucceeding to forging.

The coarſer cut files are always to be ſucceeded by finer; and in all the kinds the rule is to lean heavy on the file in thruſting it forward, becauſe the teeth of the file are made to cut forwards; but in drawing the file back again for a ſecond ſtroke, it is to be lightly lifted juſt above the work, becauſe it cuts not coming back.

The rough or coarſe-toothed file (which, when large, is called a rubber) ſerves to take off the unevenneſſes of the work left by the hammer in forging.

The baſtard-toothed file is to take out the too deep cuts and file-ſtrokes made by the rough file; the fine-toothed file takes out the cuts or file-ſtrokes the baſtard file made; and laſtly, the ſmooth file thoſe left by the fine file.

In this order the files of ſeveral cuts are to ſucceed each other till the work is as ſmooth as it can be filed; after which it may be made yet ſmoother with emery, tripoli, &c. See POLISHING.

FILIPENDULA, in *Botany*. See DROPWORT and SPIRÆA.

FILIUS *ante patrem*, q. d. the ſon before the father, a denomination applied by botaniſts and floriſts to plants whoſe flowers come out before their leaves. Such are the ſeveral ſpecies of colchicum or meadow-ſaffron, the colt's-foot, butterbur, &c.

FILIX, in *Botany*. See FERN.

To FILL, in the *Sea-language*, is to brace the ſails in ſuch a manner, that the wind, entering their cavities from behind, dilates them, ſo as to advance the ſhip in her courſe, after the ſails had been for ſome time ſhivering or braced back.

FILLAR, or THILLER, *Horſe*. See THILLER.

FILLET, in *Anatomy*. See FRÆNUM.

The word is French, *filet*, formed of *fil*, *thread*.

FILLET, or FILET, in *Architecture*, denotes a little ſquare member or ornament uſed in divers places and on divers occaſions, but generally as a ſort of corona over a greater moulding. See *Tab. Archit. fig.* 25. N°. 1.

The *fillet* is the ſame with what the French call *reglet*, *bande*, and *bandelette*; the Italians, *liſta*, or *liſtella*.

FILLET, in *Botany*. See THREAD.

FILLET, *teniola*, in *Heraldry*, a kind of orle or bordure, containing only a third or fourth part of the breadth of the common BORDURE.

It is ſuppoſed to be withdrawn inwards, and is of a different colour from the field. It runs quite round, near the edge, as a lace over a cloak.

FILLET is alſo uſed for an ordinary drawn like the bar from the ſiniſter point of the chief acroſs the ſhield, in manner of a ſcarf; though it is ſometimes alſo ſeen in the ſituation of a bend, feſſe, croſs, &c.

According to Guillim, the *fillet* is a fourth part of the chief, and is placed in the chief point of the eſcutcheon.

FILLET is alſo uſed among *Painters*, *Gilders*, &c. for a little rule or reglet of leaf-gold, drawn over certain mouldings; or on the edges of frames, pannels, &c. eſpecially when painted white, by way of enrichment.

FILLETS, in the *Manege*, are the loins of a horſe, which begin at the place where the hinder-part of the ſaddle reſts.

FILLY, a term among *Horſe-dealers*, to denote the female or mare colt. See FOAL.

FILM, a thick ſkin or pellicle.

In plants it is often uſed for that thin woody ſkin which ſeparates the ſeeds in the pods, and keeps them apart.

FILM, *white*, on *the eye of a horſe*, may be removed by lifting up the eye-lid, after the eye has been waſhed with wine, and ſtroking it gently with the thumb with wheat-flour: common ſalt and ſalt of lead, beaten fine, and put into the eye, is proper to conſume a *film*; or the horſe's eye may be waſhed with the ſpittle in the morning, faſting, having firſt put a little ſalt into your mouth; but there is nothing ſo effectual as ſal armoniac, beaten and put into the eye, and repeated every day till the *film* is gone.

FILTER, or FILTRE, in *Chemiſtry*, &c. a piece of woollen cloth, linen, paper, or other matter, ſome of which are in the form of hollow inverted cones, uſed to filtrate or ſtrain liquors through.

The *filtre* has the ſame uſe and effect with regard to liquids that the ſieve or ſearce has in dry matters.

Filtres are of two ſorts: the firſt are ſimple pieces of paper or cloth, through which the liquor is paſſed without farther trouble.

The ſecond are twiſted up like a ſkain or wick, and firſt wetted, then ſqueezed, and one end put in the veſſel that contains the liquor to be filtrated; the other end is to be out, and hang down below the ſurface of the liquor; by means hereof the pureſt part of the liquor diſtils drop by drop out of the veſſel, leaving the coarſer part behind.

This *filter* or *philter* acts as a ſiphon.

FILTER is alſo a charm, ſuppoſed to have a virtue of inſpiring love.

The word is derived from φιλτρον, which ſignifies the ſame thing, of φιλεω, *amo*, *I love*.

The Greeks, when their love was without ſucceſs, had ſeveral arts to procure the affections of their beloved. The Theſſalian women were famous for their ſkill in this, as well as other magical practices. The means whereby it was effected were of divers ſorts; it was ſometimes done by potions called φιλτρα, which are frequently mentioned in authors of both languages. Juvenal ſpeaks thus:

> *Hic magicus affert cantus, hic Theſſala vendit*
> Philtra, *quibus valeant mentem vexare mariti.*

Their operations are violent and dangerous, and commonly deprived ſuch as drank them of their reaſon. Plutarch and Cornelius Nepos report, that Lucullus the Roman general firſt loſt his reaſon, and afterwards his life by one of them. Lucretius the poet ended his life by the ſame way; and Caius Caligula, as Suetonius reports, was driven into a fit of madneſs by a *philtre* given him by his wife Cæſonia, which ſtory is mentioned by the ſame poet. Ovid likewiſe aſſures us, that this was the uſual effect of ſuch potions.

The ingredients they were made of were of divers ſorts, ſeveral of which applied by themſelves were thought effectual.

FILTRATION, the act of paſſing any liquor through a filtre, called alſo *colature*, *percolation*, and *tranſcolation*. See FILTRE.

The end of *filtration* is of two kinds; the one to free fluids from any ſolid bodies of a feculent nature with which they are mixed; and the other to ſeparate any precipitated powder or other ſolid body from ſuperfluous fluid; and the means muſt be varied accordingly. Such liquors as are incorporated with particles that adhere to them are rendered capable of *filtration* by coagulating and collecting the heterogeneous parts. This is effected either by boiling or by mixing whites of eggs and boiling them with the turbid liquors. See CLARIFICATION.

The moſt commodious way of *filtrating* is by whited-brown paper faſtened over the mouth or aperture of a funnel; the ſmallneſs of the pores of this paper admits only the finer parts through, and keeps the reſt behind. There are alſo *filtrations* through ſand, pulverized glaſs, &c. Spirits of vitriol, ſalt, and nitre, are *filtrated* through a quantity of beaten glaſs in the bottom of a funnel. *Filtration* is alſo performed by a woollen or linen bag, called Hippocrates's ſleeve: the choice of theſe muſt be directed by the liquor to be *filtered*.

Dr. Papin contrived a method by which *filtrations* through cap-paper might be made ſuddenly, and with great quantities of liquor, by the help of the air-pump. For this purpoſe he made uſe of the following contrivance: A A (*Tab.* II. *Hydraulics*, &c. *fig.* 9.) is a glaſs receiver,

ceiver, BB a cover fitted to it, CCC is a pipe forming the communication between the receiver AA and the air-pump, DD a ſhallow veſſel full of little holes, EEE a pipe that makes the communication between the veſſel DD and the receiver AA, FF a veſſel to contain the liquor to be filtrated, and GG the plate of the pump. When this inſtrument is uſed, the ſhallow veſſel DD ought to be tied about firſt with linen cloth, and then with cap-paper, ſo that no liquor may get into the holes of the ſaid veſſel but through the cap-paper and linen cloth; this muſt be wholly placed within the liquor to be filtrated: let the air be extracted by means of the air-pump out of the veſſel AA. Then the liquor in the veſſel FF muſt be drawn through the cap-paper, and the linen cloth into the veſſel DD, and from thence through the pipe EEE into the veſſel AA; and this operation muſt be quick, on account of the great preſſure of the atmoſphere that drives the liquor; beſides, the ſediment of the liquor ſubſiding at the bottom of the veſſel FF will not be ſo apt to ſtop the pores of the cap-paper as in ordinary *filtrations*. Birch's Hiſt. of the Royal Society, vol. iv. p. 366, &c.

The ſecretion of the divers juices in the body from the maſs of blood ſeem to be little elſe but *filtration*. Pitcairn, and other late authors, hold, that the diverſity of *filtration* does not depend on the different configurations of pores, but on their different ſizes or diameters.

Springs, alſo, ſeem to be raiſed from the ocean by the ſame principle of *filtration*.

FILTRATION, in *Pharmacy*, is chiefly concerned in tinctures; as when ſome portion is drawn from the ingredients or ſuſpended in the tincture which is not neceſſary thereunto, but diſturbs and renders the reſt unpleaſant both to the palate and ſight. Beſides this, there is a *filtration* which has much tortured the philoſophy of ſome ages to account for; this is that performed by the aſcent of the finer parts of a liquor up a cord or ſkain of cotton, or ſuch like matter, which is contrived to drop over another veſſel and leave the groſſer behind.

After the ſame manner it is, without doubt, that the humidity of the earth is drawn up into the ſubſtance of the roots of vegetables, which we know conſiſts of long and very minute fibres, ſo diſpoſed as to form a great number of tubular interſtices; theſe act in the nature of this ſort of *filtre*, and attract the juices and moiſture appointed for the nutriment and increaſe of the plant.

Some ſay, that the cauſe of this aſcent is becauſe the liquor ſwells thoſe parts of the filter that touch it, by entering into the pores of the threads which compoſe it, whereby they riſe up, touch, and wet thoſe next above them; and theſe again the next threads; and ſo on to the brim of the veſſel, when the liquor runs over, and deſcends in the other part of the filter which hangs down by its own natural gravity.

But this account is liable to many objections, eſpecially as liquors riſe after the like manner in glaſs tubes much above the ſurface of the liquor they are immerſed in, where the glaſs cannot be imagined thus to ſwell.

Others account for it, by conſidering every filter as compoſed of a great number of long, ſmall, ſolid bodies, which lie very cloſe together; ſo that the air getting in between them loſes much of its preſſure, and cannot gravitate ſo ſtrongly as it doth on the fluid without them; the conſequence is, that the parts of the water between the threads of the filter muſt be preſſed upwards, and aſcend till they come ſo high, as, by their weight, to counter-balance the general preſſure on the other parts of the ſurface of the water.

Laſtly, the retainers to Sir Iſaac Newton's philoſophy deduce the phenomenon from the principle of attraction. According to them, the cauſe of this *filtration* is, doubtleſs, the ſame with that whereby fluids aſcend up heaps of aſhes, ſand, &c. the ſame with that whereby water is raiſed in form of vapour, the ſap riſes in vegetables, and the blood circulates through the capillary arteries, and the extremely minute glandular ſtrainers. See ASCENT *of fluids*.

FILTRUM, in *Natural Hiſtory*, the name of a ſtone much in uſe in the eaſtern parts of the world, and ſometimes with us for the filtrating water intended for drinking. The Japoneſe are extremely fond of this ſtone, and impute their uninterrupted health, and particularly, their being always free from the ſtone and gravel to their drinking the water thus cleared of all its heterogeneous and miſchievous particles. The people of this, and many other places thereabouts, have a ſettled opinion, that moſt diſeaſes ariſe from impurities of water, and are well aſſured, that theſe impurities are all lodged in the ſtone-filtre, and left behind by the water in its paſſage. The manner of uſing the ſtone is this; they form a ſort of mortars with very thick bottoms out of the largeſt pieces of it, and the water is poured into theſe, and the ſtone being of a very lax and ſpungy texture, it ſoon makes its way through, and is received into a veſſel placed underneath for that purpoſe. It being found, therefore, an eaſy thing for us to have our water filtered in the ſame manner that the Japoneſe have, it remains to try whether it will have all thoſe ſalutary effects which the people of that part of the world give it; and this ſeems not to be imagined from reaſon and analogy. We very well know that water is frequently impregnated with ſaline particles, and that it alſo frequently diſſolves by this means earthy and other matters which it otherwiſe could not do. But we alſo know, that ſalts diſſolved in water are not to be ſeparated by filtration; and it is equally certain, that earthy, ſparry, or other matter, that is ſuſpended in water when clear, will in like manner paſs through the filter with it.

Upon the whole, we are happy enough to have no occaſion for filtering ſtones, ſince our ſprings and rivers afford us water already pure enough to our hands; and in places where this is not the caſe, it is always poſſible to ſave rain-water, which will keep a long time with proper management, and is much purer than all the art in the world can make ſuch as has once been foul. Valentini Muſæum Muſæorum, lib. i. cap. 22.

The only inſtance in which a filtering-ſtone can be of real uſe, is, when there is no water to be had but that of ſome muddy river; in this caſe, the mud being a foreign body not diſſolved in, but only floating among the water, it will be left behind in its paſſing the cloſe ſtructure in the filtre; but this is always to be as well obtained by letting it ſtand a while to ſubſide. Ephem. Germ. Cent. iii. p. 76.

FILUM *Aquæ*, the thread or middle of the ſtream where a river parts two lordſhips: *Et habebunt iſtas buttas, uſque ad* filum aquæ *prædictæ. File du mer, the high tide of the ſea.* Rot. Parl. 11 Hen. IV.

FIMBRIÆ, *Fringes.* The extremities or borders of the tubæ Fallopianæ were formerly thus called, the word ſignifying a *fringed border,* which that part reſembles. See *Tab. Anat. (Splanch.) fig. 9. lit. d d.*

FIMBRIATED, a term in *Heraldry*, ſignifying that an ordinary is edged round with another of a different colour.

Thus, he beareth or, a croſs-pattee gules, *fimbriated* ſable.

FIN, *Pinna*, in *Natural Hiſtory*, the name of that part of a fiſh which diſtinguiſhes it from other aquatic creatures, no animal but a fiſh having *fins* and wanting legs.

The *fin* is properly a part ſtanding out or hanging from the body of the fiſh, and conſiſting of a membrane ſupported by ſeveral rays or oblong bones, which are in ſome hard and firm, and in others cartilaginous.

This definition of a *fin* properly excludes all thoſe other parts of a fiſh which may be prominent from the body, and may be of a membranaceous ſtructure, and even bear the appearance of a *fin*, though they have none of the rays or little bony ſubſtances within them, and therefore cannot ſerve the creature in the office of *fins* in ſwimming; for the cartilages or bones which ſupport the membranes of the *fins* are what give them their due and neceſſary ſtrength and firmneſs to bear againſt the water for the motion of the body of the fiſh; thoſe other membranaceous appendages to the bodies of fiſhes cannot do this; for wanting the ſupport of theſe rays, the ſimple and ſoft membrane has no more power of moving the water than the water has of moving it. Hence appears the uſe of the bones or rays ſupporting the *fins*, and the truth of the definition, that nothing is properly a *fin* which wants them.

The *fins*, by their differences, make very obvious diſtinctions among the ſeveral ſpecies of fiſh; and theſe differences are in regard to number, ſituation, figure, and proportion.

The number of the *fins*, including the tail, is very different in different fiſh. 1. In ſome there is only one *fin* to the whole fiſh: this is the caſe in the ophidium lumbriciforme, and in the muræna. 2. The *fins* are two in number in others, as in the petromyzæ, and the like. 3. There are many which have three *fins*, as the conger, the eel, the common ophidium, the Greenland whale, the ſea-cow, and the like. 4. Many have four *fins*; of the number of which are the dolphin, the phocæna, and the ſecond kind of the acus Ariſtotelis. 5. Several have five *fins*, as the ammodytes or ſand-eel, the ſword-fiſh, the lupus marinus, the mola or ſun-fiſh, and many others. 6. The lump-fiſh gives us an inſtance of ſix *fins*; for the ſeeming firſt *fin* on the back of that fiſh is not a real *fin*, but only a cutaneous prominence. 7. Many fiſh have ſeven *fins*, as the gudgeon, the pleuronectes, the cyprinus, the clupea, the coregones, the oſmeri, the ſalmons, the cobites, the eſoces, the cernua fluviatilis, the gaſteroſteæ, the ſpari, the labri, the ſilurus,

rus, the mugil alatus, the remora, the capriſcus, the hippurus, the pompilus, and the accipenſer. 8. Many fiſh alſo have eight *fins* each; of this number are ſome of the pearches, the clarea, the cottus, the mugil, the labrax, the ſudis, the mulli, the ling, the trachurus, the ſcyæne, the trachinus, the uranoſcope, and that little fiſh called the anguella by the Venetians. 9. The ſcorpæna of Rondeletius gives us an inſtance of the *fins* being nine in number; and finally, the ſcombri and thynni give us inſtances of eleven *fins* in the ſame fiſh.

The differences in ſituation are leſs numerous than theſe as to number, but they are not leſs obvious and eſſential. 1. They are generally placed both on the back and belly, as we ſee in moſt of the ſpecies of fiſhes. 2. They are ſometimes placed only on the back: this is the caſe in the petromyzæ, the acus lumbriciformis, and ſome others. 3. Some have them, on the contrary, only on the belly; of this kind are the Greenland whale, the ſea-cow, and the like: and to this it is to be added, that the back and belly *fins* differ greatly in the ſeveral fiſh, in their being placed more or leſs backward or forward.

The differences of ſhape or figure in the *fins* of fiſhes are alſo very obvious. 1. They are in ſome nearly triangular, as in the cyprini, and ſalmons, &c. 2. Some few fiſh have them round. And 3. Some have them of an oblong ſquare or parallellogram figure.

Finally, the difference in proportion is not to be omitted, for they are in ſome much ſhorter and ſmaller than the body, as is the caſe in the generality of fiſh; but in others they are of an equal length with the body. Of this kind are the pectoral *fins* in ſome of the legyræ, and the ventral *fins* in the mugil alatus of Rondeletius and other authors. Artedi, Ichthyol. p. 4.

FIN-*fiſh*, the *balena phyſalis* of Linnæus, is a ſpecies of WHALE, diſtinguiſhed from the common whale by a *fin* on the back, placed very low and near the tail.

The office of the *fins* has commonly been ſuppoſed to be analogous to that of feathers in fowls, and to aſſiſt the fiſh in its progreſſive motion or ſwimming; but the latter naturaliſts find this a miſtake.

It is the tail that is the greateſt inſtrument of ſwimming; the *fins* only ſerve to keep the fiſh upright, and prevent vacillation or wavering. See SWIMMING *of fiſh*.

FINS, *whale*, are commonly taken for that part of the whale which the populace call WHALE-*bone*; but whence the miſtake ſhould ariſe is not eaſy to determine.

Theſe *whale-fins*, as ſome have erroneouſly called them, are the moſt valuable part of the animal. See *Whale* FISHERY and WHALE-*bone*.

FINAL, that which terminates or comes laſt in any thing, as a *final* judgment, *final* ſentence, &c.

FINAL *cauſe*, is the end for which the thing is done. The *final cauſe* is the firſt thing in the intention of a perſon who does a thing; and the laſt, in the execution. See CAUSE.

FINAL *letters* are thoſe which cloſe words.

The Hebrews have five *final* letters, which, when at the end of a word have a different figure from what they have at the beginning or in the middle thereof. Theſe are the ך, ם, ן, ף, ץ, *caph*, *mem*, *nun*, *pe*, *tſdae*, which every where but at the end of words, are wrote כ, מ, נ, פ, צ.

FINANCES, in the *French Polity*, denote the revenues of the king and ſtate; much the ſame with the treaſury or exchequer of the Engliſh, and the fiſcus of the Romans. The word is derived from the German, *finantz*, *ſcraping*, *uſury*; though Du-Cange chooſes rather to deduce it from the barbarous Latin, *financia*, *præſtatio pecuniaria*.

FINANCES, *council of the*, correſponds to our lords commiſſioners of the treaſury; the comptroller general of the *finances*, to our lord high treaſurer, &c.

The French have a peculiar kind of figures or numeral characters, which they call *chiffre de finance*. See CHARACTER.

FINANCES, *Britiſh*. See FUND.

FINCH, in *Ornithology*. See FRINGILLA.

FINDERS, in our *Old Statutes*, are ſuppoſed to be the ſame with thoſe we now call ſearchers, who are employed for the diſcovery of goods imported or exported without paying cuſtom. Stat. 18 Ed. III. 14 Ric. II. 17 Ric. II. &c.

FINDER, among *Sportſmen*. See *Water*-DOG.

FINDING *of a bill of indictment*, in *Law*. See INDICTMENT.

FINE, that which is pure, and without mixture. The term is particularly uſed in ſpeaking of gold or ſilver. See GOLD and SILVER.

FINE, in *Law*, denotes a covenant made before juſtices, and entered on record, for conveyance of lands, tenements, or any thing inheritable, being *in eſſe tempore finis*, in order to cut off all future controverſies.

A *fine*, then, appears to be a concord, acknowledged and recorded before a competent judge, touching ſome hereditament or thing immoveable that was in controverſy between the parties to the ſame concord; and for the better credit of the tranſaction, it is ſuppoſed to be made in the preſence of the king, becauſe levied in his court.

Hence it binds women covert, being parties, and others whom ordinarily the law diſables to tranſact, only for this reaſon, that all preſumption of deceit or evil-meaning is excluded where the king and his court of juſtice are ſuppoſed to be privy to the act.

Originally this *final* concord was inſtituted and allowed, in regard that by the law and ancient courſe of proceedings, no plaintiff could agree or end the cauſe without licence of the court: ſo that *fines* have been anciently levied in perſonal actions, and for no greater a ſum of money than 11*l*.

But time has produced other uſes of *fines*, viz. to cut off entails, bar dowers, and with more certainty to paſs the intereſt or title of any land or tenement, though not controverted, to whom we think good, either for years or in fee; inſomuch, that the paſſing a fine in moſt caſes now is but a *fictitio juris*, ſuppoſing an action or controverſy, where, in truth, none is, and ſo not only operating as a preſent bar and concluſion againſt the cognizor or perſon who paſſes the *fine*, and his heirs; but at five years end, againſt all others, not expreſsly excepted, and not claiming (if it be levied upon good conſideration, and without covin); as women covert, perſons under twenty-one years, priſoners, or ſuch as are out of the realm at the time of its acknowleging; and perſons *non ſanæ memoriæ*, who are allowed the ſame time after their malady is removed.

To this purpoſe a *fine* after the engroſſing muſt be openly read and proclaimed in the court of common pleas, once in the term when they were engroſſed, and once in each of the three ſucceeding terms, and a tranſcript of it ſent to the juſtices of aſſize, and another to the juſtices of the peace of the county where the land lies, to be proclaimed there. The day and year of acknowleging a *fine* and warrant of attorney for ſuffering a recovery are to be certified with the concord; and an office hath been appointed for the inrollment of writs for *fines*; and the chirographer, on the firſt day of every term, is to fix in the court of C. B. or common pleas, a table containing the *fines* paſſed in the term before in every county, by ſtat. Eliz. cap. 3.

Every *fine* hath in it five eſſential parts: 1. An original writ, uſually a writ of covenant. 2. The king's licence, giving the parties liberty to accord; for which he hath a *fine* called the *king's ſilver*, being accounted part of the crown revenue. 3. The concord itſelf, which begins thus, *Et eſt concordia talis*, &c. 4. The note or abſtract of the *fine*, beginning thus, K. *inter* R. *querentem*, *&* S. *&* T. *uxorem ejus deforcientes*, &c. (where inſtead of *deforcientes*, anciently *impedientes* was uſed). 5. The foot of the *fine* (*Hæc eſt finalis concordia facta in curia domini regis apud Weſt. a die Paſchæ in quindecim dies*, *anno*, &c.) concludes all, containing the day, year, and place, and before what juſtice the concord was made.

Fines are either with proclamations, called *fines* according to the ſtatutes, which are the beſt ſort, and moſt uſed; or without proclamations, called *fines* at the common law.

Fines are either *ſingle* or *double*.

FINE, *ſingle*, is that by which nothing is granted or rendered back again by the cogniſees to the cogniſors, or any of them.

FINE, *double*, contains a grant and render-back, either of ſome rent, common, or other thing out of the land, or of the land itſelf, to all or ſome of the cogniſors for ſome eſtate, limiting thereby remainders to ſtrangers not named in the writ of covenant.

In this kind of *fine* called *ſur* DONE, grant and render, both the *fines ſur cognizance*, &c. and *ſur conceſſit*, are formed into one; and it is partly executed and partly executory.

Sometimes alſo a *double fine* is when the lands lie in ſeveral counties.

Fines, with regard to their effect, are divided into *executed* and *executory*.

FINE *executed*, is ſuch as of its own force gives a preſent poſſeſſion (at leaſt in law) to a cogniſee; ſo that he needs no writ of *habere facias ſeiſinam* for execution of the ſame; of which ſort is a *fine ſur cogniſance de droit come ceo*, &c. that is, upon acknowlegement, that the thing mentioned in the concord is *jus ipſius cogniſati, ut illa quæ idem habet de dono cognitoris.* Weſt. § 51. K.

The reaſon is, becauſe this *fine* paſſeth by way of releaſe of a thing which the cogniſee hath already (at leaſt by ſuppoſition) by virtue of a former gift to the cogniſor, which is, in truth, the ſureſt *fine* of all.

FINES *executory*, are ſuch as of their own force do not execute or give the poſſeſſion to the cogniſee without entry or action, but require a writ of *habere facias ſeiſinam*; as a *fine ſur cogniſance de droit tantum*, unleſs the party be in poſſeſſion of the lands. This kind of *fine* is commonly made uſe of to paſs a reverſion. There is alſo another executory *fine*, called *ſur conceſſit*, which is uſed to grant away eſtate for life or years, when the cogniſor is ſeiſed of the lands contained therein, and the cogniſor hath no freehold in it, but it paſſeth by the *fine*.

Fines in England are now levied in the court of common pleas at Weſtminſter, in regard to the ſolemnity thereof, ordained by the ſtatute of 18 Ed. I. ſtat. 4. before which time they were ſometimes levied in the county-court, court barons, and in the exchequer, as may be ſeen in Origines Juridiciales, &c.

Fines, are alſo taken by commiſſioners in the country, impowered by *dedimus poteſtatem*. 15 Ed. II. ſtat. *de fin.* Though by the common law all *fines* were levied in the court. *Fines* levied before the juſtices in Wales, or in the counties palatinate of Cheſter, Durham, &c. have the ſame effect as thoſe that are levied before the juſtices of C. B. Plowden ſays, that there were *fines* levied before the Conqueſt: Fulbeck aſſures us alſo, that he has ſeen the exemplification of one of Henry the Firſt's time; though Dugdale affirms, there were none till Henry the Second.

Fine *adnullando levato de tenemento quod fuit de antiquo dominico*, a writ directed to the juſtices of C. B. for diſannulling a *fine* levied of lands in ancient demeſne to the prejudice of the lord. Reg. Orig. 15.

Fines *for alienation*, are reaſonable *fines* formerly paid to the king by his tenants in chief, for licence to alienate their lands; according to the ſtatute 1 Edw. III. cap. 12. but taken away by ſtatute 12 Car. II. cap. 24.

Fine *capiendo pro terris*, &c. a writ lying where a perſon upon conviction of any offence by jury hath his land and goods taken into the king's hands, and his body is committed to priſon, to be remitted his impriſonment, and have his lands and goods re-delivered him on obtaining favour for a ſum of money. Reg. Orig. 142.

Fine, *force*, is an expreſſion in ſtat. 35 Hen. VIII. cap. 12. denoting that a perſon is *forced* to do that which he can in no way avoid.

Fine *levando de tenementis tentis de rege in capite*, &c. a writ directed to the juſtices of the common pleas to admit of a *fine* for the ſale of land holden of the king *in capite*. Reg. Orig. 167.

Fine *non capiendo pro pulchre placitando*, a writ to inhibit officers of courts to take *fines* for fair pleading. Reg. Orig. 179.

Fine *pro rediſſeiſina capienda*, &c. a writ lying for the releaſe of one impriſoned for a rediſſeiſin, on payment of a reaſonable fine. Reg. Orig. 222.

Fines *le roy*, in *Law*, are all *fines* to the king. Under this head are included *fines* for original writs. Thus, for every writ of plea of land, if it be not of right patent, which is for the yearly value of five marks, and for all original writs in debt and treſpaſs where the debt or damage is 40*l.* a *fine* is due to the king of 6*s.* 8*d.* and more proportionably when the writ is for greater value.

Fine alſo, according to Cowel, ſignifies a ſum of money paid as an income for lands or tenements let by leaſe, anciently called *gerſuma*.

Fine is alſo uſed to denote an amends, pecuniary puniſhment, or recompence, for an offence committed againſt the king and his laws, or againſt the lord of a manor.

In which caſe a man is ſaid, *facere* finem *de tranſgreſſione cum rege*, &c.

In all the diverſities of the uſe of the word *fine*, it hath but one ſignification; and that is, a *final* concluſion, or end of differences between parties. In the laſt ſenſe, where it denotes the ending and remiſſion of an offence, it is uſed by Bracton, who ſpeaks of a *common fine* that the country pays to the king for falſe judgments or other treſpaſſes, which is to be aſſeſſed by the juſtices in eyre before their departure, by the oaths of knights and other good men, upon ſuch as ought to pay it.

There is alſo a *common fine* in courts leet.

Fine-*drawing*, or *rentering*, a very nice way of ſewing up or rejoining the parts of any cloth, ſtuff, or the like, torn or rent in the dreſſing, wearing, &c.

It is prohibited to *fine-draw* pieces of foreign manufacture upon thoſe of our own, as has formerly been practiſed.

Fine-*ſtiller*, in the *Diſtillery*. That branch of the art which is employed on the diſtilling the ſpirit from treacle or other preparations or recrements of ſugar, is called *fine-ſtilling*, by way of diſtinction from malt-ſtilling; and the perſon who exerciſes this part of the trade is called a *fine-ſtiller*.

The operation in procuring the ſpirit from ſugar is the ſame with that uſed in making the malt ſpirit; a waſh of the ſaccharine matter being made with water from treacle, &c. and fermented with yeaſt. It is uſual to add in this caſe, however, a conſiderable portion of malt, and ſometimes powdered jalap, to the fermenting backs. The malt accelerates the fermentation, and makes the ſpirit come out the cheaper, and the jalap prevents the riſe of any muſty head on the ſurface of the fermenting liquor, ſo as to leave a greater opportunity for the free acceſs of the air, and thus to ſhorten the work, by turning the foamy into a hiſſing fermentation. Shaw's Lect. p. 220.

FINERS *of gold and ſilver*, are thoſe who purify and part thoſe metals from other coarſer ones by fire and acids.

They are alſo called *parters* in our old law-books, and ſometimes *departers*.

FINERY, in the *Iron-works*, is one of the two forges at which they hammer the ſow or pig iron.

Into the *finery* they firſt put the pigs of iron, placing three or four of them together behind the fire, with a little of one end thruſt into it; where, ſoftening by degrees, they ſtir and work them with long bars of iron, and expoſe at different times different parts to the blaſt of the bellows, in order to refine it as equally as poſſible, till the metal runs together with a round maſs or lump, which they call a *half*-BLOOM. They then take this out, and give it a few ſtrokes with their ſledges; afterwards they carry it to a great heavy hammer, raiſed by the motion of a water-wheel; where, applying it dexterouſly to the blows, they preſently beat it out into a thick ſhort ſquare. This they put into the *finery* again, and heating it red-hot, they work it out under the ſame hammer till it comes to be in the ſhape of a bar in the middle, but with two ſquare knobs at the ends, which they call an ANCONY. It is then carried into the other forge, called the CHAFERY. Phil. Tranſ. Nº 137. or Abr. vol. ii. p. 559.

FINEERING. See VENEERING.

FINESSE, a French term, of late current in Engliſh. Literally, it is of no farther import than our Engliſh *fineneſs*; but among us it is chiefly uſed to denote that peculiar delicacy or ſubtlety perceived in works of the mind, and the niceſt and moſt ſecret and ſublime parts of any ſcience or art.

It is ſometimes uſed to expreſs that kind of ſubtilty made uſe of for the purpoſes of deception.

FINGERS, *Digiti*, the extreme part of the HAND, divided into five members.

The *fingers* conſiſt of fifteen bones, diſpoſed in three rows or ranks, each *finger* having three bones.

The joints or jointures are called *condyli* and *internodia*; and their arrangement or rows, *phalanges*; the uppermoſt of which is the longeſt and largeſt; the ſecond leſs, but yet longer and larger than the third.

The firſt *finger* is called the *pollex* or the THUMB; the ſecond, *index*, ſometimes *ſalutarius digitus*, and ſometimes *numerans*; the third, the middle *finger*, *infamis*, *obſcœnus*, *impudicus*, and *famoſus*, becauſe uſed in mocking and deriſion; the fourth, *annularis*, the ring *finger*, *medio proximus* and *medicus*, becauſe the ancients uſed to ſtir and mix their medicines therewith; the fifth, the little *finger*, *auricularis*, becauſe the ear is picked therewith.

Fingers, *bones of the*. The phalanges of the bones of the four *fingers* are all of nearly the ſame ſtructure, differing only in ſize. The firſt phalanges are made nearly in the ſame manner with the ſecond of the thumb, only that they are lower on their concave ſides, and more rounded at their convex ſides. They are alſo larger in proportion; and the edges of the flat ſides have the ſame rough line as the ſecond phalanx of the thumb. Their baſes are more hollow for their articulations with the metacarpal bones, and their heads are formed like pullies. The ſecond phalanges are ſhorter, narrower, and thinner than the firſt; both phalanges are gently incurvated, and reſemble each other in ſtructure, except that the ſecond contract by degrees from their baſes to the heads, which are very ſmall, and that their bones have a double cavity for their articulation by ginglymus, with the heads of the firſt phalanges. Their flat ſides have all the before mentioned rough lines. The third phalanges are in every thing like that of the thumb (which ſee) but that they are ſmaller, each of them being proportioned to the *fingers* they belong to. It is to be obſerved of all the phalanges, that their baſes have ſmall tuberoſities; and their heads, except thoſe of the laſt phalanges, have on each ſide a ſort of roundiſh foſſula, bordered with ſmall eminences. Winſlow's Anatomy, p. 88.

Mr. Hunauld has given us obſervations on the ſtructure and action of ſome MUSCLES of the *fingers* in the Mem. Acad. Sciences for 1729.

Fingers, *ſuperfluous*. Infants are often born with ſuperſluous or ſuper-numerary *fingers*, which are uſually miſhapen and miſplaced; ſome of theſe are found to have nails and bones like the other *fingers*; others have none of theſe, but are mere maſſes of fleſh.

Theſe ſhould always be amputated in the infancy of the child; but if they are many in number, and the child but weakly, it may be better not to take them all off at one time, but to ſtay ſome time between each amputation, that one may be almoſt well before another is taken off. They are to be cut off with the ſcalpel or ſciſſars, and the hæmorrhage ſtopped with dry lint or with the ſame dipped in ſpirit of wine, and afterwards healed as common wounds with vulnerary balſams. Heiſter's Surgery, p. 330.

Fingers, *carious.* The *fingers* when carious, or affected by a ſpina ventoſa, are to be amputated three ways. 1. By a pair of ſtrong ſciſſars or ſharp-edged pinchers. 2. By a chiſſel ſtruck by a leaden mallet, by which they are ſeparated at one blow; or laſtly, by dividing the next ſound joint with a ſcalpel, and drawing back a part of the ſkin to wrap over the ſtump that it may heal the ſooner; and this is the beſt method of all, as by this you are in no fear about any ſplinters of the bone being left. Heiſter's Surgery, p. 331.

Fingers, *fractured.* When one or more of the bones in the *fingers* are broke, the ſurgeon's buſineſs is carefully to replace what has been removed, and to roll up the *finger* a little way with a narrow bandage, and then to bind it firmly to the next ſound *finger*. But it is much more proper, when the *finger* is maſhed ſo as to give no hope of a good cure, to take it off at once. Heiſter's Surgery, p. 129.

Fingers, *luxated.* The bones of the *fingers* and thumbs are liable to luxations of each of their articulations, and that in ſeveral directions; but theſe are accidents not only eaſily diſcovered, but very eaſily remedied alſo; for the ligaments being not very robuſt, the fat and muſcles thin, and the ſinuſes of the articulations ſhallow, the extenſion is very eaſy, and the reduction of them into their former places not leſs ſo. The beſt method is to extend ſufficiently the *finger* with one hand, and to replace the luxated bone at the ſame time with the other, and to retain it ſo by a proper bandage. Heiſter's Surgery, p. 166.

Finger's *breadth*, a meaſure, of two barley-corns in length, or four laid ſide to ſide.

FINGERY, in *Ichthyology.* See Branlin.

FINGITES, a name given by ſome of the barbarous writers of the middle ages to the phengites, a very tranſparent ſort of marble uſed by the Romans in building.

FINGRIGO, *Piſonia*, in *Botany*, a genus of the *polygamia dioecia* claſs. Its characters are theſe: the male flowers grow upon different plants from the fruit. The male flowers are funnel-ſhaped, the tube is ſhort; the brim is expanded, and cut into five acute parts; they have five awl-ſhaped ſtamina, which are longer than the petal, terminated by obtuſe ſummits: the female flowers are of the ſame form; they ſit upon the germen, which is ſituated under the receptacle, ſupporting a cylindrical ſtyle longer than the petal, crowned by five oblong ſpreading ſtigmas. The germen afterwards turns to an oval capſule, having five angles and one cell, containing one ſmooth, oblong, oval ſeed.

We have but one ſpecies at preſent in England, viz. the prickly piſonia, called *fingrigo* in the Weſt Indies. Theſe plants are very common in the ſavannas and other low places in the iſland of Jamaica; as alſo in ſeveral other iſlands in the Weſt Indies, where they are very troubleſome to any one who paſſes through the places of their growth, faſtening themſelves by their ſtrong crooked thorns to the clothes of perſons; and their ſeeds being glutinous and burry, alſo faſten themſelves to any thing that touches them; ſo that the wings of the grounddoves and other birds are often ſo loaded with the ſeeds as to prevent their flying, by which means they become an eaſy prey. Miller.

FINING. See Refining.

Fining *of wines.* The uſual method of *fining* down wines, ſo as to render them expeditiouſly bright, clear, and fit for uſe, is this: take an ounce of iſinglaſs, beat it into thin ſhreds with a hammer, and diſſolve it by boiling in a pint of water; this when cold becomes a ſtiff jelly. Whiſk up ſome of this jelly into a froth with a little of the wine intended to be fined, then ſtir it well among the reſt in the caſk, and bung it down tight; by this means the wine will become bright in eight or ten days. This method, however, is found to be beſt ſuited to the white wines; for the red ones, the wine coopers commonly uſe the whites of eggs beat up to a froth, and mixed in the ſame manner with their wines. The method by which theſe viſcous bodies act in the operation is this; they entangle themſelves among the flying lee or light fæculencies that float in the wine, and thus forming a maſs ſpecifically heavier than the wine, they ſink through the body thereof like a net, carrying down all the foulneſs they meet in the way to the bottom; but when the wine is extremely rich, ſo that its ſpecific gravity is greater than that of the maſs formed by the ingredients uſed in *fining* and the dregs or lee; this maſs then riſes upward, and floats at the ſurface of the wine, which will in this caſe alſo draw off fine. See Clarification and Forcing.

FINIRE, in *Law*, was uſed to fine, or pay a fine upon compoſition and making ſatisfaction. It is the ſame with *finem facere*, mentioned in Leg. Hen. I. cap. 53.

FINISHING, in *Architecture*, &c. is frequently applied to the crowning or acroteria over a piece of building, placed there to terminate and finiſh it.

FINITE, ſomething bounded or limited, in contradiſtinction to infinite.

The ſchoolmen make two kinds of *finite*.

The one as to *extenſion*, which is applied to things that have not all poſſible or conceivable extenſion.

The other as to *perfection*, applied to things which have not the laſt perfection.

To get an idea of a thing *finite* in point of perfection, we firſt conceive the thing as having certain perfections; and then conceive ſome other perfection which it has not, or ſome perfection in a farther degree.

After the ſame manner I conceive a room to be *finite*, by having an idea of extenſion beyond what is contained therein.

FINITO, in the *Italian Muſic*. A canon or fugue is ſaid to be *finito* when it is not perpetual; but when at ſome certain places all the parts join or unite, after having followed one another for ſome time.

FINITOR, in *Aſtronomy*, the horizon; thus called, becauſe it finiſhes or bounds the ſight or proſpect.

FINNIKIN, the name of a particular ſpecies of pigeon, called by Moore the *Columba in gyrum flectens.* It is of the ſhape and ſize of the common pigeon. The crown of its head has ſomething of the reſemblance of a ſnake's head; and it is gravel-eyed, and has a tuft of feathers on the hinder part of its crown, which runs down its neck not unlike a horſe's main. It is not feather-legged, and is in colour always either a black or blue pied.

They have their name from their ſingular manner of courting the female, which is always by riſing over her, and making three or four turns, flapping the wings, and then turning as many times round the other way.

FINOCHIA, in *Gardening*, the name of a plant which has of late years been introduced into the Engliſh gardens, and cultivated as a ſallad herb. See Fennel.

The culture of it is this: good ſeeds muſt be firſt procured from Italy, for thoſe of Engliſh ripening are very apt to degenerate. In March ſome of theſe ſhould be ſowed for the firſt crop on a light rich earth, and in a warm ſituation. The manner of ſowing theſe ſeeds is firſt to rake the bed very ſmooth, then draw a ſmall rill along it, and in this ſcatter them pretty thin, for the plants are not to ſtand nearer than ſix inches to one another; cover this with half an inch of earth, and at the diſtance of eighteen inches make another rill, and ſo on throughout the bed. In about a month the plants will come up, and they muſt be then cleared of weeds, and cut up to four inches diſtance; a month after this they muſt be thinned to ſix or ſeven inches diſtance; the ſtalks will now begin to ſwell to a large bulk juſt above the ground, this part muſt be earthed up in the manner of celery about a fortnight before it is uſed, which will make it eat very tender and criſp.

A ſecond crop ſhould be ſown three weeks after the firſt; and in that manner till July: every three weeks or month a new crop ſhould be ſown, to keep a conſtant ſupply for the table. The crops ſown in the hotter weather ſhould be watered and ſhaded from the great heats. Miller.

FINSCALE, an Engliſh name for the river fiſh, more uſually called the rudd, the *rutilus latior*, or *rubellio fluviatilis* of authors.

FINTO, in the *Italian Muſic*, ſignifies a feint, or an attempt to do ſomething, and not to do it; as *cadenza finta*, is when having done every thing proper for a true cadence, inſtead of falling on the right final, another note, either higher or lower, is taken, or perhaps a pauſe brought in.

FIOL, or Fial. See Phial.

FIR-*tree*, *Abies*, in *Botany*, a genus of the *monoecia monadelphia* claſs. To this genus Linnæus refers the pine and larch trees, making them as well as the *fir-tree* only different ſpecies of the pinus. Its characters are theſe: there are male and female flowers on the ſame tree; the male flowers are produced at remote diſtances from the cones on the ſame tree; they are compoſed of many ſtamina ſupporting great ſummits, and diſpoſed in a conical ſpike. The female flowers are collected in a ſcaly cone, each ſcale covering two flowers, having no petals; but from the embryo there ariſes a ſingle ſtyle, covered with a blunt ſtigma; which embryo afterwards turns to an oblong ſeed or nut, incloſed between the pales of the cone, each ſcale having commonly two ſeeds under it. The diſtinguiſhing character of this genus is, that the leaves ariſe ſingly from their baſe, whereas the pines have two or more riſing from the ſame point. There are nine ſpecies now in the Engliſh gardens. The moſt common are the ſilver or yew-leaved *fir-tree* and the pitch-tree, or the Norway or ſpruce *fir*. The firſt grows in great plenty about Straſburgh and other parts of Germany, from whence the turpentine is brought to England; but the moſt beautiful of theſe trees grow on mount Olympus. The ſecond ſort is common in the woods of Norway, and affords the white deals. Of this tree there are two or three varieties; from this the pitch is drawn, whence its name. There are two ſpecies natives of America, one called the black ſpruce *fir*, and the other the white ſpruce *fir*, becauſe the leaves of both are uſed indifferently for making of SPRUCE-*beer*. Theſe two ſpecies alſo yield a fine clear ſtrong-ſcented turpentine, which the native Indians uſe to cure green wounds, and for ſome internal diſorders. The phyſicians of North America have lately adopted it into their practice. There is another ſpecies the native of America, called the balm of Gilead *fir*, becauſe it affords a clear fragrant turpentine, commonly ſold in England for the balm of Gilead.

The manner of propagating *fir*, pines, and other trees of that kind from ſeeds is this: the ripe cones of theſe trees are to be either expoſed to a gentle heat, or ſoaked for twelve hours in warm water; after which the ſeveral cells will open, and the ſeeds fall out.

Theſe ſeeds ſhould never be taken out till the time of ſowing them, which is the latter end of March. The ground they are to be ſown in muſt be carefully turned ſeveral times to deſtroy the roots of weeds. For a large plantation, this is beſt done by ploughing ſeveral times; after this, the earth is to be levelled with a ſpade in ſmall ſpots at every ſix feet ſquare; in each of which ſpots ten or twelve ſeeds are to be ſown, and covered with ſome of the ſame mould broken fine, but not ſifted; then they are to be covered with a furze buſh or other ſuch covering; and this is to remain for ſome time after the plants are come up, but they muſt not be covered too cloſe by it; when this covering is taken off, a little looſe earth is to be drawn about the ſtems of the plants, and a little furze ſtuck about them, to keep off the too great heat of the ſun. Uſually from twelve ſeeds there are eight plants or thereabouts, and theſe may be left ſtanding together till the third year. In March or April, the third year after ſowing, the plants are to be removed to the place where they are to ſtand, and planted at eight foot ſquare diſtance, or greater, if deſired. Two plants ſhould, however, be left in the plantation in each cluſter, and great care taken not to injure the roots of theſe. The others alſo muſt be taken up with as much earth about their roots as poſſible. When they are ſet in the new plantation, there muſt be ſtakes fixt near them to tie them to, that the wind may not blow them down, and the roots muſt be covered with litter, and they muſt have a gentle watering to ſettle the earth to their roots. If the weather prove very dry, this may be repeated two or three times, but a little at a time; over-watering kills all new-ſet trees; and the cutting away of the heads or branches of thoſe of the reſinous kind is a very dangerous thing.

The Scotch pine delights in a chalky ſoil on the ſide of a hill, but will alſo grow in gravel, and in any ground that is not too wet.

The common *fir* loves a loamy ſtrong ſoil, and is a native of low flat grounds; and moſt of the American *firs* and pines love a looſe moiſt ſoil. The ſilver *fir*, and the manured pine, love a dry ſituation, but muſt have a deeper ſoil than the Scotch pine, and muſt be ſheltered from the north winds. The two trees left in each ſpot of the place where they were ſown may be left together ſeven years, then the leaſt flouriſhing tree is to be carefully removed. Miller.

FIR, *moſs, upright*. See LYCOPODIUM.

FIR, *Scotch*, in *Botany*. See PINE.

FIRDFARE. See FERDFARE.

FIRDWITE. See FERD-WIT.

FIRE, in *Phyſiology*. The moſt univerſal and ſenſible character of *fire*, and that which beſt defines and diſtinguiſhes it from every other thing, is, its giving heat.

Fire, therefore, may be generally defined to be whatever warms or heats bodies.

Again, as heat is ſomething whoſe preſence we beſt perceive by the dilatation of the air, ſpirit, or mercury in the thermometer; *fire* may be defined to be that whoſe preſence we perceive by the expanſion of theſe in the thermometer.

Whence it follows, that *fire* is an elaſtic body, compoſed of infinitely ſmall particles, ſcarcely if at all adhering to each other, and a body in motion. Its motion is argued from its expanding the air, which is not effected without communicating motion thereto; and its corporeity is proved by experiment. For pure mercury being incloſed in a phial with a long neck, and kept in a gentle heat for the ſpace of a year, is reduced into a ſolid; and its weight is conſiderably increaſed; which increaſe, ſome have ſuppoſed, can ariſe from nothing but the acceſſion of *fire*. See the ſequel of this article, and CALCINATION.

Its ſolidity is alſo evinced by its reflection from burning-glaſſes: the ſmallneſs of its conſtituent particles by the facility with which it penetrates any body however denſe, or ſeparates itſelf from any ſuch body.

Fire makes one of the vulgar or peripatetic elements, defined to be hot and dry; or it is that part or ingredient in all bodies which is hot in the higheſt degree, and dry in an inferior one.

What the ſchool-philoſophers add farther as to the nature of *fire*, is, that it is a ſimple body, as not including any contrariety of qualities; and a body abſolutely light, as tending naturally upward; for which reaſon they hold its natural place to be above all the other elements, between the extremity of our atmoſphere and the moon; and the fund of *fire* is ſuppoſed to reſide in that ſphere, which they call *elementary fire*.

Fire, according to the Carteſians, is an aſſemblage of the more ſolid, earthy particles, which, ſmimming in the rapidly fluid matter of the firſt element, become vehemently agitated thereby; and by this intenſe agitation or motion are diſpoſed to give the ſenſation of heat, light, &c.

Fire, according to Sir Iſaac Newton, is a body heated ſo hot as to emit light copiouſly; for what elſe, ſays that philoſopher, is red-hot iron, but *fire*? And what elſe is a *fiery* coal than red-hot wood? By which he ſuggeſts, that bodies which are not *fire* may be changed and converted into *fire*.

It is a diſpute of ſome ſtanding among philoſophers, whether *fire* be any ſpecific ſubſtance, originally diſtinct from all other; or whether it be of the common matter of other bodies, only under certain peculiar modifications; i. e. whether *fire* be ſuch by its own nature, or by motion? See HEAT, under which article the reader will find this controvercy more largely ſtated and explained. See alſo *Theory of* ELECTRICITY and PHLOGISTON.

According to ſome of the lateſt philoſophers, *fire* is a certain ſubſtance or body, *ſui generis*, originally ſuch, and not producible by any motion or alteration of other bodies.

Theſe authors deſcribe *fire* as a very ſubtle, moveable, penetrating body, the cauſe or inſtrument of HEAT and LIGHT.

Some of them add, that when *fire* enters the eye in right lines it produces or excites the idea of light, which rectilinear motion they account abſolutely neceſſary to the idea of light.

Whereas, to produce heat, and the other effects of *fire*, ſuch rectilinear motion is not required; but on the contrary, an irregular, various motion is fitter to produce the ſame.

Others diſlike the uſe of the term *fire* as a conſtituent principle of natural bodies, becauſe in the general application of it heat has alſo been included; and therefore the term has become ambiguous, and it is neceſſary to diſtinguiſh continually between *fire* in a ſtate of action and inactive or quieſcent *fire*. They have, therefore, preferred the term PHLOGISTON for denoting one and the ſame unknown cauſe of certain well known effects. Prieſtley's Exp. and Obſ. &c. vol. i. p. 282, &c.

The nature of *fire* is ſo wonderful and abſtruſe, that the ancients generally revered it as a god: among the moderns we can ſcarce name one point in all philoſophy of more importance, or one that is leſs underſtood.

Fire, in effect, is the univerſal inſtrument of all the motion and action in the univerſe; without *fire* all bodies would become immoveable; as in a ſevere winter we actually ſee our fluids become ſolid for want thereof. Without *fire* a man would harden into a ſtatue, and the very air would cohere into a firm rigid maſs.

Fire, then, is the univerſal cauſe of all mutation or change; for all mutation is by motion, and all motion by *fire*.

Several authors have laboured to ſet this grand agent in its juſt light; and particularly the excellent Boerhaave, in a new courſe of experiments and lectures expreſsly on the ſubject, De Igne. The ſum of his doctrine we ſhall here ſubjoin:

Fire, then, is diſtinguiſhed into two kinds; as it is in itſelf called *elementary fire*; and as it is joined with other bodies, called *culinary fire*.

Fire, *pure* or *elementary*, is ſuch as exiſts in itſelf, which alone we properly call *fire*, and has lately been denominated abſolute HEAT.

Fire, *common* or *culinary*, is that exiſting in ignited bodies, or excited by the former in combuſtible matters, the minute particles whereof joining with thoſe of the pure *fire* conſtitute pure flame.

This latter is improperly called *fire*, in regard only a ſmall part of it is real or pure *fire*.

Pure *fire* is ſuch as collected in a burning-glaſs yields no flame, ſmoke, aſhes, or the like; conſequently, in ignited bodies, that which flames, ſmokes, &c. is not ſimply *fire*.

The effects, nature, properties, &c. of each ſhall be conſidered: 1. *Pure* or *elementary fire* of itſelf is imperceptible, and only diſcovers itſelf by certain effects which it produces in bodies, which effects are only learnt by obſerving the changes that ariſe in thoſe bodies.

The firſt effect of *elementary fire* on bodies is heat, which ariſes wholly from *fire*; and in ſuch manner as that the meaſure of heat is always the meaſure of *fire*, and that of *fire* of heat. So the heat is inſeparable from *fire*.

The ſecond is dilatation in moſt ſolid bodies, and rarefaction in all fluids.

That both theſe are inſeparable from heat, is evident from numerous experiments. An iron-rod or bar being heated, increaſes in all its dimenſions; and the more ſo as it is farther and farther heated: upon expoſing it to the cold again, it contracts, and returns ſucceſſively through all the degrees of its dilatation till it arrives at its firſt bulk, being never two minutes ſucceſſively of the ſame magnitude. See HEAT and PYROMETER.

The like is obſerved in the heavieſt of all bodies, gold, which, when fuſed, takes up more ſpace than before; ſo mercury, the heavieſt of all fluids, we have known to aſcend in a narrow tube over the *fire* to above thirty times its height.

The laws of this expanſion are, 1. That the ſame degree of *fire* rarefies fluids ſooner, and in a greater degree than it does ſolids. Without this the thermometer would be of no uſe, ſince the cavity of the tube would then be dilated in the ſame propoprtion as the fluid is rarefied. 2. The lighter the fluid, the more it is dilated by *fire*. Thus air, the lighteſt of all fluids, expands the moſt; and next after air, ſpirit of wine. See THERMOMETER.

Some ſubſtances are capable of a greater dilatation or diminution of their ſpecific gravity than others by *fire*. Thus, certain matters are ſo much rarefied by even a moderate heat, that they ſeem to loſe all their ſpecific gravity, or become at leaſt ſpecifically lighter than all the ſurrounding bodies; hence theſe ſubſtances, when heated to a certain degree, are raiſed as bodies would be without gravity. All ſubſtances which have this property are called in general volatile ſubſtances. See VOLATILISATION. Other bodies are ſo little dilatable by *fire* relatively to their denſity, that the greateſt heat which can be given them produces almoſt an inſenſible diminution of ſpecific gravity. Theſe, being almoſt unalterable in this reſpect by *fire*, are called fixed bodies. See FIXITY.

The third effect of *fire* on bodies is motion; for *fire*, in warming and dilating bodies, muſt of neceſſity move their parts.

In effect, all the motion in nature ariſes from *fire* alone; and, taking this away, all things become immoveable. Upon the abſence of only a certain degree of *fire*, all oils, fats, waters, wines, ales, ſpirits of wine, vegetables, animals, &c. become hard, rigid, and inert; and the leſs the degree of *fire*, the ſooner and more violently is this induration made.

Hence, if there were the greateſt degree of cold, and all *fire* were abſolutely taken away, all nature would grow into one concrete body, ſolid as gold, and hard as diamond; but upon the application of *fire*, it would recover its former mobility.

Conſequently, every diminution of *fire* is attended with a proportionable diminution of motion, and *vice verſa*.

This *fire*, whoſe effects we have been relating, needs no air or pabulum to ſuſtain or preſerve it. For putting ſome calx of tin or lead in the exhauſted receiver of an air-pump, and applying a burning-glaſs, ſo that the focus ſhall fall on the calx, the conſequence will be a vehement dilatation of the calx from the center towards the circumference, whereby the receiver will be broken into a thouſand pieces; and if a quantity of any eſſential aromatic oil be poured, *in vacuo*, upon ſpirit of nitre, there will immediately ariſe a violent *fire*, to the great danger of the by-ſtanders.

All the abovementioned effects of *elementary fire* may be increaſed divers ways, viz.

1. By attrition, or a ſwift agitation or rubbing of one body againſt another. This is apparent in ſolids; a vehement attrition of a flint and ſteel, every body knows, will produce ſparks. So alſo in fluids, cream, by long churning, to ſeparate the butter, will grow inſenſibly warm; the barometer renders this effect ſtill more diſcernible.

In effect, all the heat of an animal, ſays Boerhaave, is owing to the agitation and attrition of the parts of its juices againſt each other, and againſt the ſides of the veſſels. The more ſolid, hard, and elaſtic, the bodies thus agitated are, the more points of contact they have; the more intenſe the force whereby they are ſtruck againſt each other is, the greater is their motion; and the quicker the returns of their ſtrokes, and the longer they are continued, the greater is the heat produced.

Thus, a piece of ſpunge rubbed lightly, and for a little while againſt another, acquires no ſenſible heat; but a large heavy piece of iron briſkly rubbed againſt another in a cold ſeaſon (when bodies are the denſeſt) will preſently acquire an intenſe heat ſufficient to *fire* ſulphur, gunpowder, or the like.

So a knife whetted briſkly on a dry rough ſtone ſhall yield ſparks of *fire*; but if oil, or any other fatty matter be interpoſed, no ſenſible heat ſhall ariſe; and the points of two needles rubbed againſt each other ever ſo ſtrongly, or ſo long, will never grow warm, as only touching in a few parts.

In New Holland they produce *fire* with great facility by means of two pieces of dry ſoft wood; one of which is a ſtick about eight or nine inches long, and the other is flat; the ſtick they ſhape into an obtuſe point at one end, and preſſing it upon the other, turn it nimbly by holding it between both their hands as we do a chocolate-mill, often ſhifting their hands up, and then moving them down upon it, to increaſe the preſſure as much as poſſible. By this method they get *fire* in leſs than two minutes. Hawkeſworth's Voyages, &c. vol. iii. p. 234.

Hence, 1. The globules of the cruor or red blood driven by the force of the heart againſt each other, or againſt the ſides of the arteries, excite more heat than the globules of the ſerum, or any other humour in the animal. Hence, 2. Thoſe parts abounding moſt with theſe globules thus agitated, as the heart, liver, and head, will be the hotteſt of all others; and the denſer the blood, *cæteris paribus*, the greater the heat, &c. 3. The quicker the contractions of the heart are repeated, the greater will the heat be. For the more probable cauſe of animal heat, ſee *Animal* HEAT.

The ſecond manner of increaſing the effect of *elemental fire*, is, by throwing a quantity of moiſt or green vegetables, cut down while full of ſap, into a large heap, and preſſing them cloſe down, the reſult of which is, that they grow warm, hot, ſmoke; and finally, will break out into flame.

The third way is by the mixture of certain cold bodies. Thus, water and ſpirit of wine firſt warmed, grow much hotter by the mixture; ſo any of the heavy, aromatic oils, as of cloves, cinnamon, ſaſſafras, guaiacum, &c. mixed with ſpirit of nitre, grow exceedingly hot, and burſt forth like volcanos; and the ſame may be ſaid of ſpirit of nitre and ſteel-filings.

It is poſſible to produce *fire* and flame by the bare mixture of two cold liquors, in the following manner: take two drams of ſtrong and freſh ſpirit of nitre prepared with oil of vitriol, and putting it into a clean and dry gallipot, ſet it under a chimney, then pour to it at once of the oil of cloves one dram, there will be immediately produced a loud noiſe and a conſiderable flame; and when that is gone, a dry reſin is formed in the pot. See INFLAMMABILITY.

The like effect may be had from dry bodies. Thus, pure ſulphur and ſteel-filings, well ground, and mixed in equal quantities, with water enough to make them into a dry paſte, and laid an hour or two any where, even under ground, will ſmoke and emit flame, and that with the greater vehemence as it is more ſtrongly preſſed down.

The fourth is by PHOSPHORUS, which is a kind of fire-magnet prepared from the parts of animals, that imbibes and retains *fire* for many years.

But in all theſe ways it does not appear that any *fire* is excited or generated of what was not *fire* before; for if in a ſevere winter's day you rub a plate of gold briſkly againſt another, they will both grow hotter and hotter by degrees, till at length they become red-hot, and at the point of melting; and yet all this time the plates loſe nothing of their weight, but ſwell and grow bigger in all their dimenſions.

Hence it follows, that the particles of the gold are not converted by the friction into *fire*, but that the *fire* exiſted before; and all the effect of the friction, &c. is to collect or bring together a quantity thereof before diſperſed throughout the atmoſphere.

In effect, there is no making or producing of *fire de novo*; all we can do is, of inſenſible, to render it ſenſible; i. e. to collect it out of a greater ſpace into a leſſer, and to direct and determine it to certain places. This is effected, as above mentioned by motion, attrition, &c.

The ſun alſo contributes very much to the bringing of *fire* to light, by means of his rapid motion round his axis, whereby the fiery particles every-where diffuſed are directed and determined in parallel lines towards certain places, where their effect becomes apparent.

Whence it is that we perceive the *fire* or heat when the ſun is above the horizon; but that when he diſappears, his impreſſion or preſſion being taken away, the *fire* continues diſperſed at large through the ethereal ſpace?

In effect, there is not leſs *fire* in our hemiſphere in the night-time than by day, only it wants the proper determination to make it perceived.

Another way of rendering it ſenſible, is, by collecting the parallel rays into a leſs compaſs, by means of convex glaſſes, or concave ſpecula. See BURNING-*glaſs*.

From theſe various ways of kindling *fire*, or producing heat in bodies, Dr. Franklin conjectures, that the *fire* exiſted in theſe bodies, though in a quieſcent ſtate, before it was by any of theſe means exerted, diſengaged, and brought forth to action and to view; and that it conſtitutes part, and even a principal part of the ſolid ſubſtance of bodies; ſo that kindling *fire* in a body is nothing more than developping the inflammable principle, and ſetting it at liberty to act in ſeparating the parts of that body, which then exhibits the appearances of ſcorching, melting, burning, &c. He alſo ſuppoſes, that particles of *fire* joined to thoſe of air and water aſſiſt in raiſing vapours. See EVAPORATION. Franklin's Letters and Papers on Philoſophical Subjects, p. 412, &c.

To the ſame purpoſe Boerhaave maintains, that this *elementary fire* is preſent every-where, in all bodies, in all ſpace, and at all times, and in equal quantities; for go where you will, to the top of the higheſt mountain, or deſcend into the loweſt cavern, whether the ſun ſhine or not, in the coldeſt winter, or the moſt ſcorching ſummer, by one or other, or all of the means above mentioned, may *fire* be collected. In a word, there is no aſſignable phyſical point without *fire*; no place in nature where the attrition of two ſticks will not render it ſenſible. So long as *fire* remains equably and undetermined in any place, it does not diſcover itſelf by any effect. In the ſevereſt weather we perceive no influence or effect of *fire*; when, at the ſame time, being collected and determined by attrition, it becomes manifeſt.

By changing *fire* out of its indeterminate ſtate, and impelling it in converging lines, its momentum is increaſed; witneſs the phenomena of burning-glaſſes.

But how attrition, crude vegetables, &c. contribute towards altering the direction, &c. of *fire*, does not eaſily appear.

On this *fire*, and the effects thereof above mentioned, depends all fluidity of humours, juices, &c. alſo all vegetation, putrefaction, fermentation, animal heat, and a thouſand other things.

2. But in what manner ſoever *fire* is collected in bodies, upon a ceſſation of the collecting cauſe, it ſoon diſappears again, unleſs it be ſupplied with a pabulum or fuel; and in this caſe it becomes *culinary fire*.

By pabulum or fuel of *fire*, we mean whatever receives and retains *fire*, and is conſumed, or at leaſt rendered inſenſible thereby.

The only pabulum of *fire* in all nature is the oil of ſulphur, or fat, or rather the phlogiſton of bodies; and bodies are only fuel, on account of the oil or phlogiſton they contain. For oil and ſulphur were names which the ancient chemiſts indiſcriminately gave to ſubſtances into the compoſition of which a great quantity of PHLOGISTON enters.

Hence, 1. All vegetables, not too moiſt, nor too dry, afford ſuch a pabulum, particularly thoſe which contain the greateſt quantity of oil, as balſamic and reſinous woods, &c. 2. All vegetable and animal coals are a proper pabulum for maintaining of *fire*, as being only the parts of vegetables and animals which have exhaled their water and ſalt, and retained the oil alone inhering in a black form in their earth. 3. All foſſil and bituminous earths, turfs, &c. 4. All mineral ſulphur, whether pure, or joined with earth, ſtone, or metals, as pit-coal, &c. 5. The fat and dung of animals. And 6. Several productions of chemiſtry, as oils, inflammable ſpirits, &c. afford alſo a pabulum for *fire*. See COMBUSTION.

This *fire* which burns combuſtible bodies requires air to ſuſtain it; which taken away, the *fire* is immediately diſſipated, as appears from the experiments, *in vacuo*; except in the caſe of ſubſtances into the compoſition of which nitre enters; for theſe will burn *in vacuo*, in fixed air, and under water, as is evident in ſome rockets which are made for this purpoſe.

And yet *fire* does not immediately bear or endure the air, but always repels it, and by that means forms a kind of vault or aerial furnace all round, which by its weight, and the preſſure of the incumbent air, acts on all the particles or corpuſcles that would make their way through it, and thus retains the *fire*, and applies it to the combuſtible matter.

Hence, the heavier the air, the more vehement the *fire*; and accordingly, in ſtill cold weather we obſerve the *fire* to act with more violence than in warm weather.

But whether the air retains *fire* by its weight alone (which water itſelf would do) may be queſtioned; and whether its elaſticity does not contribute ſomething thereto; as alſo, whether there be not ſome farther unknown property in the air that has a ſhare in this effect may be doubted. Something of this kind one would ſuſpect from hence, that all air is not proper to maintain flame. Probably air is capable of receiving only a certain quantity of the phlogiſton or inflammable principle from bodies in a ſtate of combuſtion; and when it is ſaturated, it can no longer ſerve the purpoſe of maintaining flame. See AIR, *phlogiſticated*, and PHLOGISTON.

This *fire*, in a burning combuſtible matter, affords a ſhining *fire* or flame, or both, according to the diverſity of fuel, and frequently alſo ſmoke, ſoot, and aſhes.

Shining or luminous *fire* ſeems to be *elementary fire*, attracted towards the part of the ſulphur or oil with ſuch force and velocity, as to move and ſhake them very violently, whirl them about, divide, and attenuate them, and thus render them volatile, and ready to be expelled; while in the mean time the air, making its vault all round, reſtrains and keeps them in, directs them to the ſulphur, and keeps them ſtill collected in their place or pabulum, while the combuſtible matter is diffuſed all round.

Flame ſeems to be nothing but a thick ſulphur, agitated, as before, by *elementary fire*; ſo that the *fire* is driven with a great motion around the revolving particles of the ſulphur. See FLAME.

Soot ſeems to be produced, when *fire* and ſulphur cannot break into a flame, being a ſort of coal conſiſting of a thick ſulphur, and an attenuated oil with earth and ſalt. See SOOT.

Smoke ſeems to be the combuſtible matter when it begins to be relinquiſhed by the *elementary fire*; for if this ſmoke be afterwards paſſed through a flame, it will itſelf become flame as before. See SMOKE.

Laſtly, aſhes are the earth and ſalt which the *fire* leaves untouched. See ASHES.

Fire may be diſtinguiſhed into *ſhining* and *not ſhining*; for that there is *fire* which does not emit light, is evident hence, that a piece of iron taken out of the *fire* before it be red-hot ſhall yet give *fire* to ſulphur.

Shining fire, again, may be ſubdivided into two kinds: that which warms, as red-hot iron; and that which does not warm, as that obſerved in putrid fiſhes, rotten wood, &c. the oil whereof, beginning to be agitated and attenuated, produces light without any heat, ſo far as the thermometer may be a rule of judging.

Among the number of theſe lambent or innocent flames, is the ſhining of meat at certain times. It has been uſually ſuppoſed that this was owing only to the putrefaction of the meat, and that it never ſhone till ſtinking, or nearly ſo, but experience proves the contrary. We have in the Philoſophical Tranſactions an account of a piece of veal which was obſerved to ſhine the night after it was killed, and yet when eaten the day afterwards was perfectly ſweet; and a part of it that was kept by way of experiment continued good many days after. This is not of the nature of common *fire* or flame, and not only differs in not burning, but in this alſo, that it is not extinguiſhable in water. A perſon ſtriking this piece of veal had the flame covering his whole hand, and that continuing even when he had put it under water; but the wiping it with a towel carried it all off and deſtroyed it. It is not uncommon to find the guts of hogs when dreſſed for the making what they call chitterlings, and put into the pickle, ſhine in this manner. Some of the pieces while under this management uſually ſwim on the water, and others ſink in it. Thoſe which ſwim are the only ones that ſhine. The light upon them is as bright as the ſtrongeſt moonſhine, and may be communicated to a perſon's hand by rubbing the pieces on it, where it will continue to be bright a long time without any ſenſible heat. The face and hands of a perſon being rubbed over with one of theſe ſhining pieces of the chitterling, not only appear bright and flaming, but are made to look conſiderably larger than they really are; and a perſon who had a mind to raiſe ſtories of ghoſts and apparitions might eaſily do it by covering the whole body of a man with this flame, and making him appear a *fiery* giant to all that ſaw him.

Mackrel in pickle will uſually become luminous in ſome degree a little before they ſtink, but it is rarely that the light is great; and when it has once happened ſo, it is not eaſy to hit the ſame again on a ſecond trial, though all the ingredients of the pickle are kept the ſame in the niceſt manner. Worms are often found luminous on their ſurfaces in oyſter-ſhells, yet the ſame worms are not always ſo; and what Pliny reports of the PHOLAS, and Reaumur has ſince found to be true, perhaps may not always hold ſo in future experiments. Philoſoph. Tranſ. N° 124. See DACTYLUS.

One of the moſt ſingular kinds of lambent *fire* is that diſcovered at certain times on the ſea-water, and on other water in which there are fiſh or other ſea productions kept. We have in the Philoſophical Tranſactions an account of ſome water in which mackrel were boiled, and afterwards kept, which became blackiſh and thick after two or three days, and then would ſparkle on the touch of a finger. The fiſh alſo were luminous, eſpecially about the gills; and the water, when ſtirred about with the hand, would appear ſo bright over the whole ſurface, that the appearance was like that of water in motion, on which the moon ſhines very ſtrongly.

In the ſame manner the ſea-water in many places will ſparkle and ſhine on the breaking its ſurface. Where a ſhip makes a good way in the night, in many ſeas, the whole breaking of the water will appear behind it as if on *fire*, ſparkling and ſhining all the way that it moves from the diſturbance in the wake of the ſhip. Philoſ. Tranſ. N° 37.

There does not always need the motion of a foreign body in the ſea to occaſion this ſort of phoſphorus, but the waves beating againſt one another will often occaſion it in great plenty; and ſometimes the waves waſhing againſt the rocks or againſt the ſhore, will yield a long courſe of light the whole night. This is no where ſo remarkable as at the Braſils; the ſhores there are often all on *fire* to appearance, from the vaſt effuſion of this luminous matter, as the waves waſh and break upon the ſhore.

This flaming and ſparkling of the ſurface of the ſea is wholly owing to the peculiar quality of the water; and in general, the thicker and fouler the ſea is, the more light it affords on being ſtirred in the night. A cloth dipped in the ſea-water will ſometimes be ſticky as if dipt in a ſolution of glue; in this caſe it will afford much brighter and more luminous ſparks in the drying; and this fat water will give much more *fire* from the motion of the ſhip than any other. In many places the ſurface of the ſea is found covered with fiery matter of a reddiſh or yellowiſh colour, looking like ſaw-duſt, and ſeeming to be the ordure or recrement of ſome ſea animals. This matter is always of a viſcous nature, and the ſea-water is viſcous and gluey wherever this is found, and gives more light on the moving than any other water. In the Northern ſeas there are ſometimes ſeen whole banks, as it were, of this matter, the ſurface of the ſea appearing wholly covered with it for ſeveral leagues; and this is often luminous all over in the night, though not ſtirred by any ſhip, or even by the motion of any fiſh. Many of the ſea fiſh have a viſcous matter about their gills, eſpecially when they have been ſome time dead. Theſe, when kept in ſea-water, have ſo much of this luminous property, that all that part appears as ſoon as taken up of the brightneſs of a flaming coal, and gives a light which it is eaſy to read by. A piece of ſtick rubbed on the gills of theſe fiſh will become luminous whereever it has touched them, and will continue ſo as long as it retains any of the moiſture, but as that dies the light will fade and go off; and it may be revived again, on touching the fiſh a ſecond time. Obſerv. ſur l'Aſie, p. 289. Jones's Abr. Philoſ. Tranſ. vol. v. part ii. p. 213. See a more particular account and explication of this phenomenon under the article *Luminouſneſs of the* SEA.

Of *ſhining*, and at the ſame time *warming fires*, the principal is that of the ſun, as it is called; though, whether the *fire* be really emitted from the body of the ſun, or whether it be only the common vague univerſal *fire* determined by the ſun, is not eaſy to ſay; this *fire* we more uſually conſider under the denomination of light.

This ſolar *fire*, in calcining certain bodies, makes ſome addition to the weight thereof.

Thus, antimony expoſed in the focus of a burning-glaſs will ſmoke a conſiderable time, and the greateſt part of it will ſeem to evaporate in fumes; but, if afterwards tried by the balance, it will be found to have gained in weight; and if it be again applied in the focus of a larger glaſs, it will again emit fumes, and yet ſtill be increaſed in weight.

Du-Clos found, that a pound of regulus of antimony, finely powdered, and expoſed to the focus of a burning-glaſs, acquired in the ſpace of an hour an increaſe of weight equal to a tenth part of the former weight: the ſame fact was alſo obſerved by Homberg with regard to antimony, and by Du-Hamel in ſeveral other minerals.

Zumbachius found that lead liquified in the focus of a large ſpeculum, and afterwards calcined and converted into glaſs, gained an increaſe of weight, though part of it evaporated in ſmoke. Nor is this increaſe of weight peculiar to ſubſtances calcined by ſolar *fire*. It is well known that 100 lb. of lead calcined in a fierce *fire* yields 110 lb. of minium. Hellot, by reducing 4 lb. of zinc into a calx, obtained 3 lb. 14 ounces of very white and fine calx, 2 ounces and 2 drams of coarſer and whitiſh calx, and an ounce of earth, though in the mean while part of the metal had eſcaped in ſmoke. Geoffroy found that biſmuth acquires in calcination an increaſe of $\frac{1}{48}$th of its original weight. The calx of tin is alſo known to gain $\frac{1}{12}$th in weight. An ounce of filings of copper expoſed to a wheel-*fire* for the ſpace of three hours, and and afterwards left to cool, had acquired an increaſe of 49 grains. Iron, according to the experiments of Mr. Scheffer, publiſhed in the Swediſh Tranſactions for the year 1757, receives by complete calcination an augmentation of one third of its weight; and it has been lately obſerved by Profeſſor Brugmans, in his Obſervationes Academicæ de Affinitatibus Magneticis, publiſhed at Leyden in 1778, that a quantity of the filings of iron which weighed one ounce or 480 grains before it was expoſed to the *fire*, after eleven calcinations, increaſed in weight 149 grains; in the firſt calcination, which was the weakeſt, and in which all the filings were not red-hot in the crucible, the weight of the ounce increaſed 3 grains; in the ſecond, in which the phlogiſton was inflamed, and the whole maſs had a white heat, the weight of the ounce was increaſed during the ſpace of half an hour 34 grains; in the third, during a like interval, 50 grains; in the fourth, 18; in the fifth, 15; in the ſixth, 7; in the ſeventh, 6; in the eighth, 9; in the ninth, in a new crucible, 5; in the tenth and eleventh, in the ſame crucible, one each. From other experiments this learned profeſſor concludes, that the condition which is neceſſary in order to the augmentation of the weight of iron by *fire*, is, that the phlogiſton be previouſly conſumed; and he is of opinion, that the ſame rule holds with reſpect to the augmentation of weight in other metals. M. de Buffon, in the firſt volume of his Supplement to his Natural Hiſtory, 1774, recites ſome experiments which he had made on coherent maſſes of iron, and from which he inferred the ponderoſity of *fire*. In one of his trials he found a ball of iron which weighed 49 lb. 9 ounces when cold, to weigh when heated to a white heat 49 lb. 11 ounces, which gives an augmentation of $19\frac{1}{5}$ grains to the pound. Theſe concluſions of Buffon have been ſince invalidated by ſome experiments of Dr. Roebuck and Mr. Whitehurſt: the former uſed two accurate balances; one of which, with the weight of a pound, would turn with one-tenth of a grain; and the other with a weight of half an ounce in each ſcale, would turn with the one hundredth part of a grain. A piece of iron of nearly one pound weight having received a white heat, was found to have loſt ſcarce a grain when it was cold; and another piece of about five penny-weights weighed ſomewhat more when it was cold than when it was hot. By other experiments ſince made in the preſence of ſeveral members of the royal ſociety, it appeared, that a cylinder of iron brought to a white heat, and then weighing 55 pounds, on being ſuffered to cool, ſeemed gradually to acquire weight; and about twenty-two hours after it had begun to cool, was found to have increaſed in weight 6 penny-weight, 17 grains. The beam uſed on this occaſion was ſo nicely conſtructed, that, when it was loaded with the great weight above mentioned, the ſcale evidently turned with 4 grains.

The experiments of Mr. Whitehurſt were made with ſmall maſſes; but with a balance ſo nice as to be ſenſibly affected by the two thouſandth part of a grain. A penny-weight of gold made red-hot, and brought nearly to a ſtate of fuſion, became apparently lighter; but on cooling, its former weight was perfectly reſtored. The ſame quantity of iron likewiſe ſeemingly loſt weight on being equally heated; but its weight was viſibly augmented on becoming cold.

Mr. Whitehurſt accounts for the apparent fallacy in M. de Buffon's experiments, by ſuppoſing that the heat of the large maſs of iron employed by him had a greater effect on that arm of the beam from which it was ſuſpended than on the other; and that by expanding or lengthening the former in a greater degree than the latter, it produced the preponderancy on that ſide which M. de Buffon aſcribed to the particles of *fire* contained in the metal. Philoſoph. Tranſ. vol. lxvi. part. ii. art. 31. p. 509. art. 38. p. 575.

M. Marggraff, in his experiments on PLATINA, found, that after expoſing 2 ounces of crude platina in a ſcorifying diſh under a muffle to a ſtrong *fire* for two hours, and ſuffering it to become cold, it weighed 2 ounces and 10 grains, or one part in ninety-ſix more than it did at firſt; and an ounce of platina in a covered crucible, placed in a melting furnace, and expoſed between three and four hours to the ſtrongeſt *fire* of all the furnaces in his laboratory, weighed near 6 grains, or about one part in eighty more than at firſt. Acta Chemica, tom. ii. p. 113. M. Macquer put an ounce of platina into a German crucible, and expoſed it to a ſtrong *fire* for fifty hours; and on weighing the platina after the operation, it was found to be increaſed 14 grains, or allowing 576 grains to the French ounce, about one part in forty-one. The ſame platina, ſubmitted to another ſimilar operation, received a farther increaſe of 2 grains; the augmentation in all being 16 grains, or one part in 36. This increaſe of weight he ſuppoſes to be owing to the calcination of ſome heterogeneous ſubſtances mixed with the platina.

Dr. Lewis, having picked out from platina 360 grains of the larger and brighter particles, and the ſame quantity of the blackiſh duſt ſeparated from it by a ſieve, put the two parcels in two ſmooth ſcorifying diſhes, and kept them under a muffle in very ſtrong heat for five hours, and when cold the picked platina weighed with great exactneſs was found to have gained 2 grains, or one part in 180, while the duſt was increaſed 9 grains, or one part in 40. Comm. Philoſ. Techn. p. 462. The concluſion which ſome philoſophers have drawn from theſe experiments, and others of a ſimilar nature, is, that *fire*, by adhering to certain ſubſtances increaſes their weight, and is therefore ponderous like other bodies; an opinion which ſeems to have been ſuggeſted even by the ancients. See Lucretius, lib. ii. v. 185. But howſoever the queſtion concerning the nature and gravity of *fire* may be determined, the increaſe of weight acquired by calcined ſubſtances is moſt ſatisfactorily accounted for by the modern diſcoveries with regard to fixed air. See CALCINATION.

See on the ſubject of this article Boerhaave's Chemiſtry, vol. i. part 2. of *Fire*, and Muſchenbroek's Introd. ad Phil. Nat. tom. ii. cap. xviii. p. 609, &c. Ed. 1762.

Beſide the ſolar, there is likewiſe a ſubterraneous *fire*.

This appears in digging under-ground; for the firſt glebe next to the ſurface is warmed by the heat of the ſun, and as you go deeper you will find it colder; whence, even in hot countries, they have conſervatories of ice at ſome depth under-ground, till, arriving at a certain depth, viz. forty or fifty feet, it begins to grow warmer, ſo that no ice can there ſubſiſt; and at a yet greater depth, it is ſo hot as to take away reſpiration, extinguiſh candles, &c. and if the miner will venture farther, and carry a candle along with him, he frequently ſets the whole place in a flame, the ſulphureous fumes, rendered volatile by the ſubterraneous *fire*, catching flame from the candle.

Whence it is alleged by ſome that there is another ſource of *fire*, or, as it were, another ſun in the boſom of the earth which gives motion and life to every thing growing in or upon the globe, and even that the center of the earth is mere *fire*; which *fire* is likewiſe argued to be perpetual, from volcanos or burning-mountains, which have been known to caſt up *fire* from the earlieſt account of time. See HEAT and VOLCANO.

There are two great *fires*, therefore, the higher or ſolar, and the lower or ſubterraneous.

The effects of this laſt ſeem wholly the ſame with thoſe of the common culinary *fires*; for burnt coals, cinders, and melted minerals are thrown out by the burning mountains; and hot ſprings, ſteams, vapours, &c. are found in ſeveral parts of the globe, riſing nearly in the ſame manner as if they were produced by the heat of a common furnace. Whence there is little room to doubt but that the ſubterranean *fires* are not like the celeſtial or ſolar but the culinary.

Martin, in his Atlas, tells us, that there are pits of natural *fire* in China which are capable of dreſſing meat, but will not conſume wood; but we have no authentic teſtimony of any eye-witneſs to this ſtrange fact.

FIRE, in *Chemiſtry*, is the great inſtrument by which moſt of the operations of that art are performed.

The kind, degree, direction, &c. of *fire* are things the chemiſt is principally to attend to. The diverſity of *fire* makes a great difference in the reſult of the experiment; ſo that the ſame effect, e. gr. ſhall not ariſe, if an experiment be made with the *fire* of ſpirit of wine and that of pit-coal.

And to this cauſe Mr. Boyle, in his Treatiſe of the unexpected Failure of Experiments, attributes it, that a great many experiments ſucceſsfully tried by ſome have not ſucceeded with others.

The *fires* chiefly required by the chemiſts are ſuch as yield no fæces or remains, no ſalt nor ſmoke; and ſuch alone are thoſe of the ſun and of ſpirit of wine. Thoſe which come next in purity are oils diſtilled *per veſicam*, which loſe their earth and ſalt by their boiling and agitation in the water, ſo that the oftener the diſtillation is repeated, the purer they are rendered. After theſe the beſt is turf.

Indeed, the very manner wherein the *fire* is blown is found to have ſome effect. Thus, Acoſta, lib. iv. cap. 5. relates, that in Peru, when they would melt and ſeparate their ſilver from the earth, &c. if the *fire* be blown up with bellows, the fuſion will not ſucceed; nor will any other *fire* do but that blown by the wind raiſed from the fall of ſome water; ſo that they are forced to have recourſe to large tubes laid to the feet of large mountains, where there are cataracts to convey the wind generated by the fall of water to their works.

The degree of *fire*, or the collection and direction of *fire* to the degree proper for each operation, conſtitutes almoſt the whole art of chemiſtry.

Now the greater or leſs force of *fire* depends altogether on a greater or leſs quantity thereof collected into a focus; for as to its motion it does not ſeem in our power to alter it, or to make any increaſe or diminution of the force of the *fire* on that account.

The chemiſts in all ages have been accuſtomed to ſpeak of the degrees of *fire*, which they uſually divide into four; but very little accuracy was found on this head till the method was diſcovered of applying the thermometer of Fahrenheit to the meaſurement of the progreſs of heat by certain and invariable rules. On this baſis Boerhaave has eſtabliſhed the chemical doctrine of the power of *fire*, and divided it into ſix degrees; and theſe are the degrees of *fire* which our chemiſts allude to, when they now mention the force of *fire* in their operations.

The firſt degree is that by which nature performs the office of vegetation in plants, and by which chemiſtry imitates and does the like. This commences from the higheſt degree of cold, which in Fahrenheit's thermometer is marked at 1° and ends at 80°, ſince in this whole interval vegetables of one kind or other give indications of life and growth; ſo that if all the plants with which we are at preſent acquainted be examined by the degrees of heat contained within theſe limits, we ſhall find ſome plant or other that comes to its maturity in almoſt every one of theſe intermediate degrees.

Hence it appears probable, that a chemiſt, by duly conducting this degree of heat in an artificial ſtove might contrive to cheriſh and forward the vegetation of various plants; and in the offices of chemiſtry a furnace might be made for raiſing any degree of heat within theſe limits, on which a veſſel of water might be ſet, and a thermometer applied to it, the riſe or fall of which indicate the degree of heat required. Glaſs veſſels placed in the water thus tempered might be uſed for containing thoſe ſubſtances which are to undergo this degree of *fire*. Thus, the fragrant ſcent of roſes may be communicated to oil, by putting the inodorous and inſipid oil of olives in a tall clean chemical glaſs, and digeſting it in a heat of 56 degrees with the moſt fragrant roſes gathered juſt as they are opening in the morning: the application of a ſimilar degree of heat would impregnate alcohol with the pureſt ſpirit of ſaffron.

The ſecond degree of *fire* may be commodiouſly meaſured by the heat that is at ſome time or other obſerved in healthy bodies, and may be ſuppoſed to commence at the 40th degree of the thermometer, and to end about the 94th. Animals may ſubſiſt if their humours have any degree of heat in them between theſe limits. The eggs of inſects ſubſiſt unhurt during hard winters, and hatch in the ſucceeding ſpring. Fiſhes, both of the ſea and of rivers, live in water which is only 34 degrees warm; and fiſhes that have lungs, and all reſpiring animals in a ſtate of health, communicate to their humours a warmth of 92 degrees; and therefore, the limits of this degree are fixed at 33 and 94. Within the compaſs of this heat are included the vital actions of animals, the fermentation of vegetables, and the putrefaction both of vegetables and animals; and likewiſe the generation, breeding, hatching, birth, and nutrition of animals. Some determine the ſtandard of this heat by applying a thermometer to a hen brooding on her eggs, and by keeping a *fire* continually to this degree, chickens have been hatched. This degree of heat is employed by chemiſts to prepare their elixirs, volatile alkaline ſalts, and their tinctures. However, it appears from later obſervations, that the limits of *animal* HEAT are conſiderably greater than thoſe which the celebrated profeſſor has above ſtated.

The third degree of heat extends from the 94th degree of the thermometer to the 212th, at which water generally begins to boil. Through this ſpace the water and native ſpirits are ſeparated from all vegetables and animals, and the reſiduum becomes dry and durable. The eſſential oils of plants become volatile; the ſalts and oils in the freſh juices of animals are ſcarcely raiſed, but the juices dry into a thick, hard, brittle, inſipid, inodorous ſubſtance, which will keep for years without any conſiderable alteration. This degree of heat is for the diſtillation of oils and medicinal waters of vegetables. The ſanguineous ſerous juices of animals coagulate in boiling water into maſſes that may be cut aſunder; all their ſolids are converted into a thick tenaceous liquid, and it is conſequently deſtructive to all animals. See *Animal* Heat.

The fourth degree of heat may be reckoned from the degree 212 to 600; within which limits all oils, ſaline lixivia, mercury, and oil of vitriol are diſtilled; lead and tin will alſo melt and mix together. The oils, ſalts, and ſaponaceous juices of animals and vegetables are rendered volatile and acrid, and become more or leſs alcaleſcent: their ſolid parts are calcined, and loſe their diſtinguiſhing qualities and proper virtues; and with this degree of *fire* foſſil ſulphur and ſal armoniac are ſublimed.

The fifth degree of *fire* is that which fumes the other metals, beginning at the degree 600, and terminating at the degree of heat capable of melting iron. Glaſs, gold, ſilver, copper, and iron remain long unchanged; all other fixed bodies become white with this heat, the fixed ſalts of vegetables and foſſils melt, loſe moſt of their oils, acquire an increaſing alcaline acrimony, and with ſand or flint are converted into glaſs. Lime-ſtones are calcined, and all other bodies either vitrify or become volatile, and are diſſipated into the air.

The ſixth and higheſt degree of *fire* is that produced either by a lens or a burning ſpeculum, which hardly any ſubſtance is able to reſiſt; and even the gold and diamond, and platina are conſiderably altered by it.

The utmoſt effect of *fire* is the vitrification of fixed bodies; and this, ſays Boerhaave, the ancient magi of the Eaſt ſeems to have been appriſed of, as they predict the deſtruction of the world by *fire*, and its mutation into tranſparent glaſs. Boerhaave by Dallow, ubi ſupra, p. 241, &c.

This laſt degree was firſt diſcovered in the year 1690 by Mr. Tſchirnhauſen, whoſe burning-glaſs rendered every thing, even gold itſelf volatile.

Beſides theſe ſix degrees, the chemiſts have ſeveral intermediate ones; all which, however, may be eaſily reduced to the former.

As the *digeſting fire*, or *venter equi*, which is the heat of a dunghill.

The *balneum Mariæ*, *arenoſum*, &c. explained under the article Balneum.

The *naked* or *immediate fire*, which is the common *fire* applied under a veſſel.

The *fire* of a lamp, which is moderate and equal, and may be increaſed by the addition of more wick, uſed by enamellers, &c.

The *wheel fire*, which is lighted all round a crucible or other veſſel to heat it all alike.

That called *by ſuppreſſion*, which is when the veſſel is not only encompaſſed round, but covered over with *fire*.

The *reverberatory fire*, when it is in a furnace cloſe a-top, by which the *fire* is reflected back, and all round upon the veſſel.

The *melting* or *fuſing fire*, for the ſolution and calcination of metals and minerals.

The *glaſs-houſe fire*, for the vitrifying of the aſhes of vegetables.

And the *olympic fire*, which is that of the ſun collected in the focus of a burning mirrour, &c.

Hell-fire is a term denoting the greateſt degree of heat employed by the manufacturers of ſal ammoniac in Egypt.

To the ſeveral degrees of *fire* required, ſeveral forms of furnaces are accommodated; which ſee under the article Furnace.

There are five principal ways of altering the degree of *fire*.

For *fire* differs 1. According to the weight of the pabulum or fuel, it being a rule, that the heavier the fuel or combuſtible matter is, the more vehement, *cæteris paribus*, is the *fire*. Thus, ſpirit of wine affords a weaker and leſs deſtructive *fire* than oil; and this than pitch, and ſo on; the heaver and groſſer, ſtill the fiercer.

2. According to the quantity of the pabulum or fuel.

3. According to the diſtance of the *fire* from the object; it being a rule, that the heat of the *fire* at different diſtances is reciprocally as the ſquares of thoſe diſtances.

4. By the introducing or blowing of air into the *fire*, it being a rule that the ſtronger the current of air or wind is, provided it be not ſo ſtrong as to break the aereal fornix or vault incumbent on the *fire*, the more is the *fire* increaſed. For a briſk blowing puts the minute parts of the pabulum into a greater motion; whence the greater attrition ariſes, and of conſequence more *fire* is collected.

5. According to the ſolidity or reſiſtance of the medium between the *fire* and the object; for the more ſolid the medium, the greater quantity of heat, *cæteris paribus*, does it receive from the *fire* and communicate to the object.

Thus, a vapour-bath communicates much leſs heat to the bodies diſtilled by it than a water-bath, and this again leſs than a bath of ſteel-filings; for all bodies expoſed to the *fire* grow hot in proportion to their ſpecific gravities. Thus, if a piece of metal be put in water, and both ſet over the *fire*, while the water only grows lukewarm the metal ſhall be ſo hot as to be paſt touching; and thus, a key in a perſon's pocket ſitting near the *fire* ſhall frequently be very hot, while his clothes themſelves have not any ſenſible warmth. Indeed, this rule admits of ſome exceptions; for we have oils lighter than water, which yet admit of triple its degree of heat before they boil.

It is a great controverſy in chemiſtry, whether *fire* when applied to bodies only ſeparates and diſſolves them, or whether it does not alſo really and abſolutely change them.

Mr. Boyle, in his Sceptical Chemiſt, we think, has abundantly proved, that *fire* really alters bodies, and that the parts or elements procured from bodies by *fire* did not exiſt as ſuch in the bodies themſelves.

Add, that *fire* does not only ſeparate and decompound, but it alſo compounds and mixes different bodies ſo intimately together, that the new formed ſubſtance appears perfectly ſimple, and is not liable to any alteration from its power afterwards. Boerhaave.

Fire, in *Medicine* and *Surgery*, is uſed in the ſame ſenſe with cautery. See Cautery and Caustic.

Fire alſo gives the denomination to divers diſeaſes, as

Fire, *St. Anthony*'s, by phyſicians more uſually called *eryſipelas*. See Erysipelas and Anthony.

Fire, *walking*, called alſo *Will-with-a-wiſp*, *Jack-in-a-lantern*, *ignis fatuus*, &c. See Ignis *fatuus*.

Fire, in *Theology*, is frequently underſtood of the puniſhment of the wicked after death. See Hell.

It is ſuppoſed the world will periſh at laſt by *fire*. See Conflagration.

God has made ſeveral revelations of himſelf under the appearance of *fire*; he appeared to Moſes under the form of a *fire* burning in a buſh; the Holy Ghoſt deſcended on the apoſtles in tongues of *fire*; and the camp of the Iſraelites was guided and conducted in the night-time by a pillar of *fire*.

The Perſians adored God under the image or repreſentation of *fire*, becauſe it is *fire* that gives motion to every thing in nature. They are ſaid to have in that empire *fires* ſtill ſubſiſting, which have burnt many thouſand years. See Fire *everlaſting*, Gabres, and Magi.

The Hebrews kept up the *holy fire* in the temple. This *holy fire* deſcended from heaven, firſt upon the altar in the tabernacle at the conſecration of Aaron and his ſons to the prieſthood, Lev. ix. 24. and afterwards it deſcended anew on the altar in the temple of Solomon, at the conſecration of that temple. 2 Chron. vii. 1. And there it was conſtantly maintained by the prieſts day and night, without ſuffering it ever to go out; and with this all the ſacrifices were offered that required *fire*. This *fire*, according to ſome of the Jewiſh writers, was extinguiſhed in the days of Manaſſeh; but the more general opinion among them, is, that it continued till the deſtruction of the temple by the Chaldeans: after that it was never more reſtored; but inſtead of it they had only common *fire* in the ſecond temple.

The Vestals were appointed expreſsly to keep up the ſacred *fire* of the Romans.

Vulcan was worſhipped among the ancients, and particularly the Egyptians, as the inventor of *fire*; and Boerhaave has made it highly probable, that the Vulcan of the heathens was the Tubal-Cain of the Hebrews, the firſt who appears to have known the uſe of *fire*, and to have applied it in the fuſion of metals, and other preparations of chemiſtry.

Fire, in the *Manege*. To give the *fire* to a horſe is to apply the firing-iron red-hot to ſome preternatural ſwelling in order to diſcuſs it, which is oftentimes done by clapping the firing-iron upon the ſkin without piercing through. We give the *fire* to farcy knots, by running a pointed burning-iron into the ulcers. We likewiſe give the *fire* for wrenches of the paſterns. See Firing-*iron*.

Fire, in the *Military Language*, is ſometimes applied to the *fires* lighted in an army in the night-time.

But the term *fire* or *firing* is more frequently uſed for the diſcharge of the *fire*-arms, or the ſhot made on the enemy from the artillery, &c. And accordingly it is uſed as a word of command to ſoldiers of all denominations to diſcharge their *fire*-arms, grenades, cannon, &c. The *fire*

fire of the infantry is by a regular diſcharge of their *fire*-locks, by platoons, diviſions, &c. that of the cavalry with their fuſees and piſtols; and that of the place beſieged from their artillery. See Exercise and Firing.

In fortification, the *fire of the place* denotes the flank, or that part of the curtain where the line of defence terminates, from whence they *fire* to defend the oppoſite face of the baſtion.

Fire-*arrow* is a ſmall iron dart furniſhed with ſprings and bars, together with a match impregnated with powder and ſulphur, which is wound about its ſhaft. It is uſed by privateers and pirates to *fire* the ſails of the enemy, and for this purpoſe is diſcharged from a muſket or a ſwivel-gun. The match being kindled by the exploſion, communicates the flame to the ſail, againſt which it is directed where the arrow is faſtened by means of its bars and ſprings. As this is peculiar to hot climates, particularly the Weſt Indies, the ſails being extremely dry are inſtantly ſet on *fire*, and the *fire* is conveyed to the maſts, rigging, and finally to the veſſel itſelf.

Fire-*arms*. See Arms.

Fire-*ball*, a compoſition of meal-powder, ſulphur, ſaltpetre, roſin, pitch, &c. about the bigneſs of a hand-granade, made of an iron ſheet, filled and covered over with ſeveral coats of the above mixture, the laſt coat being of grained powder. Thick brown paper made into the form of a ſhell adapted to the ſize of the mortar, and filled with an equal quantity of ſulphur, pitch, roſin, and meal powder well mixed and put in warm, will anſwer the purpoſe as well as any thing elſe. This is to be thrown into the enemies works in the night-time to diſcover where they are; or to *fire* houſes, galleries, or blinds of the beſiegers. The balls uſed for this intention are prepared with mealed powder, ſaltpetre, ſulphur, roſin, ſteel or iron filings, fir-tree ſaw-duſt boiled in ſaltpetre ley, and birch wood charcoal, well rammed into a ſhell, having various holes filled with ſmall barrels, loaded with muſket-balls, and immerſed in melted pitch, roſin, and turpentine oil. They are ſometimes armed with ſpikes or hooks of iron, that they may not roll off, but ſtick or hang where they are deſired to have any effect. See Balls.

Fire-*bare*, in our *Old Writers*, is uſed for a beacon. *Quod ſine dilatione levari & reparari fac. ſigna &* fire-bares, *ſuper montes altiores in quolibet hundredo, ita quod tota patria, per illa ſigna, quotieſcunque neceſſe fuerit, præmunire poteſt.* Ordin. Obſervand. Temp. Edw. II.

Fire-*barrels*. See Barrels. Thoſe uſed in fire-*ſhips* ought to be of a cylindric form, as moſt ſuitable to contain the reeds with which they are filled, and more convenient for ſtowing them between the troughs in the *fire*-room. Their inſide diameters ſhould not be leſs than 21 inches, and 30 inches are ſufficient for their length. The bottom parts are firſt well ſtored with ſhort double-dipped reeds placed upright; and the remaining vacancy is filled with *fire-barrel* compoſition, being a maſs of corned powder, pitch, and tallow, well mixed and melted, and poured over them. The proportion and quantity of ingredients for one barrel are 120 lb. corned powder, 60 lb. of pitch, and 10 lb. of tallow; and the priming compoſition for one barrel is 100 lb. of corn powder, 50 lb. of ſaltpetre, 40 lb. of ſulphur, 6 lb. of roſin, and three pints of oil. There are five holes of three-fourths of an inch in diameter, and 3 inches deep, formed in the top of the compoſition while it is warm; one being in the center, and the other four at equal diſtances round the ſides of the barrel. When the compoſition is cold and hard, the barrel is primed by filling thoſe holes with fuſe-compoſition, which is firmly driven into them, ſo as to leave a little vacancy at the top to admit a ſtrand of quick match twice doubled. The center hole contains two ſtrands at their whole length, and every ſtrand muſt be driven home with mealed powder. The looſe ends of the quick-match being then laid within the barrel, the whole is covered with a dipped curtain, faſtened on with a hoop that ſlips over the head of the barrel, to which it is nailed. Theſe barrels ſhould be made very ſtrong, not only to ſupport the weight of the compoſition before firing, when they are moved from place to place, but to keep them together whilſt burning; for if the ſtaves are too light and thin, ſo as to burn very ſoon, the remaining compoſition will tumble out and be diſſipated, and the intention of the barrels, which is to carry the flame aloft, will be fruſtrated. Falconer's Mar. Dict. and Muller, vol. .v p. 301.

Fire-*blaſts*, in *Agriculture* and *Gardening*. See Blast, and Hales's Statics, vol. i. p. 36.

Fire, *bon*. M. Mahudel has a diſſertation on the origin of *bon-fires*, wherein he endeavours to make it appear that they were unknown to the ancients, and conſequently muſt be a modern invention.

He does not deny that the ancients had rejoicings on occaſion of the concluſion of a peace or alliance, or the news of a victory's being obtained againſt their enemies, on the birth-day, proclamation, or marriage of their prince; as alſo when they recovered from a dangerous ſickneſs; but, according to him, the *fire* on all theſe occaſions ſerved only to burn the victims or the incenſe; and as theſe ſacrifices were moſtly offered in the night-time, the illuminations were only intended to give light to perform the ceremonies. Hiſt. Acad. Inſcript. tom. ii. p. 430. ſeqq.

Fire-*bote*, fuel for neceſſary firing, which, by the common law, tenants may take out of the lands granted to them.

Fire-*cocks*. Church-wardens in London, and within the bills of mortality, are to fix *fire-cocks* at proper diſtances in ſtreets, and written marks near them, and to keep in every houſe thus marked an inſtrument or key for opening the plug, and a large engine and hand-engine for extinguiſhing *fire*, under the penalty of 10 *l*. The turn-cock whoſe water ſhall come firſt into a main-pipe at a *fire* ſhall have 10 *s*. the firſt engine that is brought ſhall entitle to 30 *s*. the ſecond to 20 *s*. and the third to 10 *s*. 6 Ann. cap. 31. 12 Geo. III. cap. 73. To prevent *fires*, it is required that workmen in the city of London, &c. build all front and rear walls of brick or ſtone; and that the front walls be 18 inches above the gutter, and coped with ſtone, tile, or brick; and party walls between houſe and houſe, thoſe belonging to houſes the expence of building which is more than 120 *l*. to be of the thickneſs of 1 foot 9 inches, or 2½ bricks in the loweſt ſtory; and of 2 bricks, or 1 foot 5½ inches from thence to the garret floor; and from the garret upwards 1½ brick, or 13 inches, and to be carried up to the full height of 18 inches above the adjoining gutters; and it is alſo required, that no timbers, except the girders, binding and trimming joints, and the templets under theſame, ſhall be laid into ſuch party-walls; and that there ſhall be 5 inches of ſolid brick work left at or between the ends of all lentils, wall-plates, and bond timbers. See Building, and Stat. 7 Anne, cap. 17. 11 Geo. I. cap. 28. 33 Geo. II. cap. 30. and 4 Geo. III. cap. 14. And on the breaking out of any *fire*, all the conſtables and beadles ſhall repair to the place with their ſtaves, and be aſſiſting in putting out the ſame, and cauſing people to work, &c. No action ſhall be had againſt any perſon in whoſe houſe or chamber a *fire* ſhall begin. 6 Anne, 10 Anne, cap. 14. But if ſuch *fire* happens through negligence of any ſervant, ſuch ſervant ſhall forfeit 100 *l*. to be diſtributed among the ſufferers; or, in default of payment, ſhall be committed to ſome work-houſe, and there kept to hard labour for eighteen months. See Arson.

All the laws relating to the prevention, &c. of *fire*, are reduced into one ſtatute, and former ſtatutes repealed by 12 Geo. III. cap. 73.

Fire-*damp*, in *Natural Hiſtory*. See Damp.

Fire-*eater*. We have a great number of mountebanks who have procured the attention and wonder of the public by eating of *fire*, walking on *fire*, waſhing their hands in melted lead, and the like tricks.

The moſt celebrated of theſe was our countryman Richardſon, much talked of abroad. His ſecret, as related in the Journals des Sçavans, of the year 1680, conſiſted in a pure ſpirit of ſulphur, wherewith he rubbed his hands and the parts that were to touch the *fire*, which, burning and cauteriſing the epidermis, hardened and enabled the ſkin to reſiſt the *fire*

Indeed, this is no new thing; Amb. Paré aſſures us he had tried on himſelf, that after waſhing the hands in urine, and with unguentum aureum, one may ſafely waſh them in melted lead.

He adds alſo, that by waſhing his hands in the juice of onions he could bear a hot ſhovel on them while it melted lard.

Fire, *electrical*. See Electricity.

Fire-*engine* is a machine for extinguiſhing accidental *fires* by means of a ſtream or jet of water. The common ſquirting *fire-engine* conſiſts of a lifting pump placed in a circular or cylindric veſſel of water, and wrought by two leavers that act always together. During the ſtroke, the quantity of water raiſed by the piſton of the pump ſpouts with force through a pipe joined to the pump-barrel, and made capable of any degree of elevation by means of a yielding leather pipe, or by a ball and ſocket turning every way, ſcrewed on the top of the pump. The veſſel containing the water is covered with a ſtrainer, which prevents the dirt and filth poured into it with the water from choaking the pump-work. Between the ſtrokes of this engine the ſtream is diſcontinued for want of an air-veſſel. However, in ſome caſes, engines of this conſtruction have their uſe, becauſe the ſtream, though interrupted, is much ſmarter than when the engine is made to throw water in a continued ſtream. The beſt engine of this latter kind is that of Mr. Newſham, formerly an engine-maker in London. A perſpective view of the whole engine ready for working is repreſented in *Tab. Hydraulics*, &c. *fig.* 3. This engine conſiſts of a ciſtern A B about three times as long as it is broad, made of thick oaken planks, the joints of which are lined with ſheet-copper, and eaſily moveable by means of a pole and croſs bar C in the fore-part of the engine, which is ſo contrived as to ſlide back under the cover of the ciſtern, and of four ſolid wheels, two of which are ſeen at D and E. The hind axle-tree, to which the wheel E and its oppoſite are fixed, is faſtened acroſs under the bottom of the ciſtern; but the fore axle-tree, bearing the wheel D, &c. is put on a ſtrong pin or bolt ſtrongly faſtened in an horizontal ſituation in the middle of the front of the bottom of the ciſtern, by which contrivace the two fore-wheels and their axle-tree have a circular motion round the bolt, ſo that the engine may ſtand as firm on rough or ſloping ground as if it was level. Upon the ground next to the hind part of the engine may be ſeen a leathern pipe F, one end of which may be ſcrewed on and off upon occaſion to a braſs cock at the lower end of the ciſtern: the other end is immerſed in the water, ſupplied by a pond, *fire*-plug, &c. and the pipe becomes a ſucking pipe for furniſhing the pumps of the engine by its working, without pouring water into the ciſtern. To the hind part of the ciſtern is faſtened a wooden trough G, with a copper grate for keeping out ſtones, ſand, and dirt, through which the ciſtern is ſupplied with water when the ſucking pipe cannot be uſed. The fore part of the ciſtern is alſo ſeparated from the reſt of its cavity by another copper grate, through which water may be poured into the ciſtern. Thoſe that work the pumps of this engine move the handles viſible at the long ſides up and down, and are aſſiſted by others who ſtand on two ſuſpended treddles, throwing their weight alternately on each of them, and keeping themſelves ſteady by taking hold of two round horizontal rails, H, I, framed into four vertical ſtands, which reach to the bottom of the ciſtern, and are well ſecured to its ſides. Over the hind trough there is an iron handle or key K, ſerving to open and ſhut a cock placed under it on the bottom of the ciſtern, the uſe of which we ſhall explain in the ſequel of this article. L is an inverted pyramidal box or caſe which preſerves the pumps and air veſſel from damage, and alſo ſupports a wooden frame M, on which ſtands a man, who, by raiſing or depreſſing, and turning about the ſpout N, directs the ſtream of water as occaſion requires. This ſpout is made of two pieces of braſs pipe, each of which has an elbow; the lower is ſcrewed over the upper end T (ſee *fig.* 5.) of the pipe that goes through the air-veſſel, and the upper part ſcrews on to the lower by a ſcrew of ſeveral threads, ſo truly turned as to be water-tight in every ſituation. The conic form of the ſpouting-pipe ſerves for wire-drawing the water in its paſſage through it, which occaſions a friction that produces ſuch a velocity of the jet as to render it capable of breaking windows, &c. whilſt the valves and leathern pipes of the engine have ſufficient water-way to ſupply the jet in its greateſt velocity. Leather pipes of conſiderable length may be ſcrewed at one end to the noſel of the engine, and furniſhed at the other end with a wooden or braſs pipe for guiding the water into the inner apartments of houſes, &c. Between the pyramidal box L and the fore-end of the engine, there is a ſtrong iron bar O, lying in an horizontal poſition over the middle of the ciſtern, and playing in braſſes ſupported by two wooden ſtands; one of which, P, is placed between the two fore-ſtands of the upper rails, and the other is hid in the incloſure over the hind part. Upon proper ſquares of this bar are fitted, one near each end, two ſtrong croſs bars, which take hold of the long wooden cylindrical handles, by means of which the engine is worked; and the treddles by which they are aſſiſted are ſuſpended at each end by chains in the form of a watch chain, and receive their motion jointly with the handles that are on the ſame ſide, by means of two circular ſectors of iron faſtened together, and fixed upon proper ſquares of the middle horizontal bar; the two fore ones may be ſeen at Q; the two hind ones, repreſented on a large ſcale in *fig.* 4. differ from the former only in thickneſs; for the fore-ſectors are made to carry only one chain each, faſtened by one end to their upper part, and by the lower end to the treddles; whereas the ſole of the two hind ſectors is wide enough to carry two chains each; one ſet faſtened like thoſe of the fore ones for the motion of the treddles; and the other two chains are faſtened by their lower ends to the lower part of theſe ſectors, and by their upper ends to the top of the piſton bars, in order to give them motion. See *fig.* 4. in which the hind ſectors and their apparatus are repreſented, as they would appear to a perſon, ſtanding between the two fore wheels, and looking at the hind part of the engine. The ſquare over the letter A is the ſection of the middle bar, on which, right over the two barrels, are placed the two ſectors B C A and D E A forged together. E G H K and *f g h k* are the two piſton rods; and the openings between the letters G, H, and *g*, *h*, are the ſpaces through which the hind parts of the two treddles paſs. L and M repreſent two ſtrong ſtuds rivetted on the other ſide of the bars on which they are placed; and to each of theſe is faſtened a chain like a watch chain, fixed by their upper ends to the upper extremities D and B of the iron ſectors, by which they are drawn up and down alternately. Theſe ſectors give alſo an alternate motion up and down to the piſton-rods, by means of two other chains left white in the figure, in order to diſtinguiſh them from the others; theſe are faſtened by their lower ends to the lower extremities of the ſectors E and C, and their upper ends terminating in a male ſcrew, are made tight to the piſton-rods at F and *f* by two nuts. The ſhape of the piſton-rods, and the ſize and ſituation of the chains that give them motion, are ſo contrived, that the vertical axis of the piſtons is exactly in the middle of the breadth of the perpendicular part of the chains, and of the upper part of the piſton-rods taken together. P Q repreſents one of the two croſs bars through the ends of which paſs the long handles, to which the men apply their hands when they work the engine; theſe croſs bars are fitted on the middle bar at ſome diſtance from the ſectors.

The other parts of this uſeful engine may be underſtood by the help of *fig.* 5. which repreſents a vertical ſection taken through the middle line of the hind part of the engine, as alſo the ſection of the air-veſſel, and that of one of the barrels, and likewiſe the profiles of the hind ſectors, and of ſeveral other parts. A B is the ſection of the bottom of the ciſtern, and C that of the hindmoſt axle-tree. D E is the vertical ſection of a ſtrong piece of caſt braſs or hard metal, ſo worked as to have a hollow in it, repreſented by the white part, and fixed to the bottom of the ciſtern: this reaches from the opening D through the cock W, and afterwards divides itſelf into two branches, ſo as to open under the two barrels; one of theſe branches is exhibited in the figure, and the other is exactly behind this. Through this channel, which may be called the ſucking-piece, water is conveyed to the pumps by the preſſure of the atmoſphere, either from the ciſtern itſelf, or from any place at a diſtance, by means of a leathern pipe F, *fig.* r. which ſcrews on to the ſucking-piece at D, *fig.* 5. under the hind trough Z, the grate of which is repreſented by the horizontal ſtrokes. F G repreſents the vertical ſection of another piece of caſt braſs or hard metal that may be called the communication-piece, having two hollows for conveying the water from under the two piſtons to the two openings of the flanch of the air-veſſel: one of theſe hollows appears in the figure; the other lies exactly behind this, though not in a parallel direction. Between the ſection of the ſucking-piece D E and that of the communication-piece F G may be obſerved the ſection of one of the plates of leather, which makes all tight, and forms one of the two ſucking valves, of which there is another juſt behind this under the other barrel. R S T is the ſection of the copper air-veſſel, and T V that of the conduit-pipe; this veſſel is ſcrewed on to the hind part of the communication-piece, and at top is faſtened by a collar of iron to a croſs piece of timber. Between the flanch of the air-veſſel and the communication-pipe may be obſerved the ſection of one of the plates of leather, making all tight, and ſcrewing one of the two forcing valves, of which there is another juſt behind this, exactly over the other opening of the communication from the air-veſſel. Theſe valves are loaded with a lump of caſt iron or lead, having a tail or teat let through the flap of the valve and croſs-pinned under it; and it is to be obſerved, that, though both the valves are repreſented open in the figure, they are never both open at the ſame time; for when the engine is not at work they are cloſed down by the weights on their upper ſurfaces; and when the engine works, two are ſhut, and the other two are open alternately, by the motion of the piſtons and the action of the atmoſphere, together with the re-action of the air contained in the air-veſſel. H I is the ſection of one of the barrels of the two pumps, which are both ſucking and forcing, as is evident from the poſition of the valves and the ſtructure of the piſtons, each of which is compoſed of two iron plates, of two wooden trenchers, and of two flat pieces of leather turning one up and the other down. L K repreſents one of the piſton rods edge-wiſe, behind which is one of the chains, the top ſcrew of which, K, can only be ſeen. M is the end of the middle bar, and N a ſection of the hindmoſt of the two middle ſtands which ſupport the middle bar. O repreſents the end of the profile of one of the treddles, paſſing through the rectangular holes of the piſton-rods as in *fig.* 2. The weight on theſe treddles brings them and the piſton-rods down alternately, and they are raiſed up again by help of the other ſet of chains, one of which may be ſeen edge-wiſe in this figure, placed on the ſole of one of the ſectors, &c. See *fig.* 4 PQ is part of the croſs bars which carry the handles, ſeen edge-wiſe; and XY repreſents an iron handle, by the help of which the cock W may be placed in the ſeveral ſituations requiſite for the uſe of the engine. The mechaniſm of the cock W may be underſtood by *fig.* 6, 7, and 8. which repreſent the horizontal ſection of it in three different ſituations. It has three holes that are left white in theſe figures. In *fig.* 6. the poſition of the cock is repreſented when the handle XY or K is in a direction parallel to DE or to the middle bar, as in *fig.* 5. and *fig.* 3. In this poſition the water ſupplied by the ſucking-pipe enters at D, and proceeds directly through the cock W to the valve under the two piſtons; and there is now no communication from the barrels with the cavity of the ciſtern. In *fig.* 7. we have the poſition of the cock when the handle XY is turned one quarter of a revolution towards the eye from the laſt mentioned ſituation, in which caſe there is no communication from the barrels with the outer extremity of the ſucking-piece, but the water poured into the fore and hind trough, and paſſing from thence into the cavity of the ciſtern, enters the cock ſide-wiſe at W, and turning at right angles through the cock towards E, proceeds to the barrels of the pumps. *Fig.* 8. repreſents the cock W when the handle is placed diametrically oppoſite to its laſt ſituation, in which caſe there is no communication from the under-ſide of the barrels with the cavity of the ciſtern or the outward end of the ſucking-piece; but this ſituation affords a communication from the cavity of the ciſtern with the outſide of the engine, and the water left in the cavity of the ciſtern may by this means be employed when the engine has done working. Theſe engines are made of five or ſix different ſizes. See Deſaguliers's Courſe of Exper. Philoſ. vol. ii. p. 505—518.

The principles on which this engine acts, ſo as to produce a continued ſtream are obvious: the water, being driven into the air-veſſel, as in the operation of common ſucking and forcing pumps, will compreſs the air contained in it, and proportionably increaſe its ſpring, ſince the force of the air's ſpring will always be inverſely as the ſpace which it poſſeſſes: therefore, when the air-veſſel is half filled with water, the ſpring of the included air, which in its original ſtate counterbalanced the preſſure of the atmoſphere, being now compreſſed into half the ſpace, will be equal to twice the preſſure of the atmoſphere; and by its action on the ſubjacent water will cauſe it to riſe through the conduit pipe, and to play a jet of 32 or 33 feet high, abating the effect of friction. When the air-veſſel is two-thirds full of water, the ſpace which the air occupies is only one-third of its firſt ſpace; therefore, its ſpring being three times as great as that of the common air, will project the water with twice the force of the atmoſphere, or to the height of 64 or 66 feet. In the ſame manner, when the air-veſſel is three-fourths full of water, the air will be compreſſed into one-fourth of its original ſpace, and cauſe the water to aſcend in air with the force of three atmoſpheres, or to the height of 96 or 99 feet, &c. as in the following table:

Height of the water	Height of the compreſſed air	Proportion of the air's ſpring	Height to which the water will riſe
$\frac{1}{2}$	$\frac{1}{2}$	2	33 feet
$\frac{2}{3}$	$\frac{1}{3}$	3	66
$\frac{3}{4}$	$\frac{1}{4}$	4	99
$\frac{4}{5}$	$\frac{1}{5}$	5	132
$\frac{5}{6}$	$\frac{1}{6}$	6	165
$\frac{6}{7}$	$\frac{1}{7}$	7	198
$\frac{7}{8}$	$\frac{1}{8}$	8	231
$\frac{8}{9}$	$\frac{1}{9}$	9	264
$\frac{9}{10}$	$\frac{1}{10}$	10	297

See Martin's Philoſ. Brit. vol. ii. p. 69, &c.

Fire-*engine* is alſo a name frequently given to a machine for raiſing water by ſteam, more properly called **steam**-*engine.*

Fire, *everlaſting*, in *Pagan Theology*, is a kind of reputed ſacred *fire* worſhipped by the Gavers or **Gabres** in Perſia. Dr. Mounſey, formerly phyſician to the Czarina's army, has given the following account of it: this perpetual *fire* riſes out of the ground in the peninſula of Abſcheron, about twenty miles from Baku, and three miles from the Caſpian ſhore. The ground is rocky, over which is a ſhallow covering of earth. If a little of the ſurface be ſcraped off, and *fire* be applied to the hollow, it catches flame immediately, and burns without intermiſſion, and almoſt without conſumption; nor is it ever extinguiſhed unleſs ſome cold earth be thrown over it, by which it is eaſily put out. There is a ſpot of ground, about two Engliſh miles in extent, which has this property, where the earth continually burns; but the moſt remarkable part of it is a hole about four feet deep and fourteen in diameter. This *fire* is worſhipped, and is ſaid to have burnt many thouſand years. The cracks in the walls of the caravanſera inhabited by the religious are covered with flame if a candle be held to them; and when there is occaſion for a ſmall light, no more is neceſſary than to ſtick one end of a piece of reed in the ground, and apply a lighted candle to the other; a flame will kindle at the top of the reed, and burn till it is extinguiſhed by covering it. They burn ſtones into lime by filling a hole in the ground with a heap of them, and bringing a lighted candle to the hole, upon which the *fire* kindles, and in about three days burns the ſtones ſufficiently. The flame yielded by this *fire* has neither ſmoke nor ſmell. This ſacred and adored phenomenon is nothing more than an inflammable vapour, which iſſues in great quantity out of the ground in this place, and is ſupplied by the naphtha with which the adjacent country abounds. Philoſ. Tranſ. vol. xlv. for 1748, p. 296.

Fire, *extinguiſhing of.* The world has long been in an opinion, that a more ready way than that in general uſe might be found for *extinguiſhing* fires in buildings; and it has been generally attempted upon the doctrine of exploſion. Zachary Greyl was the firſt perſon who put this plan into execution with any tolerable degree of ſucceſs. He contrived certain engines eaſily manageable, which he proved before ſome perſons of the firſt rank to be of ſufficient efficacy, and offered to diſcover the ſecret by which they were contrived for a large premium given either from the crown or raiſed by a ſubſcription of private perſons. But this ſcheme meeting with no better ſucceſs than things of this nature uſually do, he died without making this diſcovery. Two years after this, the people who had his papers found the method; and it was ſhewn before the king of Poland and a great concourſe of nobility at Dreſden, and the ſecret purchaſed at a very conſiderable price. After this the ſame perſon carried the invention to Paris and many other places, and practiſed it every where with ſucceſs.

The ſecret was this: a wooden veſſel was provided holding a very conſiderable quantity of water; in the center of this there was fixt a caſe made of iron plates, and filled with gunpowder; from this veſſel to the head of the larger veſſel containing the water, there proceeded a tube or pipe which might convey the *fire* very readily through the water to the gunpowder contained in the inner veſſel. This tube was filled with a preparation eaſily taking *fire* and quickly burning away; and the manner of uſing the engine was to convey it into the room or building where the *fire* was, with the powder in the tube lighted. The conſequence of this was, that the powder in the inner caſe ſoon took *fire*, and with a great exploſion burſt the veſſel to pieces and diſperſed the water every way; thus was the *fire* put out in an inſtant, though the room was flaming before in all parts at once. The advantage of this invention was, that at a ſmall expence, and with the help of a few people, a *fire* in its beginning might be extinguiſhed; but the thing was not ſo general as it was at firſt expected that it would prove; for though of certain efficacy in a chamber or cloſe building where a *fire* had but newly begun; yet when the miſchief had increaſed ſo far that the houſe was fallen in, or the top open, the machine had no effect. This was the contrivance firſt diſcovered by Greyl, and from which our chemiſt Godfrey took the hint of the machine, which he called the **water**-*bomb*, and would fain have brought into uſe in England. Act. Eruditor. ann. 1721. p. 183.

Dr. Hales propoſes to check the progreſs of *fires* by covering the floors of the adjoining houſes with earth. The propoſal is founded on an experiment which he made with a fir-board half an inch thick, part of which he covered with an inch depth of damp garden mould, and then lighted a *fire* on the ſurface of the mould; though the *fire* was kept up by blowing, it was two hours before the board was burnt through, and the earth prevented it from flaming. The thicker the earth is laid on the floors, the better; however, Dr. Hales apprehends, that the depth of an inch will generally be ſufficient; and he recommends to lay a deeper covering on the ſtairs, becauſe the *fire* commonly aſcends by them with the greateſt velocity. Philoſ. Tranſ. vol. xlv. for 1748, p. 277.

Mr. Hartley made ſeveral trials in the years 1775 and 1776, in order to evince the efficacy of a method which he had invented for reſtraining the ſpread of *fire* in buildings.

ings. For this purpoſe thin iron plates are well nailed to the tops of the joiſts, &c. the edges of the ſides and ends being lapped over, folded together, and hammered cloſe. Partitions, ſtairs, and floors, may be defended in the ſame manner; and plates applied to one ſide have been found ſufficient. The plates are ſo thin as not to prevent the floor from being nailed in the joiſts in the ſame manner as if this preventative were not uſed: they are kept from ruſt by being painted or varniſhed with oil and turpentine. The expence of this addition, when extended through a whole building, is eſtimated at about five *per cent.* Mr. Hartley has a patent for this invention, and parliament has voted a ſum of money towards defraying the expence of his numerous experiments. 14 Geo. III. cap. 85. The ſame preſervative may alſo be applied to ſhips, furniture, &c.

Lord Mahon has alſo diſcovered and publiſhed a very ſimple and effectual method of ſecuring every kind of building againſt all danger of *fire*. This method he has divided into three parts, viz. under-flooring, extra-lathing, and inter-ſecuring. The method of under-flooring is either ſingle or double: in ſingle under-flooring, a common ſtrong lath of oak or fir, about one-fourth of an inch thick, ſhould be nailed againſt each ſide of every joiſt, and of every main timber, ſupporting the floor which is to be ſecured. Other ſimilar laths are then to be nailed along the whole length of the joiſts, with their ends butting againſt each other. The top of each of theſe laths or fillets ought to be at 1½ inch below the top of the joiſts or timbers againſt which they are nailed; and they will thus form a ſort of ſmall ledge on each ſide of all the joiſts. Theſe fillets are to be well bedded in a rough plaſter hereafter mentioned when they are nailed on, ſo that there may be no interval between them and the joiſts; and the ſame plaſter ought to be ſpread with a trowel upon the tops of all the fillets, and along the ſides of that part of the joiſts which is between the top of the fillets and the upper edge of the joiſts. In order to fill up the intervals between the joiſts that ſupport the floor, ſhort pieces of common laths, whoſe length is equal to the width of theſe intervals, ſhould be laid in the contrary direction to the joiſts, and cloſe together in a row, ſo as to touch one another: their ends muſt reſt upon the fillets, and they ought to be well bedded in the rough plaſter, but are not to be faſtened with nails. They muſt then be covered with one thick coat of the rough plaſter, which is to be ſpread over them to the level of the tops of the joiſts; and in a day or two this plaſter ſhould be trowelled over cloſe to the ſides of the joiſts, without covering the tops of the joiſts with it.

In the method of double-flooring, the fillets and ſhort pieces of laths are applied in the manner already deſcribed; but the coat of rough plaſter ought to be little more than half as thick as that in the former method. Whilſt this rough plaſter is laid on, ſome more of the ſhort pieces of laths above mentioned muſt be laid in the intervals between the joiſts upon the firſt coat, and be dipped deep in it. They ſhould be laid as cloſe as poſſible to each other, and in the ſame direction with the firſt layer of ſhort laths. Over this ſecond layer of ſhort laths there muſt be ſpread another coat of rough plaſter, which ſhould be trowelled level with the tops of the joiſts without riſing above them. The rough plaſter may be made of coarſe lime and hair; or inſtead of hair, hay chopped to about three inches in length may be ſubſtituted with advantage. One meaſure of common rough ſand, two meaſures of ſlacked lime, and three meaſures of chopped hay, will form in general a very good proportion, when ſufficiently beat up together in the manner of common mortar. The hay ſhould be put in after the two other ingredients are well beat up together with water. This plaſter ſhould be made ſtiff; and when the flooring boards are required to be laid down very ſoon, a fourth or fifth part of quick-lime in powder, formed by dropping a ſmall quantity of water on the lime-ſtone a little while before it is uſed, and well mixed with this rough plaſter, will cauſe it to dry very faſt. If any cracks appear in the rough plaſter work near the joiſts when it is thoroughly dry, they ought to be cloſed by waſhing them over with a bruſh wet with mortar waſh: this waſh may be prepared by putting two meaſures of quick-lime and one of common ſand in a pail, and ſtirring the mixture with water till the water becomes of the conſiſtence of a thin jelly.

Before the flooring boards are laid, a ſmall quantity of very dry common ſand ſhould be ſtrewed over the plaſter-work, and ſtruck ſmooth with an hollow rule, moved in the direction of the joiſts, ſo that it may lie rounding between each pair of joiſts. The plaſter-work and ſand ſhould be perfectly dry before the boards are laid for fear of the dry rot. The method of under-flooring may be ſucceſsfully applied to a wooden ſtair-caſe; but no ſand is to be laid upon the rough plaſter-work. The method of extra-lathing may be applied to cieling joiſts, to ſloping roofs, and to wooden partitions.

The third method, which is that of inter-ſecuring, is very ſimilar to that of under-flooring; but no ſand is afterwards to be laid upon it. Inter-ſecuring is applicable to the ſame parts of a building as the method of extra-lathing, but it is ſeldom neceſſary.

Lord Mahon has made ſeveral experiments in order to demonſtrate the efficacy of theſe methods. In moſt houſes, it is only neceſſary to ſecure the floors; and the extra-expence of under-flooring, including all materials, is only about nine pence per ſquare yard; and with the uſe of quick-lime a little more. The extra expence of the method of extra-lathing is no more than ſix pence per ſquare yard for the timber ſide-walls and partitions; but for the cieling about nine pence per ſquare yard. But in moſt houſes no extra-lathing is neceſſary. Philoſ. Tranſ. vol. lxviii. for 1778, part ii. art. 40. p. 884, &c.

FIRE-*flaire*, in *Ichthyology*. See PASTINACHA *marina*.

FIRE-*flies*, in the *Hiſtory of Inſects*. Among the flies of Guiana there are two ſpecies of *fire-flies*. The largeſt is more than an inch in length, having a very large head connected with the body by a joint of a particular ſtructure, with which at ſome times it makes a loud knock, eſpecially when laid on its back. This fly has two feelers or horns, two wings, and ſix legs. Under its belly is a circular patch, which, in the dark, ſhines like a candle; and on each ſide of the head, near the eyes, is a prominent, globular, luminous body, in ſize about one-third larger than a muſtard ſeed. Each of theſe bodies is like a riſing ſtar, emitting a bright, and not ſmall light; ſince two or three of theſe animals put into a glaſs veſſel afford light ſufficient to read without difficulty, when placed cloſe to a book. When the fly is dead theſe bodies will ſtill afford conſiderable light, though leſs vivid than before; and if bruiſed and rubbed over the hands and face, they become luminous in the dark, like a board ſmeared with phoſphorus. They have a reddiſh brown colour, and live in rotten trees in the day, but are always abroad in the night. The other kind are not more than half as large as the former, and their light proceeds from under their wings, and is ſeen only when they are elevated, like ſparks of *fire*, appearing and diſappearing every ſecond. Of theſe the air is full in the night, though they are never ſeen in the day. They are common not only in the ſouthern but northern parts of America during the ſummer.

FIRE-*lock*, or FUSIL, a ſmall gun which fires with a flint and ſteel. It is diſtinguiſhed from an old muſket or match-lock which was fired with a match. The *fire-lock* is now in common uſe with the European armies, and carried by the foot-ſoldiers. It it is three feet eight inches in the barrel; and, including the ſtock, four feet eight inches, and carries a leaden bullet, of which twenty-nine make 2lb. Its diameter is the fifty-five hundredths of an inch, and that of the barrel one and a fiftieth part of the ſhot. *Fire-locks* were made uſe of in 1690, when match-locks were diſuſed; but the time of their invention is uncertain.

For the uſe of the *fire-lock*, ſee EXERCISE.

FIRE-*maſter*, in our *Train of Artillery*, is an officer who gives the directions, and the proportions of the ingredients for all the compoſitions of *fire*-works, whether for ſervice in war, or for rejoicings and recreations. He has a mate to aſſiſt him.

His orders are given to the *fire*-workers and bombardeers, who are obliged to execute them.

FIRE-*office*, an office of inſurance from *fire*. See INSURANCE.

FIRE-*ordeal*. See ORDEAL.

FIRE-*philoſophers*, or *Philoſophi per ignem*, a fanatical ſect of philoſophers who appeared towards the cloſe of the ſixteenth century, and made a figure in almoſt all the countries of Europe. The diſtinguiſhing tenet from which they derived this appellation was, that the intimate eſſences of natural things were only to be known by the trying efforts of *fire*, directed in a chemical proceſs. They were alſo called *Theoſophiſts*, from their declaring againſt human reaſon as a dangerous and deceitful guide, and repreſenting a divine and ſupernatural illumination as the only means of arriving at truth: they were likewiſe denominated *Paracelſiſts*, from the name of Paracelſus, the eminent phyſician and chemiſt, who was the chief ornament and leader of this extraordinary ſect. It was patronized in England by M. Robert Flood or Fludd, who endeavoured to illuſtrate the philoſophy of Paracelſus in a great number of treatiſes; in France, it was zealouſly propagated by Rivier; in Denmark, by Severinus; in Germany, by Kunrath, an eminent phyſician of Dreſden; and in other countries by warm and ſucceſsful votaries, who aſſumed a ſtriking air of piety and devotion, and propoſed to themſelves no other end than the advancement of the Divine glory, and the reſtoration of peace and concord in a divided church; accordingly they were joined by ſeveral perſons eminent for their piety, and diſtinguiſhed by their zeal for the advancement of true religion. One of the moſt celebrated of theſe was Daniel Hoffman, profeſſor of divinity in the univerſity of Helmſtadt, who, availing himſelf of ſome unguarded paſſages in the writings of Luther, extravagantly maintained, that philoſophy was the mortal enemy of religion; that truth was diviſible into two branches, the philoſophical and theological; and that what was true in philoſophy was falſe in theology. Hoffman was afterwards obliged, by the interpoſition of Henry Julius, duke of Brunſwick, to retract his invectives againſt philoſophy, and to acknowledge in the moſt open manner the harmony and union of ſound philoſophy with true and genuine theology. Moſheim's Eccl. Hiſt. by Maclean, vol. iv. p. 17, 18. 8vo. edit. 1768.

FIRE-*places* are contrivances for communicating heat to rooms, and alſo for anſwering various purpoſes of art and manufacture.

For the latter kind, ſee FURNACE and STOVE. The principal objects with regard to the former are leſſening the charge of fuel and augmenting the benefit of *fire*. The general properties of air and *fire*, on which their conſtruction chiefly depends, are the following, viz. that air is rarefied by heat, and condenſed by cold; i. e. the ſame quantity of air takes up more ſpace when warm than when cold: air rarefied and expanded by heat is ſpecifically lighter than it was before, and will riſe in other air of greater denſity; ſo that a *fire* being made in any CHIMNEY, the air over the *fire* is rarefied by the heat, becomes lighter, and immediately riſes in the funnel, and goes out; the other air in the room, flowing towards the chimney, ſupplies its place, is rarefied in its turn, and riſes likewiſe; and the place of the air thus carried out of the room, is ſupplied by freſh air coming in through doors and windows, or, if they be ſhut, through every crevice with violence; or if the avenues to the room be ſo cloſed up, that no freſh ſupply of air can be obtained, the current up the funnel muſt flag; and the ſmoke, no longer driven up, float about in the room. Common *fire* throws out light, heat, and ſmoke; the light and heat move in right lines with great ſwiftneſs, but the ſmoke is but juſt ſeparated from the fuel, and moves only as it is carried off by the ſtream of rarefied air; and without a continual acceſſion of air, will remain crowded about the *fire*, and ſtifle it. Heat may be ſeparated from the ſmoke and light by means of a plate of iron; and the greateſt ſenſible heat is directly over the *fire*, where, beſides the rays of heat ſhot upwards, there is a continual riſing ſtream of hot air, heated by thoſe rays that are ſhot round on every ſide.

The *fire-places* moſt in uſe are, 1. The large open *fire-places*, that were commonly uſed in former times, and are ſtill continued in the country, and in kitchens. Theſe require a large funnel, conſume a great quantity of fuel, generally ſmoke, if the door be not left open, and contribute little to warm a room. Their ſpaciouſneſs is their greateſt convenience.

2. Inſtead of theſe old faſhioned chimnies, the modern *fire-places*, eſpecially in towns, have been conſtructed with low breaſts and hearths, narrowed by jambs. *Fire-places* of this contracted form will keep rooms generally free from ſmoke; but the funnel requires a conſiderable quantity of air, which ruſhes in at every crevice, ſo as to render the ſituation of perſons continually expoſed to it uncomfortable and dangerous. Many of the diſeaſes proceeding from colds may be aſcribed to ſtrong drawing chimnies, whereby, in ſevere weather, perſons are ſcorched before while they are froze behind. Theſe *fire-places* are of little uſe in warming a room; becauſe the air round them, which is warmed by the direct rays of the *fire*, does not continue in the room, but is continually collected into the chimney by the current of cold air coming behind it, and is preſently carried off. Beſides, the gteateſt part of the *fire* is loſt, being abſorbed by the back jambs and hearth, which are ſo dark and porous as to reflect very little, and the upright heat flies directly up the chimney. To remedy this inconvenience the Sieur Gauger, in his book entitled La Mechanique de Feu, publiſhed in 1709, and ſince tranſlated by Dr. Deſaguliers, (ſee CHIMNEY) propoſed ſeven different conſtructions of, 3. A third ſort of chimnies, in which there are hollow cavities made by iron plates in the back, jambs, and hearth, through which plates the heat paſſing, warms the air in thoſe cavities, which is continually coming into the room freſh and warm. This conſtruction had many obvious advantages; but the expence and difficulty attending it diſcouraged the propagation of the invention. However, the upright heat was almoſt wholly loſt in theſe as in the common chimnies

4. Another kind of *fire-place* is the Holland iron ſtove, with a flue proceeding from the top, and a ſmall iron door opening into the room. Theſe ſerve to warm a room, ſave fuel, and produce a conſtant change of air. But the *fire* is not ſeen, and little uſe can be made of it beſides that of warming the room. It is therefore rarely uſed in England, except in ſome work-ſhops.

5. The German ſtove is compoſed of five iron plates ſcrewed together, and fixed ſo as that the fuel may be put into it from another room, or from the outſide of the houſe. It is a kind of oven reverſed, its mouth being without, and body within the room that is to be warmed by it. This ſtove warms a room with little fuel, and is attended with no danger from the irruption of cold air; but the *fire* is not ſeen, and there is no change of air in the room heated by it. For an account of the Chineſe ſtove, ſee KANG.

6. Another kind of convenience for warming rooms is a charcoal *fire* kindled in pots and chaffing diſhes. This is chiefly uſed in the ſhops of handicraftmen. But the ſulphureous fumes ariſing from the coals render this mode of giving heat diſagreeable and dangerous, and in a cloſe room ſometimes fatal.

The ingenious Dr. Franklin, whoſe name we have had frequent occaſion of recording in this work, having recounted the inconveniencies and advantages of *fire-places* in common uſe, propoſes a new contrivance for this purpoſe, called the Penſylvania *fire-place*. 1. This machine conſiſts of a bottom-plate or hearth-piece (ſee *Tab. Miſcellany*, *fig*. 6.) with a riſing moulding before for a fender, two perforated ears F, G, for receiving two ſcrew-rods; a long air-hole *a a*, through which the outward air paſſes into an air-box; and three ſmoke-holes repreſented by dark ſquares in BC, through which the ſmoke deſcends and paſſes away; beſides double ledges for receiving between them the lower edges of the other plates. 2. A back plate without holes, and furniſhed with a pair of ledges to receive, 3. The two ſide-plates, each of which has a pair of ledges to receive the ſide-edges of the front plate, with a ſhoulder on which it reſts; two pair of ledges to receive the ſide-edges of the two middle plates which form the air-box, and an oblong air-hole near the top, through which the air warmed in the box is diſcharged into the room, and a wing or bracket, as H, and a ſmall hole, as R, for the axis of the regiſter to turn in. See *fig*. 7. which repreſents one of theſe plates. 4. An air-box, compoſed of the two middle plates D E and F G, *fig*. 8. and 9. The firſt has five thin ledges or partitions caſt on it, the edges of which are received into ſo many pair of ledges caſt in the other: the tops of all the cavities formed by theſe thin deep ledges are alſo covered by a ledge of the ſame form and depth caſt with them; ſo that when the plates are put together, and the joints luted, there is no communication between the air-box and the ſmoke. In the winding paſſages of this box, freſh air is warmed as it paſſes into the room. 5. A front plate, which is arched on the under ſide, and ornamented with foliages, &c. 6. A top plate, with a pair of ears M, N, (*fig*. 10.) anſwerable to thoſe in the bottom plate, and perforated for the ſame purpoſe. It has alſo a pair of ledges running round the under ſide to receive the top edges of the front, back and ſide plates. The air-box does not reach up to the top-plate by 2½ inches.

All theſe plates are of caſt iron; and when they are all in their proper places, they are bound firmly together by a pair of ſlender rods of wrought iron with ſcrews, and the machine appears as in *fig*. 10. There are alſo two thin plates of wrought iron, viz. 7. The ſhutter, which is of ſuch a length and breadth as to cloſe well the opening of the *fire-place*, and ſerving to blow up the *fire*, and to ſecure it in the night. It is raiſed or depreſſed by means of two braſs knobs, and ſlides in a groove left between the foremoſt ledge of the ſide plates and the face of the front plate. 8. The regiſter, which is placed between the back plate and air-box, and furniſhed with a key; ſo that it may be turned on its axis and made to lie in any poſition between level and upright. The operation of this machine, and the method of fixing it may be underſtood by obſerving the profile of the chimney and *fire-places* in *fig*. 11. M. is the mantle-piece or breaſt of the chimney; C the funnel; B the falſe back, made of brick-work in the chimney, four inches or more from the true back, from the top of which a cloſing is to be made over to the breaſt of the chimney, that no air may paſs into the chimney except that which goes under the falſe back, and up behind it; E the true back of the chimney; T the top of the *fire-place*; F the front of it; A the place where the *fire* is made; D the air-box; K the hole in the ſide plate, through which the warmed air is diſcharged out of the box into the room; H the hollow, formed by removing ſome bricks from the hearth under the bottom plate filled with freſh air, entering at the paſſage I, and aſcending into the air-box through the air-hole in the bottom plate near G, the partition in the hollow, deſigned to keep the air and ſmoke apart; P the paſſage under the falſe back, and part of the hearth for the ſmoke; and the arrows in the figure ſhew the courſe of the ſmoke. The *fire* being made at A, the flame and ſmoke will aſcend, ſtrike the top T, and give it a conſiderable heat; the ſmoke will turn over the air-box, and deſcend between it and the back plate to the holes near G in the bottom plate, heating in its paſſage all the plates of the machine; it will then proceed under and behind the falſe back, and riſe into the chimney. The air of the room contiguous to the ſeveral plates, and warmed by them, becomes ſpecifically lighter than the other air in the room, and is obliged to riſe; but, being prevented by the cloſure over the *fire-place* from going up the chimney, is forced out into the room, and riſing by the mantle-piece to the cieling, is again driven down gradually by the ſteam of newly-warmed air that follows; and thus the whole room becomes in a little time equally warmed. The air, alſo, warmed under the bottom plate and in the air-box, riſes and comes out of the holes in the ſide plates, and thus warming and continually changing the air of the room. In the cloſing of the chimney a ſquare opening for a trap-door ſhould be left open for the ſweeper to go up: the door may be made of ſlate or tin, and ſo placed, that by turning up againſt the back of the chimney when open, it cloſes the vacancy behind the falſe back, and ſhoots the ſoot that falls in ſweeping out upon the hearth. It will alſo be convenient to have a ſmall hole about five or ſix inches ſquare, cut near the cieling through into the funnel, and provided with a ſhutter, by occaſionally opening which, the heated air of the room and ſmoke of tobacco, &c. may be carried off without incommoding the company. For a farther account of the manner of uſing this *fire-place*, the advantages attending it, anſwers to objections and directions to the brick-layer in fixing it, the curious reader may conſult Franklin's Letters and Papers on Philoſophical Subjects, p. 284—318. edit. 1769.

Fire-*pots*, in the *Military Art*, are ſmall earthen pots into which is put a grenade, filled with fine powder till the grenade be covered; and then the pot is covered with a piece of parchment, and two pieces of match laid acroſs and lighted. This pot being thrown where it is deſigned to do execution, breaks and *fires* the powder, and thereby *fires* the powder in the grenade, which ought to have no fuze, that its operation may be the quicker.

Fire, *razant* or *raſant*, is a *fire* from the artillery and ſmall arms directed in a line parallel to the horizon, or to thoſe parts of the works of a place that are defended.

Fire, *running*, is when a rank or ranks of men drawn up *fire* one after another; or when the lines of an army are drawn out to *fire* on account of a victory; in which caſe each ſquadron or battalion takes it from that on its right, from the right of the firſt line to the left, and from the left to the right of the ſecond line, &c.

Fire-*ſhips*, in the *Navy*, veſſels charged with combuſtible materials or artificial *fire*-works; which having the wind of an enemy's ſhip, grapple her, and ſet her on *fire*.

It is obſerved by Anderſon, in his Hiſtory of Commerce, vol. I. p. 432. that ſome Engliſh veſſels, filled with combuſtible matter, and ſent among the Spaniſh ſhips compoſing the Invincible Armada in 1588, are ſaid to have given riſe to the terrible invention of *fire-ſhips*. However, Livy informs us, that the Rhodians had invented a kind of *fire*-ſhips which were uſed in junction with the Roman fleet in their engagement with the Syrians in the year before Chriſt 190: cauldrons of combuſtible and burning materials were hung out at their prows, ſo that none of the enemies ſhips durſt approach them: theſe fell on the enemies gallies, ſtruck their beaks into them, and at the ſame time ſet them on *fire*. Liv. lib. xxxvii. cap. 30. tom. iii. p. 322. Ed. Crevier.

There is nothing peculiar in the conſtruction of a modern *fire-ſhip*, except the apparatus by which the *fire* is inſtantly conveyed from one part to another, and from thence to the enemy: for this purpoſe the *fire* room, in which the combuſtibles are incloſed, is built between decks, and extends from the bulk-head at the forecaſtle to a bulk-head raiſed behind the main maſt. The train incloſed in this apartment is contained in a number of wooden troughs which interſect each other in different parts of the ſhip's length, being ſupported at proper diſtances by croſs-pieces and ſtanchions. On each ſide of the ſhip are cut out ſix or ſeven port-holes, in ſize about fifteen by eighteen inches, with their lids opening downward, and cloſe caulked up. Againſt each port is fixed an *iron*-CHAMBER, which, when the ſhip is fired, blows out the port-lid and lets out the flame. Under the main and fore ſhrouds is fixed a wooden funnel, one end of which communicates with a FIRE-*barrel*, and deſigned to convey the flames to the ſhrouds. Between the funnels, called alſo *fire*-trunks, are two ſcuttles or ſmall holes in the upper deck, ſerving alſo to let out the flames. Both funnels and ſcuttles muſt be ſtopped with plugs, and have ſail-cloth or canvas nailed over them, to prevent any accident happening from above to the combuſtibles below. The port-holes, funnels, and ſcuttles, ſerve not only to communicate the flames to the outſide and upper works of the ſhip and her rigging, but likewiſe to open a paſſage for the inward air confined in the *fire*-room, ſo that it may expand itſelf without blowing up the decks. On each ſide of the bulk-head behind is cut a hole big enough to receive a trough of the ſame ſize as the others; leading troughs whoſe foremoſt ends communicate with other troughs within the *fire*-room, extend obliquely from theſe openings to ſally-ports cut through the ſhip's ſide: the decks and troughs are well covered with melted roſin. When either of the leading-troughs is fired, the flame is immediately conveyed to the oppoſite ſide of the ſhip, and both ſides burn together.

The cabbins of the lieutenant and maſter are behind the *fire*-room, one on the ſtarboard and the other on the larboard ſide. The captain's cabin is ſeparated from theſe by a bulk-head.

The ſtores for a *fire-ſhip* of 150 tuns are 8 FIRE-*barrels*, 12 *iron*-CHAMBERS, 3½ priming compoſition barrels, 1 QUICK-*match* barrel, 30 dipped CURTAINS, 150 long REEDS ſingle dipped, 75 ſhort reeds ſingle dipped, 75 ſhort reeds double dipped, 209 bavins ſingle dipped, and 24 PORT-*fires*.

The quantity of compoſition for preparing the ſtores of a *fire-ſhip* is exhibited in the following table:

	petre lb.	ſulph. lb.	corn pow. lb.	pitch. lb.	roſin. lb.	tallow. lb.	tar. lb.	oil. pts.
For 8 barrels,	0	0	960	480	0	80	0	0
For 3½ ditto priming compoſition,	175	140	350	0	21	0	0	11
For the curtains, bavins, and reeds for the ſhip, and ſulphur for ſalting them,	0	200	0	350	175	50	25	0
Total,	175	340	1310	830	196	130	25	11

For reeds for the barrels, 160lb. being one-fifth of the whole of the laſt article.

When all the ſtores are provided, they are diſpoſed of in the following manner: four of the eight *fire*-barrels are placed under the four *fire*-trunks, and the other four between them, two on each ſide the *fire*-ſcuttles, where they are ſecurely cleated to the deck. The longeſt reeds are put into the fore and aft troughs, and tied down; the ſhorteſt reeds are laid in the troughs athwart, and tied down alſo: the bavins, dipped at one end, are tied faſt to the troughs over the reeds, and the curtains are nailed up to the beams in equal quantities on each ſide of the *fire*-room. The remainder of the reeds is placed in a poſition nearly upright at all the angles of every ſquare in the *fire*-room, and there tied down; and ſome of them are put round the *fire*-barrels and tied faſt. The priming compoſition is ſtrowed along all the troughs, and over the reeds and bavins; then lay the quick-match two or three ſtrands thick on the reeds, and about the *fire*-barrels and chambers, in order to communicate a general *fire* at once: let the plugs be taken out of the funnels and ſcuttles, the curtains covering the *fire*-barrels be cut and rolled back; and let the leading troughs be laid with four or five ſtrands of quick-match, and alſo the communication-trough, ſo that the *fire* may be communicated to the whole at once. Port-*fires*, which burn about twelve minutes, are frequently uſed for firing the ſhip in preference to matches. When two fleets commence an engagement, thoſe who have the care of the *fire-ſhips* prime and prepare their *fire*-works; and when they are ready for grappling, inform the admiral of it by a particular ſignal. Muller's Syſtem of Math. &c. vol. v. p. 299, &c. and Falconer's Mar. Dict.

Fire-*ſtone* is a coarſe, harſh, duſty FREE-*ſtone*, of a moderately compact texture, of a pale greyiſh colour, nearly white, with a very ſlight greeniſh tinge. This ſtone is moderately hard and heavy, and ſlightly colours the hands: it is compoſed of a fine ſmall angular grit, cemented by an earthy ſparry matter, intermixed with numerous ſmall ſpangles of a ſilvery mica: it will not ſtrike *fire* with ſteel, and in the fire changes to a ſlight reddiſh hue. It is called alſo *Rygate-ſtone*, from the place whence it is chiefly brought; it bears the *fire*, and is much uſed for chimneys, hearths, ovens, ſtoves, &c.

It does not bear the weather, and is therefore unfit for building.

Fire-*water*, a name given to alkaheſt. See Ignis *aqua*.

Fire, *wild*, is a kind of artificial or factitious *fire*, which burns even under water, and that with greater violence than out of it.

It is compoſed of ſulphur, naphtha, pitch, gum, and bitumen; and it is only extinguiſhable by vinegar, mixed with ſand and urine, or by covering it with raw hides.

Its motion or tendency is ſaid to be contrary to that of natural *fire*, and always following the direction in which it is thrown, whether it be downwards, ſidewiſe, or otherwiſe.

The French call it *Greek fire*, or *feu Gregeois*, becauſe firſt uſed by the Greeks about the year 660, as is obſerved by the Jeſuit Petavius, on the authority of Nicetas, Theophanes, Cedrenus, &c.

The inventor, according to the ſame Jeſuit, was an engineer of Heliopolis, in Syria, named Callinicus, who firſt applied it in the ſea-fight commanded by Conſtantine Pogonates againſt the Saracens, near Cyzicus, in the Helleſpont; and with ſuch effect, that he burnt the whole fleet therewith, wherein there were thirty thouſand men.

But others will have it of a much older date; and hold Marcus Gracchus the inventor; which opinion is ſupported by ſeveral paſſages, both in the Greek and Roman writers, which ſhew it to have been anciently uſed by both theſe nations in the wars. See Scaliger againſt Cardan.

Conſtantine's ſucceſſors uſed it on divers occaſions, with equal advantage, as himſelf; and what is remarkable enough is, that they were ſo happy as to keep the ſecret of the compoſition to themſelves; ſo that no other nation knew it in the year 960.

Hugh, king of Burgundy, demanding ſhips of the emperor Leo for the ſiege of Freſne, deſired likewiſe the Greek *fire*. Chorier, Hiſt. De Dauph.

F. Daniel gives us a good deſcription of the Greek *fire*, in his account of the ſiege of Damietta, under St. Louis. Every body, ſays that author, was aſtoniſhed with the Greek *fire* which the Turks then prepared; and the ſecret whereof is now loſt. They threw it out of a kind of mortar; and ſometimes ſhot it with an odd ſort of croſs bow, which was ſtrongly bent by means of a handle, or winch, of much greater force than the bare arm. That thrown with the mortar ſometimes appeared in the air of the ſize of a tun, with a long tail, and a noiſe like that of thunder. The French, by degrees, got the ſecret of extinguiſhing it; in which they ſucceeded ſeveral times.

Fire-*works*, or *artificial* **Fires**, are preparations made of gunpowder, ſulphur, and other inflammable and combuſtible ingredients, uſed on occaſion of public rejoicings, and other ſolemnities.

The principal of theſe are rockets, ſerpents, ſtars, hail, mines, bombs, garlands, letters, and other devices. See Rocket, Star, Bomb, &c.

The invention of *fire-works* is by M. Mahudel attributed to the Florentines and people of Sienna; who found out likewiſe the method of adding decorations to them of ſtatues, with *fire* iſſuing from their eyes and mouths.

The art of preparing and managing *fire-works* is called PYROTECHNY.

The making or ſelling of *fire-works*, or ſquibs, or throwing them about in any ſtreet, is, on account of the danger that may enſue to any thatched or timber buildings, declared to be a common nuſance, by 9 and 10 W. III. cap. 7. and puniſhed by a fine of 20*s*.

Fire-*workers*, are ſubordinate officers to the *fire-maſters*, who command the bombardeers, and are ſecond lieutenants to the royal regiment of artillery.

Theſe receive the orders from the *fire-maſters*, and ſee that the bombardeers execute them.

FIRING, in the *Military Art*, denotes the diſcharge of the fire-arms; and its object is to do the utmoſt execution to the enemy.

The preſent method of *firing* by platoons is ſaid to have been invented by Guſtavus Adolphus, and firſt uſed about the year 1618; the reaſon commonly given for this method is, that a conſtant fire may be always kept up. There are three different ways of platoon *firing*; viz. ſtanding, advancing, and retreating. But previous to every kind of *firing*, each regiment or battalion muſt be told off in grand diviſions, ſubdiviſions, and platoons, excluſively of the grenadiers, which form two ſubdiviſions, or four platoons of themſelves. In *firing* ſtanding, either by diviſions or platoons, the firſt fire is from the diviſion or platoon on the right; the ſecond fire, from the left; the third, from the right again; and ſo on alternately, till the *firing* comes to the center platoon, which is generally called the colour platoon, and does not fire, remaining as a reſerve for the colours. *Firing* advancing is performed in the ſame manner, with this addition, that before either diviſion or platoon fires, it advances three paces forward. *Firing* retreating varies from either of the former methods; for, before either diviſion or platoon fires, if they are marching from the enemy, it muſt go to the right about, and after *firing*, to the left about again, and continue the retreat as ſlow and orderly as poſſible.

In hedge-*firing* the men are drawn up two deep, and in that order both ranks are to fire ſtanding. Oblique *firing* is either to the right and left, or from the right and left to the center, according to the ſituation of the object. The Pruſſians have a particular contrivance for this purpoſe; if they are to level to the right, the rear ranks of every platoon make two quick but ſmall paces to the left, and the body of each ſoldier turns one-eighth of a circle, and *vice verſâ*. Parapet *firing* depends on the nature of the parapet over which the men are to fire, and alſo upon that of the attack made to poſſeſs it. This method of *firing* is ſometimes performed by ſingle ranks ſtepping on the banquette and *firing*; each man inſtantly handing his arms to the center rank of the ſame file, and taking his back in the room of it; and the center rank giving it to the rear to load, and forwarding the arms of the rear to the front rank; by which means the front rank men can fire ſix or ſeven rounds in a minute with exactneſs. Parapet *firing* may alſo be executed two deep, when the banquette is three feet broad, or in field works, where no banquettes are made. Square *firing* is performed by a regiment or body of men drawn up in a hollow ſquare, in which caſe each front is generally divided into four diviſions or *firings*, and the flanks of the ſquare, being the weakeſt part, are covered by four platoons of grenadiers. The firſt fire is from the right diviſion of each face; the ſecond from the left diviſion of each face, &c. and the grenadiers make the laſt fire. Street *firing* is practiſed in two ways; either by making the diviſion or platoon that has fired to wheel by half-rank to the right and left outwards from the center, and to march in that order by half diviſions down the flanks on each ſide of the column, and to draw up in the rear, and go on with their priming and loading; or, to make the diviſion or platoon, after *firing*, to face to the right and left outwards from the center, and one half rank to follow the other; and in that order to march in one center file down on each ſide of the column into the rear, and there draw up as before.

Firing-*iron*, in the *Manege*, is a piece of copper or iron, about a foot long, one end of which is made flat, and forged like a knife; the back of it being half an inch thick, and the fore edge about the fifth or ſixth part of this. When the farrier has made his *firing-iron* red hot in his forge, he applies the thinneſt part to the horſes ſkin, and ſo gives the *fire* to the hams, or ſuch places as ſtand in need of it.

FIRKIN, an Engliſh meaſure of capacity, for things liquid; containing the fourth part of the barrel.

The *firkin of ale* contains eight gallons; and that of *beer*, nine; two *firkins* of beer make the kilderkin; two kilderkins the barrel; and two barrels the hogſhead.

The *firkins* of *ſoap* and *butter* are on the footing of the *firkin* of ale; viz. a gallon per *firkin* leſs than that of beer.

FIRLOT, a dry meaſure uſed in Scotland. The oat *firlot*, which contains $21\frac{1}{4}$ pints of that country, is $19\frac{1}{2}$ inches in diameter both at top and bottom, being of a perfectly cylindrical form, and in depth $7\frac{1}{3}$ inches. The wheat *firlot* contains about 2211 cubical inches, and the barley *firlot* 31 ſtandard pints; whereby it appears that the Scotch wheat *firlot* exceeds the Engliſh buſhel by 33 cubical inches.

FIRMAMENT, in the *Ancient Aſtronomy*, the eighth heaven, or ſphere; being that wherein the fixed ſtars were ſuppoſed to be placed.

It is called the *eighth*, with reſpect to the ſeven heavens or ſpheres of the planets, which it ſurrounds.

It is ſuppoſed to have two motions; a diurnal motion, given it by the primum mobile, from eaſt to weſt, about the poles of the ecliptic; and another oppoſite motion from weſt to eaſt; which laſt it finiſhes, according to Tycho, in 25412 years; according to Ptolemy, in 36000; and according to Copernicus, in 258000; in which time the fixed ſtars return to the ſame preciſe points wherein they were at the beginning. This period is commonly called Plato's year, or the great year. See Præcession *of the equinox*.

In divers places of Scripture the word *firmament* is uſed for the middle region of the air. Many of the ancients allowed, with the moderns, that the *firmament* is a fluid matter; though they, who gave it the denomination of *firmament*, muſt have taken it for a ſolid one.

FIRMAN, in the Eaſt Indies, and particularly in the territories of the Great Mogul, is the paſſport, or permit, granted to foreign veſſels, to trade within their juriſdiction.

FIRMNESS, Firmitas, in *Philoſophy*, denotes the conſiſtence of a body; or that ſtate, wherein its ſenſible parts cohere, or are united together, ſo that the motion of one part induces a motion of the reſt. In which ſenſe, *firmneſs* ſtands oppoſed to fluidity.

Some authors confound *firmneſs* with denſity; as thinking the ſame ſtate or property of body implied by both; or at leaſt, that *firmneſs* follows denſity; but this is a miſtake. For mercury, the denſeſt body in nature excepting gold, is yet one of the moſt fluid; and even gold itſelf, with all its denſity, when fuſed, wants *firmneſs*, or coheſion.

Many of the Carteſians, and others, hold *firmneſs* to conſiſt in the mere quiet of the particles of the body, and their mutual immediate contact; urging, that a ſeparation of parts can only ariſe from ſome matter interpoſed between them, which is excluded by the notion of contiguity.

But the inſufficiency of this hypotheſis is evident: for mere ſimple reſt has no force, either to act or reſiſt; and conſequently two particles only joined by reſt and contiguity, would never cohere ſo as that a motion of the one ſhould induce a motion of the other. This is obvious in the caſe of two grains of ſand, which, however contiguous, and at reſt, will never conſtitute a *firm* coherent body.

The *firmneſs* of bodies, then, depends on the connexion or coheſion of their particles. Now, the cauſe of coheſion, Sir I. Newton, and his followers, hold to be an attractive force, inherent in bodies, which binds the ſmall particles thereof together; exerting itſelf only at, or extremely near, the points of contact, and vaniſhing at greater diſtances.

The *firmneſs* of bodies, therefore, follows the laws of the Cohesion of bodies.

Hence, *firmneſs* in all bodies muſt be as the ſurfaces and contacts of the component parts: thus a body, whoſe parts are by their peculiar ſhapes capable of the greateſt contacts, is moſt *firm*; and that, whoſe parts are capable of the leaſt contact, will be moſt ſoft.

In the former, the greateſt requiſite is to be as near to cubes as poſſible, and in the latter to ſpheres. And in the ſame manner are to be accounted for, not only all the intermediate degrees between the moſt *firm*, and the moſt ſoft bodies, but thoſe different conſiſtencies, which are diſtinguiſhed by other names, as friable, tenacious, glutinous, and the like; for the greater are the ſolidities of the component parts of any body, in proportion to their ſurfaces, though that body, by the aptitude of the contacts, may be what we call *very hard*; yet it will be moſt friable or brittle. And where the ſurfaces of the component particles are much extended upon a ſmall quantity of matter, the bodies they compoſe, though they may be light and ſoft, yet they will be tenacious or glutinous; for although the flexibility of their compounding parts admits of their eaſy changing of figure by any external force, yet by their touching one another in ſo many points, they are very difficultly ſeparated.

The former is the caſe in cryſtallized ſalts, reſins, and the like; the latter in turpentines, gums, and all of that ſort.

FIRM-ORE, a kind of Lead-*ore*.

FIRST *mover*, in the *Ancient Aſtronomy*. See Primum *Mobile*.

FIRST-*fruits*, *Annates* or *Primitiæ*, the profits of a benefice for the firſt year after avoidance. See Annates and Primitiæ.

The *firſt fruits* were formerly eſtimated according to a rate or *valor* made under the direction of pope Innocent IV. by Walter biſhop of Norwich, in 38 Hen. III. and afterwards advanced in value by commiſſion from pope Nicholas III. A. D. 1292, 20 Edw. I. which valuation of pope Nicholas is ſtill preſerved in the exchequer; and the tenths or *decimæ* were the tenth part of the annual profit of each living by the ſame valuation; claimed by the holy ſee on the authority of the precept recorded in Numb. xviii. 26. Theſe papal uſurpations were firſt introduced into this kingdom by Pandulph the pope's legate, during the reigns of king John and Henry III. in the ſee of Norwich, and afterwards attempted to be made univerſal by the popes Clement V. and John XXII. about the beginning of the fourteenth century. Theſe claims were often oppoſed by the Engliſh parliament; but they continued till the reformation in the reign of Henry VIII. at which period it was computed, that in the compaſs of 50 years 800,000 ducats had been ſent to Rome for *firſt fruits* only. This revenue was annexed to the crown by 26 Hen. VIII. cap. 3. confirmed by 1 Eliz. cap. 4. and a new *valor beneficiorum* was then made, by which the clergy are at preſent rated. By theſe ſtatutes all vicarages under ten pounds a year, and all rectories under ten marks, are diſcharged from the payment of *firſt fruits*; and if the incumbent lives but half a year, he ſhall pay only one quarter of his *firſt fruits*; if one whole year, half of them; if a year and a half, three quarters; and if two years, the whole. By ſtat. 27 Hen. VIII. cap. 8. no tenths are due to be paid for the firſt year; and by other ſtatutes of queen Anne, in the fifth and ſixth years of her reign, if a benefice be under fifty pounds per annum, clear yearly value, it ſhall be diſcharged of the payment of *firſt fruits* and tenths. Queen Anne granted her royal charter, confirmed by ſtat. 2 Ann. cap. 11. whereby the whole revenue of *firſt fruits* and tenths is veſted in truſtees for ever, to form a perpetual fund for the Augmentation of poor livings, uſually called queen Anne's bounty. Blackſt. Comm. vol. i. p. 284, &c.

First *fruits*, *office of*, is kept in the Temple, under the direction of a remembrancer, receiver, and comptroller, and their deputies and clerks.

FIRUZINUS *color*, a term that frequently occurs in ſome of the old writers on gems, and has been miſtaken by many to mean a ruſty brown; and by others, black; but theſe are not colours to be ſought after among the gems, and yet it is to thoſe that this epithet is uſually applied. We find it uſed for a blue kind of jaſper by ſome authors, the ſame with the jaſpis boreas of Pliny and Dioſcorides, and by others for the ſapphire, which ſome of the ancients, particularly Theophraſtus, having called *μελανα*, that is, black in its deepeſt colour, authors have been led to ſuppoſe that this word ſtood for black; but as there are not, nor ever were any black ſapphires, it is certain from this, as well as many other inſtances, that the ancients uſed this word, *μελας*, for a deep blue, and in that ſenſe *firuzinus color* does ſignify the ſame thing; it being the aerinus color of the ancients, or what we call ſky-colour, or a fine blue; ſuch as the colour of the fineſt ſapphires.

FISANELLE, in *Ornithology*, a name given by the Venetians to a water-fowl of the colymbus kind, called by authors the colymbus major, or great diver. Its general weight is about a pound, its beak is two fingers breadth long, and all its feathers are downy, ſoft, and very thick ſet together; its head and neck are brown, and its back is blackiſh; its ſides and belly brown, and its breaſt of a ſilver white; it has no tail, and its wing-feathers are black and white; its feet are not webbed, but the toes are all widened by membranes. It is very common in the markets of Italy. Ray's Ornith. p. 256.

FISC, Fiscus, in the *Civil Law*, the treaſury of a prince, or ſtate; or that to which all things due to the public do fall.

The word is derived from the Greek φισκος, *a great baſket*, uſed when they went to market.

By the civil law, none but a ſovereign prince has a right to have a *fiſc*, or public treaſury. See Ærarium.

FISCAL, ſomething relating to the pecuniary intereſt of the king, the public, or a private perſon.

The emperor Adrian erected the office of *fiſcal* advocate in the Roman empire.

FISCHERLIN, in *Ornithology*, a name given by many of the northern nations to a ſmall ſpecies of the Larus or Gull, called by Mr. Ray *larus piſcator*, by Linnæus *larus minuta*, and in Engliſh, the leſſer ſea-ſwallow. It is ſmaller than the common black-bird. Its bill is yellow, tipt with black, its forehead and cheeks white; from the eyes to the bill is a black line. Its wings are long and grey, its feet ſhort and yellow, its breaſt and belly are white, and of an exquiſite gloſs, the crown of its head black, and its back grey. They are very common on our coaſts, and feed on ſmall fiſh; but as they are delicate birds, and incapable of bearing the inclemency of the weather on our ſhores during winter, they quit their breeding places at its approach, and do not return till ſpring. Ray's Ornithology, p. 269.

FISGUM, a name uſed by ſome for the fiſh commonly called *miſgum*.

FISH, in *Natural Hiſtory*, the fourth claſs of animals, including four orders, viz. *apodes*, *jugulares*, *thoracica*, and *abdominales*, which comprehend forty-ſeven genera, and four hundred ſpecies, in the Linnæan ſyſtem; the characters of which are, that they have either a naked or ſcaly body, that they have no feet, and always have fins. According to the new Artedian ſyſtem, *fiſh* in general are divided into five diſtinct orders. The generality of *fiſh* have the tail placed perpendicularly, but a few of them have it horizontally. Of thoſe which have the tail perpendicular, ſome have the rays of the fins bony; and theſe either have the gills covered with a membrane, containing ſeveral bones, or they have no ſuch membrane: of thoſe which have this membrane, with the bones over the gills, ſome have the rays, though bony, yet not pungent; theſe are called the Malacopterygii, or the ſoft-finned *fiſh*. Others have them with the rays prickly; theſe are the ACANTHOPTERYGII, or prickly-finned *fiſh*. Thoſe which have no bones in the membrane over the gills, make only one genus, and are called the BRANCHIOSTEGI. The other kind, which have not bony, but cartilaginous rays in the fins, are called CHONDROPTERYGII. And finally, thoſe *fiſh* which have the tail placed not perpendicularly, but horizontally, are called PLAGIURI.

Naturaliſts obſerve much wiſdom and deſign in the ſtructure of *fiſhes*, and their conformation to the element in which they are to reſide.

Their bodies are clothed and guarded in the beſt manner with ſcales, &c. ſuitable to their reſpective circumſtances, the dangers they are expoſed to, and the motion and buſineſs they are to perform.

The center of gravity is placed in the fitteſt part of the body for ſwimming; and their ſhape is the moſt commodious for making way through the water, and moſt agreeable to geometrical rules.

They have ſeveral parts peculiar to themſelves; as fins, to balance and keep them upright. See FIN.

And an air-bladder, or ſwim, to enable them to riſe and ſink to any height and depth of water, at pleaſure.

They have alſo gills or bronchiæ, whereby they reſpire; as land-animals do by the lungs.

The tail is the inſtrument of progreſſive motion, and ſerves to row them forward.

Their eyes are peculiarly formed to enable them to correſpond to all the convergencies and divergencies of rays, which the variations of the watry medium, and the refractions thereof, may occaſion; in which reſpect they bear a near reſemblance to thoſe of birds.

Fiſh are diſtinguiſhed into *ſea*, or *ſalt-water fiſh*, *piſces marini*, as the whale, herring, mackrel, &c. *river*, or *freſh-water fiſh*, *piſces fluviales*, as the pike, trout, &c. and *pond*, or *lake-fiſh*, as the carp, tench, &c. to which may be added others which abide indifferently in freſh water or ſalt, as ſalmons, ſhad-fiſh, &c.

Ariſtotle, and after him Mr. Willughby, more accurately diſtinguiſh *fiſh* into *cetaceous*, *cartilaginous*, and *ſpinous*.

The cetaceous *fiſh* are thoſe whoſe tail is ſo placed, that when the *fiſh* is in its natural poſture, it ſtands parallel to the horizon. By this ſituation of the tail, they are enabled to force themſelves ſuddenly to the ſurface of the water to breathe, which they are frequently obliged to do. This ſpecies, like land-animals, breathe by means of lungs, being deſtitute of gills; for this purpoſe they have an orifice on the top of the head, through which alſo they eject water. They copulate alſo like quadrupeds, and conceive and bring forth their young, which they ſuckle with their milk. Many of theſe circumſtances induced Linnæus to place this tribe among his MAMMALIA. The cartilaginous *fiſh* are thoſe whoſe fins ſerving for ſwimming, are ſuſtained by cartilages in the place of the bony rays which ſupport them in the other, and which have alſo cartilages in the whole body, inſtead of bones. They breathe through certain apertures, generally placed on each ſide of the neck, but in ſome inſtances beneath, and in ſome above, and from one to ſeven in number on each part. Many of the cartilaginous *fiſh* are viviparous, being excluded from an egg, which is hatched within them; but ſome, as the ſturgeon and others, are oviparous. This diviſion comprehends the ſame genera to which Linnæus has given the name of AMPHIBIA *nantes*. Theſe are the characters of the two firſt claſſes; and all thoſe *fiſh* which have their fins ſupported by bony rays, which have their tails placed perpendicularly, not horizontally, and which have bones, not cartilages in their bodies, are called the ſpinoſe *fiſh*.

The true characters of theſe two great claſſes of *fiſh*, the cetaceous and cartilaginous, are eaſily found; but the characters of the ſpinoſe kinds are to be ſought for deeper, and do not offer themſelves ſo readily. The multitude of theſe, and the great likeneſs between ſeveral of the different genera, render it no eaſy taſk to diſtinguiſh them one from another. Though it be a general rule that the generical characters of *fiſh* are to be taken from their external parts; yet in caſes where theſe external parts differ among themſelves in number, figure, and proportion, it is neceſſary that the primary character of the genus ſhould be taken from thoſe parts which are the leaſt variable of all others; and which are the moſt peculiar to the *fiſh* under conſideration, and the leaſt common to other genera. The utmoſt care and ſkill of the *ichthyologiſt* is neceſſary to the diſtinguiſhing theſe characters; and on a ſtrict enquiry he will find, that thoſe parts which ſeem at firſt moſt proper to found diſtinctions on, are in reality leaſt of all ſo. The figure of the fins and tail in *fiſh* might ſeem one of the moſt eſſential characters for a generical diſtinction; yet a farther ſearch into their nature will ſhew that they can be of no uſe at all in this ſenſe. Almoſt all the ſpecies of the cyprini, a genus conſtituted on eſſential and invariable characters, and a truly natural one, have fins acute at the end, and have forked tails; yet had theſe been made characters of the genus, they would have excluded *fiſh* that are properly of it. Thus the tench and the caraſſius have both obtuſe fins, and tails ſtraight or plain, not forked at the end. There are indeed many natural genera of *fiſh*, in which the fins and tail are alike in all, as the pearch, the mackrel, the conger. Theſe allow the fins and tail as very good collateral circumſtances of the diſtinction; but even theſe could not well be diſtinguiſhed by ſuch marks alone, as they are common to many other genera beſides.

The figure of the breaſt, the belly, and the back, and the whole figure of the body in regard to length and breadth, are all very obvious characters; but they are not eſſential enough to be of any uſe in the diſtinctions of the genera. The back in ſome of the cyprini is ſubacute, as in the common bream; whereas in almoſt all the others it is only moderately convex. This ſets aſide the uſe of the figure of the back as a generical character, ſince the bream, notwithſtanding this difference from the reſt of the cyprini, is truly of that genus. The belly, in the far greater number of the cyprini, alſo is plane in the anterior part, and between the pinnæ ventrales and the anus is raiſed into a ridge; but in the tench, the whole belly from the head to the tail is flat. And to this it may be added, that the general figure of the body, as to length or breadth, is extremely different in the cyprini of various ſpecies, as witneſs the bream, the alburnus, the rutilus, &c. ſome of which are properly flat, and others almoſt round.

The figure of the HEAD, the MOUTH, the EYES, the NOSTRILS, and other parts belonging to the head, are very different from theſe variable parts; they are in general fixed and permanent, and are of the utmoſt conſequence in the diſtinctions; but as this figure is too common, and belongs to too many ſpecies equally, they are rather of uſe in diſtinguiſhing the orders, claſſes, and families of *fiſh*, than their genera. Thus the clupeæ, the cotti, the coregones, and ſcorpænæ of authors, have a plain general reſemblance in the form of their heads, and yet they are of very different genera.

The figure of the ſcales is generally always the ſame in the ſame genus, and therefore may be made a good collateral circumſtance in the diſtinctions; but as the ſame form is common to the ſcales of many genera, it is impoſſible to bring them to any great uſe in conſtituting the characters of the genera. As to the ſituation of the external parts, as that of the eyes, noſtrils, mouth, and anus, they are generally regular, and alike in all the ſpecies of the ſame genus, regard being had to the proportion; but as their ſituation, though alike in theſe genera, is not peculiar to each, the marks are too common to be uſed as diſtinctive characters for genera. The ſituation of the fins alſo is uſually very regularly the ſame in all the ſpecies of the ſame genus; but the ſame objection lies againſt this as againſt the others, in regard to making generical characters from it. The number of TEETH can be of no uſe in making characters of genera; for this very often varies in the ſame ſpecies in different individuals, as in the pike, ſalmon, &c.

In regard to the other external parts of *fiſh*, there are none which are found in all the ſpinoſe *fiſh*, and differ in all the ſeveral genera, except thoſe little bones which are found on each ſide in the membrane of the head, which covers the gills. Theſe bones are found in almoſt all the *fiſh* that have any bones, though in ſome kinds the thickneſs of this membrane makes them leſs conſpicuous than in others. The number of theſe bones is much more regularly and conſtantly the ſame in the ſame genera, than that of the fins, as we may find by many obſervations. The four genera of the *ſcombri*, *gadi*, *percæ*, and *ſyngnathi*, have the number of the fins very various in the ſeveral ſpecies of each genus; but in all theſe genera the number of the bones in the membrane that covers the gills, is regularly the ſame in every ſpecies. All the *gadi* have regularly ſeven bones on each ſide, and ſo on of the reſt. All the *cyprini* have three of theſe bones on each ſide; all the *cotti* have ſix on each ſide; all the *clariæ* ſeven; all the *clupeæ* eight; all the *eſoces* fourteen; and ſo of the reſt. There are only two known genera of *fiſh*, that do not agree in all the ſpecies in the number of theſe bones; theſe are the ſalmon and the coregoni. In the firſt of theſe the number of the bones is in the ſeveral ſpecies ten, eleven, or twelve; and in the ſeveral ſpecies of the other, there are eight, nine, or ten, and ſometimes but ſeven. It is an obſervation, however, worthy the naturaliſt's conſideration, that nature has given this difference in the number of theſe bones in the ſeveral ſpecies only to thoſe genera in which all the ſpecies have ſuch a ſtrong external reſemblance in all parts, that ſcarce any thing more than the facies externa was neceſſary for knowing that they belonged to one another; for beſide that all the ſalmon and coregoni have a membranous appendage reſembling a fin on the hinder part of the back, the ſeveral ſpecies of each genus are ſo very remarkably like one another, that it is not eaſy to diſtinguiſh them in many caſes.

As to the number of the fins on *fiſh*, there are a vaſt number of genera which have all the ſame general number, as the *cyprini*, *clupeæ*, *coregoni*, *oſmeri*, *ſalmon*, *cobitides*, *eſoces*, *pleuronecti*, *ſpari*, *labri*, *gobii*, and *gaſteroſtei*; all have ſeven fins radiated with bony ribs. The ſame number of ſeven fins, and thoſe of the ſame kind, is common alſo to the ſeveral other genera; but on the contrary, though all the ſpecies of the ſame genus have conſtantly the ſame number of bones in the membrane that covers the gills, yet it is very rare that the different genera have the ſame number. The pearch, the *gadi*, the *ammodytes*, and the *ſcombri*, have indeed all ſeven on each ſide. The *cyprini* and the *gaſteroſtei* have each of them three on each ſide. The *cotti*, the *pleuronecti*, and the *mugil*, have ſix each: theſe, however, are genera ſo very different in their other characters, and in their *facies externa*, that there is not the leaſt danger of their being confounded one with another.

From this it appears very evidently, that the number of theſe bones in the *membrana branchioſtega*, affords the firſt and moſt eſſential of all characters for the diſtinction of the genera of the catheturous and oſteopterygious, or bony-finned *fiſh*. This however is not ſufficient alone, though it is a great aſſiſtant in determining the genera; but in order to bring *fiſh* to their proper genera, it is neceſſary firſt, that all of the ſame genus ſhould have the ſame number of bones in the gills; then, that they ſhould have in the genera the ſame external form and figure; after this, that they muſt have the ſame ſituation of the fins, provided that the number does not differ, which ſometimes has been found to vary in ſpecies truly of the ſame genus; but in general it is, and ought to be, the ſame in all.

The ſituation of the teeth alſo ſhould be the ſame, and this generally holds right in the different genera of *fiſh*, all the ſpecies having in each natural genus the ſame orders of teeth. After this, the ſcales are to be examined, and theſe ought to be of the ſame ſort, and to have the ſame ſituation. Theſe are the circumſtances neceſſary to be enquired into, in regard to the eſtabliſhing juſt and natural genera. If all theſe agree in all the ſpecies, and, beſide this agreement, there be an analogy in the ſituation and form of the other internal and external parts, particularly in the ſtomach, and its appendices, in the inteſtines, and in the air-bladder, there will remain no doubt of the genus eſtabliſhed on ſuch foundations being perfectly juſt and natural.

It is not to be expected, however, that every one of theſe characters ſhould be found regularly in every ſpecies of the ſame genus in the ſame perfection; ſome will ſhew them more, others leſs, and others will want ſomething of them. But the three grand things that are eſſential to the ſameneſs of the genus, are the ſame number of bones in the branchioſtege membrane, and the ſame general external face or figure, and the ſame ſituation of the fins. The other circumſtances are additional and confirmative.

Upon the whole it appears, that the number of certain parts is the firſt great foundation of generical diſtinctions in *fiſh*; and that no one note or generical character can be ſo extenſive as to take in the whole at once, but that other characters leſs eſſential but more numerous muſt be in ſome caſes taken in for eſtabliſhing the whole ſeries of *ichthyological* diſtinctions. Artedi, Ichthyolog.

Willughby thinks it would be yet more proper to divide *fiſh* into ſuch as *breathe with lungs*, and ſuch as *breathe with gills*; and then to ſubdivide thoſe that breathe with gills, not into cartilaginous and ſpinous, but into *viviparous* and *oviparous*.

The *viviparous* kind that *breathe with gills*, he ſubdivides into *long*; ſuch as the *galei* and *canes*, or ſharks and dog-*fiſh*; and broad, ſuch as the paſtinaca, raja, &c. the ſubdiviſions of each whereof, he gives in his chapter of cartilaginous *fiſh* in general.

The *oviparous* kind that *breathe with gills* are the moſt numerous; and theſe he ſubdivides into ſuch as are what we uſually call *flat-fiſh*; and ſuch as ſwim with their back upright, or at right angles to the horizon.

The *plain* or *flat-fiſh* kind, called uſually *plani ſpinoſi*, are either *quadrati*, as the rhombi and paſſeres; or *longiuſculi*, as the ſoleæ.

Such as ſwim *with their backs erect*, are either long and ſmooth, and without viſible ſcales, as the eel-kind; or ſhorter and leſs ſmooth; and theſe have either but one pair of fins at their gills, or elſe another pair of fins alſo on their bellies; which latter kind he ſubdivides into two kinds. 1. Such as have *no prickly fins on their backs*, but ſoft and flexible ones. 2. Such as have *prickly fins* upon their backs.

Thoſe *fiſh* which have only ſoft and flexible fins on their backs, may be divided into ſuch as have *three*, *two*, or but *one* ſingle fin there.

No *fiſh* but the aſelli have *three* FINS on their backs.

Fiſh with *two fins* on their backs are either the truttaceous, trout kind; or the gobionites, loch, or gudgeon kind.

Fiſh with but *one ſoft back-fin* are of three ſorts. The firſt kind have one long continued fin, from head to tail, as the hipparus of Rondeletius, &c.

The ſecond have their fins but ſhort, and placed juſt in the middle of their back; and theſe are either *marine*, as the herring-kind; or *fluviatile*, as thoſe which we call *leather-mouthed fiſh*; ſuch as carp, tench, &c.

Fiſh which have *prickly fins on their backs* are of two kinds. 1. Such as have *two prickly fins on their backs*; and in theſe the anterior radii of their fins are always prickly. 2. Such as have but *one prickly fin* there.

The northern countries abound in large and delicate *fiſh* even to the extremeſt degrees of cold. Scheffer, in his Hiſtory of Lapland, gives us a wonderful account of the abundance, and large ſize of the *fiſh* there.

The ſalmon grow to a larger ſize than we ever ſee them, and are caught in ſuch abundance, that the natives who pickle them, ſometimes export not leſs than thirteen thouſand tuns in a year; pike are very common, and grow to the length of ſix or ſeven foot, and a proportionable thickneſs.

The carp grow to an ell long, and often conſiderably more; and trout, barble, gudgeons, and pearch, grow to a proportionable ſize and fatneſs. The laſt of theſe *fiſh* have one thing very peculiar among them: they ſoak the ſkins in water, and then ſtripping off the ſcales, they add freſh water, and boil the ſkins down till wholly diſſolved; of this they make a very pure and beautiful ſort of glue, which is not inferior in ſtrength to our coarſe and ſtinking kind.

The coming of certain kinds of *fiſh* in ſhoals and infinite multitudes, to certain coaſts at certain times of the year, is a thing of great advantage to mankind, as it gives opportunities of taking them with great eaſe, and in vaſt quantities; but the reaſon of theſe periodical returns of the ſeveral kinds does not ſeem much underſtood, though a little obſervation would probably clear it up. There is a ſmall inſect common in many ſeas, but peculiarly plentiful on the coaſts of Normandy in the months of June, July, and Auguſt. This is well deſcribed by Rondeletius, under the name of the ſea-caterpillar; and at this time of the year it is ſo frequent in the place before mentioned, that the whole ſurface of the water is covered with it as with a ſcum. This is the ſeaſon of the year when the herrings come alſo in ſuch prodigious ſhoals to theſe coaſts. The fiſhermen complain much of theſe naſty vermin, which diſturb their fiſheries; but they do not conſider that it is to theſe alone that their fiſheries are owing; for it is evident, that the herrings feed on theſe creatures greedily, by the vaſt quantity found in all their ſtomachs; and it is highly probable, nay ſcarce to be doubted, that the reaſon of thoſe *fiſh* coming up in ſuch numbers is to feed on them; probably if obſervation was made, the ſame would be found to be the caſe in all the other places where the herrings come in the ſame ſort of plenty. The mackrel come down in the ſame numbers regularly at certain times of the year, and for the ſame ſort of reaſon. This *fiſh* is an herb-eater, and is particularly fond of that ſea-plant called by naturaliſts the narrow-leaved purple palmated ſea-wrack; this grows in great abundance on the coaſts of England, and many other places, and is in its greateſt perfection in the beginning of the ſummer, though ſometimes later than others, according to the ſeverity or mildneſs of the winter.

The whole occaſion of theſe *fiſh* coming in ſuch quantities is to feed on this plant; and thoſe who would attend to its growing up, would know when to expect the mackrel berter than thoſe who liſten for thunder for the ſignal of them. The tunnies come at certain ſeaſons to the coaſts of Provence and Languedoc, in the ſame ſhoals that herrings and mackrel do to other places. This ſeems to be on another occaſion: the *fiſh* called by the French the emperor, and by the ſame confounded with the ſword-fiſh, is the great enemy of theſe *fiſh*, and in ſummer is ſo plentiful in thoſe ſeas, that they find no way of ſaving themſelves, but by flying to the ſhallow waters, where the other cannot eaſily follow them; hence they frequent the ſhores. The pilchards caught upon the coaſts of Brittany, and making a conſiderable article of commerce for that province, are yet a ſtronger proof of the natural means that bring *fiſh* in ſhoals to certain places, than any other. Theſe *fiſh* evidently come for food, and that not natural to the place, but prepared for them by the inhabitants.

The people of Brittany purchaſe from Norway the offal and entrails of all the large *fiſh* caught in the northern ſeas; this is of late years become a regular and conſiderable article of trade; they cut theſe to pieces, and ſtrew them in vaſt quantities over the whole ſurface of the ſea along their coaſts, at times when the winds do not ſit ſo as to blow it off.

This always brings together the pilchards in as vaſt ſhoals, as the herrings or mackrel come in other places; and the fiſhermen catch them in ſuch quantities, as to be able to ſupply all the maritime places in the neighbourhood with them at a ſmall price. The ſalmon, a *fiſh* bred in rivers, yet going at certain times to the ſea, is another of thoſe *fiſh* which come up at times in vaſt ſhoals. See Salmon.

Small *fiſh* may very well be kept in glaſs-jars with freſh water; and thoſe of prey are very fit to be tamed by this means.

Some of theſe creatures often have no other ſuſtenance than the animalcula of the water they are put in. Phil. Tranſ. N° 478. p. 26. See Dace and Ruff.

Mr. Boyle ſpeaks of a kind of *fiſh* on the coaſt of Ireland, the hearts of which are found inverted. Works abridg. vol. i. p. 27.

In the Philoſophical Tranſactions, N° 463. ſect. 1. we have a method of preparing ſpecimens of *fiſh*, by drying their ſkins, as practiſed by Dr. Gronovius.

Fish, *black, of Aleppo*, is deſcribed by Dr. Ruſſel as reſembling, in its ſhape, the SILURUS *Rondeletii*, and like it having no ſcales. The head and back are black; the lateral line runs quite from the head to the tail, on the middle of the ſide; below which to the belly, the colour generally changes to a dark purple. The under part of the head is alſo of the ſame colour. The head is flat, and about five inches long; the body is round, and near the tail becomes flat. The mouth is not ſo large in proportion as that of the ſilurus; it has no tongue, and the ſtructure of the mouth and palate agree exactly with the deſcription of that *fiſh*. A ſmall cirrus ariſes on each ſide from the edge of the noſtril, and two others twice as long, and much ſtronger, from the angles of the mouth. There are alſo four on the lower lip; the eyes are ſituated near the corner of the mouth; the branchiæ are four on each ſide, with a double row of ſharp points. Near the bronchiæ there are two fins, compoſed of ſeven radii; to the anterior part of which joins a pretty ſtrong prickly bone. Above the anus are two ſmaller fins; a long fin extends from under the anus to the tail, and another from the neck along the back; neither of which join with the tail. This *fiſh* is found in the river Orontes, and in ſtagnant waters near it. The markets of Aleppo are plentifully ſupplied with it from November to March. The fleſh is red like beef, and of a rank taſte, and eſteemed unwholeſome, though for want of better much uſed. Hiſt. Aleppo, p. 73.

Fish, with regard to commerce, is diſtinguiſhed into *dry*, *pickled*, *green*, and *red*.

Fish, *dry* or *ſalt*, is that which is ſalted and dried either by the heat of the ſun, or by fire. Such principally are the cod, ſtock-fiſh, herring, and pilchard. See *Cod* Fishery.

Fish, *green*, is that lately ſalted, and which yet remains moiſt; as green cod, &c.

Fish, *pickled*, is that boiled and ſteeped in a pickle made of ſalt, vinegar, &c. as ſalmon, cod, herring, mackrel, pilchard, anchovy, and oyſters.

Fish, *red*, is ſome freſh *fiſh* broiled on the gridiron, then fried in oil of olives, and barrelled up with a proper liquor, as new olive-oil, vinegar, ſalt, pepper, cloves, and laurel-leaves, or other herbs. The beſt *fiſh* thus prepared are ſturgeon and tunny.

Fish, conſidered as a food, makes a conſiderable article in the furniture of the table; and the breeding, feeding, catching, &c. thereof, make a peculiar art of no ſmall moment in the œconomy of a gentleman's houſe and garden.

To this relate the ponds, ſtews, &c. deſcribed in their proper places. See Fish-*pond*, Stew, &c.

Fish, *blowing of*, is a practice ſimilar to that of blowing fleſh, poultry, and pigs, and adopted for the ſame deceitful purpoſes. The method of blowing *fiſh*, eſpecially cod and whitings, is by placing the end of a quill or tobacco-pipe at the vent, and pricking a hole with a pin under the fin which is next the gill; thereby making the *fiſh* appear to the eye large and full, which when dreſſed will be flabby, and little elſe than ſkin and bones. But this impoſition may be diſcovered by placing the finger and thumb on each ſide of the vent, and ſqueezing it hard; the wind may be perceived to go out, the ſkin will fall in, and the *fiſh* appear lank, and of little value.

Fish, *breeding of*. See Fish-*pond*.

Fish, *caſtration of*, is a method firſt practiſed by Mr. Tull, in order to prevent the exceſſive increaſe of *fiſh* in ſome of his ponds, where the numbers did not permit any of them to grow to an advantageous ſize. But he afterwards found, that the caſtrated *fiſh* grew much larger than their uſual ſize, were more fat, and always in ſeaſon. This operation may be performed both on male and female *fiſh*; and the moſt eligible time for it is when the ovaries of the female have their *ova* in them, and when the veſſels of the male, analogous to theſe, have their ſeminal matter in them; becauſe, at this time, theſe veſſels are more eaſily diſtinguiſhed from the ureters, which convey the urine from the kidneys into the bladder, and are ſituated near the ſeminal veſſels on each ſide of the ſpine; which, without ſufficient attention, may be miſtaken for the ovaries, eſpecially when theſe laſt are empty. The time leaſt proper for this operation, is juſt after they have ſpawned, becauſe the *fiſh* are then too weak and languid to bear, with ſucceſs, ſo ſevere an operation; however, with ſkill and care, it may be performed almoſt at any time. When a *fiſh* is to be caſtrated, it muſt be held in a wet cloth, with its belly upwards; then with a ſharp pen-knife, having its point bent backwards, the operator cuts through the integuments of the rim of the belly, taking care not to wound any of the inteſtines. As ſoon as a ſmall aperture is made, he carefully inſerts a hooked pen-knife, and with this dilates this aperture from between the two fore-fins almoſt to the anus. He then, with two ſmall blunt ſilver-hooks, five or ſix inches long, and of this form ρ, by the help of an aſſiſtant, holds open the belly of the *fiſh*; and, with a ſpoon or ſpatula, removes carefully the inteſtines from one ſide. When theſe are removed, you ſee the ureter, a ſmall veſſel, nearly in the direction of the ſpine, and alſo the ovary, a larger veſſel, lying before it, nearer the integuments of the belly. This laſt veſſel is taken up with a hook of the ſame kind with thoſe before mentioned, and, after detaching it from the ſide far enough for the purpoſe, divided tranſverſely with a pair of ſharp ſciſſars, care being taken, that the inteſtines are not wounded or injured. After one of the ovaries has been divided, the operator proceeds to divide the other in the ſame manner; and then the divided integuments of the belly are ſewed with ſilk, the ſtitches being inſerted at a ſmall diſtance from one another. Mr. Tull obſerves farther, that the ſpawning time is very various; that trouts are full about Chriſtmas; perch in February; pikes in March, and carp and tench in May; and that allowance muſt be made for climate and ſituation, with regard to the ſpawning of *fiſh*. When the *fiſh* are caſtrated, they are put into the water where they are intended to continue; and they take their chance in common with other *fiſh*, as though they were not caſtrated. With tolerable care, few die of the operation. Phil. Tranſ. vol. xlviii. part 2. art. 106.

Fish, *eyes of*. See Eyes.

Fish, *fecundity of*, has been taken notice of by various writers, who have furniſhed inſtances of it in ſome particular ſpecies that have been thought ſurpriſing. M. Petit is ſaid to have found in the carp 342,144 eggs; and Lewenhoeck in a cod of middling ſize 9,384,000. But Mr. Harmer has lately purſued the inveſtigation of this curious ſubject with peculiar attention and accuracy, and extended his inquiries to a greater variety of ſpecies than any other perſon. The method which he adopted was that of weighing the whole ſpawn very exactly; he then took a piece weighing a certain number of grains, and carefully counted the eggs contained in it; and by dividing the number of eggs by the number of grains, he found, nearly, how many eggs there were in each grain. His computation of the number of eggs extended no farther than to thoſe which he could diſtinguiſh with his naked eye; though by this limitation, he omitted many eggs, diſcoverable by a microſcope, that might juſtly have been counted. The weights he uſed were avoirdupois, and he reckoned 437½ grains to an ounce.

The following table exhibits the general reſult of his enquiries: the firſt column contains the names of the *fiſh* which he examined; the ſecond, their weight; the third, the weight of their ſpawn; and the fourth, their fecundity; and the fifth, the time of the year, when each ſpecies of *fiſh* was examined. He has alſo added other columns, exhibiting the portion of ſpawn weighed, and the number of eggs found in a grain, and the reſult of examining ſeveral varieties of the ſame ſpecies of *fiſh* of different weights, which the curious reader may conſult. See Phil. Tranſ. vol. lvii. for 1767. art. 30. p. 280.

Abſtract of the Table.

Fiſh.	Weight. oz.	dr.	Weight of ſpawn. Grains.	Fecundity. Eggs.	Time.
Carp	25	8	2571	203109	April 4.
Cod-fiſh	———	———	12540	3686760	Dec. 23.
Flounder	24	4	2200	1357400	Mar. 14.
Herring	5	10	480	36960	Oct. 25.
Lobſter	36	0	1671	21699	Aug. 11.
Mackrel	18	0	1223½	546681	June 18.
Perch	8	9	765½	28323	April 5.
Pike	56	4	5100½	49304	April 25.
Prawn	(127 grains)		———	3806	May 12.
Roach	10	6½	361	81586	May 2.
Shrimp	(39 grains)		7	6807	May 3.
Smelt	2	0	149½	38278	Feb. 21.
Soal	14	8	542½	100362	June 13.
Tench	40	0	———	383252*	May 28.

* N. B. Part of the ſpawn of this *fiſh* was accidentally loſt, and therefore this number is conſiderably too ſmall.

Fish, *feeding of*. 1. In a ſtew, thirty or forty carps may be kept from October to March, without feeding; and, by fiſhing with trammels, or flews, in March or April, you may take from your great waters, to recruit the ſtews; but you muſt not fail to feed all ſummer, from March to October again, as conſtantly as cooped chickens are fed; and it will turn to as good an account.

2. The conſtancy and regularity of ſerving the *fiſh* conduces very much to their well eating, and thriving.

The care of doing this, is beſt committed to the gardener, who is always at hand, and on the ſpot.

3. Any ſort of grain boiled is good to feed with, eſpecially peas and malt, coarſe ground; the grains after brewing, while freſh and ſweet, are alſo very proper; but one buſhel of malt, not brewed, will go as far as two of grains; chippings of bread, and orts of a table, ſteeped in tap-droppings of ſtrong beer, or ale, are excellent food for carps. Of theſe the quantity of two quarts to thirty carps, every day, is ſufficient; and to be ſo fed morning and evening, is better than once a day.

There is a ſort of food for *fiſh*, that may be called accidental, and is no leſs improving than the beſt that can be provided; and this is, when the pools happen to receive the waſh of commons, where many ſheep have paſture, the water is thus enriched by the ſoil, and will feed a much greater number of carps than otherwiſe it would do; and farther, the dung that falls from cattle ſtanding in water in hot weather, is alſo a very great nouriſhment to *fiſh*. See farther on the method of feeding carp, and the advantages reſulting from it, under the article **Carp**.

The beſt food, to raiſe pikes to an extraordinary fatneſs, is eels; and without them it is not to be done, but in a long time. Setting theſe aſide, ſmall perches are the beſt meat. Breams put into a pike pond breed exceedingly, and are fit to maintain pikes; which will take care they do not increaſe overmuch; the numerous fry of roaches and rudds, which come from the greater pools into the pike quarters, will likewiſe be good diet for them.

Pike in all ſtreams, and carp in hungry ſpringing waters, being fed at certain times, will come up, and take their meat almoſt from your hand.

The beſt feeding-place is toward the mouth of the pond, at the depth of about half a yard; for by that means the deep will be kept clean and neat; the meat thrown into the water, without other trouble, will be picked up by the *fiſh*, and nothing will be loſt; yet there are ſeveral devices for giving them food, eſpecially peas; as a ſquare board like a trencher, ſupported by four ſtrings, one at each corner, with leads at the bottom for ſinking it, on which the food may be let down into the water.

When *fiſh* are fed in the larger pools or ponds, where their numbers are great, malt boiled, or freſh grains, is the beſt food. Thus carps may be fed and raiſed like capons, and tench will feed as well; but perch are not for a ſtew in feeding-time.

Fish, *generation of*. The general opinion of the world as to the generation of *fiſh*, is, that the female depoſits her ſpawn or eggs, and that the male after this ejects the ſperm or male ſemen upon it in the water, by which it is fecundated. The want of the organs of generation in *fiſh*, gives an apparent probability to this; but Linnæus is greatly againſt it. He affirms, that there can be no poſſibility of the impregnation of the eggs of any animal out of its body.

To confirm this, the general courſe of nature not only in birds, quadrupeds, and inſects, but even the vegetable world, has been called in to his aſſiſtance, as proving, that all impregnation is performed, whilſt the ova are in the body of the parent; and he ſupplies the want of the organs of generation by a very ſtrange proceſs, affirming that the males eject their ſemen always ſome days before the females depoſit their ova or ſpawn, and that the females ſwallow this, and have their eggs by that means impregnated by it.

He ſays, that he has often ſeen three or four females at this time frequently gathered about the male, and greedily ſnatching up into their mouths the ſemen he ejects: he mentions ſome of the eſoces, ſome pearch, and ſome of the cyprini, in which he had ſeen this proceſs. Mr. Tull aſſerts, that he has frequently ſeen *fiſh* in actual copulation; and that this is generally done before the ova arrive at maturity. Phil. Tranſ. vol. xlviii. part ii. art. 106. p. 873.

Fish, *generical names of*. See **Generical** *name*.

Fish, *gilding of*. See **Gilding**.

Fish, *hearing of*. When the lapilli or bones in the heads of *fiſh*, which are truly their organs of hearing, are examined in the heads of the ſeveral kinds, it appears, that they differ from one another both in their ſtructure and ſubſtance. For in the cetaceous *fiſh*, whoſe ſkeletons are truly bony, and which in certain reſpects may be compared to truly ligneous trees, both the os petroſum, and the auditory organs, are in theſe as in other animals, perfectly oſſeous or bony; whereas the cartilaginous *fiſh*, whoſe ſkeletons are elaſtic, and are cartilaginous rather than bony, may be compared to the keratophyta, or tough horny ſea-plants; and theſe *fiſh*, inſtead of an os petroſum, have ſomething analogous; but it is cartilaginous not bony, and the auditory bones are of a tartareous kind of ſubſtance, being friable, and eaſily crumbled to pieces. See **Ear**.

It has been a diſputed point among the naturaliſts of many ages, whether *fiſh* hear or not; it is plain that the cetaceous *fiſh* have all of them auditory paſſages or ear-holes, but it has not been found, that any other *fiſh* have any appearance of them. Many authors have been fond of believing that all *fiſh* have hearing; but their arguments in general are inconcluſive.

Among the ancients, many authors appear to have been poſitive in the opinion, that *fiſh* had hearing, though they were by no means ſatisfied about the ways or paſſages by which they heard. Placentini afterwards diſcovered ſome bones in the head of the pike, which had very much the appearance of being organs of hearing, but he could never diſcover any external paſſages to them. Klein ſeems to be the only author who has improved upon this hint to any purpoſe; and he affirms and proves from experiments and obſervations, that all *fiſh* have the organs of hearing, and have alſo paſſages from without to thoſe organs, though in many ſpecies they are difficult to be be ſeen, and that even the moſt minute and obſcure of theſe are capable of communicating a tremulous motion to thoſe organs from ſounds iſſuing from without; nor does the water appear, on ſerious conſideration, to be any impediment, but rather a proper medium for the conveying the ſounds to ſuch organs; and it appears no way more ſtrange, that they ſhould hear through the water, than that a man ſhould hear in one room the words pronounced in another, though there is a partition between them.

The organs of hearing in *fiſh* are indiſputably the little bones commonly called lapilli, and found in the heads of all *fiſh*; theſe are conſtituent and eſſential parts in the head of *fiſh*, and are generated with the brain itſelf; not an accidental thing as ſome have believed them to be. They are always found to differ in magnitude, according to the ſize of the *fiſh* they belong to; and they are more eaſily diſtinguiſhed in the heads of the ſpinoſe *fiſh*, than in any other kind. There are in all kinds of *fiſh* three pair of them; the firſt are the two largeſt bones, and are eaſily enough found; but the greateſt difficulty lies in diſcovering the other two pair, which are ſmall, and lie enveloped in diſtinct little bags compoſed of a fine membrane. Theſe ſeem to be the auditory organs, and to anſwer to the incus, malleus, and ſtapes, in other animals; and by a diligent and careful inſpection, the age of a *fiſh* may be determined by the number and thickneſs of the laminæ and fibres of theſe bones, in the ſame manner as the age of a tree is known by the number of circles of the wood. The paſſages by which a tremulous motion is conveyed from without to theſe internal organs are to be diſcovered with care in moſt *fiſh*, and in particular in the pike; though Placentini could not diſcover them there. A cloſe examination of the head of this *fiſh* will ſhew ſeveral holes into which hog's briſtles may be thruſt, and theſe will be found to go directly into the internal auditory organs; and in diſſecting the head of a ſturgeon, the auditory duct is eaſily traced as far as the membranous body, in which the three pair of little bones are placed. Curious figures of theſe auditory ducts, and of the great variety of theſe oſſicula or lapilli, are exhibited in Klein's Hiſtory of *Fiſh*, to which we refer, as much more expreſſive than any form of words can be. See an account of Klein's book in Phil. Tranſ. abr. vol. ix. p. 114, &c.

Mr. Baker aſcribes to the exquiſite ſenſibility of the organs of ſight and feeling in *fiſh* thoſe effects, which others have urged as arguments of their poſſeſſing the faculty of hearing, in Phil. Tranſ. vol. xlv. art. 4. p. 153. However, M. Camper has more lately endeavoured to ſhew, that *fiſh* are really endowed with this ſenſation, and deſcribed the organs adapted to this purpoſe in ſome particular ſpecies. Mem. de Mathem. & Phyſ. Roy. Acad. Sc. Paris, vol. vi 1774. And the abbé Nollet has long ſince evinced, by diving under water for this purpoſe, that water is capable of receiving and tranſmitting to the animals contained in it, thoſe peculiar impreſſions that conſtitute ſound. Mem. de l'Acad. 1743.

Fish, *iſinglaſs*. See Huso.

Fish, *iſland*. See Island-*fiſh*.

Fish, *milt of*. See Milt.

Fish, *needle*. See Needle-*fiſh*.

Fish, *noſtrils of*. See Nares *piſcium*.

Fish, *royal*. See Royal *fiſhes*.

Fish, *ſhell*. See Shells.

Fish, *ſtealing of*, by perſons armed and diſguiſed, is felony without benefit of clergy by 9 Geo. I. cap. 22. See Black *act*. And by 5 Geo. III. cap. 14. the penalty of tranſportation for ſeven years is inflicted on perſons ſtealing or taking *fiſh* in any water, within a park, paddock, orchard, or yard; and on the receivers, aiders, and abettors; and a forfeiture of five pounds to the owner of the fiſhery is made payable by perſons taking or deſtroying (or attempting ſo to do) any *fiſh* in any river or other water within any incloſed ground, being private property.

Fish, *ſwimming of*. See Swimming *of fiſh*, and Air-*bladder*.

Fish, *teeth of*. See Teeth *of fiſh*.

Fish, in *Aſtronomy*. See Pisces.

Fish-*days*. See Abstinence.

Fish, in *Heraldry*. See Heraldry.

FISHER, in *Zoology*. See Sable.

FISHERY, a commodious place for *fiſhing*; or a place wherein great quantities of *fiſh* are caught.

The principal *fiſheries* of Europe for ſalmon, herring, cod, and mackrel, are along the coaſts of England, Scotland, and Ireland; for cod, on the banks of Newfoundland; for whales, about Greenland; for pearls, in the Eaſt and Weſt Indies, &c.

Fishery alſo denotes the commerce of *fiſh*; more eſpecially the catching them for ſale. The *fiſhery* makes a principal branch of the Britiſh commerce. A great quantity of veſſels and ſeamen are employed therein; and beſides what is ſpent at home, large ſums are yearly returned, merely for herring, cod, and pilchards, exported to Spain, Italy, and ſeveral parts of the Mediterranean, and the iſlands of the Archipelago.

Yet are our countrymen reproached, and with a good deal of juſtice, for their remiſſneſs in this branch of trade. The advantageous ſituation of our coaſts might be of immenſe benefit to us, did not we let our neighbours overreach us therein. The Dutch, French, Hamburghers, &c. come yearly in large ſhoals, and not only take the fiſh from our own coaſts, but ſell them to us for our money, when they have done.

Scotland ſuffers incredibly on this ſcore: no country in Europe can pretend to rival it in the abundance of the fineſt fiſh, wherewith its numerous harbours, loughs, rivers, &c. are ſtored. In the river Dee, it is ſaid, an hundred and ſeventy head of ſalmon is not very extraordinary for a ſingle draught of a net; and the pickled ſalmon ſent hence is allowed the beſt in Europe. The Scottiſh iſlands, eſpecially thoſe on the weſtern ſide, do certainly lie the moſt commodiouſly for carrying on the fiſhing-trade to perfection.

King Charles the firſt began the experiment in 1630 and 1633, in conjunction with a company of merchants; but the civil wars ſoon ſet it aſide. King Charles the ſecond, in 1661, made a like attempt; but having preſſing occaſion for money, he was perſuaded to withdraw what he had employed in the *fiſhery*; at which the merchants, joined with him, being diſpleaſed, did the like themſelves.

Since the Union, ſeveral efforts have been made to retrieve it; and in 1750 there was a corporation ſettled on that footing by parliament, called the *Free Britiſh Fiſhery*, for the term of twenty-one years, under the direction of a governor, preſident, vice-preſident, council, and other officers, who were empowered to make bye-laws, &c. and to raiſe a capital of 500,000*l* and the Scotch *fiſhery*, encouraged by fiſhing chambers, erected in ſeveral cities, is likely to be put on a very advantageous baſis. See *Herring* Fishery.

Fishery, *anchovy*. See Anchovy.

Fishery, *cod*. The cod is a fiſh of paſſage, pretty large, with a great head, and teeth in the bottom of the throat; its fleſh white; its ſkin browniſh on the back, white under the belly, and covered with a few thin tranſparent ſcales. See Cod.

It eats excellently when freſh; and, if well prepared and ſalted, will keep a long time. This fiſh, thus prepared, is commonly eaten among us in Lent, &c. under the denomination of *ſalt-fiſh*, or *ſtock-fiſh*.

There are two kinds of *ſalt-cod*; the one called *green*, or *white*; and the other *dried*, or *cured*; though it is the ſame fiſh, only differently prepared.

They are alſo diſtinguiſhed by the places from whence they are brought, as well as by the manner of curing, into Aberdeen-fiſh, Iceland-fiſh, green-fiſh, ſtock-fiſh, North-ſea cod, poor Jack, and barrelled cod.

Green cod.—The chief *fiſheries* for *green cod* are in the bay of Canada, on the Great and Little Bank, near the coaſt of Newfoundland, the iſle of St. Peter, and the iſle of Sable; and thither veſſels are yearly ſent from divers parts both of America and Europe.

The veſſels uſed herein are from a hundred to a hundred and fifty tons burden; and theſe will bring thirty or thirty-five thouſand fiſh a-piece.

The moſt eſſential articles in this *fiſhery* are the perſons who know how to open the fiſh, to cut off the heads, and to ſalt them; upon the ability of which laſt the ſucceſs of the voyage chiefly depends.

Several authors will have it, that the Biſcayans, in purſuing their whales, made the firſt diſcovery of the Great and Little Banks of *cods* at Newfoundland, Canada, &c. a hundred years before Columbus's time; and that it was a Biſcayan Newfoundlander that gave the firſt intimation thereof to Columbus.

Others ſay, that the Great Bank was diſcovered by a native of St. Malo's, named Cartier. But be the diſcoverer of what name or nation he may, the diſcovery is certainly highly valuable; there is not a trading nation in Europe, but allows the commerce of *cod-fiſh* one of the moſt ſecure and gainful that is known.

The beſt, largeſt, and fatteſt *cod*, are thoſe taken on the ſouth-ſide of the great Bank, which is a kind of ſubmarine mountain, one hundred and fifty miles long, and fifty broad, and at the diſtance of twenty-five leagues from Newfoundland: thoſe on the north-ſide are generally much ſmaller.

The beſt ſeaſon is from the beginning of February to the end of April; at which time the *cod*, which during the winter had retired to the deepeſt part of the ſea, return to the Bank, and grow very fat.

Thoſe caught from March to June keep well enough; but thoſe taken in July, Auguſt, and September, ſoon ſpoil. The fiſhing is ſometimes done in a month, or ſix weeks; and ſometimes it holds four or five months. As Lent draws on, if the fiſhermen have but half their cargo, they ſtrive who ſhall make homeward the firſt; the market being then the beſt.

Some will thus make a ſecond voyage, before others have got loading for the firſt. Each fiſher only takes one cod at a time; and yet the more experienced will take from three hundred and fifty to four hundred *per day*; but this is the moſt; for it is very fatiguing work, both on account of the weight of the fiſh, and of the extreme cold which reigns on the Bank.

The wages uſually allowed the captain and ſailors, is one third of the *cod* they bring home ſound.

They ſalt the *cod* on board. The head being cut off, the belly opened, and the guts taken out, the ſalter ranges them in the bottom of the veſſel, head to tail; and having thus made a layer thereof, a fathom or two ſquare, he covers it with ſalt; over this he lays another layer of fiſh, which he covers as before; and thus he diſpoſes all the fiſh of that day, taking care never to mix the fiſh of different days together.

By that time the *cod* has lain thus to drain three or four days, they are moved into another part of the veſſel, and ſalted afreſh. After this, they are no more to be touched, till the veſſel have its burden.

Sometimes they put them up in barrels, for the conveniency of carriage.

Dry cod.—In the fiſhing of *dry cod*, veſſels of all ſizes are uſed; though ſuch are generally choſen, as have large holds, becauſe this ſort of fiſh incumbers more than it burdens.

As *cod* is only to be dried by the ſun, the European veſſels are obliged to put out in March, or April, to have the benefit of the ſummer for drying. Indeed, we ſend veſſels for *cod* in June and July; but thoſe only buy what had been fiſhed and prepared by the inhabitants of the Engliſh colonies of Newfoundland, and the neighbouring parts; in exchange for which, we carry them meal, brandies, biſcuits, pulſe, melaſſes, linen, &c.

The principal *fiſhery* for *dry cod* is along the coaſt of Placentia, from Cape Roſe, to the Bay des Experts; in which compaſs there are divers commodious ports for the fiſh to be dried in.

The fiſh intended for this uſe, though of the ſame kind with the green cod, is yet much ſmaller; whence it is the fitter to keep, as the ſalt more eaſily penetrates it.

The method of fiſhing is much the ſame in both; only this latter is the more expenſive, as it takes up more time, and employs more hands; and yet ſcarce half ſo much ſalt is ſpent in this, as in the other.

When ſeveral fiſhing veſſels meet, and intend to fiſh in the ſame port, he whoſe ſhaloop firſt touches ground, becomes entitled to the quality and privileges of ADMIRAL; he has the choice of his ſtation, and the refuſal of all the wood on the coaſt at his arrival.

As faſt as the captains arrive, they unrig all their veſſels, leaving nothing but the ſhrouds to ſuſtain the maſts; and in the mean time the mates provide a tent on ſhore, covered with branches of fir, and ſails over them; with a ſcaffold, fifty or ſixty feet long, and about one third in breadth.

While the ſcaffold is making ready, the crew are fiſhing; and as faſt as they catch, they bring their fiſh, open them, and ſalt them on moveable benches; but the main ſalting is performed on the ſcaffold, called FLAKE.

When the fiſh have taken ſalt, they waſh them; and to drain them again, lay them in piles on the galleries of the ſcaffold; when drained, they range them on hurdles, a fiſh thick, head againſt tail, with the back uppermoſt; obſerving, while they lie thus, to turn and ſhift them four times every twenty-four hours.

When they begin to dry, they lay them in heaps of ten or twelve a-piece, to retain their warmth, and continue to enlarge the heap every day, till it becomes double its firſt bulk: at length they join two of theſe heaps into one, which they turn every day, as before. Laſtly, they ſalt them over again, beginning with thoſe that had been ſalted firſt; and thus lay them in huge piles, as big as hayſtacks.

In this manner they reſt, till they are carried a ſhip-board, where they are laid on branches of trees, diſpoſed for that purpoſe in the bottom of the veſſel, with mats all around, to prevent their contracting any moiſture.

There are four kinds of commodities drawn from *cod*; viz. the zounds, and tongues, which are ſalted at the ſame time with the fiſh, and barrelled up; the roes, or eggs, which, being ſalted and barrelled up, ſerve to caſt into the ſea, to draw fiſh together, and particularly pilchards; and laſtly, the oil, which is uſed in dreſſing of leather, &c.

By the definitive treaty between Great Britain and France in 1763, the French are now abſolutely deprived of the powerful fortifications of Cape Breton, and of the poſſeſſion of Canada and all its dependencies; and are entitled to no poſſeſſions contiguous to Newfoundland, except the ſmall iſlands of St. Peter's and Miquelon, ceded by the ſixth article of the ſaid treaty to his moſt Chriſtian majeſty, as a ſhelter for the French fiſhermen; and his moſt Chriſtian majeſty engages not to fortify the ſaid iſlands, to erect no buildings upon them, but merely for the convenience of the *fiſhery*, and to keep upon them a guard only of fifty men for the police. And by the eighteenth article of the ſame treaty, it is expreſly ſtipulated between Great Britain and Spain, that his Catholic majeſty deſiſts, as well for himſelf, as for his ſucceſſors, from all pretenſions which he may have formed in favour of the Guipuſcoans and other his ſubjects, to the right of fiſhing in the neighbourhood of Newfoundland.

The Scots catch a ſmall kind of *cod* on the coaſts of Buchan, which is highly prized, though very much like ling. They ſalt it, and dry it in the ſun, upon rocks; and ſometimes in the chimney; but the greateſt part of it is ſpent at home.

Fishery, *coral*. See Coral.

Fishery, *herring*. The *herring* is a ſmall ſalt-water fiſh, with a bluiſh back, and a white ſilvered belly, not unlike a little ſhad-fiſh; whence it is called in Latin *aloſa minor*. Rondeletius calls it *harengus*.

It is a popular error to believe the *herring* to be the *halec* of the Romans. The *halec* was no particular fiſh, but a kind of ſawce, made of any kind of ſalt-fiſh. The modern *herring* ſeems to have been unknown to the ancients: it is neither the *halec*, nor *halex*, nor *mænis*, nor *lencomenis*, nor the *gerres* of Pliny. See Rondelet. De Piſcib. Marin. lib. v. cap. 13. and Voſſius De Idolol. See Herring.

Herrings are chiefly found in the North ſea. It is true, there are *fiſheries* elſewhere, but none ſo copious.

They uſually make two fiſhing ſeaſons for *herrings*; the firſt in June, July, and Auguſt; the ſecond in autumn; the latter of theſe is the more conſiderable, on account of the fogs, which are very favourable to this kind of fiſhing.

It is commonly ſaid, that nobody ever ſaw a *herring* alive, and that they die the minute they are taken out of the water; but there are inſtances to the contrary.

The *herring* is a fiſh of paſſage; ſo that it is allowed to catch them on holidays and Sundays: in the Decretal there is an expreſs chapter to this effect. They go chiefly in ſhoals, and are fond of following any fire, or light; and in their paſſage they reſemble a kind of lightning themſelves.

About the beginning of June, a ſhoal of herrings, in bulk not leſs than the whole extent of Great Britain and Ireland, comes from the North, on the ſurface of the ſea; and their approach is known to the Shetlanders by ſeveral tokens in the air and water; as by the birds, ſuch as gannets, and others, which follow, to prey on them, and the ſmoothneſs of the water. It is not certainly known from whence they come; though it is probable that their winter rendezvous is within the arctic circle, where the ſeas ſwarm with inſect food in greater abundance than in our warmer latitudes. But when they arrive in theſe ſeas, they caſt their ſpawn; for they come to us full, and are ſhotten long before they leave us. As the great ſhoal formed by the migrating herrings, and divided into diſtinct columns, five or ſix miles in length, and three or four in breadth, reflecting in bright weather many ſplendid colours, paſſes between the ſhores of Greenland and the North Cape, it is probably much ſtraitened, and as it reaches the extremities of Great Britain, it is ſeparated into two parts; one part ſteers weſt or ſouth-weſt, and, leaving the iſlands of Orkney and Shetland to the left, paſſes on towards Ireland; where being interrupted by that iſland, this part is again divided; ſome, keeping to the coaſt of Britain, go ſouthward down St. George's or the Iriſh channel, and the others, edging off for want of room to the weſt and ſouth-weſt, go along the Hibernian ocean, and, keeping on the coaſt, reach the ſouth ſhore of Ireland, from whence they ſteer ſouthward, and join the reſt in the Iriſh channel. The other part of the firſt diviſion made in the north, parting a little to the eaſt and ſouth-eaſt, come down into the German ocean: they paſs by Shetland, and make the point of Buchaneſs, and the coaſt of Aberdeen, filling the bays, friths, rivers, and creeks, with their innumerable multitudes. Hence they proceed ſouthward, paſs by Dunbar, and rounding the high ſhores of St. Tobbs and Berwick, are ſeen again off Scarborough, and not before, but not in bulk, till they come to Yarmouth roads in England, and thence to the mouth of the Thames; from whence paſſing the Britiſh channel, they are ſeen no more in any number. The herrings are found again upon the ſhores of North America, though not in ſuch quantities as with us; and they are ſeen no farther ſouth than the rivers of Carolina. Whether theſe may be part of that large ſhoal, which, at their firſt coming by the coaſt of Greenland, keep to the coaſts of America on the north-weſt ſide; or whether they are the remainder of thoſe that paſs our channels, is uncertain; but we know that they are not ſeen in quantities in any of the ſouthern kingdoms, as Spain, Portugal, or the ſouth parts of France, on the ſide of the ocean, or in the Mediterranean, or on the coaſt of Africa.

The Hollanders were the firſt who began the *herring-fiſhery*, and obſerved the ſeveral ſeaſons of their paſſage. Their firſt regular fiſhing is fixed to the year 1164.

In the year 1313 we have an account of the ſeizure of a ſhip of Lynn, in the port of Bergen, which had been fiſhing on the Norway coaſt for herrings. Rymer's Fœd. vol. iii. p. 400. And as ladings of herrings carried to a diſtance muſt have been ſalted, it is plain that ſalted herrings, either wet or elſe dried, called red herrings, were, in thoſe times, a merchantable commodity in foreign parts. And in 1338 we have an account of fifty laſts of herrings ſhipped from Portſmouth for the uſe of the army and fleet of Edward III. in Gaſcony, which muſt have been ſalted, either wet or dried. Fœd. vol. v. p. 12. And they were barrelled and ſalted at the port of Whitby, in Yorkſhire, in 1394. Fœd. vol. vii. p. 778.

But the preſent method of pickling them was not diſcovered till the year 1416, though others date it from the year 1397. Willughby, in his Hiſtory of Fiſhes, obſerves, that Will. Buekelſz, or Bachalen, a native of Bier Uliet, rendered his name immortal by the diſcovery of the ſecret of curing and pickling *herrings*, which he might probably have learned from the people of Yarmouth, and other parts of England, where *herrings* were not only ſalted and dried for *red-herrings*, but ſalted and barrelled up wet, at different times, from the year 1306 to 1360. Yarmouth has indeed been long famous for its *herring-*

herring-fair, which was regulated by an act, commonly called the ſtatute of *herrings*, in the thirty-firſt year of Edward III. He adds, that the emperor Charles V. coming into the Low Countries, made a journey to the iſle of Bier Uliet, with the queen of Hungary, on purpoſe to view the tomb of this firſt barreller of *herring*.

The Dutch begin their *herring-fiſhery* on the twenty-fourth of June, and employ no leſs than ten or eleven hundred veſſels therein. Theſe veſſels are a kind of barks, called *buſſes*, carrying from forty-five to ſixty ton, and two or three ſmall cannon.

Before the eſtabliſhment of the Society of the Free Britiſh *Fiſhery*, the number of Dutch veſſels employed in this *fiſhery* was more conſiderable, and amounted to fifteen hundred or two thouſand.

None of them are allowed to ſtir out of port without a convoy, unleſs there be enough of them together, to make eighteen or twenty pieces of cannon; in which caſe they are allowed to go in company. Before they ſet out, they make a verbal convention; which has the ſame force, as if it were in writing.

Theſe regulations of the admiralty of Holland are partly followed by the French, and other nations; and partly improved and augmented with new ones: as, that no fiſher ſhall caſt his net within a hundred fathoms of another boat; that while the nets are caſt, a light ſhall be kept on the hind part of the veſſel; that when a boat is by any accident obliged to leave off fiſhing, the light ſhall be caſt into the ſea; that when the greater part of a fleet leaves off fiſhing, and caſts anchor, the reſt ſhall do the ſame, &c.

By the act for encouraging the Britiſh white *herring fiſhery*, in 1750, it is required, that the buſſes employed in this *fiſhery*, entitled to the bounty of 30*s.* per ton, ſhall be decked veſſels, built in Great Britain, after the commencement of the act; and that each of them ſhall carry twelve Wincheſter buſhels of ſalt, for every laſt of fiſh which ſuch veſſel is capable of holding, and as many more new barrels as ſuch a ſhip is capable of carrying, and two fleets of tanned nets; i. e. every veſſel of ſeventy tons ſhall have one fleet of nets, each thirty yards full on the rope, and ſeventeen fathoms deep, and others in proportion; and be provided with one other fleet of fifty like nets, on board a jagger or tender, which is to attend the ſaid *fiſhery*. Every ſuch buſs properly manned and furniſhed, ſhall proceed either to Braſſey's Sound in Shetland, and be at the rendezvous of the ſaid *fiſhery* there, on or before the eleventh day of June, but ſhall not ſhoot their net till the thirteenth, and ſhall continue following the ſhoal and fiſhing, as they move ſouthward, to the firſt of October; or to Campbeltown in Argyleſhire, and be at the rendezvous of the ſaid *fiſheries* on or before the firſt day of December, unleſs they ſhall have ſooner completed their loading of fiſh. For other regulations of the *herring-fiſhery*, ſee HERRING.

The manner of fiſhing has nothing particular in it. The nets wherein the fiſh is drawn, ſhould, regularly, have their maſhes an inch ſquare, that none of the leſſer fry may be taken.

The commerce of *herring*, both white, i. e. pickled, and red, is very conſiderable; but there are ſo many different ſorts prepared, in ſuch different ways, and different places, that it is hard to ſay any thing preciſe thereupon.

The white *herrings* cured by the Dutch are in the greateſt repute: they are diſtinguiſhed into four kinds, according to their ſizes. The goodneſs of this commodity conſiſts in its being fat, fleſhy, firm, white; ſalted the ſame day it is taken, and with good ſalt, and well barrelled.

The Iriſh *herring* are the next in value after thoſe of Holland; and principally thoſe of Dublin, which are ſcarce inferior to the beſt *herring* of Rotterdam or Enkuyſen.

The Scotch *herring* is not ſo well prepared, gutted, ſalted, nor barrelled, as the Dutch; and yet its taſte is excellent, that of thoſe caught on the weſtern coaſt eſpecially; nor is it to be doubted, but that if the Scots were as careful in theſe circumſtances as their neighbours, their *herring* would be the beſt in the world. The *herring* fiſhed in England is inconſiderable; the fiſh being too dry for the market. However, at Yarmouth and Leoſtoff they take and cure about 50,000 barrels of *red-herrings* in a year; and very large quantities are alſo caught at the mouth of the Thames by the fiſhing-ſmacks of London, Folkſtone, Dover, Sandwich, &c. for the London markets, and near the ſea-coaſt of Kent and Suſſex for general conſumption.

Curing and preparing herring. 1. For *white* or *pickled herring*: as ſoon as the *herring* are taken out of the ſea, one of the crew, appointed for this office, cuts them open, and takes out the guts, and every thing but the milts and roes, which are always to be left in the body of the fiſh. Then, waſhing them in freſh water, they are left the ſpace of twelve or fifteen hours in a tub full of ſtrong brine made of freſh water, and ſea ſalt.

When they are taken out, they drain them; and when well drained, put them up in barrels; taking care to diſpoſe and range them evenly, in rows, or layers, preſſing them well down, and ſtrewing a layer of ſalt both at top and bottom.

When the barrel is full, they ſtop it up very cloſe, that no air may get in, nor any brine out; either of which is very prejudicial to the fiſh.

The Dutch, after opening and gutting the *herrings*, cure and ſalt them by lining or rubbing their inſide with ſalt; they are then packed, with handfuls of ſalt between each row, and ſtopped up cloſe.

2. For *red-herrings*: the fiſh being caught, they proceed to waſh, gut, and lay them in brine, as for *pickled-herring*; only they let them lie double the time in brine, viz. twenty-four hours; inaſmuch as they are to take all their ſalt here, whereas the other kind takes half its ſalt in the barrel.

When the *herrings* are taken out of the brine, they ſpit them, i. e. ſtring them by the head on little wooden ſpits, and thus hang them in a kind of chimney, made for the purpoſe; and when the chimney is as full as it will hold, which leſs than ten or twelve thouſand ſeldom effects, they make a little fire underneath of bruſh-wood, which yields a deal of ſmoke, but no flame.

Here the *herrings* remain, till ſufficiently ſmoked and dried; which ordinarily is in twenty-four hours. Then they are taken down, and barrelled up for keeping.

Their goodneſs conſiſts in being large, freſh, fat, oily, ſoft, and pliable; their outſide of a yellow, golden colour; their having roes, or milt, within them, and being well ſalted and barrelled. See HERRING.

FISHERY, *lobſter*. *Lobſters* are taken along the Britiſh channel, and on the coaſt of Norway, whence they are brought to London for ſale; and alſo in the frith of Edinburgh, and on the coaſt of Northumberland.

By 10 and 11 W. III. cap. 24. no *lobſter* is to be taken under eight inches in length, from the peak of the noſe to the end of the middle fin of the tail; and by 9 G. II. cap. 33. no *lobſters* are to be taken on the coaſt of Scotland from the firſt of June to the firſt of September.

FISHERY, *mackrel*. The *mackrel* is a ſalt-water fiſh, without ſcales. Its body is round, and fleſhy; terminating almoſt in a point, at each extreme.

Some perſons well ſkilled in the naval architecture, hold its figure the moſt commodious for ſwimming of all others, and propoſe it as a model for the building of ſhips.

It is ordinarily about a foot long; when in the water, it appears yellow, and when out of it, of a ſilver white, excepting four ſtreaks, or ſpeckles, of a deep blue, on the back and ſides. See MACKREL.

The *mackrel* is a ſummer fiſh of paſſage, found in large ſhoals, in divers parts of the ocean, not far north; but eſpecially on the French and Engliſh coaſts.

The fiſhing is uſually in the months of April, May, and June, and even July, according to the place. They enter the Engliſh channel in April, and proceed up to the ſtreights of Dover, as the ſummer advances; ſo that by June they are on the coaſts of Cornwall, Suſſex, Normandy, Picardy, &c. where the *fiſhery* is moſt conſiderable. They are an excellent food, freſh; and not to be deſpiſed, when well prepared, pickled, and put up in barrels; a method of preſerving them chiefly uſed in Cornwall.

Naturaliſts have obſerved, that the water wherein *mackrel* has been boiled, often yields a light, after ſtirring it a little. See FIRE, and *Luminouſneſs of the* SEA.

The fiſh is taken two ways; either with a line, or nets: the latter is the more conſiderable, and is uſually performed in the night-time. The rules obſerved in the fiſhing for *mackrel* are much the ſame as thoſe already mentioned in the *fiſhery* of herrings.

There are two ways of pickling them: the firſt is, by opening and gutting them, and filling the belly with ſalt, crammed in as hard as poſſible with a ſtick; which done, they range them in ſtrata or rows, at the bottom of the veſſel, ſtrewing ſalt between the layers.

In the ſecond way, they put them immediately into tubs full of brine, made of freſh water and ſalt; and leave them to ſteep, till they have imbibed ſalt enough to make them keep; after which they are taken out, and barrelled up, taking care to preſs them cloſe down.

Mackrel are not cured or exported as merchandize, except a few by the Yarmouth and Leoſtoff merchants, but are generally conſumed at home; eſpecially in the city of London, and the ſea-ports between the Thames and Yarmouth, eaſt, and the Land's end of Cornwall, weſt.

FISHERY, *oyſter*, is principally carried on at Colcheſter, in Eſſex; Feverſham and Milton, in Kent; the Iſle of Wight; the Swales of the Medway; and Tenby, on the coaſt of Wales. From Feverſham, and adjacent parts, the Dutch have ſometimes loaded a hundred large hoys with *oyſters* in a year. They are alſo taken in great quantities near Portſmouth, and in all the creeks and rivers between Southampton and Chicheſter; many of which are carried about by ſea to London and to Colcheſter, to be fed in the pits about Wavenhoe, and other places.

Fishery, *pearl.* See **Pearl** *fiſhery.*

Fishery, *pilchard.* The *pilchard* is a ſmall ſalt-water fiſh, bigger than the anchovy, but leſs than the herring which in other reſpects it reſembles. Its head is yellow; its belly white; and its back a ſea-green. It eats admirably, freſh, or lightly ſalted. See **Pilchard.**

There are certain ſeaſons for fiſhing the *pilchard*; which, like the herring and anchovy, is a fiſh of paſſage; and its arrival is indicated by ſimilar ſigns with that of the herrings. They are prepared and ſalted much as the anchovy is; with this difference, that the head is cut off the latter; but the *pilchard* were diſtinguiſhable from the anchovy, even though its head were off likewiſe; the *pilchard* having a very flat back, and the anchovy a round one.

The chief *pilchard fiſheries* are along the coaſts of Dalmatia, to the ſouth of the iſland Iſſea; on the coaſts of Bretagne, from Belle iſland as far as Breſt; and along the coaſts of Cornwall and Devonſhire.

It is a ſaying of the Corniſh men, with regard to the *pilchard,* that it is the leaſt fiſh in ſize, moſt in number, and greateſt in gain, of any they take out of the ſea. This obſervation is amply confirmed by Dr. Borlaſe's account of this *fiſhery*; for beſides the great number of perſons employed by it, the poor are fed with the offals of the captures, the land with the refuſe of the fiſh and ſalt, the merchant finds the gains of commiſſion and commerce, and the fiſherman the gains of the fiſh. The uſual produce of the number of hogſheads exported each year, for ten years, from 1747 to 1756, incluſive, from the four ports of Fowey, Falmouth, Penzance, and St. Ives, amounted to 29,795 hogſheads. Every hogſhead for ten years laſt paſt, together with the bounty allowed for each hogſhead exported, and the oil made out of each, has amounted, one year with another, at an average, to the price of 1*l.* 13*s.* and 3*d.*; ſo that the caſh paid for *pilchards* exported has, at a medium, annually amounted to the ſum of 49,532*l.* 10*s.* The number taken at one ſhooting out of the nets is amazingly great. In 1767, there were at one time incloſed in St. Ives's bay 7000 hogſheads, each hogſhead containing 35,000 fiſh; in all 245,000,000.

That on the coaſts of Dalmatia is ſo plentiful, that it not only furniſhes all Greece, but a great part of Italy. That on the coaſts of Bretagne employs yearly above three hundred ſloops, and moſt of the ſeamen of the country.

The fiſh caught on our own coaſts, though bigger, are not ſo much valued, as thoſe on the coaſts of France; owing principally to their not being ſo thoroughly cured. The ſeaſon is from June to September.

The *pilchards* naturally follow the light; and will gather about a boat that bears a light in the night-time; which contributes much to the facility of the *fiſhery.*

On the coaſts of France they make uſe of the roes of cod fiſh, as a bait; which, thrown into the ſea, makes them riſe from the bottom, and run into the nets, placed for that purpoſe.

On our coaſts, there are perſons, called in Cornwall *huers,* poſted aſhore, who, ſpying by the colour of the water where the ſhoals are, make ſigns to the boats, to get among them, to caſt their nets.

When taken, the fiſh are brought to a warehouſe on ſhore, where they are laid up in broad piles, ſupported by backs and ſides.

As they pile them, they ſalt them with bay-ſalt; in which they lie ſoaking twenty or thirty days, and diſcharge a great quantity of blood, with dirty pickle, and bittern; which laſt draws much of the oil from the fiſh, to the great loſs of the owners. When taken out of the pile, there remains a quantity of ſalt, blood, ſcales, &c. at bottom, which, with freſh ſalt, ſerves for another pile.

They now proceed to waſh them in ſea-water to clear off the dirt and blood; and when dry, they put them up in barrels, and preſs them hard down, to ſqueeze out the oil, which iſſues away at a hole in the bottom of the caſk; and in this ſtate they are fit for ſale, or uſe.

Fishery, *ſalmon.* The *ſalmon* is a northern fiſh, being unknown in the Mediterranean ſea, and other warm climates, and, according to ſome, breeds in the ſea; but the opinion of others ſeems better warranted, that it breeds in the clear ſandy parts of rivers, remote from their mouths. They commonly ſpawn in November; and when they have found a place fit for the purpoſe, the male and female unite in forming a proper receptacle for it in the ſand or gravel, about the depth of eighteen inches; in this the female depoſits her ſpawn, and the male his milt, which they cover carefully, as it is ſaid, with their tails; for after ſpawning they are obſerved to have no ſkin on that part. The ſpawn lies buried till the ſpring. The milter and ſpawner, having performed their office, betake themſelves to the ſea; and if their return be prevented by weirs, or the like, they become ſick, lean, and are then called *kipper,* pine away, and die in two years time. If they ſpawn in the mean time, the produce is a diminutive *ſalmon,* called *ſkegger,* which will never arrive at the natural bulk; it being the ſea that makes them grow big, and the rivers fat. The female is diſtinguiſhed from the male, in that its noſe is longer, and more hooked, its ſcales not ſo bright, and its body ſpeckled over with dark brown ſpots, its belly flatter, and its fleſh not ſo red; more dry, and leſs delicious to the taſte. In ſpawning time, when they repair from the ſea up to the rivers, ſcarce any thing can ſtop their progreſs. Many have ſeen them leap up cataracts and precipices, many yards high. See **Salmon.**

When the *ſalmon* firſt enter the freſh water, they have a number of inſects, the *lerneæ ſalmoneæ* of Linnæus, adhering to them, eſpecially above the gills, which are ſigns that the fiſh is in high ſeaſon; theſe die and drop off ſoon after the *ſalmon* have left the ſea. About the latter end of March, the ſpawn begins to exclude the young, which gradually increaſe to the length of four or five inches, and are then termed ſmelts or ſmouts; and about the beginning of May the Tweed, &c. is full of them; but they are ſoon hurried away to the ſea. About the middle of June the earlieſt of the fry begin to drop, as it were, into the river again from the ſea, being about twelve, fourteen, or ſixteen inches, and they gradually increaſe in number and ſize till about the end of July; (at Berwick the fiſh in this ſtage is called gilſe) when they again leſſen in number, and increaſe in ſize, ſome being ſix, ſeven, eight, or nine pounds in weight.

The chief *ſalmon fiſheries* in Europe are along the coaſts of England, Scotland, and Ireland. The fiſhing uſually begins about the firſt of January, and ends by the laſt of September. It is performed with nets, in the places where the rivers empty themſelves into the ſea, and along the ſea-coaſts thereabout. The fiſh are ſeen to croud thither frequently in ſhoals from all parts, in ſearch of the freſh water; they alſo fiſh for them higher up in the rivers; ſometimes with nets, and ſometimes with a kind of locks, or weirs, made for the purpoſe, with iron grates therein, ſo diſpoſed, as that the fiſh, in going up the river, open them with their head; but are no ſooner entered, than the gate claps to. Thus the *ſalmon* are incloſed as in a reſervoir, where it is eaſy to take them. In ſome places they fiſh for *ſalmon* in the night-time, by the light of torches, or kindled ſtraw. The fiſhermen watch when the fiſh draws towards the light, whereof he is naturally a great lover, and ſtrikes him with a ſpear, or liſter. In ſome parts of Scotland, it is ſaid, they ride a fiſhing up the rivers, and when they ſpy them in the ſhallow parts, ſhoot them with fire-arms.

Salmon form, in ſeveral countries, a great article of commerce; being cured in different ways, by ſalting, pickling, and drying. There are ſtationary *fiſheries* in Iceland, Norway, and the Baltic; but thoſe at Coleraine in Ireland, at Berwick in Great Britain, and in ſome of the rivers of Scotland, are the moſt conſiderable. The capture in the Tweed near Berwick, about the month of July, is prodigious; a boat load, and ſometimes near two, is taken in a tide; and it is common to take from fifty to a hundred fiſh at one hawl. At this time the coopers in Berwick begin to ſalt both *ſalmon* and gilſes in pipes, and other large veſſels, and then barrel them to ſend abroad. The *ſalmon* barrel holds above forty-two gallons, wine meaſure. Moſt of the *ſalmon* taken before April is ſent freſh to London; and that which they fail to ſend is boiled, pickled, and kitted. Freſh *ſalmon* has alſo been ſent to London in the latter end of September; but then the fiſh are full of large roes, very thin bellied, and are eſteemed neither palatable nor wholeſome. In the month of July a ſtone of freſh *ſalmon,* of eighteen pounds ten ounces and a half, has been ſold at Berwick for eight pence; but the more common price is between ſixteen pence, and two ſhillings and ſix pence. The ſeaſon for fiſhing in the Tweed begins the thirtieth of November, though the fiſhermen work very little till after Chriſtmas, and ends on Michaelmas day. There are on this river forty-one conſiderable fiſheries, beſides others of leſs value, rented for near 5400*l.* per annum.

Scotland poſſeſſes alſo great numbers of fine *fiſheries* on both ſides of that kingdom. The *ſalmon* are cured in the ſame manner as at Berwick; and a great quantity is ſent to London in the ſpring; but after that time the adventurer begins to barrel and export them to foreign countries; though the demand for them is much abated of late years. They have alſo in Scotland a great deal of *ſalmon*, ſalted in the common way, which after ſoaking in brine for a competent time, is well preſſed, and then dried in ſmoke: this is called *kipper*, is chiefly made for home conſumption, and, if properly cured and prepared, is reckoned very delicious food. The north of Ireland abounds with this fiſh: the moſt conſiderable *fiſhery* is at Cranna, about a mile and a half from Coleraine, rented, in 1754, for 620*l.* a year. It is ſituated on the river Ban, where they fiſh with nets eighteen ſcore yards long, and are continually drawing night and day through the whole ſeaſon, which laſts about four months; eight hundred and forty fiſh have been taken at a ſingle draught. There is alſo a weir on the river, which takes the fiſh that eſcape the nets. In 1760, three hundred and twenty tons were taken in the Cranna *fiſhery*. The *ſalmon* are cured in this manner: they are firſt ſplit, and the guts and gills, and many of the bones, are taken out, and then rubbed with fine ſalt; and after lying in pickle in large tubs for ſix weeks, are packed up with layers of coarſe brown Spaniſh ſalt in caſks, ſix of which make a ton. Theſe are exported to Leghorn and Venice, &c at the price of twelve or thirteen pounds a ton. Pennant's Brit. Zool. vol. iii. p. 284. 294.

The ſtat. 4 and 5 Anne, cap. 21. was made for the increaſe and preſervation of *ſalmon* in rivers in the counties of Southampton and Wilts, requiring that no *ſalmon* be taken between the firſt of Auguſt, and twelfth of November, or under ſize, &c. And by 1 Geo. I. cap. 18. *ſalmon* taken in the rivers Severn, Dee, Wye, Were, Ouſe, &c. are to be eighteen inches long, at leaſt; or the perſons catching them ſhall forfeit 5*l.* And by 30 Geo. II. cap. 21. no *ſalmon* is to be caught in the rivers Thames and Medway between the eleventh of November and twenty-fourth of Auguſt, or to be of leſs weight than ſix pounds.

Salmon is alſo fiſhed for in rivers, after the manner of trout, with a line and hook. He bites beſt in the afternoon, about three, in May, June, July, and Auguſt; the water being clear, and a little breeze of wind ſtirring; eſpecially if the wind and ſtream ſet contrary ways. The *ſalmon* is caught like a trout, with worm, fly, and minim; and eſpecially the garden-worm, if well ſcoured, and kept twenty days in moſs. The *ſalmon* never ſtays long in a place, but is continually ſhifting to be as near the ſpring-head as poſſible, and ſwimming generally in the deepeſt and broadeſt parts of the rivers, near the ground. Put two or three garden-worms well ſcoured on your hook at once, as if you were baiting for trout; and be ſure to give him time to gorge his bait, before your ſtrike. Some uſe a wire-ring on the top of the rod, through which the line may be let run to any length at pleaſure, by a reel near the hand.

FISHERY, *ſturgeon*. The *ſturgeon* is a large ſea-fiſh, which at its ſeaſon runs up the rivers; having a ſharp-pointed ſnout, a flat belly, and bluiſh back. *Sturgeons*, as well as whales, are reckoned among the number of ROYAL *fiſhes*.

There are *ſturgeons* of all ſizes; and we even read of ſome twenty feet long; but the middle ſize are reckoned the beſt; though ſome prefer the ſmaller. See STURGEON.

It is of the roe or eggs of this fiſh that the CAVEAR, or kavia, ſo much prized by the Italians, &c. is prepared.

Sturgeon, when freſh, eats delicioſly. To make it keep, they ſalt or pickle it in large pieces, and put them up in cags, from twenty-five to fifty pounds.

The greateſt *ſturgeon fiſhery* in the world is in the mouth of the Volga, in the Caſpian ſea; where the Muſcovites find employment for a great number of men. We have lately had a conſiderable ſupply of *ſturgeon* from North America, which rivals that of the Baltic.

They are not caught in nets, but in a kind of encloſure, formed by huge ſtakes, diſpoſed in triangles, repreſenting the letter Z ſeveral times repeated. Theſe kinds of *fiſheries* are open on the ſide towards the ſea, and cloſe on the other; by which means the fiſh, aſcending in its ſeaſon up the river, embarraſſes itſelf in theſe narrow, angular retreats; and, not being able to turn itſelf, to go back again, on account of its bulk, is eaſily ſtruck, and killed with a ſort of harping-iron. They are alſo taken, during ſummer, in the lakes Friſchechaff and Curiſchhaff, near Pillau, in large nets, made of ſmall cord; the adjacent ſhores are formed into diſtricts, and farmed out to companies of fiſhermen; ſome of which are rented for ſix thouſand guilders, or near 300*l.* *per annum*.

The chief object of this *fiſhery* is the roe or ſpawn, which is a commodity as much uſed in Muſcovy as butter in Holland; and there are ſome *ſturgeons* that furniſh each four hundred pounds thereof. It is only the leſſer and younger *ſturgeon* that they pickle for eating.

FISHERY, *whale*, or *Greenland* FISHERY. This huge fiſh, we have elſewhere obſerved, is chiefly caught in the North ſea. The largeſt ſort are found about Spitzbergen, ſome of them being there two hundred feet in length. Thoſe on the coaſts of America are about ninety, or a hundred; and thoſe on the coaſts of Guyenne, and the Mediterranean, are the ſmalleſt of all.

The firſt perſons that ſeem to have been employed in the *whale-fiſhery* were the Norwegians; probably ſoon after their diſcovery of Greenland, about the year 837: for we find, that king Alfred received information from Octher, a Norwegian, in 887 or 890, that the Norwegians were employed in this *fiſhery*. He tells the king, that he ſailed along the Norway coaſt, as far north as the whale-hunters commonly uſe to travel; but it ſeems that all knowlege of this gainful employ was loſt, at leaſt in this country, for almoſt ſeven centuries. The Biſcayners were alſo concerned in it, for the ſake not only of the oil, but alſo of the whale-bone, before the Engliſh; for, though their north-eaſt diſcoveries in 1553 had pointed out the way to the *whale-fiſhery* at Spitzbergen, they were ſo ignorant of the buſineſs in 1575, as to be under a neceſſity of procuring information and aſſiſtance from Biſcay for this purpoſe. The firſt mention that occurs in the Engliſh hiſtory of whale-fins, or whale-bone, is in 1593, when eight hundred fins, part of the cargo of ſome Biſcay ſhips, that had been wrecked three years before, were brought to England from the bay of St. Laurence in America by an Engliſh ſhip; previous to which time, the ladies ſtays, as Mr. Anderſon obſerves, muſt have been made of ſplit or ſome other tough and pliant wood; the *whale-fiſhery* being carried on for the ſake of the oil long before the diſcovery of the uſe of the whale-bone, which was firſt brought to England, with the blubber or oil, in 1617. The Engliſh, having been accuſtomed to the Northern ſeas, by their repeated trials for a north-weſt and north-eaſt paſſage to China, in 1598 commenced their *fiſhery* for *whales* at or near Spitzbergen, where thoſe animals reſort in greater numbers than any where elſe. But the firſt Engliſh voyage for the purpoſe of killing *whales* was undertaken by the Ruſſian company in 1611, who ſent two ſhips thither, with ſix Biſcayners, expert in the buſineſs; the ſhips were loſt, though their men and boats, &c. were ſaved by a ſhip of Hull, then at Spitzbergen. In 1618, the Eaſt-India adventurers joined ſtock with the Ruſſian company for purſuing the *whale-fiſhery*, and fitted out thirteen ſhips, but the voyage proved unſucceſsful. The manner of managing the whale fiſhing both by the Engliſh and Dutch was then quite different from the preſent mode: the whales, having never been diſturbed, reſorted to the bays near the ſhore, ſo that their blubber was eaſily landed at Spitzbergen, where they erected cookeries, i. e. coppers, &c. for boiling their oil; and theſe they left ſtanding from year to year, and only brought home the purified oil, and the whale-bone. The Engliſh, having been the firſt in that *fiſhery*, kept poſſeſſion of the beſt bays; the Hollanders, coming later, were obliged to find bays farther to the North; the Danes, who came later into this trade than the Dutch, got in between the Engliſh and Dutch; the Hamburghers came after the Danes, and after them came the French, and alſo the Biſcayners, the moſt ancient whale fiſhers in Europe, except the Norwegians, and purſued the ſame method. But, ſince theſe times, the whales are leſs frequent in the bays, and are commonly among the openings of the ice farther from the land; ſo that the blubber is now cut from the whales, after they are killed, in the manner deſcribed in the ſequel of this article, and brought home to be boiled and purified, and the whale-fins are alſo to be cleaned at home. This latter method of fiſhing, being dangerous to ſhipping, diſcouraged our Engliſh adventurers who traded in a company; ſo that they ſoon after, viz. in 1619, relinquiſhed the *fiſhery*. Some private adventurers proſecuted the trade with various ſucceſs in 1621, 1622, and 1623, when they were moleſted by the Dutch, who were then ſuperior in number of ſhips, and had the prince of Orange's commiſſion; for in 1622, the Dutch, for preventing of diſturbance in their *whale-fiſhery*, had erected an excluſive company, who, by their own power, might protect it: however, the *fiſhery* was laid open, in 1643, to all the inhabitants of the ſeven provinces. As to the claims which different European nations have alleged in favour of a monopoly of the *whale-fiſhery* at Spitzbergen, it has been urged by the Engliſh, that they were the firſt diſcoverers, by Sir Hugh Willoughby, in 1553; by the Dutch, who deny his having been ſo far north as Spitzbergen, and maintain their having firſt diſcovered it in 1596; by the Danes, that Spitzbergen is a part of Old Greenland, poſſeſſed in early times by them. But all nations have now wiſely given up their excluſive pretenſions, and that part of the world remains now alike free to all nations for this *fiſhery*. In 1636, king Charles I. confirmed, by his proclamation, the Greenland *whale-fiſhery* ſolely to the Ruſſia company, who ſoon relinquiſhed it. In 1672 an attempt was made for reviving this *fiſhery*, when an act was paſſed for the encouragement of it; and this act was continued in 1690, but without any great effect. A corporation was eſtabliſhed by act of parliament, in 1693, for carrying on this *fiſhery*, called the GREENLAND *company*.

In 1725 the Engliſh South-ſea company revived this trade, but, after great loſſes, were obliged to diſcontinue it in 1733. At this time a bounty of 20*s*. per ton was granted by parliament to Britiſh ſhips of two hundred tons and upwards, fitted out for the *whale-fiſhery*, which bounty was not only continued in 1740, but an additional bounty of 10*s*. per ton was granted during the war with Spain, in which we were then engaged; and in 1749, a farther bounty or allowance of 20*s*. over and above that of 1733, was granted to all Britiſh whale-fiſhing ſhips, and extended to ſhips of the Britiſh American colonies; and in 1755 this bounty was extended to ſhips under two hundred tons burthen; and, as a farther encouragement to this *fiſhery*, foreign proteſtants, ſerving three years in it, were naturalized on certain conditions. See Hackluyt's Coll. Voyages, and Anderſon's Hiſtory of Commerce.

But, notwithſtanding the great importance and numerous advantages of this trade to England, and the encouragement which the legiſlature has given it, the Dutch have carried it on with much greater ſucceſs than the Engliſh; and it is now eſteemed one of the principal branches of their flouriſhing trade. The chief merchants of the ſeveral provinces aſſociate themſelves into a body for carrying it on, and ſend every year a great fleet of veſſels to the North ſeas for that purpoſe. They attempted to make their firſt eſtabliſhments in Greenland; but not ſucceeding, they have ſince fixed their *fiſhery* about the weſtern coaſt of Spitzbergen, from the latitude of 76 deg. 40 min. to 80 deg. and from eaſt to weſt about eighty-nine leagues.

To give ſome idea of the manner and importance of this trade, we ſhall here ſubjoin the diſcipline of a long time obſerved in the *whale-fiſhery*; the method of fiſhing; the cargo and equipage of a veſſel; and the produce thereof.

The diſcipline is adjuſted by a ſtanding regulation, conſiſting of twelve articles; the principal whereof are:

That in caſe a fiſhing-veſſel be ſhipwrecked, and the captain and crew ſaved, the next veſſel they meet ſhall take them in; and the ſecond veſſel take half of them from the firſt; but that no veſſel ſhall be obliged to take any of the loading of a veſſel ſhipwrecked; that the effects of a ſhipwrecked veſſel, which are abſolutely relinquiſhed, and which another captain ſhall find, and take up, upon his arrival in Holland, he ſhall account for one half of them to the proprietors of the ſhipwrecked veſſel, clear of all expences; that, if the crew deſert a ſhipwrecked veſſel, they ſhall have no claim to any of the effects ſaved, but the whole ſhall go to the proprietor; but if they be preſent when the effects are ſaved, and aſſiſt therein, they ſhall have one fourth thereof; that if a perſon kill a fiſh on the ice, it ſhall be reputed his own, ſo long as he leaves any perſon with it; but the minute he leaves it, it becomes the due of the firſt captain that comes that way; but that, if a fiſh be tied to an anchor, or a rope faſtened to the ſhore, it ſhall remain to its firſt proprietor, though he leave it alone; that if any perſon be wounded or lamed in the ſervice, the commiſſioners of the *fiſhery* undertake to procure him a reaſonable ſatisfaction; to which the whole fleet ſhall contribute.

Beſides this general regulation, to the obſervance of which all the captains, pilots, and maſters of veſſels, are obliged to ſwear, before they put to ſea, there is alſo a particular one for each ſhip's crew, which they are all ſworn to execute, in preſence of one of the commiſſioners, who goes aboard every ſhip, to receive the oath. This regulation is a kind of charter-party, importing, that they will attend prayers morning and evening, on pain of an amercement, at the diſcretion of the captain; that they will not get drunk, nor draw their knives, on forfeiture of half of their wages; nor fight, on forfeiture of the whole; that no one ſhall lay wagers on the good or ill ſucceſs of the fiſhing, nor buy or ſell, on theſe conditions, in caſe we take one or more fiſh, on penalty of twenty-five florins; that they will be contented with the proviſions allowed them; and that they will never light fire, candle, or match, by night or day, without the captain's leave, on the like penalty.

After the reading of this regulation, the crew are all called, to receive the cuſtomary gratuity before their ſetting out, with an aſſurance of another ſum at their return, in proportion to the ſucceſs of the fiſhing. The captain, on this occaſion, receives from a hundred to a hundred and fifty florins; the pilot from forty to ſixty; each harpooner from forty to fifty florins; the other officers from twenty-ſix to thirty-ſix florins; the elder ſailors twenty; and the younger twelve.

The fleet, which conſiſts moſtly of fluyts, from two to three hundred tons, and from thirty-ſix men to forty-two, uſually ſets ſail about the beginning of April, and takes its courſe by the iſles of Iceland, from 60 to 61 degrees of latitude; after which, leaving them to the weſt, it ſteers northward, through 73, 74, and 75 deg. of latitude, where they begin to find the ice.

It is among theſe huge heaps of ice, wherewith the whole quarter is filled, that they firſt begin to ſpy the whales; and there moſt of the veſſels fix their abode for the fiſhing. But as the fiſh are larger and fatter the farther north they go, ſome captains will venture as far as 80 or 82 deg. of north lat. Each veſſel of three hundred tons has ſix ſhalloops; and each ſhalloop has ſix harpooners, with five ſeamen to row it. To every ſhalloop there are ſeven lines, of three inches circumference; five of them in the hind-part of the veſſel, and two before. The hind lines together make ſix hundred fathoms, and, with the addition of the other two, eight hundred and eighty. If the *whale* dive deeper, or run farther underneath the ice than this ſtint, the line muſt be cut, leſt the ſhalloop be drawn after it.

In the Engliſh *whale-fiſhery* every ſhip has ſix or ſeven boats; each of which has one harpooner, one boatſteerer, one manager of the line, and four ſeamen to row it. In each boat there are two or three harpoons, ſeveral lances, and ſix lines faſtened together, each line being a hundred and twenty fathom long. To each harping iron is faſtened a ſtrong ſtick, about ſix feet long, and a ſoft pliable line, about ſix fathom long, called the foregauger, which is faſtened to the lines in the boat. When more line is wanted, the lines of a ſecond boat are faſtened to thoſe of the firſt.

The inſtrument, wherewith the *whale* is ſtruck, is a HARPING-*iron*, or javelin, five or ſix feet long, pointed with ſteel, in a triangular ſhape, like the barb of an arrow.

The harpooner, upon ſight of the fiſh, from one end of the ſhalloop where he is placed, flings the harping iron with all his might againſt his back; and, if he be ſo happy as to make it penetrate the ſkin and fat into the fleſh, he lets go a ſtring faſtened to the harping-iron, at the end whereof is a dry gourd, which ſwimming on the water, diſcovers whereabout the *whale* is; for the minute he is ſtruck, he plunges to the bottom, commonly ſwimming againſt the wind.

If the *whale* return to breathe in the air, the harpooner takes occaſion to give him a freſh wound, till, fainting by the loſs of blood, the men have an opportunity of approaching him, and thruſting a long ſteeled lance under his gills into his breaſt, and through the inteſtines, ſoon diſpatch him; and when the carcaſe begins to float, they cut holes in the fins and tail; and, tying a rope in theſe holes, they tow him to the veſſel, where he is faſtened along the larboard ſide of the ſhip, floating upon his back almoſt level with the ſea. They then begin to take the blubber or fat, and the fins, as they are called, or *whale-bone*.

In order to this, ſeveral men ſtand upon the fiſh, with a kind of iron calkers, or ſpurs, to prevent their ſlipping; and cut off the tail, which is hoiſted upon deck, and then cut out ſquare pieces of blubber, weighing two or three thouſand pounds, which are hoiſted on board with the capſtan, where each piece is again cut into ſmaller pieces, each of two or three hundred pounds weight; and theſe are thrown into the hold, and left to drain for three or four days. When all the blubber is cut from the belly of the fiſh, it is turned on one ſide, by means of a piece of blubber, left in the middle, called the *cant* or turning-piece; and then they cut out this ſide in large pieces, called *hockies*, as before, and alſo the whale-bones with the gums, which are preſerved entire, and hoiſted on deck, where the blades are cut and ſeparated, and left till they have time to clean and ſcrape them. The fiſh is next turned on his back, and the blubber cut out from the back and crown bone; and laſt of all they cut the blubber from the other ſide, as before. They then cut out the two large jaw-bones, ſituated in the under-lip, which are hoiſted on deck, cleanſed and faſtened to the ſhrouds, and tubs are placed under them to receive the oil which they diſcharge; this oil belongs to the captain, and likewiſe the tail and fins. The carcaſe is left to float, and ſupplies food for Greenland birds, called mallemucks, &c. In three or four days, they hoiſt the pieces of blubber out of the hold, chop them, and put ſmall pieces through the bung-holes into their caſks.

A *whale*, the longeſt blade of whoſe mouth is nine or ten feet, generally fills thirty butts with blubber; but one of the largeſt fiſh will fill ſeventy butts and more. A good large *whale* is valued at about 1000*l.* ſterling. A full ſhip of three hundred tons is worth, clear of all expence, at leaſt 5000*l.* There is a premium aſſigned to every perſon in the ſhip for every *whale*: the captain has three guineas; the mate, one; each harpooner, one; the ſurgeon, one; carpenter, one; cook and boat-ſteerers, half a guinea each; a common man, a crown; and each boy, half a crown. The captain and harpooners have no wages; but the captain is allowed twenty-five pounds, and the harpooners, nine guineas each. In a ſucceſsful voyage they have ſix ſhillings for every ton of oil boiled in Greenland-dock; but the reſt of the ſhip's company have monthly wages, beſides the fiſh-money, but no oil-money.

Nothing now remains, but to ſail homewards, where the fat is to be boiled, and melted down into train-oil.

The *whale-fiſhery* of the Caroline iſlands is more eaſy and agreeable than that of all other places, and, beſide the great profit, affords a pleaſant ſpectacle to multitudes of people on the ſhores.

There are ten or twelve of theſe iſles diſpoſed in form of a circle, ſo that they make a ſort of port, in which the ſea is perpetually calm and pleaſant.

When a *whale* appears in this gulf, the people all get into their canoes, and rowing toward the ſea, keep between the creature and its retreat, and drive him forwards towards the iſles at the bottom of the port. They drive him in this manner before them into the ſhallows, where they plunge into the water themſelves, and ſome get ropes and chains about him, while others dart him with their ſpears. Their agility and addreſs is wonderful in this. The creature can never get away when they have once got him faſtened, but is ſoon killed, and got to the ſhore.

Fishery, *produce of one year's whale.* To ſtate the produce, we make choice of the *fiſhery* of 1697, as being one of the greateſt, and moſt fortunate, that ever was known; to which we ſhall add that of the year 1725.

In the year 1697, there were a hundred and eighty-nine veſſels of divers nations; whereof a hundred and twenty-one were Dutch; forty-ſeven Hamburghers; two Swediſh; four Daniſh; twelve of Bremen; two of Embden; and one of Lubeck; who caught in all 1968 fiſh.

In the year 1725, there were two hundred and twenty-ſix veſſels; whereof one hundred and forty-four were Dutch, twelve Engliſh, forty-three Hamburghers, twenty-three of Bremen, two of Berghen, two of Flenſburg. Their captures were 349 fiſh.

The Dutch captures in 1697, produced	41344	puncheons
The Hamburghers —— ——	16414	(of blubber
The Swedes —— ——	540	
The Danes —— ——	1710	
The Bremeners —— ——	3790	
The Embdeners —— ——	68	

The Engliſh captures in 1725, produced 1000 puncheons of blubber, and 20 tons of whale-bone.

Now, eſtimating the puncheon of blubber at thirty florins, Dutch, or 2*l.* 15*s.* Engliſh, the current price in the year 1697, the total produce of the year's *fiſhing* amounts to 175,631*l.* 10*s.* ſterling. As to fins, or *whale-bones*, ſetting them at two thouſand weight per *whale*, and an hundred weight at 4*l.* 4*s.* they will yield 165,312*l.* which, added to the former ſum, amounts to 340,943*l.* 10*s.*

Mr. Anderſon, in his Hiſtory of Commerce, vol. ii. p. 350. obſerves, from an account of the Dutch *whale-fiſhing* for forty-ſix years, ending anno 1721, that in this time they had employed 5886 ſhips, and caught 32907 whales, which valued one with another at 500*l.* give an amount for the whole value of above 16 millions ſterling, gained out of the ſea moſtly by the labour of the people, deducting the expence of the wear and tear of ſhipping, the caſks, and the proviſions. The *whale-fiſhery* begins in May, and continues through the months of June and July; but whether the ſhips have had good or bad ſucceſs, they muſt come away and get clear of the ice by the end of Auguſt; ſo that in the month of September at fartheſt they may be expected home; but the more fortunate ſhips may return in June or July.

FISHES, aboard a *Ship*, are pieces of timber, convex on one ſide, and concave on the other, uſed to ſtrengthen the maſts and yards, when they begin to ſail, through an extraordinary weight of ſail, or after damage in battle, or tempeſtuous weather. They both nail the *fiſhes* on with iron ſpikes, and alſo *would* them, as they call it, that is, wind ropes hard about them. There is alſo a tackle called the *fiſh*, which hangs at the end of the davit by the ſtrap of the block, in which is the runner of the *fiſh-hook*; by which means the fluke of the anchor is haled up to the ſhip's bow, or *chainwale*. See Blocks. Perhaps this tackle was called a *fiſh*, from that which the ancients called a *dolphin*, which was a pointed and vaſtly heavy piece of iron, which they uſed to heave up by a tackle to a good height, and then, when they came near enough to the enemies ſhip, let it fall at once, to break or pierce a hole through the bottom of the enemies veſſel, and ſink her.

Fish-*gig*, an inſtrument uſed to ſtrike *fiſh* at ſea, particularly dolphins. It conſiſts of a ſtaff, three or four barbed prongs, and a line faſtened to the end, on which the prongs are fixed; to the other end is fitted a piece of lead, which ſerves to give additional force to the ſtroke, when the weapon flies, and to turn the points upward after the *fiſh* is penetrated.

FISH-GARTH, according to Skinner, ſignifies an engine to take *fiſh*; but it ſhould rather ſeem to denote the dam or weir in a river, where theſe engines are laid and uſed.

FISH-GLUE. See Ichthyocolla and Glue.

FISHING, the act or art of catching *fiſh*.

Right of *fiſhing* and the property of fiſh belong to the lord of the manor, when he hath the ſoil on both ſides of a river; but where a river ebbs and flows, and is an arm of the ſea, they are common to all; and he who claims a privilege to himſelf muſt prove it. In the Severn, the ſoil belongs to the owners of the land on each ſide; and the ſoil of the river Thames is in the king, &c. but the *fiſhing* is common to all. There are ſeveral ſtatutes for preventing the deſtruction of the fry of fiſh; and perſons uſing nets for that purpoſe, or taking ſalmon or trout out of ſeaſon, or any fiſh under certain lengths, are liable to forfeit 20*s*; and juſtices of peace and lords of leets have power to put the acts in force. See 1 Eliz. cap. 17. 3 Jac. I. cap. 12. 30 Geo. II. cap. 21. See *Salmon* Fishery and *Stealing of* Fish.

Fiſhing is diſtinguiſhed with regard to its inſtrument into that performed with the net for fiſh that go in ſhoals; and that with the hook, for ſolitary fiſh; which latter is properly called angling.

Fiſhing, again, is diſtinguiſhed with regard to its object into that performed in ſalt water and that in freſh. The firſt practiſed for whales, herring, cod, ſalmon, pearls, mackrel, and other ſea-fiſh. The latter practiſed for pike, trout, carp, tench, perch, dace, eels, &c.

The inſtruments principally uſed in angling or *fiſhing* with the hook, are the rod, line, hook, and fly.

The points on which the art of *fiſhing* chiefly turns are the proper ſeaſon, place, bait, and manner of application. What relates to each thereof, we ſhall here give the reader in the ſeveral kinds of *fiſhing* chiefly practiſed among us.

In March, April, and September, the warmeſt days are the beſt for *fiſhing*, and the bait muſt be deep; for the *fiſh* in theſe cool months lie near the bottom. In fly-*fiſhing* it is always obſerved, that the *fiſh* will riſe beſt after a ſmall ſhower of rain, that has juſt beat down the flies upon the water without muddying it. March, April, May, and June, are the beſt months for fly-*fiſhing*, and the beſt hours are about nine in the morning, and three or four in the afternoon; in a ſtill warm evening, they will bite as long as the day-light laſts, at thoſe ſeaſons when the gnats are ſeen moſt plentifully about in the air.

In the extremity of heat, when the earth is parched with drought, there is but little ſport to be expected in *fiſhing*, in any water. In cold weather, when there is a white hoary froſt in the morning, the *fiſh* will not bite kindly all day, except in the evening, if that ſhould prove ſerene and warm.

Too much wind is never convenient for *fiſhing*, though a little is rather advantageous than otherwiſe. It is bad *fiſhing* about ſheep-ſhearing time, in waters where the ſheep are waſhed; for the fiſh glut themſelves in ſuch a manner with what is waſhed from theſe creatures, that they will not take any bait till that ſeaſon is over.

North and eaſt winds are enemies to *fiſhing*; and it is not right to fiſh ſoon after the time of the fiſh ſpawning, for they are then ſick, and have no great appetite, ſo that they do not bite readily. All fiſh have a natural fore-knowlege of a ſhower of rain, and when clouds are coming on, that will fall in rain, they will not bite; the expert angler, who is uſed to this, often eſcapes being wet to the ſkin by it.

The ſubterranean or underground *fiſhing* of the lake Ribeſkajamnia, has been much talked of by thoſe who have written of the Zirchnitzer ſea, of which it is a part; but on the whole it amounts to no more than this. The waters of this lake emptying themſelves through ſubterranean paſſages into another lake below, the whole body of the water, with the fiſh in it, is firſt received into a large opening, which conveys it into a ſort of ſubterranean baſon, in the bottom of which there are many holes, and through theſe the water is let out, but the fiſh left behind. The people of the place who know this, deſcend through the large hole into this ſubterraneous baſon with torches in their hands, and as the waters run off they ſeize upon the fiſh wherever they can catch them. This ſort of *fiſhing* is attended with one inconvenience; for the people being obliged to ſtand up to the middle more or leſs in the water, the horſe-leeches, which are extremely plentiful there, ſeize upon their legs and other parts, and are only to be got off by ſome perſons making water upon the part; the heat and nauſeous taſte of the urine always making them let go their hold. Phil. Tranſ. N° 91.

Fishing, *white-bait*. See Bait.

The ſeaſon for taking *white-bait* is only from the firſt of Auguſt to the firſt of October. 30 Geo. II. cap. 21.

Fishing, *barbel*. See Barbus.

No *barbel* is to be taken in the Thames or Medway under twelve inches in ſize, from the eye to the end of the tail, and only between the twenty-fourth of Auguſt and the twenty-firſt of March. 30 Geo. II. cap. 21.

Fishing, *carp*. The *carp* is generally held the queen of freſh-water fiſh. It is exceeding ſubtle, and of all others, the eel only excepted, lives longeſt out of water. Mr. Ray aſſures us, that in Holland they have a ſpeedy way of fattening them, by hanging them up in a net in a cellar, and feeding them with white bread and milk. See the method deſcribed under Carp. They breed ſeveral times in the year; for which reaſon we ſeldom meet with male or female without either milt or ſpawn. Their natural place is ſome ſtill water; in running waters they rarely, if ever, breed. To make them fat and large, it is a good way, when the pond is low, in April, to rake all the ſides thereof with an iron rake, and ſow hay-ſeeds thereon. By autumn there will be a crop of graſs, which, coming to be overflowed as the pond riſes, will be a fine feeding-place for them.

Great patience is requiſite in angling for *carp*, on account of their incredible policy. They always chooſe to lie in the deepeſt places; they ſeldom bite in cold weather; and in hot, a man cannot be too early or too late for them. When they do bite, there is no fear of the hold. The tackle muſt be very ſtrong, and it will be proper to bait the place beforehand where it is to be fiſhed for, with a coarſe paſte. It may be alſo proper to bring the *carp* to the place intended for angling, by throwing in cow-dung and blood, or bran and blood mixed together, or ſome chicken guts cut ſmall. The baits are the red-worm, in March; the cadew, in June; and the graſhopper, in July, Auguſt, and September. Proper paſtes may alſo be prepared for them; as honey and ſugar, wrought together with flour, and thrown in pieces into the water ſome hours before you begin to angle. Honey and white crums of bread mixed together, alſo make a good paſte. The following paſte is much recommended: take common wheat flour and veal, or any other young meat, of each equal quantities; beat them together in a mortar till the meat is thoroughly diſſolved or broke to pieces; then add about half the quantity of honey; beat it well together again, and add more flour till the whole is of a proper conſiſtence. This has the advantage of a paſte, and of an animal bait, and hangs well upon the hook, ſo that it ſeldom fails of ſucceſs.

The beſt ſeaſon for catching ſuch as are intended for ſale is autumn. See Carp.

Fishing, *chub*. The *chevin* or *chub* is a freſh-water fiſh with a large head. It ſpawns in March, and is very ſtrong, though inactive, yielding in a very little time after it is ſtruck; and the larger it is the quieter. His bait is any kind of worm or fly, particularly the large yellow moth; alſo grains, cheeſe, the pith in the bone of an ox's back, &c. He affects a large bait, and variety of them at the ſame hook. Early in the morning angle for him with ſnails; but, in the heat of the day, chooſe ſome other bait, and in the afternoon, fiſh for him at ground or fly. See Chub.

No *chub* is to be taken under nine inches from the eye to the end of the tail, and only between Auguſt 24th and March 21 in the river Thames and waters of Medway. 30 Geo. II. cap. 21.

Fishing, *dace* or *dare*. See Dace.

No *dace* are to be taken in the Thames or Medway under ſix inches from the eye to the end of the tail in ſize, and only between Auguſt 24th and March 21. 30 Geo. II. cap. 21.

Fishing, *eel*. See Eel.

The *ſilver eel* may be caught with divers baits, particularly powdered beef, garden-worms or lobs, minnows, hens guts, fiſh, garbage, &c. But as they hide themſelves in winter in the mud, without ſtirring out for ſix months, and in the ſummer, they take no delight to be abroad in the day, the moſt proper time to take them is in the night, by faſtening a line to the bank ſide with a hook in the water; or a line may be thrown at large, with a good ſtore of hooks baited, and plumbed with a float, to diſcover where the line lies in the morning. A ſmall roach does well here for a bait, the hook being laid in his mouth. For other methods of catching *eels*. See Bobbing, Bulters, Eel-*ſpear*, and Sniggling.

No leaps or rods for *eels* are to be laid in the Thames and Medway but from April 21 to October 30; but they may be hooked for all the year. 30 Geo. II. cap. 21.

Fishing, *flounder*. The *flounder* is a flat ſea or river fiſh, caught in April, May, June, and July, in any time of the day, in a ſwift ſtream, and ſometimes alſo in a ſtill deep. The beſt bait is red worms, waſps, and gentles. *Flounders* may be taken in the rivers Thames and Medway at any time of the year; but their ſize muſt not be leſs than ſix inches from the eye to the end of the tail. 30 Geo. II. cap. 21.

Fishing, *gudgeon*. The *gudgeon* is a ſmall fiſh of a very delicious taſte. It ſpawns three or four times in the ſummer-ſeaſon, and feeds in ſtreams and on gravel, ſlighting all kinds of flies; but is eaſily taken with a ſmall red worm, *fiſhing* near the ground; and being a leather-mouthed fiſh, will not eaſily get off the hook when ſtruck. The *gudgeon* may either be fiſhed with a float, the hook being on the ground, or by hand, with a running line on the ground, without cork or float. He will bite well at waſps, gentles, and cadworms; and one may even fiſh for him with two or three hooks at the ſame time, which makes good ſport. When you angle for *gudgeons*, ſtir up the ſand or gravel with a long pole, which will make them gather to the place and bite the faſter.

The ſeaſon for *gudgeon fiſhing* in the Thames and Medway is from Auguſt 24th to March 21ſt. 30 Geo. II. cap. 21.

Fishing, *pearch* or *perch*. The *pearch* or *perch* is hook-backed, not unlike a hog, armed with ſtiff prickles, and his ſides with dry thick ſcales; he is voracious, and will venture on his own kind even with greater courage than the pike. He ſeldom grows much above a foot long. He ſpawns in February or March, and bites beſt when the ſpring is far ſpent. The proper baits are the braddling, minnow, and ſmall frog; as alſo the lob-worm, bob, oak-worm, gentle, waſp, and cad-bait. The minnow yields the beſt ſport, which is to be alive, and ſtuck on the hook through the upper-lip or back-fin, and kept ſwimming about mid-water. If the frog be uſed, he is to be faſtened to the hook by the ſkin of his leg. When the fiſh bites, as he is none of the leather-mouthed kind, he muſt have time to pouch his bait. The beſt place to fiſh for him is in the turning of the water-eddy in a good gravel bottom.

No *perch* is to be taken in the Thames or Medway under ſix inches from the eye to the end of the tail, and only between Auguſt 24th and March 21ſt. 30 Geo. II. cap. 21.

Fishing, *pike*. The *pike* is reputed the tyrant of the freſh waters. By the common conſent of naturaliſts, he is the longeſt-lived of all fiſhes. The larger he is found, the coarſer is his fleſh; and ſo *vice verſa*. This fiſh never ſwims in ſhoals, but always ſingle, being very rapacious, and preying even on his own kind. The *pike* ſpawns in February and March. The beſt ſort is in rivers; the worſt in meres and ponds. His ordinary food is frogs, and what fiſh he can lay hold on.

There are two ways of *fiſhing* for the *pike*; by the *ledger-bait* and the *walking-bait*. 1. The *ledger-bait* is that fixed in one certain place, and which the angler may leave behind him. Of this kind the beſt is ſome living bait, as a dace, roach, gudgeon, or a living frog. To apply it, if a fiſh, ſtick the hook through his upper-lip; then faſtening it to a ſtrong line twelve or fourteen yards long, tie the other end of the line to ſome ſtake in the ground, or bough of a tree, near the *pike*'s uſual haunt, letting the line paſs over the fork of a ſtick placed for the purpoſe, ſuſpending the hook, and about a yard of line in the water, but ſo as that when the *pike* bites the fork may give way, and let him have line enough to go to his hold and paunch. If the bait be a frog, the arming wire is to be put in at his mouth and out at his vent, and one of his legs to be ſtitched or tied over the upper joint of the wire. 2. The *walking-bait* is that which the fiſher caſts in, and conducts with a rod, &c. This is perforated by a troll, with a winch for winding it up. At the top of the line is to be placed a ring for the line to be run through. The line, for two yards and a quarter next the hook, to be of ſilk double, and armed with wire the length of ſeven inches. On the ſhank of the hook is to be faſtened a ſmooth piece of lead, ſo as to ſink the fiſh-bait, which is to be a gudgeon with its head downwards. Thus diſpoſed, the bait is to be caſt up and down; and if you feel the fiſh at the hook, give him length enough to run away with the bait, and paunch it; then ſtrike him with a ſmart jerk. To fiſh with a dead bait, uſe a yellow frog, dace, or roach, anointed in gum of ivy, diſſolved in oil of ſpike, and caſt it where the *pike* frequents. After it has lain a little while at the bottom, draw it to the top, and ſo up the ſtream, and you will quickly perceive a *pike* in earneſt purſuit thereof. This fiſh bites beſt about three in the afternoon in clear water, with a gentle gale, from the middle of ſummer to the end of autumn; but in winter, all day long; and in the ſpring he bites beſt early in the morning, and late at night. Another method of *fiſhing* for *pike*, ſee under Huxing.

No *pike* or jack is to be taken in the Thames or Medway under twelve inches from the eye to the end of the tail, and only between Auguſt 24th and March 21ſt. 30 Geo. II. cap. 21.

Fishing, *roach*. The *roach* or *rochet* is no delicate fiſh. Thoſe in rivers are more valued than thoſe in ponds, though the latter are much the larger. They ſpawn about the middle of May.

To angle for this fiſh in April, cads or worms are proper baits; ſo are ſmall white ſnails or flies in ſummer. The bait is always to be under water, for this fiſh will not bite at top. Others uſe May-fly in that ſeaſon with good ſucceſs. In autumn, a paſte muſt be uſed, made of the crumb of white bread moulded with a little water, laboured with the hands into a tough paſte, and coloured, not very deep, with red lead. In winter, gentles are the beſt bait. Sprouted malt, the young brood of waſps, and bees dipt in blood, and the thick blood of ſheep half dried, are noſtrums in this ſort of *fiſhing*.

In the neighbourhood of London they have a peculiar method of *fiſhing* for *roach*: they take a ſtrong cord, at the end of which is faſtened a three pound weight; and a foot above the lead, a packthread of twelve feet is made faſt to the cord; and to the packthread, at proper diſtances, they add twelve ſtrong links of hair with *roach* hooks at them, baited with a white ſnail or perriwinkle. Then holding the cord in their hands, the biting of the fiſh draws the packthread, and this the cord, which gives them notice what to do. By this means they ſometimes draw up half a dozen, and very commonly two or three at a draught. By 30 Geo. II. cap. 21. no *roach* is to be taken in the Thames or Medway under ſix inches from the eye to the end of the tail, and only between Auguſt 24th and March 21.

Fishing, *ſmelt*. See Smelt.

By 30 Geo. II. cap. 21. No *ſmelt* is to be taken in the Thames or Medway leſs than five inches from the eye to the end of the tail, or at any time, except from January 25th to June 1ſt; and thoſe that are caught in other waters muſt be of the above ſize. 33 Geo. II.

Fishing, *ſoal*. See Soal.

Fishing, *tench*. The *tench* is a fine freſh-water fiſh, having very ſmall ſcales, but large, ſmooth fins, with a red circle about the eyes, and a little barb hanging at each corner of the mouth. It takes more delight among weeds in ponds than in clear rivers, and covets to feed in foul water. His ſlime is ſaid to have a healing quality for wounded fiſh; upon which he is commonly called the *fiſhes phyſician*. When the carp, pike, &c. are hurt, it is ſaid they find relief by rubbing themſelves againſt the *tench*.

The ſeaſon for catching this fiſh is in June, July, and Auguſt very early and late, or even all night, in the ſtill part of rivers. His bait is a large red worm, at which he bites very eagerly, eſpecially if firſt dipped in tar. He alſo delights in all ſorts of paſtes made up of ſtrong-ſcented oils, or with tar; or a paſte of brown bread and honey; nor does he refuſe the cad-worm, lob-worm, flag-worm, green gentles, cod-bait, or ſoft boiled bread-grain.

When a number of *tench* are to be taken out of a muddy pond, the method is to take a large caſting-net, well leaded, and with the meſhes from the crown to a full yard and a half, not too ſmall; for then, if the pond be deep, the fiſh will ſtrike away before the net gets to the bottom. The place where the net is to be thrown into muſt be cleared of weeds, &c. with a rake. A bait is next to be prepared for drawing the fiſh together; for this purpoſe put a quarter of a peck of wheat into three quarts of water, ſend it to an oven, and let it be well ſoaked; then add to it five pints of blood, and as much bran as is neceſſary to give it the conſiſtence of a paſte; mix with it ſome clay, and add a quart of lob-worms chopped to pieces. Let the whole be wrought up into a ſtiff paſte, and rolled into balls of the ſize of a hen's egg, and throw theſe into the pond in the place where the net is to be caſt. Let theſe, and ſome grains be occaſionally thrown in, and the place be thus baited for ſeveral days. When the fiſh may be ſuppoſed to be well acquainted with the place, let a good baiting be given in the morning, and in the cloſe of the evening let the caſting-net be carefully thrown in. When the net is ſunk, the mud all about is to be ſtirred with a long pole with a fork at the end; the net is to lie half an hour, and the mud to be thus ſtirred all the time; by this means the *tench* will be raiſed, and will be taken in pulling out the net; but if the net were to be thrown in and taken out in the common way, there would hardly be one fiſh taken; for the cuſtom of both *tench* and carp, when they are frighted, is to plunge their heads up to the eyes in the mud, and thus placed with their tails erect, the net muſt draw over them, without the poſſibility of entangling them.

Fishing, *trout*. The trout is a delicious freſh-water fiſh, ſpeckled with red and yellow, coming in and going out of ſeaſon with the buck, and ſpawning in the cold months of October and November, whereas all the other ſpecies ſpawn in hot ſummer weather. There are divers kinds of this fiſh, all valuable; but the beſt are the red and yellow *trouts*; and of theſe the female, diſtinguiſhed by a leſs head and deeper body, is preferred. They are known to be in ſeaſon by the bright colour of their ſpots, and by their large and thick back; which laſt may ſerve alſo as a rule for other fiſh. Through the whole winter they are ſick, lean, and unwholeſome, and frequently louſy. As the ſpring comes on, deſerting the ſtill, deep waters, they repair to the gravelly ground, againſt which they continue to rub till they get rid of their lice, which are a kind of worms with large heads. From that time they delight to be in the ſharp ſtreams, and ſuch as are ſwift, where they lie in wait for minnows and May-flies. At the latter end of May they are in their prime.

The uſual baits whereby the *trout* is caught are the worm, minnow, and fly, either natural or artificial. The proper worms are the brandling, lob-worm, ſquirrel-tail worm, which has a ſtreak round the back, a red head, and a broad tail, earth-worm, dung-worm, and maggot or gentle, eſpecially the three firſt; the brandling is commonly found in an old dunghill, or under cow-dung, or elſe among tanners bark; the others are found in the earth, and under large ſtones or ſtumps of trees; but whatever worms are uſed, they are the better for keeping, which is to be done in an earthen pot, with moſs, frequently changed. To take the *trout* with a ground-bait, the angler ſhould have a light, taper rod, with a tender hazel top; and may angle with a ſingle hair of three links, the one tied to the other, for the bottom of the line, and a line of three-haired links for the upper part: with this ſort of tackle, if the ſportſman has room enough, he will take the largeſt *trout* in any river. The angler muſt always keep out of ſight, and the point of the rod muſt be down the ſtream. The ſeaſon for *fiſhing* for the *trout* with the ground-bait begins in March, and the mornings and evenings are the beſt time of the day; but in cloudy weather the ſport may be followed all day long. There muſt be a plummet at ten inches from the hook, which the angler muſt feel always touching the ground; and this muſt be heavier as the ſtream is ſwifter. When the minnow is uſed, chuſe the whiteſt, and that of middling ſize; ſlip the hook through his mouth, and the point and beard out at the tail, ſo as it may lie almoſt ſtraight on the hook. Then try againſt the ſtream, whether it will turn. The tackle in this caſe may be ſtronger, for the *trout* will ſeize this bait as ſoon as it comes in ſight; the upper part of the line may be of three ſilk and three hairs, and the lower of two of each; and the hook may be moderately large. In defect of a minnow, a ſmall loach or a ſtickle-back may ſerve the turn; or for want of either, an artificial one may be made of cloth by the life, which is found every whit as good a bait as the natural one.

The moſt agreeable manner of *fiſhing* for *trout* is with the fly: the rod in this caſe muſt be light and pliable, and the line long and fine; if one hair be ſtrong enough, as it may be made by proper ſkill in the angler, there will be more fiſh caught than when a thicker line is uſed; and the fly-fiſher ſhould have the wind in his back, and the ſun before him. See Angling.

By 1 Eliz. cap. 21. no *trout* is to be taken under eight inches in length; and by ſtat. 24 Anne, cap. 21. *ſea-trout* is not to be taken in particular rivers, creeks, or arms of the ſea between June 30th and Nov. 11th. By 30 Geo. II. cap. 21. no *trout* is to be taken in the Thames or Medway between November 11th and Auguſt 24th, or to be of leſs weight than one pound.

Fishing-*fly*, a bait uſed in angling for divers kinds of fiſh. The *fly* is either *natural* or *artificial*.

Natural flies are innumerable: the more uſual on this occaſion are the *dun-fly*, the *ſtone* or *May-fly*, the *red-fly*, the *moor-fly*, the *tawny-fly*, the *vine-fly*, the *ſhell-fly*, the *cloudy* and *blackiſh-fly*, the *flag-fly*; alſo *caterpillars*, *canker-*

canker-flies, *bear-flies*, &c. all which appear ſooner or later, according to the forwardneſs or backwardneſs of the ſpring. To know the particular fly the fiſh moſt covets, when you come in the morning to the river-ſide, beat the buſhes with your rod, and take up what variety you can of all ſorts of flies; try them all, and you will quickly know which are in moſt eſteem; not but that fiſh will ſometimes change their fly; but it is only when they have ſometimes glutted themſelves therewith.

There are two ways to fiſh with *natural flies*, either on the ſurface of the water, or a little underneath it.

In angling for chub, roach, or dace, move not your *natural fly* ſwiftly, when you ſee the fiſh make at it; but rather let it glide freely towards him with the ſtream; but if it be in a ſtill and ſlow water, draw the fly ſlowly ſideways by him, which will make him eagerly purſue it.

The *artificial fly* is moſt ſucceſsfully uſed in bluſtering weather, when the waters are ſo troubled by the winds that the natural fly cannot be ſeen, nor reſt upon them.

Of this *artificial fly* there are reckoned ten principal ſorts:

1. The *dun-fly*, in March, made of dun wool, and the feathers of a partridge wing. 2. A *dun-fly*, made of black wool, and the feathers of a black drake; the body made of the firſt, and the wings of the latter. 3. The *ſtone-fly*, in April, the body made of black wool, dyed yellow under the wings and tail. 4. The *ruddy-fly*, in the beginning of May; the body made of red wool, and bound about with black ſilk, with the feathers of a black capon, which hang dangling on his ſides next his tail. 5. The *yellow* or *greeniſh fly*, in June; the body made of black wool, with a yellow liſt on either ſide, and the wings taken off the wings of a buzzard, bound with black broken hemp. 6. The *mooriſh-fly*; the body made of duſkiſh wool, and the wings with the blackiſh mail of a drake. 7. *Tawny-fly*, till the middle of June; the body made of tawny wool, the wings made contrary one againſt the other, of the whitiſh mail of a white drake. 8. The *waſp-fly*, in July; the body made of black wool, caſt about with yellow ſilk, and the wings of drakes feathers. 9. The *ſteel-fly*, in the middle of July; the body made of greeniſh wool, caſt about with the feathers of a peacock's tail, and the wings made of buzzards wings. 10. The *drake-fly*, in Auguſt; the body made of black wool, caſt about with black ſilk, his wings of the mail of a black drake, with a black head.

The beſt rules for *artificial fly-fiſhing* are,

1. To fiſh in a river ſomewhat diſturbed with rain, or in a cloudy day, when the waters are moved by a gentle breeze; the ſouth-wind is beſt; and if the wind blow high, yet not ſo but that you may conveniently guide your tackle, the fiſh will riſe in plain deeps; but if the wind be ſmall, the beſt angling is in ſwift ſtreams.
2. Keep as far from the water-ſide as may be; fiſh down the ſtream, with the ſun on your face, and touch not the water with your line.
3. Angle always in clear rivers with a ſmall fly and ſlender wings, but in muddy places uſe larger.
4. When after rain the water becomes browniſh, uſe an orange fly; in a clear day, a light-coloured fly; a dark fly for dark waters, &c.
5. Let the line be twice as long as the rod, unleſs the river be encumbered with trees.
6. For every ſort of fly have ſeveral of the ſame, differing in colour, to ſuit with the different complexions of ſeveral waters and weathers.
7. Have a nimble eye and active hand, to ſtrike preſently with the riſing of the fiſh, or elſe he will be apt to throw out the hook.
8. Let the fly fall firſt into the water, and not the line, which will ſcare the fiſh.
9. In ſlow rivers or ſtill places, caſt the fly croſs over the river, and let it ſink a little in the water, and draw it gently back with the current.

Salmon flies ſhould be made with their wings ſtanding one behind the other, whether two or four. That fiſh delights in the gaudieſt colours that can be; chiefly in the wings, which muſt be long, as well as the tail.

FISHING-*floats* are little appendages to the line, ſerving to keep the hook and bait ſuſpended at the proper depth, to diſcover when the fiſh has hold of them, &c.

Of theſe there are divers kinds, ſome made of Muſcovy duck quills, which are the beſt for ſlow waters; but for ſtrong ſtreams, ſound cork, without flaws or holes, bored through with an hot iron, into which is put a quill of a fit proportion, is preferable; pare the cork to a pyramidal form, and grind it ſmooth.

FISHING-*hook*, a little engine of ſteel-wire, of a proper form to catch and retain fiſh.

The *fiſhing-hook*, in general, ought to be long in the ſhank, ſomewhat thick in the circumference, the point even and ſtrait: let the bending be in the ſhank. For ſetting the hook on, uſe ſtrong, but ſmall ſilk, laying the hair on the inſide of your hook; for if it be on the outſide, the ſilk will fret and cut it aſunder.

There are ſeveral ſizes of theſe *fiſhing-hooks*, ſome big, ſome little; and of theſe ſome have peculiar names, as, 1. *Single hooks*. 2. *Double hooks*, which have two bendings, one contrary to the other. 3. *Snappers* or *gorgers*, which are hooks to whip the artificial fly upon, or to bait with the natural fly. 4. *Springers* or *ſpring-hooks*, a kind of double hooks, with a ſpring which flies open, being ſtruck into any fiſh, and ſo keeps its mouth open.

FISHING-*line*. See *Angling* LINE.

FISHING-*nets*. See NET.

FISHING-*rod*, a long, ſlender rod or wand, to which the line is faſtened for angling.

Of theſe there are ſeveral ſorts, as,

1, A *troller* or *trolling-rod*, which has a ring at the end of the rod for the line to go through when it runs off a reel. 2. A *whipper* or *whipping-rod*, a top-rod that is weak in the middle, and top-heavy, but all ſlender and fine. 3. A *dopper*, which is a ſtrong rod, and very light. 4. A *ſnapper* or *ſnap-rod*, that is, a ſtrong pole, peculiarly uſed for the pike. 5. A *bottom-rod*, being the ſame as the dopper, but ſomewhat more pliable. 6. A *ſniggling* or *poking-ſtick*, a forked ſtick, having a ſhort, ſtrong line, with a needle, baited with a lob-worm: this is only for eels in their holes.

Fiſhing-rods are made of different materials and ſtrength, according to the purpoſes for which they are uſed: in *fiſhing* with more than one hair, and with a ſilk-worm gut, red deal is reckoned the beſt, with hickery top, and the length of the whole rod ſhould be about four yards; but for a ſmall fly and ſingle hair, the length of three yards will be ſufficient, with the top of yellowiſh hickery, and about nine inches of whalebone, near as long as the ſtock, which ſhould be of white deal. The ſtocks or buts of rods are generally of ground hazle, aſh, or willow, about two or three feet long; and every joint ſhould gradually taper to the top. Hazle tops are preferred, though ſome uſe the Bamboo cane, and ſay it exceeds the beſt hazle. For ground angling, eſpecially in muddy waters, the cane or reed is preferred for a ſtock; with a hazle top, conſiſting of one, two, or three pieces, and a ſmall piece of round, ſmooth, taper whalebone, which is whipped to the hazle with ſtrong ſilk, rubbed with ſhoemakers wax; the whole length of the rod being five yards or five and a half yards. The beſt method of piecing hazle and bone is firſt to whip the end of the hazle with thread, and to bore it with a ſquare piece of iron of a proper ſize; and then make the thick end of the bone, firſt dipped in pitch, to go into it; after which let it be ſcraped, filed, and neatly whipped. However, the neateſt rod may be thus made: get a thick white deal or fir-board, free from knots, and ſeven or eight feet long; let this be divided by a joiner into ſeveral breadths, and with his planes let him ſhoot them round, ſmooth, and taper. To one of theſe faſten an hazle rod, ſix or ſeven feet long, which may conſiſt of two or three pieces; to the top of which fix a piece of yew, about two feet long, made round, taper, and ſmooth, and to the yew a piece of ſmall, round, ſmooth whalebone, five or ſix inches long. The fir may be coloured by warming it at the fire, and with a feather dipped in aqua fortis, ſtroking it over and chafing it into the wood, which will make it of a pure cinnamon colour.

It is found uſeful to have rings or eyes made of fine wire, and placed upon the rod from one end to the other, in ſuch a manner as that when the eye is laid to one you may ſee through all the reſt: through theſe rings the line is made to run, which will thus be kept in a due poſture; and you muſt have a winch or wheel affixed to the rod, about a foot above the end, by which, whenever it is proper, you may give range to the fiſh. See ANGLING.

FISHING-*veſſels*, or thoſe uſed in the ſeveral fiſheries at ſea, or on the coaſts, are the *buſs*, *coble*, *cock*, *dogger*, *driver*, *eel-boat*, *fly-boat*, *fluyt*, *hooker*, *Peter-boat*, *ſmack*, *ſtand-boat*, *trawler*, *trinker*, &c.

FISH-PONDS, reſervoirs of water, for the breeding, feeding, and preſerving of fiſh.

The quality of the pond, water, &c. proper for this end is ſcarce determinable by any certain ſymptom or rule: for ſome very promiſing ponds do not prove ſerviceable that way. One of the beſt indications of a breeding pond, is, when there is good ſtore of ruſh and grazing about it, with gravelly ſhoals, ſuch as horſe-ponds uſually have; and when a water takes thus to breeding, with a few milters and ſpawners, that is, males and females, two or three of each, a whole county may be ſtocked in a ſhort time.

Eels and perch are of very good uſe to keep down the ſtock of fiſh; for they prey much upon the ſpawn and fry of bred fiſh, and will probably deſtroy the ſuperfluity of them.

As for pike, perch, tench, roach, &c. they are obſerved to breed almoſt in any waters, and very numerouſly; only eels never breed in ſtanding waters that are without ſprings; and in ſuch are neither found, nor increaſe, but by putting in; yet where ſprings are they are never wanting, though not put in. And, which is moſt ſtrange of all, many ſay there is not in an eel the leaſt token of propagation, either by milt or ſpawn; ſo that how they are produced is a queſtion very myſterious. See Eel.

For *fiſh-ponds*, it is agreed, thoſe grounds are beſt which are full of ſprings and apt to be mooriſh; the one breeds them well, and the other preſerves them from being ſtolen. The ſituation of the pond is alſo to be conſidered, and the nature of the currents that fall into it; likewiſe, that it be refreſhed with a little brook, or with the rain-water that falls from the adjacent hilly ground. Add, that thoſe ponds which receive the ſtale and dung of horſes, and other cattle, breed the largeſt and fatteſt fiſh.

Fiſh-ponds are not only a thing of convenience to great families, but may be made a very profitable article with the farmer under due management. Watery and boggy land is often fit for no other uſe, and theſe are then a great improvement of it. Ponds made in dry grounds in the flat bottoms between hills, will alſo ſerve not only to ſupply the cattle with water, but the profit of the fiſh that may be bred in them, is greater than many are aware of, and comes without any labour or expence.

In making the pond, obſerve that the head be at the loweſt part of the ground; and that the trench of the flood gate or ſluice have a good ſwift fall, that it may not be long in emptying on occaſion.

The beſt way of making the head is by driving three or four rows of ſtakes about ſix foot long, and at about four foot diſtance from one another, the whole length of the pond-head: the firſt row of theſe is to be driven in four foot deep, that they may be very firm and ſecure; and if the bottom be not good, but be of a looſe ſand, ſome lime is to be added, which will harden into a ſort of ſtone. The earth dug out of the pond is to be laid between theſe ſtakes and rammed hard down. Other rows of ſtakes muſt be added behind and over theſe, and the ſpaces filled up till the whole is as high and as thick as is neceſſary. The face of it muſt be made even and ſlanting, and there muſt be a waſh left to carry off the ſuperfluous water in floods, &c.

If the pond carry ſix feet of water, it is enough; but it muſt be made eight feet deep, to receive the freſhes and rains that may fall into it.

It would alſo be advantageous to have ſhoals on the ſides for the fiſh to ſun themſelves in, and lay their ſpawn on; beſide, in other places, certain holes, hollow banks, ſhelves, roots of trees, iſlands, &c. to ſerve as their retiring-places. Conſider farther, whether your pond be a breeder; if ſo, never expect any large carp from thence, the greatneſs of the number of ſpawn overſtocking the pond.

Carp and tench will live and thrive very well together in the ſame pond. Where pike are kept, there ſhould be roach or ſome other quick breeding fiſh to ſupply them with food.

Some think that pike and tench may be kept in the ſame pond. They imagine that pike will not feed upon tench; but they are miſtaken, for the pike is fonder of this than of almoſt any other fiſh. Ponds with clear gravelly and ſandy bottoms are uſually the beſt for breeding of fiſh, and foul water with muddy bottoms are the beſt for them to fatten in. Carp have been known to grow in one year from five to eighteen inches long in ponds where the water of the common ſewers of any town have run into it.

The ordinary growth of a carp is not above two or three inches in that time, ſo that all the exceſs is to be attributed to the fatneſs of the water of the ſewers. See Carp.

Reſerve ſome great waters for the head-quarters of the fiſh, whence you may take, or wherein you may put any quantity thereof; and take care to have ſtews, and other auxiliary waters, ſo that you may convey any part of the ſtock from one to the other, and loſe no time in the growth of the fiſh, but employ the water as you do your land, to the beſt advantage. View the grounds, and find out ſome fall between the hills as nearly flat as may be, ſo as to leave a proper current for the water: if there be any difficulty in judging of ſuch, take an opportunity after ſome ſudden rain, or the breaking up of a great ſnow in winter, and you will plainly ſee which way the ground caſts, for the water will take the true fall, and run accordingly.

The condition of the place muſt determine the quantity of ground to be covered with water. For example, we may propoſe in all fifteen acres in three ponds; or eight acres in two, and no leſs; and theſe ponds ſhould be placed one above another, ſo as the point of the lower may almoſt reach the head or bank of the upper; which contrivance is no leſs beautiful than advantageous.

The head or bank, which, by ſtopping the current, is to raiſe the water, and to make a pond, muſt be built with the clay and earth taken out of the pan or hollow dug in the loweſt ground above the bank: the ſhape of the pan is to be an half-oval, whereof the flat is to come to the bank, and the longer diameter to run ſquare from it.

All *fiſh-ponds* ſhould be drawn once in three or four years, and the fiſh ſorted; if it be a breeding-pond, the ſmaller fiſh ſhould be taken out to ſtore other ponds with; and in feeding-ponds all the fiſh ſhould be kept as nearly as may be of a ſize, for the larger and ſmaller never all thrive well together.

Flounders will both thrive and breed in any pond, eſpecially in a clay pond, and will be much larger than in rivers.

Bitterns, herons, otters, water-rats, and ſea-gulls, are all great deſtroyers of fiſh, and the ponds ſhould be kept as clear as poſſible of them; but the greateſt of all deſtruction in *fiſh-ponds* is occaſioned by froſts.

To remedy this, ſome propoſe to break the ice and lay in pipes, ſtraw, and other things, to give air to the fiſh; but all theſe fail when the ponds are foul; but when they are clean, the fiſh ſeldom ſuffer any harm, be the froſt ever ſo long, though no holes be broke in the ice. The ſtench of foul water ſeems to be the occaſion of the death of the fiſh, in this caſe of its being locked up by froſts, and not the want of air. The cleaning of ponds frequently is of great uſe as well on this as on many other occaſions; and it is done at no expence, becauſe the mud ſerving as manure to the lands, more than pays the expence of taking it out.

When the ground is boggy, and carts cannot come up to take the mud, it is beſt to cut the ponds long and narrow in form of moats, that it may be thrown out at one toſs by the labourers in clearing them; for if it require two toſſes, the difference will be juſt the double price of labour.

FISSURE, Fiſſura, in *Surgery*, a longitudinal fracture of a bone; or a ſolution of the continuity of a bone, whereby it is only cloven or cracked.

Fiſſures are of two kinds; the one apparent, by the Greeks called ῥηγμα or ῥηξις; and by the Latins, *ſciſſura*; the other ſo ſmall as not to be viſible, called τριχισμος, or *capillary*, as reſembling a thread.

The cauſes of *fiſſures* are falls, leaps, and contuſions of the parts againſt hard bodies.

Fiſſures, eſpecially in the cranium, either happen on the part where the ſtroke was given, or on the oppoſite part: that on the oppoſite part is called *counter-fiſſure*, or *counter-cleft*, by the Greeks, απηχημα, and the Latins, *reſonitus*. See Contra-*fiſſure*.

Old men are more ſubject to *fiſſures* than young ones, becauſe their bones are drier.

Fiſſures are difficult to be diſcovered; but they are the eaſieſt cured of all fractures; though if they be not known, or be neglected, they bring on ulcers and caries, and in ſuch caſe become very dangerous, ſo that there is frequently a neceſſity of having recourſe to the ſevereſt operations.

The ſigns of a *fiſſure* of the cranium are bilious vomitings, vertigoes, fluxes of the blood at the mouth or noſe, dumbneſs, delirium, &c. If there be any *fiſſure* in the ſcull, the patient will feel a pain in the place, upon holding a ſtring between his teeth, while the ſurgeon pulls it ſtrongly.

In ſuch caſes it is frequently neceſſary to perforate the cranium, to give a vent for the blood and ſanies. See Contusion.

Fiſſures, in the *Hiſtory of the Earth*, certain interruptions that horizontally or parallely divide the ſeveral ſtrata of which the body of our terreſtrial globe is compoſed.

FISTUCA, in *Antiquity*, an inſtrument of wood uſed in driving piles, and fitted with two handles. It was either raiſed with pullies fixed at the head of large beams, and then let fall again directly on the piles, or was wrought by the hand only.

FISTULA, in the *Ancient Muſic*, an inſtrument of the wind kind, reſembling our flute or flageolet.

The principal wind inſtruments of the ancients were the *tibia* and *fiſtula*; though how theſe were conſtituted, or wherein they differed, or how they were played on, does not at preſent appear. All we know is, that the *fiſtula* was at firſt made of reeds, and afterwards of other matters. Some had holes, ſome none; ſome again were ſingle pipes; others a combination of ſeveral; witneſs the ſyringa of Pan.

Fistula, in *Surgery*, a deep, winding, cavernous ulcer, with a narrow entrance, but opening thence into a ſpacious bottom, ſeated in the cellular membrane, and generally yielding a ſharp and virulent matter.

Fiſtulas differ from ſimple ſinuſes in this, that the former are callous, at leaſt in their progreſs, and the latter not. They attack all parts of the body without exception; but particularly the anus, foramen lachrymale, thorax, &c. The general cauſe of *fiſtulæ* is ſome abſceſs or ulcer, which, either being inveterate, or having been ill treated, comes to be callous, the orifice being at firſt lined or incruſtrated therewith, and at length the whole ſinus.

In the firſt ſtage of *fiſtulas*, before they are become callous, the readieſt way of curing them is by an inciſion to the bottom whenever it can be ſafely done, and afterwards deterging and conſolidating them. They ſhould then be gently preſſed from the bottom towards the orifice in order to diſcharge the peccant matter; for which purpoſe a compreſs or ſmall ſlip of plaſter wrapped up in ſuch a form ſhould be applied to the bottom of the *fiſtula*, after it has been cleanſed, and proper dreſſings have been uſed, and ſecured with lint, plaſter, and bandages; and if this method fails, recourſe muſt be had to the manual operation; becauſe, by laying open all the ſinuſes of the *fiſtula*, proper paſſages are made for the diſcharge of the corrupted matter, and ſuitable remedies may be conveniently applied to the ſeveral diſeaſed parts. The ancients gave the name *fiſtula* to this kind of ulcers, from the reſemblance they bear on account of their depth to a flute or pipe, called by the Latins *fiſtula*.

Fistula *in ano*, is a *fiſtula* formed in the anus or fundament. Of this ſome reckon four kinds, viz. the *cæcum internum*, which is open outwards, but not into the rectum; the *cæcum externum*, which has an aperture into the rectum, but none outwards; the *complete*, which opens both ways; and the *cuniculatus*, or that with ſeveral ſinuſes, which diſcharge themſelves into one common cavity, which is the fund, and, as it were, the reſervoir of them all.

Others, as Wiſeman, reduce *fiſtulas in ano* into two claſſes. The firſt are thoſe ariſing from a phyma; theſe are very painful, and difficult to cure, enter deep among the interſtices of the muſcles, and form various cuniculi or ſinuſes; which, the more remote they are from the anus, the worſe they are, becauſe they do not allow of being cut.

The ſecond owe their origin to an internal hæmorrhage, or extravaſation between the coats of the rectum, and have a ſmall perforation near the circumference of the anus, whence they yield a thin ſanies or ichor without pain, which in time bring on itchings and excoriations; and the orifices at length become callous, and are ſometimes cloſed, and ſometimes open again.

Some *fiſtulæ*, if they do no harm by the copiouſneſs of the flux, the ſtench, or the like accidents, are a benefit to nature, becauſe they carry off cachectic humours, and ought not to be cured, but kept open. The freſh, ſimple *fiſtula* may be cured without danger.

The chief way is by cutting, where that may be done without damage to the muſcle of the anus, which might occaſion an involuntary diſcharge of the excrements.

The cutting is either performed with a thread or with a cutting inſtrument.

The method by ligature is to take a thread of ſilk or horſe hair, and threading it in the eye of a leaden or tin probe, to introduce the end of the thread into the *fiſtula*, and with the fore-finger of the other hand, anointed with oil of roſes, and thruſt up into the anus, to lay hold of the end of the probe and draw out the thread, and then tie the two ends together as tight as the patient can well bear it; and thus by tying it afreſh, ſomewhat ſtraiter every day, it will cut quite through, and the *fiſtula* will be laid open; after that the callus muſt be conſumed, and the ulcer healed. Mr. Pott adviſes the operation by inciſion, to be performed in the following manner: let a curve probe-pointed knife with a narrow blade be introduced into the ſinus, while the ſurgeon's fore-finger is in the inteſtine; when there is no opening in the inteſtine, the leaſt degree of force will thruſt the point of the knife through, and thereby make one; if there be an opening already, the ſame point will find and paſs through it: in either caſe, it will be received by the finger *in ano*, will thereby be prevented from deviating, and, being brought out by the ſaid finger, muſt neceſſarily divide all that is between the edge of the knife and the verge of the anus. When the operation is finiſhed, a ſoft doſſil of fine lint muſt be introduced between the lips of the wound, and the reſt of the ulcer dreſt with the ſame. He obſerves, in his remarks on this diſeaſe, that it is much more uncommon than is generally imagined; and that a mere abſceſs or collection of matter, without *fiſtula* or calloſity, is often miſtaken for it. A total ſuppreſſion of urine is a ſymptom frequently attendant on the formation of an abſceſs near the rectum and bladder; for the relief of which, recourſe is often had to the catheter; but as this complaint is ſpaſmodic, he adviſes evacuation and anodyne relaxation, ſuch as veneſection, gentle cathartics, ſemicupium, bladders of hot water applied to the pubes and perineum, and glyſters compoſed of warm water, oil, and opium, as the true, ſafe, and rational method of relieving it.

Fistula, in the *Epidydymis*. We have in the Lond. Med. Obſ. vol. ii. p. 273. a caſe of this kind, related by Mr. Ingham: a man of thirty-five years of age hurt his teſticles by a fall, a ſuppuration followed, and the matter was diſcharged externally. After this, the ſwelling being reduced by means of emollient and reſolvent cataplaſms, a *fiſtula* was diſcovered in each epidydymis: a fine probe-director was then introduced into the ſinus of the left teſtis, which was cut open through its whole length; after which all the indurated parts and the diſeaſed ſkin were cut off; the ſame was done to the other teſtis, and a large portion of the lower part of the epidydymis was extirpated. A ſuppuration came on in five or ſix days, and the patient was cured by the common method of dreſſing in three weeks; ſo that the functions of the teſtes were properly executed.

Fistula *lachrymalis* is a *fiſtula* in the greater canthus of the eye: this is frequently confounded with ÆGILOPS.

It is a little deep callous ulcer in the greater caruncle, or the place of the glandula lachrymalis. It uſually begins with an abſceſs, called *anchilops*, which in time produces an ulcer, called *ægilops*, which afterwards degenerates into a *fiſtula*. When preſſed with the finger it yields a ſtinking matter, not unlike the yolk of an egg; and the corroſive humour, finding or making itſelf a paſſage, there enſues a perpetual ouſing.

Sometimes the os ethmoides itſelf is corroded, and rendered carious by it; in which condition it is ſuppoſed to be only curable by an actual cautery; ſometimes it becomes cancerous; and then Riverius directs all medicines to be laid aſide.

This malady is ſeldom or ever cured by any other means than external and chirurgical operation; and the operator muſt be guided by the various circumſtances of the diſeaſe. If the lachrymal ſac and its integuments be diſtended with only a ſmall degree of inflammation and thinneſs of the ſkin, a ſingle inciſion, made with a ſmall ſharp round-pointed knife, and continued from the upper to the lower extent of the tumor quite down into the cavity of the cyſt, will ſometimes be found ſufficient, for the purpoſe of applying proper dreſſings to the bottom of the diſeaſed ſac. Where the ſkin is much lifted up and grown thin, and diſcoloured from a large quantity of matter that has long been depoſited and confined in the ſac, or where the integuments have burſt, become callous and livid; it will be found expedient, in the firſt inſtance, to remove an oval piece of the integuments and ſac, by making the inciſions equally long with the diſtended ſkin, and of ſuch a breadth as will admit the removal of the greateſt part of the diſeaſed integuments and ſac; and, in the ſecond inſtance the whole of the callous integuments, together with the upper part of the lachrymal ſac, muſt be cut away; by theſe means every advantage which art can procure will be obtained for the treatment of an hollow ill-conditioned ſore. Warner, &c. on the eye, 1775, p. 19.

Mr. Lamorier propoſes to abridge the operation of the *fiſtula lachrymalis*, and to ſecure a paſſage for the tears into the noſe. The os unguis is to be laid bare at the firſt inciſion, and pierced with a pair of ſtrong, ſharp-pointed and crooked forceps, and then the perforation dilated by opening the forceps. After the inflammation is over, a piece of ſmall wax-candle, ſhaped like a tent, is to be introduced by the wound into the noſe, and ſecured by the other dreſſings. He continues the uſe of this bougie till the paſſage is made callous, and out of hazard of reuniting: after which he allows the external wound to cure. Medic. Eſſ. Edinb.

Dr. Hunauld has communicated ſome thoughts on the operation of the *fiſtula lachrymalis*, and propoſes, that no tent ſhould be put into the perforation of the os unguis, becauſe the tears will of themſelves keep it open. Phil. Tranſ. Nº 437. § 5. or Abr. vol. ix. p. 121, &c.

Mr. Petit conſiders the canals for the tears from the *puncta lachrymalia* as a ſyphon, the longer leg of which is the naſal duct, and therefore thinks that a ſhorter paſſage made through the os unguis would not convey away the tears; for which reaſon he would always have the natural paſſage forced open in the *fiſtula lachrymalis*, and a ſmall bougie kept in it till it heals. Mem. Acad. Scienc. 1734.

A French ſurgeon, named Anel, found out a new way, viz. by putting a probe and ſyringe of an inconceivable fineneſs through the puncta lachrymalia into the ſacculus lachrymalis.

The expediency of perforating the os unguis has been a ſubject of diſpute, eſpecially when it does not appear to be carious, known by being diveſted of its perioſteum. But Mr. Warner obſerves, from his own experience, that there is no curing a diſeaſe of this kind without deſtroying the os unguis, at leaſt in part, even when that bone is not denuded and carious. The neceſſity of breaking through this bone ariſes from the diſeaſed ſtate of the hinder part of the ſac and perioſteum: the os unguis is ſo thin as to require very little force in breaking it; a paſſage may be made through it into the noſtril with the edge of the inciſion-knife, and ſo effectually as not to require the aſſiſtance of any other inſtrument beſides a large probe or bougie, bent and fitted to the ſize and direction of the orifice, and inclining downwards into the noſtril. The perforation of the os unguis is ſometimes known by its cracking, and by a diſcharge of blood, which in a ſmall quantity trickles down the noſtril. If a trocar be uſed for this purpoſe, it ſhould not be too much curved; otherwiſe it will be brought too much forwards and outwards, inclining to the naſal proceſs of the ſuperior maxillary bone, which is thick and ſtrong, and cannot be broke without very great force. When the perforation is made, Mr. Warner immediately introduces a ſmall long ſpunge tent through the wound into the noſtril, and continues the uſe of the tent for ten or twelve days, or longer; together with thin and ſoft injections for keeping the parts clean and open whenever the wound is dreſſed, which is generally at firſt neceſſary to be done twice a day. When the opening through the os unguis is ſufficiently confirmed, known by being able to introduce into the noſtril a ſmall bougie, or a large ductile probe, without reſiſtance; he uſes ſoft tents of lint for a week or ten days longer, and then dreſſes the wound to the bottom, ſometimes with pledgets of deterſive ointments, and ſometimes with dry lint only, occaſionally touching the ſprouting and looſe fleſh with the lunar cauſtic, which he prefers to vitriol. He afterwards dreſſes the wound almoſt ſuperficially with lint, or ceratum epuloticum ſpread upon lint, till the parts are healed; and the cure is uſually completed in five or ſix weeks.

Some have recommended preſſure upon the integuments and ſubjacent lachrymal ſac, by means of inſtruments adapted to this purpoſe, in incipient abſceſſes and diſtenſions of theſe parts; but Mr. Warner obſerves, that he has ſeldom or ever found ſuch an application of ſervice. The beſt preſſure in ſuch caſe is that of one of the fingers applied to the inferior part of the tumour when the ſac is loaded and diſtended: by this ſimple treatment, joined with purgative medicines, and a moderately cooling and aſtringent eye-water, the diſeaſe has been checked, and may poſſibly be cured. In this diſeaſe, opiates occaſionally adminiſtered, evacuations by bleeding, gentle purges or glyſters, and antiphlogiſtic medicines, joined with a proper regimen in diet, ought to be continued till the inquietude, ſpaſms, pain, and ſymptomatic fever, ariſing from the ſeverity of the operation, are removed. In many inſtances it will be neceſſary to uſe alteratives; ſometimes of the mercurial, and ſometimes of the antimonial kind, given alone or joined with antiſeptics, as the bark in ſubſtance or decoction, or infuſions with common or ſimple lime-water, the aqua calcis magis or minus compoſita of the London Diſpenſatory, or decoctions of equal parts of ſaſſafras and ſarſaparilla. Warner on the Eye, p. 18—26.

Fistula *in perinæo* is uſually the conſequence of lithotomy, or making a puncture near the urethra, or from a ſeroſity of the proſtrate gland, or from a wound or ulcer, the lips of which become callous, and form a *fiſtula*, through which the urine is preternaturally diſcharged. The circumſtances attending different caſes of this kind are ſo various, that only general rules can be laid down for a cure. Accordingly, the outward opening muſt be enlarged by cutting away the callous lips, or deſtroying them by cauſtic: in ſome caſes it will be ſufficient to introduce a bougie into the urethra for diſtending it. Le Dran obſerves, that though there are ſeveral fiſtulous orifices, and ſeveral calloſities in the perinæum, and when the water paſſes off through the natural paſſage in a ſmall ſtream, the chief remedy will be the introduction of bougies; and that as this canal is enlarged, the external orifices are leſſened and healed, and the calloſities ſoftened. See Le Dran's Operations.

Fistula *pulmonis*, in *Anatomy*, a term uſed by ſome writers for the *aſpera arteria*.

Fistula *ſacra*, in *Anatomy*, is that part of the back-bone which is perforated.

Fistula *urinaria*, in *Anatomy*, the ſame with the urethra.

FISTULAR, or **Fistulous**, is applied by the ſurgeons to wounds and ulcers which degenerate into fiſtulas.

Fistular is alſo applied to the leaves of plants which are round and hollow within; as the leaves of leeks, &c.

Fistular *flowers*, among *Herbaliſts*, are thoſe made up of many ſmall, long, hollow flowers, like pipes.

FIT, in *Medicine*, an acceſs or PAROXYSM.

Dr. Cheyne is of opinion, that *fits* of all kinds, whether epileptic, hyſteric, or apoplectic, may be cured ſolely by a milk diet, of about two quarts of cow's milk a day, without any other food. Cheyne, Nat. Meth. of Curing, p. 265. See Convulsions.

Fits *of eaſy reflection* and *eaſy tranſmiſſion*. See Light.

Fits *of the mother*. See Hysteric *affection*.

FITCHEE, or **Fichee**, in *Heraldry*, is when the lower part of any croſs is ſharpened into a point fit to fix into the ground.

Thus, he bears azure, a croſs-potent *fitchee*. See *Tab. Heraldry*, *fig*. 24.

The origin hereof M'Kenzie aſcribes to the primitive Chriſtians, who uſed to carry their croſſes with them wherever they went; and when they ſtopped at any place in a journey, fixed them in the ground.

FITCHES, a name given by our farmers to a ſort of pulſe which they ſow in their fields. Many ſuppoſe it the ſame with the tare, but erroneouſly; it is the chich or chich-pea of authors. There are two principal kinds of this in uſe among us, the winter and the ſummer *fitch*. The one is ſown before winter, and abides the extremity of it; the other is ſown in ſpring. They are propagated in the ſame manner as peaſe, and they make a very good and nouriſhing food for cattle, whether given in ſtraw or threſhed out. They are ſometimes ſown only to improve the land. In this caſe they are to be plowed in, juſt as they are beginning to bloſſom, and in this manner they finely enrich a tough ſtiff clay.

FITCHET, a name uſed in ſome places for the WEASEL; called alſo the *fitchel* and the *foumart*. See Pole-*cat*.

FITTING-*out*, in *Naval Language*, the act of providing a ſhip with a ſufficient number of men, to navigate and arm her for attack or defence; as alſo of furniſhing her with proper maſts, ſails, yards, ammunition, artillery, cordage, anchors, and other naval furniture, together with ſufficient proviſions for the ſhip's company. See Crew.

FITZ, a French term, literally denoting *ſon*; ſometimes given by way of addition to the natural ſons of the kings of England; as James *Fitz roy*, duke of Grafton, &c.

FIVE-*leaved Graſs*, *Cinquefoil*, in *Heraldry*, is uſed by ſuch as would iutroduce a blazon by herbs and flowers inſtead of metals and colours, to ſignify VERT, or *green*.

Fives, among *Farriers*. See Vives.

FIXATION, the act of fixing, or of rendering a thing firm and fixed.

Fixation is applied in the general to any proceſs that fixes and binds together what, of its own nature, is volatile; and enables it to ſuſtain the loſs of fire for ſome conſiderable time.

Geber defines *fixation* an operation whereby a volatile thing, i. e. a thing that cannot endure the fire is rendered capable of enduring it. In the general, *fixation* is the changing of a volatile body into a fixed one.

Fixation, among *Alchemiſts*, denotes a peculiar preparation of mercury, whereby it is to be put in a condition to bear the fire without evaporating, or the hammer without flying or ſeparating.

The alchemiſts hold, that if they had the true ſecret of fixing mercury without the addition of any foreign leſs heavy and ſolid ingredient, they could make gold, or at leaſt ſilver.

M. Homberg had a long proceſs of many months to prepare an oil from the fæcal matter of human excrements; which, he imagined, would have fixed mercury into ſilver; but it failed.

FIXED *Air*. See Air.

Fixed *bodies*, in the general, are thoſe which neither the fire nor any corroſive has ſuch effect on, as to reduce or reſolve them into their component elements; i. e. abſolutely to deſtroy them.

Chauvin holds it not ſufficient to denominate a body *fixed* that it can withſtand the fire or any one agent, but it ſhould withſtand all. He contends, that *fixity* ſhould not be reſtrained, as it uſually is, to an exemption from evaporation, but from deſtruction, or reſolution into primary elements: in this ſenſe, gold, precious ſtones, and glaſs, and even ſulphur, and mercury itſelf, are properly *fixed bodies*; for mercury and ſulphur retain their nature notwithſtanding all their evaporation.

The chemiſts divide all natural bodies into *fixed* and volatile; i. e. ſuch as bear the utmoſt force of the fire without diſſipating or ſpending themſelves in fume, and ſuch as do not.

Of *fixed bodies*, the principal are platina, gold, ſilver, precious ſtones, particularly the diamond; ſalts, &c.

Of all metals, gold and ſilver alone are fixed; i. e. on remaining a long time expoſed to the moſt intenſe flame, they, alone, loſe nothing of their weight.

Whence this property ſhould ariſe is difficult to ſay. If the reader is not contented with the cauſes enumerated under FIXITY, he may add the following one from Boerhaave, viz. the homogeneity and equality of the parts. The parts, e. gr. of gold being all homogeneous, and equal, will equally ſuſtain each other, and leave equal pores between them; through which pores, when fuſed, the fire finding an eaſy, equal paſſage, goes off, without carrying any thing of the metal with it; or rather the particles of gold being of all others the moſt ſolid and heavy (as appears from the weight of that metal), and of all others the moſt ſtrongly united or bound together (as appears from the immenſe ductility of that metal), the force of the fire is not ſufficient to overcome ſo powerful a reſiſtance; the ſolidity of the particles, and their freedom from air, prevents their being rarefied, or ſet farther apart, which might leſſen their ſpecific gravity, and diminiſh their *vis coheſionis*; ſo that what has the chief effect in the raiſing of fumes and vapours, viz. the rarefaction or expanſion of the body being here precluded, the metal maintains its natural weight and tendency to the center.

Mr. Boyle, the prince of Mirandola, M. Homberg, and others, have made numerous experiments on gold, ſilver, &c. to ſee how far their fixity extended: in theſe, pure gold, kept in an intenſe heat for two months, loſt nothing ſenſible of its weight: SILVER, under the like circumſtances, and in the like time, loſt one-twelfth part of its weight; but Mr. Boyle attributes this to the metal's not being fine and pure.

Indeed, by the great burning-glaſſes of Meſſ. Tſchirnhauſen and Villette, the moſt *fixed bodies*, as gold itſelf, are rendered volatile, and loſe of their weight; ſo that there is no body in all nature abſolutely *fixed*.

Fixed *line of defence*, a line drawn along the face of the baſtion, and terminating in the curtain. See DEFENCE.

Fixed *nitre*, a preparation of ſaltpetre, made by fuſing it in a crucible, and then inflaming it, with throwing in a few coals; and thus again and again, till no more flame or detonation ariſe; then, letting it cool, they pulverize and diſſolve it in water, and afterwards evaporate it into a fine white ſalt, which ſerves to draw the tinctures out of vegetables. This ſalt, *per deliquium*, yields what they call the *liquor of fixed nitre*.

Fixed *ſalts* are thoſe extracted or gained from bodies by calcination and lotion. See SALTS.

They are called *fixed*, becauſe the fire was not able to ſublime or raiſe them; as thoſe carried off in the courſe of calcination by the vehemence of fire are called *volatile*.

The aſhes of all plants yield *fixed ſalts*. See LIXIVIUM.

Fixed *ſigns of the Zodiac*, according to ſome, are the *ſigns* Taurus, Leo, Scorpio, and Aquarius.

They are ſo called becauſe the ſun paſſes them reſpectively in the middle of each quarter, when that ſeaſon is more ſettled and *fixed* than under the ſign which begins and ends it.

Fixed *ſtars* are ſuch as conſtantly retain the ſame poſition and diſtance with reſpect to each other.

By which they are contra-diſtinguiſhed from erratic or wandering ſtars, which are continually ſhifting their ſituation and diſtance.

The *fixed ſtars* are what we properly and abſolutely call STARS; the reſt have their peculiar denomination of PLANET and COMET.

FIXEN, among *Sportſmen*. See VIXEN.

FIXES is a name given by the workmen in gold and ſilver to a ſolution of ſilver, from its uſe in carrying down and *fixing* the heterogeneous acids mingled with aqua fortis.

FIXING *Sulphur*. See SULPHUR.

FIXITY, or **Fixedness**, in *Philoſophy*, the quality of a body which denominates and renders it fixed; or a property which enables it to endure the fire and other violent agents.

According to Chauvin, *fixity* conſiſts in this; that the component principles of the body are ſo cloſely united or cohere ſo ſtrongly, and are mixed in ſuch proportion that they cannot eaſily be divided either by fire or any other corroſive menſtruum, or their integral parts ſeparated and carried off in vapour: for a body may be ſaid to be fixed in two reſpects:

Firſt, When, on being expoſed to the fire, or a corroſive menſtruum, its particles are indeed ſeparated, and the body rendered fluid, but without being reſolved into its firſt elements. The ſecond, when the body ſuſtains the active force of the fire or menſtruums whilſt its integral parts are not carried off in fumes. Each kind of *fixity* is the reſult of a ſtrong or intimate coheſion between the particles mixed.

Fixity, or **Fixedness**, in *Chemiſtry*, is, in a peculiar manner uſed for the affection oppoſite to VOLATILITY; i. e. the property whereby bodies bear the action of the fire, without being diſſipated in fumes.

The principal cauſes of *fixity*, or the qualifications that contribute moſt to the rendering a body fixed, according to Mr. Boyle, are, 1. That its corpuſcles be ſingly of a certain proportionable bulk, too big and unwieldy to be carried up by heat, or buoyed up in the air. 2. That they have alſo a proper degree of weight or ſolidity. 3. That their figure be ſuch as unfits them for evaporation or flying off; ſome being branched, others hooked, &c. ſo that being entangled with one another, they cannot eaſily be extricated, looſened, and ſeparated. To theſe may be added a fourth circumſtance, viz. the nearneſs of the particles, and their being contiguous in a great many points, or large extent of ſurface, which produces a ſtronger force of attraction and coheſion.

FLACCIDITY, in *Medicine*, &c. a diſorder of the fibres or ſolid parts of the body, oppoſite to *rigidity*.

The too great *flaccidity* of the parts is cured by cardiacs, exerciſe, friction, a dry warm air, proper food, &c.

FLAG, a general name, including colours, ſtandards, ancients, banners, enſigns, &c. which authors frequently confound with each other.

The faſhion of bearing the *flags* pointed or triangular, which now obtains, Roderic. Toletanus aſſures us, came from the Mahometan Arabs or Saracens, upon their ſeizing of Spain, before which time all the enſigns of war were ſquare, ſtretched, or extended, on croſs pieces of wood, like church-banners; on which account they were called in Latin *vexilla*, q d. *velilla*, *à veli diminutione*, as is remarked by Iſidore.

The pirates of Algiers, and thoſe throughout the coaſts of Barbary, are the only people that bear an hexagonal *flag*. It is gules, charged with a moreſk head, coifed with its turban, &c. though this be expreſsly contrary to their law, which prohibits the making any image or repreſentation of a man, founded on an opinion, that they who make them ſhall be obliged at the day of judgment to find ſouls for them, and that in defect hereof they ſhall be damned. But this portrait which they carry is that of Hali, Mahomet's ſon-in-law, to whoſe party the Africans all retain, who ordered that his effigy ſhould be expreſſed on their *flags* and ſtandards, believing himſelf ſo formidable to the Chriſtians, that the bare ſight of his image would carry undoubted victory over them. Leunclavius.

Flags, in the *Military Art*, are ſmall banners of diſtinction ſtuck in the baggage-waggons of the army, to diſtinguiſh the baggage of one brigade from another, and of one battalion from another, that they may be marſhalled by the waggon-maſter-general according to the rank of their brigades, to avoid the confuſion that otherwiſe might ariſe.

Flag is more particularly uſed in *Sea-language*, for the colours, ancients, ſtandards, &c. borne on the top of the maſts of veſſels, to notify the quality of the perſon who commands the ſhip, of what nation it is, and whether it be equipped for war or trade.

In the Britiſh navy *flags* are either red, white, or blue, and are diſplayed from the top of the main-maſt, fore-maſt, or mizzen-maſt, according to the rank of the admiral. The firſt flag in Great Britain is the Royal ſtandard, which is only to be hoiſted when the king or queen are aboard the veſſel. The ſecond is that of the anchor of hope, which characteriſes the lord high admiral, or lords commiſſioners of the admiralty; and the third is the union *flag*, in which the croſſes of St. George and St. Andrew are blended: this laſt is appropriated to the admiral of the fleet, who is the firſt military officer under the lord high admiral.

The admiral or commander in chief carries his *flag* on the main-maſt; the vice-admiral carries his on the fore-maſt; and the rear-admiral his on the mizzen-maſt.

The next *flag* after the union is that of the white ſquadron, at the main maſt; and the laſt which characteriſes an admiral is the blue, at the ſame maſt-head. For a vice-admiral, the firſt *flag* is the red; the ſecond, the white; the third, the blue, at the *flag*-ſtaff on the fore-maſt. The ſame order proceeds with regard to the rear-admirals, whoſe flags are hoiſted on the top of the mizzen-maſt; ſo that the loweſt flag in our navy is the blue ou the mizzen-maſt. When a council of war is held at ſea, if it be on board the admiral, they hang a *flag* on the main-ſhrouds; if in the vice-admiral, in the fore-ſhrouds; and if in the rear-admiral, in the mizzen-ſhrouds. The *flags* borne on the mizzen are particularly called *gallants*. See MAST, &c.

The *flag* of the French nation is blue, charged with a white croſs, and the arms of France.

Beſide the national *flag*, merchant-ſhips frequently bear leſſer *flags* on the mizzen-maſt, with the arms of the city where the maſter ordinarily reſides, and on the fore-maſt with the arms of the place where the perſon who freights them lives. See *Table of Flags.*

FLAG, *to heave out the*, is to put out or hang abroad the *flag*.

FLAG, *to hang out the white*, is to aſk quarter; or it ſhews when a veſſel is arrived on a coaſt that it has no hoſtile intention, but comes to trade, or the like. The red *flag* is a ſignal of defiance, and battle.

FLAG, *to lower* or *ſtrike the*, is to pull it down or take it in, out of reſpect or ſubmiſſion, when a weaker party meets a more powerful one.

By an ordinance of Philip II. king of Spain, 1565, the captains are peremptorily commanded to periſh rather than lower their royal *flag* when once hung out.

The way of leading vanquiſhed ſhips in triumph is, to tie the *flags* to the ſhrowds, or the gallery in the hind-part of the ſhip, and let them hang down towards the water, and to tow the veſſels by the ſtern. It was thus the Romans uſed thoſe of Carthage, as Livy relates.

FLAG-*officers*, thoſe who command the ſeveral ſquadrons of a fleet; as admirals, vice-admirals, and rear-admirals.

The *flag-officers* in our ſea-pay are the admiral, vice-admiral, and rear-admiral, of the white, red, and blue.

FLAG-*ſhip*, a ſhip commanded by a general or *flag*-officer, who has a right to carry a *flag*, in contra-diſtinction to the ſecondary veſſels under the command thereof.

FLAG-*ſtaves* are the ſtaves ſet on the heads of the top-gallant maſts, ſerving to let fly and unfurl the *flag*.

FLAG, in *Natural Hiſtory*, a genus of harſh and rough STONES, compoſed of a viſible grit of a laminated ſtructure, and ſplitting only horizontally or into plates. M. da Coſta diſtributes them into alkaline *flag*, or laminated ſand-ſtone, and ſuch as are not acted upon by acids. Of the former kind are the aſhen-coloured *flag*, the laminæ of which are numerous and very viſible, and ſo thin as ſometimes not to exceed the thickneſs of brown paper; ſo that in a piece of half an inch thick ſeven or eight perfect laminæ are often diſcernible: this, by being burnt, becomes extremely friable, and of a white colour: it is dug in ſeveral parts of the kingdom, and is frequently uſed to cover houſes inſtead of tiles, though it is very unfit for the purpoſe, as it bears the weather badly, and crumbles after froſts: and the aſhen brown-coloured flag, of a more compact texture, and heavier than the former, though compoſed like that of an irregular grit cemented by a coarſe ſpar; this becomes friable by being burnt, but ſuffers no change of colour: there are quarries of it at Burford in Oxfordſhire, where it is uſed to ſlate houſes, for pavements, &c. Neither this nor the former will ſtrike fire with ſteel.

The *flag* or *ſlate ſtone* common in Northumberland and ſome of the neighbouring counties is called by ſome *Carliſle* and *white flag*. It is a white foſſile ſtone, eaſily ſplitting into thin plates, and is full of ſmall ſpangles of a fine glittering talc. It is alſo common in Yorkſhire and the neighbouring places; it varies a little in colour, being ſometimes grey, ſometimes browniſh, and ſometimes merely whitiſh. Its ſtrata are very thick, but they eaſily ſeparate into laminæ of about half an inch thick, and the workmen ſeldom attempt to ſplit it any thinner; the upper ſtrata, however, grow gradually thinner, and the bottom ones are ſo thick as not to be uſed for ſlates These they raiſe, however, and uſe for tanners fats, the pavements of floors, and ciſterns for water.

The Stunsfield ſlate is of a pale browniſh colour, very hard and heavy, and its flats or the ſurfaces of the laminæ are always thick ſet with ſmall bivalves, but few or none are imbedded in its ſolid ſubſtance: it burns to a browner colour. This *flag-ſtone* is dug out of the quarries at Stunsfield in Oxfordſhire, in the winter ſeaſon, and laid in large maſſes in the open air till ſummer, and thus rendered fiſſile: the plates into which it is ſplit are the common ſlating-ſtone in thoſe parts: the upper ſtratum of the quarries is a ſoft gritty laminated ſtone, violently fermenting in aqua fortis, uſed as a ſort of whetſtone: neither of theſe two laſt ſpecies will readily ſtrike fire with ſteel. The pale, whitiſh, brown-coloured *flag* is of a compact and uniform ſtructure; and the grit that forms it is ſo intimately blended with marine bodies, and ſaturated and cemented to ſuch a degree with fine ſparry matter, that the gritty texture of the ſtone is hardly viſible. No part of it is changed by burning, except the ſhells, that are lodged in it. It will not ſtrike fire with ſteel. There are ſeveral ſtrata of this ſtone in the neighbourhood of Bath, where it is uſed as ſlate for covering houſes. The deep, duſky, lead-coloured *flag* is extremely hard and heavy, of a compact texture, compoſed of a ſmall grit, which is cemented together by an earthy, ſparry, and cryſtalline ſubſtance: its flat ſurfaces are beſpangled with great numbers of fine talcy particles; the plates are generally very regular and thin, not exceeding the tenth part of an inch in thickneſs, and cohere ſo firmly together as not to be eaſily ſeparated. This ſtone readily ſtrikes fire with ſteel, and, being burnt, acquires a reddiſh brown colour. It is dug in ſeveral parts of Italy, and much uſed in building. The firſt, ſecond, and fifth ſpecies above enumerated are deſtitute of any brightneſs; the fourth has, interiorly, ſome ſmall degree of luſtre; but the third and laſt are very bright and glittering. Of *flags* which are not acted upon by acids, there are the following ſpecies: the *flag* of ſullied white colour, which is compoſed of a large irregular cryſtalline grit cohering looſely together, and cemented with a terrene cryſtalline ſubſtance: the flat ſurfaces of the plates are covered with great quantities of ſmall ſpangles of ſilver talc, which render them very bright and dazzling. This ſtone is very heavy, and pretty hard, and the laminæ are generally very regular and thin; a *flag* of two inches thick, having often fourteen or fifteen plates: it will not ſtrike fire with ſteel; when burnt, it acquires a clearer white colour, with a ſlight reddiſh hue, and becomes very friable. It is dug in ſeveral parts of the kingdom, and uſed much as ſlate, for pavements, &c.

The bright and glittering *flag* is the hardeſt ſtone of this genus, and generally variegated with white and purple, and often the plates have one of theſe colours only. It is of a compact texture, and thickly ſpangled with ſmall laminæ; ſtrikes fire with ſteel, and acquires a paler colour by being burnt. It is much uſed in Italy, where it is dug for pavements. The brown coloured *flag* is compoſed, like the others, of an irregular grit, cemented by a cryſtalline ſubſtance; it is moderately hard and heavy; its flat ſurfaces are covered with ſmall ſpangles of a ſilvery talc, and its laminæ are thin and numerous: it burns to a pale reddiſh colour. It is dug in England, and very commonly in Sweden, but not applied to any particular uſe. Da Coſta's Foſſils, p. 144—148. Hill's Hiſt. of Foſſils, p. 433, &c.

FLAG or **FLAG**-*flower*, in *Botany*. See IRIS.

FLAG is alſo uſed for a kind of ruſh called ſedge, as well as for the upper part of turf pared off to burn.

FLAG, *corn*, in *Botany*, *gladiolus*, a genus of the *triandria monogynia* claſs. Its characters are theſe: the flowers are included in ſheaths; the petal of the flower is cut into ſix parts, and form a ſhort incurved tube with their baſe; they have three awl-ſhaped ſtamina, which are inſerted into every other petal. The germen is ſituated below the flower, which afterward becomes an oblong ſwelling three-cornered capſule with three cells, filled with roundiſh ſeeds. Miller reckons ſix ſpecies.

The root of the common *corn flag* or *gladiole* is accounted diſcutient, and good in malignant and peſtilential caſes.

FLAG, *ſweet-ſcented*. See ACORUS.

FLAGS, in *Falconry*, are the feathers in a hawk's wing near the principal ones.

FLAG-*worm*, a worm ſo called from being found in ſedgy places.

FLAGELLANTES, a ſect of wild fanatics who chaſtiſed and diſciplined themſelves with whips in public.

The ſect of the *Flagellantes* had its riſe in Italy in the year 1260; its author was one Rainier, a hermit; and it was propagated from hence through almoſt all the countries of Europe. It was in all probability no more than the effect of an indiſcreet zeal. A great number of perſons of all ages and ſexes made proceſſions, walking two by two with their ſhoulders bare, which they whipped till the blood ran down, in order to obtain mercy from God, and appeaſe his indignation againſt the wickedneſs of the age. They were then called the *devout*; and having eſtabliſhed a ſuperior, he was called the *general of the devotion*. Though the primitive *Flagellantes* were exemplary in point of morals, yet they were joined by a turbulent rabble, who were infected with the moſt ridiculous and impious opinions; ſo that the emperors and pontiffs thought proper to put an end to this religious phrenzy, by declaring all devout whipping contrary to the Divine law, and prejudicial to the ſoul's eternal intereſt.

However, this ſect revived in Germany towards the middle of the next century, and rambling through many provinces, occaſioned great diſturbances. They held, among other things, that *flagellation* was of equal virtue with baptiſm, and the other ſacraments; that the forgiveneſs of all ſins was to be obtained by it from God, without the merits of Jeſus Chriſt; that the old law of Chriſt was ſoon to be aboliſhed, and that a new law enjoining the baptiſm of blood to be adminiſtered by whipping was to be ſubſtituted in its place: upon which Clement VII. by an injudicious as well as unrighteous policy, thundered out anathemas againſt the *flagellantes*, who were burnt by the inquiſitors in ſeveral places; but they were not eaſily extirpated. They appeared again in Thuringia and Lower Saxony in the fifteenth century, and rejected not only the ſacraments, but every branch of external worſhip, and placed their only hopes of ſalvation in faith and flagellation, to which they added other ſtrange doctrines concerning evil ſpirits. Their leader Conrad Schmidt and many others were committed to the flames by German inquiſitors, in and after the year 1414. Moſheim's Eccl. Hiſt. vol. iii. p. 94, &c. 206 and 277, &c. Eng. 8vo. edit. 1758.

FLAGELLARIA, in *Botany*, a genus of the *hexandria trigynia* claſs, without any corolla; the calyx is divided into ſix ſegments, and the fruit is a berry containing a ſingle ſeed.

FLAGELLATION, *whipping*, a voluntary diſcipline or penance, frequently practiſed by the ancient penitents. See DISCIPLINE.

The parliament of Paris prohibited all public *flagellations* by an arret of 1601. See FLAGELLANTES.

FLAGELLATION is a term more peculiarly appropriated to the ſufferings of Jeſus Chriſt when whipped and ſcourged by the Jews; from the Latin, *flagellum, a ſcourge* or *whip*.

We ſay, a painting of the *flagellation*; or, ſimply, a *flagellation*, to denote a picture or print repreſenting this torment inflicted on the Saviour of the world.

In this ſenſe we ſay, the *flagellation* of ſuch a painter, &c.

FLAGEOLET, or FLAJOLET, a kind of little flute; or a muſical inſtrument of the flute kind, uſed chiefly by ſhepherds and country people.

It is uſually made of box, or ſome other hard wood, ſometimes of ivory. It has ſix holes or ſtops beſide that at bottom, the mouth-piece, and that behind the neck.

The ambit of the *flageolet*, according to the ſcale exhibited by Merſennus, is two octaves from *g ſol re ut* upwards.

FLAIL. See THRASHING.

FLAIR, in *Sea-language*. The ſeamen ſay that the work doth *flair-over*, when a ſhip being houſed in near the water, ſo that the work hangs over a little too much, and thus is let out broader aloft than the due proportion will allow.

FLAIRS, in *Ichthyology*, a name given by ſome to the SKAITE, a ſpecies of the RAIA.

The ancient Greeks called this BATOS, when they ſpoke of the male, and when of the female, BATIS.

FLAIRING, in *Sea-language*. See FLAIR.

FLAKE, in the *Cod-fiſhery*, a ſort of ſcaffold or platform, made of hurdles, and ſupported by ſtanchions, and uſed for drying cod-fiſh in Newfoundland. Theſe *flakes* are uſually placed near the ſhores of fiſhing-harbours.

FLAKE, in *Gardening*, a name given by the floriſts to a ſort of carnations, which are of two colours only, and have very large ſtripes, all of them going quite through the leaves.

FLAKE, *white*, in *Painting*, is lead corroded by means of the preſſing of grapes, or a ceruſs prepared by the acid of grapes. It is brought here from Italy, and far ſurpaſſes both with regard to the purity of its whiteneſs and the certainty of its ſtanding, all the ceruſs or white lead made with us in common. It is uſed in oil and varniſh painting for all purpoſes, where a very clean white is required. The white *flake* ſhould be procured in lumps as it is brought over, and levigated by thoſe who uſe it, becauſe that which the colourmen ſell in a prepared ſtate is levigated and mixed up with ſtarch, and often with white lead, and worſe ſophiſtications.

FLAMBEAU, or FLAMBOY, a luminary made of ſeveral thick wicks, covered over with wax, ſerving to burn at nights in the ſtreets; as alſo at funeral proceſſions, illuminations, &c.

Flambeaux differ from links, torches, and tapers. See TORCH.

They are made ſquare, ſometimes of white wax, and ſometimes of yellow: they uſually conſiſt of four wicks or branches near an inch thick, and about three feet long, made of a ſort of coarſe hempen yarn, half twiſted. They are made with the ladle, much as torches or tapers are, viz. by firſt pouring the melted wax on the top of the ſeveral ſuſpended wicks, and letting it run down to the bottom; this they repeat twice. After each wick has thus got its proper cover of wax, they lay them to dry; then roll them on a table, and ſo join four of them together by means of a red-hot iron.

When joined, they pour on more wax till the *flambeau* is brought to the ſize required, which is uſually from a pound and half to three pounds.

The laſt thing is to finiſh their form or outſide, which they do with a kind of poliſhing inſtrument of wood by running it along all the angles formed by the union of the branches.

The *flambeaux* of the ancients were different from ours. They were made of woods, dried in furnaces, or otherwiſe. They uſed divers kinds of wood for this purpoſe; the wood moſt uſual was pine. Pliny ſays, that in his time they frequently alſo burnt oak, elm, and hazle. In the ſeventh book of the Æneid, mention is made of a *flambeau* of pine; and Servius, on that paſſage, remarks, that they alſo made them of the cornel-tree.

FLAMBO, in *Natural Hiſtory*, a name given by ſome to a long anguilliform fiſh, a ſpecies of the tænia, called CAVAGIRO.

FLAME, the brighteſt and ſubtleſt part of the fuel, aſcending above it in a pyramidal or conical figure.

Flame ſeems to be the ſmoke; i. e. the fumes or volatile part of the fuel, greatly rarefied, and at laſt kindled or heated red hot. By this great rarefaction the matter becomes ſo light as to be raiſed with great velocity in the air; and by the preſſure of the incumbent atmoſpherical fluid, it is kept for ſome time together, the air forming a ſort of arch or ſphere around it that prevents its immediate diffuſion and diſſipation, and by its contiguity and fixation ſuſtains and feeds the fire of the *flame*; the aqueous and earthy parts of the fume being naturally incapable of being ignited, are only rarefied, and ſo impelled upwards in a duſky cloud without flaming.

Flame is defined by Sir Iſaac Newton, in his little piece De Acido, to be *fumus candens, red-hot ſmoke.* But Dr. Prieſtley has properly obſerved, that the ſmoke of common fuel conſiſts of two very different things: that which riſes firſt is mere water, loaded with ſome of the groſſer parts of the fuel, and is hardly more capable of becoming red-hot than water itſelf; but the other kind of ſmoke which alone is capable of ignition, is properly *inflammable* AIR, which is alſo loaded with other heterogeneous matter, ſo as to appear like a very denſe ſmoke. A lighted candle ſoon ſhews them to be eſſentially different; for one of them inſtantly takes fire, whereas the other extinguiſhes a candle. Prieſtley on Air, vol. i. p. 207.

Flame may be conſidered as vapour compoſed of inflammable parts, and kindled by contact with an ignited body; by which means, together with the acceſs of air or nitrous acids, it may be made to undergo thoſe effects which are produced upon all bodies during their combuſtion, viz. the decompoſition of its parts, the diſſipation of its phlogiſton, and the emiſſion of light and heat. Moreover, it is not merely the vapour of an inflammable body, but the body itſelf, that may, by contact with an ignited body, or by any other mode of exciting heat, as friction, &c. together with acceſs of air or nitrous acid, emit a *flame*, which conſiſts of particles flying off from that body in the act of combuſtion. Thus, by applying a hot iron to ſulphur, we may ſee a *flame* immediately produced upon the ſurface of the ſulphur; and bodies thus kindled can only *flame* at their ſurfaces, becauſe there only they are contiguous to the air; whereas, when nitre is intimately mixed with the inflammable ſubſtance, as in gunpowder, the whole ſubſtance is inſtantly inflamed, becauſe the nitrous acid has, like air, the property of maintaining combuſtion. See *Nitrous* AIR. Hence we may alſo conceive why the external ſurface of a *flame*, by being contiguous to air, is much hotter than its internal parts, which may be eaſily evinced by applying any ſubſtance, alterable by heat, alternately to the exterior and interior parts of the *flame* of a candle; and when a vapour of a foot or eighteen inches diameter is kindled, and the combuſtion maintained only by the air contiguous to it, the *flame* will then be only an inch or two thick, while the vapour near the center, ſurrounded by the *flame*, is not inflamed. See the remarks of the ingenious tranſlator of the Chemical Dict. Art. *Flame*. Sir Iſaac Newton, to whoſe reaſoning we return after this digreſſion, argues, Is not *flame* a vapour, fume, or exhalation heated red-hot; that is, ſo hot as to ſhine? For bodies do not *flame* without emitting a copious fume; and this fume burns in the *flame*. The ignis fatuus is a vapour ſhining without heat; and is there not the ſame difference between this vapour and *flame* as between rotten wood ſhining without heat, and burning coals of fire? In diſtilling hot ſpirits, if the head of the ſtill be taken off, the vapour which aſcends will take fire at the *flame* of a candle, and turn into *flame*. Some bodies, heated by motion or fermentation, if the heat grow intenſe, fume copiouſly; and if the heat be great enough, the fumes will ſhine, and become *flame*. Metals in fuſion do not *flame*, for want of a copious fume. All *flaming* bodies, as oil, tallow, wax, wood, foſſil-coal, pitch, ſulphur, &c. by burning, waſte in ſmoke, which at firſt is lucid; but at a little diſtance from the body ceaſes to be ſo, and only continues hot. When the *flame* is put out, the ſmoke is thick, and frequently ſmells ſtrongly: but in the *flame* it loſes its ſmell; and, according to the nature of the fuel, the *flame* is of divers colours. That of ſulphur, e. gr. is blue; that of copper opened with ſublimate, green; that of tallow, yellow; of camphire, white, &c.

From this difference of the colours of the *flames* proceeds the difference of the colours of bodies as viewed by day-light, candle-light, or any one of theſe *flames*; and for making curious experiments of this kind, oil may be impregnated with copper, &c.

We find that when gun-powder takes fire, it goes off in a *flaming* ſmoke. The manner we conceive to be this: the charcoal and ſulphur eaſily take fire, and ſet fire to the nitre; by which the ſpirit of the nitre being rarefied into vapour, ruſhes out like the vapour of water out of an æolipile. Then the acid ſpirit of the ſulphur entering violently into the fixed body of the nitre ſets looſe the ſpirit of the nitre, and excites a greater fermentation, whereby the heat is increaſed, and the fixed body of the nitre rarefied into fume, and thus is a vehement exploſion effected. The *flame* of gun-powder ariſes from a violent action, whereby the mixt being quickly and vehemently heated, is rarefied and converted into fume and vapour; which vapour, by the violence of the action becoming ſo hot as to ſhine, appears in the form of *flame*. Newt. Optics, p. 318. See AIR, FIRE, HEAT, and PHLOGISTON.

It is a remarkable phænomenon of the *flame* of a candle, torch, or the like, that in the dark it appears bigger at a diſtance than near at hand. The reaſon is, that at a diſtance, e. gr. of ſix feet, the eye can readily diſtinguiſh between the *flame* and the contiguous air illuminated by it, and ſees preciſely where the *flame* terminates; but at the diſtance, e. gr. of thirty feet, though the angle ſubtended by the *flame* be much ſmaller than before, yet the eye, not being able to diſtinguiſh the preciſe bound of the *flame*, takes part of the ſphere of air illuminated by it for the *flame* itſelf.

We have ſeveral inſtances of actual *flame* being produced by the mixture of two cold liquors. Dr. Slare gives us a liſt of the oils which burſt into *flame* upon mixing them with compound ſpirit of nitre; ſuch are thoſe of caraways, cloves, ſaſſafras, guaiacum, box, camphire, pepper, hartſhorn, blood, &c. Philoſoph. Tranſact. Nº 213.

It is evident to every curious obſerver, that *flame* dwells and plays only about the ſurface of fuel, having nothing to do with its interior parts. If a lamp-glaſs be filled with ſpirit of wine, another with oil of turpentine, and others with other liquors, and each ſet on fire, it will be eaſily diſtinguiſhable through the ſides of the glaſs, that they all burn and *flame* only on their ſurface, the *flame* continually ſinking lower and lower in the glaſſes as the liquors conſume. The ſame obſervation holds good in ſolid as well as liquid fuel, and appears to be univerſal; and hence we are directed to the choice of proper fuel on the different occaſions we want it for. Shaw's Lect. p. 33.

It is obſerved by Neumann, that the face viewed by the *flame* of zinc looks like that of a dead corpſe; the *flame* of phoſphorus, and of ſpirit of wine impregnated with ſea-ſalt, exhibit the ſame phenomenon. For the effect of joining the *flame* of two candles, ſee CANDLES. For an account of the generation and extinction of *flame*, according to the theory of Dr. Crawford, ſee HEAT *of inflammable*, &c. *bodies*.

FLAME *from cold liquors*. See FIRE.

FLAME-*heat*, the ſame with white-heat. See IRON.

FLAME, *vital*, **FLAMMA**, or **FLAMMULA** *vitalis*, a fine, warm, igneous ſubſtance, ſuppoſed by many both of the ancients and moderns to reſide in the hearts of animals, as neceſſary to life, or rather as that which conſtitutes life itſelf.

To the preſervation of this *flame* they ſuppoſe air as neceſſary as it is to the preſervation of common *flame*; and hence they aſcribe the neceſſity of reſpiration to animal life.

Mr. Boyle, by experiments in an exhauſted receiver, found, that the *vital flame* of animals, if life may be ſo called, ſurvives or outlaſts the *flame* of ſpirit of wine, or of a wax or tallow candle, &c. Some animals would remain alive and well *in vacuo* for three or four minutes, whereas no common *flame* would laſt there one minute. The light of the glow-worms, he found, would preſently be deſtroyed by exhauſting the air, and retrieved again upon its re-admiſſion. Dr. Quincy could find nothing more in the notion of vital *flame* than the natural warmth, which is the effect of a circulating blood, and which is always as its velocity. See *Animal* HEAT.

FLAMEN, among the ancient Romans, was a prieſt or miniſter of ſacrifice.

There were as many kinds of *flamens* at Rome as there were gods who had prieſts and ſacrifices offered them. Romulus and Numa, at firſt, only inſtituted three; one for Jupiter, called *flamen Dialis*; another for Mars, called *flamen Martialis*; and a third for Romulus or Quirinus, called *flamen Quirinalis*. Plutarch and Dionyſius Halicarnaſſeus maintain, that Numa created only the laſt in honour of Romulus; but Livy aſſures us, that Romulus had inſtituted only the firſt, and that the two others were added by Numa; and Varro ſpeaks in the plural number, of the *flamines* inſtituted by Numa. In after-times twelve more were added, which made the number of *flamens* fifteen.

The three firſt were taken from among the patricians, and were held of a rank and diſtinction ſuperior to the reſt. They were called *greater flamens*, *flamines majores*, in contradiſtinction to the other twelve, who were choſen from among the plebeians, and were therefore called *leſſer flamens*, *flamines minores*. The *flamen Dialis*, or of Jupiter, was the firſt inſtituted, and held in the greateſt repute. He bore a peculiar ornament on his head, called *albugalerus*, which was made of the ſkin of a white victim ſacrificed to Jupiter.

One of theſe prieſts revived an ancient pretenſion to a ſeat in the ſenate in right of his office, which, by the indolence of his predeceſſors, had not been claimed or enjoyed for many generations. The prætor rejected his claim, nor would ſuffer him to ſit in that aſſembly; but upon his appeal to the tribunes of the people; that is, to the people, his right was confirmed, and he was allowed to take his place as a ſenator. Liv. xxvii. 8. Middlet. of Rom. Sen. p. 49.

The cap worn by the reſt was called *flamma* or *apex*. It was made of a ſheep's ſkin, with the wool on; to which was faſtened a little branch of an olive-tree. That of the *flamen* of Jupiter ended in a point called *tutulus*. It was tied under the chin with ſtrings; but in the ſummer-time it was only a woollen thread tied round the head, it being prohibited them ever to appear quite bare-headed. And hence, according to Feſtus, came their denomination of *flamen*, viz. from *filamen* or *filum*, *thread*.

Though the *flamens* bore one common appellation, yet did not they conſtitute any company or college. Each god had his ſeveral ſacrifices, feaſts, and ceremonies a-part; nor had one *flamen* any relation to another, only they were all ſubordinate to the pontifex maximus. Aulus Gellius aſſures us, that they were created by the people in the comitia curiata; but the pontifex maximus afterwards conſecrated them. Their prieſthood, called *flaminatus*, was perpetual, though on ſome occaſions they might be depoſed.

The names of the ſeveral *flamens* are as follow: the three great *flamens*, as already obſerved, were the *flamen Dialis*, *flamen Martialis*, and *flamen Quirinalis*: the twelve leſſer were the *flamen Carmentalis*, or prieſt of the goddeſs Carmenta, mentioned by Cicero in his Brutus; *flamen Falacer*, or prieſt of the god Falacer, a name whoſe origin, Varro obſerves, is not known; *flamen Floralis*, or of the goddeſs Flora; *flamen Furinalis*, whoſe etymology is not known; *flamen Levinalis*; *flamen Lucinaris*; *flamen Palatualis*, whom ſome moderns will have to be the prieſt of the goddeſs that preſided over the palatium, though Varro owns himſelf at a loſs for its original; *flamen Pomonales*, or of Pomona, goddeſs of fruits; *flamen Virbialis*, or of the god Virbius, whom ſome take for the ſame with Hippolytus; *flamen Vulcanalis*, or of Vulcan; and *flamen Volturnalis*, or of the god Volturnus. Some authors alſo ſpeak of the *flamen Hadrianalis*, prieſt of Hadrian; *flamen Julii Cæſaris*, of Julius Cæſar; and *flamen Auguſtalis*; and Commodus likewiſe had a *flamen* created under the title of *flamen Herculaneus Commodianus*.

They had alſo their *flaminæ* or *flaminicæ*, who were wives of the *flamens*, or the prieſteſſes of the deities. In an ancient marble, quoted by Gruter, p. ccccIix. n. 9. the word *flamina* is uſed for prieſteſs; and in the ſame author, p. cccviii. n. 3. the prieſteſs of the goddeſs Feronia is called FLAM. FERON. that is, *flamina*, or *flaminica Feroniæ*. The *flamina* bore the ſame ornament on her head with the *flamen*. She had alſo the ſame ſurname of office with her huſband, as *flamina Dialis*, *Martialis*, &c.

FLAMETTE, in *Zoology*, a name given by the French writers to a ſpecies of chama or ſhell-fiſh of the bivalve kind, with its ſhells always more or leſs open: this ſpecies is as hot as pepper to the taſte.

FLAMINGO, in *Zoology*, the name of a very beautiful and very remarkable bird; it has long legs, and a long neck; yet has webbed feet, and is remarkable for the fine bright red of its wings.

Its beak is broad, and of a very ſingular figure; the upper chap being bent, depreſſed, and dentated; the lower, much thicker and firmer. It is black at the end, and in the other part of a duſky blue. Its neck and body are white; the long flight-feathers of its wings black;

but the ſhorter feathers, which make the covering of the wings, are of a very elegant and bright red, whence the bird has its name. It lives about waters, and feeds on fiſh: it is common in many parts of America, and is ſeen at times in many parts of Europe: it is well known to the ancients; and its tongue was accounted a very great delicacy among the nice eaters of old times. See *Tab*. II. *of Birds*, N° 10.

One thing very remarkable about it is, that its beak is ſo long and crooked that the whole head muſt be immerſed before the water can get into it. See a learned and elaborate hiſtory of the bird in the Phil. Tranſ. Abr. vol. v. p. 63, &c.

FLAMMA *Jovis*, a name given by many writers to a plant of the *clematis* or VIRGIN'*s bower* kind, called by the Greek writers PHLOGUS.

FLAMMULA, or FLAMULA, under the *Eaſtern Empire*, was a kind of flag terminating in a point ſomewhat like a flame, ſerving as a mark or badge to diſtinguiſh the ſoldiers of the ſeveral companies, battalions, regiments, &c. In Greek it was called φλαμȣλον: it was ſometimes placed on the caſque, ſometimes on the cuiraſs, and ſometimes at the end or tip of the pike, &c.

The emperor Maurice ordered, that the *flammulæ* of each diviſion ſhould be of a particular colour, to diſtinguiſh them from the other battalions or brigades.

They uſed to lay aſide the *flammula* before an engagement, leſt it ſhould prove an incumbrance. The cavalry had alſo *flammulæ* on their horſes, to diſtinguiſh the troops they belonged to.

FLAMMULA, in *Botany*, a name given by ſome authors to a particular ſpecies of the crowfoot, commonly called the ranunculus flammeus.

FLAMMULÆ *auri*, in *Natural Hiſtory*, a name given by Dr. Woodward, and others, to thoſe ſmall pieces of gold found among the ſands of rivers in ſome places. They are ſometimes found in roundiſh pieces, but more uſually in their ſhining flakes, whence the name *flammula* ſeems to have been given them, as being very bright and gloſſy. This ſort of gold is pure and malleable, and loſes ſcarce any part of its weight in fuſion.

The gold duſt, as it is called, which is brought from Guinea is much of this kind; its particles are uſually very ſmall, though ſometimes lumps of the ſize of a pea or horſe-bean are found, and ſometimes maſſes of an irregular figure of three or four ounces weight; but theſe loſe the name of *flammulæ* when they become ſo thick and ſolid, and ſo large, and are called by the merchants rock-gold. Woodw. Cat. Foſſ. vol. ii. p. 30. See GOLD.

FLANCH, FLANQUE, or FLASQUE, an ordinary, in *Heraldry*, formed by an arched line, which begins at the corners of the chief, and ends in the baſe of the eſcutcheon.

He beareth ermin two *flanches* vert. See *Tab. Herald. fig*. 25. *Flanches* are always borne by pairs.

Leigh makes *flanque* and *flaſk* two diſtinct bearings, whereof the former is more bent than the latter; but Gibbon judiciouſly makes them but one, which he calls *flanque*.

FLANCONADE, in *Fencing*, is the action of dropping the point of your ſword under your adverſary's hilt, in ſeizing with force the feeble of his blade; which, binding without quitting it, form the parade in octave, and then throw in your thruſt.

FLANEL, or FLANNEL, a kind of ſlight, looſe, woollen ſtuff, not quilted, but very warm, compoſed of a woof and warp, and wove on a loom with two treddles, after the manner of BAYS.

It has been obſerved that new *flanel*, after ſome time wearing, acquires the property of ſhining in the dark, but loſes it on being waſhed. Philoſ. Tranſ. N° 483. § 7. See ELECTRICITY.

FLANK, or FLANC, in the *Manege*, is applied to the ſides of a horſe's buttocks, &c.

In a ſtrict ſenſe, the *flanks* of a horſe are the extremes of the belly, where the ribs are wanting, and are below the loins.

The *flanks* of a horſe ſhould be full, and at the top of each a feather. The diſtance between the laſt rib and haunch bone, which is properly the *flank*, ſhould be ſhort, which they term *well coupled*, ſuch horſes being moſt hardy, and fit to endure labour.

A horſe is ſaid to have no *flank* if the laſt of the ſhort ribs be at a conſiderable diſtance from the haunch-bone; as alſo when his ribs are too much ſtreightened in their compaſs.

FLANK, in *War*, is uſed by way of analogy for the ſide of a battalion, army, &c. in contradiſtinction to the *front* and *rear*.

To attack the enemy in flank, is to diſcover and fire upon them on one ſide. See FILE.

FLANK, in *Fortification*, is a line drawn from the extremity of the face towards the inſide of the work. Such is the line B A, *Tab. Fortification*, *fig*. 1. and E F and L N, *fig*. 16.

Or, *flank* is that part of a baſtion which reaches from the curtain to the face, and defends the oppoſite face, the *flank*, and the curtain.

FLANK, *oblique* or *ſecond*, is that part of the curtain, E I, intercepted between the greater line of defence, E C, and the leſſer, I C; and from which they can ſee to ſcour the face of the oppoſite baſtion.

FLANK, *low*, *covered*, or *retired*, is the platform of the caſement which lies hid in the baſtion; otherwiſe called the ORILLON.

FLANK *fitchant* is that from whence a cannon playing, fireth bullets directly in the face of the oppoſite baſtion.

FLANK *razant*, or *raſant*, is the point from whence the line of defence begins, from the conjunction of which with the curtain, the ſhot only raſeth the face of the next baſtion, which happens when the face cannot be diſcovered but from the *flank* alone.

FLANKS, *ſimple*, are lines going from the angle of the ſhoulder to the curtain, whoſe chief office is for defence of the moat and place.

FLANKED, FLANQUE', is uſed by the French heralds to expreſs our party per ſaltier; that is, when the field is divided into four parts, after the manner of an X.

Though Colombiere uſes the term in another ſenſe, which appears more natural, viz. for the taking of flanches or rounding ſections out of the ſides of the eſcutcheons; the firſt from the angles of it, the latter in ſtrait lines, forming an angle at the feſs, without making any ſaltier.

FLANKED *angle*, in *Fortification*, is the angle formed by the two faces of the baſtion, and which of courſe forms the point of the baſtion.

FLANKED *line of defence*, in *Fortification*. See ANGLE and *Line of* DEFENCE.

FLANKED *tenaille*, is called alſo TENAILLE.

FLANKING, in the general, is the act of diſcovering and firing upon the ſide of a place, body, battalion, &c.

To *flank* a place, is to diſpoſe a place or other work in ſuch a manner as that there ſhall be no part of the place but what may be played on, both in front and rear.

Any fortification that has no defence but juſt right forwards is faulty; and to render it complete, one part ought to be made to *flank* the other. Hence the curtain is always the ſtrongeſt part of any place, becauſe it is *flanked* at each end.

Battalions alſo are ſaid to be *flanked* by the wings of the cavalry. A houſe is ſometimes ſaid to be *flanked* with two pavilions, or two galleries, meaning it has a gallery, &c. on each ſide.

FLANKING *angle*. See ANGLE.

FLANKING *line of defence*. See *Line of* DEFENCE.

FLASK, in the *Artillery*. See POWDER *flaſk*.

FLASK, FLASQUE, a bearing more properly called *flanque* or FLANCH.

FLAT, in *Sea-language*, denotes a level ground lying at a ſmall depth under the ſurface of the ſea, and is alſo called a ſhoal or ſhallow.

FLAT *baſtion*, in *Fortification*. See BASTION.

FLAT-*bottomed boats* are ſuch as are made to ſwim in ſhallow water, and to carry a great number of troops, artillery, ammunition, &c. They are conſtructed with a twelve-pounder, bow-chaſe, and an eighteen-pounder, ſtern-chaſe; their keel is from ninety to one hundred feet, and from twelve to twenty-four feet beam: they have one maſt, a large ſquare main-ſail, and a jib-ſail, are rowed by eighteen or twenty oars, and can carry four hundred men each. The gun takes up one bow, and a bridge the other, over which the troops are to march. Thoſe that carry horſes have the fore-part of the boat made to open when the men are to mount and ride over a bridge.

FLAT-*bottomed moat*, in *Fortification*. See MOAT.

FLAT-*crown*, in *Architecture*. See CORONA.

To FLAT-*in*, in *Sea-language*, is to draw in the aftmoſt lower corner or clue of a ſail towards the middle of the ſhip, to give the ſail a greater power of turning the veſſel. Thus, if the mizzen or after-ſails are *flatted-in*, this action is intended to carry the ſtern to leeward, and turn the head nearer to the direction of the wind; and if the head-ſails are *flatted-in*, the intention is to make the ſhip fall off, when by accident or deſign ſhe has come ſo near the wind as to make the ſails ſhiver.

To FLAT-*in forward* is to draw in the fore-ſheet, jib-ſheet, and fore-ſtay-ſail ſheet towards the middle of the ſhip. This operation is ſeldom performed, except in light breezes of wind, when the helm has not ſufficient government of the ſhip.

FLATS, in *Muſic*, a kind of additional or half-notes, contrived together with ſharps, to remedy the defects of muſical inſtruments.

The natural ſcale of muſic being limited to fixed ſounds, and adjuſted to an inſtrument, the inſtrument will be found defective in ſeveral points; as particularly, in that we can only proceed from any note by one particular order of degrees; that for this reaſon we cannot find any interval required from any note or letter upwards or downwards; and that a ſong may be ſo contrived, as that if it be begun by any particular note or letter, all the intervals or other notes ſhall be juſtly found on the inſtrument, or in the fixed ſeries; yet where the ſong begun with any other note, we could not proceed.

To remove or ſupply this defect, muſicians have recourſe to a ſcale proceeding by twelve degrees; that is, thirteen notes, including the extremes, to an octave, which makes the inſtrument ſo perfect that there is but little to complain of. This, therefore, is the preſent ſyſtem of the ſcale for inſtruments, viz. between the extremes of every tone of the natural ſcale is put a note, which divides it into two unequal parts, called *ſemitones*; and the whole may be called the *ſemitonic ſcale*, containing twelve ſemitones betwixt thirteen notes in the compaſs of the octave.

Now, to preſerve the diatonic ſeries diſtinct, theſe inſerted notes either take the name of the natural note next below with a character called a *ſharp*; or they take the name of the natural note next above with a mark called *flat*. Thus D *flat* ſignifies a ſemitone below the D natural: and it is indifferent, in the main, whether the inſerted note be accounted as a *flat* or a *ſharp*.

The ſemitonic ſeries or ſcale is very exactly repreſented by the keys of a ſpinnet; the foremoſt range of keys being the natural notes, and keys behind, the artificial notes, or the *flats* and *ſharps*.

AT-*third*, in *Muſic*, the third minor. See INTERVAL.

LATTER, or FLATTENER. } See COINING.

LATTING, or FLATTENING. } See COINING.

ATTING-*courſe*, among *Brick-makers*. See BRICK.

ATTING-*mill*. See MILL and GOLD-*wire*.

LATULENCY, a word uſed by medical writers to expreſs a diſtempered ſtate of the body, in which there is an uncommon and unnatural generation of flatuſes or halituous and elaſtic matter of the nature of air, ariſing from the humidity of the abdomen, and attended with ſeveral very bad ſymptoms.

Some authors mention flatuſes of the uterus and of the bladder; but theſe are very rare caſes, though they do ſometimes happen; and what is uſually underſtood by the word *flatulency*, are ſuch flatuſes in the ſtomach and bowels. Theſe are either torpid or impetuous. The torpid *flatulencies* of the bowels give the patient very little uneaſineſs; people of phlegmatic habits are much ſubject to them, and generally very little regard them. But the impetuous kind very often occaſion the utmoſt diſorders, on the ſlighteſt accidental occaſions irritating them; people of a ſanguine and melancholic habit, are moſt ſubject to them. *Flatulencies* differ alſo greatly in regard to their cauſes; for ſome are only occaſioned by a ſimple languor, or ſmall loſs of tone in the inteſtines, in which caſe the flatuſes are generally diſcharged upwards in eructations, or downward, without trouble. Other *flatulencies* have their origin from a tough viſcid matter, which deſtroys the intent of the periſtaltic motion to this purpoſe; and in this caſe the patient is ſometimes troubled with ſpaſtic conſtrictions of the inteſtines, ſometimes with troubleſome relaxations of them; and finally ſome *flatulencies* take their origin from a turbulent commotion of the blood about the vena porta, from the ramifications of this veſſel having connections with the inteſtines.

Signs of flatulencies. The moſt obvious of theſe are the rumblings that are felt in the bowels, with noiſes in them; and in the place of theſe rumblings, there are ſometimes plainly perceived fixed diſtenſions of them in particular parts, with tenſion and ſtraitneſs of the abdomen. From the continuance of theſe ſymptoms ariſe pains which ſometimes change place, and ſometimes remain fixed, and ſeem to ſwell the inteſtines in ſuch manner as to endanger burſting; and when commotions of the blood are the cauſe of theſe, there are uſually pains felt attending them on the left ſide, and about the region of the heart, and the patient complains of the uſual ſymptoms of hypochondriacal people.

An obſtinate coſtiveneſs alſo uſually attends this diſtemper, which always makes it more violent; and a ſtraitneſs of the breaſt, attended with anxieties and difficulties of breathing, are uſually the attendant ſymptoms on it, when violent. The more the *flatulency* has been owing to crudities in the primæ viæ, the more will the patient be affected with vertiginous complaints, and other diſorders of the head; and when the cauſe is a commotion of blood about the vena porta, the pains are always very violent, and are often attended with bad conſequences.

Perſons ſubject to it. *Flatulencies* attack perſons of all ages, ſexes, and conſtitutions, but eſpecially the phlegmatic, whoſe parts are of a weaker tone, and naturally more ſubject to expanſion; after theſe, perſons of a ſanguine habit are moſt ſubject to them, and thoſe of choleric and melancholy habits, though naturally leſs ſubject to them, yet often fall into them after illneſſes.

People who are particularly ſenſible of the changes of the air from warmer to colder, are alſo more ſubject to them, than thoſe of a more robuſt and leſs delicate frame; hence women are more ſubject to them than men, and thoſe eſpecially in the times of the menſes and lochia.

Cauſes of them. Theſe are in general a relaxation of the periſtaltic motion of the guts; but this not extending to the whole canal, but only to ſome one part, the tranſpiration of the halituous matter being chiefly into this flaccid part, which it diſtends in a manner that it could not do by any part that had its natural tone and motions. And the defect in one part is always attended with the exceſs of the periſtaltic motion in another, in order to the driving off the cauſe; hence proceed alternate conſtrictions and relaxations, to which, in a great meaſure, the pain is owing; and in caſes of the commotions of the blood about the vena porta, the ſame conſtrictions and relaxations always happen. The material cauſes of *flatulencies*, are thoſe ſubſtances ſwallowed in food, which are of a mucous and tenacious conſiſtence, and by their obſtinately adhering to the bowels are capable of giving great trouble. Of this kind are the herbs in uſe in food, which are of a thick tough juice; or the leguminous tribe, as peas, beans, and the like; alſo dried ſea-fiſh, and all animal fats, as that of ſheep and calves, eſpecially if the perſon drink immediately after eating heartily of them. The drinking fæculent liquors will alſo occaſion them very violently, as new malt-liquors, or the ſame when the veſſels are almoſt out; the ſummer-fruits are alſo chargeable with theſe effects, and above all things honey. To all theſe cauſes, the habit of the patient greatly concurs, and a general coolneſs of the body, and dryneſs of the bowels, are a frequent occaſion of them.

Prognoſtics in them. *Flatulencies* often prove an extremely troubleſome complaint, and people of an idle ſedentary life, eſpecially women, owe a great many uneaſy hours to them; and when they grow into a habit, they are always attended with colic pains, cardialgias, anxieties, and ſuffocatory emotions. It is always to be obſerved, that the forcible ſuppreſſion of flatuſes, brings on much worſe complaints, eſpecially in plethoric and ſanguine habits; for ſpaſtic tormina of the bowels, and vibrative convulſions, with faintings, are often the conſequences of it; and the phyſician is apt to accuſe foulneſſes or ſcorbutic habits of the blood, for the ſymptoms he diſcovers, which, in truth, are only owing to ſuch a ſuppreſſion. The free diſcharging of *flatulencies*, on the other hand, is attended with its ill conſequence, becauſe it naturally degenerates into a habit.

The ſuppreſſion of habitual *flatulencies* brings on tumors, indurations of the abdomen, hectics, and a tympanites, and particularly the anterior flatuſes: theſe, which might be avoided by eructations, when ſuppreſſed, bring on cardialgious and vertiginous diſorders of the head.

Method of cure. In this it is firſt to be conſidered, whether the flatuſes have their origin in the bowels, or whether they affect them only by conſent, as is often the caſe in diſeaſes of the neighbouring parts in hypochondriac and hyſteric patients, and in perſons afflicted with hæmorrhoidal and nephritic complaints, and in caſes where women have been ill managed in lyings-in, or in miſcarriages: in all theſe caſes, the original cauſe is to be conſidered and treated with its proper remedies. But in caſes of direct and ſimple *flatulencies*, the following method will be uſually found effectual. The bowels muſt be carefully kept gently open; for in caſes of coſtiveneſs, *flatulencies* will always be increaſed. To this purpoſe, the common clyſters muſt be given at repeated times, and to theſe, by way of increaſing the ſtimulus, ſome of the leſſer centaury is to be added, and ſome common ſalt. After theſe the laxative medicines of the gentler kind are to be given, and in the intermediate days, the digeſtive ſalts, to attenuate the viſcous matter in the bowels; to theſe nitre and a little cinnabar may be added, and theſe always have a much better effect than all the hot carminatives uſually given. After theſe, thoſe things are to be given which reſtore the tone of the part; ſuch are the bitter and aromatic extracts, with ſpirit of ſalt of tartar, ſpirit of nitre dulcified, and the volatile urinous ſalts aromatiſed. Externally ſtomachic plaſters may be applied to the pit of the ſtomach, as may alſo the ſtomachic balſams, ſuch as the oils of nutmeg, carui, fennel, and the like.

The general method of treating *flatulencies*, is by the hot aromatics; but theſe are to be given with great caution; for when the commotions of the blood about the vena porta are in fault, theſe things always irritate rather than do good; but beyond all things, the too common methods of giving a vomit in theſe caſes is to be avoided; for the diſcharge of the *flatulencies* upwards is inverted by this means, and then uſually follow exquiſite pains and tenſions of the parts, difficulty of breathing, and vertiginous complaints in the head, with noiſes in the ears, and many other complaints, which are continually increaſing, till they are a little eaſed for the preſent by an eructation. The happy way of getting rid of theſe anterior flatuſes, is by driving the cauſe of them downwards, and reſtoring the loſt tone of the parts. Continued exerciſe is alſo of the utmoſt ſervice. Junker's Conſp. Med. p. 600.

Dr. Whytt recommends æther and laudanum as the moſt effectual medicines for expelling wind. He generally gave the laudanum in a mixture with pepper-mint water and tincture of caſtor, or ſweet ſpirits of nitre; and ſometimes opium in pills, with aſſa fœtida. The doſe of æther is a tea-ſpoonful mixed with two table ſpoonfuls of water. He alſo in ſome caſes adviſes external applications; as equal parts of the antihyſteric and ſtomachic plaſter, ſpread on a piece of ſoft leather, of ſuch ſize as to cover a great part of the belly; and a table ſpoonful of the following ingredients mixed together, and well rubbed on the parts at bed-time; viz. Bate's anodyne balſam, an ounce; the expreſſed oil of mace, half an ounce; and two drams of oil of mint. For ſtrengthening the ſtomach and bowels, and leſſening the production of *flatulence*, he recommends the Peruvian bark, bitters, chalybeats, and exerciſe. To remove the coſtiveneſs, which often attends windy complaints, four or five of the following pills ſhould be taken every night at bed-time: take of aſſa-fœtida, two drams; Soccotrine aloes, ſalt of iron, and powdered ginger, of each one dram; and as much of the elixir proprietatis as will be ſufficient to form them into pills. When the body is too open, twelve or fifteen grains of rhubarb, with half a dram, or two ſcruples, of the Japonic confection, may be taken every other evening with advantage. *Flatulencies* that attend the ceſſation of the menſes are relieved by repeated ſmall bleedings. With regard to diet, tea and all flatulent aliments ſhould be avoided; and as for drink, water, with a little brandy or rum, is not only preferable to malt liquor, but, in moſt caſes, to wine.

FLATULENT, ſomething that has a relation to flatuſes, or blaſts of wind.

Peas, and moſt kind of pulſe, onions, &c. are *flatulent* foods.

FLAUTINO, in the *Italian Muſic*, the name of a ſmall flute or FLAGEOLET.

FLAUTO, in the *Italian Muſic*, is uſed to denote a flute, or the part to be played by that inſtrument.

FLAUTO *tranſverſo*, in the *Italian Muſic*, a German FLUTE.

FLAW, at *Sea*, ſignifies a ſudden guſt of wind, otherwiſe called *ſquale*.

FLAX, *Linum*, in *Botany*, a genus of the *pentandria pentagynia* claſs. Its characters are theſe: the flower has a permanent empalement, compoſed of five ſmall ſpear-ſhaped acute leaves, and five large oblong petals, which ſpread open; and five awl-ſhaped erect ſtamina, terminated by arrow-ſhaped ſummits. In the center is ſituated an oval germen, ſupporting five ſlender ſtyles, crowned by reflex ſtigmas, and afterward turns to a globular capſule with ten cells, opening with five valves; in each cell is lodged one oval, plain, ſmooth ſeed, with an acute point. There are fourteen ſpecies. Miller.

The common *flax* is an annual plant that will grow in any kind of good ſound land, but that does beſt for it, which has lain ſome time unplowed. The beſt land yields the beſt *flax*, and makes the greateſt improvement; and upon the whole, it is an excellent commodity, and the tilling and ordering it is ſo good a piece of huſbandry, that it well deſerves to be more frequently practiſed among us. It is a plant that exhauſts the land very much; on which account it is beſt to ſow it on very rank ground, and not two years together on the ſame piece. If the land is ſituated in a valley, or the ſoil has been thrown up by rivers; or if there be water at a ſmall depth below the ſurface, it is thought better. To this laſt circumſtance it is owing, that Zealand is remarkable for the fineneſs of its *flax*, and that the other provinces of Holland do not ſucceed ſo well in the culture of this plant. However, M. Du-Hamel obſerves, that ſtrong land can hardly yield ſuch fine *flax* as that which grows on lighter ground; though a moiſt ſtiff ſoil yields larger quantities, and better ſeed. The time of ſowing is in the latter end of March, when the weather is mild and warm; the land ſhould be well prepared, cleared fr weeds, and laid even, and the drieſt ſeaſon that can ſhould be choſen for the ſowing it. The ground ſho be fallowed two winters and one ſummer; and betw each ploughing it ſhould be well harrowed, in order deſtroy the weeds, and pulverize the ſoil. The du ſhould not be laid on till the laſt ploughing, when muſt be buried in the ground, and care ſhould be ta that the dung be free from weeds. The Livonians, wh they clear wood land, burn the wood upon it, and th plough it, and in this ſtate prefer it to any other ſoil *flax*. The beſt way of ſowing *flax*-ſeed is to drill it equidiſtant rows, about ten inches from one anoth When the *flax* is thus ſown, the ground may be eaſ hoed, to deſtroy the weeds, which, repeated twice dry weather, will keep the ground clean till the *flax* ripe. Some have recommended feeding the ſheep w *flax*, when it is riſen to a good height; but Mr. Mill condemns this as a wrong practice; becauſe, if the ſhe gnaw the *flax*, the plants will ſhoot up very weak, a never come to half the ſize they would have done, if n cropped. *Flax* is ſometimes damaged by inſects, wh it is about three or four inches high; it has been ſa that they may be deſtroyed by a ſlight ſtrewing of ſoo aſhes, &c. This dreſſing will, at leaſt, give vigour the *flax*, though it ſhould not kill the inſects.

Two or three buſhels of good ſeed, ſown in broad-caſt, a required for an acre; but half the quantity in drills w produce a greater crop. The thicker the ſeed is ſow the finer thread will the *flax* produce; but the ſeed w be of an inferior quality. Towards the latter end Auguſt the *flax* will begin to ripen, but it muſt not ſta till too ripe, but muſt be pulled as ſoon as the ſeed gro brown, and bends down the heads.

The beſt ſeed is that brought from the eaſt country, pa ticularly from Riga, whence great quantities are im ported into Scotland and Ireland, to the amount of ma thouſand pounds ſterling *per annum*. The beſt ſeed ſhort, roundiſh, firm, oily, heavy, and of a ſhining clear brown colour; which, though dear, repays th charges with abundance.

Flax, pulled up in the bloom, proves whiter and ſtronge than if left ſtanding till the ſeed is ripe; but then th ſeed is loſt. However, the thread will be ſtronger, whe the *flax* is left till the ſeed is ripe, provided it is not le to ſtand too long; but the colour of it will not be ſo good In Holland, when the *flax* is pulled, it is laid in hand fuls on the ground, with the heads towards the ſouth and thus piled in heaps, when the weather is uncertain but in dry weather it is ſpread in handfuls on the field and left for twelve or fourteen days to dry. However this drying is not neceſſary for the rippling; and there fore, in ſome parts of Brittany, they ripple the *flax* afte it has been in the air two or three days; and even on day will be ſufficient, if the weather be dry.

The Siberian perennial *flax* anſwers very well for making common ſtrong linen; but the thread ſpun from this i not ſo fine or white as that produced from the common ſort; but the roots of this kind of *flax* will continue many years, ſo that there will be a great ſaving of culture, as it will require no other care, beſides keeping it conſtantly clean from weeds. The fineſt *flax* is moſt liable to be laid in ſtormy weather; to guard againſt this accident, ſome perſons run acroſs their *flax-field* ſlender poles fixed to ſtakes; but a better method is to run ſmall ropes acroſs the field, both lengthwiſe and breadthwiſe; for theſe, being faſtened where they interſect one another, and ſupported by ſtakes at due diſtances, form a kind of netting, which is proof againſt almoſt any accident that can happen from tempeſtuous weather.

For the preparations *flax* muſt undergo, to fit it for ſpinning, as pulling, drying, and ſwingling, ſee HEMP.

They have a very good way of beating their hemp and *flax* in Derbyſhire, which is this: they make the axle-tree of the main wheel of their corn-mills longer than ordinary, and place pins in it to raiſe large hammers, like thoſe uſed in the paper and fulling-mills; and with theſe they beat the ſtalks, and ſave a great deal of labour. See HEMP.

In the Swediſh Tranſactions for 1747, we have the following method of preparing *flax* ſo as to reſemble cotton, in whiteneſs and ſoftneſs as well as in coherency. For this purpoſe, a little ſea-water is directed to be put into an iron pot, or an untinned copper kettle, and a mixture of equal parts of birch-aſhes, and quick-lime ſtrewed upon it. A ſmall bundle of *flax* is to be opened and ſpread upon the ſurface, and covered with more of the mixture, and the ſtrata are to be continued till the veſſel is ſufficiently filled. The whole is then to be boiled with ſea-water for ten hours; freſh water being occaſionally ſupplied in proportion to the evaporation, that the matter may never become dry. The boiled *flax* is to be immediately waſhed in the ſea, by a little at a time, in a baſket, with a ſmooth ſtick; when it is become cold enough to be borne by the hands, it muſt be well rubbed, waſhed with ſoap, and laid to bleach, and turned and watered every day. Repetitions of waſhing with the ſoap, expedite the bleaching; after which the *flax* is to be beat, and again well waſhed. When dry, it is to be worked and carded in the ſame manner as common cotton, and preſſed betwixt two boards for forty-eight hours. It is now fully prepared, and fit for uſe. It loſes in this proceſs near one half of its weight, which is abundantly compenſated by the improvement made in its quality.

Flax has one quality not taken notice of by botanical writers, which is, that the herb, infuſed in water, as in ponds or rivers, as is practiſed, in order to rot the ſtem, and procure the bark for mechanical purpoſes, communicates to the water a very poiſonous quality; inſomuch that cattle which drink of it die, and the fiſh in ſuch waters are poiſoned; it is therefore forbid to be watered in any running ſtream, or common pond, by 33 Hen. VIII. cap. 17.

This plant yields, by means of a retort, a greaſy ſubſtance, reſembling oil of mace, and called by ſome butter of *flax*.

The ſeed, which is uſually called LINSEED, is emollient, digeſting, and ripening; of great uſe againſt inflammations, tumors, and impoſthumes; and is frequently put into fomentations and cataplaſms for thoſe purpoſes. Cold drawn linſeed oil is of great ſervice in all diſeaſes of the breaſt and lungs; as peripneumonies, pleuriſies, coughs, aſthmas, conſumptions, colics, and conſtipations of the belly. It likewiſe helps the colic and ſtone, both when taken by the mouth, and given in clyſters. The oil by expreſſion is the only officinal preparation.

This oil, when carefully drawn, without the application of heat, has no particular taſte or flavour, though in ſome properties it differs conſiderably from moſt of the other oils of this kind; not congealing in winter; not forming a ſolid ſoap with fixed alkaline ſalts; and acting more powerfully, as a menſtruum, on ſulphureous bodies, than any other expreſſed oil that has been tried. It is alſo ſuppoſed to be of a more healing and balſamic nature than the other oils of this claſs. Lewis, Mat. Med.

In pleuritic pains, ſays Ruygerus, Ephem. Germ. An. 6 & 7. he has often experienced linſeed oil to be the moſt ſucceſsful medicine he could preſcribe; for it immediately facilitated reſpiration, and promoted ſpitting. In a hæmoptoe alſo, he exhibited the ſame oil with the deſired ſucceſs; for by its balſamic and emplaſtic virtue it conſolidates the affected parts.

Linſeed oil is of ſuch ſubtile parts, as not to be kept in earthen veſſels without tranſudation. Meyerus de Luſu ſerio. Tumors of the belly are very happily cured by the uſe of linſeed oil. Ephem. Germ. An. 3.

Flax, *Carolina*. See Polypremum.

Flax, *purging*. See Linum *catharticum*.

Flax, *toad*, *Linaria*, in *Botany*. Its characters are theſe: the flower hath a permanent empalement of one leaf, divided into five parts almoſt at the bottom, and one petal of the ringent kind, having an oblong ſwelling tube, with two lips above, and the chaps ſhut. The upper lip is bifid and reflexed on the ſides; the lower lip is trifid and obtuſe. It hath an oblong nectarium, awl-ſhaped, and prominent behind, and four ſtamina, which are included in the upper lip, two of which are ſhorter than the other; and a roundiſh germen, ſupporting a ſingle ſtyle, crowned by an obtuſe ſtigma, which afterward turns to a roundiſh, obtuſe capſule, with two cells, filled with ſmall ſeed. There are ſeventeen ſpecies. Miller.

This is joined by Linnæus to the *antirrhinum*. See Snap-dragon.

The firſt ſpecies of theſe plants grows in great plenty on the ſides of dry banks in moſt parts of England. It flowers in July and Auguſt, and would make an agreeable appearance in gardens, where it might be allowed a place, were it not for its creeping roots, which ſpread too much. It is one of the ſimples, in the catalogue of ſimples, of the College Diſpenſatory, to be uſed in medicine. The leaves have a bitteriſh, and ſomewhat ſaline taſte; and when rubbed between the fingers yield a faint ſmell, reſembling that of elder.

The whole herb is uſed, and is of an aperitive and diuretic nature, opening obſtructions of the liver and ſpleen, relieving the dropſy and jaundice, which it carries off by urine. The ointment made with hog's lard, and a good quantity of this herb, is accounted excellent for the piles, being mixed with the yolk of an egg, and applied to the part. James.

The only officinal preparation is the *unguentum linariæ*.

Flax-*plant*, is a name which we may give to a plant that ſerves the inhabitants of New Zealand inſtead of hemp and *flax*. Of this plant there are two ſorts; the leaves of both reſemble thoſe of flags, but the flowers are ſmaller, and their cluſters more numerous; in one kind they are yellow, and in the other a deep red. Of the leaves of theſe plants, with very little preparation, they make all their common apparel, and alſo their ſtrings, lines, and cordage, for every purpoſe, which are ſo much ſtronger than any thing we can make with hemp, that they will not bear a compariſon. From the ſame plant, by another preparation, they draw long ſlender fibres, which ſhine like ſilk, and are as white as ſnow: of theſe, which are very ſtrong, they make their fineſt cloaths; and of the leaves, without any other preparation than ſplitting them into proper breadths, and tying the ſtrips together, they make their fiſhing-nets, ſome of which are of an enormous ſize. Hawkeſworth's Voyag. vol. iii. p. 39.

The ſeeds of this valuable plant have been brought over into England; but, upon trial, appeared to have loſt their vegetating power.

The filamentous parts of different vegetables have been employed in different countries for the ſame mechanic uſes as hemp and *flax* among us. Putrefaction, and in ſome degree alcaline lixivia, deſtroy the pulpy or fleſhy matter, and leave the tough filaments entire. By curiouſly putrefying the leaf of a plant in water, we obtain the fine flexible fibres, which conſtituted the baſis of the ribs and minute veins, and which form, as it were, a ſkeleton of the leaf. In Madagaſcar, different kinds of cloth are prepared from the filaments of the bark of certain trees boiled in ſtrong ley; and ſome of theſe cloths are very fine, and approach to the ſoftneſs of ſilk, but in durability come ſhort of cotton; others are coarſer and ſtronger, and laſt thrice as long as cotton; and of theſe filaments they make ſails and cordage to their veſſels. The ſtalks of nettles are ſometimes uſed for like purpoſes even in France; and Sir Hans Sloane relates, in one of his letters to Mr. Ray, that he has been informed by ſeveral, that muſlin and callico, and moſt of the Indian linens, are made of nettles. A ſtrong kind of cloth is ſaid to be prepared in ſome of the provinces of Sweden of hop-ſtalks; and in the Tranſactions of the Swediſh academy for 1750, we have an account of an experiment relating to this ſubject: a quantity of the ſtalks was gathered in autumn, which was equal in bulk to a quantity of *flax* ſufficient to yield a pound after preparation. The ſtalks were put into water, and kept covered with it during the winter. In March they were taken out, dried in a ſtove, and dreſſed as *flax*. The prepared filaments weighed nearly a pound, and proved fine, ſoft, and white; they were ſpun and wove into ſix ells of fine ſtrong cloth. Unleſs the ſtalks are fully rotted, which will take much longer time than *flax*, the woody part will not ſeparate, and the cloth will prove neither white nor fine. See Dr. Lewis's notes to Neumann's Chemiſtry, p. 428, 429.

FLEA, *Pulex*, in *Natural Hiſtory*, a genus of the *aptera* claſs of inſects; of a roundiſh compreſſed figure, with two eyes, ſix feet formed for leaping, and filiform antennæ; the mouth is bent downwards, and conceals a ſmall ſting or piercer. The generation of this familiar vermin affords ſomething very curious, firſt diſcovered by Sig. Diacinto Ceſtone.

Fleas bring forth eggs, or nits, which they depoſit on animals that afford them a proper food; theſe eggs being very round and ſmooth, uſually ſlip ſtrait down; unleſs detained by the piles, or other inequalities, of the clothes, hairs, &c.

Of theſe eggs are hatched white worms, of a ſhining pearl colour, which feed on the ſcurfy ſubſtance of the cuticle, the downy matter gathered in the piles of clothes, or other the like ſubſtances.

In a fortnight they come to a tolerable ſize, and are very lively and active; and if, at any time diſturbed, they ſuddenly roll themſelves into a kind of ball.

Soon after this, they come to creep, after the manner of ſilk-worms, with a very ſwift motion. When arrived at their ſize, they hide themſelves as much as poſſible, and ſpin a ſilken thread out of their mouth, wherewith they form themſelves a ſmall round bag, or caſe, white within as paper, but without always dirty, and fouled with duſt. Here, after a fortnight's reſt, the animalcule burſts out, transformed into a perfect *flea*; leaving its exuviæ in the bag.

While it remains in the bag it is milk-white, till the ſecond day before its eruption; when it becomes coloured, grows hard, and gets ſtrength; ſo that, upon its firſt delivery, it ſprings nimbly away. Phil. Tranſ. N° 249.

The *flea* when examined by the microſcope affords a very pleaſing object. It is covered all over with black, hard, and ſhelly ſcales, or plates, which are curiouſly jointed, and folded over one another in ſuch a manner, as to comply with all the nimble motions of the creature. Theſe ſcales are all curiouſly poliſhed, and are beſet about the edges with ſhort ſpikes in a very beautiful and regular order. Its neck is finely arched, and much reſembles the tail of a lobſter; the head alſo is very extraordinary; for from the ſnout part of it there proceed the two fore-legs, and between theſe is placed the piercer or ſucker, with which it penetrates the ſkin to get its food.

Its eyes are very large and beautiful, and it has two ſhort horns or feelers. It has four other legs joined all at the breaſt. Theſe, when it leaps, fold ſhort one within another, and then exerting their ſpring all at the ſame inſtant, they carry the creature to a ſurpriſing diſtance. The legs have ſeveral joints, and are very hairy, and terminate in two long and hooked ſharp claws.

The piercer or ſucker of the *flea* is lodged between its fore-legs, and includes a couple of darts or lancets, which after the piercer has made an entrance, are thruſt farther into the fleſh, to make the blood flow from the adjacent parts, and occaſion that round red ſpot, with a hole in the center of it, vulgarly called a *flea-bite.*

This piercer, its ſheath opening ſideways, and the two lancets within it, are very difficult to be ſeen, unleſs the two fore-legs, between which they are hid, be cut off cloſe to the head; for the *flea* rarely puts out its piercer, except at the time of feeding, but keeps it folded inwards; and the beſt way of ſeeing it is by cutting off firſt the head, and then the fore-legs, and then it is uſually ſeen thruſt out in convulſions.

By keeping *fleas* in a glaſs tube corked up at both ends, but ſo as to admit freſh air, their ſeveral actions may be obſerved, and particularly their way of coupling, which is performed tail to tail; the female, which is much the larger, ſtanding over the male: they may alſo be thus ſeen to lay their eggs, not all at once, but ten or twelve in a day, for ſeveral days ſucceſſively, which eggs will be afterwards found to hatch ſucceſſively in the ſame order. The *flea* may eaſily be diſſected in a drop of water, and by this means the ſtomach and bowels, with their periſtaltic motion, may be diſcovered very plainly, as alſo their teſtes and penis, with the veins and arteries, though minute beyond all conception. Mr. Leuwenhoek affirms alſo, that he has ſeen innumerable animalcules ſhaped like ſerpents, in the ſemen maſculinum of a *flea.* Baker's Microſ. p. 191 and 194.

Flea-*bane*, in *Botany*, *Conyza*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are as follow: it hath a compound flower, made up of many hermaphrodite florets, which compoſe the diſk, and female half florets, which form the rays; the hermaphrodite florets are funnel-ſhaped, and cut into five parts at the brim, and have each five ſhort hairy ſtamina; in the bottom of each floret is ſituated a germen. The female half florets, or rays, are funnel-ſhaped, and cut into three parts at the top; theſe have a germen. The hermaphrodite and female florets are each ſucceeded by one oblong ſeed, crowned with down, ſitting upon a plain receptacle, and are included in the empalement. Miller enumerates ſeventeen ſpecies.

The common *flea-bane* ſtands recommended by the old authors as a remedy for many cutaneous diſorders. They had an opinion alſo, that the ſmoke of it when burnt in a room deſtroyed fleas, and other inſects.

Flea-*bane*, *ſhrubby*, *African.* See Tarchonanthus.

Flea-*bane*, *ſweet.* See Groundsel.

Flea-*bane*, *marſh*, *Inula.* See Elecampane.

Flea-*wort*, *Pſyllium*, in *Botany*, the name of a genus of plants, the flowers and fruit of which are like thoſe of the plantain, to which Linnæus has joined it; but the ſtalks are ramoſe and foliaceous.

The ſeeds of *pſyllium* are recommended by many in jaundices and dyſenteries; but the preſent practice receives it only as a mucilaginous ſeed.

Flea-*bitten colour* of a horſe is white, ſpotted all over with dark reddiſh ſpots.

FLEAM, a ſmall inſtrument of pure ſteel, compoſed of two or three moveable lancets, for bleeding a horſe, or the like.

A caſe of *fleams*, as it is called by farriers, comprehends ſix ſorts of inſtruments; two hooked ones, called drawers, and uſed for cleanſing wounds; a penknife, a ſharp pointed lancet for making inciſions; and two *fleams*, one ſharp, and the other broad pointed: theſe laſt are ſomewhat like the point of a lancet, fixed in a flat handle, only no longer than is juſt neceſſary to open the vein.

Fleams imported, beſide the duty on ſteel, pay each $\frac{38\frac{1}{2}}{100}$*d.* and drawback on exportation $\frac{34\frac{3}{4}}{100}$*d.*

There are many ſurgeons in Germany who bleed, or perform the operation of phlebotomy with this inſtrument, which they uſe in this manner: they hold one finger upon the end of it, which ſerves as a handle, and applying the point to the vein they are to open, ſtrike upon the back over the point with one of the fingers of the other hand, opening the vein much as farriers bleed horſes. Others uſe a ſpring *fleam*, ſomething like a ſingle point of the ſcarifying inſtrument uſed in cupping; and others employ a ſort of inſtrument in form of a dart; but as the poſition and ſize of the veins is different, in different ſubjects, no inſtrument will ever be found ſo uſeful as the common lancet of a proper ſize. Heiſter's Surgery, p. 274.

FLEDWITE, or **Flight-wite,** in our *Ancient Laws*, a diſcharge, or freedom, from amercements; when one, having been an outlawed fugitive, comes to the peace of our lord the king, on his own accord, or with licence. Raſtal.

Others rather take it to denote a mulct, or fine, ſet upon a fugitive to be reſtored to the king's peace.

FLEECE, the covering of wool ſhorn off the bodies of ſheep.

Fleece, *the golden*, is famous among the ancient writers. It was this that the Argonauts, under the command of Jaſon, went in purſuit of to Colchis, a province of Aſia, now called Mingrelia.

The myſtery of the *golden fleece* is variouſly explained; either of the profit of the wool-trade to Colchis; or of the gold that they commonly gathered there, with fleeces, in the rivers. Arbuth. Diſſ. p. 224. See Argonauts.

Fleece, *order of the Golden.* See Golden *Fleece.*

FLEET, a number of veſſels, going in company, whether on a deſign of war, or commerce.

In times of peace, merchant ſhips go in *fleets*, for their mutual aid and aſſiſtance: in times of war, beſides this ſecurity, they likewiſe procure convoys of men of war; either to eſcort them to the places whither they are bound, or only a part of the way, to a certain point or latitude, beyond which they are judged out of danger of privateers, &c.

The admirals of his majeſty's *fleet* are claſſed into three ſquadrons, viz. the red, white, and blue. When any of theſe officers are inveſted with the command of a ſquadron, or detachment of men of war, the particular ſhips are diſtinguiſhed by the colours of their reſpective ſquadron; the union is common to them all, and in thoſe of the red ſquadron it is diſplayed on a red field; on a white for thoſe of the white ſquadron, and on a blue field for the blue ſquadron. A *fleet*, whatſoever be the number of ſhips of which it conſiſts, is uſually divided into three squadrons, and theſe again, when the ſhips are numerous, into three divisions, diſtinguiſhed by a particular flag or pendant, and uſually commanded by a general officer. The admiral, or principal officer, commands the center; the vice-admiral, or ſecond in command, ſuperintends the van-guard; and the operations of the rear are directed by the rear-admiral, or officer next in rank. The moſt convenient order of a *fleet*, proceeding on a voyage, is that in which it is ranged into three lines or columns, each of which is parallel to a line cloſe-hauled, according to the tack on which the line of battle is deſigned to be formed. The *fleet* being thus more incloſed, will more readily obſerve the ſignals, and with greater eaſe form itſelf into the line of battle. See Engagement.

The Spaniſh *fleet* ſent againſt England by Philip II. conſiſted of a thouſand veſſels. In the Eaſt there have been *fleets* ſeen of three thouſand veſſels.

Merchant *fleets* generally take their denomination from the place they are bound to; as the Turky *fleet*, Eaſt India *fleet*, &c.

The Spaniards call ſimply the *fleet*, or *flota*, a certain number of veſſels, belonging partly to the king, and partly to merchants, ſent every year to Vera Cruz, a port of New Spain.

The *flota* conſiſts of the captain, admiral, and patach or pinnace, which go on the king's account; and about ſixteen ſhips, from four hundred to a thouſand tons, belonging to particular perſons. They are all ſo heavy laden, both going and coming, that they have much ado to defend themſelves when attacked. The *fleet* puts out from Cadiz about the month of Auguſt, and makes it eighteen or twenty months before its return.

The *fleet* ſent annually from the ſame port to Peru, they call the galleons.

When the two *fleets* put out together, they go in company as far as the Antilles, where they ſeparate; the galleons for Carthagena, and Porto Bello; and the *flota* for Vera Cruz; at their return they join at the Havanna. Of the two *fleets* the *galleons* are the moſt richly laden; not but the cargo of the *flota* is alſo very conſiderable.

Fleet is alſo a famous priſon in London, thus called from the river Fleet, on the border whereof it once ſtood. To this priſon perſons are uſually committed for contempt of the king and his laws; or upon abſolute command of the king, or ſome of his courts, particularly that of chancery; and laſtly, for debt.

FLEETING, in *Sea Language*, is the act of changing the ſituation of a tackle, when the blocks are drawn together; or what is called BLOCK and block by ſailors. The uſe of *fleeting* is to replace the mechanical powers into a ſtate of action, and the operation is nearly ſimilar to that of winding up a clock or watch.

FLEGM, FLEGMATIC, FLEGMAGOGUE, &c. See PHLEGM, PHLEGMATIC, &c.

FLEMENEFRIT, FLEMENEFRINTHE, or FLYMENAFRYNTHE, in our *Old Writers*, ſignifies the receiving or relieving of a fugitive or outlaw.

FLEMESWITE. Fleta, who writes of this word, interprets it *habere catalla fugitivorum*.

FLEMINGIANS, or FLANDRIANS, in *Eccleſiaſtical Hiſtory*, a ſect of rigid anabaptiſts, who acquired this name in the ſixteenth century, becauſe moſt of them were natives of Flanders, by way of diſtinction from the WATERLANDIANS. In conſequence of ſome diſſenſions among the *Flemingians*, relating to the treatment of excommunicated perſons, they were divided into two ſects, diſtinguiſhed by the appellations of Flandrians and Frieſlanders, who differed from each other in their manners and diſcipline. Many of theſe in proceſs of time came over to the moderate community of the Waterlandians; and thoſe who remained ſeparate are ſtill known by the name of the old *Flemingians*, or Flandrians; but they are comparatively few in number. Theſe maintain the opinion of Menno, with reſpect to the incarnation of Chriſt, alleging, that his body was produced by the creating power of the Holy Ghoſt, and not derived from his mother Mary.

FLEMISH, or the FLEMISH *tongue*, is that which we otherwiſe call Low Dutch, to diſtinguiſh it from the German, whereof it is a corruption, and a kind of dialect.

The *Flemiſh* is the language uſed throughout the provinces of the Netherlands. It differs conſiderably from the Walloon, which is a corrupt French.

There are ſeveral *Flemiſh* tranſlations of the Bible. In the year 1618, it was decreed by the ſynod of Dort, that a new *Flemiſh* verſion ſhould be made of the whole Scriptures; becauſe the old tranſlation, which had been taken from that of Luther, was full of faults. Accordingly, ſeveral perſons, learned in the Greek and Hebrew languages, undertook the work; which was publiſhed with notes in 1637. This Bible is highly valued by the reformed in Holland, &c. though M. Simon cenſures it as being far from the perfection of a juſt tranſlation.

FLEMISH *bricks*. See BRICKS.

FLESH, *Caro*, in *Anatomy*, a ſimilar fibrous part of an animal body, ſoft and bloody; being that whereof moſt of the other parts are compoſed, and whereby they are connected together.

Fleſh is properly underſtood of ſuch parts of the body where the blood-veſſels are ſo ſmall, as only to retain blood enough to preſerve their colour red.

The ancients accounted five different kinds of *fleſh*: the firſt *muſcular*, *fibrous*, or *fiſtular*; as the ſubſtance of the heart, and other muſcles; the ſecond *parenchymous*, as that of the lungs, liver, and ſpleen; the third *viſcerous*, as the *fleſh* of the ſtomach and inteſtines; the fourth *glandulous*, as that of the breaſts, pancreas, tonſils, &c. and the fifth *ſpurious*, as that of the gums, glans of the penis, the lips, &c.

The moderns admit only of one kind of *fleſh*; viz. the muſcular, conſiſting of little tubes and veſſels, with blood therein; ſo that *fleſhy* and muſcular parts of the body with them are the ſame thing.

Sometimes, however, they apply the term to the glands; which they call, by way of diſtinction, *glandulous fleſh*.

As to the parenchymas, they are now found to be quite other things than the ancients imagined. The lungs are only an aſſemblage of membranous veſicles, inflated with air; the liver a collection of glands, wherein the bile is ſeparated; the ſpleen, a heap of veſicles, full of blood; and the kidneys, like the liver, a maſs of glands for ſeparating of the urine.

FLESH is alſo uſed, in *Theology*, in ſpeaking of the myſteries of the INCARNATION and euchariſt.

The Word was *made fleſh*, *Verbum* caro *factum eſt*.

The Romaniſts hold, that the bread in the ſacrament of the ſupper is turned into the real *fleſh* of Jeſus Chriſt. See TRANSUBSTANTIATION.

FLESH, *fungus*. See FUNGUS.

FLESH is ſometimes alſo uſed by botaniſts for the ſoft pulpy ſubſtance of any fruit, incloſed between the outer rind or ſkin, and the ſeeds, or ſtone; or for that part of a root, fruit, &c. fit to be eaten.

FLESH-*colour*. See CARNATION.

FLESHY *roots*. See FIBROSE *roots*.

FLESUS, in *Ichthyology*, a name uſed by ſome authors for the common FLOUNDER; the PASSER *fluviatilis* of moſt writers.

FLET-*milk*, denotes milk that has been ſkimmed, or from which the cream has been taken.

FLEUR-DE-LIS, FLEURETTE', FLEURONNE', and FLEURY, in *Heraldry*. See FLORY.

FLEXIBLE, in *Phyſics*, is applied to bodies that are capable of being bent, or changed from their natural form and direction.

A body is not capable of being inflected or bent, unleſs the whole thereof be at reſt. In bending a body, it conſtitutes, as it were, two levers; and the point it is to be bent in, is a fulcrum: hence, as a moving power, the farther it is from the fulcrum, acquires a greater force; the longer the *flexible* body is, the eaſier it is bent.

FLEXION, in *Anatomy*, &c. is applied to the motion of an arm, or other member, whereby it is bent.

The arm has a motion of *flexion*, and another of extenſion.

The motion of *flexion* is, when the radius and humerus approach each other, and form an angle at the elbows.

FLEXION, in *Geometry*. See FLEXURE.

FLEXOR, in *Anatomy*, a name given to ſeveral muſcles, in reſpect of their action; viz. the bending of the members, or joints, in oppoſition to the extenſors, which open and ſtretch them; among which are the following:

FLEXOR *capitis* is a muſcle of the head, called alſo RECTUS *major anticus*.

FLEXOR *carpi radialis*, called alſo *radiæus internus*, riſes from the inner protuberance of the humerus; and, running along the radius, is inſerted into the upper part of the bone of the metacarpus, which is joined with the fore-finger.

FLEXOR *carpi ulnaris*, called alſo *cubitæus internus*, ariſes tendinous from the inner protuberance of the humerus, and upper part of the ulna, upon which it runs along, till, paſſing under the ligamentum annulare, it is inſerted by a ſhort ſtrong tendon into the fourth bone of the firſt row of the carpus. See *Tab. Anat.* (*Myol.*) *fig.* 2. *n.* 24.

Both theſe muſcles bend the wriſt.

FLEXOR *digitorum pedis acceſſorius*, a flat and pretty long fleſhy muſcle, ſituated obliquely under the ſole of the foot, and from its ſituation and figure, formerly called *caro plantæ pedis quadrata*.

It is fixed poſteriorly by one fleſhy portion, in the lower ſide of the os calcis, and in the anterior tuberoſity on that ſide, and by the other in the ligament which joins this bone to the aſtragalus. From thence the two other portions run obliquely to the middle of the ſole of the foot, and there unite in a flat, long, and irregularly ſquare muſcular maſs, which is fixed to the outer edge of the faſciculus of tendons of the *flexor longus*, to which it ſerves as a *frænum* in that place.

FLEXOR *pollicis pedis brevis* ariſes from the middle of the cuneiform bone. It is ſhort, thick, and fleſhy, ſeemingly two; and, running over the termination of the peronæus, has a double inſertion into the oſſa ſeſamoidea.

FLEXOR *pollicis pedis longus*. This is a muſcle of the toe; it is derived from the back part of the fibula, with a double order of fibres, and runs tendinous under the inner ankle, and through the channel in the inner part of the bone of the heel, to its inſertion at the extremity of the great toe, on the under ſide.

FLEXOR *profundus*, in *Anatomy*, a name given by Cowper and ſome other writers to the muſcle of the foot, called alſo the PERFORANS *pedis*, and the perodactylæus by Riolan, and ſome others.

FLEXOR *primi internodii digitorum pedis*. See LUMBRICALES *pedis*.

FLEXOR *ſecundi internodii digitorum manus*. See PERFORATUS *manus*.

FLEXOR *tertii internodii digitorum manus*. See PERFORANS *manus*.

FLEXOR *tertii internodii digitorum pedis*. See PERFORANS *pedis*.

FLEXORES *primi internodii digitorum manus*, are muſcles of the fingers, called alſo *lumbricales manus*. See LUMBRICALES.

FLEXORES *pollicis manus*, are two muſcles ſerving to bend the thumb.

The firſt, called *flexor tertii internodii*, &c. ariſes from the internal protuberance of the humerus, and part of the radius, by different orders of fibres, and, paſſing under the ligamentum annulare, is inſerted into the third bone of the thumb. The ſecond, called *flexor ſecundi internodii*, &c. ariſes from the bones of the carpus, and annular ligament; and is inſerted into the ſecond bone of the thumb.

FLEXORES *ſecundi internodii digitorum pedis*. See PERFORATUS *pedis*.

FLEXURE, or FLEXION, in *Geometry*, is uſed to ſignify, that a curve is both concave and convex, with reſpect to a given right line, or a fixed point. And the point which limits the concavity and convexity, is called the POINT *of contrary flexure*. See RETROGRADATION *of curves*.

As to the method of finding the points of contrary *flexure*, ſee INFLECTION.

FLIDETHRIFT, or more truly SLIDETHRIFT, is the game we now call *ſhovel-board*. It is otherwiſe called *ſhove-groat*, and is mentioned in the ſtatute 33 Hen. VIII. cap. 9.

FLIE, or FLY, that part of the mariner's compaſs, on which the thirty-two winds are drawn, and over which the needle is placed, and faſtened underneath.

FLIGHT, the act of a bird in FLYING; or the manner, duration, &c. thereof.

The FEATHERS of birds are admirably contrived and fitted for the eaſe and conveniency of *flight*.

Almoſt every kind of bird has its particular *flight*: the eagle's *flight* is the higheſt; the *flight* of the ſparrow-hawk and vulture are noble, and are fit for high enterprize and combat. The *flight* of ſome birds is low, weak, tranſient, and, as they call it, *terra à terra*; the *flight* of the partridge and pheaſant is but of ſhort continuance; that of the dove is laboured; that of the ſparrow, undulatory, &c.

The augurs pretended to foretel future events from the *flight* of birds.

FLIGHT. In melting the lead-ore in the works at Mendip, there is a ſubſtance which flies away in the ſmoke, which they call the *flight*.

They find it ſweetiſh upon their lips, if their faces happen to be in the way of the ſmoke, which they avoid as much as poſſible. This, falling on the graſs, kills cattle that feed thereon; and, being gathered, and carried home, kills rats and mice in their houſes; that which falls on the ſand, they gather, and melt upon a flag-hearth, into ſhot, and ſheet-lead.

FLIGHT, *capon's*, in ſome *Cuſtoms*, is a compaſs of ground, ſuch as a capon might *fly* over, due to the eldeſt born of ſeveral brothers, in making partition of the father's effects with them, when there is no principal manor in a lordſhip. It is uſually eſtimated by a bow-ſhot.

FLIGHT *of a ſtair-caſe*. See STAIR-*caſe*.

FLIGHT, in *Heraldry*. See VOL.

FLING, in the *Manege*, is the fiery and obſtinate action of an unruly horſe.

To fling like a cow, is to raiſe only one leg, and give a blow with it.

To fling or kick with the hind legs. See YERKING.

FLINGING, among *Bowlers*. See BOWLING.

FLINT, *ſilex*, in *Natural Hiſtory*, the name of a genus of ſemipellucid ſtones, the matter of which is a cryſtal, debaſed by an admixture of a peculiar and appropriated earth, which is of a blackiſh grey; always free from veins, but, according to the different quantity and diſpoſition of the earth in its compoſition, ſubject to clouds of a darker or paler colour, and naturally inveſted with a thin whitiſh cruſt.

Naturaliſts, in general, have accounted various ſpecies of *flint*, but erroneouſly; nature has eſtabliſhed it into a genus of itſelf, and allowed no other ſpecies than one, which is ever compoſed of the ſame matter, and differs only in the proportions of its admixture. When cryſtalline matter is debaſed by earths of other colours, or clouded and veined, it ceaſes to be *flint*, and becomes the pebble, the agate, or the onyx; and for want of attending to this diſtinction, many have deſcribed theſe variouſly-coloured bodies twice over: one under the name of *coloured flints*, and a ſecond time under that of *Engliſh agates*, &c.

The characters of genuine *flint* are, that it is a ſtone of an extremely fine and even texture; of a very uncertain ſurface, ſometimes rough, ſometimes ſmooth; of a colour always, in ſome degree, between blackiſh and whitiſh, unleſs accidentally tinged, as all other foſſils are ſubject to be; very readily giving fire with ſteel; not fermenting with acids. Hill's Hiſt. of Foſſils, p. 508.

Flints are generally found in beds of chalk and ſand, but never forming entire ſtrata of rock, as jaſper does. By long expoſure to air and ſun, they ſeem to decay, to loſe their luſtre, and their firmneſs of texture, and to be changed into a white calcareous earth or chalk; and on this account they are almoſt always found covered with a white chalky cruſt. *Flint* belongs to the claſs of vitrifiable EARTHS, becauſe it is uſed in one of the principal ingredients of making GLASS.

The ſparks of fire which are produced by ſtriking *flint* againſt ſteel, are of the number of thoſe things which cuſtom has made familiar to us, but by which we might find much matter of inquiry, if we would give way to reaſon on the ſubject.

The ſtriking fire in this manner has probably been as old as the knowledge of ſteel; and ſince the microſcope has been familiar among us, it has been diſcovered, firſt by Mr. Hook, (See Micrograph. 1665 p. 44.) that theſe ſparks are ſo many ſpherical balls of iron detached by the blow from the maſs, and rendered by the heat a ſort of ſcoriæ. Kemp de Kenvyck, a very ingenious chemiſt, propoſed it as a problem worthy the attempts of the curious to ſolve, and propoſed the whole in theſe words; when a *flint* and ſteel are ſtruck together, if the ſparks are received upon a white paper, they are found to be round maſſes, which examined by the microſcope, are found to be melted and ſcorified or vitrified iron, which will no longer anſwer to the magnet: it is therefore demanded, 1. Which of the two inſtruments contributes moſt to this change in the iron? 2. What ſubſtance it is, that is employed to this purpoſe? 3. In what manner the operation is performed; and 4. Why if iron be uſed inſtead of ſteel, the ſparks are very few or none, when with ſteel they are ſo many? Theſe queſtions have appeared almoſt unanſwerable, becauſe people ſcarce knew how to conceive, that iron which requires ſo long continued, and ſo violent a fire to put it in fuſion, could by means only of a ſlight blow, be not only melted, but deſtroyed as it were. The moſt eminent perſons of the time declined engaging in the attempt, and Mr. Muſchenbroek, from whom a ſolution was expected by many, at length referred the whole to Mr. Reaumur, who had ſome time before publiſhed a treatiſe on iron and ſteel, and was therefore judged to have moſt conſidered the metal in both thoſe ſtates.

This gentleman accepted the taſk, and attempted the ſolution of the problem by reſolving theſe queſtions. 1. By what means the iron is in this act converted into ſcoriæ? 2. By what methods it can be ſo deſtroyed? 3. How it comes not only to be reduced to ſcoriæ, but to be in a ſtate of fuſion, and truly rendered liquid, and 4. Why iron gives leſs as well as fewer ſparks on colliſion with *flint* than ſteel does? The nature of iron is well enough known for us to be aſſured that it contains a large portion of inflammable matter, and that it is never ductile, but while it has a quantity of that inflammable matter in it; and that when that is wholly taken from it, it becomes friable, and is reduced to a ſort of ſcoriæ, analagous to common vitrified matters.

What much conduces to the explication of the given problem, is, that this inflammable matter contained in iron is very eaſily ſeparated when iron is heated in an open fire; which is evidently ſeen, in that it is impoſſible to heat a bar of iron in a ſmith's forge, ſo much as to make it ready for working or joining with another bar, without reducing its whole ſurface to ſcoriæ, or a friable matter which is all thrown off from the bar by the blows of the hammer.

The ſmaller and thinner a piece of iron is, the more eaſily is it reduced to ſcoriæ, and it is eaſy to conceive from hence, that in pieces extremely ſmall, there requires no more than the once thoroughly heating them to reduce the whole to ſcoriæ; and it is eaſily proved by experiment, that the flame of a candle being applied to a fine ſmall piece of filings of ſteel, will ſoon make it red hot; and that if it be then ſuffered to cool and laid on a white paper, it will be found much to reſemble the ſparks thrown off by *flint* and ſteel, and will be reduced to ſcoriæ and be friable under the nail, like a piece of charcoal.

It appears then, that there requires but an inſtant of time to give a red heat to a ſmall particle of iron; and alſo that when that heat has been given, the particle muſt have loſt that inflammable matter which cauſed its ductility, and conſequently muſt be reduced to ſcoriæ; and hence it appears not wonderful, that the very ſmall piece or particle of ſteel which is ſtruck off by the *flint*, ſhould be diveſted of its inflammable matter, and with it of its ductility, by being kept red hot in the open air, only ſo long as it was in falling from the ſteel to the paper that is placed to receive it. The extreme ſmallneſs of the particle gives power for ſo ſhort a heat to deſtroy its inflammable matter, in which its ductility conſiſts; and therefore to reduce it to a matter no longer ductile, that is, into ſcoriæ; and we find that if a parcel of fine ſteel-filings be dropt through the flame of a lamp driven into an horizontal direction by the blaſt of a blow-pipe, they will in the inſtant of their paſſing through that flame, ſparkle and become ignited; and if they are received on a white paper placed underneath, the ſmalleſt particles will be found round and friable, reduced to ſcoriæ, no way differing from the little globules of ſcorified ſteel, which are ſtruck off from the *flint* and ſteel in giving fire by their colliſion.

When we have occaſion to melt larger parcels of ſteel or iron, we are obliged to have recourſe to ſuch ſubſtances to mix with them as will replace with increaſe that inflammable matter which the fire drives off: the ſubſtances of this kind are common ſulphur, orpiment, arſenic, and the like; and by means of theſe, it is ſoon made to run like lead.

Mr. Reaumur having given theſe hints for explaining the occaſion of iron's being found ſcorified by the ſhort heat it receives from the colliſion of *flint* and ſteel, proceeds to account for the reaſon why iron yields fewer ſparks with *flint* than ſteel does.

On this occaſion he obſerves, that he accidentally had diſcovered a new phoſphorus of iron, in giving the proceſs of which, great light would be thrown into this ſubject: the method of making it was this, having melted ſome antimony in a crucible, he threw in, at ſeveral times, twice the quantity of iron reduced into thin ſcales; the whole ſoon melted together, and became one fluid maſs; when this had been caſt into a mould and was become cold, it afforded a long train of ſparks on being filed with a common coarſe file. The ſparks were much larger than thoſe produced by a colliſion of *flint* and ſteel, and the larger of them ſet fire to the paper placed to receive them; but upon examination, theſe were all found to be melted in the manner of the ſparkling particles ſtruck off from ſteel, not only burnt, but melted, and that more perfectly than the others from the common colliſion with *flint*. If after all this, it be aſked, why ſteel yields much more numerous ſparkles than iron? the anſwer is plain, that the difference of hardneſs alone is ſufficient to occaſion it; but granting even that ſteel and iron were of equal hardneſs, ſteel has the ſame advantage of iron in this reſpect, that the before-mentioned mixture of iron with antimony has over plain iron, in that it contains much more of the inflammable matter than the iron does, and this inflammable matter is alſo more equally diſtributed through all its ſurface.

It may alſo be judged, that the *flint* not only contributes by its hardneſs to the ſending off the ſparks, but alſo by its ſulphur; what the blow diſlodges from it of this kind, and puts in violent motion, probably having no ſmall effect both in the fuſion and ſcorification of the metal. That all *flints* contain a large quantity of ſulphur is plain, from the ſulphureous ſmell they afford on being ſtruck together; and the ſparks which are produced by ſtriking iron againſt iron are probably affected in the ſame manner, by the ſulphur of the metal diſlodged from the adjoining parts by the blow.

One great proof of the ſparks being melted and rendered globular by means of the ſulphur of the *flint* is, that ſparks may be ſtruck from ſteel, in the ſame manner by glaſs as by *flint*, but in leſs quantity; theſe having been received on a paper, were examined by Mr. Reaumur, and were found to be ſcoriæ, of an irregular figure, having never been melted, and therefore never reduced to the globular ſhape of the others. In regard to the great change wrought in iron by this operation, or its being, according to the words of Kemp, deſtroyed, no longer retaining its great character of being attracted by the loadſtone, Mr. Reaumur willing to try the experiment before he reaſoned upon it, found the aſſertion not to be a fact, or at leaſt not a general one.

All the ſeveral kinds of ſparks which he mentions, thoſe produced by the common colliſion of *flint* and ſteel, thoſe by dropping ſteel filings through the flame of a lamp, and even thoſe from the filing of the antimoniated iron, all as readily anſwering to the loadſtone as common filings of iron; ſo that if this caſe ſometimes happen, and iron be liable thus to be deſtroyed, it is however no general fact, but a very rare and extraordinary one. Memoires Acad. Scienc. Par. 1736.

Flints, in the *Glaſs-trade*. The way of preparing *flints* for the niceſt operations in the glaſs-trade is this. Chooſe the hardeſt *flints*, ſuch as are black and will reſiſt the file, and will grow white when calcined in the fire. Cleanſe theſe of the white cruſt that adheres to them, then calcine them in a ſtrong fire, and throw them while red-hot into cold water; waſh off the aſhes that may adhere to them, and powder them in an iron-mortar, and ſift them through a very fine ſieve; pour upon this powder ſome weak aqua fortis, or the phlegm of aqua fortis, to diſſolve and take up any particles of iron it may have got from the mortar; ſtir this mixture ſeveral times, then let it reſt, and in the morning pour off the liquor, and waſh the powder ſeveral times with hot water, and afterwards dry it for uſe. You will thus have a powder for making the pureſt glaſs as perfectly fine and faultneſs, as if you had uſed rock-cryſtal itſelf. Cramer's Art of Aſſaying Metals, p. 438.

The waſhing off the ferrugineous particles with aqua fortis is not neceſſary, when the glaſs intended to be made is to be tinged with iron afterwards; but when meant to be a pure white, this is the method that will ſecure ſucceſs.

Flint, *breaking of*.--- The art of cutting or rather breaking *flint* ſtones into uniform figures, was by ſome ſuppoſed to be one of the arts now loſt. That it was known formerly appears from the ancient Bridewell at Norwich, from the gate of the Auſtin-friars at Canterbury, that of St. John's abbey at Colcheſter, and the gate that formerly ſtood near White-hall, Weſtminſter.

But that the art is not loſt, and that the French know it, appears from the platform on the top of the royal obſervatory at Paris, which, inſtead of being leaded, is paved with *flint*, in the manner here mentioned. But we know not that this art is any where deſcribed. Phil. Tranſ. Nº. 477. p. 521, and Note ibid.

Flints, *oil* or *liquor of*, a name given by ſome to a preparation made of four ounces of *flints* calcined and powdered and mixed with twelve ounces of ſalt of tartar; theſe being melted together in a large crucible by a ſtrong fire, run into a glaſs, which quickly and ſtrongly attracts moiſture from the air; and is entirely ſoluble in water, except a very ſmall portion of earthy matter: this glaſs being afterwards powdered and ſet in a cellar, runs into an oil per deliquium; with this and the calx of any metal is prepared one of the *metallic* VEGETATIONS. If any acid be added to the liquor of *flints* ſo as to ſaturate the alkali, the *flint* which was kept diſſolved in water by means of this alkali will be now precipitated in the ſtate of a fine earth, which earth is entirely ſoluble by acids.

Flint *walls*. See Wall.

FLIP, a ſort of ſailors drink, made of malt liquor, brandy, and ſugar, mixed.

Flitter-*Mouſe*, in *Zoology*. See Bat.

FLIX *weed*, in *Botany*; a ſpecies of *water* CRESSES, which grows in uncultivated places, and by the ſide of foot-ways in many parts of England: it flowers in June, and the ſeeds, which ripen in Auguſt, are greatly recommended by ſome for the gravel and retention of urine.

FLOAT, or Fleet. See Flota, and Fleet.

Float *of a fiſhing line*, &c. See Fishing-*float*.

Float, ſometimes called *Catamaran*, alſo denotes a certain quantity of pieces of timber joined together with rafters athwart, thrown into a river, to be conveyed down the ſtream; and even ſometimes to carry burdens down a river with the ſtream. The invention of *floats* is of great uſe; it is ſaid to have been firſt put in execution at Paris, in the year 1618.

Float-*boards*, thoſe boards fixed to *water*-WHEELS of underſhot mills, ſerving to receive the impulſe of the ſtream, whereby the wheel is carried round.

It is a diſadvantage to have too great a number of *float-boards*; becauſe when they are all ſtruck by the water in the beſt manner that it can be brought to act againſt them, the ſum of all theſe impulſes will only be equal to the impulſe made againſt one *float-board* at right angles, by all the water coming out of the pin-ſtock, through the opening, ſo as to take place on the *float-board*. The beſt rule in this caſe is, to have juſt ſo many, that each of them may come out of the water as ſoon as poſſible, after it has received and acted with its full impulſe; or, which comes to the ſame thing, when the ſucceeding one is in a perpendicular direction to the ſurface of the water. As to the length of theſe *float-boards*, it may be regulated according to the breadth of the ſtream. See Deſaguliers, vol. ii. p. 425.

Float *Graſs*, in *Botany*. See Grass.

FLOATAGES. See Flotages.

FLOATING-*bridge*, a bridge conſiſting of ſeveral boats covered with planks; which ought to be ſo ſolidly framed, as to bear both horſes and cannon. See Bridge.

Floating-*iſlands*. See Islands.

Floating-*veſſels*. See Boat, Vessel, &c.

Floating, in *Huſbandry*, is the drowning or watering of meadows.

FLOCK-*Paper*. See Paper.

FLOOD, a DELUGE or inundation of waters.

Flood is alſo uſed in ſpeaking of the TIDE.

When the water is at loweſt, it is called *flood*; when riſing, *young*, or *old flood*; when at higheſt, *high flood*; when beginning to fall, *ebb-water*.

Flood-*mark*, the mark which the ſea makes on the ſhore, at flowing water, and the higheſt tide: it is alſo called *high-water mark*.

Flood *Sand*. See Sand.

FLOOK *of an anchor*. See Anchor.

FLOOKING, in *Mining*, a term uſed to expreſs a peculiarity in the load of a MINE. The load or quantity of ore is frequently intercepted in its courſe, by the croſſing of a vein of earth or ſtone, or ſome different metallic ſubſtance; in which caſe the load is moved to one ſide, and this tranſient part of the land is called a *flooking*.

FLOOR, in *Building*, the underſide of a room, or that part we walk on.

Floors are of divers ſorts; ſome of earth, ſome of brick, others of ſtone, others of boards, &c.

Carpenters, by the word *floor*, underſtand as well the frame work of timber, as the boarding over it.

For brick and *ſtone* **FLOORS**, ſee PAVEMENT.

For boarded **FLOORS**, it is obſervable, that the carpenters never *floor* their rooms with boards, till the carcaſe is ſet up, and alſo incloſed with walls, leſt the weather ſhould injure the *flooring*. Yet they generally rough-plane their boards for the *flooring*, before they begin any thing elſe about the building, that they may ſet them by to dry and ſeaſon, which is done in the moſt careful manner. The beſt wood for *flooring* is the fine yellow deal well ſeaſoned, which, when well laid, will keep its colour for a long while; whereas the white ſort becomes black by often waſhing, and looks very bad The joints of the boards are commonly made plain, ſo as to touch each other only; but, when the ſtuff is not quite dry, and the boards ſhrink, the water runs through them, whenever the floor is waſhed, and injures the cieling underneath. For this reaſon they are made with feather edges, ſo as to cover each other about half an inch, and ſometimes they are made with grooves and tenons; and ſometimes the joints are made with dove-tails; in which caſe the lower edge is nailed down and the next drove into it, ſo that the nails are concealed. The manner of meaſuring *floors* is by ſquares of 10 feet on each ſide, ſo that taking the length and breadth and multiplying them together and cutting off 2 decimals, the content of a *floor* in ſquare will be given. Thus 18 by 16 gives 288 or 2 ſquares and 88 decimal parts.

FLOORS, *earthen*, are commonly made of loam, and ſometimes, eſpecially to make malt on, of lime, and brook-ſand, and gun-duſt, or anvil-duſt from the forge.

Ox-blood and fine clay, tempered together, Sir Hugh Plat ſays, make the fineſt *floor* in the world.

The mannner of making earthen *floors* for plain country habitations is as follows. Take two thirds of lime, and one of coal aſhes well ſifted, with a ſmall quantity of loam clay; mix the whole together, and temper it well with water, making it up into a heap: let it lie a week or ten days and then temper it over again. After this, heap it up for three or four days, and repeat the tempering very high, till it become ſmooth, yielding, tough, and gluey. The ground being then levelled, lay the *floor* therewith about 2½ or 3 inches thick, making it ſmooth with a trowel: the hotter the ſeaſon is the better; and when it is thoroughly dried, it will make the beſt *floor* for houſes, eſpecially malt houſes.

If any one would have their *floors* look better, let them take lime made of rag-ſtones, well tempered with whites of eggs, covering the *floor* about ½ an inch thick with it, before the under *flooring* is too dry. If this be well done, and thoroughly dried, it will look when rubbed with a little oil, as tranſparent as metal or glaſs. In elegant houſes *floors* of this nature are made of ſtucco or of plaiſter of Paris beaten and ſifted, and mixed with other ingredients.

FLOOR *of a ſhip*, ſtrictly taken, is only ſo much of her bottom as ſhe reſts on, when aground.

Such ſhips as have long, and withal broad *floors*, lie on the ground with moſt ſecurity, and are not apt to ſeel, or tilt on one ſide; whereas others, which are narrow in the *floor*, or, in the ſea-phraſe, *cranked by the ground*, cannot be grounded without danger of being overturned.

FLOOR-*Timbers*, in a *ſhip*, are thoſe parts of a ſhip's timbers which are placed immediately acroſs the keel, and upon which the bottom of the ſhip is framed; to theſe the upper parts of the timbers are united, being only a continuation of *floor*-timbers upwards.

FLORAL *leaf*. See LEAF.

FLORALES *ludi*, or FLORAL *games*, in *antiquity* were games held in honour of Flora, the goddeſs of flowers.

They were celebrated with ſhameful debaucheries. The moſt licentious diſcourſes were not enough, but the courteſans were called together by the ſound of a trumpet, and made their appearance naked, and entertained the people with indecent ſhews and poſtures: the comedians appeared after the ſame manner on the ſtage. Val. Maximus relates, that Cato being once preſent in the theatre on this occaſion, the people were aſhamed to aſk for ſuch immodeſt repreſentations in his preſence; till Cato, appriſed of the reſervedneſs and reſpect with which he inſpired them, withdrew, that the people might not be diſappointed of their accuſtomed diverſion.

There were divers other ſorts of ſhews exhibited on this occaſion; and, if we may believe Suetonius in Galba, c. vi. and Vopiſcus in Carinus, theſe princes preſented elephants dancing on ropes on theſe occaſions.

The *ludi Florales* according to Pliny, lib. xviii. c. 29. were inſtituted by order of an oracle of the Sibyls, on the 28th of April; not in the year of Rome IↃXVI. as we commonly read it in the ancient editions of that author; nor in IↃXIV. as F. Hardouin has corrected it, but, as Voſſius reads it, in 513. Though they were not regularly held every year, till after 580. They were chiefly held in the night-time, in the Patrician-ſtreet: ſome will have it there was a circus for the purpoſe, on the hill called Hortulorum.

The goddeſs Flora is by ſome held to be the ſame with the Chloris of the Greeks. Others maintain, that this Flora was a famous courteſan at Rome, who, having enriched herſelf by proſtitution, made the people of Rome her heirs, on condition that they ſhould celebrate the anniverſary of her birth-day, by the games and feaſts above mentioned. Some time afterwards, the ſenate, judging ſuch a foundation unworthy the majeſty of the Roman people, to ennoble the ceremony, converted Flora into a goddeſs, whom they ſuppoſed to preſide over flowers; and ſo made it a part of religion to render her propitious, that it might be well with their gardens, vineyards, &c. This is the common account: but Voſſius de Idolol. lib. i. c. 12. can by no means allow the goddeſs Flora to have been the courteſan above mentioned: he will rather have her a Sabine deity, and thinks her worſhip might have commenced under Romulus. His reaſon is, that Varro, in his fourth book of the Latin tongue, ranks Flora among the deities, to whom Tatius, king of the Sabines, offered up vows, before he joined battle with the Romans. Add, that from another paſſage in Varro it appears, that there were prieſts of Flora, with ſacrifices, &c. as early as the times of Romulus and Numa.

FLORAL *games*. There is alſo a kind of *Floral games* obſerved at this day in France; firſt inſtituted in 1324.

The deſign and eſtabliſhment is owing to ſeven perſons of condition, lovers of poetry, who about All-ſaints-day, in 1323, ſent a circular letter to all the Provençal poets, called Troubadours, to meet at Thoulouſe on May-day following, there to rehearſe their poems; promiſing a prize of a violet of gold to the perſon whoſe piece ſhould be judged the beſt.

The capitouls found the deſign ſo good, that it was afterwards reſolved, at a council of the city, to continue it at the city-charge; which is ſtill done in a manner that does honour to the place.

In 1325, a chancellor and ſecretary of the new academy were choſen; and the ſeven inſtitutors took the quality of maintainers thereof. Two other prizes were afterwards added to the violet; *viz.* an eglantine for the ſecond prize, and a panſy for the third. It was alſo decreed, that the perſon who bore away the firſt prize, might demand to be made bachelor: and that whoever bore away all three, ſhould be created doctor in the *gay ſcience*, that is, in poetry.

There is a regiſter of theſe games kept at Thoulouſe, which gives this account of their origin; though others repreſent the matter differently. It was an ancient cuſtom, they ſay, for the poets of Provence to meet yearly at Thoulouſe, to confer together, rehearſe their verſes, and receive a prize allotted to the beſt performance. This held till about the year 1540, when a lady of quality left the beſt part of her fortune to eternize the cuſtom, and bear the expence of prizes; the number of which ſhe increaſed, ordering an eglantine, a panſy, a violet, and a pink: the three firſt, a cubit high; and worth fifteen piſtoles a-piece.

The ceremony begins on May-day, wirh a ſolemn maſs, muſic, &c. The corporation attend; and poems are rehearſed every day: the third day a magnificent treat is given by the magiſtracy, &c. and that day the prizes are adjudged. The three prizes are the rewards of three different kinds of compoſitions; *viz.* a poem, an eclogue, and an ode.

FLORALIA, in *Antiquity*, a general name for the feaſts, games, and other ceremonies, held in honour of the goddeſs Flora.

FLORES *argenti*, in *Natural Hiſtory*, a name given by ſome to the earth called by the generality of authors LAC *lunæ*. It has both theſe names from its being ſuppoſed to partake of the nature of ſilver.

FLORES *martiales*, a name given to a preparation of the nature of what was formerly called ens veneris. Theſe flowers are thus prepared: take of waſhed colcothar, or green vitriol, or of iron filings, one pound; of ſal ammoniac, two pounds; mix them, and ſublime them in a retort, and mixing again the bottom with the flowers, renew the ſublimation till the flowers acquire a beautiful yellow colour. To the reſidue may be added half a pound of freſh ſal ammoniac, and the ſublimation repeated, and the ſame proceſs may be continued as long as the flowers ariſe duly coloured. Pemberton's Lond. Diſp. p. 215.

FLORET, *Floſculus*, in *Botany*, is a little tube expanded at the top uſually into five ſegments, and fitting upon the embryo of a ſingle ſeed: from the inner part of the *floret* ariſe five ſtamina, which, uniting together, form a ſheath; from the embryo of the ſeed ariſes a ſtyle, which paſſes through the ſheath, to which it is connected; and is terminated by a bifid ſtigma, which is generally reflexed. Theſe are hermaphrodite.

Floret, *ſemi*, is tubulous at the baſe, and afterwards expanded in the form of a tongue: theſe generally form the rays of compound flowers, and are female.

FLORID *ſtyle*, is that enriched and heightened with figures and flowers of rhetoric. See Style.

Longinus uſes the terms *florid* and *affected* ſtyle indifferently, and lays them down as quite contrary to the true ſublime.

FLORILEGIUM, Florilege, a name the Latins have given to what the Greeks call *ανθολογιον*, ANTHOLOGY; viz. a collection of choice pieces, containing the fineſt and brighteſt things in their kind.

Florilege is alſo particularly uſed for a kind of breviary, in the Eaſtern church, compiled by Arcadius, for the conveniency of the Greek prieſts and monks, who cannot carry with them, in their travels and pilgrimages, all the volumes wherein their office is diſperſed.

The *florilegium* contains the general rubrics, pſalter, canticles, the horologium, and the office of the feriæ, &c.

FLORIN is ſometimes uſed for a coin, or real money; and ſometimes for an imaginary money, or money of account.

Florin, as a coin, is of diverſe values, according to the diverſe metals, and diverſe countries where it is ſtruck. Pieces under this denomination were anciently very frequent in commerce; at preſent they are leſs common, though there were abundance of them ſtruck in Holland, of Engliſh ſilver, during the war, which was terminated by the treaty of Ryſwick. In all appearance they took their name from the place where they were firſt ſtruck, viz. the city of Florence. Their æra is about the year 1251; though others aſcribe the name to a fleur-de-lis, which was ſtruck on one ſide.

Villani obſerves, that there were gold *florins* in the year 1067, from which time the names FRANK or *florin* became applied to the gold coins, which till that time had been called *ſolidi*, *ſhillings*. See Coin.

Florin, as a *money of account*, is uſed by the Italian, Dutch, and German merchants and bankers, in keeping their books, and making up their accounts. But this *florin* is very diverſe, and admits of different diviſions. See Coin.

Florin, or Florence, was alſo a gold coin, ſtruck in England in the eighteenth year of Edward III. of the value of ſix ſhillings.

Camden ſays, it was ſo called, becauſe made by Florentines. Fabian obſerves, the *florins* were not of ſo fine gold as the nobles and half-nobles of that prince.

But what is moſt obſervable is, that Fabian calls the *florin* a penny, value 6*s.* 8*d.* the half *florin*, an halfpenny, value 3*s.* 4*d.* the quarter *florin*, a farthing, value 1*s.* 8*d.* Theſe words we often meet with in old hiſtories and accounts, applied to ſeveral coins, as royals, angels, &c. where we are therefore only to underſtand by *penny* or *denarius* the whole, by *obolus* the half, and by *quadrans* the fourth part, or farthing.

By indenture of the mint, in 18 Edw. III. every pound weight of old ſtandard gold was to be coined into fifty *florences*, or *florins*, to be current at ſix ſhillings a-piece; all which made in tale fifteen pounds; or into a proportionable number of half or quarter *florins*.

FLORINIANI, or Floriani, a ſect of heretics, of the ſecond century, denominated from its author Florinus, or Florianus, a prieſt of the Roman church, depoſed along with Blaſtus, for his errors.

Florinus had been a diſciple of St. Polycarp, along with Irenæus. He made God the author of evil; or rather aſſerted, that the things forbidden by God are not evil, but of his own appointing. In which he followed the errors of Valentinus, and joined himſelf with the Carpocratians.

They had alſo other names given them. Philaſtrius ſays, they were the ſame with the *Carpophorians*. He adds, that they were alſo called *ſoldiers*, *milites*, *quia de militaribus fuerunt*. St. Irenæus calls them *Gnoſtics*; St. Epiphanius, *Phibionites*; and Theodoret, *Borborites*, on account of the impurities of their lives. Others call them *Zaccheans*; others *Coddians*, &c. though for what particular reaſons, it is not eaſy to ſay, nor perhaps would it be worth while to inquire.

FLORIST, a perſon curious or ſkilled in flowers; their kinds, names, characters, culture, &c.

It is alſo applied to an author who writes what is called the flora of any particular place, that is, a catalogue of the plants and trees which are found ſpontaneouſly growing there. The Flora Laponica of Linnæus, and Flora Virginia of Gronovius, are works of this kind; and theſe authors, as the authors of thoſe works, are properly called *floriſtæ*.

FLORUS, in *Zoology*, a name by which Aldrovand and ſome other authors have called the bird commonly known with us by the name of the WHINCHAT, a kind of the OENANTHE or fallow-finch.

FLORY, Flowry, Fleury, Florette', Fleur-de-lisse', &c. terms in *Heraldry*, uſed when the outlines of any ordinary are drawn as if trimmed with, or in the form of flowers, as lilies, fleurs-de-lis, &c.

Thus, he bears a croſs *flory*, &c. See *Tab. Heraldry*, *fig.* 26.

FLOS, the *flower* of a plant. It is to be obſerved that the ancients ſometimes called the ſtamina or threads in the center of flowers, the *flos*, and not the petals, which we uſually call ſo. Without underſtanding this, it is not poſſible to underſtand many paſſages in their writings. We find in Aurelian, the roſe called a yellow flower ſtanding in a purple huſk; it is plain by this, that he meant the threads in the middle of that flower, which are of a fine yellow, and are very numerous, by the word flower; and he calls the fine purple petals, which we eſteem the flower, only the huſk of the flower. In this ſenſe, Virgil is explained to mean the common baum by the name amello; he ſays it has a yellow flower, and purple leaves at the bottom, and they ſuppoſe that he meant the ſtamina or threads, which in the baum are yellow, by the name flower; and the calyx or cup of the flower, which is a purple, by this expreſſion of leaves at the bottom. The ancients in general do not ſeem determined as to what they would have underſtood by the word *flos*. In the narciſſus, Pliny calls the cup that yellow part which occupies the center, and the whitiſh leaves that ſurround it, the flower. Pliny has been cenſured for calling this part of the flower the cup; but he does not by this mean to confound it with the green leaves in the generality of plants which ſurround the flower; he only calls it thus in reſemblance to the cups out of which they drank in their feſtivals.

Flos *æris*. See Æs.

Flos *ambarvalis*, in *Botany*, a name given by ſome to the polygala or MILKWORT.

Flos *argenti*. See Flores *argenti*.

Flos *Aſiæ*, in *Natural Hiſtory*, a name given by Swenkfield, and ſome other writers, to that ſalt which is found on the ſurface of the earth in ſome part of Aſia in form of an effloreſcence, and is called the *Smyrna ſoap earth*.

This ſalt is evidently the ſame with the nitre of the ancients. It will ferment with any acid, in the manner of our pot-aſh, or other fixed ſalts, made by fire; and with oil or any fatty ſubſtance, boils into a ſoap. Euelius gives us a great many different places for its production, from which he diſtinguiſhes it into ſeveral kinds; all theſe lie in the eaſtern parts of the world; but to theſe Wormius adds, that it is found in New Spain. It is always eaſy to be known, however, in whatſoever place it is found, being a native alcali ſalt, perforated like a ſponge, and of a lixivial taſte. Its principles ſeem to be a marine and an urinous ſalt.

That it contains a marine ſalt ſeems manifeſt from this, that it has the ſame taſte in ſolution, or nearly ſo, with marine ſalt; that the particles of it when coagulating in the evaporated water in which they were diſſolved, firſt riſe to the top or ſurface, as thoſe of common ſalt do, and that it is always of a ſpongy texture, or full of holes, which is always the caſe with thoſe things in which the common ſalt makes a part, its natural concretions being hollow pyramids. Its containing an urinous ſalt is plain, from its producing with ſalt of tartar the ſame ſort of ſpirit that ſal ammoniac does, when mixed with that fixed ſalt.

Flos *cæli*, the *flower of the heavens*, a name given by the alchemiſts to the NOSTOCH, which often appearing after rain, was ſuppoſed to fall from heaven. See Flos *terræ*.

Flos *martialis*. See Flores *martiales*.

Flos *ſalis*. The flower of ſalt flows down with the Nile, and is alſo found on the ſurface of ſome lakes. It is to be choſen of the colour of ſaffron, ſomewhat of a rank ſmell like garum, of a biting taſte, and of a fattiſh ſubſtance. What is coloured with minium, or is grumous, is to be rejected: beſide, what is pure and genuine is not to be diſſolved but in oil; whereas what is adulterated is partly diſſoluble in water.

It is effectual againſt malignant and phagedenic ulcers; nomæ in the pudenda, and purulences in the ears; it alſo cures dimneſs of ſight, and removes ſpecks and albugos from the eyes. It is mixed with plaſters and ointments, as alſo with oil of roſes, for the ſake of the colour it communicates to them. Taken inwardly, in wine or water, it provokes ſweat, diſturbs the belly, and incommodes the ſtomach. It is alſo an ingredient in acopa and ſmegmata, for extenuating the hair. In general it is of an acrimonious and pyrotic quality, as are all ſalts themſelves. Dioſcor. lib. v. cap. 129.

Flos *terræ*, *flower of the earth*, a name given by ſome of the chemical authors to the NOSTOCH, a remarkable plant, which reſembles the common green oyſter-weed, but that it is thicker and more like a jelly. It ſuddenly appears on gravel walks and gardens, after rain; and the alchemiſts, who knew not what to think of its origin, ſuppoſed it to contain an univerſal ſpirit, capable of turning metals into gold. It is a very ſingular plant, being no way fixed to the ground, nor having any roots, but imbibing its nutritious juices from the humidity of the air, as the ſea-plants do theirs from the ſea-water.

FLOS *tinctorius*, in *Botany*, a name given by Fuchſius, and many others, to the geniſtella tinctoria, or DYER'*s weed*, called alſo lutea herba, and lutum by the Latins, and alcomenium, cymene, and thapſos, by the Greeks.

FLOSCULOUS, in *Botany*, a term uſed by Mr. Tournefort, and others, to expreſs ſuch flowers of plants as are compoſed each of a great number of other ſmaller flowers placed cloſe to one another, and encloſed in the ſame common cup; each of theſe ſmaller flowers conſiſts of one petal, which is ſlender and hollow, and wider than the bottom, and uſually divided into many ſegments, which ſometimes are diſpoſed in the form of a ſtar. Each of theſe flowers ſtands upon an embryo, or young fruit, from which there grows a capillament, which reaches beyond the flowers. Theſe embryos are lodged in the bottom of the cup, which is called by authors the thalamus of the flower, and finally become ſeeds winged with down, or ſometimes without that, and ſometimes are armed with prickles. Of this ſort are the flowers of thiſtles, knapweed, &c. See *Tab.* IX. *of Botany, Claſs* 12.

FLOTA, or FLOTTA, *fleet*; a name the Spaniards give particularly to the ſhips which they ſend annually from Cadiz, to the port of Vera Cruz, to fetch thence the merchandizes gathered in Mexico for Spain. It conſiſts of the captains, admiral, and patach, or pinnace, which go on the king's account; and about ſixteen ſhips, from four hundred to a thouſand tons, belonging to particular perſons. They ſet out from Cadiz about the month of Auguſt, and are eighteen or twenty months before they return.

Thoſe ſent to fetch the commodities prepared in Peru, are called galleons.

The name *flotilla* is given to a number of ſhips, which get before the reſt in their return, and give information of the departure and cargo of the *flota* and galleons.

FLOTAGES, all ſuch things as are floating on the top of the ſea, or great rivers, a word chiefly uſed in the commiſſions of water-bailiffs.

FLOTSON, FLOTZAM, or FLOATSAM, a term ſignifying any goods loſt by ſhipwreck, and ſwimming on the top of the water; which, with *jetſon* and *lagon*, and *ſhares*, are given the lord high admiral, by his letters patent.

Jetſon is what is caſt out of the ſhip, being in danger of a wreck, and beaten to the ſhore by the water; or caſt on ſhore by the ſeamen. *Lagon*, or *lagan*, is that which lies in the bottom of the ſea. *Shares* are goods due to ſeveral perſons by proportion.

FLOUNDER, in *Ichthyology*, the Engliſh name of the fiſh called by the generality of authors paſſer fluviatilis, and fleſus. According to the new ſyſtem of Artedi, this is a ſpecies of the PLEURONECTES.

It is diſtinguiſhed from other fiſh of that genus by a row of ſharp ſmall ſpines, that ſurround its upper ſides, and are placed juſt at the junction of the fins with the body; another row marks the ſide-line, and runs half-way down the back. The colour of the upper part of the body is a pale brown, ſometimes marked with a few obſcure ſpots of dirty yellow; the belly is white. The *flounder* inhabits every part of the Britiſh ſea, and even frequents our rivers at a great diſtance from the ſalt-waters. It never grows large in our rivers, but is reckoned ſweeter than thoſe that live in the ſea. See FISHING.

FLOUR, the meal of any grain, but more particularly of wheat; ground and ſifted for the purpoſes of food.

The grain itſelf is not only ſubject to be eaten by inſects in that ſtate, but when ground into *flour*, it gives birth to another race of deſtroyers, who eat it unmercifully, and increaſe ſo faſt in it, that it is not long before they wholly deſtroy the ſubſtance. The fineſt *flour* is moſt liable to breed them, eſpecially when ſtale or ill prepared; in this caſe, if it be examined in a good light, it will be perceived to be in a continual motion; and on a nicer inſpection, there will be found in it a great number of little animals of the colour of the *flour*, and very nimble. If a little of this *flour* be laid on the plate of the double microſcope, the inſects are very diſtinctly ſeen in great numbers, very briſk and lively, continually crawling over one another's backs, and playing a thouſand antic tricks together; whether for diverſion or ſearch of food, it is not to be eaſily determined. Theſe animals are of an oblong ſlender form, their heads are furniſhed with a kind of trunk, or oblong hollow tube, by means of which they take in their food, and their body is compoſed of ſeveral rings. They do vaſt miſchief among the magazines of *flour* laid up for armies and other public uſes; when they have once taken poſſeſſion of a parcel of this valuable commodity, it is impoſſible to drive them out; and they increaſe ſo faſt, that the only method of preventing the total loſs of the parcel, is to make it up into bread as ſoon as can be. The way to prevent their breeding in the *flour* is to preſerve it from damp; nothing gets more injury by being put up damp than *flour*, and yet nothing is ſo often put up ſo. It ſhould be always carefully and thoroughly dried before it is put up, and the barrels alſo dried into which it is to be put; then if they are kept in a room tolerably warm and dry, they will preſerve it well. Too dry a place never does any hurt, though one too moiſt always ſpoils it. See MEAL.

FLOWER, in *Botany*. Though no part of plants are more known than their *flowers*, yet the diſtinction given by different authors of the word are extremely various, and are very neceſſary to be explained, in order to the underſtanding of their works. See FLOS.

Jungius defines it to be the moſt tender part of a plant, remarkable for its colour or form, or for both, and cohering with the fruit. But this author acknowleges, that there are ſeveral plants, whoſe *flowers* are produced remote from the fruit, and therefore not comprehended in his definition. Mr. Ray ſays, in very vague terms, that the *flowers* cohere for the moſt part with the rudiments of the fruit. Tournefort defines it to be a part of a plant very often remarkable for its peculiar colours, for the moſt part adhering to the young fruit, to which it ſeems to afford the firſt nouriſhment, in order to explicate its moſt tender parts. But this is a more indeterminate definition than the former, from its looſe mode of expreſſion. Pontedera defines it to be a part of a plant, unlike the reſt in form and nature. If the *flower* has a tube, it adheres to, or is fixed very near to the embryo, to the uſe of which it is ſubſervient; but if the *flower* has no tube, then its baſe does not adhere to the embryo. This is ſcarce intelligible, except to the expert botaniſt, and may be made to comprehend ſome parts of plants by no means to be underſtood by the name *flower*. Juſſieu defines it to be compoſed of chives, and a piſtillum, and to be of uſe in the generation of the plant; but this is too imperfect, as there are many plants in which the piſtillum is found at a great diſtance from the chives, and many *flowers* which have no piſtillum, and many others which have no chives. Vaillant ſays, that *flowers* are the organs which conſtitute the different ſexes of plants, which are ſometimes found without any covering; and the petals, which moſt of them have, are no way eſſential to their uſe, but are merely intended as covers for them; but yet as theſe coats or coverings are the moſt conſpicuous and moſt beautiful parts of the *flower*, theſe are to be called *flowers*, whatever be their form, ſtructure, or colour; and whether they contain the organs of both ſexes in each individual, or only one, or even ſome part depending on one of them, provided they are not of the ſame figure with the leaves of the plant.

The ſhorteſt and moſt expreſs definition, however, ſeems to be Martyn's; which is, that *flowers* are the organs of generation of both ſexes, adhering to a common placenta, together with their common covering; or of either ſex ſeparately with its proper coverings, if it have any.

The parts of *flowers* are, 1. The ovary, which is the rudiment of the fruit, and is therefore properly the female organ of generation. 2. The ſtyle, which is a body accompanying the ovary, either ariſing from the top of it, or ſtanding as an axis in the middle, with the embryos of the ſeeds round it. 3. The ſummits, called alſo apices and antheræ, which are thoſe bodies that contain the prolific powder, analogous to the male ſperm in animals, and generally hung upon ſlender threads, which are called the chives. 4. The petals, commonly called the *flower* leaves, which are thoſe tender fine coloured leaves which are generally the moſt conſpicuous part of a *flower*. 5. The empalement or calyx, which is formed of thoſe tender leaves which cover the outer parts of the *flower*. Theſe *flowers*, according to the number of their leaves or petals, are called monopetalous, or one-leaved; dipetalous, or two-leaved, and ſo on.

The ſtructure of the different *flowers* is very various; but Dr. Grew has obſerved, that the far greater number of them have the empalement, the foliation, and the attire of chives, &c. Mr. Ray accounts that every perfect *flower* has the petals, ſtamina or chives, apices or ſummits, and the ſtyle or piſtil; and ſuch as want any of theſe parts he calls imperfect *flowers*. The greater number

ber of plants have a *flower* cup, which is of a firmer ſtructure than their leaves, and ſerves for their ſupport.

Flowers are diſtinguiſhed into three kinds, the male, the female, and the hermaphrodite. The male *flowers* are thoſe which have the ſtamina, but bear no fruit; the female are ſuch as contain the piſtillum; this piſtil is ſucceeded by the fruit, and theſe are therefore called the fruitful or knitting *flowers*; and the hermaphrodite are ſuch as have in them the organs of both ſexes in each individual, and of this ſort are the generality of *flowers*, particularly the lily, tulip, daffodil, roſemary, ſage, &c. See Fructification.

The ſtructure of parts is much the ſame in thoſe where the ſexes are divided: the difference between them conſiſts in this, that the ſtamina and apices, i. e. the male parts, in theſe, are ſeparated from the piſtils; being ſometimes on the ſame ſtalk, and ſometimes on different ones.

Among the plants which bear both male and female parts on the ſame plant, but at a diſtance from each other, are reckoned the cucumber, melon, gourd, Turky-wheat, turnſol, walnut, oak, beech, fir, alder, cypreſs, cedar, juniper, mulberry, plantain, &c.

Thoſe in which the male and female parts of the *flowers* are borne on different plants, the willow, poplar, hemp, mercury, ſpinage, nettles, and hops. Miller.

Mr. Ray divides *flowers* into *perfect* and *imperfect*.

Flowers, *perfect*, he accounts all ſuch as have the petala, though they ſhould want the ſtamina; but this is a very erroneous opinion. Theſe he ſubdivides into *ſimple*, which are thoſe not compoſed of other ſmaller ones, and which uſually have but one ſingle ſtyle; and *compounded*, which conſiſt of many floſculi, all making but one *flower*.

Flowers, *ſimple*, are either *monopetalous*, which have the body of the *flower* all of one entire leaf, though ſometimes cut, or divided, a little way, into many ſeeming petala, or leaves; as the borrage, bugloſs, &c. or,

Flowers, *polypetalous*, thoſe which have diſtinct petala, and thoſe falling off ſingly, and not altogether, as the ſeeming petala of the monopetalous *flowers* always do.

Both theſe are farther divided into *uniform* and *difform flowers*.

The former have their right and left-hand parts, and the forward and backward parts all alike; but the difform have no ſuch regularity: ſuch are the *flowers* of ſage, dead-nettle, &c.

Flowers, *monopetalous difform*, are likewiſe farther divided into

Flowers, *ſemifiſtular*, thoſe whoſe upper part reſembles a pipe, cut off obliquely; as in the *ariſtolochia*.

Flowers, *labiate*, thoſe either with one lip only, as in the *acanthium* and *ſcordium*; or with two lips, as in the far greater part of the labiate *flowers*.

In theſe the upper lip is ſometimes turned upwards, and ſo turns the convex part downwards, as in the chamæciſſus, &c. but moſt uſually the upper lip is convex above, and turns the hollow part down to its fellow below, and ſo repreſents a kind of helmet, or monk's hood; whence theſe are frequently called *galeate*, *cucullate*, and *galericulate flowers*.

Such are the *flowers* of the *lamium*, and moſt of the verticillate plants.

Sometimes alſo the *labium* is entire, and ſometimes jagged or divided.

Flowers, *corniculate*. Theſe are ſuch hollow *flowers* as have on their hinder part a kind of ſpur, or little horn; as in the *linaria*, *delphinum*, &c. and the *corniculum*, or *calcar*, is always impervious at the tip or point.

Flowers, *compound*, called alſo *compoſite*, and *aggregate flowers*, are ſuch as conſiſt of many little *flowers*, concurring to make up one whole one; each of which has its ſtyle, ſtamina, and adhering ſeed, but all are contained within one and the ſame calyx, or perianthium.

This *compound flower* diſtinguiſhes a large genus of plants, which Mr. Ray divides thus. Herbs having *compounded* or *aggregated flowers*, are,

1. Such as have a *plain-leaved flower* naturally, and for the moſt part full; and having their whole body milky (yielding a milky juice on cutting them); and theſe have their ſeeds,

Firſtly, pappous, or winged; that is, having a little lanugo adhering to each ſeed, by which the wind can eaſily carry it from place to place: ſuch are the *lactuca*, *tragopogon*, *ſcorzonera*, *dens leonis*, *hieracium*, and the *piloſella*.

Secondly, ſuch as have a ſolid ſeed, without any pappus or down upon them; as the *eryngium luteum*, *cichorium*, *lampſana*.

2. Such as have a *diſcous flower*; i. e. one compoſed of many ſhort, thick, compaſſed *floſculi* (which ſome, by miſtake, call *ſtamina*) ſet together, ſo as to make one flat, or hollowiſh ſuperficies; and theſe are alſo either ſuch as have their ſeeds,

Firſtly, pappous, as the *tuſſilago*, *petaſites*, *carlina*, *helenium*, *doronicum*, *conyza*, *aſter*, *virga aurea*, *jacobæa*, *ſtæchas citrina*, *jacea*, *ſenecio*, *eupatorium Avicennæ*, *cacalia vulgaris*, *gnaphalium maritimum*, and *monſpelienſe*.

Secondly, ſuch whoſe ſeeds are ſolid, and not pappous; as the corymbiferous herbs.

Their diſk is ſometimes radiated, when there is a row of petala ſtanding round in the diſk, like the points of a ſtar; as in the *matricaria*, *chamæmelum*, &c.

And ſometimes naked, having no ſuch radiating leaves round the limb of its diſk; as in the *tanacetum*.

They are likewiſe diſtinguiſhed into *planifolious*, and *fiſtular*.

Flowers, *planifolious*, are thoſe which are compoſed of plain *flowers*, ſet together in circular rows, round the center, and whoſe face is uſually indented, notched, uneven, and jagged; as the *hierachia*, *ſonchi*, &c.

Flowers, *fiſtular*, are thoſe which are compounded of many long, hollow, little *flowers*, like pipes, all divided into large jags at the ends.

Flowers, *imperfect*, are ſuch as want the petala, and are called likewiſe *ſtamineous*, *apetalous*, and *capillaceous flowers*.

Thoſe which hang pendulous by fine threads, like the iuli, are by Tournefort called *amentaceous*; we call them *cats-tails*. Theſe are Mr. Ray's principal diſtinctions of *flowers*; but other botaniſts furniſh other diviſions and denominations of them; and Mr. Tournefort, in particular, has formed the various claſſes of plants according to the diſpoſition and ſtructure of the *flower*. See *Tab.* VIII. IX. and X. of *Botany*. See Botany, and Fructification.

Flowers, *amentaceous*. See Amentaceous, and *Tab.* X. *of Botany*, *Claſs* 19.

Flowers, *anomalous* or *irregular*, are either monopetalous or polypetalous. The irregular monopetalous *flower* is that in which the petal is divided into unequal ſegments. Theſe are called by Linnæus ringent *flowers*. An irregular polypetalous *flower* is that in which the petals do not agree in figure and poſition. See *Tab.* VIII. *Claſs* 3. and *Tab.* IX. *Claſs* 11.

Flowers, *apetalous*. See Apetalous, and *Tab.* X. *Claſs* 15 and 18.

Flowers, *campaniform*, are compoſed of one leaf, and formed into the ſhape of a bell, but with ſome differences in the figure, which conſtitute four ſubordinate ſpecies. 1. The *bell-flower*, ſimply ſo called, which approaches to no other figure but that expreſſed by the name. 2. The tubular narrow kind, which is always conſiderably long. 3. The expanded kind, which opens very wide at the extremity, and repreſents in ſome degree a diſh or baſon. And, 4. The globular *bell-flower*, the mouth of which is narrower and ſmaller than the belly. Tourn. Inſt. p. 76. See *Tab.* VIII. *Claſs* 1.

Flowers, *caryophylleous*. See Caryophylleous, and *Tab.* IX. *Claſs* 8.

Flowers, *cruciform*, or thoſe conſiſting of four petala, or leaves, diſpoſed in form of a croſs.

Some of theſe *flowers* have a cup, others have not: thoſe which have cups, uſually have them compoſed of four leaves, and placed in the ſame order and direction with thoſe of the *flower*. Of this claſs of plants are the cabbage, rocket, wall-*flower*, &c. Tourn. Inſt. p. 210. See *Tab.* VIII. *of Botany*, *Claſs* 5.

Flowers, *cucurbitaceous*. See Cucurbitaceous.

Flower, *diſcous*. See Discous.

Flowers, *floſculous*. See Flosculous, and *Tab.* IX. *Claſs* 12.

Flowers, *headed*, are thoſe that are compoſed of florets and ſemiflorets, collected into a roundiſh head, and incloſed in one common ſcaly empalement.

Flowers, *infundibuliform*, are ſuch as reſemble the figure of a funnel, i. e. are broad and ample at top, and contracted into a neck at bottom: ſuch is that of the bear's ear, or auricula. See *Tab.* VIII. *of Botany*, *Claſs* 2.

Flowers, *labiated*. See Labiated *flowers*, and *Tab.* VIII. *of Botany*, *Claſs* 4.

Flowers, *leguminous*, are thoſe of leguminous plants. Theſe bear ſome reſemblance to a flying butterfly; for which reaſon they are alſo called *papilionaceous flowers*.

Flowers, *liliaceous*. See Liliaceous, and *Tab.* IX. *of Botany*, *Claſs* 9.

Flowers, *luxuriant*, are *flowers* ſo called, when ſome of the parts of fructification are augmented in number, and others thereby excluded; and theſe are again ſubdivided into *multiplicate flowers*, when by the increaſe of the corolla only a part of the ſtamina is excluded; *full flowers*, when the corolla is ſo far multiplied as to exclude all the ſtamina; and *proliferous flowers*, when one grows out of another; and this happens two ways; either from the center, when the piſtil ſhoots up into another *flower*, ſtanding on a ſingle peduncle; and from the ſide, when many pedunculate *flowers* are produced out of one common calyx.

Flowers, *monopetalous.* See Monopetalous, and *Tab.* VIII. *of Botany, Claſs* 1, 2, 3, and 4. and *Tab.* X. *Claſs* 20.

Flowers, *mutilate*, are the reverſe of the *luxuriant*. Linnæus confines the term to thoſe *flowers* that want the corolla, though they ought to be furniſhed with it; and this defect he aſcribes chiefly to the want of ſufficient heat.

Flowers, *papilionaceous*, reſemble a butterfly with its wings elevated, and conſiſt of four parts, whereof the uppermoſt is called *vexillum*, or ſtandard; and the loweſt *carina*, as reſembling the bottom or keel of a boat: thoſe between the two are called *lateral* leaves, or *alæ*.

From the bottom of the calyx ariſes a piſtil, which is encompaſſed with a ſheath, or cover, fringed with ſtamina. This piſtil always becomes the fruit, and is uſually called the *pod*; in Latin, *ſiliqua*. See *Tab.* IX. *Claſs* 10. and *Tab.* X. *Claſs* 22.

Flowers, *radiated.* See Radiated, and *Tab.* X. *Claſs* 14.

Flowers, *roſaceous.* See Rosaceous, and *Tab.* IX. *Claſs* 6. and *Tab.* X. *Claſs* 21.

Flowers, *ſemifloſculous.* See Semiflosculous, and *Tab.* IX. *Claſs* 13.

Flowers, *ſtamineous*, are ſuch as have no petala, but conſiſt wholly of ſtamina or threads, with apices at top. See Stamineous, and *Tab.* X. *Claſs* 15.

Flowers, *verticillate*, or *whorled*, are thoſe ranged, as it were, in ſtories, rings, or rays, along the ſtalks, at the baſe of the leaves: ſuch are thoſe of horehound, clary, &c.

Flowers, *umbelliform*, are thoſe with ſeveral leaves diſpoſed in manner of a roſe; and whoſe calyx eſſentially becomes a fruit of two ſeeds, joined, before they come to maturity; but afterwards eaſily ſeparated again.

They have this denomination, becauſe they are generally ſuſtained by a number of pedicles, which, proceeding from the ſame center, are branched all around, like the ſticks of an umbrella. See *Tab.* IX. *Claſs* 7.

Of this kind are the *flowers* of fennel, angelica, &c.

Flowers, *colours of.* It is generally agreed among the chemiſts, that all colours ariſe from ſulphurs, and that they differ according to the different admixtures of ſalts with theſe ſulphurs. Perhaps on theſe principles, it may be poſſible to form ſome rational conjectures in regard to the origin of colours in the *flowers* of plants. We know very well that the *flowers* of all plants abound in an eſſential oil or ſulphur, to which, according to this doctrine, their colours may be rationally ſuppoſed to be owing; and though this oil ſhould be proved to be the very ſame ſubſtance in all, yet their variety of colours may be accounted for from it, ſince we find that one and the ſame oil, the eſſential oil of thyme, according to Mr. Geoffroy's experiments, may be turned to all the colours that we find in the different *flowers* of plants, from white to deep black, with all the ſhades of red, yellow, purple, blue, and green, by mixing it with different ſubſtances; and by the ſame laws, the eſſential oil of plants, while contained in their *flowers*, may by the different mixtures they meet with, give them all their beautiful variety of colours. See *Eſſential* Oils.

We know that the infuſions of *flowers*, and of other parts of plants, become red on being mixed with acids, and green on being mixed with alkalies; and there is no reaſon to doubt, but that it is the ſulphureous part of the vegetable in theſe infuſions which thus changes colours on theſe mixtures. This, however, ought to be proved poſſible, before it is allowed in argument.

This proof is given in the change of colours before mentioned, which are produced in oils merely by the admixture of different ſalts; and as all the colours in theſe are the regular reſult of certain combinations, there is great reaſon to believe, that in thoſe plants whoſe *flowers* give the ſame colours, there may be the ſame combinations. The principal colours of plants, and their ſeveral parts, are green, yellow, red, purple, blue, white, black, and tranſparent whitiſhneſs; all the others are produced by different combinations of theſe. The green, which is the common colour of the leaves of plants, is probably the effect of an oil rarefied in that part of the plant, and there mixed with the fixed and volatile ſalts of the ſap, which remain entangled by the earthy particles after moſt of the aqueous humidity is evaporated, and by that means become in a ſtate to act upon the oil. A clear proof of this is, that if the leaves are covered up in ſuch a manner, that the aqueous humidity of the ſap cannot evaporate itſelf, the oil and ſalts cannot act upon one another as they naturally would, but becoming diffuſed among ſo great a quantity of water, loſe the colour they would otherwiſe have obtained together, and become whitiſh or tranſparent. This is ſeen in the obvious inſtance of ſuccory and celery, the leaves of both which plants, though naturally green, become white by being covered up with earth by the gardener.

The leaves both of plants and trees uſually turn red in autumn, or on the attack of the firſt froſts; the reaſon of which is, that the ſeveral canals of the ſap being conſtringed by the cold, the juices are detained in the veſſels of the leaves, or at leaſt its circulation is greatly interrupted; and being detained there, it naturally grows ſour, the acidity of this altered juice deſtroying the green colour produced by the alkaline ſalts. The ſap brings on a red colour, in the very ſame manner that an eſſential oil made green by a mixture of oil of tartar, is again changed to red, by adding to it a proper quantity of diſtilled vinegar. Where we find in our common experiments the acids of the mineral kingdom turning the infuſions of *flowers* red, it ſeems by the analogy of theſe experiments to be only owing to their deſtroying the blue, brown, or other colour, which the alkaline ſalts of the plant had made with its eſſential oil.

All the ſhades and degrees of yellow and ſaffron colour in the *flowers* of plants, ſeem wholly owing to a mixture of an acid in their juices, with their eſſential oil; as the oil of thyme, which itſelf has very little colour, is made to paſs through all theſe ſhades of colours, only by digeſting it with diſtilled vinegar. From the digeſting the volatile alkalies, ſuch as ſpirit of ſal ammoniac and urine, with the ſame oil, it appears that all the ſhades of red, from the paleſt fleſh-colour, to purple, and even to the violet blue, are only owing to the different admixtures of an alkaline volatile ſalt of the urinous kind, mixed in different manners with their eſſential oil.

Black, which is a very uncommon colour in *flowers*, and which in them ought to be regarded only as a very deep violet, ſeems the effect of an addition of an acid juice to their oil, already turned purple or violet colour by a volatile alkali.

All the ſhades of blue and purple ſeem alſo, by the analogy of the ſame experiments, to be only the effects of mixtures of alkalies of the fixed and volatile kind, with the oils of plants; ſince theſe colours are all produced in thoſe experiments, by mixing the ſpirit of ſal ammoniac, and the oil of tartar with oil of thyme.

The bright green of ſome *flowers* ſeems alſo to be produced by the ſame ſalts, only acting on oils more rarefied. For the oil of thyme, of a purple violet colour, diluted with rectified ſpirit of wine, being united with oil of tartar, becomes green. Mem. Acad. Par. 1707.

Boccone is of opinion, that in many plants the colour of the *flower* is wholly owing to the colour of the juices of the root. This he inſtances in the greater celandine, whoſe roots and *flowers* are of the ſame yellow colour. The barberry in like manner, he obſerves, has both its roots and *flowers* yellow. The dentillaria has its roots and *flowers* both of a pale red, and the acacia indica Aldini, and many other plants, he ſays, are inſtances of this. The reaſon that he aſſigns for this is, that the more fixed parts wherein this colour conſiſts, preſerve the ſame tincture, without being at all altered by ſo long a circulation as that from the root to the *flower*; and he adds another very remarkable obſervation, which is, that in all theſe plants and trees, whoſe roots and *flowers* are of the ſame colour, the juices are more fixed; and therefore, that theſe are more fit for dying than any other coloured woods or plants. Vide Boccone, Muſ. de Plant.

Dr. Lewis, in his notes on Neumann's Chemiſtry, has many curious obſervations on the colours of *flowers*. There are few of them which are durable in themſelves, or that can be made durable by art. The only permanent colour is yellow. The red, the blue, and the intermediate ſhades of purple, crimſon, violet, &c. are very periſhable. Many *flowers* loſe their colours on being dried, and eſpecially if they are dried in a ſhady and not warm place. The colours of all of them periſh by keeping even in the cloſeſt veſſels; the more haſtily they are dried, and the more perfectly they are ſecured from air, ſo much the longer do they retain their beauty. The colouring matter of *flowers* extracted and applied to other bodies is ſtill more periſhable.

The colour of many blue *flowers* is extracted by infuſion in water; but from others, water acquires only a purpliſh hue. Of thoſe which have been tried, not one gives a blue colour to ſpirit of wine; ſome give no colour, and ſome give a reddiſh colour. The expreſſed juice of theſe *flowers* is generally blue. The blue juices and infuſions are rendered red by all acids; and the moſt florid red is given to them by marine acid. The *flowers* alſo, by maceration, impart a red colour to acid liquors. Alkalies fixed and volatile, and lime-water, change theſe blue colours to green. And thoſe infuſions or juices which have nothing of the colour of the *flower*, ſuffer the ſame changes from the addition of acid and alkaline liquors. Even when the *flowers* have been kept till their colours are loſt, their infuſions acquire a red colour from acids, and a green colour from alkalies, but in a leſs degree than when the *flowers* were freſh. The red colour produced by acids is ſcarcely more durable than the original blue; applied upon other bodies, and expoſed to air, it gradually degenerates into a faint purple, and at laſt diſappears, without leaving a ſtain behind. The green produced by alkalies changes to a yellow, which does not fade ſo ſoon. The green made by lime-water is more permanent and beautiful. Green lakes, prepared from blue *flowers* by means of lime-water, have been uſed by painters. The *flowers* of *cyanus* have been much commended for affording elegant and blue pigments. But Dr. Lewis has not been able to extract from them any blue colour. They retain their colour, when haſtily dried, longer than other blue *flowers*, but do not communicate their original colour to any menſtruum.

Red *flowers* readily communicate their colour to water; and thoſe of a full red colour give to a rectified ſpirit alſo a deep red tincture, brighter, though ſomewhat paler, than the watery infuſion. But the lighter red *flowers*, and thoſe which are purpliſh, impart little colour to pure ſpirit. The colours of infuſions of theſe *flowers* are ſuppoſed to be heightened by acids, and to be rendered green by alkalies. But this is not univerſal. For amongſt thoſe examined by Dr. Lewis, the roſe colours and purpliſh red were changed by acids nearly as blue *flowers* are; but the full deep reds were not. The deep infuſion of red poppies was turned by alkalies not to a green, but to a duſky purple.

Yellow *flowers* communicate to water and to ſpirit of wine durable yellow colours, not alterable but in degree by acids or by alkalies; the former only rendering them paler; and the latter, as alſo alum, rendering them deeper. Wool, or ſilk, impregnated with a ſolution of alum and of tartar, receives, on being boiled with the watery infuſion or decoction, a durable yellow dye. A durable yellow lake is prepared by precipitating with alum an infuſion of yellow *flowers* made in an alkaline ley. In ſome of the orange-coloured *flowers* the yellow matter ſeems to be of the ſame kind as that of the pure yellow *flowers*; but the red matter ſeems to be different from that of the pure red *flowers*. The yellow matter is extracted from theſe *flowers* by water; and the remaining red matter is extracted by ſpirit of wine, or by a weak ſolution of fixed alkali in water. Such are the ſaffron-coloured *flowers* of *carthamus*. Theſe *flowers*, after the yellow matter has been extracted by water, are ſaid to give a red tincture to ley, from which a deep red fecula ſubſides, called *ſafflower*, *Spaniſh red*, and *China-lake*. This pigment gives a beautiful red colour to ſpirit of wine, but none to water. The yellow farina or fine duſt, reſting on the tips of the ſtamina of *flowers*, gives a fine bright yellow colour to ſpirit of wine, and a duller yellow colour to water. The colours of both the watery and ſpirituous tinctures were heightened by alkalies, rendered red by acids, and again reſtored to a yellow by adding an alkali. This is the only known inſtance of the yellow colour of a vegetable being rendered red by acids.

White *flowers*, or their expreſſed juices, impart a green colour to alkaline leys, but have not been obſerved by Dr. Lewis to give a red colour to acids. The white *flowers* of the common wild *convolvulus* give a deep yellow or orange colour to water, which is affected by acids, by alkalies, and by alum, as the infuſions of yellow *flowers* are. The white *flowers* of *xeranthemum* give a beautiful yellow colour to water acidulated with ſpirit of nitre. See Neumann's Chem. by Dr. Lewis, p. 430. 432.

Flowers, in *Gardening*, are diſtinguiſhed into *early*, or *ſpring-flowers*, which flouriſh in the months of March, April, and May. Of this claſs are the anemonies, daffodils, hyacinths, tulips, jonquils, cowſlips, primroſes, &c. Summer *flowers*, which open in June, July, and Auguſt; as pinks, gilly-flowers, lilies, daiſies, campanulas, poppies, ſun-flowers, &c. Autumnal, or late *flowers*, denote thoſe of September and October; as the oculus Chriſti, Indian pinks and roſes, panſy, flower-gentle, &c. Of theſe *flowers*, thoſe which ſubſiſt all the year, we mean in the ſtem, or root at leaſt, are called *perennials*. And thoſe which are to be planted or ſowed afreſh every year, according to the ſeaſon, are called *annual*.

Flowers, *preſervation of*. The method of preſerving *flowers* in their beauty through the whole year has been diligently ſought after by many people; ſome have attempted it, by gathering them when dry, and not too much opened, and burying them in dry ſand; but this, though it preſerves their figure well, yet takes off from the livelineſs of their colour.

The primroſe and cow-ſlip kind are very eminent inſtances of the change of colours in the *flowers* of dried ſpecimens; for thoſe of this claſs of plants eaſily dry in their natural ſhape, but they not only loſe their yellow, which might be expected naturally enough, but they acquire a fine deep green, much ſuperior to that of the leaves in their moſt perfect ſtate. The *flowers* of all the violet kind loſe their noble blue, and become of a dead white, ſo that in dried ſpecimens there is no difference between the blue flowered violet and the white flowered kinds.

Muntingius gives a method, which he ſays is preferable to all others; this is as follows: gather roſes or other *flowers* when they are not yet thoroughly open, in the middle of a dry day; put them into a good earthen veſſel glazed within; fill the veſſel up to the top with them; and when full, ſprinkle them over with ſome good French wine, with a little ſalt in it; then ſet them by in a cellar, tying the mouth of the pot carefully down. After this, they may be taken out at pleaſure, and on ſetting them in the ſun, or within the reach of the fire, they will open as if on the tree, and not only the colour, but the ſmell will be preſerved.

Sir Robert Southwell has communicated to the world a method of drying plants, by which all *flowers* are preſerved in their natural ſhape, and many in their proper colours. To this purpoſe two plates of iron are to be prepared of the ſize of a large half ſheet of paper, or larger, for particular occaſions; theſe plates muſt be made ſo thick as not to have any power of bending, and there muſt be a hole made near every corner for the receiving a ſcrew to faſten them cloſe together.

When theſe plates are prepared, lay in readineſs ſeveral ſheets of paper, and then gather the plants with their *flowers*, when they are quite perfect; let this always be done in the middle of a dry day, and then lay the plant and its *flower* on one of the ſheets of paper doubled in half, ſpreading out all the leaves and petals as nicely as can be. If the ſtalk be thick, it muſt be pared or cut in half, ſo that it may lye flat; and if it be woody, it may be peeled, and only the bark left; when the plant is thus expanded, lay round about it ſome looſe leaves and petals of the *flower*, which may ſerve to complete any part that may prove deficient; when all is thus prepared, lay ſeveral ſheets of paper over the plant, and as many under it; then put the whole into the iron plates, laying the papers ſmoothly on one, and laying the other evenly over them; then ſcrew them cloſe, and put them into an oven after the bread is drawn, and let them lie there two hours; after this make a mixture of equal parts of aqua fortis and common brandy; ſhake theſe well together; and when the *flowers* are taken out of the preſſure of the plates, rub them lightly over with a camel's hair pencil dipped in this liquor; then lay them upon freſh brown paper, and covering them with ſome other ſheets, preſs them between this and other papers with a handkerchief, till the wet of theſe liquors is dried wholly away. When the plant is thus far prepared, take the quantity of a nutmeg of gum dragon, put this into a pint of fair water cold, and let it ſtand four and twenty hours; it will in this time be wholly diſſolved; then dip a fine hair pencil in this liquor, and with it daub over the backſides of the leaves, and lay them carefully down on a half ſheet of white paper fairly expanded, and preſs them with ſome more papers over theſe. When the gum-water is fixed, let the preſſure and papers be removed, and the whole work is finiſhed. The leaves retain their verdure in this caſe, and the *flowers* uſually keep their natural colours. Some care muſt be taken, that the heat of the oven be not too great. When the *flowers* are thick and bulky, ſome art may be uſed to pare off their backs, and diſpoſe the petals in a due order; and after this, if any of them are wanting, their places may be ſupplied with ſome of the ſupernumerary ones dried on purpoſe; and if any one of them be only faded, it will be prudent to take them away, and lay down others in their ſtead; the leaves may be alſo diſpoſed and mended in the ſame manner. Another way of keeping both *flowers* and fruit the whole year without ſpoiling, is delivered by the ſame author in the following manner: take ſalt-petre, one pound; bole-armenic, two pounds; clean common ſand three pounds; mix all well together, then gather fruit of any kind, that is not full ripe, with the ſtalk to each; put theſe in one by one into a wide-mouthed glaſs, laying them in good order; tie over the top with an oil-cloth, and carry the glaſs into a dry cellar, and ſet the whole upon a bed of this prepared matter of four inches thick in a box; fill up the remainder of the box with the ſame preparation, and let it be four inches thick over the top of the glaſs and round all its ſides. *Flowers* are to be preſerved in the ſame ſort of glaſſes in the ſame manner, and they may be taken up after a whole year as plump and as fair as when buried.

Flowers, in *Antiquity*. We find *flowers* in great requeſt at the entertainments of the ancients, being provided by the maſter of the feaſt, and brought in before the ſecond courſe; or, as ſome are of opinion, at the beginning of the entertainment. They not only adorned their heads, necks, and breaſts, with *flowers*, but often beſtrewed the beds whereon they lay, and all parts of the room with them. But the head was chiefly regarded. Potter, Archæol. Græc. tom. ii. p. 383. See GARLAND.

Flowers were likewiſe uſed in the bedecking of tombs. Potter, Archæol. Græc. lib. iv. cap. 7. tom. ii. p. 232, ſeq. See BURIAL.

Flower, in *Architecture*, according to Vitruvius, is a repreſentation of ſome imaginary *flower*, by way of crowning, or finiſhing, on the top of a dome, &c. See *Tab. Architecture*, *fig.* 12.

In lieu of this the moderns commonly uſe a vaſe, ball, or the like.

Flower-de-luce, **Fleur-de-lis**, in *Heraldry*, is a bearing anciently of great dignity; being reputed the nobleſt of all *flowers*, and as ſuch having been in all ages the charge of the royal eſcutcheon of the kings of France; though time has made the bearing thereof more vulgar.

In ſome coats it is borne ſingle; in others triple; in others it is ſemée, ſeeded all over the eſcutcheon.

Flower *of the capital* is an ornament of ſculpture, in form of a roſe, in the middle of the ſweep of the Corinthian abacus.

In that of the Compoſite, it is not a roſe, nor any real, but an imaginary kind of *flower*.

Flowers, in *Chemiſtry*, are the fineſt and moſt ſubtle parts of dry bodies, raiſed by fire, into the veſſel's head, and aludels; and adhering to them, in form of a fine powder, or duſt. Such are the *flowers* of ſulphur, benjamin, &c.

Flowers *of antimony*. See ANTIMONY.

Flowers, *argentine*, of *regulus of antimony*, are made by putting the regulus into an unvarniſhed earthen pot, placed in a furnace, ſo that its bottom may be red-hot, while its upper part ſhall be much colder. The pot is to be covered with a lid, without luting it, and heat is to be applied for an hour or more. When the pot is cold, its internal ſurface, and the remaining part of the regulus, are found covered with white *flowers*, in form of beautiful, tranſparent, and ſhining needles, which are to be gathered with a feather. After this, a ſecond ſublimation may be commenced, and managed in the ſame manner; and the whole regulus may be changed into *flowers*. Theſe *flowers* appear to be nothing elſe than the earth of regulus of antimony deprived of almoſt all its phlogiſton. They are neither emetic nor purgative; they are ſoluble in aqua regia.

Flowers *of arſenic*, *white*, are made, as all other *flowers* are, by ſubliming ARSENIC; from which they do not differ in their nature and properties.

Flowers *of benjamin*, or *benzoin*, are made by putting a quantity of this reſin into a varniſhed earthen pan, and covering it with another inverted pan of ſtone-ware; and let the edges of theſe pans be made to fit well to each other, and be well luted together with paper dipped in paſte. Put the earthen pan containing the benzoin on a gentle fire, and with that the ſublimation is performed; when the veſſels are cool and unluted, the *flowers* are to be ſwept off with a feather. For the properties and medicinal uſes of theſe *flowers*, ſee BENZOIN.

Flowers *of biſmuth*. See BISMUTH.

Flowers *of cobalt*. See COBALT.

Flowers *of copper* have been prepared by ſubliming ſal ammoniacum with the caput mortuum of blue vitriol. See COPPER.

Flowers, *martial*. See FLORES *martiales*.

Flowers *of ſal ammoniac* are nothing more than ſal ammoniac ſublimed; and the ſublimation is facilitated by generally mixing with it an equal part of decrepitated common ſalt. See *Sal* AMMONIAC.

Flowers *of ſulphur*, or *brimſtone*, are the vapours of melted brimſtone conveyed from an iron pot (in which it is kept boiling) through a proper flew, into a cloſe room or oven, where this vapour condenſes into *flowers*. See SULPHUR.

Flower *of wheat*, *rye*, and other *pulſe*. See FARINA and FLOUR.

Flowers *of zinc*. See CADMIA and ZINC.

Flowers, in the *Animal Oeconomy*, denote women's monthly purgations, or MENSES.

Nicod derives the word in this ſenſe from *fluere*, q. d. *fluors*. Others will have the name occaſioned hence, that women do not conceive till they have had their *flowers*; ſo that theſe are a ſort of forerunners of their fruit.

Flowers, in *Rhetoric*, are FIGURES, or ornaments of diſcourſe, by the Latins called *floſculi*.

Flower-*fence*, *Barbadoes*. See BARBADOES *flower-fence*.

Flower-*fence*, *baſtard*. See ADENANTHERA.

Flower *of Briſtol*. See CAMPION.

Flower-*de-luce*, in *Botany*. See IRIS.

Flower, *eternal*, or *everlaſting*. See ETERNAL *flower*, and CUD-*weed*.

Flower, *four o'clock*. See MIRABILIS.

Flower, *gentle*. See AMARANTH.

Flower, *ſide-ſaddle*. See *Hollow-leaved Sea*-LAVENDER.

Flower, *ſky*. See CINERARIA.

Flower, *ſultan*. See BLUE-*bottle*, and CENTAURY.

Flower, *ſun*. See SUN-*flower*.

Flower, *trumpet*. See TRUMPET.

Flower, *wind*. See ANEMONE.

Flower *of oſteocolla*, a name given by the people employed in finding the OSTEOCOLLA to a ſort of white marley matter, which they uſually find on the ſurface of the ground in the places where the oſteocolla lies underneath. It ſeems very nearly allied to the nature of the oſteocolla itſelf, and uſually has under it ſome of that blackiſh matter reſembling rotten wood, which the oſteocolla itſelf is formed upon, and which fills up thoſe hollows we find in moſt of the pieces, while the whole is in the ground. This rotten vegetable matter has much the reſemblance of the roots or branches of trees, and is called by the common people the root of the oſteocolla or hammoſtei radix. Phil. Tranſ. Nº 39.

Flower-*root worm*, in *Natural Hiſtory*, a peculiar ſpecies of fly-worm, which makes its habitation only in the bulbous roots of *flowers*. The roots of the narciſſus at the time they are taken up out of the earth toward the end of autumn, very frequently are found to contain each a ſingle worm, which eats and deſtroys them. Sometimes one root is found to contain two of them; but this is but rarely the caſe. The roots which have them may eaſily be known, by having each a round hole in ſome part, at which the deſtroyer has entered while it was ſmall, and which probably ſerves it now in its larger ſtate for reſpiration of the freer air. The interior part of theſe bulbs is always found rotted and deſtroyed, and the worm is found in theſe, lying in a brown ſort of dirt made by its own liquid excrements, mixed among the fragments of the coats of the root which it has deſtroyed. Reaumur's Hiſt. Inſect. vol. iv. p. 499.

Theſe worms undergo all their changes in a ſhell made of their own ſkin, which is of the ſame egg-faſhioned ſhape with that of the blue fleſh fly, but conſiderably larger, and of a greyiſh colour. But this is not all its difference from thoſe ſhells; for on its anterior and ſuperior part it has two horns of the ſame kind with the four of the ſhells of the rat-tailed worms; and ſeeming to ſerve to the ſame purpoſes, and to convey the air neceſſary for the life of the creature, into its corcelet; the old ſtigmata, which ſerved the creature in its worm-ſtate, being now obliterated, and ſomething neceſſarily wanted in their place. After having undergone all the neceſſary changes, the ſhells are burſt open, in the month of April, and let out the fly they contained.

This has ſo much the appearance of an humble-bee, that at firſt ſight it is ſcarce to be diſtinguiſhed from it. It is covered with black, yellow, and reddiſh hairs, as the ſmaller kinds of the common humble bees are; but its antennæ, which are of the battledore faſhion, prove plain enough, that it is really no bee, even before one can determine with certainty that it has only two wings.

FLOWERAGE, a collection of flowers of ſeveral kinds ſet together in huſks, and hung up with ſtrings.

FLOWERED, in the *Manufactures*. A ſtuff, or cloth, is ſaid to be *flowered*, *flouriſhed*, *ſprigged*, or *figured*, when there are repreſentations of *flowers*, either natural, or imaginary, wrought thereon.

There are ſtuffs *flowered* of almoſt all kinds of matter: *flowers* of gold, ſilver, ſilk, wool, thread, cotton, &c. Stuffs and cloths are uſually denominated from the ground, whereon the *flowers* are raiſed.

Thus, there are *flowered* velvets, taffaties, damaſks, ſattins, mohairs, dimities, &c.

Thoſe *flowered* with gold and ſilver are more uſually called BROCADES.

The flowers are uſually wrought at the ſame time with the cloth, or ground. The threads of the warp are raiſed and lowered by means of packthreads paſſed through them in mounting the loom; and the manufacturer, ſhooting his warp, or matter of the flowers, whether gold, ſilver, ſilk, or the like, between the threads thus raiſed, forms the FLOWERS.

It is very curious to ſee them mount a loom; or, as they call it, *read a deſign*, to be repreſented on a ſtuff; but it is next to impoſſible to deſcribe it; yet we have endeavoured to give ſome idea thereof under DESIGN.

FLOWERING *of bulbous plants*. Theſe plants will grow and *flower* in water alone without any earth, and make a very elegant appearance. We daily ſee this practiſed in ſingle roots, but there is a method of doing it with ſeveral together, as follows: take a common ſmall garden-pot, ſtop the hole at the bottom with a cork, and lute in the cork with putty that no water can get through; then fit a board to the top of the pot, and bore ſix or ſeven holes in it, at equal diſtances, to place the bulbs in, and as many ſmaller holes near them to receive ſticks, which will ſerve to tie up the *flowers*. Then fill up the pot with water to the board, and place tulips, jonquils, narciſſuſes and the like plants in the root upon the holes, ſo that the bottom of the roots may touch the water; thus will they all *flower* early in the ſeaſon, and be much more beautiful than any pot of gathered *flowers*, and will laſt many weeks in their full perfection After the ſeaſon of *flowering* is over, the roots will gradually ſhrink through the holes of the board, and get looſe into the water, but inſtead of becoming ſpoiled there, they will ſoon increaſe in ſize, ſo as not to be capable of coming back, and will produce ſeveral off-ſets. It is natural to try from this the conſequence of keeping the roots under water during the whole time of their blowing, and in this manner they have been found to ſucceed very well, and *flower* even ſtronger and more beautifully than when in the ground. They may thus alſo, with proper care in the degree of heat in the room, be kept *flowering* from before Chriſtmas, till March or April. It is not eaſy in this laſt manner to manage the keeping the boards under water, for which reaſon it is better to procure ſome ſheet lead of about four pounds to the foot, and cut this to the ſize of the mouth of the pot; in this there ſhould be bored holes for the bulbs, and other holes for the ſticks; and in order to keep the ſticks quite firm, it is proper to have another plate of lead ſhaped to the bottom of the pot, with holes in it, anſwering thoſe in the upper plate made for the ſticks. The ſticks will by this means be kept always perfectly ſteady, and the roots being kept under water by the upper plate of lead, will *flower* in the moſt vigorous and beautiful manner imaginable.

Notches in the ſide of each lead, will give eaſy paſſage to the water, that if there ſhould be any foulneſs or ſediment in it, on ſhaking it a little, it may all run through, and freſh water be put in its place; but this ſhifting the water need not be done more than once or twice in a winter, as there may be occaſion from the foulneſs; and when this is done, the ſides of the veſſel ſhould be cleaned with a painter's bruſh, and rinſed out again, and the bulbs themſelves waſhed, by pouring water on them at a little diſtance: and if any duſt or foul matter be at any time obſerved ſwimming on the ſurface, the method is to fill up the veſſel, and let it run over: this will carry off that light foulneſs, and the water may afterwards be poured away to the proper ſtandard.

It may be more agreeable to ſome to uſe glaſs jars, in this laſt method with the lead, inſtead of earthen pots. The bulbs ſucceed full as well in theſe; and there is this advantage, that the progreſs of the roots is ſeen all the while, and they are managed better as to the ſupply of water.

By repeated experiments in this way on dried bulbs, and on thoſe taken freſh out of the ground, the former have been found to ſucceed the beſt; for thoſe taken freſh out of the ground being full of moiſture, will not ſo ſoon upon changing their element be nouriſhed fully by a new one; and the fibres which they had ſtruck in the ground always rot when put into the water, and new ones muſt be formed in their places, ſo that it requires more time for them to come to *flowering*. The bulbs themſelves will not rot in this manner, but they will never be ſo ſtrong as thoſe which were put into the water dry, which gradually fill themſelves with moiſture from it, and regularly plump up. The beſt method of managing the whole proceſs is this: place the bulbs at firſt only on the ſurface of the water; for thus they will ſtrike out their fibres moſt ſtrongly. When they have ſtood thus ſix weeks, pour in the water ſo high as to cover them entirely, and keep them at this ſtandard till they have done *flowering*.

Sometimes the roots will become mouldy in ſeveral parts while they ſtand above the water, and the cleaning them of it is to no purpoſe; for it will eat and ſpread the farther, and frequently eat through two or three of their coats. In this caſe, they muſt be immediately covered with water, and the mould will be ſtopped, and they will become ſound, and flower as well as thoſe which never had any ſuch diſtemperature. If the roots are ſuffered to remain in water all the year, they will not decay, but will flower again at their proper ſeaſon, and that as vigorouſly as thoſe which are taken out and dried. The old fibres of theſe roots never rot till they are ready to puſh out new ones. It is found by experience, that the hyacinth, and many other plants, grow to a greater perfection thus in water, than when in the ground. There is a peculiar ſpecies of hyacinth, called Keyſer's jewel; this never, or however very rarely, produces ſeed-veſſels in the common way of *flowering* in the ground, but it will often produce ſome pods when blown in water.

Mr. Miller has intimated, in the Philoſophical Tranſactions, that bulbs ſet in glaſſes grow weaker, and ſhould be renewed with freſh ones every other year; but it is found that when they are managed in this manner, and kept under water, at the time of taking them up, they are as large, and ſome of them larger and ſtronger than when planted; and if theſe be dried at a proper ſeaſon, they will flower year after year as well as freſh ones.

The ſmaller SEEDS may alſo be raiſed in this manner, by the help of wool to ſupport them.

No plant tranſplanted out of earth into water will thrive kindly; but any plant, whether raiſed from the root or ſeed in water, may be tranſplanted to the earth, and will ſucceed very well. It may be poſſible, therefore, from this method of raiſing plants in water, to come at a better way than is uſually practiſed of raiſing ſome roots in the earth which are ſubject to rot there; ſuch as anemonies, ranunculuſes, and hyacinths. A bulb dropped by chance upon the ground will ſtrike out both ſtronger and more numerous fibres, than thoſe which are planted in the uſual way on the ground. On this principle it may be proper to take out the earth of the bed where the bulbs are to ſtand at the time of planting them, to ſuch a depth as they are to be placed under it, when ſet for *flowering*. The bulbs are then to be ſet in their places on the ſurface of this low ground, and to ſtand there till they have ſhot out their fibres and their head, then the earth is to be added over them by degrees, till they are covered as high above the head as they are in the uſual way of planting them; thus they would be preſerved from the danger of rotting, and their fibres would be much ſtronger, and conſequently they would draw more nouriſhment, and flower better than in the common way.

At the time of planting the bulbs, they muſt be carefully cleaned from any foulneſs at the bottom, by ſcraping them clean with the point of a knife, till the ſound part of the bulb appears; clean them likewiſe from any looſe ſkins, and even take off their brown ſkin, till they appear white; otherwiſe this brown ſkin will tinge the water, and the growth will not ſucceed ſo well.

There is yet another way of cauſing flowers to blow early in pots of earth in this manner. Diſſolve crude ſal ammoniac in water, in ſuch proportion, as that a piece of the bigneſs of a walnut may be diſſolved in every quart; then prepare ſome pots of a proper ſize filled with good garden mould. Sow the annual flowers, and ſet the roots of the perennial ones, ſuch as tulips, &c. in theſe pots at Michaelmas; continue the enſuing ſeaſon to water them with this ſolution of the ſalt, and keep them in a warm room; by this means they will be in full flower about Chriſtmas, and will continue through January and February.

FLOWING, or FLOWN-*ſheets*, in *Sea-Language*, denote the poſition of the ſheets, or lower corners of the principal ſails, when they are looſened to the wind, ſo as to receive it into their cavities in a direction more uſually perpendicular than when they are cloſe-hawled, but more obliquely than when the veſſel is ſailing before the wind. This poſition of the ſheets takes place when the wind croſſes the line of her courſe nearly at right angles.

FLOX, in the *Colour Trade*, a very well cleaned wool uſed to abſorb the colours of cochineal, &c. It is prepared in this manner: infuſe a pound of the fineſt ſheerings of woollen cloth in cold water for one day; then take them up, and preſs them well together, to waſh off the unctuoſity the wool naturally has. This is the ſimple *flox*, which when impregnated with a ſolution of alum, is called alumed *flox*. This is done in the following manner: take four ounces of roach-alum, and two ounces of crude tartar, both in fine powder; put them into an earthen veſſel with three quarts of water, ſet it over the fire, and when it begins to boil, then put in the *flox*; let the liquor now boil half an hour over a gentle fire, then take it off, and when all is perfectly cooled, waſh the *flox* with fair water, letting them ſtand in it two hours, then preſs them in the hand, and let them dry.

FLUDER, or *Sea*-FLUDDER, in *Zoology*, the name of a water-fowl of the colymbus or diver-kind, deſcribed by Geſner, and ſome other authors, under the name of the colymbus maximus, or largeſt diver. It is nearly of the ſize of a gooſe, and moves but very ſlowly on the water, and much worſe either on land, or in the air, being but little able either to walk or fly. Its beak is long, and its legs very ſhort; it makes a very ſhrill noiſe, and is remarkable for diving to vaſt depths. Its feet are webbed, its back is of a greyiſh colour, and its belly white. It ſeems much to approach to the northern colymbus, called the lumme, and perhaps differs only in colour, which may be an accidental variety, as is common in birds. Ray's Ornithol. p. 260.

FLUELLIN, *Elatine*, in *Botany*. See ELATINE.

FLUENT, or *flowing quantity*, in the *Doctrine of Fluxions*, that quantity (whether line, ſurface, ſolid, &c.) which is continually increaſing, or decreaſing.

Thoſe *fluents*, which are generated in the ſame time, or in equal times, or which begin together and end together, are called contemporary *fluents*, and their fluxions are called contemporary fluxions; and if two or more of theſe contemporary *fluents* are always equal, or in any invariable ratio to each other, their contemporary fluxions will likewiſe be equal, or in the ſame proportion, and *vice verſâ*. See FLUXION.

Mr. Maclaurin, in his Treatiſe of Fluxions, has made ſeveral inquiries into *fluents*, reducible to the rectification of the ellipſis and hyperbola. M. D'Alambert has purſued the ſame ſubject, and carried it farther, in Mem. de l'Acad. de Berlin. tom. ii. p. 200.

FLUIDITY, in *Phyſics*, that ſtate or affection of bodies, which denominates or renders them *fluid*.

Fluidity ſtands in direct oppoſition to *firmneſs*, or *ſolidity*.

Fluidity is diſtinguiſhed from *liquidity* or *humidity*, in that the idea of the firſt is abſolute, and the property contained in the thing itſelf; whereas that of the latter is relative, and implies wetting, or adhering; i. e. ſomewhat that gives us the ſenſation of wetneſs, or moiſture, and which would have no exiſtence but for our ſenſes.

Thus, melted metals, air, æther, and even ſmoke, and flame itſelf, are *fluid* bodies, but not liquid ones; their parts being actually dry, and not leaving any ſenſe of moiſture.

The nature and cauſes of *fluidity* have been variouſly aſſigned.

The Gaſſendiſts, and ancient Corpuſcularians, require only three conditions as neceſſary thereto; viz. a ſmallneſs and ſmoothneſs of the particles of the body; vacuities interſperſed between them; and a ſpherical figure. Thus the Epicurean poet, Lucretius:

Illa autem debent ex lævibus atque rotundis
Eſſe magis, fluido *quæ corpore liquida conſtant*.

The Carteſians, and after them Dr. Hook, Mr. Boyle, &c. beſide the circumſtances above mentioned, require a various, perpetual, inteſtine motion of the particles of the bodies, as that which principally contributes to *fluidity*.

Fluidity then, according to theſe philoſophers, conſiſts in this, that the parts of the body, being very fine, and ſmall, are ſo diſpoſed by motion, or figure, as that they can eaſily ſlide over one another's ſurfaces all manner of ways; and that they be in conſtant, various, ſeparate agitation to and fro; and that they only touch one another in ſome few parts of their ſurfaces. Mr. Boyle, in his *hiſtory of fluidity*, mentions three conditions principally required to *fluidity*, viz.

1. The minuteneſs of parts: thus, in effect, we find that fire, by dividing metals into fine, ſmall parts, renders them fluid; and that acid menſtruums diſſolve and render them fluid after the like manner; and that fire turns the hard body of common ſalt almoſt wholly into a liquor, by diſtillation: not but that the figure of the particles may have a conſiderable ſhare in *fluidity*.

Thus mercury, whoſe parts are doubtleſs much groſſer than thoſe of oil and water, is yet more fluid than either of them: and thus oil, by the action of fire, may be converted into a conſiſtent ſubſtance like butter.

2. A number of vacuities interſperſed between the corpuſcles, to give room for the ſeveral particles to move among themſelves.

3. A motion and agitation of the corpuſcles; either from ſome principle of mobility within themſelves, or from ſome extraneous agent, penetrating and entering the pores, moving variouſly among them, and communicating to them a part of its motion.

That this laſt is the qualification chiefly required in *fluidity*, he argues from divers obſervations and experiments. Thus, a little dry powder of alabaſter, or plaiſter of Paris, finely ſifted, being put in a veſſel over the fire, ſoon begins to boil like water; exhibiting all the motions and phænomena of a boiling liquor. It will tumble variouſly in great waves like that; will bear ſtirring with a ſtick or ladle like that, without reſiſting; nay, if ſtrongly ſtirred near the ſide of the veſſel, its waves will apparently daſh againſt them: yet it is all the while a dry, parched powder.

The like is obſerved in ſand; a diſh of which being ſet on a drum-head, briſkly beaten by the ſticks, or on the upper ſtone of a mill, it in all reſpects emulates the properties of a fluid body. A heavy body, e. gr. will immediately ſink in it to the bottom, and a light one emerge to the top. Each grain of ſand has a conſtant vibratory and dancing motion; and if a hole be made in the ſide of the diſh, the ſand will ſpin out like water.

That the parts of fluids are in continual motion, the Carteſians bring divers conſiderations to prove: as, 1. The tranſmutation of ſolids into fluids, e. gr. ice into water, and vice verſa; the chief difference between the body in thoſe two ſtates conſiſting in this, that the parts, being fixed and at reſt in the one, reſiſt the touch; whereas in the other, being already in motion, they give way to the ſlighteſt impulſe.

2. The effects of fluids, which commonly proceed from motion: ſuch are the inſinuation of fluids among the pores of bodies; the ſoftening and diſſolving hard bodies; the actions of corroſive menſtruums, &c. Add, that no ſolid can be brought to a ſtate of *fluidity*, without the intervention of ſome moving, or moveable body, as fire, air, or water.

Air, the ſame gentlemen hold to be the firſt ſpring of theſe cauſes of *fluidity*, it being this that gives motion to fire and water, though itſelf receives its motion and action from the æther, or ſubtle medium.

Boerhaave pleads ſtrenuouſly for fire's being the firſt mover, and the cauſe of all *fluidity* in other bodies, as air, water, &c. Without this, he ſhews that the atmoſphere itſelf would fix into one ſolid maſs. See FIRE and HEAT.

Sir I. Newton ſets aſide this theory of the cauſe of *fluidity*, and ſubſtitutes a new one, the great principle of attraction. The corpuſcular ſyſtem, with all the improvements of Deſcartes, and Mr. Boyle, did not ſufficiently account for the primary condition, requiſite to conſtitute a body fluid, viz. the various inteſtine motion and agitation of its particles. But this motion is naturally enough accounted for, by ſuppoſing it a primary law of nature, that as all the particles of matter attract each other when within a certain diſtance; ſo at all greater diſtances, they fly from, and avoid one another. For then, though their common gravity, together with the preſſure of other bodies upon them, may keep them together in a maſs, yet their continual endeavour to avoid one another ſingly, and the adventitious impulſes of heat, and light, or other external cauſes, may make the particles of fluids continually move round about one another, and ſo produce this quality.

There is a difficulty, indeed, in accounting, why the particles of fluids always keep at ſuch a diſtance from one another, as not to come within the ſphere of one another's attraction. The fabric and conſtitution of that fluid body, water, is amazing; that a body ſo very rare, and which has a vaſt over-proportion of pores, or interſperſed vacuity, to ſolid matter, ſhould yet be perfectly incompreſſible by the greateſt force, as philoſophers very generally and for a long time have imagined, (ſee COMPRESSION;) and yet this fluid is eaſily reducible into that firm, tranſparent, friable body, which we call ice, by being only expoſed to a certain degree of cold.

One would think, that though the particles of water cannot come near enough to attract each other, yet the intervening frigorific matter doth, by being mingled per minima, ſtrongly attract them, and is itſelf likewiſe ſtrongly attracted by them, and ſo wedges or fixes all the maſs into a firm ſolid body; which ſolid body loſes its ſolidity again, when by heat the vinculum is ſolved, and the frigorific particles are disjoined from thoſe of the water, and are forced to fly out of it. And thus may the fumes of lead perhaps fix quickſilver.

When a firm ſolid body, ſuch as metal, is by heat reduced into a fluid, the particles of fire disjoin and ſeparate its conſtituent parts, which their mutual attraction cauſed before to cohere, and keep them at ſuch a diſtance from one another, as that they are out of the ſphere of each other's attraction, as long as that violent motion laſts; and when by their lightneſs and activity they are flown off, unleſs they be renewed by a continual ſupply, the component particles of the metal finally come near enough again to feel one another's attractions.

As, therefore, the cauſe of coheſion of the parts of ſolid bodies appears to be their mutual attraction, ſo the chief cauſe of *fluidity* ſeems to be a contrary motion, impreſſed on the particles of fluids; by which they avoid and fly one another, as ſoon as they come at, and as long as they keep at ſuch a diſtance from each other.

It is obſerved alſo in all fluids, that the direction of their preſſure againſt the veſſels which contain them, is in lines, perpendicular to the ſides of ſuch veſſels; which property, being the neceſſary reſult of the particles of any fluid's being ſpherical, ſhews that the parts of all fluids are ſo, or of a figure very nearly approaching thereto.

FLUIDS are bodies, whoſe particles are but weakly connected; their mutual coheſion being in great meaſure prevented by ſome external cauſe.

In this ſenſe a *fluid* ſtands oppoſed to a ſolid.

Sir I. Newton defines a *fluid* body, to be that whoſe parts yield to the ſmalleſt force impreſſed, and by yielding are eaſily moved among each other.

That the particles whereof fluids conſiſt, are of the ſame nature, and have the ſame properties, with the particles of ſolids, is evident, from the converſion of liquids and ſolids into each other, e. gr. of water into ice, of metals into fluors, &c. Nor can it be reaſonably doubted, that the component parts of all bodies are the ſame, viz. hard, ſolid, impenetrable, moveable corpuſcles.

We obſerve therefore, with Dr. Clark, that if the parts of a body either do not touch each other, or eaſily ſlide over one another; and are of ſuch a magnitude, as that they may be eaſily agitated by heat, and the heat be ſufficiently great to agitate them, though it may perhaps be leſs than ſuffices to prevent water from freezing; or, even, though the parts be not actually moved, yet, if they be ſmall, ſmooth, ſlippery, and of ſuch a figure and magnitude as diſpoſes them to move, and give way, that body is *fluid*.

And yet the particles of ſuch *fluid* bodies do, in ſome meaſure, cohere; as is evident hence, that mercury, when well purged of air, will be ſuſtained in the barometer, to the height of 60 or 70 inches; that water will aſcend in capillary tubes even in vacuo; and that the drops of liquor in vacuo run into a ſpherical form; as adhering by ſome mutual coheſion like that between poliſhed marble planes. Add, that theſe *fluid* bodies, if they conſiſt of particles that are eaſily entangled within each other, as oil; or if they be capable of being ſtiffened by cold, and joined by the interpoſition of little cunei, or wedges, as water; they are eaſily rendered hard: but if their particles be ſuch as can neither be entangled, as air; nor ſtiffened by cold, as quickſilver; then they never grow hard and fixed.

FLUIDS are called either *natural*, as water, and mercury; or *animal*, as blood, milk, bile, lymph, urine, &c. or *factitious*, as wines, ſpirits, oils, &c. See each under its proper article.

The doctrine and laws of *fluids* are of the greateſt extent in philoſophy. The preſſure and gravitation of bodies in *fluids*, and the action of the *fluids* immerged in them, make the ſubject of HYDROSTATICS.

FLUIDS, *hydroſtatical laws of*. I. The upper parts of all *fluids*, as water, &c. do preſs upon the lower; or, as ſome philoſophers ſtate it, all *fluids* do gravitate in *proprio loco*.

The contrary of this was a principle in the ſchool-philoſophy; and two facts have been commonly urged in ſupport of it. A bucket full of water is lighter in the water than out of it, nor does it weigh more when full in the water, than when empty out of it; therefore, it has been concluded, that the water in the bucket, becauſe it is within water, its own element, does not gravitate: and divers who deſcend to conſiderable depths, it has been ſaid, feel no ſenſible preſſure under water; though at the depth of thirty-two feet, the additional preſſure they ſuſtain is not leſs than twenty thouſand avoirdupois pounds: for, ſuppoſing the ſurface of the body to contain only ten ſquare feet, and a cubic foot of water to weigh one thouſand avoirdupois ounces, 32 × 10 feet, or 16 × 20 feet of water will weigh 16 × 20000 avoirdupois ounces, or twenty thouſand pounds. However, in this caſe, the uniformity of the preſſure, the increaſed elaſticity and reſiſtance of the compreſſed internal air, and the firm texture of the membranes, &c. may prevent their complaining of any ſenſible pain; though there have been many inſtances to the contrary, in which the difference of the preſſure has produced very injurious effects. See DIVING.

As to the former fact, it is eaſily explained by the theory of *ſpecific* GRAVITY. The bucket of water weighs in water, but does not overweigh; becauſe the ſurrounding parts of water endeavour to deſcend as well as the bucket, and with equal force, and therefore do not permit it to deſcend. Thus, according to an obſervation of Dr. Deſaguliers, if two pound weights were hung at the two arms of a balance, no one will ſay, that neither weighs, becauſe it does not outweigh the other. Deſag. Exp. Phil. vol. ii. p. 96.

Beſides, it is evident, that, in any *fluid*, the weight of the whole is equal to the weight of all its parts; and if any part be taken from the whole, the weight of the whole will be diminiſhed by the weight of that part; and if any part be added to the whole, the weight of the whole will be increaſed by the weight of the part which was added; and, therefore, it is reaſonable to conclude, that the weight of the whole is compoſed of the weights of the ſeveral parts, and that the parts do, therefore, gravitate in the whole, or in *proprio loco*. Cotes's Hyd. and Pneum. Lectures, p. 7. But the certainty of ſuch preſſure is now demonſtrated by a thouſand experiments: it will be ſufficient to inſtance one or two.

immerge a tube, open at both ends, and half filled with oil of turpentine, in a veſſel of water, the upper end of the tube being ſtopped with the finger: if now the upper ſurface of the oil lie as low as that of the water, the oil, upon removing the finger, will not run out at the lower end of the tube; nay, and if the tube be thruſt a little lower, the water will riſe up in it, and bear the oil above it: but if the upper ſurface of the oil be conſiderably higher than that of the water, the oil will drop out of the tube. Whence it follows, that the column of oil in one caſe preſſes or gravitates leſs on the plane imagined to paſs under its lower ſurface, than a column of water; and in the other caſe, more.

Or thus; a phial, with as much ſhot in it as will make it ſink, cloſe ſhut, being immerged in water, and ſuſpended by a horſe-hair to the beam of a balance, with a weight at the other end exactly counterpoiſing it; upon unſtopping the phial, and letting it fill with water, it will preponderate, and bear down the end of the balance, without having any communication with the external air. And if the phial had been firſt weighed in air, it will be found, that the weights neceſſary for reſtoring its equilibrium in water, anſwer exactly to the additional weight of the phial, when it is again weighed in air with the water in it: ſo that water weighs in water juſt as much as in air.

Theſe two experiments abundantly prove the propoſition, that the upper parts of *fluids* do really preſs or gravitate on the lower. See *Specific* GRAVITY.

From this gravity it follows, that the ſurfaces of ſtagnant *fluids* are plain, and parallel to the horizon; or rather, that they are ſegments of a ſphere concentrical with the earth, becauſe they all gravitate towards the center of the EARTH.

For, as the particles are ſuppoſed to yield to any force impreſſed, they will be moved by the action of gravity, till ſuch time as none of them can deſcend any lower. And this ſituation once attained, the *fluid* muſt remain at reſt, unleſs put in motion by ſome foreign cauſe; inaſmuch as none of the particles can now move without aſcending, contrary to their natural tendency.

II. If a body be immerged in a *fluid*, either wholly, or in part, its lower ſurface will be preſſed upwards by the water underneath it: and the preſſure of *fluids* upwards is equal to the preſſure downwards at the ſame depth.

The truth of this propoſition is evident from the experiment above mentioned; where the oil of turpentine was ſuſpended, and made to mount up in the tube, by the preſſure of the water upwards on its lower parts. Thus alſo, if the open end of a narrow-bored tube be dipped into quickſilver, whilſt the other end is ſtopped with the finger, and the tube be lifted up, a ſhort column of quickſilver will be ſuſpended in the lower end, which column, when dipped into water deeper than about fourteen times its own length, will be preſſed upwards, after the finger is removed from the orifice.

This upward preſſure of *fluids* may be evinced by cauſing a piece of lead, &c. to ſwim in water; which may be done by immerging it to a proper depth, and keeping the water from getting above it. Let CD, *Tab.* II. *Hydraulics*, *fig.* 10. be a glaſs tube open at both ends, and EFG, a flat piece of lead half an inch thick, exactly fitted to the lower end of the tube, having its upper ſurface covered with wet leather, ſo as to hinder the entrance of the water contained in the outer veſſel. Let this leaden plate be held cloſe to the tube, by pulling the ſtring or wire IHL upward at L with one hand, whilſt the tube is held in the other by the upper end C. In this ſituation, let the tube be immerſed in water in the glaſs-veſſel AB, to the depth of ſix inches below the ſurface of the water at K; and then, the leaden plate EFG will be plunged to the depth of ſomewhat more than eleven times its own thickneſs: holding the tube at that depth, you may let go the wire or thread at L; and the lead will not fall from the tube, but will be kept to it by the upward preſſure of the water below it, occaſioned by the height of the water at K above the level of the lead. For, as lead is 11.33 times as heavy as its bulk of water, and in this experiment is immerſed to a depth ſomewhat more than 11.33 times its thickneſs, and no water getting into the tube between it and the lead, the column of water E a b c G, below the lead, is preſſed upward againſt it by the water KDEGL, all round the tube; which water, being a little more than 11.33 times as high as the lead is thick, is ſufficient to balance and ſupport the lead at the depth KE. If a little water be poured into the tube upon the lead, it will increaſe the weight upon the column of water under the lead, and cauſe the lead to fall from the tube to the bottom of the glaſs veſſel, where it will lie in the ſituation b d: or, if the tube be raiſed a little in the water, the lead will fall by its own weight, which will then be too great for the preſſure of the water round the tube on the column of water below it. If the plate were braſs inſtead of lead, it ought to be immerſed under water at leaſt eight times its thickneſs, in order to be ſupported by the water; becauſe braſs is about eight times ſpecifically heavier than water. A plate of pure gold would require near twenty times its thickneſs of water: and this led Mr. Boyle to propoſe one of his hydroſtatical paradoxes in theſe words, viz. That a ſolid body, as ponderous as any yet known, though near the top of the water, it will ſink by its own weight, yet immerſed in water, at a greater depth than that of twenty times its thickneſs, will not ſink, if its deſcent be not aſſiſted by the weight of the incumbent water. Paradox. 11. Statics. Boyle's Works, abr. by Shaw, vol. ii. p. 311.

As we have now ſeen that the heavieſt body may be made to ſwim in water, the lighteſt wood may be made to lie at the bottom of water or mercury. Thus, let two pieces of wood be planed quite flat, ſo that no water may get between them when they are put together; let one of them, bd, be cemented to the bottom of the veſſel AB, *fig.* 10. and the other be laid flat and cloſe upon it, and held down with a ſtick, whilſt water is poured into the veſſel; then remove the ſtick, and the upper piece of wood will not riſe from the lower one: for, as the upper one is preſſed down both by its own weight and the weight of water over it, whilſt the contrary preſſure of the water is kept off by the wood under it, it will lie as ſtill as the heavieſt body: but if it be raiſed at the edge, ſo that the water may get under it, it will immediately be preſſed upwards; and as it is lighter than its bulk of water, it will riſe and float on the ſurface of the water. See Ferguſon's Lectures, 4to. p. 68. and Cotes's Hyd. Lect. 2. See HYDROSTATIC *Bellows*, and Art. xi. in the ſequel.

The law or quantity of this preſſure is this; that a body immerged in a *fluid*, loſes juſt ſo much of the weight it would have in air, as ſo much of the *fluid* as is equal to it in bulk, if weighed in the air, would amount to.

This preſſure of *fluids* on the lower parts of an immerſed body, is farther confirmed, by attending to the reaſon why bodies ſpecifically lighter than *fluids* aſcend therein. The effect is owing to this, that there is a greater preſſure or weight on every other part of the plane or ſurface of the *fluid* imagined to paſs under the lower ſurface of the body, than there is on that whereon the emerging body inſiſts. Conſequently, to produce an equilibrium in the *fluid*, the parts immediately under the riſing body, being preſſed by the reſt every way, do continually force it upwards.

In effect, the emerging body is continually preſſed on by two columns of water, one bearing againſt its upper, and the other againſt its lower parts: the length of both which columns being to be accounted from the top of the water, that which preſſes on the lower part will be the longer, by the thickneſs of the aſcending body, and conſequently will overbalance it by the weight of as much water as will fill the ſpace that body takes up.

Hence, 1. We are furniſhed with one reaſon, why very minute corpuſcles, either heavier or lighter than the liquor they are mingled with, will be ſuſtained therein a good while, without either emerging to the top, or precipitating to the bottom; the difference between the two columns of the *fluid* being here inconſiderable.

Hence, 2. If a body A be ſpecifically lighter than B, an equal portion of the *fluid* in which it is immerged, it will riſe with a force proportionable to the exceſs of gravity of B above A: and if A be ſpecifically heavier than B, it gravitates and deſcends with the exceſs only of its weight above that of B.

Hence, 3. We have a ſolution of the phenomenon of two poliſhed marbles or other planes adhering ſo ſtrongly together; becauſe the atmoſphere preſſes or gravitates with its whole weight on the under ſurface and ſides of the lower marble, but cannot do ſo at all on its upper ſurface, which is cloſely contiguous to the upper and ſuſpended marble.

III. The preſſure of the upper parts of a *fluid* on the lower exerts itſelf every way, and every way equally, laterally, horizontally, and obliquely, as well as perpendicularly.

For, as the parts of a *fluid* yield to any impreſſion, and are eaſily moved, it is impoſſible any drop ſhould remain in its place, if, while it is preſſed by the ſuperincumbent *fluid*, it be not equally preſſed on every ſide.

The ſame is confirmed from experiments: for ſeveral tubes of divers forms, ſtrait, curved, angular, &c. being immerſed in the ſame *fluid*, though the apertures, through which the *fluid* enters, be differently poſited to the ſurface or plane, ſome being perpendicular, others parallel, and others variouſly declined; yet will the *fluid* riſe to an equal height in them all. See SYPHON.

Hence, 1. All the particles of *fluids* being thus equally preſſed on all ſides, it is argued, that they muſt be at reſt, and not in continual motion, as has been uſually ſuppoſed.

Hence, 2. alſo, A body, being immerſed in a *fluid*, ſuſtains a lateral preſſure from the *fluid*; which is alſo increaſed as the body is placed deeper beneath the ſurface of the *fluid*.

IV. In tubes that have a communication with each other, whatever their magnitude be, whether equal, or unequal; and whatever their form, whether ſtrait, angular, or crooked; ſtill, *fluids* riſe in them to the ſame height.

V. If a *fluid* riſe to the ſame altitude in two tubes that communicate with each other, the *fluid* in one tube is a balance, or equal in weight, to that in the other.

If the tubes be of equal diameters, the columns of the *fluid*, having the ſame baſe and altitude, are equal, and conſequently their gravities equal; ſo that they preſs and gravitate againſt each other with equal force.

This is demonſtrated from mechanics. E. gr. Let the baſe of GI, *Tab.* II. *Hydraulics*, *fig.* 11. be ſuppoſed quadruple the baſe of HK; and let the *fluid* deſcend in the greater tube the ſpace of an inch, as from L to O; it will then riſe in the other the ſpace of four inches, as from M to N. Wherefore the velocity wherewith the *fluid* moves in the tube HK, is to that wherewith it moves in GI, as the baſe of the tube GI to the baſe of the other, HK. But the altitude of the *fluid* being ſuppoſed the ſame in both tubes, the quantity of the *fluid* in the tube GI will be to that in the other tube HK, as the baſe of the tube GI to the baſe of the other HK. Conſequently, the momentum of the *fluid* in the tube GI is to that in the tube HK, as the product of the baſe of the tube GI into the baſe of the other HK, to the factum of the tube HK into the baſe of the other GI. Wherefore, the products being equal, the momenta muſt be equal.

The ſame is eaſily demonſtrated where one of the tubes is inclined, and the other perpendicular, &c.

Hence in tubes that communicate, the *fluid* will preponderate in that where its altitude is the greateſt.

VI. In communicating tubes, *fluids* of different ſpecific gravities will equiponderate, if their altitudes be in the ratio of their ſpecific gravities.

Hence we have a way of finding the ſpecific gravities of *fluids*, viz. by pouring one *fluid* into one of the communicating tubes, as AB (*fig.* 12.) and another into the other tube CD; and meaſuring the altitudes GB and HD, at which they ſtand when balanced.

For the ſpecific gravity of the *fluid* in AB is to that in DC, as DH to BG. If the *fluids* employed in this experiment be apt to mix, it may be proper to fill the horizontal tube BD with mercury, to prevent the mixture.

Hence, ſince the DENSITIES of *fluids* are as their ſpecific gravities, the denſities will likewiſe be as the altitudes of the *fluids* DH and BG; ſo that we have hence likewiſe a method of determining the denſities of *fluids*.

VII. The bottoms and ſides of veſſels are preſſed in the ſame manner, and by the ſame laws, as the liquids contained in them.

And hence, as action and re-action are equal, the *flui* themſelves ſuſtain an equal preſſure from the bottoms and ſides. And as the preſſion of *fluids* is equal every way the bottom and ſides are preſſed as much as the neighbouring parts of the *fluids*; and conſequently this action increaſes in proportion to the height of the *fluid*, and i equal every way at the ſame depth; as depending altogether on the height, and not at all on the quantity o the *fluid*.

VIII. In perpendicular veſſels of equal baſes, the preſſu of *fluids* on the bottoms is in the ratio of their altitudes.

This is evident, becauſe, the veſſels being perpendicula the bottoms are horizontal: conſequently the tendenc of *fluids* by the action of gravity will be in lines perpendicular to the bottom, ſo that they will preſs with all the weight; the bottoms therefore are preſſed in the rat of the gravities. But the gravities are as the bulks, an the bulks here are as the altitudes; therefore the preſſures on the bottoms are as the altitudes.

IX. In perpendicular veſſels of unequal baſes, the preſſure on the bottoms is in a ratio compounded of the baſe and altitudes.

From the preceding demonſtration it appears, that t bottoms are preſſed in the ratio of the gravities: and t gravities of *fluids* are as their bulks; and their bulks a ratio compounded of the baſes and altitudes. Conſequently, &c.

X. If an inclined veſſel ABCD, *fig.* 13. have the ſa baſe and altitude with a perpendicular one, BEFG, t bottoms of each will be equally preſſed.

For, in the inclined veſſel ABCD, the bottom CD preſſed in the direction BD. But the force of gravity the direction BD is to the abſolute gravity, as BE to BD

Con

Conſequently, the bottom CD is preſſed in the ſame manner, as if it had been preſſed perpendicularly by the *fluid* under the altitude BE. Therefore, the bottoms of the perpendicular and inclined veſſels are equally preſſed.

XI. *Fluids* preſs upon ſubject bodies, according to their perpendicular altitude, and not according to their latitude, or breadth.

Or, as others ſtate it, thus: if a veſſel be taper, or unequally big at top and bottom, yet the bottom will be preſſed after the ſame manner as if the veſſel were cylindrical, and the top and bottom equal.

Or thus: the preſſure ſuſtained by the bottom of a veſſel, whatever the figure of the veſſel be, is ever equal to the weight of a column of the *fluid*, whoſe baſe is the bottom itſelf, and height, the vertical diſtance of the upper ſurface of the water from the bottom.

Or, yet more explicitly, thus: if there be two tubes or veſſels, having the ſame heights, and baſes, both filled with water; but one of them made ſo tapering upwards, that it ſhall contain but twenty ounces of water; whereas the other, widening upwards, holds two hundred ounces; yet the bottoms of the two tubes ſhall ſuſtain an equal preſſure of water, viz. each of them that of the weight of two hundred ounces.

This is a noble paradox in hydroſtatics, firſt diſcovered by M. Paſchal, and which it is well worth the clearing, and inſiſting on. It is found unexceptionably true from abundant experiments; and it may even be demonſtrated and accounted for on principles of mechanics.

Suppoſe, e. g. the bottom of a veſſel CD (*fig.* 14.) leſs than its top AB; ſince the *fluid* preſſes the bottom CD, which we ſuppoſe horizontal, in a perpendicular direction, EC, none but that part within the cylinder ECDF can preſs upon it, the natural tendency and preſſure of the reſt being taken off by the ſides.

Again, ſuppoſing the bottom CD (*fig.* 15.) much bigger than the top FG; or even, for the eaſier demonſtration, ſuppoſe a tube FE fixed in a cylinder ABCD; and ſuppoſe the bottom CD raiſed to L, that the *fluid* may be moved through the interval DL; then will it have riſen through the altitude GL, which is to DL as the baſe CD to that of GF. The velocity therefore of the *fluid* FE is to its velocity in the veſſel AD as the baſe CD to the baſe FG.

Hence we have the momentum wherewith the *fluid* in the tube tends downwards, by multiplying the baſe of the cylinder CD into its altitude CH.

Conſequently, the bottom CD is preſſed with the ſame force, as it would be preſſed by the cylinder HCDI.

To confirm and illuſtrate this doctrine of the preſſure of *fluids* in the ratio of the baſe and altitude, provide a metallic veſſel ACDB (*fig.* 15.) ſo contrived, as that the bottom CD may be moveable, and to that end fitted in the cavity of the veſſel with a rim of wet leather, to ſlide freely without letting any water paſs. For this purpoſe it would be moſt adviſeable, that the moveable bottom ſhould have a groove round its edge, and that it be put into a bladder, tied cloſe round it in the groove by a ſtrong waxen thread; and the bladder may be made to come up like a purſe within the veſſel, and put over the top of it at A and B all round, and then the lid of the veſſel preſſed on it: ſo that when water is poured through a hole in the lid, it would lie upon the bottom CD, and be contained within the bladder. Then, through holes in the top, AB, apply ſucceſſively ſeveral tubes of equal altitudes, but of different diameters. Laſtly, faſtening a ſtring or wire to the beam of a balance, and fixing the other end by a little ring K to the moveable bottom, put weights in the other ſcale, till they be ſufficient to raiſe the bottom CD: then will you not only find, that the ſame weight is required, what diameter or magnitude ſoever the tube be of; but even, that the weight which will raiſe the bottom when preſſed by the ſmalleſt tube, will raiſe it when preſſed by the whole cylinder HCDI.

Suppoſe the veſſel ABCD to hold about a pound of water, and that the moveable bottom, wire, and hook, are of equal weight with an empty ſcale M. When this ſcale is pulled down, the bottom CD will be drawn up within the box, and that motion will cauſe the water to riſe in the glaſs tube ELFG. If one pound be put into the ſcale, the bottom will be moved a little, and the water will juſt appear at the lower end of the tube at *a*. Another pound will cauſe it to riſe from *a* to *b*, juſt twice as high above the bottom as it was when at *a*; the preſſure on the bottom being equal to two pounds, the counterbalancing weight in the ſcale M. A third pound will raiſe it to *c*, a fourth to *d*, &c. the diſtances *ab*, *bc*, *cd*, &c. being taken equal to each other and to the depth of the veſſel. If another tube, as *f*, be put into a hole made in the top of the veſſel, and the veſſel be filled with water; and, then, if water be poured in at the top of the tube FGEL, it will riſe in the tube *f* to the ſame height as it does in the other tube: from hence it is evident, that the upward preſſure of the water, riſing in the tube *f*, is equal to the downward preſſure in the other tube FGEL: the caſe would be the ſame, whatever be the number of tubes; and the moveable bottom would ſuſtain the weight of the water in all the tubes, beſides the weight of all the water in the veſſel: and if all the holes to which theſe tubes (FGEL excepted) were fixed be ſtopped up, each part, thus ſtopped, will be preſſed upward with a force equal to the weight of water in each tube: and, conſequently, the whole upward preſſure againſt the top of the veſſel, ariſing from the weight or downward preſſure of the water in the tube FGEL, will be equal to the weight of a column of water of the ſame height with that in the tube, and of the ſame thickneſs as the width of the inſide of the box or of the moveable bottom; and this upward preſſure againſt the top will reach downward with equal force againſt the bottom.

If the diameter of the moveable bottom be three inches, therefore, and the diameter of the bore of the tube a quarter of an inch, their ſquares will be nine inches and one ſixteenth of an inch; and therefore the whole area of the bottom will be a hundred and forty-four times as great as that of the area of the bottom or top of the tube; ſo that if the moveable bottom be raiſed one inch, the water would be raiſed to the top of a tube a hundred and forty-four inches, or twelve feet in height. The veſſel muſt be open below the moveable bottom to let in the air; otherwiſe the preſſure of the atmoſphere upon it, ſuppoſing its diameter three inches, would require a counterbalance of a hundred and eight pounds in the ſcale M before the bottom would begin to move. See HYDROSTATIC *Bellows*.

XII. From the preceding articles, we may eaſily deduce a method of eſtimating the quantity of preſſure of *fluids* on any given ſurface. Let *abcd* (*fig.* 16.) repreſent a cubical veſſel full of water; the ſide *ac* will, therefore, repreſent a ſquare; and the meaſure of the preſſure on every phyſical point of *ac* will be the altitude of the water above that point; thus, the preſſure on *l* is meaſured by *al*, on *m* by *am*, &c. and the preſſure on the whole line will be meaſured by the ſum of as many altitudes *al*, *am*, &c. as there are points in the line *ac*. Erect perpendiculars *lo*, *mp*, &c. reſpectively equal to *al*, *am*, &c. and the ſum of theſe perpendiculars will be the meaſure of the whole preſſure on the line *ac*: but the ſum of theſe is equal to the area of the triangle *acd*; and this is as the ſquare of its altitude *ac*. When *ac* repreſents a ſquare, the triangle *acd* muſt repreſent a priſm, having the ſaid triangle for its baſe, and the ſide of the ſquare for its altitude: the weight of that priſm of water is, therefore, equal to the preſſure made againſt the ſquare, or ſide of the cube; which, as the priſm is half the cube, is equal to half the weight of the whole water contained in the veſſel; and as each ſide bears the ſame degree of preſſure, all the four ſides ſuſtain four times half the weight, or twice the whole weight of the water: and, becauſe the bottom ſuſtains a preſſure equal to the whole weight of the water, the bottom and ſides of a cubical veſſel taken together ſuſtain a preſſure from the water contained in it equal to thrice its weight. The ſame obſervations may be eaſily applied to planes that are oblique to the horizon; and we may conclude univerſally, that the preſſure upon any plane, of whatever figure and ſituation, is equivalent to the weight of a ſolid of water, formed by erecting perpendiculars upon every point of the plane propoſed, equal to the reſpective diſtances of thoſe points from the upper ſurface of the water: or, the preſſure on any ſurface is equal to the ſum of all the products which are made by multiplying every indefinitely ſmall part of the ſurface into its diſtance from the top of the water. To find the ſum of all theſe products, or a body of water equal to that ſum, is, in moſt caſes, a difficult problem: Stevinus has attempted the ſolution of it in few inſtances, confining himſelf to regular plane ſurfaces. Mr. Cotes has laid down the following univerſal and expeditious rule: the preſſure on any ſurface is equal to the weight of a body of water whoſe magnitude is found by multiplying the ſurface propoſed into the depth of its center of gravity under water; and the preſſure on any number of ſurfaces of different bodies, however differently ſituated, is equal to the weight of a body of water whoſe magnitude is found by multiplying the ſum of all thoſe ſurfaces into the depth of their common center of gravity under water. The demonſtration of this rule depends on the following theorem, viz. that the ſum of the products, ariſing from multiplying every indefinitely ſmall part of any ſurface, or number of ſurfaces, reſpectively, into its perpendicular diſtance from any propoſed plane, will be equal to the product of the whole ſurface or number of ſurfaces multiplied into the perpendicular diſtance of the center of gravity of any ſingle ſurface, or of the common center of gravity of the whole number of ſurfaces from the ſame plane. Thus, let a, b, c, d, (*fig.* 17.) repreſent weights, hanging at their centers of gravity a, b, c, d, by the lines ao, bo, co, do, fixed to a horizontal plane o, o; o, o; and let z be the common center of gravity of all the weights, and zo its perpendicular diſtance from the ſaid plane. Let x be the common center of gravity of a and b, and to xo, drawn parallel to the reſt, let am and bn be perpendicular. In the ſimilar triangles mxa and nxb, $mx:nx::(xa:xb::)\,b:a$. See Center *of Gravity.* Therefore $a \times mx = b \times nx$, i. e. $a \times \overline{mo - xo} = b \times \overline{xo - no}$, and, conſequently, $a \times mo + b \times no = \overline{a+b} \times xo$. In the common center of gravity of a and b ſuſpend a weight $x = a + b$, and a weight $y = x + c$ in the common center of gravity of x and c, and a weight $z = y + d$, in the common center of gravity of y and d. Then z is the common center of gravity of a, b, c, d. And we have (as above) $a \times ao + b \times bo = x \times xo$, and $x \times xo + c \times co = y \times yo$, and $y \times yo + d \times do = z \times zo$: conſequently $a \times ao + b \times bo + c \times co + d \times do = z \times zo = \overline{a+b+c+d} \times zo$. And this will be the caſe, if the ſuſpended lines ao, &c. be perpendicular to any plane, though not parallel to the horizon. Now taking the upper ſurface of water for that plane to which we refer the indefinitely ſmall parts of the ſurface which is expoſed to the preſſure we are concerned with; ſince it has been already ſhewn, that the preſſure upon the whole is equivalent to the weight of a body of water which is equal in magnitude to the ſum of all the products, made by multiplying every little part by its diſtance from the upper plane of the water; and that this ſum of products is exactly equal to the product of the whole ſurface or number of ſurfaces multiplied into the diſtance of the center of gravity from the upper plane of the water; it will follow, that the ſame product is the meaſure of a magnitude of water, whoſe weight is equivalent to the preſſure required. See Cotes's Hydroſt. Lect. 3.

For the laws of the preſſure and gravitation in Fluids ſpecifically heavier, or lighter, than the bodies immerged, ſee Gravity, *Specific.*

For the laws of the reſiſtance of Fluids, or the retardation of ſolid bodies moving in *fluids*, ſee Resistance.

For the aſcent of Fluids in capillary tubes, or between glaſs planes, ſee Ascent and Capillary *Tubes.*

The motions of *fluids*, and particularly water, do alſo make the ſubject of hydraulics.

Fluids, *Hydraulic Laws of.* I. The velocity of a *fluid*, as water, moved by the preſſure of a ſuperincumbent *fluid*, as air, is equal at equal depths, and unequal at unequal ones.

For the preſſure being equal at equal depths, the velocity ariſing thence muſt be ſo to; and vice verſa: yet the velocity does not follow the ſame proportion as the depth, notwithſtanding that the preſſure, whence the velocity ariſes, does increaſe in the proportion of the depth. But here the quantity of the matter is concerned: and the quantity of motion, which is compounded of the ratio of the velocity and quantity of matter, is increaſed in equal times as the ſquares of the velocities.

II. The velocity of a *fluid* ariſing from the preſſure of a ſuperincumbent *fluid*, at any depth, is the ſame as that which a body would acquire in falling from a height equal to the depth; as is demonſtrated both from mechanics and experiments. See Descent.

III. If two tubes of equal diameters, full of any *fluid*, be placed in any poſition, either erect, or inclined; provided they be of the ſame altitude, they will diſcharge equal quantities of the *fluid* in equal times.

That tubes, every way equal, ſhould, under the ſame circumſtances, empty themſelves equally, is evident; and that the bottom of a perpendicular tube is preſſed with the ſame force as that of an inclined one, when their altitudes are equal, has already been ſhewn. Whence it eaſily follows, that they muſt yield equal quantities of water, &c.

IV. If two tubes of equal altitudes, but of unequal apertures, be kept conſtantly full of water, the quantities of water they yield in the ſame time, will be as the diameters; and this, whether they be erect, or any way inclined.

Hence, if the apertures be circular, the quantities of water emptied in the ſame time, ought to be in a duplicate ratio of the diameters.

But this law, Mariotte obſerves, is not perfectly agreeable to experiment. If one diameter be double the other, the water flowing out of the leſs is found more than a fourth of what flows out of the greater. But this may have been owing to the ſame accidental irregularities in making the experiments.

Wolfius however aſcribes it principally to this, that the column of water directly over the aperture is ſhorter than that next the ſides or parietes of the veſſel: for the water, in its efflux, forms a kind of cavity over the aperture; that part immediately over it being evacuated firſt, and the other water not running faſt enough from the ſides to ſupply it. Now, this cavity, or diminution of altitude, being greater in the greater tube, than in the leſs; hence the preſſure, or endeavour to paſs out, becomes proportionably leſs in the greater tube, than in the leſs.

V. If the apertures E and F of two tubes AB and CD (*fig.* 18. and 19.) be equal, the quantities of water, diſcharged in the ſame time, will be as the velocities.

VI. If two tubes have equal apertures E and F, and unequal altitudes AB and CD, the quantity of water diſcharged from the greater AB, will be to that diſcharged from CD, in the ſame time, in a ſubduplicate ratio of the altitudes AB and CD.

Hence, 1. The altitudes of waters, AB, and CD, diſcharged through equal apertures E and F, will be in a duplicate ratio of the waters diſcharged in the ſame time. And as the quantities of water are as the velocities, the velocities are likewiſe in a ſubduplicate ratio of their altitudes.

Hence, 2. The ratio of the waters diſcharged by two tubes AB, and CD, together with the altitude of one of them, being given, we have a method of finding the altitude of the other, viz. by finding a fourth proportional to the three given quantities; which proportional, multiplied by itſelf, gives the altitude of CD, required.

Hence, alſo, 3. The ratio of the altitudes of two tubes of equal apertures being given, as alſo the quantity of water diſcharged by one of them, we have a method of determining the quantity the other ſhould diſcharge in the ſame time.

Thus, to the given altitudes, and the ſquare of the quantity of water diſcharged at one aperture, find a fourth proportional. The ſquare root of this will be the quantity of water required.

Suppoſe, e. gr. the height of the tubes as 9 to 25, and the quantity of water diſcharged at one of them, three inches; that diſcharged by the other will be $= \sqrt{\frac{9 \times 25}{9}} = \sqrt{25} = 5$.

VII. If the altitude of two tubes AB and CD be unequal, and the apertures E and F be likewiſe unequal, the quantities of water, diſcharged in the ſame time, will be in a ratio compounded of the ſimple ratio of the apertures, and the ſubduplicate one of the altitudes.

And hence, if the quantities of water diſcharged in the ſame time by two tubes, whoſe apertures and altitudes are unequal, be equal, the apertures are reciprocally as the roots of the altitudes, and the altitudes in a reciprocal ratio of the ſquares of the apertures.

VIII. If the altitudes of two tubes be equal, the water will flow out with equal velocity, however unequal the apertures be.

IX. If the altitudes of two tubes, AB and CD, as alſo their apertures, E and F, be unequal, the velocities of the waters diſcharged are in a ſubduplicate ratio of their altitudes.

And hence, 1. As the velocities of waters flowing out at equal apertures, when the altitudes are unequal, are alſo in a ſubduplicate ratio of the altitudes; and as this ratio is equal, if the altitudes be equal, it appears in the general, that the velocities of waters flowing out of tubes, are in a ſubduplicate ratio of the altitudes.

Hence alſo, 2. The ſquares of the velocities are as the altitudes.

Mariotte found, from repeated experiments, that if a veſſel ABCD have a tube EG fitted to it, there will more water be evacuated through the tube, than there could have been, in the ſame time, through the aperture of the veſſel E without the tube; and that the motion of the *fluid* is accelerated ſo much the more, as the tube EG is the longer.

E. gr. The altitude of a veſſel AC being one foot, that of the tube EG three feet, and the diameter of the aperture three lines, no leſs than 6½ ſeptiers of water were diſcharged in the ſpace of one minute; whereas, upon taking off the tube, only four ſeptiers were diſcharged. Again, when the length of the tube EG was ſix feet, and the diameter of the aperture G an inch, the whole quantity of water ran out in thirty-ſeven ſeconds; but, cutting off half the tube, the veſſel was not evacuated in leſs than forty-five ſeconds; and, taking it quite away, in leſs than ninety-five ſeconds.

X. The altitudes and apertures of two cylinders full of water being the ſame, one of them will diſcharge double the quantity of water diſcharged in the ſame time by the other, if the firſt be kept continually full, while the other runs itſelf empty; for the velocity of the full veſſel will be equable, and that of the other will be continually retarded. Now, it is demonſtrated, that, if two bodies be impelled by the ſame force, and the one proceeds equably, and the ſecond is equably retarded, by that time they have loſt all their motion, the one has moved double the ſpace of the other.

XI. If two tubes have the ſame altitudes, and equal apertures, the times wherein they will empty themſelves, will be in the ratio of their baſes.

XII. Cylindric and priſmatic veſſels, as ABCD (*fig.* 20.) empty themſelves by this law, that the quantities of water diſcharged in equal times decreaſe, according to the uneven numbers 1, 3, 5, 7, 9, &c. taken backwards.

For the velocity of the deſcending level FG is continually decreaſing in the ſubduplicate ratio of the decreaſing altitudes; but the velocity of a heavy body deſcending, increaſes in the ſubduplicate ratio of the increaſing altitudes. The motion, therefore, of the level FG, in its deſcent from G to B, is the ſame as if it were to deſcend in the inverſe ratio from B to G; but, if it deſcend from B to G, the ſpaces, in equal times, would increaſe, according to the progreſſion of the uneven numbers; conſequently the altitudes of the level FG, in equal times, would decreaſe, according to the ſame progreſſion inverſly taken.

Hence, therefore, the level of water FG deſcends by the ſame law, as, by an equal force impreſſed, it would aſcend through an altitude equal to BG.

From this principle many other particular laws of the motion of *fluids* might be demonſtrated, which, for brevity ſake, we here omit.

To divide a cylindrical veſſel into parts, which ſhall be evacuted in certain parts or diviſions of time, ſee Clepsydra.

XIII. If water, deſcending through a tube HE (*fig.* 21.) ſpout up at the aperture G, whoſe direction is vertical, it will riſe to the ſame altitude GI, at which the level of the water LM, in the veſſel ABCD, does ſtand.

For ſince the water is driven through the aperture G by the force of gravity of the column EK, its velocity will be the ſame as that with which a body, by the ſame force impreſſed, would riſe to the altitude FI: wherefore, ſince the direction of the aperture is vertical, the direction of the water ſpouting through it, will be ſo too; conſequently the water muſt riſe to the height of the level of the water LM in the veſſel.

Indeed, by the experiment, it appears, that the water does not riſe quite ſo high as I: beſides, the aperture G ſhould be ſmaller, as the height of the level of the water is leſs; and even ſmaller when mercury is to be ſpouted than when water. But this is no objection to the truth of the theorem; it only ſhews, that there are certain external impediments, which diminiſh the aſcent. Such are, the reſiſtance of the air, and the friction of the tube, &c. See Jet *d'Eau*.

XIV. Water, deſcending through an inclined tube, or a tube bent in any manner, will ſpout up, through a perpendicular aperture, to the height at which the level of the water in the veſſel ſtands.

XV. The lengths or diſtances DE and DF, or IH and IG, (*fig.* 22.) to which water will ſpout either through an inclined, or an horizontal aperture D, are in a ſubduplicate ratio of the altitudes of the veſſel or tube AB and AC.

For ſince water, ſpouted out through the aperture D, endeavours to proceed in the horizontal line DF, and, at the ſame time, by the power of gravity, tends downwards in lines perpendicular to the ſame; nor can the one power hinder the other, inaſmuch as the directions are not contrary; it follows, that the water, by the direction BA, will arrive at the line IG in the ſame time wherein it would have arrived at it, had there been no horizontal impulſe at all. Now, the right lines IH and IG are the ſpaces which the ſame water would have deſcribed in the mean time by the horizontal impetus; but the ſpaces IH and IG, inaſmuch as the motion is uniform, are as the velocities: conſequently the velocities are in a ſubduplicate ratio of the altitudes AB and AC; and therefore the lengths or diſtances, to which the water will ſpout in apertures either horizontal or inclined, are in a ſubduplicate ratio of the altitudes.

That the velocities are in the ſubduplicate ratio of the altitudes may be ſhewn by experiment: for, let two pipes, as C and *g*, of equal ſized bores, be fixed into the ſide of the veſſel AB, (*fig.* 23.) and let the pipe *g* be four times as deep below the ſurface of the water at *b*, in the veſſel, as the pipe C is; and whilſt theſe pipes run, let water be conſtantly poured into the veſſel, to keep the ſurface at the ſame height. Then a veſſel holding a pint, applied to the ſpout C, and another containing a quart, at the ſpout *g*, will be filled at the ſame time. The horizontal diſtance, to which a *fluid* will ſpout from an horizontal pipe, in any part of the ſide of an upright veſſel, below the ſurface of the *fluid*, is equal to twice the length of a perpendicular to the ſide of the veſſel, drawn from the mouth of the pipe to a ſemicircle deſcribed upon the altitude of the *fluid*; and, therefore, the *fluid* will ſpout to the greateſt diſtance poſſible from a pipe, whoſe mouth is at the center of the ſemicircle; becauſe a perpendicular to its diameter (ſuppoſed parallel to the ſide of the veſſel) drawn from that point, is the longeſt that can poſſibly be drawn from any part of the diameter to the circumference of the ſemicircle. Thus, if the veſſel AB, *fig.* 23. be full of water, the horizontal pipe D be in the middle of its ſide, and the ſemicircle N*edcb* be deſcribed on D as a center, with the radius D*g*N, or D*fb*, the perpendicular D*d* to the diameter ND*b*, is the longeſt that can be drawn from any part of the diameter to the circumference N*edcb*. And if the veſſel be kept full, the jet G will ſpout from the pipe D to the horizontal diſtance NM, which is double the length of the perpendicular D*d*. If two other pipes, as C and E, be fixed into the ſide of the veſſel at equal diſtances above and below the pipe D, the perpendiculars C*c* and E*e*, from theſe pipes to the ſemicircle, will be equal; and the jets F and H, ſpouting from them, will each go to the horizontal diſtance NK, which is double the length of either of the equal perpendiculars C*c* or E*e*. Ferguſon's Lect. p. 70.

Hence, as every body, projected either horizontally or obliquely, in an unreſiſting medium, deſcribes a parabola; water projected either through a vertical or inclined ſpout, will deſcribe a parabola.

Hence we have a way of making a delightful kind of water arbours, or arches, viz. by placing ſeveral inclined tubes in the ſame right line.

On theſe principles are formed various hydraulic engines for the raiſing, &c. of fluids, as pumps, ſyphons, fountains, or jets d'eau, &c. which ſee deſcribed under their proper articles Pump, Syphon, Fountain, Spiral Screw, &c.

For the laws of the motion of Fluids, by their own gravity, along open chanels, &c. ſee River, and Wave, and *Motion* of Water.

For the laws of preſſure and motion of air, conſidered as a Fluid, ſee Air, and Wind.

Fluids. Animalcules obſerved in *fluids* are of divers kinds; ſome are flat, others eel-like, but the greater part of an oval figure. Lewenhoeck gives a deſcription of a very unuſual ſhaped creature, fixed in a little ſcabbard or ſheath, which was faſtened to ſome of the ſmall green weeds found in ditches full of water. Phil. Tranſ. N° 337, p. 160.

Waters of all kinds, that have ſtood a while expoſed to the air, till they have grown a little putrid, or where putrefaction has been promoted by the admixture of other matters, abound in variety of animalcules, having each their peculiar characters, ſizes, figures, œconomy, and method of life, not to ſay uſes. In a ſmall drop of the diſcoloured ſurface of rain-water, which had ſtood two months in a window, Dr. Harris obſerved four ſorts of animalcules: the clear part of the drop preſented two kinds, both very ſmall; the firſt of the figure of ants-eggs: theſe were in a continual briſk motion. The ſecond more oblong, three times as long as broad, were exceedingly numerous, but their motion ſlow.

In the thick part of the drop there were alſo two ſorts of animalcules. The firſt of the eel-kind, reſembling thoſe in vinegar, but much ſmaller, and with their extremes more ſharp. Theſe would wriggle out into the clear part, and then ſuddenly betake themſelves back again, and hide in the thick and muddy part of the drop, much like common eels in the water. The ſecond ſort reſembled a large maggot, which would contract themſelves into a ſpherical figure, and then ſtretch out again. The end of the tail appeared with a forceps, like that of an ear-wig. They might be plainly perceived to open and ſhut their mouths, from whence air-bubbles were frequently diſcharged. The number of theſe was not above four or five. The ſame four kinds of animalcules he alſo found in many other drops of the ſame corrupted water.

Animalcules in *fluids*, are generally found at the top. In the lower parts of the water, Dr. Harris aſſures us he could never find any, unleſs when the liquor had been diſturbed, and the ſurface ſhaken down, and mingled with the lower parts. Dr. Harris examined ſome rain-water that had ſtood uncovered a little while, but had not contracted any thick or diſcoloured ſcum.

And here, where the water was clear, he could not find any animals at all; but a little thin white ſcum, that, like greaſe, began to appear in its ſurface, he found to be a congeries of exceeding ſmall animals of different ſhapes and ſizes, much like thoſe produced by ſteeping barley in water.

Viewing a ſmall drop of the green ſurface of ſome puddle water, he found it altogether compoſed of animalcules of ſeveral ſhapes and magnitudes; the moſt remarkable, were thoſe which gave the water that green colour, and were oval creatures, whoſe middle parts were of a graſs-green, but each end clear and tranſparent. They could contract and dilate themſelves, tumble over and over many times together, and then ſhoot away like fiſhes. Phil. Tranſ. N° 220, p. 255.

Dr. Harris looked on the ſurface of ſome mineral chalybeate water, which ſtood in a vial unſtopt for about three weeks. In it he ſaw two kinds of animals, one exceeding ſmall, and the other very large, which latter ſort had on the tail ſomething that looked like fins. There were but very few of either ſort. Phil. Tranſ. N° 220, p. 257. ſeqq.

Animalcules in *fluids* are eaſily deſtroyed by only ſeparating them a while from their element. Naturaliſts have even found ſhorter ways. A needle-point dipped in ſpirit of vitriol, and then immerſed into a drop of pepper-water, readily kills all the animalcules, which though before friſking about with great livelineſs and activity, no ſooner come within the influence of the acid particles, than they ſpread themſelves, and tumble down to all appearance dead. The like may be done by a ſolution of ſalt, only with this difference; that by the application of this latter, they ſeem to grow vertiginous, turning round and round, till they fall down. Tincture of ſalt of tartar uſed in the ſame manner kills them ſtill more readily; yet not ſo, but there will be apparent marks of their being ſick firſt and convulſed. Inks deſtroy them as faſt as ſpirit of vitriol, and human blood, by virtue of the ſalt contained in it, produces the ſame effect. Urine, ſack, and ſugar, do all deſtroy them, though not ſo faſt; beſides, that there is ſome diverſity in their figures and appearances, as they receive their deaths from this poiſon, or that. The point of a pin dipped in ſpittle preſently killed all the kinds of animalcules in puddle water, as Dr. Harris ſuppoſes it will other animalcules of this kind. Phil. Tranſ. N° 203, p. 863, ſeq. and No. 220, p. 256.

We find in the waters of our ditches many ſpecies of ſmall animalcules, both of the cruſtaceous and teſtaceous kinds. The legs of the creatures are ſhort, they reſemble thoſe of crabs and lobſters, but are of a much more curious ſtructure; they are leſs than a ſmall flea, but they ſeem all breeders, carrying ſpawn at their tails, or in two ſmall bags, one hanging from each ſide. Theſe bags are often ſeen broken, and the ſpawn is then found to conſiſt of globules very large in proportion to the ſize of the creature. There is another ſort beſide theſe, as beautiful, but much ſmaller than they; this in ſhape more reſembles the ſhrimp, and carries its ſpawn as the ſhrimp does. Theſe kinds both ſeem only to have one eye, and that placed exactly in the middle of their forehead, without the leaſt trace of a dividing line; and they are often ſo tranſparent, that the motion of their bowels, and pulſation of their heart, may be ſeen. Baker's Microſcope, p. 93.

All who are acquainted with the microſcope, know very well, that in water, in which the beſt glaſſes can diſcover no animated particle of matter, after a few grains of pepper, or a ſmall fragment of a plant of almoſt any kind has been ſome time in it, animals full of life and motion are produced, and thoſe ſo numerous as to equal the *fluid* itſelf in quantity.

A ſmall quantity of water taken from any ditch in the ſummer months, is found to be full of little worms, ſeeming in nothing ſo much as ſize to differ from theſe microſcopic animalcules. Nay water, without theſe, expoſed in open veſſels in the ſummer months, will be always found, after a few days, to abound with multitudes of them, viſible to the naked eye, and full of life and motion.

Theſe we know, by their future changes, are the fly-worms of the different ſpecies of gnats, tipulæ, and multitudes of the other fly-ſpecies; and we can eaſily determine, that they have owed their origin only to the eggs of the parent fly there depoſited. Nay, a cloſer obſervation will at any time give ocular proof of this; as the flies may be ſeen laying their eggs there, and thoſe eggs may be followed in all their changes to the fly again. Why then are we to doubt but that the air abounds with other flies and animalcules, as minute as the worms in theſe *fluids?* and that theſe laſt are only the fly-worms of the former, which after a proper time ſpent in that ſtate, will ſuffer changes like thoſe of the larger kinds, and become flies like thoſe to whoſe eggs they owed their origin? Vid. Reaumur, Hiſt. Inſect. vol. iv. p. 431.

The differently medicated liquors, made by the infuſions of different plants, afford a proper matter for the worms of different ſpecies of theſe ſmall flies; and there is no reaſon to doubt but that among theſe ſome are viviparous, others oviparous, and to this may be in a great meaſure owing the different time taken up for the production of the inſects in different *fluids*. Thoſe which are a proper matter for the worms of the viviparous fly, may be ſooneſt found full of them, as probably the liquor is no ſooner in a ſtate to afford them a proper nouriſhment than their parents place them there: whereas thoſe produced from the eggs of the little oviparous flies muſt, after the liquor is in a proper ſtate, and they are depoſited in it, in form of eggs, have a proper time to be hatched before they can appear alive.

It is eaſy to prove that the animals we find in theſe vegetable infuſions were brought thither from ſome other place. It is not leſs eaſy to prove that they could not be in the matter infuſed, any more than in the *fluid* it is infuſed in.

Notwithſtanding the fabulous accounts of ſalamanders, it is now well known, that no animal, large or ſmall, can bear the force of fire for any conſiderable time; and by parity of reaſon we are not to believe, that any inſect, or embryo inſect, in any ſtate, can bear the heat of boiling water for many minutes. To proceed to enquiries on this foundation, if ſeveral tubes filled with water with a ſmall quantity of vegetable matter, ſuch as pepper, oak-bark, truffles, &c. in which, after a time, inſects will be diſcovered by the microſcope; and other-like tubes be filled with ſimple water boiled, with water and pepper boiled together, and with water with the two other ingredients, all ſeparately boiled in it; when all theſe liquors come to a proper time for the obſervation of the microſcope, all, as well thoſe which have been boiled, as thoſe which have not, will be found equally to abound with inſects, and thoſe of the ſame kind in the infuſions of the ſame kind, whether boiled or not boiled.

Thoſe in the infuſions which had ſuſtained a heat capable of deſtroying animal life, muſt therefore not have ſubſiſted either in the water, or in the matters put into it, but muſt have been brought thither, after boiling, and it ſeems by no way ſo probable, as by means of ſome little winged inhabitants of the air depoſiting their eggs or worms in thoſe *fluids*.

It is a natural queſtion on this to aſk, why it is, that while we ſee myriads of the progeny of theſe winged inſects in water, we ſeldom ſee the inſects themſelves? The anſwer is equally eaſy, viz. becauſe we can always place a drop of this water immediately before the focus of the microſcope, and keep it there while we at leiſure examine its contents; but that is not the caſe with regard to the air inhabited by the parent flies of theſe our worms, which is of immenſe extent in proportion to the water proper to nouriſh theſe worms, and conſequently, while the latter are cluſtered together in heaps, the former may be diſperſed and ſcattered. Nor do we want inſtances of this even in the inſects of a larger kind. In many of our gardens we frequently find veſſels of water filled with the gnat-worms, as plentifully in proportion to their ſize, as theſe our *fluids* with animalcules. Every cubic inch of water in theſe veſſels contains many hundreds of theſe animals; yet we ſee many cubic inches of the air in the garden not affording any one of the parent flies. Id. ibid. See Animalcules, Eel, Vinegar, and Pepper-*water*.

Fluid, *Cauſtic*. See Caustic-*fluid*.

Fluid, *Senſitive*. See Sensitive-*fluid*.

FLUKE, in *Ichthyology*, a word uſed in ſome parts of England as a name for the Flounder.

Fluke *of an anchor*, that part of it which faſtens in the ground. See Anchor.

FLUKEN, in *Natural Hiſtory*, a name given by the miners in Cornwall, and ſome other places, to a ſort of greyiſh ſoft earth, in which there are a great number of ſmall white ſtones of a ſparry nature. They uſually find this mixt ſubſtance near the places where the loads or veins of ore lie, and it ſeems evidently to have been waſhed from among the broken parts of the ſtrata near where the metals lie. It is itſelf a coarſe and often foul earth, and the white ſtones which it contains, are ſometimes ſmall cryſtalline, but opake pebbles, of the nature of thoſe which we find in various ſizes in our ſand and gravel-pits; but more uſually they are ſmall fragments of common ſpar, and are of a plated figure when broken, and ſeem only rounded by the motion of the water, like many ſmall ſtones which are found in the beds of rivers, and on the ſea-ſhores. The ſoft nature of the ſubſtance of which theſe are compoſed makes them eaſily liable to be rubbed into a round figure.

FLUMMERY, a wholeſome ſort of vegetable jelly made of oatmeal.

The manner of preparing it is as follows: put in the proportion of three large handfuls of finely ground oatmeal, to ſteep for twenty-four hours or more, in two quarts of fair water; then pour off the clear water, and put two quarts of freſh water to it; ſtrain it through a fine hair-ſieve, and boil it till it is as thick as a haſty pudding, ſtirring it continually while it is boiling that it may be very ſmooth: ſome ſweeten it with ſugar, and add roſe or orange-flower water; and then eat it with white or Rheniſh wine, cream, or milk.

FLUOR, in *Phyſic*, &c. denotes a fluid; or, more properly, the ſtate of a body, which was before hard and ſolid, but is now reduced, by fuſion or fire, into a ſtate of fluidity.

Gold and ſilver will remain a long time in *fluor*, kept to them by the intenſeſt heat, without loſing any thing of their weight. See GOLD, FIXITY, &c.

The word *Fluor* is applied to ſignify the habitual fluidity of any ſubſtance, or that property by which a ſubſtance cannot be rendered ſolid, and is employed as an epithet, to diſtinguiſh ſuch ſubſtances from others of the ſame kind, but which are habitually ſolid, or which may be rendered ſolid.

Thus, acids, which are habitually fluid, as all the mineral and ſome vegetable acids, are called *fluor* acids, in order to diſtinguiſh them from the acid of tartar and acid eſſential ſalts, which are naturally concrete. Alſo volatile alkali treated with quick-lime, or with metallic earths, ſo that it is always liquid and not cryſtallized, is called *fluor* volatile alkali, to diſtinguiſh it from the concrete and cryſtallizable volatile alkali. See ACID *Fluor*.

FLUOR is alſo uſed, by the modern mineral writers, for ſuch ſoft, tranſparent, ſparry kinds of mineral concretions, as are frequently found amongſt ores and ſtone, in mines and quarries.

Theſe are of a ſtony nature, and reſemble gems, but are leſs hard, and are called *metallic fluors* and *ſpars*.

FLUOR *Albus*, or *Uterinus*, a kind of flux, incident to women, popularly called the *whites*.

It conſiſts in an irregular, diſorderly diſcharge of ſome corrupt humour from the uterus, near the os internum and the vagina, ſometimes white and pale, like whey; ſometimes yellow, green, or blackiſh. At firſt, it is uſually mild, and harmleſs; but, in time, it grows hot, ſharp, and corroſive, and excoriates all the parts it touches. It is attended with a pain in the ſpina dorſi, a ſwelling of the feet and eyes, wearineſs, lumbago, a loſs of appetite, loathings, and unaccountable longings, change of complexion, &c.

It generally proceeds from a relaxed habit, ariſing from indolence, extreme grief, or the immoderate uſe of coffee, tea, or other weak and watery diet; and ſometimes from exceſſive menſtrual diſcharges, abortions, &c.

The immediate cauſes of a *fluor albus*, are debility of the veſſels from which the menſtrual diſcharge is made, or a retarded circulation of the blood through them. In ſome languid habits, the *fluor albus* returns periodically, inſtead of the proper menſtrual evacuation, till the patient's conſtitution is invigorated; and in many inſtances, it is manifeſt only during the abſence of the menſes.

It muſt be carefully diſtinguiſhed from an ulcer in the uterus, and a gonorrhœa, which laſt it greatly reſembles. It happens to all ages, from girls of three years old; and at all times, before, after, or even along with, the menſes, and even to women with child.

Thoſe that are moſt ſubject to this diſorder, are women abounding with ſerum, thoſe of lax fibres, women at the flower of their age, and girls at the approach of the menſes.

Etmuller takes it for a gonorrhœa muliebris, analogous to a non-virulent gonorrhœa in men, flowing out of the glandulæ of the proſtates.

What the coryza is in the noſtrils; too much weeping in the eyes; and coughing and hawking in the fauces; that, according to Etmuller, is this *fluor* in the uterus.

According to Pitcairn, all the difference between the venereal gonorrhœa, and a *fluor albus*, is, that the humour evacuated in the latter is viſcid, and in the former quite thin and ſerous. The ſame author adds, that the *fluor albus* can only be cured by medicines proper for the venereal diſeaſe.

Aſtruc diſtinguiſhes this diſorder into the lymphatic, ſemilacteous, and lacteous: Dr. Shebbeare ſays, that the *fluor albus*, the hectic fever, and the diabetes, are of the ſame general kind, and that they are cauſed by a defect of vital heat in different circumſtances.

Other authors diſtinguiſh this diſeaſe into two kinds, the benign and the malignant; the firſt is ſimple, the other complicated with the venereal diſeaſe. The ſimple *fluor albus*, though called benign in compariſon of the other, is yet very difficult to cure, and is always the more ſo, the longer it has continued upon the perſon; and very often the common methods by medicine fail, unleſs the cauſe and manner of life be changed. But though it is thus difficult of cure, it is of leſs danger than many other diſeaſes, for many women have had it many years, nay a great part of their lives even to old age, and that without any great hurt. Indeed it very rarely grows to that height as to injure the ſtrength or health, farther than by a paleneſs of the face, and a tumid look, and a laſſitude of the limbs: but if this diſcharge, when it has been many years habitual to a perſon, be ſtopped by any improper methods, it often brings on very terrible complaints. The worſt effect of the *fluor albus*, is that, when of long ſtanding, it uſually renders women barren; and its principal difficulty of cure is this, that it will often ſeem to give way to medicines, but return afterwards with all its former violence; nay when people ſeem ever ſo perfectly cured of it, it often returns, and the whole method is to be gone through again. The *fluor albus*, while it only attends the flowing of the menſtrual diſcharges, is a thing of no great moment; but when thoſe diſcharges ſtop, and this matter becomes more acrid, and is voided in larger quantities, it then becomes a diſeaſe that calls for all the art of the phyſician to remedy it; for, in ſome perſons it brings on finally hectics and waſting of the fleſh, and in others cachexies, œdemas, and dropſies.

Method of cure. When this diſeaſe happens to a perſon of a plethoric habit, the firſt ſtep toward a cure is bleeding in the foot, to diſcharge part of the load of blood, leſt nature ſhould make that an occaſion of converting a great part of it into ſerum, and throwing it upon the uterus for its diſcharge. After bleeding, an abſterſion of the matter of the diſeaſe, and a ſucceſſive evacuation of it are to be attempted, by the more temperate uterine medicines, the gentle emmenagogues and cleanſers; ſuch are amber, myrrh, and turpentine. The ſecond of theſe is to be given, but in moderate doſes, and the laſt ſucceeds beſt after boiling, or when mixt with maſtic. The digeſtive ſalts are alſo to be given, and nitre in this caſe often proves a very beneficial medicine. The aperient roots, ſuch as lovage, pimpernel, and the like, are to be given in decoction, and the leaves of baum and ſouthernwood are no ineffectual remedies; and finally the gums are to be added, ſuch as galbanum, ammoniacum, and ſagapenum. After theſe abſtergents and preparatory medicines, gentle purges are to be given, and finally ſuch medicines as reſtore the due tone of the parts; of this nature are the milder chalybeats, and decoctions of the nervous and aromatic herbs, ſuch as roſemary, origanum, ſerpyllum, and the like. Junker's Conſp. Med. p. 472.

The diet of the patient ſhould be ſolid and nouriſhing, but eaſy of digeſtion: her drink generous, as red port or claret, mixed with Pyrmont, Briſtol, or lime-water. Iſinglaſs diſſolved in milk, ſtrong broths, and a milk diet, have been of conſiderable ſervice: tea and coffee ſhould be avoided. The beſt medicine is the Peruvian bark in ſubſtance; and the cold bath is extremely uſeful. Dr. Cheyne recommends mild mercurials to alter, chalybeats to invigorate, and the bark and cold bathing for completing the cure.

Dr. Morgan thinks the *fluor albus* is the lymph corrupted, and aſſures us, that the tincture of cantharides, given in a pretty ſtrong decoction of guiacum, has good effects when the diſtemper is recent, but when it is of long ſtanding and inveterate, recourſe muſt be had to mercurials.

FLUSH *Deck*. See DECK.

FLUSHER, in *Ornithology*, the common name of the leſſer BUTCHER-*bird*, called by authors the lanius minor, and the lanius tertius of Aldrovand. Its beak is black, long, and very ſtrong, and a little hooked at the end: the mouth is yellow within, and the tongue jagged. It has ſeveral ſhort briſtles at the top of the beak. The middle of its back and ſmaller feathers of its wings are of a reddiſh brown; its head and rump grey: it has a broad black line on each ſide of the head, running from the angle of the beak; its belly is white; its throat and breaſt whitiſh, with a caſt of red. Its wing-feathers are brown and black, and its legs and feet of a deep bluiſh black. It builds in holly-buſhes and ſuch places, and lays ſix oblong eggs, white at the ſmaller end, and ornamented with a circle and reddiſh ſpots at the other. It is common in Germany and in the northern parts of England. Ray's Ornith. p. 54.

FLUTA, in *Ichthyology*, a name given by Gaza and ſome authors to the common SPARUS, diſtinguiſhed by Artedi, by the name of the plain yellowiſh SPARUS, with a large annular black ſpot near the tail.

FLUTA is alſo a name given by Columella to the muræna of Ariſtotle and the ancient authors in general, as well Greek as Roman. It makes only one ſpecies of the muræna, according to Artedi; but being with him a generical name which comprehends all the eel-kind, the ſerpens marinus and the like, among theſe. This, which was anciently called ſimply the muræna, is diſtinguiſhed by that author under the name of the muræna having no pectoral fins; which being peculiar to this ſpecies, evidently and obviouſly diſtinguiſhes it at firſt ſight from all the reſt.

FLUTE, an inſtrument of muſic, the ſimpleſt of all thoſe of the wind-kind; played, by blowing it with the mouth; and the tones or notes formed and changed by ſtopping or opening holes diſpoſed for that purpoſe all along it. Thoſe in common uſe are either the *flute abec*, i. e. a beaked or common Engliſh *flute*, and the traverſe, Helvetian, or German *flute*, the invention of which is aſcribed by Galileo and Merſenne to the Helvetians: but the antique ſtatue of the piping faun, and a teſſelated pavement of Fortuna Virilis, erected by Sylla at Rome, in which is a repreſentation of a young man playing on a traverſe pipe, with an aperture to receive his breath, ſhew that it is of more ancient original.

The Latins call it *fiſtula*, and ſometimes *tibia*, pipe; from the former of which, ſome derive the the word *flute*: though Borel will have it derived from *fluta*, a lamprey, thus called *a fluitando in fluviis*; in regard the *flute* is long, like the lamprey, and has ſeven holes all along it, like that fiſh. Hawkins's Muſ. p. 128.

The ancient *fiſtulæ*, or *flutes*, were made of reeds; afterwards they were of wood; and at length of metal. But how they were blown, whether as our *flutes*, or hautboys, does not appear.

Monſ. Caſtillon apprehends that they were ſounded by means of a reed; and that there were two ſorts of them, in one of which the reed was viſible, as in our hautboy, but concealed in the other. Berlin. Mem. 1774, vol. v.

It is plain, ſome had holes, which at firſt were but few; but afterwards were increaſed to a greater number; and ſome had none. Some were ſingle pipes, and ſome a combination of ſeveral, particularly Pan's ſyringa, which conſiſted of ſeven reeds, joined together ſideways. Theſe ſeven reeds had no holes, each giving but one note, in all ſeven diſtinct notes; but at what intervals, is not known: perhaps they were the notes of the natural, or diatonic ſcale.

The German *flute* is different from the common one: it is not put into the mouth, by the end, as the ordinary ones are; the end is ſtopped up with a plug or tampion, but the lower lip is applied to a hole a little way diſtant from it.

It is made equally big every where, and perforated with ſix holes, beſides that of the mouth, and that opened by the key.

Flute, or **Fluyt**, is alſo a kind of long veſſel, with flat ribs, or floor timbers, round behind, and ſwelled in the middle; ſerving chiefly for the carrying of proviſions in fleets, or ſquadrons of ſhips: though it is often uſed in merchandize.

The word *flute*, taken for a ſort of boat, or veſſel, is derived, according to Borel, from the ancient *flotte*, a little boat. In the verbal proceſs of the miracles of St. Catherine of Sweden, in the xiith century, we read, *Unus equum ſuum una cum mercibus magni ponderis introduxit ſuper inſtrumentum de lignis fabricatum, vulgariter dictum* Fluta. Upon which the Bollandiſts obſerve, that in ſome copies it is read *flotta*, an inſtrument called by the Latins *ratis*; and that the word *flutta* or *flotta*, aroſe from *flotten*, or *vlotten*, to float.

Flute, in *weaving tapeſtry*. See **Tapestry**.

Flutes, or **Flutings**, in *Architecture*, are perpendicular channels, or cavities, cut along the ſhaft of a column, or pilaſter. See *Tab. Archit. fig.* 25, 26.

They are ſuppoſed to have been firſt introduced in imitation of the plaits of womens robes; and are therefore called by the Latins, *ſtriges*, and *rugæ*.

The French call them *cannelures*, as being excavations; and we, *flutes*, or *flutings*, as bearing ſome reſemblance to the muſical inſtrument ſo called.

They are chiefly affected in the Ionic order, in which they had their firſt riſe; though they are alſo uſed in all the richer orders, as the Corinthian and Compoſite; but rarely in the Doric; and ſcarce ever in the Tuſcan.

Their number is uſually twenty-four, though in the Doric it is only twenty.

Each *flute* is hollowed exactly in a quadrant of a circle.

Between the *flutes* are little ſpaces that ſeparate them, called, by Vitruvius, *ſtriæ*, and by us, *liſts*; though in the Doric, the *flutes* are frequently made to join each other, without any intermediate ſpace at all, the liſt being ſharpened off to a thin edge, which forms a part of each *flute*.

In ſome buildings we ſee columns with *flutes* that go winding round the ſhaft, ſpirally; but this is rather looked on as an abuſe.

Vignola determines the depth of the *flutes*, by taking the angle of an equilateral triangle for the centre. Vitruvius deſcribes it from the middle of the ſquare, whoſe ſide is the breadth of the *flute*; which latter method makes them deep. The *flutes*, or *ſtriges*, are frequently filled up with a prominent, or ſwelling ornament, ſometimes plain, in form of a ſtaff, or reed; and ſometimes a little carved, or enriched, in imitation of a rope, or otherwiſe, and therefore called *radentures*, or **Cablings**; and the columns, thus enriched, are called *cabled columns*. This is moſt frequent in the Corinthian order. The cablings, or fillings up, commence from about one third of the height of the column, reckoning from the baſe; and are continued to the capital: that is, they begin and end with the diminution of the column.

Flutes, or *Flutings*, are alſo uſed, in *Botany*, to denote the ſtems and fruits of certain plants, which have furrows analogous to thoſe of theſe columns.

FLUVIALIS, in *Botany*, the name given by Vaillant and Micheli to a genus of plants called by Linnæus **Najas**.

FLUVIATILES *cochleæ*, freſh-water *ſhell-fiſh*, a term uſed by naturaliſts, to expreſs thoſe kinds of ſhell-fiſh which never inhabit the ſea, but are found in our ponds, rivers, and ditches. Theſe, though much leſs numerous than the ſpecies of ſea-ſhells, are yet of a greater variety and beauty, than is uſually ſuppoſed. What are known at preſent, may be arranged under their proper heads in the following manner.

Of the univalve kinds we have two ſpecies of patellæ: the one having a beak at the ſummit of the ſhell; the other wanting it, and being ſmooth as the common patellæ or limpets of the ſea.

Of the *limaces* or ſnails we have five ſpecies; of the freſh water *neritæ* we have three kinds; one ſpecies of the *trochus*; three ſpecies of the *turbo*; ſeven ſpecies of the water *buccina*; four ſpecies of the *dolia*, or *conchæ globoſæ*; four ſpecies of the *cornu ammonis*: of the bivalve freſh water ſhells we have five ſpecies of the *chama* kind; ſix ſpecies of the muſcle kind.

Of the *pecten* kind we have only one ſpecies.

Of the multivalve claſs, there is not one known ſpecies.

The reducing the ſeveral ſpecies to their proper genera is eaſy, from a remembrance of the characters of each genus of the marine ſhells. The limpet is a flat ſhell elevated into a ſort of cone at the ſummit. Of the ſnail kind, if the mouth be round, the ſhell is a true limax; when it is ſemicircular, the ſhell is a nerita; and when it is oval or depreſſed, and the clavicle is long, it is then a trochus. The turbo, or ſcrew-ſhell, is known by its long and ſlender figure. The buccina are long ſhaped, and have a tail, and their mouth is narrow; and the dolia are of a ſomewhat globoſe figure. The cornu ammonis, and the umbilicated ſnail, are often confounded together by thoſe who obſerve their external reſemblance among the freſh water ſhells; but they are in reality ſufficiently different, the cornu ammonis being marked on the outſide with circular ridges, and divided on the inſide into ſeveral ſeparate cells like the common foſſile kinds; whereas the umbilicated ſnail is of an even external ſurface, and has only one cavity within. The ſnail alſo has its mouth placed toward one ſide, the **Cornu** *ammonis* in the middle: there are other differences, but theſe are ſufficient for the diſtinction. The *chamæ* are known by their roundiſh figure; the muſcles by being oblong; and the *pecten* is known by its ears and its *ſtriæ*. Hiſt. Nat. Eclair. p. 372.

FLUX, **Fluxus**, in *Medicine*, an extraordinary iſſue, or evacuation of ſome humour.

Fluxes are various, and variouſly denominated, according to their ſeats, or the humours thus voided; as a *flux* of the belly, uterine *flux*, hepatic *flux*, ſalival *flux*, &c.

The *flux* of the belly is of four kinds, which have each their reſpective denominations, viz. the **Lientery**, or *fluxus lientericus*; the **Coeliac**, or *fluxus chyloſus*; the **Diarrhoea**; and the **Dysentery**, or *bloody flux*.

A wound, or ſcarification acroſs the crown of the head, is uſed in Scotland, to cure *fluxes* and dyſenteries. Philoſoph. Tranſact. N° 312.

The biſhop of Cloyne, in his reflections on tar-water, ſays, he has known a *bloody-flux* of long continuance, after divers medicines had been tried in vain, cured by **Tar**-*water*. But what he takes to be the moſt ſpeedy and effectual remedy in a *bloody-flux*, is a clyſter of an ounce of common brown roſin, diſſolved over a fire in two ounces of oil, and added to a pint of broth, which not long ſince he had frequent occaſion of trying, when that diſtemper was epidemical. Nor can he ſay, that any to whom he adviſed it, miſcarried.

Flux, *abortive*, *fluxus abortivus*, is ſometimes uſed, among the ancients, as ſynonymous with abortion or effluxion, viz. where the embryo loſes its hold, and ſlips away. In this ſenſe, the eagle-ſtone is celebrated for ſtopping *abortive* fluxes; for which end it was to be hung to the arm, *ſubnexus ſpem uteri defendit a fluxibus abortivis*. See **Ætites**.

Among modern phyſicians, *abortive fluxes* are chiefly underſtood of a kind of hæmorrhages, which ſometimes precede, and bring on abortion; at other times, burſt forth in the act of excluſion.

In this ſenſe, a late author defines them a ſpecies of uterine hæmorrhages, happening to married women; when, after a ſtoppage of the menſes, for three or four months ſucceſſively, with a gradual ſwelling of the abdomen, and other ſigns of pregnancy, the blood begins to iſſue from the womb, at firſt ſparingly, like the regular menſes, but afterwards, burſts out with great force, attended with anxieties, fainting fits, and ſometimes with miſcarriage.

The cauſe is a violent ſeparation of the ſecundines from the uterus, which may ariſe from a vehement fit of paſſion, or motion of the body, a fall, fright, or the like. Thunder, lightning, hot liquor, too liberal uſe of deobſtruents, or the navel-ſtring being too ſhort, ſometimes occaſion an *abortive* hæmorrhage.

FLUX *of the mouth*, or ſalival *flux*. See SALIVATION.

The *hepatic* FLUX of the ancients, is, by ſeveral moderns, held a mere name; being, in reality, an hæmorrhoidal *flux*, out of the hæmorrhoidal veins. See HEPATIC *Flux*.

Women are ſubject to three kinds of *fluxes* extraordinary: the firſt, called the MENSES, or *menſtrual flux*, as happening every month; ſometimes *courſes*, as keeping pace with the moon; and ſometimes *flowers*.

The ſecond is after-delivery, called LOCHIA.

The third is irregular, and preternatural; and, for want of a better name, called FLUOR *albus*, or the *whites*.

FLUX, in *Hydrography*, a regular, periodical motion of the ſea, happening twice in twenty-four hours; wherein the water is raiſed, and driven violently againſt the ſhores. The *flux*, or *flow*, is one of the motions of the TIDE: the other, whereby the water ſinks and retires, is called the *reflux*, or *ebb*.

There is alſo a kind of reſt, or ceſſation of about half an hour, between the *flux*, and reflux; during which time the water is at its greateſt height, called *high-water*.

The *flux* is made by the motion of the water of the ſea, from the equator towards the poles; which, in its progreſs, ſtriking againſt the coaſts in its way, and meeting with oppoſition from them, ſwells, and where it can find paſſage, as in flats, rivers, &c. riſes up, and runs into the land.

This motion follows, in ſome meaſure, the courſe of the moon; as it loſes, or comes later every day by about three quarters of an hour; or more preciſely, by forty-eight minutes: and by ſo much is the motion of the moon ſlower than that of the ſun. It is always higheſt and greateſt in full moons, particularly thoſe of the equinoxes. In ſome parts, as at Mount St. Michael, it riſes eighty or ninety feet, though in the open ſea it never riſes above a foot or two; and in ſome places, as about the Morea, there is no *flux* at all. It runs up ſome rivers above a hundred and twenty miles. Up the river Thames it only goes eighty, viz. near to Kingſton in Surry.

Above London-bridge, the water flows four hours, and ebbs eight; and below the bridge, flows five hours, and ebbs ſeven.

FLUXES, in *Metallurgy*, are certain ſaline matters, which cauſe a body otherwiſe not at all, or hardly fuſible by fire, to melt. Fixed alkalis, nitre, borax, tartar, and common ſalt, are the ſaline matters of which *fluxes* are generally compoſed.

The moſt powerful of theſe, are glaſs of lead, and the alkaline and neutral ſalts. Theſe are principally uſed by aſſayers, when they would work minerals in a ſmall quantity; but when large quantities of minerals are to be wrought on, it is ſeldom poſſible to uſe *fluxes* of this kind to any advantage, becauſe of their prices. In theſe caſes, inſtead of theſe expenſive *fluxes*, they uſe ſuch ſtones as are vitrified by a gentle fire, or the ſcoriæ made of the ſame ſtones when melted, which always ſerve their purpoſes much better; for the oftner theſe ſtones have been expoſed to the fire, the more eaſily are they put in fuſion: the reaſon of which ſeems to be, that the alkaline ſalt proceeding from the fuel of the fire, adheres to the ſcoriæ; and theſe added in large quantities to the reſt of the metals in great operations, cauſe the ſaid ores to melt, which are otherwiſe made refractory by the calcarious and incombuſtible ſtones and earths mixed with them.

The melting of gold and ſilver, and of their calxes is greatly promoted by glaſs of lead, alkaline ſalts, &c. but when gold and ſilver in the fuſion itſelf, are to be purged from other metals and ſemimetals, it is proper to uſe nitre only; or if not ſo, nitre muſt be always mixed with the other ſalts; for the ſemimetals and the four leſs perfect metals are deſtroyed by nitre.

In this operation, nitre by its detonation with their ſulphurs is in part alkaliſed, and by the help of a gentle fire, turns their calxes into vitreous and much attenuated ſcoriæ.

From hence, the reaſon is plain, why gold and ſilver, when made brittle, are readily reſtored to their malleability by nitre: for the ſemimetals, and among the metals, lead, and tin, moſt of all communicate this fault to gold and ſilver; but theſe being changed, as before obſerved, by nitre, are then rejected by gold and ſilver in a ſimple fuſion, ſo that they can no longer mix with theſe metals, unleſs they are themſelves firſt again reduced to their metallic ſtate; and there is beſides theſe, no other body that can be mixed with ſilver and gold to render them brittle, unleſs crude charcoal happening to fall into the veſſel, wherein thoſe metals are melted, ſhould impregnate them with ſomething arſenical, there being ſome arſenic contained in coals of this kind; as has been demonſtrated by Stahl and Hoffman.

The leſs perfect metals, and the ſemimetals melt more eaſily by adding ſalts to them, than of themſelves; they always, however, loſe a great deal of their ſubſtance by this means; and this is more particularly the caſe, in regard to copper and iron. To amend this, it is neceſſary to add ſome kind of fat body, which prevents the deſtruction, and even reduces the metals already deſtroyed; and this is the more neceſſary, when the calxes prepared either by burning, or by a detonation with nitre, are to be reduced.

The moſt proper *flux* on theſe occaſions, is that uſually known among metallurgiſts, under the name of the *black flux powder*, and is thus prepared:

Take of common nitre one part, of crude tartar thoroughly dried, two or three parts; make them ſeparately into very fine powder, then grind them well together, and afterwards put them into an earthen pot, narrow at the orifice, not glazed within, and of capacity three times larger than the powder will take up; put this into a gentle fire, and as ſoon as the maſs begins to flame with ſome noiſe, ſhut the orifice of the veſſel with a tile; after the detonation is over, you will find in the veſſel a black oily alkaline ſalt, which is very eaſily fuſible in the fire, and is called the *black flux*: keep it in a dry warm place, and in a veſſel cloſely ſhut, to prevent its growing moiſt.

Tartar being burnt either alone in veſſels cloſely ſhut, or detonated with nitre, is very readily alkalized; and thus retains a conſiderable quantity of the oil which it contains in great abundance, and which is fixed enough to remain with it, after this operation; and for this reaſon it very eaſily becomes a reducing *flux*, which, on account of its alkaline ſalts, diſſolves earths and ſtones, and changes them into an imperfect kind of glaſs by a moderate melting fire; but the oil being of a more fixed nature, ſtill remains concealed therein, and is of great uſe both to preſerve metals from being deſtroyed, and to reduce ſuch as have been deſtroyed already.

If the pot in which this *flux* powder is made be glazed within, and part of the glazing comes off, and mixes with the *flux*, and melts with it, it is again reduced to lead, and may thus diſappoint the artificer; for this cruſt of glazing is given to earthen veſſels by lead or litharge.

Another caution is alſo neceſſary; which is, that all *fluxes* muſt be kept and uſed very dry, for moiſt ſalts foam very much; and when the operations are made in cloſe veſſels, if the fire is quickly increaſed, not being able to get rid of the moiſture, the veſſels will ſplit and break.

Beſides the black, aſſayers are alſo very fond of a white *flux* powder, which is prepared only of equal parts of nitre and tartar detonated in the ſame manner. For in this caſe the oil of the tartar is almoſt entirely conſumed by the abundance of the nitre, and the remaining maſs becomes a whitiſh or aſh-coloured ſalt; which is alſo more powerfully alkaline, and ſharp than the foregoing. This *flux* is very efficacious in the diſſolving of ſtones, and earths; but for want of its oil is of a leſs reductive virtue, and deſtroys the metal, when the fire is continued a little longer than is required.

By crude *flux*, is meant the mixture of nitre and tartar in any proportions, without detonation.

Flux powders are of great ſervice alſo to reduce metals out of their reſpective calxes, and to free them from the ſtones in which they are embodied; but when the refractory calx of iron is to be reduced by a great and long laſting fire, theſe *fluxes* being greatly attenuated, though confined in cloſe veſſels, part from their oily principle, and their alkaline ſalt remaining, begin to corrode and conſume the veſſels, of what matter ſoever they are made, and finally make their way through them and get out. The firſt of theſe accidents is prevented by adding coal duſt, which will never part with its oil, without the help of a free air; and the others by an admixture of common glaſs, made of a due mixture of flints and fixed alkali.

kali. For this is ſufficiently fuſible, and readily melts with the *fluxes*, and by its viſcidity, in ſome ſort coagulates, and holds the ſalt of the *flux* together, and prevents it from ſo eaſily corroding the veſſels. Cramer, Art. Aſſ. p. 48, 52.

The great ſecret in making and improving *fluxes* for the ores of metals, is not only to find ſuch ingredients as will be of efficacy to ſeparate the metal already ripened in the ore, but even to maturate and ripen the yet immature part of it in the fire; and ſomething of this kind we apprehend might be effected, as there is great reaſon to believe, that certain *fluxes* will obtain a much larger yield of metals from certain ores than other *fluxes* in common uſe, though eſteemed of the beſt, and perhaps of the deareſt kind: thus clean iron filings will often do more than borax; but as the ſcales and ruſt of iron have commonly been uſed under the name of iron in *fluxes*, few operators know the value of pure iron in that intention, and many advantages are now obtained by mixing one ore with another of the ſame denomination, and with the ſlags or recrements of metals in the way of a *flux*.

The *fluxes* for the ores of metals ſeem in general reducible to two kinds, the vitreous and the ſaline. The vitreous are thoſe which either naturally have a glaſſy form, or readily aſſume one in the fire; the principal of theſe are glaſs of lead, glaſs of antimony, and borax.

By the ſaline *fluxes*, authors generally mean thoſe which are compoſed of ſalts, whether tartar, nitre, fixed alkali, or the like, as the black *flux*, ſandiver, pot-aſhes, and the like. The vitreous *fluxes* ſeem deſtined more immediately to act upon the ſtony or vitreſcible matter, wherewith the ſtubborn ores are frequently mixed, and the ſaline kind to act more immediately upon the matter of the ore itſelf, for the due excluſion or ſeparation of the metal.

The more kindly ores require no *fluxes* at all, and often they contain in themſelves, the neceſſary matter for that *flux*; thus there are copper ores, which being only ground to powder, and put into a common wind furnace, will yield as much pure metal at the firſt operation, as can be produced from them, by all the *fluxes*. Shaw's Lectures, p. 256.

Powder of antimony is a very good *flux* powder. By this alone may you readily melt iron or ſteel in a crucible, with an ordinary charcoal fire.

Some of the cheapeſt and moſt powerful *fluxes* now in uſe are, dried wine-lees, dried cow-dung and horſe-dung, dried river-mud, fuller's-earth, iron filings, common ſalt, potaſh, and ſandiver. Theſe may be uſed in the larger works; as nitre, tartar, borax, ſal armoniac, and mercury ſublimate, in the leſs: as for compound *fluxes*, they are very numerous, almoſt every operator having his particular noſtrum; and it is plain that ſome *fluxes* are better adapted to the ores of ſome metals than others; but certainly a few general ones might be fixed upon, one or other of which would anſwer all the operator's expectations.

The three following preparations are all very general, very powerful, and not expenſive. 1. Take of nitre, prepared by long boiling in lime-water, of ſea-ſalt melted in the fire, of ſandiver, and of dry wine-lees, each one part; glaſs of lead, three parts, and powdered glaſs, eight parts; mix them all well together, and uſe them in an equal weight with ſtubborn ores. 2. For a ſtill ſtronger *flux*, take equal parts of white tartar, common ſalt, and nitre prepared as above; calcine all together to a white powder, and mix with it its own weight of glaſs of lead: of this *flux* add two parts to one part of the moſt ſtubborn ores. 3. For a very powerful ſaline *flux*, take of the ſtrongeſt ſoap-boiler's lees four pounds, of white tartar and common ſalt, melted in the fire, each one pound; boil theſe together, with four gallons of human urine, to a dry ſalt. This *flux* is particularly ſerviceable where ſulphur and cobalt abound, and render the ore very refractory. Shaw's Lectures, p. 257.

Fluxes, in *Enamel-painting*, are uſed for forming the grounds and colours: there are two kinds of ſubſtances which enter the compoſition of enamel *fluxes*, viz. the vitrifiable matters, which conſiſt of ſalts, lead and arſenic, and the correctives of theſe, which are calcined flints, ſand, or ſuch calcareous matter, which give body and firmneſs to the fluxing compoſition, without diſcolouring or changing the proper fluxing qualities, unleſs by diminiſhing in a degree their vitrefactive power. The moſt active *flux* among ſalts is borax; the next is lead; arſenic, joined with ſome other body already vitrified and hereby fixed, is the next powerful *flux*; and the ſeveral kinds of ſalts ſucceed, of which ſea ſalt poſſeſſes the greateſt fluxing power. Though theſe are not ſtrong enough by themſelves, yet, as they are colourleſs, they are neceſſary to be compounded with lead, or ſubſtituted for it, with the aid of borax, for purpoſes, in which the *flux* muſt be wholly deſtitute of colour. *Fluxes* of all kinds are prepared by levigating the ingredients of which they conſiſt on a porphyry ſtone, with a mullar of the ſame matter or of flint; or in a mortar of agate or flint, with an agate peſtle: or, for the ſake of expedition, a mortar and peſtle of the common green glaſs may be previouſly uſed. This levigated matter muſt be then put into melting pots, and placed in a furnace, where the heat is nearly that of a ſtrong culinary fire; and when the vitrification is perfect, which may be known by the matter's being tranſparent and free from air-bubbles, it muſt be poured out on an iron plate free from ruſt, and when cold, powdered and kept for uſe. See ENAMEL.

Fluxes, in the *Manufacture of Glaſs*, are red-lead, pearl-aſhes, nitre, ſea-ſalt, borax, arſenic, the *ſcoriæ* of forges, commonly called clinkers, and wood-aſhes. See GLASS.

FLUXION, in *Medicine*, a ſudden collection of morbid matter in any part of the body.

Fluxions ariſe either from the weakneſs, flaccidity, and inactivity of the part affected, which does not diſperſe, protrude, or expel, the humours naturally received into it; or from the derivation of ſome extraordinary quantity of peccant matter from ſome other part.

This latter is properly called DEFLUXION, and, by the ancients, *attraction*.

A *fluxion*, or *defluxion*, on the trachea and lungs, is called a CATARRH.

Fluxion, in the *Newtonian analyſis*, denotes the velocity with which a flowing quantity is increaſed by its generative motion: by which it ſtands contradiſtinguiſhed from *fluent* or the *flowing* quantity, which is gradually, and indefinitely increaſing, after the manner of a ſpace which a body in motion deſcribes.

Or, a *fluxion* may be more accurately defined, as, the magnitude by which any flowing quantity *would be* uniformly increaſed in a given portion of time, with the generating celerity at any propoſed poſition, or inſtant, ſuppoſing it from thence to continue invariable.

Thus, if the point m move from A, and generate the right line Am, *Tab.* II. *Geometry*, *fig.* 29. and the celerity at R be ſuch as would be ſufficient, ſuppoſing it to continue uniform from that point, to deſcribe the line Rr in the given time; then Rr repreſents the *fluxion* of the variable line Am in that poſition. The rectangle AS, *fig.* 30. may be conceived to be generated by the parallel motion of the invariable line mn between AF and BG; and ſince Rr is the *fluxion* of Am, the rectangle $RrsS$ will be the ſpace which would be uniformly deſcribed by mn, whilſt Am would be uniformly encreaſed by mr, and it is, therefore, the *fluxion* of the generated rectangle ABSR. Farther, if the curvilineal ſpace Amn, *fig.* 31. be generated by the parallel motion of mn, conſidered as variable, and Rr be the *fluxion* of Am, the rectangle $RrsS$ would be uniformly generated with the celerity, with which it begins to be generated, and with which the ſpace Amn is increaſed in the poſition Rs, when the length and velocity of mn are ſuppoſed to continue invariable from that poſition, and, therefore, agreeably to the definition, will be the *fluxion* of the generated ſpace Amn.

From this definition it appears, that the *fluxions* of quantities are, always, as the celerities by which the quantities themſelves increaſe in magnitude.

Mr. Simpſon obſerves, that there is an advantage in conſidering *fluxions*, not as mere velocities, but as the magnitudes which theſe velocities would, uniformly, generate in a given finite time: the imagination is not here confined to a ſingle point, and the higher orders of *fluxions* are rendered much more eaſy and intelligible. And though Sir Iſaac Newton defines *fluxions* to be the velocities of motions, yet he hath recourſe to the increments or moments, generated in equal particles of time, in order to determine thoſe velocities, which he afterwards teaches us to expound by finite magnitudes of other kinds. Simpſon's *Fluxions*, vol. i. pref. p. 6. and p. 2, &c.

Fluxions, *method of*, is the arithmetic and analyſis of *fluxions*, and fluents, or flowing quantities.

Foreigners uſually define the method of *fluxions*, the arithmetic, or analyſis, of infinitely, or rather indefinitely, ſmall variable quantities; or the method of finding an infiniteſimal, or infinitely ſmall quantity, which, being taken an infinite number of times, becomes equal to a given quantity.

Sir I. Newton, and, after him, the Engliſh authors, call theſe infinitely ſmall quantities, *moments*; conſidering them as the momentary increments, or decrements, of variable quantities, e. gr. of a line conſidered as generated by the flux of a point, or of a ſurface generated by the flux of a line.

Accordingly, the variable quantities are called *fluent*, or flowing quantities; and the method of finding either the *fluxion*, or the fluent, the method of *fluxions*.

M. Leibnitz conſiders the ſame infinitely ſmall quantities as the differences, or differentials, of two quantities; and calls the method of finding thoſe differences, the *differential calculus*. Each of theſe ways of conſidering and denominating, has its advantages, which the retainers to this or that method ſtrenuouſly aſſert.

Flowing quantities, i. e. ſuch as, in the geneſis of figures by local motion, are continually increaſing and diminiſhing, are certainly very properly denominated fluents: and as all figures may be conceived as ſo generated, the infinitely ſmall increments or decrements of ſuch quantities, are very naturally denominated *fluxions*.

Beſide this difference in the name, there is another in the notation.

Sir I. Newton expreſſes the *fluxion* of a quantity, as x, by a dot placed over it, as $\dot{x}$; and M. Leibnitz expreſſes his differential of the ſame x, by prefixing a d, as dx; each of which methods of notation has likewiſe its advantage.

Setting aſide theſe circumſtances, the two methods are the ſame.

The method of *fluxions* is one of the greateſt, moſt ſubtle, and ſublime diſcoveries of this, or, perhaps, of any age: it opens a new world to us, and extends our knowlege, as it were, to infinity; it carries us beyond the bounds that ſeemed to have been preſcribed to the human mind, at leaſt infinitely beyond thoſe to which the ancient geometry was confined.

The hiſtory of this important diſcovery, as freſh as it is, is a little dark, and imbroiled. Two of the greateſt men of this age do both of them claim the invention, Sir I. Newton, and M. Leibnitz; and nothing can be more glorious for the method itſelf, than the zeal wherewith the partiſans of either ſide have aſſerted their title.

To give the reader a juſt view of this noble diſpute, and of the pretenſions of each party, we ſhall lay before him the origin of the diſcovery, and mark where each claim commenced, and how it was ſupported.

The firſt time the method made its appearance in public, was in 1684, when M. Leibnitz gave the rules thereof in the Leipſic Acts of that year; but the demonſtrations he kept to himſelf. The two brothers, the Bernoullis, were preſently ſtruck with it, and found out the demonſtrations, though very difficult; and practiſed the calculus with ſurpriſing ſucceſs.

However, M. Leibnitz began to propoſe his differential method in a letter, dated 21 Jan. 1677, in which he exactly purſues Dr. Barrow's method of tangents, publiſhed in 1670: and Sir I. Newton communicated his method of drawing tangents to Mr. Collins, in a letter dated 10 Dec. 1672; which letter, together with another dated 13 June, 1676, were ſent to M. Leibnitz by Mr. Oldenburgh, in 1676. So that there is a ſtrong preſumption that he might avail himſelf of the information contained in theſe letters, and other papers tranſmitted with them, and alſo in 1675, before the publication of his own letter, containing the firſt hint of his differential method. And it ſufficiently appears, that Sir I. Newton had invented his method before the year 1669, and that he actually made uſe of it in his Compendium of Analyſis and Quadrature of Curves before that time. His attention ſeems to have been directed this way, even before the plague which happened in London in 1665 and 1666, when he was about twenty-three years of age: and, therefore, there is no foundation for the hint ſuggeſted by the authors of the Encyclopedie Art. *Differentielle*, that Sir Iſaac borrowed the differential method from Dr. Barrow.

This is all we hear of it, till the year 1687, when Sir Iſaac Newton's admirable Principia came forth, which is almoſt wholly founded on the ſame calculus.

The common opinion, at that time, was, that Sir Iſaac, and M. Leibnitz, had each invented it about the ſame time: and what confirmed it was, that neither of them made any mention of the other; and that, though they agreed in the ſubſtance of the thing, yet they differed in their ways of conceiving; called it by different names, and uſed different characters.

In effect, M. Leibnitz's character was ſuppoſed, by foreigners, to be ſomewhat more commodious than that of Sir Iſaac Newton: accordingly, the method ſoon ſpreading itſelf throughout Europe, M. Leibnitz's character went with it; by which means the geometricians were inſenſibly accuſtomed to look on him as the ſole, or principal inventor.

The two great authors themſelves, without any ſeeming concern, or diſpute, as to the property of the invention, enjoyed the glorious proſpect of the progreſſes continually making under their auſpices, till the year 1699, when the peace began to be diſturbed.

M. Fatio, in a treatiſe Of the Line of ſwifteſt Deſcent, declared, that he was obliged to own Sir Iſaac Newton as the firſt inventor of the differential calculus, and the firſt by many years; and that he left the world to judge, whether M. Leibnitz, the ſecond inventor, had taken any thing from him. This preciſe diſtinction between firſt and ſecond inventor, with the ſuſpicion it inſinuated, raiſed a controverſy between M. Leibnitz, ſupported by the editors of the Leipſic Acts, and the Engliſh geometricians, who declared for Sir I. Newton. Sir Iſaac himſelf never appeared on the ſcene; his glory was become that of the nation; and his adherents, warm in the cauſe of their country, needed not him to animate them.

Writings ſucceeded each other but ſlowly, on either ſide; probably, on account of the diſtance of places; but the controverſy grew ſtill hotter and hotter: till, at length, it came to ſuch paſs, that, in the year 1711, M. Leibnitz complained to the Royal Society, that Dr. Keill had accuſed him of publiſhing the method of *fluxions* invented by Sir I. Newton, under other names, and characters. He inſiſted, that nobody knew better than Sir Iſaac himſelf, that he had ſtolen nothing from him; and required, that Dr. Keill ſhould publicly diſavow the ill conſtruction which might be put on his words.

The ſociety, here appealed to as a judge, appointed a committee to examine all the old letters, papers, &c. that had paſſed among the ſeveral mathematicians, relating to the point; and, after a ſtrict examen of all the evidences that could be procured, gave in their report to this purpoſe: "That Mr. Leibnitz was in London in 1673, and kept a correſpondence with Mr. Collins by means of Mr. Oldenburgh, till Sept. 1676, when he returned from Paris to Hanover, by way of London and Amſterdam: that it did not appear that M. Leibnitz knew any thing of the differential calculus before his letter of the 21ſt June, 1677, which was a year after a copy of a letter, wrote by Sir I. Newton, in the year 1672, had been ſent to Paris to be communicated to him, and above four years after Mr. Collins began to communicate that letter to his correſpondents; wherein the method of *fluxions* was ſufficiently explained, to let a man of his ſagacity into the whole matter: and that Sir I. Newton had even invented his method before the year 1669, and, of conſequence, fifteen years before M. Leibnitz had given any thing on the ſubject in the Leipſic Acts." And thence they concluded, that Dr. Keill had not at all injured M. Leibnitz in what he had ſaid.

The ſociety printed this cenſure of theirs, together with all the pieces and materials relating thereto, under the title of Commercium Epiſtolicum de Analyſi Promota, Lond. 1712. This book was carefully diſtributed through Europe, to vindicate the title of the Engliſh nation to the diſcovery; for Sir Iſaac, as already hinted, never appeared in it: whether it were that he truſted his honour with his compatriots, who were zealous enough in the cauſe; or whether it were that he was even ſuperior to the glory thereof.

M. Leibnitz and his friends, however, could not ſhew the ſame indifference: he was accuſed of a theft; and the whole Commercium Epiſtolicum either expreſſes it in terms, or inſinuates it. Soon after the publication thereof, a looſe ſheet was printed, at Paris, in behalf of M. Leibnitz, then at Vienna. It is wrote with great zeal and ſpirit; and maintains, boldly, that the method of *fluxions* had not preceded that of *differences*: and even inſinuates, that it might have ariſen from it. The detail of the proofs, on each ſide, would be too long, and could not be underſtood without a large comment, which muſt enter into the deepeſt geometry.

M. Leibnitz had begun to work upon a Commercium Epiſtolicum, in oppoſition to that of the Royal Society; but he died before it was completed.

A ſecond edition of the Commercium Epiſtolicum was printed at London in 1722; where Sir Iſaac Newton, in the preface, account, and annotations, which were added to that edition, particularly anſwered all the objections which M. Leibnitz and M. Bernouilli were able to make ſince the Commercium firſt appeared in 1712. See alſo Raphſon's Hiſt. *Fluxion*. From the laſt edition of the Commercium, and the various original papers contained in it, it evidently appears that Sir Iſaac Newton had diſcovered his method of *fluxions* many years before M. Leibnitz's pretenſions.

It muſt be owned, that there are ſtrong preſumptions in favour of M. Leibnitz; preſumptions, we mean, that he was no plagiary: for that Sir Iſaac Newton was the firſt inventor, is paſt all diſpute; his glory is ſecure; the reaſonable part, even among the foreigners, allow it: and the queſtion is only, whether M. Leibnitz took it from him, or fell upon the ſame thing with him; for, in his Theory of Abſtract Notions, which he dedicated to the Royal Academy, 1671, before he had ſeen any thing of Sir I. Newton's, he already ſuppoſed infinitely ſmall quantities, ſome greater than others; which is one of the great principles of the ſyſtem.

The doctrine conſiſts of two parts, viz. the *Direct method of fluxions*, called, alſo, *Calculus differentialis*; and the *Inverſe method of fluxions*, or *Calculus integralis*.

The latter is directly oppoſite to the former; and is a ſequel of it: both of them are adopted into the new geometry, and make reigning methods therein.

The firſt deſcends from finite, to infinite; the latter aſcends from infinitely ſmall, to finite: the one de-compounds a magnitude; the other re-eſtabliſhes it.

The foundation of the direct method of *fluxions* amounts to this problem: the length of the ſpace deſcribed being continually (that is, at all times) given, to find the velocity at any time propoſed.

The foundation of the inverſe method of *fluxions* amounts to this problem: the velocity of the motion being continually given, to find the ſpace deſcribed by it at any time propoſed.

Direct method of FLUXIONS. All finite magnitudes are here conceived to be reſolved into infinitely ſmall ones, ſuppoſed to be generated by motion, as a line by the motion of a point, a ſuperficies by a line, and a ſolid by a ſuperficies; and they are the elements, moments, or differences, thereof.

The art of finding theſe infinitely ſmall quantities, or the velocities by which they are generated, and of working on them, and diſcovering other infinite quantities, by their means, makes the direct method of *fluxions*.

What renders the knowlege of infinitely ſmall quantities of ſuch ſignal uſe and extent is, that they have relations to each other, which the finite magnitudes, whereof they are the infiniteſimals, have not.

Thus, e gr. in a curve, of any kind whatever, the infinitely ſmall differences of the ordinate and abſciſs have the ratio to each other, not of the ordinate and abſciſs, but of the ordinate and ſubtangent; and, of conſequence, the abſciſs and ordinate alone being known, give the ſubtangent unknown; or, which amounts to the ſame, the tangent itſelf. See the *Inverſe method of* FLUXIONS.

The method of notation in *fluxions*, introduced by the inventor, Sir I. Newton, is thus:

The variable, or flowing quantity, to be uniformly augmented, as ſuppoſe the abſciſs of a curve, he denotes by the final letters v, x, y, z; and their *fluxions* by the ſame letters with dots placed over them, thus, $\dot{v}\ \dot{x}\ \dot{y}\ \dot{z}$. And the initial letters a, b, c, d, &c. are uſed to expreſs invariable quantities.

Again, if the *fluxions* themſelves are alſo variable quantities, and are continually increaſing, or decreaſing, he conſiders the velocities with which they increaſe, or decreaſe, as the *fluxions* of the former *fluxions*, or ſecond *fluxions*; which are denoted by two dots over them, thus, $\ddot{y}\ \ddot{x}\ \ddot{z}$.

After the ſame manner one may conſider the augments, and diminutions of theſe, as their *fluxions* alſo; and thus proceed to the third, fourth, fifth, &c. *fluxions*, which will be noted thus, $\dddot{y}\ \dddot{x}\ \dddot{z} : \ddddot{y}\ \ddddot{x}\ \ddddot{z} : \overset{\cdot\cdot\cdot\cdot\cdot}{y}\ \overset{\cdot\cdot\cdot\cdot\cdot}{x}\ \overset{\cdot\cdot\cdot\cdot\cdot}{z}$, &c. We may obſerve, in general, that the *fluxions* of all kinds and orders whatever, are contemporaneous, or ſuch as may be generated together, with their reſpective celerities, in one and the ſame time.

Laſtly, if the flowing quantity be a ſurd, as $\sqrt{a-b}$; he notes its *fluxion* $\sqrt{\overset{:}{\overline{a-b}}}$: if a fraction $\frac{x \quad x}{d-y}$ he notes it, $\frac{x \dot{:} x}{d-y}$. V. Wallis's Algebra, p. 392, apud Oper. vol. ii. See FLUENT.

The chief ſcope and buſineſs of *fluxions* is, from the flowing quantity given, to find the *fluxion*. for this we ſhall lay down one general rule, as ſtated by Dr. Wallis, and afterwards apply and exemplify it in the ſeveral caſes.

"Multiply each term of the equation ſeparately by the
" ſeveral indices of the powers of all the flowing quan-
" tities contained in that term; and in each multiplica-
" tion, change one root or letter of the power into its
" proper *fluxion*: the aggregate of all the products con-
" nected together by their proper ſigns, will be the *fluxion*
" of the equation deſired."

The application of this rule will be contained in the following caſes. I. To expreſs the *fluxions* of ſimple variable quantities, as already mentioned, you need only put the letter, or letters, which expreſs them, with a dot over them: thus, the *fluxion* of x is $\dot{x}$, and the *fluxion* of y is $\dot{y}$, and the *fluxion* of $x+y+v+z$, is $\dot{x}+\dot{y}+\dot{v}+\dot{z}$, &c.

Note, For the *fluxion* of permanent quantities, when any ſuch are in the equation, you muſt imagine o, or a cypher; for ſuch quantities can have no *fluxion*, properly ſpeaking, becauſe they are without motion, or invariable.

Again, the *fluxion* of a quantity, which decreaſes, inſtead of increaſing, is to be conſidered as negative.

II. *To find the* FLUXIONS *of the products of two or more variable or flowing quantities*—Multiply the *fluxion* of each ſimple quantity by the factors of the products, or the product of all the reſt; and connect the laſt products by their proper ſigns: then the ſum, or aggregate, is the *fluxion* ſought.

Thus, the *fluxion* of xy, is $\dot{x}y + x\dot{y}$. For, let two right lines, DE and FG, move parallel to themſelves from two other right lines, BA and BC, *Tab.* II. *Geometry, fig.* 32. and generate the rectangle DF. Let them always interſect each other in the curve BHR, and let Dd ($\dot{x}$) and Ff ($\dot{y}$) be the *fluxions* of the ſides BD (x) and BF (y); and draw dm and fn parallel to DH and FH. The *fluxion* of the area BDH (ſee the beginning of this article) is Dm or $y\dot{x}$, and that of the area BFH is Fn or $x\dot{y}$, and therefore the *fluxion* of the whole rectangle $EF = xy = BDH + BFG$ will be $\dot{x}y + x\dot{y}$. The *fluxion* of yzu is $\dot{y}zu + y\dot{z}u + yz\dot{u}$; for if x be put $= zu$, then yzu will be $= yx$, and its *fluxion* $= y\dot{x} + x\dot{y}$: but x being $= zu$, and $\dot{x} = z\dot{u} + u\dot{z}$, $y\dot{x} + x\dot{y}$, by ſubſtitution, will be $= yz\dot{u} + yu\dot{z} + \dot{y}zu$. And the *fluxion* of $xuyz$, is $xuy\dot{z} + xu\dot{y}z + x\dot{u}yz + \dot{x}uyz$; and the *fluxion* of $\overline{a+x} \times \overline{b-y}$ (the common product being $ab + bx - ya - xy$) will be $b\dot{x} - \dot{y}a - \dot{x}y - x\dot{y}$.

III. *To find the* FLUXION *of a fraction*—Multiply the *fluxion* of the numerator by the denominator, and from this product ſubſtract the *fluxion* of the denominator drawn into the numerator; this will be the numerator, and the ſquare of the denominator will be the denominator of the fraction expreſſing the *fluxion* of the given fraction.

Thus the *fluxion* of $\frac{x}{y}$ is $\frac{\dot{x}y - x\dot{y}}{yy}$.

For ſuppoſe $\frac{x}{y} = z$, then will $x = yz$, which equal quantities muſt have equal *fluxions*; therefore $\dot{x} = \dot{y}z + \dot{z}y$ and $\dot{x} - z\dot{y} = \dot{z}y$; and dividing all by y, $\frac{\dot{x} - z\dot{y}}{y} = \dot{z} =$ (becauſe $\frac{x}{y} = z$) $\frac{\dot{x} - \frac{x}{y} \times \dot{y}}{y} = \frac{\dot{x}y - x\dot{y}}{y} \div y = \frac{\dot{x}y - x\dot{y}}{yy}$: wherefore this laſt is the *fluxion* of the fraction $\frac{x}{y} = z$; becauſe z being $= \frac{x}{y}$, $\dot{z}$ will be equal to the *fluxion* of $\frac{x}{y}$.

And the *fluxion* of $\frac{a}{x}$ will be $\frac{-\dot{x}a}{xx}$; for the permanent quantity a having no *fluxion*, there can be no product of the *fluxion* of the numerator into the denominator, as there would have been, had a been x, z, or any other variable quantity.

IV. *To find the* FLUXION *of a power.* Multiply the *fluxion* of the root by the exponent of the power, and the product by that power of the ſame root, whoſe exponent is leſs by unit than the given exponent; and likewiſe by the invariable quantity and co-efficient, if there be any.

Thus, the *fluxion* of xx will be $2x\dot{x}$; for $xx = x \times x$; but the *fluxion* of $x \times x = \dot{x}x + x\dot{x} = 2\dot{x}x$, &c. and the *fluxion* of x^3 will be $3xx\dot{x}$. That of x^8 will be $8x^7\dot{x}$, &c. that of $5x^5$ will be $25x^4\dot{x}$; that of $3ax^4$ will be $12ax^3\dot{x}$.

Or, if m expreſs the index of any power, as ſuppoſe x^m; its *fluxion* will be $mx^{m-1}\dot{x}$.

If the power be produced from a binomial, &c. as ſuppoſe $\overline{x+y}|^2$, or $xx + 2xy + yy$, its *fluxion* will be $2 \times \overline{x+y} \times \overline{\dot{x}+\dot{y}}$, or $2x\dot{x} + 2x\dot{y} + 2\dot{x}y + 2y\dot{y}$.

If the exponent be negative, as ſuppoſe x^{-m} or $\frac{1}{x^m}$ its *fluxion* will be $-m\dot{x}x^{-m-1}$.

Or, if you would do it by way of fraction, $\frac{-mx^{m-1}\dot{x}}{x^{2m}}$ (for the ſquare of x_m is x^{2m}) $= -mx^{m-1-2m}\dot{x} = -mx^{-m-1}\dot{x}$ as before; $=$, removing x^{m-1} to the denominator, by changing the ſign of the exponent, $\frac{-m\dot{x}}{x^{m+1}}$.

If the power be imperfect, i. e. if its exponent be a fraction, as ſuppoſe $\sqrt[n]{x^m}$; or in the other notation $x^{\frac{m}{n}}$, ſuppoſe $x\frac{m}{n} = z$: then if you raiſe up each member to the power of n, it will ſtand thus, $x^m = z^n$; the *fluxion* of which will be, by this general rule, $mx^{m-1}\dot{x} = nz^{n-1}\dot{z}$.

Wherefore $\dot z$ will be $=\frac{m\dot x x^{m-1}}{nz^{n-1}}$ (by dividing both parts by nz^{n-1}) and $\frac{m\dot x x^{m-1}}{nz^{n-1}}=\frac{m}{n}\times\frac{x^{m-1}}{z^{n-1}}\times\dot x$; or $\frac{m}{n}\dot x\sqrt[n]{}$: x^{m-n}; putting, inſtead of z^{n-1}, its value $x^{\frac{mn-m}{n}}$, and the above expreſſion will become $\frac{m}{n}\dot x\times\frac{x^{m-1}}{x^{\frac{mn-m}{n}}}=\frac{m}{n}\dot x\times x^{m-1-\frac{mn+m}{n}}=\frac{m}{n}\dot x\times x^{\frac{mn-n-mn+m}{n}}=\frac{m}{n}\dot x\times x^{\frac{m-n}{n}}=\frac{m}{n}\dot x\sqrt[n]{x^{m-n}}$. Or, more briefly, according to the rule, the *fluxion* of $\sqrt[n]{x^m}$ or $x^{\frac{m}{n}}$ will be $\frac{m}{n}\times\dot x\times x^{\frac{m}{n}-1}=\frac{m}{n}\dot x x^{\frac{m-n}{n}}$, &c.

V. *To find the* FLUXIONS *of ſurd quantities.* Suppoſe it required to find the *fluxion* of $\sqrt{2rx-xx}$, or $\overline{2rx-xx}|^{\frac{1}{2}}$. Suppoſe $\overline{2rx-xx}|^{\frac{1}{2}}=z$; then is $2rx-xx=zz$; and conſequently $r\dot x-x\dot x=z\dot z$; and, by diviſion, $\frac{r\dot x-x\dot x}{z}=\dot z=$ (by ſubſtitution) $\frac{r\dot x-x\dot x}{\sqrt{2rx-xx}}=$ to the *fluxion* of $\sqrt{2rx-xx}$.

Or, by the preceding rule, the *fluxion* of $\overline{2rx-xx}|^{\frac{1}{2}}$ will be $\frac{1}{2}\times 2r\dot x-2x\dot x\times\overline{2rx-xx}|^{\frac{1}{2}-1}=r\dot x-x\dot x\times\overline{2rx-xx}|^{-\frac{1}{2}}=\frac{r\dot x-x\dot x}{\overline{2rx-xx}|^{\frac{1}{2}}}$. See POWER.

If it be required to find the *fluxion* of $\overline{ay-xx}|^{\frac{1}{3}}$; for $\overline{ay-xx}|^{\frac{1}{3}}$ put z; then $ay-xx=z^{\frac{1}{3}}$, and $a\dot y-2x\dot x=\frac{1}{3}\dot z z^{-\frac{2}{3}}$; and multiplying by 3, $3a\dot y-6x\dot x=\dot z z^{-\frac{2}{3}}$; and, conſequently, $3az^{\frac{2}{3}}\dot y-6z^{\frac{2}{3}}x\dot x=\dot z$; equal (ſubſtituting $\overline{ay-xx}|^{2}=z^{\frac{2}{3}}$) $3a^3y^2\dot y-6a^2x^2y\dot y+3ax^4\dot y-6a^2y^2x\dot x+12ayx^3\dot x-6x^5\dot x=$ to the *fluxion* of $\overline{ay-xx}|^{\frac{1}{3}}$.

VI. *To find the* FLUXION *of quantities compounded of rational and ſurd quantities*—Let it be required to find the *fluxion* of $\overline{bx^2+cax+ea^2}\times\sqrt{xx+aa}=z$. Put $\overline{bx^2+cax+ea^2}=p$, and $\sqrt{xx+aa}=q$. Then the given quantity is $pq=z$, and the *fluxion* thereof is $p\dot q+q\dot p=\dot z$: but $\dot q$ is $=\frac{x\dot x}{\sqrt{xx+aa}}$, and $\dot p$ is $=2bx\dot x+ca\dot x$; therefore, in the equation $p\dot q+q\dot p=\dot z$, if in the place of p, q, $\dot p$, $\dot q$, we reſtore the quantities they repreſent, we ſhall have $\frac{\overline{bx^3+cax^2+ea^2x}\times\dot x}{\sqrt{x^2+aa}}+2bx\dot x\times\sqrt{x^2+a^2}+ca\dot x\times\sqrt{x^2+a^2}=\dot z$. Which being reduced to one denomination, gives $\frac{\overline{3bx^3+2acx^2+ea^2x+2ba^2x+ca^3x}\times\dot x}{\sqrt{xx+aa}}=\dot z=$ to the *fluxion* of the given quantity.

VII. *To find the* FLUXION *of a logarithm.* The *fluxion* of the hyperbolic logarithm of any quantity is equal to the *fluxion* of that quantity divided by the quantity itſelf: e. gr. the *fluxion* of the hyperbolic logarithm of x is $=\frac{\dot x}{x}$: for let LQ *Tab.* II. *Analyſis*, *fig.* 49. be an hyperbola, whoſe aſymptotes are OR and OS, and whoſe parameter is AL=AO=1: draw an ordinate PM parallel to AL, and the ſpace APML will be the hyperbolic logarithm of the line OP; and, therefore, the *fluxion* of the ſpace APML will be equal to the *fluxion* of the *hyperbolic* LOGARITHM of the line OP. But the *fluxion* of this ſpace, OP being $=x$, and PM $=y$, is $=y\dot x$, and OP : AO :: LA : MP by the nature of the curve; i. e. $x:1::1:y=\frac{1}{x}$; therefore $y\dot x=\frac{\dot x}{x}$. Then, from the nature of LOGARITHMS, the hyperbolic logarithm of 10 (viz. 2.30258, &c.) is to the common logarithm of 10 (viz. 1) as the hyperbolic logarithm of any number x to the common logarithm of the ſame number x; i. e. L being made $=$ 2.30258, &c. L : 1 :: the hyperbolic logarithm of x : common logarithm of x : and therefore L : 1 :: the *fluxion* of the hyperbolic logarithm of x : the *fluxion* of the common logarithm of x : i. e. L : 1 :: $\frac{\dot x}{x}:\frac{\dot x}{Lx}$, which is the *fluxion* of the common logarithm of x; or becauſe $\frac{1}{L}=0.43429$, &c. the modulus of the Brigean or common form of logarithms, if $\frac{1}{L}$ be $=$ M, the *fluxion* of the common logarithm of x (viz. $\frac{\dot x}{Lx}$) will be $=\frac{\dot x}{x}\times M$; or, the *fluxion* of the hyperbolic logarithm of any number multiplied by M or 0.43429, &c. is $=$ the *fluxion* of the common logarithm of the ſaid number.

VIII. *To find the* FLUXION *of an exponential or percurrent quantity*, i. e. of a quantity having a variable exponent, as y^x. Suppoſe $y^x=u$; then, by the properties of logarithms, $x\times\log.y=\log.u$. And finding the *fluxions* of theſe terms, $\dot x\times\log.y+\frac{M\dot y}{y}\times x=\frac{M\dot u}{u}$, M being as in the preceding article: conſequently, the *fluxion* of y^x or $\dot u=\frac{u\dot x}{M}\times\log.y+\frac{\dot y x u}{y}=\frac{\dot x}{M}\times y^x\times\log.y+xy^{x-1}\dot y$.

IX. *To find the* FLUXION *of a rectangle, when one ſide x increaſes, and the other y decreaſes.* In this caſe the *fluxion* of the decreaſing quantity is negative with reſpect to that of the increaſing quantity (ſee the beginning of this article), and therefore, the ſign of the term affected with it ought to be changed; e. gr. the *fluxion* of the rectangle xy in theſe circumſtances will be expreſſed by $\dot xy-x\dot y$.

X. *To find the ſecond, third, &c.* FLUXION *of a flowing quantity.* Theſe *fluxions* differ in nothing, except their order and notation, from firſt *fluxions*, being actually ſuch to the quantities from which they are immediately derived; and therefore, they may be found, in the ſame manner, by the general rules already delivered.

Thus, by the 4th rule, the firſt *fluxion* of x^3 is $3x^2\dot x$; and if $\dot x$ be ſuppoſed conſtant, or if the root x be generated with an equable celerity, the *fluxion* of $3x^2\dot x$, or $3\dot x\times x^2$, will be $3\dot x\times 2x\dot x=6x\dot x^2$, which is the ſecond *fluxion* of x^3; and $6\dot x^3$ will be its third *fluxion*: but if the celerity with which x is generated be variable, either increaſing or decreaſing, then $\dot x$, being variable, will have its *fluxion* denoted by $\ddot x$, &c. In this caſe the *fluxion* of $3x^2\times\dot x$ will be, by the 2d and 4th rules, $6x\dot x\times\dot x+3x^2\times\ddot x=6x\dot x^2+3x^2\ddot x$, the ſecond *fluxion* of x^3. And the third *fluxion* of x^3, obtained in like manner from the laſt, will be $6\dot x\times\dot x^2+6x\times 2\dot x\ddot x+6x\dot x\times\ddot x+3x^2\dddot x=6\dot x^3+18x\dot x\ddot x+3x^2\dddot x$. Thus alſo, if $\dot y=nx^{n-1}\dot x$, then $\ddot y=n\times n-1\times x^{n-2}\dot x^2+n\ddot x x^{n-1}$; and if $\dot z^2=\dot x\dot y$, then $2\dot z\ddot z=\dot x\ddot y+\dot y\ddot x$, &c.

FLUXIONS, *inverſe method of*, or *calculus integralis*, conſiſts in finding finite magnitudes, from the infinitely ſmall parts thereof, and in determining the variable quantity or fluent from the velocity with which it flows at any point or term aſſigned, or the given *fluxion*.

It proceeds, as already obſerved, from infinitely ſmall quantities to finite; and recompounds and ſums up what the other has reſolved: whence it is alſo called, by ſome, the *ſummatory calculus*.

But what that has decompounded, this does not always re-eſtabliſh; ſo that the inverſe method is limited and imperfect, at leaſt hitherto; if it were once complete, geometry would be arrived at its laſt perfection.

To give an idea of its nature and office, take the inſtance already propoſed in the direct method: in that the infinitely ſmall quantities of the ordinates and abſciſs, being known, give the ſubtangent required; in this, on the contrary, the ſubtangent of an unknown curve being had, gives the infinitely ſmall quantities of the abſciſs and ordinate which produced it, and, of conſequence, the abſciſs and ordinate themſelves; which are finite magnitudes, in whoſe relation the whole eſſence of the curve is founded.

But the diſtinguiſhing uſe of this method is in meaſuring. The baſe of a parallelogram multiplied by the infinitely ſmall element of its altitude, gives an infinitely ſmall parallelogram; which is the element of the finite parallelogram, and is repeated an infinity of times therein, i. e. as many times as there are points in the height of the parallelogram.

To have the finite parallelogram, therefore, by means of its element, the element muſt be multiplied by the altitude; which is the inverſe method of *fluxions*, re-aſcending from the infinitely ſmall quantity to the finite.

Such a circuit of infiniteſimals, it is true, would be impertinent, in ſo ſimple a caſe; but when we have to do with ſurfaces terminated by curves, the method then becomes neceſſary, or, at leaſt, ſuperior to any other.

Suppoſe, e. gr. in a parabola, the ſpace included between two infinitely near ordinates, an infinitely ſmall portion of the axis, and an infinitely little arch of the curve; it is certain, this infinitely ſmall ſurface is no parallelogram; ſince the two parallel ordinates which terminate it on one ſide are not equal; and the arch of the curve, oppoſite to the little portion of the axis, is frequently neither equal nor parallel thereto; and yet this ſurface, which is no parallelogram, may be conſidered, in the ſtricteſt geometry, as if it really were one, becauſe it is infinitely ſmall; and the error, of conſequence, infinitely little, i. e. none.

So that, to meaſure it, there needs nothing but to multiply an ordinate of the parabola by the infinitely ſmall portion of the axis correſponding thereto. Thus we have the element of the whole parabola; which element being raiſed, by the inverſe method, to a finite magnitude, is the whole ſurface of the parabola.

This advantage, ſo peculiar to the geometry of infinites, of being able, without any error, to treat little arches of curves as if they were right lines; curvilinear ſpaces, as if rectilinear ones, &c. enables it not only to go with more eaſe and readineſs than the ancient geometry, to the ſame truths, but to reach a great number of truths which were inacceſſible to the other.

Its operations, in effect, are more eaſy, and its diſcoveries more extenſive; and ſimplicity and univerſality are its diſtinguiſhing characters.

The preceding obſervations are more properly applicable to the method of infinites and indiviſibles than to the Newtonian method of *fluxions*, in which magnitudes of various kinds are capable of increaſe, not by a repeated acceſſion of parts, but by a continued motion or flux. See the ſequel of this article.

FLUXION *given, to find the flowing quantity belonging to any.* To have the doctrine of the inverſe method correſpond and keep pace with that of the direct, we will apply it in the ſame caſes.

1. In the general, to expreſs the variable quantity of a *fluxion*, there needs nothing but to write the letters without the dots, or to ſubſtitute the variable or flowing letter for its *fluxion*. Thus the flowing quantities of $\dot{x}, \dot{y}, \dot{z}$, are x, y, z.

2. To find the fluent of a compound fluxional expreſſion conſiſting of the products of two or more flowing quantities drawn into their *fluxions*; or which conſiſts of the *fluxion* of each quantity drawn into the other, or product of the reſt of the quantities.

Multiply the flowing quantities together; and the product is the fluent required. E. gr. the fluent of $\dot{x}y+x\dot{y}$ is $=xy$; of $\dot{x}yz+x\dot{y}z+xy\dot{z}$ is $=xyz$, &c.

3. To find the *fluxion* of a fraction. The following rule will ſerve in many caſes. Divide the laſt term in the numerator by the *fluxion* of the negative ſquare root of the denominator; then divide this quotient by the affirmative ſquare root of the denominator for the required fluent. Thus, the fluent of $\frac{\dot{x}y-x\dot{y}}{y^2}$ is $=\frac{x}{y}$.

4. To find the fluent of an expreſſion compounded of different fluxionary terms connected together by the ſigns + and —.

Find the ſeparate fluents of the different terms, and connect them together by the ſigns of their reſpective *fluxions*. Thus, the fluent of $a\dot{x}+\dot{x}y+x\dot{y}-\frac{\dot{x}y-x\dot{y}}{y^2}$ is $=ax+xy-\frac{x}{y}$.

5. To find the flowing quantity belonging to the *fluxion* of any power, either perfect, or imperfect. Take the fluxionary letter, or letters, out of the equation; then augment the index of the *fluxion* by 1, or unity: laſtly, divide the *fluxion* by the index of its power ſo increaſed by unity.

Thus, ſuppoſe $3xx\dot{x}$ propoſed; by taking away $\dot{x}$ it will be $3xx$; and by increaſing its index by unity, it will be $3xxx$; then dividing it by 3, its now (augmented) index, the quotient will be xxx, the flowing quantity required.

Again, the fluent of $\frac{n}{m}\dot{x}x^{\frac{n-m}{m}}$ will be $x^{\frac{n}{m}}$. In compound fluxionary expreſſions, if the fluxionary part is equal, or in an invariable ratio to the *fluxion* of the quantity under the vinculum, the fluent may be had by adding 1 to the index of the power, and dividing by the *fluxion* of the quantity under the vinculum drawn into the index of the power thus increaſed. E. gr. the *fluent* of $\overline{x+x^2}|^2\times\overline{3\dot{x}+6x\dot{x}}$ is $=\frac{\overline{x+x^2}|^3\times\overline{3\dot{x}+6x\dot{x}}}{3\times\overline{\dot{x}+2x\dot{x}}}=\overline{x+x^2}|^3$: the fluent of $\overline{a+cz^n}|^m\times dz^{n-1}\dot{z}$ is $=\frac{\overline{a+cz^n}|^{m+1}\times dz^{n-1}\dot{z}}{\overline{m+1}\times nc\dot{z}z^{n-1}}=\frac{\overline{a+cz^n}|^{m+1}\times d}{nc\times\overline{m+1}}$; and the fluent of $\overline{a^m+z^m}|^n\times z^{m-1}\dot{z}$ is $=\frac{\overline{a^m+z^m}|^{n+1}}{m\times\overline{n+1}}$.

By theſe methods the fluent is found when the *fluxion* is given; and the rules are derived from thoſe of the direct method; as the rules in diviſion and evolution in algebra are deduced from thoſe of multiplication and involution. As when a fluent conſiſts of a variable, and invariable part, the latter does not appear in the *fluxion*; ſo when any *fluxion* is propoſed, it is only the variable part of the fluent that can be derived from it. If $\dot{x}$ repreſent any *fluxion* that may be propoſed, the variable part of the fluent will be equal to x; for ſuppoſing y to be any variable quantity, if $x+y$ could repreſent the fluent of $\dot{x}$, then $\dot{x}+\dot{y}$ would be equal to $\dot{x}$, and $\dot{y}=0$, or y would be invariable, againſt the ſuppoſition. But ſuppoſing K to repreſent any invariable quantity, then $x+K$ may generally repreſent the fluent of $\dot{x}$. If it be required to find ſuch a fluent of $\dot{x}$ as ſhall vaniſh when x is ſuppoſed to vaniſh, it can be no other than x; and if it be required that the fluent ſhould vaniſh when x is equal to any given quantity a, then by ſuppoſing $x+K$ to vaniſh when x becomes equal to a; we ſhall have $a+K=0$, or $K=-a$; whence the fluent is $x-a$. In the ſame manner, the fluent of $-\dot{x}$ may be generally repreſented by $K-x$. When a *fluxion* that is propoſed coincides with any of thoſe which were deduced from their fluents in the preceding articles, the variable part of the fluent required muſt coincide with that which was there propoſed. As diviſion in algebra leads us to fractions, and evolutions to ſurds; ſo the inverſe method of *fluxions* leads us often to quantities that are not known in common algebra, and that cannot be expreſſed by common algebraic ſymbols. Maclaurin's Flux. art. 735.

We cannot here pretend to enter into a detail of the rules of the inverſe method of *fluxions*. We ſhall only obſerve in general, that a *fluxion* being propoſed, its fluent may ſometimes be found accurately in algebraic terms; but this is far from being always poſſible; and recourſe muſt ſometimes be had to a converging ſeries. Thus, if $nx^{n-1}\dot{x}$ were propoſed, the variable part of the fluent is found by adding unity to the exponent of the power, dividing by the exponent thus increaſed, and by the *fluxion* of the root; that is, the variable part of the *fluent* of $nx^{n-1}\dot{x}$ will be $\frac{nx^{n-1+1}\dot{x}}{\overline{n-1+1}\times\dot{x}}=x^n$. But in many caſes this fluent requires the addition or ſubtraction of ſome conſtant quantity to render it complete, which can only be known from the nature of the problem under conſideration: e. gr. the fluent of $nx^{n-1}\dot{x}$ may be either repreſented by x^n or by $x^n\pm a$, becauſe a being conſtant, the *fluxion* of $x^n\pm a$, as well as of x^n is $nx^{n-1}\dot{x}$. To find this invariable quantity that muſt be added or ſubtracted, is to correct the fluent. In order to do this, the beſt way is to conſider how much the variable part of the fluent, firſt found, differs from the truth, in that particular circumſtance when the required quantity which the whole fluent ought to expreſs is equal to nothing; then, that difference added to or ſubtracted from the variable part, as occaſion requires, will give the fluent truly corrected. For, ſince the difference of two quantities flowing with the ſame celerity, or having equal *fluxions*, is either nothing at all, or conſtantly the ſame, the difference in that circumſtance will likewiſe be the difference in all other circumſtances; and, therefore, being added to the leſſer quantity, or ſubtracted from the greater, both become equal. Let the variable quantities x and y be firſt ſuppoſed to begin their exiſtence together, or to be generated at the ſame time: e. gr. 1. Let $\dot{y}=a^2x\dot{x}$, the fluent will be $y=\frac{a^2x^2}{2}$; if $y=0$, $\frac{a^2x^2}{2}$ vaniſhes, becauſe x is alſo $=0$, and the fluent needs no correction. 2. Let $\dot{y}=\overline{a+x}|^3\times\dot{x}$; and y will be $=\frac{\overline{a+x}|^4}{4}$; but when $y=0$ and $x=0$, $\frac{\overline{a+x}|^4}{4}$ becomes $=\frac{a^4}{4}$; and, therefore, $\frac{\overline{a+x}|^4}{4}$ always exceeds y by $\frac{a^4}{4}$, and the fluent properly corrected will be $y=\frac{\overline{a+x}|^4-a^4}{4}=a^3x+\frac{3a^2x^2}{2}+ax^3+\frac{x^4}{4}$. But this fluent may be found without correction, by expanding $\overline{a+x}|^3$ in the original equation, which will become $\dot{y}=a^3\dot{x}+3a^2x\dot{x}+3ax^2\dot{x}+x^3\dot{x}$, whence $y=a^3x+\frac{3a^2x^2}{2}+ax^3+\frac{x^4}{4}$.

3. Let $\dot{y}=\overline{a^2-x^2}|^{\frac{1}{2}}\times x\dot{x}$; then, $y=-\frac{\overline{a^2-x^2}|^{\frac{3}{2}}}{3}$, and y being $=0$, $-\frac{\overline{a^2-x^2}|^{\frac{3}{2}}}{3}$ becomes $=-\frac{a^3}{3}$; therefore $-\frac{\overline{a^2-x^2}|^{\frac{3}{2}}}{3}$ is too little by $\frac{a^3}{3}$; and the fluent corrected will be $y=\frac{a^3}{3}-\frac{\overline{a^2-x^2}|^{\frac{3}{2}}}{3}$, &c.

In the ſolution of other problems, the value of y will be equal to nothing, when that of x is equal to any given quantity a. E. gr. Let $\dot{y} = x^2 \dot{x}$, and y is $= \frac{x^3}{3}$; but when $y = 0$, $\frac{x^3}{3}$ is $= \frac{a^3}{3}$, by ſuppoſition; therefore, the corrected fluent will be $y = \frac{x^3 - a^3}{3}$. 2. Let $\dot{y} = - x^n \dot{x}$, then $y = - \frac{x^{n+1}}{n+1}$, which corrected becomes $y = \frac{a^{n+1} - x^{n+1}}{n+1}$, &c.

But if the propoſed *fluxion* were $\frac{a \dot{x}}{a-x}$, we cannot find its fluent by the rule above given; however, we may throw the *fluxion* into an infinite SERIES by dividing a by $a-x$ in the uſual method, and we ſhall find the quotient or $\frac{a}{a-x} = 1 + \frac{x}{a} + \frac{x^2}{a^2} + \frac{x^3}{a^3}$, &c. Hence $\frac{a}{a-x} = \dot{x} + \frac{x \dot{x}}{a} + \frac{x^2 \dot{x}}{a^2} + \frac{x^3 \dot{x}}{a^3} +$, &c. Now the fluent of each term of this ſeries may be found by the foregoing rule; and therefore the fluent of $\frac{a \dot{x}}{a-x}$ will be expreſſed by the ſeries $x + \frac{x^2}{2a} + \frac{x^3}{3a^2} + \frac{x^4}{4a^3}$, &c. which may be of uſe for determining the fluent when x is very ſmall in reſpect of a; becauſe in that caſe, a few terms at the beginning of the ſeries will be nearly equal to the value of the whole. But it often happens that the ſeries deduced in this method converges ſo ſlowly, as to be of little or no uſe. Or, becauſe the *fluxion* of the hyperbolic logarithm of any quantity is equal to the *fluxion* of that quantity divided by the quantity itſelf, the fluent of $\frac{a \dot{x}}{a-x}$ will be $=$ $a \times$ hyp. log. of $a-x$. For the *fluxion* of $a-x$ is $- \dot{x}$, which divided by $a-x$ is $\frac{\dot{x}}{a-x}$. See Maclaurin's Tr. of Flux. art. 737. 744. 827. Sterling, De Summat. Serier. p. 28. and Simpſon's Fluxions, vol. i. p. 87, &c.

Mathematicians do not always immediately recur to infinite ſeries, when it does not appear that a fluent can be aſſigned in a finite number of algebraic terms. The arches of a circle, and hyperbolic areas or logarithms, cannot be aſſigned in algebraic terms, but have been computed with great exactneſs by ſeveral methods. By theſe with algebraic quantities, any ſegments of conic ſections, and the arches of a parabola, are eaſily meaſured; and when a fluent can be aſſigned by them, this is conſidered as the ſecond degree of reſolution. When it does not appear that a fluent can be meaſured by the areas of conic ſections, it may however be meaſured in ſome caſes by their arcs; and this may be conſidered as the third degree of reſolution. If it does not appear that a fluent can be aſſigned by the arc of any conic ſections (the circle included) it may however be of ſome uſe to aſſign the fluent by an area, or arc of ſome other figure, that is eaſily conſtructed or deſcribed; and it is often important, that the propoſed *fluxion* be reduced to a proper form, in order that the ſeries for the fluent may not be too complex, and that it may not converge at too ſlow a rate.

We may therefore conſtitute three orders or claſſes of fluents. Firſt, ſuch as can be accurately aſſigned in finite terms by common algebraic expreſſions. Secondly, thoſe which can be reduced to circular arcs and logarithms. Thirdly, ſuch as can be aſſigned by hyperbolic or elliptic arcs. The firſt two claſſes (conſidering triangles and circles as conic ſections) may therefore be meaſured by the areas of conic ſections; and the third claſs by their perimeters, or lines that bound them.

The fluent of $\frac{\dot{x}}{\sqrt{1 \pm x}}$ is of the firſt claſs; that of $\frac{\dot{x}}{\sqrt{x} \times \sqrt{1 \pm x}}$, or of $\frac{\dot{x}}{\sqrt{1 \pm xx}}$, of the ſecond; but the fluents of $\frac{\dot{x}\sqrt{x}}{\sqrt{1 \pm xx}}$, $\frac{\dot{x}}{\sqrt{x} \times \sqrt{1 \pm xx}}$, $\frac{\dot{x}}{\overline{1 \pm xx}|^{\frac{1}{4}}}$, and $\frac{\dot{x}}{\overline{1 \pm xx}|^{\frac{3}{4}}}$ are of the third claſs, and as far as has appeared hitherto, cannot be reduced to the former. See Maclaurin's Flux. book ii. chap. iii. art. 755. 798, &c.

It is to be obſerved, as to the fluent of $\frac{\dot{x}}{\sqrt{x} \times \sqrt{1 \pm xx}}$, or of $\frac{\dot{x}}{\overline{1 \pm xx}|^{\frac{3}{4}}}$, that it does not appear poſſible to repreſent them by any hyperbolic arc and algebraic quantities. But by aſſuming an elliptic arc likewiſe, they may be conſtructed. See Maclaurin, lib. cit. art. 802.

So likewiſe to repreſent the fluent of $\frac{\dot{z}}{\sqrt{z} \times \sqrt{b^2 \pm 2ez - zz}}$ or of $\frac{\dot{p}}{\sqrt{a^2 b^2 \pm 2aep^2 - p^4}}$, we muſt have recourſe to both the hyperbolic and elliptic arcs. Maclaurin, lib. cit. art. 805.

The fluent of $\frac{z^{\frac{rn}{4} - 1} \dot{z}}{\sqrt{e + fz^n}}$ is aſſignable by the arcs of conic ſections, when r is an integer number; that is, by right lines, when r is equal to 4, or to any multiple of 4; by circular and parabolic arcs (reducible to logarithms) with right lines, when r is any other even number; by arcs of an equilateral hyperbola with right lines, when r is any number of the ſeries 3, 7, 11, 15, &c. and by arcs of the ſame hyperbola and right lines, with arcs of an ellipſis, that has its excentricity equal to the ſecond axis, when r is any of the numbers 1, 5, 9, 13, &c. See Maclaurin, ibid. art. 809.

We preſume, upon the whole, that few will be ſo ſcrupulous as to deny the Newtonian doctrine of *fluxions* to be intelligible, and accurately demonſtrated. But on the other hand it muſt be confeſſed, that the introduction of the notions of motion and velocity, which are mechanical, ſeems not to have thrown any light on this part of geometry. The conſideration of the limiting ratios of variable quantities, and that of the limiting polygons of curves, as it requires no other knowlege but what depends on the common properties of number and magnitude, ſo it ſeems, in all reſpects, the moſt clear and unexceptionable manner of conſidering the ſubjects treated of in the higher geometry. An eminent mathematician ſeems to declare himſelf of this opinion, when he ſays, that quadratures by limiting polygons is one of that kind which requires no other knowlege but what depends on the common properties of number and magnitude; and ſo may ſerve as an inſtance to ſhew, that no other is requiſite for the eſtabliſhment of principles for arithmetic and geometry; a truth, which though certain in itſelf, may perhaps ſeem doubtful from the nature and tendency of the preſent inquiries in mathematics. For among the moderns ſome have thought it neceſſary, for the inveſtigation of the relations of quantities, to have recourſe to very hard hypotheſes; ſuch as that of numbers infinite, and indeterminate; and that of magnitudes in *ſtatu fieri*, exiſting in a potential manner, which are actually of no bigneſs. And others, whoſe names are truly to be reverenced, on account of their great and ſingular inventions, have thought it requiſite to have recourſe even to principles foreign to mathematics, and have introduced the conſideration of efficient cauſes and phyſical powers, for the production of mathematical quantities; and have ſpoken of them, and uſed them, as if they were a ſpecies of quantities by themſelves. Vide Machin, in Phil. Tranſ. N° 447.

The elements of the doctrine of *fluxions* have been delivered by its great author in ſo conciſe a manner, as to give occaſion to one of the moſt ingenious writers of this age to repreſent it as founded on inconceivable principles, and full of falſe reaſonings. This author, in a letter, under the title of the Analyſt, publiſhed in the year 1734, has been at great pains to convince his readers, that the objects, principles, and inferences of the modern analyſis by *fluxions*, are not more diſtinctly conceived, or more evidently deduced, than religious myſteries and points of faith. He ſays he does not controvert the truth of the concluſions, but only the logic and method of mathematicians. He aſks how they demonſtrate, what objects they are converſant with, and whether they conceive them clearly; what principles they proceed upon, how ſound they may be, and how they apply them; declaring himſelf not concerned about the truth of the theorems, but only about the way of coming at them, whether it be legitimate or illegitimate, clear or obſcure, ſcientific or tentative. He conſiders the concluſions not in themſelves, but in their premiſes; not as true or falſe, uſeful or inſignificant, but as derived from ſuch principles, and by ſuch inferences. And for as much as it may ſeem an unaccountable paradox, that mathematicians ſhould deduce true propoſitions from falſe principles, be right in the concluſion, and yet err in the premiſes, he endeavours particularly to explain, how this may come to paſs, and ſhew how error may bring forth truth, though it cannot bring forth ſcience. His ſolution of the paradox is, that in the application of the method of infiniteſimals and *fluxions*, two errors are committed, which being equal and contrary, deſtroy each other. We cannot enter into a detail of all he ſays on theſe and many other heads, nor of all that has been ſaid on the other ſide, in defence of the method of *fluxions*, and of its inventor, Sir Iſaac Newton. An anſwer to the Analyſt, under the title of Geometry no Friend to Infidelity, appeared very early under the name of Philalethes Cantabrigienſis, ſuppoſed to be Dr. Jurin; a ſecond, by the ſame hand, in defence of the firſt, intitled, The Minute Mathematician, or the Free-thinker no juſt Thinker, publiſhed in 1735; a Diſcourſe of *Fluxions*, by Mr. Robins, firſt publiſhed in 1735 (ſee his Collection of Tracts, by Wilſon, vol. ii.); a Treatiſe of Sir Iſaac Newton's, with a commentary by Mr. Colſon; and ſeveral other pieces were publiſhed on this ſubject; particularly a very full and excellent treatiſe of *fluxions*, by Mr. Maclaurin, late profeſſor of mathematics in the univerſity of Edinburgh, containing not only a moſt diſtinct account of the principles of *fluxions*, but alſo of the chief diſcoveries in geometry, and mathematical philoſophy of this age. The curious may find an elegant account of this treatiſe in the Philoſophical Tranſactions, N° 468, 469.

We preſume that Mr. Maclaurin's demonſtrations are ſufficient to ſatisfy the moſt ſcrupulous; it would exceed the bounds of our deſign to inſert them at length here; but we cannot omit mentioning what ſeems neceſſary to explain and illuſtrate the notion of *fluxions*; and the principles on which this method of computation is founded.

In the doctrine of *fluxions*, magnitudes are conceived to be generated by motion; and the velocity of the generating motion is the *fluxion* of the magnitude. Lines are ſuppoſed to be generated by the motion of points: the velocity of the point that deſcribes the line, is its *fluxion*, and meaſures the rate of its increaſe or decreaſe. When the motion of a point is uniform, its velocity is conſtant, and is meaſured by the ſpace deſcribed by it in a given time: when the motion varies, the velocity at any term of the time is meaſured by the ſpace which would be deſcribed in a given time, if the motion was to be continued uniformly, from that term, without any variation. And this is analogous to the general doctrine of powers, or may be conſidered as a particular application of it. As a power which acts continually and uniformly is meaſured by the effect that is produced by it in a given time, ſo the velocity of an uniform motion is meaſured by the ſpace that is deſcribed in a given time. If the action of the power vary, then its exertion at any rate of the time is not meaſured by the effect that is produced after that term in a given time, but by the effect that would have been produced if its action had continued uniform from that term; and in the ſame manner, the velocity of a variable motion at any given term of time is not to be meaſured by the ſpace that is actually deſcribed after that term in a given time, but by the ſpace that would have been deſcribed, if the motion had continued uniformly from that term. If the action of a variable power, or the velocity of a variable motion, may not be meaſured in this manner, they muſt not be ſuſceptible of any menſuration at all. When it is ſuppoſed that a body has ſome velocity or other at any term of the time, during which it moves, it is not therefore ſuppoſed, that there can be any motion in a term, limit or moment of time, or in an indiviſible point of ſpace; and as velocity is always meaſured by the ſpace that would be deſcribed by it, continued uniformly for ſome given finite time, it cannot ſurely be ſaid, that geometers pretend to conceive motion or velocity without regard to ſpace or time, as the author of the Analyſt often ſuggeſts. This is a ſhort view of the nature and tendency of the doctrine of *fluxions*, which we ſhall now proceed to explain more particularly.

We have already ſaid that lines may be conceived as generated by the motion of points; in like manner ſurfaces may be conceived as generated by the motion of lines; ſolids by the motion of ſurfaces; angles, by the rotation of their ſides; the flux of time being ſuppoſed to be always uniform. The velocity with which a line flows, is the ſame as that of the point which is ſuppoſed to deſcribe or generate it. The velocity with which a ſurface flows, is the ſame as the velocity of a given right line; that, by moving parallel to itſelf, is ſuppoſed to generate a rectangle which is always equal to the ſurface. The velocity with which a ſolid flows, is the ſame as the velocity of a given plain ſurface, that, by moving parallel to itſelf, is ſuppoſed to generate an erect priſm or cylinder that is always equal to the ſolid. The velocity with which an angle flows, is meaſured by the velocity of a point, that is ſuppoſed to deſcribe the arch of a given circle, which always ſubtends the angle, and meaſures it. In general, all quantities of the ſame kind (when we conſider their magnitude only, and abſtract from their poſition, figure, and other affections) may be repreſented by right lines, that are ſuppoſed to be always in the ſame proportion to each other as theſe quantities. They are repreſented by right lines in this manner in Euclid's Elements, in the general doctrine of proportion, and by right lines and figures in the data of that accurate geometer. In this method likewiſe, quantities of the ſame kind may be repreſented by right lines, and the velocities of the motions by which they are ſuppoſed to be generated, by the velocities of points moving in right lines. All the velocities we have mentioned are meaſured, at any term of the time of the motion, by the ſpaces which would be deſcribed in a given time, by theſe points, lines, or ſurfaces, with their motions continued uniformly from that term.

A *fluxion* being the velocity with which a quantity flows, at any term of the time while it is ſuppoſed to be generated, is therefore always meaſured by the increment or decrement that would be generated in a given time by this motion, if it was continued uniformly from that term without any acceleration or retardation; or it may be meaſured by the quantity that is generated in a given time by an uniform motion, which is equal to the generating motion at that term.

Time is repreſented by a right line that flows uniformly, or is deſcribed by an uniform motion; and a moment, or termination of time, is repreſented by a point or termination of that line. A given velocity is repreſented by a given line, the ſame which would be deſcribed by it in a given time. A velocity that is accelerated or retarded, is repreſented by a line that increaſes or decreaſes in the ſame proportion. The time of any motion being repreſented by the baſe of a figure, and any part of the time by the correſponding part of the baſe; if the ordinate at any point of the baſe be equal to the ſpace that would be deſcribed, in a given time, by the velocity at the correſponding term of the time continued uniformly, then any velocity will be repreſented by the correſponding ordinate. The *fluxions* of quantities are repreſented by the increments or decrements, deſcribed in the foregoing paragraph, which meaſure them; and inſtead of the proportion of the *fluxions* themſelves, we may always ſubſtitute the proportion of their meaſures.

When a motion is uniform, the ſpaces that are deſcribed by it in any equal times are always equal. When a motion is perpetually accelerated, the ſpaces deſcribed by it in any equal times that ſucceed after one another, perpetually increaſe. When a motion is perpetually retarded, the ſpaces that are deſcribed by it in any equal times that ſucceed after one another, perpetually decreaſe.

It is manifeſt, converſely, that if the ſpaces deſcribed in any equal times are always equal, then the motion is uniform. If the ſpaces deſcribed in any equal times that ſucceed after one another perpetually increaſe, the motion is perpetually accelerated; for it is plain, that if the motion was uniform for any time, the ſpaces deſcribed in any equal parts of this time would be equal; and if it was retarded for any time, the ſpaces deſcribed in equal parts of this time that ſucceed after one another would decreaſe; both of which are againſt the ſuppoſition. In like manner it is evident, that a motion is perpetually retarded, when the ſpaces that are deſcribed in any equal times that ſucceed after one another, perpetually decreaſe. The following axioms are as evident, as that a greater or leſſer ſpace is deſcribed in a given time, according as the velocity of the motion is greater or leſs.

Axiom 1. The ſpace deſcribed by an accelerated motion is greater than the ſpace which would have been deſcribed in the ſame time, if the motion had not been accelerated, but had continued uniform from the beginning of the time.

Axiom 2. The ſpace deſcribed by a motion while it is accelerated, is leſs than the ſpace which is deſcribed in an equal time by the motion that is acquired by that acceleration continued uniformly.

Axiom 3. The ſpace deſcribed by a retarded motion is leſs than the ſpace which would have been deſcribed in the ſame time, if the motion had not been retarded, but had continued uniform from the beginning of the time.

Axiom 4. The ſpace deſcribed by a motion while it is retarded, is greater than the ſpace which is deſcribed in an equal time by the motion that remains after that retardation, continued uniformly.

From theſe axioms, general theorems concerning motion, of uſe in the doctrine of *fluxions*, may be demonſtrated. Thus when the ſpaces deſcribed by two variable motions are always equal, or in a given ratio, the velocities are always equal, or in the ſame given ratio; and converſely, when the velocities of two motions are always equal to each other, or in a given ratio, the ſpaces deſcribed by thoſe motions in the ſame time are always equal, or in that given ratio; that when a ſpace is always equal to the ſum or difference of the ſpaces deſcribed by two other motions, the velocity of the firſt motion is always equal to the ſum or difference of the velocities of the other motions; and converſely, that when a velocity is always equal to the ſum or difference of two other velocities, the ſpace deſcribed by the firſt motion is always equal to the ſum or difference of the ſpaces deſcribed by theſe two other motions. See Mr. Maclaurin's Treatiſe of Fluxions, book i. chap. 1.

The main point in the method of *fluxions*, is to obtain the *fluxion* of the rectangle, or product of two indeterminate quantities, ſince from thence may be derived rules for all other products and powers, be the coefficients, or the indices, what they will, integers or fractions, rational or ſurd; according to the manner of Sir Iſaac Newton, in the ſecond lemma of his ſecond book of Principles.

Mr. Maclaurin has therefore been very full in eſtabliſhing this point; and after what he has ſaid, we preſume that no reaſonable objection can lie either againſt the clearneſs and diſtinctneſs of the notion of *fluxions*, or againſt the truth of the principles, or accuracy of the demonſtrations by which their meaſures are determined. We cannot here inſert his demonſtrations at length; but as many readers may, perhaps, be deſirous of ſeeing the argument contracted into a narrow compaſs, we ſhall here give a ſummary of it, from the Philoſophical Tranſactions, N° 468, p. 331. or Martyn's Abridg. vol. viii. p. 31, &c.

A triangle that has two of its ſides given in poſition, is ſuppoſed to be generated by an ordinate moving parallel to itſelf along the baſe. When the baſe increaſes uniformly, the triangle increaſes with an accelerated motion, becauſe its ſucceſſive increments are *trapezia*, that continually increaſe; therefore if the motion with which the triangle flows, was continued uniformly from any term for a given time, a leſs ſpace would be deſcribed by it, than the increment of the triangle, which is actually generated in that time by axiom 1; but a greater ſpace than the increment which was actually generated in an equal time preceding that term, by axiom 2. And hence it is demonſtrated, that the *fluxion* of the triangle is accurately meaſured by the rectangle contained by the correſponding ordinate of the triangle, and the right line which meaſures the *fluxion* of the baſe. The increment which the triangle acquires in any time, is reſolved into two parts; that which is generated in conſequence of the motion with which the triangle flows at the beginning of the time, and that which is generated in conſequence of the acceleration of this motion for the ſame time. The latter is juſtly neglected in meaſuring that motion (or the *fluxion* of the triangle at that term) but may ſerve for meaſuring its acceleration, or the ſecond *fluxion* of the triangle. The motion with which the triangle flows, is ſimilar to that of a body deſcending in free ſpaces by an uniform gravity, the velocity of which, at any term of the time, is not to be meaſured by the ſpace deſcribed by the body in a given time, either before or after that term, becauſe the motion continually increaſes, but by a mean between theſe ſpaces.

When the ſides of a rectangle increaſe or decreaſe with uniform motions, it may be always conſidered as the ſum or difference of a triangle and trapezium; and this *fluxion* is derived from the laſt propoſition. If the ſides increaſe with uniform motions, the rectangle increaſes with an accelerated motion; and in meaſuring this motion at any term of the time, a part of the increment of the rectangle that may be determined, is rejected, as generated in conſequence of the acceleration of that motion.

Thoſe who have well underſtood what precedes, will not be at a loſs to conceive, that the *fluxions* of a curvilineal area, whether generated by an ordinate moving parallel to itſelf, or by a radius revolving round a given center, may be determined by demonſtrations of the ſame kind. When the ordinates of the figure increaſe, the increment of the area may be reſolved in like manner into two parts, one of which only is to be retained in meaſuring the *fluxion* of the area, the other being rejected as generated in conſequence of the acceleration of the motion with which the figure flows.

What has been hitherto ſaid will ſet the difference between the notion of *fluxions* and that of infiniteſimals, in a clear light. *Fluxions* may always be repreſented by finite quantities. The ſuppoſition of an infinitely little magnitude is too bold a poſtulatum for ſuch a ſcience as geometry. Nor have authors accounted explicitly for the truth and perfect accuracy of the concluſions derived from this conſideration. When they determine what is called the *difference*, but more accurately the *fluxion* of a quantity, they tell us, they reject certain parts of the element, becauſe they become infinitely leſs than the other parts. But this is no proper reaſon, not only becauſe a proof of this nature may leave ſome doubt as to the accuracy of the concluſion, but becauſe it may be demonſtrated that theſe parts ought to be neglected by them at any rate, or that it would be an error to retain them. If an accountant, that pretends to a ſcrupulous exactneſs, ſhould tell us, he had neglected certain articles, becauſe he found them to be of ſmall importance; and it ſhould appear that they ought not to have been taken into conſideration by him on that occaſion, but belong to a different account, we ſhould approve his concluſions as accurate, but not his reaſons. See Maclaurin's Treatiſe of *Fluxions* in the preface, and book i. chap. 12. where the method of INFINITESIMALS is expreſly treated of.

Mr. Maclaurin in the firſt part of his treatiſe conſiders *fluxions* in a merely geometrical form, and has demonſtrated the rules of the method with all poſſible accuracy and rigour; but as the great improvements made by this doctrine are chiefly to be aſcribed to the facility, conciſeneſs, and great extent of the methods of computation, or the algebraic part, it is neceſſary to add ſome account of theſe methods alſo.

Any quantities produced from each other by an algebraic operation, or whoſe relation is expreſſed by any algebraic form, being ſuppoſed to increaſe or decreaſe together, ſome will be found to increaſe or decreaſe by greater differences, or at a greater rate, others by leſs differences, or at a leſs rate; and while ſome are ſuppoſed to increaſe or decreaſe at one conſtant rate by equal ſucceſſive differences, others increaſe or decreaſe by differences that are always varying. Theſe rates of increaſe or decreaſe may be determined by comparing the velocities of points that always deſcribe lines proportional to the quantities as before mentioned, but they may alſo be determined without having recourſe to ſuch ſuppoſitions, by a juſt reaſoning from the ſimultaneous increments or decrements themſelves.

When a quantity A increaſes by differences equal to a, 2 A increaſes by differences equal to $2a$, and manifeſtly increaſes or decreaſes at a greater rate than A in the proportion of $2a$ to a or 2 to 1; and if m and n be invariable, $\frac{mA}{n}$ increaſes or decreaſes by differences equal to $\frac{ma}{n}$, and therefore at a greater or leſs rate than A in proportion as $\frac{ma}{n}$ is greater or leſs than a, or m is greater or leſs than n. This ſeems to be eaſily conceived, without having recourſe to any other conſiderations, than the relation of the differences by which the quantities increaſe or decreaſe. In order therefore to avoid figurative expreſſions in the algebraic part, it will be proper to ſubſtitute in the place of the definition and axioms before mentioned, others that are rather of a more general import, but are perfectly conſiſtent with them. Thus,

Fluxions *of quantities are any meaſures of their reſpective rates of increaſe, or decreaſe, while they vary or flow together.*

There can be no difficulty in determining thoſe meaſures when the quantities increaſe or decreaſe by ſucceſſive differences, that are always in the ſame invariable proportion to each other. While A by increaſing becomes equal to $A+a$, or by decreaſing equal to $A-a$, 2 A becomes equal to $2A+2a$, or to $2A-2a$; and as 2 A increaſes or decreaſes at a greater rate than A in the proportion of $2a$ to a; ſo the *fluxion* of A being ſuppoſed equal to a, the *fluxion* of 2 A muſt be equal to $2a$.

In the ſame manner the *fluxion* of $\frac{m}{n}\times A$ (or of $\frac{m}{n}\times A\mp e$, ſuppoſing m, n, and e to be invariable) is $\frac{m}{n}\times a$; and ſince m may be to n in any aſſignable ratio, a quantity may be always aſſigned that ſhall increaſe or decreaſe, at a greater or leſs rate than A in any proportion, or that ſhall have its *fluxion* greater or leſs than the *fluxion* of A in any ratio. In ſuch caſes, the ratio of the *fluxions* and that of the differences, by which the quantities increaſe or decreaſe, are the ſame.

But while A is ſuppoſed to increaſe at a conſtant rate by any equal ſucceſſive differences, if B increaſe or decreaſe by differences that are always varying, B cannot be ſaid to increaſe or decreaſe at any one conſtant rate; and it is not ſo obvious how the *fluxion* of A being ſuppoſed equal to its increment a, the variable *fluxion* of B is to be determined. It cannot be ſuppoſed that the *fluxions* and differences are always in the ſame proportion in this caſe; but it is evident, that if B increaſe by differences that are always greater than the equal ſucceſſive differences by which $\frac{m}{n}\times A$ increaſes, it cannot increaſe at a leſs rate than $\frac{m}{n}\times A$; and it cannot increaſe at a greater rate than $\frac{m}{n}\times A$, while its ſucceſſive differences always leſs than thoſe of $\frac{m}{n}\times A$. The *fluxion* of A, being ſtill repreſented by *a*, the *fluxion* of B therefore cannot be leſs than $\frac{m}{n}\times a$ in the former caſe, or greater then $\frac{m}{n}\times a$ in the latter. The following propoſitions are conſequences of this, and will enable us to determine at what rate B increaſes, when its relation to A is known.

The ſucceſſive values of the root A being repreſented by $A-a$, A, $A+a$, &c. which increaſe by any conſtant difference *a*, let the correſponding values of any quantity produced from A, by any algebraic operation (or that has a dependence upon it ſo as to vary with it) be B—b, B, B+*b*, &c. Then if the ſucceſſive differences b, *b*, &c. of the latter quantity always increaſe, how ſmall ſoever *a* may be, then B cannot be ſaid to increaſe at ſo great a rate as a quantity that increaſes uniformly by equal ſucceſſive differences greater than *b*, or at ſo ſmall a rate as any quantity that increaſes uniformly by equal ſucceſſive differences leſs than b. In like manner, if the relation of the quantities is ſuch, that the ſucceſſive differences b, *b*, &c. continually decreaſe; then B cannot be ſaid to increaſe at the ſame rate as a quantity that increaſes uniformly by equal ſucceſſive differences greater than b, or leſs than *b*.

Therefore the *fluxion* of A being ſuppoſed equal to the increment *a*, the *fluxion* of B cannot be greater than *b* or leſs than b, when the ſucceſſive differences b, *b*, &c. continually increaſe; and cannot be greater than b or leſs than *b*, when theſe ſucceſſive differences always decreaſe.

In the ſame manner, if the latter quantity decreaſe while the former increaſes, and its ſucceſſive values be B+*b*, B—b, &c. then if the decrements *b*, b, &c. continually increaſe, B cannot be ſaid to decreaſe at ſo great a rate as a quantity that decreaſes uniformly by equal ſucceſſive differences greater than b, or at ſo ſmall a rate as a quantity that decreaſes uniformly by equal ſucceſſive differences leſs than *b*. Therefore in this caſe the *fluxion* of A being ſuppoſed equal to *a*, the *fluxion* of B cannot be greater than b or leſs than *b*. And in the ſame manner if the ſucceſſive decrements *b*, b, &c. always decreaſe, the *fluxion* of B cannot be greater than *b*, or leſs than b. Vid. Maclaurin's Flux. book ii. cap. 1. tom. ii. p. 579, ſeq.

As the *fluxions* of quantities are any meaſures of the reſpective rates, according to which they increaſe or decreaſe; ſo it is of no importance how great or ſmall thoſe meaſures are, if they be in the juſt proportion or relation to each other. Therefore if the *fluxions* of A and B may be ſuppoſed equal to *a* and *b* reſpectively, they may be likewiſe ſuppoſed equal to $\frac{1}{2}a$ and $\frac{1}{2}b$, or to $\frac{ma}{n}$ and $\frac{mb}{n}$.

Prop. I. *The* fluxion *of the root* A *being ſuppoſed equal to* *a*, *the* fluxion *of the ſquare* AA *will be equal to* $2A\times a$. To demonſtrate this, let the ſucceſſive values of the root be $A-u$, A, $A+u$, and the correſponding values of the ſquare will be $AA-2Au+uu$, AA, $AA+2Au+uu$, which increaſe by the differences $2Au-uu$, $2Au+uu$, &c. and becauſe thoſe differences increaſe, it follows from what has been ſaid, that if the *fluxion* of A be repreſented by *u*, the *fluxion* of AA cannot be repreſented by a quantity that is greater than $2Au+uu$, or leſs than $2Au-uu$. This being premiſed, ſuppoſe, as in the propoſition, that the *fluxion* of A is equal to *a*; and if the *fluxion* of AA be not equal to $2Aa$, let it firſt be greater than $2Aa$ in any ratio, as that of $2A+o$ to $2A$, and conſequently equal to $2Aa+oa$. Suppoſe now that *u* is any increment of A leſs than *o*; and becauſe *a* is to *u* as $2Aa+oa$ is to $2Au+ou$, it follows, that if the *fluxion* of A ſhould be repreſented by *u*, the *fluxion* of AA would be repreſented by $2Au+ou$, which is greater than $2Au+uu$. But it has been ſhewn, that if the *fluxion* of A be repreſented by *u*, the *fluxion* of AA cannot be repreſented by a quantity greater than $2Au+uu$. And theſe being contradictory, it follows, that the *fluxion* of A being equal to *a*, the *fluxion* of AA cannot be greater than $2Aa$. If the *fluxion* of AA can be leſs than $2Aa$, when the *fluxion* of A is ſuppoſed equal to *a*, let it be leſs in any ratio of $2A-o$ to $2A$, and therefore equal to $2Aa-oa$. Then becauſe *a* is to *u* as $2Aa-oa$ is to $2Au-ou$, which is leſs than $2Au-uu$, (*u* being ſuppoſed leſs than *o*, as before) it follows, that if the *fluxion* of A was repreſented by *u*, the *fluxion* of AA would be repreſented by a quantity leſs than $2Au-uu$, againſt what has been ſhewn. Therefore the *fluxion* of A being ſuppoſed equal to *a*, the *fluxion* of AA muſt be equal to $2Aa$.

The *fluxions* of A and B being ſuppoſed equal to *a* and *b*, reſpectively, the *fluxion* of $A+B$ will be $a+b$, the *fluxion* of $\overline{A+B}^2$, or of $AA+2AB+BB$, will be $2\times\overline{A+B}\times\overline{a+b}$, or $2Aa+2Bb+2Ba+2Ab$, by the laſt article. The *fluxion* of $AA+BB$ is $2Aa+2Bb$, by the ſame; conſequently the *fluxion* of $2AB$ is $2Ba+2Ab$; and the *fluxion* of AB is $Ba+Ab$. Hence if P be equal to AB, and the *fluxion* of P be *p*, then *p* will be equal to $Ba+Ab$, and dividing by P, or AB, we find $\frac{p}{P}=\frac{a}{A}+\frac{b}{B}$. If $Q=\frac{A}{B}$, and *q* be the *fluxion* of Q, then $QB=A$, $\frac{q}{Q}+\frac{b}{B}=\frac{a}{A}$, or $\frac{q}{Q}=\frac{a}{A}-\frac{b}{B}$; and conſequently $q=\frac{Qa}{A}-\frac{Qb}{B}=\frac{a}{B}-\frac{Ab}{BB}$, or $\frac{aB-Ab}{BB}$.

When any of the quantities decreaſes, its *fluxion* is to be conſidered as negative.

The rule for finding the *fluxion* of a power is uſually deduced from the binomial theorem of Sir Iſaac Newton. But as this theorem, though eaſily found by induction, is not ſo eaſy to demonſtrate, it is proper to proceed upon a principle, the truth of which may be ſhewn from the firſt algebraic elements, with more facility and perſpicuity. This principle is, that if *n* be any integer number, and the ſum of the terms E^{n-1}, $E^{n-2}F$, $E^{n-3}F^2$, $E^{n-4}F^3$, &c. continued till their number be equal to *n*, be multiplied by $E-F$, the product will be E^n-F^n. For the terms being formed by ſubducting continually unity from the index of E, and adding it to the index of F, the laſt term will be F^{n-1}. The product of the ſum of the terms multiplied by E will be $E^n+E^{n-1}F+E^{n-2}F^2\ldots\ldots+EF^{n-1}$; their ſum multiplied by $-F$ gives $-E^{n-1}F-E^{n-2}F^2\ldots-EF^{n-1}-F^n$; and the ſum of theſe two products is E^n-F^n. Suppoſing E to be greater than F, E^n-F^n will be leſs than $nE^{n-1}\times\overline{E-F}$, but greater than $nF^{n-1}\times\overline{E-F}$. For each of the terms E^{n-1}, $E^{n-2}F$, $E^{n-3}F^2$, is greater than the ſubſequent term in the ſame ratio that E is greater than F, and E^{n-1} is the greateſt term; conſequently the number of terms being equal to *n*, nE^{n-1} is greater than their ſum; and $nE^{n-1}\times\overline{E-F}$ is greater than their ſum multiplied by $\overline{E-F}$, or (by the laſt paragraph) greater than E^n-F^n. Becauſe the laſt term F^{n-1} is leſs than any preceding term, $nF^{n-1}\times\overline{E-F}$ is leſs than the ſum of the terms multiplied by $\overline{E-F}$, or leſs than E^n-F^n.

When *n* is any integer poſitive number, the root A being ſuppoſed to increaſe by any equal ſucceſſive differences, the ſucceſſive differences of the power A^n will continually increaſe. For let $A-a$, A, $A+a$, be any ſucceſſive values of the root, and $\overline{A-a}^n$, A^n, $\overline{A+a}^n$ will be the correſponding values of the power. But $\overline{A+a}^n-A^n$ is greater than $nA^{n-1}a$; as appears by ſubſtituting in the laſt paragraph $\overline{A+a}$ for E, A for F, and *a* for $\overline{E-F}$. In like manner, $nA^{n-1}a$ is greater than $A^n-\overline{A-a}^n$. Therefore $\overline{A+a}^n-A^n$ is greater than $A^n-\overline{A-a}^n$, and the ſucceſſive differences of the power continually increaſe.

Prop. II. *The* fluxion *of the root* A *being ſuppoſed equal to* *a*, *the* fluxion *of the power* A^n *will be* naA^{n-1}.

For if the *fluxion* of A^n can be greater than naA^{n-1}, let the exceſs be equal to any quantity *r*; ſuppoſe *o* equal to the exceſs of $\sqrt[n-1]{A^{n-1}+\frac{r}{na}}$ above A, and conſequently $\overline{A+o}^{n-1}=A^{n-1}+\frac{r}{na}$. Then $na\times\overline{A+o}^{n-1}$ will be equal to $naA^{n-1}+r$, the *fluxion* of A^n. Let *u* be any increment of A leſs then *o*; and becauſe *a* is to *u* as $na\times\overline{A+o}^{n-1}$ to $nu\times\overline{A+o}^{n-1}$, it follows (from what has been ſaid) that if the *fluxion* of A be now repreſented by the increment *u*, the *fluxion* of A^n will be repreſented by $nu\times\overline{A+o}^{n-1}$, which is greater than $nu\times\overline{A+u}^{n-1}$, and this laſt is itſelf greater than $\overline{A+u}^{n-1}-A^n$. But when the ſucceſſive values of the root are $A-u$, A, $A+u$, thoſe of the power are $\overline{A-u}^n$, A^n, $\overline{A+u}^n$, the ſucceſſive differences of which continually increaſe; conſequently if the *fluxion* of A be repreſented by *u*, the *fluxion* of A^n cannot be repreſented by a quantity greater than $\overline{A+u}^n-A^n$, or leſs than $A^n-\overline{A-u}^n$. And theſe being contradictory, it follows, that when the *fluxion* of A is ſuppoſed equal to *a*, the *fluxion* of A^n cannot be greater than naA^{n-1}. If it can be leſs than naA^{n-1}, let it be equal to naA^n-r, or (by ſuppoſing $o=A-\sqrt[n-1]{A^{n-1}-\frac{r}{na}}$) to $na\times\overline{A-o}^{n-1}$. Then *u* being ſuppoſed

poſed leſs than *o*, if the *fluxion* of A was repreſented by *u*, the *fluxion* of A^n would be repreſented by $n u \times \overline{A-o}^{n-1}$, which is leſs than $n u \times \overline{A-u}^{n-1}$ (becauſe we ſuppoſe *u* to be leſs than *o)* and therefore leſs than $A^n - \overline{A-u}^n$. But this is repugnant to what has been demonſtrated. Therefore the *fluxion* of A being ſuppoſed equal to *a*, the *fluxion* of A^n muſt be equal to $n a A^{n-1}$.

Prop. III. *The* fluxion *of* A *being ſuppoſed equal to a, the* fluxion *of* $A^{\frac{m}{n}}$ *will be* $\frac{m a}{n} \times A^{\frac{m}{n}-1}$.

Firſt, let the exponent $\frac{m}{n}$ be any poſitive fraction whatſoever, ſuppoſe $A^{\frac{m}{n}} = K$; conſequently $A^m = K^n$; and the *fluxion* of K being ſuppoſed equal to *k*, $m a A^{m-1} = n k K^{n-1}$, and *k* or the *fluxion* of $A^{\frac{m}{n}}$ will be equal to $\frac{m a A^{m-1}}{n K^{n-1}} = \frac{m a K}{n A} = \frac{m}{n} \times a A^{\frac{m}{n}-1}$. When $\frac{n}{m}$ is negative, let it be equal to $-r$; and ſuppoſe $A^{-r} = K$, or $1 = A^r K$, then taking the *fluxions*, $r A^{r-1} a K + k A^r = o$, and $k = -\frac{r A^{r-1} a K}{A^r} = -r A^{-r-1} a = \frac{m}{n} \times a A^{\frac{m}{n}-1}$.

Prop. IV. *Suppoſing* P *to be the product of any factors A, B, C, D, E,* &c. *and the* fluxions *of P, A, B, C,* &c. *reſpectively equal to p, a, b,* &c. then will $\frac{p}{P} = \frac{a}{A} + \frac{b}{B} + \frac{c}{C} + \frac{d}{D}$, &c.

Let Q be equal to the product of all the factors of P, the firſt A excepted, that is, ſuppoſe $P = AQ$. Suppoſe R equal to the product of all the factors, the firſt two, A and B, excepted; that is, let $P = ABR$, or $Q = BR$. In the ſame manner let $R = CS$, $S = DT$, and ſo on. Then the *fluxions* of Q, R, S, T, &c. being ſuppoſed reſpectively equal to *q, r, s, t,* &c. it follows that $\frac{p}{P} = \frac{a}{A} + \frac{q}{Q} =$ (becauſe $\frac{q}{Q} = \frac{b}{B} + \frac{r}{R}$) $\frac{a}{A} + \frac{b}{B} + \frac{r}{R} =$ (becauſe $\frac{r}{R} = \frac{c}{C} + \frac{s}{S}$) $\frac{a}{A} + \frac{b}{B} + \frac{c}{C} + \frac{s}{S} =$ (becauſe $\frac{s}{S} = \frac{d}{D} + \frac{t}{T}$) $\frac{a}{A} + \frac{b}{B} + \frac{c}{C} + \frac{d}{D} + \frac{t}{T}$, and ſo on. Therefore $\frac{p}{P}$ is equal to the ſum of the quotients, when the *fluxion* of each factor is divided by the factor itſelf.

If the factors be ſuppoſed equal to each other, and their number be equal to *n*, then $P = A^n$, and by the laſt propoſition $\frac{p}{P} = \frac{n a}{A}$; conſequently $p = \frac{n P a}{A} = n a A^{n-1}$, as was before demonſtrated.

Prop. V. *If* $P = \frac{ABC, \&c.}{KLM, \&c.}$ *and the* fluxions *of the reſpective quantities be expreſſed by the ſmall letters p, a, b, c,* &c. *as before, then* $\frac{p}{P} = \frac{a}{A} + \frac{b}{B} + \frac{c}{C} - \frac{k}{K} - \frac{l}{L} - \frac{m}{M}$, &c.

For PKLM, &c. $=$ ABC, &c. and $\frac{p}{P} + \frac{k}{K} + \frac{l}{L} + \frac{m}{M}$, &c. $= \frac{a}{A} + \frac{b}{B} + \frac{c}{C}$, &c. whence by tranſpoſition $\frac{p}{P} = \frac{a}{A} + \frac{b}{B} + \frac{c}{C} - \frac{k}{K} - \frac{l}{L}$, &c. Maclaurin, ibid.

The notation we have hitherto uſed is the ſame as Sir Iſaac Newton's, in the ſecond lemma of the ſecond book of his Principles. But it is generally more convenient to diſtinguiſh *fluxions* from other algebraic expreſſions, and in ſuch manner, that the ſecond and higher *fluxions* may be repreſented ſo as to preſerve the original fluent in view. Hence Sir Iſaac Newton, in his laſt method, repreſented variable or flowing qualities by the final letters of the alphabet, as *x, y, z*; their firſt, ſecond, &c. *fluxions*, reſpectively by $\dot{x}, \dot{y}, \dot{z}$, and $\ddot{x}, \ddot{y}, \ddot{z}$, &c. But as this doctrine has been conteſted and repreſented by the author of the Analyſt, as inconceivable and ſophiſtical, we thought it proper more fully to explain and demonſtrate the principles thereof, from Mr. Maclaurin's excellent treatiſe on this ſubject.

It is to be obſerved, that the *fluxions* of powers are commonly delivered in an algebraic form; but this is not neceſſary. The ſame may be done geometrically, by ſuppoſing a ſeries of lines in geometric progreſſion, the firſt term of which is invariable. Then if the ſecond term be ſuppoſed to increaſe uniformly, all the ſubſequent terms will increaſe with an accelerated motion. The velocities of the points that deſcribe thoſe lines being compared, it may be demonſtrated from common geometry, that the *fluxions* of any two terms, are in a ratio compounded of the ratio of thoſe terms, and of the ratio of the numbers that expreſs how many terms precede them reſpectively, in the progreſſion. Thus, if A, B, C, D, E, &c. repreſent any lines in geometric progreſſion, the firſt term (A) of which is invariable, then will the *fluxion*, for inſtance, of E be to the *fluxion* of D as 4 E is to 3 D, and the *fluxion* of E will be to the *fluxion* of B, as 4 E to B. The analogy between powers in algebra and lines in geometric progreſſion, is ſufficiently known. Thus A being invariable may be called unity or 1; let $B = x$, then will $C = x x$, $D = x^3$, $E = x^4$, &c. and conſequently, the *fluxion* of E or x^4, will be to the *fluxion* of B or *x*, as $4x^4$ is to *x*, or as $4x^3$ is to 1. Therefore if the *fluxion* of *x* be expreſſed by $\dot{x}$, the *fluxion* of x^4 will be expreſſed by $4x^3 \dot{x}$, agreeably to the common algebraic method of expreſſion. Vide Mr. Maclaurin's Flux. book i. chap. 6. See alſo the Preſent State of the Rep. of Let. Oct. 1735, p 248, 249, &c.

If the *fluxion* of B, or the ſecond term of the progreſſion, be invariable, every term of the progreſſion will have *fluxions* of as many degrees, as there are terms that precede it in the progreſſion. And the increment of any term generated in a given time may be reſolved into as many parts, as it has *fluxions* of different orders; and each part may be conceived to be generated, in conſequence of its reſpective *fluxion*. Hence *fluxions* of all orders may be illuſtrated and meaſured.

As to the higher orders of *fluxions*, it is to be obſerved, that when a motion is accelerated or retarded continually, the velocity may itſelf be conſidered as a variable or flowing quantity, and may be repreſented by a line that increaſes or decreaſes continually. When a velocity increaſes uniformly ſo as to acquire equal increments in equal times, its *fluxion* is meaſured by the increment which is generated in any given time. In this caſe, the velocity is repreſented by a line that is deſcribed by an uniform motion; and its *fluxions*, by the conſtant velocity of the point that deſcribes the line, or by the ſpace which this point deſcribes in a given time. When a velocity is not accelerated uniformly, but acquires increments in equal times, that continually increaſe or decreaſe, then its *fluxion* at any term of the time is not meaſured by the increment, which it actually acquires, but by that which it would have acquired, if its acceleration had been continued uniformly from that term for a given time. And in the ſame manner, when a motion is retarded continually, the quantity by which it would be diminiſhed in a given time, if its retardation was continued uniformly for any term, meaſures its *fluxion* at that term. While the point M deſcribes the line E e, let the point Q deſcribe the line I i, ſo that I Q may be always equal to the ſpace that would be deſcribed by the motion of M, if it was continued uniformly for a given time. Then IQ ſhall always repreſent the velocity of M, and the velocity of the point Q ſhall repreſent the *fluxion* of the velocity of M; which therefore is meaſured, at any term of the time, by the ſpace which would be deſcribed by Q, with its motion at that term continued uniformly for a given time. The velocity of M is the *fluxion* of EM; and therefore the velocity of Q repreſents the *fluxion* of the *fluxion* of EM. See the beginning of this article. Thus, when a *fluxion* of a quantity is variable, it may be conſidered itſelf as a fluent, and may have its *fluxion*, which is called the *ſecond fluxion* of that quantity. This may alſo have its *fluxion*, which is called the *third fluxion* of the firſt fluent; and motions may be eaſily conceived to vary in ſuch a manner, as to give ground for admitting ſecond *fluxions*, and thoſe of any higher order. And as the firſt *fluxion* of a variable quantity, at any term of the time, is meaſured by the increment, or decrement, which would be produced, if the generating motion was continued uniformly from that term, for a given time; ſo its ſecond *fluxion* may be meaſured by twice the difference betwixt this increment, or decrement, and that which would be produced, if the acceleration, or retardation, of the generating motion was continued uniformly from that term for the ſame time. Maclaurin, lib. cit. book i. chap. 1. § 70. 75. and chap. 5, 6.

See a farther illuſtration of ſecond and third *fluxions*, in the ſame author (chap. 3. and 4.) deduced from the conſideration of the *fluxions* of ſolids.

The author of the Analyſt has repreſented the notions of ſecond and third *fluxions*, as inextricable myſteries; and indeed, when ſome ſpeak of the velocities of velocities, &c. it is not eaſy to ſay what they mean. But it is to be obſerved, that the firſt *fluxion* of any fluent is not the velocity of that fluent, but the velocity of the motion by which the fluent is conceived to be generated. And in like manner, the ſecond *fluxion* of that fluent is not the velocity of the velocity of this fluent, but the velocity of the motion by which the quantity is generated that always repreſents its firſt *fluxion*, and ſo of the reſt.

When the *fluxion* of a quantity is variable it may be conſidered as a fluent; and its *fluxion*, which is the ſecond *fluxion* of the propoſed quantity, may be determined by the preceding propoſitions. Thus the *fluxion* of A being ſuppoſed equal to a, the *fluxion* of AA is $2Aa$; and if A be ſuppoſed to increaſe at an uniform rate, or its *fluxion* a to be invariable, $2Aa$ will increaſe by equal ſucceſſive differences; conſequently its *fluxion*, or the ſecond *fluxion* of AA, will be equal to any of theſe differences, as to $2a \times \overline{A+a} - 2Aa$, or $2aa$. If a be variable, let its *fluxion* be equal to z, and the *fluxion* of $2Aa$ (or ſecond *fluxion* of AA) will be $2aa + 2Az$. In the ſame manner the *fluxion* of A being conſtant, the *fluxion* of $nA^{n-1}a$, or the ſecond *fluxion* of A^n is $na \times \overline{n-1} \times A^{n-2}a$, or $n \times \overline{n-1} \times aaA^{n-2}$; the *fluxion* of this, or third *fluxion* of A^n, is $n \times \overline{n-1} \times \overline{n-2} \times a^3 A^{n-3}$. And the *fluxion* of A^n of any order denoted by m, is $n \times \overline{n-1} \times \overline{n-2} \times \overline{n-3}$, &c. $\times a^m A^{n-m}$, where the factors in the coefficient are to be continued till their number be equal to m. When n is any integer poſitive number, the *fluxion* A^n, of the order n, is invariable and equal to $n \times \overline{n-1} \times \overline{n-2} \times \overline{n-3}$, &c $\times a^n$. The quantities that repreſent theſe *fluxions* of A^n depend on a, which repreſents the *fluxion* of A. When A remains of the ſame value, the firſt *fluxion* of A^n is greater or leſs in the ſame proportion, as a is ſuppoſed to be greater or leſs; the ſecond *fluxion* of A^n, is in the duplicate ratio of a; and its *fluxion* of the order m, is as a^m. If a be variable, but z the *fluxion* of a, or the ſecond *fluxion* of A, be conſtant, then the fourth *fluxion* of AA will be conſtant and equal to $6zz$; for we found, that the ſecond *fluxion* of AA was $2aa + 2Az$; the *fluxion* of which is $4az + 2az$, or $6az$; and the *fluxion* of this is $6zz$. In like manner, the ſixth *fluxion* of A^3 will be conſtant in this caſe, and equal to $90z^3$.

The ſecond differences of any quantity B are the ſucceſſive differences of its firſt differences; and as the *fluxion* B increaſes when its ſucceſſive differences increaſe; ſo its ſecond *fluxion*, or its *fluxions* of any higher order increaſe, when its ſecond or higher differences increaſe. If we arrive at differences of any order that are conſtant, the *fluxion* of the ſame order is conſtant, and is expreſſed by that difference. Thus when A is ſuppoſed to increaſe by conſtant differences equal to a, and its *fluxion* is ſuppoſed equal to a, the ſecond difference of AA (or $\overline{A+a}^2 - 2AA + \overline{A-a}^2$) is $2aa$, which is likewiſe its ſecond *fluxion*; and the third difference of A^3 is $6a^3$, which is its third *fluxion*. When n is any integer and poſitive number, the *fluxion* of A^n of the order n is equal to the *fluxion* of any of its firſt differences of the order $n-2$, and ſo on. For the *fluxion* of $\overline{A+a}^n - A^n$ (one of the firſt differences of A^n) of the order $n-1$ is $n \times \overline{n-1} \times \overline{n-2}$, &c. $\times \overline{A+a}^{n-n+1} - A \times a^{n-1} = n \times \overline{n-1} \times \overline{n-2}$, &c. $\times a^n$, where the coefficients are ſuppoſed to be continued till their number be $n-1$, ſo that the laſt muſt be 2. And this we found to be the *fluxion* of A^n of the order n, in the preceding paragraph. In the ſame manner the *fluxion* of $\overline{A+a}^n - 2A^n + \overline{A-a}^n$ (the ſecond difference of A^n) of the order $n-2$, is equal to the *fluxion* of $\overline{A+a}^n - A$ of the order $n-1$; and conſequently equal to the *fluxion* of A^n of the order n. Theſe *fluxions* are invariable and equal to the laſt or invariable differences. But in other caſes the *fluxions* of A^n of any order are leſs than its ſubſequent differences of the ſame order, but greater than the preceding differences, as before mentioned. Maclaurin's Flux. art. 720, ſeq.

By ſuppoſing one of the variable quantities to flow uniformly, it will have no ſecond or higher *fluxions*, and the higher *fluxions* depending on it will be expreſſed in a more ſimple manner. Thus the *fluxion* of x being ſuppoſed conſtant, the firſt *fluxion* of x^n being $nx^{n-1}\dot{x}$, its ſecond *fluxion* will be $n \times \overline{n-1} \times \dot{x}^2 x^{n-2}$, and its *fluxion* of any order m will be $n \times \overline{n-1} \times \overline{n-2} \times \overline{n-3}$, &c. $\times \dot{x}^m x^{n-m}$, where the factors in the coefficient are to be continued till their number be equal to m.

The ſecond or higher *fluxions* of quantities may be found by particular theorems (without computing thoſe of the preceding orders) as may be ſeen by the laſt example. See farther in Maclaurin's Fluxions, art. 734. See Rule 10. in the beginning of this article.

The uſe of the direct method of *fluxions*, ſee ſpecified under the articles EVOLUTE, INFLECTION, MAXIMIS and MINIMIS, and TANGENTS.

Thoſe of the inverſe method, ſee under QUADRATURE and RECTIFICATION *of curves*.

FLY, *Muſca*, in *Natural Hiſtory*. The account of the ſeveral ſpecies, genera, and claſſes of *flies*, is no ſmall part of the natural hiſtory of inſects. The number of the ſpecies of *flies* exceed perhaps even that of the butterfly; but the *flies* are in general ſmall, though there are ſome, as the libellæ, whoſe bodies are longer and larger than thoſe of the largeſt butterflies. The cicadæ alſo belong to the *fly* claſs; and there are ſome of thoſe, whoſe ſize exceed that of the largeſt butterflies in the thickneſs of their bodies. The generality of *flies*, however, are much ſmaller than the butterfly claſs, and many of them are indeed ſo very ſmall, as not eaſily to be diſtinguiſhed.

Many of the *flies* are in their prior ſtate hid from us, or detained among very diſpleaſing matters; it is in their winged ſtate that they become an agreeable object of our reſearches, and it may be moſt proper, therefore, to begin their hiſtory in that ſtate, occaſionally deſcending to the others.

It is a common error to imagine, that the ſmall *flies* one ſees in the ſpring, will become larger in ſummer. This is wholly without foundation, ſince all the *flies*, like other inſects which undergo a metamorphoſis, become of their full bigneſs, as ſoon as they arrive at the *fly* ſtate, and never grow afterwards.

The general and obvious character of *flies*, by which they are diſtinguiſhed from other winged inſects, is their having tranſparent wings, and never having on them any of that powder which is found on the wings of butterflies, and having no caſes or covers for them. They are, by this plain character of their tranſparent and naked wings, diſtinguiſhed from the butterfly, the beetle, the graſshopper, and other claſſes of winged inſects.

The parts of *flies* are the head, the CORCELET, and the body.

To the corcelet the wings are affixed, and in the body are contained the ſtomach, inteſtines, the parts of generation, and a great many of the tracheæ. The head in *flies* is uſually joined to the corcelet by a very ſhort neck, and can often turn on it as on a pivot. Some *flies* there are which have as it were two corcelets, one ſeparated from the other; the firſt in this caſe is uſually very ſmall, and the wings are affixed to the ſecond. The corcelet is the moſt prominent and rounded part of the inſect; it is always the ſtrongeſt part, and is frequently the thickeſt. The formica-leo and ſome water inſects, are transformed into *flies* which have double corcelets, or corcelets divided into two.

The moſt obvious diſtinctions for the arrangement of *flies* into claſſes, is the number of their wings; ſome having only two, others four. And this is ſo plain and obvious a diviſion, that it is wonderful that the writers of natural hiſtory have not long ſince fallen into it, nay, many of them have often omitted to tell us the number of wings of the ſpecies they deſcribe.

The firſt general diviſion of *flies* is therefore into that of the two-winged and four-winged kinds. A very ſlight obſervation is generally ſufficient to determine to which of theſe diviſions a *fly* belongs; but if we afterwards examine a *fly* with more attention, and take into conſideration the organs by which it takes its nouriſhment, one may obſerve, that ſome of them are able to thruſt out that organ to a conſiderable diſtance from their head, and that this organ, which, while in a ſtate of reſt, is folded up or ſhortened, or turned about, or laid cloſely down, when the creature wants to uſe it, is unfolded, lengthened, extended, or raiſed. This organ is what naturaliſts call the trunk of an inſect, but there are many other *flies* which have no trunk; theſe have no other than an opening, ſerving for a mouth, ſurrounded with lips and with ſome other parts. This ſort of opening, from its ſituation and figure, may very properly be called a mouth.

Some of theſe mouths have nothing analogous to teeth about them; but there are others which have teeth, ſaws, or grinders, placed on the outſide of the mouth, and moveable as in the caterpillars, with which the *flies* tear and deſtroy leaves, fruits, and fleſh: finally, there are alſo ſome *flies* to which nature has allotted both a trunk and theſe organs.

Theſe characters give us very naturally the diſtinctions of four ſubordinate claſſes under the two former general ones.

The firſt contains thoſe *flies* which have a trunk, and no teeth or ſaws. The ſecond contains thoſe which have a mouth without any ſenſible teeth. The third, thoſe which have a mouth furniſhed with teeth; and the fourth, thoſe which have both trunks and teeth. Among the *flies* which have mouths furniſhed with teeth, ſome have them not only without, but within their mouths alſo.

All the two-winged *flies* belong to the firſt or ſecond of theſe claſſes; the great blue fleſh-*fly*, the ſmall *flies* that are ſo troubleſome about our houſes, and the gnats, are all of the firſt claſs, and have trunks and no teeth. The ſpring-*fly*, ſo common in gardens, and a ſort of *fly* reſembling the gnat kind, but much larger, are of the ſecond claſs, and have mouths, but no ſenſible teeth.

The four-winged *flies* furniſh us with great numbers to fill up the other two claſſes, left vacant by the former. All the bee-kind have a trunk and two teeth; all the waſp-kind have a mouth furniſhed with two teeth; and there are, beſide theſe, ſeveral of the four-winged *flies* which belong to the ſecond claſs; all the papilionaceous *flies*, produced of water tæniæ, are of this ſort, as having a mouth without teeth. Several ſmall four-winged *flies* are alſo of the firſt claſs; as the flying pucerons, and falſe pucerons, which have all trunks and no teeth: neither are the ſmaller ſpecies only of this claſs, ſince the cicadæ alſo belong to it.

A fifth claſs may, however, be alſo eſtabliſhed, though the ſpecies of it are only few, there being only two kinds of *flies* of it; this is, of thoſe which have their head ſerving the office, or made in the form of a trunk. The *flies* of this kind have very long heads, which, like thoſe of birds, terminate in a ſort of beak; this, however, in the *fly*-kind, is never opened except at the end: or, in other words, theſe *flies* have heads, which are lengthened out into the reſemblance of a bill, or figure of a trunk, but which is ſtiff, and cannot change its figure, nor alter its poſition, otherwiſe than by altering that of the whole head. At the end of this ſort of trunk are placed the teeth or other organs, by which the creature gets its food. The firſt example of theſe heads is in the ſcorpion-*fly*; and a very beautiful *fly*, that is frequently ſeen ſkipping and leaping about flowers, is the other.

Under theſe general claſſes, ſubordinate ones are to be formed, from whatever beſides is the moſt obvious and eſſential diſtinction among theſe little animals. The form of the body may very well afford us theſe diſtinctions. So that, in this reſpect, there are three ſubordinate claſſes under the five fore-mentioned claſſes: the firſt, of thoſe *flies* whoſe bodies are ſhort and broader than they are thick; the ſecond, of thoſe with long bodies; and the third, with bodies faſtened to the corcelet only by a fine filament: and under all theſe, the ſeveral genera are to be eſtabliſhed from other leſſer but conſtant and invariable differences; ſuch as the differences of the manner of their carrying their wings, the figures of their antennæ, the poſition of their trunks, and other ſimilar differences. See *Tab. of Inſects*, and Wings, Trunks, &c.

Flies, *bodies of*. The bodies of theſe inſects are extremely different one from another, and even thoſe whoſe general form makes them properly ranged in the ſame claſs, are not without their diſtinctions, by which they alone may be made to eſtabliſh ſubordinate genera.

Among the *flies* which have ſhort or ellipſoide bodies, ſome have the body extremely flat and thin; ſuch are thoſe of the *flies* produced from the worms which devour the pucerons; and others have the hinder part of the body bent downward in form of a hook.

The extremity of the body in theſe animals is uſually ſmaller than the adjoining parts. Yet there is a *fly* found in the neſts of ſwallows, the extremity of whoſe body is larger than any other part of it; and not only the form of the body, but the differences of the filament, by which, in many genera, it is connected to the corcelet, may furniſh great matter for the diſtinctions of the ſubordinate genera.

The hinder part, or extremity of the body alone, may alſo afford great matter of diſtinction. Thoſe *flies* which carry ſtings in their tails, have in that alone a ſufficient diſtinction.

Others there are which have organs placed there, which, though we need not fear them, offer ſubject enough for our admiration; it is indeed the females alone who have occaſion for theſe, and therefore the females alone are furniſhed with them.

Several of theſe inſtruments are a kind of auger or borer, carried in a caſe or ſheath. This ſometimes has the form of a long tail to the inſect, and its uſe is to pierce and bore the body, in which the creature is to depoſit its eggs. Several of the female ichneumons have this ſort of long tail; and there are other inſects which have a long and ſtrong piercer, which however does not make a tail to their body, but is partly lodged either under their belly, or in their body: of this kind are the cicadæ, and others.

Other inſects of this kind have a ſingular inſtrument lodged in this part of their body, which may properly be called a ſaw. They never ſhew this on examination, unleſs their bodies be preſſed, and then we cannot but greatly admire the inſtrument itſelf, and the powers by which the creature moves it.

Other inſects of this claſs carry behind one or more long ſlender filaments, which, in their form and ſtructure, have ſome ſort of reſemblance to the antennæ; and the uſes of which are as little known to us, as thoſe of the antennæ. The genera of *flies* may very properly be diſtinguiſhed by means of theſe: among the four-winged *flies*, the ephemerons, and many other ſpecies, have them; and among the two-winged kinds, the ſmall *fly*, which is the male gall-inſect, furniſhes us with an inſtance of them. See *Tab. of Inſects*.

Flies *of water-worms*. Theſe, according to their ſeveral ſpecies, have ſome varieties in their manner of egreſs from their ſhell, at their leaving the nymph ſtate for that of the perfect *fly*.

The long water-worms, compoſed of many rings, and with funnel-faſhioned tails, made with an aperture for the admiſſion of the air, ſurrounded with a multitude of hairs, retain, in their ſhell-ſtate, ſo much of the ſame form which they had while living, that the one is not eaſy to be diſtinguiſhed from the other. The nymph in each of theſe fills up only a ſmall part of the cavity, and the *fly* in many of them is produced perfect in five or ſix days. At this time the parts of the nymph being thoroughly ſtrengthened, it begins to ſhew the firſt ſigns of life in its attempt to open its priſon.

To effect this, nature has ſo provided for the incloſed *fly*, that the head is but ſlightly joined to the ſecond ring of the body; but the creature in this ſtate, not being lodged in that part of the worm, can make no efforts againſt it; all its endeavours are bent to force a ſlit or opening in the ſecond ring, like that in the back of the ſkin of a caterpillar that is going to change its ſkin, or like that of the butterfly chryſaliſes. The means the incloſed *fly* uſes to this purpoſe, are the inflating and ſwelling its head, and then thruſting out the bladder from its anterior part, with which theſe *flies* are provided by nature in this ſtage of their lives, and for this only purpoſe. When this ſlit or crack is effected, the head of the worm is in ſome meaſure ſeparated from the body, and the efforts of the *fly* to puſh itſelf forward, finiſh that ſeparation, and leave an aperture of a proper ſize for the egreſs of the *fly*.

But the water, on the ſurface of which this change is effected, is a thing much to be dreaded, and indeed is often of fatal conſequences to the new-born *fly*, ſince the *flies* produced of water-worms are as much afraid of this element, and are as eaſily drowned, as thoſe produced from worms who ſpend their lives on dry land.

The *flies* produced from this long water-worm are, however, in leſs danger, and leſs afraid of the water than many others; they advance ſlowly out of their ſhells in an horizontal direction, and, as ſoon as their fore-feet are at liberty, they boldly place them upon the water, as if upon dry land, and it ſerves as well for their ſupport; and as their other parts get at liberty, they are gradually ſet upon the water too, and the creature there reſts till its wings are unfolded, and all its parts have their proper form, and then takes its flight into its new element.

The *fly* produced from this long worm is of the ſhort-bodied kind, and much of kin to the common great blue fleſh-*fly*. It has a fleſhy trunk furniſhed with lips, and has no teeth; but though this *fly* is ſo far of the ſame claſs with that common ſpecies, it has enough to amply diſtinguiſh it in theſe ſeparate characters. The firſt is, that this has its antennæ formed of granulated filaments, whereas the other has them of the battledore kind: the wings of the fleſh-*fly* are not croſſed upon the body, whereas thoſe of this water-*fly* are; but what more than theſe diſtinguiſhes it from this, and indeed from all the other ſpecies of *flies*, is, that it has two oblong and ſlender bodies formed like pins, and pointed as thoſe, which are a little crooked, of a cruſtaceous ſtructure, and are inſerted in the upper part of the corcelet of the *fly*, and directed towards its hinder part. See *Tab. of Inſects*, N° 40.

Theſe prickles are hard, rigid, and immoveable.

Fly, *St. Mark*, in *Natural Hiſtory*, the name of a ſpecies of *fly*, which makes its firſt appearance every year about St. Mark's day, and is then ſeen in vaſt numbers; it is ſomewhat ſmaller than the large blue fleſh-*fly*, and has no trunk, but a mouth without teeth: notwithſtanding this ſeemingly innocent organization, the creature does great miſchief, and every gardener knows the effects of it at one time or other. Theſe *flies* are found about fruit-trees, and are always ſeen ſitting upon the buttons of the leaves, and the flower-buds; and they do great miſchief to many kinds of trees, by ſucking the juices of thoſe tender parts, and either deſtroying them before they open, or at leaſt rendering them very weak. Some tell us that theſe *flies* had originally a ſting, but that the miſchief they did, being very great, St. Mark deprived them of that offenſive weapon for all generations: this is a ſtory much believed by the country people in many of the Roman catholic kingdoms. The mouth is of the ſame figure with that of the tipula, or long-legs, being compoſed of two membranous lateral lips, like the two valves of a ſhell-fiſh, which defend and cover two other fleſhy lips within.

The male is eaſily diſtinguiſhed from the female, by having a much larger head, and reticular eyes much larger than her's, covering, in a manner, the whole head: beſides theſe, it has alſo a cluſter of three bright ſingle eyes, placed in a triangle on the upper part of the head, and reſembling the eyes of ſpiders. The wings of this *fly* are a little longer than its body, and croſſed in ſuch a manner, that one of them entirely covers the other, and even the body. This ſpecies has a ſingular manner of flying; they ſeem as if hanging in the air, their legs being ſuſpended ſtrait down from their body, and their length gives them an odd appearance. The common *flies* of this kind are of two ſpecies, one which is black, and another whoſe breaſt is a duſky red: but there are ſeveral other ſpecies ſo ſmall as not to be diſtinctly ſeen without a microſcope. They are all produced from worms, which are hatched from the eggs of the parent *fly*, depoſited under the ſurface of the earth. They are found in great plenty in September and October in dung, into which they have crawled out of the earth for food.

If a piece of cow-dung, in which the worms of this St. Mark *fly* are, be preſerved in a box, it will keep them alive the whole winter, and they will be found in the beginning of March, to be grown much larger than before, and to be leſs hairy, their hairs being longer, and ſtanding about nine on every ring. If this dung be laid on common earth at this time, they will crawl out of it into the ground, transform themſelves into the nymph ſtate, from which they iſſue in the form of *flies* about the middle of April.

The manner of theſe *flies* leaving their worm ſtate, to enter into that of the chryſalis or nymph, is worthy of obſervation. The worm ſeems in great diſorder, and twiſts itſelf about ſeveral ways, till at length the ſkin cracks on the ſurface of the back; immediately upon this, there appears the anterior part of the nymph at the aperture, and this forces its way out by degrees, the head becomes of no farther uſe, and is left with the ſkin; and the nymph, by diſtending and contracting itſelf, at length makes its way wholly out of it, and then remains at reſt till the *fly* iſſues out of it. The laſt transformation of this inſect, or the appearance of the *fly* from the nymph, has nothing ſingular in it, but is performed in the ſame manner, with the ſame change as in other animals of the ſame kind.

FLY, *fire*. See FIRE-*flies*.

FLY, *fiſhing*. See FISHING-*fly*.

FLY, *flower*, in *Natural Hiſtory*, the name of a ſmall but very beautiful *fly*, deſcribed by Cluſius. It is black, and has two ſilvery wings, two white eyes, ſeven yellow ſpots on the back, and a black one in the middle.

FLY, *harveſt*. See HARVEST.

FLY, *humble-bee*. See HUMBLE-BEE-*fly*, and CULEX.

FLY, *lantern*. See LANTERN-*fly*.

FLY, *roſe*. See ROSE.

FLY, *ſcorpion*. See SCORPION-*fly*.

FLIES, *eggs of*. See EGGS.

FLIES, *eyes of*. See EYE.

FLIES, *legs of*. See LEG.

FLIES, *rings of*. See RINGS.

FLY, in *Mechanics*, a croſs with leaden weights at its ends, or rather a heavy wheel at right angles to the axis of a heavy windlaſs or roller, by means of which the force of the power is not only preſerved, but equally diſtributed in all the parts of the revolution.

The *fly* may be applied to ſeveral ſorts of engines, whether moved by men, horſes, wind, or water; and is of great uſe in thoſe parts of an engine which have a quick circular motion, and where the power or reſiſtance acts unequally in the different parts of a revolution. In this caſe the *fly* becomes a moderator, making the motion of revolution almoſt every where equal.

The force of a *fly*, when joined with the ſcrew, for ſtamping the image upon coins, may be calculated thus: ſuppoſe its two arms to be each fifteen inches long, meaſuring from the center of the weights to the axis of the motion, and the weights to be fifty pounds each, and the diameter of the axis preſſing upon the dye to be one inch; if every ſtroke be made in half a ſecond, and the weights deſcribe an half circumference, which will in this caſe be of four feet, the velocity will at the inſtant of the ſtroke be at the rate of eight feet in a ſecond, and therefore the momentum eight hundred; but the arms of the *fly* being as leavers, one brachium of which is fifteen inches long, whilſt the other, viz. the ſemi-axis, is but half an inch, we muſt increaſe this force thirty times, which will give twenty-four thouſand; an immenſe force, equal to that of a hundred pound weight falling a hundred and twenty feet, or near two ſeconds in time; or to that of a body of ſeven hundred and fifty pounds, falling $16\frac{1}{12}$ feet, or one ſecond in time. Some of theſe engines for coining crown-pieces have the arms of the *flies* five times as long, and the weights twice as heavy as thoſe here mentioned, ſo that the effect is ten times greater. Deſaguliers, Exper. Philoſoph. vol. i. p. 245. 339.

FLY, in the *Sea-language*, that part of the mariner's COMPASS on which the thirty-two winds are drawn, and to which the needle is faſtened underneath.

FLY *of an enſign*, is the breadth or extent from the ſtaff to the extremity or edge that flutters looſe in the wind.

Let **FLY** *the ſheets*, at *ſea*, a word of command, in caſe of a guſt of wind, leſt the ſhip ſhould overſet, or ſpend her top-ſails and maſts, to have the ſheet go a-main, and then the ſail will hold no wind.

FLY *the heels*, in the *Manege*. A horſe is ſaid to *fly* the HEELS, when he obeys the SPURS.

To **FLY** *groſs*, in *Falconry*, is ſaid of a hawk, when ſhe flies at the great birds; as cranes, geeſe, herons, &c.

FLY *on head*, is when the hawk, miſſing her quarry, betakes herſelf to the next check, as crows, &c. See HAWK.

FLY-*boat*, or *flight*, a large flat-bottomed Dutch veſſel, whoſe burthen is generally from four to ſix hundred tons. It is diſtinguiſhed by a remarkably high ſtern, reſembling a Gothic turret, and by very broad buttocks below.

FLY-*catcher*, *muſcicapa*, in *Ornithology*, the name of a genus of PASSERES in the Linnæan ſyſtem, including twenty-one different ſpecies; the characters of which are, that the bill is almoſt triangular, bent inwards at its beak, notched on both ſides and beſet with briſtles, and that the noſtrils are almoſt round. The birds of this genus found in Europe, are the *muſcicapa griſola* and *atricapilla*. The former, or ſpotted *fly-catcher*, has a large head, of a browniſh hue, ſpotted with black; the back is of a mouſe colour, the wings and tail duſky; the interior edges of the quill-feathers are edged with pale yellow; the breaſt and belly are white; the throat and ſides under the wings are duſked with red; the bill is broad at the baſe, and ridged in the middle; the inſide of the mouth is yellow; the legs and feet are ſhort and black. This is a bird of paſſage, appears with us in the ſpring, breeds here, and retires in Auguſt. It builds its neſt on the ſide of trees towards the middle, and, according to Morton, in his Hiſtory of Northamptonſhire, in the corners of walls, where ſpiders weave their webs. They feed on flies and cherries.

The other is called the COLD-*finch*, and is a rare ſpecies with us. It is a ſmall bird of the ficedula kind, and very nearly allied to the beccifago, or petty-chaps. It is called alſo, in ſome places, *chivin* and *borin*. It is a little larger than the wren, and has a very ſharp-pointed beak. Its head, neck, and back, are of a pale grey, and its throat and belly of a yellowiſh white. Its rump is white; its wings grey; its tail, feet, and legs, are brown; and its claws very ſlender. Ray's Ornithology, p. 158.

FLY-*tree*, in *Natural Hiſtory*, a name given by the common people in America to a tree, whoſe leaves, they ſay, at a certain time of the year, produce *flies*. On examining theſe leaves about the middle of ſummer, the time at which the *flies* uſe to be produced, there are found on them a ſort of bags of a tough matter, of about the ſize of a filbert, and of a duſky greeniſh colour; on opening one of theſe bags with a knife, there is uſually found a ſingle full-grown *fly* of the gnat kind, and a number of ſmall worms, which, in a day or two more, have wings, and fly away in the form of their parent. The tree is of the mulberry-kind, and its leaves are uſually very largely ſtocked with theſe inſect bags, and the generality of them are found to contain the inſects in the worm ſtate; when they become winged, they ſoon make their way out. The bags begin to appear when the leaves are young, and afterwards grow with them; but they never rumple the leaf, or injure its ſhape. They are of the kind of leaf galls, and partake in all reſpects, except ſize, of a ſpecies we have frequent on the large maple, or, as it is called, the ſycamore. Philoſ. Tranſ. N° 431. See farther, Reaumur's Hiſt. vol. vi. p. 34. See PUCERON.

FLY-*wort*. See CAMPION.

FLYERS, in *Architecture*, ſuch ſtairs as go ſtrait, and do not wind round, nor have the ſteps made tapering;

but the fore and back-part of each ſtair, and the ends, reſpectively parallel to one another.

So that if one flight do not carry you to your deſigned height, there is a broad half ſpace; and then you fly again, with ſteps every-where of the ſame breadth and length as before.

FLYING, the progreſſive motion of a bird, or other winged animal, in the liquid air.

Flying is either *natural*, or *artificial*.

Flying, *natural*, is that performed by an apparatus, or ſtructure of parts, concerted for that end by nature herſelf. Such is that of moſt birds and inſects, and of ſome fiſhes.

In Virginia and New-England they have monſtrouſly large *flying* beetles. Philoſoph. Tranſact. N° 127. And in Languedoc, graſhoppers about an inch long, wherewith the ground, in ſeveral parts, in the year 1685, was covered one third of a foot deep. Ibid. N° 182.

The parts of birds, &c. chiefly concerned in *flying*, are the wings and tail: by the firſt, the bird ſuſtains and wafts himſelf along; and by the ſecond, he is aſſiſted in aſcending and deſcending, to keep his body poiſed and upright, and to obviate the vacillations thereof.

It is by the largeneſs and ſtrength of the pectoral muſcles, that birds are ſo well diſpoſed for quick, ſtrong, and continued *flying*. Theſe muſcles, which, in men, are ſcarce a ſeventieth part of the muſcles of the body, in birds, exceed and outweigh all the other muſcles taken together; upon which Mr. Willughby makes this reflection, that if it be poſſible for man to fly, his wings muſt be ſo contrived and adapted, that he may make uſe of his legs, and not his arms, in managing them.

The *flying* of birds is thus effected:

The bird firſt bends his legs, and ſprings with a violent leap from the ground; then opens, or expands the jointures of his wings, ſo as to make a right line, perpendicular to the ſides of his body: thus, as the wings, with the feathers therein, conſtitute one continued lamina, being now raiſed a little, and vibrating the wings, with great force and velocity, perpendicularly againſt the air, the air, though a fluid, reſiſts thoſe ſucceſſions, both from its natural inactivity, and from its elaſticity, which makes it reſtore itſelf after it has been compreſſed, and re-act as much as it has been acted on: by ſuch means is the whole body of the bird protruded. The ſagacity of nature is very remarkable in the opening and recovering of the wing for freſh ſtrokes. To do it directly, and perpendicularly, it muſt needs have a great reſiſtance to overcome; to avoid which, the bony part, or bend, of the wing, into which the feathers are inſerted, moves ſide-ways with its ſharp end foremoſt, the feathers following it like a flag.

The reſiſtance the air makes to the withdrawing of the wings, and, conſequently, the progreſs of the bird will be ſo much the greater, as the waft, or ſtroke, of the fan of the wing is the longer: but as the force of the wing is continually diminiſhed by this reſiſtance, when the two forces come to be in equilibrio, the bird will remain ſuſpended in the ſame place; for the bird only aſcends ſo long as the arch of air, the wing deſcribes, makes a reſiſtance equal to the exceſs of the ſpecific gravity of the bird above the air: if the air, therefore, be ſo rare as to give way with the ſame velocity as it is ſtruck withal, there will be no reſiſtance, and, conſequently, the bird can never mount.

Mr. Ray, Willughby, &c. have ſuppoſed the tail to do the office of a rudder, in ſteering and turning the body this way, or that; but Borelli has ſhewn it to be unfit for any ſuch office. The *flying* of a bird, in effect, is quite a different motion from the ſailing of a ſhip: birds do not vibrate their wings towards the tail, as oars are ſtruck towards the ſtern, but waft them downwards; nor does the tail of the bird cut the air at right angles, as the rudder does the water, but is diſpoſed horizontally, and preſerves the ſame ſituation, what way ſoever the bird turns.

In effect, as a veſſel in the water is turned about on its center of gravity to the right, by a briſk application of the oars to the left, ſo a bird, in beating the air with its right wing alone, towards its tail, its fore-part will be turned to the left; as when in ſwimming, by only ſtriking out with the right arm and leg, we are driven to the left.

Add, that birds with long necks have another way of altering their courſe; for, by only inclining the head and neck towards this or that ſide, the center of gravity of the whole being changed, the bird will proceed according to this new direction.

Birds never fly upwards in a perpendicular line, but always in a parabola, the line deſcribed by projectiles. In a direct aſcent, the natural and artificial tendency would oppoſe and deſtroy each other; ſo that the progreſs would be very ſlow. In a direct deſcent, they would aid one another, ſo that the fall would be too precipitate. Indeed the hawk we frequently find take that advantage in ſeizing of the partridge: but ordinarily birds keep their wings expanded, and at reſt, to retard their deſcent; and at the ſame time ſtretch out their legs.

Flying, *artificial*, is that attempted by men, by the aſſiſtance of mechanics.

The *art of flying* is one of the great *deſiderata* of mechanics: it has been attempted in divers ages: the diſcovery of it might prove of great ſervice, and alſo of great diſſervice to mankind.

Nobody ſeems to have bid ſo fair for that invention, as our famous friar Bacon, who lived upwards of five hundred years ago. He not only affirms the art feaſible, but aſſures us he himſelf knew how to make an engine, in which a man ſitting might be able to carry himſelf through the air like a bird; and affirms, that there was another perſon who had actually tried it with ſucceſs.

The ſecret conſiſted in a couple of large thin hollow copper globes, exhauſted of air, which being much lighter than air, would ſuſtain a chair, whereon a perſon might ſit.

F. Franciſco Lana, in his Prodromo, propoſes the ſame thing, as his own thought. He computes, that a round veſſel of plate-braſs, fourteen feet in diameter, weighing three ounces the ſquare foot, will only weigh 1848 ounces; whereas a quantity of air of the ſame bulk will weigh $2155\frac{2}{3}$ ounces; ſo that the globe will not only be ſuſtained in the air, but will carry with it a weight of $373\frac{2}{3}$ ounces; and by encreaſing the bulk of the globe, without increaſing the thickneſs of the metal, he adds, a veſſel might be made to carry a much greater weight.

But the fallacy is obvious: a globe of the dimenſions he deſcribes, Dr. Hook ſhews, would not ſuſtain the preſſure of the air, but would be cruſhed inwards. Therefore, in whatever *ratio* the bulk of the globe were increaſed, in the ſame muſt the thickneſs of the metal be alſo, and conſequently the weight increaſed: ſo that there would be no advantage in ſuch augmentation.

The ſame author deſcribes an engine for *flying*, invented by the Sieur Beſnier, a ſmith of Sable, in the county of Maine. Vide Philoſoph. Collect. N° 1.

The famous biſhop Wilkins was ſo confident of ſucceſs in this art, that he ſeems to intimate, that, in future ages, it will be as uſual to hear a man call for his wings when he is going a journey, as it is now to call for his boots. See Math. Magic, b. ii. ch. 7. Diſcovery of a new World, prob. xiv. p. 135. Secret and Swift Meſſenger, ch. iv.

Flying *army* and *camp*. See **Camp**.

Flying *of colours*, is uſed by painters to denote their want of durableneſs, which they expreſs by their *ſtanding*.

Flying-*fiſh*, a name given by the Engliſh writers to ſeveral ſpecies of fiſh, which by means of their long fins have a method of keeping themſelves out of water for ſome time. The *flying-fiſh*, moſt properly ſo called, is the exocœtus of the ancient authors, and of Artedi. See *Tab. of Fiſh*, N° 41.

It is called alſo the *adonis*, *hirundo*, and *mugil alatus*, or winged mullet, by authors; but they uſe theſe words indeterminately for this, and the other kinds.

Its general ſize is about ſix inches in length; its head is covered with ſcales, and it reſembles the herring in the form of its body, but the back is flat. The ſcales are large and ſilvery; the dorſal fin is ſmall; its eyes are large; the mouth is ſmall, and is placed low in the head; and its jaws are granulated, rather than toothed. Its belly is white; its tail forked; its gill-fins, commonly called its wings, are ſo long, as when laid cloſe to the body to reach to the tail, and they are as it were double, a ſmall fin compoſed of a ſeries of ſhort nerves or rays, connected by a ſmall membrane ſtanding before each. Theſe wings are of an olive colour on their upper ſide, and are ſpotted with very beautiful blue ſpots near their edges.

This fiſh, when it pleaſes, is able to riſe out of the water and fly to a conſiderable diſtance in the air; but when its wings are dry, is obliged to plunge again into the water to moiſten them. It does this often, when purſued by an enemy; and whole ſhoals have been ſeen thus flying together. It is common in the Mediterranean, and ſome other ſeas; but is ſeldom known in ours, nor in any of the colder climates. See a minute and accurate deſcription of the *exocœtus volitans*, or *flying-fiſh*, in the Phil. Tranſ. vol. lxviii. part ii. p. 791.

Flying-*fiſh* is alſo a name of a fiſh of the gurnard kind. See *Sapphirine* **Gurnard**.

Flying *pinion*, is a part of a clock, having a fly or fan, whereby to gather air, and ſo bridle the rapidity of the clock's motion, when the weight deſcends in the ſtriking part. See **Clock**.

FOAL, or *colt*, the young of the horſe-kind. The word colt ſimply ſpoken, is, among the dealers, underſtood to mean the male kind; the female or male colt being called a filly.

Colts are uſually foaled in the beginning of ſummer, and it is the cuſtom to let them run with the mare till Michaelmas, when they are to be weaned. This is to be done ſooner or later, according as the cold weather comes in. Some of them are for not having them weaned till the middle of November, and that three days before the full of the moon, if it happen near that time. And ſome of the beſt writers on this ſubject are of opinion, that we do not let the *foals* ſuck long enough, and that this is the reaſon why they are ſo very long before they are fit for uſe. Theſe authors are of opinion, that a colt ought always to ſuck the whole winter, and that this would make them fit for ſervice a great deal ſooner than they are at preſent.

When firſt weaned, they muſt be kept in a convenient houſe, with a low rack and manger for hay and oats, that they may eat freely and eaſily, and the hay muſt be very ſweet and fine, eſpecially at firſt; a little wheat bran ſhould be mixed with the oats, in order to keep their bodies open, and make them eat freely and drink freely.

It has been obſerved, that the eating too much oats has rendered colts blind; but the cauſe has been wrongly attributed to the heating quality of the oats. If the oats are bruiſed in a mill before they are given them, though they eat ever ſo much of them, there never happens any miſchief of this kind; but endeavouring with their teeth to break and chew them when whole, they are apt to ſtretch and ſwell the veſſels of the head, and occaſion a fulneſs of blood about the eyes, which often terminates in inflammations, and in blindneſs.

The difficulty of chewing oats, and not their heating nature, is therefore the true reaſon of this miſchief; and if this be obviated by firſt bruiſing the grain, the colt always grows the better for eating it. His legs do not grow thick, but he becomes broader and better knit, and as he grows up, will bear fatigue much better than if he had been fed only with bran and hay. Above all things, theſe creatures are to be kept from wet and cold while they are young, for nothing is more tender than a colt, and the miſchiefs he gets at this time are not ſo eaſily overcome. Experience ſhews the great advantage of houſing and taking care of colts: for if the ſame ſtallion cover two mares, both alike in age, beauty, and all other particulars, and theſe bring both *foals* of the ſame ſex, ſo that there is no room to expect the leaſt difference between them; let one of theſe colts be houſed every winter, and let the other always run abroad, it will be found as they grow up, that the colt which has been kept abroad, ſhall have large fleſhy ſhoulders, flabby and gouty legs, weak paſterns, and bad hoofs, and ſhall be a dull heavy creature; and that the other, which has been houſed and taken care of, ſhall have a fine forehand, be well ſhaped, have good legs and good hoofs, and be of good ſtrength and ſpirit. From this it may be learned, that it is of no conſequence to have a good ſtallion, and a good mare, if the colts are ſpoiled in the breeding up.

It is obſerved, that ſome colts under the age of ſix months, though the mare yields plenty of good milk, yet decay and waſte daily. They are in this caſe always troubled with a cough. The breeders have a great many fantaſtic remedies in ſuch caſes, as the bag wherein the creature was foaled, the lungs of a fox, and the like; but a little liquorice and elecampane powder mixed with honey and milk, is a remedy greatly to be preferred to all theſe.

When the colts are kept up in the winter, they are not to be continually immured in the ſtable, but in the middle of the day, when the ſun ſhines warm, they ſhould always be let out to play about for an hour or two; and when the winter is ſpent, they ſhould be turned into ſome dry ground, where the graſs is ſweet and ſhort, and where there is good water, that they may drink at pleaſure. The winter after this, they may be kept in the ſtable without any farther care than that which is taken of other horſes; but after the firſt year, the mare colts and horſe colts are not to be kept together.

This may be the method every ſummer and winter till they are broke for uſe, which may be when they are three years old; and they will take the breaking much more eaſily, after this ſort of breeding, than if they had been all the time running about wild: for ordering them the ſecond year as the other horſes are ordered, they will be tame and gentle like them, and will not flounce and plunge about on the firſt mounting, as they otherwiſe would, but will take the ſaddle quietly. The common way of breaking a colt, by beating him and tiring him by trotting over plowed fields, however neceſſary it may be to a colt that has always run wild, is not to be choſen when it can be avoided; for it is breaking and ſpoiling the creature's ſpirit. Uſing him to other horſes, and winning him by gentleneſs, is a vaſtly preferable way.

It is proper to wear no ſpurs for ſome time with a newly backed horſe.

In order to make him endure the ſaddle well, the way is to make it familiar to him, by clapping it with the hands as it lies on his back; then ſwaying upon it, and dangling the ſtirrups by his ſides, rubbing his ſides with them, and bringing him thus to be uſed to every thing about him. Then the crupper ſhould be often ſtrained, the girths looſened and tightened, and the ſtirrups taken up and let down at times, all the while making much of him. This will make every thing eaſy to him, and will make him gentle without breaking his ſpirit.

As ſoon as he will trot with the ſaddle obediently, the mouthing of him is to be conſidered. In order to this, put a trench of a full mouth into his mouth, and throw the reins over the fore-part of the ſaddle, ſo that he may have a full feeling of it; then put on a martingale, buckled at ſuch a length, that he may juſtly feel it when he jerks up his head. A broad piece of leather is then to be put round his neck, and the ends made faſt by plating it, or ſome other way at the withers, or before the wind-pipe, about two handfuls below the thropple, betwixt the leather and his neck; let the martingale paſs ſo that, at any time when he offers to duck or throw down his head, the caveſſon being placed upon the tender griſtle of his noſe, may correct and puniſh him. This will make him bring his head to, and form him to the rein. See HORSE.

FOCAGE, or FUAGE, fire-money, hearth-money, or chimney-money. See FUAGE.

FOCILE, FOCIL, in *Anatomy*, a name the Arabs give to the two bones of the arm, reaching from the elbow to the wriſt.

The biggeſt, which is what we call the *cubitus*, and *ulna*, they call the *greater focil*, *focile majus*.

The leſs, which we call *radius*, they call *focile minus*.

The like is obſerved with regard to the bones of the leg. The biggeſt of which, by the Latins called *tibia*, the Arab writers, &c. call the *great focil*; and the leſs, or *fibula*, the *leſſer focil*.

FOCUS, in *Geometry*, and the *Conic Sections*, is applied to certain points in the *parabola*, *ellipſis*, and *hyperbola*; wherein the rays reflected from all parts of theſe CURVES do concur or meet.

The FOCI *of an* ELLIPSIS are two points, as F f, *Tab. Con. Fig.* 21. in the axis AB, on which, as centers, the figure is deſcribed: or, two points in the longer axis, whence two right lines being drawn to any point in the circumference, ſhall be together equal to the axis itſelf.

Theſe are alſo called *umbilici*. See CONIC *Section*.

To find the *foci* of an *ellipſis*. See ELLIPSIS.

FOCUS *of the hyperbola*. See CONIC *Section*, and HYPERBOLA.

The FOCUS *of a parabola* is a point in its axis, as F (*Tab. Conics*, *fig.* 18.) wherein the ſemiordinate FN is equal to the ſemiparameter: or, a point in the axis diſtant from the vertex, by a fourth part of the parameter, or latus rectum.

It is demonſtrated in conics, 1. That in a parabola, the diſtance of the *focus* from the vertex, AF, is to the parameter in a ſubquadruple ratio.

2. That the ſquare of the ſemiordinate is quadruple of the rectangle of the diſtance of the *focus* from the vertex, and the abſciſſe.

3. That the right line FM, *fig.* 19. drawn from the *focus* F to the extremity of the ſemiordinate of the parabola, is equal to the aggregate of the abſciſſe AP, and the diſtance of the *focus* from the vertex AF. See CONIC *Section*.

FOCUS, in *Optics*, is a point wherein ſeveral rays concur, and are collected; either after having undergone refraction, or reflection.

It is thus called, becauſe the rays being here brought together, and united; their force and effect are increaſed; ſo that they become able to burn: accordingly, it is in this point, that bodies are placed to ſuſtain the force of burning glaſſes, or mirrors.

It muſt be obſerved, that the *focus* is not, ſtrickly ſpeaking, a point; the rays are not all accurately collected into the ſame place: Huygens demonſtrates, that the *focus* of a lens convex on both ſides, is $\frac{5}{8}$ of the thickneſs of the lens.

FOCUS, in *Dioptrics*, is the point wherein refracted rays, rendered convergent by refraction, do concur, or meet, and croſs the axis.

The ſame point is alſo called the *point of concourſe*, or *concurrence*.

FOCUS, *Virtual*, in *Dioptrics*, is the point from which refracted rays, when by refraction they are rendered divergent, do begin to diverge or recede from each other.

The ſame point is alſo called *punctum diſperſus*, or *point of* *of divergency*, in oppoſition to the *focus* which is called the point of concurrence. Suppoſe, e. gr. the concavity of a glaſs to be abc, *Tab.*II. *Optics*, *fig.*21, and its axis de; let fg be a ray of light falling on the glaſs parallel to the axis de, and let d be the centre of the arc abc. This ray fg, after it has paſſed the glaſs, at its emerſion at g, will not proceed directly to h, but will be refracted from the perpendicular dg and become the ray gk. Draw then directly gk, ſo that it may croſs the axis in e. The point e ſo found, is called by Mr. Molyneux the virtual *focus* or point of divergence.

The effect of convex glaſſes, or lenſes, is to render the rays, tranſmitted through them, convergent, and to bring them together into a *focus*, which will be nearer, or farther off, as the lens is a portion of a greater or leſs ſphere.

The effect of concave lenſes is, to render the rays tranſmitted through them, divergent, or to diſperſe them from a virtual *focus*.

For the place, poſition, diſtance, &c. of the *foci* of rays refracted through plain, concave, and convex mediums of divers denſities, as air, water, glaſs, &c. ſee REFRACTION, LENS, &c.

The laws of the *foci* of glaſſes, and the methods of finding the ſame, being thoſe of moſt uſe and importance; we ſhall here ſubjoin them apart, as delivered and demonſtrated by Mr. Molyneux, in his *Dioptrica Nova*.

1. The *focus* of a convex glaſs, i. e. the point wherein parallel rays tranſmitted through a convex glaſs, whoſe ſurface is the ſegment of a ſphere, do unite, is diſtant from the pole or vertex of the glaſs, almoſt a diameter and half of the convexity.

2. In a plano-convex glaſs, the *focus* of parallel rays, or the place where they unite with the axis, is diſtant from the pole of the glaſs a diameter of the convexity, provided the ſegment do not exceed thirty degrees.

The rule or canon in plano-convex glaſſes is as 107 : 193 : : ſo is the radius of the convexity : to the refracted ray taken to its concourſe with the axis; which in glaſſes of larger ſpheres is almoſt equal to the diſtance of the *focus* taken in the axis.

3. In double-convex glaſſes of the ſame ſphere, the *focus* is diſtant from the pole of the glaſs about the radius of the convexity, if the ſegment be but thirty degrees.

But if the convexities be unequal, or if the two ſides be ſegments of different ſpheres, then the rule is,

As the ſum of the radii of both convexities : to the radius of either convexity alone : : ſo is the double radius of the other convexity : to the diſtance of the *focus*.

Here obſerve, that the rays which fall nearer the axis of any glaſs, are not united with it ſo near the pole of the glaſs as thoſe farther off: nor will the *focal* diſtance be ſo great in a plano-convex glaſs, when the convex ſide is towards the object, as when the plain ſide is towards it.

Hence it is truly concluded, that, in viewing any object by a plano-convex glaſs, the convex ſide ſhould always be turned outward; as alſo in burning by ſuch a glaſs.

FOCUS, *for the virtual*, obſerve, 1. That in concave glaſſes, when a ray falls from air parallel to the axis, the virtual *focus*, by its firſt refraction, becomes at the diſtance of a diameter and a half of the concavity.

2. In plano-concave glaſſes, when the rays fall parallel to the axis, the virtual *focus* is diſtant from the glaſs the diameter of the concavity.

3. In plano-concave glaſſes, as 107 : 193 : : ſo is the radius of the concavity : to the diſtance of the virtual *focus*.

4. In double concaves of the ſame ſphere, the virtual *focus* of parallel rays is at the diſtance of the radius of the concavity.

But, whether the concavities be equal or unequal, the virtual *focus*, or point of divergency of the parallel rays, is determined by this rule;

As the ſum of the radii of both concavities : is to the radius of either concavity : : ſo is the double radius of the other concavity : to the diſtance of the virtual *focus*.

5. In concave-glaſſes, expoſed to converging rays, if the point to which the incident ray converges, be diſtant from the glaſs farther than the virtual *focus* of parallel rays, the rule for finding the virtual *focus* of this ray is this;

As the difference between the diſtance of this point from the glaſs, and the diſtance of the virtual *focus* from the glaſs : is to the diſtance of the virtual *focus* : : ſo is the diſtance of this point of convergence from the glaſs : to the diſtance of the virtual *focus* of this converging ray.

6. In concave glaſſes, if the point to which the incident ray converges, be nearer to the glaſs than the virtual *focus* of parallel rays, the rule to find where it croſſes the axis, is this:

As the exceſs of the virtual *focus*, more than this point of convergency : is to the virtual *focus* : : ſo the diſtance of this point of convergency from the glaſs : is to the diſtance of the point where this ray croſſes the axis.

Rules for finding the FOCI *of glaſſes.*—To find the *focus* of a convex ſpherical glaſs, being of a ſmall ſphere, apply it to the end of a ſcale of inches, and decimal parts, and expoſe it before the ſun; upon the ſcale you will have the bright interſection of the rays meaſured out: or, expoſe it in the hole of a dark chamber; and where a white paper receives the diſtinct repreſentation of diſtinct objects, there is the *focus* of the glaſs.

For a glaſs of a pretty long *focus*, obſerve ſome diſtant object through it, and recede from the glaſs till the eye perceives all in confuſion, or the object begins to appear inverted; here the eye is in the *focus*.

For a plano-convex glaſs: make it reflect the ſun againſt a wall; you will on the wall perceive two ſorts of light; one more bright within another more obſcure: withdraw the glaſs from the wall, till the bright image is in its leaſt dimenſions; the glaſs is then diſtant from the wall about a fourth part of its *focal* length.

For a double convex: expoſe each ſide to the ſun in like manner; and obſerve both the diſtances of the glaſs from the wall. The firſt diſtance is about half the radius of the convexity turned from the ſun; and the ſecond, about half the radius of the other convexity.

Thus we have the radii of the two convexities; whence the *focus* is found by this rule.

As the ſum of the radii of both convexities : is to the radius of either convexity : : ſo is the double radius of the other convexity : to the diſtance of the *focus*.

FOCUS, in *Catoptrics*, is a point wherein the rays reflected from the ſurface of a mirror, or ſpeculum, and by reflection rendered convergent, do concur, or meet.

The effect of concave mirrors is to collect the rays falling on the concave ſurface into a *focus*.

The effect of convex mirrors is to diſperſe the rays falling on them, or render them more divergent.

For the laws of the *foci* of rays reflected from mirrors, or ſpecula, ſee MIRRORS.

The *foci* of concave glaſſes are had by reflection: for, as a concave mirror burns at the diſtance of about half the radius of the concavity; ſo a concave glaſs, being ſuppoſed a reflecting ſpeculum, unites the rays of the ſun at the diſtance of about half the radius of the concavity.

To find the FOCI *of all glaſſes geometrically.*—Dr. Halley furniſhes us with a general method for finding the *foci* of ſpherical glaſſes of all kinds, both concave and convex; expoſed to any kinds of rays, either parallel, converging, or diverging; under the following problem.

To find the *focus* of any parcel of rays diverging from, or converging to, a given point in the axis of a ſpherical lens, and inclined thereto under the ſame angle, the ratio of the ſines of refraction being given:

Suppoſe GL (*Tab. Optics, fig.* 20.) a lens; P a point in its ſurface; V its pole; C the centre of the ſphere whereof it is a ſegment; O the object, or point in the axis, to or from which the rays do proceed; and O P a given ray: and ſuppoſe the ratio of refraction to be as r to s. Then making CR to CO, as s to r for the immerſion of a ray; or as r to s for the emerſion (*i. e.* as the ſines of the angles in the medium which the ray enters, to the correſponding ſines in the medium out of which it comes), and laying CR, from C towards O, the point R will be the ſame for all the rays of the point O. Laſtly, drawing the radius PC, if need be, continued; with the centre R, and diſtance OP, ſtrike a piece of an arch, interſecting P C in Q. The line QR, being drawn, ſhall be parallel to the reflected ray; and PF, being made parallel thereto, ſhall interſect the axis in the point F; the *focus* ſought.

Or, make it, as CQ : CP : : CR : CF; then will CF be the diſtance of the *focus* from the centre of the ſphere.

This author gives a demonſtration of the method; and adds various figures, exhibiting the various caſes of rays either diverging or converging as they enter, or emerge out of, the ſurface either of a convex or concave lens.

From this principle all the rules for the *foci* of rays parallel to the axis, as likewiſe for the principal *focus* where the rays neareſt the axis do unite, are deduced. As,

Hence, 1. If O P be equal to C R; the points Q and C are coincident, and the rays OP, after refraction, run on parallel to the axis. 2. If the point Q fall on the ſame ſide of the axis, as is the point P; then the beams after refraction do tend on, either diverging or converging, as before: but if Q fall on the other ſide the axis, the diverging rays are made to converge by a convex, or the converging to diverge by a concave glaſs. 3. If O P do exceed C R, the *focus* is in all caſes on the ſame ſide of the glaſs, as is the centre of the ſphere C. But contrariwiſe, if O P be leſs than CR, the *focus* falls on the other ſide of the glaſs beyond the vertex V. 4. An object may be ſo placed, that the rays next the axis of a convex glaſs ſhall have an imaginary *focus* tranſmitting diverging rays, when the more remote parts thereof ſhall make them converge to a real *focus*. 5. If OV, the diſtance of the object from the pole or vertex of the glaſs, be taken in ſtead of OP, then will CQ be the difference of OV and CR; and as that difference is to CR, ſo is the radius CV to CF, the diſtance of the principal *focus* from the centre of the ſphere, whereof the glaſs is a ſegment. Or elſe, as CQ : OP or RQ : : PC : to VF, the *focal* diſtance from the pole of the glaſs. Whence follows a general rule for the *foci* of all glaſſes; only according to Corol. 3. if OV do exceed CR, the *focus* is on the ſame ſide of the glaſs as the centre of the ſphere: but if CR be greater, then the *focus* is on the oppoſite ſide of the glaſs: whence it will be determined whether the *focus* be real or imaginary.

What has been ſaid of one ſurface of the lens, is eaſily applicable to the other, taking F the *focus* for an object.

FODDER, any kind of meat for horſes, or other cattle: in ſome places hay and ſtraw mingled together are more peculiarly denominated *fodder*.

In the civil law it is uſed for a prerogative that the prince has, to be provided of corn, and other meat, for his horſes, by the ſubjects, in his warlike expeditions.

FODDER, in *Mining*, is a meaſure containing twenty-two hundred and a half weight, though in London but twenty hundred weight.

FODINA, a name ſome authors give to the LABYRINTH in the bone of the ear.

FŒCES See FÆCES.

FŒCIALES. See FECIALES.

FŒCULA. See FECULA.

FŒCUNDITY. See FECUNDITY.

FŒNICULUM. See FENNEL.

FŒNUM *Græcum*. See FENUGREEK.

FOENUM *ſanctum*. See SAINT *Foin*.

FŒTOR, in *Medicine*, ſtinking or fetid EFFLUVIA, proceeding from the body, or the parts thereof.

Fœtors ariſe from ſtagnant, extravaſated, corrupted, or poiſoned humours: as alſo from any thing capable of attenuating and volatilizing the oils and ſalts; as abſtinence, heat, too much motion, acrimony of food, &c.

FOETOR *narium*, ſtench of the noſtrils; a ſort of diſeaſe ariſing from a deep ulcer withinſide the noſe, yielding a fetid ſmell.

Its cauſe, according to Galen, is a ſharp humour falling from the brain upon the mamillary proceſſes.

This is one of the cauſes for which marriage might formerly be annulled.

FOETOR *oris*, a term uſed by medical writers to expreſs that ill ſmell in the mouth, uſually, though often improperly, called by us a ſtinking breath. This is a malady ariſing in different caſes from very different cauſes; as from the ſcurvy, and particularly that ſpecies of it which affects the mouth, and is therefore called *ſtomacace*; from the French pox; from an ulceration whether ſimple or fiſtulous in the lungs, which is the caſe in conſumptions; from ulcers in the mouth; from caries or rottenneſs of the teeth, or from any other impurity of them; from crudities in the ſtomach ariſing from a bad digeſtion, and in particular, from a weakneſs about the left orifice of the ſtomach, from which part the fœtid vapours will often ariſe in very great abundance.

Method of cure. According to the different cauſes of this diſorder, it requires a very different method of cure. In caſes where it depends on the ſcurvy, pox, or other diſeaſes, thoſe diſeaſes are to be attacked by the proper medicines, in order to its cure; when it ariſes from a carious tooth, there is no cure for it, but drawing the tooth; when the impurities of the teeth occaſion it, the cleaning them proves a cure. Juncker's Conſp. Med. p. 607.

FŒTUS, in *Anatomy*, denotes the child, while yet contained in the mother's womb; but particularly after it is perfectly formed; till which time it is more properly called EMBRYO.

The manner of the conception, or generation of the *fœtus*, is matter of great controverſy. That all the parts of the animal did exiſt, and that its fluids were in motion, before generation, is generally allowed; but whether the animalcule was lodged in the male, or female, has been much diſputed. See GENERATION, CONCEPTION, and PREGNANCY.

The firſt thing that appears of a *fœtus*, is the placenta, like a little cloud, on one ſide of the external coat of the egg: about the ſame time the ſpine is grown big enough to be viſible; and a little after the cerebrum and cerebellum appear like two ſmall bladders: next, the eyes ſtand prominent in the head: then the punctum ſaliens, or pulſation of the heart, is plainly ſeen. The extremities diſcover themſelves laſt of all.

The formation of the bones in a *fœtus* is very gradual and regularly performed. In the firſt two months there is nothing of a bony nature in the whole; after this, the hardneſs of the parts where the principal bones are to be ſituated becomes by degrees preceptible. Dr. Kerkring deſcribes the progreſs of the oſſification from ſceletons which he had prepared from *fœtuſes* of two months, and thence up to nine. In the firſt two months, or till the end of that time, there appears not any thing bony; after this in the third and fourth months, and ſo on, the ſeveral parts, one after another, acquire their bony nature. In the firſt ſtages every thing is membranous, where the bones are to be; theſe by degrees tranſmigrate into cartilages; and from theſe by the ſame ſort of change continued, the bones themſelves are by degrees formed. All this is done by nature, by ſuch ſlow, though ſuch certain progreſſions, that the niceſt eye can never ſee it doing, though it eaſily ſees it when done.

While *fœtuſes* continue in the womb, their muſcles commonly act only by their natural contraction, or the *fœtus* is ſaid to be in a ſleeping ſtate; but ſometimes, when its eaſe or preſervation requires a change of ſituation, it ſeems to perform ſome voluntary motions, which are called its *ſtirrings*. The poſture of the child in the womb, is owing to the muſcles being left to their natural contractions, the ſtronger always prevailing, till their antagoniſts exert ſuch a reſiſtance by being ſtretched, as brings them to an equilibrium.

Fœtuſes increaſe proportionally leſs, the longer they continue in the womb. Mauriceau pretends, that the increaſe of a child, is ſixty-four times its own weight in triple the time. Thus he ſays, that at the birth, a child weighs twelve pounds, of ſixteen ounces each; at the three months, it weighs three ounces; at one month $\frac{1}{2}$ of a drachm; and at ten days, leſs than half a grain. Monro in Med. Eſſ. Edinb. vol. ii. p. 142.

FOETUS, *in the womb*, *ſituation of the*. The *fœtus*, when formed, is almoſt of an oval figure, while it lies in the womb: for its head hangs down, with its chin upon the breaſt: its back is round; with its arms it embraces its knees, which are drawn up to its belly, and its heels are cloſe to its buttocks; its head upwards, and its face towards its mother's belly. About the ninth month, its head, which was hitherto ſpecifically lighter than any other part, becomes ſpecifically heavier, its bulk bearing a much ſmaller proportion to its ſubſtance than it did.

The conſequence of this change is, that it tumbles in the liquor which contains it; its head falls down, its feet get up, and its face turns towards its mother's back. But being now in an irkſome poſture, though, at the ſame time, a favourable one for its exit, the motion it makes for its relief gives frequent pains to the mother, which cauſe a contraction of the womb for the expulſion of the *fœtus*.

What ſome anatomiſts pretend to allege farther as to the poſture of the *fœtus* in the womb, in the ſeveral ſtages of geſtation, is very precarious.

In the firſt month it is of no moment how it lies in the womb: in the latter months, after the *fœtus* is grown not only quick, but robuſt, it frequently changes its poſture of itſelf; as not only the mothers themſelves feel, but any other perſon, by laying the hand on their bellies, frequently may. However, its ordinary poſture is ſuppoſed to be ſitting: as the time of birth draws near, it turns itſelf, and preſents the head to the os uteri; though ſometimes it offers the feet firſt, and ſometimes lies acroſs, and offers either a hand, a knee, or the like: theſe are irregular ſituations, and without conſiderable addreſs of the midwife in turning the *fœtus*, both the mother and the infant are in danger. See DELIVERY.

FOETUS, *anatomy of the*. The *fœtus* is incloſed in two membranes, or coats; the inner, which immediately inveſts the *fœtus*, and the liquor wherein it lies, is called the AMNIOS; the outward membrane is called the CHORION.

In ſome animals there is a third membrane, called the ALLANTOIS, whoſe place is between the other two, and which ſerves for the diſcharge of the urine of the *fœtus*, brought hither by the urachus.

Dr. Needham ſeems to have diſcovered ſomething analogous hereto in the human *fœtus*, and calls it the *membrana urinaria*: but others chuſe only to make it a duplicate of the chorion; though the neceſſity of ſuch third membrane be the ſame in men, as in cows, ſheep, &c.

There are ſome differences in the ſtructure, mechaniſm, and proportion of the parts of a *fœtus*, from thoſe of an adult; and even ſome additional and extraordinary parts, by which the nutrition of this zoophyte, or plant-animal, as it is called, and the circulation of the blood therein, are effected.

The principal variations are about the liver, heart, and lungs.

Of theſe, the moſt conſiderable are the umbilical veſſels, which are two arteries, a vein, and the urachus, ariſing from the placenta, and conveyed through the navel to the liver of the *fœtus*, near the navel; all which, after the birth, drying up, become impervious and uſeleſs.

In the liver itſelf there is an extraordinary communication between the porta and cava, called *canalis venoſus*, which, after the birth, gradually dries up. In the heart, at the mouth of the vena cava, is the foramen ovale, whereby that vein has a communication with the pulmonary vein: there is alſo a communication between the aorta and pulmonary artery, by means of the canalis arterioſus, which paſſes between the two, at about two inches diſtance from the baſe of the heart. It is by means of theſe two canals or paſſages, that the blood has been ſuppoſed to circulate in the *fœtus* while incloſed in the womb; they ſerving to convey and paſs the blood from the heart into the arteries, and from the veins into the heart again, without its paſſing through the lungs, which are now uſeleſs.

The lungs of a *fœtus* are of a darker colour, and cloſer conſiſtence, than after they have been breathed into, as appears from their ſwimming in water, after birth, which they will not do before; which difference has been ſaid to afford an uſeful experiment, in caſe of the ſuſpected murder of children: for if they were ſtill-born, the lungs ſink in water; if born alive, they ſwim. But this notion is not well founded; becauſe the uninflated lungs become ſpecifically lighter than water as ſoon as any degree of putrefaction takes place in them, and this happens ſoon after the death of the child; beſides, where the utmoſt care hath been taken to preſerve the child, it hath breathed once or twice, and then died.

The two canals above mentioned ſerve only to prevent the obſtruction the blood would otherwiſe have within the lungs, before they have been opened. After reſpiration has opened the lungs, the blood taking its courſe through them, thoſe paſſages cloſe up.

The head of the *fœtus* is much bigger in proportion to the body than afterwards; the bones and brain are ſofter, the ſutures open, and they leave a great ſpace on the top of the head, covered only with a membrane; and the glands, particularly the thymus and renales, are bigger and ſofter. For other differences in the proportion, ſee EMBRYO.

FOETUS, *nutrition of the*. How the nutrition of the *fœtus* is performed, is diſputed among the learned. Heiſter is of opinion, that the nutrition of the *fœtus*, during the firſt months, while the organs of concoction are not yet formed, is probably effected by means of the navel-ſtring alone. But in the more advanced ſtate of the *fœtus*, in the latter months, he ſuppoſes, that it is alſo nouriſhed by the mouth, by means of a ſoft and ſomewhat gelatinous fluid that ſurrounds it, and which is probably ſecreted from the amnios: in ſupport of which opinion he obſerves, 1. That a fluid ſimilar to that of the amnios is found in the mouth, the œſophagus, and the ſtomach, not only of the human *fœtus*, but in that of quadrupeds. 2. That this fluid is alſo found in the ſmall guts of the *fœtus*, but altered and digeſted. 3. That there are alſo found in the larger inteſtines real fœces, called meconium: ſometimes the whole ilium is full of theſe. 4. That in the firſt months there is a great quantity of this fluid ſurrounding the *fœtus*; but in the latter months, there is little of it, and the conſumption of it is not eaſily accounted for in any other way, than by its being ſwallowed by the *fœtus*. 5. That the liquid itſelf is ſo extremely proper for the nutrition of the *fœtus*, that a more fit one could not be formed or deſired. 6. That it ſeems to be continually preſſed into the mouth, œſophagus, and ſtomach of the *fœtus*, by the perpetual renitency of the uterus itſelf, and by the preſſure of the muſcles of the abdomen, and of the ambient air.

Hippocrates, among the ancients, was of opinion, that the *fœtus* was nouriſhed both by the mouth, and by the umbilical veſſels. He maintains, that the child in the womb, with its lips compreſſed together, attracts nouriſhment; for which he aſſigns this reaſon, that unleſs the child had ſucked in utero, it neither could depoſit excrement, nor know how to ſuck ſo ſoon as it is born. The celebrated Harvey maintained this doctrine; only that he ſubſtituted an albugineous aliment in place of Hippocrates's menſtrual blood. Mr. Gibſon, in the Medical Eſſays of Edinburgh, vol. i. p. 140. has alſo adopted this opinion, that the *fœtus* is nouriſhed by the mouth and by the navel alſo, as moſt probable.

He alledges, that the fluid contained in the amnios, and in which the *fœtus* ſwims, is not an excrementitious liquor, but a *materia nutricatus*; ſo that it is found in very conſiderable quantities, before the parts of the *fœtus* are viſibly delineated; and nature hath provided the delicate membrane, called the allantois, principally for preventing the urine of the *fœtus* from mixing with the liquor amnii, its food. Farther, the mouth, nay even its chaſm, long before the lips are obſervable, is always open; for air blown upon it through a pipe will evidently ſeparate its ſides: and Heiſter remarks to this purpoſe, that he has more than once, in the cold winter ſeaſon, found the liquor amnii frozen, and continued through the mouth and œſophagus to the ſtomach in a pretty large column. Mr. Gibſon adds, that there have been examples of human *fœtuſes* which have been brought into the world alive, either altogether wanting the umbilicus and its veſſels, or, at leaſt, having the umbilical rope broke aſunder. He then ſubjoins two analogical arguments in confirmation of this opinion, concerning the nutrition of the *fœtus* by the mouth and the umbilical veſſels, viz. one, deduced from the vegetation of plants, which, he ſays, in ſemine have two roots, the ſeminal, whoſe fibres are inſerted into the cotyledones of the ſeed, and the plantal, which ſucceeds the former, and ſuperſedes the uſe of the cotyledones, which die and fall off: and the other, from the apparatus for nouriſhing the chick in ovo; the albumen ovi anſwering the ſame purpoſe, with regard to the chick, as the liquor amnii does with reſpect to the *fœtus* in animals.

Dr. Fleming has lately produced a fact in ſupport of this hypotheſis, viz. that he had found hairs in the meconium of the *fœtus* of a calf: theſe, he apprehends, were looſened from the ſkin, and afterwards floating in the liquor amnii, were propelled with it into the ſtomach and inteſtines by the alimentary paſſage. But from a ſingle fact no general concluſion can be ſatisfactorily deduced. He adds, as a proof of the alimentary nature of the liquor amnii, that it is concretable by heat, like the yolk of an egg. Phil. Tranſ. vol. xlix. art. 42.

Dr. Monro, on the contrary, is of opinion, that the *fœtus* in viviparous animals is nouriſhed by the navel alone. He has given a curious diſſertation on this ſubject in the Medical Eſſays, vol. ii. p. 102, &c. where he obſerves, 1. That the *fœtus* is capable of receiving its whole nouriſhment by the umbilical vein alone, whereas no *fœtus* can ſubſiſt without the umbilical veſſels. 2. That the liquor of the amnios is ill calculated, in its natural ſtate, for the food of a *fœtus*; and becomes altogether unfit food in morbid caſes. 3. That it is highly improbable that a creature ſhould furniſh its ſubſiſtence out of its own body, which muſt be the caſe, if the *fœtus* feeds on the liquor of the amnios. 4. That it cannot be inferred from any reſemblance of the liquor of the ſtomach and amnios, nor from any other appearances, that the liquor of the amnios is ever ſent down into the ſtomach. 5. That no direct proof can be had of the liquor of the amnios being preſſed or ſwallowed down; but, on the contrary, all circumſtances make it probable, that it does not go down. 6. That all the phenomena of a *fœtus* can moſt reaſonably be accounted for, without ſuppoſing the liquor of the amnios to be any part of its food; hence he thinks it reaſonable to exclude the mouth from the office of conveying the aliment of the *fœtuſes* of viviparous animals, and to believe that all their nouriſhment is conveyed by the umbilical veſſels.

Dr. Monro has alſo given us ſeveral curious obſervations relating to the queſtion about the nutrition of the *fœtuſes* of oviparous animals.

He has alſo there conſidered the nouriſhment of plants in a *fœtus* ſtate. And he ſhews the analogy there is between theſe and animal *fœtuſes*. To fix the analogy between animals and plants, he obſerves, that the former may be ſaid to remain in the ſtate of a *fœtus*, ſo long as the young creature is ſolely nouriſhed by liquors furniſhed by the uterus of the parent; and plants are to be conſidered as *fœtuſes* only, while the ſeed is ripening, and before the earth, water, moiſture of the air, &c. have communicated immediately any matter for its increaſe.

The ſame author has given us ſome practical corollaries, from his eſſay on the nutrition of *fœtuſes* of viviparous animals, where he makes ſeveral very juſt obſervations relating to abortion, its cauſes, and the method of preventing it in many caſes.

The liquors ſent into the *fœtus* by the umbilical vein, not having their propelling force communicated from the mother, the ſtate of the mother's pulſe cannot effect the child otherwiſe than by occaſioning abortion, or vitiating the fluids. Hence the impreſſions ſaid to be made on children by the imaginations of the mother, cannot be accounted for phyſically. Hence alſo children may be infected with the diſeaſed juices of the mother; but it is poſſible for them to eſcape catching their mother's diſeaſes, if either theſe be only topical, without affecting the whole maſs of the fluids: or even when the mother's blood is ſpoiled, the child may be free of her diſeaſe, if the morbid particles be ſuch as the placentary veſſels cannot abſorb.

The mother ſupplies liquors to the *fœtus*, which returns others to the mother, by means of the uterine and umbilical veſſels. This ſeems proved from obſervations; *fœtuſes* whoſe placenta were not in the leaſt ſeparated from the uterus, having been quite exhauſted of blood by the mother's dying of an hæmorrhage; and Dr. Monro acquaints us, that he has ſeen children pale and weak by violent floodings in the time of labour.

The liquors are not carried from the mother to the *fœtus*, or from the *fœtus* to the mother by continued canals. That is, the uterine arteries and veins do not anaſtomoſe with the veins and arteries of the ſecundines; but the extremities of the umbilical vein take up the liquors by abſorption, in the ſame way as the lacteal veſſels do in the guts; and the umbilical arteries pour their liquors into the large cavities of the ſinuſes, or other cavities analogous to them.

It is a queſtion, whence the *fœtus* has its red blood. Dr. Monro anſwers, that *fœtuſes* in viviparous animals have their red blood from the ſame ſource that chickens in ovo have theirs; which can be no other than the action of their heart, and of the veſſels of their body and ſecundines. Med. Eſſ. Ed. vol. ii. p. 183, 201, 206.

A liquor is found in the thorax of *fœtuſes*, which Mr. Petit inclines to believe is furniſhed by the thymus. See Mem. de l'Acad. des Sciences, 1733.

Reſpiration ſeems to be the great act by which the change is made in animals, from the ſtate of *fœtus* to that of motion, ſenſation, and the other qualities of animal life in their larger degree. Mr. Duverney obſerved this in the *fœtus* of a common ſnake: he broke the egg of one of theſe animals, at a time when it was juſt ready for hatching, and the young ſnake fell out rolled in a ſpiral, at firſt quite ſtiff and motionleſs; but it had no ſooner breathed three or four times, than it began to perform all the motions of animal life, in the moſt nimble and active manner.

FOETUS, *circulation of the blood of a.* See BLOOD.

Mr. Wolff, a late writer, has gone a great way towards demoliſhing both the ſyſtem of Galen and Harvey, and that of Mery, with regard to the circulation of the blood in the *fœtus:* he affirms, that it neither does, nor can paſs from the right auricle to the left, nor from the left to the right, through the foramen ovale. In ſupport of this aſſertion he obſerves, that there is a ſynchroniſm in the motion of the auricles of the heart, the ſyſtole and diaſtole happening, preciſely, at the ſame moment of time; and, therefore, the force that is neceſſary to make the blood paſs from one auricle into the other, cannot exert itſelf during the ſyſtole, becauſe the two auricles are equally and ſimultaneouſly contracted, and throw out the blood with which they are filled; nor can it be exerted during the diaſtole, becauſe the two auricles are then dilated, and receive extraneous blood from whatever part it comes: conſequently, there is no moment of time in which the blood can paſs from one auricle into the other. In diſſecting the heart of a new-born child, Mr. Wolff diſcovered, that the ſtructure of the organ of circulation in the *fœtus* is very different from what it was commonly imagined to be: for he found, that the aperture on the left ſide of it was very different from that on the right; the firſt being formed by that which foreigners call the arc of Vieuſſens and the valve of Euſtachius, and the ſecond being derived from the ſame arc and the valve of the foramen ovale: and from a farther examination of this ſtructure it appeared, that the auricles had no communication with each other, but were ſeparated by the inferior trunk of the vena cava; the aperture which is diſcernible in the right auricle being nothing more than the orifice of the cava, which effectuates its inoſculation into that auricle, while the aperture that is ſeen on the left ſide, and called the foramen ovale, is no more than another orifice of the ſame vein, which has its inoſculation in the left auricle. Thus both the auricles communicate with the vena cava, but have no communication with each other; and the foramen ovale is only the left orifice of the inferior vena cava. In order to determine the direction which the blood follows in its circulation we are to conſider, that, as the vena cava opens itſelf by its two orifices in the two auricles or ſinuſes of the heart, the blood which it contains muſt be conveyed partly into the right auricle by the right orifice, and partly into the left auricle by the left orifice; and the quantity of blood, which diſcharges itſelf into the right auricle, mixing itſelf there with the blood of the ſuperior vena cava, flows directly from thence into the right ventricle of the heart; nor can the leaſt drop of blood, that has once got into the right auricle, repaſs from thence to the left; and the quantity of blood, which paſſes from the inferior cava, through its left orifice, into the left auricle of the heart, contributes to diſengage the lungs, by turning its direction from the right auricle, the right ventricle, and conſequently from the lungs, which, being deſtitute of reſpiration, could not have tranſmitted this blood, or facilitated its paſſage. That portion of blood, therefore, mixing itſelf in the left auricle with that of the pulmonary veins, proceeds directly to the left ventricle, and from thence into the aorta; from whence it takes its courſe away in different channels through the whole body, without touching the lungs. Nov. Comment. Acad. Scient. Imp. Petropol. vol. xx. 1775.

The *fœtus* often dies in the womb. This is diſcovered to be the caſe by the following ſymptoms: the mother becomes languid and weak, and is ſubject to frequent faintings. She complains alſo of flying heats and chilneſſes, ſucceeding one another at ſhort intervals, and of ſtraitneſs of the præcordia, anxieties of mind, and vertiginous dizzineſs of the head. The breaſts, though before diſtended and hard, grow flaccid on this, and have an abundance of a thin watery ſerum in them. The *fœtus* is not perceived to move, and the belly hangs upon the thighs with an uncommon dead weight, and is affected with a remarkable coldneſs.

The death of the *fœtus* is often owing to a remarkably plethoric ſtate of the mother; and yet more frequently to her violent paſſions, whether of grief, anger, fear, or any other kind. The morbid conſtitution of the mother may alſo occaſion it, be it almoſt of any kind whatever, and alſo habitual diarrhœas. But the death of the *fœtus* is moſt frequently occaſioned by the bad ſucceſs of labour-pains, or bad aſſiſtance in them, and by its being left conſtricted by the womb.

The expulſion of the dead child is to be attempted by all the forcing medicines, ſuch as borax, and the like; and the ſpirits and ſtrength are to be kept up during the attempt, by giving analeptics in the intermediate time; but if theſe medicines have not the deſired effect, the manual operation of the man-midwife muſt be called in; and when the *fœtus* is taken out, the woman is to be treated with the utmoſt care in the common way of lying-in women. See DELIVERY.

Bartholine, in his treatiſe De Inſolitis Partus Viis, relates a great many ſtupendous caſes of *fœtuſes* dead and putrefied in the womb, the parts of which have made their way through apoſtemations; one whereof, at the navel, was ſome years in coming away. And in the Philoſoph. Tranſactions we meet with the like inſtances; particularly of one voided piece-meal by the anus, ſeveral years after conception.

Authors give accounts of *fœtuſes* found in the Fallopian tubes, and others in the cavity of the belly. M. de S. Maurice, in the Memoirs of the Royal Academy of Sciences, relates the hiſtory of a *fœtus* formed in the ovary of the mother, and which, at three months from impregnation, burſting the teſticle, forced its way through, into the epigaſtric region.

Others have occaſioned abſceſſes, on the opening of which a paſſage has been made for the *fœtus*, which has come away by piece-meal.

The ſtory of Margaret, counteſs of Holland, who is ſaid to have been delivered of 364 *fœtuſes*, all alive, and afterwards baptized, paſſes for a fable; and yet there is a picture of this notable delivery ſtill preſerved in the church of Loſdune, as a monument of the truth thereof. Albertus Magnus gives a like inſtance of a woman, who brought forth 150 *fœtuſes*, or embryos, all formed, as big as a little finger.

FOG, or *miſt*, a meteor, conſiſting of groſs vapours, floating near the ſurface of the earth.

If the vapours, plentifully raiſed from the earth and waters, either by the ſolar or ſubterraneous heat, meet, at their firſt entrance into the atmoſphere, with cold enough to condenſe them conſiderably, their ſpecific gravity being hereby increaſed, their aſcent will be ſtopped, and they will either return back in form of a dew, or of drizzling rain; or they will remain ſuſpended for ſome time, in form of a *fog*. See EVAPORATION.

Fogs are only low clouds, or clouds in the loweſt region of the air; and clouds are no other than *fogs* raiſed on high.

Objects viewed through *fogs* appear larger, and more remote than through the common air.

The fiſhing for herring is chiefly practiſed in *foggy* weather.

FOGAGE, in the *Foreſt Law*, is rank graſs, not eaten in the ſummer.

FOIBLE, a French term, frequently uſed alſo in our language.

It literally ſignifies *weak*; and in that ſenſe is applied to the body of animals, and the parts thereof: as, *foible* reins, *foible* ſight, &c. being derived from the Italian *fievole*, of the Latin *flebilis*, *to be lamented*, *pitied*.

But it is chiefly uſed with us ſubſtantively, to denote a defect, or flaw, in a perſon, or thing. Thus we ſay, every perſon has his *foible*; and the great ſecret conſiſts in hiding it artfully: princes are gained by flattery, that is their *foible*: the *foible* of young people is pleaſure; the *foible* of old men is avarice; the *foible* of the great and learned is vanity; the *foible* of women and girls, coquetry, and an affectation of having gallants.

It is a term alſo uſed in fencing, to denote the weakeſt part of a blade; in oppoſition to the fort, which is the ſtrongeſt.

FOIL, in *Fencing*, denotes a blunt ſword, or one that has a button at the end covered with leather, uſed in learning the art of fencing.

FOIL, among *Jewellers*, a thin leaf of metal, placed under a precious ſtone, in order to make it look tranſparent, to improve the colour, or to give it an agreeable different colour, either deep or pale. Thus, the effect of giving luſtre is produced by the poliſh of the ſurface of the *foil*, which is colourleſs; but if a ſtone is wanted to be of a pale colour, a *foil* of that colour muſt be put under it; if deep, a dark one muſt be laid under it.

Theſe *foils* are made either of copper, tin, gold, or gold and ſilver together: the copper *foils* are generally known by the name of Nuremberg or German *foils*. They are prepared as follows.

Procure the thinneſt copper-plates that can be got, beat theſe plates gently upon a well-poliſhed anvil, with a poliſhed hammer, as thin as writing paper; or paſs them between a pair of fine ſteel rollers, very cloſe ſet; and placing them between two iron plates, as thin as poſſible, heat them in the fire: then boil the *foils* in a pipkin, with equal quantities of tartar and ſalt, conſtantly ſtirring them, until by boiling they become white; after which, taking them out and drying them, give them another hammering, until they are fit for uſe. Care however muſt be taken, not to give the *foils* too much heat, for fear of melting; neither muſt they be too long boiled, for fear of attracting too much ſalt.

The manner of poliſhing theſe *foils* is as follows: take a plate of the beſt copper, one foot long, and about five or ſix inches wide, poliſhed to the greateſt perfection; bend this to a long convex, faſten it upon a half roll, and fix it to a bench or table: then take ſome chalk, waſhed as clean as poſſible, and filtered through a fine linen cloth, until it be as fine as can be made; having laid ſome of this upon the roll, and wetted the copper all over, lay the *foils* upon it, and, with a poliſhed ſtone and the chalk, poliſh them until they are as bright as a looking-glaſs. After this they muſt be dried, and laid up ſecure from duſt.

The beſt method of preparing *foils*, ſo as to give to colourleſs ſtones, as cryſtals, pebbles, or paſte, the luſtre and play of diamonds, is as follows:

Take leaves of tin, prepared in the ſame manner as for ſilvering looking-glaſſes, and cut them into ſmall pieces, of ſuch ſize as to cover the ſurface of the ſocket of the ſtones that are to be ſet: lay three of theſe one upon another; and, having moiſtened the inſide of the ſocket with thin gum water, and ſuffered it to dry, that only a ſlight thickneſs may remain, put the three pieces of leaves, lying on each other, into it, and adapt them to the ſurface in as even a manner as poſſible. When this is done, heat the ſocket, and fill it with warm quickſilver, which muſt be left in it for three or four minutes, and then gently poured out. The ſtone muſt then be thruſt into the ſocket, and cloſed with it; care having been previouſly taken, that it may enter the ſocket without ſlipping off the tin and quickſilver from any part of the ſurface. The work ſhould be well cloſed round the ſtone, to prevent the tin and quickſilver contained in the ſocket from being ſhaken out by any violence. The luſtre of ſtones, ſet in this manner, will continue longer, than when they are ſet in the common way.

When colouring *foils* are wanted, thoſe of copper, above deſcribed, may be either tinged with ſmoke, or ſtained or painted with ſome pigment or other colouring ſubſtance. The colours uſed for this purpoſe, may be tempered with oil, gummed or ſized water, or varniſh: for red, in imitation of ruby, carmine, with a little lake uſed in iſinglaſs ſize, or ſhell-lac varniſh, or bright lake in oil, ſhould be employed; for the garnet red, dragon's blood, diſſolved in ſeed-lac varniſh, may be uſed; and for the vinegar garnet, orange lake, tempered with ſhell-lac varniſh. For the amethyſt, lake, with a little Pruſſian blue, uſed with oil; for blue, where the effect of ſapphire is wanted, Pruſſian blue in oil, and ſpread on the *foil* more or leſs thinly, according to the lightneſs or deepneſs of the colour required; for the eagle marine, common verdigriſe with a little Pruſſian blue, tempered in ſhell-lac varniſh, ſhould be uſed; for a full yellow, yellow lacquer; and for the ſlighter colour of topazes, the burniſh and *foil* itſelf will ſerve, without any addition. For a deep green, the cryſtal of verdigriſe, tempered in ſhell-lac varniſh; but for the emerald, a little yellow lacquer ſhould be added. See DOUBLETS. Handmaid to the Arts, vol. ii. p. 333, &c.

FOIL, or **FOYLE**, among *Looking-glaſs-grinders*, a ſheet of tin, with quickſilver, or the like, laid on the back-ſide of a looking-glaſs, to make it reflect. See FOLIATING. The word is formed of the Latin *folium*, leaf.

FOILING, among *Hunters*, the footing and treading of deer, which remains on the graſs, but ſcarce viſible.

FOLC-*land*. See FOLK-*land*.

FOLDAGE and **FOLK-COURSE**. See FALDAGE.

FOLD-*net*, among *Sportſmen*, a ſort of net with which ſmall birds are taken in the night: there are two ſizes of it; the leaſt may be managed by one man, but the largeſt muſt be carried by two, and uſed thus: let the net be fixed on both ſides to two ſtrong poles about twelve feet long, each man holding one of them; let a third carry lights behind them, at the diſtance of two yards: the net ſhould be carried between the wind and the birds, which rooſt on their perches with their breaſts againſt the wind: another perſon, who beats the buſhes on the other ſide of the hedge, will drive out the birds towards the light.

FOLD-*ſoca*, in *Law*. See FALDAGE.

FOLDS, in the *Manufactures*. See CLOTH, &c.

FOLDS *of the drapery*, in *Painting*. See DRAPERY.

FOLDING *of ſheep*. See SHEEP.

FOLIA, in *Botany*, is uſed for the leaves of plants, and alſo of flowers, but particularly the former; the leaves of flowers being more properly called PETALA.

FOLIACEUM *expanſum*, in *Anatomy*, is that extreme of the FALLOPIAN *tube*, next the ovary; and which is expanded like the mouth of a trumpet, and invironed with a ſort of fringe.

FOLIAGE, a cluſter or aſſemblage of flowers, branches, leaves, &c.

FOLIAGE is generally uſed for repreſentations of ſuch flowers, leaves, branches, rinds, &c. whether natural or artificial; uſed as enrichments on CAPITALS, FREEZES, PEDIMENTS, &c. See *Tab. Archit. fig* 12.

FOLIATE, in the *Higher Geometry*, a name given by ſome to a curve of the ſecond order, expreſſed by the equation $x^3 + y^3 = a x y$, being one ſpecies of defective hyperbolas, with one aſymptote, and conſiſting of two infinite legs croſſing one another, and forming a ſort of leaf.

FOLIATING *of looking-glaſſes*, is the ſpreading a compoſition of ſomething which will firmly adhere to the back of the glaſs, and there reflect the image.

This compoſition is called the *foil*, and is uſually made with quickſilver, mixed with tin, and ſome other ingredients.

For the method of *foliating* looking-glaſſes, ſee LOOKING-GLASS.

In Philoſoph. Tranſ. N° 245. we have a method of *foliating* globe looking-glaſſes, communicated by Sir R. Southwell. The mixture is of quickſilver and biſmuth, of each three ounces; and tin and lead, of each half an ounce: to the two laſt throw on the marcaſite, and afterwards the quickſilver; ſtir them well together over the fire; but they muſt be taken off, and be towards cooling, before the quickſilver be put to them.

When you uſe it, the glaſs ſhould be well heated, and very dry; but it will do alſo when it is cold, though beſt when the glaſs is heated.

Mr. Boyle's method, which he prefers to any he ever met with in print, is this: take tin and lead, of each one part; melt them together, and immediately add of good tin-glaſs, or biſmuth, two parts; carefully ſkim off the droſs; then take the crucible from the fire, and, before the mixture grows cold, add thereto ten parts of clean quickſilver, and having ſtirred them well all together, keep the fluid in a new clean glaſs. When you go to uſe it, firſt purge it, by ſtraining it through linen, and gently pour ſome ounces into the glaſs to be *foliated*, through a narrow paper funnel, reaching almoſt to the glaſs, to prevent the liquor from flying to the ſides. After this, by dexterouſly inclining the glaſs every way, endeavour to faſten it to the internal ſurface; which done, let it reſt for ſome hours; then repeat the ſame operation, and ſo continue, at times, till the liquor is ſlowly paſſed over, and equally fixed to the whole ſuperficies; which may be diſcerned by expoſing the glaſs to the eye between that and the light. Boyle's Works abr. vol. i. p. 129.

FOLIATION, in *Botany*, &c. is uſed by Dr. Grew to expreſs the aſſemblage of the FOLIA, or PETALA, of a flower.

The *foliation* is the moſt conſpicuous part of flowers, being that collection of fugacious, coloured leaves, which conſtitutes the compaſs, or body of the flower.

It is of great uſe in the generation and preſervation of the young fruit, or ſeed: it filtrates a fine juice, to nouriſh it in the uterus, or piſtil.

In ſome ſpecies, as apricots, cherries, &c. it likewiſe ſerves to guard the young tender fruit from the violence of wind, weather, &c. for this, being of a very tender and pulpous body, and coming forth in the colder times of the ſpring, would be often injured by the extremities of weather, if it were not thus protected, and lodged within the flowers.

Before the flower opens, the *foliation* is curiouſly and artfully folded up in the calyx or perianthium.

Dr. Grew enumerates ſeveral varieties of their foldings, viz. the *cloſe couch*, as in roſes; the *concave couch*, as in the blattaria flore albo; the *ſingle plait*, as in pea bloſſoms; the *couch* and *plait*, as in marigolds; and the *rowl*, as in the ladies bower.

FOLIO, or rather **Folium**, in books of account, &c. ſignifies *page*.

Thus *folio* 7. written abridgedly F° 7. denotes the ſeventh page, &c.

Folio recto, or F° R°, expreſſes the firſt ſide or page of a leaf.

Folio verſo, or F° V°, the ſecond, or back-ſide of the leaf.

The word is Italian, and literally ſignifies *leaf*.

Folio, among *Bookſellers*, a book in *folio*; or ſimply, a *folio*, is that where the ſheet is only folded in two, each leaf making half a ſheet.

Beneath the *folio* are the *quarto*, *octavo*, *duodecimo*, *ſixteens*, *twenty-fours*, &c.

FOLIS, or **Follis**, anciently ſignified a little bag or purſe; whence it came to be uſed for a ſum of money, and very different ſums were called by that name: thus, the ſcholiaſt on the Baſilics, mentions a *follis* of copper which was worth but the twenty-fourth part of the miliarensis; the gloſſæ nomicæ, quoted by Gronovius and others, one of a hundred and twenty-five miliarenſes, and another of two hundred and fifty denarii, which was the ancient ſeſtertium; and three different ſums of eight, four, and two pound of gold, were each called *follis*. According to the account of the ſcholiaſt, the ounce of ſilver, which contained five miliarenſes of ſixty in the pound, was worth a hundred and twenty *folles* of copper. The gloſſographer, deſcribing a *follis* of two hundred and fifty denarii, ſays it was equal to three hundred and twelve pounds ſix ounces of copper; and as the denarius of that age was the eighth part of an ounce, an ounce of ſilver muſt have been worth a hundred and twenty ounces of copper; and, therefore, the ſcholiaſt's *follis* was an ounce of copper, and equal to the gloſſographer's *nummus*. But as Conſtantine's copper money weighed a quarter of a Roman ounce, the ſcholiaſt's *follis* and the gloſſographer's nummus contained four of them, as the ancient nummus contained four aſſes. See Phil. Tranſ. vol lxi. ii. p. 515, &c.

FOLIUM. See Leaf.

Folium *branchiarum*, the *leaf of the gills*, a term uſed by ſome of the ichthyologiſts, to expreſs that part of the gills which looks red and fringed. The gills of fiſh are compoſed of certain bony circles, which are formed on the convex ſide with a great number of laminæ; theſe ſerve to receive the ramifications of the arteries, and are called the *folium* or leaf of the gills. The aorta or great artery reaches no farther than this part in fiſh. It has no deſcending trunk, but every part of the body is ſupplied by a large venal trunk, formed by the joining of the ſeveral ſmaller trunks of the ſeveral circles of the gills.

Folium *caryophyllatum*, or clove-leaf. See Clove-*tree*.

Folium *Indicum*, or *Indum*, called alſo tamalapatra, and malabathrum; a leaf brought from the Indies, growing chiefly about Cambaye, produced by a tree not unlike the lemon-tree; uſed in the compoſition of Venice-treacle.

FOLK-LAND, in our ancient Saxon cuſtoms, denoted copyhold *lands*.

In oppoſition to theſe, charter-lands were called *book-lands*, or bock-*lands*.

Fundus ſine ſcripto poſſeſſus (ſays Sommer) *cenſum penſitans annuum, & officiorum ſervituti obnoxius: terra popularis.*

FOLKMOTE, **Folcmote**, or **Folkesmote**, among our Saxon anceſtors, ſignified any popular or public meeting of all the folk or people of a place, diſtrict, or the like; e. gr. of all the tenants at a court-leet, or court-baron; or of all the freemen of a county; or of all the barons, of a kingdom.

The word, ſays Stow, is ſtill in uſe among the Londoners, and ſignifies *celebrem ex omni civitate conventum*, an aſſembly of all the citizens. Manwood ſays it is the court holden in London, wherein all the folk and people of the city did complain of the mayor and aldermen for any miſgovernment.

Somner, in his Saxon dictionary, makes *folcmote* to denote a general aſſembly of the people, for doing fealty to the king, and conſidering and ordering matters of the commonwealth: whence ſome date the origin of parliaments.

Omnes proceres regni, & milites & liberi homines univerſi totius regni Britanniæ, facere debent in pleno folcmote *fidelitatem domino regi, coram epiſcopis regni. In* leg. Edw. Confeſſ. cap. 33. *Et amplius non ſit in huſtinga, miſkenninga*, i. e. ſpeaking amiſs; *neque in* folkeſmote, *neque in aliis placitis infra civitatem.* Charta H. I. pro London. Du-Cange.

When ſuch aſſembly is made in a city, it may be called a *burghmote*; when in the county, a *ſhiregemote*.

Cum aliquid vero inopinatum & malum contra regnum vel contra coronam regis emerſerit, ſtatim debent, pulſatis campanis, quod Anglice vocatur motbel, *convocares omnes & univerſos, quod Anglici vocant* folkmote, *&c.* Leg. Alfred.

FOLLICULUS, among *Gardeners*, the ſeed-veſſel, caſe, coat, huſk, or cover, wherewith ſeveral kinds of ſeeds and fruits are incloſed.

Folliculus *fellis*. See Gall-*bladder*.

FOLLY, according to Mr. Locke, conſiſts in the drawing of falſe concluſions from juſt principles; by which it is diſtinguiſhed from madneſs, which draws juſt concluſions from falſe principles.

But this ſeems too confined a definition; *folly*, in its moſt general acceptation, denoting a weakneſs of intellect or apprehenſion, or ſome partial abſurdity in ſentiment or conduct.

FOMAHANT, or **Fomalhaut**, in *Aſtronomy*, a ſtar of the firſt magnitude, in the water of the conſtellation Aquarius.

FOMENTATION, a liquid medicine, applied to any diſeaſed part, to reſolve, diſcuſs, ſoften, aſſwage, fortify, or conſtringe the ſame.

Fomentations are either *ſimple* or *compound*.

Fomentations, *compound*, are decoctions of roots, leaves, flowers, and ſeeds, made in common water, or other proper liquor; to which are ſometimes added ſalts, axungiæ, oils, &c.

To uſe, or apply them, they dip a hot linen cloth, or flannel, in the liquor, and ſpread it on the part affected.

There are alſo *fomentations* made another way, viz. by boiling certain drugs in linen bags, and then applying them, bags and all, on the part.

There is alſo a ſort of dry *fomentations*, being bags filled with medicines, but not boiled, only ſometimes ſprinkled with a little wine or brandy.

Fomentations, *ſimple*, are thoſe made with lukewarm water, milk, oil, oxycrate, or the like liquors.

Fomentations are alſo called *local baths*, or partial bathings; becauſe, being applied on a diſeaſed part, they have much the ſame effect as a bath, or half-bath, has on the whole body.

Fomentations have different names, according to the preparations of which they conſiſt, and the uſes to which they are applied. Thus, the anodyne *fomentation*, uſed for relieving acute pain, is compoſed of white poppy-heads, two ounces; elder flowers, half an ounce; which are boiled in three pints of water till one pint is evaporated, and then the liquor is ſtrained out: the aromatic *fomentation* is prepared by boiling half an ounce of Jamaica pepper in a pint of red wine for a little while, and ſtraining out the liquor: this is uſed both for external and internal complaints. Colics and diſorders of the bowels are often abated by fomenting the abdomen and region of the ſtomach with this warm liquor. The common *fomentation* is made by ſlightly boiling the dried tops of wormwood and camomile flowers, of each two ounces, in two quarts of water, and pouring off the liquor, to which may be added ſuch quantities of brandy or ſpirit of wine as the particular caſe may require. The emollient *fomentation* conſiſts of one ounce of camomile flowers; elder flowers, and ſweet fennel ſeeds, of each half an ounce; boiled for a little while in two quarts of water, and ſtrained, with the addition of ſpirit of wine, &c. The ſtrengthening *fomentation* is prepared of oak-bark, one ounce; granate peel, half an ounce; alum, two drams; and ſmith's forge water, three pints: the water is boiled with the bark and peel till one third is conſumed, and in the remaining decoction ſtrained, the alum is to be diſſolved. This aſtringent liquor may be applied to foment weak parts, and alſo uſed internally.

FONCEAU, in the *Manege*, is the bottom or end of a cannon-bitt-mouth; that is, the part of the bitt that joins it to the banquet. See Chaperon.

FONGITES, a name given by the writers of the middle ages to a ſtone famous for its imaginary virtues. Authors are very vague in their deſcriptions of it; ſome deſcribing it as pellucid and colourleſs, like cryſtal; others, as opake and of a flame-colour; and ſome ſay, that it was partly of one and partly of the other of theſe colours. It is ſaid to mitigate pain, on being held for ſome time in the hand.

FONT, or *baptiſmal* **Font**, a ſtone or marble veſſel, at the lower-end of a pariſh-church, ſerving to hold water to be uſed in adminiſtering the ſacrament of baptiſm.

A baptiſmal *font* was anciently the character of a pariſh-church.

Its place, at preſent, is at the bottom of the church, or in a little chapel within the church. Anciently it was placed in a little church, diſtinct from the great one, though near to it, called the BAPTISTERY.

By the eighty-firſt canon it is required, that there ſhall be a *font* of ſtone in every church and chapel, where baptiſm is to be adminiſtered, the ſame to be ſet in the ancient uſual places; in which only *font* the miniſter ſhall baptize publicly.

Font, in the *Art of Printing*, denotes a complete aſſort-of letters, accents, &c. uſed in printing. See FOUNT.

FONTANELLA, in *Anatomy*, imports the quadrangular aperture found betwixt the os frontis, and oſſa ſincipitis, in children juſt born; which is alſo called *fons pulſatilis.*

FONTEVRAUD, or **FRONTEVAUX**, *order of*, in *Eccleſiaſtical Hiſtory*, a religious order inſtituted by Robert d'Arbriſſel, about the latter end of the eleventh century, and taken under the protection of the holy ſee by pope Paſcal II. in 1106, and confirmed by a bull in 1113, and inveſted by his ſucceſſors with very extraordinary privileges. The chief of this order is a female, who is appointed to inſpect both the monks and nuns. The order is divided into four provinces, which are thoſe of France, Aquitaine, Auvergne, and Bretagne, in each of which they have ſeveral priories. Bayle.

FONTICULUS, or **FONTANELLA**, in *Surgery*, a general name for ISSUES, SETONS, and the like other ſmall artificial diſcharges.

The word is a diminutive of *fons, fountain*, or *ſpring*.

FONTINALIA, or **FONTANALIA**, in *Antiquity*, a religious feaſt, held among the Romans, in honour of the deities who preſided over fountains, or ſprings. Varro obſerves, that it was the cuſtom to viſit the wells on thoſe days, and to caſt crowns into fountains. Scaliger, in his conjectures on Varro, takes this not to be a feaſt of fountains in general, as Feſtus inſinuates, but of the fountain which had a temple at Rome, near the Porta Capena, called alſo *Porta Fontinalis*: he adds, that it is of this fountain Cicero ſpeaks in his ſecond book De legib. The *fontinalia* were held on the 13th of October.

FONTINALIS, in *Botany*, the name of a genus of moſſes of the *cryptogamia* claſs; the characters of which are theſe: the capſules are ſeſſile, or have either no pedicles, or extremely ſhort ones; they are not naked as in the ſphagna, but are covered with calyptræ, and are included beſides in a membranous huſk, by which laſt particular they are diſtinguiſhed from the hypnums, bryums, and other moſſes which produce capſules.

There are only five known ſpecies of this genus. Linnæus enumerates only four ſpecies. Dillen. Hiſt. Moſc. p. 256.

FOOD, or **ALIMENT**, is whatever matter is taken in at the mouth, digeſted in the ſtomach, and other viſcera, and converted into the matter of the body, to repair or ſupply what is ſpent, or wanting.

The operations which the *food* undergoes, before it becomes a part of our body, are, 1. Maſtication. 2. Deglutition. 3. Concoction. 4. Chylification. 5. Sanguification. 6. Aſſimilation.

Food is of two kinds, viz. *eſculents*, or *meat*; and *potulents*, or *drink*.

The firſt *foods* of our great forefathers were water, and the ſpontaneous productions of the earth; with which alſo many whole nations ſuſtain themſelves to this day.

The variety of *foods*, it ſeems, does not make any difference in the ſubſtance, or actions, of the bodies ſuſtained thereby; the viſcera having a power of altering and aſſimilating them, however heterogeneous, into one ſimilar ſubſtance, like themſelves.

The difference in *foods* conſiſts principally in this: that ſome are more eaſily digeſted, and aſſimilated than others; and that ſome afford more nutritious juice than others: and to this end it is, that the divers kind of dreſſings have been invented, viz. to diſpoſe the matter for a more eaſy and plentiful aſſimilation.

The beſt, moſt ſimple, and light of digeſtion, are, the *foods* prepared of frumentaceous and leguminous ſeeds; as wheat, rye, barley, oats, and maize, dried, ground, fermented, baked, &c. peas, beans, vetches, &c. alſo, green plants, and pot-herbs; as lettuce, beet, parſley, &c. fruits; as apples, pears, berries, plums, cherries, &c and the lean parts of animals, birds, fiſhes, inſects, &c. prepared by boiling, baking, ſtewing, &c.

And yet, for different intentions, different kinds of *foods* are required. Thus hard, dry, thick, heavy, feculent *foods*, are beſt for thoſe whoſe viſcera are ſtrong, digeſtion quick, &c. and ſoft, light, humid, ſimple *foods*, to ſuch are pernicious. Again, to the weak, valetudinary, ſtudious, and ſedentary, thoſe *foods* are beſt, which are either by art, or nature, the neareſt to chyle; as milk, broths, &c. Where the temperature inclines to acidity, there alcalious *foods* are the more ſuitable; and acids, where the conſtitution inclines to be alcaline.

Some will have it, that iron, metals, minerals, &c. may, by a proper preparation, become *food*; on which account, decoctions of gold, chalybeats, &c. are extolled: but it is certain, that no ſuch matters can ever be aſſimilated, and become part of our body; they may act, indeed, on the blood, and the blood-veſſels, by their weight, impetus, &c. and, on that account, may be of uſe in medicine, but not as *food*.

A due regulation of the quantity and quality of our *food*, and a nice adjuſtment thereof to the concoctive powers, would be of the utmoſt conſequence to health and long life.

What we expend in motion, excretion, effluvia, &c. is but a determinate quantity; and the ſupply ſhould only keep pace with the expence: a juſt proportion of the two would, probably, preſerve us from acute diſtempers, as it certainly would from chronical ones; moſt, or all, of which, proceed from repletion, as appears from their being cured by evacuation.

The qualities of *foods*, as to eaſineſs, or difficulty, of digeſtion, Dr. Cheyne thinks, may be determined, in all caſes, from theſe three principles.

1. That thoſe ſubſtances which conſiſt of the groſſeſt parts, are hardeſt of digeſtion; becauſe their conſtituent parts touch in the moſt points, or have the greateſt quantity of contact, upon which their coheſion depends.

2. That thoſe ſubſtances whoſe parts are brought together with greater force, cohere proportionally cloſer, and are the more difficultly ſeparated.

3. That ſalts are very hard to be digeſted; becauſe united by plane ſurfaces, under which they are always comprehended: hence, in the laſt ſtages of the circulation, where it is ſlower, they readily ſhoot into larger cluſters, and ſo are hard to be driven out of the habit.

From theſe principles that author infers, that ſuch vegetables and animals as come ſooneſt to their growth, are eaſier of digeſtion than thoſe long in attaining to maturity; the ſmalleſt of their kind, ſooner than the larger; thoſe of a dry, fleſhy, and fibrous ſubſtance, ſooner than the oily, fat, and glutinous; thoſe of a white colour, ſooner than thoſe of a redder; thoſe of a ſoft, mild, and ſweet, ſooner than thoſe of a rich, ſtrong, poignant, aromatic taſte; land animals, than ſea animals; animals that live on light vegetable *food*, than thoſe on hard and heavy *food*; plain dreſſed *food*, than what is pickled, ſalted, baked, ſmoked, or otherwiſe high ſeaſoned; and boiled meat, ſooner than roaſt, &c.

The ſame author adds, that abſtinence and exerciſe muſt concur with the due *food* for the preſervation of health; and that where exerciſe is wanting, as in ſtudious perſons, the defect muſt be ſupplied by abſtinence. See DIET.

Phyſicians have attempted to determine the healthful quantity of *food* for a human body. Some ſay, that in winter, where the perſpiration of an unexerciſed perſon is only equal to the urine, the diet for twenty-four hours ought not to exceed four pounds, or four pounds and a half. In ſummer, the diet may be ſix pounds and a half, which may be carried off without the help of exerciſe, when the air is hot and dry.

Dr. Bryan Robinſon thinks, that if the quantity of *food* be ſuch as to make the perſpiration and urine of a natural day always nearly equal, and the morning weight of the body always nearly the ſame, that quantity is the truly healthful quantity of *food* for grown bodies, which uſe but little exerciſe.

The quantity of *food* neceſſary to keep a grown body in health, will be better and more eaſily digeſted, when it is ſo divided as to make the meats equal, than when they are very unequal. The diſtance between one meal and another ſhould bear ſome proportion to the largeneſs of the preceding meal.

The ſame author thinks, that good and conſtant health conſiſts in a juſt quantity of *food*, and a juſt proportion of the meat to the drink; and that to be freed from chronical diſorders contracted by intemperance, the quantity of *food* ought to be leſſened, and the proportion of the meat to the drink increaſed more or leſs, according to the greatneſs of the diſorders; and that both the quantity of *food*, and the proportion of meat to drink, ought to be ſuch as ſhall make perſpiration and urine nearly equal at all ſeaſons of the year. See his Diſſert. on the Food and Diſcharge of Human Bodies, p. 6.

Food *of plants*. What is generally underſtood by this term, is ſuch matter, of whatever kind, as being added and united to the firſt ſtamina of plants or plantulæ, at their ſowing, or to their roots, and thence to their trunks and other parts afterwards, gives them their increaſe, or, in other words, is itſelf the matter of that increaſe. The great art of the huſbandman is the giving this *food* to plants, in the beſt manner, and to the greateſt advantage. But before he can expect to arrive at any true knowlege in this article, it is neceſſary that he ſhould know what this *food* or matter of nouriſhment is. There are five things generally allowed to contribute to the growth and increaſe of plants; theſe are nitre, water, air, fire, and earth; but it has been much diſputed which of all theſe it is that increaſes, or is properly the *food* of the plant. Many people ſay much of the acid ſpirit reſiding in the air; but as this is ſharp enough to corrode iron bars, it is too ſharp to be fit for nouriſhing tender plants. As to nitre, it is ſaid to nouriſh them; but its true office is not actually nouriſhing, but preparing other things to nouriſh them. Nitre applied to the root of a plant will kill it; but at a diſtance, ſo attenuates, cuts and divides the viſcous matters found in the earth, that after this they are fit to nouriſh plants, though they were not ſo before. Water has been thought by ſome the only *food* of plants; but Van Helmont's famous experiment, uſually brought to prove this, is nothing, for the water contains earth, and therefore is never given to a plant as water alone.

Air, becauſe of its elaſticity, is neceſſary to the increaſe of plants, but it is not that increaſe, though Bradley and others have taken great pains to prove that it is ſo. As to fire, we are very well aſſured indeed, that no plant can live without heat; but though different degrees of it are neceſſary to different plants, yet none can live in actual fire; nor has fire ever been thought the food of plants, except by Mr. Lawrence, and ſome of the metaphyſicians. This author indeed ſays, plants are true fire-eaters, and others explain away the meaning of the phraſe, by defining that fire to be only the minuteſt particles of earth put in motion; if this be the caſe, probably enough the doctrine may be true. But in plain fact, earth alone is the true *food* and matter of increaſe of plants. Every plant is earth, and the growth and increaſe of that plant is only the addition of more earth to it, in the ſame form. Nitre and other ſalts, as thoſe of dung, &c. prepare, attenuate, and divide the earth, deſtined for the increaſe of vegetables; water and air move it by conveying, and fermenting it in the juices; but earth itſelf ſtill is the *food*. When the additional earth is once aſſimilated to the plant, it becomes a part of it, and remains for ever with it; but let water, air, and heat, be taken away, and the plant remains a plant ſtill, though a dead one.

The exceſs of the other things proves, that they are not the proper *food* of the plant, by deſtroying not nouriſhing it. Too much nitre or other ſalts corrode and kill the plant, too much water drowns it, too much air dries the roots of it, too much heat burns it; but too much earth a plant can never have, unleſs wholly buried under it, ſo as to exclude the neceſſary action of the reſt of the aſſiſtant articles. See Plants.

FOOL, according to Mr. Locke, is one who makes falſe concluſions from right principles; by which he is diſtinguiſhed from a madman. See Folly.

Dr. Willis relates, that, upon diſſecting a *fool*, the principal differences found between him and a man of ſenſe, were, that the brain was ſmâller; and that the cervical plexus, formed of the intercoſtal nerve, whereby the correſpondence between the brain and heart is effected, was leſs, and ſent forth fewer branches to the heart, &c. Nervor. Deſcript. & Uſ. cap. 26.

Fool's *ſtones*, in *Botany*. See Orchis.

FOOT, a part of the body of moſt animals, whereon they ſtand, walk, &c.

Animals are diſtinguiſhed, with reſpect to the number of *feet*, into bipedes, q. d. *two-footed*; ſuch are men and birds; quadrupedes, q. d. *four-footed*; ſuch are moſt land animals; and multipedes, q. d. *many-footed*; as inſects. The reptile kind, as ſerpents, &c. have no feet.

Lobſters have twelve *feet*; ſpiders, mites, and polypuſes, eight; flies, graſhoppers, and butterflies, have ſix *feet*. Galen has ſeveral good obſervations on the wiſe adjuſtment of the number of *feet* in men and other animals, in his book De Uſu Part. lib. iii.

The *fore-feet* of the mole are admirably formed to dig, and ſcratch up, the earth, and make way for its head, &c. in water fowls, the legs and *feet* are excellently adapted to their reſpective occaſions, and manners of living; in ſuch as are to wade in rivers, the legs are long, and bare of feathers a good way above the knee; their toes alſo are broad; and in ſuch as bear the name of *mudſuckers*, two of the toes are ſomewhat alated, that they may not eaſily ſink in walking upon boggy places.

Others, which are to ſwim, are *whole-footed*; i. e. have their toes webbed together; as in the gooſe, duck, &c. and it is pretty enough to obſerve, how artfully theſe will gather up their toes and *feet*, when they withdraw their legs, or go to take their ſtroke in ſwimming; and again expand, or open, the whole *foot*, when they preſs upon, or drive themſelves forward in the water.

Foot, in *Anatomy*. The *great foot* denotes the whole extent from the jointure of the hip to the tip of the toes; as the great hand does the whole from the ſhoulder to the fingers ends.

The *pes magnus*, or *great foot*, is divided into the thigh, the leg, and the *foot* properly ſo called.

Its bones are, the femur, or thigh-bone; the TIBIA, the PATELLA, and FIBULA, for the leg; and thoſe of the *tarſus*, *metatarſus*, and toes.

Its arteries are branches of the crural artery, and its veins terminate in the crural vein. Of theſe there are five principal ones; viz. the SAPHÆNA, great and little iſchiadic, the MUSCULUS, POPLITEA, and SURALIS.

Foot, properly ſo called, or the *leſſer foot*, denotes only the extremity of the leg, conſiſting of three parts; viz. the *tarſus*, the ſpace from the ankle to the body of the *foot*, anſwering to the wriſt in the hand; *metatarſus*, the body of the *foot* to the toes, and *digiti*, or toes. Each of theſe parts conſiſt of a great number of bones; as the *calx*, *talus*, *cuneiformia*, and *cuboides*. The bottom of all is called the ſole, or *planta pedis*. See Talus, &c.

Foot, *cartilages of the*. The *aſtragalus* is covered by three cartilages; the firſt covers the three ſurfaces which make the convex part and ſides of the pully; the ſecond the concave ſurface of its inferior part, and the third the convex ſurface of its inferior part, being continued over the inferior part, ſo far as to form three other ſmall ſurfaces; one of which is not articular in a ſtrict ſenſe. The firſt of theſe cartilages is for the articulation of this bone with the *tibia* and *fibula*, the ſecond for the *os calcis*, and the third for the *os ſcaphoides*; two of the inferior ſurfaces formed by the continuation of the third cartilage, are for the articulation of this bone with the *os calcis*; and the third contributes to the formation of a channel for the paſſage of a tendon.

The *os calcis* has four cartilages, of which three are ſuperior, one large, and two ſmall, for its triple articulation with the *aſtragalus*; the fourth is anterior for the *os cuboides*. And to theſe muſt be added a ſmall thin cartilage of a kind of ligamentary ſubſtance, under the tubercle, on the outſide of this bone. The *os ſcaphoides* has two cartilages; one poſterior, for its articulation with the *aſtragalus*, and one anterior, divided into three parts, for the three *oſſa cuneiformia*.

The *os cuboides* has two remarkable cartilages, one poſterior, for its articulation with the *os calcis*; the other anterior, lying in two planes, for its articulation with the two laſt metatarſal bones; it has likewiſe a cartilage on the inſide for the *os cuneiforme*, which is next to it, and one on the lower part, covering an oblique eminence ſituated there.

The three *oſſa cuneiformia* have each of them a poſterior cartilage for their articulation with the *os ſcaphoides*, and one anterior for the three firſt metatarſal bones; they have likewiſe ſmall cartilaginous ſurfaces on their lateral ſides for their articulation with each other; and beſides, the firſt and third bones are joined thereby to the lateral parts of the baſis of the ſecond metatarſal bone, and the third to the *os cuboides*. The baſes and heads of the metatarſal bones are covered with cartilages. The phalanges alſo have, in the ſame manner, cartilages at their baſes and heads, except at the heads or extremities of the laſt. The ſeſamoide bones are covered with cartilages on that ſide, by which they ſlide on other bones; but great caution is required not to confound the remains of tendons, ligaments, and aponeuroſes, with the true cartilages, particularly on the poſterior part of the *os calcis*. Winſlow's Anatomy, vol. i. p. 132, &c.

Foot, *ligaments of the*. The *foot* being made up of many bones, muſt neceſſarily, beſide thoſe ligaments, by which it is tied to the bones of the leg, have ſeveral others to connect not only the three parts of which it is compoſed, but alſo the particular bones of each part to one another. In each ankle there are three ligaments for their articulations with the *foot*; one anterior, one middle, and one poſterior. The ligaments of the inner ankle are all fixed to the inſide of the *aſtragalus*; the anterior and middle ligaments of the outer ankle are more or leſs broad, and are fixed in the outſide of the *aſtragalus*, the poſterior, which is the narroweſt, and pretty thick, is chiefly fixed in the outſide of the great portion of the *os calcis*. All theſe ligaments lie on the outſide of the capſula, which ſurrounds the articulation of the *aſtragalus* with the bones of the leg. The ligaments by which the bones of the tarſus are connected to one another, are ſhort, flat, of different breadths, and run from one bone to another, in different directions. Some of theſe are common to ſeveral bones, and others belong only to two. The *aſtragalus* is tied to the other bones of the tarſus by ſeveral true ligaments; to the inſide of the *os calcis*, by one which comes from the lateral *apophyſis* of the *os calcis*, in an inequality on its hinder part, and is fixed again to the poſterior internal tuberoſity of the body of the *aſtragalus*, to the outſide of the ſame bone, by two ligaments which come from the edge of the oblique inferior depreſſion of the *aſtragalus*, and afterwards ſeparating a little, are fixed in the outſide of the great *apophyſis* of the *os calcis*, one forward, which ſeems to ſend off a ſmall portion to the *os cuboides*, and the other backward, of different breadths; to the *os ſcaphoides* ſuperiorly by a ligament, which goes from the neck of the *aſtragalus*, to the upper part of that bone, and from thence is extended to the middle of the *os cuneiforme*; to the ſame bone internally by two ligaments, one of which is a continuation of that which goes from the lateral *apophyſis* of the *os calcis* to the cartilaginous production of the *aſtragalus*; the other is near the ſame production, being partly covered by the former, and fixed in the tuberoſity of the *os ſcaphoides* to the *os calcis*, by a ligament which comes from the oblique inferior depreſſion of the *aſtragalus*, and is fixed in the oblique ſuperior depreſſion of the *os calcis*; and to theſe the principal ligaments of the *aſtragalus*, ſeveral ſmaller may be added, which are uſually ſeen, and increaſe the number very greatly.

The capſular ligaments go very little farther than the edges of the articulations of this bone with the reſt; they adhere very cloſely to the true ligaments, and are covered and hid by them. The *os calcis* is connected to the *os ſcaphoides*, by a continuation of the ligament that goes from its lateral internal *apophyſis* to the cartilaginous production of the *aſtragalus*, by a ligamentary plane, which goes from its great *apophyſis*, to the inferior part of the *ſcaphoides*; and by a narrower ligament, which goes from the ſuperior internal part of its great *apophyſis*, and ends in the neareſt part of the circumference of the *ſcaphoides*. It is connected to the *os cuboides* by ſeveral ligamentary *faſciculi*, which go from its extremity in its ſuperior oblique depreſſion, to the contiguous angle of the *os cuboides*; by one from near the lateral external tuberoſity of the *os calcis*, to a part of the *cuboides* near the former; by one fixed to the exterior and inferior part of the great *apophyſis* of the *os calcis*, to the contiguous part of the *cuboides*; by a pretty broad plane, which covers the inferior part of the *os calcis*, and ends in the oblique eminence of the *cuboides*; and by a broader plane, which, filling the lower part of the lateral concavity in the *os calcis*, is chiefly inſerted in the contiguous angle of the *os cuboides*. The capſular ligaments agree with thoſe of the *aſtragalus*.

The *os ſcaphoides* is tied to the *os cuboides* on its outſide by one ligament, which connects it to the contiguous angle of that bone: on its upper part two go from it to the ſecond and third *oſſa cuneiformia*; on its interior ſide it is joined to the convex ſide of the great *os cuneiforme* by two ligaments, and on its lower, it has four; the firſt appears double, and goes from the tuberoſity of this bone to the baſis of the firſt *os cuneiforme*; the ſecond and third go obliquely to the ſecond and third *os cuneiforme*; and the fourth is a little tranſverſe, being fixed in the inferior internal angle of the *os cuboides*.

The *os cuboides*, beſide thoſe already deſcribed, has ligaments which tie it above, below, and on the outſide, with the third *os cuneiforme*, and the two laſt bones of the metatarſus; the ſuperior ligaments are almoſt equally flat, the inferior irregularly thick, and ſtronger than the ſuperior. The three *oſſa cuneiformia* are connected together on their upper part by particular ligamentary planes, which go more or leſs tranſverſely, from one bone to another, being all joined to one common ligamentary plane which covers theſe three bones, and alſo the *os cuboides*; they are alſo connected by ligaments to the three firſt bones of the metatarſus.

The bones of the metatarſus are connected together by their baſes and heads; the ligaments which go between the baſes are ſuperior and inferior. The ſuperior ſmall and flat, the inferior ſtrong and thick; thoſe between their heads have nearly the ſame diſpoſition, but the inferior have this peculiar to them, that by filling up the ſpaces between the heads, they keep them at ſome diſtance from one another; the inferior portions are fixed in the angles at the lower part of each head, and are ſtrengthened by their union and intertexture with the *aponeuroſis plantaris*. Winſlow's Anatomy, vol. i. p. 134, &c.

Feet, *bathing of the*. The uſes of warm bathing in general, and of the *pediluvium* in particular, are ſo little underſtood, that they are often prepoſterouſly uſed, and ſometimes as injudiciouſly abſtained from.

In the Medical Eſſays of Edinburgh, we find an ingenious author's opinion of the warm *pediluvium*, notwithſtanding that of Borelli, Boerhaave, and Hoffman, to the contrary, to be, that the legs becoming warmer than before, the blood in them is warmed; this blood rarifying, diſtends the veſſels; and in circulating imparts a great degree of warmth to the reſt of the maſs; and as there is a portion of it conſtantly paſſing through the legs, and acquiring new heat there, which heat is, in the courſe of circulation, communicated to the reſt of the blood; the whole maſs rarifying, occupies a larger ſpace, and of conſequence circulates with greater force. The volume of the blood being thus increaſed, every veſſel is diſtended, and every part of the body feels the effects of it; the diſtant parts a little later than thoſe firſt heated. The benefit obtained by a warm *pediluvium* is generally attributed to its making a derivation into the parts immerſed, and a revulſion from thoſe affected, becauſe they are relieved; but the cure is performed by the direct contrary method of operating, viz. by a greater force of circulation through the parts affected, removing what was ſtagnant, or moving too ſluggiſhly there. Warm bathing is of no ſervice where there is an irreſoluble obſtruction, though, by its taking off from a ſpaſm in general, it may ſeem to give a moment's eaſe; nor does it draw from the diſtant parts, but often hurts by puſhing againſt matter that will not yield with a ſtronger impetus of circulation than the ſtretched and diſeaſed veſſels can bear; ſo that where there is any ſuſpicion of ſchirrhus, warm bathing of any ſort ſhould never be uſed. On the other hand, where obſtructions are not of long ſtanding, and the impacted matter is not obſtinate, warm baths may be of great uſe to reſolve them quickly. In recent colds, with ſlight humoral peripneumonies, they are frequently an immediate cure. This they effect by increaſing the force of the circulation, opening the ſkin, and driving freely through the lungs that lentor which ſtagnated or moved ſlowly in them. As thus conducing to the reſolution of obſtructions, they may be conſidered as ſhort and ſafe fevers; and in uſing them we imitate nature, which by a fever often carries off an obſtructing cauſe of a chronical ailment. Borelli, Boerhaave, and Hoffman, are all of opinion, that the warm *pediluvium* acts by deriving a larger quantity of blood into the parts immerſed. But arguments muſt give way to facts: the experiments related in the Medical Eſſays ſeem to prove to a demonſtration, that the warm *pediluvium* acts by rarifying the blood.

A warm *pediluvium*, when rightly tempered, may be uſed as a ſafe cordial, by which circulation can be rouſed, or a gentle fever raiſed; with this advantage over the cordials and ſudorifics, that the effect of them may be taken off at pleaſure. Med. Eſſ. Edinb. abr. vol. i. p. 237, &c.

Pediluvia are ſometimes uſed in the ſmall-pox; but Dr. Stevenſon thinks their frequently tumultuous operations render that ſuſpected, and at beſt of very doubtful effect; and he therefore prefers Monſ. Martin of Lauſanne's method of bathing the ſkin, not only of the legs, but of the whole body, with a ſoft cloth dipped in warm water, every four hours, till the eruption; by which means the puſtules may become univerſally higher, and conſequently more ſafe. Med. Eſſ. abr. ib. p. 248.

Foot, *bleeding in the*. Bleeding in the *foot* is an operation of very old ſtanding, and has been uſed by the oldeſt phyſicians, for diſorders of the head and breaſt, and for obſtructions of the menſtrual, and habitual diſcharges by the hæmorrhoidal veins. It has been of old ſuppoſed, that the bleeding from the ſaphæna was more particularly ſerviceable in ſome caſes, and from the cephalica in others; but this is now known to be highly erroneous, and the ſurgeon is always to take that which lies faireſt and moſt conſpicuous. If the veins on the metatarſus or inſtep do not appear ſo fairly as might be wiſhed, it is common to take one of thoſe about the ankle, or the calf of the leg or ham.

The patient to be blooded in the *foot*, muſt firſt keep both *feet* ſome time in warm water, that the veins may become turgid, and the ſurgeon have his choice which he will take. Having fixed upon the proper *foot*, the ligature muſt be made about two fingers breadth above the ankle, and the patient muſt then return the *foot* into water. The ſurgeon is to kneel on one knee, and having wiped the *foot* dry, to put it either againſt his other knee, or upon a board placed over the veſſel of hot water, and the vein muſt be held ſecure from ſlipping away, with the left hand, while the orifice is made with the other. If the blood does not flow freely, the *foot* muſt be returned into the warm water, till by the colour of the water, ſtrength of the patient, &c. it is found to have bled enough. Heiſter's Surgery, p. 280.

Feet, *fractures of the*. The bones of the *foot* which compoſe the tarſus, the metatarſus, and toes, are equally liable to fractures with the other bones, but on account of the great complication of nerves, tendons, ligaments, and membranes, fractures in this part are uſually attended ed with very bad ſymptoms. The bones are carefully to be replaced and ſecured by bandage; but fractures of the *feet*, like thoſe of the hands, can ſeldom be ſo perfectly cured, as not to leave a ſtiffneſs or want of motion behind; if the patient ſhould be ſo happy as to eſcape ulcers, caries, or incurable fiſtulæ. Theſe bad ſymptoms, when they appear in the courſe of the cure, are no way to be remedied but by the amputation of the limb; nor will that indeed always ſecure the patient from death. Heiſter, p. 138.

Dr. Waltherus has given a minute deſcription of the muſcles and ligaments of the ſole of the *foot*, in the Nova Act. Erudit. Lipſ. April, 1732.

Foot, in the *Manege*, is the extremity of a horſe's leg, from the cornet to the lower part of the hoof. The four *feet* are diſtinguiſhed by four different names: the two *fore-feet* are by ſome called the hands of a horſe; but that term is in diſuſe, the common expreſſion being the *far fore-foot*, to denote the right *foot* before; and the *near fore-foot*, the *ſtirrup-foot*, and the *bridle-hand foot*, to denote the left *foot* before.

Of the two hinder *feet*, the right is called the *far hinder-foot*; and when ſpears were uſed, it was called the *ſpear-foot*, becauſe in reſting the ſpear, the ſocket of it anſwered the right hinder *foot*. The left hind *foot* is called the *near foot behind*.

Foot-*derobé*, in the *Manege*. A horſe's *foot* has this appellation when it is worn and waſted by going without ſhoes, ſo that for want of a hoof, it is a hard matter to ſhoe him.

A horſe's *foot* is ſaid to be worn and waſted, called in French *uſé*, when he has but little hoof, and not enough for ſhoeing.

Foot, *to gallop upon a good*, or put a horſe upon a good *foot*, called in French *ſur le bon pied*. See *Falſe* Gallop.

Foot, *fat*, in the *Manege*. A horſe is ſaid to have a *fat foot*, when the hoof is ſo thin and weak, that unleſs the nails be driven very ſhort, he runs the riſque of being pricked in ſhoeing. The Engliſh horſes are very ſubject to this diſorder.

Foot, in the *Military Art*, is uſed for the *foot* ſoldiers, or the INFANTRY of an army.

Foot, in the *Greek* and *Latin Poetry*, denotes a metre, or meaſure, compoſed of a certain number of long and ſhort ſyllables.

The ſpondee, iambic, trochee, and pyrrhic, are diſyllabic *feet*; i. e. they conſiſt of two ſyllables each; the dactyl, anapæſt, moloſſus, tribrach, bacchius, antibacchius, amphibrachys, and creticus, are triſyllabic, or conſiſt of three ſyllables each; the proceleuſmaticus, choriambus, and epitrite, are quadriſyllabic, or compoſed of four ſyllables. See each under its proper head, Spondee, Iambic, &c.

There are alſo other *feet*, invented by grammarians, of five, ſix, or more ſyllables; but they are not worth the reciting.

Hexameter verſes conſiſt of ſix *feet*; pentameters, only of five.

Foot, *even and odd*, par and impar. In poetry, and, particularly, in iambic verſes, *feet* are denominated *odd* and *even*, in reſpect of their ſituation in the verſe. Thus, the firſt, third, and fifth, *foot* of the verſe, are uneven; becauſe thoſe numbers are not capable of being divided into two equal parts.

In the ancient tragedy, the iambic verſes, which prevailed therein, only allowed uneven *feet* to the ſpondees; ſo that the ſecond, the fourth, and ſixth, *feet*, were to be iambics, becauſe they were even. This regular mixture of ſpondees in the uneven *feet*, rendered the verſe the more ſolemn and noble.

The comic poets, the better to diſguiſe their verſe, and make it more like proſe, took the contrary courſe; putting ſpondees, where the tragic poets would only have allowed iambics.

Foot is alſo a long meaſure, conſiſting of twelve inches.

The *foot* long is divided into twelve inches, and the INCH into barley-corns.

Geometricians divide the *foot* into ten digits, and the digit into ten lines, &c.

The French divide their *foot*, as we do, into twelve inches; and the inch into twelve lines.

The *foot* ſquare is the ſame meaſure, both in length and breadth, containing 144 ſquare, or ſuperficial inches.

The cubic, or ſolid *foot*, is the ſame meaſure in all the three dimenſions, containing 1728 cubic inches.

The *foot* is of different lengths, in different countries. The Paris royal *foot* exceeds the Engliſh by nine lines and a half; the ancient Roman *foot* of the Capitol conſiſted of four palms; equal to eleven inches and ſeventenths Engliſh; the Rhinland, or Leyden *foot*, by which the northern nations go, is to the Roman *foot*, as 950 to 1000. The proportions of the principal *feet* of ſeveral nations, compared with the Engliſh and French, are here ſubjoined.

The Engliſh *foot* being divided into one thouſand parts, or into twelve inches, the other *feet* will be as follow:

		Th. Pts.	F.	Inch.	Li.
London - -	Foot	1000	0	12	0
Paris foot, the royal, by Greaves		1068	1	0	9.7
Paris foot, by Dr. Bernard		1066	1	0	1
Paris foot, by Graham, from the meaſure of half the toiſe of the Chatelet, the toiſe containing ſix Paris feet -		1065.41⅔			
By Monnier, from the ſame data - - -		1065.351			
From both theſe it may be fixed at - - -		1065.4	1	0	9.4
Amſterdam - -	Foot	942	0	11	3
Antwerp - -	Foot	946	0	11	2
Dort - - -	Foot	1184	1	2	2
Rhinland, or Leyden -	Foot	1033	1	0	4
Lorrain - -	Foot	958	0	11	4
Mechlin - -	Foot	919	0	11	0
Middleburg - -	Foot	991	0	11	9
Straſbourg - -	Foot	920	0	11	0
Bremen - -	Foot	964	0	11	6
Cologn - - -	Foot	954	0	11	4
Francfort on the Mayn	Foot	948	0	11	4
Spaniſh - -	Foot	1001	0	11	0
Toledo - -	Foot	899	0	10	7
Roman - -	Foot	967	0	11	6
Bononia - -	Foot	1204	1	2	4
Mantua - -	Foot	1569	1	6	8
Venice - -	Foot	1162	1	1	9
Dantzick - -	Foot	944	0	11	3
Copenhagen -	Foot	965	0	11	6
Prague - -	Foot	1026	1	0	3
Riga - - -	Foot	1831	1	9	9
Turin - -	Foot	1062	1	0	7
The Greek - -	Foot	1007	1	0	1
Old Roman - -	Foot	970			
Roman *foot*, from the monument of Coſſutius in Rome, by Greaves - - -		967			
From the monument of Statilius, by the ſame - -		972			
Of Villalpandus, deduced from the congius of Veſpaſian		986			

Mr. Raper, who has induſtriouſly collected a variety of authorities relating to the meaſure of the old Roman *foot*, determines the mean to be nearly 968 thouſandth parts of the London *foot*. And by an examination of the ancient Roman buildings in Deſgodetz's Edifices Antiques de Rome, Paris, 1682, he concludes, that the Roman *foot* before the reign of Titus exceeded 970 parts in 1000 of the London *foot*; and in the reigns of Severus and Diocleſian fell ſhort of 965. Phil. Tranſ. vol. li. art. 69. p. 774, &c.

The Paris *foot* being ſuppoſed to contain 1440 parts, the reſt will be as follow:

Paris - - -	Foot	1440
Rhinland - -	Foot	1391
Roman - -	Foot	1320
London - -	Foot	1350
Swediſh - -	Foot	1320
Daniſh - -	Foot	1403
Venetian - -	Foot	1540⅔
Conſtantinopolitan -	Foot	3120
Bononian - - -	Foot	1682⅖
Straſbourg - -	Foot	1282¾
Norimberg - -	Foot	1346¼
Dantzick - -	Foot	1721½
Hall - - -	Foot	1320

In Scotland, this MEASURE of length, though conſiſting of twelve inches, exceeds the Engliſh *foot*, ſo that 185 of the former is equal to 186 of the latter.

Foot-*bank*, or **Foot**-*ſtep*, in *Fortification*. See Banquette.

Foot *of the foreſt*, *pes foreſtæ*, in our *Ancient Cuſtoms*, contained 18 inches, or 1½ of the common *feet*. *Notandum eſt, quod* pes foreſtæ *uſitatus tempore Ric. Oyſell, in arrentatione vaſtorum, factus eſt, ſignatus & ſculptus in pariete cancellæ eccleſiæ de Edwynſtone, & in eccleſiæ Beatæ Mariæ de Nottingham: Et dictus* pes *continet in longitudine octodecim pollices*, &c. Ex Regiſt. Abb. de Novo. Loco in Com. Nott.

Foot, *fore*. See Fore-*foot*.

Foot-*geld* was an ancient amercement, for not cutting out the balls of the feet of great dogs in the foreſt; to prevent their running after the king's deer.

FOOT-*guards*. See GUARDS.

FOOT-*hooks*, in a *Ship*. See FUTTOCKS.

FOOT, *horary*. See *Univerſal* MEASURE.

FOOT-*huſks*, among *Gardeners*, are the ſhort heads out of which flowers grow. See CALYX.

FOOT *of a ſail*, denotes the lower edge or bottom.

FOOT-*level*, an inſtrument which ſerves to do the office both of a level, a ſquare, and a *foot* rule.

The *foot level*, repreſented *Tab. Surveying*, *fig.* 15. conſiſts of two branches, about an inch broad; opening and ſhutting like a two-foot rule.

Theſe branches are hollowed half way up the ſide of each to receive a kind of tongue, or thin piece of braſs, which is faſtened to one of them, by means whereof the branches may be ſhut cloſe together. The uſe of this tongue is ſuch, that when the end of it is placed in the branch it is not faſtened to, where there is a pin that holds it, the two branches will ſtand at right angles; to the head of the inſtrument is likewiſe added a ſquare piece of braſs; by means whereof it does the office of a ſquare. At the bottom of the angle of the ſaid piece of braſs is a little hole, wherein is faſtened a line with a plumbet; which falling on a perpendicular line drawn on the tongue, ſhews whether any thing the inſtrument is applied to, be level or not. See LEVEL.

FOOT, *lieutenant colonel of*. See LIEUTENANT.

FOOT-*pace*, *half-pace*, or *landing-place*. See STAIR-*caſe*.

FOOT-*rule*. See RULE.

FOOT-*ropes*, are thoſe to which the *foot* of the ſail is ſewed. They are alſo the ſame with the horſes of the yards. See HORSE.

FOOT-*waleing* denotes the whole inſide planks or lining of a ſhip, uſed to prevent any part of the ballaſt or cargo from falling between the floor-timbers.

FOP, probably derived from the *vappa* of Horace, applied in the firſt ſatire of his firſt book to the wild and extravagant Nævius, is uſed among us to denote a perſon who cultivates a regard to adventitious ornament and beauty to exceſs.

FORAGE. See FORRAGE.

FORAMEN, in *Anatomy*, a name given to certain holes, or perforations, in divers parts of the body; as the

FORAMEN *auditorium internum*, which is ſituate in the backſide of the *apophyſis petroſa*, in ſome meaſure behind the *veſtibulum* and baſis of the *cochlea*. It is a kind of blind hole divided into two foſſulæ, one large, the other ſmall; the large one lies loweſt, and ſerves for the *portio mollis* of the auditory nerve, or ſeventh pair; the ſmall one is uppermoſt, and is the opening of a ſmall duct, through which the *portio dura* of the ſame nerve paſſes. The inferior foſſula is full of little holes, which in the natural ſtate are filled with nervous filaments of the *portio mollis*, which go to the ſpindle, to the ſemicircular canals, and to thoſe of the *cochlea*. It is this foſſula which forms that ſhallow cavity at the baſis of the ſpindle of the *cochlea*. The paſſage of the *portio dura* of the auditory nerve runs behind the tympanum, and its orifice is the ſtylomaſtoide hole. Fallopius gave this duct the name of the aqueduct, from its reſemblance to the aqueducts in Italy. It begins by the ſmall foſſula, and pierces from within outwards, the upper part of the *apophyſis petroſa* making there an angle or curvature; from thence it is inclined backward behind the ſmall pyramid of the tympanum, and runs down to the ſtylomaſtoide hole, through which it goes out. It communicates likewiſe by a ſmall hole with the ſinus of the pyramid, and lower down by another hole with the barrel of the ear. In ſome ſkulls this aqueduct of Fallopius is open on the upper part of the *apophyſis petroſa*, a kind of break appearing in it, formed by a double hole. It is at this place that it makes the angle already mentioned, but it is commonly covered with a bony lamina. Winſlow's Anat. p. 52.

FORAMEN *lacerum*. See DURA *Mater*.

FORAMEN *of the membrana tympani*, is a perforation in the membrane of the tympanum, or drum in the ear; which admits of the paſſage of wind, ſmoke, &c. from the *meatus a palato* to the drum.

This paſſage is very ſmall, and runs obliquely from the tympanum through the upper part of its membrane, near the proceſs of the malleus. The exiſtence of this perforation is more evident, when ulcers affect the palate, by the egreſs of wind upon the patient's ſtopping his noſe and mouth, and forcing the wind by the ears, than by any anatomical inſpection.

FORAMEN *ovale*, or FORAMEN *Botalli*, an oval aperture or paſſage through the heart of a fœtus, which cloſes up after birth. See *Tab. Anat. (Splanch.) fig.* 12. *lit. g.*

It riſes above the coronary vein, near the right auricle; and paſſes directly into the left auricle of the heart.

The *foramen ovale* is one of the temporary parts of the fœtus, wherein it differs from an adult. It ſerves for the circulation of the blood in the fœtus, till ſuch time as the infant breathes, and the lungs are opened.

Its uſe was firſt exactly deſcribed by Leon. Botallus of Aſti in Piedmont, in the year 1562, who, tracing the courſe and paſſage of the blood, aſſerted the *foramen ovale* to be that opening whereby the blood in fœtuſes was conveyed from the right ventricle to the left.

The modern anatomiſts have admitted the diſcovery; and the *foramen ovale* is now generally allowed a part neceſſary in the ſyſtem of the circulation of the blood in the fœtus. The different hypotheſes relating to this ſubject by Harvey, Mery, and Wolff, may be found under the articles BLOOD and FOETUS.

At the aperture of the *foramen* there is a kind of floating membrane, which looks like a valve; but it has nothing of the office thereof; it does not hinder the blood from paſſing from either auricle to the other. All it ſerves for, according to Mr. Winſlow, is, to cloſe the *foramen* after the birth.

It has generally been thought, that the *foramen ovale* may ſometimes remain open, even in adults; and, in effect, divers authors furniſh us with inſtances thereof. See Phil. Tranſ. N° 460. § 5.

Dr. Connor aſſures us, he found it but half cloſed in a girl of four or five years old; and in another girl, which he opened at Oxford, there was room left to thruſt a tent through. Diſſert. Med. Phyſ. de Stup. Of. Coal.

The accurate Mr. Cowper adds, that he has often found the *foramen ovale* open in adults. Anat. Append. *fig.* 3.

And the Paris anatomiſts obſerve, that in a ſea-calf the *foramen ovale* is always open; by which means it is enabled to ſtay ſo long under water.

Somewhat of this, too, is ſuppoſed to have been the caſe in the extraordinary recoveries of divers perſons drowned, hanged, &c. See DROWNING.

But Mr. Cheſelden ventures to ſet aſide all theſe authorities; and contends, that the *foramen ovale* is neither open in any adult land-animals, nor in amphibious creatures.

When he firſt applied himſelf to diſſection, he tells us, he had no diſtruſt of the frequent accounts in authors of the *foramen* being open; but he afterwards found, that he himſelf often miſtook the oſtium of the coronary veins for the *foramen*; and the like he imagines other authors to have done; who aſſert, that it is always open in amphibious animals; for that, upon a diligent inquiry into theſe animals, he could never find it open in any of them.

Neither does he think that ſufficient to enable thoſe creatures to live under water, as the FOETUS does *in utero*; unleſs the *ductus arterioſus* were open alſo. Cheſel. Ap. Der. Phyſ. Theol. lib. iv. cap. 7.

FORCE, *Vis*, or *Power*, in *Mechanics*, *Philoſophy*, &c. See VIS, and POWER.

Whenever a body, which was at reſt, begins to move, or has a motion which is either not uniform, or not direct, the cauſe of this change in the ſtate of the body is called *force*.

While a body remains in the ſame ſtate, either of reſt, or of uniform and rectilinear motion, the cauſe of its remaining in ſuch a ſtate, is in the nature of the body, and it cannot be ſaid, that any extrinſic *force* has acted on it. This internal cauſe or principle is called *inertia*.

Mechanical *forces* may be reduced to two ſorts; one of a body at reſt, the other of a body in motion.

The *force* of a body at reſt, is that which we conceive to be in a body lying ſtill on a table, or hanging by a rope, or ſupported by a ſpring, &c. and this is called by the names of *preſſure*, *tenſion*, *force*, or *vis mortua*, *ſolicitatio*, *conatus movendi*, *conamen*, &c. To this claſs alſo of *forces* we muſt refer centripetal and centrifugal *forces*, though they reſide in a body in motion; becauſe theſe *forces* are homogeneous to weights, preſſures, or tenſions of any kind.

The meaſure of this *force* is the weight with which the table is preſſed, or the rope ſtretched, or the ſpring is bent; and as to this meaſure there is no diſpute, notwithſtanding the diverſity of appellations by which it is called.

The *force of a body in motion* is on all hands agreed to be a power reſiding in that body, ſo long as it continues its motion; by means of which, it is able to remove obſtacles lying in its way; to leſſen, deſtroy, or overcome the *force* of any other moving body, which meets it in an oppoſite direction; or to ſurmount any dead preſſure or reſiſtance, as tenſion, gravity, friction, &c. for ſome time; but which will be leſſened or deſtroyed by ſuch reſiſtance, as leſſens or deſtroys the motion of the body.

This is called *moving force*, *vis motrix*, and by ſome late writers *vis viva*, to diſtinguiſh it from the *vis mortua* ſpoken of before; and by theſe appellations, however different, the ſame thing is underſtood by all mathematicians; namely, that power of diſplacing, of withſtanding oppoſite moving *forces*, or of overcoming any dead reſiſtance, which reſides in a moving body, and which, in whole or in part, continues to accompany it, ſo long as the body moves.

But about the meaſure of this ſort of *force*, mathematicians are divided into two parties. Both ſides agree, that the meaſure of this *force* depends partly upon the maſs, or weight, of the body, and partly upon its velocity; ſo that upon any increaſe of weight or velocity, the moving *force* will become greater. It is alſo agreed, that the velocity being given, or being the ſame in two bodies, their *forces* will be in proportion to their maſſes or weights.

But when two bodies are equal, and the velocities with which they move are different, the two parties no longer agree about the meaſure of the moving *force*.

The Newtonians and Carteſians maintain, that the moving *force* is in proportion to the velocity with which the bodies move. But the Leibnitians aſſert, that the moving *force* is in proportion to the ſquare of the velocity; ſo that if the velocity of a moving body be double, triple, quadruple, &c. of that of another equal body, the *force* of the former will be four times, nine times, ſixteen times as great as that of the latter. See Dr. Jurin, in Phil. Tranſ. N° 476.

Hence the Newtonians allege, that the momentum or moving *force* of bodies is in the compound ratio of their weights and velocities; and the Leibnitians, that it is in the compound ratio of their weights, and the ſquares of the velocities. If we allow the diſtinction, already ſtated, between the *vis viva* and the *vis mortua*, they appear, by the moſt familiar experiments with the balance, and other mechanical powers, to be in the ſimple proportion of the velocity multiplied into the maſs; e. gr. four pounds being placed at the diſtance of ſix inches from the center of motion of a balance, and two pounds at the diſtance of twelve, will have a *vis viva*, if the balance be put into a ſwinging motion. Theſe *forces* appear to be equal, becauſe, with contrary directions, they ſoon deſtroy each other; but they are to one another in the ſimple ratio of the velocity multiplied into the maſs, viz. $4 \times 6 = 24$, and $2 \times 12 = 24$. Whereas if the *forces*, in this caſe, had been as the maſs into the ſquare of the velocity, the weight 2 placed at near $8\frac{1}{2}$ inches would have deſtroyed the motion of the weight 4 at ſix inches diſtance, and have reduced it to an equilibrium; i. e. $6 \times 6 \times 4 = 144$; and 8.426, &c. × 8.426, &c. $\times 2 = 144$. With regard to the *vis mortua*, it is plain, that 2 at the diſtance 12 keeps 4 in equilibrio at the diſtance 6; and the leaſt alteration either of weights or diſtances will deſtroy the equilibrium. Deſag. Exp. Phil. vol. i. p. 393.

Though Leibnitz was the firſt that expreſly aſſerted the *force* of a body in motion to be as the ſquare of its velocity, in a paper inſerted in the Leipſick Acts of the year 1686, yet Huygens has been thought to have led him into this notion, by ſome demonſtrations in the fourth part of his book De Horologio Oſcillatorio, relating to the center of oſcillation, and by his diſſertations, in anſwer to the objections of the abbot Catalan, one of which was publiſhed in 1684. This eminent mathematician had demonſtrated, that in the colliſions of two bodies, perfectly elaſtic, the ſum of the products of the bodies by the ſquares of their reſpective velocities, was the ſame after the ſhock as before; and this propoſition is ſo far general as to obtain in all colliſions of bodies that are perfectly elaſtic. It is alſo true, when bodies of a perfect elaſticity ſtrike any immoveable obſtacle, as well as when they ſtrike one another; or when they are conſtrained by any power or reſiſtance to move in directions different from thoſe in which they impel one another. Theſe conſiderations might have induced Huygens to lay it down as a general rule, that bodies conſtantly preſerve their *aſcenſional force*, that is, the product of their maſs, by the height to which their center of gravity can aſcend; and, therefore, in a given ſyſtem of bodies the ſum of the ſquares of their velocities will remain the ſame, and not be altered by the action of the bodies among themſelves, nor againſt immoveable obſtacles. Leibnitz's metaphyſical ſyſtem led him to think that the ſame quantity of action or *force* ſubſiſted in the univerſe; and finding this impoſſible, if *force* were eſtimated by the quantities of motion, he adopted Huygens's principle of the preſervation of the aſcenſional *force*, and made it the meaſure of moving *forces*. But it is to be obſerved, that Huygens's principle, above mentioned, is general only when bodies are perfectly elaſtic; and in ſome other caſes, which Mr. Maclaurin has endeavoured to diſtinguiſh; ſhewing at the ſame time that no uſeful concluſion in mechanics is affected by the diſputes concerning the menſuration of the *force* of bodies in motion, which have been objected to mathematicians. Analyſt, Query 9.

See Maclaurin's Fluxions, vol. ii. art. 533. and preceding articles. *Hæc conſtans lex eſt, corpora ſervare* vim ſuam aſcendentem, *& idcirco ſummam quadratorum velocitatum illorum ſemper manere eandem. Hoc autem non ſolum obtinet in ponderibus pendulorum & percuſſione corporum durorum, ſed in multis quoque mechanicis experimentis.* Huygen, Oper. tom. i. p. 248.

Huygens, p. 247. of the ſame book obſerves, *Quod ſæpe pereat pars motus, licet hunc in aliquo effectu edendo conſumi, affirmare non poſſumus, ut in multis caſibus percuſſionis durorum corporum—ita ut minime pro lege naturæ habendum ſit, eandem motus quantitatem ſemper conſervari, niſi alicui impendatur & conſumatur; ſed hæc conſtans lex eſt corpora ſervare vim ſuam aſcendentem*, &c. Where it is to be obſerved, that by hard bodies Huygens means ſuch as are elaſtic, as appears from his treatiſe De Motu Corporum & Percuſſione, Oper. vol. ii.

But it is to be obſerved, that though it be true, that in the colliſion of elaſtic bodies the *vis viva*, or aſcenſional *force*, is preſerved before and after the ſhock; yet during the ſhock, while the elaſtic bodies are bending, and preſs on each other, there ſeems to be a diminution of this *force*, which is afterwards reſtored by the action of their elaſticity; though the followers of Leibnitz do not allow that any *force* is loſt even during the ſhock. They ſay, the *vis viva* is communicated to the ſpring while it is bending, and then is recommunicated to the bodies by the unbending of the ſpring. They alſo deny that any *force* is loſt in the percuſſion of ſoft bodies. For though the *force* of the bodies impelling each other be diminiſhed, yet their *force* does not periſh, but is communicated to ſome other matter, ſuch as the ſubtle fluid cauſing coheſion and elaſticity. *Vis viva quæ in percuſſione amittitur, non perit, ſed conſervatur.* Wolf. Coſmol. § 486. *In toto univerſo ſemper conſervatur eadem virium vivarum quantitas.* Ibid. § 487. *Vis viva—dum figura corporum in contactu mutatur, in alia materia conſervatur.* Ibid. Demonſtr. § 486. Mr. Dan. Bernouilli, ſpeaking of this principle of the preſervation of the *vis viva*, obſerves, *Quamvis principium univerſale ſit, non tamen eſt ſine circumſpectione adhibendum, quia ſæpe contingit ut motus tranſeat in materiam alienam. Ita verbi gratia poſitio illius valet pro regulis motuum ex percuſſione eruendis, ſi modo corpora ſint perfectè elaſtica; ſed cum talia non ſunt, facile eſt videre, partem* virium vivarum *ſive* aſcenſus potentialis *in compreſſionem corporum impenſam corporibus non reſtitui, ſed materiæ cuidam ſubtili, ad quam tranſiit, impreſſam hærere.* And Mr. Daniel Bernouilli, in this treatiſe, has aſſumed the preſervation of the *vis aſcendens* of Huygens, or, as others expreſs it, the *conſervatio virium vivarum*; and, in Mr. Bernouilli's own expreſſion, *æqualitas inter deſcenſum actualem aſcenſumque potentialem*, as an hypotheſis of wonderful uſe in mechanics. But a late author contends, that the concluſions drawn from this principle are oftener falſe than true. See De Conſervat. Virium vivarum Diſſert. Lond. 1744. 4to.

Mr. Robins, in his remarks on Mr. J. Bernouilli's treatiſe, entitled, Diſcours ſur les Loix de la Communication du Mouvement, informs us, that Leibnitz adopted this opinion through miſtake; for, though he maintained that the quantity of *force* is always the ſame in the univerſe, he endeavours to expoſe the error of Des Cartes, who aſſerted, that the quantity of motion is always the ſame; and in his diſcourſe on this ſubject in the Acta Eruditorum, 1686, he ſays, that it is agreed on by the Carteſians, and all other philoſophers and mathematicians, that there is the ſame *force* requiſite to raiſe a body of one pound to the height of four yards, as to raiſe a body of four pounds to the height of one yard; but being ſhewn how much he was miſtaken in taking that for the common opinion, which would, if allowed, prove the *force* of the body to be as the ſquare of the velocity it moved with, he afterwards, rather than own himſelf capable of ſuch a miſtake, endeavoured to defend it as true; ſince he found it was the neceſſary conſequence of what he had once aſſerted; and maintained, that the *force* of a body in motion was proportional to the height from which it muſt fall, to acquire that velocity; and the heights being as the ſquares of the velocities, the *forces* would be as the maſſes multiplied by them; whereas, when a body deſcends by its gravity, or is projected perpendicularly upwards, its motion may be conſidered as the ſum of the uniform and continual impulſes of the power of gravity, during its falling in the former caſe, and till they extinguiſh it in the latter. Thus, when a body is projected upwards with a double velocity, theſe uniform impulſes muſt be continued for a double time, in order to deſtroy the motion of the body; and hence it follows, that the body, by ſetting out with a double velocity, and aſcending for a double time, muſt ariſe to a quadruple height, before its motion is exhauſted. But this proves that a body with a double velocity moves with a double *force*, ſince it is produced or deſtroyed by the ſame uniform power continued for a double time, and not with a quadruple *force*, though it ariſes to a quadruple height; ſo that the error of Leibnitz conſiſted in his not conſidering the time, ſince the velocities alone are not the cauſes of the ſpaces deſcribed, but the times and the velocities together; and yet this is the fallacious argument on which he firſt built his new doctrine; and thoſe which have been ſince much inſiſted on, and derived from the indentings or hollows produced in ſoft bodies by others falling into them, are much of the ſame kind. Robins's Tracts, vol. ii. p. 178. Maclaurin's View of Sir I. Newton's Diſcov. p. 135.

Catalan and Papin replied to Leibnitz's paper publiſhed in 1686; and from that time the controverſy became more general, and was carried on for ſeveral years by Leibnitz, John and Daniel Bernouilli, Herman, Poleni, Wolfius, s'Graveſande, Camus, Muſchenbroek, &c. on one ſide; and Pemberton, Eames, Deſaguliers, Dr. S. Clark, M. de Mairan, Jurin, Maclaurin, Robins, &c. on the other. See Act. Erud. 1686. 1690. 1691. 1695. & Nouv. de la Rep. Let. Sept. 1686. 1687. art. 2. Comm. Epiſt. inter Leibn. & Bern. Ep. 24. p. 143. Diſcours ſur les Loix de la Comm. du Mouvement, Oper. tom. iii. & Diſſ. de vera Notione Virium virarum, ib. Act. Petropol. tom. i. p. 131, &c. Hydronamica, ſec. 1. Herm. in Act. Petrop. tom. i. p. 2, &c. Polen. de Caſtellis. Wolf. in Act. Petrop. tom. i. p. 217, &c. & in Coſmol. Gener. Graveſ. in Journ. Lit. & Phyſ. Elem. Math. 1742. lib. ii. cap. 2 & 3. Mem. de l'Acad. des Scienc. 1728. Muſchenbr. Int. ad Phil. Nat. 1762. vol. i. p. 83, &c. Pemb. &c. in Phil. Tranſ. N° 371. N° 375. N° 376. N° 396. N° 400. N° 401. or Abridg. vol. vi. p. 216, &c. Mairan in Mem. de l'Acad. Sc. 1728. Phil. Tranſ. N° 459. or Abr. vol. viii. p. 236. Phil. Tranſ. vol. xliii. p. 423, &c. Maclaurin's Account of Sir Iſaac Newton's Diſcoveries, p. 117, &c. Fluxions, ubi ſup. & Receuil des Pieces qui ont importé le Prix, &c. tom. i. Deſag. Courſe Exp. Phil. vol. i. p. 393, &c. vol. ii. p. 49, &c. Robins, ubi ſupra.

The nature and limits of this work will not admit our giving a full account of the arguments and experiments which have been repeatedly urged on both ſides of this queſtion. Thoſe who are deſirous of farther information than this article furniſhes, with reſpect to the ſubject in diſpute, may conſult the preceding references. We ſhall, however, endeavour to collect a ſummary account of this controverſy. The chief arguments that have been urged on both ſides have been deduced from the mutual colliſion of bodies, from the action of ſprings, from the compoſition and reſolution of motion, from the impreſſions made by falling bodies on ſoft ſubſtances, and from ſome experiments in hydraulics relating to the velocities of fluids.

It is a well known law of MOTION, that action and reaction are equal with oppoſite directions, and are to be eſtimated always in the ſame right line; and from this law it follows, that the ſum of the motions of any number of bodies, eſtimated in a given direction, continues the ſame in their mutual actions and colliſions, till ſome external influence diſturbs them. The advocates for the new opinion concerning the *forces* of bodies have found it impoſſible to explain the actions and colliſions of perfectly hard bodies, void of all elaſticity, conſiſtently with their doctrine; and, therefore, they have denied the exiſtence of any ſuch bodies; though it is reaſonable to ſuppoſe, that the ultimate elementary particles of bodies, void of all pores, or atoms, are perfectly hard or inflexible, ſo as not to yield in the ordinary colliſions of bodies; whilſt they have admitted the exiſtence of bodies perfectly elaſtic, none of which are to be met with in nature. Notwithſtanding this evaſion, they have been no leſs puzzled in explaining the colliſion of ſoft bodies, and reconciling the phenomena with their doctrine; for if a ſoft body, with the velocity u, ſtrikes another equal ſoft body, they will proceed as in one maſs with the velocity $\frac{1}{2}u$, dividing the motion of the firſt body equally between them, by the forementioned law. According to the new opinion, the *force* of the firſt body before the ſtroke was uu, the *force* of each of them after the ſtroke is $\frac{1}{2}u \times \frac{1}{2}u$, or $\frac{1}{4}uu$; and the ſum of their *forces* after the ſtroke is $\frac{1}{2}uu$; ſo that the ſum of their *forces* after the ſtroke is only half of what it was before the ſtroke, while the quantity of motion is preſerved the ſame as it was without any change. In order to account for the loſs of one half of the *force* of the firſt body in the ſtroke, they allege, without proof, that when the parts of ſoft bodies yield without reſtoring themſelves, being void of all elaſticity, a certain quantity of *force* is loſt in the compreſſion of their parts by the colliſion; whereas there is no way by which *force* is loſt in one body, but by the communication of it to another; ſo that there is no juſt reaſon for ſuppoſing, as they have done, that any motion or *force* is loſt in flattening or hollowing ſoft bodies in their colliſions.

If we admit the common rules of finding the velocities of non-elaſtic bodies after colliſion, which Mr. s'Graveſande, an advocate for the new opinion, allows, it will follow, according to that opinion, that equal cauſes may have unequal effects: e. gr. Let a and b be two equal non-elaſtic bodies; let b be at reſt, while a moves towards it with eight degrees of velocity. In this caſe, the common velocity after the ſtroke will be half the velocity of a before the ſtroke, i. e. four degrees, dividing the ſum of the quantities of motion in the two bodies by the ſum of the quantities of matter; conſequently the force in b, thus communicated by the ſtroke, will be as its ſquare or 16. Again, let b move forward with two degrees of velocity, and a follow it with ten degrees, the relative velocity will be 8 as before; and, therefore, the ſtrokes in both caſes are equal; the velocity of b after the ſtroke will be half the ſum of the velocities before the ſtroke, or ſix degrees. According to the new opinion, the *forces* being as the ſquares of the velocities, the *force* of b before the ſtroke will be to its *force* after the ſtroke, as the ſquare of 2 is to the ſquare of 6, i. e. as 4 to 36. Subtract the *force* of b before the ſtroke from the *force* it has after the ſtroke, and you have the degree of *force* communicated by the ſtroke; which, if this opinion be true, would be 32, i. e. double the number of degrees communicated by the ſame *force* in the former inſtance, which was as 16; and, therefore, equal ſtrokes produce unequal effects. The intropreſſion of the parts, which is the other part of the entire effect of the ſtroke, will make but a ſmall alteration in the matter; ſince the intropreſſions in all caſes are equal, when the relative velocity is ſuppoſed to be the ſame.

It has been alſo alleged by the advocates for the new doctrine, particularly by Mr. Bernouilli, that the preſervation of the ſum of the abſolute motions of bodies, in their colliſions, reſults immediately from the equality of action and reaction; the augmentation or diminution of the *force* of the one being the neceſſary conſequence of the diminution or augmentation of the *force* of the other. But the third law of motion is general, and extends to bodies of all kinds; and it is well known, that when ſoft bodies meet in oppoſite directions, the ſum of their abſolute motions or *forces* is diminiſhed; and when the bodies are equal, and their velocities likewiſe equal, it is totally deſtroyed by this colliſion; and if two elaſtic bodies meet each other with contrary velocities, then on their firſt compreſſion it is evident, that both their *forces* are diminiſhed at the ſame time, and it may happen, that in reſtoring themſelves, both their *forces* may be increaſed at the ſame time. It is not the ſum of the abſolute motions or *forces* of bodies, but this ſum eſtimated in a given direction, that is preſerved unaltered in their colliſions, in conſequence of the third law of motion; nor can the preſervation of the ſum of the abſolute *forces* of any ſort of bodies be conſidered as an immediate conſequence of it.

The advocates for the new opinion farther maintain, that the *force* of bodies is that power of acting in them, which muſt be meaſured by its whole effect, till its motion be deſtroyed; and they alſo lay it down as a definition or axiom, that *force* is proportional to the number of ſprings which it can bend before it be conſumed. Accordingly they ſhew, that a body with a velocity as 2, is able to bend and overcome the reſiſtance of four ſprings, one of which alone is equivalent to the *force* of the ſame body moving with a velocity as 1; and hence they infer, that, in the former caſe, the *force* is quadruple, though the velocity be only double of what it is in the latter caſe. But we may obſerve in general, that cauſes are not to be meaſured by any effects produced by them, conſidered without regard to their circumſtances: thus, motions and *forces* are not to be meaſured by the effects produced, without regard to the times and directions of the motions. It is not conſidered in the preceding argument, and in others of a ſimilar kind, that the *force* which one body loſes, in acting upon another, is not equal to that which it produces or deſtroys in the other, eſtimated in any direction at pleaſure, but in that only in which the firſt body acts; and that body, in conſequence of its *inertia*, not only reſiſts any change in its quantity of motion, but likewiſe any change in the direction of its motion. For the farther illuſtration of this argument, let the bodies A and B (*Tab.* III. *Mechanics*, *fig.* 37.) by moving towards each other, compreſs equal and ſimilar ſprings placed between them, till by the re-action of theſe ſprings their motions be deſtroyed. Mr. Bernouilli expreſsly owns, that the actions of the ſprings on thoſe bodies are conſtantly equal to each other; and yet maintains that they deſtroy a *force* in B greater than the *force* of A, in the ſame proportion as the body A is greater than B, or (C being the center of gravity of A and B) as CB is greater than CA. He, therefore, maintains, that equal preſſures or actions of ſprings generate, in the ſame time, *forces* that may be unequal in any aſſignable ratio, which is repugnant to the plaineſt notions we can form of action and *force*. If we ſuppoſe the body A to compreſs the ſprings from A to C, then the body B will compreſs all the ſprings from B to C, in the ſame degree, and in the ſame time; and thence he infers, that the *force* of A is to the *force* of B in the ſame proportion as the number of ſprings from C to A to the number of ſprings from C to B. But ſince the motion, *force*, or effect of any kind, produced or deſtroyed in A or B, depends upon the immediate action which produces the effect, and upon it only; and ſince, in this caſe, the actions of the ſprings upon the bodies A and B are thoſe which deſtroy their motion; and ſince it is allowed that the actions of the ſprings on theſe bodies are equal, is it not evident that the *forces* deſtroyed by them in the ſame time muſt be equal? And is it not manifeſt, that the *forces* which are produced or deſtroyed in bodies are to be meaſured by the efforts which the ſprings exert upon the bodies in producing this effect, and not by the number of ſprings? It is the laſt ſpring only, which is in contact with the body that acts upon it, the reſt ſerving only to ſuſtain it in its action; and, therefore, any change produced in the body, by whatever name it be called, ought to be determined from the action of this laſt ſpring only, and in juſt reaſoning ought to be computed from this alone. Moreover, if two unequal bodies, moving with unequal velocities, ſtrike upon two equal ſprings, with one end leaning againſt an immoveable ſupport, and each of them bend the ſpring on which it ſtrikes exactly to the ſame degree; and in ſo doing the moving *force* of each body be entirely conſumed; in this caſe there will be, according to the Leibnitzians, two equal effects produced, ſince the ſprings are equal and equally bent, and the moving *forces* are wholly conſumed in producing them; and, therefore, on their principles, theſe moving *forces*, being the cauſes of equal effects, muſt be equal. But thoſe who eſpouſe the old opinion, deny this concluſion, unleſs the times of producing theſe effects are equal; and they allege in the preſent caſe, that the greater body will take up a longer time in producing its effect, or in bending its ſpring; conſequently the moving *forces* of theſe two bodies may be unequal, though they bend equal ſprings to the ſame degree. In like manner, when a ſpring, already bent to ſome certain degree, does, by unbending, drive before it a body which gave way to its preſſure, the preſſure of the ſpring may produce a greater effect, when it continues for a longer time. Dr. Jurin has very accurately conſidered the action of ſprings. Having premiſed the three following axioms, viz. 1. That a ſpring will unbend itſelf more ſlowly according to the ſize of the body againſt which it acts; 2. That its preſſure is in proportion to the degree in which it is bent; and, 3. That a greater preſſure produces a greater moving *force* in a given time: he deduces from them the following propoſition, viz. that moving *forces* are not proportional to the maſſes of the bodies, and the ſquares of their velocities; for when two ſprings, A and B, equal, and equally bent, puſh before them, by unbending, two unequal bodies, the ſpring A, which acts on the greater body, will unbend more ſlowly than the other, and, therefore, in every inſtant of time, will have unbent itſelf leſs than B; conſequently its preſſure will be greater than that of B at the ſame inſtant; and the infinitely ſmall moving *force* produced by A in every moment will be greater than that of B; whence it follows, that the ſum of the infinitely ſmall moving *forces*, i. e. the whole moving *force*, produced by A, will be greater than that of B in the ſame time; ſo that the ſpring A, not being wholly unbent, when the preſſure of B ceaſes, will continue to act on the greater body, the moving *force* of which will increaſe, and, therefore, more and more exceed the moving *force* of the ſmaller body; but, ſince the products of the maſſes and ſquares of the velocities are equal in the two bodies, the moving *forces*, which are proved to be unequal, cannot be proportional to the ſame products. He then ſubjoins the two following axioms, viz. 4. That ſprings of unequal lengths, when bent alike, have equal preſſures; and, 5. That equal preſſures in equal times produce equal moving *forces*; from which he deduces his ſecond propoſition, that moving *forces* are proportional to the maſſes and velocities jointly. Thus, if there be two ſprings, of the lengths 1 and 2, but equal in all other reſpects, and bent alike; and the ſpring 1, in unbending itſelf, be made to drive before it a body whoſe maſs is 2, and the ſpring 2 another body of the maſs 1, theſe two ſprings, by what he has elſewhere demonſtrated, will unbend themſelves exactly in the ſame time; and, therefore, the ſpring 2 will unbend itſelf with a velocity double of that of the ſpring 1; and it will give to the body 1 a velocity double of that, which the body 2 will receive from the ſpring 1; conſequently, the two ſprings, during the whole time of their expanſion, will be always bent alike; and, by axiom 4. their preſſures will be conſtantly equal; and by axiom 5. the infinitely ſmall moving *forces* produced by each of theſe ſprings, in every infinitely ſmall part of time, will be equal one to the other; therefore, the ſums of theſe infinitely ſmall moving *forces*, i. e. the whole moving *forces*, produced by the two ſprings, will be equal. And as the maſſes of the two bodies are 2 and 1, and their velocities 1 and 2 reſpectively, the moving *forces* muſt be proportional to the maſſes and velocities jointly. From theſe principles, Dr. Jurin infers, that the Leibnitian opinion about the meaſure of moving *forces* is inconteſtibly overthrown by the firſt propoſition, and the oppoſite opinion evidently eſtabliſhed by the ſecond.

It is a well known theorem in mechanics, that the motions and actions of bodies upon each other, in a ſpace that is carried uniformly forward, are the ſame as if that ſpace were at reſt; and any powers or motions that act upon all the bodies, ſo as to produce equal velocities in them in the ſame or in parallel right lines, have no effect on their mutual actions or relative motions. From this theorem, Mr. Maclaurin has deduced the following argument againſt the new doctrine concerning the *forces* of bodies in motion. Let A and B (*Tab.* III. *Mechanics*, *fig.* 38.) be two equal bodies that are ſeparated from each other by ſprings interpoſed between them in a ſpace E, F, G, H, which in the mean time proceeds uniformly in the direction B A, in which line the ſprings act, with a velocity as 1; and let the ſprings impreſs on the equal bodies A and B equal velocities, in oppoſite directions, that are each as 1. Then the abſolute velocity of A, which was as 1, will be now as 2; and, according to the new doctrine, its *force* as 4; whereas the abſolute velocity, and the *force* of B, which was as 1, will be now deſtroyed; ſo that the action of the ſprings adds to A a *force* as 3, and ſubducts from the equal body B a *force* as 1 only; and yet it ſeems manifeſt, that the actions of the ſprings, on theſe equal bodies, ought to be equal; which Mr. Bernouilli allows: i. e. equal actions of the ſame ſprings on equal bodies would produce very unequal effects, the one being triple of the other according to the new doctrine, than which hardly any thing more abſurd can be advanced in philoſophy or mechanics. In general, if m repreſent the velocity of the ſpace E F G H, in the direction B A, n the velocity added to that of A, and ſubducted from that of B, by the action of the ſprings, then the abſolute velocities of A and B will be repreſented by $m+n$ and $m-n$ reſpectively, the *force* added to A by the ſprings will be $2mn+nn$, and the *force* taken from B will be $2mn-nn$, which differ by $2nn$. Farther, it is allowed that the actions of bodies upon one another are the ſame in a ſpace proceeding with an uniform motion as if the ſpace was at reſt; but if the ſpace E F G H, was at reſt, it is allowed, that the *forces* communicated by the ſprings to A and B had been equal; and, by the new doctrine, the *force* of each had been repreſented by nn; whereas the *force* communicated to A by the ſprings in the ſpace E F G H, is repreſented by $2mn+nn$, and the *force* taken from B will be $2mn-nn$.

It has been farther urged by the advocates for the new opinion, that, ſince a body moving with a velocity proportional to the diagonal of a rectangle is able to balance the reſiſtance of two ſprings proportional to the ſides of the ſame rectangle, the *force* of a body moving with a velocity, as the diagonal, is equal to the ſum of the *forces* of two bodies moving with velocities proportional to the ſides of the rectangle; and, becauſe the ſquare of the diagonal is equal to the ſum of the ſquares of the two ſides, they thence infer, that the *forces* of equal bodies are as the ſquares of their velocities. Mr. Maclaurin has very largely diſcuſſed this argument, and ſhewn that it contradicts not only their own principles but the eſtabliſhed laws of motion. It is well known to thoſe who are acquainted with the COMPOSITION and RESOLUTION of MOTION, that powers acting in the directions AB and AD (*Tab.* III. *Mechanics*, *fig.* 39.) proportional to thoſe right lines, compound a power acting in the direction of the diagonal AC, and meaſured by it; and this compound power muſt be leſs than the ſum of the ſimple powers, becauſe AC is leſs than AB+AD. This is eaſily accounted for by reſolving the power AB into AM and AN, and the power AD into AK and AL, of which AN and AL are oppoſite and equal, and deſtroy each other's effect, ſo that there remains AM+AK or AC, the meaſure of the compounded power. The followers of Leibnitz agree in this manner of arguing concerning powers and preſſures, but not in the compoſition and reſolution of *forces*; for, according to them, when the angle BAD is right, the compounded *force* is equal to the ſum of the *forces* AB and AD, and no *force* is loſt, notwithſtanding the oppoſite directions of the *forces* AL and AN. When the angle BAD (*fig.* 40.) is acute, the ſquare of the diagonal AC exceeds the ſum of the ſquares of AD and DC, or of AD and AB; and, therefore, the two *forces* in the directions AD and AB muſt, according to the new doctrine, compound a *force* AC greater than their ſum; a conſequence which contradicts their own metaphyſical principle, that the effect is proportional to the cauſe which produces it, becauſe the effect is, in this caſe, greater than the cauſe, and is as abſurd in mechanics, as that two quantities collected together ſhould produce a greater quantity than their ſum in geometry; whereas, it appears from a view of the figure, that AL and AN, parts of AD and AB, deſtroy each other; and, therefore, the whole *forces* AD and AB are not accumulated in the direction AC, but only their parts AM and AN, which taken together are equal to AC, becauſe the triangles ADK and BMC are ſimilar and equal; ſo that the *forces* in the directions AB and AD compoſe a *force* in the directions AC leſs than their ſum, whilſt the ſquares of AB and AD, taken together, exceed the ſquare of AC; conſequently the *forces* are not to be meaſured by the ſquares of the lines. Farther, let the elaſtic body A (*fig.* 41.) receive its *force*, in the direction AB, from the equal elaſtic body H, and its *force*, in the direction AD, from the equal elaſtic body G, at the ſame time. According to the patrons of the new doctrine, the *forces* of H and G are communicated to A by infinitely ſmall degrees, or by an uninterrupted ſucceſſion of preſſures, and the whole *force* communicated to A is the ſum of the effects of theſe preſſures. Now in every inſtant, the preſſure, or infinitely ſmall *force* impreſſed on A, is leſs than the ſum of the preſſures exerted in that inſtant by H and G, in proportion as AC is leſs than AB+AD, as is allowed on all ſides. Therefore the ſum of all the preſſures, or the *force* impreſſed on A, muſt be leſs than the ſum of all the preſſures, or the ſum of the *forces* exerted by H and G, in the ſame proportion of AC to AB+AD; that is, the *forces* of A, H, and G, muſt be as the lines AC, AB, and AD, and not as their ſquares. It is not poſſible to conceive, that while the *force* in A ariſes from the accumulation of the preſſures, or infinitely ſmall *forces*, which it receives every moment from the actions of H and G, and each of theſe preſſures, or infinitely ſmall *forces*, is leſs than the ſum of the actions of H and G that produce them; yet the whole *force* of A ſhould, nevertheleſs, exceed the ſum of the whole actions or *forces* of H and G. If the angle BAD be infinitely acute, the ſame *forces* (according to the new opinion) generate a *force* in A, which exceeds their ſum as much as the ſquare of AB+AD exceeds the ſum of the ſquares of AB and AD; ſo that if AD be equal to AB, they will in that caſe generate at A a *force* double of their ſum, for then the ſquare of AB+AD will be equal to the ſquare of $2AB = 4AB^2$; though the two equal *forces*, which are ſuppoſed to produce this, taken together, amount only to $2AB^2$, according to their own computation; and, therefore, in this caſe, a cauſe produces an effect of the ſame kind double of itſelf.

In the reſolution of motion, motion is gained; and as the powers that generate motion are increaſed, the effects of theſe powers, or the *force* of bodies, muſt be increaſed likewiſe. Mr. Maclaurin has illuſtrated and applied this principle in the following manner. Let the body C (*fig.* 42.) moving in the direction DC, the diagonal of the parallelogram, CLDK, ſtrike the equal body A obliquely, ſo as to impel it in the direction CA, the continuation of CK, and at the ſame time the equal body B, in the direction CB, the continuation of CL; the body A will proceed in the right line CA, and the body B will proceed in the direction CB, the continuation of CL, and C having communicated all its *force* to them, will ſtop. It will not appear ſtrange, that the motions and *forces* of A and B exceed the motion or *force* of C, if we conſider that C communicates the whole motion or *force* CK to A, and the whole motion or *force* CL to B, that the reſiſtance or *inertia* of A reacting upon C, not in the direction of its motion CD, but in the direction CK, oblique to it, the abſolute motion or *force* of C, in the direction DC, is not ſo much diminiſhed by this reaction as if it was directly oppoſite to the motion of C; for no power or reſiſtance can produce ſo great an effect in any direction as in that wherein it acts. In like manner, the reaction of B deſtroys the *force* LC in the body C, in the direction in which B reacts; but not ſo great a motion or *force* in the direction DC, to which it is oblique; and thus it appears, that the motion or *force* of C, in the direction DC, muſt neceſſarily be leſs than the ſum of the motions or *forces* of the bodies A and B in their reſpective directions. It may alſo be obſerved, that in conſequence of the *inertia* of body, it not only reſiſts any change of its motion, but likewiſe any change in the direction of its motion; and when the action of bodies upon each other is not in a right line, both theſe are to be taken into the account. Thus, if C ſtrike A, the reaction of A has a twofold effect; it ſubducts ſomewhat from the motion or *force* of C, and produces a change in its direction; and its whole reaction is to be eſtimated by both theſe effects conjointly. After the body C has ſtruck A, it proceeds in the right line CB with a motion or *force* as CL, and, impinging on B directly, it communicates its whole motion or *force* to B, which reacts directly againſt it; the bodies C, A, and B, are ſuppoſed to be perfectly elaſtic. If ſprings be ſubſtituted, inſtead of the bodies A and B, and their reſiſtances meaſured by CK and CL, the reſiſtances of thoſe ſprings are not the proper meaſures of the *force* of the body C, but, taken together, they muſt exceed it; becauſe the ſpring A acts at a diſadvantage againſt the motion or *force* of C. It has its whole effect in the direction CK, in which it reſiſts; but not ſo great an effect in the direction CD, oblique to that in which it acts. If the ſpring A acted with the ſame advantage as B, they would together produce a greater effect than in the ſituation they have in the figure; and, therefore, the greateſt reſiſtances which they are able to exert taken together, muſt exceed the *force* of the body C. Thus, ſays Mr. Maclaurin, it appears, that this argument, inſtead of overthrowing the old doctrine, confirms it, and that they who advanced it, ſuppoſed thoſe *forces* to be equal, which, according to the known principles of mechanics, are unequal. In other inſtances, the followers of M. Leibnitz neglect the conſideration of time, in reaſoning concerning the *forces* of bodies; in this caſe they do not duly regard the directions of motions and *forces*, in eſtimating and comparing their effects. Mr. Eames has likewiſe ſhewn, that the argument drawn from the compoſition and reſolution of *forces*, equally proves both ſides of the queſtion, and by thus proving too much, proves nothing. Another argument advanced in favour of the new opinion, has been founded on the learned and ingenious Mr. Poleni's experiment, in which equal cavities are formed in ſoft ſubſtances, by equal bodies falling from heights reciprocally proportional to their maſſes; whence it has been inferred, that the bodies ſtrike with equal *force*, and, therefore, that the *force* of the ſame body in deſcending is proportional, according to Mr. Leibnitz's principle, to the height from which it falls, or, in all motion, proportional to the ſquare of the velocity. Dr. Jurin has ſet this argument aſide, as inſufficient, ſince the times of forming theſe equal cavities are unequal, and unequal cauſes may produce equal effects in unequal times. Mr. Poleni, indeed, maintains, that the formation of theſe cavities ſeems to be inſtantaneous; but Dr. Jurin has ſhewn the contrary, even from a poſition allowed of by Poleni himſelf. Dr. Pemberton aſſerts and proves, that this experiment of Poleni is not only reconcileable to the common doctrine of motion, but that it manifeſts the great unreaſonableneſs, if not the abſolute abſurdity, of Mr. Leibnitz's opinion; and Dr. Deſaguliers obſerves, that Poleni's miſtake lies in this; that he eſtimates the *force* of the ſtroke of the falling balls, by the depth of the impreſſion made in the yielding ſubſtances; but this is not the whole effect; for when two bodies move with equal *forces*, but different velocities, that which moves the ſwifteſt muſt make the deepeſt impreſſion, whilſt the ſloweſt body communicates its motion to the ſubſtance round about, and, therefore, does not ſtrike in ſo deep as the ſwifter body, which puts in motion few parts of the clay, beſides thoſe that are before it, and which have ſo much leſs time to oppoſe this body's motion, as its velocity is greater.

The ingenious Mr. Graham, in confirmation of the old opinion, prepared a pendulous body, with a cavity in it, capable of receiving another body of an equal weight, at the loweſt point of its vibration; and when the body was dropped into it, he found, by the ſubſequent vibration, that the velocity of the double maſs was preciſely one half of the velocity of the pendulum before; from which it appears, that the ſame *force* produces in a double quantity of matter one half of the velocity only; which is agreeable to the common doctrine, but directly repugnant to the new one, concerning the *forces* of bodies in motion.

The advocates for the new opinion have produced in favour of it ſome experiments in hydraulics, the reſult of which is, that the velocities of any fluid, iſſuing out at equal orifices made in the ſides of veſſels filled up to different heights, and kept full at thoſe heights, above the orifices, are found to be as the ſquare roots of thoſe heights reſpectively; whence they infer, that the *forces* of equal maſſes, or moving bodies, are proportional to the ſquares of their velocities. Every ſingle particle, they ſay, iſſuing out with two degrees of velocity, muſt move with four times the *force* of any other ſingle particle that moves with only one degree of velocity; becauſe the *force* with which it moves is the effect of a cauſe four times greater, or the preſſure of a column of water four times higher, &c. The preſſures are as the altitudes, and the altitudes as the ſquares of the velocities of every ſingle particle; therefore the preſſures are as the ſquares of the velocities; but the preſſures being the cauſes of the *forces*, with which the ſeveral particles iſſue out or move, and effects being proportional to their cauſes, the *forces* muſt be as the ſquares of the velocities. On this reaſoning, Mr. Eames has remarked, that the entire effect of any of theſe preſſures is not barely a certain number of degrees of velocity, in any ſingle particle, but certain degrees of velocity in a certain number of particles, which number of particles, in a given time, is, confeſſedly, as the degrees of velocity. Beſides, it is acknowleged, that the quantities of the fluid, preſſed out in equal times, are as the velocities. See s'Graveſ. Epit. Elem. Phyſ. Math. part ii. cap. 4. p. 665.

If this be true, the *forces* cannot be as the quantities of matter multiplied by the ſquares of the velocities; for then the effects would be more than in proportion to their cauſes. E. gr. the effect of a preſſure of a column of water, nine inches high, inſtead of being nine times greater than that of one inch above the orifice, would be no leſs than twenty-ſeven times greater; for the velocity being at this height triple, the quantity of matter, in a given time, will be alſo triple; which multiplied by the ſquare of the velocity gives 27 for the *force* communicated by a preſſure of 9 inches in altitude, while the *force* communicated by the preſſure of 1 inch, is but as 1; ſo that the moving *forces* produced will be as 27 to 1, while the cauſes producing theſe *forces* are but as 9 to 1, i. e. three times too little for ſuch a purpoſe. In reality, the common rule of eſtimating the *forces* of moving bodies by the quantities of matter multiplied by their velocities, is confirmed by theſe experiments; for, effects being proportional to their cauſes, the *forces* communicated will be as the *forces* communicating, or preſſures. Thus, let the altitude, and conſequent preſſure of any column of water, be nine times greater than the altitude of another; then the velocity of every ſingle particle of water preſſed out will be triple, and the number of particles iſſuing out in a given time will likewiſe be triple; therefore, the *force* reſulting from theſe 2, multiplied together, according to the common rule, will be 9, proportional to the preſſure, as it ought to be, &c. And univerſally, the *forces* communicated, according to the old rule, are in a ratio compounded of two others, viz. the quantities of matter and the velocities; the ratio of the velocities, by the experiments, is the ſubduplicate ratio of the heights, and the ratio of the quantities of matter is, confeſſedly, likewiſe the ſubduplicate of the heights; therefore, the compound of theſe two is the ratio integra, or ſimple ratio of the heights; in which ratio are the preſſures themſelves, which produce theſe moving *forces*; ſo that, according to the common rule, the effects are always proportional to their cauſes. After this manner profeſſor s'Graveſande reaſons in parag. 355 of his Phyſ. El. Math. ed. 1.

Many of the experiments and reaſonings, that have been urged on both ſides in this controverſy, have been founded in the different ſenſes applied to the term *force*. The Engliſh and French philoſophers mean by the word *force* the ſame thing as they do by momentum, motion, quantity of motion, or inſtantaneous preſſure, which is meaſured by the maſs multiplied into the velocity, and may be known by its effect; and when they conſider bodies as moving through a certain ſpace, they allow for the time in which that ſpace is deſcribed; whereas the Dutch, Italian, and German philoſophers, who have eſpouſed the new opinion, mean by the word *force*, or *force* inherent in a body in motion, that which it is able to produce; or, in other words, the *force* is always meaſured by the whole effect produced by the body in motion, until its whole *force* be entirely communicated or deſtroyed, without any regard to the time employed in producing this total effect. Thus, ſay they, if a point runs through a determinate ſpace, and preſſes with a certain given *force* or intenſity of preſſure, it will perform the ſame action whether it move faſt or ſlow, and therefore the time of the action in this caſe ought not to be regarded. s'Graveſande, lib. cit. § 723—728.

Leibnitz himſelf aſſumed it as certain, that the action is as the effect by the velocity with which it is produced; and hence he deduces, that the power is as the maſs by the ſquare of the velocity: his words, as quoted by Wolfius, are, *Calculum virium purarum ſeu actionum talem inſtituo. Sit ſpatium s, tempus t, velocitas v, corpus c, effectus e, potentia p, actio a, in motu æquabili erit tv ut s, e ut cs, tp ut a. Atque hæc quidem ſine demonſtratione aſſumi poſſunt. Accedit quod demonſtrandum, ev ut a. Huic porro plurima theoremata demonſtrari poſſunt, e. gr. p ut* cv^2. *Nam tp ut ev: ſed e ut cs & s ut tv. Ergo fit tp ut* ctv^2, *ſeu p ut* cv^2. Vide Act. Petrop. tom. i. p. 232.

Mr. Euler obſerves, with reſpect to this diſpute concerning the meaſure of vivid *force*, that we cannot abſolutely aſcribe any *force* to a body in motion, whether we ſuppoſe this *force* proportional to the velocity, or to the ſquare of the velocity: for the *force* exerted by a body, ſtriking another at reſt, is different from that which it exerts in ſtriking the ſame body in motion; ſo that this *force* cannot be aſcribed to any body conſidered in itſelf, but only relatively to the other bodies it meets with. There is no *force* in a body, abſolutely conſidered, but its inertia, which is always the ſame, whether the body be at reſt or in motion. But if this body be forced by others to change its ſtate, its inertia then exerts itſelf as a *force*, properly ſo called, which is not abſolutely determinable; becauſe it depends on the changes that happen in the ſtate of the body. Suppoſe, for inſtance, a body A forced to move in an incurvated tube, or along the curve ſurface E *a* F (*Tab. Mechanics, fig.* 43.) the body in this caſe will preſs the ſurface wherever it touches it in a direction *a α* normal to the curve; and with a certain *force* commonly determined in mechanics, by the maſs of the body, its velocity, and by the radius of curvature O *a*. Now the body exerts a preſſure, or *vis mortua*; yet it would be abſurd to aſcribe a certain and determinate *force* of preſſure to this body conſidered in itſelf, ſince this preſſure may vary very much, according to the difference of the curvature of E *a* F. In like manner it ſeems unreaſonable to place a certain abſolute *force* of percuſſion in bodies, ſince it principally depends on the external circumſtances accompanying the ſhock.

A ſecond obſervation which has been made by ſeveral great men, is, that the effect of a ſhock of two or more bodies is not produced in an inſtant, but requires a certain interval of time. If this be ſo, the heterogeneity between the *vires vivæ* and *mortuæ* vaniſhes; ſince a preſſure may always be aſſigned, which in the ſame time, however little, ſhall produce the ſame effect. If then the *vires vivæ* be homogeneous to the *vires mortuæ*, and ſince we have a perfect meaſure and knowlege of the latter, we need require no other meaſure of the former than that which is derived from the *vires mortuæ* equivalent to them.

Now that the change of the ſtate in the ſhock of two bodies does not happen in an inſtant, appears evidently from the experiments made on ſoft bodies: in theſe, percuſſion forms a ſmall cavity, viſible after the ſhock, if the bodies have no elaſticity. Such a cavity cannot certainly be made in an inſtant. And if the ſhock of ſoft bodies require a determinate time, we muſt certainly ſay as much of the hardeſt, though this time may be ſo ſmall as to be beyond all our ideas. Neither can any inſtantaneous ſhock agree with that conſtant law of nature, by virtue of which nothing is performed *per ſaltum*. But it is needleſs to inſiſt farther on this, ſince the duration of any ſhock may be determined from the moſt certain principles.

There can be no ſhock or colliſion of bodies, without their making mutual impreſſions on each other: theſe impreſſions will be greater or leſs, according as the bodies are more or leſs ſoft, other circumſtances being the ſame. In bodies called hard, the impreſſions are ſmall; but a perfect hardneſs, which admits of no impreſſion, ſeems inconſiſtent with the laws of nature; ſo that while the colliſion laſts, the action of bodies is the reſult of their mutually preſſing each other. This preſſure changes their ſtate; and the *forces* exerted in percuſſion are really preſſures, and truly *vires mortuæ*, if we will uſe this expreſſion, which is no longer proper, ſince the pretended infinite difference between the *vires vivæ* and *mortuæ* ceaſes. See HARD *bodies*.

The *force* of percuſſion, reſulting from the preſſures bodies exert on each other while the colliſion laſts, may be perfectly known, if theſe preſſures be determined for every inſtant of the ſhock.

The mutual action of the bodies begins the firſt moment of their contact, and is then leaſt; after which this action increaſes, and becomes greateſt when the reciprocal impreſſions are ſtrongeſt. If the bodies have no elaſticity, and the impreſſions they have received remain, the *forces* will then ceaſe. But if the bodies be elaſtic, and the parts compreſſed reſtore themſelves to their former ſtate, then will the bodies continue to preſs each other till they ſeparate. To comprehend therefore perfectly the *force* of percuſſion, it is requiſite to define, firſt, the time the ſhock laſts, and then to aſſign the preſſure correſponding to each inſtant of this time; and as the effect of preſſures in changing the ſtate of any body may be known, we may thence come at the true cauſe of the change of motion ariſing from colliſion. The *force* of percuſſion, therefore, is no more than the operation of a variable preſſure during a given time; and to meaſure this *force* we muſt have regard to the time, and to the variations according to which the preſſure increaſes and decreaſes.

Mr. Euler has given us ſome calculations with reſpect to theſe particulars. It will be ſufficient here only to illuſtrate their tendency by the inſtance he brings. Suppoſe two bodies A and B; that the hardneſs of theſe bodies is equal; and ſuch, that being preſſed together with the *force* of 100℔. the impreſſion made on each is of the depth of $\frac{1}{1000}$ part of a foot. Suppoſe, farther, B to be at reſt, and fixed, and that A ſtrikes it with the velocity of 100 feet in a ſecond; according to Mr. Euler, the greateſt *force* of compreſſion will be equivalent to 4000℔. and this *force* will produce in each of theſe bodies an impreſſion equal to $\frac{1}{25}$ of a foot; and the duration of the colliſion, that is, till the bodies arrive at their greateſt compreſſion, will be about $\frac{1}{800}$ of a ſecond. Mr. Euler, in his calculations, ſuppoſes the hardneſs of a body to be proportional to the *force* or preſſure requiſite to make a given impreſſion on it; ſo that the *force* by which a given impreſſion is made on a body, is in a compound ratio of the hardneſs of the body and of the quantity of the impreſſion. But he obſerves, that regard muſt be had to the magnitude of the bodies, as the ſame impreſſion cannot be made on the leaſt bodies as on the greateſt, from the defect of ſpace through which their component particles muſt be driven: he, therefore, only conſiders the leaſt impreſſions, and that the bodies are of ſuch magnitudes, that with reſpect to them the impreſſions may be looked upon as nothing. What he ſuppoſes about the hardneſs of bodies, neither implies elaſticity nor its defect, elaſticity only producing a reſtitution of figure and impreſſion when the preſſing *force* ceaſes; but this reſtitution needs not be here conſidered. It is likewiſe ſuppoſed, that the bodies ſtriking each other have plane and equal baſes, by which they touch each other in the colliſion; ſo that the impreſſion hereby made diminiſhes the length of each body. It is farther to be obſerved, that in Mr. Euler's calculations, bodies are ſuppoſed ſo conſtituted, that they may not only receive impreſſions from the *forces* preſſing them, but that a greater *force* is requiſite to make a greater impreſſion. This excludes all bodies fluid or ſolid, in which the ſame *force* may penetrate farther and farther, providing it have time, without ever being *in equilibrio* with the reſiſtance. Thus a body may continually penetrate farther into ſoft wax, although the *force* impelling it be not increaſed. In theſe, and the like caſes, nothing is required but to ſurmount the firſt obſtacles; which being once done, and the connexion of parts broken, the penetrating body always advances, meeting with the ſame obſtacles as before, and deſtroying them by an equal *force*. But Mr. Euler only conſiders the firſt obſtacles which exiſt before any ſeparation of parts, and which are, no doubt, ſuch, that a greater impreſſion requires a greater *force*. This, indeed, principally takes place in elaſtic bodies; but it ſeems likewiſe to obtain in all bodies when the impreſſions made on them are ſmall, and the contexture of their parts is not altered.

Theſe things being premiſed, let the maſs or weight of the body A be expreſſed in general by A, and let its velocity before the ſhock be that which it might acquire by falling from the height *a*. Farther, let the hardneſs of A be expreſſed by M, and that of B by N, and let the amplitude of the baſe, by which the impreſſion is made, be cc; then will the greateſt compreſſion be made with a *force* $\sqrt{\frac{\mathrm{MN}cc}{\mathrm{M+N}}\times \mathrm{A}a}$. Therefore if the hardneſs of the two bodies, and the plane of their contact during the whole time of their colliſion be the ſame, this *force* will be $\sqrt{\mathrm{A}a}$, that is, as the ſquare root of the *vis viva* of the ſtriking body A. And as $\sqrt{a}$ is proportional to the velocity of the body A, the *force* of percuſſion will be in a compound ratio of the velocity and of the ſubduplicate ratio of the maſs of the body ſtriking; ſo that in this caſe neither the Leibnitian nor the Carteſian proportions take place. But this *force* of percuſſion depends chiefly on the hardneſs of the bodies; the greater this is, the greater will the *force* of percuſſion be. If M=N, this *force* will be as $\sqrt{\mathrm{M}cc\times \mathrm{A}a}$, that is, in a compound ſubduplicate ratio of the *vis viva* of the body ſtriking, of the hardneſs, and of the plane of contact. But if M, the hardneſs of one of the bodies, be infinite, the *force* of percuſſion will be as $\sqrt{\mathrm{N}cc\times \mathrm{A}a}$; at the ſame time, if M=N, this *force* will be as $\sqrt{\frac{1}{2}\mathrm{N}cc\times \mathrm{A}a}$. Therefore all other things being equal, the *force* of percuſſion, if the ſtriking body be infinitely hard, will be to the *force* of percuſſion, if both the bodies be equally hard, as $\sqrt{2}$ to 1. Mr. Euler farther deduces from his calculation, that the impreſſion received by the body A will be as $\sqrt{\frac{\mathrm{N}\times \mathrm{A}a}{\overline{\mathrm{M+N}}\times \mathrm{M}cc}}$, and the impreſſion on B will be as $\sqrt{\frac{\mathrm{M}\times \mathrm{A}a}{\overline{\mathrm{M+N}}\times \mathrm{N}cc}}$. If, therefore, the hardneſs of A, that is M, be infinite, it will ſuffer no impreſſion, whereas that on B will extend to the depth of $\sqrt{\frac{\mathrm{A}a}{\mathrm{N}cc}}$. But if the hardneſs of the two bodies be the ſame, or M=N, they will each receive equal impreſſions of the depth $\sqrt{\frac{\mathrm{A}a}{2\mathrm{N}cc}}$. So that the impreſſion received by the body B, in this caſe, will be to the impreſſion it receives in the former as 1 to $\sqrt{2}$.

Mr. Euler has likewiſe conſidered and computed the caſe when the ſtriking body has its anterior ſurface convex, with which it ſtrikes an immoveable body whoſe ſurface is plane. He has alſo examined the caſe when both bodies are ſuppoſed immoveable; and from his formulæ he deduces the known laws of the colliſion of non-elaſtic and elaſtic bodies. He has alſo determined the greateſt preſſures the bodies receive in theſe caſes; and likewiſe the impreſſions made on them. In particular he ſhews, that the impreſſion received by the body ſtruck, or B, if moveable, is to the impreſſion received by the ſame body when immoveable as $\sqrt{\mathrm{B}}$ to $\sqrt{\mathrm{A+B}}$.

This doctrine of Mr Euler may ſerve to ſhew, that the diſpute about the meaſure of *forces* is very needleſs in phyſics; ſince the laws of motion may, independently of any hypotheſis about the meaſure of the *vis viva*, be deduced from the moſt unconteſted principles of preſſure and time. But we doubt whether we ſhall be enabled hereby to ſettle the metaphyſical part of this diſpute to the ſatisfaction of both parties, each of which may aſſent to all that Mr. Euler ſays, and yet adhere either to the Carteſians or Leibnitians. But whatever may be ſaid of the metaphyſical part of the diſpute, it is certain, from experience,

That the number of equal ſprings requiſite to produce any velocity in a given body, is always proportional to the ſquare of the velocity to be produced. Thus if one ſpring can, by unbending half, produce one degree of velocity in a body, it will require four equal ſprings to produce two degrees of velocity in that body; nine ſprings to produce three degrees of velocity, &c. See SPRING. Alſo, if a portion of a yielding ſubſtance, as clay, tallow, &c. be juſt ſufficient to ſtop the motion of a body moving with a certain degree of velocity, it will require four times the quantity of the ſame reſiſting ſubſtance to ſtop it, if the velocity of the moving body be double, &c. The ſame holds in the reſiſtance of wood againſt muſquet-balls, as Mr. Robins obſerves in his New Principles of Gunnery; ſo that a ball moving with twice the velocity of another, will penetrate four times as deep into earth, clay, tallow, wood, &c. And in like manner if the action of one man, one horſe, or other animal, can give a certain degree of velocity to a given maſs, it will require the action of four equal men, horſes, &c. to give the ſame maſs two degrees of velocity; nine men, horſes, &c. to give it three degrees of velocity; and ſo on.

Theſe practical points have been put out of all queſtion by the experiments of Poleni, s'Graveſande, Deſaguliers, and others, and are of great uſe, although they do not decide the controverſy about the meaſure of the *force* of bodies in motion.

FORCE, *accelerating*. See VIS *acceleratrix*, and ACCELERATION.

FORCE, *attractive*. See ATTRACTION.

FORCE, *central*. See CENTRAL.

FORCE, *centrifugal*. See CENTRIFUGAL.

FORCE, *centripetal*. See CENTRIPETAL.

FORCE *of coheſion*. See COHESION.

FORCE, *contractile*. See CONTRACTILE.

FORCE, *elaſtic*. See ELASTIC, and ELASTICITY.

FORCE, *electrical*. See ELECTRICITY.

FORCE *of gravity*. See GRAVITY.

FORCE *of the heart*. See HEART.

FORCE *of inactivity*. See VIS *inertiæ*.

FORCE, *innate*. See VIS *inſita*.

FORCE, *magnetic*. See MAGNETISM.

FORCE, *moving*. See VIS *motrix*, and preceding article, FORCE.

FORCE, *repelling*. See REPULSION.

FORCE, *reſiſting*. See RESISTANCE.

FORCE, *retarding*. See RETARDATION.

FORCE *of wind*. See WIND, &c.

Force, in *Common Law*, ſignifies an offence, by which violence is uſed either to perſons, or things.

Force is either *ſimple*, or *compound*.

Force, *mixed*, or *compound*, is violence committed with ſome fact, which of itſelf alone were criminal: as if any man by *force* enter into another man's poſſeſſion, and there kill a man, or raviſh a woman, &c.

Force, *ſimple*, is that which has no other crime adjoined to it: if one, by *force*, enter into another man's poſſeſſion, without doing any other unlawful act.

Force is alſo divided into *true force*, or *force after a ſort*.

There are other branches; as FORCIBLE entries, *forcible* detaining, or holding unlawful aſſembly, routs, riots, rebellions, &c.

Force, *freſh*. See **Fresh**.

Force, in *Grammar*, and ſome other arts, is applied to a thing which ſtands in lieu of, or has the ſame effect, as another. In our language, the *ſ* between two vowels has the *force* or power of a *z*, and is ſometimes put for a *z*: as in horiſon, baptiſing, &c.

In Hebrew, the dageſh; and in Arabic, the teſdid; have the *force* of a letter ſuppreſſed. An unit before a cypher, has the *force* of ten.

Force, in *practical Mechanics*. We have ſeveral curious as well as uſeful obſervations in Deſagulier's Experimental Philoſophy, concerning the comparative *forces* of men and horſes, and the beſt way of applying them. A horſe draws with the greateſt advantage when the line of direction is level with his breaſt; in ſuch a ſituation, he is able to draw 200 ℔. eight hours a day, walking about two miles and an half an hour. And if the ſame horſe is made to draw 240 ℔. he can work but ſix hours a day, and cannot go quite ſo faſt. On a carriage, indeed, where friction alone is to be overcome, a middling horſe will draw 1000 ℔. But the beſt way to try a horſe's *force*, is by making him draw up out of a well, over a ſingle pully or roller; and in ſuch a caſe, one horſe with another will draw 200 ℔. as already obſerved.

Five men are found to be equal in ſtrength to one horſe, and can, with as much eaſe, puſh round the horizontal beam of a mill, in a walk forty feet wide; whereas three men will do it in a walk only nineteen feet wide.

The worſt way of applying the *force* of a horſe, is to make him carry or draw up hill: for, if the hill be ſteep, three men will do more than a horſe, each man climbing up faſter with a burden of 100 ℔. weight, than a horſe that is loaded with 300 ℔. a difference which is owing to the poſition of the parts of the human body being better adapted to climb than thoſe of a horſe.

On the other hand, the beſt way of applying the *force* of a horſe, is an horizontal direction, wherein a man can exert leaſt *force*: thus a man, weighing 140 ℔. and drawing a boat along, by means of a rope coming over his ſhoulders, cannot draw above 27 ℔. or exert above one ſeventh part of the *force* of a horſe employed to the ſame purpoſe.

The very beſt and moſt effectual poſture in a man, is that of rowing; wherein he not only acts with more muſcles at once for overcoming the reſiſtance, than in any other poſition; but as he pulls backwards, the weight of his body aſſiſts by way of lever. Deſaguliers, Exp. Phil. vol. i. p. 241. where we have ſeveral other obſervations relative to *force* acquired by certain poſitions of the body, from which that author accounts for moſt feats of ſtrength and activity. See alſo a Memoire on this ſubject by M. de la Hire, in Mem. Roy. Acad. Sc. 1629; or in Deſaguliers, Exp. &c. p. 267, &c. who has publiſhed a tranſlation of part of it with remarks.

FORCEPS, a ſurgeon's inſtrument, wherewith dead and corrupt parts are ſeized, cut, or pulled off, &c. As alſo foreign bodies extracted out of wounds, &c.

The word literally denotes a pair of tongs.

They are of divers forms; long, crooked, with teeth, with beaks, half-mooned, &c. See *Tab. Surgery*, *fig.* 14. *Tab.* III. *fig.* 31.

Mr. Monro deſcribes and gives a figure of a *forceps*, the mouth of which has on each ſide two ſmall ſharp teeth, which apply cloſe to one another when it is ſhut. This *forceps*, when ſhut, may be ſafely introduced into a gunſhot wound, and the blades being immediately opened behind the bullet, the teeth will pierce into the lead, and hold it faſt enough to bring it out, though they are not advanced ſo far as the largeſt part of it. Med. Eſſ. Edinb. vol. v. art. 41.

Dr. Le Cat has contrived a new *forceps* for the extirpation of tumours, the extraction of ſtones, &c. for an account of which, ſee Phil. Tranſ. N° 491. or vol. xlvi. p. 80, &c.

The *forceps* is alſo uſed for extracting the fœtus in caſes of preternatural delivery. The inſtrument uſed for this purpoſe is either ſtrait or curved. The ſtrait *forceps* is uſed for bringing the head of the child forward, when on account of its ſize, or the want of pains, it cannot otherwiſe be protruded; but the uſe of them requires great care: and it is obſerved, that inſtruments of this kind are never neceſſary, whilſt the head is above the brim of the pelvis, and rarely when it hath deſcended lower. Dr. Hunter abſolutely forbids the uſe of them, if they can poſſibly be avoided. Thoſe improved by Smellie are the beſt, who has reduced their length, in order to prevent their being uſed before the head is low enough. The long curved *forceps* was invented by Smellie, with a view to ſaving the life of the child, when the body being delivered, the head could not be brought away in the uſual manner. Theſe are longer than the ſtrait ones, becauſe they are applied, when the head of the child is above the brim of the pelvis. The ſtrait and curved *forceps*, as well as the blunt hook, are uſed to expedite and facilitate delivery; whereas the crotchet, which has a hook at its point that is forced into the part to which it is applied, wounds, and generally kills the child.

FORCER, in *Mechanics*, is properly a PISTON, without a valve.

There are ſeveral ways of making *forcers*: the moſt common of all conſiſts of a braſs cylinder, a very little leſs in diameter, at its bottom and top, than the bore of the barrel of the pump, and turned ſtill leſs at the middle, in order to let in a leathern ring or collar (made of a thick leather put round the braſs cylinder), which makes it juſt equal to the bore of the barrel, ſo as to fit it quite when it is put into it.

The ſecond ſort of *forcers* conſiſts of three braſs cylinders, which can be ſcrewed together. The middle one ought to be almoſt equal in diameter to the bore of the pipe, ſo as to ſlide in it without any friction. The upper cylinder and the lower muſt be a little leſs, and equal to one another. There are two leathers which muſt be put between them when they are unſcrewed: then it is evident, that if the cylinders be ſcrewed together, and the leathers, which ought to be a little bigger than the braſs cylinders, apply themſelves folding upwards round the upper cylinder, and downwards round the lower, they will become juſt equal to the bore of the barrel; and conſequently they will hinder any air from getting through the ſides of the *forcer*, when it moves up and down in the barrel. The uſe of the middle braſs cylinder is to hinder the leathers from turning themſelves back by the motion.

This kind of *forcer* has, above the other, the advantage of having a great deal leſs friction; and beſides, as the leathers, which are applied to it, may be thin ones, they are much ſmoother than thick ones, which are uſed in the other.

But the beſt way of making *forcers*, is to have a plunger, or ſolid braſs cylinder, equal in length to the barrel of the pump, and a little leſs in the diameter than the bore; ſo that it may move freely in it without any friction. There muſt be two hollow, ſhort, braſs cylinders, or rather rings, at the top of the barrel, which can be ſcrewed together; the upper one muſt be equal in bore to the barrel, and the lower a little leſs: there are two leathers, both having in the middle a leſs hole than in the bore of the pipe; the one muſt be applied between the barrel and the lower ring, and the other between the ſame ring and the upper one; and the whole muſt be ſcrewed together. Then if the ſolid cylinder or *forcer* be put into it, and moved up and down, it is evident that the two before mentioned leathers, which are applied the one to the barrel and the other to the inſide of the hollow cylinder, will hinder any air from getting between them and the ſolid cylinder.

The advantage of this kind of *forcer* is, that it has no other friction but at the top of the barrel, and that the inſide of the barrel need not be ſmooth, as in other kinds of pumps; but only the outſide of the *forcer* muſt be turned true and poliſhed, which can be done with much more eaſe, and the lower part muſt be turned a little conical, that it may be brought into the barrel, without any reſiſtance of the upper leather of the collar or jack-head. See Deſaguliers, Courſe of Experim. Philoſ. vol. ii. p. 161, 162.

FORCIBLE *Entry*, a violent, actual entry into houſes, or lands, &c. with menaces or weapons, whether violence or hurt be offered to any perſon therein, or not.

Forcible *holding*, or *detaining*, a with-holding by violence, and with a ſtrong hand, of the poſſeſſion of land, &c. whereby he who has a lawful right of entry is barred or hindered. See **Entry**.

This was formerly allowable to every perſon diſſeiſed, or turned out of poſſeſſion, unleſs his entry was taken away or barred by his own neglect, or other circumſtances. But this being found very prejudicial to the public peace, it was thought neceſſary, by ſeveral ſtatutes, to reſtrain all perſons from the uſe of ſuch violent methods even of doing themſelves juſtice: ſo that the entry now allowed by law is a peaceable one. By the ſeveral ſtatutes of 15 Ric. II. cap. 2. 8 Hen. VI. cap. 9. 31 Eliz. cap. 11. and 21 Jac. I. cap. 15. upon any *forcible* entry, or *forcible* detainer after peaceable entry into any lands or benefices of the church, one or more juſtices of the peace, taking ſufficient power of the county, may go to the place, and there record the force upon his own view, as in caſe of riots; and upon ſuch conviction, may commit the offender to gaol, till he makes fine and ranſom to the king. And the juſtice or juſtices have power to ſummon a jury, to try the *forcible* entry or detainer complained of; and if the ſame be found by that jury, then, beſides the fine on the offender, the juſtices ſhall make reſtitution by the ſheriff of the poſſeſſion, without inquiring into the merits of the title; for the force is the only thing to be tried, puniſhed, and remedied by them; and the ſame may be done by indictment at the general ſeſſions. But this proviſion does not extend to ſuch as endeavour to maintain poſſeſſion by force, where they or their anceſtors have been in the peaceable enjoyment of the lands and tenements for three years immediately preceding.

FORCIBLE *abduction* and *marriage*, vulgarly called ſtealing an heireſs. By ſtat. 3 Hen. VII. cap. 2. it is enacted, that if any perſon ſhall, for lucre, take any woman, maid, widow, or wife, having ſubſtance either in goods or lands, or being heir apparent to her anceſtors, contrary to her will, and afterwards ſhe be married to ſuch miſdoer, or by his conſent to others, or defiled; ſuch perſon, and all his acceſſaries, ſhall be deemed principal felons: and by ſtat. 39 Eliz. cap. 9. the benefit of clergy is taken away from all ſuch felons, except acceſſaries after the offence. See MARRIAGE.

FORCING, in the *Wine-trade*, a term uſed by the wine-coopers for the FINING down wines, and rendering them fit for immediate draught.

The principal inconvenience of the common way of FINING down the white-wines by iſinglaſs, and the red by whites of eggs, is the ſlowneſs of the operation; theſe ingredients not performing their office in leſs than a week, or ſometimes a fortnight, according as the weather proves favourable, cloudy, or clear, windy or calm: this appears to be matter of conſtant obſervation. But the wine-merchant frequently requires a method that ſhall, with certainty, make the wines fit for taſting in a few hours. A method of this kind there is, but it is kept in a few hands a valuable ſecret. Perhaps it depends upon a prudent uſe of a tartarized ſpirit of wine, and the common *forcing*, as occaſion is, along with gypſum, as the principal; all which are to be well ſtirred about in wine, for half an hour before it is ſuffered to reſt. Shaw's Lectures, p. 208.

FORCING, among *Gardeners*, is uſed for producing ripe fruits from trees before their natural ſeaſon. The method of doing it is this: a wall ſhould be erected ten foot high; a border muſt be marked out on the ſouth ſide of it, of about four foot wide, and ſome ſtakes muſt be faſtened into the ground all along the edge of the border; theſe ſhould be four inches thick. They are intended to reſt the glaſs-lights upon, which are to ſlope backwards to the wall, to ſhelter the fruit as there ſhall be occaſion; and there muſt be at each end a door to open either way, according as the wind blows. The frame ſhould be made moveable along the wall, that when a tree has been *forced* one year, the frame may be removed to another, and ſo on, that the trees may be each of them *forced* only once in three years, at which rate they will laſt a long time. They muſt be always well-grown trees that are choſen for *forcing*, for young ones are ſoon deſtroyed, and the fruit that is produced from them is never ſo well taſted. The fruits moſt proper for this management are the avant, or ſmall white nutmeg, the albermarle, the early Newington, and the brown nutmeg peaches; Mr. Fairchild's early, and the elrugo and Newington nectarins; the maſculine apricot, and the May-duke and May-cherry. For grapes, the white and black ſweet-water are the propereſt; and of gooſeberries, the Dutch white, the Dutch early green, and the walnut gooſeberry; and the large Dutch white, and large Dutch red currants.

The dung, before it is put to the wall, ſhould be laid together on a heap for five or ſix days, that it may heat uniformly through; and when thus prepared, it muſt be laid four foot thick at the baſe of the wall, and go ſloping up, till it is two foot thick at the top. It muſt be laid at leaſt within three or four inches of the top of the wall, and when it ſinks, as it will ſink two or three feet, freſh dung muſt be laid; for the firſt heat will do little more than juſt ſwell the bloſſom-buds. The covering of the trees with glaſſes is of great ſervice, but they ſhould be taken off to admit the benefit of gentle ſhowers to the trees, and the doors at the ends ſhould be either left entirely open, or one or both of them opened, and a mat hung before them, at once to let the air circulate and to keep out the froſts.

The dung is never to be applied till toward the end of November, and three changes of it will be ſufficient to ripen the cherries, which will be very fine in February. As to the apricots, grapes, nectarines, peaches, and plums, if the weather be milder, the glaſſes are to be opened to let in ſunſhine or gentle ſhowers.

If a row or two of ſcarlet ſtrawberries be planted at the back of the frame, they will ripen in February, or the beginning of March; the vines will bloſſom in April, and the grapes will be ripe in June.

It ſhould be carefully obſerved not to place early and late ripening fruits together, becauſe the heat neceſſary to force the late ones will be of great injury to the early ones, after they have fruited.

The maſculine apricot will be ripe in the beginning of April, the early nectarines will be ripe about the ſame time, and the forward ſort of plums by the latter end of that month. Gooſeberries will have fruits fit for tarts in January or February, and will ripen in March, and currants will have ripe fruit in April.

The trees need not be planted ſo diſtant at theſe walls as at others, for they do not ſhoot ſo freely as in the open air: if they are nine feet aſunder it is ſufficient. They ſhould be pruned about three weeks before the heat is applied. See HOT-*Bed*.

FORCING *pump*. See PUMP.

FORDICIDIA, in *Antiquity*, a religious feaſt among the Romans, held on the fifteenth of April: thus called from the Latin *forda, a cow big with calf*; and *cædo, I ſlay*, or *ſacrifice*; becauſe ſuch cows were herein ſacrificed to the goddeſs Tellus, or the earth.

Forda, a cow with calf, is formed, according to Ovid, from *fero, I bear*; or rather, as Scaliger and Salmaſius imagine, from the Greek φορας, φοραδος, the ſame.

Varro writes, that there were ſeveral of theſe cows ſacrificed in the Curiæ. And Livy and Halicarnaſſeus relate, that there was one in each Curia; ſo that there were thirty in all; which is confirmed by Ovid. Faſtor. lib iv. ver. 631.

The *fordicidia* were firſt inſtituted by Numa, on occaſion of a general barrenneſs among the cattle. Ovid gives a particular deſcription of the ceremony, in the paſſage above quoted: he adds, that part of theſe cows were ſacrificed in the temple of Jupiter; that is, in the Capitol.

FORE, applied to a ſhip, denotes all that part of a ſhip's frame and machinery which lies near the ſtem.

FORE *and aft* is uſed for the whole ſhip's length, or from end to end.

FORE *bowline* is the BOWLINE of the *fore*-ſail.

FORE-*caſtle of a ſhip*, is a ſhort deck placed in the *fore* part of the ſhip, above the upper deck. See *Tab. Ship, fig.* 2, *let.* BC, N° 23.

It is uſually terminated, both before and behind, by a breaſt-work in veſſels of war; the foremoſt end forming the top of the BEAK-*head*, and the hind-part reaching to the after-part of the fore-chains.

FORE-*cat-harpings* are thoſe that are uſed to brace in the upper part of the *fore*-ſhrouds. See CAT-*harpings*.

FORECLOSED, in our *ancient Law-books*, ſignifies barred, ſhut out, or excluded for ever: as, when the equity of redemption on MORTGAGES is barred.

FOREFANG, or FOREFENG, in *our old Writers*, is the taking of proviſion from any one in fairs or markets, before the king's purveyors are ſerved with neceſſaries for him.

The word is Saxon, compounded of *fore, ante*, and *fangen, prendere*.

FORE-*foot of a ſhip*, is a piece of timber that terminates the keel at the *fore* end. It is connected by a ſcarf to the extremity of the keel, of which it makes a part; and the other end of it, which is bent upwards into a kind of knee or crotch, is faſtened to the lower end of the ſtem, of which it makes a part, being alſo called the *gripe*.

FOREFOOT, in the *Sea-language*, is when one veſſel ſails, or lies acroſs another's way.

As if two ſhips being under ſail, and in ken of one another, one of them lies in a courſe, with her ſtern ſo much weather of the other, that if both hold on, the windward ſhip will run a-head of the other: ſuch ſhip is ſaid to lie with the other's *forefoot*.

Though, as ſoon as ſhe has paſſed, they ſay, ſhe is gone out a-head.

FOREGAVEL, *forgabulum*, in *our old Writers*, is uſed for a ſmall reſerved rent in money, or quit-rent.

FOREGOERS, in *our old Writers*. The king's ſurveyors were thus called from their *going before*, to provide for his houſhold. 36 Edw. III. 5.

FOREHEAD. *Wounds of the* Forehead. After a wound in this part is cleanſed from grumous blood and extraneous bodies, if any were left there, it ſhould be dreſſed with balſam of Peru, or ſome other vulnerary balſam; the lips of the wound are then to be kept together by long ſlips of ſticking plaſter, and over this a vulnerary plaſter is to be laid. Where the wound is large, theſe plaſters will not be ſufficient to bring on an even cicatrix; therefore, to forward this end, the wound ſhould be ſprinkled with a compound powder of comfrey-root and gum tragacanth and arabic, and with gum ſarcocolla in powder; and then the plaſters, compreſſes, and proper bandages, are to be applied. The bloody ſuture is never to be uſed in any wound of the face if it can be avoided, becauſe the ſtitches increaſe the number of the ſcars. If a wound of the *forehead* is made in a ſtraight line, the uniting bandage will be of great ſervice in forming a fine cicatrix: but if the *forehead* is wounded tranſverſely, and the fibres of the frontal muſcle are divided, it occaſions a great deformity; for the power of lifting up the eye-brows, and of contracting the ſkin of the *forehead*, ceaſes. In this caſe, after cleaning the wound, it is beſt to unite it with a ſtitch or two, dreſſing it with a vulnerary balſam, and laying on ſticking plaſters, ſecuring all with a proper bandage, and enjoining the patient to keep himſelf ſtill. In young and healthy perſons, the fibres of the muſcles join and unite when this method is uſed, without coming to a ſuppuration. Heiſter's Surg. p. 78.

FORE-*hooks of a ſhip*. See Breast-*hooks*.

Fore-*jeers*. See Jeers.

Fore-*jeer-bits*, in a *Ship*. See Bits.

FOREIGN, ſomething extraneous, or that comes from abroad.

The word is formed from the Latin *fores*, *doors*; or *foris*, *out of doors*; or *forum*, *market*, &c.

Foreign miniſter, *foreign* prince, *foreign* goods, &c. are thoſe belonging to other nations. See Minister, &c.

Foreign to the purpoſe, ſignifies a thing remote or impertinent.

Matter is *foreign* to the idea of ſpace, i. e. it is not inherent therein, but adventitious thereto.

Foreign plants are particularly called exotics. *Foreign foſſils*; ſee Fossil. *Foreign motion*; ſee Motion. *Foreign canons*; ſee Canon.

In ſome univerſities they give the appellation *foreign doctors*, *doctores forenſes*, to ſuch as do not reſide in the place, or the univerſity; but take degrees to go and live elſewhere, and in other countries.

In the Life of St. Paul, biſhop of Verdun, written by an anonymous author, and publiſhed from a MS. about four hundred years old, by Bollandus, we meet with *forenſis preſbyter*, for a prieſt who lives in another part. The ſame Bollandus notes, that St. Ambroſe uſes the word *forenſis* for exterior.

Foreign, or **Foraine** *Traitte*, is a duty belonging to the king of France, of one-twentieth of the value of all goods imported, or exported out of the kingdom.

Foreign, is uſed in *Law*, in ſeveral ſenſes, and joined with divers ſubſtantives. Thus,

Foreign *anſwer*, is ſuch an anſwer as is not triable in the country where it is made.

Foreign *attachment*. See Attachment.

Foreign *bill of exchange*. See Bill.

Foreign *matter*, in *Law*, is matter triable in another county; or matter done in another county.

Foreign *oppoſer*, or *appoſer*, is an officer in the exchequer, to whom all ſheriffs or bailiffs do repair to be appoſed by him of their green wax, after they are appoſed of their ſums out of the pipe-office; and who from thence draws down a charge upon one of them to the clerk of the pipe.

His buſineſs is to examine the ſheriff's eſtreats with the record, to aſk the ſheriff what he ſays to every particular ſum therein.

Foreign *plea*, is a refuſal of the judge as incompetent, becauſe the matter in hand was not within his precinct.

Foreign *ſeamen*, ſerving two years on board Britiſh ſhips, whether of war, trade, or privateers, during the time of war, ſhall be deemed natural born ſubjects. But the perſons ſo naturalized are not capable of being of the privy council, or members of parliament, or of taking any place of truſt, civil or military, or to have any grant from the crown of lands. Stat. 13 Geo. II. cap. 3. ſect. 2.

Foreign *ſervice*, is ſuch ſervice whereby a mean lord holdeth of another, without the compaſs of his own fee; or that which a tenant performeth, either to his own lord, or to the lord paramount, out of his own fee.

Foreign *ſervice* is alſo uſed to denote military ſervice performed to *foreign* ſtates. The ſtat. 3 Jac. I. cap. 4. makes it felony for any perſon to go out of the realm to ſerve any *foreign* prince, without having firſt taken the oath of allegiance before his departure: and it is alſo felony for any gentleman, or perſon of higher degree, who hath borne any office in the army, to go out of the realm to ſerve ſuch *foreign* prince or ſtate, without previouſly entering into a bond with two ſureties, not to be reconciled to the ſee of Rome, or enter into any conſpiracy againſt his natural ſovereign. And by ſtat. 9 Geo. II. cap. 30. enforced by 29 Geo. II. cap. 17. if any ſubject of Great Britain ſhall enliſt himſelf, or any perſon ſhall procure him to be enliſted, in any *foreign* ſervice, or detain or embark him for that purpoſe, without licence under the king's manual, he ſhall be guilty of felony without benefit of clergy; but if the perſon ſo enliſted or enticed, diſcover his ſeducer within fifteen days, ſo that he may be apprehended and convicted of the ſame, he ſhall be indemnified. By ſtat. 29 Geo. II. cap 17. to ſerve under the French king, as a military officer, is felony without benefit of clergy; and to enter into the Scotch brigade, in the Dutch ſervice, without taking the oaths of allegiance and abjuration, incurs a forfeiture of five hundred pounds.

FOREIGNERS are the natural born ſubjects of ſome foreign prince. *Foreigners* reſiding ſeven years in the Britiſh plantations, without any longer abſence than two months at one time, and taking the oaths, are to be deemed natural born ſubjects. But, excepting Quakers and Jews, all other perſons muſt receive the ſacrament in ſome proteſtant or reformed congregation in Great Britain, or the colonies; a certificate whereof muſt be produced at the time of taking the oaths. 13 Geo. II. cap. 7. ſect. 2. See Naturalization.

FOREJUDGED *the court*, is when an officer of any court is baniſhed, or expelled the ſame, for ſome offence; or for not appearing to an action by bill filed againſt him: in which latter caſe, he is not to be admitted to officiate, till he appear to the bill. Anno 2 Hen. IV. cap. 8.

He ſhall loſe his office, and be *forejudged* the court, &c.

Forejudicare, interdum eſt male judicare. Spel.

FOREJUDGER, in *Law*, ſignifies a judgment, whereby a man is deprived, or put by a thing in queſtion.

FORELLA, in *Ichthyology*, a name given by Figulus and others to the trout.

FORE-*knight*, in the *Sea-language*, a piece of wood, carved in figure of a man's head, and faſt bolted to the beams upon the ſecond deck.

FORELAND, or **Foreness**, in *Navigation*, a point of land jutting out into the ſea.

Foreland, in *Fortification*, is a ſmall ſpace of ground between the wall of a place, and the moat; called alſo berme, and *liziere*.

FORELOCKS, in a *Ship*, are little flat wedges, like pieces of iron, uſed at the ends of bolts, to keep them from flying out of the holes.

FORELOIN, among *Hunters*, is when a hound going before the reſt of the cry, meets chace, and goes away with it.

FORELORN *hope*, in an *Army*, an almoſt obſolete expreſſion. See Enfans *perdus*.

FORE-*maſt of a ſhip*, is a round large piece of timber, ſeated in her fore-part, on which is borne the fore-ſail, and fore-top-ſail yard. See *Tab. Ship*, *fig.* 1. N° 81. See Mast.

Fore-*maſt-men*, in a *Man of War*, thoſe on board that take in the top-ſails, fling the yards, furl the ſails, browſe, triſe, and take their turn at the helm, &c.

FORENSIC *ſervice*. See Service and Foreign.

FORENSIS *toga*. See Toga.

FORE-*rake*, in *Sea-language*. See Rake.

Fore-*reach*, in *Sea-language*. The ſeamen ſay one ſhip *fore-reaches* upon another, when both ſailing together, ſhe ſails better, or outgoes the other.

Fore-*ſail*, the ſail of the fore-maſt. See Sail.

FORESCHOKE, *derelictum*, anciently ſignified as much as *forſaken* in modern language.

It is eſpecially uſed in one of our ſtatutes, for land or tenements ſeized by the lord, for want of ſervices due from the tenant; and ſo quietly held and poſſeſſed beyond the year and day.

As if we ſhould ſay, that the tenant, who ſeeing his lands or tenements taken into the lord's hand, and poſſeſſed ſo long, takes not the courſe appointed by law to recover them, does, in due preſumption of law, diſavow or forſake all the right he has to them. In which caſe, ſuch lands ſhall be called *foreſchoke*, ſays the ſtat. 10 Ed. II. cap. 1.

FORE-*ſhrouds*. See Shrouds.

FORESKIN. See Prepuce.

FORE-*ſtay*. See Stay.

FOREST, *ſylva*, in *Geography*, a great wood; or a large extent of ground covered with trees.

The word is formed of the Latin *foreſta*, which firſt occurs in the Capitulars of Charlemagne, and which itſelf is derived from the German *forſt*, ſignifying the ſame thing. Spelman derives it from the Latin *foris reſtat*, by reaſon *foreſts* are out of towns. Others derive *foreſta a feris*, q. d. *foreſta, quod ſit tuta ſtatio ferarum*, as being a ſafe ſtation, or abode, for wild beaſts.

The Caledonian and Hercynian *foreſts* are famous in hiſtory. The firſt was a celebrated retreat of the ancient Picts and Scots: the latter anciently poſſeſſed the greateſt part of Europe; particularly Germany, Poland, Hungary, &c. In Cæſar's time it extended from the borders of Alſatia and Switzerland to Tranſylvania, and was computed ſixty days journey long, and nine broad: ſome parts or cantons thereof are ſtill remaining. The *foreſt* of Dean in Glouceſterſhire, is famous for the iron works therein.

The ancients adored *foreſts*, and imagined a great part of their gods to reſide therein: temples were frequently built in the thickeſt *foreſts*, the gloom and ſilence whereof naturally inſpired ſentiments of devotion, and turned men's thoughts within themſelves.

For the like reaſon, the ancient Druids made *foreſts* the place of their reſidence, and performed their ſacrifices, inſtructed their youth, and gave laws therein. See DRUIDS.

FOREST, in a *Law-ſenſe*, is defined a certain territory of woody grounds and fruitful paſtures, privileged for wild beaſts, and fowls of *foreſt*, chace, and warren, to reſt and abide in, under the protection of the king, for his recreation and delight; bounded with unremoveable marks and meres, either known by matter of record or preſcription; repleniſhed with wild beaſts of venery, or chace, and with great coverts of vert for ſuccour of the ſaid beaſts; for preſervation and continuance whereof, with the vert and veniſon, there are certain peculiar laws, privileges, and officers.

The properties and characters of a *foreſt* are, firſt, that it cannot be in the hands of any but the king; becauſe none elſe had power to conſtitute ſuch commiſſions as are neceſſary to the being of a *foreſt*, beſide the king; as, particularly, that of juſtice in eyre of the *foreſt*.

And yet the abbot of Whitby had a *foreſt* by grant of king Henry II. and king John, with all officers incident thereto.

The ſecond character, is the courts belonging thereto, which are, the *juſtice-ſeat*, and the *regard*, held every third year; the *ſwanimote*, held thrice every year; and the *attachment*, once every forty days.

The third characteriſtic is the officers belonging thereto, for preſervation of the vert and veniſon; as the juſtices of the *foreſt*, the warder or keeper, ranger, verderers, foreſters, agiſtors, regarders, bailiffs, beadles, &c. See each under its proper article, JUSTICE *of the foreſt*, KEEPER, &c.

But the moſt eſſential mark of a *foreſt* is the ſwanimote, which is no leſs incident thereto, than the court of pyepowder to a fair. If that fail, it ceaſes to be a *foreſt*, and commences a chace. See SWANIMOTE.

The way of making a *foreſt* is thus: certain commiſſioners, appointed under the great ſeal, view the ground intended, and fence it round; this being reported in chancery, the king cauſes it to be proclaimed throughout the county where the land lies, that it is a *foreſt*, and is thenceforth to be governed by the laws of the *foreſt*; and prohibits all perſons from hunting therein, without his leave.

New *Foreſt* in Hampſhire, hiſtory tells us, was made by the deſtruction of twenty-two pariſh-churches, and all the villages, manors, chapels, &c. for the ſpace of thirty miles together. Beſide New *Foreſt*, there are now ſubſiſting ſixty-eight *foreſts* in England, thirteen chaces, and eight hundred parks.

Our ancient Norman kings were the firſt who incloſed *foreſts*, and ſettled the juriſdiction thereof. In the courſe of a few reigns from the Conqueſt, no leſs than ſixty-eight *foreſts* were incloſed; the ſtricteſt laws were made to ſecure them, and the ſevereſt penalties inflicted on all treſpaſſers thereon.

William the Conqueror decreed the eyes of any perſon to be pulled out, who took either a buck or boar: William Rufus made the ſtealing of a doe a hanging matter; the taking of a hare was fined at 20*s*. and a coney at 10*s*. Eadmer adds, that fifty perſons of fortune, being apprehended by that laſt prince for killing his bucks, were forced to purge themſelves by the fire of ordeal, &c.

Henry I. made no diſtinction between him who killed a man, and him who killed a buck; and puniſhed thoſe who deſtroyed the game, though not in the *foreſt*, either by forfeiture of their goods, or loſs of limbs; though Henry II. remitted it for a temporary impriſonment.

Richard I. revived the old diſcipline of gelding and pulling out the eyes of thoſe convicted of hunting in the *foreſt*: but he afterwards relaxed a little, and was contented to make ſuch convicts abjure the realm, or be committed, or pay a fine.

FOREST, *aſſize of the*. See ASSIZE.

FOREST, *charter of the*. See CHARTER *of the foreſt*.

FOREST, *drift of the*. See DRIFT.

FOREST, *foot of the*. See FOOT.

FOREST, *keeper of the*. See KEEPER.

FOREST, *perambulation of the*. See PERAMBULATION.

FOREST, *repoſition of the*. See REPOSITION.

FOREST, *waſte of the*. See WASTE.

FOREST is alſo uſed adjectively. The *foreſt* cities of the empire are four cities ſituate in the ancient Black *Foreſt*, or Sylva Nigra, a part of the ancient Hercynian *Foreſt*, viz. Rhinfield, Waldhuſt, Seckingen, and Lauffembourg. But, now ſince the bounds of the Black *Foreſt* are contracted, theſe cities are out of the limits thereof.

FOREST-*law*. The *foreſt* laws are peculiar laws, different from the common law of England.

Before the making of Charta de *Foreſta*, in the time of king John and his ſon Henry III. confirmed in parliament by 9 Henry III. offences committed therein were puniſhed at the pleaſure of the king, in the ſevereſt manner. By this charter, many *foreſts* were diſafforeſted and ſtripped of their oppreſſive privileges, and regulations were made for the government of thoſe that remained; particularly, killing the king's deer was made no longer a capital offence, but only puniſhed by fine, impriſonment, or abjuration of the realm: yet even in the charter there were ſome grievous articles, which the clemency of later princes have ſince by ſtatute thought fit to alter *per aſſiſas* foreſtæ.

And to this day, in treſpaſſes relating to the *foreſt*, *voluntas reputabitur pro facto*; ſo that if a man be taken hunting a deer, he may be arreſted, as if he had taken a deer. The foreſter may take and arreſt a man, if he be taken either at dog-draw, ſtable-ſtand, back-bear, or bloody-hand, notwithſtanding that three of theſe be only preſumptions. See DOG-*draw*, STABLE-*ſtand*, &c. See alſo BLACK-*act*.

FOREST-*trees*. Many are wholly averſe to pruning *foreſt*-trees; but though it is to be done with care, and under proper regulations (ſee LOPPING), yet it is by no means to be wholly omitted. It may be obſerved in *foreſts* and large woods, that for one tree which thrives well, there are twenty that grow faulty, and all this is owing to the want of pruning or lopping in a proper manner; for this, when wiſely executed, is a renewal of their age, and of their growth too; the want of it being what occaſions trees to run out into ſuckers, and to load themſelves with uſeleſs boughs, which draw away the ſap from the upper part, and make it grow knotty and diſtempered, and uſually covered with moſs.

If a tree grow crooked, the buſineſs of the owner is to cut it off ſloping at the crooked place, and nurſe up ſome young bough that grows upright from that part, and it will make it a ſtraight body. This is not to be done when trees are very large, but the careful owner will not ſuffer them to grow very large without doing it. Mortimer's Huſbandry, vol. ii. p 84.

There is alſo another caution, which is, that ſoft woods do not bear this heading ſo well as the harder, and the beech in particular is leſs able to bear it than any other. If young trees grow but a little crooked, they may be cured by only ſhreding up the branches while young, all the way up the body, till paſt the crooked part. When cattle have cropped any of the ſhoots of young trees, they ſhould be cut off cloſe to the body, for they not only never grow well after it, but the cattle uſually leave a drivel where they have bitten, which ſometimes occaſions a rot of the branch, and endangers the whole tree. The beſt time for pruning young *foreſt*-trees is in February; and it ſhould be done where there is occaſion every year, or at the utmoſt every ſecond year, ſo that the tree may be able to overgrow the knot, and the place not liable to put out ſuckers, becauſe the ſap has had no great recourſe to it. When it is neceſſary to cut off a bough of any bigneſs, there muſt always be given a chop or two underneath, oppoſite to the part where it is cut above, otherwiſe the weight of the bough, in its fall, is apt to ſtrip off the bark from the remaining ſtump, to the great detriment of the tree. When trees are kept for pollards, they muſt be regularly lopped every two years; for if the branches are ſuffered to grow longer than that, they are apt to be faulty at the wound when cut off, and to let in water, the conſequence of which will be the decay of the tree, and it can no more bear any great quantity of branches or top.

The general growth of trees in thickneſs of the body, is from one inch to two inches in a year. The large and ſmall increaſe much in the ſame proportion in this reſpect, if they are in a like thriving condition. The goodneſs of ſoil will make a great difference in this growth, as has been experienced by Mortimer, who obſerved, that the common increaſe of the oak is about an inch and a quarter in thickneſs in the body in a year; but a large oak that grew in one of his own ploughed fields, where the earth was tilled and manured every year, and that often had cattle lying under it, and dunged about its roots, grew annually no leſs than four inches in thickneſs. This ſhews the great advantage of digging about the roots of trees, and dunging them, and may ſerve as a hint for a very practicable method of increaſing the growth of trees on occaſion. The killing of weeds that grow about the roots of trees, is one great method of haſtening their growth; but there is an error which ſome have run into on this principle, that is to be carefully avoided. Theſe people obſerving the great damage that weeds do the trees, have ſuppoſed that ſhrubs and underwood in hedges and coppices do the ſame; but this is a miſtake. Experience ſhews, that *foreſt*-trees thrive better and grow faſter in coppices than when they ſtand ſingle; and it is certain that, next to digging and dunging about the roots, the growth of underwood about the tree is the beſt method of promoting its increaſe; theſe ſhrubs keeping the earth moiſt about the roots of the tree, and manuring all the earth about with their falling leaves and rotten branches, which break off at times, and which are the richeſt of all manure: a little rotten wood blended among even a bad ſoil converting it into the nature of garden-mould. Mortimer's Huſbandry, vol. ii. p. 86. See TREES and TIMBER.

FOREST-*trees, tranſplanting of.* See TRANSPLANTING.

FORE-*ſtaff*, an inſtrument uſed at ſea, for taking the altitudes of heavenly bodies.

The *fore-ſtaff*, called alſo *croſs-ſtaff*, takes its denomination hence, that the obſerver, in uſing it, turns his face towards the object, in contradiſtinction to the back-ſtaff, where he turns his back to the object.

The *fore*, or croſs-ſtaff, repreſented in *Tab. Navigat. fig.* 12. conſiſts of a ſtrait, ſquare ſtaff, AB, graduated like a line of tangents, and four croſſes, or vanes, FF, EE, DD, CC, which ſlide thereon. The firſt and ſhorteſt of theſe vanes, FF, is called the *ten croſs*, or *vane*, and belongs to that ſide of the inſtrument, whereon the diviſions begin at three degrees, and end at ten. The next longer vane, EE, is called the *thirty croſs*, belonging to that ſide of the ſtaff, wherein the diviſions begin at ten degrees, and end at thirty, called the *thirty ſcale*. The next vane, DD, is called the *ſixty croſs*, and belongs to the ſide where the diviſions begin at twenty degrees, and end at ſixty. The laſt, and longeſt, CC, called the *ninety-croſs*, belongs to the ſide whereon the diviſions begin at thirty degrees, and end at ninety.

FORE-*ſtaff, uſe of the.* The great uſe of this inſtrument is to take the height of the ſun, and ſtars, or the diſtance of two ſtars: and the ten, thirty, ſixty, or ninety croſſes, are to be uſed according as the altitude is greater, or leſſer; that is, if the altitude be leſs than ten degrees, the ten croſs is to be uſed; if above ten, but leſs than thirty, the thirty croſs is to be uſed, &c.

Note, For altitudes greater than thirty degrees, this inſtrument is not ſo convenient as a quadrant, or ſemicircle.

FORE-*ſtaff, to obſerve an altitude by the.* Apply the flat end of the ſtaff to your eye, and look at the upper-end of the croſs for the center of the ſun, or ſtar, and at the lower end for the horizon. If you ſee the ſky, inſtead of the horizon, ſlide the croſs a little nearer the eye; and if you ſee the ſea, inſtead of the horizon, ſlide the croſs farther from the eye: and thus continue moving, till you ſee exactly the ſun or ſtar's center by the top of the croſs, and the horizon by the bottom thereof.

Then the degrees and minutes, cut by the inner edge of the croſs upon the ſide of the ſtaff, peculiar to the croſs you uſe, give the altitude of the ſun or ſtar.

If it be the meridian altitude you want, continue your obſervation as long as you find the altitude increaſe, ſtill moving the croſs nearer to the eye.

By ſubtracting the meridian altitude thus found, from ninety degrees, you will have the zenith diſtance.

To work accurately, an allowance muſt be made for the height of the eye above the ſurface of the ſea, viz. for one Engliſh foot, 1 minute; for five foot, 2½; for ten foot, 3½; for twenty foot, 5; for forty foot, 7, &c.

Theſe minutes ſubtracted from the altitude obſerved, and added to the zenith diſtance obſerved, give the true altitude, and zenith diſtance.

FORE *ſtaff. To obſerve the diſtance of two ſtars, or the moon's diſtance from a ſtar, by the* Fore-*ſtaff.* Apply the inſtrument to the eye, and looking to both ends of the croſs, move it nearer, or farther from the eye, till you ſee the two ſtars; the one on the one end, and the other on the other end of the croſs: then the degrees and minutes cut by the croſs on the ſide proper to the vane in uſe, give the ſtars diſtance.

FORESTAGE, FORESTAGIUM, in *our ancient cuſtoms*, an obſolete duty, or ſervice, paid by the foreſter to the king.

In Britany, Lobineau obſerves, the office of foreſters was held by gentlemen of the firſt rank, who for their *foreſtage* were obliged to furniſh the lord, when he kept open houſe, with cups and ſpoons.

FORESTAGE alſo ſeems to have been uſed for a duty payable to the king's foreſters. *Et ſint quieti de thelonio, & paſſagio, & de* foreſtagio, &c. Chart. Edw. I.

It may likewiſe be taken for a right to uſe the foreſt, or a taking of reaſonable ESTOVERS.

FORESTAL, or FORSTAL, in Domeſday wrote FORISTEL, is an intercepting in the highway; or ſtopping, or even inſulting a paſſenger therein.

The word is formed of the Saxon *fore, before*; and *ſtal, ſtation.* In the laws of Henry I. the ſenſe of the word is thus explained: foreſtal *eſt, ſi quis ex tranſverſo incurrat, vel in viam expectet, & aſſaliet inimicum ſuum.*

FORESTALLER, a perſon who *foreſtalls* the market, or buys up goods upon the road.

FORESTALLING, the buying or bargaining for corn, cattle, or other merchandize, by the way, before it reaches the market, or fair, to be ſold; or by the way, as it comes beyond the ſeas, or otherwiſe, toward any city, port, haven, or creek, of this realm, with deſign to take advantage thereof, and ſell it again at a more advanced and dear rate.

Fleta ſays, it ſignifies *obſtructionem viæ, vel impedimentum tranſitus & fugæ averiorum.*

By the 5th and 6th Edw. vi. cap. 14. any buying or contracting for merchandize, victuals, or other things whatſoever, in the way, coming by land or water to any fair or market, or to any port, &c. to be ſold, or cauſing the ſame to be bought; or diſſuading people by word, letter, or meſſage, or otherwiſe, from bringing ſuch things to market; or perſuading them to enhance the price after they are brought thither; is *foreſtalling*: and the party guilty of any offence of *foreſtalling*, &c. upon conviction at the quarter-ſeſſions by two witneſſes, on bill, information, preſentment, &c. ſhall, for the firſt offence, loſe the goods ſo bought, or the value of them, and ſuffer two months impriſonment; for the ſecond offence, he ſhall forfeit double the value, and be impriſoned ſix months; and for the third offence, he ſhall loſe all his goods, be ſet upon the pillory, and be impriſoned at the king's pleaſure.

FORESTALLING is particularly uſed, in Crompton, for ſtopping a deer broken out of the foreſt, and preventing its returning home again; or, a lying between him and the foreſt in the way he is to return.

FORESTER, a ſworn officer of the foreſt, appointed by the king's letters patent to walk the foreſt, and watch the vert and veniſon; as alſo to attach and preſent all treſpaſſes againſt both, within his bailiwick or walk, to the foreſt-courts, to be puniſhed according to their offences.

Though the letters patent of a *foreſter* be ordinarily only granted *quamdiu bene ſe geſſerit*; yet they are granted to ſome and their heirs, who are hereby called *foreſters in fee.*

Sir William Temple relates, that the Franks having ſubdued all Gaul, their princes reduced Flanders into a kind of government, and gave the quality of *foreſter*, with part of the province, to the braveſt of their captains.

This quality of lord *foreſter* held till the time of Charlemagne, or, according to others, of Charles the Bald, in whoſe time Flanders being erected into a county, the title of *foreſter* was changed into that of count.

FORESTID *ore*, in *Mining*, is ore got out of earth and dirt that has been waſhed, and ore taken from it before.

FORE-*top of a ſhip.* See TOP.

FORE-*top-maſt* is half the length of the fore-maſt (ſee *Tab. Ship, fig,* 1. 11. 102.) and the fore-top-gallant-maſt half the length of the *fore-top-maſt.* See TOP-*maſt* and MAST.

FORE-*tooth.* Striking out the *fore-tooth* is a *mayhem.*

FORE-*yard.* See YARD.

FORFEITURE orignally ſignifies a tranſgreſſion or offence againſt ſome penal law.

The word is formed of the baſe Latin *foriſfactura*; whence *forfaitura*, and *forfaictura*, and the French *forfait. Foriſfactura* comes of *foriſfacere*, which, according to Iſidore, ſignifies *to hurt*, or *offend*, *facere contra rationem*; and which is not improperly derived of *foris, out*, and *facere, to do*, q. d. an action out of rule, or contrary to the rules.

But with us, it is now more frequently uſed for the effect of ſuch tranſgreſſion, or the loſing ſome right, privilege, eſtate, honour, office, or effects, in conſequence thereof, than for the tranſgreſſion itſelf: as *forfeiture of eſcheats, forfeiture of goods*, &c. A fee becomes vacant by the *forfeiture* or rebellion of the vaſſal.

Goods *forfeited*, and goods confiſcated, differ: thoſe which have a known owner, who has committed ſome offence, whereby he loſes his goods, are ſaid to be *forfeited*: thoſe which an offender diſavows, as not his own, and which are not claimed by any other, are ſaid to be confiſcated, ſtat. 25 Edw. III. Add, that *forfeiture*, or *forfeit*, is more general; and confiſcation more particular, being principally uſed for ſuch as *forfeit* only to the king's exchequer.

FORFEITURE, *full, plena foriſfactura*, called alſo *plena vita*, is a *forfeiture* of life and member, and all elſe that a man has.

This obtains in criminal caſes, as where a perſon is attainted of treaſon, felony, &c. There is alſo a *forfeiture* of lands, &c. in civil caſes. There are various degrees and various means, whereby lands, tenements, and hereditaments, may be *forfeited*. 1. By crimes and miſdemeanors: of theſe, the principal offences that induce a *forfeiture* of lands and tenements to the crown, are treaſon, felony, miſpriſion of treaſon, præmunire; drawing a weapon on a judge, or ſtriking any one in the preſence of the king's principal courts of juſtice, and popiſh recuſancy or non-obſervance of certain laws enacted in reſtraint of papiſts. 2. By ALIENATION, contrary to law, which may be in MORTMAIN; to an alien, on account of his incapacity to hold the lands ſo alienated; and by particular tenants, when the alienations are greater than the law entitles them to make, and diveſt the remainder or reverſion; in which caſe they become *forfeitures* to him whoſe right is hereby injured: there is alſo an alienation by DISCLAIMER. 3. By non-preſentation to a benefice, when the *forfeiture* is denominated a LAPSE. 4. By SIMONY. 5. By breach or non-performance of CONDITIONS, annexed to eſtates, either expreſſed or legally implied. 6 By WASTE. 7. By breach of COPYHOLD cuſtoms. 8. By BANKRUPTCY. Goods and chattels, likewiſe, are totally *forfeited* by conviction of high treaſon, or miſpriſion of treaſon; of petit treaſon; of felony in general, and particularly of felony *de ſe*, and of man-ſlaughter; nay, even by conviction of excuſable homicide; by outlawry for treaſon or felony; by conviction of petit larceny; by flight in treaſon or felony, even though the party be acquitted of the fact; by ſtanding mute, when arraigned of felony; by pretended prophecies, upon ſecond conviction; by owling; by the reſiding abroad of artificers; and by challenging to fight on account of money won at gaming. This *forfeiture* commences from the time of conviction, and not the time of committing the fact, as in *forfeitures* of real property. However, a fraudulent conveyance of chattels, between the time of committing the fact and conviction of the offender, to defeat the intereſt of the crown, is made void by ſtatute 13 Eliz. cap. 5. There are alſo various other *forfeitures* inflicted, by ſpecial ſtatutes, for particular crimes and miſdemeanors; ſome of which are *mala in ſe*, or offences againſt the divine law, either natural or revealed; but by far the greateſt part are *mala prohibita*, or ſuch as derive their guilt merely from their prohibition by the laws of the land: ſuch as the *forfeiture* of 40*s*. per month by the ſtat. 5 Eliz. cap. 4. for exerciſing a trade without having ſerved ſeven years apprenticeſhip to it; and the *forfeiture* of 10*l*. by 9 Ann. cap. 23. for printing an almanac without a ſtamp. Blackſt. Com. vol. ii. p. 267, &c. 420, &c. vol. iv. p. 370, &c. 416, &c.

The true reaſon of any *forfeiture* for crimes, ſays judge Blackſtone, is this: that all property is derived from ſociety, being one of thoſe civil rights which are conferred upon individuals, in exchange for that degree of natural freedom, which every man muſt ſacrifice when he enters into ſocial communities: if, therefore, a member of any national community violates the fundamental contract of his aſſociation, by tranſgreſſing the municipal law, he *forfeits* his right to ſuch privileges as he claims by that contract; and the ſtate may very juſtly reſume that portion of property, or any part of it, which the laws have before aſſigned him. Hence, in every offence of an atrocious kind, the laws of England have exacted a total confiſcation of the moveables or perſonal eſtate; and in many caſes a perpetual, in others only a temporary, loſs of the offender's immoveables or landed property; and have veſted them both in the king, who is the perſon ſuppoſed to be offended, being the one viſible magiſtrate in whom the majeſty of the public reſides. Blackſt. Com. vol. i. p. 299.

FORFEITURE *of marriage, foriſfactura maritagii*, a writ, which formerly lay againſt him, who, holding by knight's ſervice, and being under age, and unmarried, refuſed her whom the lord offered him, without his diſparagement, and married another.

FORFEX, in *Surgery*, a pair of ſciſſars wherewith things may be cut.

The word is ſometimes alſo uſed for pincers, nippers, or pliers; and is often confounded with *forceps*. Blanchard, and, after him, Quincy, deſcribes a *forfex* as an inſtrument for drawing teeth.

FORFICULA. See EAR-*wig*.

FORFICULA *marina*, the *ſea-ear-wig*, a name given by authors to an inſect frequently found about the ſea-ſhores, and having ſome ſort of external reſemblance to the common *ear-wig*. It is of the ſize of the common *ear-wig*, and is of a mixed colour, of a deep black and a ſilvery white. The ſhoulders are ſomewhat gibboſe, the eyes ſtanding cloſe to one another on the ſummit of the head; the antennæ are long and very ſlender. It has eight pair of legs on the anterior part of the body, and eight pair more at the hinder part, and there are three or four briſtles at the tail. It moves about very ſwiftly, and lives on rocks and among ſtones.

FORFIELD, in *Mining*, is the fartheſt place that a man has wrought in his ground; or the end of a meer above ground.

FORGE properly ſignifies a little furnace, wherein ſmiths, and other artificers in iron or ſteel, &c. heat their metals red-hot, in order to ſoften and render them more malleable and manageable on the anvil, &c.

We ſay, a farrier's *forge*, ſilverſmith's *forge*, cutler's *forge*, lockſmith's *forge*, &c. The *forge* uſed by the ſeveral operators in iron is very ſimple; we ſhall inſtance in that of the blackſmith, to which all the reſt are reducible.

The hearth, or fire-place, is a maſs of brick, about two feet ſix inches high: the back of the *forge* is built upright to the cieling, and is incloſed over the fire-place with a hovel, which leads into a chimney, to carry away the ſmoke. In the back of the *forge*, againſt the fire-place, is a thick iron plate, with a taper pipe fixed therein, about five inches long, called the *tewel*, into which the noſe or pipe of the bellows is received: the uſe of this plate and tewel is, to preſerve the pipe of the bellows, and the back of the hearth from being burnt. Right before the back, at about two feet diſtance, is the trough, filled with water, to wet the coals with, and thereby increaſe their force, as alſo to quench the iron in. Behind the back of the *forge* is placed the bellows, one of whoſe boards is fixed ſo, that it moves not, either upward or downward; and to the other is fitted a rope, chain, or even a rod, which riſing perpendicularly, is fixed to a croſs piece, called the *rocker*, which moving on a kind of fulcrum near the middle, ſerves as a handle. By drawing down this handle, the moveable board of the bellows riſes, and, by a conſiderable weight at the top of its upper ſide, it ſinks down again, and, by this alternate agitation, performs the neceſſary motions of a pair of bellows. See BELLOWS.

Braziers and copperſmiths *forge* differs but little from that already deſcribed; only that it is much leſs, and that nothing is burnt in it but charcoal, the metals uſed by theſe operators not working well with pit-coal.

FORGE is alſo uſed for a large furnace, wherein iron ore, taken out of the mine, is melted down.

But this is not ſo properly called a *forge* as a furnace.

FORGE is more properly uſed for another kind of furnace, wherein the iron ore, melted down and ſeparated in a former furnace, and there caſt into ſows and pigs, is heated, and fuſed over again, and beaten afterwards with large hammers, and thus rendered more ſoft, pure, ductile, and fit for uſe.

Of theſe *forges* there are two kinds, which the iron ſucceſſively paſſes through, before it comes to the ſmith.

The firſt is called the FINERY, where the pigs are worked into groſs iron, and prepared for the ſecond, which is called the CHAFERY, where it is farther wrought into bars fit for uſe.

FORGE-*mills*. See MILL.

FORGE, *travelling*, in the *Train of Artillery*, is a kind of portable ſmith's ſhop, by means of which any neceſſary work may be performed on a march, as well as in camp. This kind of *forge* has been formerly fixed in a carriage with two wheels, and wooden ſupporters, to prop the *forge* when uſed; but they are now commonly made with four wheels, ſo that they ſtand more firmly, and are more eaſily removed.

FORGE *for red-hot balls*, is a place where the balls are made red hot before they are fired off: it is conſtructed about five or ſix feet below the ſurface of the ground, of ſtrong brick-work, and an iron grate, upon which the balls are laid with a large fire under them.

FORGER *of falſe deeds*, ſignifies either him that fraudulently makes and publiſhes falſe writings, to the prejudice of any man's right, or elſe the writ that lies againſt him who commits this offence.

Fitz. Nat. Br. fol. 69. b. ſays, that a writ of deceit lies againſt him who commits this offence; and the penalty of it is declared in the ſtat. 5 Eliz. cap. 14.

FORGERY, in *Law*, is where a perſon fraudulently makes and publiſhes falſe writings, to the prejudice of another man's right: and *forgery* is either at common law, or by ſtatute, puniſhable by indictment, information, &c. But there can be no *forgery* where no one can be prejudiced by it, but the perſon doing it. 1 Salk. 375. *Forgery*, by common law, extends to a falſe and fraudulent making or altering of a deed or writing, whether it be matter of record, or any other writing, deed, or will. 3 Inſt. 169. 1 Roll. abr. 65. Not only where a falſe deed is made, but where a fraudulent alteration is made of a true deed in a material part of it, it is *forgery*.

By a late act, an offender, *forging* or counterfeiting any deed, will, bond, bill of exchange, note, or acquittance for money, or any indorſement or aſſignment of a bill, &c. with intent to defraud any perſon, or publiſhing ſuch falſe deed, &c. to be true, knowingly, ſhall be guilty of felony, and ſuffer death as a felon; but not to work any corruption of blood, &c. Stat. 2 Geo. II. cap. 25. 7 Geo. II. cap. 22.

By an act paſſed in 1778, explaining the former laws on the ſubject of *forgeries*, it is enacted, that making or forging, &c. or cauſing to be made or forged, &c. or aſſiſting in making or forging, &c. any acceptance of any bill of exchange, or the number or principal ſum of any accountable receipt for any note or bill, or any warrant or order for payment of money or delivery of goods, with intention to defraud any corporation, or publiſhing as true any ſuch forged acceptance, &c. incur the guilt of felony, and the puniſhment of death, without benefit of clergy. 18 Geo. III.

FORGING, in the *Mechanic Arts*, the act of beating or hammering iron on an anvil, after having firſt made it red-hot in the *forge*, in order to extend it into various forms, and faſhion it into works.

Iron is hammered and forged two ways; either by the force of the hand, in which there are uſually ſeveral perſons employed, one of them turning the iron, and hammering likewiſe, and the reſt only hammering.

Or, it is done by the force of a water-mill, which raiſes and works ſeveral huge hammers, beyond the force of man, under the ſtrokes whereof the workmen preſent large lumps or pieces of iron, which are ſuſtained, at one end, by the anvils, and, at the other, by iron chains faſtened to the cieling of the forge.

This laſt way of *forging* is only uſed in the largeſt works, as anchors for ſhips, &c. which uſually weigh ſeveral thouſand pounds. For the lighter works, a ſingle man ſuffices to hold, heat, and turn, with one hand, while he ſtrikes with the other. Each purpoſe for which the work is deſigned, requires its proper heat. If it be too cold, it will not feel the weight of the hammer, as the ſmiths call it, i e. it will not ſtretch or give way; and, if it be too hot, it will red-ſear, i. e. it will break or crackle under the hammer.

The ſeveral heats the ſmiths give to their irons are, 1. A blood-red heat. 2. A white-flame heat. 3. A ſparkling or welding heat.

Forging *over*, in *Sea-language*, denotes the art of forcing a ſhip violently over a ſhoal, by the effort of a great quantity of ſail.

FORK-*tail*, among the *Fiſhermen of England*, a name given to the ſalmon, while in the fourth year's growth, and not yet come to what they call a SALMON.

FORKED *beard, great*, in *Icthyology*, a name given on the coaſt of Cornwall to the BLENNIUS *phycis* of Linnæus.

Forked *heads*, among *Hunters*, thoſe horns of deer which bear two croches on the top, or which have their croches doubled.

FORLANA, in the *Italian Muſic*, a ſort of dance much in uſe among the Venetians. See SALTARELLA.

FORLET *land*, ſuch land in the biſhoprick of Hereford, as was granted or leaſed, *dum epiſcopus in epiſcopatu ſteterit*, that the ſucceſſor might have it for his preſent income.

But now that cuſtom is diſuſed, and the ſame lands are granted, as others, by leaſe; yet they ſtill retain the name.

FORLORN, or Forelorn-*hope*. See Enfans *perdus*.

FORM, Forma, in *Phyſics*, denotes the manner of being peculiar to each body; or that which conſtitutes it ſuch a particular body, and diſtinguiſhes it from every other.

Mr. Harris uſes the term *form* likewiſe in another ſenſe, as an efficient animating principle; to which he ſuppoſes Ovid to refer in the firſt lines of his Metamorphoſis,

> *In nova fert animus mutatas dicere* formas
> *Corpora*——

Theſe animating *forms* are of themſelves no objects either of the ear, or of the eye; but their nature or character is underſtood in this, that were they never to exert their proper energies on their proper ſubjects, the marble on which the ſculptor exerciſes his art would remain for ever ſhapeleſs, and the harp from which the harper calls forth ſounds would remain for ever ſilent.

Thus, alſo, the animating *form* of a natural body is neither its organization, nor its figure, nor any other of thoſe inferior *forms*, which make up the ſyſtem of its viſible qualities; but it is the power, which is yet able to produce, preſerve, and employ theſe. It is the power, which firſt moves, and then conducts that latent proceſs, by which the acorn becomes an oak, and the embryo becomes a man; by which digeſtion is performed in plants and animals, and, which departing, the body ceaſes to live, and its members putrefy; and by which every being produces another like itſelf, and every ſpecies is continued. In animals, it is that higher faculty, which, by employing the organs of ſenſe, peculiar to them as animals, diſtinguiſhes them as ſenſitive beings from vegetables; and it is alſo that more noble faculty, which, by its own divine vigour, unaſſiſted perhaps with organs, makes and denominates him a being intellective and rational. So that Mr. Harris reckons two ſorts of *forms*, thoſe which are paſſive elements, and thoſe which are efficient cauſes. And all of them agree in this, that they give to every being its pecular and diſtinctive character: and on the whole he concludes, that *form* appears in part to be an element, and in part an efficient cauſe, i. e. a cauſe which aſſociates the conſtituent elements of natural ſubſtance, and which employs them, when aſſociated, according to their various and peculiar characters. Harris's Phil. Arrangements, chap. vi.

The philoſophers generally allow two principles of bodies: *matter*, as the common baſis, or ſubſtratum of all; and *form*, as that which ſpecifies and diſtinguiſhes each; and which, added to a quantity of common matter, determines or denominates it this, or that; wood, or fire, or aſhes, &c.

Subſtantial *forms* ſeem to have been firſt broached by the followers of Ariſtotle, who thought matter, under different modes or modifications, not ſufficient to conſtitute different bodies; but that ſomething ſubſtantial was neceſſary to ſet them at a greater diſtance: and thus introduced ſubſtantial *forms*, on the footing of ſouls, which ſpecify and diſtinguiſh animals.

The conſiderations which the Peripatetics principally inſiſt on, in confirmation of this doctrine, are: 1. That, without ſubſtantial *forms*, all natural things would be of the ſame ſpecies, nature, and eſſence; which is ſuppoſed to be an abſurdity.

2. That every thing has its peculiar power, motion, and operation; as the magnet, e. gr. has that of attracting iron; but that this power does not flow from the matter of the body, which is only paſſive; nor from the accidents: and therefore that it muſt ariſe from a ſubſtantial *form*.

3. That, without ſubſtantial *forms*, there would be no generation: for a production of accidents is only an alteration.

4. That, without ſuch *form*, the nature of a man and of a lion would not differ.

What contributed much to their error, was the circumſtances of life and death: for obſerving, that, as ſoon as the ſoul was departed out of a man, all motion, reſpiration, nutrition, &c. immediately ceaſed, they concluded, that all thoſe functions depended on the ſoul, and conſequently that the ſoul was the *form* of the animal body, or that which conſtituted it ſuch: that the ſoul was a ſubſtance, independent of matter, nobody doubted; and hence the *forms* of other bodies were concluded equally ſubſtantial.

But to this it is anſwered, that though the ſoul be that by which a man is man, and conſequently is the *form* of the human body, as human; yet it does not follow, that it is properly the *form* of this body of our's, as it is a body; nor of the ſeveral parts thereof, conſidered as diſtinct from each other.

For thoſe ſeveral parts have their proper *forms* ſo cloſely connected with their matter, that it remains inſeparable therefrom, long after the ſoul has quitted the body: thus, fleſh has the *form* of fleſh; bone of bone, &c. long after the ſoul is removed, as well as before.

The truth is, the body does not become incapable of performing its accuſtomed functions, becauſe the ſoul has deſerted it; but the ſoul takes its leave, becauſe the body is not in a condition to perform its functions.

The ancient and modern corpuſcular philoſophers, therefore, with the Carteſians, exclude the notion of ſubſtantial *forms*; and ſhew, by many arguments, that the *form* is only the modus or manner of the body it is inherent in.

And as there are only three primary modes of matter, viz. figure, reſt, and motion, with two others ariſing therefrom, viz. magnitude, and ſituation, the *forms* of all bodies they hold to conſiſt therein; and ſuppoſe the variations theſe modes are capable of, ſufficient to preſent all the variety obſervable in bodies. See Mode.

Many varieties we actually ſee reſult from changes in theſe modes, which may very well paſs for differences of *form*: thus, an awl only differs from a needle in magnitude; a globe from a cube in figure: and tranſparent glaſs, being pulverized, will reflect the light, and appear white; and yet all the alteration conſiſts in the order and arrangement of the parts: when wheat is ground into flour, all the change conſiſts in a ſeparation of the contiguous parts; and when the flour is baked into bread, what is it but the ſame particles aſſociated again in another manner? By agitating water, a froth is formed; if the agitation be increaſed, the particles will exhale, and form clouds; which being congregated again, return in dew, ſnow, hail, or rain: and the ſame water, by the acceſſion of cold, might have been formed into ice. So many different bodies, endued with different qualities, and which the Peripatetics themſelves allow ſpecifically different, ariſe from one and the ſame body, by mere motion and reſt!

The philoſophy of ſubſtantial *forms*, its riſe, uſe, and extent, are ſet in an excellent light by F. Malebranche.

The way of thinking, that firſt introduced it, is this: every thing I perceive in taſting, ſeeing, and handling this honey and ſalt, is in the honey and ſalt; but it is certain, that the things I perceive in the honey, e. gr. the colour, taſte, &c. differ eſſentially from thoſe I perceive in the ſalt; conſequently there is an eſſential difference between the two.

Hence it follows, that they are groſly deceived, who take all the differences between thoſe bodies to conſiſt in the different configurations of the component parts; ſince the different figure is not at all eſſential to the different bodies: for, change the figure of the parts of the honey how you will, and even give them thoſe of the parts of ſalt, yet it is honey ſtill.

There muſt, therefore, be ſome ſubſtance added to the common matter of all bodies, to make them eſſentially different. And thus are ſubſtantial *forms* hooked in; thoſe fertile ſubſtances, which perform every thing that we ſee in all nature. Since then, in every natural body, there are two ſubſtances; the one common to honey, ſalt, and all other bodies; and the other, that which makes the honey, honey; the ſalt, ſalt; and all other bodies what they are; it follows that the firſt, viz. matter, having no contrary, but being indifferent to all *forms*, muſt remain without force and action, as having no occaſion to defend itſelf.

But, for the others, viz. the ſubſtantial forms, there is a neceſſity of their being accompanied and inveſted with faculties and qualities, for their defence and ſubſiſtence. Theſe muſt be always on their guard, for fear of being ſurpriſed: they are in poſſeſſion of a thing, which they are to hold againſt numerous pretenders; and therefore they muſt be continually at work to fortify themſelves, and extend their dominion over the neighbouring matters, and puſh their conqueſts as far as they can: were they to remain unactive, and unprepared, other *forms* would lay hold of them, and baniſh and deſtroy them for ever. To guard againſt this, they keep conſtant watch, and entertain mortal enmities and antipathies againſt thoſe other *forms*, which only wait to deſtroy them.

If now it happen, that one *form* ſeize the matter or receptacle of another, that the *form* of a carcaſe, for inſtance, ſeize the body of a dog, it is not enough that this new *form* annihilate the former; but its hatred muſt be farther gratified with the deſtruction of all the qualities, that took its enemy's part.

The hair of the carcaſe, then, muſt be turned white, by a creation of a new colour: its blood muſt become red, but of ſuch a red, as is not to be ſuſpected in the intereſt of the enemy; and the whole body to be inveſted with qualities, truſty to their new maſter, whom they are to defend with all the power the qualities of a carcaſe can have, till ſuch time as, being overpowered, this *form* gives way too, in its turn, to the *form* of maggots, worms, &c.

But as nothing can be in perpetual war, but every thing has its place of reſt, it follows, that even the fire muſt likewiſe have its centre, whither its natural levity always prompts it, that it may remain at reſt, ceaſe to burn, and even quit its heat, which it only maintains here below for its defence.

Theſe may ſerve as a taſte of the conſequences drawn from that important principle, *ſubſtantial forms*; which is infinitely fertile, and furniſhes every philoſopher with all ſorts of ſolutions, according to his ability, addreſs, inclination, &c.

Forms are uſually diſtinguiſhed into *eſſential* and *accidental.*

Forms, *Eſſential.* Though the five modes above mentioned, generally taken, be adventitious; yet, to this or that body, e. gr. to fire, or water, they are eſſential: thus, it is *accidental* to iron, to have this or that magnitude, figure, or ſituation, ſince it might exiſt in different ones; yet, to a knife, or hammer, the figure, magnitude, and poſition of parts, which conſtitute it a hammer, or knife, are *eſſential*; and they cannot exiſt, or be conceived, without them.

Hence it is inferred, that, though there be no *ſubſtantial*, there are *eſſential forms*, whereby the ſeveral ſpecies of bodies become what they are, and are diſtinguiſhed from all others.

Forms, *Accidental*, are thoſe really inherent in bodies, but in ſuch manner as that the body may exiſt in all its perfection without them. Such is whiteneſs in a wall; heat in water; a figure of a man in wax, &c.

Form, *Metaphyſical*, is nothing elſe but ſpecific difference; as metaphyſical matter is nothing elſe but the genus. Thus, *rational* is the metaphyſical *form* of man.

Forms, again, are diſtinguiſhed into *ſimple* and *compound.*

Forms, *Simple*, are thoſe of ſimple bodies, i. e. of ſuch as have but few properties.

Forms, *Compound*, are thoſe of more compound bodies; or of ſuch as have more properties.

Thus, e. gr. if the *form* of a hard body be compared with the *form* of wood, the former may be accounted *ſimple*, and the latter *complex*: inaſmuch as a hard body, conſidered only as hard, has fewer properties than wood. Abſolutely ſpeaking, however, ſimple *forms* are thoſe of the elements; and compound, thoſe of mixt bodies.

Some diſtinguiſh *forms* into *natural* and *artificial.*

Forms, *Natural*, are thoſe inherent in bodies, without any thing contributed thereto on the part of man. Such is the *form* of marble.

Forms, *Artificial*, are thoſe ariſing from human induſtry. Such is that of a ſtatue. But this diſtinction is uſeleſs, and does not imply any intrinſic difference in the *forms* themſelves.

Others, again, diſtinguiſh *forms* into *primary* and *ſecondary.*

Forms, *Primary* or *univerſal*, are thoſe which originally belong to phyſical or natural body; and theſe, they ſay, are extenſion, figure, and organization; figure having reſpect to its external, organization to its internal, and extenſion being common to both.

Forms, *ſecondary*, are the ſame with ſenſible qualities and ariſe, for the moſt part, from the primary *forms*. Harris's Philoſ. Arrangements, p. 88.

Form *of concord*, in *Eccleſiaſtical Hiſtory.* See Concord.

Form *of Corporeity*, according to Avicenna, and the Scotiſts, is that which conſtitutes body in the generical eſſe of body.

That there is ſuch a thing, they prove thus: the human body is a natural body, which cannot be placed in the eſſe of body, but by the *form* of corporeity: for it is either ſo placed by this, or by the rational ſoul; not by the ſoul, ſince that is ſpiritual; therefore by the *form* of corporeity. And the ſame may be underſtood of other bodies: but the later philoſophers ſet this aſide as a chimæra.

Form *of a ſeries*, in *Algebra.* See Series.

Form, *Syllogiſtic*, is a juſt diſpoſition, both of the terms, in reſpect of predicate and ſubject; and of the propoſitions, in reſpect of quantity and quality.

By juſt diſpoſition, we mean ſuch an one, wherein the concluſion follows duly and legitimately from the two premiſes, there being no *form* where there is no concluſion. See Syllogism.

The diſpoſition of the ſeveral terms, being, as it were, ſo many ſteps or degrees of a *ſyllogiſtic form*, is called the *figure of the ſyllogiſm.*

The diſpoſition of the premiſes alone, being, as it were, another degree, is called the *mode of the ſyllogiſm.*

Form, in *Theology*, denotes one of the eſſential parts of the ſacraments, being that which gives them their ſacramental nature and efficacy.

The *form* conſiſts in certain words, which the prieſt pronounces in adminiſtering them. In ſome of the Romiſh ſacraments, the form is deprecative; in our's it is abſolute, or indicative.

The fathers and ancient divines held, that the ſacraments conſiſted of things and words, *rebus & verbis.* William of Auxerre was the firſt, who, about the beginning of the 13th century, introduced the terms, *matter* and *form*, in lieu thereof.

Form is alſo uſed, in a *moral ſenſe*, for a manner of being, or doing a thing according to rules.

This republic has frequently changed its *form* of government; that is, its conſtitution. Pardons generally expreſs a remiſſion or abolition of a crime, in what *form* or manner ſoever it were committed. He was admitted doctor in *form*. Put your argument in *form*.

Form, in *Law*, is applied to certain eſtabliſhed rules to be obſerved in proceſſes or judiciary proceedings.

In which ſenſe the word ſtands oppoſed to the ground or matter in diſpute, or the merits of a cauſe.

Contra Formam *collationis*, *feoffamenti*, and *ſtatuti.* See Contra.

Modo & **Forma.** See Modo.

Form, in *Joinery*, &c. is applied to the long ſeats or benches in the choirs of churches, for the prieſts, canons, prebends, religious, &c. to ſit on.

Du-Cange takes the name to be derived from hence, that the backs of the ſeats were anciently enriched with figures of painting and ſculpture, called in Latin *formæ & typi.* In the life of St. William of Roſchild, we meet with *forma* as ſignifying a ſeat for an eccleſiaſtic, or religious, in a choir; and in that of St. Lupicin, we have *formula* in the ſame ſenſe. In the rule of the monaſtery of St. Cæſarea, the nun who preſides over the choir is called *primiceria, vel formari.*

Form is alſo uſed in the ſame ſenſe with class.

Form alſo denotes the external appearance or ſurface of a body; or the diſpoſition of its parts, as to length, breadth, and thickneſs,

In which ſenſe it coincides with figure.

Form is alſo uſed, in the *Mechanic Arts*, for a kind of mould, whereon a thing is faſhioned or wrought.

Such are the hatters *form*, the paper-makers *form*, &c.

Form, *Hatters*, is a large block or piece of wood of a cylindrical figure; the top thereof being rounded, and the bottom quite flat.

Its uſe is, to mould or faſhion the crown of the hat, after the matter thereof has been beaten and fulled.

To *form* a hat, it is neceſſary the wool, hair, &c. be very hot, juſt reeking out of the copper.

Form, *Paper-makers*, is the frame or mould wherein the ſheets are faſhioned. See Paper.

Form, *Printers*, is an aſſemblage of letters, words, and lines, arranged in order, and diſpoſed into pages, by the compoſitor; from which, by means of ink and a preſs, the printed ſheets are drawn.

Every *form* is incloſed in an iron chaſe, wherein it is firmly locked by a number of pieces of wood, ſome long and narrow, and others in *form* of wedges.

There are two *forms* required for every ſheet; one for each ſide; and each *form* conſiſts of more or fewer pages, according to the volume of the book. See Press, and Printing.

Form, in *Hunting*, denotes the ſeat of a hare; or the place and time when and where ſhe ſquats.

FORMA *Pauperis*, or *in* **Forma** *Pauperis*, is when any perſon has cauſe of ſuit, but is ſo poor that he cannot diſpend the uſual charges of ſuing at law, or in equity.

In this caſe, upon his making oath that he is not worth 5*l.* his debts being paid, and bringing a certificate from ſome lawyer, that he has juſt cauſe of ſuit, the judge admits him to ſue *in forma pauperis*; that is, without paying fees to the counſellor, attorney, or clerk. This cuſtom has its beginning from ſtat. 11 Hen. VII. cap. 12. See Dispauper.

FORMAL, ſomething that regards the *form*; or that gives the manner, or *form*.

The *formal* cauſe, joining itſelf to the material, produces the body, or compound.

The ſchoolmen alſo apply the word to any thing which has a kind of *form*, either eſſential or accidental, at leaſt, in our conception.

Thus, we frequently hear the philoſophers talk of the *formal* object of knowlege; and of the *formal* reaſon of any thing; *formal* unity, &c.

Formal *cauſe* is defined, by certain philoſophers, to be ſomething implanted in one parcel of matter, whereby it is diſtinguiſhed from all other matter.

For matter is ſuppoſed common to all bodies: conſequently, that they are diſtinguiſhable from one another, does not ariſe from their matter, but from the *form* which is peculiar to each: hence, what is produced by ſuch cauſe, is ſaid to be *formed*.

Hence it follows, that the caſualty of matter and *form* is not the ſame: or that the component power, and the actual compoſition, are different; contrary to the opinion of the generality of ſchoolmen, who, maintaining *form* to be a ſubſtance co-extended with matter, make it a real component part, as much as matter itſelf.

Formal *circle.* See Circle.

Formal *notion.* See Notion.

Formal is alſo uſed in a moral ſenſe, importing poſitive, expreſs, and preciſe.

Thus we ſay, a *formal* agreement, a *formal* text, *formal* anſwer, &c. *Formal* evidence. See Evidence.

FORMALITER, **Formally**, is variouſly uſed in the ſchools.

Sometimes it is underſtood of the ſubject, when a predicate is therein on account of ſome form: thus, white, *formally* taken, diffuſes light; q. d. the form inherent in this ſubject, viz. whiteneſs, is the cauſe why the ſubject diſperſes the light.

Formally has alſo place in ſuppoſitions; a word being *formally* ſuppoſed, when it is taken for the thing it was intended to ſignify: as, *man is an animal.*

Formally is alſo uſed in the ſame ſenſe with *adequately*, and totally: thus, a ſyllogiſm *formally*, i. e. adequately taken, requires three propoſitions.

Sometimes it is alſo uſed for *quidditatively*: thus man, *formally* taken, is a reaſonable animal.

Formally is alſo uſed for *really*, in oppoſition to objectively; thus, a thing is ſaid to be *formally* ſuch, when it is ſuch in the proper notion of the thing ſpoken of.

Formally, again, is uſed in ſpeaking of the manner wherein a thing is contained in another, in oppoſition to virtually, and eminently.

FORMALITY, the quality of a *form*, or *formula*; or that which conſtitutes and denominates them ſuch.

Formality, as defined in the *ſchools*, is any manner, wherein a thing is conceived; or, a manner in any object, importing a relation to the underſtanding, whereby it may be diſtinguiſhed from another object.

Thus, animality and rationality are *formalities.* The Scotiſts make great uſe of *formalities*, in oppoſition to the virtualities of the Thomiſts.

The Scotiſts hold, that the metaphyſical degrees in man are ſo many *formalities*, really diſtinct from each other; as *man*, *living*, *animal*, &c. And the ſame they hold of the attributes of God. The Thomiſts, on the contrary, contend, that they are really and intrinſically the ſame.

Formalities, in *Matters of Law*, are frequently uſed for the formulas themſelves, or the rules preſcribed for judiciary proceedings. In contracts of ſtrict law, all the *formalities* muſt be ſtrictly obſerved: an omiſſion of the leaſt *formality* may ruin the whole convention.

The term is alſo uſed for a certain order, or decorum, to be obſerved.

FORMATION, in *Philoſophy*, &c. the act of forming, faſhioning, or producing, a thing.

The *formation* of the chick in the egg is admirably explained by Malpighi, in an expreſs treatiſe, De Formatione Pulli in Ovo.

The *formation* of the foetus, the embryo, in the womb, is a proceſs of which we have but very dark conceptions. See Generation.

The *formation* of metals is effected in the earth, of fumes or vapours raiſed by the ſubterraneous fire, and fixed or condenſed as they arrive towards the ſurface of the earth.

Formation *of ſtones.* See Stones.

Formation *of the tails of comets.* See Comets.

FORMATRIX, or **Formatrice.** The ancient philoſophers admitted a *virtus*, or *facultas formatrix*, whereby all bodies had their forms given them.

FORMATUM *punctum.* See Punctum.

FORME, or **Formy**, in *Heraldry.* A *croſs* forme, or *formy*, is a croſs narrow in the center, and broad at the extremes; ſo called by Leigh and Morgan, though moſt other authors call it *patée.*

FORMED, or **Figured** *ſtones*, among *Naturaliſts*, are ſuch bodies, as, being either pure ſtone, flint, or ſpar, are found in the earth, ſo *formed*, as that they bear a near reſemblance to the external figure of muſcles, cockles, oyſters, or other ſhells, or to plants, or animals.

Authors have been greatly divided as to their origin: the ſeveral opinions ſee under the articles Fossil, Shell, &c.

Formed *bachelor.* See Bachelor.

Formed, in *Heraldry*, &c. the ſame with *ſeated.*

FORMEDON, *ſecundum formam doni*, in *Law*, a writ which lies for him who has right to lands or tenements by virtue of an entail ariſing from the ſtatute of Weſtm. 2. 13 Edw. I. cap. 1.

The time of limitation in a *formedon*, by ſtat. 21 Jac. I. cap. 16. is twenty years; within which ſpace of time, after his title accrues, the demandant muſt bring his action, or elſe is for ever barred.

There are three kinds, viz. *forma donationis*, or *formedon in the deſcender*; *formedon in the remainder*; and *formedon in the reverter.*

Formedon *in the deſcender* lies for the recovery of lands, &c. given to one and the heirs of his body; or to a man and his wife, and the heirs of their two bodies; or to a man and his wife, being couſin to the donor, in frank marriage, and afterwards alienated by the donee.

After his deceaſe, his heir ſhall have this writ againſt the tenant or alienee.

Fitz. Nat. Br. fol. 211, &c. makes three ſorts of *formedon* in the deſcender: the firſt is that now expreſſed; the ſecond, for the heir of a coparcener that aliens, and dies; the third he calls *inſimul tenuit*, which lies for a coparcener, or heir in gavel-kind, before partition, againſt him to whom the other coparcener or heir has alienated, and is dead.

Formedon *in the remainder* lies, where a man gives land to another for life or in tail, with the remainder to a third perſon in tail or in fee; and afterwards the former tenant dies without iſſue, and a ſtranger abates; then he in remainder ſhall have this writ.

Formedon *in the reverter* lies for the donor, or his heirs (whoſe land is intailed to certain perſons, and their iſſue, with condition, for want of ſuch iſſue, to revert to the donor, and his heirs), againſt him to whom the donee alienates after the iſſue extinct to which it was intailed.

FORMELLA, a certain weight of about ſeventy pounds, mentioned in the ſtatute of weights and meaſures, 51 Hen. III.

FORMER, in *Gunnery*, a round piece of wood fitted to the diameter of the bore of a gun, on which the paper, parchment, or flannel, which is to make the cartridge, is rolled before it be paſted or ſewed.

FORMICA, in *Zoology*. See Ant.

Formica, in *Medicine*, a ſpecies of tumid callous wart, of a blackiſh colour, and broad baſe, which appears like the ſtingings of ants; called alſo *myrmicia*.

And hence the name *formica*, which literally denotes an ant: for the like reaſon it is denominated by the Greeks, *μυρμηκια*.

The name *ant*, *formica*, is alſo given to thoſe minute varicous intumeſcences of the ſmalleſt blood-veſſels, obſerved either in the anus, or the glans of the penis.

Some alſo give the appellation ant, or *formica*, to the miliary herpes.

Formica, among *Sportſmen*, the name of a diſeaſe incident to ſpaniels. See Spaniel.

Formica-*leo*, the *ant-lion*, in *Natural Hiſtory*, the name given by authors to a very remarkable ſpecies of inſect, which is, in its perfect ſtate, a winged creature, approaching to the nature of the *libellæ*, or DRAGON-*flies*; but in its prior ſtate of a creeping animal, has a wonderful art and addreſs in catching its prey. It is in this ſtate that it is known by the name of *formica-leo*, as it chiefly feeds upon ants.

It is ſomewhat of the nature of the ſpider in its way of taking its prey, its manner of ſpinning, and in the figure and ſoftneſs of its body; and has, in its general figure, ſomewhat of the appearance of the millepes, or wood-louſe; ſo that ſome have miſtaken it at firſt ſight for that animal. It is of a dirty greyiſh colour marked with ſome black ſpots, and theſe are alſo many points, which when it is viewed with the microſcope, make it reſemble a hedge-hog or porcupine. Its body is compoſed of ſeveral rings, and has thence a wrinkled look. It has ſix legs; four are joined to the breaſt, and the other two to a long part which may be taken for its neck; its head is ſmall and flat, and it has two remarkable horns; theſe are about a ſixth of an inch long, and as thick as a hair, and are hard, hollow, and hooked at the end, like the claws of a cat; at the origin of each of theſe horns, it has a clear and bright black eye, which ſees very diſtinctly, and gives the creature notice to eſcape on ſight of the ſmalleſt object. Mem. Acad. Par. 1704.

He uſually encamps under an old wall, that he may be ſheltered from the injuries of the weather, and he always chuſes a place where the ſoil is compoſed of a fine dry ſand; in this he makes a pit of the ſhape of a funnel, or an inverted hollow cone.

When he has finiſhed his pit, he buries himſelf at the bottom of it in the ſand, leaving no part above ground, but the tips of his two horns, which he expands to the two ſides of the pit. In this condition he lies and waits for his prey, and never comes up after it. When an ant, or any other ſuch creature, chances to walk over the edges of his pit, his ſteps throw down a little of the ſand, which naturally running down to the bottom of the pit, gives the enemy notice of his prey; he then toſſes up the ſand which covers his head, to bury the ant, and bring him down with its returning force to the bottom; and as one attempt cannot be ſufficient to prevent the ant's eſcape, he throws more and more ſand upon him, till he by degrees brings him down to the bottom. All the endeavours of the ant to eſcape, when once it is within the verge of the pit, are in vain; for, as it attempts to climb, the ſand runs away from under its feet, and it ſinks the lower for every attempt. This motion of the ſand alſo informs the enemy where it is, and directs him to throw up more ſand in the right place, which it does till the poor ant falls to the bottom between its horns. It then plunges their points deep into the ant's body, and having ſucked out all the juices of the prey, it throws out the empty ſkin as far from the hole as it can. This done, it mounts up the edges of its pit, and if they have ſuffered any injury, repairs them with great care, and immediately buries itſelf again in the center to wait for another meal.

The horns of this creature are its only organs for receiving nouriſhment; it never brings any animal that it has ſeized near to its head, but always holds it at the tip of the horns; they therefore plainly ſerve as ſyringes, to draw into its ſtomach the juices of the bodies of the inſects it feeds on; neither is there any mouth or trunk, or any other organ to be diſcovered about its head, which could ſerve to the purpoſe of eating, the head ſeeming only intended to throw away the ſand in forming the pit. The horns of this animal being ſo neceſſary to its life, nature has provided for the reſtoring them in caſe of accidents, and if cut off they are found to grow again.

When the *formica-leo* has lived a proper time in this ſtate, it leaves its pit, and is only ſeen drawing lines and traces on the ſurface of the ſand; after this it buries itſelf under the ſurface, and there incloſes itſelf in a fine web to paſs its transformation into the winged ſtate. This caſe is made of a ſort of ſilk, which the creature ſpins in the manner of the ſpider, and of a quantity of the grains of ſand cemented together by a glutinous humour which flows from its pores. This caſe, however, would be too harſh and coarſe for the body of the creature, and therefore it ſerves only for the outer covering, to defend it from injuries; the creature ſpinning one of pure and incomparably fine ſilk, of a beautiful pearl-colour within it, which covers its whole body.

When the creature has lain ſome time in this caſe, it throws off its outer ſkin, with the eyes, the horns, and every other part neceſſary to its life before, and becomes an oblong nymph, in which a careful eye may trace the form of the fly it is to become. There may be ſeen through its tranſparent covering, new eyes, new horns, wings, and all the other parts of the animal in its perfect ſtate. This nymph makes its way about half out of the ſhell, and remains in this condition, but without farther life or motion, till the perfect fly makes its way out at a ſlit in the back; in this ſtate it much reſembles the libellæ or dragon-flies common about our waters. The male couples with the female in this ſtate only, and Mr. Poupart, to whom the world is indebted for this curious deſcription, is of opinion that the females lay only one egg; but this is very different from the courſe of nature, in the other animals of the ſame claſs. Mem. Acad. Par. 1704.

The common *formica-leo* moves only backward, but Mr. Rouet has obſerved a ſpecies which moves forward in the common way of other animals, and makes no pit of this kind to intrap its prey, but ſeizes other inſects by force. Philoſ. Tranſ. N° 469. p. 466.

FORMICATION, a term uſed among *Builders*, for arching or vaulting.

FORMING is uſed for the act of giving being or birth to any thing.

The word is alſo ſimply uſed for giving the figure to any thing. The potter *forms* his veſſels as he pleaſes. Geometry teaches how to *form* all kinds of figures.

It is alſo uſed for the producing of a thing: thus, the lineaments of the face began to be *formed*.

Forming *of a ſiege* is the making lines of circumvallation, to fortify the camp, and diſpoſing things for the attack of a place in *form*.

They alſo ſay, to *form* a ſquadron or battalion; meaning, to range the ſoldiers in *form* of a ſquadron, &c.

The term is alſo uſed in ſpeaking of a body of forces, which being out of any order of ſquadrons, battalions, &c. do halt, range themſelves in order, and put themſelves in a condition for the attack.

Forming the line, is drawing up infantry, cavalry, and artillery, into line of battle. See Line.

Angle **Forming** *the flank*. See Angle.

Forming is alſo uſed in grammar, in ſpeaking of certain tenſes of verbs, which are made from others, by a change of certain letters.

The preſent tenſe is *formed* from the infinitive. Compound and derivative words alſo, and even all that have any etymology, are ſaid to be *formed*.

FORMULA, a rule, or model, or certain terms preſcribed and decreed by authority, for the form and manner of an act, inſtrument, proceeding, or the like.

The Roman law was full of *formulas*. The *Formulas* of Marculphus, with M. Bignon's Comment, are in great eſteem.

Formula, in *Church-hiſtory* and *Theology*, denotes a formulary or profeſſion of faith.

Formula, in *Medicine*, denotes a little form, or preſcription, ſuch as phyſicians direct in extemporaneous practice, in diſtinction from the greater forms, which are the officinal medicines. See Prescription.

FORMULARY, a writing, containing the form or formula of an oath, declaration, atteſtation, or abjuration, &c. to be made on certain occaſions.

There are alſo *formularies* of devotion, of prayers, &c. Liturgies are *formularies* of the public ſervice in moſt churches.

FORNA, in *Ichthyology*, a name given by Hildegard, and others, to the trout.

FORNACALIA, or **Fornicalia**, a feaſt held among the ancient Romans, in honour of the goddeſs Fornax, or Fornix. It was ſolemnized with ſacrifices, performed before the mouth of an oven, wherein they dried their corn, baked their bread, &c. The *fornicalia* were moveable: the grand curio proclaimed the time of celebration every year on the twelfth of the calends of March. They were firſt inſtituted by Numa: and the QUIRINALIA were inſtituted for the ſake of ſuch as had not kept the *fornacalia*.

FORNAGE, *fornagium*, in *our old Writers*, ſignifies the fee taken by a lord from his tenants, bound to bake in the lord's oven, or for a permiſſion to uſe their own; this was uſual in the northern parts of England.

The word comes from the French *fournage*, which ſignifies the ſame.

FORNICATION, *whoredom*, the act or crime of incontinency between ſingle perſons; for, if either of the parties be married, it becomes adultery.

St. Thomas labours much to prove ſimple *fornication* contrary to the law of nature.

By the ancient law of England, the firſt offence herein was puniſhed with three months impriſonment: the ſecond was made felony, by an act in the time of the late uſurpation. At preſent, doing public penance is the chief puniſhment. See BASTARD.

FORNICATION is ſometimes uſed as a generical term, including all kinds of offences againſt chaſtity.

Its ſpecies are, 1. *Simple fornication*, which is that committed with a proſtitute. 2. *Stuprum*, that committed with perſons of reputation and ſobriety. 3. That committed with relations, called *inceſt*. 4. That committed with married perſons, *adultery*. 5. That committed with perſons conſecrated to God, *ſacrilege*. 6. That committed between perſons of the ſame ſex, *ſodomy*. 7. That committed by perſons on themſelves, *manuſtupration*. And, 8. That committed with beaſts, *beſtiality*.

FORNIX, in *Anatomy*, the extremity of the corpus calloſum, next the cerebellum; which is ſeparated or divaricated into two legs, forming a kind of arch, or *fornix*. See CORPUS *calloſum*.

FORPRISE, in *Law*, an exception, or reſervation: in which ſenſe the word is uſed in the ſtatute of Exon. 14 Edw. I.

We ſtill uſe it in conveyances and leaſes, wherein excepted and *forpriſed* are ſynonimous terms.

FORPRISE is alſo uſed for an exaction: in which ſenſe it amounts to the ſame with forecapium.

Totum pratum, &c. ſine quacunque forpriſa *in excambium pro placca dedit.*

FORRAGE, or FORAGE, proviſion for cattle, of hay, oats, and ſtraw; particularly in war.

Skinner derives the word from *foras agere*, by reaſon they go abroad to ſeek *forrage*: others from *far*, which anciently ſignified any kind of corn or grain. Menage, from *foderagium*, of *foderum*, or *fodrum*, which the Romans uſed in the ſame ſenſe. Cujas and Du-Cange derive it from the German *futter*, *horſe-meat*; Voſſius, from the German *foden*, or *voeden*, *to feed*; Nicod, from *farrago*, which literally ſignifies what we call *forrage*, and figuratively, a mixture of divers kinds of things; Hicks derives it from the Saxon *fodra*, or the Engliſh *fodder*, or the baſe Latin *fodrum*. See FODDER.

In marching, encamping, &c. care muſt be taken, that the cavalry may find *forrage*.

A ration of *forrage* is the portion of hay, ſtraw, and oats, allowed each horſeman, for the ſubſiſtence of his horſe one day; which is twenty pounds of hay, five of ſtraw, and ten pounds of oats. See RATION.

FORRAGE-*guard*, in *Military Affairs*, a detachment ſent out to ſecure the *forragers*. The *forrage*-guard is poſted at all places, where the enemies parties may come to diſturb the *forragers*. This guard is likewiſe called the *covering party*, and marches generally the night before the *forraging*, that they may be poſted in the morning before the *forragers* come. The guard conſiſts both of horſe and foot, and muſt ſtay at their poſt till the *forragers* be all come off the ground.

FORSES, *catadupæ*, a term uſed in Weſtmoreland for water-falls.

FORSKHOLEA, in *Botany*, a genus of the *decandria pentagynia* claſs, with a five-leaved calyx extending beyond the corolla, ten ſpatulated petals, no pericarpium, and five ſeeds connected by a woolly down.

FORSTAL. } See { FORESTAL.
FORSTALLING. } See { FORESTALLING.

FORT, a little caſtle or fortreſs; or a place of ſmall extent, fortified by art, or nature, or both.

A *fort* is a work encompaſſed round with a moat, rampart, and parapet, to ſecure ſome high ground, or paſſage of a river; to make good an advantageous poſt; to fortify the lines and quarters of a ſiege.

FORT, *field*, otherwiſe called *Fortin* or *Fortlet*, and ſometimes *Sconce*, is a ſmall *fort*, built in haſte, for the defence of a paſs or poſt; but particularly conſtructed for the defence of a camp in the time of a ſiege, where the principal quarters are uſually joined, or made to communicate with each other, by lines defended by fortins and redoubts. Their figure and ſize are various, according to the nature of the ſituation, and the importance of the ſervice for which they are intended. Some are fortified with baſtions, and ſome with demi-baſtions. A *fort* differs from a CITADEL, as this laſt is erected to command and guard ſome town; and from a redoubt, as it is cloſed on all ſides; whereas a redoubt is open on one ſide. *Forts* are moſt commonly made ſquare (ſee *Tab. Fortification, fig.* 5.) eſpecially when the paſs they are to guard is of any conſequence, or the place may eaſily be approached: the ſides of this ſquare are a hundred toiſes, the perpendicular ten, and the faces twenty-five; the ditch about this *fort* may be from ten to twelve toiſes; the parapet is to be made of turf, and fraiſed, and the ditch paliſſadoed when dry. There may be made a covert-way about this *fort*, or elſe a row of paliſades might be placed on the outſide of the ditch. A *ſquare fort* may be fortified in the following manner: having inſcribed the ſquare in a circle, divide each of its ſides, AB, BD, &c. into two equal parts in the points F, M, &c. from the center E draw an indefinite line EF; from the center draw alſo the lines EA, EB, ED, EC, to the angles of the ſquare; divide the ſide AB into eight equal parts, and ſet off one of theſe parts from F to G, and from G draw the lines of defence AG, BG; divide another ſide of the ſquare into ſeven equal parts, and ſet off two of thoſe parts from A to K, and from B to L, which will be the faces of the baſtions; take the diſtance KL in your compaſſes, and ſet it off on the lines of defence from K to H, and from L to I, and draw HI, which will be the curtain, and the lines KI, LH, will be the flanks. Or, it may be otherwiſe fortified thus: let the ſide AA (*fig.* 6.) be a hundred and thirty fathoms; the demi-gorge AB, twenty-five fathoms; and with the compaſſes opened to the length of the pinched line BCB, which is the diagonal of two ſides, from each of which there has been taken twenty-five fathoms, upon the extremity oppoſed to the angle which they form, deſcribe two arcs above the angle of the figure, alternately making uſe of the points B for centers; then draw lines from the points of interſection of the arcs D, to the point which ſerved for centers B, upon which points B, raiſe the flanks BE perpendicular to the oppoſed lines of defence BD.

FORT *paine, & dure*: See PAINE.

FORT *royal* is a *fort*, whoſe line of defence is at leaſt twenty-ſix fathoms long.

FORT, *ſtar*, is a ſconce or redoubt, conſtituted by re-entering and ſaliant angles, having commonly from five to eight points, and the ſides flanking each other.

To deſcribe a ſtar-fort. Deſcribe a hexagon *a*BC*def*; (*fig.* 7.) divide one of its ſides into four equal parts; and on the center of this ſide raiſe the perpendicular DA equal to one fourth of the ſide BC. From the point A draw the faces AC and AB, and let the ſame operations be performed with reſpect to the other ſides of the hexagon.

FORTS are ſometimes made *triangular*, only with half baſtions, as in *fig.* 8. This, as well as the ſquare and pentagonal *fort*, (*fig.* 9. and 10.) may be deſcribed in the following manner. Parallel to the inner figure, whether it be a triangle, ſquare, or pentagon, whoſe ſide AB may be ſuppoſed about eighteen yards, deſcribe an outward figure at the diſtance of about four or five yards from it, or farther, if neceſſary, whoſe ſides are ED, EF, &c. Divide each ſide, as ED, EF, &c. into three equal parts, one of which is EI, FL, &c. and in theſe ſides prolonged, take DG, EH, &c. each equal to one of thoſe three parts. From the points G, H, &c. thus found, draw the lines of defence to the angles of the outward figure, as HD, &c. and from the points I, L, &c. draw the flanks IK, LM, &c. perpendicular to the ſides ED, EF, meeting the lines of defence in K, M, &c. Or the flanks may be drawn, by continuing the line DI towards E, and taking IP equal to twice IE; from P as a center, with the radius PI, cut the line of defence in K, and draw the flank IK. Then to each face HK, flank KI, and curtin IG, make a parapet of about ſeven feet thick, or more if neceſſary, expreſſed in the figures, by drawing lines at that diſtance on the inſide of the ſeveral parts. Leave a proper berm of about four or five feet broad, and make a ditch about five or ſix yards wide, whoſe outer line or counterſcarp is to be parallel to the faces and curtins only. A *fort* thus conſtructed is more capable of defence than one without flanks; for the curtin IG is defended by the flank IK; and the face HK has ſome defence from the part DG. In the conſtruction of triangular *forts*, (*fig.* 11.) inſtead of making half baſtions at the angles, whole ones are placed in the middle of the ſides. The gorges of theſe baſtions may be from twenty to twenty-four toiſes, when the ſides are from a hundred to a hundred and twenty; the flanks are perpendicular to the ſides, from ten to twelve toiſes long, and the capitals from twenty to twenty-four. If the ſides happen to be greater or leſs, the parts of the baſtions are likewiſe made greater or leſs in proportion: the ditch round this *fort* may be ten or twelve toiſes wide. The ramparts and parapets of theſe works are commonly made of turf, and the outſide of the parapet fraiſed. *Forts* are often made of various figures, regular or irregular, and ſometimes in the form of a ſemi-circle, eſpecially when they are ſituated near a river, ſea, or at the entrance of a harbour; by which figure they are able to fire at the ſhips on all ſides. When a *fort* is to be built on a neck of land, formed by the confluence of two rivers, or in the windings of a river, in order to prevent an enemy from tranſporting any thing by water, or to prevent their ſhips paſſing that way, the figure of the *fort* muſt be adapted to the ſituation, in ſuch a manner, that there may be no place for landing troops out of the reach of the fire of ſome work or other; and the ſide next to the land ſhould always be better fortified than the other parts near the river, as being more liable to an attack. There are two principal errors committed in the conſtruction of *forts* near the ſea, or navigable rivers, which ſhould be carefully guarded againſt; the one is, that of making the parapet too low, ſo that perſons behind it may be fired upon from the round top of a maſt, by which the gunners are obliged to abandon their guns, and to ſave themſelves by flight: to remedy this inconvenience, the parapet ſhould be nine or ten feet high, and the batteries may be covered above by making an arch over every piece left open behind to let out the the ſmoak, or with planks, like ſheds, over which may be ſcattered earth or dung about a foot and a half thick, to prevent the wood from taking fire.

The other fault is, leaving *forts* or batteries open behind, or very little fortified towards the land, ſo that the enemy may land men in the dark and ſurprize them, by which the guns placed in them become not only uſeleſs, but ſerve rather to deſtroy them. A *fort*, or battery, therefore, ſhould be fortified all round with a good rampart and ditch, at leaſt, or with an addition of outworks, if the place is of any importance: the rampart ſhould be fraiſed, and the ditch have a row of paliſades planted in the middle of it, if it be dry. In the conſtruction of all *forts*, it ſhould be remembered, that the figure of feweſt ſides and baſtions, that can probably anſwer the propoſed defence, is always to be preferred; as works on ſuch a plan are ſooner executed, and with leſs expence; beſides, fewer troops will ſerve, and they are more readily brought together in caſe of neceſſity.

FORTAMENTE, in the *Italian Muſic*, the ſame with FORTE.

FORTE, in the *Italian Muſic*, directs to play ſtrong and loud.

FORTE FORTE, or F. F. ſignifies a degree louder or ſtronger than *forte*.

FORTE, *piu*, the ſame as *forte forte*.

FORTERESSE, FORTRESSE, or **FORTRESS**, a general name for all FORTIFIED *places*, whether made by nature or art. Such are fortified towns, caſtles, citadels, forts, towers, redoubts, ſconces, &c.

FORTIFICATION, called alſo *military architecture*, is the art of *fortifying* or ſtrengthening a place, by making works around the ſame, to render it capable of being defended by a ſmall force, againſt the attacks of a more numerous enemy.

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7. No line of defence is to be above point-blank muſquet-ſhot, which is from one hundred and twenty to one hundred and fifty fathom.

8. The acuter the angle at the center, the ſtronger is the place; as conſiſting of the more ſides, and conſequently more defenſible.

9. All the defences ſhould be as nearly direct as poſſible.

Such are the general laws and views of *fortification*: the particular ones, reſpecting each ſeveral work or member thereof, will be delivered under their proper articles. See BASTION, and FORTIFIED *place*.

FORTIFICATION, *the art of*, may be diſtinguiſhed into two parts, viz. the *elementary* or *theoretical*, and *practical*.

before the mouth of an oven, wherein they dried their corn, baked their bread, &c. The *fornicalia* were moveable: the grand curio proclaimed the time of celebration every year on the twelfth of the calends of March. They were firſt inſtituted by Numa: and the QUIRINALIA were inſtituted for the ſake of ſuch as had not kept the *fornacalia*.

FORNAGE, *fornagium*, in *our old Writers*, ſignifies the fee taken by a lord from his tenants, bound to bake in the lord's oven, or for a permiſſion to uſe their own; this was uſual in the northern parts of England.

The word comes from the French *fournage*, which ſignifies the ſame.

FORNICATION, *whoredom*, the act or crime of incontinency between ſingle perſons; for, if either of the parties be married, it becomes adultery.

St. Thomas labours much to prove ſimple *fornication* contrary to the law of nature.

By the ancient law of England, the firſt offence herein was puniſhed with three months impriſonment: the ſecond was made felony, by an act in the time of the late uſurpation. At preſent, doing public penance is the chief puniſhment. See BASTARD.

FORNICATION is ſometimes uſed as a generical term, including all kinds of offences againſt chaſtity.

Its ſpecies are, 1. *Simple fornication*, which is that committed with a proſtitute. 2. *Stuprum*, that committed with perſons of reputation and ſobriety. 3. That committed with relations, called *inceſt*. 4. That committed with married perſons, *adultery*. 5. That committed with perſons conſecrated to God, *ſacrilege*. 6. That committed between perſons of the ſame ſex, *ſodomy*. 7. That committed by perſons on themſelves, *manuſtupration*. And, 8. That committed with beaſts, *beſtiality*.

FORNIX, in *Anatomy*, the extremity of the corpus calloſum, next the cerebellum; which is ſeparated or divaricated into two legs, forming a kind of arch, or *fornix*. See CORPUS *calloſum*.

FORPRISE, in *Law*, an exception, or reſervation: in which ſenſe the word is uſed in the ſtatute of Exon. 14 Edw. I.

We ſtill uſe it in conveyances and leaſes, wherein excepted and *forpriſed* are ſynonimous terms.

FORPRISE is alſo uſed for an exaction: in which ſenſe it amounts to the ſame with forecapium.

Totum pratum, &c. ſine quacunque forpriſa *in excambium pro placca dedit.*

FORRAGE, or FORAGE, proviſion for cattle, of hay, oats, and ſtraw; particularly in war.

Skinner derives the word from *foras agere*, by reaſon they go abroad to ſeek *forrage*: others from *far*, which anciently ſignified any kind of corn or grain. Menage, from *foderagium*, of *foderum*, or *fodrum*, which the Romans uſed in the ſame ſenſe. Cujas and Du-Cange derive it from the German *futter*, *horſe-meat*; Voſſius, from the German *foden*, or *voeden*, *to feed*; Nicod, from *farrago*, which literally ſignifies what we call *forrage*, and figuratively, a mixture of divers kinds of things; Hicks derives it from the Saxon *fodra*, or the Engliſh *fodder*, or the baſe Latin *fodrum*. See FODDER.

In marching, encamping, &c. care muſt be taken, that the cavalry may find *forrage*.

A ration of *forrage* is the portion of hay, ſtraw, and oats, allowed each horſeman, for the ſubſiſtence of his horſe one day; which is twenty pounds of hay, five of ſtraw, and ten pounds of oats. See RATION.

FORRAGE-*guard*, in *Military Affairs*, a detachment ſent out to ſecure the *forragers*. The *forrage*-guard is poſted at all places, where the enemies parties may come to diſturb the *forragers*. This guard is likewiſe called the *covering party*, and marches generally the night before the *forraging*, that they may be poſted in the morning before the *forragers* come. The guard conſiſts both of horſe and foot, and muſt ſtay at their poſt till the *forragers* be all come off the ground.

FORSES, *catadupæ*, a term uſed in Weſtmoreland for water-falls.

FORSKHOLEA, in *Botany*, a genus of the *decandria pentagynia* claſs, with a five-leaved calyx extending beyond the corolla, ten ſpatulated petals, no pericarpium, and five ſeeds connected by a woolly down.

FORSTAL. } See { FORESTAL.
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FORT, a little caſtle or fortreſs; or a place of ſmall extent, fortified by art, or nature, or both.

A *fort* is a work encompaſſed round with a moat, rampart, and parapet, to ſecure ſome high ground, or paſſage of a river; to make good an advantageous poſt; to fortify the lines and quarters of a ſiege.

FORT, *field*, otherwiſe called *Fortin* or *Fortlet*, and ſometimes *Sconce*, is a ſmall *fort*, built in haſte, for the defence of a paſs or poſt; but particularly conſtructed for the defence of a camp in the time of a ſiege, where the principal quarters are uſually joined, or made to communicate with each other, by lines defended by fortins and redoubts. Their figure and ſize are various, according to the nature of the ſituation, and the importance of the ſervice for which they are intended. Some are fortified with baſtions, and ſome with demi-baſtions. A *fort* differs from a CITADEL, as this laſt is erected to command and guard ſome town; and from a redoubt, as it is cloſed on all ſides; whereas a redoubt is open on one ſide. *Forts* are moſt commonly made ſquare (ſee *Tab. Fortification*, *fig.* 5.) eſpecially when the paſs they are to guard is of any conſequence, or the place may eaſily be approached: the ſides of this ſquare are a hundred toiſes, the perpendicular ten, and the faces twenty-five; the ditch about this *fort* may be from ten to twelve toiſes; the parapet is to be made of turf, and fraiſed, and the ditch paliſſadoed when dry. There may be made a covert-way about this *fort*, or elſe a row of paliſades might be placed on the outſide of the ditch. A *ſquare fort* may be fortified in the following manner: having inſcribed the ſquare in a circle, divide each of its ſides, AB, BD, &c. into two equal parts in the points F, M, &c. from the center E draw an indefinite line EF; from the center draw alſo the lines EA, EB, ED, EC, to the angles of the ſquare; divide the ſide AB into eight equal parts, and ſet off one of theſe parts from F to G, and from G draw the lines of defence AG, BG; divide another ſide of the ſquare into ſeven equal parts, and ſet off two of thoſe parts from A to K, and from B to L, which will be the faces of the baſtions; take the diſtance KL in your compaſſes, and ſet it off on the lines of defence from K to H, and from L to I, and draw HI, which will be the curtain, and the lines KI, LH, will be the flanks. Or, it may be otherwiſe fortified thus: let the ſide AA (*fig.* 6.) be a hundred and thirty fathoms; the demi-gorge AB, twenty-five fathoms; and with the compaſſes opened to the length of the pinched line BCB, which is the diagonal of two ſides, from each of which there has been taken twenty-five fathoms, upon the extremity oppoſed to the angle which they form, deſcribe two arcs above the angle of the figure, alternately making uſe of the points B for centers; then draw lines from the points of interſection of the arcs D, to the point which ſerved for centers B, upon which points B, raiſe the flanks BE perpendicular to the oppoſed lines of defence BD.

FORT *paine, & dure:* See PAINE.

FORT *royal* is a *fort*, whoſe line of defence is at leaſt twenty-ſix fathoms long.

FORT, *ſtar*, is a ſconce or redoubt, conſtituted by re-entering and ſaliant angles, having commonly from five to eight points, and the ſides flanking each other.

To deſcribe a ſtar-fort. Deſcribe a hexagon *a*BC*def*; (*fig.* 7.) divide one of its ſides into four equal parts; and on the center of this ſide raiſe the perpendicular DA equal to one fourth of the ſide BC. From the point A draw the faces AC and AB, and let the ſame operations be performed with reſpect to the other ſides of the hexagon.

FORTS are ſometimes made *triangular*, only with half baſtions, as in *fig.* 8. This, as well as the ſquare and pentagonal *fort*, (*fig.* 9. and 10.) may be deſcribed in the following manner. Parallel to the inner figure, whether it be a triangle, ſquare, or pentagon, whoſe ſide AB may be ſuppoſed about eighteen yards, deſcribe an outward figure at the diſtance of about four or five yards from it, or farther, if neceſſary, whoſe ſides are ED, EF, &c. Divide each ſide, as ED, EF, &c. into three equal parts, one of which is EI, FL, &c. and in theſe ſides prolonged, take DG, EH, &c. each equal to one of thoſe three parts. From the points G, H, &c. thus found, draw the lines of defence to the angles of the outward figure, as HD, &c. and from the points I, L, &c. draw the flanks IK, LM, &c. perpendicular to the ſides ED, EF, meeting the lines of defence in K, M, &c. Or the flanks may be drawn, by continuing the line DI towards E, and taking IP equal to twice IE; from P as a center, with the radius PI, cut the line of defence in K, and draw the flank IK. Then to each face HK, flank KI, and curtin IG, make a parapet of about ſeven feet thick, or more if neceſſary, expreſſed in the figures, by drawing lines at that diſtance on the inſide of the ſeveral parts. Leave a proper berm of about four or five feet broad, and make a ditch about five or ſix yards wide, whoſe outer line or counterſcarp is to be parallel to the faces and curtins only. A *fort* thus conſtructed is more capable of defence than one without flanks; for the curtin IG is defended by the flank IK; and the face HK has ſome defence from the part DG. In the conſtruction of triangular *forts*, (*fig.* 11.) inſtead of making half baſtions at the angles, whole ones are placed in the middle of the ſides. The gorges of theſe baſtions may be from twenty to twenty-four toiſes, when the ſides are from a hundred to a hundred and twenty; the flanks are perpendicular to the ſides, from ten to twelve toiſes long, and the capitals from twenty to twenty-four. If the ſides happen to be greater or leſs, the parts of the baſtions are likewiſe made greater or leſs in proportion: the ditch round this *fort* may be ten or twelve toiſes wide. The ramparts and parapets of theſe works are commonly made of turf, and the outſide of the parapet fraiſed. *Forts* are often made of various figures, regular or irregular, and ſometimes in the form of a ſemi-circle, eſpecially when they are ſituated near a river, ſea, or at the entrance of a harbour; by which figure they are able to fire at the ſhips on all ſides. When a *fort* is to be built on a neck of land, formed by the confluence of two rivers, or in the windings of a river, in order to prevent an enemy from tranſporting any thing by water, or to prevent their ſhips paſſing that way, the figure of the *fort* muſt be adapted to the ſituation, in ſuch a manner, that there may be no place for landing troops out of the reach of the fire of ſome work or other; and the ſide next to the land ſhould always be better fortified than the other parts near the river, as being more liable to an attack. There are two principal errors committed in the conſtruction of *forts* near the ſea, or navigable rivers, which ſhould be carefully guarded againſt; the one is, that of making the parapet too low, ſo that perſons behind it may be fired upon from the round top of a maſt, by which the gunners are obliged to abandon their guns, and to ſave themſelves by flight: to remedy this inconvenience, the parapet ſhould be nine or ten feet high, and the batteries may be covered above by making an arch over every piece left open behind to let out the the ſmoak, or with planks, like ſheds, over which may be ſcattered earth or dung about a foot and a half thick, to prevent the wood from taking fire.

The other fault is, leaving *forts* or batteries open behind, or very little fortified towards the land, ſo that the enemy may land men in the dark and ſurprize them, by which the guns placed in them become not only uſeleſs, but ſerve rather to deſtroy them. A *fort*, or battery, therefore, ſhould be fortified all round with a good rampart and ditch, at leaſt, or with an addition of outworks, if the place is of any importance: the rampart ſhould be fraiſed, and the ditch have a row of paliſades planted in the middle of it, if it be dry. In the conſtruction of all *forts*, it ſhould be remembered, that the figure of feweſt ſides and baſtions, that can probably anſwer the propoſed defence, is always to be preferred; as works on ſuch a plan are ſooner executed, and with leſs expence; beſides, fewer troops will ſerve, and they are more readily brought together in caſe of neceſſity.

FORTAMENTE, in the *Italian Muſic*, the ſame with FORTE.

FORTE, in the *Italian Muſic*, directs to play ſtrong and loud.

FORTE FORTE, or F. F. ſignifies a degree louder or ſtronger than *forte*.

FORTE, *piu*, the ſame as *forte forte*.

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6. All the campaign around muſt lie open to the defendants; ſo that no hills or eminence muſt be allowed, behind which the enemy might ſhelter himſelf from the guns of the *fortification*; or from which he might annoy them with his own.

The fortreſs, then, is to command all the place round about; conſequently the out-works muſt all be lower than the body of the place.

7. No line of defence is to be above point-blank muſquet-ſhot, which is from one hundred and twenty to one hundred and fifty fathom.

8. The acuter the angle at the center, the ſtronger is the place; as conſiſting of the more ſides, and conſequently more defenſible.

9. All the defences ſhould be as nearly direct as poſſible.

Such are the general laws and views of *fortification*: the particular ones, reſpecting each ſeveral work or member thereof, will be delivered under their proper articles. See BASTION, and FORTIFIED *place*.

FORTIFICATION, *the art of*, may be diſtinguiſhed into two parts, viz. the *elementary* or *theoretical*, and *practical*.

Fortification, *elementary* or *theoretical*, conſiſts in tracing the plans and profiles of a *fortification* on paper, with ſcales and compaſſes; and in examining the ſyſtems propoſed by different authors, in order to diſcover their advantages and diſadvantages.

Fortification, *practical*, conſiſts in forming a project of a *fortification* according to the nature of the ground, and other neceſſary circumſtances, tracing it on the ground, and executing the project, together with all the military buildings, ſuch as magazines, ſtore-houſes, bridges, &c.

Fortification again is either *offenſive* or *defenſive*. *Offenſive fortification* is the ſame with the ATTACK of a place, and is the art of making and conducting all the different works in a SIEGE, in order to gain poſſeſſion of the place.

Fortification, *defenſive*, or DEFENCE, is the art of defending a town that is beſieged, with all the advantages which the *fortification* of it will admit.

Fortification is alſo uſed for the place *fortified*; or the ſeveral works raiſed to defend and flank it, and keep off the enemy.

All *fortifications* conſiſt of lines and angles, which have various names, according to their various offices.

The principal angles are thoſe of the *center*, the *flanking* angle, *flanked* angle, angle of the *epaule*, &c.

The principal lines are thoſe of *circumvallation*, of *contravallation*, of the capital, &c. See each in its place.

Fortifications are divided into *regular*, and *irregular*, and again into *durable* and *temporary*.

Fortification, *regular*, is that wherein the baſtions are all equal; or that which is built in a regular polygon, the ſides and angles whereof are generally about a muſquet-ſhot from each other.

In a regular *fortification*, the parts being all equal, have the advantage of being equally defenſible; ſo that there are no weak places.

Fortification, *irregular*, is that wherein the baſtions are unequal, and unlike; or the ſides and angles not all equal, and equidiſtant.

In an irregular *fortification*, the defence and ſtrength being unequal, there is a neceſſity for reducing the irregular figure, as near as may be, to a regular one; i. e. inſtead of inſcribing it in a circle, it ſhould be inſcribed in an oval, ſo that one half may be ſimilar and equal to the other half.

And as the irregularity of a figure depends on the quantity of angles and ſides; the irregularity of a *fortification* ariſes either from the angles being too ſmall, or the ſides being too long, or too ſhort.

Conſequently an irregular figure being propoſed to be fortified; all the angles, with the quantity of the ſides, muſt be found, to be able to judge how it is to be fortified. See *Tab.* VI. *Fortification, fig.* 36. which repreſents a *fortification* inſcribed in an oval.

In this caſe the ſides CD, GH, on the flat parts, are ſtronger than the ſides AB, EF, on the narrow parts, ſuppoſing all the exterior ſides equal, and the place equally fortified. When the angles BCD, CDE of the polygon are very great, and the beſieger comes within a ſmall diſtance of the works, he cannot approach nearer, without being ſeen in front, except by a direct ſap, with traverſes; and as this way of approaching preſents but a ſmall front, the beſieged, who have a much larger, may oppoſe with peculiar advantage: whereas, if the angles HAB, ABC of the polygon, are very ſmall, the beſiegers may carry their approaches to the counterſcarp itſelf, and have always a larger front than the beſieged; and, as the beſiegers muſt extend their approaches to three fronts, whether they are ſmall or large, the work of the approaches before the front BCDE will be to the work before the front HABC, as the line BE is to the line HC, nearly, i. e. as the greater axis of the oval is to the leſs; and therefore the front CD, on the flat ſide, is ſtronger than the front AB, on the narrow ſide; conſequently, the longer CD is, ſo that the lines of defence are within the reach of muſket-ſhot, and the angles BCD, CDE, are the ſame, the ſtronger will the front be; ſince the works become more ſpacious, hold more troops to defend them, and the beſiegers are obliged to extend their trenches farther. Moreover, the greater the angles of the polygon BCD, CDE are, the exterior ſides being the ſame, the ſtronger will be the front CD; becauſe the length of the line BE increaſes, and the extent of the beſiegers approaches in proportion; and, therefore, the ſtrength of a *fortification* increaſes in proportion to the number and length of its ſides; ſo that a dodecagon is ſtronger than an octagon, when the length of their ſides is the ſame. However, as it is found difficult to inſcribe a polygon in an ellipſe or oval, the following more eaſy method will anſwer the purpoſe. Reduce the ſpot of ground to be fortified to the figure ACEG (*fig.* 36.) and draw BE, AF, parallel to each other; draw CH, DG, perpendicular to theſe lines, and at equal diſtance from the points B and E, and let their interval be equal to that of the lines BE and AF; then, draw DC, GH, parallel to AF and BE, and equally diſtant from them; and from their interſections C, D, G, H, with DG, CH, as centers, deſcribe arcs, with a radius equal to CD or GH, ſo as to interſect the lines AF, BE, in A, B, E, F; join the points A, B, E, F, and ABCDEFGH, will be an oblong octagon, having one half ſimilar and equal to the other half. If a hexagon be to be deſcribed, inſtead of drawing the two lines CH, DG, one will be ſufficient; in a decagon there muſt be three, and four in a dodecagon. If the ſides cannot eaſily be made equal, then the ſides AB, EF, on the narroweſt part of the polygon, ſhould be the longeſt, becauſe it is the weakeſt. But when the figure cannot in any reſpect be made regular, the ſtrength of each ſide muſt be eſtimated according to the works a beſieger is obliged to make in the attack, and according to the obſtacles he meets with in his approaches. Muller's Elements of Fort. p. 146, &c.

Fortification, *marine*, is ſometimes uſed by way of diſtinction from *land fortification*, and denotes the art of raiſing works fit for the defence of a harbour againſt the attacks of any kind of ſhipping; but the works proper for this purpoſe depend in a great meaſure on the principles employed in the *fortification* of towns. However, attention ſhould be given to the ſituation of roads or harbours in contriving works for their defence: e. gr. when a town lies open to the ſea, on a curved, or ſtrait bold ſhore, and has before it a ſufficient depth of water and good anchorage, the ſhips, in this ſituation, may be well defended by forts built near the water's edge on each ſide of the anchoring place, ſo contrived as to have two or three batteries, one higher than the other, and furniſhed with a ſufficient number of cannon, carrying ſhot from twenty-four to forty-eight pounds. A town, in this ſituation, may be defended by a rampart, or wall, well flanked, built along the ſhore, beſide the *fortifications* on the land ſide. The works along the ſhore ſhould be carried ſo near to the water's edge, that troops, attempting to land under the cannon of a fleet, might not find ground on which to intrench themſelves. Farther, when a harbour, being a bay, has a ſhoal or ſmall iſland lying before its entrance, a ſtrong fort ſhould be built upon the iſland, in a place where it can command the entrance on both ſides, if the iſland be not too large; otherwiſe two or more forts ſhould be erected in ſuch places as may command the avenues to the bay; other forts ſhould alſo be raiſed on the moſt convenient points of land, forming the mouth of the bay. Again, when the harbour is in a bay, whoſe points, forming the entrance, ſtretch into the ſea, and approach one another within cannon ſhot; ſuch a harbour may be fortified by building on both ſides of its entrance one or more forts; and, if poſſible, a fort ſhould alſo be built within the harbour's mouth in ſuch a manner, that its cannon can rake the ſhipping fore and aft as they come in.

When a harbour is formed by a cluſter of iſlands, it is eaſily fortified, if the channel between the iſlands is not too wide for the command of cannon from one or both ſhores; but if it be too wide, the ſhipping that rides there muſt be defended from the batteries on the ſhore. When the harbour lies in an inlet, or river, ſome miles above its mouth, a fort built at each point of the entrance, when the paſſage lies ſtrait, and can be commanded from ſide to ſide, and two others between them and the harbour, but not directly oppoſite, unleſs the breadth of the channel requires it, will be a proper ſecurity for the ſhipping in ſuch a harbour; and if the channel or river is winding, the forts ſhould be built where they can command a reach at leaſt, or be ſo placed at the bends, as to command two adjacent reaches. See FORTS, and Robertſon's Treat. of Marine Fort. part ii. § 2. For the *fortification* of harbours by booms, ſee BOOM.

Fortification, *durable*, is that built with deſign to remain a ſtanding ſhelter for ages. Such are the uſual *fortifications* of cities, frontier places, &c.

Fortification, *temporary*, is that erected on ſome emergent occaſion, and only for a little time.

Such are field-works, caſt up for the ſeizing and maintaining a poſt, or paſſage; thoſe about camps, &c. as circumvallations, contravallations, redoubts, trenches, batteries, &c.

The methods of *fortifying*, that have been invented, are various; and new methods continue ſtill to be propoſed. We ſhall here ſubjoin ſome of the principal, and of thoſe which chiefly obtain through Europe; ſuch as thoſe of Coehorn, Pagan, Vauban, Scheiter, &c. from which all the reſt are eaſily conceived.

Fortification, *according to the Dutch method*, or *the ſyſtem of Marolois*, is that which, making the flank perpendicular to the curtin, makes the flank the ſubduple of the face, and ſubtriple of the curtin; and the angle of the baſtion equal either to two thirds of the angle of the polygon; or to half thereof, with the addition of fifteen or twenty degrees, to make it equal to a right angle.

Freitach determines the quantity of the flank in a ſquare to be ſix; in a pentagon, ſeven; in a hexagon, eight; in a heptagon, nine; in an enneagon, ten; in a decagon, eleven; and in all other figures, twelve Rhinland perches; conſequently, the face twenty-four, and the curtin thirty-ſix perches.

To draw the profile of a *fortification* after the Dutch manner: divide the ſide of the inner polygon, GH, (*Tab. Fortification, fig.* 1.) into five equal parts; the demigorge AH is to contain one of them; and the capital HC, two. Then divide the curtin EA into four parts; and make the flank AB one.

This is Freitach's method. Marolois's method of fortifying a hexagon is repreſented in *fig.* 12. Draw an indefinite right line AB; at the point A make the angle BAO equal to ſixty degrees; and as the flanked angle of the hexagon, according to Marolois, is 80°, the half flanked angle will be 40°; and let the diminiſhed angle BAD be 20°. In AD take AE=48 toiſes; and from E let fall on AB the perpendicular EN; and for the fauſſe-bray lay down 64 toiſes from N to I, and 72 for the length of the curtin. Take IB=AN, and at I erect a perpendicular IL=NE; and drawing the line LB, this will be the face of the demi-baſtion oppoſite to AE. Draw OB, which makes an angle ABO of 60°, with AB. At the point E, and with NE produced, make the angle BEF=55°; the line EF, forming this angle, will cut OA in a point F, from which draw FM parallel to AB. Produce the perpendiculars NE, IL, to the line FM, and you will have EG and LH for the flanks of the demi-baſtions, and GH will be the curtin. If a circle be deſcribed on the center O, with the radius OA, or AB, and a hexagon inſcribed in it, and each ſide of the hexagon be fortified in the ſame manner, the work will be finiſhed; and all the meaſures may be preſerved on the front AB. We may obſerve, that Marolois makes the flanked angle of his ſquare 60°, of the pentagon 72°, of the hexagon 80°, of the heptagon 85°, and of the octagon and other polygons 90°.

FORTIFICATION, *according to De Ville's*, or the *French method.* In this method the flanked angle is always right, and the flank is equal to the demi-gorge, and perpendicular to the curtin, and the lines of defence are *fichantes.* Let AB (*fig.* 13.) be the ſide of a hexagon, and divided into ſix equal parts: take AC and BD equal reſpectively to one of theſe parts for the demi-gorges of the baſtions of the front AB; at the points C and D erect the perpendiculars CL and DH, each equal to AC or BD; theſe will be the flanks of the demi-baſtions of the front AB. Draw the radii OA and OB, and produce them indefinitely beyond A and B; on OA produced, let fall a perpendicular LQ from the point L; make QM=QL, and draw ML, which will be the face of the demi-baſtion MLC. In the ſame manner the face HN of the other demi-baſtion may be determined; and if the ſame operations are performed with regard to the other ſides of the polygon, the *fortification* will be finiſhed. In order to cover the flank HD with an orillon, it is divided into three equal parts; GD is taken equal to one of theſe parts, and through the line GM is drawn to M, in which GK is taken equal to GD. Then the face NH is produced to meet the line MG in the point R; and on this point, as a center, with the radius RK, an arc is deſcribed, which will interſect the face NH produced, in I. Draw the line KI, and upon this let the orillon be conſtructed, by erecting an indefinite perpendicular on IN, at the point I, within the baſtion, and another on the middle of IK towards the baſtion, which perpendiculars will interſect, and the point of their interſection will give the center of the orillon; and if the compaſs be opened to I or K, the arc of the orillon may be deſcribed. For a ſecond flank, KG is produced from G to F, and FE is drawn parallel to GD.

FORTIFICATION, *according to De Sardi*, or the *Italian method.* This author allows 800 geometric Rhinland feet, or about 136 toiſes, to the ſide of his hexagon; which he divides into ſixteen equal parts, three of which parts he aſſumes for the demi-gorge; he makes the flank perpendicular to the curtin, and equal to the demi-gorge. He divides the curtin into eight equal parts, one of which is the ſecond flank; and through the extremity of this part, and that of the flank, he draws the face of the baſtion indefinitely; and he purſues the ſame operation with regard to the other ſides of the polygon; and the interſection of the faces gives the flanked angle of the baſtion; and he covers his flank with an orillon or epaulement.

FORTIFICATION, *according to the Spaniſh method.* The Spaniſh method is the ſame with that of De Ville, only omitting the ſecond flanks, and making the flanked angle obtuſe. In fortifying a regular polygon, they divide the ſide into ſix equal parts; they make the demi-gorges equal to one of theſe parts, the flanks perpendicular to the curtin, and equal to the demi-gorges, and the faces are drawn from the angle of the flank, and the extremity of the flanks, and their concurrence gives the flanked angle of the baſtions.

FORTIFICATION, *according to the reinforced order.* This method is aſcribed to different Italian authors, and particularly to De Marchi; and is explained in a book of *fortification* of Bourdin the Jeſuit, printed in 1655. Let any regular polygon, e. g. a hexagon, be inſcribed in a circle (*fig.* 14.) Let each of its ſides, AB, AC, be 160 toiſes; divide AB into eight equal parts, and let the demi-gorges of the baſtions, laid on from A and B, be equal to one of theſe parts. At the points D and E, which terminate the demi-gorges, erect the indefinite perpendiculars DK, EL, for the flanks of the demi-baſtions at A and B. Take DF and GE, each equal to a fourth part of AB, and at the points F and G erect the perpendiculars FH, GI, equal to the eighth part of AB, and draw the curtin HI; through the points I and F draw the line IM, terminated in M, which line will cut the perpendicular DK in K, and DK will be the flank of the demi-baſtion A, KM the face, and HF the double flank of the front AB. In the ſame manner the other demi-baſtion may be conſtructed in B, and by ſimilar operations on the other ſide of the polygon, the work may be completed. This method derives its name from the diſpoſition of the flanks belonging to each front.

FORTIFICATION, *according to M. Vauban's firſt method.* This method is divided into little, mean, and great; the little is chiefly uſed in the conſtruction of citadels, and is commonly formed of pentagons; the mean in that of all ſorts of towns, from an hexagon upwards to any number of ſides; and the great only in particular caſes, chiefly of irregular *fortification.* The conſtruction of the mean, which is the moſt uſeful, is as follows: deſcribe a circle with any radius AO (*fig.* 15. N° 2.) and in this circle inſcribe a polygon of as many ſides as the *fortification* is deſigned to have fronts; e. g. a hexagon. Biſect AB, one of the ſides, which M. Vauban always ſuppoſes to be 180 toiſes, in C, and at the point C erect a perpendicular, CD, towards the center of the polygon; when the polygon is a ſquare, CD muſt be one eighth of the ſide AB; when it is a pentagon, one ſeventh; but when it is a hexagon, or any other polygon of a greater number of ſides, CD will be one ſixth of the ſide. In this caſe, then, make CD=30 toiſes; and through D draw the indefinite lines ADG, BDF, in which take AE and BH, each equal to $\frac{2}{7}$ths of AB, or 50 toiſes, neglecting the fractions. On E, as a center, deſcribe an arc through the point H, meeting AD in G; and on H, as a center, deſcribe an arc through the point E, meeting BD in F; or, make each of the lines EG, HF, equal to the diſtance EH: then the lines joining the points A, E, F, G, H, B, will be the principal or outline of the front. And if the ſame conſtruction be performed on the other ſides of the polygon, we ſhall have the outline of the whole *fortification.* If with a radius of 20 toiſes, there be deſcribed circular arcs, from the angular points B, A, M, T, and lines be drawn from the oppoſite angles E, H, &c. ſo as to touch theſe arcs, their parts *ab*, *bc*, &c. together with theſe arcs, will repreſent the outline of the ditch. In this figure, the part FEALN is called the BASTION, AE and AL are the FACES of the baſtion, EF and LN are the FLANKS, FG the CURTIN, FN the GORGE of the baſtion, AG and BF the *lines of* DEFENCE, AB the exterior ſide of the polygon, CD the *perpendicular*; any line which divides a work into two equal parts is called the CAPITAL of that work, *abc* the COUNTERSCARP of the ditch, A and M the *flanked* ANGLES, H, E, L, the angles of the *ſhoulder* or SHOULDER, G, F, and N, the angles of the flank; any angle whoſe point turns from the place is called a SALIANT angle, ſuch as A, M, and any angle whoſe point turns towards the place, *re-entering* ANGLE, ſuch as *b*, F, and N. If two lines be drawn parallel to the principal or outline, the one at the diſtance of three toiſes, and the other at the diſtance of eight toiſes from it, the ſpace *yx* included between the principal one, and that fartheſt diſtant, is called the RAMPART; and the ſpace *xx* contained between the principal line, and that next to it, and which is generally ſtained black, is called the PARAPET; within four feet of the parapet there is drawn a fine line, which expreſſes a ſtep, called BANQUETTE. All works have a parapet of three toiſes thick, and a rampart of eight to ten, beſides their ſlopes. The rampart is elevated more or leſs above the level of the place, from ten to twenty feet, according to the nature of the ground, and the particular conſtruction of the engineer. The parapet is a part of the rampart, elevated from ſix to ſeven feet and a half above the reſt, in order to cover the troops that are drawn up there from the fire of the enemy in a ſiege; and the banquette is two or three feet higher than the rampart, or about four feet lower than the parapet; ſo that when the troops ſtand upon it, they may juſt be able to fire over the parapet. The body of the place is that which is contained within the firſt rampart; and all the works which are conſtructed beyond the ditch, before the body of the place, are called OUT-WORKS.

The following table exhibits the proportional dimenſions of the ſeveral parts in the little, mean, and great *fortification* of M. Vauban. In the firſt horizontal column are the numbers expreſſing the lengths of the exterior ſides from 80 to 260; in the ſecond, the perpendiculars anſwering to theſe ſides; in the third, the lengths of the faces of the baſtions; and in the fourth, the lengths of the capitals of the ravelins.

TABLE.

	Forts.						Little Fortif.				Mean.		Great.	
Side of polyg.	80	90	100	110	120	130	140	150	160	170	180	190	200	260
Perpendicular	10	11	12½	14	15	16	20	21	23	25	30	31	25	22
Faces of baſtions	22	25	28	30	33	35	40	42	45	47	50	53	55	60
Capital of ravelins	25	28	30	35	38	40	45	50	50	52	55	55	60	50

The principal works that are now uſed in the conſtruction of fortified places, beſide thoſe that have been already mentioned, are ARROWS, COVERT-WAYS, COUNTERGUARDS, CROWN-WORKS, DITCHES, *retired* FLANKS, GLACIS, HALF-MOONS, HORN-WORKS, LUNETTES, ORILLONS, RAVELINS, *detached* REDOUBTS, TENAILLES, and TENAILLONS.

FORTIFICATION, *according to M. Vauban's ſecond method, with tower-baſtions*, called the *ſyſtem of Landau*, becauſe the city of Landau is fortified after this manner. Let AB (*fig.* 16.) be the interior ſide of a hexagon, equal to 120 toiſes; draw AC, BD, from the center, through the extremities of the ſide; ſet off 6 toiſes from A to *b*, and from B to *c*; through the points *b* and *c*, draw lines at right angles to AB; from *b* ſet off ſix toiſes to *f* outwards, and four from *b* to *d* inwards; and from the points *f* and *d*, draw perpendiculars *f r*, *d n*, to the capital AC; then if *r* E is made equal to *r f*, the point E will be the ſaliant angle of the tower-baſtion, and E *f d n* half the tower. If in the capitals, there be taken, from the ſaliant angles of the tower-baſtions, the diſtances EC, FD, each of forty toiſes, the points C and D will be the ſaliant angles of the counterguards before the towers. From the points C and D draw the lines of defence C *c*, D *b*, to the points where the flanks of the towers cut the curtin; on which ſet off fifty-ſix toiſes for the faces of the counterguards; the flanks are found as in the firſt method, and likewiſe the tenailles. The ditch before the ſaliant angles of the towers is ſix toiſes, and its counterſcarp drawn to the extremities of the flanks of the counterguards; the right line which joins the ends of theſe flanks will determine the inſide of the tenailles. The ditch before the counterguards is twelve toiſes at the ſaliant angles, and the counterſcarp is drawn to the oppoſite ſhoulders in the ſame manner as in the firſt method. The capital of the ravelin is forty-five toiſes, its faces, when produced, terminate on thoſe of the counterguards, within ten toiſes of the ſhoulders; ten toiſes are cut off from the faces by the flanks, which are parallel to the capital as uſual. The ditch before the ravelin is ten toiſes; the covert-way five, the ſemi-gorges of the places of arms twelve the faces ſeventeen, and the glacis twenty. See *fig.* 17.

FORTIFICATION, *according to M. Vauban's third method*, or *that of New-Briſach*. This method is applied to an octagon, whoſe exterior ſide AB (*Tab.* II. *fig.* 18.) is 180 toiſes, the perpendicular CD, 30; the faces AK, BL, of the counterguards, 60; the flanks LN, KM, are found by ſetting off 22 toiſes, as chords to the arcs deſcribed from the oppoſite ſhoulders as centers. From the extremities of the flanks a line is drawn, which will be parallel to the exterior ſide AB, meeting the capitals AE, BF of the counterguards at G and H, which line will terminate the inſide of the tenaille, and alſo the ſaliant angles, G, H, of the tower-baſtions. If EF be drawn parallel to GH, and at nine toiſes diſtant from it, the interſections E, F, with the capitals of the counterguards, will be the centers of the towers; from which ſet off ſeven toiſes from E to *a*, and F to *l*, for the ſemi-gorges, and draw the flanks *b c*, *k m*, through the extremities of theſe ſemi-gorges, perpendicular to the line EF; theſe flanks are four toiſes inwards from *a* to *c*, and *l* to *m*, and five outwards from *a* to *b*, and *l* to *k*; the faces *b* G, *k* H, are drawn from the points *b* and *k* to G and H, and the lines joining the inſide of the flanks, at the end of four toiſes, will complete the towers. The ditch is ſix toiſes before the ſaliant angle of the towers, and its counterſcarp meets the line GH, within ten toiſes of the extremities M, N, of the flanks of the counterguards. If from the point *n*, when the line EF interſects the perpendicular CD produced, five toiſes be ſet off to the point *r*, and the lines of defence are drawn from the extremities of the ſemi-gorges *a* and *l* of the towers through this point *r*; then the flanks of the counterguards produced, will determine the little flanks *p*, *q*, and *s*, *t*, of the inſide rampart, and the extremities of theſe little flanks being joined, will give the curtin between them. The great ditch before the counterguards is fifteen toiſes, and its counterſcarp parallel to the faces; the capital of the ravelin is fifty-five toiſes, and that of the redoubt within it twenty-three; the faces of the ravelin are drawn to the faces of the counterguards within fifteen toiſes from the ſhoulders, and thoſe of the redoubt parallel to theſe; twelve toiſes are cut off from the faces of the ravelin, and ſix from thoſe of the redoubt, by the flanks which are parallel to the capital; the ditch before the ravelin is twelve toiſes, and that before the redoubt ſix; the covert-way and glacis are the ſame as in the ſecond method. The parapets of the counterguards, on both ſides of the ſaliant angles, are raiſed four feet higher for the ſpace of twenty feet above the reſt, in order to prevent the enfilades of the ricochet batteries. See *fig.* 19.

Mr. Muller has made ſeveral remarks on the three methods of M. Vauban above recited. With regard to the firſt he obſerves, that it is ſimple, eaſily conſtructed, and takes up but little ground, about once and a half more ground than the buildings. It is guarded from ſurprize by its ſtone revetements, requires only few men to defend it, and with the addition of ſome outworks, as counterguards before the baſtions, and lunettes or tenaillons to cover the ravelins, furniſhes a good defence. However, his flanks are too ſmall; his retired flanks on circular arcs of 60° are needleſs, ſince the flanks made upon their chords will contain as many guns, and reſiſt better than the curved flank; his capital ditch is too wide; the faces of the ravelins, inſtead of terminating on the ſhoulders of the baſtions, ſhould terminate three or four toiſes beyond them; the ſemi-gorges of the bonnet, inſtead of being fifteen toiſes, ſhould, in Mr. Muller's opinion, be but eight or ten at moſt; one of the faces of the lunettes ſhould be perpendicular to the face of the ravelin, and the other to that of the baſtion, in order to be defended in a direct manner; inſtead of the counterguards before the ravelin, which are ſeldom made, he recommends a redoubt within it, as leſs expenſive, and anſwering the ſame purpoſe. All tenaillons and counterguards ſhould have retrenchments.

The ſecond method, he obſerves, is deſigned for fortifying an old town already incloſed by a rampart; on which account M. Vauban begins within, and fortifies outwards, contrary to his other methods; the tower baſtions are joined to the old wall, and have underneath a magazine in the form of a croſs, round which are caſemates, or cellars, to hold both men and guns; thoſe in the flanks have each an embraſure, which opens into the ditch, and thoſe in the faces have embraſures, ſo as to fire out of one into the other, when taken by the enemy, and above there is a parapet twelve feet thick, with embraſures. Theſe towers are expenſive, and afford little reſiſtance; and ſmall baſtions, without caſemates, might be ſubſtituted in their room with advantage. The flanks of the counterguards are too ſmall, and are eaſily deſtroyed from the oppoſite covert-way; and, therefore, they ſhould either be enlarged or increaſed in number.

The third method differs only from the former, in having two ſmall flanks in each curtin, of about four toiſes, which can hardly hold two guns each, and, therefore, add no great ſtrength.

FORTIFICATION, *according to count Pagan's method.* This author eſtabliſhes three ſorts of *fortification*; viz. the great, mean, and little, whoſe chief dimenſions are contained in the following table.

	Great Fortif.		Mean		Little	
	Square	In all the other polyg.	Square	In all the other polyg.	Square	In all the other polyg.
Exter. ſides	200	200	180	180	160	160
Perpendic.	27	30	24	30	21	30
Faces	60	60	55	55	45	50

For conſtructing the mean *fortification*, let AB (*fig.* 20.) be the ſide of a regular polygon, e. g. of a hexagon, and equal to a hundred and eighty toiſes. Biſect it in D, and erect a perpendicular equal to thirty toiſes; from the points A and B, draw through C the indefinite lines of defence AN and BM; let the faces AE and BF be each equal to fifty-five toiſes; draw the flanks FN and EM perpendicular to the lines of defence, and MN will be the curtin. Count Pagan, in order to increaſe the fire of his flank, made three flanks, raiſed one above another, and a ſecond baſtion within the firſt. To conſtruct theſe caſemates, as they are commonly called, biſect the flank FN in G; through the points A and G draw the line AG, and produce it indefinitely within the baſtion; produce alſo the line of defence AN; take GH=5 toiſes, and through H draw the line HI parallel to FN or GN; draw LK parallel to HI, and at the diſtance of ſeven toiſes from it, and equal to fourteen toiſes from K to L; at the diſtance of ſeven toiſes from KL draw the parallel OP, making it equal to fourteen toiſes three feet from O to P; then draw through the point P the line PQ parallel to FB; this line will be the face of the interior baſtion, having *o*P for its flank. and let a parapet three toiſes thick be conſtructed, to the three flanks HI, LK, and OP. The great ditch is ſixteen toiſes, and its counterſcarp parallel to the faces of the baſtions; the capital of the ravelin fifty, and its faces are drawn to the ſhoulders; the ſemi-gorges of the redoubt within the ravelin fifteen, and the faces parallel to thoſe of the ravelin; the ditch of the ravelin twelve, and that of the redoubt ſix; the ſaliant angle of the counterguard is forty toiſes diſtant from that of the baſtion, and nine or ten broad at the extremities; the ditch before the counterguard is twelve, the covert-way four, and the faces of the place of arms eight, and parallel to the oppoſite counterſcarp. See *fig*. 21. N° 1.

This method, though at firſt received with great applauſe, has its defects; its triple flanks are too near each other; the ditch before the redoubt is but ill defended, which ſhould never be made without making tenailles likewiſe; the covert-way is too narrow, and the places of arms too inconſiderable for defending the glacis; and the want of traverſes in the covert-way is a defect, eſpecially ſince the modern diſcovery of ricochet batteries.

Fortification, *according to M. Blondel's method*, has a great affinity with that of the count de Pagan; only that the quantity of the lines and angles is differently determined. See *fig*. 22. and *fig*. 23. N° 1.

Mr. Blondel makes two ſorts of *fortification*, viz. the great, whoſe exterior ſide he makes two hundred toiſes; and the little, in which it is one hundred and ſeventy toiſes. In order to find the angles made by the exterior ſides, and the lines of defence, he directs to ſubtract 90° from the angle of the polygon, and to add 15° to the third part of the remainder, which will give the angle ſought. E. g. the angle of an hexagon is 120°, from which take 90°, and the third part of the remainder 30 is 10, which added to 15, gives the angle required. The lines of defence are equal to $\frac{7}{10}$ of the exterior ſide, i. e. 119 or 120 in the little, and 140 in the great. The conſtruction is as follows: let AB (*fig*. 23.) the exterior ſide of an hexagon, be one hundred and ſeventy toiſes; the angles ABC, BAD, twenty-five degrees each; the lines of defence, AD, BC, one hundred and twenty toiſes; let O be the point of interſection of theſe lines; biſect AO, BO, in E and H; then will AE, BH, be the faces; EC, HD the flanks; and CD the ſtrait part of the curtin. The orillons EI, LH, are ten toiſes each; the flanks are retired five toiſes behind the lines EC, HD: in all polygons above an heptagon, M. Blondel makes the retired flanks from ten to twelve toiſes diſtant from theſe lines, in order to lengthen the curtins. Each flank exceeds the flank before it nine feet in height, and they are eight toiſes diſtant from outline to outline. The counterſcarp of the ditch is drawn from the extremities I, L, of the orillons, parallel to the faces of the baſtions; the counterguards are but four toiſes broad, ten or twelve feet of which are taken for the parapet; the ditch before them is ten toiſes. If from the ſhoulder E, as a center, an arc be deſcribed through H, and another from H through E, the interſection of theſe arcs will be in the ſaliant angle of the ravelin, the faces of which are directed to a point in the faces of the baſtions within ſix toiſes of the ſhoulders; the gorge of the ravelin is determined by producing the faces of the counterguards; the ditch of the ravelin is twelve toiſes. The ſemi-gorges of the lunettes V are twenty toiſes; their faces parallel to the counterſcarps of the ditches, before the ravelin and counterguard, and the ditch before them, is eight toiſes; the covert-way ſix, and the faces of the places of arms, which are likewiſe parallel to the counterſcarps, are as much. The retired batteries, *x*, in the baſtions and ravelins, are ſeven toiſes from the faces; and their lenghts are determined by the faces and counterſcarps of the ravelin and counterguards produced. This method is very expenſive, and requires a numerous artillery for defence. His three flanks are too near each other, and too open, and. therefore, liable to be deſtroyed from the covert-way, for the counterguards are not broad enough to ſcreen thoſe flanks; the low batteries *x*, &c. are too narrow and confined; and his places of arms are too ſmall; his great ditch is too wide; and the omiſſion of traverſes in the covert-way is important, ſince the uſe of ricochet batteries.

Fortification, *according to the firſt method of baron de Coehorn*. This firſt method is applied to an hexagon, and it is ſuppoſed that the ſurface of the water is but four feet lower than the level ground. Let AB (*Tab*. III. *fig*. 24.) the interior ſide of an hexagon, be one hundred and fifty toiſes; take AC, BD, each equal to 39, and the capitals AE, BF, each 80, and AG, BH, 40; from E and F draw the lines of defence to D and C, and through G, H, lines parallel to ED, FC, in which take GI, HK, each equal to forty toiſes, for the higher faces of the baſtions. For the lower faces EM, FN, draw IO (*fig*. 25. N° 2.) perpendicular to IG, and equal to four toiſes; O*r* parallel to IG, and = 4 toiſes; then will *r*M, perpendicular to EM, determine the lower face EM. In order to determine the tower 3, in *r*M take *r*S=5 toiſes; draw S*m* parallel to EM, and = 14 toiſes; in O*r* produced, take *rn* = 4 toiſes, and in EM take MV = 8 toiſes; then if the points *n* and *m* are joined by a right line, and *m*, V, by an arc of 60°, we ſhall have the outline of the tower. From the points C and D (*fig*. 24.) ſet off on the lines of defence fourteen toiſes to Y and W, and on the baſes YI and WK deſcribe equilateral triangles, and the angles oppoſite to theſe baſes will be the centers of the higher flanks YI and WK; and R being the interſection of the two lines of defence, biſect RM in S, and RC in Q, and, drawing SQ, *v*SQR will be half the tenaille; and drawing from C a line parallel to IY, ſo as to meet the tower, on this the mean flank may be deſcribed in the ſame manner as the former. The parapets of the three flanks, and thoſe of the parts *m*V, VM (*fig*. 25. N° 2.) of the towers, are twenty-four feet thick; the other parts M*r*, *rnm*, ſixteen, and all the other parapets, in general, are twenty feet. Behind the lower parapet there is a banquette of three feet, and a rampart of five; and under this rampart a ſtone gallery running from one end to the other, and divided into ſeveral apartments, which are ſhut from without; and alſo another, going from the ſaliant angle of the lower faces to that of the higher, with loop-holes facing the dry ditch X, (*fig*. 24.) which lies between the higher and lower faces of the baſtions; and likewiſe a row of paliſades parallel to the higher faces, and four toiſes diſtant from them. Before the mean flank there is a wet ditch ſix toiſes broad, and another *z* (*fig*. 25.) behind the towers of the ſame breadth, over which there are two draw-bridges, parallel to the higher faces. The ditch *z* is flanked by three embraſures in O*r*, and the dry ditch by two in IO. The great ditch is twenty-four toiſes broad, and its counterſcarp parallel to the lower faces of the baſtions; the ſemi-gorges OL of the ravelin (*fig*. 24.) are twenty-nine toiſes, and the faces LP, forty-five; the dry ditch Y is ſixteen toiſes, the rampart twenty-eight feet, and the lower faces *a*T are parallel to the higher ones, the parapet of which is twenty, and the banquette three. In the gorge of the ravelin there is a ſmall redoubt *a*, about five feet high, and underneath a lodgment of ſtones, the walls being eighteen inches thick at the ſides; the roof is made of planks, covered with three feet of earth. There is a dry ditch going from the extremities of the faces to the redoubt, and round its angle, having a row of paliſades before it, to ſecure the retreat from the ravelin into this redoubt; there is likewiſe another row going from the extremities of the faces, in a round form, turning towards the gorge of the ravelin.

In the dry ditch of the ravelin, within ſix toiſes from the great ditch, is a coffer, and a ditch *p* of ſix toiſes before it: this coffer has a wall on both ſides, and the roof is planked and covered with a foot and half of earth; above this is a ſtone parapet of five feet high, with a banquette behind it. There runs a covered gallery under the rampart of the lower faces, and another joining the two ſaliant angles, together with a row of paliſades, in the ſame manner as in the dry ditch before the baſtions. The wet ditch before the ravelin is eighteen toiſes; the counterguards *x*, which the author calls *cover-faces*, are twenty-five feet broad, and the ditch before them is fourteen toiſes; the covert-way is twelve toiſes broad, and the glacis twenty; the ſemi-gorges *fg*, *gh*, of the places of arms, are twenty-two toiſes, and are taken from the point *g*, where the branches of the covert-way meet, and the faces *fk*, *hk*, are twenty-eight; within theſe places of arms are traverſes of twenty feet thick and eighteen toiſes long, within ten or twelve feet from, and parallel to the faces. The ſtone lodgments *b*, within the places of arms, are found by ſetting off twelve toiſes from the point g, for the ſemi-gorges, and the faces are drawn parallel to thoſe of the places of arms. At ſix toiſes from the places of arms, are coffers *q* of eight feet broad, made with planks at the ſides, and above with a foot of earth over and before them. There are two banquettes all round the covert-way, and before the traverſes, as alſo two rows of palliſades before the traverſes, one of which joins them, and the other goes round the covert-way. Laſtly, the re-entering angles of the counterſcarp next to the covert-way are made a little round, as likewiſe that in the ravelin; but the contrary way, that is, they are made hollow.

Fortification, *according to Coehorn's ſecond method.* In this method, the level of the ground is ſuppoſed to be three feet above the ſurface of the water, and A B, *fig.* 26. is the interior ſide of an heptagon of a hundred and twenty-ſix toiſes; take in the capitals, AC, B D, each of ſeventy-two toiſes; at the extremities C, D, make the angles A C E, B D F, each of forty degrees; and ſet off ſixty-ſix toiſes for the faces C E, D F, of the baſtions; on the interior ſide, take A G, B H, each of thirty toiſes, and from the point D as center, deſcribe an arc through the point G, on which ſet off a chord of thirty; and on this chord deſcribe the mean flank G I, which is an arc of ſixty degrees.

Draw a line from the ſaliant angle D through the extremity I of this flank, on which take I a of ten toiſes; join a E, on which deſcribe the orillon as uſual.

The outline of the higher flank is twelve toiſes diſtant from that of the outline of the mean; this flank is an arc deſcribed from the ſame center as that of the former, the chord of which is forty toiſes.

From the points G, H, draw the broken parts of the curtain perpendicular to the capital of the baſtion, and make it nine toiſes long: the extremity of the higher flank is terminated, by the inſide line of the parapet of the curtin produced.

The tenaille is found by producing the faces of the baſtions ten toiſes; through the extremity of which, an arc is deſcribed from the oppoſite ſaliant angle of the baſtion, as center; on this arc is ſet off a chord of twenty toiſes; and this chord ſerves to deſcribe the flank upon, which is an arc of ſixty degrees; the curtin is a right line.

There is a wet ditch before the tenailles of ten toiſes broad, with two bridges at each end, near the orillons; the one directly over it, and the other along the faces of the baſtion.

The dry ditch round the body of the place is twenty toiſes broad, before the faces of the baſtion to which it is parallel, and the lower rampart K L twenty-nine feet; the ſemi-gorges M L are fifteen toiſes, and the flanks L N, eighteen, and are deſcribed from the ſaliant angles K of the lower faces as centers.

The ſaliant angle of the ravelin is a hundred and twenty-five toiſes diſtant from the curtin of the body of the place, and is ſeventy degrees; the faces are fifty toiſes long; the faces of the redoubt x, are ſixteen toiſes diſtant from thoſe of the ravelin, and fourteen long.

The wet ditch round the lower faces of the ravelin is twenty-four toiſes broad: the work beyond this ditch, which the author calls the ſecond counterſcarp, is twenty, parallel to the ditch.

To find the broken part of this work, join the two re-entering angles m, r; on which take m r, of thirty toiſes, and draw r t, r v, parallel to the outline of the counterſcarp, each equal to twelve: ſet off twenty-two from t to s, and from v to q; and upon theſe lines as chords deſcribe the round flanks, which are arcs of ſixty degrees.

The traverſes in this counterſcarp are drawn at ten toiſes from the flanks perpendicular to the parapet.

The redouts z in the re-entering angles, are found by ſetting off ſixteen toiſes from the points m, to n for their capitals, and the faces are parallel to the broken curtin before them: thoſe marked y which are in the ſaliant angles are found by producing the counterſcarps of the great ditch, and ſetting off twelve toiſes from the points of their interſections for their faces; and the flanks are drawn parallel to their capitals.

The ditch before this work is fourteen toiſes; as to the covert-way and glacis, they are the ſame as in the author's firſt method.

Fortification, *according to Coehorn's third method.* Here the level of the ground is five feet above the ſurface of the water; and the author ſuppoſes an octagon, whoſe interior ſide A B, *fig.* 27. is a hundred and ten toiſes; the ſemi-gorges A n, B m, twenty-one; the capitals A C, B D, of the baſtions ſixty-four; and the ſaliant angles eighty-five degrees; the faces C E, D F, of the baſtions fifty-four toiſes; the parts Q s, Q r, of the tenaille thirty-two; the lower flanks, that is, thoſe of the tenaille, are found by deſcribing arcs through the points s, r; from the oppoſite ſaliant angles D C, on which are twenty toiſes ſet off as chords; and theſe chords ſerve to deſcribe arcs of ſixty degrees upon, for the required flanks.

From the extremities v, t, of theſe flanks, lines are drawn to the oppoſite angles D, C, and ſix toiſes ſet off from v to q; and upon q E the orillon is deſcribed as uſual.

The higher flanks are deſcribed from the ſame centers, as the lower through the extremities n, m, of the curtin; and their chord is thirty toiſes.

The wet ditch before the body of the place is twenty toiſes, and its counterſcarp parallel to the faces of the baſtions.

The capital VW of the detached baſtion is a hundred toiſes; the faces are directed to the ſaliant angles of the inner baſtions; the dry ditch behind the lower faces in the detached baſtions is twenty toiſes; and the higher faces are parallel to the lower, and thirty-one toiſes long: the towers x, and the ditch before them, are made in the ſame manner as in the firſt method. To find the flanks, make the ſemi-gorges V a, V b, each thirty-eight toiſes, and draw the chords off theſe flanks parallel to the capital VW; and from the extremities of the higher faces draw alſo lines to the former, upon which the flanks are deſcribed as uſual.

The counterſcarp of the ditch before the redoubt z, is drawn from the extremities of the flanks parallel to the faces; and at ſix toiſes from this, the faces of the redoubt are drawn; four toiſes of which are cut off for the flanks.

The ditch before the detached baſtion is twenty-four toiſes; the ravelins, counter-guards, covert-way, and glacis, are the ſame here as in the firſt method.

There are little pits or ponds l, l, dug between the higher and lower curtins, to hold water, in order to prevent the paſſing from the tenailles to the flanks.

Mr. Muller has urged a number of objections againſt Coehorn's firſt method, for which we muſt refer to his Elements of *Fortification,* p. 91, &c. and as to the ſecond and third, they are abſolutely impracticable. However, Coehorn's works were publiſhed before he had acquired that experience which afterwards rendered him one of the greateſt engineers; and Bergen-op-zoom, which he fortified, is one of the beſt contrived *fortifications* in all Europe.

Fortification, *according to the method of Scheiter.* This method is divided into the great, mean, and little: the exterior ſide of the polygon for the great ſort is two hundred toiſes, for the mean ſort one hundred and eighty, and the ſmall one hundred and ſixty. The line of defence in the firſt is one hundred and forty toiſes, in the ſecond one hundred and thirty, and in the third one hundred and twenty. This line is always raſant. All the other lines are fixed at the ſame length for all polygons, whoſe ſtructure chiefly depends upon the knowledge of the exterior ſide, of the capital, and of the flanked angle: for which conſult the following

Table *of Capitals and flanked Angles.*

Polygons	IV	V	VI	VII	VIII	IX	X	XI	XII
The flanked angles in the three ſorts of *fortification*	deg. 64	76	84	90	95	97	99	101	103
Capital for the great ſort	toiſes 46	49	51	52	53	54½	56½	58	59
Ca. for the mean ſort	42	44½	46½	48½	50	51	52½	54	54
Ca. for the ſmall ſort	39	41½	42½	45	46	47½	48½	50	50½

Scheiter detaches the baſtions from the curtin, and forms a kind of receſs behind the curtin: ſuppoſe an octagon to be fortified with his greater *fortification*; let A B, (*Tab.* IV. *fig.* 28.) be its exterior ſide, and equal to two hundred toiſes; A C, B D, parts of the radii, equal to forty-ſix toiſes, be the capitals, and draw the interior ſide CD: in the compaſs take a hundred and forty toiſes for the line of defence, and putting one leg in the flanked angle A, deſcribe with the other an arc to cut the interior ſide in E; make C F = E D, and draw through F and B the ſecond line of defence F B; at E and F, on the lines of defence A E and F B, erect the perpendiculars E L and F I, which, meeting the lines of defence alternately, determine the faces of the counter-guards or detached baſtions of Scheiter. Produce the lines of defence towards the capitals, and take the parts E H and F P, each of ſixteen toiſes, and, biſecting theſe lines, draw the higher flanks parallel to the lower, and make the ſame conſtruction on the other ſides; take the diſtance P Q, and with one leg of the compaſs in P, deſcribe an arc to interſect the capital in the point N; draw N Q and N P, and the counterguard will be finiſhed. About the counterguard make a large ditch of eighteen toiſes, which will give the redan R S T, and as the ſcarp of this ditch forms a ſaliant angle towards the middle of the curtin, Scheiter, in order to remedy this inconvenience, conſtructed there a ſmall baſtion in the following manner: from the point 3, where the lines of defence interſect one another, he let fall a perpendicular 34 on the interior ſide; and from the point 4 on each ſide, he took the diſtances 45 and 46, each equal to 43; and then drew the faces 53 and 36 of this baſtion. The flanks are drawn parallel to the perpendicular 43, and produced till they meet a parallel to P F and E H. The ditch of the counterguards is formed by producing the faces of twenty toiſes, as Z A to X, and drawing a line from X to the angle of the ſhoulder L, &c.

On the re-entering angle of the ditch, Scheiter deſcribes a kind of redoubt K, the capital of which is ſixteen toiſes; the counterguards are encompaſſed with *fauſſe-braies*, as well as the whole interior incloſure, except the faces of the ſmall baſtion in the middle of the curtins: he alſo adds a covert-way to that of the place, at the foot of the glacis of the firſt. This ſyſtem of Scheiter differs eſſentially from that which M. Vauban executed in the *fortification* of New Briſach; and yet ſome have groundleſsly charged Vauban with having borrowed his from this of Scheiter.

Fortification, *according to M. Belidor's firſt method.* Let A B, *fig.* 29. be the exterior ſide of an octagon, and equal to two hundred toiſes; the perpendicular C D, fifty; the faces A E, B F, ſeventy; and the flanks are found according to M. Vauban's method.

The line joining the extremities *a* and *b* of the flanks of the ſame baſtion, ſerves as an exterior ſide for tracing the front of a polygon, whoſe perpendicular *c d* is thirteen toiſes, the faces twenty-two; the parts *d f* of the lines of defence, which terminate the flanks, are fourteen; the dry ditch before this front is ten toiſes at the points *a*, *b*, and the counterſcarp terminates at the oppoſite ſhoulders.

The rams-horns *g*, are deſcribed from a point, in the middle of the faces of the interior front as centers, with a radius of twenty-five toiſes.

The retrenchments H, are drawn from a point h in the face at fifteen toiſes from the ſhoulder to the points *b*, *a*, and are twenty-five toiſes long; the orillons k l, eight, and the flanks n m are eight toiſes retired near the orillon; which are the chords of an arc from the oppoſite ſhoulders; the ditch before theſe retrenchments is eight toiſes near the parapet of the baſtions, and its counterſcarp directed to the ſhoulders.

The ſaliant angle of the redoubt B touches the interſections of the curtins produced, and the faces terminate on the faces of the inner front within three toiſes of the ſhoulders; its ditch is three toiſes: theſe redoubts are a ſtone wall of three or four feet thick, with loop-holes in the faces.

M. Belidor has made no outworks to this ſyſtem, but Mr. Muller has added ravelins and a covert-way, made in the uſual manner; the great ditch is twenty toiſes before the ſaliant angles of the baſtion, and its counterſcarp is directed to the ſhoulders; and the faces of the ravelins to the outline of the retrenchments H.

Fortification, *according to M. Belidor's ſecond method.* AB, *fig.* 30. is the exterior ſide of an octagon of two hundred toiſes; the perpendicular C D, fifty-five, and the faces A E, B F, ſeventy, as in the former; and the flanks are likewiſe found according to M. Vauban's method.

The line *a b*, which paſſes through the extremities of the flanks, ſerves as an exterior ſide to the inward polygon, whoſe perpendicular c d is five toiſes, the faces twenty-four, and the flanks are chords of arcs deſcribed from the oppoſite ſhoulders of the detached baſtions as centers.

This inward polygon is nothing elſe but a ſtrong wall, behind the curtin of which, and about eighteen feet diſtance from it, is a parapet or epaulement of earth three toiſes thick; and within the baſtions are cavaliers, whoſe fronts are circular arcs deſcribed with a radius of about twenty-three or twenty-four toiſes; the flanks are ſeven toiſes long, and gorges thirty-two.

The counterſcarp of the ditch before this polygon is ſeven toiſes at the ſaliant angles *a*, *b*, and parallel to the curtin.

The rams-horns or tenailles touch the lines of defence within three toiſes of the ſhoulders, and are deſcribed ſo as to meet the other lines of defence in the ſame point as the counterſcarp of the inner ditch.

The outline of the curtin between the rams-horns is nine toiſes from the ditch.

The exterior ſide h k of the retrenchments within the detached baſtions, meets the faces within twenty toiſes from the ſhoulders; the perpendicular m n, is ſeventeen, the faces h l, twenty; the chord on which the orillon is deſcribed is five toiſes, as likewiſe the retired part of the flank; the flanks and orillons are made according to M. Vauban's method.

The circular curtin and the round part of the ditch behind it, are deſcribed with a center, twenty-five toiſes diſtant from the points *a*, *b*.

The great ditch is twenty toiſes before the ſaliant angles of the detached baſtions, and is ſuppoſed to be dry; for which reaſon M. Belidor made a caponiere to go from the curtin to the ravelin, eighteen or twenty feet wide, whoſe parapets terminate on both ſides in a ſlope or glacis.

The capital of the ravelin Q is ſixty-ſix toiſes, that of the redoubt P, thirty; the faces of the ravelin are directed to thoſe of the retrenchments within the baſtions, and thoſe of the redoubt to the ſhoulders; the batteries in the ravelin are retired eight toiſes behind the faces; the ditch of the ravelin is twelve toiſes, and that of the redoubt ſeven.

The ſemi-gorges of the lunettes R, are twenty-five toiſes, and the faces perpendicular to thoſe of the ravelin and the baſtion; the ditch before them is eight toiſes, and the batteries S, are retired as much, and are fifteen toiſes long: laſtly, the covert-way is ſix toiſes.

Fortification, *according to M. Belidor's third method.* The figure in this conſtruction, is part of an octagon, whoſe ſide A B, *fig.* 31. is two hundred toiſes, the perpendicular C D, forty; the faces A E, B F, fifty-five; the parts D r of the lines of defence, between the perpendicular and the broken part of the curtin, thirty; and the length of the broken parts r n, twenty-five; the orillon is nine, and is a part of a flank found according to M. Vauban's method; the flanks are eight toiſes retired, and are arcs of ſixty degrees; the outlines of the rams-horns are thirteen toiſes diſtant from each other; the paſſages at their extremities are three, the outmoſt or loweſt is deſcribed with a radius of thirty toiſes, and the other is deſcribed from the ſame center.

Mr. Muller has omitted the cavaliers placed in the gorges of the baſtions, as being according to his notion ſuperfluous.

The center R of the arc K L, is eighteen toiſes diſtant from the re-entering angle of the counterſcarp; the chord K L is forty-four toiſes, as well as the other face of the lunette; and the radius R K, eighty-eight; the battery H is ten toiſes retired.

The figure m is a redoubt made of a ſtone wall full of loop-holes, with a ditch of two toiſes before it.

The ditch before the lunettes is twelve toiſes at the ſaliant angles, and its counterſcarp directed to the extremities of the oppoſite faces.

The capital of the ravelin W is forty-four toiſes, the ſemi-gorges, thirty-one; the flanks are nine toiſes, and directed to the ſhoulders of the baſtions.

The ditch before the ravelin is ten toiſes, and the covert-way ſix.

The glacis T, before the ſaliant angles of the baſtions, is fifteen toiſes broad; the ſemi-gorges of the places of arms X are twenty-ſix toiſes; and thoſe of the redoubts or ſtone wall within them, twenty, reckoning from the edge of the glacis T; and the faces are drawn parallel to the oppoſite ſemi-gorges.

The redoubts S within the lunettes, are alſo made of a wall three or four feet thick full of loop-holes, with a ditch of three toiſes before them.

The dimenſions of the arrows and detached redoubts, are the ſame as thoſe in M. Vauban's method, only the arrows have flanks parallel to the paſſage of ten toiſes.

The ſeveral ſyſtems of Pagan, Vauban, Coehorn, Blondel, and Belidor, may be ſeen at one view in *Tab.* V. *fig.* 32.

Fortification, *according to Mr. Muller's firſt method.* Let AB, *Tab.* VI. *fig.* 33. be the exterior ſide of a polygon of any length, e, gr. a hundred and eighty toiſes; make the perpendicular C D of any length, as the ſixth, fifth, or fourth part of the exterior ſide, according to the expence or importance of the place: here it is the ſixth part or thirty toiſes; ſet off fifty toiſes or more for the faces B H, A E, or rather $\frac{2}{7}$ of the exterior ſide; from the ſaliant angle A deſcribe an arc with the radius A I of twenty toiſes, that is two or three toiſes more than the breadth of the ditch; draw from the oppoſite ſhoulder H a tangent H I to that arc, and from the angle A the indefinite line A b parallel to that tangent; then, if from the angle A as center an arc a b be deſcribed with any radius, the flank G H is drawn parallel to the chord a b: one of the flanks being thus found, the others will be found by taking the diſtance D G, between the perpendicular and the angle of the flank, and carrying it from the extremities of all the perpendiculars on the lines of defence, as from D to F; this being done, the counterſcarp of the ditch is drawn parallel to the line H I or to A b; and having the point or re-entering angle O, its diſtance from the extremity of the perpendicular, being carried all round, will give the re-entering angles before the other fronts.

The tenailles hk, which M. Belidor has invented, and called them rams-horns, are deſcribed, by ſetting off three toiſes from the ſhoulder Q of the baſtion to the point h, and drawing h f perpendicular to the line of defence; then its interſection f, with the other line of defence produced, will be the center of the arc h k.

In order to conſtruct the ravelin, ſet off twelve or fifteen toiſes from the ſhoulder E to the point r, in the face of the baſtion, and from the angle G of the flank as center, deſcribe an arc through the point r, meeting the perpendicular CD produced at L; from this point L draw the faces, ſo as when produced to fall on the faces of the baſtions within three toiſes of the ſhoulders; the ditch of the ravelin is twelve toiſes.

For the retired flanks, find the flank QR as before, on which ſet off five or ſix toiſes for the ſhoulder or orillons; and from a point g in the oppoſite face of the baſtion at five toiſes from the ſaliant angle B, draw the broken part of the flank; then draw the retired flank parallel to the line QR, at five toiſes diſtant from it: the orillon may be made round in the manner of M. Vauban's, if it be thought proper.

Fortification, *according to Mr. Muller's ſecond method, with detached baſtions.* Let the interior ſide AB, *fig.* 34. of an octagon be a hundred and thirty toiſes; take A b, B n, equal to twelve toiſes for the ſemi-gorges of the ſmall baſtions, and as much for their capitals A c, B r; from the points c, r, draw the lines c n, r b, to the extremity of the gorges, and make the flanks b d, n m, perpendicular to the lines of defence; the ditch is ſix toiſes at the ſaliant angles c, r, and its counterſcarp drawn to the extremities of the flanks of the detached baſtions. The capitals c C, r D, of the detached baſtions are fifty-five toiſes, and the lines of defence are drawn to the extremeties b and n of the interior flanks; the faces are ſixty; the radius of the arc, which ſerves to determine the poſition of the flanks, eighteen; and the ditch ſixteen at the ſaliant angle.

The ravelin is conſtructed by deſcribing an arc from the extremity of the flank, as center, through a point in the oppoſite face of the baſtion, within twenty toiſes of the ſhoulder, which arc interſects the capital of the ravelin at the ſaliant angle; the faces terminate within five toiſes of the ſhoulders, the ſemi-gorge of the redoubt R is fifteen, its faces parallel to thoſe of the ravelin, and its parapet two toiſes; the ditch of the ravelin twelve, and that of the redoubt ſix.

The ſemi-gorges of the places of arms are twenty toiſes, thoſe of the ſtone redoubts p within them twelve; the faces of the places of arms are twenty-five; and thoſe of the redoubts parallel to them, with a dry ditch of three toiſes before them; the covert way is ſix, and the glacis twenty.

The faces of the tenailles are ſixteen toiſes, the paſſage between them and the flanks of the baſtions three; their flanks are parallel to the others, the curtin is drawn through the points where they meet the lines of defence, and the inſide of the tenailles is terminated by lines drawn through the extremities of the flanks of the detached baſtions.

Fortification, *according to Mr. Muller's third method, with detached orillon baſtions.* Let the exterior ſide AB, *fig.* 35. of an octagon be two hundred toiſes, the perpendicular CD forty, that is, a fifth part of the exterior ſide, the faces A E, BF, fifty-five; the radius of the arc which ſerves to determine the poſition of the flanks, twenty-two; the ditch ſixteen at the ſaliant angles; the orillon five; the flank is retired five toiſes; and the line k d, which terminates the flanks, is drawn from a point d, in the face at five toiſes from the ſaliant angle; the ſhoulders of the tenailles are twenty toiſes from thoſe of the baſtions; the flanks parallel to the others, and the curtin is drawn through the points of interſection of the flanks and lines of defence.

Take on the lines E l, F h, drawn from the extremities of the faces parallel to the flanks, and which terminate the inſide of the tenailles, the parts l n, h m, each of ſix toiſes, for the breadth of the ditch; and upon the exterior ſide r n, conſtruct a front of a polygon, by making the perpendicular twelve, and faces twenty toiſes. The redoubts V are made of a wall three feet thick only with loop-holes; their ſaliant angle is determined by the counterſcarps of the inner ditch produced; and the faces terminate within three toiſes of the ſhoulders; the ditch about theſe redoubts is four toiſes.

The ravelins and covert-way are conſtructed in the ſame manner as thoſe in the former method.

Mr. Muller has made remarks on theſe ſeveral conſtructions, deſigned to ſhew in what reſpects they are ſuperior to thoſe of M. Vauban, already recited. See Muller's Elem. of *Fortification*, p. 100, 104, 108, &c.

Fortification, *profile of a,* is a repreſentation of a vertical ſection of a work, ſerving to ſhew thoſe dimenſions which cannot be repreſented in plans, and are neceſſary in the building of a *fortification.* This profile is conſtructed in the following manner: provide a ſcale of equal parts, adapted to the perpendicular height of the work, e. gr. let *a b*, *Tab.* VII. *fig.* 37. be a ſcale of twenty toiſes; and let A B, repreſent the level of the ground plane, ſo that thoſe parts of the *fortification* which are above the ſurface of the ground, or below it, may be above or below this line in the profile. From the point A, in the line AB, take $AC=4$ toiſes three feet, for the interior talus or ſlope of the rampart; at C erect a perpendicular CD of three toiſes eighteen feet for the height of the rampart; through the point D draw an indefinite line DN parallel to AB, in which take $DE=5$ toiſes for the breadth of the *terre-plein* of the rampart: at the point E erect the perpendicular $EF=2$ feet for the height of the banquette, and draw F H parallel to DN, making FG and GH, each equal to three feet. Draw the line EG, which will repreſent the talus of the banquette, and GH will be the upper part of it: on the point H erect the perpendicular $HI=4\frac{1}{2}$ feet for the height of the parapet above the banquette. From I draw the indefinite line IK parallel to DN, in which take $IL=1\frac{1}{2}$ foot, and draw HL, which will be the interior ſide of the parapet: take $LK=3$ toiſes for the thickneſs of the parapet, and from the point K let fall the indefinite line KP, perpendicular to the line AB, and produce it below AB: in this line take $KM=2\frac{1}{2}$ feet, and draw the line LM for the upper part of the parapet, which is a talus, that the ſoldier on the banquette may be able to diſcover the covert-way and the glacis. On the point N, where DN interſects KP, as a center, with a radius of one foot, deſcribe a ſmall ſemi-circle, which repreſents the *cordon*; take $NP=6$ toiſes, and from the point P draw an indefinite line Pn parallel to AB, which will repreſent the bottom of the ditch, the depth of which is ſuppoſed to be equal to the height of the rampart. Take $NO=5$ feet for the thickneſs of the *revetement* of the *cordon*, and from the point O draw the indefinite line OQ parallel to NP; this will be the interior ſide of the *revetement* of the point P, where the line P n meets the line NP; take $PR=7$ feet, or about the fifth part of its height NP, for the talus of the *revetement*, and draw the line NR, which repreſents the ſcarp or exterior ſide of the *revetement:* take $RS=1$ foot for the jutting of the foundation, and draw ST perpendicular to P n, making it equal to two or three toiſes for the depth of the foundation; draw TQ parallel to P n, and let it interſect OQ in Q; and let Y & be drawn parallel to NM, and at the diſtance of three feet, for the *revetement* of the parapet. In order to repreſent the profile of the counterfort or buttreſs, when there is any, take $OV=9$ feet, and draw VX parallel to OQ; VX, QO, will repreſent this profil, by means of which the *revetement* OR is ſtrengthened. That the *terre-plein* of the rampart may have a proper declivity, for carrying away the water which falls upon it, let DW be equal to $1\frac{1}{2}$ foot, and draw WE, which will repreſent the upper part of the rampart, and the line AW repreſents the ſlope of its interior ſide. Suppoſe the breadth of the ditch to be twenty toiſes, and lay this down from P to n; and on the point n erect the perpendicular n m, terminated by the line AB at m, which will be the limit of the counterſcarp. At the diſtance of three feet from this line, and parallel to it, draw z y, which will give the thickneſs of the *revetement* of the counterſcarp; $nu=3$ feet will be the talus of this *revetement*, and the line u m the exterior ſide of it. The foundation may be made to terminate at the diſtance of about ſix inches from the point u. Let $mc=5$ toiſes be the breadth of the covert-way, and at the point c erect a perpendicular $cd=2$ feet for the height of the banquette. Draw d f parallel to AB, and equal to one toiſe, in which take de and e f, each equal to three feet.

Draw the line c e for the talus of the banquette, and ef will be the upper part of it: from the point f erect a perpendicular $fl=4\frac{1}{2}$ feet, for the height of the parapet of the covert-way above the banquette. Produce f l till it cuts AB in r; take $rg=20$ toiſes for the breadth of the glacis, and draw l g, which will repreſent the glacis, or the declivity of the rampart of the covert-way: in this line take $lh=1$ foot, and draw h f, which will be the interior ſide of the parapet of the covert-way; after which let there be a paliſade conſtructed on the banquette, and the profile is finiſhed. Encyclopedie.

FORTIFIED *place*, a *fortreſs*, or *fortification*, i. e. a place well flanked, and ſheltered with works. See *Tab. Fortification*, *fig.* 21. with the explanation annexed to it, and *fig.* 38. which repreſents a *fortified* place beſieged.

Places fortified after the modern way, conſiſt chiefly of baſtions and curtins, and ſometimes of demi-baſtions, according

cording to the ſituation of the ground; of cavaliers, ramparts, fauſſe-brayes, ditches, counterſcarps, covert-ways, half-moons, ravelins, horn-works, crown-works, outworks, eſplanades, redents, and tenailles. See each under its proper article, Bastion, &c.

There are other moveable and additional parts; as bermes, parapets, banquettes, embraſures, cordons, boyaux, moulinets, chevaux de friſe, chauſſetrapes, galleries, mantelets, batteries, ſaps, mines, blinds, gabions, and paliſades. See each in its place, Berme, Parapet, &c.

Several of theſe works, again, conſiſt of diverſe parts, which have different denominations: thus, a baſtion conſiſts of faces, flanks, caſemates, orillons, gorge, &c. which ſee.

FORTIN, or **Fortlet**, a diminutive of the word *fort*, importing a little *fort*, or ſconce, called alſo *field* Fort.

Star **Fortin**, is that whoſe ſides flank each other, &c. See *Star* Fort.

FORTIORI. *A multo* Fortiori. See Multo.

FORTIS *Aqua*. See Aqua *Fortis*.

FORTISSIMO, in the *Italian Muſic*, is uſed to ſignify *very ſtrong*. It is ſometimes denoted by F F F, or *f f f*, and intimates that the performers are to play or ſing very loud or ſtrong, to expreſs ſome paſſion, &c. See Forte.

FORTRESS. See Fort and Fortification.

FORTUNA *equeſtris*. See Equestris.

Fortuna, in our ancient *Law-Books*, is the ſame with what we call treasure-*trove*.

Theſaurum ducente fortuna *invenire inquirendum eſt per* 12 *juratores pro rege, &c. quod fideliter præſentabunt, &c. omnes* fortunas, *abjurationes, appella*, &c.

Some pretend it alſo ſignifies *fortuito occiſos*; but this ſeems to be very fanciful.

FORTUNATE *iſlands*, in the *Ancient Geography*, an appellation which has given the critics and antiquaries great perplexity; being the name of a place famous for golden apples which grew there; or, as Varro ſays, for ſheep with golden fleeces.

The ancients deſcribe them as ſituate without the ſtreights of Gibraltar, in the Atlantic ocean. The common opinion of the moderns takes them for the Canary iſlands; this is grounded principally on the ſituation and temperature of thoſe iſlands, which renders the uſe of cloaths there unneceſſary; and from the abundance of oranges, lemons, grapes, and other delicious fruits growing there.

Ol. Rudbecks has found a very different place for them. That learned author, who makes his native country, Sweden, the ſcene of all that is great and extraordinary in ancient tradition and fable, will have the *Fortunate Iſlands* to be Sweden; and the delicious fruits, talked of by the ancients, his imagination ſuggeſts, were nothing but the virtue and good manners, which anciently flouriſhed in that cold hyperborean nation.

FORTUNE. See Providence, Fate, &c.

Fortune, *Τυχη*, is a name unknown in the earlier ages; and does not occur either in Homer or Heſiod; as not being invented in their time.

In after-days it was introduced as a machine; and made to ſerve divers purpoſes in natural philoſophy and theology.

Plutarch, in an expreſs treatiſe of the *Fortune* of the Romans, accounts for the practice of the ancient poets, who ſeem to make Jupiter the author of all the evils of life. Mankind, he obſerves, before the name of *Fortune* had got into the world, perceiving a certain arbitrary cauſe, diſpoſing of things in an irreſiſtible manner, called it *God*; but the ſame cauſe being often obſerved to act at random, and without any rule or order at all, the ſupreme Being came to be diveſted of the attribute; and *Fortune*, or Deſtiny, acknowleged in his ſtead.

It is not eaſy to unravel what the ancients meant by the name *Fortune*. The Romans underſtood by it a principle of fortuity, whereby things came to paſs, without being neceſſitated thereto; but what and whence that principle is, they do not ſeem to have ever preciſely thought; whence their philoſophers are often intimating, that men only framed the phantom *Fortune*, to hide their ignorance; and that they call *Fortune* whatever befals a man without his knowing for what purpoſe. Hence Juvenal, ſat. x. ver. 366, affirms, they were men who made a deity of *Fortune*.

> *Nullum numen abeſt, ſi ſit prudentia; ſed te*
> *Nos facimus*, Fortuna, *deam, cæloque locamus.*

The ingenious Mr. Spence gives another reading of this paſſage:

> *Nullum numen habes, ſi ſit prudentia; ſed te*
> *Nos facimus*, Fortuna, *deam cæloque locamus.*

This reading, he thinks, agrees beſt with the context: Juvenal ſays, ver. 356. that the two things we ſhould pray for are good health and good ſenſe; that we might be the authors of our own happineſs if we pleaſed, ver. 363. that virtue is the only way to true happineſs, ver. 364. that if we ourſelves are prudent, *Fortune* has no power over us; and that, in truth, ſhe is no goddeſs at all, and has only uſurped a ſeat in heaven from the folly of mankind, ver. 366. *Fortune* was not conſidered as a deity by the old Romans, but was made ſo by the devotion and folly of the vulgar; and Mr. Spence ſays, that he has ſeen an ancient gem, in which Cybele, the mother of the gods, is repreſented as turning away her head from *Fortune*, in an attitude of diſowning and rejecting her. Polymetis, p. 150, 154, &c.

According to the opinion of the heathens, therefore, *fortune*, in reality, was only the arrival of things in a ſudden and unexpected manner, without any apparent cauſe, or reaſon; ſo that the philoſophical ſenſe of the word coincides with what is vulgarly called *chance*.

But in religion it had a farther force; altars and temples in great numbers were conſecrated to this *Fortune*, as a deity. This intimates that the heathens had perſonified, and even deified, their chance; and conceived her as a ſort of goddeſs, who diſpoſed of the fate of men at her pleaſure. Hence that invocation of Horace, *O diva, gratum quæ regis Antium*; in the thirty-fifth ode of the firſt book, where he recommends Auguſtus, then preparing for a viſit to Britain, to her protection. From theſe different ſentiments it may be inferred, that the ancients at one time took *Fortune* for a peremptory cauſe, bent upon doing good to ſome, and perſecuting others; and ſometimes for a blind, inconſtant cauſe, without any view or determination at all.

If then the word *Fortune* had no certain idea in the mouth of thoſe who erected altars to her; much leſs can it be aſcertained what it denotes in the mind of thoſe who now uſe the word in their writings.

They who would ſubſtitute the name *Providence* in lieu of that of *Fortune*, cannot give any tolerable ſenſe to half the phraſes wherein the word occurs.

Horace paints the goddeſs, preceded by Neceſſity, holding nails and wedges in her hands, with a cramp-iron, and melted lead to faſten it; rarely accompanied with Fidelity, unleſs when ſhe abandons a family; for in that caſe Fidelity never fails to depart with her, as well as friends.

She is diſreſpectfully ſpoken of by moſt of the Roman writers, and repreſented as blind, inconſtant, unjuſt, and delighting in miſchief. Ovid. ad Liv. ver. 52. ver. 374. Hor. lib. i. od. 34. ver. 26. lib. iii. od. 29. ver. 51. Statius, Theb. xii. ver. 505. However, they had a good as well as a bad *Fortune*, a conſtant and inconſtant *Fortune*, the latter of which was repreſented with wings, and a wheel by her. Hor. lib. iii. od. 29. ver. 56.

Juvenal alludes to a ſtatue of *Fortune*, which exhibited her under a very good character, as the patroneſs of the poor infants that were expoſed by their parents in the ſtreets. Sat. vi. ver. 605.

The painters repreſent her in a woman's habit, with a bandage before her eyes, to ſhew that ſhe acts without diſcernment; and ſtanding on a wheel, to expreſs her inſtability. The Romans, ſays Lactantius, repreſented her with a cornucopiæ, and the helm of a ſhip, to ſhew that ſhe diſtributes riches, and directs the affairs of the world. In effect, it is with ſuch characters, that we ſee her repreſented on ſo many medals, with the inſcriptions, FORTVNA AVG. FORTVNA REDVX. FORTVNAE AVG. OI REDVCIS, &c. Sometimes ſhe is ſeen pointing at a globe before her feet, with a ſceptre in one hand, and holding the cornucopiæ in the other.

The Romans had a virile, as well as a muliebrian *Fortune*, for the objects of their adoration: the *Fortuna virilis* was honoured by the men, and the *fortuna muliebris* by the women.

They honoured *Fortune* alſo under a variety of other appellations. The Romans derived the worſhip of *Fortune* from the Greeks, under the reign of Servius Tullius, who dedicated the firſt temple to her in the public market. Nero alſo built a temple to *Fortune*. The *Fortune* worſhipped at Antium was probably of the moſt exalted character of any among the Romans; if we may judge by the account which Horace gives us of the great ſolemn proceſſions that were made to her. Hor. lib. i. od. xxxv. ver. 22. But the moſt celebrated temple of *Fortune* was at Præneſte. Statius ſpeaks of ſeveral *Fortunes* there, and calls them the *Præneſtinæ ſorores*. Lib. i. Sylv. iii. ver. 80.

On the reverſe of a medal of Commodus, we have a repreſentation of *Fortune*, under the quality, or ſurname of *Manens*, i. e. *ſtable, permanent*; holding a horſe by the reins. On the Greek medals we meet with ΑΓΑΘΗ or ΚΑΛΗΤΥΧΗ, *Good Fortune*. Conſtantine gave the epithet *anthouſia*, i. e. *flouriſhing*, to the *Fortune* of his new city Conſtantinople.

Fortune, *part of*. See Part.

Fortune-*tellers*. Pretenders to tell *fortunes*, and to any crafty ſcience for the diſcovery of ſtolen goods, are puniſhable by impriſonment, pillory, and binding to the good behaviour, and ſhall be deemed vagabonds. Stat. 9 Geo, II. cap. 5. ſect. 4. Stat. 17 Geo. II. cap. 5. ſect. 2. See CONJURATION.

FORTY *days*. See QUADRAGESIMA, and LENT.

Forty *days court*. See ATTACHMENT *of the foreſt*.

Forty *hours, prayers of*. See HOURS.

Forty *ſhilling-land* is uſed in Scotland for a certain portion of arable land. The *forty-ſhilling land* of old extent contains eight OXGANG, or 104 acres.

FORUM, in *Antiquity*, is uſed in divers acceptations: ſometimes for a place of traffic, anſwering to our market-place; in which ſenſe it has uſually ſome adjective added to it, as *forum boarium*, the *beaſt-market*; *forum piſcarium*, the *fiſh-market*; *olitorium forum*, the *herb-market*.

Forum, again, is uſed for any place, where the governor of a province convenes his people, to give judgment, according to courſe of law.

Whence a man is ſaid *forum agere*, when he keeps the aſſizes; *forum indicere*, when he appoints the place where they are to be kept, &c.

Forum was alſo a public ſtanding place in the city of Rome, where cauſes were judicially tried, and orations delivered to the people.

Of theſe *forums* there were ſeveral; at firſt only three, viz. *Romanum*, *Julianum*, and *Auguſtum*; but that number was afterwards increaſed to ſix, by the addition of the *Tranſitorium*, called alſo *Palladium*; the *Trojanum*, and *Saluſtii forum*.

The firſt, and moſt eminent of theſe, was the *forum Romanum*, called alſo *forum vetus*; and abſolutely, *forum*, or *the forum*.

In this was an apartment, called the ROSTRA, where the lawyers pleaded; the officers harangued; funeral orations were delivered, &c.

In the ſame *forum* was the *comitium*, or hall of juſtice, with the ſanctuary of Saturn, the temple of Caſtor, &c.

Forum is alſo uſed among caſuiſts, &c. for *juriſdiction*. Thus they ſay *in foro legis*, or the *outer forum*, i. e. in the eye of the laws, or the common courſe of juſtice: *in foro conſcientiæ*, or the *inner forum*, i. e. in the eye of God, or a man's own conſcience.

There are a great many things not condemned *in foro legis*, which yet are criminal *in foro conſcientiæ*.

FOSS, or **Fosse**, in *Fortification*, &c. a DITCH, or MOAT. The word is French, formed of the Latin participle *foſſum*, of the verb *fodio*, *I dig*.

Fosse, *advance*. See ADVANCE.

Fosse, *van*. See VAN.

Foss, **Fossa**, in *Anatomy*, a kind of cavity in a bone, with a large aperture, but no exit, or perforation.

When the aperture is very narrow, it is called a *ſinus*.

In the cranium there are ſix internal, and fourteen external *foſſes*. The cavity of the orbit, which contains the eye, is a *foſs*.

Foss is particularly uſed for the cavity, or denture in the back part of the neck.

FOSSA *magna*, or *navicularis*, is an oblong cavity, forming the inſide of the *pudendum muliebre*, and which preſents itſelf upon opening the labia; and in the middle whereof are the *carunculæ myrtiformes*. See *Tab. Anat.* *(Splanch.) fig.* 9. *lit. t.*

Fossa, in our *Ancient Cuſtoms*, was a ditch full of water, where women committing felony were drowned; as men were hanged. *Nam & ipſi in omnibus tenementis ſuis omnem ab antiquo legalem habuere juſtitiam, videlicet ferrum,* foſſam, *furcas, & ſimilia*. In another ſenſe it is taken for a grave, as appears by theſe old verſes:

> *Hic jacent in* foſſa *Bedæ venerabilis oſſa:*
> *Hic eſt* foſſatus, *qui bis erat hic cathedratus.*

Foss-*way* was anciently one of the four great Roman highways of England: ſo called, according to Camden, becauſe it was ditched on both ſides, which was the Roman method of making highways.

FOSSARII, in *Antiquity*, a kind of officers in the Eaſtern church, whoſe buſineſs was to inter the dead.

Ciaconius relates, that Conſtantine created nine hundred and fifty *foſſaries*, whom he took out of the divers colleges or companies of tradeſmen: he adds, that they were exempted from taxes, ſervices, burdenſome offices, &c.

F. Goar, in his notes on the Greek Euchologion, inſinuates, that the *foſſarii* were eſtabliſhed in the times of the apoſtles; and that the young men, who carried off the body of Ananias, and thoſe perſons full of the fear of God, who interred St. Stephen, were of the number.

St. Jerom aſſures us, that the rank of *foſſarii* held the firſt place among the clerks; but he is to be underſtood of thoſe clerks only, who had the direction and intendance of the interment of the devout.

FOSSIL, in *Natural Hiſtory*, is uſed, in a general ſenſe, for any thing dug up, or found under ground. Such are all minerals, metals, rock ſalts, &c.

Foſſils is uſed in a more confined ſenſe by Linnæus, to denote the third claſs of ſtones; and includes petrified, concrete, and terrene ſubſtances.

The chemiſts divide all bodies into three claſſes, or kingdoms; viz. *foſſil* or *mineral*, *vegetable*, and *animal*.

Foſſils may be diſtinguiſhed into, 1. Such as are *natives* of the earth; and, 2. Such as are *adventitious*, and repoſited therein by any extraordinary means; as earthquakes, deluges, &c.

Fossils, *native*, or **Fossils** *properly ſo called*, are ſenſible bodies, generated and growing in the earth, and found either buried in it, or lying on its ſurface; whoſe conſtituent parts are ſo ſimple and homogeneous, that there is no apparent diſtinction of veſſels and juices; nor any difference between the part, and the whole.

The firſt perſon who attempted to reduce the ſubject of *foſſils* into a regular ſcience, was Dr. Woodward, who publiſhed a method of arrangement, founded on the growth, ſtructure, and texture of *foſſils*. But this ſyſtem being found inſufficient for diſtinguiſhing the bodies of the *foſſil* kingdom with accuracy, was ſucceeded by the method of dividing theſe bodies, according to the various changes produced on them by fire, into *calcarii*, *apyri*, *vitreſcentes*, &c. eſtabliſhed by the Swediſh and German authors; and this method now univerſally prevails. The mineralogy of Wallerius is on this plan; however, other writers, as Dr. Hill, Mendes da Coſta, &c. have endeavoured to form a new ſyſtem from the combined principles of Woodward and Wallerius; and arranged *foſſils*, not only according to their growth, texture, and ſtructure, but alſo their principles and qualities, as diſcovered by the aid of fire and acid menſtrua.

Native *foſſils* are either *ſimple*, or *compound*.

Fossils, *ſimple*, are thoſe, whoſe parts, however divided, are all of the ſame nature, i. e. of the ſame gravity, magnitude, figure, hardneſs, and mobility.

Such is quickſilver, which, however divided, is always found the ſame.

Of *foſſils* naturally and eſſentially ſimple, ſome, according to Dr. Hill, in his Hiſtory of *Foſſils*, are neither inflammable nor ſoluble in water, of which he reckons three ſeries; as thoſe of no regular ſtructure or determinate figure, comprehending the ſimple EARTHS, of which there are ſeveral orders and genera; thoſe of a regular ſtructure, and no determinate figure, of which ſeries there are three claſſes, viz. the TALCS, the FIBRARIÆ, and the GYPSUMS, each of which is again ſubdivided into orders and genera; and thoſe of a regular ſtructure and a determinate figure, comprehending three claſſes, viz. the SELENITÆ, CRYSTALS, and SPARS, which include various orders and genera. Other ſimple foſſils, though uninflammable, are ſoluble in water; ſuch are the ſimple SALTS: and others, on the contrary, are inflammable, but not ſoluble in water; of which there are two ſeries, viz. thoſe of a ſolid form, comprehending the PHLOGIDIAUGIA and the PHLOGISCIERIA.

Fossils, *compound*, are thoſe which may be divided into different, or diſſimilar parts.

As antimony, which may be reſolved by fire into ſulphur, and a metalline part.

Of theſe compound *foſſils*, in the diſtribution of Dr. Hill, ſome are neither inflammable, nor ſoluble in water, of which there are four ſeries; as thoſe that are found in continued ſtrata, comprehending the two claſſes of *compound* EARTHS, ſubdivided into LOAMS and MOULDS, and their ſubordinate genera; and STONES, including three orders, and under thoſe eight genera; thoſe again, that are formed in detached maſſes, of a regular ſtructure and determinate figure, comprehending the two claſſes of SEPTARIÆ and SIDEROCHITA; thoſe formed in detached maſſes, of no determinate figure or regular ſtructure, and compoſed of a cryſtalline or ſparry matter, debaſed by an admixture of earth in various proportions, comprehending four claſſes, viz. the SCRUPI, the *ſemipellucid* GEMS, the PEBBLES, and SANDS; and thoſe that are formed of a fine pellucid ſubſtance, of great hardneſs, and never fouled by an admixture of earthy, or any other coarſe matter, but ſuſceptible of elegant tinges from metalline particles, of which ſeries there is only one claſs, including the pellucid GEMS, of which there are two genera, viz. ſuch as retain one ſimple and permanent appearance in all lights, as the diamond, the carbuncle, the ruby, the garnet, the hyacinth, the amethyſt, the ſapphire, the beryll, the emerald, the praſius, the chryſolite, and the topaz; and ſuch as exhibit variable colours, when viewed in different lights, as the opal and aſteria. Other compound *foſſils* are ſoluble in water, but not inflammable, as all the *metallic* SALTS, ſome of which are found naturally in a ſolid form, as VITRIOL and CHALCANTHUM; and others in a liquid ſtate, ſuch as the water from which the blue Cyprian vitriol is procured; and others are inflammable but not ſoluble in water, of which there are three claſſes, viz. the MARCASITES, the PYRITÆ, and PHLOGONIÆ.

Dr. Hill adds a third general diviſion of *foſſils*, including the metallic *foſſils*, ſome of which are fuſible by fire, and not malleable in their pureſt ſtate; ſuch are antimony, biſmuth, cobalt, zinc, and quickſilver; and others are fuſible by fire, but concrete again in the cold, and become malleable, or diſtenſible, and ductile under the hammer: ſuch are tin, iron, copper, ſilver, lead, and gold.

FOSSILS, *adventitious*, or *foreign*, include the ſubterraneous exuviæ of ſea and land animals, and even vegetables; as ſhells, bones, teeth, leaves, ſtalks, &c. which are found buried in great abundance, in divers parts of the earth. See *Foſſile* PLANTS, SHELLS, WOOD, &c.

Theſe extraneous *foſſils* have employed the curioſity of ſeveral of our lateſt naturaliſts, who have each their ſeveral ſyſtem to account for the ſurpriſing appearances of petrified ſea-fiſhes, in places far remote from the ſea, and on the tops of mountains; ſhells in the middle of quarries of ſtone; and of elephants teeth, and bones of divers animals, peculiar to the ſouthern climates, and plants only growing in the Eaſt, found *foſſile* in our northern and weſtern parts.

Some will have theſe ſhells, &c. to be real ſtones, and ſtone plants, formed after the uſual manner of other figured ſtones; of which opinion is our learned Dr. Liſter.

That author, though he allows of petrified ſhells on the ſea-ſhores, will by no means agree, that there are any ſuch petrifactions in the midland countries. The ſhell-like ſtones, found in our quarries, he contends, are *lapides ſui generis*; and never were any part of an animal. His reaſons are, that their matter and texture is perfectly the ſame with that of the rock, or quarry, where they are taken; as iron-ſtone ſhells are all iron-ſtone; ſpar, or cryſtalline, all ſpar, &c. Add, that the quarries of different ſtone yield different ſorts of theſe ſhells; and that there are no animals in nature, which yield any thing exactly like many of them.

But to this erroneous doctrine it is to be anſwered, 1. That theſe ſhells found under-ground, are often perfectly conformable to thoſe in the ſea in figure, ſubſtance, magnitude, &c. 2. The ſubſtance of theſe *foſſils* often alſo differs eſſentially from the common ſubſtance of ſtones. It is true, we frequently find them covered, or impregnated with a mineral, or ſtony matter, which has gradually inſinuated itſelf into the pores; but it is in many caſes eaſy to diſtinguiſh that matter from the ſubſtance of the ſhell.

Another opinion is, that theſe *foſſil* ſhells, with all other foreign bodies found within the earth, as bones, trees, plants, &c. were buried therein at the time of the univerſal DELUGE; and that having been penetrated either by the bituminous matter, abounding chiefly in watery places, or by the ſalts of the earth, they have been preſerved entire, and ſometimes petrified.

Others think, that thoſe ſhells, found at the tops of the higheſt mountains, could never have been carried thither by the waters, even of the deluge; inaſmuch as moſt of theſe aquatic animals, on account of the weight of their ſhells, always remain at the bottom of the water, and never move but cloſe along the ground.

They imagine, that a year's continuance of the waters of the deluge, intermixed with the ſalt waters of the ſea, upon the ſurface of the earth, might well give occaſion to the production of ſhells of diverſe kinds in different climates; and that the univerſal ſaltneſs of the water was the real cauſe of their reſemblance to the ſea-ſhells; as the lakes formed daily by the retention of rain, or ſpring-water, produce different kinds.

Others think, that the waters of the ſea, and the rivers, with thoſe which fell from heaven, turned the whole ſurface of the earth upſide down; after the ſame manner as the waters of the Loire, and other rivers, which roll in a ſandy bottom, overturn all their ſands, and even the earth itſelf, in their ſwellings and inundations; and that in this general ſubverſion, the ſhells came to be interred here, fiſhes there, trees there, &c. See Journ. des Sçavans, 1715. p. 19. and Mem. de Trev. 1713.

But nobody has ſet this ſyſtem in a better light than Dr. Woodward, in his Natural Hiſtory of the Earth. That author, purſuing and improving the hypotheſis of Dr. Burnet, maintains the whole maſs of earth, with every thing belonging thereto, to have been ſo broken and diſſolved, at the time of the deluge, that a new earth was then formed in the boſom of the water, conſiſting of different ſtrata, or beds of terreſtrial matter, ranged over each other uſually, according to the order of their ſpecific gravities. By this means, plants, animals, and eſpecially fiſhes, and ſhells, not yet diſſolved among the reſt, remained mixed and blended among the mineral and *foſſil* matters; which preſerved them, or at leaſt aſſumed and retained their figures and impreſſions, either indentedly, or in relievo.

Camerarius attacks this opinion of Dr. Woodward, and goes yet higher, and advances many new notions. He ſuppoſes, 1. That the greateſt part of the ſhells now dug from under-ground, had been placed there before the deluge, that is, at the time of the creation, when God ſeparated the earth from the waters. 2. That, without having recourſe to the diſſolution of the earth by the waters, one might ſuppoſe moſt of them to have ſlipped in at the chinks and crevices naturally happening after the waters were retired, and the earth ſufficiently drained. 3. That particular inundations might have ſwept moſt of theſe ſhells into the places where we now find them. 4. That the ſea may have wrought, or caſt up, moſt of theſe ſhells through ſubterraneous ſpiracles and canals. 5. That God has created divers ſtony and metalline bodies, perfectly like the vegetables and animals, which we ſee on earth, and in the ſea.

To all theſe ſuppoſitions, Dr. Woodward anſwers, 1. That it is no ways probable, God ſhould create ſuch a number of ſhell-fiſh of the ſame ſpecies at once; and that purely with a deſign to deſtroy them all again ſo ſoon after; that among the *foſſil* ſhells of the ſame ſpecies it is eaſy to diſtinguiſh thoſe of different ages; that ſome appear preciſely ſuch as we now find them in the ſpring, the ſeaſon when the deluge began; that it is not only ſhells we find under-ground, but alſo bones of quadrupeds, plants, and trees of extraordinary ſizes, and which are not of the number of aquatics; and laſtly, that the waters were ſeparated from the earth on the third day, and that none of theſe things were created, till afterwards. 2. That, on the ſecond ſuppoſition, theſe ſhells would be diſpoſed perpendicularly, and not horizontally, as they are always found; that we ſhould ſometimes find them in the clefts of the earth, where in fact there are none but what are broken. 3. That we have no acquaintance with any of theſe pretended inundations; that they could never have brought ſhells, ſtags horns, and elephants teeth, from America, and the Eaſt Indies, to England, and the other parts of Europe; nor the fruits, pines, and beeches, frequently found far greater than any of our growth. Add, that theſe particular inundations muſt have riſen to the tops of the higheſt mountains, and of conſequence they muſt have been general. 4. On the fourth ſuppoſition it muſt be held, that God did not only create all theſe ſeveral bodies in the entrails of the earth, but their ſeveral parts, and the ſeparate pieces and fragments of thoſe parts; a piece of ſhell, for inſtance; one ſide of a ſhell, which conſiſts of two; a ſhell void of the fiſh it ſhould contain; beards of corn, without the grain; pieces of cedar-bark, without the wood; pieces of bullocks hides without fleſh and bones; human ſkins without bodies; a bone without the reſt of the ſkeleton; a tooth without the jaw, &c. Add, that the *foſſil* ſhells have not only external, but eſſential reſemblances to ſea-ſhells; both, e. gr. yielding, by analyſis, a quantity of ſea-ſalt; that among the *foſſil* teeth of fiſhes, we meet with ſome apparently worn; and, laſtly, that the ſhell-fiſh, called *purple*, has a long ſharp tongue, by means whereof it pierces other ſhells, and picks the fiſh out of them; and that in digging underground we actually meet with divers of theſe ſhells thus pierced. Can ſuch minute thorough-paced reſemblances be the accidental effects of a *luſus naturæ*? See MARINE *remains*, PETRIFACTION, *Formed* STONES, SHELLS, &c.

FOSSIL-*plant*. See PLANT.

FOSSILS, *marine*. See MARINE.

FOSSIL-*ivory*. See IVORY.

FOSSIL-*ſalt*. See SALT.

FOSSIL-*wood*. See WOOD.

FOSSORES, in *Natural Hiſtory*, a name given to a ſpecies of ſmall worms hatched from the eggs of a fly, which feeds on the parenchymatous ſubſtance of the leaves of plants, burying themſelves between the two membranes. Theſe animals in general are called by Reamur, *aſcarides*; but as they greatly differ in their ſize, and in their manner of eating and deſtroying leaves, the ſmall ones which eat but ſlowly, and gnaw their way in crooked furrows, are called by him *foſſores parvi*; and on the contrary, thoſe which eat away all that lies before them, and are of a ſomewhat larger ſize, are called *foſſores magni*. See ASCARIDES.

FOSTER-*land*, in our *Old Writers*, is land given or allotted for the finding of food or victuals; as for monks in monaſteries, &c.

FOSTERLEAN, anciently ſignified nuptial gifts; much the ſame with what we now call JOINTURE.

The word is originally Saxon, and ſignifies *ciborum exhibitio*, that is, a ſtipend which the wife has for her maintenance. *Poſtea ſciendum eſt cui* fosterlean *pertineat*, *vadiet hoc Brigdunia*, *& plegient amici ſui*.

FOTHER, or **Fodder**, is a weight of lead, containing eight pigs, and every pig one and twenty ſtone and a half; ſo that it is about a tun or common cart-load. Among the plumbers in London, it is nineteen hundred and a half; and at the mines it is two and twenty hundred and a half.

The word is of Teutonic origin, from *fuder*.

FOTHERING, in *Sea-Language*, is a peculiar method of endeavouring to ſtop a leak in the bottom of a ſhip while ſhe is afloat, either under ſail, or at anchor. It is uſually performed in the following manner: a baſket is filled with aſhes, cinders, and chopped rope-yarns, and looſely covered with a piece of canvas: to this is faſtened a long pole, by which it is plunged repeatedly in the water, as cloſe as poſſible to the place where the leak is conjectured to lie. The oakum, or chopped rope-yarns, being thus gradually ſhaken through the twigs, or over the top of the baſket, are frequently ſucked into the hole along with the water, ſo that the leak is choaked, and the entrance of the water prevented. Falconer's Mar. Dict.

FOTOQUE, in the *Japoneſe Theology*, the name of an order of deities; the other order being called Camis. From the latter they obtain the bleſſings of this life, and from the former thoſe which relate to a future life.

FOTUS, in *Medicine*, the ſame as fomentation.

FOUCADE. See Fougate.

FOVEA *cordis*, the pit of the heart, or rather of the ſtomach, called alſo *ſcrobiculus cordis*.

FOUGATE, **Fougasse**, or **Fougades**, in the *Art of War*, a little mine, in manner of a well, ſeldom exceeding ten feet in width, and twelve in depth; dug under ſome work, or poſt, that is like to be loſt; and charged with barrels, or ſacks of gunpowder, covered with earth. It is frequently placed before the weakeſt parts of a fortification, as the ſaliant angles and faces, not defended by a croſs-fire, and is ſet on fire like other mines, with a ſauciſſe.

The word is French. M. Huet derives it from *focata*, or *focus*, *fire*.

FOUL, in the *Sea-Language*, is uſed when a ſhip has been long untrimmed, ſo that graſs, weeds, periwinkles, barnacles, or the like, ſtick or grow to her ſides under water. In this ſtate, ſhe is ſaid to be *foul*.

A ſhip is ſaid to make *foul water*, when, being under ſail, ſhe comes into ſuch ſhoal, or low water, that though her keel doth not touch the ground, yet ſhe comes ſo near it, that the motion of the water under her raiſes the mud from the bottom, and ſo *fouls* the water.

Foul is alſo a ſea-term, importing the running of one ſhip againſt another. This happens ſometimes by the ungovernable violence of the wind, and ſometimes by the careleſſneſs of the people on board; and ſometimes happens to ſhips of the ſame convoy; ſometimes to ſuch as meet accidentally; and ſometimes to ſuch as are in port, by means of others coming in. The damages occaſioned by running *foul*, are of the nature of thoſe in which both parties muſt bear a part; they are uſually made half to fall upon the ſufferer, and half upon the veſſel which did the injury; but in caſes where it is evidently the fault of the maſter of the veſſel, he alone is to bear the damage.

Foul *ground* of a road, bay, ſea-coaſt, or harbour, ſignifies that which is rocky, or abounding with ſhallows, or otherwiſe dangerous.

Foul *hawſe* denotes that the cables are turned round each other, by the winding or turning about of a ſhip while ſhe rides at anchor.

Foul *wind* expreſſes that which is unfavourable, or contrary to the courſe of the ſhip, in oppoſition to large or fair.

Foul *feeding*, in the *Manege*, denotes a voracious appetite, to which ſome horſes are ſubject, which, though not properly a diſeaſe, is the cauſe of various maladies. It is commonly the effect of ſome latent diſtemper, and frequently occaſioned by worms irritating the inteſtines. *Foul* feeders will leave their hay to eat their litter, even when it is ſoaked with their dung and urine, and diſcover a vitiated as well as a voracious appetite. The beſt remedy in caſes of this kind is to begin with purging, and to diſſolve chalk in their water, and afterwards to give them good exerciſe. The following draught will alſo ſerve to blunt their appetites: take a large handful of the roots of marſhmallows; cummin ſeeds, and fenugreek ſeeds, of each an ounce; liquorice roots ſliced, half an ounce; boil them in three pints of water, till the roots are ſoft and ſlimy; then pour off the decoction, and diſſolve it in an ounce of gum arabic, and add four ounces of linſeed oil. Let the horſe have four handfuls of this mixture every morning faſting, till his appetite abates. Care ſhould alſo be taken to keep the ſtalls as clean as poſſible. Gibſon's Farriery.

FOULDAGE. See **Faldage.**

FOULNESS *of colours*, in *Painting*, is uſed in oppoſition to brightneſs, and denotes a defect of purity. It is ſometimes called *breaking* the colour.

Foulness *in wounds*. When what the ſurgeons call uncleanneſs or *foulneſs* is perceived in a wound, that is, when the fleſh in it looks fungous, black, putrid, or livid, it muſt be well cleanſed before any attempts are made to heal it. Different methods of effecting this have been in uſe at different times among the ſurgeons: the ancients uſed honey, but the moſt uſual practice now is, to apply a digeſtive ointment made of turpentine diſſolved in the yolk of an egg, and afterwards mixed with honey of roſes; but where this is not found ſtrong enough for the purpoſe, the Egyptian ointment is to be uſed, mixed either with ſpirit of wine, or with the common digeſtive. To theſe digeſtive ointments a ſmall quantity of aloes and myrrh may alſo very properly be added; and where more ſtrength is required in them, a ſmall quantity of red precipitate is to be added. The uſe of lime-water as a detergent is alſo very great, and yet more ſo, if there be added to every pint of it twenty or thirty grains of ſublimate; this makes what is called the phagedænic *water*. Applications of this kind are to be continued till the wound is entirely clean, and then it is to be healed with the common digeſtives, &c. Heiſter's Surgery, p. 42.

FOUMART, a name uſed in ſome parts of England for the weasel, called alſo, in ſome places, the *fitchet*. See Pole-*cat*.

FOUNDATION, that part of a building which is underground: or, that maſs of ſtone, &c. which ſupports a building; or upon which the walls of the ſuperſtructure are raiſed: or, it is the coffer, or bed, dug below the level of the ground, to raiſe a building upon.

The *foundation* either takes up the whole area and extent of the building, as when there are to be vaults, cellars, or the like; or it is drawn in cuts, or trenches, as when only walls are to be raiſed.

The *foundation* is properly ſo much of the maſonry, as reaches as high as the ſurface of the ground; and this is always to be proportioned to the load or weight of the building which it is to bear.

Sometimes it is maſſive, and continued under the whole building; as in the antique arches, and aqueducts, and ſome amphitheatres: more uſually it is only in ſpaces, or intervals; either to avoid expence, or becauſe the vacuities are at too great a diſtance; in which latter caſe they make uſe of inſulated pillars, bound together by arches.

That we may *found* our habitation firmly, ſays Sir H. Wotton, we muſt firſt examine the bed of earth, upon which we are to build; and then the under-ceilings, or ſubſtruction, as the ancients called it. For the former, we have the general precept in Vitruvius: *Subſtructiones* fundationes *fodiantus, ſi queant inveniri ad ſolidum, & in ſolido*: by which he recommends not only a diligent, but even jealous examination of what the ſoil will bear; adviſing us not to reſt upon any appearing ſolidity, unleſs the whole mould, through which we cut, have likewiſe been ſolid.

But how deep we ſhould go in this ſearch, he has nowhere determined, as perhaps depending more on diſcretion than regularity, according to the weight of the work: yet Palladio has ventured to reduce it to a rule; allowing for the cavaſione, i. e. the hollowing or underdigging, a ſixth part of the height of the whole fabric, unleſs there be cellars under-ground, in which caſe he would have it ſomewhat lower.

The *foundations* of buildings are either *natural* or *artificial*. *Natural*, as when we build on a rock, or a very ſolid earth; in which caſe we need not ſeek for any farther ſtrengthening. *Artificial*, where the ground is ſandy, or marſhy, or has lately been dug. In the former caſe, the architect muſt adjuſt the depth of the *foundation* by the height, weight, &c. of the building: a ſixth part of the whole height is looked on as a medium; and as to thickneſs, double that of the width of the wall, is a good rule. Architects ought to uſe the utmoſt diligence in regard to *foundations*, ſince of all errors which may happen in building, an error in this point is moſt pernicious.

The ground fit for building upon is of various kinds; ſometimes it is ſo hard as ſcarce to be cut with iron; in other places it is ſtiff, blackiſh, or whitiſh. This laſt is reckoned the weakeſt; and, in general, that is the beſt which requires moſt labour in cutting or digging.

When the ground is very bad, you muſt get large oaken piles of ſuch a length as may reach the ſound ground, and whoſe diameter muſt be about one twelfth part of their length: theſe muſt be driven down with a machine, as cloſe to one another as poſſible, and that under the middle walls as well as the outer ones; and upon their tops large planks are to be pinned down. But if the ground be only faulty in ſome places, arches may be turned over them, by which means no part of the weight of the building will reſt upon them.

As to the rules neceſſary to be obſerved in conſtructing the ground-work, they are theſe: 1. That the bottom of the trench be made exactly level. 2. That the loweſt ledge or row be all of ſtone, laid cloſe together. 3. That the breadth of the ground-work be at leaſt double that of the wall that is to be raiſed on it. However, art ought always to give way to diſcretion, for the breadth may be regulated according to the goodneſs of the ground, and the weight of the intended edifice. 4. That the *foundation* be made to diminiſh as it riſes, only care muſt be taken that it do ſo equally on both ſides. 5. That you ought never to build upon the ruins of an old *foundation*, unleſs well aſſured of its depth and goodneſs.

In ſome places they *found* the piers of bridges, and other buildings near the water, on ſacks of wool, laid like mattreſſes, which, being well preſſed, and greaſy, will never give way; nor rot in water. See BRIDGE, CAISSON, and COFFER-DAMS.

FOUNDATION is alſo uſed figuratively for the eſtabliſhment of a city, empire, or the like.

The Romans reckoned their years from the *foundation* of Rome, *ab urbe condita*; which we ſometimes expreſs by *ab U. C.* Chronologers make 745 years from the Iſraelites paſſing out of Egypt, to the *foundation* of Rome.

FOUNDATION alſo denotes a donation, or legacy, either in money, or lands, for the maintenance and ſupport of ſome community, hoſpital, ſchool, lecture, or other work of piety.

Among the order of Auguſtines, there is a *foundation* for the marrying of poor maids; and another for the furniſhing of truſſes to poor people who have ruptures, or hernias.

The founding and building of a college or hoſpital, is called *foundatio, quaſi fundatio*, or *fundamenti locatio. Co. lib.* 10. The king only can found a college; but there may be a college in reputation founded by others. *Dyer* 267. See FOUNDER.

FOUNDAY, in *Metallurgy*, a term uſed by the workers at the iron-mines, in many counties of England, for the ſpace of ſix days, in which time they contrive to make a determinate quantity of iron, ſo that they count their work by theſe *foundays* or weeks.

FOUNDER, he who lays a foundation, or who *founds* and endows a church, ſchool, religious houſe, or other work of charity and piety.

The *founders* of churches may preſerve to themſelves the right of patronage, or preſentation to the living. The *founder* of all corporations in the ſtricteſt and original ſenſe is the king alone, for he only can incorporate a ſociety; and in civil incorporations, ſuch as Mayor and Commonalty &c. where there are no poſſeſſions or endowments given to the body, there is no other *founder* but the king; but in eleemoſynary foundations, ſuch as colleges and hoſpitals, where there is an endowment of lands, the law diſtinguiſhes, and makes two ſpecies of foundation; the one *fundatio incipiens*, or the incorporation, in which ſenſe the king is the general *founder* of all colleges and hoſpitals; the other *fundatio perficiens*, or the donation of it; in which ſenſe the firſt gift of the revenues is the foundation, and he who gives them is in law the *founder*: but if the king and a private perſon join in endowing an eleemoſynary foundation, the king alone ſhall be the *founder* of it.

OUNDER is alſo an artiſt that melts or caſts metals into various forms, for divers uſes; as guns, bells, ſtatues, bombs, types, or printing characters; and other ſmall works, as candleſticks, buckles, &c.

The word in this ſenſe is formed of the French *fondre*, to melt or fuſe. In the Roman law they are called *ſtatuarii.*

From the different productions, or works of the *founders*, they are differently denominated, as *founders of ſmall works*; *bell-founders*; *gun-founders*; *letter-founders*; *figure-caſters*, &c. What belongs to each, ſee under FOUNDERY.

OUNDER, in *Glaſs-making*, is a term appropriated to the green-glaſs-houſes, and is the perſon there, who in the ſame office in the white-glaſs-making is called the CONCIATOR.

OUNDER'S *furnace*, See FURNACE.

OUNDERS, *moulds of.* See MOULDS.

OUNDER'S *preſs.* See PRESS.

OUNDER, in the *ſea-language.* A ſhip is ſaid to *founder* at ſea, when by an extraordinary leak, or a great ſea breaking in upon her, ſhe is ſo filled with water, that ſhe cannot be freed of it, nor is able to ſwim under it, but ſinks with the weight thereof.

FOUNDERING, in the *Manege*, a diſorder in horſes, whereof there are two kinds, viz. in the feet, and in the cheſt.

FOUNDERING *in the feet*, ariſes from hard riding, ſevere labour, great heats, ſudden colds, &c. which inflame the blood, and, as the farriers term it, melt the greaſe, and make it deſcend downward to the feet, and there ſettle; which cauſes ſuch a numbneſs, and pricking in the hoof, that the horſe has no ſenſe or feeling in it, being hardly able to ſtand; or, when he does, ſhaking and trembling as if he had an ague.

A horſe may likewiſe be *foundered*, by wearing ſtreight ſhoes, and by travelling upon hard ground.

It may be known when he is *foundered* on his fore-feet, and not his hind-feet, by his treading firmly on his hind-feet, and ſparing the other; or his going crouching or crippling on his buttocks.

Sometimes, though rarely, he is *foundered* in his hind-feet, and not his fore; which is known by his ſeeming weak behind; and reſting, as much as poſſible, on the fore-feet.

The general methods of curing this diſtemper are, firſt, by paring all the horſe's ſoles ſo thin, that the quick may be ſeen; then bleeding him well at the toes; ſtopping the vein with tallow and reſin; and then, having tacked hollow ſhoes on his feet, ſtopping them with bran, tar, and tallow, as boiling hot as may be; which is to be renewed once in two days, for a week together; after which he is to have good exerciſe.

Or, after he is pared thin, and let blood at the toes, his feet are to be ſtopped with cows-dung, kitchin-fee, tar, and ſoot, boiled together, and poured, boiling hot, into them.

FOUNDERING *in the cheſt, or body*, uſually befals a horſe by eating too much provender ſuddenly, when too hot; as alſo by drinking too much upon travelling, when he is hot, and riding him after it.

The effect of which is, that the body is oppreſſed with ill humours, which take away his ſtrength, and put him in ſuch condition, that he can neither go, nor bow his joints; and, being once laid, he cannot riſe again, &c. his legs ſwell; and, ſoon after begin to peel; he has a dry cough, which makes his eyes water; and his noſe runs with white phlegmatic matter. For the cure of this diſorder, take five or ſix pennyworth of oil of petre and mingle it with an equal quantity of ale or beer; then rub this mixture with the hand on the part affected and at the ſame time hold a red hot ſhovel before it.

FOUNDERY, or FOUNDRY, the art of melting and caſting all ſorts of metals; particularly braſs, iron, bell metal, &c. The word is alſo uſed for a place, or work-houſe, furniſhed with furnaces, or forges for this purpoſe.

FOUNDERY *of ſmall works, or the manner of* CASTING *in ſand.*

The ſand uſed by the founders, in caſting braſs, &c. is yellowiſh, and pretty ſoft; but, after it has been uſed, it becomes quite black, becauſe of the charcoal-duſt uſed in the moulds. Every time they would uſe this ſand, they work and tew it, ſeveral times over, in a board about a foot ſquare, placed over a kind of trunk, or box, into which it may fall from off the board. This tewing is performed with a roller, or cylinder, about two feet long, and two inches in diameter; and a kind of knife, made of the blade of a ſword: with the two inſtruments they alternately roll and cut the ſand; and, at length, turn it down into the box or trough underneath.

Then, taking a wooden board, or table, of a length and breadth proportional to the quantity of things to be caſt; round this they put a frame or ledge; and thus make a ſort of mould. This mould they fill with the ſand before prepared, and moderately moiſtened: which done, they take wooden, or metalline models, or patterns of the things intended to be caſt; apply them on the mould, and preſs them down in the ſand, ſo as to leave their form indented; along the middle of the mould is laid half a little cylinder of braſs, which is to be the maſter-jet, or canal for running the metal; being ſo diſpoſed, as to touch the ledge on one ſide, and only to reach to the laſt pattern on the other: from this are placed ſeveral leſſer jets, or branches, reaching to each pattern, whereby the metal is conveyed through the whole frame.

This firſt frame being thus finiſhed, they turn it upſide down, to take out the patterns from the ſand; in order to which, they firſt looſen them a little all round, with a ſmall cutting inſtrument.

After the ſame manner they proceed to work the counter-part, or other half of the mould, with the ſame patterns, in a frame exactly like the former; excepting that it has pins, which, entering holes correſponding thereto in the other, make, when the two are joined together, the two cavities of the pattern fall exactly on each other.

The frame, being thus moulded, is carried to the founder, or melter; who, after enlarging the principal jet, or canal, of the counter-part, with a kind of knife, adding the croſs jets, or canals, to the ſeveral patterns in both, and ſprinkling them over with mill-duſt, ſets them to dry in an oven.

When both parts of the mould are ſufficiently dried, they join them together, by means of the pins; and, to prevent their ſtarting, or ſlipping aſide, by the force of the metal, which is to come in flaming hot, through a hole contrived at the maſter jet, they lock them in a kind of preſs, either with ſcrews; or, if the mould be too big for this, with wedges. The moulds, thus put in the preſs, are ranged near the furnace, to be in readineſs to receive the metal as it comes out of the crucible.

While the moulds are thus preparing, the metal is put in fuſion in an earthen crucible, about ten inches high, and four in diameter.

The furnace wherein the fuſion is made, is much like the ſmith's forge; having, like that, a chimney, to carry off the ſmoke; a pair of bellows to blow up the fire; and a hearth where the fire is made, and the crucible placed. It is the uſe of this hearth, that chiefly diſtinguiſhes the furnace from the forge.

In the middle thereof is a ſquare cavity, ten or twelve inches wide, which goes to the very bottom: it is divided into two, by an iron grate; the upper partition ſerves to hold the crucible, and the fuel; and the lower to receive the aſhes.

When the fuel, which is to be of dry wood, is pretty well lighted, they put the crucible full of metal in the middle, and cover it with an earthen lid; and, to increaſe the force of the fire, beſides blowing it up with the bellows, they lay a tile over part of the aperture or cavity of the furnace.

The metal firſt put in being brought to a fuſion, they fill the crucible with pieces of braſs beaten in a mortar; to put them in they make uſe of a kind of iron ladle, with a long ſhank at the end thereof, formed into a kind of hollow cylinder, out of which the piece is dropped.

Nothing now remains, but for the founder to take the crucible out of the fire, and carry it in a pair of iron tongs (whoſe feet are bent, the better to embrace the top of the crucible), to the mould; into which he pours the melted metal, through the hole anſwering to the maſter-jet of each mould.

Thus he goes ſucceſſively, from one to another, till his crucible is emptied, or there is not matter enough left for another mould.

Then, caſting cold water on the moulds, they take the frames out of the preſſes, and the caſtworks out of the ſand: which afterwards they work again, for another caſting. Laſtly, they cut off the jets, or caſts, and ſell or deliver the work to thoſe who beſpoke it, without any farther repairing.

FOUNDERY *of ſtatues, great guns, and bells.* The art of caſting ſtatues in braſs is very ancient; inſomuch that its origin was too remote and obſcure, even for the reſearch of Pliny; an author admirably ſkilled at diſcovering the inventors of other arts.

All we can learn for certain, is, that it was practiſed, in all its perfection, firſt among the Greeks; and afterwards, among the Romans; and that the number of their ſtatues conſecrated to their gods and heroes ſurpaſſed all belief. See STATUE.

The ſingle cities of Athens, Delphos, Rhodes, &c. had each three thouſand ſtatues; and Marcus Scaurus alone, though only ædile, adorned the circus with no leſs than three thouſand ſtatues of braſs, for the time of the Circenſian games. This taſte for ſtatues was finally carried to ſuch a pitch, that it became a proverb, that in Rome the people of braſs were not leſs numerous than the Roman people.

Among us, the caſting of ſtatues was but little known, or practiſed, before the ſeventeenth century.

As to the *caſting of guns*, it is quite modern; and it were, perhaps, to be wiſhed, we were as ignorant of it as the ancients. All authors agree, that the firſt cannon were caſt in the fourteenth century; though ſome affix the event to the year 1338, and others to 1380. See CANNON and GUNNERY.

The *caſting of bells* is of a middle ſtanding, between the other two. The uſe of bells is certainly very ancient in the weſtern church; and the ſame were likewiſe once uſed in the church of the Eaſt. But, at preſent, F. Vanſleb aſſures us, in his ſecond account of Egypt, he had found but one bell in all the eaſtern church, and that in a monaſtery in the Upper Egypt. See BELL.

The matter of theſe large works is rarely any ſimple metal, but commonly a mixture of ſeveral. We ſhall here give the proceſs in the *foundery* of each.

Method of caſting ſtatues, or figures. See BRONZE.

There are three things chiefly required in caſting of ſtatues, buſts, baſſo-relievos, vaſes, and other works of ſculpture: viz. the mould, the wax, and ſhell, or coat. The inner mould, or core (thus called from *cœur*, as being in the heart or middle of the ſtatue,) is a rude lumpiſh figure, to which is given the attitudes and contours of the ſtatue intended: it is raiſed on an iron grate, ſtrong enough to ſuſtain it; and is ſtrengthened withinſide by ſeveral bars, or ribs, of iron.

It may be made at the diſcretion of the workmen; of potters clay, mixed up with horſe-dung and hair; or of plaſter of Paris, mixed with fine brickduſt.

The uſe of the core in ſtatues is to ſupport the wax and ſhell, to leſſen the weight and to ſave metal. In bells it takes up all the inſide, and preſerves the ſpace vacant where the clapper is hung. In great guns it forms the whole chace, from the mouth to the breech: and, in mortars, the chace, and chamber. The iron bars and the core are taken out of the braſs figure, through an aperture left in it, which is afterwards ſoldered up: but it is neceſſary to leave ſome of the iron bars of the core that contribute to the ſteadineſs of the projecting parts, within the braſs figure.

The wax is a repreſentation of the intended ſtatue. If it be a piece of ſculpture, the wax muſt be all of the ſculptor's own hand, who uſually faſhions it on the core itſelf; though it may be wrought ſeparately, in cavities, moulded, or formed, on a model, and afterwards diſpoſed and arranged on the ribs of iron over the grate, as before; filling the vacant ſpace in the middle with liquid plaſter, and brick-duſt; by which means the inner mould, or core, is formed in proportion as the ſculptor carries on the wax.

When the wax (which is to be of the intended thickneſs of the metal) is finiſhed, they fix little waxen tubes perpendicularly to it, from top to bottom; to ſerve, both as jets, for the conveyance of the metal to all parts of the work: and as vent-holes, to give paſſage to the air, which would, otherwiſe, occaſion great diſorder, when the hot metal came to encompaſs it. By the weight of the wax uſed herein, is that of the metal adjuſted; ten pounds of this laſt being the proportion to one pound of the former.

The work brought thus far, wants nothing but to be covered with its ſhell; which is a kind of coat, or cruſt, laid over the wax; and which, being of a ſoft matter, and even, at firſt, liquid, eaſily takes and preſerves the impreſſion of every part thereof; which it afterwards communicates to the metal, upon its taking the place of the wax, between the ſhell and the core. The matter of this outer mould, or ſhell, is varied according as different layers, or ſtrata, are applied. The firſt is a compoſition of clay, and old white crucibles, well ground and ſifted, and mixed up with water, to the conſiſtence of a colour fit for painting: accordingly, they apply it with a pencil, laying it ſeven or eight times over, letting it dry between whiles. For the ſecond impreſſion, they add horſes dung and natural earth to the former compoſition. The third impreſſion is only horſes dung and earth. Laſtly, the ſhell is finiſhed by laying on ſeveral more impreſſions of this laſt matter, made very thick with the hand.

The ſhell, thus finiſhed, is ſecured and ſtrengthened by ſeveral bands, or girts, of iron, wound around it at half a foot's diſtance from one another, and faſtened at bottom to the grate under the ſtatue; and at the top to a circle of iron, where they all terminate.

Here it muſt be obſerved, that if the ſtatue be ſo big, that it would not be eaſy to move the moulds, when thus provided, it muſt be wrought on the ſpot where it is to be caſt.

This is performed two ways; in the firſt, a ſquare hole is dug under-ground, much bigger than the mould to be made therein, and its inſides lined with walls of freeſtone, or brick. At the bottom is made a hole, of the ſame materials, with a kind of furnace, having its aperture outwards: in this is a fire to be lighted, to dry the mould; and, afterwards, to melt the wax. Over this furnace is placed the grate; and on this the mould, &c. framed as above explained. Laſtly, at one of the edges of the ſquare pit is made another large furnace, to melt the metal, as hereafter mentioned.

In the other way, it is ſufficient to work the mould above-ground: but with the ſame precaution of a furnace, and grate, underneath: when finiſhed, four walls are to be run up around it: and, by the ſide thereof, a maſſive made, for a melting furnace. For the reſt, the method is the ſame in both. The mould being finiſhed, and incloſed between four walls, whether under-ground, or above it, a moderate fire is lighted in the furnace under it, and the hole covered with planks, that the wax may melt gently down, and run out at pipes contrived for the purpoſe, at the foot of the mould; which are afterwards very exactly cloſed with earth, as ſoon as all the wax is carried off.

This done, the hole is filled up with bricks thrown in at random, and the fire in the furnace is augmented till ſuch time as both the bricks and the mould become red-hot; which ordinarily happens in twenty-four hours. Then, the fire being extinguiſhed, and every thing cold again, they take out the bricks, and fill up their place with earth, moiſtened, and a litttle beaten, to the top of the mould, in order to make it the more firm and ſteady.

Things being in this condition, there remains nothing but to melt the metal, and run it into the mould: this is the office of the furnace above, which is made in manner of an oven, with three apertures; one to put in the wood; another for a vent; and a third to run the metal out at. From this laſt aperture, which is kept very cloſe whilſt the metal is in fuſion, a little tube or canal is laid, whereby the melted metal is conveyed into a large earthen baſon over the mould; into the bottom of which all the big branches of the jets, or caſts, which are to carry the metal into all the parts of the mould, are inſerted.

It muſt be added, that theſe jets are all terminated, or ſtopped with a kind of plugs, which are kept cloſe, that, upon opening the furnace, the braſs, which guſhes out like a torrent of fire, may not enter any of them till the baſon be full enough of matter to run into them all at once; upon which occaſion they pull out the plugs, which are long iron rods, with a head at one end, capable of filling the whole diameter of each tube. The hole of the furnace is opened with a long piece of iron, fitted at the end of a pole; and the mould is then filled in an inſtant. The work is now finiſhed, at leaſt ſo much as belongs to the caſting, the reſt being the ſculptor's, or carver's buſineſs; who, taking the figure out of the mould and earth with which it is encompaſſed, ſaws off the jets, wherewith it appears covered over; and repairs it, with inſtruments proper to his art; as chiſſels, gravers, puncheons, &c.

Foundery. *The manner of caſting bells.* What has been hitherto ſhewn of the caſting of ſtatues, holds, in proportion, of the caſting of bells: that which is particular in theſe latter, is as follows: firſt, then, the metal is different; there being no tin in the metal of ſtatues, but no leſs than a fifth part of tin in that of bells. Secondly, the dimenſions of the core, and the wax of bells, eſpecially if it be a ring of ſeveral bells that is to be caſt, are not left to chance, or the caprice of the workman; but muſt be meaſured, on a kind of ſcale, or DIAPASON; which gives the height, aperture, and thickneſs, neceſſary for the ſeveral tones required.

It need not be added, that it is on the wax that the ſeveral mouldings and other ornaments, and inſcriptions, to be repreſented in relievo, on the outſide of the bell, are formed. The clapper, or tongue, is not properly a part of the bell, but is furniſhed from other hands. In Europe, it is uſually of iron, with a large knob at the extreme; and is ſuſpended in the middle of the bell. In China, it is only a huge wooden mallet, ſtruck by force of arm againſt the bell; whence they can have but little of that conſonancy ſo much admired in ſome of our rings of bells. The Chineſe have an extraordinary way of increaſing the ſound of their bells; viz. by leaving a hole under the cannon; which our bell-founders would reckon a defect.

The proportions of our bells differ very much from thoſe of the Chineſe. In our's, the modern proportions are, to make the diameter fifteen times the thickneſs of the brim, and the height twelve times. The parts of a bell are 1. the ſounding bow, terminated by an inferior circle, which grows thinner and thinner, 2. the brim or that part of a bell whereon the clapper ſtrikes, and which is thicker than the reſt. 3. The outward ſinking of the middle of the bell, or the point under which it grows wider to the brim. 4. The waiſt or furniture, and the part that grows wider and thicker quite to the brim. 5. The upper vaſe, or that part which is above the waiſt. 6. The pallet which ſupports the ſtaple of the clapper within. 7. The bent and hollowed branches of metal uniting with the cannons, to receive the iron keys, whereby the bell is hung up to the beam which is its ſupport and counterpoiſe, when rung out. The buſineſs of bell-*foundery* is reducible to three particulars. 1. The proportion of a bell. 2. The forming of the mould. And, 3. the melting of the metal. There are two kinds of proportions, viz. the ſimple and the relative; the former are thoſe proportions only that are between the ſeveral parts of a bell to render it ſonorous; the relative proportions eſtabliſh a requiſite harmony between ſeveral bells. The method of forming the profile of a bell, previous to its being caſt, in which the proportion of the ſeveral parts may be ſeen, is as follows: the thickneſs of the brim, C1 (See *Tab. Miſcellan. fig.* 12.) is the foundation of every other meaſure, and is divided into three equal parts. Firſt, draw the line HD, which repreſents the diameter of the bell; biſect it in F and erect the perpendicular Ff; let DF and HF be alſo biſected in E and G, and two other perpendiculars Ee, Ga be erected at E and G: GE will be the diameter of the top or upper vaſe, i. e. the diameter of the top will be half that of the bell; and it will, therefore, be the diameter of a bell which will ſound an octave to the other. Divide the diameter of the bell or the line HD into fifteen equal parts, and one of theſe will give C1 the thickneſs of the brim; divide again each of theſe fifteen equal parts into three other equal parts, and then form a ſcale. From this ſcale take twelve of the larger diviſions or $\frac{2}{15}$ of the whole ſcale in the compaſs, and ſetting one leg in D deſcribe an arc to cut the line Ee in N, draw ND, and divide this line into twelve equal parts; at the point 1 erect the perpendicular $1C=10$, and C1 will be the thickneſs of the brim $=\frac{1}{15}$ of the diameter: draw the line CD: biſect DN and at the point of biſection 6 erect the perpendicular 6 $K=1\frac{1}{2}$ of the larger diviſions on the ſcale. With an opening of the compaſs equal to twice the length of the ſcale or thirty brims, ſetting one leg in N, deſcribe an arc of a circle, and with the ſame leg in K and the ſame opening deſcribe another arc to interſect the former: on this point of interſection, as a center, and with a radius equal to thirty brims deſcribe the arc NK; in 6K produced take KB $=\frac{1}{3}$ of the larger meaſure of the ſcale or $\frac{1}{3}$ of the brim, and on the ſame center with the radius $30\frac{1}{3}$ brims deſcribe an arc AB parallel to NK. For the arc BC, take twelve diviſions of the ſcale or twelve brims in the compaſs, find a center, and from that center, with this opening, deſcribe the arc BC, in the ſame manner as NK or AB were deſcribed. There are various ways of deſcribing the arc Kp; ſome deſcribe it on a center at the diſtance of nine brims from the points p and K; others, as it is done in the figure, on a center at the diſtance only of ſeven brims from thoſe points. But it is neceſſary firſt to find the point p and to determine the rounding of the bell p 1. For this purpoſe, on the point C as a center and with the radius C1 deſcribe the arc 1pn; biſect the part 1, 2 of the line D*n*, and erecting the perpendicular pm, this perpendicular will cut the arc 1pn in m, which terminates the rounding 1p. Some founders make the bendings K a third of a brim lower than the middle of the line DN; others make the part C1D more acute, and inſtead of making C1 perpendicular to DN at 1, draw it $\frac{1}{6}$th of a brim higher, making it ſtill equal to one brim; ſo that the line 1D is longer than the brim C1. In order to trace out the top-part N*a*, take in the compaſs eight diviſions of the ſcale or eight brims, and on the points N and D, as centers, deſcribe arcs to interſect each other in 8; on this point 8, with a radius of eight brims, deſcribe the arc Nb; this arc will be the exterior curve of the top or crown; on the ſame point 8, as a center and with a radius equal to $7\frac{2}{3}$ brims, deſcribe the arc Ae, and this will be the interior curve of the crown, and its whole thickneſs will be one third of the brim. As the point 8 does not fall in the axis of the bell, a center M may be found in the axis by deſcribing, with the interval of eight brims on the centers D and H arcs which will interſect in M; and this point may be made the center of the inner and outer curves of the crown, as before. The thickneſs of the cap which ſtrengthens the crown at Q is about one third of the thickneſs of the brim; and the hollow branches or ears about one ſixth of the diameter of the bell. The height of the bell is in proportion to its diameter as twelve to fifteen, or in the proportion of the fundamental ſound to its third major; whence it follows that the ſound of a bell is principally compoſed of the ſound of its extremity or brim, as a fundamental, of the ſound of the crown which is an octave to it, and of that of the height which is a third. Encyclopedie, Art. CLOCHE. See BELL.

The particulars neceſſary for making the mould of a bell, are, 1. The earth: the moſt coheſive is the beſt; it muſt be well ground and ſifted, to prevent any chinks. 2. Brick-ſtone; which muſt be uſed for the mine, mould, or core, and for the furnace. 3. Horſe dung, hair, and hemp, mixed with the earth, to render the cement more binding. 4. The wax for inſcriptions, coats of arms, &c. 5. The tallow equally mixed with the wax, in order to put a ſlight lay of it upon the outer mould, before any letters are applied to it. 6. The coals to dry the mould.

For making the mould, they have a ſcaffold conſiſting of four boards, ranged upon treſſels. Upon this they carry the earth, groſly diluted, to mix it with horſe-dung, beating the whole with a large ſpatula.

The compaſſes of conſtruction is the chief inſtrument for making the mould, which conſiſt of two different legs, joined by a third piece. And laſt of all, the founders ſhelves, on which are the engravings of the letters, cartridges, coats of arms, &c.

They firſt dig a hole, of a ſufficient depth to contain the mould of the bell, together with the caſe, or cannon, under ground; and about ſix inches lower than the terreplein, where the work is performed. The hole muſt be wide enough for a free paſſage between the mould and walls of the hole; or between one mould and another, when ſeveral bells are to be caſt. At the center of the hole is a ſtake erected, that is ſtrongly faſtened in the ground. This ſupports an iron-peg, on which the pivot of the ſecond branch of the compaſſes turns. The ſtake is encompaſſed with a ſolid brick-work, perfectly round, about half a foot high, and of the propoſed bell's diameter. This they call a mill ſtone. The parts of the mould are the core, the model of the bell, and the ſhell. When the outer ſurface of the core is formed, they begin to raiſe the core, which is made of bricks that are laid in courſes of equal height upon a lay of plain earth. At the laying each brick, they bring near it the branch of the compaſſes, on which the curve of the core is ſhaped, ſo as that there may remain between it and the curve the diſtance of a line, to be afterwards filled up with layers of cement. The work is continued to the top, only leaving an opening for the coals to bake the core. This work is covered with a layer of cement, made of earth and horſe-dung, on which they move the compaſſes of conſtruction, to make it of an even ſmoothneſs every where.

The firſt layer being finiſhed, they put the fire to the core, by filling it half with coals, through an opening that is kept ſhut, during the baking, with a cake of earth, that has been ſeparately baked. The firſt fire conſumes the ſtake, and the fire is left in the core half, or, ſometimes, a whole day: the firſt layer being thoroughly dry, they cover it with a ſecond, third, and fourth; each being ſmoothed by the board of the compaſſes, and thoroughly dried before they proceed to another.

The core being completed, they take the compaſſes to pieces, with intent to cut off the thickneſs of the model, and the compaſſes are immediately put in their place, to begin a ſecond piece of the mould. It conſiſts of a mixture of earth and hair, applied with the hand on the core, in ſeveral cakes that cloſe together. This work is finiſhed by ſeveral layers of a thinner cement of the ſame matter, ſmoothed by the compaſſes, and thoroughly dried, before another is laid on. The laſt layer of the model is a mixture of wax and greaſe ſpread over the whole. After which are applied the inſcriptions, coats of arms, &c. beſmeared with a pencil dipped in a veſſel of wax on a chaffing-diſh: this is done for every letter. Before the ſhell is begun, the compaſſes are taken to pieces, to cut off all the wood that fills the place of the thickneſs to be given to the ſhell.

The firſt layer is the ſame earth with the reſt, ſifted very fine; whilſt it is tempering in water, it is mixed with cow's hair, to make it cohere. The whole being a thin cullis, is gently poured on the model, that fills exactly all the ſinuoſities of the figures, &c. and this is repeated till the whole is two lines thick over the model. When this layer is thoroughly dried, they cover it with a ſecond of the ſame matter, but ſomething thicker: when this ſecond layer becomes of ſome conſiſtence, they apply the compaſſes again, and light a fire in the core, ſo as to melt off the wax of the inſcriptions, &c.

After this, they go on with other layers of the ſhell, by means of the compaſſes. Here they add to the cow's hair a quantity of hemp, ſpread upon the layers, and afterwards ſmoothed by the board of the compaſſes. The thickneſs of the ſhell comes to four or five inches lower than the mill-ſtone before obſerved, and ſurrounds it quite cloſe, which prevents the extravaſation of the metal. The wax ſhould be taken out before the melting of the metal.

The ear of the bell requires a ſeparate work, which is done during the drying of the ſeveral incruſtations of the cement. It has ſeven rings, the ſeventh is called the bridge, and unites the others, being a perpendicular ſupport to ſtrengthen the curves. It has an aperture at the top, to admit a large iron-peg, bent at the bottom; and this is introduced into two holes in the beam, faſtened with two ſtrong iron-keys. There are models made of the rings, with maſſes of beaten earth, that are dried in the fire, in order to have the hollow of them. Theſe rings are gently preſſed upon a layer of earth and cow's hair, one half of its depth; and then taken out, without breaking the mould. This operation is repeated twelve times for twelve half-moulds, that two and two united may make the hollows of the ſix rings: the ſame they do for the hollow of the bridge, and bake them all, to unite them together.

Upon the open place left for the coals to be put in, are placed the rings that conſtitute the ear. They firſt put into this open place the iron-ring to ſupport the clapper of the bell; then they make a round cake of clay, to fill up the diameter of the thickneſs of the core. This cake, after baking, it is clapped upon the opening, and ſoldered with a thin mortar ſpread over it, which binds the cover cloſe to the core.

The hollow of the model is filled with an earth, ſufficiently moiſt, to fix on the place, which is ſtrewed, at ſeveral times, upon the cover of the core; and they beat it gently with a peſtle, to a proper height; and a workman ſmooths the earth at top with a wooden trowel dipped in water.

Upon this cover, to be taken off afterwards, they aſſemble the hollows of the rings. When every thing is in its proper place, they ſtrengthen the outſides of the hollows with mortar, in order to bind them with the bridge, and keep them ſteady at the bottom, by means of a cake of the ſame mortar, which fills up the whole aperture of the ſhell. This they let dry, that it may be removed without breaking. To make room for the metal they pull off the hollows of the rings, through which the metal is to paſs, before it enters into the vacuity of the mould. The ſhell being unloaded of its ear, they range under the mill-ſtone five or ſix pieces of wood, about two feet long, and thick enough to reach almoſt the lower part of the ſhell; between theſe and the mould they drive in wooden wedges with a mallet, to ſhake the ſhell of the model whereon it reſts, ſo as to be pulled up, and got out of the pit.

When this and the wax are removed, they break the model and layer of earth, through which the metal muſt run, from the hollow of the rings, between the bell and the core. They ſmoke the inſide of the ſhell, by burning ſtraw under it, that helps to ſmooth the ſurface of the bell. Then they put the ſhell in the place, ſo as to leave the ſame interval between that and the core; and before the hollows of the rings or the cap are put on again, they add two vents, that are united to the rings, and to each other, by a maſs of baked cement. After which they put on this maſs of the cap, the rings, and vents, over the ſhell, and ſolder it with thin cement, which is dried gradually by covering it with burning coals. Then they fill up the pit with earth, beating it ſtrongly all the time, round the mould.

The furnace has a place for the fire, and another for the metal. The fire-place has a large chimney, with a ſpacious aſh-hole; the furnace which contains the metal is vaulted, whoſe bottom is made of earth, rammed down; the reſt is built with brick. It has four apertures; the firſt, through which the flame reverberates; the ſecond is cloſed with a ſtopple, that is opened for the metal to run; the others are to ſeparate the droſs, or ſcoriæ, of the metal by wooden rakes; through theſe laſt apertures paſſes the thick ſmoke. The ground of the furnace is built ſloping, for the metal to run down. See Dict. Commerc. Eng. edit. art. **Foundery.**

Foundery. *Manner of caſting great guns, or pieces of artillery.* The caſting of cannons, mortars, and other pieces of artillery, is performed much like that of ſtatues, and bells; eſpecially as to what regards the wax, ſhell, and furnaces.

All pieces of artillery are now caſt ſolid, and bored afterwards by means of a machine invented at Straſburgh, (ſee *Boring of* Cannon) and much improved by Mr. Verbruggen, the preſent head founder at Woolwich. The gun to be bored was at firſt placed in a perpendicular poſition; but the machines uſed for this purpoſe have lately been made to bore horizontally, and much more exactly than thoſe that bore in a vertical ſituation. Whilſt the inſide is bored, the outſide is turned and poliſhed at the ſame time.

As to the metal, it is ſomewhat different from both; as having a mixture of tin, which is not in that of ſtatues; and only having half the quantity of tin that is in bells, i. e. at the rate of ten pound of tin to an hundred of copper. The reſpective quantities of different metals that ſhould enter into the compoſition for braſs cannon is not abſolutely decided; the moſt common proportions of the ingredients are the following; viz. to 240℔ of metal fit for caſting, they put 68℔ of copper, 52℔ of braſs, and 12℔ of tin. To 4200℔ of metal fit for caſting, the Germans put $3687\frac{33}{41}$℔ of copper, $204\frac{13}{41}$℔ of braſs, and $307\frac{36}{41}$℔ of tin. Others, again, uſe 100℔ of copper, 6℔ of braſs, and 9℔ of tin; and laſtly, others make uſe of 100℔ of copper, 10℔ of braſs, and 15℔ of tin. See Cannon.

A cannon is always ſhaped a little conical, being thickeſt of metal at the breech, where the greateſt effort of the gunpowder is made, and diminiſhing thence to the muzzle;

zle; ſo that if the mouth be two inches thick of metal, the breech is ſix. See CANNON.

Its length is meaſured in calibers, i. e. in diameters of the muzzle. Six inches at the muzzle requires twenty calibers, or ten feet in length; there is always about the ſixth of an inch allowed play for the ball. For the parts, and their reſpective proportions of different ſorts of guns, ſee CANNON and GUN. The method of caſting iron cannon differs very little from that of braſs.

FOUNDERY, *Letter, or the manner of caſting printing letters.* The invention of printing letters we ſhall ſpeak of under PRINTING, and LETTER.

Their difference, kind, &c. has already been explained under the articles CHARACTER, &c.

In the buſineſs of cutting, caſting, &c. letters for printing, the letter-cutter muſt be provided with a vice, hand-vice, hammers and files of all ſorts for watchmakers uſe; as alſo gravers and ſculpters of all ſorts, and an oil-ſtone, &c. ſuitable and ſizeable to the ſeveral letters to be cut: a flat gage made of box to hold a rod of ſteel, or the body of a mould, &c. exactly perpendicular to the flat of the uſing-file: a ſliding gage, whoſe uſe is to meaſure and ſet off diſtances between the ſhoulder and the tooth, and to mark it off from the end, or from the edge of the work; a face-gage, which is a ſquare notch cut with a file into the edge of a thin plate of ſteel, iron, or braſs, of the thickneſs of a piece of common tin, whoſe uſe is to proportion the face of each ſort of letter, viz. Long letters, aſcending letters, and ſhort letters. So there muſt be three gages, and the gage for the long letters is the length of the whole body ſuppoſed to be divided into forty-two equal parts. The gage for the aſcending letters Roman and Italic are $\frac{5}{7}$ or 30 parts of 42, and 33 parts for the Engliſh face. The gage for the ſhort letters is $\frac{3}{7}$ or 18 parts of 42 of the whole body for the Roman and Italic, and 22 parts for the Engliſh face.

The Italic and other ſtanding gages are to meaſure the ſcope of the Italic ſtems, by applying the top and bottom of the gage to the top and bottom lines of the letters, and the other ſide of the gage to the ſtem; for when the letter complies with theſe three ſides of the gage, that letter has its true ſhape.

The next care of the letter-cutter is to prepare good ſteel punches, well tempered, and quite free from all veins of iron; on the face of which he draws or marks the exact ſhape of the letter, with pen and ink, if the letter be large; or with a ſmooth blunted point of a needle, if it be ſmall; and then with ſizeable and proper ſhaped and pointed gravers and ſculpters, digs or ſculps out the ſteel between the ſtrokes or marks he made on the face of the punch, and leaves the marks ſtanding on the face. Having well ſhaped the inſide ſtrokes of his letter, he deepens the hollows with the ſame tools: for if a letter be not deep in proportion to its width, it will, when uſed at preſs, print black, and be good for nothing. This work is generally regulated by the depth of the counter-punch. Then he works the outſide with proper files till it be fit for the matrice.

But, before we proceed to the ſinking and juſtifying of the matrices, we muſt provide a mould to juſtify them by, of which you have a draught in *Tab. Miſcellany, fig.* 13, 14,

Every mould is compoſed of an upper and an under part. The under part is delineated in *fig.* 13. The upper part is marked *fig.* 14, and is in all reſpects made like the under part, excepting the ſtool behind, and the bow, or ſpring, alſo behind; and excepting a ſmall roundiſh wire between the body and carriage, near the break where the under part hath a ſmall rounding groove made in the body. This wire, or rather half-wire, in the upper part makes the nick in the ſhank of the letter, when part of it is received into the groove in the under part. Theſe two parts are ſo exactly fitted and gaged into one another (viz. the male gage, marked c in *fig.* 14, into the female marked g in *fig.* 13, that when the upper part of the mould is properly placed on, and in the under part of the mould, both together, make the entire mould, and may be ſlid backwards for uſe ſo far, till the edge of either of the bodies on the middle of either carriage comes juſt to the edge of the female gages, cut in each carriage: and they may be ſlid forwards ſo far, till the bodies on either carriage touch each other: and the ſliding of theſe two parts of the mould backwards makes the ſhank of the letter thicker, becauſe the bodies in each part ſtand wider aſunder, and the ſliding them forwards makes the ſhank of the letter thinner, becauſe the bodies on each part of the mould ſtand cloſer together.

The parts of the mould are as follow: viz.

a The carriage.
b The body.
c The male gage.
d e The mouth-piece.
f i The regiſter.
g The female gage.
h The hag.
a a a a The bottom plate.
b b b The wood, on which the bottom plate lies.
c c e The mouth.
d d The throat.
e d d The pallat.
f The nick.
g g The ſtool.
h h The ſpring or bow.

Then the mould muſt be juſtified: and firſt the founder juſtifies the body, by caſting about twenty proofs, or ſamples of letters: which are ſet up in a compoſing ſtick, with all their nicks towards the right hand; and then by comparing theſe with the pattern letters, ſet up in the ſame manner, he finds the exact meaſure of the body to be caſt. He alſo tries if the two ſides of the body are parallel, or that the body be no bigger at the head than at the foot; by taking half the number of his proofs, and turning them with their heads to the feet of the other half; and if then the heads and the feet be found exactly even upon each other, and neither to drive out nor get in, the two ſides may be pronounced parallel. He farther tries whether the two ſides of the thickneſs of the letter be parallel by firſt ſetting his proofs in the compoſing ſtick with their nicks upwards; and then turning one half with their heads to the feet of the other half: and if the heads and feet lie exactly upon each other, and neither drive out nor get in, the two ſides of the thickneſs are parallel.

The mould thus juſtified, the next buſineſs is to prepare the matrices. A matrice is a piece of braſs or copper of about an inch and a half long, and of a thickneſs in proportion to the ſize of the letter it is to contain. In this metal is ſunk the face of the letter intended to be caſt, by ſtriking the letter punch about the depth of an n. After this the ſides and face of the matrice muſt be juſtified and cleared, with files, of all bunchings made by ſinking the punch.

Every thing thus prepared, it is brought to the furnace, which is built of brick upright, with four ſquare ſides, and a ſtone on the top, in which ſtone is a wide round hole for the pan to ſtand in. A *foundery* of any conſequence has ſeveral of theſe furnaces in it.

As to the metal of which the types are to be caſt, this, in extenſive founderies, is always prepared in large quantities; but caſt into ſmall bars, of about twenty pounds weight, to be delivered out to the workmen as occaſion requires. In the *letter foundery* which has been long carried on with reputation, under the direction of Dr. Alex. Wilſon, and ſons, at Glaſgow, we are informed, that a ſtock of metal is made up at two different times of the year, ſufficient to ſerve the caſters at the furnace for ſix months each time. For this purpoſe a large furnace is built under a ſhade, furniſhed with a wheel vent, in order the more equally to heat the ſides of a ſtrong pot of caſt iron which holds, when full, fifteen hundred weight of the metal. The fire being kindled below, the bars of lead are let ſoftly down into the pot, and their fuſion promoted by throwing in ſome pitch and tallow, which ſoon inflame. An outer chimney, which is built ſo as to project about a foot over the fartheſt lip of the pot, catches hold of the flame by a ſtrong draught, and makes it act very powerfully in melting lead; whilſt it ſerves at the ſame time to convey away all the fumes, &c. from the workmen, to whom this laborious part of the buſineſs is committed. When the lead is thoroughly melted, a due proportion of the regulus of antimony and other ingredients are put in, and ſome more tallow is inflamed, to make the whole incorporate ſooner. The workmen now having mixed the contents of the pot very thoroughly, by ſtirring long with a large iron ladle, next proceed to draw the metal off into the ſmall troughs of caſt iron which are ranged, to the number of fourſcore, upon a level platform, faced with ſtone, built towards the right hand. In the courſe of a day fifteen hundred weight of metal can be eaſily prepared in this manner; and the operation is continued for as many days as are neceſſary to prepare a ſtock of metal, of all the various degrees of hardneſs. After this the whole is diſpoſed into preſſes, according to its quality, to be delivered out occaſionally to the workmen.

The founder muſt be now provided with a ladle, which differs nothing from other iron ladles, but in its ſize. And he is provided always with ladles of ſeveral ſizes, which he uſes according to the ſize of the letters he is to caſt. Before the caſter begins to caſt, he muſt kindle his fire in the furnace to melt the metal in the pan. Therefore he takes the pan out of the hole in the ſtone, and there lays in coals and kindles them; and, when they are well kindled, he ſets the pan in again and puts in metal into it to melt: if it be a ſmall bodied letter he caſts, or a thin letter of great bodies, his metal muſt be very hot; nay ſometimes red-hot, to make the letter come. Then having choſe a ladle that will hold about ſo much as the letter and break is, he lays it at the ſtoking-hole, where the flame burſts out, to heat. Then he ties a thin leather, cut with its narrow end againſt the face to the leather groove of the matrice, by whipping a brown thread twice about the leather-groove, and faſtening the thread with a knot. Then he puts both halves of the mould together, and puts the matrice into the matrice-cheek, and places the foot of the matrice on the ſtool of the mould, and the broad end of the leather upon the wood of the upper half of the mould, but not tight up, leſt it might hinder the foot of the matrice from ſinking cloſe down upon the ſtool in a train of work. Then laying a little roſin on the upper wood of the mould, and having his caſting-ladle hot, he with the bolling-ſide of it melts the roſin: and, when it is yet melted, preſſes the broad end of the leather hard down on the wood, and ſo faſtens it to the wood; all this is the preparation.

Now he comes to caſting. Wherefore placing the under half of the mould in his left hand, with the hook or hag forward, he clutches the ends of its wood between the lower part of the ball of his thumb and his three hind fingers; then he lays the upper half of the mould upon the under half, ſo that the male gages may fall into the female gages, and at the ſame time the foot of the matrice places itſelf upon the ſtool; and, claſping his left hand thumb ſtrong over the upper half of the mould, he nimbly catches hold of the bow or ſpring with his right hand fingers at the top of it, and his thumb under it, and places the point of it againſt the middle of the notch in the backſide of the matrice, preſſing it as well forwards towards the mould, as downwards, by the ſhoulder of the notch cloſe upon the ſtool, while at the ſame time with his hinder fingers, as aforeſaid, he draws the under half of the mould towards the ball of his thumb, and thruſts by the ball of his thumb the upper part towards his fingers, that both the regiſters of the mould may preſs againſt both ſides of the matrice, and his thumb and fingers preſs both halves of the mould cloſe together.

Then he takes the handle of his ladle in his right hand, and with the boll of it gives a ſtroke, two or three, outwards upon the ſurface of the melted metal, to ſcum or clear it from the film or duſt that may ſwim upon it; then takes up the ladle full of metal, and having his mould, as aforeſaid, in his left hand, he a little twiſts the left ſide of his body from the furnace, and brings the geat of his ladle (full of metal) to the mouth of the mould, and twiſts the upper part of his right hand towards him to turn the metal into it, while at the ſame moment of time he jilts the mould in his left hand forwards, to receive the metal with a ſtrong ſhake (as it is called); not only into the bodies of the mould, but while the metal is yet hot running, ſwift and ſtrongly, into the very face of the matrice, to receive its perfect form there, as well as in the ſhank.

Then he takes the upper half of the mould off the under half, by placing his right hand thumb on the end of the wood next his left hand thumb, and his two middle-fingers at the other end of the wood; and finding the letter, and break lie in the under half of the mould (as moſt commonly by reaſon of its weight it does) he throws or toſſes the letter, break and all, upon a ſheet of waſte paper laid for that purpoſe on the bench, juſt a little beyond his left hand, and is then ready to caſt another letter as before; and alſo, the whole number that is to be caſt with that matrice.

A workman will ordinarily caſt about three thouſand of theſe letters in a day.

When the caſters at the furnace have got a ſufficient number of types upon the tables, a ſet of boys come, and nimbly break away the jets from them: the jets are thrown into the pots, and the types are carried away in parcels to other boys, who paſs them ſwiftly under their fingers, defended by leather, upon ſmooth flat ſtones, in order to poliſh their broad-ſides. This is a very dextrous operation, and is a remarkable inſtance of what may be effected by the power of habit and long practice; for theſe boys, in turning up the other ſide of the type, do it ſo quickly by a mere touch of the fingers of the left hand, as not to require the leaſt perceptible intermiſſion in the motion of the right hand upon the ſtone. The types, thus finely ſmoothed and flattened on the broad-ſides, are next carried to another ſet of boys, who ſit at a ſquare table, two on each ſide, and there are ranged up on long rulers, or ſticks, fitted with a ſmall projection, to hinder them from ſliding off backwards. When theſe ſticks are ſo filled, they are placed, two and two, upon a ſet of wooden pins fixed into the wall, near the dreſſer, ſometimes to the amount of a hundred, in order to undergo the finiſhing operations. This workman, who is always the moſt expert and ſkilful in all the different branches carried on at the *foundery*, begins by taking one of theſe ſticks, and, with a peculiar addreſs, ſlides the whole column of types off upon the dreſſing-ſtick: this is made of well ſeaſoned mahogany, and furniſhed with two end-pieces of ſteel, a little lower than the body of the types, one of which is moveable, ſo as to approach the other by means of a long ſcrew-pin, inſerted in the end of the ſtick. The types are put into this ſtick with their faces next to the back or projection; and after they are adjuſted to one another ſo as to ſtand even, they are then bound up, by ſcrewing home the moveable end-piece. It is here where the great and requiſite accuracy of the moulds comes to be perceived; for in this caſe the whole column, ſo bound up, lies flat and true upon the ſtick, the two extreme types being quite parallel, and the whole has the appearance of one ſolid continuous plate of metal. The leaſt inaccuracy in the exact parallelilſm of the individual type, when multiplied ſo many times, would render it impoſſible to bind them up in this manner, by diſpoſing them to riſe or ſpring from the ſtick by the ſmalleſt preſſure from the ſcrew. Now, when lying ſo conveniently with the narrow edges uppermoſt, which cannot poſſibly be ſmoothed in the manner before mentioned by the ſtones, the workman does this more effectually by ſcraping the ſurface of the column with a thick-edged but ſharp razor, which at every ſtroke brings on a very fine ſmooth ſkin, like to poliſhed ſilver; and thus he proceeds till in about half a minute he comes to the farther end of the ſtick. The other edges of the types are next turned upwards, and poliſhed in the ſame manner. It is whilſt the types thus lie in the dreſſing-ſtick that the operation of bearding or barbing is performed, which is effected by running a plane, faced with ſteel, along the ſhoulder of the body next to the face, which takes more or leſs off the corner, as occaſion may require. Whilſt in the dreſſing-ſtick they are alſo grooved, which is a very material operation. In order to underſtand this, it muſt be remembered, that when the types are firſt broken off from the jets, ſome ſuperfluous metal always remains, which would make them bear very unequally againſt the paper whilſt under the printing-preſs, and effectually mar the impreſſion. That all theſe inequalities may, therefore, be taken away, and that the bearings of every type may be regulated by the ſhoulders imparted to them all alike from the mould, the workman or dreſſer proceeds in the following manner. The types being ſcrewed up in the ſtick, as before mentioned, with the jet-end outermoſt, and projecting beyond the wood about one eighth of an inch, the ſtick is put into an open preſs, ſo as to preſent the jet-end uppermoſt, and then every thing is made faſt by driving a long wedge, which bears upon a ſlip of wood, which lies cloſe to the types the whole length: then a plough or plane is applied, which is ſo conſtructed as to embrace the projecting part of the types betwixt its long ſides, which are made of poliſhed iron. When the plane is thus applied, the ſteel cutter bearing upon that part between the ſhoulders of the types, where the inequalities lie, the dreſſer dextrouſly glides it along, and by this means ſtrips off every irregular part that comes in the way, and ſo makes an uniform groove the whole length, and leaves the two ſhoulders ſtanding; by which means every type becomes preciſely like to another, as to the height againſt paper. The types being now finiſhed, the ſtick is taken out of the preſs, and the whole column replaced upon the other ſtick; and after the whole are ſo dreſſed he proceeds to pick out the bad letters, previous to putting them up into pages and papers. In doing this he takes the ſtick into his left hand, and turning the faces near to the light, he examines them carefully, and whenever an imperfect or damaged letter occurs, he nimbly plucks it out with a ſharp bodkin, which he holds in the right hand for that purpoſe. Thoſe letters which, from their form, project over the body of the type, and which cannot on this account be rubbed on the ſtones, are ſcraped on the broad-ſides with a knife or file, and ſome of the metal next the face pared away with a pen-knife, in order to allow the type to come cloſe to any other. This operation is called kerning.

The excellence of printing types conſiſts not only in the due performance of all the operations above deſcribed, but alſo in the hardneſs of the metal, form, and fine proportion of the character, and in the exact bearing and ranging of the letters in relation to one another.

FOUNDLING *hoſpital.* See *Foundling* HOSPITAL.

FOUNT, or FONT, among *Printers*, &c. a ſet, or quantity, of CHARACTERS, or LETTERS, of each kind, caſt by a letter-founder, and ſorted.

We ſay, a founder has caſt a *fount* of pica, of engliſh, of pearl, &c. meaning that he has caſt a ſet of characters of theſe kinds.

A complete *fount* does not only include the running letter, but alſo majuſcules, or large and ſmall capitals, ſingle letters, double letters, points, commas, lines, borders, head-pieces, tail-pieces, and numeral characters.

Founts are large or ſmall, according to the demand of the printer, who orders them by the hundred weight, or by ſheets. When the printer orders a *fount* of five hundred, he means that the *fount* ſhall weigh five hundred pounds. When he demands a *fount* of ten ſheets, it is underſtood, that with that *fount* he ſhall be able to compoſe ten ſheets, or twenty forms, without being obliged to diſtribute. The founder takes his meaſures accordingly; he reckons a hundred and twenty pounds for a ſheet, including the quadrates, &c. or ſixty pounds for a form, which is half a ſheet: not that the ſheet always weighs a hundred and twenty pounds, or the form ſixty pounds; on the contrary, it varies according to the ſize of the form; beſides, it is always ſuppoſed that there are letters left in the caſes.

The letter-founders have a kind of liſt, or tariff, whereby they regulate their *founts:* the occaſion thereof is, that ſome letters being in much more uſe, and oftener repeated, than others, their cells, or caſes, ſhould be better filled and ſtored, than thoſe of the letters which do not return ſo frequently.

Thus the *o*, and *i*, for inſtance, are always in greater quantity than the *k*, or *z*.

This difference will be beſt perceived from a proportional compariſon of thoſe letters with themſelves, or ſome others. Suppoſe a *fount* of a hundred thouſand characters, which is a common *fount*; here the *a* ſhould have five thouſand; the *c*, three thouſand; the *e*, eleven thouſand; the *i*, ſix thouſand; the *m*, three thouſand; the *k*, only thirty; and the *x*, *y*, and *z*, not many more. But this is only to be underſtood of the letters of the lower-caſe; thoſe of the upper having other proportions, which it would be, here, too long to inſiſt on.

FOUNTAIN, FONS, in *Philoſophy*, a ſpring, or ſource, of water, riſing out of the ground.

For the phenomena, theory, origin, &c. of ſprings, or *fountains*, ſee SPRING.

Among the ancients, the *fountains*, or ſources of rivers, were held ſacred, and even worſhipped, as a kind of divinities.

Seneca obſerves as much, in his forty-firſt epiſtle; and Cicero, lib. iii De Nat. Deor. cap. 20. mentions, that the Roman prieſts, and augurs, uſed, in their prayers and invocations, to call on the names of the Tyber, and other rivers, brooks, and ſprings, about Rome. And the ſeventh inſcription, in p. 94. of Gruter, has *FONTI* DIVINO ET GENIO NVMINIS *FONTIS*.

It was a point of religion, not to diſturb, or make muddy, theſe waters in waſhing or bathing: Tacitus gives an inſtance hereof in Nero, Annal. lib. xiv. cap. 22.

FOUNTAIN, or *artificial* FOUNTAIN, in *Hydraulics*, a machine or contrivance, whereby water is violently ſpouted, or darted up; called alſo a *jet d'eau*. See JET *d'Eau*, FLUID, &c.

There are divers kinds of artificial *fountains*; ſome founded on the ſpring, or elaſticity, of the air; and others, on the preſſure, or weight, of the water, &c.

The ſtructure of each of theſe being pretty and curious, and affording a good illuſtration of the doctrine of hydraulics, and pneumatics, ſhall be here explained.

The theory of *fountains* may be collected from the articles AIR, FLUID, &c. and other particulars relating to their ajutages, and pipes of conduct, &c. may be found under JET *d'Eau*, and *Motion of* WATER.

FOUNTAIN. *Conſtruction of an artificial* FOUNTAIN, *playing by the ſpring, or elaſticity, of the air.* A veſſel, proper for a reſervoir, as AB, *Tab.* II. *Hydraulics*, *fig*. 24. is provided, of metal, glaſs, or the like, ending in a ſmall neck *c*, at the top: through this neck a tube is put, *c d*, traverſing the middle of the veſſel, till its lower orifice *d*, nearly, but not abſolutely, reach the bottom of the veſſel; the veſſel being firſt half filled with water. The neck is ſo contrived, as that a ſyringe, or condenſing pipe, may be ſcrewed upon the tube; by means whereof a large quantity of air may be intruded through the tube into the water, out of which it will diſengage itſelf, and emerge into the vacant part of the veſſel, and lie over the ſurface of the water CD.

Now, the water here contained being thus preſſed by the air, which is, e. gr. twice as denſe as the external air; and the elaſtic force of air being equal to its gravitating force; the effect will be the ſame, as if the weight of the column of air over the ſurface of the water were double that of the column preſſing in the tube; ſo that the water muſt, of neceſſity, ſpout up, through the tube, when the ſyringe is removed, with a force equal to the exceſs of preſſure of the included, above that of the external air.

FOUNTAIN. *Conſtruction of an artificial* FOUNTAIN, *playing by the preſſure of the water.* Having the conveniency of a fund, or reſervoir of water, in a place conſiderably higher than that where the *fountain* is to be (whether that fund hath been placed there by nature, or whether it hath been raiſed for the purpoſe, by a proper engine, as a pump, ſiphon, ſpiral ſcrew, or the like): from the reſervoir lay vertical tubes, for the water to deſcend through; and, to theſe vertical tubes, fit other horizontal ones, under ground, to carry the water to the place where the *fountain* is to play. Laſtly, from theſe horizontal tubes, erect other vertical ones, by way of ajurages, jets, or ſpouts, their altitude being much leſs than that of the tubes whereby the water was carried to the horizontal ones.

Then will the water, by the preſſure of the ſuperincumbent column, be ſpouted up at theſe jets; and that to the height, or level, of the water in the reſervoir; and this will be the caſe, howſoever any of the tubes be bent or incurvated. The demonſtration hereof, ſee under FLUIDS.

Thus may water be ſpouted to any given height at pleaſure; and the tubes may be ſo proportioned as to yield any given quantity of water, in a given time; or ſeveral tubes, of the ſame *fountain*, may be made to yield water in any given ratio; or, laſtly, different tubes may project the water to different altitudes. Rules for all which, the reader will find among the laws of FLUIDS and JETS *d'Eau*.

Theſe aereal or aquatic *fountains* may be applied in various manners, ſo as to exhibit various appearances; and, from theſe alone, ariſes the greateſt part of our artificial water-works. An inſtance, or two, will not be diſagreeable.

FOUNTAIN *ſpouting the water in various directions.* Suppoſe the vertical tube, or ſpout, in which the water riſes, to be AB (*Tab.* II. *Hydraulics*, *fig* 25.) into this fit ſeveral other tubes; ſome horizontal, others oblique; ſome inclining, others reclining, as OP, MN, FL, &c.

Then, as all water retains the direction of the aperture through which it is ſpouted, that iſſuing through A will riſe perpendicularly; and that through L, H, N, P, E, will deſcribe arches of different magnitudes, and tending different ways.

Or thus: ſuppoſe the vertical tube AB, *fig*. 26. through which the water riſes, to be ſtopped at the top, as in A; and, inſtead of pipes, or jets, let it be only perforated with little holes all round, or only round half its ſurface: then will the water ſpin forth, in all directions, through the little apertures, and to a diſtance proportional to the height of the fall of the water.

And hence, if the tube AB be ſuppoſed the height of a man, and be furniſhed with an epiſtomium, or cock, at C, upon opening the cock, the ſpectators will be covered unexpectedly with a ſhower.

It muſt be here obſerved, that the diameters of the apertures by which the water is emitted, muſt be conſiderably leſs than thoſe of the tubes in which the water is brought; leſt the reſiſtance of the air, and other impediments, ſpecified under FLUID and JET *d'Eau*, break the force of the water.

FOUNTAIN *playing by the draught of the breath.* Suppoſe AB, *Tab.* II. *fig* 27. a glaſs, or metalline ſphere, wherein is fitted a tube CD, having a little orifice in C, and reaching almoſt to D, the bottom of the ſphere. If, now, the air be ſucked out of the tube CD, and the orifice C be immediately immerged under cold water, the water will aſcend through the tube into the ſphere.

Thus proceeding, by repeated exſuctions, till the veſſel be above half full of water; and then applying the mouth to C, and blowing air into the tube, upon removing the mouth the water will ſpout forth.

Or, if the ſphere be put in hot water, the air, being thereby rarefied, will make the water ſpout as before.

This kind of *fountain* is called *Pila Heronis*, or Hero's ball, from the name of its inventor.

FOUNTAIN, *the ſtream whereof raiſes and plays a braſs ball.* Provide a hollow braſs ball A, *Tab.* III. *Hydraulics*, *fig*. 28. made of a thin plate, that its weight may not be too great for the force of the water. Let the tube BC, through which the water riſes, be exactly perpendicular to the horizon.

Then the ball, being laid in the bottom of the cup, or baſon, B, will be taken up in the ſtream, and ſuſtained at a conſiderable height, as A, alternately vibrating, or playing up and down.

Hence, as the figure of the ball contributes nothing to its reciprocal riſe and fall, any other body, not too heavy, may be ſubſtituted in lieu thereof; e. gr. a bird, with its wings ſtretched forth.

But note, that, as it is neceſſary the ball, when on the deſcent, ſhould keep the ſame preciſe perpendicular wherein it roſe (ſince, otherwiſe, it would miſs the ſtream, and fall downright), ſuch a *fountain* can only be played in a place free from wind.

Fountain *which ſpouts water in form of a ſhower.* To the tube wherein the water is to riſe, fit a ſpherical, or lenticular head, AB, *fig.* 29. made of a plate of metal, and perforated at the top with a great number of little holes.

The water riſing with vehemence towards AB, will be there divided into innumerable little threads, and afterwards broke, and diſperſed into the fineſt drops.

Fountain *which ſpreads the water in form of a table-cloth.* To the tube AB, *fig.* 30. ſolder two ſpherical ſegments, C and D, almoſt touching each other, with a ſcrew E, to contract or amplify the interſtice or chink, at pleaſure.

Others chuſe to make a ſmooth, even cleft, in a ſpherical or lenticular head, fitted upon the tube.

The water ſpouting through this chink or cleft will expand itſelf in manner of a cloth.

Fountains, *wherein the water ſpouts out of the figures of men, and other animals.* Since water may be derived, or conveyed, by tubes in any ſituation, and always retains the direction of the aperture, all here required is, to incloſe tubes within the figures of men, or other animals, having their orifices in thoſe parts whence the water is intended to ſpout forth.

From the principles hitherto laid down, it will be very eaſy to deduce whatever relates to the furniture of *fountains*, and the various forms water may be put into by their means; all depending on the magnitude, figure, and direction, of the ajutages, or apertures.

Fountain, *which, when it has done ſpouting, may be turned like an hour-glaſs.* Provide two veſſels, A and B, *fig.* 31. to be ſo much the bigger as the *fountain* is to play the longer; and placed at ſo much the greater diſtance from each other, as the water is deſired to ſpout the higher. Let CDE be a crooked tube, furniſhed in E with a jet; and GHI another bent tube, furniſhed with a jet in I: KL and GF are to be other leſſer tubes, open at both ends, and reaching near to the bottom of the veſſels B and A, to which the tubes GH and CD are likewiſe to reach.

If, now, the veſſel A be filled with water, it will deſcend through the tube CD; and will ſpout up through the jet E, by the preſſure of the column of water CD. But unleſs the pipe GF was open at G, to let the air run up to F, and preſs at the top of the ſurface of the water in the cavity A, the water could not run down and ſpout at E. After its fall again, it will ſink through the little tube KL, into the veſſel B, and expel the air through the tube GI. At length, when all the water is emptied out of the veſſel A, by turning the machine upſide down, the veſſel B will be the reſervoir, and make the water ſpout up through the jet I, the pipe KL ſupplying B with air to let the water deſcend in the direction GHI.

Hence, if the veſſels A and B contain juſt as much water as will be ſpouted up in an hour's time, we ſhall have a ſpouting clepſydra, or water-clock; which may be graduated, or divided, into quarters, minutes, &c. as ſhewn under Clepsydra.

Fountain *of command.* This depends on the ſame principles with thoſe of the former: CAE, *fig.* 32. is a veſſel of water ſecured againſt the entrance of the air, except through the pipe GF, when the cock C, by which it was filled, is ſhut. There is another pipe EDHB, which goes from the bottom of the water to the jet B in the baſon DB, but this is ſtopped by the cock H. At the loweſt part of the baſon DB, there is a ſmall hole at I to let the water of the baſon DB run into the baſon GH under it; there is alſo a ſmall triangular hole, or notch, in the bottom of the pipe FG, at G. Turn the cock H, and the *fountain* will play for ſome time, then ſtop, then play again alternately for ſeveral times together. When thoſe times of playing and ſtopping are known before-hand, you may command the *fountain* to play or ſtop, whence its name. The cauſe of this phenomenon is as follows: the water coming down the pipe EDHB, would not come out at B, if the air Ss, above the water, was not ſupplied as it dilated: now it is ſupplied by the pipe GF, which takes in at the notch G, and delivers it out at F; but after ſome time the water, which has ſpouted out at B, falling down into the baſon DB, riſes high enough to come above the notch G, which ſtops the paſſage of the air; ſo that the air Ss, above the water in the veſſel CAE, wanting a ſupply, cannot ſufficiently preſs, and the *fountain* ceaſes playing: But when the water of DB has run down into the lower baſon HG, through the hole I, till it falls below the top of the notch G, the air runs up into the upper receptacle, and ſupplies that at Ss, and the *fountain* plays again. This is ſeen a little before-hand, by a ſkin of water on the notch G, before the air finds a paſſage, and then you may command the *fountain* to play. It is evident, that the hole I muſt be leſs than the hole of the jet, or elſe all the water would run out into the lower baſon, without riſing high enough to ſtop the notch G.

Fountain *that begins to play upon the lighting of candles, and ceaſes as they go out.* Provide two cylindrical veſſels, AB and CD, *fig.* 33. connect them by tubes, open at both ends, KL, BE, &c. ſo that the air may deſcend out of the higher into the lower: to the tubes ſolder candleſticks, H, &c. and to the hollow cover of the lower veſſel, CE, fit a little tube, or jet, FG, furniſhed with a cock G, and reaching almoſt to the bottom of the veſſel. In G let there be an aperture, furniſhed with a ſcrew, whereby water may be poured into CD.

Then, upon lighting the candles H, &c. the air in the contiguous tubes becoming rarefied thereby, the water will begin to ſpout through GF.

By the ſame contrivance may a ſtatue be made to ſhed tears upon the preſence of the ſun, or on the lighting of a candle, &c. all here required being only to lay tubes from the cavity wherein the air is rarefied, to ſome other cavities placed near the eyes, full of water.

A **Fountain** may be made by the rarefaction of the air in the following manner: let AB and CD, *fig.* 34. be two pipes fixed to a braſs head C, made to ſcrew into a glaſs veſſel E, which, having a little water in it, is inverted till the pipes are ſcrewed on; then reverting it ſuddenly, ſo as to put A, the lower end of the ſpouting pipe AB, into a jar of water A, and the lower end of the deſcending pipe CD, into a receiving veſſel D, the water will ſpout up from the jar A into the tall glaſs veſſel E, from which it will go down at the mouth C, through CD, into the veſſel D, till the water is wholly emptied out of A, making a *fountain* in E, into D. The reaſon of the play of the *fountain* is this: the pipe CD, being two foot nine inches long, lets down a column of water, which rarefies the air $\frac{1}{12}$ part in the veſſel E, where it preſſes againſt the water ſpouting at B with $\frac{1}{12}$ of the force by which the water is puſhed up at the hole A, by the preſſure of the common air on the water in the veſſel A; ſo that the water ſpouts up into E, when the air is rarefied $\frac{1}{11}$, with the difference of the preſſure of the atmoſphere, and the forementioned rarefied air; i. e. of 33 to $2\frac{3}{4}$. This would raiſe the water two foot nine inches; but the length of the pipe A, nine inches being deducted, the jet will only riſe two foot. This, ſays Deſaguliers, may be called a ſyphon *fountain*, where AB is the driving leg, and CD the iſſuing leg.

Fountain *of Hero of Alexandria*, ſo called, becauſe it was contrived by him. In the firſt *fountain* already deſcribed, the air is compreſſed by a ſyringe; in this, ſee *fig.* 35. the air, being only compreſſed by the concealed fall of water, makes a jet, which, after ſome continuance, is conſidered by the ignorant as a perpetual motion; becauſe they imagine that the ſame water which fell from the jet riſes again. The boxes CE and DYX, being cloſe, we ſee only the baſon ABW, with a hole at W, into which the water ſpouting at B falls; but that water does not come up again; for it runs down through the pipe WX into the box DYX, from whence it drives out the air, through the aſcending pipe YZ, into the cavity of the box CE, where, preſſing upon the water that is in it, it forces it out through the ſpouting pipe OB, as long as there is any water in CE; ſo that this whole play is only whilſt the water contained in CE, having ſpouted out, falls down through the pipe WX into the cavity DYX. The force of the jet is proportional to the height of the pipe WX, or of the boxes CE and DY above one another: the height of the water, meaſured from the baſon ABW to the ſurface of the water in the lower box DYX, is always equal to the height meaſured from the top of the jet to the ſurface of the water in the middle cavity at CE. Now, ſince the ſurface CE is always falling, and the water in DY always riſing, the height of the jet muſt continually decreaſe, till it is ſhorter by the height of the depth of the cavity CE, which is emptying, added to the depth of the cavity DY, which is always filling; and when the jet is fallen ſo low, it immediately ceaſes. The air is repreſented by the points in this figure. To prepare this *fountain* for playing, which ſhould be done unobſerved, pour in water at W, till the cavity DXY is filled; then invert the *fountain*, and the water will run from the cavity DXY into the cavity CE, which may be known to be full, when the water runs out at B held down. Set the *fountain* up again, and, in order to make it play, pour in about a pint of water into the baſon ABW; and, as ſoon as it has filled the pipe W X, it will begin to play, and continue as long as there is any water in CE. You may then pour back the water left in the baſon ABW, into any veſſel, and invert the *fountain*, which, being ſet upright again, will be made to play, by putting back the water poured out into ABW; and ſo on as often as you pleaſe.

The **Fountain**, *fig.* 36. is of the ſame kind; but, having double the number of pipes and concealed cavities, it plays as high again. In order to underſtand its ſtructure, ſee *fig* 37. The baſon is A, the four cavities are B, C, D, and E, from which the water, through the pipe f G, ſpouts up to double the height of the *fountain*, the air at E, which drives it, being doubly condenſed. The water going down the pipe 1 (e. gr. three foot long), condenſes the air that goes up into the cavity C through the pipe 2, ſo as to make it $\frac{1}{10}$ ſtronger than the common air; then the water, which falling in the pipe 3 from C to D, is capable, by the height of its fall, of condenſing the air at E, ſo as to make it $\frac{1}{10}$ ſtronger, being puſhed at C by air already condenſed into $\frac{1}{10}$ leſs ſpace, cauſes the air at E to be condenſed twice as much; that is, to be $\frac{1}{5}$ ſtronger than common air; and, therefore, it will make the water at G ſpout out with twice the force, and riſe twice as high as it would do, if the *fountain* had been of the ſame ſtructure as the former. In playing this *fountain*, turn it upſide down, and taking out the plugs g, h, fill the two cavities C and E, and, having ſhut the holes again, ſet the *fountain* upright, and pour ſome water into the baſon A, and the jet will play out at G: but the *fountain* will begin to play too ſoon; and, therefore, the beſt way is to have a cock in the pipe 3, which, being open, whilſt the cavities C and E are filled, and ſhut again before the *fountain* is ſet up, will keep the water thrown into the baſon from going down the pipe 1, and that of the cavity C from going down the pipe 3, by which means the *fountain* will not play before its time, which will be as ſoon as the cock is opened.

Fountain, *dial, of Deſaguliers*, is contrived to play by the ſpring of the air, increaſed by the heat of the ſun, and ſerves alſo for a dial at the ſame time. GNS, *fig.* 38. is a hollow globe of thin copper, eighteen inches in diameter, ſupported by a ſmall inverted baſon, reſting on a frame ABC, with four legs, between which there is a large baſon of two foot diameter. In the leg C there is a concealed pipe, proceeding from G, the bottom of the inſide of the globe, along HV, and joining an upright pipe u I, for making a jet at I. The ſhort pipe I u, going to the bottom of the baſon, has a valve at u under the horizontal part HV, and another valve at V above it, and under the cock &. At the north pole N, there is a ſcrew for opening a hole, through which the globe is ſupplied with water. When the globe is half filled, let the machine be ſet in a garden, and, as the ſun heats the copper and rarefies the included air, the air will preſs upon the water, which, deſcending through the pipe GCHV, will lift up the valve V, and ſhut the valve u, and, the cock being open, ſpout out at I, and continue to do ſo for a long time, if the ſun ſhines, and the ajutage be ſmall. At night, as the air condenſes again by the cold, the outward air, preſſing into the ajutage I, will ſhut the valve V, but, by its preſſure on the baſon DuH, puſh up the water, which has been played in the daytime, through the valve u, and the pipe uHG into the globe, ſo as to fill it up again to the ſame height which it had at firſt, and the next ſun-ſhine will cauſe the *fountain* to play again, &c. The uſe of the cock is to keep the *fountain* from playing till you think proper: a ſmall jet will play ſix or eight hours. If the globe be ſet for the latitude of the place, and rectified before it be fixed, with the hour-lines or meridians drawn upon it, the hours marked, and the countries painted upon it, as in the common globe, it will be a good dial; the ſun ſhining upon the ſame places in this globe, as it does upon the earth itſelf. Deſaguliers, Exper. Phil. vol. ii. lect. 9. p. 205.

Fountain, with regard to *Architecture*, is an aſſemblage of maſonry, ſculpture, &c. either for the decoration or conveniency of a city, garden, or the like.

Fountains acquire various denominations, according to their form and ſituation: as,

Fountain, *arched*, that whoſe baſon and jet are placed perpendicularly under the arch. Such are the *fountains* of the Colonade, and the triumphal water-arch at Verſailles.

Fountain, *baſon*, is that with only a ſimple baſon, of any figure whatever; in the middle whereof is a jet, or ſpout, or perhaps a ſtatue, or even a group of figures. Such was formerly the *fountain* in the court of Buckingham-houſe.

Fountain, *covered*, a kind of pavilion, built of ſtone, either inſulate, and ſquare, or round, or multilateral, or backed; and that either with a projecture, or indenture, incloſing a reſervoir, and ſpouting or darting forth the water thereof through one or more cocks, in the middle of a ſtreet, ſquare, garden, court, or the like. Such was that in Lincoln's-inn new ſquare, London.

Fountain, *cup*, is that which, beſide a baſon, has likewiſe a cup of one ſingle piece of ſtone, or marble, ſupported on a ſhaft or pedeſtal, and receiving a jet, or ſpout, riſing out of the middle thereof.

As the *fountain* in the court of the Vatican; the cup whereof is of granite, and antique, being brought from the baths of Titus at Rome.

Fountain, *marine*, that compoſed of aquatic figures, as ſea divinities, naiads, tritons, rivers, dolphins, and other fiſhes, and ſhells. Such is the *fountain* of the palace of Paleſtrina at Rome, where a ſhell, ſupported by four dolphins, ſerves as a cup, and ſupports a triton, that ſpouts water out of his concha marina.

Fountain, *naval*, is that made in the form of a veſſel. Such is that of the place D'Eſpagne, at Paris, repreſenting a bark; that at Monte-Cavello, repreſenting a galley; or that before the vineyard Mattei, at Rome, reſembling a boat.

Fountain, *open*, is any ſpouting *fountain* with a baſon, cup, or other ornaments, all open; ſuch as are met with frequently in our gardens, and in the vineyards at Rome.

Fountain, *pyramidal*, that formed of ſeveral baſons, or cups, ranged in ſtories over each other, and diminiſhing all the way, being ſupported by a hollow ſtem, or ſhaft. As the *fountain* of Monte-Dragone at Freſcati.

Or elſe ſupported by figures, fiſhes, or conſoles; the water whereof, in its fall, makes nets in divers ſtories, and repreſents a kind of water pyramid. As that at the head of the caſcades at Verſailles.

Fountain, *ruſtic*, is that formed, or enriched, with rock-work, ſhell-work, petrifactions, &c.

Fountain, *ſatyric*, is a kind of ruſtic *fountain*, in the manner of a grotto, adorned with termini, maſcaroons, fauns, ſylvans, bacchantes, and other ſatyrical figures, ſerving for ornaments, as well as jets d'eau.

Fountain, *ſpouting*, or *jet d'eau*, is any *fountain*, whoſe water is darted forth impetuouſly through one or more jets, or ajutages, and returns in form of rains, nets, folds, or the like. See Jet *d'Eau*.

Fountain, *ſpring*, a kind of plain ſpout, or ſtream of water, iſſuing out of ſtone, or a hole in a wall, without any decoration. Such is the *fountain* of Trevi at Rome.

Fountain, *ſtatuary*, that which, being opened and inſulated, or even-backed, is adorned with one or more ſtatues, by way of finiſhing, or crowning. As the *fountain* of Latona, at Verſailles; and that at the Shepherd at Caprarola.

There are, alſo, ſtatues which ſpout forth water at ſome of their parts; or at ſea-ſhells, vaſes, urns, and other attributes of the ſea.

Fountain, *ſymbolical*, that where the principal ornaments are the attributes, arms, or cognizances, of the perſon who erected it. Such are the *fountain* of St. Peter in Montorio, reſembling a caſtle flanked with towers, and donjons, repreſenting the arms of Caſtile; and ſome other *fountains* at Rome, among which are the fleur-de-lis, and the dove, the bearings of the family of pope Innocent X.

Fountain-*pen*, is a ſort of pen contrived to contain a great quantity of ink, and let it flow, by gentle degrees, ſo as to ſupply the writer a long time without a neceſſity of taking freſh ink.

The *fountain*-pen, repreſented *Tab. Miſcellan. fig.* 15. conſiſts of divers pieces, F, G, H, of braſs, ſilver, &c. whereof the middle piece F carries the pen, which is ſcrewed into the inſide of a little pipe; which, again, is ſoldered to another pipe of the ſame bigneſs, as the lid G; in which lid is ſoldered a male ſcrew, for ſcrewing on the cover; as, alſo, for ſtopping a little hole at the place, and hindering the ink from paſſing through it: at the other end of the piece F is a little pipe, on the outſide whereof the top cover H may be ſcrewed. In the cover there goes a porte-craion, to be ſcrewed into the laſt-mentioned pipe, in order to ſtop the end of the pipe into which the ink is to be poured by a funnel.

To uſe the pen, the cover G muſt be taken off, and the pen a little ſhaken, to make the ink run more freely.

FOUR-*corners*, in the *Manege*, or to work upon the *four-corners*, is to divide in imagination the volt or round into four quarters; ſo that, upon each of theſe quarters, the horſe makes a round or two at trot or gallop; and when he has done ſo upon each quarter, he has made the *four-corners*.

FOUR, *cul de four*. See Cul.

FOURCHEE, or Fourchy, in *Heraldry*. A croſs *fourchee* is that forked at the ends.

Upton rather repreſents it as anchored, the extremities turning in a circular manner to ſharp points; whereas the true croſs *fourcbee*, i e. forked, has its forks compoſed of ſtrait lines, and blunt ends. See *Tab. Herald. fig.* 33.

FOURCHER, an ancient law term, ſignifying a putting off, prolonging, or delaying, an action.

As by ſtammering we draw out our ſpeech, not delivering that we have to ſay in ordinary time; ſo by *fourchin* we prolong a ſuit, that might be ended in a ſhorter ſpace.

In Stat. Weſtm. 1. cap. 42. we have theſe words: "Co-"parceners and joint-tenants ſhall be no more *fourch*, "but only ſhall have one eſſoin," &c. And anno 6 Edw. I. cap. 10. it is uſed in the ſame ſenſe: "The defendants "ſhall be put to anſwer without *fourchin*," &c. In the Latin it is called *furcare*, and is uſed where a man and his wife do eſſoin ſeverally. *Caveat vir & mulier implacitati, quod ſemper in iſſonio alterius alter compareat, quamdiu* furcare *poſſint*; *& cum ultra non poſſint, concurrant coram eſſonio in ſuis locis: alter autem earum tantum unum eſſonium de malo lecti habere poteſt.* Hengham mag. cap. 9.

FOURCHETTE. *Fer de* FOURCHETTE. See FER.

FOURMILLIER, in *Zoology*, the name given by Buffon to the *myrmecophaga didactyla* of Linnæus, or the little anteater; or leſſer yellowiſh *tamandua*; or the white American *coati*. This animal has a conic noſe bending a little downwards, ears that are ſmall and hid in the fur, two hooked claws on the fore-feet, and four on the hind-feet; the head, body, limbs, and upper part and ſides of the tail, are covered with long, ſoft, ſilky hair, or rather wool, of a yellowiſh brown colour; the tail is thick at the baſe, and tapers to a point. This ſpecies inhabits Guiana, and climbs trees in ſearch of ants, which build their neſts in the branches. *Tab.* II. *Quadrupeds*, N° 11. See ANT-*eater*.

FOURTH, in *Muſic*, one of the harmonic intervals, or concords.

The *fourth* is the fourth in order of the concords. It conſiſts in the mixture of two ſounds, which are in the ratio of 4 to 3; i. e. of ſounds produced by chords, whoſe lengths are to each other as 4 : 3.

It is called *fourth*, becauſe containing *four* terms, or ſounds, between its extremes, and three degrees; or, as being the *fourth*, in the order of the natural ſcale, from the fundamental.

The ancients call the *fourth* DIATESSARON, and ſpeak of it as the firſt and principal of all concords; and yet the moderns find it one of the moſt imperfect. It is ſo very barren and jejune, that it affords nothing good, either by multiplication or diviſion.

Some modern muſicians have doubted whether the *fourth* ſhould be received among the number of concords, or not. The ancients expreſsly admitted it as ſuch, and Andreas Papius wrote a treatiſe againſt thoſe moderns who reject it. Merſen. Harm. lib. iv. prop. 8. Wallis, Append. Ptolem. Harm. p. 182.

FOURTH, *diminiſhed*, in *Muſic*. See DIMINISHED *fourth*.

The *redundant* FOURTH is a diſcord compoſed of the ratios of 27 to 20, and of 4 to 5.

Arches of the FOURTH *point*. See ARCH.

FOURTH *rate*. See RATE.

FOUTGELD, or FOOTGELD. See FOOTGELD.

FOWL, in a general ſenſe, is of equal import with BIRD.

FOWL is, in a more peculiar manner, underſtood of poultry, or the larger ſort of birds, both domeſtic and wild, either bred up, or hunted, for the table.

Such as turkeys, geeſe, cocks, hens, and ducks both wild and tame, pheaſants, partridges, pigeons, ſnipes, &c.

Our common poultry came originally from Perſia and India. Ariſtophanes calls the cock the Perſian bird, and that it was known in that country before Darius and Megabyzus; and theſe birds are now found wild in the iſle of Tinian, and other iſlands in the Indian ocean: in this ſtate their plumage is black and yellow, and their combs and wattles purple and yellow. They have been naturalized in this country before the arrival of the Romans; for Cæſar informs us, that they were one of the forbidden foods of the old Britons. They were probably imported by the Phœnicians, who traded to Britain about five hundred years before Chriſt. For all other domeſtic *fowls*, turkies, geeſe, and ducks excepted, we ſeem to be indebted to our conquerors, the Romans. The wild *fowl* were our own from the earlieſt period. Pennant.

The belly of a living *fowl* being ript up, the creature is thus applied to a part bit by a rattle-ſnake, to draw out ſome of the poiſon. It ſeems to have ſome effect this way. We find an inſtance in the Philoſophical Tranſactions, where a *fowl* thus applied to a hand bit by that moſt venomous ſnake, immediately ſwelled, grew black, and ſtunk. N° 479. p. 144.

The *ſea-fowls* which come on ſhore in immenſe numbers to rooſt, in the north iſlands of Scotland, ſet their watches and centinels at diſtant poſts, to give them notice of any danger; on the leaſt alarm from theſe, the whole body riſes, but without ſuch notice they are not to be alarmed by almoſt any thing. The people of the country know this; and when they go out to take them, they employ all their art to take the centinels without noiſe; this they ſometimes ſucceed in, and when they do, they often afterwards catch three hundred of the others, or more, in one night. Phil. Tranſ. N° 233.

The laying of theſe ſea birds is leſs certain as to time than might be imagined. They can occaſionally defer it; and as they uſually lay in a rainy ſeaſon, if the rain does not come on at the uſual time, they will defer it ſome weeks; and if the April moon goes far in May, that alſo has been obſerved to hinder them from laying ten or twelve days longer than ordinary. See BIRD.

FOWL, *tame*, are a neceſſary part of the ſtock of a country farm; and yield conſiderable ſervice and profit, by their EGGS, BROOD, FEATHERS, DUNG, &c.

They may be kept at a very eaſy expence near any highway-ſide; as being able to ſhift for themſelves, during the greateſt part of the year, by their feeding on inſects, worms, ſnails, and almoſt any thing eatable.

The oldeſt hens are always the beſt for ſitting, and the youngeſt for laying; but no ſort will be good for either, if kept too fat.

The beſt age to ſet a hen for CHICKENS, is, from two years old to five; and the moſt proper month to ſet them in, is February; though it may be done, to good purpoſe, at any time between that and Michaelmas. One cock will ſerve ten hens. A hen ſits but twenty days; whereas geeſe, ducks, and turkeys, ſit thirty.

Buckwheat, or French wheat, or hempſeed, it is ſaid, makes them lay faſter than any other food; and the ſame buckwheat, either whole, or ground, and made into a paſte, fats them apace; though the common food, for that purpoſe, is barley-meal, or pollard mixed up with hot water or milk. A gooſe will ſcarce ſit on any but her own eggs; a hen will ſit indifferently on all.

The lighteſt coloured geeſe are the beſt, and thoſe that begin to lay the ſooneſt; as they have a chance of hatching twice in one year. They begin to lay in the ſpring, and lay twelve or ſixteen eggs. Green geeſe are begun to be fattened at a month old, and will be fat in a month more. Old geeſe are chiefly fattened at ſix months old, in or after the harveſt. A wild gooſe, if red-footed and hairy, is old; but if white-footed, and not hairy, ſhe is young.

When the eggs are ſet under a hen, or other *fowl*, it is adviſeable to mark the upper ſides thereof; and when ſhe goes to feed, to note whether ſhe minds to turn them upſide down, or not; that if ſhe neglect that office, it may be done for her.

FOWL, *water*, may be taken in great abundance by nets properly managed. The net for this purpoſe ſhould be always made of the ſmalleſt and ſtrongeſt packthread that can be got. The meſhes may be large, but the nets ſhould be lined on both ſides with other ſmaller nets, every meſh of which is to be about an inch and a half ſquare each way, that as the *fowl* ſtrike either through them or againſt them, the ſmaller may paſs through the great meſhes, and ſo ſtreighten and entangle the *fowl*.

Theſe nets are to be pitched for every evening flight of *fowl*, about an hour before ſun-ſet, ſtaking them on each ſide of the river, about half a foot within the water, the lower ſide of the net being ſo plummed, that it may ſink ſo far and no farther; place the upper ſide of the net ſlantwiſe, ſhoaling againſt the water, but not touching it by near two foot; and let the ſtrings, which ſupport this upper ſide of the net, be faſtened to ſmall yielding ſticks ſet in the bank; theſe, as the *fowl* ſtrikes, will give the net liberty to play, and to entangle them. Several of theſe nets ſhould be placed at once over different parts of the river, at about twelve-ſcore fathom diſtance one from another; and if any *fowl* come that way, the ſportſman will have a ſhare of them. It is a good method, when the nets are ſet, to go to places ſufficiently diſtant from them with a gun, to fright them toward the places where the nets are; and wherever any of the *fowl* are ſtarted from, it may not be amiſs to plant ſome nets alſo there, to take them as they return. The nets are to be left thus placed all night, and in the morning the ſportſman is to go and ſee what is caught; he ſhould viſit the river firſt, and take up what are caught there, and, frightening the reſt away to the other places where his nets are, he is next to viſit them, and take what are there ſecured.

The Ceiloneſe have great plenty of water-*fowl* wild on their iſland, and have a very remarkable way of catching them, which is this: the fowler enters a lake or other water which has a good bottom, and is not very deep; he puts an earthen pot upon his head, in which there are bored holes, through which he can ſee; he keeps himſelf ſo bent down in the water, that only the pot is above the ſurface; in this manner he enters the place where the wild-*fowl* are in cluſters, and they think it is only ſome floating block. He then takes ſome one by the legs, and gently draws it under water, and wrings its neck till he has killed it; then putting it into his bag, which is faſtened about his middle, he takes hold of another in the ſame manner, and ſo on, till he has got as many as he can carry off, and then he goes back in the ſame manner in which he came, not diſturbing the reſt of the birds, who never miſs their companions, but only ſuppoſe that they dive down for their diverſion, when the fowler pulls them under. In places where this has been practiſed ſo long or ſo careleſsly that the birds are ſhy, the fowler uſes a gun; but this he does in the following manner: he makes a ſcreen of about five foot high, and three foot wide, which he carries in one hand ſtraight between himſelf and his game, and in the other hand his gun. The birds are not alarmed at what appears only a buſh; for this ſcreen is always covered with branches of trees freſh cut down, and full of leaves, ſo that the ſportſman behind advances as near as he pleaſes, and then putting the gun through ſome crevice of the ſcreen, he fires. See DECOY. See an account of experiments on water-*fowl*, with regard to their faculty of reſpiration, under the article DUCK.

Fowl, *wild*, *driving of*. See DRIVING.

FOWLING, the act, or art, of catching birds with NETS, BIRDLIME, DECOYS, and other devices; as alſo of breeding up the ſame.

Fowling is alſo uſed for the purſuing and taking of birds with hawks, falcons, and other birds of prey; more properly called FALCONRY and HAWKING.

Fowling-*piece*, a portable fire-arm for the ſhooting of birds. Of *fowling*-pieces, thoſe are reputed the beſt, which have the longeſt barrel, viz. from $5\frac{1}{2}$ feet to 6, with a moderate bore; though, for different occaſions, they ſhould be of different ſorts and ſizes: but in all, it is eſſential the barrel be well poliſhed, and ſmooth within, and the bore of an uniform bigneſs, from one end to another; which may be proved by thruſting in a piece of wood, cut exactly to the bore of the muzzle, down to the touch-hole; for if this goes down without ſtoppage, you may conclude that the bore is good. The bridge-pan ſhould be a little above the touch-hole, and ought to have a notch to let down a little powder, which will prevent the piece from recoiling. The locks ſhould be accurately filed, and their ſprings be neither too ſtrong nor too weak. The hammer ought to be well hardened, and pliable, ſo as to go down to the pan with a quick motion. In ſhooting, obſerve to do it with the wind, if poſſible, and rather ſide-ways, or behind the fowl, than full in their faces. Obſerve alſo to chuſe the moſt convenient ſhelter, as a hedge, bank, or tree. If you have not ſhelter enough, you muſt creep on your hands and knees, or uſe a ſtalking-horſe. Let your dogs be under good command. See SETTING *Dog*, *Water* DOG, and SPANIEL.

FOX, *Vulpes*, in *Zoology*, an animal of the dog kind; much reſembling the common dog in form, and of the ſize of the ſpaniel. It is chiefly diſtinguiſhed by its long ſtrait tail, with a white tip to it. See CANIS, and DOG.

It differs, however, from the common dog in the length, denſe diſpoſition, and ſoftneſs of its hairs, eſpecially thoſe about its tail, which is buſhy, much admired by the animal itſelf, and in cold weather wrapped round its noſe; and in its ſmell, which is peculiarly rank and diſagreeable. The ſmell of its urine is remarkably fœtid; inſomuch that the animal covers it in the earth. It is ſaid that the *fox* makes uſe of its urine as an expedient to force the cleanly badger from its habitation; however, it makes uſe of the badger's hole. Its uſual colour is a reddiſh tawney, though it is ſometimes found white, and ſometimes black. Its manner of digging itſelf a hole in the earth, is alſo a cuſtom wholly different from all the dog-kind; and it is far from the tameneſs of that animal, being with difficulty made to loſe its fierceneſs. Of all animals the *fox* has the moſt ſignificant eye, by which it expreſſes every paſſion of love, fear, hatred, &c. The *fox* is a crafty, lively, libidinous animal: it breeds only once in a year, unleſs ſome accident befalls its firſt litter, and brings four or five young, which, like puppies are born blind.

The *fox* is a native of moſt northern countries, and there are three varieties of it, differing a little in form, but not in colour. They are diſtinguiſhed in Wales by different names. The greyhound *fox* is the largeſt, talleſt, and boldeſt, and will attack a grown ſheep or wether; the maſtiff *fox* is leſs, but more ſtrongly built; the cur *fox* is the leaſt, lurks about hedges, out-houſes, &c. and is the moſt pernicious to the feathered tribe. The firſt of theſe has a white tip to the tail; the laſt a black. The ſkin of this animal is furniſhed with a ſoft and warm fur, which in many parts of Europe is uſed to make muffs and fine cloths.

A *fox* in the firſt year is called a cub; in the ſecond, a *fox*, and afterward an old *fox*. It is a beaſt of chaſe, uſually very prejudicial to the huſbandman, by taking away and deſtroying his lambs, geeſe, and poultry. It will feed on fleſh of any kind; and when urged by hunger eat carrots and inſects; and, near the ſea-coaſts, for want of other food, eat crabs, ſhrimps, or ſhell-fiſh. In France and Italy it does incredible damage in the vineyards, by eating the grapes, of which it is very fond. The *fox* is a great deſtroyer of rats, and field animals. It ſecures its booty by digging holes in ſeveral places; and if a whole flock of poultry ſhould happen to be its prey, will bring them one by one, thruſt them in with its noſe, and conceal them by ramming the looſe earth upon them, till the calls of hunger induce him to devour them. The common way to catch him is by gins, which being baited, and a train made by drawing raw fleſh acroſs his uſual paths or haunts to the gin, it proves an inducement to lure him to the place of deſtruction. They are alſo taken with greyhounds, hounds, terriers, and nets: it is a commendable exerciſe to hunt theſe miſchievous beaſts, the nature of which in many reſpects is like that of wolves. See HUNTING.

Fox, *field*. See ALOPEX.

Fox, *Siberian*. See LAGOPUS.

Fox, *ſea*, *vulpes marina*, in *Ichthyology*, the name given by authors to a large fiſh, called the *ſea-fox* by us. In the Artedian ſyſtem it is the SQUALUS, with a tail longer than the body. It is ſaid by many authors to have naturally the rank ſmell of the *fox*, and to be one of the worſt-taſted fiſhes; but this does not appear to be true, on a ſtrict inquiry; for its ſmell ſeems very little different from that of other fiſhes, and its fleſh is well-taſted; ſo that theſe things ſeem only to have been ſaid, in order to ſtrengthen the reſemblance with the *fox*; a name which ſeems, upon the whole, to have been given it only from the length of its tail; and even that, though very long for a fiſh of this kind, has no reſemblance with the tail of a fox. The length of this fiſh is about nine foot, ſometimes twelve or thirteen, and its breadth, in the broadeſt part of the belly, fourteen inches. Its tail is nearly as long as the whole body beſide, and is of the ſhape of a ſcythe, and is bent downwards. Near the origin of the tail, it has a ſingle fin below, and the ſpine is more moveable up and down in this part, than in any other; ſo that the tail is, by this means, eaſily elevated or depreſſed. It has two eminences on the back, a large one near the middle, and a ſmall one near the tail. It has three fins on each ſide; the pair near the head are large, and reſemble the wings of a bird; the others are ſmaller. The ſkin is ſmooth, and without ſcales; and the fins and eminences on the back are compoſed of a ſort of ribs, held together by a tough and ſtrong membrane. The tongue adheres inſeparably to the lower jaw, and is compoſed of a great number of bones, articulated together by a fleſhy ſubſtance of a fibroſe texture, and covered with a membrane, in which there are ſeveral prominences, which, when viewed with the microſcope, appears as pellucid as the fineſt cryſtal. Its throat and ſtomach are remarkably large; and authors ſay, that when in a fright it will ſwallow its young ones into its ſtomach, and afterwards caſt them up again when the danger is over. Others, who ſpeak largely of its cunning, ſay, that when it has ſwallowed a bait at a hook, it will take in the whole line, till it comes to a weak place, where it can bite it aſunder. This is a tale very well calculated for the carrying on a reſemblance with the *fox* in cunning; but it is very ill adapted to this fiſh, which has no teeth with which it can bite any thing aſunder. The heart of this fiſh is remarkably ſmall, nothing larger than a hen's egg; it is alſo much of the ſame ſhape, and has no pericardium; but the aorta for a little way is covered with a membrane analogous to a pericardium. The head ſeems a mere lump of fleſh, being covered with muſcles, of which ſome are four inches thick; and though the head is ſo large, the ſkull is not bigger than a man's fiſt; it is thick, and is divided within into three cavities, each of which contains a ſmall quantity of a mucous matter mixed with blood; ſo that the fiſh ſeems ſcarce to have any brain at all, what little matter of it there is being quite ſoft, and having very few windings. The eyes are as large as thoſe of an ox, and are only hemiſpheric in figure, being flat before, ſo that they appear of a very ſingular ſhape. Mem. pour Hiſt. Anim. p. 114.

The teeth are triangular, ſmall, and placed in three rows; the back is an aſh-colour, and the belly white. The guts of this fiſh have a very peculiar ſtructure. In the upper part of them, inſtead of the ordinary circumvolutions of the guts of animals, the cavity is diſtinguiſhed by many tranſverſe ſeparations, compoſed of the membranes of the inteſtine turned inwards; theſe ſeparations ſtand at about half an inch diſtance from one another, and turn helically like a ſnail-ſhell. The conſequence of this is, that the food is detained a long time in its paſſage, though the way it has to go be very ſhort. This creature feeds both on other fiſh, and on ſea-plants. Ouvrage adoptez de l'Acad. Par. vol. i.

This fiſh has been ſometimes taken in our ſeas, and imagined to be the fiſh called the fluſher, from its attacking and beating the grampus with its long tail, when it riſes to the ſurface to breathe.

Fox, in *Sea-Language*, ſignifies a ſort of ſtrand, formed by twiſting ſeveral rope-yarns together, and uſed as a ſeizing, or to weave a mat or paunch, &c.

Fox-*glove*, *Digitalis*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower is bell-ſhaped, of one petal, with a large open tube, whoſe brim is ſlightly divided into five parts; it has four ſtamina, which are inſerted in the baſe of the petal; two being longer than the other. The germen afterward ſwells to an oval capſule, having two cells incloſing many ſmall angular ſeeds. There are nine ſpecies, which are great ornaments to a garden.

All theſe ſorts ſhould be ſown in autumn; for if the ſeeds are ſown in the ſpring, they commonly fail, or at leaſt lie a whole year in the ground before they begin to vegetate. The plants, one ſpecies excepted, are biennial, and periſh as ſoon as the ſeeds are ripe. Miller.

The common *fox-glove*, or the purple *fox-glove*, with a rough leaf, grows wild in woods, and on heaths; flowers in June, and the ſeeds ripen in autumn. The leaves communicate a bitteriſh and nauſeous taſte both to watery and ſpirituous menſtrua; and have been ſtrongly recommended in epileptic diſorders. It operates by ſtool and vomit; but with ſuch violence, that it is now diſuſed. Boerhaave judges it to be of a poiſonous nature; Dr. Alſton, on the contrary, ranks it among thoſe indigenous vegetables, which, though now diſregarded, are medicines of great virtue, and ſcarcely inferior to any that the Indies afford. Externally, the leaves and flowers have been employed with great ſafety, and with ſucceſs, in cataplaſms and unguents for ill-conditioned ulcers. The *unguentum digitale* takes its name from this plant. Lewis's Mat. Med.

Fox-*tail graſs*. See Grass.

FOYLING *of land*, among *Farmers*, the FALLOWING it in ſummer and autumn.

Foyling, among *Sportſmen*, a term uſed for the footſteps of a ſtag, on the graſs or leaves.

FOYNA, in *Zoology*, a name given by many to the MARTIN or *martes*, an animal of the weaſel-kind, common with us.

FRACHES, in the *Glaſs Trade*, are the flat iron pans into which the glaſs veſſels already formed are put, when in the tower over the working furnace, and by means of which they are drawn out through the leers, that they may be taken gradually from the fire, and cool by degrees.

FRACTION, in *Arithmetic* and *Algebra*, a part or diviſion of an unit, or integer; or, a number which ſtands to an unit in the relation of a part to its whole.

The word literally imports a broken number.

Fractions are uſually divided into *decimal*, *ſexageſimal*, and *vulgar*.

For *decimal, and ſexageſimal fractions*, ſee Decimal, and Sexagesimal.

Fractions, *Vulgar*, called alſo ſimply, *fractions*, are always expreſſed by two numbers, the one wrote over the other, with a line between them.

The lower, called the *denominator of the fraction*, denotes the unit, or whole, that is divided into parts; and the upper, called the *numerator of the fraction*, expreſſes the parts given in the preſent caſe.

Thus, two-third parts of a line, or other thing, are wrote $\frac{2}{3}$; where the denominator 3 ſhews, that the whole line is ſuppoſed to be divided into three equal parts; and the numerator 2 indicates or aſſigns two of ſuch parts.

Again, twenty-nine ſixtieths is wrote $\frac{29}{60}$; where the numerator 29 expreſſes 29 parts of an integer divided into 60; and the denominator 60 gives the denomination to theſe parts, which are called *ſixtieths*.

The real deſign of adding the denominator is, to ſhew what aliquot part the broken number has in common with unity.

In all *fractions*, as the numerator is to the denominator, ſo is the *fraction* itſelf, to the whole whereof it is a *fraction*.

Thus, ſuppoſing $\frac{3}{4}$ of a pound equal to 15*s.* it is evident, that 3 : 4 :: 15 : 20. Whence it follows, 1°, That there may be infinite *fractions* of the ſame value, one with another; inaſmuch as there may be infinite numbers found, which ſhall have the ratio of 3 : 4.

Fractions are either *proper*, or *improper*.

Fraction, *Proper*, is that where the numerator is leſs than the denominator; and, conſequently the *fraction* leſs than the whole, or integer as $\frac{25}{40}$.

Fraction, *Improper*, is where the numerator is either equal to, or bigger than the denominator; and of courſe the *fraction* equal to, or greater than the whole, or integer, as $\frac{25}{25}$ or $\frac{27}{26}$; or $\frac{90}{22}$.

Fractions, again, are either *ſimple*, or *compound*.

Fractions, *Simple*, are ſuch, as conſiſt of only one numerator, and one denominator; as $\frac{2}{7}$, or $\frac{14}{350}$, &c.

Fractions, *Compound*, called alſo *fractions of fractions*, are ſuch as conſiſt of ſeveral numerators, and denominators; as $\frac{4}{7}$ of $\frac{11}{12}$ of $\frac{5}{9}$ of $\frac{15}{87}$, &c.

Of *fractions*, thoſe are equal to each other, whoſe numerators have the ſame ratio to their denominators.— Thoſe are greater, whoſe numerators have a greater ratio; and thoſe leſs which have leſs: thus, $\frac{3}{6}=\frac{4}{8}=\frac{5}{10}=\frac{25}{50}=\frac{1}{2}$. But $\frac{3}{2}$ is greater than $\frac{2}{6}$; and $\frac{4}{6}$ leſs than $\frac{11}{18}$. Hence if both the numerator, and denominator of a *fraction*, as $\frac{4}{6}$, be multiplied or divided by the ſame number, 2; the facta in the former caſe, $\frac{8}{12}$, and the quotients in the latter, $\frac{2}{3}$, will conſtitute *fractions* equal to the firſt *fraction* given.

The arithmetic of *fractions* conſiſts in the *reduction*, *addition*, *ſubtraction*, and *multiplication* thereof.

Fractions, *reduction of*. 1. *To reduce a given whole number into a* fraction *of any given denominator.* Multiply the given integer, by the given denominator, the factum will be the numerator. Thus we ſhall find $3=\frac{24}{8}$ and $5=\frac{30}{6}$; and $7=\frac{28}{4}$, &c.

If no denominator be given, the number is reduced to a *fraction*, by writing 1 underneath it, as a denominator. Thus $\frac{2}{1}$, $\frac{4}{1}$, $\frac{55}{1}$.

2 *To reduce a given* fraction *to a* fraction *equal to it, that ſhall have a given denominator.* Multiply the numerator by the given denominator, and divide the product by the former denominator, and the quotient ſet over the given denominator is the *fraction* required. Let it be propoſed to reduce $\frac{3}{4}$ to an equal *fraction* with the denominator 8; $8\times3\div4=6$ and $\frac{6}{8}=\frac{3}{4}$.

3. *To reduce a given* fraction *to its loweſt terms*; i. e. to find a *fraction*, equivalent to a given *fraction* ($\frac{20}{48}$), but expreſſed in leſs numbers, divide both the numerator 20, and denominator 48, by ſome one number, that will divide them both without any remainder, as here by 4. The quotients 5 and 12 make a new *fraction* $\frac{5}{12}$, equal to $\frac{20}{48}$.

And if the diviſion be performed with the greateſt number that will divide them both, the *fraction* is reduced to its loweſt terms. See Common *Meaſure*.

If it happens that unity is the only common meaſure of the numerator and denominator; then is the *fraction* incapable of being reduced any lower: and numbers, whoſe greateſt common meaſure is unit, are ſaid to be Prime to each other.

4. *To reduce two or more* fractions *to the ſame denomination*; i. e. to find *fractions* equal to the given ones, and with the ſame denominator. Multiply each numerator, ſeparately taken, into all the denominators but its own, and the products ſhall give the new numerators. Then multiply all the denominators into one another, and the product will be the common denominator. Thus, $\frac{2}{3}$ and $\frac{4}{5}$ are $\frac{10}{15}$ and $\frac{12}{15}$; and $\frac{2}{3}$, $\frac{3}{4}$ and $\frac{4}{5}$ are reſpectively $\frac{40}{60}$, $\frac{45}{60}$, and $\frac{48}{60}$.

5. *To find the value of a* fraction, *in the known parts of its integer.* Suppoſe, e. gr. it were required to know what is $\frac{9}{16}$ of a pound; multiply the numerator 9 by 20, the number of known parts in a pound, and divide the product by the denominator 16, the quotient gives 11*s.* Then multiply the remainder 4 by 12, the number of known parts in the next inferior denomination; and dividing the product by 16, as before, the quotient is 3*d.* So that $\frac{9}{16}$ of a pound = 11*s.* 3*d.*

6. *To reduce a mixed number*, i. e. *a number partly integral and partly fractional, as* $4\frac{11}{12}$ *into an improper* fraction *of the ſame value.* Multiply the integer, 4, by 12, the denominator of the *fraction*; and to the product 48 add the numerator; the ſum 59 ſet over the former denominator, $\frac{59}{12}$ conſtitutes the *fraction*.

7. *To reduce an improper* fraction *into its equivalent mixed number.* Suppoſe the given *fraction* $\frac{59}{12}$; divide the numerator by the denominator; the quotient is the integral part, and the remainder ſet over the denominator will be the fractional part. Thus, $\frac{59}{12}=4\frac{11}{12}$.

8. *To reduce a compound* fraction *into a ſimple one.* Multiply all the numerators into each other for a new numerator; and all the denominators for a new denominator. Thus $\frac{1}{2}$ of $\frac{3}{4}$ of $\frac{5}{6}$ reduced will be $\frac{15}{48}$.

9. *To reduce a vulgar* fraction *to a decimal of the ſame value.* See Decimal.

Fractions, *addition of vulgar*. 1. If the given *fractions* have different denominators, reduce them to the ſame. Then add the numerators together, and under the ſum write the common denominator. Thus, e. gr. $\frac{2}{3}+\frac{4}{5}=\frac{10}{15}+\frac{12}{15}=1\frac{7}{15}$.

2. If compound *fractions* are given to be added, they muſt firſt be reduced to ſimple ones: and if the *fractions* be of different denominations, as $\frac{6}{8}$ of a pound, and $\frac{2}{3}$ of a ſhilling, they muſt firſt be reduced to *fractions* of the ſame denomination of pounds.

3. *To add mixed numbers.* The integers are firſt to be added, then the fractional parts: and if the ſum be a proper *fraction*, only annex it to the ſum of the integers. If it be an improper *fraction*, reduce it to a mixed number, adding the integral part thereof to the ſum, of the integers, and the fractional part after it. Thus, $5\frac{2}{3}+4\frac{1}{2}=10\frac{1}{6}$.

FRACTIONS, *ſubtraction of.* 1. If they have the ſame common denominator, ſubtract the leſſer numerator from the greater, and ſet the remainder over the common denominator. Thus from $\frac{9}{16}$ take $\frac{5}{16}$, and there remains $\frac{4}{16}=\frac{1}{4}$.

2. If they have not a common denominator, they muſt be reduced to *fractions* of the ſame value, having a common denominator, and then, as in the firſt rule. Thus, $\frac{6}{}-\frac{2}{5}=\frac{30}{35}-\frac{}{35}=\frac{16}{35}$.

3. *To ſubſtract a whole number from a mixed number, or one mixed number from another.* Reduce the whole, or mixed numbers to improper *fractions*, and then proceed as in the firſt and ſecond rule.

FRACTIONS, *multiplication of.* 1. If the *fractions* propoſed be both ſimple, multiply the numerators one by another for a new numerator, and the denominators for a new denominator. Thus $\frac{3}{4}$ into $\frac{5}{8}$ produces $\frac{15}{32}$.

2. If one of them be a mixed, or whole number, it muſt be reduced to an improper *fraction*; and then proceed as in the laſt rule. Thus $\frac{2}{8}$ into $5\frac{2}{3}$, gives $\frac{34}{24}$, and $\frac{4}{9}$ into $\frac{10}{1}=\frac{40}{9}$.

In multiplication of *fractions*, obſerve that the product is leſs in value, than either the multiplicand, or multiplicator; becauſe in all multiplications, as unity is to the multiplicator, ſo is the multiplicand, to the product: or, as unity is to either factor, ſo is the other factor, to the product. But unity is bigger than either factor, if the *fractions* be proper; and therefore either of them muſt be greater than the product.

Thus in whole numbers, if 5 be multiplied by 8, it will be as 1 : 5 : : 8 : 40; or 1 : 8 : : 5 : 40. Wherefore in *fractions*, alſo, as $1 : \frac{3}{4} :: \frac{5}{8} : \frac{15}{32}$; or as $1 : \frac{5}{8} :: \frac{3}{4} : \frac{15}{32}$. But 1 is greater than either $\frac{3}{4}$, or $\frac{5}{8}$: wherefore either of them muſt be bigger than $\frac{15}{32}$.

FRACTIONS, *diviſion of.* 1. If the *fractions* propoſed be both ſimple, multiply the denominator of the diviſor by the numerator of the dividend; the product is the numerator of the quotient: then multiply the numerator of the diviſor by the denominator of the dividend, the product, is the denominator of the quotient. Thus $\frac{3}{5})\frac{4}{9}(\frac{20}{27}$. Or, invert the diviſor and proceed as in multiplication.

2. If either dividend, diviſor, or both, be whole, or mixed, numbers, reduce them to improper *fractions*; and if they be compound *fractions*, reduce them to ſimple ones, and proceed as in the firſt rule.

In diviſion of *fractions* obſerve, that the quotient is always greater than the dividend; becauſe in all diviſion, as the diviſor is to unity, ſo is the dividend to the quotient: as if 3 divide 12, it will be, as 3 : 1 : : 12 : 4. Now 3 is greater than 1; wherefore 12 muſt be greater than 4: but in *fractions*, as $\frac{3}{5} : 1 :: \frac{4}{9} : \frac{20}{27}$; where, $\frac{3}{5}$ is leſs than 1; wherefore $\frac{4}{9}$ muſt alſo be leſs than $\frac{20}{27}$.

FRACTIONS *in ſpecies*, or *algebraic quantities.* 1. *To reduce* fractions *in ſpecies to their leaſt terms.* The numerators and denominators are to be divided by the greateſt common diviſor, as in numbers.

Thus the *fraction* $\frac{aac}{bc}$ is reduced to a more ſimple one $\frac{aa}{b}$ by dividing both aac, and abc, by c: and $\frac{203}{667}$ is reduced to a more ſimple one $\frac{7}{23}$ by dividing both 203 and 667 by 29; and $\frac{203aac}{667bc}$ is reduced to $\frac{7aa}{23b}$ by dividing by $29c$. And ſo $\frac{6a^3-9acc}{6aa+3ac}$ becomes $\frac{2aa-3cc}{2a+c}$ by dividing by $3a$. And $\frac{a^3-aab+abb-b^3}{aa-ab}$ becomes $\frac{aa+bb}{a}$ by dividing by $a-b$. See COMMON *Meaſure.*

2. *To reduce* fractions *in ſpecies to a common denominator.* The terms of each are to be multiplied by the denominator of the other.

Thus, having $\frac{a}{b}$ and $\frac{c}{d}$; multiply the terms of one $\frac{a}{b}$ by d, and alſo the terms of the other $\frac{c}{d}$ by b, and they will become $\frac{ad}{bd}$ and $\frac{bc}{bd}$, whereof the common denominator is bd. And thus a and $\frac{ab}{c}$, or $\frac{a}{1}$ and $\frac{ab}{c}$, become $\frac{ac}{c}$ and $\frac{ab}{c}$.

But where the denominators have a common diviſor, it is ſufficient to multiply them alternately by the quotients.

Thus the *fraction* $\frac{a^3}{bc}$ and $\frac{a^3}{bd}$ are reduced to theſe $\frac{a^3d}{bcd}$ and $\frac{a^3c}{bcd}$ by multiplying alternately by the quotients c and d, ariſing by the diviſion of the denominators by the common diviſor b. The other operations, with reſpect to numbers, are eaſily applied to algebraic quantities.

Addition and ſubtraction of fractions *in ſpecies* The proceſs is, in all reſpects, the ſame in ſpecies as in numbers. E. gr.

Suppoſe it be required to add the *fractions* $\frac{a}{b}$ and $\frac{c}{d}$. Theſe, when reduced to the ſame denomination, will be $\frac{ad}{bd}$ and $\frac{bc}{bd}$; conſequently their ſum is $\frac{ad+bc}{bd}$.

So, if the *fraction* $\frac{a}{b}$ were to be ſubtracted from $\frac{c}{d}$; having reduced them they will be $\frac{ad}{bd}$ and $\frac{bc}{bd}$, as before. Their difference, therefore, is $\frac{bc-ad}{bd}$.

Multiplication and diviſion of fractions *in ſpecies.* Here, too, the proceſs is perfectly the ſame as in vulgar arithmetic. Thus, e. gr. ſuppoſe the factors, or *fractions* to be multiplied, $\frac{a}{b}$ and $\frac{c}{d}$: the product will be, $\frac{ac}{bd}$.

Or ſuppoſe the *fractions*, required to be divided, $\frac{ac}{bd}$ and $\frac{a}{b}$; the quotient will be, $\frac{ac}{bd}\times\frac{b}{a}=\frac{abc}{abd}=\frac{c}{d}$.

Hence, as $a=\frac{a}{1}$; the product of a into $\frac{c}{d}$, that is, of an integral quantity ino a *fraction*, $\frac{c}{d}\times\frac{a}{1}=\frac{ac}{d}$. Whence it appears, that the numerator of the *fraction* is to be multiplied by the integer.

Hence, alſo, the quotient of $\frac{c}{d}$ by a, that is, of the broken quantity, divided by the whole one, $\frac{c}{d}\times\frac{1}{a}=\frac{c}{ad}$.

Beſide the common notion of a *fraction*, there is another neceſſary to be underſtood. Thus,

Suppoſe $\frac{3}{4}$ of 20*s.* or a pound ſterling, were the *fraction*: this *fraction*, inſtead of three quarters of one pound, may be conſidered as a fourth part of three pounds; that is, by taking as many of the integers as the numerator expreſſes (viz. 3), and dividing them by 4, the denominator, for then the quotient of the ſame value will ariſe; for 4) 60*s.* (15*s.* This ſhews that the reaſon of that manner of expreſſion uſed by geometers and algebraiſts, who read $\frac{a}{b}$, thus, a divided by b.

FRACTION, *continued*, is uſed for a *fraction* the denominator of which is a whole number with a *fraction*, the denominator of which is again a whole number and a *fraction*, and ſo on, whether this affection be continued *ad infinitum*, or whether the ſeries breaks off after a finite number of terms. Thus,

$$\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{4+\cfrac{1}{5+,\ \&c.}}}} \qquad \text{or} \cfrac{1}{2+\cfrac{2}{3+\cfrac{3}{4+\cfrac{4}{5+,\ \&c.}}}}$$

are *continued fractions.*

If we make uſe of letters inſtead of numbers, we ſhall have general expreſſions of theſe *fractions*, thus,

$$a+\cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d+\cfrac{1}{e+\cfrac{1}{f+,\ \&c.}}}}}$$

and

$$a+\cfrac{\alpha}{b+\cfrac{\beta}{c+\cfrac{\gamma}{d+\cfrac{\delta}{e+\cfrac{\varepsilon}{f+,\ \&c.}}}}}$$

The reduction of theſe *continued fractions* to thoſe of a common form, is not difficult by the uſual rules of arithmetic and algebra. Thus, to give an example, which may at the ſame time ſhew the uſe of theſe *continued fraction:*, ſuppoſe the *continued fraction*,

$$3+\cfrac{1}{7+\cfrac{1}{15+\cfrac{1}{1+\cfrac{1}{292+\cfrac{1}{1+\cfrac{1}{1+\text{, \&c.}}}}}}}$$

which expreſſes the circumference of a circle, when the diameter is one; if we ſtop at $\frac{1}{7}$, we ſhall have $3+\frac{1}{7}=\frac{21+1}{7}=\frac{22}{7}$. If we ſtop at $\frac{1}{15}$, we ſhall have

$$3+\cfrac{1}{7+\cfrac{1}{15}}=3+\cfrac{1}{\cfrac{106}{15}}=3+\frac{15}{106}=\frac{318+15}{106}=\frac{333}{106}$$

But if we ſtop at $\frac{1}{1}$, which is convenient on account of the ſmall *fraction* $\frac{1}{292}$, added to the laſt denominator 1, we ſhall then find, $3+\cfrac{1}{7+\cfrac{1}{15+\cfrac{1}{1}}}=\frac{355}{113}$. The firſt of the reductions gives the proportion of Archimedes, and the laſt that of Adrian Metius.

But as beginning at the laſt denominator of the *continued fraction* makes the computation ſomewhat tedious, ſhorter methods have been contrived for the reduction of theſe *fractions*, and for a continued approximation to their true value. And Mr. Cotes's method for the reduction of ratios to ſmaller terms, may be here applied. (See RATIO.) For it is to be obſerved, that when the numerators of the *continued fraction* are each units, the denominators will be the quotients ariſing from the continued diviſions in Mr. Cotes's method: or in the common, for reducing *fractions* to a lower denomination, which is in effect the ſame as Euclid's method for finding the greateſt common meaſure of two magnitudes, lib. x. prop. 3. But a detail of theſe things would lead us too far, we therefore refer the reader for a farther account of theſe *continued fractions* to Dr. Wallis's Arithmet. infinit. prop. 191. Oper. vol. i. p. 469, ſeq. Huygens, Deſcript. Automat. Planetar. in Oper. poſthum. p. 173, ſeq. edit. Amſtelod. 1728. and particularly to Mr. Euler's Analyſ. Infinit. vol I. cap. xviii. p. 295, ſeq. who has ſhewn the uſe and application of this doctrine in many inſtances.

Lord Brouncker ſeems to have been the firſt who conſidered *continued fractions*, or at leaſt who firſt applied them to the quadrature of curves. The hint ſeems uſeful, but has been pretty much neglected, excepting in approximations to *fractions* or ratios expreſſed in great numbers. See the article RATIO. His ſeries for the quadrature of the circle, is

$$\square = 1\cfrac{1}{2\cfrac{9}{2\cfrac{25}{2\cfrac{49}{2\cfrac{81}{2}}}}}\text{, \&c.}$$

in his and Dr. Wallis's notation, which amounts to the ſame thing as $1+\cfrac{1}{2+\cfrac{9}{2+\cfrac{25}{2+\text{, \&c.}}}}$

in the notatio of Huygens and Euler.

The ſymbol $\square$ denotes, as before, the ratio of the ſquare of the diameter to the area of the circle.

FRACTION *repetend of a decimal.* See REPETEND.

FRACTION, *logarithm of a.* See LOGARITHM.

FRACTIONS, *ſumming of infinite.* See CALCULUS and FLUXIONS.

FRACTURE, in *Medicine* and *Surgery*, a breach, or rupture, of a bone; or a ſolution of continuity in a bone, when it is cruſhed, or broken, by ſome external cauſe.

This may be diſcovered by the eye, when the injured part is apparently ſhorter than the ſound one, or when the patient cannot make uſe of it; by the touch, when a preternatural inequality of the bone may be perceived, or where it bends in a part where nature did not deſign it ſhould; or by the ear, when, upon moving of the limb, the grating of the broken bones may be heard.

Fractures may be diſtinguiſhed into ſeveral claſſes or ſpecies. Firſt, every *fracture* is either *ſimple*, that is, when no other parts beſide the bone are injured; or *compound*, that is, when you have at the ſame time a wound, a diſlocation, hæmorrhage, inflammation, fever, caries or contuſion of the bone; or where the bone is fractured in ſeveral places at the ſame time. Other differences ariſe with regard to the ſituation of the *fracture*, and from its poſition: ſome are tranſverſe, others longitudinal, called FISSURES, and others oblique; in which caſe it frequently happens, that the point of the bones wound or puſh themſelves through the neighbouring parts. Violent CONTUSIONS alſo may be claſſed under the head of *fractures*; for in theſe the bones are frequently broken into ſplinters, by the falling of any heavy body upon the part, or other ſuch accidents. When the ſituation of the bone is not altered by a *fracture*, or the broken parts ſtart very little from their proper ſituation, they are much eaſier replaced than when they are entirely ſeparated from one another, and a great ſpace intervenes between them. Tranſverſe *fractures* admit of an eaſier cure than oblique ones. A *fracture* in the middle of a bone is leſs dangerous than one towards the articulation. When two bones of the ſame limb are fractured, the cure is uſually much more difficult than when only one. When the bone is broken into ſeveral pieces, the patient ſeldom eſcapes a gangrene, at leaſt the cure in theſe caſes requires a longer time, and the limb ſeldom recovers it true ſhape.

When the broken bones are inſtantly reduced, the cur will be much ſooner performed, than when they hav been ſome time ſeparated. *Fractures* in the neighbour hood of parts of great conſequence to the animal œconomy, are always attended with great danger, ſuch a *fractures* of the cranium from the vicinity of the brain of the vertebræ, from the medulla ſpinalis; and of th ribs or ſternum, or the oſſa ilei and pubis, from the ſitu ation of the viſcera of the thorax and abdomen. *Fractur* of the bones to which the larger arteries are connected are alſo very dangerous; more particularly, when on ſplinter or point of the bone vellicates or wounds larg veſſels, or when the bone is broken into ſeveral frag ments, the conſequences are generally inflammations ſuppurations, or fiſtulæ, which will admit of no reme dy, till the ſplinter of the bone is removed. *Fractur* proceeding from internal diſorders or caries of the bones as ſuch ſometimes happen, are cured with much mor difficulty than thoſe ariſing from external injuries; na this, indeed, is frequently an incurable caſe, unleſs th internal cauſe be firſt removed. This is uſually either ſcorbutic habit of body, or a venereal taint. When large piece of the bone is driven away by a piſtol o muſket-ball, the limb muſt be taken off, for the two end of the bone are never likely to unite, unleſs it be a ver ſmall piece that is thus taken away; for in that caſe th bone will ſometimes join, but then the limb always be comes ſomething ſhorter than it was before. When th blood inſinuates itſelf by a fiſſure into the internal pa of the bone, by corrupting there it produces a caries, ſpina ventoſa, or elſe incurable fiſtulæ, tabes, and a ſpha celus, which always require amputation of the limb, an frequently deſtroy the patient. The ſame accidents wi happen in *fractures* of any kind, when the extravaſate blood mixes with the marrow and corrodes it. Heiſter's Surg. p. 103.

Inſtances have been known of the *fracture* of the patell in perſons thoroughly ſound, where the part itſelf ha received no hurt. The cauſe of this is aſcribed to th action of the muſcles only. And many inſtances migh be given of *fractures* in the neck of the os femoris, i the middle of the humerus, tibia, and perone, by th power of the muſcles only, or ſuch power at leaſt a ſhewed they have as great a ſhare in ſeveral *fractures* a ſcribed to outward cauſes, as they are frequently know to have in the *fracture* of the tendo Achillis. We hav an obſervation of a *fracture* of the os humerus, by th power of the muſcles only, in the Philoſophical Tran actions, N°. 475. ſect. 15.

In the cure of *fractures* the ſurgeon has two things t attend to: firſt, to reſtore the fractured bone into i natural ſituation; and then, to keep it ſtrait and ea with ferulæ, or ſplinters, and bandages, which ſhoul by no means be tight: in which caſe, nature takes o herſelf the office of healing and conglutinating it, b forming a callus upon it.

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On the other hand, if the veſſel is not ready, the merchant may ſhip the remainder of his goods aboard another, and recover damages againſt the firſt maſter or owners: therefore, by the law marine, chance, or other notorious neceſſity, will excuſe the maſter, but he loſes his *fraight* till he breaks ground. But if the merchant be in fault, he muſt anſwer the damage, or be liable to maintain the crew ten days; and, if after that, the full *fraight*; if damage afterwards, it is the merchants riſque: but by the common law, while the goods are on board, the maſter muſt ſee them forth-coming.

If goods are fully laded, and the ſhip hath broke ground, but the merchant afterwards declines the adventure, and unlades again, by the law marine the *fraight* is due.

If a ſet time be agreed on between the merchant and maſter, to begin and end the voyage, it may not be altered by the ſupercargo, without ſpecial commiſſion: and if a maſter ſhall ſail on his voyage, after the time agreed on for his departure, and damage happens afterwards, he ſhall make it good. If a ſhip be freighted from one port to another, thence to a third, &c. and ſo home to the port whence ſhe firſt ſailed (commonly called a trading voyage), the whole is one and the ſame voyage, if performed according to the charter-party. If the ſhip be freighted out and in, no *fraight* is due till the voyage is performed; if, therefore the ſhip periſh coming home, the whole *fraight* is loſt.

The maſter may ſet aſhore ſuch goods as he finds in his veſſel, which were not notified to him; or take them at a higher rate than was agreed on for the reſt. But if the maſter *fraight* his ſhip, and afterwards ſecretly take in other goods, he loſes his *fraight*; and if any of the freighter's goods ſhould, for the ſhip's ſafety, be caſt overboard, the reſt ſhall not be ſubject to average, but the maſter muſt make it good.

If a ſhip be ſtopped or detained in its courſe, either through the maſter's, or the merchant's default, the delinquent ſhall be accountable to the other. Thus, if the freighter load the ſhip with prohibited goods, he ſhall anſwer the *fraight* contracted: but if the ſhip put into any other port than ſhe is freighted to, the maſter ſhall anſwer damage to the merchant; but if forced in by ſtorm, enemy, or pirates, he muſt then ſail to the ſtipulated port at his own coſts.

If the maſter be obliged to refit his veſſel during the voyage, the merchant ſhall wait, or elſe pay the whole *fraight*: if the veſſel could not be refitted, the maſter is obliged to hire another immediately, otherwiſe only to be paid his *fraight* in proportion to the part of the voyage performed; though, in caſe the merchant prove that the veſſel, at the time it ſet ſail, was not capable of the voyage, the maſter muſt loſe his *fraight*, and account for damages to the merchant.

Fraight ſhall be paid for merchandizes which the maſter was obliged to ſell for victuals, or refitting, or other neceſſary occaſions, paying for the goods at the rate the reſt were ſold at, where they were landed.

In caſe of a prohibition of commerce with the country whither the veſſel is bound, ſo that it is obliged to be brought back again, the maſter ſhall only be paid *fraight* for going.

And if a ſhip be ſtopped or detained in its voyage, by an embargo by order of the prince, there ſhall neither be any *fraight* paid for the time of the detention, in caſe it be hired per month; nor ſhall the *fraight* be increaſed, if hired for the voyage; but the pay and the victuals of the ſailors, during the detention, ſhall be deemed average.

The maſter ſhall take no *fraight* for any goods loſt by ſhipwreck, plundered by pirates, or taken by the enemy, unleſs the ſhip and goods be redeemed; in which caſe he ſhall be paid his *fraight* to the place where he was taken, upon contributing to the redemption.

The maſter ſhall be paid his *fraight* for the goods ſaved from ſhipwreck; and in caſe he cannot get a veſſel to carry them unto the place where they were bound, he ſhall be paid in proportion to the part of the voyage already gone. The ſhip's lading, in conſtruction of law, is tacitly obliged for the *fraight*; this being, in point of payment, preferred before any other debts to which the goods laden are liable, though ſuch were precedent to the *freight*, becauſe the goods remain, as it were, bailed for the ſame.

The maſter may not detain any merchandize in his veſſel, in default of payment of *fraight*; though he may order them to be ſeized any time, or any where afterwards. If merchandizes in caſks, as wines, oils, &c. have ſo run out in carriage, that the veſſels are left empty, or almoſt empty, the merchant may relinquiſh them, and the maſter be obliged to take them for their *fraight*; though this does not hold of any other goods damaged, or diminiſhed of themſelves, or through accidents.

Fraight is alſo uſed for the burthen, or lading of a ſhip, or the cargo of goods, &c. which ſhe has on board.

Fraight is alſo a duty of fifty ſols per ton, paid to the arithmetic and algebra. Thus, to give an example, which may at the ſame time ſhew the uſe of theſe *continued fraction:*, ſuppoſe the *continued fraction*,

$$3+\cfrac{1}{7+\cfrac{1}{15+\cfrac{1}{1+\cfrac{1}{292+\cfrac{1}{1+\cfrac{1}{1+,\ \&c.}}}}}}$$

which expreſſes the circumference of a circle, when the diameter is one; if we ſtop at $\frac{1}{7}$, we ſhall have $3+\frac{1}{7}=\frac{21+1}{7}=\frac{22}{7}$. If we ſtop at $\frac{1}{15}$, we ſhall have

$$3+\cfrac{1}{7+\cfrac{1}{15}}=3+\cfrac{1}{\frac{106}{15}}=3+\frac{15}{106}=\frac{318+15}{106}=\frac{333}{106}$$

But if we ſtop at $\frac{1}{1}$, which is convenient on account of the ſmall *fraction* $\frac{1}{292}$, added to the laſt denominator 1, we ſhall then find, $3+\cfrac{1}{7+\cfrac{1}{15+\cfrac{1}{1}}}=\frac{355}{113}$. The firſt of the reductions gives the proportion of Archimedes, and the laſt that of Adrian Metius.

But as beginning at the laſt denominator of the *continued fraction* makes the computation ſomewhat tedious, ſhorter methods have been contrived for the reduction of theſe *fractions*, and for a continued approximation to their true value. And Mr. Cotes's method for the reduction of ratios to ſmaller terms, may be here applied. (See RATIO.) For it is to be obſerved, that when the numerators of the *continued fraction* are each units, the denominators will be the quotients ariſing from the continued diviſions in Mr. Cotes's method: or in the common, for reducing *fractions* to a lower denomination, which is in effect the ſame as Euclid's method for finding the greateſt common meaſure of two magnitudes, lib. x. prop. 3. But a detail of theſe things would lead us too far, we therefore refer the reader for a farther account of theſe *continued fractions* to Dr. Wallis's Arithmet. infinit. prop. 191. Oper. vol. i. p. 469, ſeq. Huygens, Deſcript. Automat. Planetar. in Oper. poſthum. p. 173, ſeq. edit. Amſtelod. 1728. and particularly to Mr. Euler's Analyſ. Infinit. vol I. cap. xviii. p. 295, ſeq. who has ſhewn the uſe and application of this doctrine in many inſtances.

Lord Brouncker ſeems to have been the firſt who conſidered *continued fractions*, or at leaſt who firſt applied them to the quadrature of curves. The hint ſeems uſeful, but has been pretty much neglected, excepting in approximations to *fractions* or ratios expreſſed in great numbers. See the article RATIO. His ſeries for the quadrature of the circle, is

$$\square = 1\cfrac{1}{2\cfrac{9}{2\cfrac{25}{2\cfrac{49}{2\cfrac{81}{2},\ \&c.}}}}$$

in his and Dr. Wallis's notation, which amounts to the ſame thing as $1+\cfrac{1}{2+\cfrac{9}{2+\cfrac{25}{2+,\ \&c.}}}$

in the notatio of Huygens and Euler.

The ſymbol □ denotes, as before, the ratio of the ſquare of the diameter to the area of the circle.

FRACTION *repetend of a decimal.* See REPETEND.

FRACTION, *logarithm of a.* See LOGARITHM.

FRACTIONS, *ſumming of infinite.* See CALCULUS and FLUXIONS.

FRACTURE, in *Medicine* and *Surgery*, a breach, or rupture, of a bone; or a ſolution of continuity in a bone, when it is cruſhed, or broken, by ſome external cauſe.

This may be diſcovered by the eye, when the injured part is apparently ſhorter than the ſound one, or when the patient cannot make uſe of it; by the touch, when a preternatural inequality of the bone may be perceived, or where it bends in a part where nature did not deſign it ſhould; or by the ear, when, upon moving of the limb, the grating of the broken bones may be heard.

Fractures may be diſtinguiſhed into ſeveral claſſes or ſpecies. Firſt, every *fracture* is either *ſimple*, that is, when no other parts beſide the bone are injured; or *compound*, that is, when you have at the ſame time a wound, a diſlocation, hæmorrhage, inflammation, fever, caries or contuſion of the bone; or where the bone is fractured in ſeveral places at the ſame time. Other differences ariſe with regard to the ſituation of the *fracture*, and from its poſition: ſome are tranſverſe, others longitudinal, called FISSURES, and others oblique; in which caſe it frequently happens, that the point of the bones wound or puſh themſelves through the neighbouring parts. Violent CONTUSIONS alſo may be claſſed under the head of *fractures*; for in theſe the bones are frequently broke into ſplinters, by the falling of any heavy body upon th part, or other ſuch accidents. When the ſituation o the bone is not altered by a *fracture*, or the broken part ſtart very little from their proper ſituation, they are much eaſier replaced than when they are entirely ſeparated from one another, and a great ſpace intervenes between them. Tranſverſe *fractures* admit of an eaſier cure than oblique ones. A *fracture* in the middle of a bone is leſ dangerous than one towards the articulation. When two bones of the ſame limb are fractured, the cure i uſually much more difficult than when only one. When the bone is broken into ſeveral pieces, the patient ſeldom eſcapes a gangrene, at leaſt the cure in theſe caſes requires a longer time, and the limb ſeldom recovers it true ſhape.

When the broken bones are inſtantly reduced, the cur will be much ſooner performed, than when they hav been ſome time ſeparated. *Fractures* in the neighbour hood of parts of great conſequence to the animal œcono my, are always attended with great danger, ſuch a *fractures* of the cranium from the vicinity of the brain of the vertebræ, from the medulla ſpinalis; and of th ribs or ſternum, or the oſſa ilei and pubis, from the ſitu ation of the viſcera of the thorax and abdomen. *Fractur* of the bones to which the larger arteries are connected are alſo very dangerous; more particularly, when on ſplinter or point of the bone vellicates or wounds larg veſſels, or when the bone is broken into ſeveral frag ments, the conſequences are generally inflammations ſuppurations, or fiſtulæ, which will admit of no reme dy, till the ſplinter of the bone is removed. *Fractur* proceeding from internal diſorders or caries of the bones as ſuch ſometimes happen, are cured with much mor difficulty than thoſe ariſing from external injuries; na this, indeed, is frequently an incurable caſe, unleſs th internal cauſe be firſt removed. This is uſually either ſcorbutic habit of body, or a venereal taint. When large piece of the bone is driven away by a piſtol o muſket-ball, the limb muſt be taken off, for the two end of the bone are never likely to unite, unleſs it be a ver ſmall piece that is thus taken away; for in that caſe th bone will ſometimes join, but then the limb always b comes ſomething ſhorter than it was before. When th blood inſinuates itſelf by a fiſſure into the internal pa of the bone, by corrupting there it produces a caries, ſpina ventoſa, or elſe incurable fiſtulæ, tabes, and a ſpha celus, which always require amputation of the limb, an frequently deſtroy the patient. The ſame accidents wi happen in *fractures* of any kind, when the extravaſate blood mixes with the marrow and corrodes it. Heiſter' Surg. p. 103.

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If a time be appointed by charter-party, and either the ſhip be not ready to take in, or the merchant to put on board, the parties are at liberty, with remedy by action for the detriment.

If part be on board, and ſome misfortune prevent the merchant's ſending the whole in time, the maſter may contract with another, and have *fraight* as damage for the time they were on board longer than limited.

On the other hand, if the veſſel is not ready, the merchant may ſhip the remainder of his goods aboard another, and recover damages againſt the firſt maſter or owners: therefore, by the law marine, chance, or other notorious neceſſity, will excuſe the maſter, but he loſes his *fraight* till he breaks ground. But if the merchant be in fault, he muſt anſwer the damage, or be liable to maintain the crew ten days; and, if after that, the full *fraight*; if damage afterwards, it is the merchants riſque: but by the common law, while the goods are on board, the maſter muſt ſee them forth-coming.

If goods are fully laded, and the ſhip hath broke ground, but the merchant afterwards declines the adventure, and unlades again, by the law marine the *fraight* is due.

If a ſet time be agreed on between the merchant and maſter, to begin and end the voyage, it may not be altered by the ſupercargo, without ſpecial commiſſion: and if a maſter ſhall ſail on his voyage, after the time agreed on for his departure, and damage happens afterwards, he ſhall make it good. If a ſhip be freighted from one port to another, thence to a third, &c. and ſo home to the port whence ſhe firſt ſailed (commonly called a trading voyage), the whole is one and the ſame voyage, if performed according to the charter-party. If the ſhip be freighted out and in, no *fraight* is due till the voyage is performed; if, therefore the ſhip periſh coming home, the whole *fraight* is loſt.

The maſter may ſet aſhore ſuch goods as he finds in his veſſel, which were not notified to him; or take them at a higher rate than was agreed on for the reſt. But if the maſter *fraight* his ſhip, and afterwards ſecretly take in other goods, he loſes his *fraight*; and if any of the freighter's goods ſhould, for the ſhip's ſafety, be caſt overboard, the reſt ſhall not be ſubject to AVERAGE, but the maſter muſt make it good.

If a ſhip be ſtopped or detained in its courſe, either through the maſter's, or the merchant's default, the delinquent ſhall be accountable to the other. Thus, if the freighter load the ſhip with prohibited goods, he ſhall anſwer the *fraight* contracted: but if the ſhip put into any other port than ſhe is freighted to, the maſter ſhall anſwer damage to the merchant; but if forced in by ſtorm, enemy, or pirates, he muſt then ſail to the ſtipulated port at his own coſts.

If the maſter be obliged to refit his veſſel during the voyage, the merchant ſhall wait, or elſe pay the whole *fraight*: if the veſſel could not be refitted, the maſter is obliged to hire another immediately, otherwiſe only to be paid his *fraight* in proportion to the part of the voyage performed; though, in caſe the merchant prove that the veſſel, at the time it ſet ſail, was not capable of the voyage, the maſter muſt loſe his *fraight*, and account for damages to the merchant.

Fraight ſhall be paid for merchandizes which the maſter was obliged to ſell for victuals, or refitting, or other neceſſary occaſions, paying for the goods at the rate the reſt were ſold at, where they were landed.

In caſe of a prohibition of commerce with the country whither the veſſel is bound, ſo that it is obliged to be brought back again, the maſter ſhall only be paid *fraight* for going.

And if a ſhip be ſtopped or detained in its voyage, by an embargo by order of the prince, there ſhall neither be any *fraight* paid for the time of the detention, in caſe it be hired per month; nor ſhall the *fraight* be increaſed, if hired for the voyage; but the pay and the victuals of the ſailors, during the detention, ſhall be deemed AVERAGE.

The maſter ſhall take no *fraight* for any goods loſt by ſhipwreck, plundered by pirates, or taken by the enemy, unleſs the ſhip and goods be redeemed; in which caſe he ſhall be paid his *fraight* to the place where he was taken, upon contributing to the redemption.

The maſter ſhall be paid his *fraight* for the goods ſaved from ſhipwreck; and in caſe he cannot get a veſſel to carry them unto the place where they were bound, he ſhall be paid in proportion to the part of the voyage already gone. The ſhip's lading, in conſtruction of law, is tacitly obliged for the *fraight*; this being, in point of payment, preferred before any other debts to which the goods laden are liable, though ſuch were precedent to the *freight*, becauſe the goods remain, as it were, bailed for the ſame.

The maſter may not detain any merchandize in his veſſel, in default of payment of *fraight*; though he may order them to be ſeized any time, or any where afterwards. If merchandizes in caſks, as wines, oils, &c. have ſo run out in carriage, that the veſſels are left empty, or almoſt empty, the merchant may relinquiſh them, and the maſter be obliged to take them for their *fraight*; though this does not hold of any other goods damaged, or diminiſhed of themſelves, or through accidents.

FRAIGHT is alſo uſed for the burthen, or lading of a ſhip, or the cargo of goods, &c. which ſhe has on board.

FRAIGHT is alſo a duty of fifty ſols per ton, paid to the crown of France by the maſters of all foreign veſſels, at their entrance into and going out of the ports and havens of that kingdom. And note, that all veſſels not built in France, however they may belong to the ſubjects of France, are reputed foreigners, and ſubject to this impoſt, unleſs it be made appear, that two thirds of the ſhip's crew are French.

By the eleventh article of the treaty of commerce, concluded at Utrecht between England and France, this duty of fifty ſols per ton was to have been remitted the Engliſh; and at the ſame time, the duty of five ſhillings ſterling to have been ſuppreſſed in favour of the French: but the execution of that article, as well as the tariff ſettled between the two nations, has been ſuſpended.

The Dutch, however, and the Hans towns, are exempted from the duty of *fraight*.

FRAIL, a baſket of ruſhes, or the like matter, wherein to pack up figs, raiſins, &c.

FRAIL alſo denotes a certain quantity of raiſins, about ſeventy-five pounds.

FRAISE, in *Fortification*, a kind of defence, conſiſting of pointed ſtakes, driven parallel to the horizon, into the retrenchments of a camp, a half-moon, or the like, to ward off and prevent any approach or ſcalade.

Fraiſes differ from paliſades chiefly in this, that the latter ſtand perpendicular to the horizon; and the former jet out parallel to the horizon, at leaſt nearly ſo, being uſually made a little ſloping, or with the points hanging down.

Fraiſes are chiefly uſed in retrenchments, and other works thrown up of earth: ſometimes they are found under the parapet of a rampart, ſerving inſtead of the cordon of ſtone uſed in ſtone works.

FRAISING *of a battalion*, is the lining it all round with pikes, in caſe of being charged by a body of horſe.

FRAMBOISE, a name uſed by ſome for the *rubus* or blackberry-buſh. See RASPBERRY.

FRAME, in *Joinery*, &c. a kind of caſe, wherein a thing is ſet, or incloſed, or even ſupported; as a window *frame*, a *frame* of a picture, of a table, &c.

FRAME is alſo a machine, uſed in divers arts. The printers *frame* is more uſually called a CASE.

The founders *frame* is a kind of ledge, incloſing a board, which being filled with wetted ſand, ſerves as a mould to caſt their work in. See FOUNDERY.

FRAME is more particularly uſed for a ſort of loom, whereon artizans ſtretch their linens, ſilks, ſtuffs, &c. to be embroidered, quilted, or the like.

FRAME, among *Painters*, &c. is a kind of ſquare, compoſed of four long pieces, or ſlips of wood, joined together; the intermediate ſpace whereof is divided by little ſtrings or threads, into a great number of little ſquares, like the maſhes of a net; and for that reaſon ſometimes called *reticula*.

Its uſe is in reducing of figures from great to ſmall, or augmenting their ſize from ſmall to great. See DESIGNING.

FRAMING *of a houſe*, all the timber-work therein, viz. the carcaſe, flooring, partitioning, roofing, cieling, beams, aſhlering, &c.

FRAMPOLE *fence*, a privilege enjoyed by the tenants of the manor of Writtel, in Eſſex; whereby they are entitled to the wood growing on the fence; and as many trees or poles as they can reach from the top of the ditch with the helve of an ax, toward the repair of their fence.

The chief juſtice Brampton, whilſt ſteward of this court, acknowleged he could not find out the reaſon why theſe fences were called *frampole*. It may come from the Saxon *fremſul*, *profitable*; or may be a corruption of *franc-pole*, becauſe the poles are free for the tenant to take.

FRANC. See FRANK.

FRANCA, in *Botany*, the name given by Micheli to a genus of plants, ſince called by Linnæus FRANKENIA.

FRANCHISE, a privilege, or exemption from ordinary juriſdiction.

FRANCHISE is alſo uſed for an immunity from the ordinary tributes and taxes.

This is either real, or perſonal; that is, either belonging immediately to the perſon; or accruing on account of this or that place, or office of IMMUNITY.

Theſe *franchiſes*, being royal privileges, or branches of the king's prerogative, ſubſiſting in the hands of a ſubject, are derived from the crown by grant or charter, and, in ſome caſes, are held by preſcription and uſage. They may be veſted either in natural perſons, or bodies politic; in one man, or in many; but the ſame identical *franchiſe* that has before been granted to one, cannot be beſtowed on another, for that would prejudice the former grant. The principal kinds of *franchiſes* are the following: to be a COUNTY palatine is a *franchiſe* veſted in a number of perſons. It is likewiſe a *franchiſe* for a number of perſons to be incorporated, and ſubſiſt as a body politic, with a power to maintain perpetual ſucceſſion, and do other corporate acts; and each individual member of ſuch corporation is alſo ſaid to have a *franchiſe* or freedom. Other *franchiſes* are to hold a court leet; to have a manor or lordſhip; or, at leaſt, to have a lordſhip paramount; to have waifs, wrecks, eſtrays, treaſure-trove, royal-fiſh, forfeitures, and deodands; to have a court of one's own, or liberty of holding pleas and trying cauſes; to have the cognizance of pleas, which is a ſtill greater liberty, being an excluſive right, ſo that no other court ſhall try cauſes ariſing within that juriſdiction; to have a bailiwick, or liberty exempt from the ſheriff of the county, wherein the grantee only and his officers are to execute all proceſs; to have a fair or market, with the right of taking toll, either there or at any other public places, as bridges, wharfs, and the like; which tolls muſt have a reaſonable cauſe of commencement, elſe the *franchiſe* is illegal and void; or, laſtly, to have a foreſt, chaſe, park, warren, or fiſhery, endowed with privileges of royalty. See the ſeveral articles above recited.

FRANCHISE, *allowance of*. See QUO *warranto*.

FRANCHISE, *diſturbance of*, is remedied by ſuing for damages, by a ſpecial action on the caſe; or, in caſe of toll, the injured perſon may take a diſtreſs if he pleaſes.

FRANCHISE is alſo uſed for an aſylum, or ſanctuary, where people are ſecure of their perſons, &c.

Churches and monaſteries in Spain are *franchiſes* for criminals; ſo were they anciently in England, till they were abuſed to ſuch a degree, that there was a neceſſity for aboliſhing the cuſtom.

One of the moſt remarkable capitulars made by Charlemagne in his palace of Heriſtal, in 779, was that relating to the *franchiſes* of churches. The right of *franchiſe* was held ſo ſacred, that even the leſs religious kings obſerved it to a degree of ſcrupulouſneſs; but to ſuch exceſs in time was it carried, that Charlemagne reſolved to reduce it. Accordingly he forbad any proviſion being carried to criminals retired into churches for refuge.

FRANCHISE *of quarters*, is a certain ſpace, or diſtrict at Rome, wherein are the houſes of the ambaſſadors of the princes of Europe; and where ſuch as retire, cannot be arreſted, or ſeized by the ſbirri, or ſerjeants, nor proſecuted at law.

The people of Rome look on this as an old uſurpation, and a ſcandalous privilege, which ambaſſadors, out of a jealouſy of their power, carried to a great length in the fifteenth century, by enlarging inſenſibly the dependencies of their palaces or houſes, within which the right of *franchiſe* was anciently confined. Several of the popes, Julius III. Pius XIV. Gregory XIII. and Sixtus V. publiſhed bulls and ordinances againſt this abuſe; which had reſcued ſo conſiderable a part of the city from their authority, and rendered it a retreat for the moſt abandoned perſons.

At length Innocent XI. expreſly refuſed to receive any more ambaſſadors but ſuch as would make a formal renunciation of the *franchiſe of quarters*.

FRANCHISE *royal*, is a place where the king's writ runs not; as at Cheſter, and Durham; and anciently at Tyndal, and Hexamſhire in Northumberland. But Bracton ſays, that a *franchiſe royal* is where the king grants to one and his heirs an exemption of toll, &c. See FRANCHISE.

FRANCHISING. See ENFRANCHISEMENT, and MANUMISSION.

FRANCIGENA, or FRENCHMAN, in our *Ancient Cuſtoms*, was a general appellation of all foreigners; i. e. all perſons who could not prove themſelves Engliſhmen.

FRANCISCANS, in *Eccleſiaſtical Hiſtory*, are religious of the order of St. Francis, founded by him in the year 1209. Francis was the ſon of a merchant of Aſſiſi, in the province of Umbria, who, having led a diſſolute life, was reclaimed by a fit of ſickneſs; and afterwards fell into an extravagant kind of devotion, that looked leſs like religion than alienation of mind. Soon after this, viz. in the year 1208, hearing the paſſage repeated, Matt. x. 9, 10. in which Chriſt addreſſes his apoſtles, *Provide neither gold, nor ſilver*, &c. he was led to conſider a voluntary and abſolute poverty as the eſſence of the Goſpel, and to preſcribe this poverty as a ſacred rule both to himſelf and to the few that followed him. This new ſociety, which appeared to Innocent III. extremely adapted to the preſent ſtate of the church, and proper to reſtore its declining credit, was ſolemnly approved and confirmed by Honorius III. in 1223, and had made a conſiderable progreſs before the death of its founder in 1226. Francis, through an exceſſive humility, would not ſuffer the monks of his order to be called *fratres*, i. e. *brethren* or *friars*, but *fraterculi*, i. e. *little brethren*, or *friars-minor*, by which denomination they ſtill continue to be diſtinguiſhed. They are alſo called *grey friars*, on account of the colour of their cloathing, and CORDELIERS, &

&c. The *Franciſcans* and DOMINICANS were zealous and active friends to the papal hierarchy, and, in return, were diſtinguiſhed by peculiar privileges and honourable employments. The *Franciſcans*, in particular, were inveſted with the treaſure of ample and extenſive indulgences, the diſtribution of which was committed to them by the popes, as a means of ſubſiſtence, and a rich indemnification for their voluntary poverty. In conſequence of this grant, the rule of the founder, which abſolutely prohibited both perſonal and collective property, ſo that neither the individual nor the community were permitted to poſſeſs either fund, revenue, or any worldly goods, was conſidered as too ſtrict and ſevere, and diſpenſed with ſoon after his death. In 1231, Gregory IX. publiſhed an interpretation of this rule, mitigating its rigour; which was farther confirmed by Innocent IV. in 1245, and by Alexander IV. in 1247. Theſe milder alterations were zealouſly oppoſed by a branch of the *Franciſcans*, called the *ſpiritual*; and their complaints were regarded by Nicolas III. who, in 1279, publiſhed a famous conſtitution, confirming the rule of St. Francis, and containing an elaborate explication of the maxims it recommended, and the duties it preſcribed. In 1287, Matthew of Aqua Sparta, being elected general of the order, diſcouraged the ancient diſcipline of the *Franciſcans*, and indulged his monks in abandoning even the appearance of poverty; and this conduct inflamed the indignation of the *ſpiritual* or auſterer *Franciſcans*; ſo that from the year 1290, ſeditions and ſchiſms aroſe in an order, that had been ſo famous for its pretended diſintereſtedneſs and humility. Such was the enthuſiaſtic frenzy of the *Franciſcans*, that they impiouſly maintained, that the founder of their order was a ſecond Chriſt, in all reſpects ſimilar to the firſt; and that their inſtitution and diſcipline were the true goſpel of Jeſus. Accordingly, Albizi, a *Franciſcan* of Piſa, publiſhed a book, in 1383, with the applauſe of his order, entitled, The Book of the Conformities of St. Francis with Jeſus Chriſt. In the beginning of this century the whole *Franciſcan* order was divided into two parties; the one, embracing the ſevere diſcipline and abſolute poverty of St. Francis, were called *ſpirituals*; and the other, who inſiſted on mitigating the auſtere injunctions of their founder, were denominated *brethren of the community*. Theſe wore long, looſe, and good habits, with large hoods; the former were clad in a ſtrait, coarſe, and ſhort dreſs, pretending, that this dreſs was enjoined by St. Francis, and that no power on earth had a right to alter it. Neither the moderation of Clement V. nor the violence of John XXII. could appeaſe the tumult, occaſioned by theſe two parties: however, their rage ſubſided from the year 1329. In 1368 theſe two parties were formed into two large bodies, comprehending the whole *Franciſcan* order, which ſubſiſt to this day; viz. the CONVENTUAL *brethren*, and the *brethren of the* OBSERVANCE or *obſervation*, from whom ſprung the CAPUCHINS and RECOLLECTS. Moſh. Eccl. Hiſt. vol. iii. See *Nuns of St.* CLARE and FRIARS.

The general opinion is, that the *Franciſcans* came into England in the year 1224, and had their firſt houſe at Canterbury, and their ſecond at London; but there is no certain account of their being here till king Henry VII. built two or three houſes for them. At the diſſolution of the monaſteries, the conventual *Franciſcans* had about fifty-five houſes, which were under ſeven cuſtodies or wardenſhips; viz. thoſe of London, York, Cambridge, Briſtol, Oxford, Newcaſtle, and Worceſter.

FRANCOLIN, in *Ornithology*. See ATTAGEN.

FRANGIPANE, an exquiſite kind of perfume, frequently given to the leather whereof gloves, purſes, bags, &c. are made.

It takes its name from a Roman nobleman, of the ancient family of Frangipani, who was the inventor of it.

There is alſo a kind of perfumed liquor of the ſame denomination, ſaid to have been invented by a grandſon of Mutio Frangipani; and alſo a perfumed kind of *ros ſolis*, called by the ſame name.

FRANGULA, in *Botany*. See *Berry-bearing* ALDER.

FRANK, or FRANC, a term literally ſignifying free and open, or exempt from public impoſitions and charges; as *frank* confeſſion, *frank* fair, *frank* letter, &c.

The term *frank* is much uſed in our ancient cuſtoms and tenures; where it receives various particular modifications and meanings, according to the words it is combined with; as

FRANK *allen*, or *allodium*, is a land, tenement, or demeſne, that is not held of any ſuperior lord.

FRANK *almoin*, or *free alms*, is a tenure of lands or tenements beſtowed on God; that is, given to ſuch people as devote themſelves to the ſervice of God, in pure and perpetual alms; or, it is a tenure, whereby a religious corporation, aggregate or ſole, holdeth lands of the donor to them and their ſucceſſors for ever.

Whence the feoffers, or givers, cannot demand any terreſtrial ſervice, ſo long as the land remains in the hands of the feoffees.

The ſervice which the feoffees were bound to render for theſe lands is not certainly defined; but only, in general, to pray for the ſouls of the donor and his heirs, dead or alive; and, therefore, they did no fealty, which is incident to all other ſervices but this, becauſe this divine ſervice was of a more exalted nature. This is the tenure, by which all the ancient monaſteries and religious houſes held their lands; and by which the parochial clergy, and many eccleſiaſtical and eleemoſynary foundations, hold them at this day. This was an old Saxon tenure, and continued under the Norman revolution, on account of the reſpect ſhewn to religion, and religious men, in ancient times; and for this reaſon, tenants in *frank-almoign* were diſcharged of all other ſervices, except the *trinoda neceſſitas*, of repairing the highways, building caſtles, and repelling invaſions. And this tenure is ſtill diſtinct from all others, being not in the leaſt feodal, but merely ſpiritual; for, if the ſervice be neglected, the law gives no remedy by diſtreſs or otherwiſe to the lord of whom the lands are holden; but merely a complaint to the ordinary or viſitor to correct it.

Briton mentions another kind of land given in alms, but not free alms; the tenants being tied in certain ſervices to the feoffer: as to ſing ſo many maſſes, diſtribute ſuch a ſum in alms, and the like; and this tenure by divine ſervice differs from the former, becauſe for this, unperformed, the lord might diſtrain, without any complaint to the viſitor. All ſuch donations are now out of uſe; for ſince the ſtatute of *quia emptores*, 18 Edw. I. none but the king can give lands to be holden by this tenure.

FRANK *bank*. See FREE *bench*.

FRANK *chace* denotes liberty of free chace, in a circuit adjoining to a foreſt, on account of which, men, though they have land of their own within that compaſs, are forbidden to cut down wood, without the view of the foreſter; though it be their own demeſne. See CHASE.

FRANK *fee*, *feudum francum*, as defined by Brook, is that which is in the hands of the king, or lord of the manor; being ancient demeſne of the crown.

FRANK *fee*, *feudum liberum*, according to ſome, denotes that for which no ſervice is performed to any lord.

According to Fachin, lib. vii. cap. 39. lands held in *frank fee* were exempted from all ſervices, except homage.

In contradiſtinction to that in the tenants hands, which is only ancient demeſne.

In the reg. of writs, *frank fee* is ſaid to be that which a man holds at common law to him, and his heirs; and not by ſuch ſervice as is required in ancient demeſne, according to the cuſtom of the manor.

It is added, that the land in the hands of king Edward the Confeſſor, at the making of Domeſday book, is ancient demeſne; and all the reſt, *frank fee*. On which footing, all the lands in the realm are either ancient demeſne, or *frank fee*.

Others define *frank fee* to be a tenure in fee-ſimple, of lands pleadable at common law; and not in ancient demeſne. See FEE.

FRANK *ferm*, *firma libera*, denotes lands or tenements, wherein the nature of the fee is changed, by feoffment, from knight's ſervice, to a certain yearly ſervice; and whence neither homage, wardſhip, marriage, nor relief, may be demanded; nor any other ſervice not contained in the feoffment. See FEE *farm*, and SOCAGE.

FRANK *fold* is where the lord hath the benefit of folding his tenants ſheep, within his manor, for the manuring of his land.

FRANK *language*, or *lingua* FRANCA, is a kind of jargon, ſpoken on the Mediterranean, and particularly throughout the coaſts and ports of the Levant; compoſed of Italian, Spaniſh, French, vulgar Greek, and other languages.

The *lingua Franca* is the trading language; and is thus called from the *Franks*, a common appellation given in the Levant to all the European merchants and traders, who come thither to traffick.

In this language, if it may be ſo called, nothing but the infinitive mood of each verb is uſed; this ſerving for all the tenſes and moods of the conjugation; and yet this lame, mutilated diction, this barbarous medley, is learnt and underſtood by the merchants and mariners of all nations who repair thither.

FRANK *law*, *lex libera*, is the benefit of the free and common law of the land.

He that for any offence, as conſpiracy, &c. loſeth his *frank law*, incurs theſe inconveniencies: 1. That he may not be impanelled on any jury or aſſize; or otherwiſe uſed as an evidence, or witneſs to the truth. 2. That if he have any thing to do in the king's court, he muſt not approach it in perſon, but appoint his attorney. 3. That his lands, goods, and chattels, be ſeized into the king's hands; and his lands be eſtreated, his trees rooted up, and his body committed to cuſtody.

FRANK *letters*, or *letters free of poſtage*. The privilege of ſuch letters was claimed by the houſe of commons in 1660, when the firſt legal ſettlement of the preſent POST-OFFICE was made; but afterwards dropped on a private aſſurance from the crown, that this privilege ſhould be allowed the members. Accordingly, a warrant was conſtantly iſſued to the poſt-maſter general, directing the allowance thereof to the extent of two ounces in weight; till at length it was expreſsly confirmed by ſtatute 4 Geo. III. cap. 24. which adds many new regulations, rendered neceſſary by the abuſes crept into the practice of franking; whereby the annual amount of *franked letters* had gradually increaſed from 23,600*l.* in 1715, to 170,700*l.* in 1763. Blackſt. Com. vol. i. p. 322.

FRANK *marriage, liberum maritagium*, is a tenure in tail ſpecial, whereby lands, or tenements, are held to a perſon and his wife, and the heirs of their bodies, on condition of doing fealty to the donor, till the fourth degree of conſanguinity between the iſſues of the donor and donee.

Fleta gives this reaſon, why the heirs do no ſervice, till the fourth degree: *ne donatores, vel eorum hæredes, per homagii receptionem a reverſione repellantur*; and why, in the fourth deſcent, they ſhall do ſervice to the donor, *quia in quarto gradu vehementer præſumitur quod terra eſt pro defectu hæredum donotariorum reverſura*.

Frank marriage is expreſſed, by Bracton, to be that where the donor intends, that the land thus beſtowed ſhall remain quiet, and free from all ſecular ſervice that might be annexed to the fee; ſo that he who gave it ſhall claim no manner of ſervice from it, until the third heir, and the fourth deſcent, or degree; reckoning the donee in the firſt degree, his heir in the ſecond, the heir of him in the third, and his, again, in the fourth; but afterwards the ſame land to become ſubject to all the former ſervices; as being then ſuppoſed to revert to the lord, for want of heirs.

The lands otherwiſe given in marriage, viz. *ſervitio obligatæ*, were with a reſervation of the ſervices due to the lord, which the donee, and his heirs, were bound to perform for ever: only, homage was not to commence till the fourth degree, when both ſervice and homage were to be enjoined for ever.

FRANK-*pledge* ſignifies a pledge or ſurety for the behaviour of a freeman; called alſo FRIBURGH.

The ancient cuſtom of England, for preſervation of the public peace, was, that every free-born man, at fourteen years of age (religious perſons, clerks, knights, and their eldeſt ſons, excepted) ſhould find ſurety for his truth towards the king and his ſubjects, or elſe to be kept in priſon.

Accordingly, a number of neighbours became interchangeably bound for each other, to ſee each man of their pledge forthcoming at all times; or to anſwer for the offence committed by any one gone away; ſo that whenever one offended, it was preſently inquired in what *pledge* he was; and then thoſe of the pledge either brought him forth within one and thirty days to his anſwer; or they ſatisfied for his offence.

This cuſtom was called *frank-pledge*; and the circuit it extended to, *decenna*, becauſe it uſually conſiſted of ten houſholds; and every perſon thus bound for himſelf and neighbours was called a *decennier*. See DECINERS.

In obſervance of this cuſtom, the ſheriffs at every county-court did from time to time take the oaths of young perſons, as they arrived at the age of fourteen; and ſee they were ſettled in one *decenna*, or *dozein*, or another; whereupon this branch of the ſheriff's office and authority was called *viſus franci plegi*, i. e. *view of frank-pledge*.

Omnis homo, ſive liber, ſive ſervus, aut eſt, vel debet eſſe, in franco plegio, *aut de alicujus manupaſtu, niſi ſit aliquis itinerans de loco in locum, qui non plus ſe teneat ad unum quam ad alium, vel qui habet quod ſufficiat pro* franco plegio, *ſicut dignitatem, vel ordinem, vel liberum tenementum, vel in civitate rem immobilem*, &c. Bracton, lib. iii. Tract. de Corona, cap. 20.

FRANK *ſervice*. See SERVICE.

FRANK *tenement*. See TENEMENT, and FREEHOLD.

FRANK, or **FRANC**, alſo denotes an ancient coin, ſtruck, and current in France; thus called from its impreſſion, which repreſented a Frenchman, ſometimes on horſeback, and ſometimes on foot.

The *frank* was either of gold or ſilver: the firſt was worth ſomewhat more than the ecu d'or, or gold crown. See CROWN.

The ſecond was a third of the firſt; but theſe coins have been long diſuſed.

The term *frank*, however, is ſtill retained as the name of a money of account. In this ſenſe it is equivalent to a livre, or twenty ſols, or a third of a French crown. Thus they ſay indifferently, a hundred *franks*, or a hundred livres.

FRANKENIA, in *Botany*, the name given by Linnæus to a genus of plants of the *hexandria monogynia* claſs, called by Micheli, *franca*. The perianthium is permanent, and is compoſed of one leaf of an oblong tubular form, divided into five ſegments at the edge. The flower conſiſts of five petals, the ungues of which are narrow, and of the length of the cup, and the tops roundiſh and expanded; the ſtamina are ten filaments longer than the tube; the apices are ſimple; the germen of the piſtil is roundiſh; the ſtyle is capillary, and of the length of the ſtamina; the ſtigma is divided into ſix parts; the fruit is an oval capſule covered with the cup, and formed of three valves, but containing only one cell, in which are a great number of ſmall ſeeds of an oval figure.

FRANKINCENSE, or ſimply INCENSE, an odoriferous aromatic gum, or reſin, anciently burnt in temples, as a perfume, and now uſed in pharmacy as an agglutinant and ſtrengthener.

The word is formed from the Latin *incenſum*, *burnt*; as alluding to its ancient uſe in temples.

Frankincenſe diſtils from inciſions made in a tree called *arbor thurifera*, during the heats of ſummer. But, notwithſtanding the great uſe of this gum, both in the ancient religion, and the modern medicine, the tree that produces it, or even the place where the tree grows, is but little known.

The moſt common opinion has always been, that it was brought from Arabia Felix, and was found near the city of Saba; whence its epithet *Sabæum*; and yet the name *olibanum*, which it ſometimes alſo bears, ſeems to intimate, that there are of theſe thuriferous or incenſe-bearing trees in the Holy Land near mount Lebanon. And travellers are poſitive, that there are others in the Eaſt Indies.

Nor are we leſs at a loſs as to the form or kind of the tree from which it flows. Pliny contents himſelf to ſay, that it at firſt reſembles the pear tree; then the maſtich tree; then the laurel; but that in reality it is a kind of turpentine-tree.

Frankincenſe is uſually divided into *male* and *female*.

The beſt *male incenſe*, *thus maſculum*, called alſo *olibanum*, is in fair white bits, or tears, a little yellowiſh, of a bitter diſagreeable taſte; and when chewed, it promotes the flux of ſaliva, which becomes white. When laid on coals, or a red-hot iron, it flames and burns with a ſtrong and not unpleaſant ſmell. On trituration with water, the greateſt part diſſolves into a milky liquor, which depoſits a reſinous matter, and being gently inſpiſſated, leaves a yellow extract, retaining the greateſt part of the ſmell as well as taſte of the *olibanum*. Rectified ſpirit diſſolves leſs than water.

It is called *male* in reſpect of its tears, which are larger than thoſe of the common or female.

That brought from the Indies is not near ſo good as that from Arabia, or mount Lebanon; it is ſometimes called *incenſe of Mocha*; though it be not brought from that city.

It is often in a maſs, but ſometimes in looſe drops or tears; ſomewhat reddiſh, and bitter to the taſte. Some ſell this for the true bdellium.

Male incenſe, or *olibanum*, is an ingredient in divers galenical and chemical preparations: it warms, dries, and binds; and is uſed not only in divers diſeaſes of the head and breaſt, but in vomitings, diarrhœas, and dyſenteries. The doſe is from a ſcruple to a dram or more. Externally it is applied to ſtrengthen the brain, and heal wounds. Some uſe it to aſſuage the tooth-ach; but it i apt to ſpoil the good teeth.

As for *female incenſe*, or *frankincenſe*, authors deſcribe i to be ſofter, and more reſinous, but of leſſer virtue than the former. This common *frankincenſe* is brought to u in little globes or maſſes, of a browniſh or yellowiſh colour on the outſide, internally whitiſh, and variegated with whitiſh ſpecks. It is ſuppoſed to be the produce o the pine that yields the common turpentine, and to concrete upon the ſurface of the terebinthinate juice, ſoo after it has iſſued from the tree. This reſin has a bitteriſh, acid, unpleaſant taſte, and no conſiderable ſmell it diſſolves totally in rectified ſpirit, but is ſcarcely acted upon by watery menſtrua. It may be looked upon as mild corroborant; though at preſent it is little otherwi made uſe of than as an ingredient in theriaca, and externally in plaſters. Lewis, Mat. Med.

Bark of incenſe, *cortex thuris*, is the bark of the tre whence the *incenſe* flows, which has the ſame qualiti with the *incenſe* itſelf.

There is another bark brought from the Indies, called al *bark of incenſe*, and ſometimes *Jews incenſe*, becauſe th Jews make frequent uſe thereof in their perfume: this i the *cortex eleutheriæ*.

Manna of incenſe is the flour or farina of *incenſe*, occa ſione ſioned by the friction of the grains againſt each other in the ſacks wherein they carry it.

There is alſo a ſoot of *incenſe*, which is a preparation of it, burnt like reſin to make lamp-black.

Frankincenſe was formerly burnt in the temples of all religions, to do honour to the divinities that were there adored. Many of the primitive Chriſtians were put to death, becauſe they would not offer *incenſe* to idols.

In the Romiſh church they ſtill retain the uſe of *incenſe* in ſome of their ceremonies; always at high-maſs, and at the elevation of the hoſt at veſpers; and at ſolemn funerals, beſtowing it on ſuch perſons as they would honour, as on prelates, &c. and ſometimes alſo on the people.

FRANKS, FRANCS, FRANKIS, or FRANQUIS, a name which the Turks, Arabs, Greeks, &c. give to all the people of the weſtern parts of Europe.

The appellation is commonly ſuppoſed to have had its riſe in Aſia, at the time of the croiſades; when the French made the moſt conſiderable figure among the croiſees; from which time the Turks, Saracens, Greeks, Abyſſinians, &c. uſed it as a common term for all the Chriſtians of Europe; and called Europe itſelf *Frankiſtan*.

The Arabs and Mahometans, ſays M. d'Herbelot, apply the term *Franks* not only to the French (to whom the name originally belonged) but alſo to the Latins and Europeans in general.

But F. Goar, in his notes on Condinus, cap. 5. n. 43. furniſhes another origin of the appellation *Franks*, of greater antiquity than the former. He obſerves, that the Greeks at firſt confined the name to the *Franci*, i. e. the German nations, who had ſettled themſelves in France or Gaul; but afterwards they gave the ſame name to the Apulians and Calabrians, after they had been conquered by the Normans; and at length the name was farther extended to all the Latins.

In this ſenſe is the word uſed by divers Greek writers; as Comnenus, &c. who, to diſtinguiſh the French, call them the *weſtern Franks*.

Du-Cange adds, that about the time of Charlemagne, they diſtinguiſhed eaſtern France, weſtern France, Latin, or Roman France; and German France, which was the ancient France, afterwards called Franconia.

FRAPPING, in *Sea-language*, denotes the art of croſſing and drawing together the ſeveral parts of a tackle, or other complication of ropes, which had been already ſtraitened to their utmoſt extent, reſembling the operation of bracing up a drum, &c. The *frapping* increaſes the tenſion, and adds to the ſecurity acquired by the purchaſe. Hence the cat-harpings are no other than *frappings* to the ſhrouds.

FRAPPING *a ſhip*, is the art of paſſing three, four, or five turns of a cable round the hull, or frame of a ſhip, in the middle, to ſupport her in a great ſtorm, when it is apprehended ſhe is not ſtrong enough to reſiſt the violent efforts of the ſea. This is ſeldom uſed, except in old ſhips. Falconer.

FRASSETUM, in *our old Writers*, is taken for a wood, or woody ground, where aſh grows. 1 Inſt. 4.

The word is a corruption of the Latin *fraxinetum*, which ſignifies the ſame.

FRATERIA, of *frater*, *brother*, a fraternity, brotherhood, or ſociety of religious perſons, who were bound to pray for the good health and life, &c. of their living brethren, and the ſouls of thoſe that were dead. In the ſtatutes of the cathedral church of St. Paul, London, collected by Ralph Baldock, dean, 1295, there is one chapter *De* frateria *beneficiorum eccleſiæ S. Pauli, &c.*

FRATERCULA, in *Zoology*, a name by which Geſner and Androvand have called the *anus arctica cluſii*. See PUFFIN.

FRATERNITY, *brotherhood*, the relation or union of brothers, friends, partners, aſſociates, &c.

FRATERNITY, in *a civil ſenſe*, is uſed for a guild, aſſociation, or ſociety of perſons, united into a body, for ſome common intereſt or advantage.

For the origin, uſe, &c. of *fraternities*, ſee COMPANY and GILD.

FRATERNITY, in *a religious ſenſe*, is a ſociety of perſons meeting together to perform ſome exerciſes of devotion, or divine worſhip.

In the Romiſh church, ſuch *fraternities* are very numerous and conſiderable, being moſt of them eſtabliſhed by royal patents; as the *fraternity* of the ROSARY; the *fraternity* of the SCAPULARY; of St. Francis's Cord: ſee CORDELIERS and FRANCISCANS. The biſhop may hinder the eſtabliſhment of any ſuch *fraternity* in his dioceſe.

At Rome there is a *fraternity*, called the *archi-fraternity*, or *grand fraternity*, under the title of *Our Lady of the Suffrages*, eſtabliſhed in favour of the ſouls in purgatory, approved and confirmed by a bull of pope Clement VIII. in 1594. See BRETHREN and BROTHERS.

There are nine different ſorts of *fraternities*, or confrairies, in France, viz. 1. Of Devotion. 2. Of Charity, or Mercy. 3. Of Penitents, under divers names. 4. Of Pilgrimages. 5. Of Merchants, to procure the divine favour on their endeavours. 6. Of Officers of Juſtice. 7. Of the Sufferings of Chriſt. 8. Of Arts and Trades of divers kinds. And, 9. Of Factions.

Fraternities, in Latin called *ſodalitates*, derive their origin from the heathens, as is ſhewn by Polydore Virgil, in his book De Inventoribus Rerum. But the good uſe made of them by the Chriſtians has effectually purged them of any impurities derived from ſo ill a ſource.

Numa Pompilius is ſaid to have eſtabliſhed *fraternities* of all arts and trades in ancient Rome, and to have preſcribed the ſacrifices each profeſſion was to perform to the patrons or tutelary gods he had aſſigned them.

FRATERNITY *of the holy Trinity*. See TRINITY.

FRATERNITY is alſo a title or quality which kings and emperors gave to each other; ſo alſo do biſhops and monks. We meet with it frequently in authors under the eaſtern empire, both Greek and Latin: the Greek term is αδελφοτης, *fraternitas*.

FRATERNITY *of arms* was an alliance, or aſſociation in arms, anciently concluded between two knights, who thereby agreed to go together, ſhare their fortune, and mutually aſſiſt each other againſt all the world.

Bertrand du Gueſclin and Oliver Cliſſon ſwore a *fraternity* of arms in the year 1579, laying their hands on the goſpels. Hiſt. de Bret. tom. i. p. 395.

FRATERNITY *of St. Catharine*. See CATHARINE.

FRATRES *Arvales*. See ARVALES.

FRATRES *conjurati*, in *our ancient Law-books*, &c. denote ſworn brothers, or companions.

Sometimes they are alſo ſo called who were ſworn to defend the king againſt his enemies, leg. W. 1. cap. 59. *Præcipimus, ut omnes liberi homines ſint* fratres *conjurati ad monarchiam noſtram & regnum noſtrum contra inimicos pro poſſe ſuo defendendum.*

FRATRES *gaudentes*. See *Joyful* BROTHERS.

FRATRIAGE, FRATRIAGIUM, or FRERAGE, the partition among brothers, or coheirs, coming to the ſame inheritance or ſucceſſion.

FRATRIAGE is more particularly uſed for that part of the inheritance which comes to the youngeſt brothers.

Whatever the cadets, or younger brothers, poſſeſs of the father's eſtate, they poſſeſs *ratione fratriagii*, and they are to do homage to the elder brother for it; in regard he is to do homage for the whole to the ſuperior lord.

FRATRICELLI, in *Eccleſiaſtical Hiſtory*, an enthuſiaſtic ſect of FRANCISCANS, which roſe in Italy, and particularly in the marquiſate of Ancona, about the year 1294.

The word is an Italian diminutive, ſignifying *faterculi*, or little brothers; and was here uſed as a term of deriſion, as they were moſt of them apoſtate monks, whom the Italians call *fratelli*, or *fratricelli*.

For this reaſon the term *fratricelli*, as a nick-name, was given to many other ſects, as the Cathariſts, the Waldenſes, &c. however different in their opinions and in their conduct But this denomination applied to the auſtere part of the Franciſcans was conſidered as honourable. See FRANCISCANS.

The founders were P. Maurato, and P. de Foſſombroni, who having obtained of pope Celeſtin V. a permiſſion to live in ſolitude, after the manner of hermits, and to obſerve the rule of St. Francis in all its rigour, ſeveral idle vagabond monks joined them, who, living after their own fancies, and making all perfection to conſiſt in poverty, were ſoon condemned by pope Boniface VIII. and his ſucceſſor, and the inquiſitors ordered to proceed againſt them as heretics: which commiſſion they executed with their uſual barbarity. Upon this, retiring into Sicily, Peter John Oliva de Serignan had no ſooner publiſhed his Comment on the Apocalypſe, than they adopted his errors.

They held the Romiſh church to be Babylon, and propoſed to eſtabliſh another far more perfect one: they maintained, that the rule of St. Francis was the evangelical rule obſerved by Jeſus Chriſt, and his apoſtles.

They foretold the reformation of the church, and the reſtoration of the true goſpel of Chriſt, by the genuine followers of St. Francis, and declared their aſſent to almoſt all the doctrines which were publiſhed under the name of the abbot Joachim, in the Introduction to the everlaſting Goſpel, a book publiſhed in 1250, and explained by one of the *ſpiritual* friars whoſe name was Gerhard. Among other enormities inculcated in this book, it is pretended that St. Francis was the angel mentioned in Rev. xiv. 6. and had promulgated to the world the true and everlaſting goſpel of God; that the goſpel of Chriſt was to be abrogated in 1260, and to give place to this new and everlaſting goſpel, which was to be ſubſtituted in its room; and that the miniſters of this great reformation were to be humble and bare-footed friars, deſtitute of all worldly employments.

Some ſay they even elected a pope of their new church; at leaſt they appointed a general, with ſuperiors, and built monaſteries, &c. Beſide the opinions of Oliva, they held, that the ſacraments of the church were invalid; becauſe thoſe who adminiſtered them, had no longer any power or juriſdiction.

They were condemned afreſh by pope John XXII. in conſequence of whoſe cruelty they regarded him as the true antichriſt; but ſeveral of them returning into Germany, were ſheltered by Lewis, duke of Bavaria, the emperor.

There are authentic records, from which it appears, that no leſs than two thouſand perſons were burnt by the inquiſition, from the year 1318 to the time of Innocent VI. for their inflexible attachment to the poverty of St. Francis. The ſeverities againſt them were again revived towards the cloſe of the fifteenth century by pope Nicholas V. and his ſucceſſors. However, notwithſtanding all the perſecutions which this ſect endured, they were not ſufficient to extinguiſh it; for it ſubſiſted until the times of the reformation in Germany, when its remaining votaries adopted the cauſe, and embraced the doctrine and diſcipline of Luther. And this has led the popiſh writers to charge the *fratricelli* with many enormities, ſome of which are recounted by M. Bayle, art. *Fratricelli.*

The *fratricelli* had divers other denominations: they were called *fratricelli*, according to ſome, becauſe they lived in community, in imitation of the primitive Chriſtians, or rather through the humility of the founder of the Franciſcan order, to which the *fratricelli* originally belonged; *dulcini*, from one of their doctors; Bizochi, Beguins, and Beghardi.

FRATRICIDE, of *frater*, *brother*, and *cædo*, *I kill*, the crime of murdering one's brother. See Parricide.

Cain committed the firſt *fratricide*; and the empire of Rome began with a *fratricide*.

FRAUD, Fraus, a ſecret underhand deceit, or injury, done to any one.

To export or import goods by *fraud*, or fraudulently, is to do it by indirect ways, in order to avoid the paying of duty, &c. if they be permitted goods; or if they be contraband goods, to avoid the penalties adjudged by the laws.

A fraudulent conveyance of lands or goods to deceive creditors, or to defraud purchaſers, is void in law; and the perſons juſtifying or putting off ſuch grants as good, ſhall forfeit a year's value of the lands, and the full value of the goods and chattels, and likewiſe be impriſoned.

The ſeveral marks of *fraud* in a gift or grant of goods are the following: 1. If it be general, without exception of ſome things of neceſſity. 2. If the donor ſtill poſſeſſes and uſes the goods. 3. If the deed be made in ſecret. 4. If there be a truſt between the parties. 5. If it be made while the action is depending. When a perſon is party to a *fraud*, all that follows thereupon will be intended to be done by him, though *fraud* ſhall not be preſumed or adjudged to be ſo, until it be found by a jury. The ſtatute of *frauds*, 29 Car. II. cap. 3. requires that contracts and agreements, leaſes, and deviſes of land, be in writing. And deviſes of land, rents, &c. are deemed fraudulent and void, againſt creditors, upon bonds or other ſpecialties, 3 and 4 William and Mary, cap. 14. See Cheats.

Fraus *legis*; if a perſon, having no manner of title to a houſe, procure an affidavit of the ſervice of a declaration in ejectment, and thereupon gets judgment; and, by virtue of a writ of *hab. fac. poſſeſſionem*, turns the owner out of poſſeſſion of the houſe, and ſeizes and converts the goods therein to his own uſe; he may be puniſhed as a felon; becauſe he uſed the proceſs of the law with a felonious purpoſe, in *fraudem legis*.

FRAXINELLA, in *Botany*. See Dittany.

FRAXINUS, in *Botany*. See Ash.

FRAY literally ſignifies to fret; as cloth or ſtuff does by rubbing, or over-much wearing.

Among hunters a deer is ſaid to *fray his head*, when he rubs it againſt a tree, to cauſe the ſkins of his new horns to come off.

FREAM, among *Farmers*, arable or ploughed land worn out of heart, and laid fallow till it recovers.

Fream, among *Sportſmen*, a term uſed for the noiſe of a boar in rutting time.

FRECKLES, ſmall, duſky ſpots, ſprinkled on the ſkin of the face or hands; particularly in perſons of the faireſt ſkins, and during the hot ſeaſons, after being expoſed to the ſun and air. They are ſuppoſed to be formed of fuliginous vapours, ſtopped and coagulated in the ſkin. Vide Turner's Diſcourſe of the Skin, p. 256.

They are called in Latin *lentigines*, from their reſemblance in ſize and colour to a lentil; by the French they are called *rouſſeurs*, and *bran de Judas*; by the Italians *roſſore* and *lentigine*.

Freckles ſeem to be only the earthy, oily, and ſaline part, of the ſweat, retained in the *plexus* or maſhes of the ſkin. While the aqueous liquor, which was their vehicle, is evaporated by the heat of the body, theſe groſſer parts are gradually accumulated, till the maſhes are full. Some part of this ſweat is continually ouſing through the cuticle; and, being of a viſcid nature, retains the dirt, duſt, &c. that fly about the face. This viſcid matter on the ſurface of the *freckles* will ſtick there, notwithſtanding any repeated wipings, which rather condenſe, and preſs it into the cavities thereof, than clear it off.

They are found more about the noſe, and backs of the hands, than any where elſe; becauſe the ſkin is more ſtretched there, and conſequently the pores more open to receive the duſt, &c.

It follows, that there can ſcarce be any ſuch thing as an adequate remedy, or preventive, of *freckles*. Temporary ones there may be, which ſhall draw out and diſſipate what matter is already gathered; but the ſpaces will fill up again in time.

Bullocks gall, mixed with alum, and, after the alum has precipitated, expoſed three or four months to the ſun in a cloſe phial, Monſ. Homberg ſhews, is one of the beſt remedies known for *freckles*. It acts as a lixivium, and enters the pores, and dilutes and diſſolves the coagulum of the *freckles*. Mem. de l'Acad. Royal. des Sciences, an. 1709, p. 472, &c. See the method of preparing and uſing it under Gall.

FREDUM, in *Antiquity*, a compoſition made by a criminal to be freed from proſecution, a third part of which was paid into the fiſcus or exchequer; or it was the price paid to the magiſtrate for protection againſt the violences of reſentment. Monteſq. de l'Eſprit des Loix, lib. xxx. cap. 20. and Robertſon's Hiſt. chap. v. of vol. i. p. 361.

FREE, a term variouſly uſed; but generally in oppoſition to conſtrained, confined, or neceſſitated. See Frank.

Thus, a man is ſaid to be *free*, who is out of priſon; and a bird is *free*, when let out of the cage: *free* from pain, i. e. void of pain: we ſay, a *free* air, a *free* paſſage, &c.

Free, in ſpeaking of things endowed with underſtanding, has a more peculiar relation to the will, and implies its being at full liberty.

The Stoics maintain, that their ſage or wiſe men alone are *free*.

Free is alſo uſed in oppoſition to ſlave.

The moment a ſlave ſets foot on Engliſh ground, he becomes to ſome purpoſes *free*. The fineſt legacy the ancient Romans could leave their ſlaves, was their *freedom*.

Free, *aboard a ſhip*. The ſeamen ſay the pump *frees* the ſhip, when it throws out more water than leaks into her; but, on the contrary, when it cannot throw out the water as faſt as it leaks in, they ſay the pump cannot *free* her: alſo bailing or lading out water out of a boat, is called *freeing* the boat.

Free *agent*. See Agent.

Free *bench*, or *franc banc*, ſignifies that eſtate in copyhold lands, which the wife hath after the deceaſe of her huſband, for her dower, according to the cuſtom of the manor.

Fitzherbert calls *free bench* a cuſtom, whereby, in certain cities, the wife ſhall have her huſband's whole lands, &c. for her dower.

Thus, at Orleton, in the county of Hereford, the relict of a copyhold tenant is admitted to her *free bench*, i. e. to all her huſband's copyhold land, during her life, at the next court after her huſband's death.

In the manors of Eaſt and Weſt Enbourne, in Berks, if a cuſtomary tenant die, the widow ſhall have a *free bench* in all his copyhold lands, only *dum ſola & caſta fuerit*: if ſhe commits incontinency, ſhe forfeits her eſtate; but if ſhe will come into court, riding backwards on a black ram, with his tail in her hand, rehearſing a certain form of words, in the nature of a confeſſion and petition, the ſteward is bound by the cuſtom to reſtore her to her *free bench*. The words are theſe:

Here I am
Riding upon a black ram,
Like a whore as I am:
And for my crincum crancum
I have loſt my bincum bancum,
And for my tail's game
Have done this worldly ſhame;
Therefore, pray, Mr. Steward, let me have my land again.

The like cuſtoms hold alſo in the manor of Chadleworth, in Berks; that of Tor, in Devonſhire; and in ſome other parts of the Weſt.

Free-*booter*, or FLIBUSTER, a name given to the pirates, who ſcour the American ſeas; particularly ſuch as make war againſt the Spaniards.

The French call them *flybuſters*, deducing the word from the Engliſh *flibote*, or *flybote*; by reaſon the firſt adventurers of this kind were the people of St. Domingo, who made their excurſions with flybotes, which they had taken from the Engliſh. See BUCCANEER.

Free *bord*. *franc bord*. In ſome places three feet, in others more, and in others leſs, is claimed by way of *free bord*, beyond or without the fence.

Et totum boſcum, quod vocatur brendewode, *cum* franc bordo *duorum pedum, & dimid. per circuitum illius boſci*. Mon. Ang. 2d part, fol. 241.

Free *chapel*, is a chapel founded by the king, and by him exempted from the juriſdiction of the ordinary. See CHAPEL.

A ſubject may alſo be licenſed by the king to build ſuch a chapel, and by his charter may exempt it from the viſitation of the biſhop, &c.

Free or *imperial cities* in Germany, are thoſe not ſubject to any particular prince; but governed, like republics, by their own magiſtrates.

There were *free cities, liberæ civitates*, even under the ancient Roman empire: ſuch were thoſe to whom the emperor, by the advice or conſent of the ſenate, gave the privilege of appointing their own magiſtrates, and governing themſelves by their own laws. See CITY.

Free *fair*. See FAIR.

Free *fee*. See FEE and FRANK.

Free-*maſon*. See MASON.

Free *port*. See PORT.

Free *ſtate*, is a republic governed by magiſtrates, elected by the *free* ſuffrages of the inhabitants.

Free-*ſtone*, a whitiſh ſtone, dug up in many parts of England, that works like alabaſter; but is more hard and durable, being of excellent uſe in building, &c.

It is a kind of the gritt ſtone, but finer ſanded, and a ſmoother ſtone; and is called *free-ſtone*, from its being of ſuch a conſtitution as to be cut freely in any direction. This is a ſpecies of the PSADURIA of Hill.

The qualities of the ſeveral kinds of *free-ſtone*, in common uſe in the ſeveral parts of Europe, are very different. They all agree in this general property indeed, that they are ſofter while in the quarry than when they have been ſome time expoſed to the air: but even this general property differs greatly in degree. They have a ſort of grey *free-ſtone* in uſe at Paris, of which we do not ſeem yet to have met with any quarries in England, though probably enough there are ſuch, which has this property in ſo eminent a degree, that the expence of working it is in a great meaſure ſaved.

This ſtone lies every where on the ſouth ſide of the river Seine, and is of a coarſe and large gritt. It is ſo ſoft when newly taken out of the ſtrata, that they cut it very conveniently with a ſort of broad axe, and faſhion as many ſtones for building in this manner in an hour, as an equal number of our people do in a day or two. Though this ſtone is as ſoft as dry clay when firſt taken up, it is found to harden ſo conſiderably in the air, that it becomes more than equal to our ordinary *free-ſtone*.

Our Portland ſtone, of the fineſt kind, which is white, and of a cloſe gritt, is very fit for hewing or carving, but it will neither reſiſt water nor fire, which is a very ſingular circumſtance in ſo denſe a ſtone; while the *free-ſtone* of Kent, which is leſs beautiful to the eye, and is of a greyiſh colour, and conſiderably cloſe, though of a larger grain, reſiſts the air and water very well.

The *free-ſtone* of Derbyſhire, on the other hand, is ſo brittle as to be unfit for any fine working, and ſo coarſe and open in its texture that it lets water through; yet it bears the fire extremely well, and is fit for ovens, hearths, &c. Phil. Tranſ. N° 93.

Free-*ſtool*. See FRIDSTOLL.

Free-*thinker*. See DEIST.

Free-*warren*, the power of granting or denying licence to any one to hunt in ſuch and ſuch ground.

Free-*will*. See WILL.

FREEDOM, the quality or ſtate of being *free*. See FREE.

Freedom *of a city, town*, &c. denotes a right or capacity of exerciſing a certain trade or employment in that city or town corporate, and of being elected to the dignities and offices thereof. It is procured regularly, by ſerving an apprenticeſhip; but ſometimes purchaſed with money, and ſometimes conferred as a favour or compliment.

Freedom *of the will*, a ſtate or faculty of the mind, whereby all the motions of our will are in our power, and we are enabled to determine on this or that; to do good or evil, without any force or conſtraint from any external cauſe whatever. See LIBERTY, and NECESSITY.

Freedom *of conſcience*. See LIBERTY, and TOLERATION.

The ſchoolmen diſtinguiſh two kinds of this *freedom*, viz.

Freedom *of contradiction*, whereby we are at our choice to will, or nill; to love, or not to love, &c.

Thus, if I give my friend a power to take my horſe, that friend has *freedom* of contradiction with reſpect to the horſe; ſince it is in his own power either to uſe him, or let him alone.

Freedom *of contrariety*, or of *contraries*, is that whereby we are at our choice to do good or evil, to be virtuous or vicious.

Thus, if I offer my friend a horſe, or a lion, and give him his option of the two, he is ſaid to have a *liberty of contrariety* over the horſe and lion.

But the logicians charge this as a faulty or unartful diviſion, in regard one member of the diviſion is contained in the other, as a ſpecies in the genus; for whatever is free, in reſpect of contradiction, is alſo free in reſpect of contrariety, though not vice verſa: for if it be free for my friend to take the horſe, or the lion, it is alſo free for them to let them both alone; but he may be free to take one of them, without a *freedom* of chuſing which to take.

Yet is the diſtinction of ſome uſe; as it intimates, that the will is not always poſſeſſed of both kinds of *freedom*, and that the matter or ſubject of the two is different.

The will, though it ſhould be allowed to be free, has not a liberty of contrariety: thus, any evident truth being propoſed to the mind, e. gr. that the whole is greater than a part, though we may have a power of not aſſenting thereto, by diverting our attention to ſomething elſe, yet we have not a power of diſſenting from that propoſition, and judging that the whole is not greater than the part.

Hence moraliſts commonly hold, that with reſpect to the ſupreme good, mankind has a liberty of contradiction, inaſmuch as he may abſtain from the love or purſuit thereof; but he has not a liberty of contrariety, whereby to hate goodneſs.

Add, that though the human mind may have a *freedom* of contradiction with reſpect to all objects, even the ſupreme good itſelf; yet the *freedom* of contrariety is reſtrained to certain particulars, which either are, or appear to be good; the will having ſuch a natural propenſity to good, that it cannot deſire evil, but under the notion and appearance of good.

Freedom *of thinking*. See DEISM.

FREEHOLD, FRANK TENEMENT, *liberum tenementum*, is land, or tenement, which a man holds in FEE-*ſimple*, FEE-*tail*, or for term of life.

Freehold is of two kinds, in *deed*, and in *law*.

The firſt is the real poſſeſſion of land or tenement in fee, fee-tail, or for life: the other is the right a man has to ſuch land or tenement before his entry or ſeizure.

A *freehold*, by the common law, cannot commence *in futuro*, but it muſt take effect preſently, either in poſſeſſion, reverſion, or remainder. Whatever is part of the *freehold* goes to the heir; and things fixed thereto may not be taken in diſtreſs for rent, or in execution, &c. No man ſhall be diſſeiſed of his *freehold* by ſtat. Magna Charta, cap. 29. but by judgment of his peers, or according to the laws of the land: nor ſhall any diſtrain freeholders to anſwer for their *freehold*, in any thing concerning the ſame, without the king's writ. *Freehold* eſtates, of certain value, are required by ſtatutes to qualify jurors, electors of the knights of the ſhire in parliament, &c. For the method of finding the value of *freehold* eſtates, ſee ANNUITIES and LIFE-ANNUITIES.

Freehold is likewiſe extended to ſuch offices as a man holds in FEE, or for life.

Freehold is alſo ſometimes taken in oppoſition to VILLENAGE.

Lambard obſerves, that land, in the Saxons time, was diſtinguiſhed into bockland, i. e. holden by book, or writing; and folkland, held without writing.

The former, he ſays, was held on far better condition, and by the better ſort of tenants, as noblemen and gentlemen; being ſuch as we now call *freehold*: the latter was moſtly in poſſeſſion of peaſants; being the ſame with what we now call *at the will of the lord*.

In the ancient laws of Scotland, *freeholders* are called *milites, knights*. In Reg. Judicial. it is expreſſed, that he who holds land upon an execution of a ſtatute merchant, until he hath ſatisfied the debt, *tenet ut liberum tenementum ſibi & aſſignatis ſuis*; and the ſame of a tenant per elegit: the meaning of which ſeems to be, not that ſuch tenants are *freeholders*, but as *freeholders* for the time, till they have received profits to the value of their debt.

FREEZE, or FRIZE, in *Architecture*, that part of the entablature of columns, between the architrave and corniche. See *Tab. Archit. fig.* 24, 25. N° 10. 26, 27, 28.

The *freeze* is properly a large, flat face, or member, ſeparating the architrave from the corniche.

The ancients called it *zoophorus*, ζωοφορος, becauſe it was uſually enriched with figures of animals; and our denomination *freeze* has a like origin, being formed of the Latin *phrygio, an embroiderer*, becauſe it is commonly adorned with ſculptures in baſſo relievo, imitating embroidery.

The *freeze* is ſuppoſed to be intended to repreſent the heads of the tranſverſe beams that ſuſtain the roof or covering.

In the Tuſcan order it is quite plain; in the Doric, enriched with triglyphs, or channelled figures, with ſpaces between them, called metopes, which are often plain, and ſometimes ornamented; in the Ionic, it is ſometimes made arched, or ſwelled, in which caſe it is called by Vitruvius, *pulvinatus*, q. d. *bolſtered*; in the Corinthian, and Compoſite, it is frequently joined to the architrave, by a little ſweep, and ſometimes to the corniche: and in theſe richer orders it is uſually adorned with ſculpture, figures, compartiments, hiſtories, foliages, feſtoons, &c. The *freezes* of the Corinthian order at Palmyra are very richly decorated.

As to the height of the *freeze*, it is in general $\frac{3}{4}$ of that of the architrave; but not ſtrictly or exactly. The Tuſcan *freeze*, Vitruvius makes 30 minutes; Vignola, 35; Palladio, who makes it ſwelling, gives it but 26; and Scamozzi, 42. The Doric, in Vitruvius and Vignola, is 30 or 40 minutes; in Palladio, &c. 45. The Ionic, Vitruvius makes flat, adorned with acanthus-leaves, lions, &c. and makes it thirty minutes high; Vignola, who alſo makes it flat, gives it 45 minutes; and Palladio, who makes it convex, or ſwelling, 27 minutes; and Scamozzi, 28. The Corinthian, Vitruvius enriches with acanthus-leaves, human figures, &c. and makes its height 37 minutes; Vignola, 45; Palladio, 28; and Scamozzi, 31$\frac{1}{2}$. Laſtly, the Compoſite, which in Vitruvius is ſet with cartoozes, and carved between them, is 52$\frac{1}{2}$ minutes; Vignola, who makes it like Vitruvius, only gives it 45 minutes; Palladio, who makes it ſwelling, only 30; and Scamozzi, 32. See the table under art. COLUMN.

From the variety of enrichments practiſed on the *freezes*, they become variouſly denominated: as

Freezes, *convex*, or *pulvinated*, are thoſe whoſe profile is a curve; the beſt proportion whereof is, when drawn on the baſe of an equilateral triangle.

In ſome, the ſwelling is only at the top, as in a conſole; in others at bottom, as in a balluſter.

Freezes, *flouriſhed*, are thoſe enriched with rinds, or imaginary foliages, as the Corinthian *freeze* of the frontiſpiece of Nero; or with natural leaves, either in cluſters or garlands; or continued, as in the Ionic of the gallery of Apollo in the Louvre.

Freezes, *hiſtorical*, are thoſe adorned with baſs-relievos, repreſenting hiſtories, ſacrifices, &c. as that of the arch of Titus at Rome.

Freezes, *marine*, are thoſe repreſenting ſea-horſes, tritons, and other attributes of the ſea; or ſhells, baths, grottos, &c.

Freezes, *ruſtic*, are thoſe whoſe courſes are ruſticated, or imboſſed; as the Tuſcan *freeze* of Palladio.

Freezes, *ſymbolical*, are thoſe adorned with the attributes of religion; as the Corinthian of the temple behind the capitol at Rome, whereon are repreſented the inſtruments and apparatus of ſacrifice.

Freeze *of the capitol*. See HYPOTRACHELION.

Freeze, in *Commerce*, a kind of cloth, or ſtuff. See FRIZE.

FREEZING, *congelation*, in *Phyſiology*, the fixing of a fluid, or depriving it of its natural mobility, by the action of cold; or it is the act of converting a fluid ſubſtance into a firm, coherent, rigid one, called *ice*.

The Carteſians define *freezing* by the quietude or reſting of a fluid body, hardened by cold; which follows naturally enough from their notion of fluidity, where the parts are ſuppoſed to be in a continual motion.

In effect, one may pretty ſafely ſay, with ſome of thoſe philoſophers, that water *freezes*, becauſe, among other reaſons, its parts loſe their natural motion, and adhere cloſe to each other.

Freezing, *the principal phenomena of*, are, 1. That water, and all fluids, oil alone excepted, dilate in *freezing*, i. e. take more ſpace, and are ſpecifically lighter than before.

That the bulk or dimenſions of water are increaſed by *freezing*, is matter of abundant experiment: and here it may be proper to obſerve the proceſs of nature in this alteration.

A glaſs veſſel, then, BD (*Tab.* II. *Pneum. fig.* 20.) full of water to G, being immerged in a veſſel of water, mixed with ſalt, RSTV, the water preſently riſes from E to F; which ſeems owing to the ſudden conſtriction of the veſſel haſtily plunged into ſo cold a medium. Soon after, from the point F it continually deſcends, condenſing, till it arrives at the point G; where, for ſome time, it ſeems to remain at reſt. But it ſoon recovers itſelf, and begins to expand, riſing from G to H; and from thence, ſoon after, by one violent leap, mounts to I. And here the water in B is immediately ſeen all thick and cloudy; and, in the very inſtant of this leap, is converted into ice. Add, that while the ice is growing harder, and ſome of the water near the neck of the veſſel B is *freezing*, the flux of water is continued above I, towards D, and at length runs out of the veſſel.

Mr. Boyle gives us ſeveral experiments of veſſels made of metals, exceeding thick and ſtrong; in which, when filled with water, cloſe ſtopped, and expoſed to the cold, the water, in *freezing*, coming to be expanded, and not finding either room, or vent, burſt the veſſels.

A ſtrong barrel of a gun, with water in it, cloſe ſtopped and *frozen*, was rent the whole length. Huygens, in order to try the force with which it would expand itſelf when confined, filled a cannon, the ſides of which were an inch thick, with water, and then cloſed the mouth and touch-hole, ſo that none could eſcape. The inſtrument thus filled was expoſed to a ſtrong *freezing* air. In leſs than twelve hours the water within was *frozen*, and began to dilate itſelf with ſuch force, that it actually burſt the piece in two different places. Mathematicians have calculated the force of the ice upon this occaſion; and they ſay, that ſuch a force would raiſe a weight of 27,720 pounds; and a ſmall braſs veſſel, five inches deep, and two in diameter, filled with water, &c. lift up its lid, which was preſſed with a weight of fifty-ſix pounds.

From hence, therefore, we need not be ſurpriſed at the effects of ice in deſtroying the ſubſtance of vegetables and trees, and even ſplitting rocks, when the froſt is carried to exceſs.

2. That they loſe not only of their ſpecific, but alſo of their abſolute gravity, by *freezing*; ſo that, when thawed again, they are found conſiderably lighter than they were before.

3. That *frozen* water is not quite ſo tranſparent as when liquid; and that bodies do not perſpire ſo freely through it.

4. That water, when *frozen*, evaporates almoſt as much as when fluid.

5. That water does not *freeze* in vacuo; but neceſſaril requires the preſence and contiguity of the air.

6. That water which has been boiled, *freezes* more rea dily than that which has not been boiled; and that a ſlight diſturbance of the fluid diſpoſes it to *freeze* more ſpeedily. Theſe two facts have lately been aſcertained b the experiments of Dr. Black of Edinburgh. The cauſe why boiling water accelerates its *freezing*, he ſuppoſes t be this; that water which has been boiled has loſt the ai naturally contained in it, and which, on being expoſe to the atmoſphere, it begins to attract and abſorb. During this proceſs of abſorption, which probably continue for a conſiderable time, a motion is neceſſarily produce among its particles, which, though imperceptible, ma be ſufficient to accelerate its congelation. In unboile water this diſturbing cauſe does not exiſt. This accoun is confirmed by a fact mentioned by Fahrenheit, who di covered, that water, when preſerved at reſt, ma b cooled ſome degrees below the *freezing* point withou *freezing*. Having put water, purged of its air, into ſmal glaſs globes, and ſealed them up, he was ſurpriſed t find that the water, expoſed to a froſty air, remaine much longer unfrozen than he expected. Upon openi ſome of the globes, and admitting the air, a ſudden co gelation took place, and a ſimilar production of ice wa occaſioned in the other globes, by ſhaking them. Fro this diſcovery, we are able to underſtand why they bo the water in India, in order to obtain ice; becauſe th utmoſt intenſity of cold they can obtain is not greate than 31° or 30° of Fahrenheit; but common water ma eaſily be cooled to this degree, provided it be undiſturbe without *freezing*; whereas this cannot happen to boile water. Phil. Tranſ. vol. lxv. part i. art. 13.

7. That the water, being covered over with a ſurface o oil of olives, does not *freeze* ſo readily as without it; an that nut-oil abſolutely preſerves it under a ſtrong fro when olive-oil would not.

8. That rectified ſpirit of wine, nut-oil, and oil of tu pentine, ſeldom *freeze*.

9. That the ſurface of the water, in *freezing*, appears a wrinkled; the rugæ, or wrinkles, being ſometimes in p rallel lines, and ſometimes like rays, proceeding from centre to the circumference.

Freezing, *the theories of*, or the methods of accounti for theſe phenomena, are very numerous. The gre principles different authors have gone upon, are eithe that ſome foreign matter is introduced within the po of the fluid, by whoſe means it is fixed, its bulk increaſe &c.

Or, that ſome matter naturally contained in the fluid, now expelled; by the abſence whereof the body becom fixed, &c.

Or, that there is ſome alteration produced in the texture or form, either of the particles of the fluid itſelf, or of ſomething contained within it.

To ſome one of theſe principles all the ſyſtems of *freezing* are reducible.

The Carteſians, who aſcribe all to the quietude of the parts of the fluid, before in motion, account for *freezing* from the receſs of the ethereal matter out of the pores of the water. The activity of that ether, or ſubtle matter, they hold to be that which gave the particles of the fluid their motion; conſequently, upon the abſence of this matter, the fluidity muſt ceaſe.

Though others of the ſame ſect aſcribe *freezing* to a diminution of the uſual force and efficacy of the ethereal matter, occaſioned by an alteration in the temperature of the air, whereby it is incapacitated for agitating the parts of the fluid as uſual.

The Gaſſendiſts, and other Corpuſcularians, with more probability, aſcribe the *freezing* of water to the ingreſs of a multitude of cold or frigorific particles, which, entering the liquor in ſwarms, and diſperſing themſelves every way through it, croud into the minuteſt parts of the water, and hinder the wonted agitation of its parts, wedging it up, as it were, into the hard and conſiſtent body of ice. And hence its increaſe of dimenſions, coldneſs, &c.

This intromiſſion of a foreign frigorific matter they ſuppoſe eſſential to CONGELATION, as that which characterizes and diſtinguiſhes it from COAGULATION; the latter being effected indifferently by a hot or cold mixture, but the former only by a cold one.

Of what kind theſe frigorific particles are, or how they produce their effect, is matter of debate, and has given occaſion to various ſyſtems.

Hobbes will have them to be common air, which, intruding into the water in congelation, entangles itſelf with the particles of the fluid, prevents their motion, and produces thoſe numerous bubbles obſerved in ice; thus expanding its bulk, and rendering it ſpecifically lighter: but this opinion is overturned by Mr. Boyle, who ſhews, that water will freeze in veſſels hermetically ſealed, and into which the air can have no ingreſs; and yet the bubbles will be as numerous herein, as in that frozen in the open air. Add, that oil is condenſed in *freezing*; conſequently, the air cannot there be the cauſe.

Others, of whom there is the greateſt number, will have the *freezing* matter to be a ſalt; arguing, that an exceſs of cold will render water torpid, but can never congeal it, without ſalt. They are ſaline particles, ſay they, and thoſe diſſolved and mixed in a due proportion, that are the chief cauſe of *freezing*, congelation bearing a near relation to CRYSTALLIZATION.

This ſalt they ſuppoſe of the nitrous kind, and to be be furniſhed by the air, which is generally allowed to abound in nitre. See AIR, and NITRE.

How the particles of nitre may prevent the fluidity of water, is pretty eaſily accounted for: theſe particles are ſuppoſed to be ſo many rigid, pointed ſpicula, which are eaſily driven into the ſtamina, or globules, of the water, and thus becoming variouſly mingled and entangled therewith, by degrees enfeeble and deſtroy the motion thereof. The reaſon this effect only ariſes in ſevere winter weather is, that it is then only that the retarding action of the nitrous ſpicula is more than equal to the power, or principle, whereby the fluid is otherwiſe kept in motion, or diſpoſed for motion.

This opinion is ſupported by the known experiment of artificial *freezing*. See FREEZING *mixture*. Let a quantity of common ſalt, or ſalt-petre, be mixed with ſnow, or ice pulverized, and the mixture diſſolved by the fire; upon immerging a tube full of water in the ſolution, the water, or at leaſt that part of it next the mixture, preſently freezes, even in warm air. Whence it is imagined, that the ſpicula of the ſalt, by the gravity of the mixture, and of the incumbent air, are driven through the pores of the glaſs, and mixed with the water; for that it is the ſalt has the effect, is ſuppoſed evident; inaſmuch as we know, aſſuredly, that the particles of water cannot find their way through the pores of glaſs. In theſe artificial *freezings*, whatever part the mixture is applied in, there is preſently produced a ſkin, or lamina, of ice, whether at top, or bottom, or on the ſides; becauſe there is always a ſtock of ſaline corpuſcles ſufficient to overpower the corpuſcles of fire; but natural congelations are confined to the top of the water, where the ſalt moſt abounds.

Againſt this ſyſtem the author of the Nouvelle Conjecture pour expliquer la Nature de la Glace, objects, that it does not appear, that nitre always enters the compoſition of ice; but that if it did, it would come ſhort of accounting for ſome of the principal effects. For how, for inſtance, ſhould the particles of nitre, by entering the pores of water, and fixing the parts, oblige the water to dilate, and render it ſpecifically lighter? Naturally they ſhould augment its weight. This difficulty, with ſome others, evince the neceſſity of a new theory. That author, therefore, advances the following one, which ſeems to ſolve the phenomena in a more eaſy and ſimple manner; as not depending on the precarious admiſſion, or extruſion, of any heterogeneous matter.

Water, then, *freezes* in the winter only, becauſe its parts, being then more cloſely joined together, mutually embarraſs one another, and loſe all the motion they had; and the cauſe of this cloſer union of the water, is the air; or, more expreſly, an alteration in the ſpring and force of the air.

That there is an infinite number of particles of groſs air interſperſed among the globules of water, is abundantly evident from experiment; and that each particle of air has the virtue of a ſpring, is confeſſed: now this author argues, that the ſmall ſprings of groſs air, mixed with the water, have more force in cold winter weather, and unbend themſelves more, than at other times: hence thoſe ſprings, thus unbending themſelves on one ſide, and the external air continuing to preſs the ſurface of the water on the other, the particles of water, thus conſtringed and locked up together, muſt loſe their motion and fluidity, and form a hard conſiſtent body; till a relaxation of the ſpring of the air, from an increaſe of heat, reduces the particles to their old dimenſions, and leaves room for the globules to flow again.

But this ſyſtem has its foible: even the principle on which it ſtands, may be demonſtrated to be falſe. The ſpring, or elaſticity of the air, is not increaſed by cold, but diminiſhed. Air expands itſelf by heat, and condenſes by cold; and it is demonſtrated, in pneumatics, that the elaſtic force of expanded air, is to that of the ſame air condenſed, as its bulk, when rarefied, to its bulk condenſed.

It is ſcarce worth mentioning, that ſome authors have advanced, to account for the increaſe of bulk and diminution of ſpecific gravity of frozen water, that the aqueous particles in their natural ſtate were nearly cubes, and ſo filled that ſpace without the interpoſition of many pores; but that, by congelation, they are changed from cubes to ſpheres; whence a neceſſity of much empty ſpace between them. Cubic particles are certainly much leſs proper to conſtitute a fluid, than ſpherical ones; and ſpherical particles leſs diſpoſed to form a fixt, than cubic ones. Thus much the nature of fluidity and firmneſs eaſily ſuggeſts.

For a conſiſtent theory of *freezing*, we muſt recur either to the frigorific matter of the Corpuſcularians, conſidered under the light and advantages of the Newtonian philoſophy; or to the ethereal matter of the Carteſians, under the improvements of Monſ. Gauteron, in the Memoires de l'Academie Royale des Sciences, an. 1709.

Each of which we ſhall here ſubjoin; and leave the reader to make his choice. For the firſt: a number of cold ſaline corpuſcles, being introduced into the interſtices between the globules of water, may be ſo near each other, as to be within the ſphere of one another's attraction; the conſequence of which muſt be, that they will cohere into one ſolid or firm body; till heat afterwards, ſeparating them, and putting them into various motions, breaks this union, and ſeparates the particles ſo far from one another, that they get out of the diſtance of the attracting force, and into the verge of the repelling force; and then the water reaſſumes its fluid form.

For that cold and *freezing* do ariſe from ſome ſubſtance of a ſaline nature, floating in the air, ſeems probable, hence, that all ſalts, and more eminently ſome particular ones, when mixed with ſnow, or ice, do prodigiouſly increaſe the force and effects of cold: add, that all ſaline bodies do produce a ſtiffneſs and rigidity in the parts of thoſe bodies into which they enter.

Microſcopical obſervations upon ſalts manifeſt, that the figures of ſome ſalts, before they ſhoot into maſſes, are thin, double, wedge-like particles, which have abundance of ſurface with reſpect to their ſolidity (the reaſon why they ſwim in water, when once raiſed in it, though ſpecifically heavier); theſe ſmall points of the ſalt getting into the pores of the water, whereby, alſo, they are in ſome meaſure ſuſpended in the winter-time (when the heat of the ſun is not ſtrong enough to diſſolve the ſalts into a fluid, to break their points, or to keep them in perpetual motion), being leſs diſturbed, and more at liberty to approach one another; and, by ſhooting into cryſtals of the form above mentioned, do, by their extremities, inſinuate themſelves into the minuteſt pores of the water, and, by that means, *freeze* it into a ſolid form.

Farther, there are many little volumes, or particles, of air, included at ſeveral diſtances, both in the pores of the watery particles, and in the interſtices left by the ſpherical figures. By the inſinuation of the ſaline cryſtals, the volumes of air are driven out of the watery particles, and many of them uniting, form larger volumes, which thereby have a greater force to expand themſelves, than when diſperſed; and ſo both enlarge the dimenſions, and leſſen the ſpecific gravity of the water, thus congealed into ice.

Hence, alſo, we may conceive how water, impregnated with ſalts, ſulphurs, or earths, which are not eaſily diſſolvable, may form itſelf into metals, minerals, bitumens, and other foſſils; the parts of theſe mixtures becoming a cement to the particles of water; or, getting into their pores, change them into theſe different ſubſtances.

For the ſecond: as an æthereal matter, or medium, is generally allowed the cauſe of the motion of fluids; and as the air itſelf has all its motion from the ſame principle; it follows, that all fluids muſt remain in a ſtate of reſt, or fixity, when this matter loſes of its neceſſary force: of conſequence, the air, being leſs warmed in the winter-time, from the obliquity of the rays of the ſun, is denſer, and more fixed, in winter, than any other ſeaſon of the year.

But, farther, from divers experiments we have learned, that the air contains a ſalt, ſuppoſed to be of the nature of nitre: this granted, and the denſity of the air allowed, it follows, that the molecules of this nitre muſt likewiſe be brought nearer together, and thickened, by the condenſation of the air; as, on the contrary, a rarefaction of the air, and an augmentation of its fluidity, muſt divide and ſeparate them.

If, now, the ſame thing happen to all liquors that have imbibed or diſſolved any ſalt; if the warmth of the liquid keep the ſalt exactly divided; and if the coolneſs of a cellar, or of ice, give occaſion to the molecules of the diſſolved ſalt to approach, run into each other, and ſhoot into cryſtals; why ſhould the air, which is allowed a fluid, be exempt from the general law of fluids?

It is true, the nitre, or the air, being groſſer in cold weather than hot, muſt have leſs velocity; but ſtill the product of its augmented maſs, into the velocity remaining, will give it a greater momentum, or quantity of motion; nor is any thing farther required to make this ſalt act with greater force againſt the parts of fluids; and, probably, this is the cauſe of the great evaporation in froſty weather.

This aerial nitre muſt promote the concretion of liquids; for it is not the air, nor yet the nitre it contains, that gives the motion to fluids; it is the ethereal medium. From a diminution of the force of that, therefore, ariſes a diminution of the motion of the reſt.

Now the ethereal matter being weak enough of itſelf, in the winter-time, muſt loſe ſtill more of its force by its action againſt air condenſed, and loaded with large molecules of ſalt: it muſt, therefore, loſe of its force in cold weather, and become leſs diſpoſed to maintain the motion of fluids. In a word, the air, during froſt, may be eſteemed like the ice impregnated with ſalt, wherewith we ice our liquors in ſummer time. Thoſe liquors, in all probability, *freeze*, from a diminution of the motion of the ethereal medium, by its acting againſt the ice and ſalt together; and the air, for all its ſcorching heat, is not able to prevent its concretion.

Freezing *mixture*, a preparation for the artificial congelation of water, and other liquors.

All kinds of ſalts, whether alcaliſate or acid; and even all ſpirits, as thoſe of wines, &c. as alſo ſugar, and ſaccharum Saturni, mixed with ſnow, are capable of *freezing* moſt fluids; and the ſame effect is produced, in a very great degree, by a mixtion of oil of vitriol, or ſpirit of nitre, with ſnow. Thus Mr. Boyle.

M. Homberg obſerves the ſame of equal quantities of corroſive ſublimate, and ſal ammoniac, with four times the quantity of diſtilled vinegar.

Boerhaave gives us a method of producing artificial froſt, without either ſnow or ice: we muſt have for this purpoſe, at any ſeaſon of the year, the coldeſt water that can be procured; this is to be mixed with a proper quantity of any ſalt (ſal ammoniac will anſwer the intention beſt), at the rate of about three ounces to a quart of water. Another quart of water muſt be prepared in the ſame manner with the firſt; the ſalt, by being diſſolved in each, will make the water much colder than it was before. They are then to be mixed together, and this will make them colder ſtill. Two quarts more of water prepared and mixed in the ſame manner are to be mixed with theſe, which will increaſe the cold to a much higher degree in all. The whole of this operation is to be carried on in a cold cellar; and a glaſs of common water is then to be placed in the veſſel of liquor thus artificially cooled, and it will be turned into ice in the ſpace of twelve hours.

There is a method of making artificial ice by means of ſnow, without any kind of ſalt: for this purpoſe fill a ſmall pewter diſh with water, and upon that place a common pewter plate filled, but not heaped, with ſnow. Bring this ſimple apparatus near the fire, and ſtir the ſnow in the plate: the ſnow will diſſolve, and the ice will be formed on the back of the plate, which was ſet in the diſh of water.

Nothing is more commonly known than the method of congealing liquors into ice by an artificial froſt, even in the warmeſt ſeaſon; but it does not ſeem to be yet known what are the ſalts moſt efficacious of all on this occaſion, or, in other words, what ſalt is capable of producing the greateſt degree of artificial cold, or in what manner it may be beſt uſed, and what proportion it ought to bear with the powdered ice or ſnow that is uſed on the occaſion. The common proceſſes are known, but few have enquired ſo curiouſly into the whole as ſo nice a ſubject ſeems to deſerve.

Mr. Reaumur at length took the whole into conſideration, and examined the various degrees of cold by a nice thermometer, which being placed in the liquor to be frozen, ſhewed very exactly the degree of cold by the deſcent of the ſpirit.

Salt-petre uſually paſſes for a ſalt that may be very ſerviceable in theſe artificial congelations; but the experiments of this gentleman prove, that this is an erroneous opinion. The moſt perfectly refined ſalt-petre employed in the operation ſunk the ſpirit in the thermometer but three degrees and a half below the fixed point.

Of the ſalt petre he uſed, the unrefined makes the ſpirit ſink conſiderably lower; the cauſe of which is, that the rough ſalt petre contains a large quantity of common, or ſea ſalt; and this being able to cauſe a greater degree of cold than the ſalt it is mixed with, exerts itſelf with it, and carries it to a greater degree of coldneſs: whereas in the refining ſalt-petre, this ſea ſalt is thrown out, and conſequently the nitre becoming purer, acts only on its own principle, and cauſes a leſs degree of cold, ſuch as is its appropriated one.

Two parts of common ſalt being mixed with three parts of powdered ice in very hot weather, the ſpirit in the thermometer immediately deſcended fifteen degrees, which is half a degree lower than it would have deſcended in the ſevereſt cold of the year 1709. Mr. Reaumur after this experimented the ſalts all round, and tried with great regularity and exactneſs, what was the degree of cold occaſioned by each in a given doſe. Among the neutral ſalts, none produced a greater degree of cold than the common ſea ſalt. Among the alkalies, ſal armoniac, though generally eſteemed ſo very powerful a one on theſe occaſions, ſunk the thermometer only to thirteen degrees. Pot-aſhes ſunk it juſt as low as well refined ſalt-petre. Thus by trials of the ſeveral ſalts, the proper degree of cold producible from each is eaſily aſcertained, and tables may be made of the numbers. After which, in the deſcribing any degree of cold in a particular ſeaſon, it will be a much better way of expreſſing it, to ſay, it was equal to that produced by ſuch or ſuch a ſalt, than to name it by the degrees of a thermometer.

For the common uſes of the table, the ice required is not expected to be very hard, or ſuch as is produced by long continuance of violent cold: it is rather deſired to be like ſnow. Salt-petre, which is no very powerful *freezer*, is therefore more fit for the purpoſe than a more potent ſalt. It is not required that the congelations ſhould be very ſuddenly made; but its retaining its form as long as may be when made, is a thing of great importance to the dealer in theſe things; nor is the price of the ſalts which are to be uſed for this purpoſe, a matter of indifference.

If it be deſired to have ices very hard and firm, and very ſuddenly prepared, then ſea ſalt is of all others moſt to be choſen for the operation. The ices thus made will be very hard, but they will keep only a very little time without running. Pot-aſhes afford an ice of about the hardneſs that is uſually required. This forms indeed very ſlowly, but then it will preſerve itſelf a long time. And there is another ſubſtance which performs the buſineſs very nearly in the ſame manner with the pot-aſhes, and that on the ſame principle. This is a very cheap and ſimple one, being no other than common wood aſhes; but for this purpoſe the wood, which is burnt, ought to be freſh.

The ſtrong acid ſpirits of the neutral ſalts act much more powerfully in theſe congelations than the ſalts themſelves, or indeed than any ſimple ſalt can do. Thus ſpirit of nitre mixed with twice its quantity of powdered ice, immediately ſinks the ſpirit in the thermometer to nineteen degrees; that is, it produced a cold of four degrees greater than that obtained by means of ſea ſalt, the moſt powerful of all the ſalts in making artificial cold. A much greater degree of cold may be given to this mixture by piling it round with more ice mixed with ſea ſalt. This gives a redoubled cold, and on the trial the thermometer was found to ſink to twenty-four degrees; that is, a degree of cold was thus artificially produced, which was to the greateſt known natural cold, that of the ſevere winter in 1709, as twelve to ſeven, or thereabouts. If this whole matter be covered with a freſh mixture of ſpirit of nitre and ice, a yet greater degree of cold is produced, and ſo on; the cold being by this method of freſh additions to be increaſed almoſt without bounds: but every addition, it is obſerved, gives a ſmaller increaſe than the former.

It is very remarkable in the acid ſpirits, that though ſea ſalt is ſo much more powerful than nitre in ſubſtance in creating cold, yet the ſpirit of nitre is much ſtronger than that of ſea ſalt; and another not leſs wonderful phenomenon is, that ſpirit of wine, a liquor which is little other than a liquid fire, has as powerful an effect in cogelations, or very nearly ſo, as the ſpirit of nitre itſelf. What but experiment could have brought people to imagine, that theſe two ſo very different liquors could have this property as it were in common?

The mixture of any other matter with powdered ice does not create a new cold by any other means than that of melting the ice it is mixed with. The moment of that melting is therefore the point of time in which the cold is ſtrongeſt of all, as after that the warmth of the external air cannot but be continually taking off from the new engendered cold. It is plain from hence, that the quicker this melting is performed, the harder the ice muſt be, or the greater the degree of cold. It were much to be wiſhed therefore, that the melting could be inſtantaneous, as in that caſe the particles of ice would all act at one and the ſame time on the matter to be congealed: and in order to this, it is neceſſary that every particle of ice ſhould have a particle of ſalt ready to act upon it. This requires that the ice and the ſalt ſhould be both powdered to a certain fineneſs. Hence may be deduced a rule, which though not quite ſo preciſe, yet may be ſufficiently ſo for the determining the proper proportion of the ſalt to be mixed with any determinate quantity of ice. We well know from experiment, how large a quanity of water is neceſſary to melt a certain quantity of ſalt of any kind, and repeated experiments might bring the knowledge of the other ſolution to nearly as great a certainty, It would be well to try the whole carefully with ſea ſalt: and when the proportions of this were known, it would be no difficult matter from theſe to deduce the proper quantities of other ſalts, according to their known differences, in regard to the quantities of water neceſſary to diſſolve them.

The ſeveral liquid ſubſtances which create a cold, in the ſame manner as the dry ſalts on being mixed with ice, are much more ſpeedy in their action than the ſalts; becauſe they immediately and much more intimately come into contact with the particles of the ice, than the ſalts can. Of this nature are ſpirit of nitre, ſpirit of wine, &c. to produce the expected degree of cold, it is always neceſſary that the ice and the added matter, whatever it be, ſhould both run together and intimately uniting form one clear fluid; it is hence that no new cold is produced with oil, which though it melts the ice, yet cannot mix itſelf into a homogene liquor with it, but muſt always remain floating on the ſurface of the water, produced by the melting of the ice. Mem. Acad. Scienc. Par. 1734.

Of late there has been a more effectual method of congealing fluids than any yet recited. It has been diſcovered, that fluids ſtanding in a current of air, grow by this means much colder than before. Fahrenheit had long ſince informed us, that a pond, which ſtands quite calm, often acquires a degree of cold much beyond what is ſufficient for *freezing*, and yet no congelation enſued: but if a ſlight breath of air happens in ſuch a caſe to bruſh over the ſurface of the water, it ſtiffens the whole in an inſtant. However, a phenomenon attends this experiment, which has not yet been explained; for the water, before its congelation, and in its liquid ſtate, ſinks the thermometer very low, which ſhews its exceſſive degree of coldneſs; but as ſoon as it begins to congeal, by means of the air, or any other agitation, the thermometer riſes to the ordinary *freezing* point. It has been diſcovered alſo, that all ſubſtances grow colder by the EVAPORATION of the fluids which they contain, or with which they are mixed. If both theſe methods, therefore, are practiſed upon the ſame body at the ſame time, they will increaſe the cold to almoſt any degree of intenſeneſs we deſire. The moſt extraordinary inſtance of artificial *freezing* that has yet been recorded, is that of the Ruſſian experiments at Peterſburgh, in which quickſilver was congealed.

In December 1759, they had at Peterſburgh the coldeſt weather, and the moſt intenſe froſt, that ever was known, ſo that De Liſle's thermometer ſtood at 205 degrees: at that time profeſſor Braun repeated Fahrenheit's experiments, in order to produce artificial cold, by means of ſpirit of nitre combined with pounded ice or ſnow. Aqua fortis, found by the thermometer to be 204 degrees cold, was poured upon pounded ice, both the ice and aqua fortis being of the ſame temperature with the air; upon the firſt pouring, the mercury fell 20 degrees; the ſpirit was poured off and on again ſeveral times, but the mercury in the thermometer fell no lower than 234 degrees, ſo that no more than 30 degrees of cold could by theſe means be produced; but as Fahrenheit, Reaumur, and Muſchenbroek, who had repeated the ſame experiment, could never produce cold greater than 40° below 0 in Fahrenheit's thermometer, which correſponds with 210 in De Liſle's, uſed by profeſſor Braun, he ſatisfied himſelf with having added 20° to the cold formerly known.

However, he determined to vary his experiments; and being under a neceſſity of uſing ſnow inſtead of ice, which he afterwards found to be much preferable to it; at a time when the ſnow and aqua fortis were of the ſame degree of cold with the air, viz. 203°, he immerſed the thermometer in ſnow contained in a glaſs; and pouring a few drops of the aqua fortis on that part of the ſnow in which the thermometer was immerſed, he obſerved the mercury to ſubſide to 260; repeating the experiment in the ſame manner, and pouring on ſome more aqua fortis, the mercury immediately fell to 380. And, then, immerſing the thermometer, before it had loſt any of this acquired cold, in another glaſs filled with ſnow, the mercury ſubſided to 470°. Upon taking out the thermometer, the mercury was immoveable, and continued ſo in the open air for twelve minutes, and did not recover its fluidity and begin to riſe for ſome minutes after it was carried into a warm room, where the temperature of the air was 125°. He repeated the ſame experiment, firſt with the ſame, and then with another thermometer, with the ſame ſucceſs. Profeſſor Braun's thermometers had a ſpherical bulb, and their ſcale was divided into 1200 parts, of which 600 were above 0, which denotes the heat of boiling water, and 600 below that heat. He alſo uſed another thermometer, the ſcale of which went no lower than 360° below 0, denoting the heat of boiling water. The mercury ſoon deſcended in this thermometer, ſo that the whole was contained in the bulb; and the immobility of the mercury led him to conjecture, that it might be frozen or become a ſolid body. But as he had not broken his glaſſes, he could at that time only form a conjecture. At another time, when the cold was abated, and the thermometer ſtood at 199°, he repeated the experiment with a little variation: he firſt put the bulb of the thermometer into a glaſs of ſnow, gently preſſed down, before he poured on the aqua fortis; he then, in another glaſs, poured the aqua fortis upon the ſnow, before he immerſed the thermometer in it; and he alſo put the ſnow to the aqua fortis, before he put his thermometer in it: but in theſe ſeveral ways he found the event exactly the ſame; the mercury was immoveable; and breaking the bulb of the thermometer, he found the mercury ſolid, but not wholly ſo, as the middle part of the ſphere was not yet fixed. Mr. Æpinus repeated the ſame experiment, and the mercury in his thermometer fell, with extreme rapidity, almoſt to the 500th degree; and in breaking the glaſs from below, he found the quickſilver contained in it abſolutely frozen. The quickſilver, thus rendered ſolid, bore hammering and extenſion, like other metals; its hardneſs was like that of lead, though ſomewhat ſofter; and, upon ſtriking, it ſounded like lead. When the mercury was extended by theſe ſtrokes, it was eaſily cut with a penknife, and in its congealed ſtate looked like the moſt poliſhed ſilver; but in about twelve minutes, after being expoſed to the air, which was 197°, it recovered its former fluidity. In this laſt experiment of Mr. Braun, the mercury deſcended to 530°, and on the next day, the cold having increaſed to 212°, it deſcended to 650. In his following experiments, he invariably found, that the mercury ſunk lower, when the whole of it was congealed, than if any part of it remained fluid. It then generally deſcended to 680 and 700, but the bulbs were never, in any of his experiments, without cracks: moreover, the mercury, on other occaſions, deſcended to 800, and even to 1500; but, in this laſt experiment, the bulb was quite broke, ſo that the globe of mercury, thoroughly frozen, fell out, and by its fall, of about three feet, the ball of mercury became a little compreſſed. In another experiment, when the mercury deſcended to 1260°, 1260°, the congealed ball was ſtruck ſeveral times with an ax, and became flat like an Engliſh half-crown; but receiving ſome cracks by the blows, it diſſolved in about twenty minutes.

Mr. Braun found, that, *cæteris paribus*, the more intenſe the natural cold was, the more eaſily and expeditiouſly did theſe experiments ſucceed; though with the nitrous acid poured on ſnow, mercury may be congealed at any time, when the heat of the atmoſphere is not greater than 175° by De Liſle's thermometer: and though the degree of cold neceſſary to conſolidate mercury cannot be preciſely aſcertained, yet Mr. Braun eſtimates it to be about 469 degrees in his thermometer. In the proceſs of his obſervations, Mr. Braun found that double aqua fortis was more effectual than ſpirit of nitre; but with the ſimple ſpirit of nitre, which ſeldom brings the mercury lower than 300°, mercury may be frozen in the following manner: let ſix glaſſes be filled with ſnow as uſual, and the thermometer be put in one of them, and the ſpirit of nitre be poured upon it; when the mercury would fall no lower in this, remove the thermometer to the ſecond, and ſo on to the third and fourth, in which fourth immerſion the mercury was congealed. Mr. Æpinus gives the following direction for uſing the fuming ſpirit of nitre: take the ſpirit of nitre, cooled as much as poſſible, and with it fill half a wine glaſs, throwing in as much ſnow at the ſame time, and ſtirring it till it becomes of the conſiſtence of pap; and you thus obtain, almoſt in an inſtant, the neceſſary degree of cold for the congelation of quickſilver. In the experiments above recited, diſtilled quickſilver was generally uſed; and in ſome the quickſilver was revivified from ſublimation.

It is remarked by Mr. Braun, that by the mixture of ſnow and ſpirit of nitre, which froze the mercury, he never was able to bring thermometers, filled with the moſt highly rectified ſpirit of wine, lower than 300°: ſo that the cold which will freeze mercury, will not freeze ſpirit of wine; and therefore ſpirit thermometers are the moſt fit to determine the degree of coldneſs in frigorific mixtures, till we are able to conſtruct ſolid metallic thermometers with ſufficient accuracy. Mr. Braun tried the effects of different fluids in his frigorific mixtures: he always found that Glauber's ſpirit of nitre and double aqua fortis were the moſt powerful; and from a number of experiments made when the temperature of the air was between 159 and 153 by his thermometer, he concludes, that ſpirit of ſalt pounded upon ſnow, increaſed the natural cold 30°; ſpirit of ſal ammoniac, 10; oil of vitriol, 35; Glauber's ſpirit of nitre, 58; aqua fortis, 40; ſimple ſpirit of nitre, 30; dulcified ſpirit of vitriol, 20; Hoffman's anodyne liquor, 32; ſpirit of hartſhorn, 10; ſpirit of ſulphur, 10; ſpirit of wine rectified, 20; camphorated ſpirit, 15; French brandy, 12; and ſeveral kinds of wine increaſed the natural cold to 6, 7, or 8 degrees. It appears alſo, from Mr. Braun's experiments, that both the boiling and *freezing* of mercury have this in common; that, when it begins to boil, it riſes with rapidity, and deſcends rapidly when it begins to freeze: ſo that if the mean term of the congelation of mercury be fixed at 650 below 0, and the term of its boiling at 414 above 0, its greateſt contraction to its greateſt dilatation will be 1064 degrees of Mr. Braun's thermometer, and 1237 of Fahrenheit's, as 212 is the point of boiling water, and 32 the *freezing* point in Fahrenheit's, which correſponds with 150 under the term of boiling water in Mr. Braun's. Hence every one will ſee the great alteration of ſpecific gravity in frozen and boiling mercury, as, between one and the other, the tenth part of the volume is leſſened. Phil. Tranſ. vol. li. part ii. for 1760. art. 64. p. 672. Ibid. vol. lii. part i. art. 31. p. 156. See alſo an account of ſome ſucceſsful experiments for *freezing* quickſilver at Albany fort, Hudſon's bay, in 1775, by Mr. Hutchins, Phil. Tranſ. vol. lxvi. part i. art. 10. p. 174. See MERCURY and THERMOMETER.

FREEZING *rain*, or *raining ice*, a very uncommon kind of ſhower, which fell, in the weſt of England, in December, anno 1672. See Phil. Tranſ. N° 90.

This rain, as ſoon as it touched any thing above ground, as a bough, or the like, immediately ſettled into ice; and, by multiplying and enlarging the icicles, it broke all down with its weight. The rain that fell on the ſnow, immediately *froze* into ice, without ſinking in the ſnow at all.

It made an incredible deſtruction of trees, beyond any thing in all hiſtory. "Had it concluded with ſome guſt of wind," ſays a gentleman on the ſpot, "it might have been of terrible conſequence."

"The ſprig of an aſh-tree, of juſt three quarters of a pound, being weighed, the ice thereon weighed ſixteen pounds. Some were frighted with the noiſe in the air; till they diſcerned it was the clatter of icy boughs daſhed againſt each other." Dr. Beale obſerves, that there was no conſiderable froſt obſerved on the ground during the whole; whence he concludes, that a froſt may be very fierce, and dangerous, on the tops of ſome hills; while, in other places, it keeps at two, three, or four, feet diſtance above the ground, rivers, lakes, &c. and may wander about, very furiouſly, in ſome places, and be remiſs in others, not far off. This froſt was followed by glowing heats, and a wonderful forwardneſs of vegetation.

FREEZING *of wines*. See *Condenſing of* WINES.

FREEZING, in *Commerce* and *Manufactures*. See FRIZING.

FREEZING, in *Sea Language*, is a ſort of ornamental painting on the upper part of a ſhip's quarter, ſtern, or bow. It generally conſiſts of armour, inſtruments of war, marine emblems, &c.

FREEZELAND, FRIEZELAND, or FRIZELAND, *horſe*, in *War*, the ſame with CHEVAL *de friſe*.

FREGAROLA, in *Zoology*, a name given by many to a ſmall river-fiſh, well known in England by the name of the MINOW.

FREGGIA, in *Zoology*, the name of a long anguilliform fiſh of the tænia kind, more commonly called CAVAGIRO.

FREGIT *clauſum*. See CLAUSUM.

FREIGHT. See FRAIGHT.

FREISER, a name uſed by ſome for the STRAWBERRY *plant*.

FRENCH, FRANÇOIS, abſolutely uſed, ſignifies the language of the people of France.

The *French*, as it now ſtands, is no original, or mother-language, but a medley of ſeveral: there is ſcarce any language but it has borrowed words, or perhaps phraſes, from.

The languages that prevail moſt, and that are, as it were, the baſis thereof, are, 1. The Celtic; whether that were a particular language itſelf, or whether it were only a dialect of the Gothic, as ſpoke in the Weſt and North. 2. The Latin, which the Romans carried with them into the Gauls, when they made the conqueſt thereof. And, 3. The Teutonic, or that dialect of the Teutonic ſpoke by the Franks, when they paſſed the Rhine, and eſtabliſhed themſelves in Gaul.

Of theſe three languages, in the ſpace of about thirteen hundred years, was the preſent *French* formed, ſuch as it is now found. Its progreſs was very ſlow; and both the Italian and Spaniſh were regular languages long before the *French*.

Paſquier obſerves, it was under Philip de Valois, that the *French* tongue firſt began to be poliſhed; and that, in the regiſter of the chamber of accounts of that time, there is a purity ſeen almoſt equal to that of the preſent age.

However, the *French* was ſtill a very imperfect language till the reign of Francis I. the cuſtom of ſpeaking Latin at the bar, and of writing the public acts and inſtruments of the courts of juſtice in that language, had made them overlook the *French*, their own language. Add, that the preceding ages had been remarkable for their ignorance, which was owing, in good meaſure, to the long and calamitous wars which France had been engaged in; whence, the *French* nobleſſe deemed it a kind of merit, not to know any thing; and the generals regarded little, whether or no they wrote and talked politely, provided they could but fight well.

But Francis I. who was the reſtorer of learning, and the father of the learned, changed the face of things; and, after his time, Henry Stevens printed his book, De la Precellence du Langage François.

The change was become very conſpicuous at the end of the ſixteenth century; and under Henry IV. Amyot, Coeffeteau, and Malherbe, contributed towards bringing it to its perfection; which the cardinal De Richelieu completed, by the eſtabliſhment of the *French* academy; an aſſembly, wherein the moſt diſtinguiſhed perſons of the church, the ſword, and the gown, have been members.

Nor did the long reign of Louis XIV. contribute a little to the improvement of the language: the perſonal qualities of that prince, and his taſte for the polite arts, and that of the princes of the blood, rendered his court the politeſt in Europe. Wit and magnificence ſeemed to vie; and his generals might have diſputed with the Greeks, Romans, &c. the glory of writing well, if they could not that of fighting.

From court, the elegance and purity of the language ſoon ſpread itſelf into the provinces; and now there is ſcarce any body there who does not write and ſpeak good *French*.

One of the characters of the *French* language is, to be natural and eaſy. The words are ranged in it much in the ſame order as the ideas in our minds; in which it differs exceedingly from the Greek and Latin, where the inverſion of the natural order of words is reputed a beauty. Indeed the Hebrew ſurpaſſes even the *French*, in this point; but then it comes ſhort of it in copiouſneſs and variety.

It muſt be added, however, that as to the analogy of grammar, and the ſimplicity wherewith the moods of verbs are formed, the Engliſh has the advantage, not only over the French, but over all the known languages in the world; but then the turns, the expreſſions, and the idioms, of the Engliſh, are ſometimes ſo quaint, and extraordinary, that it loſes a good deal of the advantage which its grammatical ſimplicity gives it over the reſt.

The *French* has but few compound words; wherein it differs widely from the Greek, High Dutch, and Engliſh. This the *French* authors own a great diſadvantage in their language; the Greek and Dutch deriving a great part of their force and energy from the compoſition of words, and frequently expreſſing that in one ſounding word, which the *French* cannot expreſs but by a periphraſis.

The diminutives in the *French* are as few as the compounds; the greateſt part of thoſe remaining in uſe having loſt their diminutive ſignification; but what diſtinguiſh the *French* moſt are its juſtneſs, purity, accuracy, and flexibility.

French is the moſt univerſal and extenſive language in Europe. The policy of ſtates and courts has rendered it neceſſary for the miniſters of princes, and their officers, &c. and the taſte of arts and ſciences has had the ſame effect, with regard to the learned.

In Germany, and elſewhere, the princeſſes and perſons of diſtinction value themſelves on underſtanding *French*; and in ſeveral courts of Europe, *French* is almoſt as much known as the language of the country; though the court of Vienna is an exception from this rule. *French* is there very little uſed; the emperor Leopold could not bear to hear it ſpoke in his court; the Latin and Italian are there cultivated inſtead of it. This extenſiveneſs of the *French* language is no modern advantage; William the Conqueror gave laws to England in the *French* language; and the ancient cuſtoms of moſt of the provinces of the Netherlands are wrote in the ſame.

Laſtly, the *French* is the ſame language every where; not only in all the provinces of France, but in all places where it is ſpoken, out of France.

For a critical acquaintance with what regards the *French* tongue, ſee the Remarques of M. Vaugelas; and the Obſervations M. Corneille has made on thoſe remarks; the Remarques of F. Bouhours; and the Doubts of a Bas-Breton gentleman, by the ſame father; the Converſations of Ariſte and Eugene; the Obſervations of M. Menage, and his Etymologies, with thoſe of M. Huet; F. Buffier's French Grammar; and that of the abbé Regnier. Add, the two diſcourſes of the abbé de Dangeau; one on the vowels, and the other on the conſonants, and many later works.

FRENCH *Bole*. See BOLE.

FRENCH *Bread*. See BREAD.

FRENCH *Character*, *Coins*, *Companies*, *Crown*. See the ſubſtantives.

FRENCH *graſs*, a name given by our farmers to a plant raiſed for the food of cattle, and more properly called SAINT-*foin*. It had its name *French graſs*, from its coming originally to us from France, and from its uſe in ſerving both freſh and dried for the food of cattle; the common clover is called graſs alſo by the farmers, though neither this nor the other are properly graſſes. Some of our farmers alſo call it everlaſting graſs, from its long continuance, a ſtrong crop often yielding a plentiful annual produce for forty years without any renewing.

FRENCH *Man*. See FRANCIGENA, and ENGLECERY.

FRENCH *Meaſures*, *Money*, *Order*, *Padſaddle*, *Pox*, *Silks*, *Weights*. See the ſubſtantives.

FRENCH *Wines*, *duty on*. See DUTY.

FRENK. See FRANK.

FRENUM, or FRÆNUM. See FRÆNUM.

FRENZY, and FRENETIC. See PHRENZY, and PHRENETIC.

FRESCO, in the *Arts*, a kind of painting performed on freſh plaſter, or on a wall laid with mortar not yet dry; and with water-colours.

This ſort of painting has a great advantage; by its incorporating with the mortar, and drying along with it, it is rendered extremely durable; and never fails or falls, but along with it. The Italians, from whom we borrow the term, call it *freſco*; becauſe it is frequently uſed for walls, alcoves, and other buildings, in the *open air*. Vitruvius, lib. vii. cap. 4. calls it *udo tectorio*.

Painting in *freſco* is very ancient, having been practiſed in the earlieſt ages of Greece and Rome. It is chiefly performed on walls and vaults, newly plaſtered with lime and ſand; but the plaſter is only to be laid, in proportion as the painting goes on; no more being to be done at once, than the painter can diſpatch in a day, while it dries. Before he begins to paint, a cartoon or deſign is uſually made on paper, to be calked, and transferred to the wall, about half an hour after the plaſter is applied.

The ancients painted on ſtucco; and we may remark in Vitruvius what infinite care they took in making the incruſtation or plaſtering of their buildings to render them beautiful and laſting; though the modern painters find a plaſter made of lime and ſand preferable to it; both as it does not dry ſo haſtily, and as being a little browniſh, it is fitter to lay colours on, than a ground ſo white as ſtucco.

In this kind of painting, all the compound and artificial colours, and almoſt all the minerals, are ſet aſide, and ſcarce any thing is uſed but earths; which are capable of preſerving their colour, defending it from the burning of the lime, and reſiſting its ſalt, which Vitruvius calls its bitterneſs.

For the work to come out in all its beauty, the colours muſt be laid on quick, while the plaſter is yet moiſt; nor ſhould they ever be retouched, dry, with colours mixed up with the white of an egg, or ſize, or gum, as ſome workmen do; becauſe ſuch colours grow blackiſh; nor do any preſerve themſelves, but only ſuch as were laid on haſtily at firſt.

The colours uſed, are white made of lime ſlacked long before, and white marble duſt; oker, both red and yellow; verditer; lapis lazuli; ſmalt; black chalk, &c. All which are only ground, and worked up with water; and moſt of them grow brighter and brighter, as the *freſco* dries.

The bruſhes and pencils for this work ought to be long and ſoft, otherwiſe they will rake and raiſe the painting. The colours ſhould be full, and flowing from the bruſh; and the deſign perfect; for, in this work, you cannot alter or add upon any colour.

FRESH *diſſeiſin*, in *Law*, (*friſca diſſeiſina*, from the French *fraiz*; i. e. *recens*, & diſſeiſer, viz. *poſſeſſione ejicere*) ſignifies that *diſſeiſin* which a man might formerly ſeek to defeat of himſelf, and by his own power, without reſorting to the king or the law; as where it was not above fifteen days old, or ſome other ſhort continuance. Briton, cap. 5. Of this Bracton writes at large, concluding it to be arbitrary. Lib. iv. cap. 5.

FRESH *fine*, is that which was levied within a year paſt. Weſtm. 2. cap. 45. See FINE.

FRESH *force*, *friſca fortia*, in *Law*, denotes a force done within forty days.

If a man be diſſeiſed of lands or tenements, within any city or borough; or deforced from them after the death of his anceſtors, to whom he is heir; or after the death of his tenant for life, or in tail; he may, within forty days after his title accrued, have his remedy by an aſſize, or bill of *freſh force*.

FRESH *the hawſe*, on board a *Ship*. See HAWSE.

FRESH *Shot*, in the *Sea-phraſe*, ſignifies the falling down of any great river, into the ſea; by means whereof the ſea hath *freſh* water a good way from the mouth of the river. As this is more or leſs, they call it a *great*, or *ſmall freſh ſhot*.

FRESH *Spell*, in the *Sea-language*, a freſh gang, to relieve the rowers in the long boat.

FRESH *Suit*, *recens inſecutio*, in *Law*, is ſuch a preſent and active proſecution of an offender, where a robbery is committed, as never ceaſes, from the time of the offence committed, or diſcovered, till he be apprehended.

The benefit of ſuch purſuit of a felon is, that the party purſuing ſhall have his goods reſtored to him; whereas otherwiſe they are the king's.

Though the party robbed doth not apprehend the thief immediately, but ſome time after the robbery, provided he uſed his utmoſt endeavours to take him; or though he happens to be apprehended by ſome other perſon, yet it ſhall be adjudged *freſh purſuit*.

Freſh ſuit is either within the view, or without. Manwood ſays, that upon *freſh ſuit* within the view, treſpaſſers in the foreſt may be attached by the officers purſuing them, though without the limits of the foreſt. *Freſh ſuit* may continue for ſeven years. See HUE *and Cry*.

FRESH *Water*, is that not tinctured or impregnated with ſalt, or ſaline particles, enough to be diſcoverable by the ſenſe.

Such generally is that of ſprings, rains, wells, lakes, &c. Dr. Liſter is of opinion, that the natural and original ſtate of water is to be ſalt: the *freſhneſs* he ſuppoſes to be accidental, and to be owing to the vapours of plants, and the breath of animals therein; and to the exhalations raiſed by the ſun.

Others will have all water originally *freſh*, and take its ſaltneſs to be accidental; to account for which, a great number of hypotheſes have been framed.

The ſaltneſs of water is a foreign, and in moſt caſes a hurtful quality. It renders it not only nauſeous to the taſte, but greatly prejudicial to the body; and it is generally agreed, that thoſe waters, *cæteris paribus*, are beſt, not only for drinking, but alſo for œconomical uſes, as waſhing, boiling, and brewing, which are the freeſt from ſaltneſs.

Hence, various methods have been contrived for examining the *freſhneſs* of waters, and for dulcifying or making ſalt water *freſh*.

Mr. Boyle gives us a method of examining the *freſhneſs* of water, by means of a precipitate, which caſts down any ſaline particles before floating therein.

Into one thouſand grains of diſtilled water he puts one grain of ſalt; and into the ſolution lets fall a few drops of a ſtrong well filtrated ſolution of a well-refined ſilver, diſſolved in clear aqua fortis; upon which there immediately appears a whitiſh cloud, which, though but ſlowly, deſcends to the bottom, and there ſettles in a white precipitate, in which is the ſaline matter of the fluid.

This method, if it were required, would examine water to a greater nicety, than that here ſpecified. It has diſcovered ſalt in water where there was but one grain of ſalt in two thouſand, nay in three thouſand times the weight of water.

The experiment was tried before the Royal Society, in 1692, by Sir Hans Sloane; where it was likewiſe found that a drop or two, even of ſpirit of ſalt, mixed with common water, would be diſcovered by the ſame method. Phil. Tranſ. abr. vol. ii. p. 298.

Dr. Hook, in the ſame year, read a lecture before the Royal Society, on a method of his own, for diſcovering the ſmalleſt quantity of ſalt contained in water, on a principle of hydroſtatics. The operation was performed by means of a large poiſe of glaſs, of the ſhape of a bolt-head; the ball thereof was three inches in diameter, and the neck $\frac{1}{24}$ of an inch. This being ſo poiſed, with red lead put in it, as to make it very little heavier than *freſh* water; and then ſuſpended by the ſmall ſtem, which was graduated, to the end of a nice beam of a balance; and the degree or diviſion of the neck, contiguous to the ſurface of the water, noted; upon infuſing a quantity of ſalt, only equal to the two thouſandth part of the weight of the water, the neck of the poiſe ſunk near half an inch lower in the water. Phil. Tranſ. abr. vol. ii. p. 304.

The dulcifying, or making of ſalt water *freſh*, is a ſecret, that has been long ſought with great attention. For an account of the principal attempts that have been made with this view, ſee *Sea*-WATER.

FRESH *Wind* ſignifies ſtrong, but not violent; hence when the gale increaſes, it is ſaid to freſhen.

FRESHES, in *Sea-language*, denotes the impetuoſity of an ebb-tide, increaſed by heavy rains, and flowing out into the ſea, often diſcolouring it to a conſiderable diſtance, and forming a line that ſeparates the two colours, and which may be diſtinctly perceived for a great length along the coaſt.

FRET, or **FRETT**, in *Architecture*, a kind of knot, or ornament, conſiſting of two liſts, or fillets, variouſly interlaced, or woven, and running at parallel diſtances, equal to their breadth. See *Tab. Archit. fig.* 34.

A neceſſary condition of theſe *frets* is, that every return and interſection be at right angles. This is ſo indiſpenſable, that they have no beauty without it, but become perfectly Gothic.

Sometimes the *fret* conſiſts but of a ſingle fillet, which, if well managed, may be made to fill its ſpace exceedingly well.

The ancients made great uſe of theſe *frets*: the places they were chiefly applied on were even, flat members, or parts of building; as the faces of the corona, and eaves of cornices; under the roofs, foſſits, &c. on the plinths of baſes, &c.

The appellation was occaſioned hence, that the French word *frette* literally ſignified the timber-work of a roof, which conſiſts chiefly of beams, rafters, &c. laid acroſs each other, and, as it were, *fretted*.

FRET, in *Muſic*, is uſed for the ſtops uſed on ſome inſtruments, eſpecially baſs viols and lutes: it conſiſts of ſtrings tied round the neck of the inſtrument, at certain diſtances, within which ſuch and ſuch notes are to be found. Theſe ſtrings or *frets* are ſometimes, yet ſeldom, put on the baſs violin for learners, and taken off again when they can find the notes without them. On lutes and viols they always remain.

FRET, or **FRETTE**, in *Heraldry*, is a bearing conſiſting of ſix bars, croſſed, and interlaced, *fretwiſe*; as in *Tab. Herald. fig.* 39.

Guillim derives the word from the French *rets*, *net*; but the reader will eaſily furniſh himſelf with a better etymology from the word *fret*, in architecture.

He bears diamond a *fret* topaz; the coat armour formerly of the lord Maltravers, and now quartered by the duke of Norfolk. When it conſiſts of more than ſix pieces, the number muſt be ſpecified.

Some call this the *true lovers knot*; others *Harrington's knot*, becauſe it is their arms; and *nodo firmo*, the motto. Gibbon is for calling it *heraldorum nodus amatorius*.

FRETTS, in *Mineralogy*, a term uſed by our miners to expreſs the worn ſide of the banks of the rivers in mine-countries, where they ſearch for the SHOAD ſtones, or grewts, waſhed down from the hills, in order from thence to trace out the running of the ſhoad up to the mine. Phil. Tranſact. N° 69.

FRETTY, or **FRETTE**, in *Heraldry*, is where there are divers bars laid acroſs each other.

Fretty is of ſix, eight, or more pieces. Azure, *fretty* of eight pieces, or, the coat of the lord Willoughby.

Columbiere obſerves, that *fretty*, abſolutely uſed, without any addition, is ſuppoſed to be of ſix pieces; that is, ſo many bars, or pieces, croſſing each other, which, therefore, need not be expreſſed; but if there be more, as much muſt be mentioned. And yet Guillim has azure, *fretty* of ſix, argent; the coat of the ancient lords Elthingham, of Suſſex.

FRETUM, *ſtraight*, or *ſtreight*, in *Geography*. See STRAIGHT.

FRET-*work*, an enrichment of *frets*, or a place adorned with ſomething in manner thereof. See FRET.

Fret-work is ſometimes uſed, among us, to fill up and enrich flat, empty ſpaces; but it is principally practiſed in roofs, which are *fretted* over with plaſter-work.

The Italians, alſo, apply it to the mantlings of chimneys with great figures: a cheap piece of magnificence, and as durable almoſt within doors, as harder matters in the weather.

FRIABLE is applied to bodies, to denote them tender and brittle, eaſily crumbled or reduced to powder between the fingers; their force of coheſion being ſuch as eaſily expoſes them to ſuch ſolution. Such are pumice, and all calcined ſtones, burnt alum, &c.

Friability is ſuppoſed to ariſe hence, that the body conſiſts wholly of dry parts, irregularly combined, and which are readily ſeparated, as having nothing unctuous or glutinous to bind them together.

FRIAR, or **FRIER**, by the Latins called *frater*, the Italians *fra*, and the French *frere*, that is, *brother*, is a term common to the monks of all orders; founded on this, that there is a kind of fraternity, or brotherhood, preſumed between the ſeveral religious perſons of the ſame convent or monaſtery.

The kinds of *frirrs* are very numerous: AUGUSTINE *friars*; DOMINICAN, or black, or preaching, *friars*; FRANCISCAN, or grey, or begging, *friars*; and CARMELITES, or white *friars*.

FRIAR, in a more peculiar ſenſe, is reſtrained to ſuch monks as are not prieſts; for thoſe in orders are uſually dignified with the appellation of FATHER.

FRIARS, or **FRIERS** *obſervant*, *fratres obſervantes*, were a branch of the Franciſcans; thus called, becauſe not combined together in any cloyſter, convent, or corporation, as the conventuals are, but only agreed among themſelves to *obſerve* the rules of their order, and that more ſtrictly than the conventuals did, from whom they ſeparated themſelves out of a ſingularity of zeal, living in certain places of their own chuſing.

FRIAR'*s cowl*, in *Botany*. See WAKE *Robin*.

FRIARY *of the holy Trinity*. See TRINITY.

FRIBURGH, **FRIDBURGH**, or **FRITHEBORG**, among our Anglo-Saxon anceſtors, denoted the ſame as FRANK-pledge did after the time of the Conqueſt.

Præterea eſt quædam ſumma & maxima ſecuritas, per quam omnes ſtatu firmiſſimo ſuſtinentur, viz. ut unuſquiſque ſtabilitat ſe ſub fidejuſſionis ſecuritate, quam Angli vocant freoborghes: *ſoli tamen Eboracenſes dicunt eandem* tienmannatale, *quod ſonat Latine decem hominum numerum.* LL. Edw. II. ap. Lamb.

Every man in this kingdom was anciently aſſociated in ſome decennary, or company of ten families, who were pledged, or bound, for each other, to keep the peace, and obſerve the law. See TITHING. If any offence was done by one, the other nine were to anſwer it; that is, if the criminal fled from juſtice, they had thirty days allowed to apprehend him: if he was not taken in that time, he who was the *friburgh*, i. e. the principal pledge of the ten, ſhould take two of his own number, and the chief pledges of three neighbouring *friburghs*, with two others out of each of the ſaid *friburghs*, who were to purge themſelves, and their *friburgh*, of the forfeiture and flight of the criminal. If they could not do this, the principal pledge, with the other eight, were to make ſatisfaction.

Great men were not combined in any ordinary decenna, or dozen, as being deemed a ſufficient aſſurance for themſelves and their menial ſervants.

FRICASSEE, a diſh, or meſs, haſtily dreſſed in a frying-pan, and ſeaſoned with butter, oil, or the like.

The word is French, formed of the Latin *frixatura*, *frying*. Others will have *fricaſſee* formed in imitation of the noiſe made by butter, or other fat, when melted in the pan.

We ſay a *fricaſſee* of pullets, of rabbits, of tench, of tripe, of frogs, of eggs, of peas, &c.

FRICIUM, of *frico*, *I rub*, in *Pharmacy*, a name given to ſuch medicines as are intended to be rubbed into the ſeveral parts of the body. The ancients had three kinds of *fricia*, the dry, the ſoft, and the liquid; the firſt was uſed in the way of fumigation, the ſecond was bound on the part with cloths, and the laſt was uſed by way of embrocation.

FRICTION, the act of rubbing or grating the ſurface of one body againſt that of another, called alſo *attrition*.

The phenomena ariſing upon the *friction* of divers bodies, under different circumſtances, are very numerous and conſiderable.

Mr. Hawkſbee gives us a number of experiments of this kind; particularly of the attrition, or *friction* of glaſs, under various circumſtances, the reſult of which was, that it yielded light, and became electrical.

All bodies by *friction* are brought to conceive heat; many of them to emit light; particularly a cat's back, ſugar, beaten ſulphur, mercury, ſea-water, gold, copper, &c. but, above all, diamonds, which, when briſkly rubbed againſt glaſs, gold, or the like, yield a light equal to that of a live coal when blowed by the bellows. See ELECTRICS and ELECTRICITY.

FRICTION, in *Mechanics*, denotes the reſiſtance a moving body meets with from the ſurface on which it moves.

Friction ariſes from the roughneſs or aſperity of the ſurface of the body moved on, and that of the body moving: for ſuch ſurfaces conſiſting alternately of eminences and cavities, either the eminences of the one muſt be raiſed over thoſe of the other, or they muſt be both broke and worn off; but neither can happen without motion, nor can motion be produced without a force impreſſed.

Hence, the force applied to move the body is either wholly, or partly, ſpent on this effect; and conſequently there ariſes a reſiſtance, or *friction*, which will be greater, *cæteris paribus*, as the eminences are the greater, and the ſubſtance the harder: and as the body, by continual *friction*, becomes more and more poliſhed, the *friction* diminiſhes.

Hence it follows, that the ſurfaces of the parts of machines that touch each other ſhould be as ſmooth and poliſhed as poſſible. However, it is found by experience, that the flat ſurfaces of metals, or other bodies, may be ſo far poliſhed as to increaſe *friction*; becauſe the attraction of COHESION becomes ſenſible, as we bring the ſurfaces of bodies nearer and nearer to contact. But, as no body can be ſo much poliſhed, as quite to take away all inequality; witneſs thoſe numerous ridges diſcovered by the microſcope on the ſmootheſt ſurfaces; hence ariſes the neceſſity of anointing the parts that touch with oil, or ſome other fatty matter.

FRICTION, *laws of*. 1. As the weight of a body moving on another is increaſed, ſo is the *friction*.

This we ſee experimentally in a balance, which, when only charged with a ſmall weight, eaſily turns; but, with a greater, a greater force is required.

Hence, if the line of direction of a moving body be oblique to the ſurface moved on, the *friction* is the greater; this having the ſame effect as an increaſe of weight.

And hence, again, as a perpendicular ſtroke or impreſſion is to an oblique one; as the whole ſine, to the ſine of the angle of incidence; and the ſine of a greater angle is greater, and that of a leſſer leſs; the *friction* is the greater, as the line of direction approaches nearer to a perpendicular.

This is eaſily obſervable, and eſpecially in the teeth of wheels, which are frequently broke on this very account. The *friction*, therefore, is taken away, if the line of direction of the moving body be parallel to the ſurface.

2. The *friction* is leſs in a body that rolls, than it would be were the ſame body to ſlide, as is eaſily demonſtrated. For ſuppoſe a dented ruler, AB, *Tab. Mechanics*, *fig.* 12. and ſuppoſe a wheel DE to move along with it, with its teeth perpendicular to the circumference; if now the body were to ſlide, the tooth F, when it touched the ruler, would deſcribe a right line on the ſurface thereof, and, as the tooth of the ruler H reſiſts the ſame, it could not proceed without removing or breaking either the tooth H, or that F. And the ſame will hold in the ſliding of any rough ſurface upon another, where all the *friction* will take place that can any way ariſe from the roughneſs of the ſurface. But if the wheel ED roll along the ruler, then the tooth H will no longer reſiſt its motion, only as it is to be hoiſted out of the cavity F over the eminence of the tooth H; and the ſame holds in the rubbing of any rough body over the ſurface of another.

Hence, in machines, leſt the *friction* ſhould employ a great part of the power, care is to be taken, that no part of the machine ſlide along another, if it can be avoided; but rather that they roll, or turn upon each other. With this view it may be proper to lay the axes of cylinders, not, as is uſually done, in a groove, or concave matrix, but between little wheels, ABCD. *fig.* 13. moveable on their reſpective axes: for, by this contrivance, the *friction* is transferred from the circumference of thoſe wheels to their pivots; and the *friction* may be ſtill diminiſhed farther, by making the axles of thoſe wheels reſt upon other *friction*-wheels that turn round with them. This was long ago recommended by P. Caſabus; and experience confirms, that we ſave much power by it. Hence alſo it is, that a pulley moveable on its axis reſiſts leſs than if it were fixed. And the ſame may be obſerved of the wheels of coaches, and other carriages.

From theſe principles, with a little farther help from the higher geometry, Olaus Roemer determined the figure of the teeth of wheels, that ſhould make the leaſt reſiſtance poſſible, and which ſhould be epicycloidal. And the ſame was afterwards demonſtrated by De la Hire; though, which is much to be lamented, the thing is not yet taken into practice.

Hence, in ſawing-mills, the ſides of the wooden rectangle the ſaws are fitted into, ſhould be furniſhed with rotulæ, or little wheels, which would greatly leſſen the *friction*; and the like in other caſes.

FRICTION, *calculation of the quantity of*. The *friction* is a point of the utmoſt importance in machines; and by all means to be conſidered, in calculating the force thereof: yet it is generally overlooked in ſuch calculations: but this is principally, becauſe its preciſe value is not known. It is not yet reduced to certain and infallible rules: ſince it depends upon the ſtructure of bodies, the form of their prominent parts and cavities, and upon their rigidity, their elaſticity, their coherence, and other circumſtances. The common method is, barely to compute the advantage, which a moving power has from the machine; either on account of its diſtance from a fixed point; or of the direction in which it acts. And in all the demonſtrations it is ſuppoſed, that the ſurfaces of bodies are perfectly ſmooth and poliſhed. Indeed the engineers expect, that in the practice they ſhould loſe part of the advantage of their force, by the *friction*: but how much, it is ſuppoſed, nothing but the practice can determine. M. Amontons, indeed, has made an attempt to ſettle, by experiment, a foundation for the preciſe calculation of the quantity of *friction*; and Mr. Parent has confirmed it, from reaſoning and geometry: but their theory, however warranted, is not generally and fully received.

M. Amontons's principle is, that the *friction* of two bodies depends on the weight, or force, wherewith they bear on each other; and only increaſes as the bodies are more ſtrongly preſſed, or applied, againſt each other, or are charged with a greater weight; and that it is a vulgar error, that the quantity of *friction* has any dependence on the bigneſs of the ſurfaces rubbed againſt each other; or that the *friction* increaſes as the ſurfaces do. Thus if a piece of wood four inches wide and one inch thick be ground, and thereby made exactly fit to the ſurface of another fixed piece of the ſame wood, it will acquire the ſame weight to draw it along on the ſame, whether it be laid on its broad or narrow ſide: for, though on the broad ſide there be four times the number of touching particles (*cæteris paribus*), yet each particle is preſſed with but $\frac{1}{4}$ of the weight bearing on thoſe of the narrow ſide; and ſince four times the number multiplied by $\frac{1}{4}$ of the weight is equal to $\frac{1}{4}$ of the number multiplied by four times the weight, it is plain that the effect, that is, the reſiſtance, is equal in both caſes, and therefore, requires the ſame force to overcome it.

Upon the firſt propoſal of this paradox, M. de la Hire had recourſe to experiments; which ſucceeded much in favour of the new ſyſtem. He laid ſeveral pieces of rough wood on a rough table; their ſizes were unequal; but he laid weights on them, ſo as to render them all equally heavy: and he found, that the ſame preciſe force, or weight, applied to them by a little pulley was required to put each in motion, notwithſtanding all the inequality of the ſurfaces. The experiment ſucceeded in the ſame manner in pieces of marble, laid on a marble table. Upon this M. de la Hire betook himſelf to the rationale of the thing; and has given us a phyſical ſolution of the effect. And M. Amontons has ſettled a calculus of the value of *friction*;

friction; and the loſs ſuſtained thereby in machines, on the foundation of the new principle.

In wood, iron, lead, and braſs, which are the principal materials uſed in machines, he finds the reſiſtance, cauſed by *friction*, to be nearly the ſame, when thoſe materials are anointed with oil, or other fatty matter; (but this fact has been diſputed by Muſchenbroek, and experiments urged in proof of the contrary): and this reſiſtance, independent of the quantity of ſurface, he makes to be nearly equal to a third part of the force wherewith the bodies are preſſed againſt each other. Others have obſerved, that, if the ſurfaces be hard and well poliſhed, the *friction* will be leſs than a third part of the weight; but if the parts be ſoft or rugged, it will be much greater. Let a very ſmooth cylinder of wood A B, *Tab.* III. *Mechanics*, *fig.* 44. be laid on two well-poliſhed and oiled or greaſed ſupporters C and D, and be charged with the weight of two pounds in the two equal balls G, H; it will require an additional weight x (equal to about a third part of the two pounds) to give motion to, or overcome the *friction* of the ſaid cylinder. But this additional weight, as it cauſes a greater preſſure of the cylinder, will increaſe the *friction*, and require the addition of another weight y, equal to a third part of its own; for the ſame reaſon the weignt y will require another z a third part of two pounds and ſo on *ad infinitum*. Therefore, if the *friction* is preciſely equal to a third of the weight, the firſt weight with all the additional ones viz. $2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}$ &c. will be a ſeries of numbers in geometrical progreſſion decreaſing: and the ſum of all theſe terms, omitting the firſt, i. e. the ſum of the infinite number of additional weights $x+y+z$ &c. is equal to one pound: ſo that if the weight of the cylinder be inconſiderable, the way to overcome the *friction* will be to double the power G or H at once.

But if the cylinder moved on the two ſmall gudgeons E and F, or on a ſmall axis, the *friction* would be abated in the ſame proportion as the diameter of theſe gudgeons is leſs than the diameter of the cylinder, becauſe in this caſe the parts on which the cylinder moves and rubs will have leſs velocity than the power which moves it in the ſame proportion. See WHEEL-*Carriages*.

The above recited hypotheſis of M. Amontons has been adopted and confirmed by M. Camus, Deſaguliers and others. In order to eſtimate the quantity of *friction* in any engine, begin at the power and conſider the velocity and the weight at the firſt rubbing part, and determine the quantity of *friction* by the foregoing principles; then proceed to the next rubbing part, finding the *friction* there, &c. Mr. Emerſon, in his Principles of Mechanics, deduces from experiments the following remarks relating to the quantity of *friction*: when a cubic piece of ſoft wood of eight pounds weight, moves upon a ſmooth plane of ſoft wood, at the rate of three feet per ſecond, its *friction* is about one third of the weight; but if it be rough, the *friction* is little leſs than half the weight: on the ſame ſuppoſition, when both the pieces of wood are very ſmooth, the *friction* is about one fourth of the weight: the *friction* of ſoft wood on hard, or of hard wood upon ſoft is one fifth or one half of the weight; of hard wood upon hard wood one ſeventh or one eighth; of poliſhed ſteel moving on ſteel or pewter one fourth; moving on copper or lead, one fifth of the weight. He obſerves in general, that metals of the ſame ſort have more *friction* than thoſe of different ſorts; that lead makes much reſiſtance; that iron or ſteel running in braſs makes the leaſt *friction* of any; and that metals oiled make the *friction* leſs than when poliſhed, and twice as little as when unpoliſhed. Deſaguliers obſerves that, in Monſ. Camus's experiments on ſmall models of ſledges in actual motion, there are more caſes wherein the *friction* is leſs than where it is more than one third of the weight. See a table, exhibiting the *friction* between various ſubſtances, formed from his experiments in Deſ. Exp. Phil. vol. i. p. 193, &c.

Beſide the preſſion, the magnitude whereof determines that of the *friction*, there is another circumſtance to be conſidered; viz. the velocity. The *friction* is the greater, and the more difficult to ſurmount, as the parts are rubbed againſt each other with the greater ſwiftneſs; ſo that this velocity muſt be compared with that of the power neceſſary to move the machine, and overcome the *friction*. If the velocity of the power be double that of the parts rubbed, it acquires, by that means, an advantage that makes it double; or, which amounts to the ſame, it diminiſhes the contrary force of *friction* by one half; and reduces it to a ſixth part of the weight, or preſſion. But this velocity M. Amontons only conſiders as a circumſtance that augments or diminiſhes the effect of the preſſion, i. e. the difficulty of the motion: ſo that the *friction* ſtill follows the proportion of the weight. Only, we are hereby directed to diſpoſe the parts of machines that rub againſt each other, in ſuch manner, as that they may have the leaſt velocity poſſible: and thus the diameter of the axis of a wheel ſhould be as ſmall as poſſible, with regard to that of the wheel; in that the leſſer the axis, the ſlower will be the motion of the ſurfaces rubbing againſt each other; ſince the velocity of a circular motion always goes diminiſhing from the circumference to the centre: and, for the ſame reaſon, the teeth of dented wheels ſhould be as ſmall and thin as poſſible; for a tooth catching on a notch, &c. rubs one of its ſides againſt a ſurface equal to its own; and is to diſengage itſelf, in a certain time, by paſſing over a ſpace equal to the ſurface; conſequently, the leſſer the ſurface, the leſs ſpace it has to move; the ſmallneſs of the ſurface diminiſhing the reſiſtance of the *friction*; not as it is a leſs ſurface that rubs, but as there is a leſs ſpace to move. The following general propoſition may be deduced from the preceding remarks viz. That the reſiſtances ariſing from *friction* are to one another in a ratio compounded of the preſſures of the rubbing parts, and the times or velocities of their motions.

But, notwithſtanding all the confirmations and illuſtrations of this theory of *friction*, the public, or even the academy itſelf where it was propoſed, could not be brought fully to acquieſce in it. Muſchenbroek and the abbé Nollet have concluded from experiments that the *friction* of bodies depends on the quantity of their ſurface as well as their weight. Introd. ad Phil. Nat. vol. i. c. 9. and Lect. Phyſ. Exp. tom. i. p. 241. There is ſcarce any ſubject of experiment, with regard to which different perſons have formed ſuch various concluſions, ſo that the nature and laws of *friction* are not yet ſufficiently clear and deciſive. It is granted, that the preſſion has a great effect, and is, in many caſes, the only thing to be conſidered in *frictions*: but it will be hard to perſuade us abſolutely to exclude the conſideration of the ſurface. In effect, the contrary ſeems capable of a metaphyſical demonſtration.

If two bodies, with plain ſurfaces, ſuppoſed infinitely hard, and poliſhed, be moved along each other, the *friction* will be none or infinitely ſmall; but if, in lieu of ſuch ſuppoſition, which has no place in nature, we ſuppoſe two bodies, with rough uneven ſurfaces, the difficulty of moving one of them on the other muſt either ariſe from this; that the firſt is to be raiſed, in order to diſengage the parts catched or locked in the ſecond; or that the parts muſt be broken, and worn off; or both. In the firſt caſe, the difficulty of raiſing one of the bodies makes that of the motion; and of conſequence the *friction* ariſes wholly from the weight, or preſſion; and the ſurface has nothing to do in it.

In the ſecond caſe, the magnitude of the ſurface would be all; were it poſſible this ſecond caſe could be abſolutely abſtracted from the firſt; i. e. could the parts of one body be rubbed and worn againſt thoſe of the other, without raiſing one of them; it being viſible, that a greater number of parts to be broken would make a greater reſiſtance than a leſs: but as in practice we never rub, or grind, without raiſing the body, the reſiſtance ariſing from the greatneſs of the ſurface in the ſecond caſe, is always combined with that from the preſſion; whereas, in the former caſe, that ariſing from the preſſion may be alone, and uncompounded.

Add, that what is worn off a body, is ordinarily very little, with regard to the great number of times the body muſt have been raiſed during the *friction*, and all the little heights added together, which the body muſt have been raiſed to.

Hence, as the reſiſtance from preſſion may be ſingle; and as the ſame always accompanies that ariſing from the magnitude of the ſurfaces, and is uſually much the more conſiderable of the two, when it does accompany it; for theſe reaſons, in moſt of the experiments that are made, it is the only one perceived, and the only one that needs to be conſidered.

But then, as it is poſſible, in certain caſes, for the preſſion to be very ſlender, and the number of parts to be rubbed, very great, it muſt be owned, there are caſes wherein the *friction* follows, very ſenſibly, the proportion of the ſurfaces.

Dr. Deſaguliers has treated fully of the *friction* of engines, carriages, &c. See his Courſe of Experim Philoſ. vol. i. p. 133 to 138. and p. 182 to 254. ſee alſo p. 458 to 460.

FRICTION *of the parts of fluids.* See RESISTANCE, and RETARDATION *of fluids.*

FRICTION *of ropes.* See CORDAGE and ROPES.

FRICTION *of wheel-carriages.* See WHEEL-*Carriages.*

FRICTION, in *Medicine*, and *Surgery*, denotes the act of rubbing a diſeaſed part with oils, unguents, or other matters; in order to eaſe, relieve, and cure it.

Frictions are much uſed of late in venereal caſes. They prefer the applying of mercury externally by way of *friction*, to that of giving it internally, to raiſe a ſalivation.

There are alſo *frictions* with the fleſh-bruſh, a linen cloth, or the hand only: for the effect of which laſt, ſee STROAKING.

Frictions of any kind are a ſort of exerciſe which contributes greatly to health; as they excite and ſtir up the natural warmth, divert defluxions, promote perſpiration, open the pores of the ſkin, and carry off ſtagnant humours.

The fleſh-bruſh, Dr. Cheyne obſerves, is an exerciſe extremely uſeful for promoting a full and free perſpiration and circulation. Every body knows the effect of currying horſes; that it makes them ſleek, gay, lively, and active; ſo as even to be judged equivalent to half the feeding.

This it can no otherwiſe effect, but by aſſiſting nature to throw off the recrements of the juices, which ſtop the free circulation, and, by conſtant *friction*, irritation, and ſtimulation, to bring the blood and ſpirits to the parts moſt diſtant from the ſeat of heat and motion; and ſo plump up the ſuperficial muſcles. And the ſame effect it would have in other creatures, and man himſelf, if managed in the ſame manner, and with the ſame care and regularity.

Perſons, therefore, of weak nerves, and ſedentary lives, would do well to ſupply the want of other exerciſe with ſpending half an hour, morning and night, in currying and rubbing their whole body, eſpecially their limbs, with a fleſh-bruſh. But this means of health is moſt advantageouſly uſed when the *primæ viæ* are moſt empty.

FRICTION, or rather FRIXION, in *Chemiſtry*, is the ſame with what in cookery we call *frying*; viz. the coction of certain matters in a pan, with the addition of ſome unctuous thing, as oil, fat, &c.

The *frixion* of medicines is performed over a ſlow, moderate fire; and that of foods over a quick one.

FRIDAY, the ſixth day of the WEEK ſo called from Friga, a goddeſs worſhipped by the Saxons on this day. It is a faſt-day in the church of England, in memory of our Saviour's crucifixion, unleſs Chriſtmaſs-day happens to fall on *friday*, which is always a feſtival.

FRIDAY, *Good*: See PASSION-*Week*.

FRIDSTOLL, or FRITHSTOW, of the Saxon *frid*, peace, and *ſtol*, ſeat, in our *ancient Writers*, ſignifies a ſeat, chair, or place of peace, where criminals might find ſafety and protection.

In the charter of immunities confirmed to the church of St. Peter in York, ann. 5 H. VII. it is explained by *Cathedra quietudinis & pacis*.

Of theſe there were many in England; but the moſt famous was at Beverley, which had this inſcription, *Hæc ſedes lapidea* Freedſtoll *dicitur, i. e.* Pacis Cathedra *ad quam reus fugiendo perveniens, omnimodam habet ſecuritatem.* Camden.

FRIENDLESS *Man*, was the old Saxon name for him whom we call an outlaw.

The reaſon is, becauſe he was, upon his excluſion from the king's peace and protection, denied all help of friends, after certain days. *Nam foris fecit amicos.*

FRIENDS *Alien*. See ALIEN.

FRIESLANDERS, in *Eccleſiaſtical Hiſtory*, a ſect of moderate ANABAPTISTS, deriving their name from *Frieſland*, the country which they inhabit. See WATERLANDIANS.

FRIEZE, FRIZE, or FREEZE. See FREEZE.

FRIGATE, in *Sea Affairs*, a ſhip of war, uſually of two decks, light built, deſigned for ſwift ſailing. When it hath but one deck, and conſequently is of a ſmaller ſize, they call her a light *frigate*.

Frigates mount from twenty to thirty-eight guns, and are eſteemed excellent cruizers. The name was formerly known only in the Mediterranean, and applied to a long kind of veſſel, navigated in that ſea with ſails and oars. The Engliſh were the firſt who appeared on the ocean with theſe ſhips, and equipped them for war as well as for commerce.

FRIGATE-*built* denotes the diſpoſition of the decks of ſuch merchant ſhips as have a deſcent of four or five ſteps from the quarter deck and fore-caſtle into the waiſt, in contradiſtinction to thoſe whoſe decks are on a continued line for the whole length of the ſhip, which are called galley-built. See *Fluſh*-DECK.

FRIGATOON, a Venetian veſſel, commonly uſed in the Adriatic, built with a ſquare ſtern, and without any foremaſt, having only a main-maſt, mizen-maſt, and bow-ſprit.

FRIGERATORY, among *Builders*, denotes a place intended to keep things cool in ſummer.

FRIGHT. This paſſion has been known not only to cauſe, but to cure diſeaſes. Mr. Boyle mentions agues, gout, and ſciatica, cured by this means. See Works abr. p. 82, &c.

It is a commonly known cure for the hiccough, to put the patient in a ſudden *fright*.

FRIGID, FRIGIDUS, *cold*, is variouſly uſed. A *frigid* ſtyle, is a low, jejune manner of diction; wanting force, warmth of imagination, figures of ſpeech, &c.

FRIGID *Zone*, or *Frozen Zone*, in *Geography*. See ZONE.

FRIGIDITY is alſo uſed in the ſame ſenſe with IMPOTENCE.

FRIGORIFIC, of *frigus*, *cold*, and *facio*, *I make*, in *Phyſics*, ſomething that occaſions cold.

Some philoſophers, particularly Gaſſendus, and other corpuſcularians, denying cold to be a mere privation, or abſence of heat, contend that there are actual *frigorific* corpuſcles, or particles as well as fiery ones: whence proceed COLD and HEAT. But later philoſophers allow of no other *frigorific* particles beſide thoſe nitrous ſalts, which float in the air in cold weather, and occaſion FREEZING.

FRILL, in *Falconry*, when a hawk trembles or ſhivers, they ſay ſhe *frills*. Dict. Ruſt.

FRINGE-*tree*. See SNOW-*drop-tree*.

FRINGILLA, in the *Linnæan Syſtem of Zoology*, the name of a large genus of birds of the general order of the paſſeres. The diſtinguiſhing characters of this genus are theſe: the tongue is whole and even, the beak is of a conic, ſtraight, ſharp-pointed figure, and one mandible receives the other into the ſinus of its baſis. Of this genus are the CHAF-FINCH, GOLD-*finch*, SPARROW, LINNET, &c.

FRINGILLAGO, in *Zoology*, a name by which ſome have called the whole genus of the titmouſe; but others have reſtrained it only to one ſpecies of them, which is the common larger kind, called by us the ox-eye. This is much larger than any of the others, weighing near an ounce, whereas they ſeldom exceed three drams. Its head and throat are black, the cheeks white, the back green, the belly of a yellowiſh green, divided in the middle by a bed of black, which extends to the vent: the rump is of a blueiſh grey. The quill feathers are duſky, edged partly with blue, partly with white; the coverts blue, the greater tipt with white. The exterior ſides of the outmoſt feathers of the tail are white, of the others blueiſh; their interior ſides duſky, the legs of a lead colour: the toes are divided to the origin; and the back toe of the whole genus of titmouſe is large and ſtrong. This bird builds in hollow trees, and lays ten eggs, though it ſometimes viſits the gardens and does great miſchief to the fruit. It has three chearful notes which it begins to utter in the month of February. Pennant. Ray's Ornithol. p. 174.

FRINGILLAGO *Americana cærulea*, in *Zoology*, a name given by Mr. Ray to the American titmouſe, otherwiſe known by its Braſilian name *guiracenoia*.

FRINGILLARIUS *Accipiter*, in *Zoology*, the name of a ſpecies of hawk, called by ſome *niſus*, and in Engliſh the *ſparrow*-HAWK.

FRIPPERY, a French term, ſometimes uſed in our language; properly importing the trade, or traffick, of old ſecond-hand cloaths and goods.

The word is alſo uſed for the place where ſuch ſort of commerce is carried on, and even for the commodities themſelves. The company of *Frippiers*, or *Fripperers*, at Paris, form a regular corporation, of an ancient ſtanding; and make a conſiderable figure among the companies of that city.

FRIST, a term among *Merchants* for ſelling goods upon credit.

FRIT, or FRITT, in the *Glaſs Manufacture*, is the matter, or ingredients, whereof glaſs is to be made; when they have been calcined, or baked in a furnace.

A ſalt drawn from the aſhes of the plant kali, or from fern, or other plants mixed with ſand, or flint, and baked together, makes an opake maſs, called by glaſs-men *frit*; probably from the Italian *frittare*, to fry, or becauſe the *frit*, when melted, runs into lumps, like fritters, called by the Italians *fritelli*.

Frit, by the antients, was called *hammonitrum*, or *ammonitrum*, of αμμος, ſand, and νιτρον, nitre: under which name it is deſcribed by Pliny thus: fine ſand from the Volturnian ſea, mixed with three times the quantity of nitre, and melted, makes a maſs called *ammonitrum*; which, being rebaked, makes pure glaſs. Hiſt. Nat. lib. xxxvi. cap. 26.

Frit, Neri obſerves, is only the calx of the materials which make glaſs; which though they might be melted, and glaſs be made, without thus calcining them, yet it would take up much more time. This calcining, or making, of *frit*, ſerves to mix and incorporate the materials together, and to evaporate all the ſuperfluous humidity. The *frit*, once made, is readily fuſed, and turned into glaſs.

There are three kinds of *frits*; the firſt, *cryſtal frit*, or that for cryſtal metal; made with ſalt of pulverine and ſand.

The ſecond, and ordinary *frit*, is made of the bare aſhes of pulverine, or barillia, without extracting the ſalt from them. This makes the ordinary white, or cryſtal metal.

The third is *frit* for green glaſſes, made of common aſhes, without any preparation. This laſt *frit* will require ten or twelve hours baking.

The materials in each are to be finely powdered, waſhed and ſearced; then equally mixed, and frequently ſtirred together in the melting pot. For the reſt, ſee Glass, and Crystal.

FRITBURGH. See Friburgh.

FRITH; ſee Fryth.

FRITHGILD, was anciently the ſame with what we now call a *guild*, or a *fraternity*, or *company*. See Gild.

FRITILLARIA *craſſa*, ſee Swallow-*wort*.

FRITILLARY, *fritillaria*, the *chequered tulip*, and *crown imperial*, in *Botany*; a genus of the *hexandria monogynia* claſs; its characters are theſe: the flower hath no empalement, but is bell-ſhaped and hath ſix oblong petals; in the hollow at the baſe of each petal is ſituated a *nectarium*: and the flower hath ſix *ſtamina* ſtanding near the ſtyle. In the centre is ſituated an oblong three-cornered germen, which afterward becomes an oblong capſule with three lobes, having three cells, which are filled with flat ſeeds ranged in a double order. There are nine ſpecies. There are vaſt varieties in the colours of the flower, when the plants are carefully propagated from ſeeds. They are by ſome propagated by roots, but the method by ſeeds is greatly preferable, as it produces much the greater number of roots, as well as the better flowers.

The ſeeds for this ſhould be ſaved from the fineſt flowers, and ſown on ſome light freſh earth in flat ſhallow pans, or boxes with holes at the bottom, kept open by tile-ſhreds to let out the moiſture. The ſeeds muſt be ſown pretty thick, and covered with a quarter of an inch of earth: this is to be done in the beginning of Auguſt. The pans or boxes are then to be ſet in a place where they may have the morning's ſun, till about eleven o'clock, and if the ſeaſon proves dry, they muſt be watered, and always carefully kept clear of weeds.

Toward the latter end of September the boxes muſt be removed into a warmer ſituation, and placed under ſhelter of a hedge or under a ſouth wall, and they are here to remain till the middle of March, by which time the plants will be come up an inch high. They are now to be removed into a ſhady ſituation, and are to remain there the whole ſummer. About the beginning of Auguſt, a bed of freſh earth is to be prepared, on which the earth of the pans and boxes containing the roots of the plants is to be ſtrewed, after their leaves are all dead: this is to be covered one fourth of an inch thick with fine freſh earth evenly ſifted on, and in this ſtate they are to remain till they flower, which is generally the third year from the ſowing. When they are in flower, the fineſt kinds ſhould be marked with ſticks, and their roots planted out into ſeparate beds.

As ſoon as the leaves are decayed they ſhould be carefully weeded, and thin off-ſets taken up and tranſplanted. Miller.

For an account of the other ſpecies of this genus, ſee Crown *imperial*.

FRIXION. See Friction.

FRIZE, or Frieze, in *Architecture*, a part of the entablature of columns, more uſually written and pronounced Freeze.

Frize, or Freeze, in *Commerce*, a kind of woollen cloth, or ſtuff, for winter wear, being *frized*, or knapt, on one ſide; whence, in all probability, it derives its name.

Of *frizes*, ſome are croſſed, others not croſſed: the former are chiefly of Engliſh manufacture, the latter of Iriſh.

FRIZING *of cloth*, a term in the *Woollen Manufactory*, applied to the forming of the knap of a cloth, or ſtuff, into a number of little hard burrs, or prominences, covering almoſt the whole ground thereof.

Some cloths are only *frized* on the back-ſide, as black cloths; others on the right ſide, as coloured and mixed cloths, rateens, bays, frizes, &c.

Frizing may be performed two ways; one with the hand, i. e. by means of two workmen, who conduct a kind of plank, that ſerves as a *frizing* inſtrument.

The other way is by a mill, worked either by water, or a horſe; or, ſometimes, by men. This latter is eſteemed the better way of *frizing*, becauſe the motion being uniform and regular, the little knobs of the *frizing* are formed more equally and regularly.

The ſtructure of this uſeful machine is as follows:

The three principal parts are, the *frizer*, or criſper; the *frizing*-table; and the drawer, or beam. The two firſt are two equal planks, or boards, each about ten feet long, and fifteen inches broad; differing only in this, that the *frizing*-table is lined or covered with a kind of coarſe woollen ſtuff, of a rough, ſturdy knap, and that the *frizer* is incruſtated with a kind of cement, compoſed of glue, gum Arabic, and yellow ſand, with a little aqua vitæ, or urine. The beam or drawer, thus called, becauſe it draws the ſtuff from between the *frizer* and *frizing*-table, is a wooden roller, beſet all over with little, fine, ſhort points or ends of wire, like thoſe of cards uſed in carding of wool.

The diſpoſition and uſe of the machine is thus: the table ſtands immoveable, and bears or ſuſtains the cloth to be *frized*, which is laid with that ſide uppermoſt on which the knap is to be raiſed. Over the table is placed the *frizer*, at ſuch diſtance from it as to give room for the ſtuff to be paſſed between them; ſo that the *frizer*, having a very ſlow, ſemi-circular motion, meeting the long hairs or knap of the cloth, twiſts and rolls them into little knobs or burrs, while, at the ſame time, the drawer, which is continually turning, draws away the ſtuff from under the *frizer*, and winds it over its own points.

All that the workman has to do while the machine is going, is to ſtretch the ſtuff on the table as faſt as the drawer takes it off, and, from time to time, to take off the ſtuff from the points of the drawer.

It has already been obſerved, that the *frizing*-table is lined with ſtuff of a ſhort, ſtiff, ſtubby knap; the uſe whereof is, to detain the cloth between the table and *frizer*, long enough for the grain to be formed, that the drawer may not take it away too readily; which otherwiſe muſt be the caſe, inaſmuch as it is not held by any thing at the other end.

It were needleſs to ſay any thing particular of the manner of *frizing* ſtuffs with the hand, it being the aim of the workmen to imitate, as near as they can, with their wooden inſtrument, the ſlow, equable, and circular motion of this machine. It needs only be added, that their *frizer* is but about two feet long, and one broad; and that, to form the knap more eaſily, they moiſten the ſurface of the ſtuff lightly with water, mingled with whites of eggs, or honey.

FRIZONE, in *Zoology*, a name by which many call the coccothraustes or groſs-beak, called alſo in Engliſh the hawfinch.

FROBENIUS'*s æthereal ſpirit*. See Æther and Spirit.

FROG, *rana*, in *Zoology*, a genus of reptiles in the claſs of amphibious animals: the characters of it are, that the body is naked, without a tail, and furniſhed with four legs.

The feet of the *frog* are webbed, for the better ſwimming, and it has very ſtrong muſcles in the hinder part of its body to aſſiſt it in leaping. The lungs of the *frog* are different from thoſe of all other animals; they are only a ſort of membranaceous bladders, with ſeveral tubercles, by means of which they reſemble the fruit of the firs, or pines: theſe, when once inflated, do not immediately become flaccid, as in other animals, but remain in that ſtate as long as the creature pleaſes. The creature can remain a long time under water, and has been kept ſo for ſeveral days, by tying it down, and received no hurt from it. It is a very long-lived animal; and even if its belly be opened, and the inteſtines and all the viſcera taken out, it will continue its leaping, and all its other motions, as if nothing had happened to it, for a conſiderable time; but if the nerve of one of the hinder legs be cut, it inſtantly loſes all power of uſing that limb. Ray's Synop. Quad. p. 247.

Frogs, *the generation of*, was very nicely inquired into by the ſagacious Lewenhoek. He found, by repeated obſervations, that the male in copulation only ſits upon the female, not being joined to her, nor having any apparent penis. At the time that the female *frog* drops her ſpawn, the male alſo throws out his ſemen, which is to be placed under the eggs, as the ſemen of fiſhes that want the penis is caſt under the eggs or ſpawn of their females, that the animalcules in it may impregnate the eggs. The animalcule in the male-ſeed has its way to make into a certain point of the egg of the female, or elſe that egg is unfruitful; and this is the reaſon why the animalcules in the male ſemen are ſo prodigiouſly more numerous than the eggs of the female, becauſe vaſt multitudes of them muſt neceſſarily be loſt. The teſticles and vaſa deferentia of *frogs* are very evident to any one uſed to anatomical inquiries, on opening the creature; and theſe contain vaſt numbers of very vigorous animalcules at the time when the creature is to produce its young, which is in April, but at other times they are not ſo numerous or lively.

The *frog* differs from all creatures in the manner of its generation. It no way reſembles any of the quadrupeds in this particular; and though in ſome ſort it approaches to the nature of fiſh, yet it differs from them alſo in many things. The egg of the *frog* is a ſmall black ſpot, enveloped in a mucilaginous ſubſtance; in this egg is contained the embrio *frog*, which, on the breaking of the egg in hatching, comes forth in the form of a tadpole. This young animal is for ſome time nouriſhed by the gelatinous matter which envelopes the eggs, but it does not conſume the whole of it; for the particles of water making way by degrees into it, divide its parts, and it ſoon becomes expanded, frees itſelf from the living animals, and floats on the ſurface of the water, or at a ſmall depth in it, in form of a thin cloud: this, though it now no longer ſerves for food to the young creature, is however of ſome ſervice to it, ſerving it as an aſylum, or place of reſt and ſafety, when tired with ſwimming.

The egg of the *frog*, therefore, is, in ſome degree, analogous to that of an inſect of the winged kind, which is to go through a metamorphoſis before it arrives at its perfect ſtate; for it hatches into the tadpole, as the egg of a butterfly into a caterpillar, and arrives at that its ultimate ſtate, after a determinate time ſpent in the other. In this it differs from the generation of fiſhes, the eggs of whoſe ſpawn hatch into perfect fiſhes, which go through no change; and it differs from all in the gelatinous ſubſtance which envelopes the egg, and ſerves as the firſt food to the fœtus.

The eggs are indeed, when nicely examined, found to be incloſed in a double liquor, a more pellucid and thin one within the gelatinous one, which ſerves as the general covering to the whole ſeries of eggs; and it is this thin one which it principally feeds on when firſt hatched, and which ſerves to the ſame purpoſes as the white of an egg in the fowl kind. Ray, ut ſupra.

This creature bears the experiments of the air-pump better than moſt other animals. It will breathe ſome time after the extraction of the air, but at length the viſible motion of the throat will ceaſe, and the body ſwell a little. After three hours lying in this condition, when no farther ſign of life appears, if the animal be placed in the open air, a few hours will recover it to its former life and vigour. The ſame animal put into a receiver exhauſted of the air, but nearly filled with water, will live many hours under the water, and ſeem to reſpire, but in five or ſix hours it will die. The larger and luſtier *frogs* live longer than the young ones in the receiver. Phil. Tranſ. N° 62.

The **Frog** affords the curious in microſcopic obſervations a very beautiful view of the circulation of the blood; but the method of examining it to advantage was never hit upon till the contrivance of the late ingenious Dr. Stuart for that purpoſe. This he did by the ſolar microſcope in the following manner. The looking-glaſs, tube, and convex lens, are the ſame in this, as in the common ſolar microſcope; but inſtead of the little pocket microſcope of Wilſon, he uſed the belly-part of the common large reflecting one, fixed horizontally on a pedeſtal, juſt at an equal height with the tube. This ſtands on a little ſhelf made to ſupport it; and to its ſnout, which lies on a level with the tube, the magnifiers are ſcrewed: the object being extended and faſtened with ſtrings and pins on a frame contrived for that purpoſe, is applied between the tube and the magnifier, whereby the ſun's rays, reflected from the looking-glaſs, through the tube, upon the object, paſs on through the magnifier, and exhibit upon the ſcreen an image of the object moſt prodigiouſly enlarged. Baker's Microſ. p. 132.

To view a *frog* with this apparatus, the ſkin of the belly is to be opened from near the anus to the throat, and then giving it a little ſnip ſide-ways both at the top and bottom, and ſticking a fiſh-hook into each corner of the ſkin, it was eaſily extended before the microſcope, and ſhewed on the ſcreen the moſt beautiful view imaginable of the veins and arteries of the ſkin, with the blood circulating through them. In the arteries thus viewed, the blood is ſeen to ſtop, and recede a little at every pulſation by the dilatation, and ruſh forcibly on again by the contraction of the heart; while in the veins it ever kept the ſame equable and uniform current, with a ſurpriſing rapidity; and when the ſcreen was removed farther back, and the object by that means more enlarged, the alternate expanſion and contraction of the ſides of the arteries were very viſible. After this, the abdomen of the *frog* being opened, and the muſcles of it being extended before the microſcope in the ſame manner as the ſkin was, the ſtructure of theſe muſcles is beautifully ſeen, being all made up of bundles of tranſparent ſtrings of fibres, all lying parallel to one another, and joined by a common membrane.

Theſe ſtrings or fibres appeared alſo through their whole length made up of roundiſh veſicles, and reſembled ruſhes divided longitudinally; but there is no certainty of any circulation being ſeen in theſe.

When this has been ſufficiently examined, a part of the creature's guts being pulled out and extended with the meſentery, there is ſeen the fineſt of all views of the circulation of the blood. Words are not able to deſcribe this wonderful ſcene. The blood is ſeen paſſing through numberleſs veſſels at one and the ſame inſtant, in ſome one way, and in others directly the contrary. Several of the veſſels are thus magnified to more than an inch in diameter, and the globules of the blood rolling through them, appear near as large as pepper-corns; while in many of the minuteſt veſſels only ſingle globules were able to find their paſſage, and that too by changing their ſhape into an oblong ſpheroid. The pulſation and acceleration of the blood in the arteries are thus alſo very beautifully ſeen. As the animal under examination grows languid and near expiring, the blood in the arteries will often ſtop on a ſudden, and ſeem as if it were coagulating, and will then run back for ſome time; after which it will again recover its natural courſe with a great deal of rapidity. A due conſideration of theſe particulars may poſſibly account for the intermiſſions, ſtarts, and irregularities, in the pulſe of perſons near death. Baker's Microſcope, p. 136.

Frog, among *Farriers*, the ſame with fruſh. See **Frush.**

Frog's *bit*, in *Botany*. See **Hydrocharis.**

Frog, *bull.* See **Bull**-*frog*.

Frog-*fiſh*, in *Ichthyology*, an Engliſh name for the **rana-piscatrix**, or **lophius**. See **Sea**-*Devil*.

Frog-*fiſh of Surinam*, is produced by the transformation of a *frog* into a fiſh. The *frog*, in its firſt ſtate, is ſpotted with brown, yellow, and green, but paler on the belly; the hinder feet are webbed like thoſe of a gooſe, but the fore-feet are without webs: the firſt change this *frog* undergoes is by the growing out of a tail; after which it gradually acquires the ſhape of a fiſh, the two fore-feet decreaſing and periſhing by degrees, and then the hinder legs; and, at length, the *frog* is changed into a perfect fiſh. The Indians and Europeans of Surinam call theſe fiſhes jakies; they are cartilaginous, and of a ſubſtance like our *muſtela*, and very delicate food. A bone or cartilage runs down the back, with ſmall bones all over the body, which is divided into equal parts; they are adorned with beautiful ſcales, are firſt of a darkiſh colour, and afterwards grey. See an account of the ſeveral transformations of this *frog*, illuſtrated with drawings, and of the transformation of fiſhes into *frogs*, in Phil. Tranſ. vol. li. p. 2. art. 60. p. 653, &c.

FRONDES, among *Botaniſts*. See **Leaf.**

FRONT, the forehead, or that part of the face above the eyebrows.

The word is formed of the Latin *frons*; and that from the Greek φρονειν, *to think*, *perceive*; of φρην, *mens*, *the mind*, *thought*. Martinius, to make out this etymology, obſerves, that from the forehead of a perſon we perceive what he is, what he is capable of, and what he thinks of. Du Laurens chuſes to derive it from *ferre*, becauſe it bears the marks of what we have in our head.

Front is alſo uſed where ſeveral perſons, or things, are ranged ſide by ſide, and ſhew their *front*, or fore-parts.

Front, in *Architecture*, denotes the principal face, or ſide of a building; or that preſented to their chief aſpect, or view.

Front, in *Fortification*. See **Face** and **Tenaille.**

Front *of a regiment*, in *Military Language*, denotes the foremoſt rank of a battalion, ſquadron, or any other body of men.

To *front* every way, is when the men are faced to all ſides. See **File**-*leaders*.

Front *of a camp* is the line that determines its extent, and in which are placed the colours and ſtandards of the troops that occupy the **camp.**

Front, in *Perſpective*, a projection or repreſentation of the face, or fore-part of an object, or of that part directly oppoſite to the eye; called alſo, and more uſually, **orthography.**

Front, *line of the.* See **Line.**

Front *ſcale.* See **Scale.**

FRONTAL, in *Architecture*, a little fronton or pediment, ſometimes placed over a ſmall door or window.

Frontal, **Frontlet**, or *Brow-band*, is alſo uſed in ſpeaking of the Jewiſh ceremonies.

This *frontal* conſiſts of four ſeveral pieces of vellum, on each whereof is written ſome text of ſcripture: they are all laid on a piece of a black calf's leather, with thongs to tie it by. The Jews apply the leather with the vellum on their foreheads, in the ſynagogue, and tie it round the head with the thongs.

FRONTALE *os*, in *Anatomy*. See *Os* **Frontis.**

Frontalb, or **Frontal**, in *Medicine*, an external form of remedy, applied on the forehead and temples, with a bandage, for the cure of the head-ach, megrim, vapours, defluxions on the eyes, &c.

Frontals are compoſed of roſes, elder flowers, betony, marjoram, lavender, camphire, &c. wrapped in a linen cloth, and applied over the forehead and temples.

There are alſo *frontals* in manner of liniments, made of unguentum populeum and extract of opium, or of paſtes, powders, ſeeds, &c.

In *frontals* applied to eaſe the violence of the head-ach, in the heights of fevers, they frequently mix the kernels of cherries.

FRONTALES, in *Anatomy*, two muſcles, one on each ſide the forehead, commonly ſuppoſed to ſpring from the ſkull, but not known to ariſe from the occipital muſcles; or rather, it appears that the *frontales* and occipitales, are only one continued digaſtric muſcle, on each ſide, moving the ſcalp and ſkin of the forehead and eyebrows. See *Tab. Anat. (Myol.) fig.* 1. N° 1.

The *frontales* begin to be thus denominated after they have begun to paſs the coronal ſuture, with fibres paſſing obliquely to the eyebrows, where they terminate, and in the lower part of the ſkin of the forehead.

They have each two appendages: the ſuperior, or external, is commonly fixed to the bone of the noſe; the lower is fixed to the os frontis, and is, by Volcherus Coiter, made a diſtinct muſcle, and called CORRUGATOR, from its uſe in drawing the eyebrows to each other, and wrinkling the forehead.

FRONTATED, a term uſed by *Botaniſts*, to expreſs that the petalum, or leaf of a flower, grows broader and broader; and at laſt, perhaps, terminates in a right line; in oppoſition to *cuſpidated*, which expreſſes, that the leaves terminate in a point.

FRONTEVAUX, *order of*. See FONTEVRAUD.

FRONTIER, the border, confine, or extreme, of a kingdom, or province; which the enemies find in front when they would enter the ſame. Thus we ſay, a *frontier* town, *frontier* province, &c. *Frontiers* were anciently called *marches*.

The word is derived from the French *frontiere*, and that of the Latin *frontaria*; as being a kind of front oppoſed to the enemy. Skinner derives *frontier* from *front*; inaſmuch as the *frontier* is the exterior, and moſt advanced part of a ſtate; as the front is that of the face of a man.

FRONTIS *os*, in *Anatomy*, the bone of the forehead. See *Tab. Anat. (Oſteol.) fig.* 1. *lit. a.* See OS FRONTIS.

FRONTIGNIAC *wine* is ſo called, from a town of Languedoc in France, ſituated ſixteen miles ſouth-weſt of Montpelier, remarkable for producing it.

FRONTISPIECE, in *Architecture*, the portrait, or principal face, of a fine BUILDING.

The word is formed of the Latin *frontiſpicium*, q. d. *frontis hominis inſpectio*.

The *frontiſpiece* of the Louvre is the fineſt piece of architecture in France.

Hence, alſo, by a figure, we ſay, the *frontiſpiece* of a book, meaning an ornament, with an engraven title on the firſt page.

FRONTLET. See FRONTAL.

FRONTLET, *Aim*, in *Gunnery*, is a piece of a plank three inches thick, a foot long, and ſeven or eight inches high, with a round cavity underneath, to fit the outſide of the gun, and having a ſmall ſlit to ſee the object through it. It is placed upon the vent field of the gun, when it is pointed in a BATTERY.

FRONTON, in *Architecture*, an ornament, among us more uſually called PEDIMENT.

FROST, an exceſſive cold ſtate of the weather, whereby the motion and fluidity of liquors is ſuſpended; or, it is that ſtate of the air, &c. whereby fluids are converted into ICE. See COLD and FREEZING.

Metals contract in *froſt*. Monſ. Azout found, by experience, that an iron tube, twelve feet long, loſt two lines of its length, upon being expoſed to the air in a *froſty* night; but this we ſuppoſe wholly the effect of the cold.

Froſt does not contract fluids, as was formerly imagined; on the contrary, it ſwells or dilates them, by nearly a tenth of their bulk. See ICE.

Scheffer aſſures us, that in Sweden the *froſt* pierces into the earth two cubits, or Swediſh ells, and turns what moiſture is found therein into a whitiſh ſubſtance, like ice: he adds, the ſtanding waters freeze to a greater depth, even to three ells, or more; but thoſe that have a current, leſs; and rapid waters, and bubbling ſprings, never freeze, even there.

Olearius aſſures us, that in the city of Moſcow he obſerved the earth to be cleft by the *froſt* many yards in length, and a foot broad. Scheffer mentions ſudden cracks or rifts in the ice of the lakes of Sweden, nine or ten feet deep, and many leagues long; and adds, that the rupture is made with a noiſe not leſs terrible than if many guns were diſcharged together. By ſuch means the fiſhes are furniſhed with air; ſo that they are rarely found dead.

In the great *froſt* in 1683, oaks, aſhes, walnut-trees, &c. Mr. Bobart tells us, were miſerably ſplit and cleft, ſo that one might ſee through them; and this, frequently, with terrible noiſes, like the exploſion of fire-arms; the clefts were not only in the bodies, but continued to the larger boughs, roots, &c. See an inquiry into the circumſtances and cauſes hereof in the Philoſoph. Tranſact. N° 165.

The natural hiſtories of *froſts* furniſh very extraordinary effects thereof. The trees are frequently ſcorched, and burnt up, as with the moſt exceſſive heat; of which there are divers inſtances in ſo warm a climate as that of Provence.

The cloſe of the year 1708, and the beginning of 1709, were remarkable, throughout the greateſt part of Europe, for a ſevere *froſt*. Dr. Derham ſays, it was the greateſt in degree, if not the moſt univerſal, in the memory of man: it extended throughout England, France, Germany, Denmark, Italy, &c. but it was ſcarce felt in Scotland or Ireland. All the orange-trees, and olives, in Italy, Provence, &c. and all the walnut-trees throughout France, with an infinity of other trees, periſhed by this *froſt*. They had a kind of gangrene that grew on them; which Monſ. Gauteron takes to have been the effect of a corroſive ſalt corrupting and deſtroying their texture. He adds, there is ſo much reſemblance between the gangrene befalling plants through *froſt*, and that which the parts of animals are liable to, that they muſt have ſome analogous cauſe. Corroſive humours burn the parts of animals; and the aerial nitre condenſed has the ſame effect on the parts of plants. *Penetrabile* frigus *aduret*. Memoires de l'Academie Royale des Sciences, an. 1709.

In England, the greateſt ſufferers in the animal kingdom, Dr. Derham obſerves, were birds and inſects; particularly larks, and robin-red-breaſts; much the greateſt part of which periſhed. But the vegetables were far the greater ſufferers; few of the tender ſorts eſcaped; bays, hollies, roſemary, cypreſs, alaterni, phillyreas, arbuti, lauruſtines, and even furze; with moſt of the fruteſcent herbs, as lavenders, abrotanums, rue, thyme, &c. Mr. Bobart informs us, were generally deſtroyed. The ſame writer adds, that the ſap of the finer wall fruit was ſo congealed and diſordered, that it ſtagnated in the limbs and branches, and produced diſorders like to chilblanes in human bodies, which, in many parts of trees, would turn to mortifications; and that the very buds of the finer trees, both the leaf-buds, and bloſſom-buds, were quite killed, and dried into a farinaceous matter.

Dr. Derham relates it, as a common obſervation, that vegetables ſuffered more in this winter from the ſun, than the *froſt*; in that the ſun-ſhine melting the ſnow, and opening the ground, left them more expoſed to the rigours of the enſuing night; and at a meeting of the Royal Society, it was obſerved, that the calamities which befel trees, aroſe, not purely from their being frozen, but, principally, from the winds ſhaking and rocking them, when they were ſo; which rent and parted their fibres. Phil. Tranſ. N° 324.

In very cold countries meat may be preſerved by the *froſt* ſix or ſeven months, and prove tolerable good eating. See Captain Middleton's Obſervations made in Hudſon's Bay, in the Phil. Tranſ. N° 465. ſect. 2.

In that climate the *froſt* ſeems never out of the ground, it having been found hard frozen in the two ſummer months.

Brandy and ſpirits of wine, ſet out in the open air, freeze to ſolid ice in three or four hours. Lakes and ſtanding waters, not above ten or twelve feet deep, are frozen to the ground in winter, and all the fiſh therein periſh.

But in rivers, where the current of the tide is ſtrong, the ice does not reach ſo deep, and the fiſh are preſerved.

Springs have never yet been found free from FREEZING, though lying ever ſo deep; ſo that the water uſed is melted ſnow and ice. Id. ibid.

The great power of *froſt* on vegetables is a thing ſufficiently known; but the differences between the *froſts* of a ſevere winter, and thoſe which happen in the ſpring mornings, in their effects on plants and trees, were never perfectly explained, till by Meſſ. Du Hamel, and De Buffon, in the Memoirs of the Paris Academy.

The accurate knowlege of vegetables, which is ſo material a part of agriculture, as to deſerve the attention of all who wiſh well to their country, is however a thing only to be arrived at in length of time, and by a great number of experiments, ſuch as no one man's life can give him opportunities of making; and even thoſe which have been made ſeemingly with the greateſt care and caution in one place, and have ſerved for the eſtabliſhment of rules with one author, have been found to ſucceed very differently, and to give very different ideas in another place, and to another perſon.

The *froſts* of ſevere winters are much more terrible than thoſe of the ſpring, as they bring on a privation of all the products of the tenderer part of the vegetable world; but then they are not frequent, ſuch winters happening but once perhaps in an age, and the *froſts* of the ſpring are in reality greater injuries to us than theſe, as they do us great injuries, though not ſo terrible as the others, and theſe are every year repeated.

In regard to trees the great difference is this, that the *froſts* of ſevere winters affect even their wood, their trunks and large branches; whereas thoſe of the ſpring have only power to hurt the buds.

The winter *froſts* happening at a time when moſt of the trees in our woods and gardens have neither leaves, flowers, nor fruits upon them, and have their buds ſo hard as to be proof againſt ſlight injuries of weather, eſpecially if the preceding ſummer has not been too wet; in this ſtate, if there are no unlucky circumſtances attending, the generality of trees bear moderate winters very well; but hard *froſts*, which happen late in the winter, cauſe very great injuries even to thoſe trees which they do not utterly deſtroy. Theſe are, 1. Long cracks following the direction of the fibres. 2. Parcels of dead wood incloſed round with wood yet in a living ſtate. And, 3. That diſtemperature which the foreſters call the double blea, which is a perfect circle of blea, or ſoft white wood, which, when the tree is afterwards felled, is found covered by a circle of hard and ſolid wood. The BLEA is in its natural ſtate an outer circle of white and imperfect wood encompaſſing the hard and more perfect wood of the tree, and ſurrounded by the bark, and is eaſily diſtinguiſhed in moſt ſpecies from the hard wood or heart of the tree by its different colour, and want of hardneſs.

The number of obſervations which Mr. Reaumur made of the blea in trees of different parts of France, all ſhewed him the falſe blea under the ſame number of annual circles of the after-growth of the tree; and theſe being counted, proved juſt as many as the number of years ſince 1709; whence he very juſtly concluded, that all the falſe blea he found throughout the kingdom, was the effect of the ſeverity of this one hard winter. And it is very evident, that this falſe blea is that part of the tree, which in the year 1709 was the true and natural blea, and which the ſeverity of the *froſts* of that winter prevented from ever becoming ſound and ſolid wood, but left it to become more weak and defective for a ſucceſſion of years; during which the ſeveral annual circles of ſupervening blea all became ſound and perfect wood in their natural courſe.

It appears very plain, that the blea muſt be that part of the wood which ſuffers moſt, becauſe it is the outer wood of all, and itſelf makes a covering for the inner part; and add to this, that it is of itſelf of a much leſs compact texture, and contains more juices for the *froſt* to act upon.

Another accident attending trees from very ſevere *froſts* is, that they are ſometimes ſplit by them according to the direction of their fibres, and this often with a very loud crack.

It is not uncommon in large foreſts to meet with trees that have been thus ſplit, and which having outlived the winter that occaſioned it, are found to have a long rib marking the place where the crack was, and forming a ſort of cicatrix or ſcar over the wound. This cicatrix or rib is however only ſuperficial; and wherever it is, the crack is ſtill found remaining under it in the tree; for though the bark and blea can in this manner conſolidate and form a covering for a wound, the fibres of the ſolid wood, when once broken or ſeparated, never cloſe again.

It is the general opinion of the workmen, that all theſe cracks in timber are the effects of *froſts*; and it is very eaſy to conceive, that it may be natural for *froſts* to effect it, as it is well known that all frozen liquors take up more room, than they did while in a fluid ſtate. See FREEZING. It is not certain, however, that all the cracks in timber are from this cauſe, many of them may have been occaſioned merely by a redundance of ſap.

The opinions of authors about the expoſitions of trees to the different quarters, have been very different, and moſt of them grounded on no rational foundation. Many are of opinion that the effects of *froſt* are moſt violently felt on thoſe trees which are expoſed to the north; and others think, the ſouth, or the weſt, the moſt ſtrongly affected by them. There is no doubt, but the north expoſure is ſubject to the greateſt cold. It does not, however, follow from this, that the injury muſt be always greateſt on the trees expoſed to the north in *froſts*; on the contrary, there are abundant proofs among the preceding obſervations, that it is on the ſouth ſide that trees are generally more injured by *froſt*; and it is plain from repeated experiments, that there are particular accidents, under which a more moderate *froſt* may do more injury to vegetables, than the moſt ſevere one which happens to them under more favourable circumſtances.

It is plain from the accounts of the injuries trees received by the *froſts* in 1709, that the greateſt of all were owing to repeated falſe thaws, ſucceeded by repeated new *froſts*. But the *froſts* of the ſpring ſeaſon furniſh abundantly more numerous examples of this truth; and ſome experiments made by Mr. de Buffon, at large in his own words, prove inconteſtibly, that it is not the ſevereſt cold, or moſt fixed *froſt*, that does the greateſt injury to vegetables.

This is an obſervation directly oppoſite to the common opinion, yet is not the leſs true, nor is it any way diſcordant to reaſon. We find by a number of experiments, that humidity is the thing that makes *froſt* fatal to vegetables, and therefore every thing that can occaſion humidity in them, expoſes them to theſe injuries, and every thing that can prevent or take off an over proportion of humidity in them, every thing that can dry them, though with ever ſo increaſed a cold, muſt prevent or preſerve them from thoſe injuries. Numerous experiments and obſervations tend to prove this. It is well known that vegetables always feel the *froſt* very deſperately in low places where there are fogs. The plants which ſtand by a river ſide, are frequently found deſtroyed by the ſpring and autumnal *froſts*, while thoſe of the ſame ſpecies, which ſtand in a drier place, ſuffer little, or perhaps not at all by them; and the low and wet parts of foreſts are well known to produce worſe wood than the high and drier; and the coppice wood in wet and low parts of common woods, though it puſh out more vigorouſly at firſt than that of other places, yet never comes to ſo good a growth; for the *froſt* of the ſpring killing theſe early top-ſhoots, obliges the lower part of the trees to throw out lateral branches; and the ſame thing happens in a greater or leſſer degree to the coppice-wood that grows under cover of larger trees in great foreſts; for here the vapours not being carried off, either by the ſun or wind, ſtagnate and freeze, and in the ſame manner deſtroy the young ſhoots, as the fogs of marſhy places. It is a general obſervation alſo, that the *froſt* is never hurtful to the late ſhoots of the vine, or to the flower-buds of trees, except when it follows heavy dews, or a long rainy ſeaſon, and then it never fails to do great miſchief, though it be ever ſo ſlight.

The *froſt* is always obſerved to be more miſchievous in its conſequences on newly cultivated ground, than in other places; and this is becauſe the vapours which continually ariſe from the earth, find an eaſier paſſage from thoſe places, than from others. Trees alſo which have been newly cut, ſuffer more than others by the ſpring *froſts*, which is owing to their ſhooting out more vigorouſly.

Froſts alſo do more damage on light and ſandy grounds, than on the tougher and firmer ſoils, ſuppoſing both equally dry; and this ſeems partly owing to their being more early in their productions, and partly to their lax texture, ſuffering a greater quantity of vapours to tranſpire.

It alſo has been frequently obſerved, that the ſide-ſhoots of trees are more ſubject to periſh by the ſpring *froſts*, than thoſe from the top; and Mr. Buffon, who examined into this with great accuracy, always found the effects of the ſpring *froſts* much greater near the ground than elſewhere. The ſhoots within a foot of the ground quickly periſhed by them; thoſe which ſtood at two or three feet high, bore them much better; and thoſe at four feet and upwards frequently remained wholly unhurt, while the lower ones were wholly deſtroyed.

Theſe are a ſeries of obſervations, which have proved beyond all doubt, that it is not the hard *froſts* which ſo much hurt plants, as thoſe *froſts*, though leſs ſevere, which happen when they are full of moiſture; and this clearly explains the account of all the great damages done by the ſevere *froſts* being on the ſouth ſide of the trees which are affected by them, though that ſide has been plainly all the while leſs cold than the north. Great damage is alſo done to the weſtern ſides of trees and plantations, when after a rain with a weſt wind, the wind turns about to the north at ſun-ſet, as is frequently the caſe in ſpring, or when an eaſt-wind blows upon a thick fog before ſun-riſing. Mem. Acad. Scien. Par. 1737.

FROST, *hoar*, or *white* FROST, *Pruina*, is the DEW *frozen*, or congealed, early in cold mornings; chiefly in autumn.

Hoar-froſt, Mr. Regis obſerves, conſiſts of an aſſemblage of little parcels of ice cryſtals; which are of various figures, according to the different diſpoſition of the vapours, when met, and condenſed, by the cold.

Dew is, in all appearance, the matter of *hoar-froſt*; though many of the Carteſians will have it formed of a cloud; and either congealed in the cloud, and ſo let fall; or ready to be congealed as ſoon as it arrives at the earth.

FROST-*ſplit*, a phraſe uſed by our farmers to expreſs ſuch trees as have large cracks in their trunks and branches, rendering them unfit for the uſes they would otherwiſe have ſold for, and by that means greatly debaſing their value. It has been pretended by ſome, that theſe rents and cracks in trees were owing to other cauſes; but we have had innumerable inſtances, and thoſe well recorded, of the immediate effect of hard *froſts* on the ſtrongeſt trees, ſpoiling them in this manner; and it appears very rational to ſuppoſe all theſe injuries do really come by the ſame means, and are properly called by this term. Vide ſupra, and the Phil. Tranſ. N° 165.

FROTH, a white, light ſubſtance, formed on the ſurface of fluids, by vehement agitation.

Froth conſiſts wholly of little ſpherules, or globules; and, accordingly, may be defined, an aſſemblage of aqueo-aereal bubbles.

FROTH, in the *Manege*, is a moiſt white matter that oozes from a horſe's mouth, otherwiſe called foam. A horſe that by champing on his bridle, throws out a great deal of *froth*, is judged to be a horſe of mettle and health, and to have a cold freſh mouth.

FROTH-*ſpit*, or *cuckow-ſpit*, a name given to a ſort of white *froth* or ſpume very common in the ſpring, and firſt months of the ſummer, on the leaves of certain plants, particularly on thoſe of the common white field lychnis, or catch-fly, thence called by ſome *ſpatling-poppy.* All writers on vegetables have taken notice of this *froth*, though few have underſtood the cauſe or origin of it, till of late. Many imagined it an exhalation from the earth; ſome have eſteemed it, as its name expreſſes, the ſaliva of the cuckow; others, the extravaſated juices of the plant, and ſome a hardened dew. But all theſe are erroneous opinions, and the account of it is that it owes its origin to a ſmall inſect, called by ſome the flea-graſshopper, which applies its anus cloſe to the leaf, and diſcharges upon it a ſmall drop of a white viſcous fluid, containing ſome air in it, and, therefore, ſoon elevated into a bubble. Before this is well formed, it depoſits ſuch another drop, and ſo on, till it is every way overwhelmed with a quantity of theſe bubbles, which form this *froth.* See CICADULA.

FROUNCE, in the *Manege*, a diſeaſe in horſes, when ſmall warts or pimples ariſe in the midſt of the palate, which are very ſoft and ſore, and ſometimes breed in the lips and tongue.

This diſorder is occaſioned many ways; ſometimes by eating wet hay, whereon rats or other vermin have piſſed; by drawing frozen duſt into their mouths among the graſs, &c.

As to the method of treatment, it conſiſts in letting them blood in the two largeſt veins under the tongue, and waſhing the ſores with vinegar and ſalt, or with ale and ſalt, till they bleed.

FROUNCE, in *Falconry*, a diſeaſe incident to hawks, ariſing from moiſt and cold humours falling down to the palate and root of the tongue; by which means they loſe their appetite, and cannot cloſe their clap. Waſhing with alum-water, lemon-juice, &c. is held good for it.

FROWER, an edged tool uſed in cleaving wood into laths.

FROWEY, a term uſed by workmen for timber, which is evenly tempered, and works freely without tearing.

FROZEN, or FRIGID *zone.* See ZONE.

FROZEN *ocean.* See OCEAN.

FROZEN *waters.* See WATERS.

FRUCTIFEROUS properly denotes any thing that produces fruit; but in a more large and figurative ſenſe, is uſed by lord Bacon, and others, for ſuch experiments in natural philoſophy, as prove advantageous to the experimenter in point of gain or profit.

FRUCTIFICATION *of plants.* *Fructification* is defined by Linnæus to be the temporary part of a vegetable appropriated to generation, terminating the old vegetable, and beginning the new. It conſiſts of the following ſeven parts; viz. the CALYX, COROLLA, STAMEN, PISTILLUM, PERICARPIUM, SEMEN or SEED, and RECEPTACULUM.

The organs of *fructification* in plants are the *pointal*, generally contained in the middle of flowers; and the *threads*, which ſurround it, furniſhed at their extremities with little *heads*; theſe the botaniſts term, the firſt the *piſtillum*, the ſecond the *ſtamina*, and the third, or heads of the ſtamina, the *antheræ*, or *apices.* See FLOWER.

The apices contain the *farina fœcundans*, a fine ſubtile matter analogous to the *ſemen maſculinum* in animals; the ſtamina ſerve only for their ſupport, and to convey nutrition to them; and the *piſtillum* is the part deſtined to receive this *farina*, and convey it to the ſeeds.

It is upon theſe principles that the excellent Linnæus has founded his ſyſtem of the vegetable world, and formed his claſſes. This author's work has been received by the learned world in all nations with the reſpect it merits; but has been too generally cenſured among the ſlighter proficients in botanical reſearches, as abſtruſe, difficult, and unintelligible. The viewing theſe things in a new light, and the neceſſity of making new words to convey new ideas, have indeed given this great attempt ſomething of the face of an abſtruſe piece; but premiſing a few general hints, it may not be difficult to vindicate the author from the heavy charges which have been laid againſt him, and give the Engliſh reader a clear and perfect view of his work.

From the ſtructure and uſe of the *piſtillum*, *ſtamina*, and *apices*, it is eaſy to conceive that the former muſt be accounted the *female*, and the two latter the *male parts* of flowers. This is the great baſis of his ſyſtem. To expreſs the different combinations of theſe in the different claſſes of plants, by formal deſcriptions to each, had been tedious, and an exceſſive burden to the memory: to avoid this, he has excellently contrived the compriſing that deſcription, or general character, in one word. It is eaſy to conceive there could be no word already in uſe, that could expreſs what had never before been thought of; he was therefore neceſſitated to invent new ones for this purpoſe. He has ventured therefore to form twenty-four ſuch, for his claſſes, which are of that number, and has taken them from that language which all the learned have ever uſed on the ſame occaſion, the Greek; and this with the leaſt oſtentation or ſhew of learning imaginable: in ſhort, to underſtand all theſe, there is no need of knowing more Greek than that ἀνὴρ ſignifies a *man*, or any thing male; and γυνὴ, a *woman*, or *female*; that δυναμις is *power* or *efficacy*; ἀδελφὸς, a *brother*; and thence ἀδελφιὰ, *brotherhoods* or *communities*; that σὺν is *together*; γένεσις, *generation*, or *origin*; and οἰκὸς, a *houſe*, or *habitation*; that πολὺς ſignifies *many*; γάμος, *marriage*; and κρυπτὸς, *hidden*, or *concealed*; and that the numbers one, two, three, four, five, ſix, ſeven, eight, nine, ten, twelve, and twenty, or their derivatives, once, twice, &c. are expreſſed by the Greek words μόνος, δὶς, τρὶς, τετρὰ, πέντε, ἕξ, ἑπτὰ, ὀκτὼ, ἐννέα, δεκὰς, δώδεκα, εικοσι: there needs, I ſay, no more knowlege of Greek than this, to underſtand perfectly the meaning of all the terms this author, to avoid tedious deſcriptions, has uſed as the characters of his claſſes. To begin with certainty and regularity:

He firſt divides the whole vegetable world into ſuch ſpecies as have their flowers viſible and obvious to the eyes, and ſuch as have them inviſible, or at the utmoſt ſcarce diſcernible.

Thoſe which have them viſible he then divides again into ſuch as have the *ſtamina*, *apices*, and *piſtillum*, that is, the male and female parts of *fructification* in the ſame flower: Theſe he, for that reaſon, calls *hermaphrodite* flowers.

And ſuch as have the male and female parts of *fructification*, that is the *apices* and *piſtillum*, either in different flowers upon the ſame ſtalk, or upon different plants of the ſame ſpecies: theſe he calls the diſtinct male and female flowers.

Thoſe which have the different organs of *fructification* lodged in the ſame flower, he again divides into ſuch as have the ſtamina in no part growing together, or cohering to one another; and ſuch as have them either growing together or cohering together mutually in ſome part, either with one another, or with the *piſtillum*

Thoſe which have them in no part cohering either with the *piſtillum* or with one another, he again ſubdivides into ſuch as obſerve no exact or accurate proportion of length one among another; and ſuch as have ever two of the ſtamina ſhorter than the reſt.

From theſe general diviſions he deſcends to his particular claſſes, of which he eſtabliſhes twenty-four. See the ſeveral claſſes and orders in the Linnæan ſyſtem illuſtrated by figures in *Tables* I. II. III. IV. V. VI. and VII. *of Botany.*

The firſt thirteen are of the plants which have *hermaphrodite* flowers, with the organs of *fructification* disjunct, no where cohering with one another, and obſerving no exact proportion in length.

The firſt is the *monandria*, containing two orders: the word is derived from the Greek μόνος and ἀνὴρ, one male part, and ſignifies a flower that has only one ſuch. This claſs accordingly comprehends thoſe plants which have an *hermaphrodite* flower, and in it only one ſingle *ſtamen*: of this claſs are the *blitum*, *canna*, &c.

The ſecond is the *diandria*, containing three orders; the word, derived from the ſame ἀνὴρ and δὶς, *twice*, and ſignifying a flower that has two male parts, comprehends all thoſe plants which have *hermaphrodite* flowers with two *ſtamina* in each: of this claſs are the *monarda*, *anthoxanthum*, *piper*, &c.

The third is the *triandria*, containing three orders; the word, derived from the ſame ἀνὴρ and τρὶς, *thrice*, ſignifies a flower that has three male parts in it, and comprehends thoſe plants which have *hermaphrodite* flowers with three *ſtamina* in each: of this claſs are the [illegible] *avenna*, *mollugo*, &c.

The fourth is the *tetrandria*, containing four orders; the word, derived from the ſame ἀνὴρ and τετρὰς, *four times*, ſignifies a flower that has four male parts, and accordingly comprehends thoſe plants which have *hermaphrodite* flowers, with four *ſtamina* in each: of this claſs are the *dipſacus*, *hammamelis*, *potamogeton*, &c.

The fifth is the *pentandria*, containing ſix orders: the word, derived from the ſame ἀνὴρ and ϖέντε, *five*, ſignifies a flower with five male parts; and accordingly this claſs comprehends thoſe plants which have *hermaphrodite* flowers with five *ſtamina* in each: of this claſs are the *nerium*, *anethum*, *turnera*, *parnaſſia*, *craſſula*, *myoſurus*, *&c.*

The ſixth is the *hexandria*, containing five orders: the word, derived from the ſame ἀνὴρ and ἕξ, ſignifies a flower that has ſix male parts, and accordingly comprehends thoſe plants which have *hermaphrodite* flowers with ſix *ſtamina* in each; theſe *ſtamina*, the author obſerves, are either all equal in length, or alternately one ſhorter than another; the latter belong to the fifteenth claſs: of this claſs are the *amaryllis*, *oryza*, *rumex*, *petiveria*, *aliſma*, *&c.*

The ſeventh is the *heptandria*, containing four orders: the word, derived from the ſame ἀνὴρ and ἑπτὰ, *ſeven*, ſignifies a flower with ſeven male parts, and comprehends thoſe plants which have *hermaphrodite* flowers with ſeven *ſtamina* in the ſame flower with the *piſtillum*: of this claſs are the *æſculus*, *ſaururus*, *&c.*

The eighth is the *octandria*, containing four orders: the word, derived from the ſame ἀνὴρ and ὀκτὼ, *eight*, ſignifies a flower with eight male parts, and comprehends thoſe plants which have *hermaphrodite* flowers with eight *ſtamina* in the ſame flower with the *piſtillum*: of this claſs are the *œnothera*, *galenia*, *polygonum*, *adoxa*, *&c.*

The ninth claſs is the *enneandria*, containing three orders: the word, derived from the ſame ἀνὴρ and ἐννέα, *nine*, ſignifies a flower that has nine male parts, and comprehends thoſe plants which have *hermaphrodite* flowers with nine *ſtamina* in each: of this claſs are the *caſſyta*, *rheum*, *butomus*, *&c.*

The tenth claſs is the *decandria*, containing five orders: the word, derived from the ſame ἀνὴρ and δεκὰς, *ten*, ſignifies a flower which has ten male parts, and comprehends all thoſe plants which have *hermaphrodite* flowers with ten *ſtamina* in each: of this claſs are the *kalmia*, *ſaxifraga*, *ſtellaria*, *oxalis*, *phytolacca*, *&c.*

The eleventh is the *dodecandria*, containing five orders: the word, derived from the ſame ἀνὴρ and δώδεκα, *twelve*, ſignifies a flower which has twelve male parts in it, and comprehends thoſe plants which have *hermaphrodite* flowers with from twelve to nineteen *ſtamina* in the *hermaphrodite* flower: of this claſs are the *aſarum*, *agrimonia*, *euphorbia*, *ſempervivum*, *&c.*

The twelfth is the *icoſandria*, containing five orders: the word, derived from the ſame ἀνὴρ and εἴκοσι, *twenty*, ſignifies ſtrictly a flower with twenty male parts in it; the author, however, does not underſtand it in that ſtrict ſenſe, but uſing it as we frequently do words expreſſing large quantities, as indefinite and in an indeterminate ſenſe, defines it to mean only a larger number of *ſtamina* than are expreſſed under any other of the diſtinctions; and comprehends under it, in this claſs, all thoſe plants which have *hermaphrodite* flowers and commonly twenty *ſtamina*, often more, in each; thoſe *ſtamina* alſo growing to the inner ſide of the cup of the flower, not to the receptacle of the future ſeeds: of this claſs is the *punica*, *cratægus*, *ſorbus*, *pyrus*, *rubus*, *&c.*

The thirteenth is the *polyandria*, containing ſeven orders: the word, derived from the ſame ἀνὴρ and ϖολὺς, *many*, ſignifies, in an exact ſenſe, no other than what he makes the *icoſandria*, the title of the laſt claſs, expreſs: theſe are, perhaps, the only two words in which his expreſſion is deficient, the name he has given the claſſes not at all importing their particular difference from one another: this, however, he has very accurately done in the character which follows them; and comprehends under this claſs thoſe plants which have *hermaphrodite* flowers with from twenty to a hundred *ſtamina* in each, but which grow in this to the receptacle of the future ſeed, not as in the other claſs to the inner ſide of the cup of the flower: of this claſs are the *ſarracenia*, *pæonia*, *aconitum*, *aquilegia*, *ſtratiotes*, *ranunculus*, *&c.*

Theſe are the claſſes this accurate diſtinguiſher has eſtabliſhed among the *hermaphrodite* flowers, whoſe *ſtamina* have no regular proportion of length, in regard to one another. To theſe he next ſubjoins two claſſes of ſuch of them as have ever two of their *ſtamina* ſhorter than the reſt.

The firſt of theſe (the fourteenth claſs of the general order) is of the *didynamia*, containing two orders: the word, derived from δὶς and δυνάμια, *power*, or *efficacy*, ſignifies with him ſuch flowers as have two of their male parts of more efficacy than the reſt; and in this claſs he accordingly comprehends all thoſe plants which have *hermaphrodite* flowers with four *ſtamina*, two of which are cloſe together, longer, and of greater efficacy in the great work of fecundating the ſeeds, than the reſt: of this claſs are the *melittis*, *melianthus*, *&c.*

The ſecond of theſe (the fifteenth claſs in the general order) is of the *tetradynamia*, containing two orders: the word, derived from τετρὰς and δυνάμις, ſignifies a flower with four of its male parts of more efficacy than the reſt; and in this claſs he comprehends the plants with *hermaphrodite* flowers, having ſix *ſtamina*, four of which are longer than the reſt, the two oppoſite ſhort: of this claſs are the *lunaria*, *cheiranthus*, *&c.*

From theſe he proceeds to thoſe *hermaphrodite* flowers whoſe *ſtamina* cohere, either mutually along one another, in different manners, or with the *piſtillum* of the flower: theſe coalitions of the *ſtamina* he calls brotherhoods, or communities; and according to the different ſtate of theſe, and their conjunction with the *piſtillum*, he eſtabliſhes five claſſes of them.

The firſt of theſe (the ſixteenth in the general order) is the *monadelphia*, containing five orders: the word, derived from μόνος, *ſingle*, and ἀδελφιὰ, *brotherhoods*, or *communities*, ſignifies with him a flower, whoſe *ſtamina*, by means of the filaments running in among one another, are all formed into one body; and under this claſs he comprehends thoſe plants with *hermaphrodite* flowers, whoſe *ſtamina*, or male parts, are all bound together in one body: of this claſs are the *hermannia*, *geranium*, *pentapetes*, *alcea*, *&c.*

The ſecond of theſe (the ſeventeenth claſs in the general order) is the *diadelphia*, containing four orders: the word, derived from δὶς and ἀδελφιὰ, ſignifies with him a flower whoſe *ſtamina* are, by the conjunction of their filaments, formed into two bodies; and under this claſs he comprehends thoſe plants which have *hermaphrodite* flowers, the *ſtamina* of which are ſo cluſtered together into two bodies: of this are the *fumaria*, *polygala*, *lathyrus*, *&c.*

The third of theſe (the eighteenth in the general order) is the *polyadelphia*, containing three orders: the word, derived from ϖολὺς and ἀδελφιὰ, ſignifies with him a flower whoſe male parts are cluſtered into three or more ſeparate bodies; and in this he comprehends thoſe plants with *hermaphrodite* flowers, whoſe *ſtamina*, by the conjunction of their filaments, are formed into three or more cluſters: of this claſs are the *theobroma*, *citrus*, *hypericum*, *&c.*

The fourth of theſe claſſes (the nineteenth in the general order) is the *ſyngeneſia*, containing ſix orders: the word, derived from σὺν, *together*, and γένεσις, *generation*, *origin*, or *formation*, ſignifies with him ſuch flowers as have their male parts naturally formed into a ſingle regular congeries; and accordingly he comprehends under this claſs ſuch plants as have *hermaphrodite* flowers, the *ſtamina* of which, by the junction of their *apices*, are formed into a ſingle, regular, cylindric body: of this claſs are the *leontodon*, *xeranthemum*, *helianthus*, *calendula*, *echinops*, *lobelia*, *&c.*

The fifth of theſe claſſes (the twentieth in the general order) is the *gynandria*, containing eight orders: the word, derived from γυνὴ, *a woman*, or *female*, and ἀνὴρ, *male*, ſignifies with this author a conjunction of the male and female parts of a flower at their origin; and he accordingly comprehends under this claſs thoſe plants which have *hermaphrodite* flowers, the *ſtamina*, or male parts of which grow to the *piſtillum*, or female part of the flower, and not to the receptacle of the ſeeds: of this claſs are the *orchis*, *ſiſyrinchium*, *paſſiflora*, *ariſtolochia*, *arum*, *&c.*

Next after theſe he ranges thoſe plants which have flowers not *hermaphrodite*, but regularly and diſtinctly male and female, as the ſexes in animals are diſpoſed; and after theſe ſuch plants as have flowers irregularly of one, or the other, or ſomething of both ſexes.

Of theſe he eſtabliſhes only three claſſes.

The firſt of theſe (the twenty-firſt claſs in the general order) is the *monoecia*, containing eleven orders: the word, derived from μόνος, and οἶκος, *a habitation*, ſignifies with this author ſuch plants as have their diſtinct flowers on the ſame individual; and he comprehends accordingly under it thoſe plants which have the male and female flowers diſtinct in themſelves, but placed on the ſame plant, or the different ſtalks from the ſame root: of this claſs are the *zanichella*, *tripſacum*, *urtica*, *parthenium*, *juglans*, *pinus*, *momordica*, *andrachne*, *&c.*

The ſecond of theſe (the twenty-ſecond claſs in the general order) is the *dioecia*, containing fourteen orders: the word, derived from the ſame οἰκὸς and δὶς, ſignifies with him plants which have their male and female flowers not on the ſame individual; and accordingly comprehends under it ſuch plants as have diſtinct male and female flowers, on different plants of the ſame ſpecies, either of which, the male and female plants, as they are hence called, might have ariſen from the ſame ſeed: of this claſs are the *ſalix, empetrum, viſcum, humulus, tamus, populus, mercurialis, kiggelaria, meniſpermum, cliffortia, juniperus, ruſcus, clutia, &c.*

The third of theſe (the twenty-third in the general method) is the *polygamia*, containing three orders: the word, derived from πολὺς, *many*, and γάμος, *marriage*, ſignifies with this author plants which have a diverſity of combinations, and many ways of *fructification*, in the ſame ſpecies; and accordingly he comprehends under this claſs thoſe plants which have, in the ſame ſpecies, ſome flowers male, others female, each diſtinct and perfect in its kind; and others mixed or *hermaphrodite*, with the male and female organs of *fructification* both in each: of this claſs are the *veratrum, fraxinus, ficus, &c.*

After all theſe he places thoſe plants whoſe flowers are either abſolutely inviſible, or ſcarce diſcernible by the eye: of theſe he makes only one, his twenty-fourth and laſt claſs, the *cryptogamia:* the word, derived from κρυπτὸς, *hidden*, or *concealed*, and γάμος, or *marriage*, ſignifies a ſet of plants, in which the *fructification* is concealed; and under this laſt claſs he comprehends thoſe plants which either flower, as is generally ſuppoſed, within the fruit, or have the organs of their *fructification* ſo mingled as to eſcape our obſervation: of this claſs are the *ferns, moſſes, flags*, and *muſhrooms*; e. gr. *polypodium, bryum, fucus*, and *agaricus*.

Theſe are the claſſes into which this author has regularly and accurately reduced the whole vegetable world; the characters of which are ſo expreſſive, and the parts they are founded upon ſo fixed and invariable in their nature and office, that there ſeems no reaſon hereafter to perplex the world with any new ſyſtem.

As the claſſes are here all taken from the number, ſite, and diſpoſition of the male parts of the flower, ſo the orders which make their ſubdiſtinctions are, by this author, deduced from the differences of the female parts or *piſtillum*; and as that is ſingle, double, triple, and ſo on, they are on the ſame principles named *monogynia, digynia, trigynia, &c.*

It were to be wiſhed indeed, that the characters of the different genera of theſe claſſes were as perfect and accurate as the claſſes themſelves: this, however, was more than the work of one man; the author has fixed the general diſtinction, and led the way, and it is eaſy now for a much leſs genius to follow him.

FRUCTISTÆ, in *Botany*. See BOTANY.

FRUGIVOROUS *Birds*, are ſuch as feed on fruits; either wholly or in part.

The *frugivorous*, according to Mr. Willughby, are a ſpecies of terreſtrial birds, ſome of which have crooked bills, and claws, yet are of gentler nature, and not rapacious. Such are the parrot kind; which, though ſometimes carnivorous, yet feed likewiſe on fruit.

FRUIT, in its general ſenſe, includes whatever the earth produces for the nouriſhment and ſupport of animals; as herbs, grain, pulſe, hay, corn, flax, and every thing expreſſed by the Latins under the name *fruges*.

In the civil law, they diſtinguiſh three kinds of *fruits*.

Fruits, *natural*, which the earth produces ſpontaneouſly, and without any culture; as thoſe of trees.

Fruits *of induſtry*, which, though natural, require ſome culture to perfect them. And

Fruits, *civil*, which are only *fruits* in the eye of law; as rents, ſalaries, wages, &c.

In the canon law, *fruits* include every thing whereof the revenue of a benefice conſiſts; as glebe-land, tythes, rents, offerings, mills, &c.

Fruit, in *Natural Hiſtory*, denotes the laſt production of a tree, or plant, for the propagation, or multiplication, of its kind; in which ſenſe *fruit* includes all kinds of ſeeds, with their furniture, &c.

Fruit, in *Botany*, is properly that part of a plant wherein the ſeed is contained; called by the Latins *fructus*, and by the Greeks, καρπὸς.

The *fruit* in the Linnæan ſyſtem is one of the parts of fructification, and is diſtinguiſhed into three parts, viz. the PERICARPIUM, SEED, and receptacle, or RECEPTACULUM *ſeminum*.

Fruits are ſometimes dry; and ſometimes ſoft and fleſhy.

Fruit alſo implies an aſſemblage of ſeeds in a head; as in a ranunculus, &c. and, in the general, all kinds of ſeeds, or grains, whether naked, or incloſed in a cover, capſule, or pod; and whether bony, fleſhy, ſkinny, membranous, or the like. The *fruit* is the product, or reſult, of the flower; or that for whoſe production, nutrition, &c. the flower is intended. The ſtructure and parts of different *fruits* are ſomewhat different; but, in all the ſpecies, the eſſential parts of the *fruit* appear to be only continuations, or expanſions, of thoſe obſerved in the other parts of the tree.

Dr. Beal ſuggeſts ſome very good reaſons for a direct communication between the remoteſt part of the tree, and the *fruit*; ſo that the ſame fibres, or ſtamina, which conſtitute the root, trunk, and boughs, are extended into the *fruit* itſelf.

Thus, cutting open an apple tranſverſly, it will be found to conſiſt of four parts; viz. 1. a ſkin, or *cortex*, which is only a production of the ſkin, or outer bark, of the tree. 2. A *parenchyma*, or pulp; which is an expanſion, and intumeſcence of the inner bark of the tree. 3. Fibres, or ramifications, of the woody part of the tree, diſperſed throughout the *parenchyma*.

Of theſe laſt, authors generally reckon fifteen principal branches; ten whereof penetrate the parenchyma, and incline to the baſis of the flower; the other five aſcend more perpendicularly from the pedicle, or ſtalk, and meet with the former at the baſe of the flower; to theſe branches are faſtened the capſulæ, or coats, of the kernels.

Theſe branches, being at firſt extended through the parenchyma, to the flower, furniſh the neceſſary matter for the vegetation thereof; but, the *fruit* increaſing, intercepts the aliment; and thus the flower is ſtarved, and falls off.

4. The core, which is the produce of the pith, or medulla, of the plant, indurated and ſtrengthened by twigs of the wood and fibres, inoſculated therewith: it ſerves to furniſh a cell, or lodge, for the kernels; filtrates the juice of the parenchyma; and conveys it, thus prepared, to the kernel.

In a pear we diſtinguiſh five parts; viz. the ſkin, parenchyma, ramification, ſtone, and acetarium.

The three firſt parts are common to the apple. The ſtone, obſerved chiefly in choak pears, is a congeries of hard corpuſcles, diſperſed throughout the whole parenchyma; but in the greateſt plenty, and cloſeſt together, about the centre, or acetarium: it is formed of the harder, or calculous parts, of the nutritious juice of the parenchyma, extravaſated in maſſes. The acetarium is a ſubſtance of a tart, acid taſte, of a globular figure, incloſed in an aſſemblage of ſeveral of the ſtony parts above mentioned.

In the plum, cherry, &c. there are four parts; viz. a coat, parenchyma, ramification, and ſtone or nucleus. The ſtone conſiſts of two very different parts; the inner, called the kernel, is ſoft, tender, and light; being derived from the pith, or medulla, of the tree, by ſeminal branches, which penetrate the baſe of the ſtone; the external, or harder part, called the ſhell, is a concretion of the ſtony, or calculous parts of the nutritious juice, like the ſtone in pears; and, like that, it contains a ſoft, parenchymous matter within it.

The nut, analogous to which is the acorn, conſiſts of a ſhell, cortex, and medulla. The ſhell conſiſts of a coat, and parenchyma, derived from the bark, and wood, of the tree. The cortex conſiſts of an inner, and outer part; the firſt is a duplicature of the inner tunic of the ſhell; the ſecond is a moſſy ſubſtance, derived from the ſame ſource as the parenchyma of the ſhell. But whether the medulla or pulp of the kernel ariſe from the pith of the tree, or the cortical part of the fruit, is not yet agreed.

Laſtly, berries, as grapes, &c. beſides the three general parts, viz. coat, parenchyma, and ramification, contain grains of a ſtony nature, which do the office of ſeeds.

As to the uſe of *fruits*, beſide the pleaſure and advantage they afford men, &c. they are of ſervice in guarding, preſerving, and feeding the ſeed incloſed; in filtrating the coarſer, more earthy, and ſtony parts of the nutritious juice of the plant, and retaining them to themſelves; and ſending none to the ſeed but the pooreſt, moſt elaborated, and ſpirituous parts, for the ſupport and growth of the tender, delicate embryo, or plantule, contained therein.

So that the *fruit* does the ſame office to the ſeed, that the leaves of the flower do to the *fruit*.

The uſe of *fruits* with us might, under proper regulations, be rendered much more extenſive than it is. Many *fruits* which do hurt when eaten raw, would make wines equal in flavour to many of thoſe now obtained at great prices from abroad; and lands which will not bear corn, yet would bear trees and ſhrubs producing ſuch *fruits*; and the conſequence of this method of culture would be, that much ground, at preſent lying waſte, would be occupied, and great employment found for the numerous poor of ſome of our counties, where the quantities of waſte land are proportionably ſo great, that there is not employment for the people of one half of the county. Cherries properly managed make an excellent wine, and that in very large quantities; and plums alſo make a very agreeable kind, but that it has an auſtereneſs, which muſt be taken off by mixing a little ſugar with it when in the glaſs, not before it is drawn off.

A coarſe plum, ſomewhat larger than a damſon, is the beſt kind for this wine. There is a ſort of plum that grows wild in ſome of our hedges. It will ſucceed on any ground, the pooreſt that can be imagined, and it produces a great abundance of *fruit*. The wine that is made from it is of a very conſiderable ſtrength, and affords a pleaſant brandy by diſtillation in conſiderable quantities. Our common garden currants afford a very agreeable wine; and our gooſeberries are not ſecond to any thing. All theſe produce *fruit* in great abundance; and the planting and taking care of them is very cheap, and the operation very eaſy. The common way of making theſe wines yields very good ones; but when the art of the experienced Vigneron is employed in it, the liquors will prove much better. Phil. Tranſ. N° 124.

Fruits are diſtinguiſhed, by gardeners, into *ſtone-fruit*, and *kernel-fruit*; *ſummer-fruit*, and *winter-fruit*; *wall-fruit*, and *dwarf-fruit*, &c.

M. Quintinie obſerves, that cold, heavy, moiſt lands, produce the faireſt and largeſt *fruit*; but the hotter, drier, and lighter, the more delicious and rich-taſted.

FRUITS, *colours from.* The red juices of *fruits*, as of currants, mulberries, elder-berries, morello, and black cherries, when inſpiſſated and dried, may be again diſſolved in water, to which they give nearly the ſame red colour as they do when freſh. Rectified ſpirit extracts the tinging particles, and acquires a brighter colour than the watery ſolution; becauſe much of the mucilage is left undiſſolved by the former. The red ſolutions, and the juices, are ſometimes made dull, and ſometimes more florid, by acids, and are generally rendered purpliſh by alkalies. The colours of theſe juices are generally periſhable. They reſiſt the power of fermentation, but quickly decay, when the juice is ſpread thinly on any ſubſtance, and dried in open air. The bright lively reds are ſooneſt changed; the dark, dull, red ſtain of the black cherry is conſiderably durable. The bright red *fruit* of the *opuntia*, or prickly pear, is an exception to the above rule; as it gives, according to Labat, a beautiful red dye. The ripe berries of BUCKTHORN ſtain paper of a green colour; from theſe is prepared the ſubſtance called SAP-*green*; which is a pigment ſufficiently durable, ſoluble in water, but not miſcible with oil. The berries, when green, yield a yellow, and, when over-ripe, a purple pigment. Woollen cloth, prepared with alum and tartar, receives, on being boiled with the berries, a periſhable yellow dye. Neumann's Chem. with Dr. Lewis's Notes, p. 433. See AVIGNON *Berry*, ANNOTTO, or ROUCOU, and TURNESOL.

FRUITS, *preſervation of.* See *Preſervation of* FLOWERS, and PRESERVATION *of Vegetables.*

Fruits intended for long keeping ſhould be gathered before they are fully ripe, and in a fair day towards noon.

For the early ripening of *fruit*, ſee FORCING and RIPENING.

FRUIT, *bread.* See BREAD.

FRUITS, with regard to commerce, are diſtinguiſhed into *recent* or *freſh*, and *dry*.

FRUITS, *recent*, are thoſe ſold juſt as they are gathered from the tree, without any farther preparation. As are moſt of the productions of our gardens and orchards, ſold by the fruiterers.

FRUITS, *dry*, are thoſe dried in the ſun, or by the fire, with other ingredients ſometimes added to them to make them keep; imported chiefly from beyond ſea, and ſold by the grocers.

Such are raiſins, currants, figs, capers, olives, cloves, nutmegs, pepper, and other ſpices; which ſee under their reſpective articles.

Under the denomination of *dry fruits* are alſo frequently included apples, pears, almonds, filberds, &c.

FRUITS, *polypyreneous.* See POLYPYRENEOUS.

FRUITS *current* for coins. See COIN.

FRUITS, *firſt.* See FIRST *fruit*, ANNATES, and PRIMITIÆ.

FRUIT-*flies*, a name given by gardeners, and others, to a ſort of ſmall black *flies*, found in vaſt numbers among *fruit*-trees, in the ſpring-ſeaſon, and ſuppoſed to do great injury to them.

Theſe are a ſpecies of ſmall black fly. Mr. Lewenhoek preſerved ſome of them for his microſcopical obſervations. He found that they did not live longer than a day or two, but that the females in this time uſually laid a great number of longiſh eggs. The gardeners who ſuppoſe that theſe flies wound the leaves of the trees, are miſtaken: it is true that they feed on their juices, but they have no weapons with which to extract this themſelves; they feed on ſuch as is naturally extravaſated, and when there is not enough of this for their purpoſe, they haunt thoſe places where the PUCERONS reſort, and feed on the juices which theſe little creatures extravaſate by means of the holes they bore in the leaves with their trunks. Theſe pucerons are a ſmall ſort of inſect very common on our *fruit*-trees, and other plants and trees; they are of a greeniſh colour, and are commonly called tree-lice. Philoſ. Tranſ. N° 262.

FRUIT-*ſtones.* The miſchiefs ariſing from the bad cuſtom of many people ſwallowing the ſtones of plums and other *fruit* are very great. The Philoſophical Tranſactions give us an account of a woman who ſuffered violent pains in her bowels for thirty years, returning once in a month or leſs. At length a ſtrong purge being given her, the occaſion of all theſe complaints was driven down from her bowels to the anus, where it gave a ſenſation of ſtoppage and diſtenſion, and produced a continual deſire of going to ſtool, but without voiding any thing. On the aſſiſtance of a careful hand in this caſe, there was taken out with a forceps an oblong ball of an oval figure, of about ten drams weight, and meaſuring five inches in circumference; this had cauſed all the violent fits of pain ſhe had been ſo many years afflicted with, and after the taking it out ſhe became perfectly well. The ball extracted looked like a ſtone, and felt very hard, but it ſwam in water; on cutting it through with a knife, there was found in the center of it a plum-ſtone, round which ſeveral coats of this tough and hard matter, reſembling a ſtone, had gathered. Another inſtance given in the ſame papers is of a man, who dying of an incurable colic, which had tormented him many years, and baffled the effects of medicines, was opened after death; and in his bowels was found the cauſe of his diſtemper, which was a ball of the like nature with that juſt mentioned, but ſomething larger, being ſix inches in circumference when meaſured, and weighing an ounce and half; in the center of this, as of the other, there was found the ſtone of a common plum, and the coats were of the ſame matter with thoſe of the former. Theſe and ſeveral other inſtances mentioned in the ſame place, ſufficiently ſhew the folly of that common opinion, that the ſtones of *fruits* are wholeſome.

For though by nature the guts are ſo defended by their proper mucus, that people very ſeldom ſuffer by things of this kind, yet if we conſider the various circumvolutions of the guts, their valves and cells, and at the ſame time conſider the hair of the ſkins of animals we feed on, the wool or down on herbs and *fruit*, and the fibres, veſſels, and nerves of plants, which are not altered by the ſtomach, it will appear a wonder that inſtances of this ſort of miſchief are not much more frequent. Cherry-ſtones, ſwallowed in great quantities, have occaſioned the death of many people, and there have been inſtances even of the ſeeds of ſtrawberries, and kernels of nuts, collected into a lump in the guts, and cauſing violent diſorders, which could never be cured till they were carried off. Philoſ. Tranſ. N° 282. p. 1282.

FRUIT-*trees* are diſtinguiſhed, like the *fruits* they bear, into wall *fruit*-trees, ſtandard *fruit*-trees, &c.

With regard to *fruit*-trees, Monſ. Quintinie obſerves,

1. That the cutting and trimming of young trees hinders them from quick bearing; though it contributes both to the beauty of the tree, and to the richneſs and flavour of the fruit.
2. That kernel *fruit*-trees come later to bear than ſtone *fruit*-trees; the term required by the firſt, before they arrive at a fit age for bearing, being, one with another, about four or five years; but, when they do begin, they bear in greater plenty than ſtone-*fruit*.
3. That ſtone-*fruits*, figs, and grapes, commonly bear conſiderably in three or four years; and bear full crops the fifth and ſixth years; and hold it for many years, if well ordered.
4. That *fruits*, in the ſame neighbourhood, will ripen a fortnight ſooner in ſome grounds, than in others of a different temperature.
5. That in the ſame country, hot or cold ſummers ſet conſiderably forwards, or put backwards, the ſame *fruit*.
6. That the *fruits* of wall-trees generally ripen before thoſe on ſtandards; and thoſe on ſtandards before thoſe on dwarfs.
7. That the *fruit* of all wall-trees, planted in the ſouth and eaſt quarters, commonly ripen about the ſame time; only thoſe in the ſouth rather earlier than thoſe in the eaſt; thoſe in the weſt are later by eight or ten days; and thoſe in the north by fifteen or twenty.

For the planting, pruning, engrafting, &c. of *fruit*-trees, ſee PLANTING, TRANSPLANTING, PRUNING, and ENGRAFTING. See alſo ORCHARD, GARDEN, and NURSERY.

Monſ. de Reſſons, in the Memoires de l'Academie Royale des Sciences, ann. 1716, gives us a method of grafting ſtone *fruit*-trees without loſing of time; ſo that a tree which bore bad *fruit* the preceding year, ſhall bear the choiceſt *fruit* the year following.

It frequently happens that perſons are deceived in their *fruit*-trees, eſpecially thoſe bought of the nurſery-men;

and it is an unpleaſing thing, after having waited three years for *fruit*, to find it bad at laſt, and to be obliged to graft the tree again, and wait four years more for the ſecond hopes. In effect, in the common methods of grafting, they know nothing better than to cut off the head of a tree, and make it put forth new wood to graft in: this neceſſarily makes a long delay, which Monſ. Reſſons ſhews how to abridge.

Upon conſidering the union of the ſap in grafts, that author was led to think, that all the office the bark has in grafting, is to receive the ſcutcheon; ſo that if the bark be not quite hard, dry, and inflexible, and incapable of yielding without cracking or burſting, it ſhould ſeem indifferent, whether one grafted on new wood, or old, the ſap paſſing equally into both: which reaſoning had the good fortune to be verified by a number of experiments made with that view.

We are at liberty, then, to graft almoſt at any age, and in any wood. Accordingly, a peach-tree of a worſe kind or quality may be grafted from another of the beſt, in autumn, in the height of its *fruit* and ſap, without cutting off any branches; the graft ſoon cements to the tree by the union of the ſaps, without ſhooting at all: ſo that, cutting off the branches above the grafts the ſpring following, the ſame graft inſerted the preceding autumn will ſhoot vigorouſly; and, being on a wood of the ſame kind, the *fruit* thenceforth produced will be much the larger and finer. But this is not the great point; for the tree thus engrafted will not bear till the third year, and we want *fruit* the firſt.

In order to this it is to be obſerved, that there are three kinds of branches: wood-branches, growing immediately from the ſtem or ſtock of the tree; *fruit*-branches; and branches half of the wood, half of the *fruit* kind, being ſuch as, ariſing from the largeſt wood-branches, preſerve the character thereof, but which, in two years time, will produce *fruit*-branches. Now, this intermediate kind of branches ſhould be choſen for ſcutcheons or grafts. They are eaſily known by being bigger than the *fruit*-branches, and leſs than the wood-branches: they have each of them two, three, four, or even five leaves to each eye; and the eyes are farther diſtant from each other than thoſe of the *fruit*-branches, but cloſer than thoſe of the wood-branches. It muſt be added, that the eyes on ſuch branch are three; one intended for a wood-branch, being ſituate between the two leaves, and advancing farther than the other two, which are intended for *fruit*, and are placed without-ſide the leaves.

Theſe laſt are the preciſe ſubjects to be choſen for the purpoſe of grafting. Twelve of theſe ſcutcheons, more or leſs, according to the ſtrength of the tree to be grafted on, being duly applied, we may depend on a crop of good *fruit* the very next year, on the ſame tree which the laſt year produced the worſt.

There is, in the Philoſophical Tranſactions, a method of making *fruits* and flowers grow in winter inſtead of ſummer, without the common way of doing it by heat. This method is to take up the trees with their roots in the ſpring-ſeaſon, juſt as they begin to ſhoot out their buds; let them be placed upright in a cellar, and ſtand there till the end of September following; then fit veſſels to them, and place the roots in them, covering them in a proper manner with earth, and bring them up into a common ſtove; water them at times with a ſolution of the bigneſs of a walnut of crude ſal armoniac in a quart of rain-water, and they will make their natural progreſs as in ſummer, and in the months of February or March following the *fruit* will be full ripe, and as well taſted as if it had grown on them in the common way, and ripened at its natural ſeaſon. Phil. Tranſ. N° 282, p. 44. The ſuperfluous ſhoots from theſe trees muſt be pruned off at ſuch times of the year, when the trees are full of juice, and furniſhed for a farther ſupply; and by this means there will be no marks of the wounds, they will cloſe up ſo perfectly. The manner of producing pyramidal trees by ingrafting, is not only applicable to *fruit*-trees, but has been tried on oaks, limes, and roſes, with the ſame ſucceſs. Vide infra.

Laurembergius tells us of a peculiar way of managing *fruit*-trees for ready ſervice and beauty, by means of which they will bear *fruit* the firſt year. The method is this: draw a branch of a *fruit*-tree through a pot of earth, and prick it full of holes with a knife, ſo far as it is to ſtand in the pot; let it be well watered for the firſt ſeven or eight days, to make it ſhoot out a great quantity of roots; in the March following cut off the branch from the tree, and let it depend wholly on itſelf for nouriſhment; break the pot away, and place the clump of earth with the young tree in it in the place where it is intended to ſtand. The author aſſures us it will partake ſo much of the nature of the ſtock, as to bear *fruit* the firſt year. Philoſ. Tranſ. N° 3.

An anonymous author has given us, in a treatiſe publiſhed at Hamburgh, under the title Amænitates Hortenſes Novæ, a new method of grafting trees, ſo as to have very beautiful pyramids of *fruit* on them, which will exceed both in quantity, beauty, and flavour, all that can be otherwiſe produced. This, he ſays, he had long experienced, and the method he gives of doing it is this: the trees are to be tranſplanted in autumn, and all the branches cut off; early in the following ſummer the young ſhoots are to be pulled off, and the buds are then to be ingrafted into them in an inverted direction; this, he ſays, adds not only to the beauty of the pyramid, but makes the branches alſo more fruitful. Theſe are to be cloſely connected to the trunk, and to be faſtened in with the common ligature; they are to be placed circularly round the tree, three buds in each circle, and theſe circles at ſix inches diſtance from one another. The old trees may be ingrafted in this manner, the ſucceſs having been found very good in thoſe of twenty years ſtanding; but the moſt eligible trees are thoſe which are young, vigorous, and full of juice, and have not more thickneſs than a finger or two. When theſe young trees are tranſplanted, they muſt be fenced round with pales, to defend them from the violence of the winds; and there muſt be no dung put to them till they are thoroughly rooted, for fear of rotting them before the fibres ſtrike. The buds ingrafted muſt be ſmall, that the wounds made in the bark to receive them, not being too large, may heal the ſooner; and if any of the buds do not ſucceed, which will be found in a fortnight, there muſt be others put in their place. The wound made to receive theſe buds, muſt be a ſtrait cut, parallel to the horizon, and the piece of bark taken out muſt be downward, that the rain may not get in at the wound. In the autumn of the ſame year, this will be a green and flouriſhing pyramid, and the next ſummer it will flower, and ripen its *fruit* in autumn. Act. Erud. ann. 1710.

The Peterſbourg academy furniſhes us with two very ſingular inſtances of *fruits* growing in an unnatural manner; the one of thoſe in the fig-tree, the other in the apple-tree. In both thoſe caſes, the *fruit*, inſtead of its common ſituation, was placed upon the trunk of the tree, with no branch or leaf near it, but only a ſhort pedicle for its ſupport. The inſtance of the fig-tree afforded three figs in a cluſter, the middle one of which withered, but the other two grew to their proper ſize, and were like the reſt of the figs on the ſame tree. The other inſtance of the apple-tree afforded only one ſingle *fruit*; but there was in it ſomething very ſtrange, or that appeared ſo, however, at firſt ſight; for the apples produced on the branches of the tree were of one kind, and this of another. The tree had been grafted, and all the *fruit* of the branches grew from the graft; this ſingle one, which ſtood upon the trunk of the tree below the graft, was of the ſpecies produced by the ſtock. This had doubtleſs been preceded by a flower, though unobſerved, and it could only be as it appeared, of the nature of the genuine *fruit* of the ſtock. All gardeners know, that the ſtock ſuffers no change from the graft; in both theſe caſes there was probably the rudiment of a branch where the ſingle *fruit* appeared, and every other part of it, except the bud of the *fruit* alone, had periſhed, while that arrived at its deſtined ſize and maturity. We have alſo an account in the Philoſophical Tranſactions, N° 385, of an apple-tree bearing a conſiderable quantity of *fruit* for many years together without bloſſoming.

FRUITERY, a place for the laying up and keeping of FRUIT. See GRANARY.

The *fruitery* ſhould be inacceſſible to any thing of moiſture, or even froſt.

FRUITFULNESS, the quality of bearing plenty of fruit, called alſo FERTILITY, and FECUNDITY.

FRUMENTACEOUS *plants* are thoſe which produce geniculated or knotted ſtalks, with reed-like leaves; and whoſe ſeed growing in ſpikes or *jubæ*, is uſeful to make pultege, or bread.

The word is formed from *frumentum*, a general name comprehending all ſorts of corn, or grain, for bread. Hence the Italians, who follow the Latins, uſe *grano* and *frumento* for the ſame.

Wheat, barley, rye, millet, &c. are *frumentaceous* plants. Some authors uſe *frumentaceous* in a narrower ſenſe, reſtraining it to plants which bear a conformity to wheat, either in reſpect of their fruits, leaves, ears, or the like. But this ſeems founded on a miſtaken notion of *frumentum*, as if it denoted only *wheat*, which is rather the ſenſe of the word *triticum*.

FRUMENTARII, in *Antiquity*, a kind of ſoldiers, or archers, under the Weſtern Empire.

St. Cyprian relates, in one of his letters, that ſome of theſe *frumentarii* were ſent to take him.

The firſt time we read of *frumentarii*, as officers, is in the time of the emperor Adrian. Spartian, in his life of that prince, aſſures us, that he made uſe of them to inform himſelf of what paſſed.

Before this time, the name *frumentarius* was only given to the corn-merchants, or meaſurers of corn.

Theſe *frumentarii* did not make any particular corps, diſtinct from the other forces, but there was a certain number of them in each legion, as, among us, there is a certain number of grenadiers in each battalion. Accordingly, in ancient inſcriptions, we meet with *frumentarii* of this or that legion. It is ſuppoſed they were originally a number of young perſons, diſpoſed by Auguſtus throughout the provinces, particularly on all the grand roads, to advertiſe the emperor, with all expedition, of every thing that happened.

In order to this they had a kind of intendance of all the carriages, and on this account came to be employed for the conveyance of corn, *frumentum*, to the armies; whence their appellation.

Afterwards they were incorporated into the troops themſelves, where they ſtill retained their ancient name.

Their principal office was the giving intelligence, in which they agreed with thoſe called *curioſi*, with whom they were frequently joined. See CURIOSUS.

FRUMENTATION, *frumentatio*, among the *Romans*, a largeſs of corn beſtowed on the people. This practice of giving corn to the people, was a very ancient cuſtom among the Romans, and frequently uſed to ſooth the turbulent humour of the populace.

At firſt the number of thoſe to whom this largeſs was given, was indeterminate, till Auguſtus fixed it at two hundred thouſand.

FRUMENTUM *Saracenicum*, in *Botany*, a name by which ſome authors expreſs the fagopyrum, or *buck*-WHEAT.

FRUMENTUM *Indicum*, *Indian corn*, a name given by our American planters to MAIZE.

FRUMENTY, popularly FURMETY, a kind of pottage, the baſis whereof is wheat, boiled up with milk, ſugar, and ſometimes ſpice.

Pliny tells us, that in his time they mixed chalk among it. Galen deſcribes it as a very nutritious food made of corn, or pulſe, boiled with water, wine, and oil.

The Latins called it *alica*, which Feſtus derives *ab alendo*; as being very nouriſhing. But then it muſt be obſerved, they made it of any kind of corn.

Ours being reſtrained to wheat, we have given its denomination accordingly, from *frumentum*. An emulſion, wherein wheat was an ingredient, would be a kind of *frumenty*.

FRUMGYLD, in *our old Writers*, is the firſt payment made to the kindred of a perſon ſlain, towards the recompence of his murder.

FRUMSTOL, in *our old Writers*, the chief ſeat or manſion-houſe, which is called by ſome the *homeſtal*. Leg. Inæ, cap. 38.

FRUSO, in *Zoology*, a name given by ſome to the *coccothrauſtes criſtata Indica*, commonly called the *Virginia* NIGHTINGALE.

FRUSSURA, in *our old Writers*, a breaking down; alſo a ploughing or breaking up. *Fruſſura domorum* is houſe-breaking; and *fruſſura terræ*, new broke land.

The word comes from the French *froiſſure*, *a bruiſe*; and that from the verb *froiſſer*, *to bruiſe* or *break*.

FRUSH, or FROG, in the *Manege*, is a ſort of tender horn which ariſes in the middle of the ſole, and at ſome diſtance from the toe of a horſe; it divides into two branches, running towards the heel, in the form of a fork.

FRUSTUM, in *Mathematics*, a piece cut off or ſeparated from a body.

FRUSTUM of a pyramid, or cone, is a part or piece thereof cut off, uſually by a plane parallel to the baſe.

All round and ſquare timber that grows tapering, may be conceived as the *fruſtum* of a cone, or pyramid: to find the quantity whereof, take the following theorem, which in the main is Mr. Oughtred's. Given, B (*Tab. Survey. fig.* 10.) the ſide of the greater baſe, *b* the leſſer baſe's ſide, A the height of the *fruſtum*: though, below, we ſuppoſe B and *b* to repreſent the areas of the two baſes. Whole height $a+A=H$.

Firſt, to find *a*, ſay, as $B-b : b :: A : \frac{b\,A}{B-b}$ or $\frac{b\,A}{x}$.

Now $BH=3$ times the whole pyramid, becauſe any priſm is three times a pyramid of the ſame baſe and height with it, by 7 and 10 Euclid, and $b\,a=3$ times the upper pyramid.

Wherefore $\frac{BH-b\,a}{3}$ equal to the *fruſtum* of the pyramid required; which theorem in words is this:

Multiply the lower baſe by the whole height, and from the product ſubtract the upper baſe multiplied by the height of the top-piece wanting, and then one third of the remainder ſhall give the *fruſtum*.

And in the ſame way you may proceed for the *fruſtum* of a cone; only it will be more difficult to find the circular baſes. See CONE.

FRUSTUM *of a ſphere*. See SEGMENT.

We have a general theorem in Mr. Mac-Laurin's Treatiſe of Fluxions, concerning the *fruſtum* of a ſphere, cone, ſpheroid, or conoid, terminated by parallel planes, when compared with a cylinder of the ſame altitude, on a baſe equal to the middle ſection of the *fruſtum* made by a parallel plane. The difference between the *fruſtum* and the cylinder is always the ſame in different parts of the ſame, or of ſimilar ſolids, when the inclination of the planes to the axis, and the altitude of the *fruſtum*, are given.

In the parabolic conoid this difference vaniſhes, the *fruſtum* being always equal to a cylinder of the ſame height, upon the ſection of the conoid that biſects the altitude of the *fruſtum*, and is parallel to its baſes.

In a ſphere the *fruſtum* is always leſs than the cylinder by one fourth part of a right angled cone, of the ſame height with the *fruſtum*, or by one half of a ſphere of a diameter equal to that height; and this difference is always the ſame in all ſpheres, when the altitude of the *fruſtum* is given.

In the cone, the *fruſtum* always exceeds the cylinder by one fourth part of the content of a ſimilar cone that has the ſame height with the *fruſtum*.

In the hyperbolic conoid this exceſs is the ſame as in the cone generated by a triangle *o c e*, (*Tab.* II. *Geometry*, *fig.* 44.) formed by the axis *o c*, the aſympote *o e*, and a perpendicular *c e*, the altitude of the *fruſtum* and the inclination of the axis to their baſes being the ſame in both.

In the ſpheroid (*fig.* 45.) the cylinder exceeds the *fruſtum*; and the difference between them is the ſame as in the cone C D *r d*, the plane D *r d*, or B *k b*, being ſuppoſed parallel to thoſe which terminate the *fruſtum*. In different inclinations of thoſe planes, when the altitude of the *fruſtum* is given, that difference is reciprocally as the cube of the diameter B *b*, which is the conjugate of C A, the axis of the *fruſtum*. But if the altitude of the *fruſtum* be alſo varied ſo as to be reciprocally proportional to the diameter B *b*, then the difference between the *fruſtum* and cylinder will be always of the ſame magnitude in the ſame ſpheroid or conoid.

When the inclination of the axis of the ſolid to the planes that terminate the *fruſtum* is given, the difference between the *fruſtum* and cylinder, in the ſame, or in ſimilar bodies, is as the cube of their common altitude. Mac-Laurin's Fluxions, Introd. p. 24, 25.

Theſe propoſitions concerning *fruſtums* are of uſe in GAUGING.

FRUTEX. See SHRUB.

FRUTEX *Æthiopicus*, in *Botany*, a name given to the ſilver PINE-*tree*.

FRUTEX *Africanus*, in *Botany*, a name given to a ſpecies of trees brought from the Cape of Good Hope; a deſcription of which ſee under *Spurge-leaved* PINE.

FRUTICOSE *ſtalks of plants* are thoſe of a hard, woody ſubſtance.

FRY, in *Zoology*, ſignifies the ſpawn, or rather the young of fiſh. See FISH.

FRYTH, or FRITH, is explained, by Sir Edward Coke, as a plain between two woods, or a lawn.

Camden uſes it for an arm of the ſea, or a ſtreight between two lands, from *fretum*.

Frith, from the Saxon *frid*, *peace*, is alſo uſed for a wood; becauſe the Engliſh Saxons held woods to be ſacred, and uſed them as ſanctuaries.

FUAGE, or FOCAGE, a tax or impoſition laid on hearths or chimneys, i. e. on fire-places, or families, from which was probably derived the *hearth-ſilver*, and *chimney-money*.

This duty was repealed by 1 William and Mary, ſeſſ. 1. cap. 10.

Edward the Black Prince, having Aquitain granted him, laid an impoſition of *fuage*, or *focage*, upon the ſubjects of that dukedom, viz. one ſhilling for every fire-place. After his example, Charles V. of France, laid a tax of a franc for each fire-place, for one year only. His ſucceſſor Charles VI. augmented it under the ſame name. Charles VII. rendered it perpetual, and called it *taille*.

By an ordonnance of Humbert II. dauphin of Viennois, the impoſition of *fouage*, or *feuage*, was then laid per feu, i. e. per fire, or family, *ſeu per lares focum habentes*. In Latin it was called *focagium*, q. d. *pro ſingulis focis*. Sometimes it was alſo called *fournage*, on account of the oven or furnace: in Greek καπνικον or καπνος, *fumus*, *ſmoke*. In Will. Tyr. De Bello Sacro, it is called *foagium*: for it was impoſed by the kings of Jeruſalem. The counts and other lords, likewiſe impoſed it on the feudataries, or vaſſals. Zonaras aſſures us, that the general Nicephorus firſt eſtabliſhed it among the Greeks. See CHIMNEY-*money*.

FUCA, in *Ichthyology*, a name given by Gaza, and ſome other writers, to the fiſh called phycis, by Ariſtotle, Ælian, and other writers; and *tinca marina*, by Salvian and Rondeletius. It is a fiſh nearly allied to the genus of the blenni.

FUCHSIA, in *Botany*, the name of a genus of plants of the *octandria monogynia* claſs; ſo called by Plumier, in memory of the famous botaniſt Fuchſius, Plum Nov. Gen. 14. the characters of which are theſe: the flower hath one petal with a cloſed tube, ſlightly cut into eight parts at the brim; and hath four ſtamina the length of the tube. An oval germen is ſituated under the flower, which afterwards becomes a ſucculent berry with four furrows, having four cells, containing ſeveral ſmall oval ſeeds. There is one ſpecies a native of the warm parts of America.

FUCUS is uſed for a paint, or compoſition, applied on the face, to beautify it, and heighten the complexion.

Old women make uſe of *fucuſes* and pomatums, to appear young. The *fucus* made with *ceruſs* is corroſive and pernicious to the ſkin.

Pliny ſays, that the *fucus* of the Roman dames was a kind of white earth, or chalk, brought from Chio and Samos, diſſolved in water.

The *fucus Solimanni* is a compoſition of prepared ſublimate, in great repute among the Spaniards of Peru.

FUCUS *Giganteus*, a name given by Mr. Banks and Dr. Solander, to a kind of ſea-weed of an enormous ſize, which they diſcovered in their paſſage from Rio de Janeiro to the ſtreight of Le Maire. The leaves of it were four feet long, and ſome of the ſtalks, though not thicker than a man's thumb, above one hundred and twenty.

FUCUS, in *Botany*, the name of a genus of ſubmarine plants, of the claſs of *cryptogamia* and order of *algæ*; the characters of which are, that they are of a tough ſtructure, and formed into a kind of leaves, which are flat, and variouſly divaricated. The male flowers are veſicles interwoven with ſmall fibres, and the female are veſicles interſperſed with ſmall prominences; they have a ſingle ſeed. See *Tab.* VII. *of Botany*, *Claſs* 24. N° 3.

The ſpecies of *fucus* enumerated by Mr. Tournefort are ſeventy-ſeven; and by Linnæus are fifty-two.

Mr. Reaumur has diſcovered, that all the *fucuſes* produce regular flowers and ſeeds, in the ſame regular manner. The flowers ſtand all over the leaves from the origin of them at the root to their utmoſt extremities, only the ribs in the middle are free from them. Every flower is compoſed of a cluſter of ſmall and extremely ſlender threads. Theſe are uſually all of the ſame length in the ſame flower, but they are ſo numerous as not to be eaſily counted; the longeſt of theſe threads are not above one twelfth of an inch in length, and the reſt are not half ſo long. They all iſſue out of a ſmall hole in the leaf, which ſerves as a ſort of cup to them. The threads are too feeble to ſupport their own weight in the air. When the ſea has left the plants, they are all found lying flat upon the leaves; though while the water covers them, they ſtand ſomewhat erect. They are not terminated at the top by apices containing a farina; but they may very eaſily contain that powder in their whole ſubſtance, and throw it off as ſoon as they expand themſelves. They are diſpoſed with no ſort of regularity on the leaves; for in ſome places they ſtand very cloſe together, in others they are placed at much greater diſtances. They grow equally on both ſides of the leaves; but the ſame flower never perforates the leaf, but all its parts appear on the ſame ſide. The flowers are much more eaſily diſcerned on the plant when it is dry, than while it is moiſt; for when dry, the filaments that compoſe them are white; whereas when moiſt, they are of a deep brown, like the leaves on which they ſtand. Of all the flowers which cover theſe plants, there are none that produce ſeeds but thoſe which are placed near the extremities of the leaves, and not all of theſe. In thoſe places where the ſeed is beginning to form itſelf, the extremity of the leaf ſwells, and forms a ſort of capſule, which contains the fruit, while the reſt of the leaf retains its former thinneſs. When the flowers are fallen, the holes in the leaf, which ſerved them for cups, become eaſily viſible in the places where the thickneſs happens, and where the ſeeds are to be lodged; and the margin of each hole is ſurrounded with a little circular protuberance, which ſtands out beyond the reſt of the ſurface. The ſwelled ends of the leaves grow often to half an inch in thickneſs, and uſually terminate in two horns, which form an acute angle; and the rib of the leaf is not viſible in theſe ſwoln parts. When theſe are cut open, whether it be tranſverſely or horizontally, they are found filled with a thick viſcous liquor, and in this are ſeen ſeveral roundiſh bodies of about a twentieth part of an inch in length; they are of a reddiſh colour, and are eaſily diſtinguiſhed, and are all found to be fixed to the ſides of the leaf. Theſe are what Dr. Robinſon, who ſeems to have been the firſt perſon who diſcovered them, took for the ſeeds; and they have really much the appearance of naked ſeeds; but, when cloſely examined, they are found to be in reality capſules containing each a great number of minute round ſeeds, which are faſtened to their ſides, as they were to the ſides of the tumour in the leaf; and theſe ſmaller capſules are in the ſame manner with thoſe full of a tranſparent viſcous liquor.

Though theſe capſules appear at firſt ſight plain roundiſh bodies; yet when more nearly examined, they are found to be rather ſhaped like glaſs bottles with ſhort necks, the neck being fixed into the ſubſtance of the leaf, and its extremity forming the protuberant circular rim that ſurrounds the little hole in the leaf, which had ſerved as a cup to the flowers. See Mem. Acad. Par. 1711, where we have figures of the *fucus*.

FUCUS *palmatus*, *handed fucus*, the name given to a ſpecies of ſea *fucus*, diſtinguiſhed from the reſt by its having no ſtalk, its leaves being divided in the manner of a hand, and its extremities divided into many curled ſegments. It is common on almoſt all the ſea coaſts of Europe, and is one of the ſeveral ſpecies of ſea plants in which Mr. Reaumur has diſcovered regular flowers and ſeeds. They are in this ſpecies however ſo ſmall, as to require the aſſiſtance of a microſcope to diſcover them; though after they have been once ſeen in that manner, as is the caſe in many microſcopic objects, they may then be eaſily diſtinguiſhed by the naked eye. This plant is faſtened to ſome ſtone by a round root, from which there ariſe four or five leaves, which at about an inch diſtance from the root divide into a number of branchings, which conſtitute the whole plant. This ſpecies carries its ſeeds at the extremities of the leaves, where they are incloſed in the interior ſubſtance of the plant; and nothing is to be diſcovered on the ſurface without the aſſiſtance of glaſſes, unleſs it be that the leaves are of a ſomewhat more duſky hue than elſewhere, which is cauſed by a number of ſmall opake bodies; and when this obſcure part of the plant is opened, there appears a number of ſmall, round, and hard reddiſh ſeeds, which may, probably, be capſules or ſeed-veſſels, and not ſingle ſeeds.

FUCUS *polyſchides*. See POLYSCHIDES.

FUCUS *thermalis*, in *Botany*, the name of a remarkable ſpecies of plant, found only in the hot water ſprings. It was firſt diſcovered by Monſ de Monteſquieu, in the great baſon, at the boiling ſpring in Gaſcony; he was not able to diſcover that it produced either flowers or ſeeds. Its ſubſtance is entirely compoſed of ſmall bladders full of air, the ſurfaces of which are reticular, as worked in the manner of a coarſe canvas. It is obſerved to grow only in the hotteſt waters.

FUDDER, among the *Miners*, a load of lead, which is eight pigs, or ſixteen hundred weight.

FUEL, in *Philoſophy*, the *pabulum* of FIRE, or whatever receives and retains fire, and is conſumed, or rendered inſenſible thereby.

A great deal of nicety is required in chooſing the proper *fuel* to raiſe and continue the ſeveral degrees of fire, in chemical operations. The natural heat of the ſummer ſun is ſufficient for inſolations. A ſpirit-lamp may be made to give the next degree of heat to this, which may be much augmented or decreaſed, according to the number of wicks kept burning at a time.

The next degree of fire to this, is made of the lighter *fuel*; ſuch as dry ſtraw, leaves, twigs, and the like; the next in order, is that from oils, wax, reſin, pitch, &c. And laſtly, ſolid wood, coals, and turf, may be employed for the ſtrongeſt. Theſe by means of proper furnaces made to contain different quantities, may be made to give a greater or leſs degree of a ſtrong fire. To excite the greateſt degree of heat in a furnace, the rule is to uſe the denſeſt *fuel*, and in the largeſt quantity, and to have bellows placed all round the furnace: theſe are to be inceſſantly blown, and directed to the central part of the fire, in which the matter to be worked upon is lodged. Thus the greateſt degree of heat from culinary fires is to be given, and this is ſufficient for the known operations on metals, glaſs, &c.

It is a known truth, that *fuel* cannot conſume by means of heat alone, without the admiſſion of freſh air, and this is no way more clearly proved, than by this eaſy experiment. Let a ſtrong cylinder of iron, hollow within, be fitted with a firm ſcrew at each end; in the cavity of this cylinder incloſe a long piece of charcoal, and then ſcrew up both the ends faſt, and place the whole in a ſtrong fire; let it continue there for ſeveral hours; and when it is taken out and cooled, open it, and the piece of charcoal will be found ſtill black, in its own form, and no way apparently altered or diminiſhed.

It is plain from this, that the conſumption of *fuel* depends upon the rarefaction, diſlodgment, briſk agitation, and diſcharge of its inflammable vapour, by means of freſh air; and hence we have the reaſon of the known rule of extinguiſhing fires by ſmothering them.

It is provided by ſtatute, that wood-*fuel* ſhall not be felled under the aſſize. See Billet and Faggots.

FUGA *demonum*, in *Botany*, a name uſed by ſome authors for the *hypericum*, or *St.* John's *wort.*

Fuga *vacui*, in the *Ancient School Philoſophy*, a ſuppoſed averſion in nature to a VACUUM.

Moſt of the phenomena which the ancients aſcribed to the *fuga vacui*, the moderns have demonſtrated to ariſe from the gravity and preſſure of the air. This is the caſe in the aſcent of water in ſyringes, pumps, &c.

FUGALIA, in *Antiquity*, a feaſt celebrated among the Romans, ſuppoſed by ſome to be the ſame with the REGIFUGIUM, held on the 24th of February, in memory of the expulſion of the kings, and the aboliſhing of the monarchical government. Struvius, Antiq. Rom. Syntag. cap. 9. diſtinguiſhes the *fugalia* from the *regifuge*; and even doubts whether the regifugium were thus called on account of the expulſion of the kings, or becauſe the *rex ſacrorum*, after the ſacrifice was ended, fled haſtily out of the *forum* and *comitia*.

Be this as it will, the only ancient author of note that makes expreſs mention of the *fugalia*, is St. Auguſtine De Civitate Dei, lib. ii. cap. 6. And his commentator Vives ſhews a great inclination to correct the reading of the word, were it not that St. Auguſtine adds, that the feaſt was a true *fugalia*, all decency and modeſty being baniſhed from it.

That learned perſon conjectures, that the *fugalia* were the ſame thing with the *poplifugia*, or the feaſt of *Fugia*, the goddeſs of joy, occaſioned by the rout of an enemy, which was the reaſon why the people abandoned themſelves to riot and debauchery; and that the feaſt was firſt inſtituted on occaſion of the victory gained over the Ficulnates, Fidenates, and neighbouring nations, upon their attempt to take poſſeſſion of Rome, the day after the people had withdrawn from it, as related by Varro, lib. v. de Ling. Lat.

But, according to Varro, the *poplifugia*, which fell in the month of June, were held in memory of the flight or retreat of the people, in a ſedition raiſed among them: it is true, he adds, that the day followed ſoon after the retreat of the Gauls, and the time when the neighbouring nations conſpired againſt them: but this does not appear to have any relation to the *poplifugia*, being only meant to mark the æra or time when the ſedition and flight of the Roman people happened. After all, though the *poplifugia* might have been originally eſtabliſhed in commemoration of the flight of the people, and not that of the enemies, this does not hinder, but the *fugalia* of St. Auguſtine may probably be the *poplifugia* of Varro, according to the conjecture of Vives.

FUGAM *fecit*, in *Law*, a term uſed where it is found by inquiſition, that a perſon fled for felony, &c. And if flight and felony be found on an indictment for felony, or before the coroner, where a murder is committed, the offender ſhall forfeit all his goods, and the iſſues of his lands, till he is acquitted or pardoned: and it is held, that when one indicted of any capital crime, before juſtices of oyer, &c. is acquitted at his trial, but found to have fled, he ſhall, notwithſtanding his acquittal, forfeit his goods, but not the iſſues of his lands, becauſe by the acquittal the land is diſcharged, and conſequently the iſſues. 3 Inſt. 218. H. P. C. 27. 2 Hawk. P. C. 450.

The party may, in all caſes, except that of the coroner's inqueſt, traverſe the finding of a *fugam fecit*; and the particulars of the goods found to be forfeited, may be always traverſed: alſo whenever the indictment againſt a man is inſufficient, the finding of a *fugam fecit* will not hurt him. 2 Hawk. 451. Making default in appearance on indictment, &c. whereby outlawry is awarded, is a flight in law.

FUGITIVE, *refugee*, a perſon obliged to fly his country, or remove from a place where he had ſome abode or eſtabliſhment, on account of his crimes, debts, or on other occaſions.

In the Roman law, a *fugitive* ſlave was ſuch a one as was apt to run away from his maſter. And in ſelling a ſlave, the maſter was obliged to declare, whether or no he were *fugitive*.

The term is alſo applied to deſerters in an army, or thoſe who fly from the combat.

Fugitives *goods*, *bona fugitivorum*, the proper goods of him that flies upon felony, which, after the flight lawfully found on record, do belong to the king, or lord of the manor.

Fugitives *over ſea*, are perſons that go over ſea without the king's licence, who, unleſs they are merchants, or eminent perſons, or king's ſoldiers, forfeit their goods; and maſters of ſhips, &c. carrying ſuch perſons beyond ſea, ſhall forfeit their veſſels; and alſo, if the ſearcher of any port ſhall negligently ſuffer any perſons to paſs, he ſhall be impriſoned, &c. Stat. 9 Edw. III. cap. 10. and 5 Ric. II. cap. 2.

Fugitive *pieces*, among the learned, denote thoſe little compoſitions which are printed on looſe ſheets, or half ſheets; thus called, becauſe eaſily loſt, and ſoon forgot.

FUGUE, of *fuga*, *flight*, in *Muſic*, is when the different parts of a muſical compoſition follow each other, each repeating what the firſt had performed.

There are three kinds of *fugues*; the *ſingle fugue*, *double fugue*, and *counterfugue*.

Fugue, *ſingle*, or *ſimple*, is ſome point conſiſting of 4, 5, 6, or any other number of notes, begun by one ſingle part, and then ſeconded by a third, fourth, fifth, and ſixth part, if the compoſition conſiſts of ſo many, repeating the ſame, or ſuch-like notes; ſo that the ſeveral parts follow, or come in, one after another, in the ſame manner, the leading parts ſtill flying before thoſe which follow.

Fugue, *double*, is when two or more different points move together in a *fugue*, and are alternately interchanged by ſeveral parts.

For the *Counter*-Fugue, ſee Counter-*fugue*.

The Italians ſay, a *fugue*, or *flight of rooms*, or *chambers*, meaning a ſeries or range of rooms, the doors whereof anſwer in a right line behind each other, ſo as they may be all ſeen at once, from one extreme to the other.

FULCRUM, *Prop*, in *Mechanics*. See Lever, and Hypomochlion.

FULGURATING *phoſphorus*, a term uſed by ſome Engliſh writers to expreſs a ſubſtance of the phoſphorous kind, the preparation of which does not ſeem to have been well known to any but the inventor of it. It was prepared both in a liquid and a dry form, and not only ſhone in the dark in both ſtates, but communicated its light to the things it was rubbed on. If incloſed in a glaſs veſſel well ſtopped, it ſometimes would *fulgurate*, or throw out little flaſhes of light, and ſometimes fill the whole vial with waves of flame. It does not need recruiting its light at the fire, or in the ſunſhine, like the phoſphorus of the Bolonian ſtone, but of itſelf continues in a ſtate of ſhining for ſeveral years together, and is ſeen as ſoon as expoſed in the dark; the ſolid or dry matter always reſembling a burning coal of fire, though not conſuming itſelf. Phil. Tranſ. N° 134. See Phosphorus.

FULICA, in *Zoology*. See Coot.

FULIGINOUS, an epithet applied to a thick SMOKE, or vapour, replete with SOOT or other craſs matter.

The word is formed from the Latin *fuligo*, *ſoot*; and is rarely uſed but when joined with vapour.

In the firſt fuſion of lead, there exhales a great deal of *fuliginous* vapour, which, retained and collected, makes what we call LITHARGE.

Lamp-BLACK is what is gathered from the *fuliginous* vapours of pines, and other reſinous woods, when burnt.

Some phyſicians talk of *fuliginous* vapours emitted from the ſpleen to the brain, which they will have to be the cauſe of the hypochondriac and hyſteric diſorders; thence called the VAPOURS, and by ſome the SPLEEN.

FULIGO *metallorum*, a term uſed by the *Chemiſts*, ſometimes to expreſs arſenic, and ſometimes crude mercury.

FULIGULA, in *Zoology*, a name given by Geſner to a ſpecies of duck, ſeeming to be the ſame with a kind common on the Yorkſhire ſhores. The ſame author alſo deſcribes another ſpecies under the name of *anas fuligula prima*, which ſeems the ſame with the CAPO *negro*, or *tufted* DUCK.

FULL is variouſly uſed, in oppoſition to empty, narrow, confined, &c.

The Carteſians hold, that the univerſe is *full*, i. e. that every part or point has matter in it.

When the body is *full* of humours it ſhould be purged. See Plenitude, and Plethora.

An ambaſſador has *full* power given him to act, tranſact, &c. The army was in *full* march, i. e. the whole army was in march, with all the forces it conſiſted of.

A man is ſaid to bear the arms of a family *full*, i. e. without any difference or diminution.

Full *age*. See Age, in *Law*.

Full *arms*. See Arms.

Full *forfeiture*. See Forfeiture.

Full *moon*, *plenilunium*, that phaſis of the moon, when her whole diſk or face is illuminated; which is in the time of her oppoſition to the ſun.

Eclipſes of the moon always happen at the time of *full* MOON. See Eclipse.

Full *and by*, a *Sea-phraſe*, denoting the ſituation of a ſhip with regard to the wind, when ſhe is cloſe-hauled, and ſailing in ſuch a manner, as neither to ſteer too nigh the direction of the wind, nor to deviate to leeward, both of which movements are unfavourable to her courſe; as in the former her ſails will ſhiver, and render the effort of the wind precarious and ineffectual; and in the latter ſhe will advance in a direction widely diſtant from her real courſe. Hence, keep her *full* is the order from the pilot or other officer to the helmſman, not to incline too much to windward, and thereby ſhake the ſails ſo as to retard the courſe. Falconer.

FULLER, a workman employed in the manufactories, to full, mill, or ſcour cloths, rateens, ſerges, and other woollen ſtuffs, by means of a mill, to render them thicker, and more compact and durable.

The word is formed of the Latin *fullo*, which ſignifies the ſame thing.

The *fullers* among the Romans waſhed, ſcoured, and fitted up cloaths; and their office was judged of that importance, that there were formal laws preſcribed them for the manner of performing it. Such was the Lex Metalla de *Fullonibus*. See alſo Pliny, lib. vii. cap. 56. Ulpian. leg. 12. ff. de Furtis, lib. xiii. § 6. Locati, lib. xii. § 6. ff. &c. See FULLING.

FULLERS-*earth*, *ſmectis*, or *cimolia purpuraſcens*, is a hard, denſe MARLE, moderately heavy, of a very compact and regular texture, of a rough or dry appearance, though, when cut or ſcraped, it is of a very ſmooth, unctuous, and glaſſy ſurface; it does not colour the hands, adheres but ſlightly to the tongue, melts freely in the mouth, and has a little harſhneſs between the teeth; in water it is immediately diffuſible, and falls into a fine ſoft powder. It makes no efferveſcence with aqua fortis; in the fire it acquires a yellowiſh brown colour, and a ſtony hardneſs: the natural colour of the *fullers*-earth is commonly a greyiſh brown; but it much varies, and is found from the pale greyiſh brown to the duſky and almoſt black, generally with a caſt of yellowiſh green. This ſubſtance is of great uſe in the woollen manufacture.

It ſerves to ſcour cloths, ſtuffs, &c. and imbibe the tar employed in the external diſtemperatures of ſheep, and all the greaſe and oil, and other unctuous ſubſtances, neceſſarily uſed in the preparing, dreſſing, &c. of the wool. *Fullers-earth* is dug in great plenty out of certain pits near Brick-hill, in Staffordſhire; alſo near Ryegate, in Surry; near Maidſtone, in Kent; near Nutley and Petworth, in Suſſex.

But the greateſt quantity and the fineſt earth of this kind in the world, is dug in the pits at Wavendon, near Woburn, in Bedfordſhire. The ſtrata in theſe pits lie thus: from the ſurface to the depth of ſix yards, there are ſeveral layers or beds of ſand, all reddiſh, but ſome lighter coloured than others. Under theſe there is a thin ſtratum of a ſand-ſtone, which they break through, and then for the depth of about ſeven or eight yards you have ſand again, and then there is the *fullers*-earth. The upper ſtratum of this is about a foot thick, and they call it CLEDGE; this is thrown aſide as uſeleſs, being commonly fouled with the ſand, which originally covered it, and uſually inſinuates itſelf conſiderably into it. After this they come at the fine *fullers*-earth for ſale, which lies to the depth of eight foot more. The matter of this is divided into ſeveral layers, there being commonly about a foot and half between one horizontal fiſſure and another. Of theſe ſeveral layers, the upper half, where the earth breaks itſelf, is tinged red; this ſeems to be owing to the running of the water on it, from among the ſands above, ſome of which are probably of a ferrugineous nature, or have ferrugineous matter among them. This reddiſh *fullers*-earth the workmen call crop; and between the cledge and this, there is a thin ſtratum of matter of leſs than an inch, which in taſte, colour, and external appearance, reſembles the terra Japonica of the ſhops. This may probably alſo have a ſhare in the tinging of the earth, as the water may be coloured in running through it.

The lower half of the ſtrata of *fullers*-earth they call wall-earth; this is untinged with the red colour of the other, and ſeems the moſt proper ſor fulling. Under the *fullers*-earth there is a ſtratum of a rough and coarſe white ſtone, about two foot thick; they ſeldom dig through this, but if they do, they find more ſtrata of ſand.

The ſtratum of *fullers*-earth ſeems all the way to lie very level, not to riſe and fall with the upper ſtrata, for when the ſurface is higher, they always find they have farther to dig for it. There are a great number of perpendicular fiſſures in the ſtratum of *fullers*-earth, and beſides this, it forms itſelf in every interval into a multitude of pieces of different ſhapes and ſizes by cracking. The place where it is dug, is that ridge of ſand-hills which runs to Shotover, in Oxfordſhire; and as the ſtrata of the earth are uſually found to continue much the ſame, for long tracts of ground, it is probable that the *fullers*-earth ſtratum runs the whole length of theſe hills, and that ſomebody will at one time or other be enriched by finding it in ſome other part of their courſe. Phil. Tranſ. N° 379. or Abridg. vol. vi. part ii. p. 220, &c.

It is abſolutely neceſſary to the well dreſſing of cloth; and hence foreigners, though they can procure wool to be clandeſtinely exported out of the kingdom, can never reach to the perfection of the Engliſh cloths, &c. without *fullers*-earth, which is very plentiful in England, and excels that of other countries in quality, as much as in quality and cheapneſs.

For this reaſon it is made a contraband commodity; and the export made equally criminal with that of exporting wool.

Abroad they make great uſe of urine, in lieu of *fullers*-earth.

This earth abounds much in the vegetative ſalt which promotes the growth of plants, and is therefore reckoned by Sir H. Plat, and others, a great improver of land. When mixed with vinegar, it diſperſes pimples and puſhes, checks inflammations, and cures burns. See CIMOLIA.

FULLERS-*weed*, *thiſtle*, or *teazle*, in *Botany*. See TEAZEL.

FULLERY, a work-houſe, or place where cloths, &c. are *fulled* or ſcoured.

The term is principally underſtood of the fulling-mill.

FULLING, the art, or act of cleanſing, ſcouring, and preſſing cloths, ſtuffs, and ſtockings, to render them ſtronger, cloſer, and firmer: called alſo *milling*.

Pliny, lib. vii. cap. 56. aſſures us, that one Nicias, the ſon of Hermias, was the firſt inventor of the art of *fulling*: and it appears by an inſcription quoted by Sir G. Wheeler, in his Travels through Greece, that this ſame Nicias was a governor in Greece in the time of the Romans.

The *fulling* of cloths, and other ſtuffs, is performed by a kind of water-mill; thence called a *fulling*, or *ſcouring-mill*.

Theſe mills, excepting in what relates to the mill-ſtones and hopper, are much the ſame with corn-mills. And there are even ſome which ſerve indifferently for both purpoſes; corn being ground, and cloths fulled, by the motion of the ſame wheel.

Hence in ſome places, particularly France, the fullers are called *millers*; as grinding corn, and milling ſtuffs, at the ſame time.

The principal parts of the *fulling-mill* are, the wheel with its trundle; which gives motion to the tree or ſpindle, whoſe teeth communicate it to the peſtles, or ſtampers, which are hereby raiſed and depreſſed alternately, according as its teeth catch on, or quit, a kind of latch in the middle of each peſtle. The peſtles and troughs are of wood; each trough having at leaſt two, ſometimes three peſtles, at the diſcretion of the maſter, and according to the force of the ſtream of water.

In theſe troughs are laid the cloths, ſtuffs, &c. intended to be *fulled*: then, letting the current of water fall on the wheel, the peſtles are ſucceſſively let fall thereon, and by their weight and velocity they ſtamp and preſs the ſtuffs very ſtrongly, which by this means become thickened and condenſed.

In the courſe of the operation, they ſometimes make uſe of urine, ſometimes of fullers-earth, and ſometimes of ſoap.

To prepare the ſtuffs to receive the firſt impreſſions of the peſtle, they are uſually laid in urine; then in fullers-earth and water; and laſtly in ſoap, diſſolved in hot water.

Soap alone would do very well; but this is expenſive; though fullers-earth, in the way of our dreſſing, is ſuperior to it; but then it muſt be firſt well cleared of all ſtones and grittineſs, which are apt to make holes in the ſtuff.

As to urine, it is certainly prejudicial, and ought to be entirely diſcarded; not ſo much on account of its ill ſmell, as of its ſharpneſs and ſaltneſs; which is apt to render the ſtuffs dry and harſh.

The true method of *fulling* with ſoap is delivered by Monſ. Colmet, in an authentic memoir on that ſubject, ſupported by experiments made by order of the marquis de Louvois, then ſuperintendant of the arts and manufactories of France. The ſubſtance of which we ſhall here ſubjoin.

FULLING, *cloth and woollen ſtuffs, with ſoap, method of.* A coloured piece of cloth, about forty-five ells, is to be laid in the uſual manner, in the trough of a *fulling-mill*, without firſt ſoaking it in water, as is commonly practiſed in many places.

To *full* this trough of cloth, fifteen pounds of ſoap are required; one half of which is to be diſſolved in two pails of river or ſpring-water, made as hot as the hand can well bear it. This ſolution is to be poured by little and little upon the cloth, in proportion as it is laid in the trough: and thus it is to be *fulled* for at leaſt two hours; after which it is to be taken out, and ſtretched.

This done, the cloth is immediately returned into the ſame trough, without any freſh ſoap; and there *fulled* two hours more. Then taking it out, they wring it well, to expreſs all the greaſe and filth.

After the ſecond *fulling*, the remainder of the ſoap is melted, as the former, and caſt at four different times, on the cloth; remembering to take out the cloth every two hours, to ſtretch it, and undo the plaits and wrinkles which it has acquired in the trough. When they perceive it ſufficiently *fulled*, and brought to the quality and thickneſs required, they ſcour it out for the laſt time in hot water, keeping it in the trough till it be quite clean.

As to white cloths; becauſe theſe *full* more eaſily, and in leſs time, than coloured ones, a third part of the ſoap may be ſpared.

Fulling *of ſtockings, caps*, &c. may be performed ſomewhat differently; viz. either with the feet, or the hands; on a kind of rack, or wooden machine, either armed with teeth of the ſame matter, or elſe with horſes or bullocks teeth.

The ingredients made uſe of herein, are urine, green ſoap, white ſoap, and fullers-earth. But water ſoftened with chalk is far preferable.

Note, woven ſtockings, &c. ſhould be *fulled* with ſoap alone; for thoſe that are knit, fullers-earth may be uſed with the ſoap.

Indeed, it is frequent to *full* theſe kinds of works with the mill, after the uſual manner, of cloths, &c. But that is too coarſe and violent a manner, and is apt to damage the work, unleſs it be very ſtrong.

FULLO, in *Ichthyology*, a name given by Theodore Gaza, and others to the Tench, or black *cyprinus*, called by the Greeks *pſylon*.

FULLONIANI, in *Church Hiſtory*, heretics who anathematized all who did not acknowlege, that Chriſt ſuffered in his divine nature; or who diſtinguiſhed his human and paſſible nature from his divine and impaſſible.

FULLONICA *terra alba*, white *fuller*'s earth, in natural hiſtory, a name given by ſome authors to the common white tobacco-pipe clay. See Cimolia *alba*.

FULLONUM *carduus*. See Teazel.

FULMAR, in *Ornithology*, a ſpecies of *procellaria* or *petrel*, that inhabits the iſle of St. Kilda; appearing there in November and continuing through the whole year, except the months of September and October. It lays a large white and brittle egg, which is hatched in June. This bird is ſuperior in ſize to the common gull; the bill is ſtrong, hooked at the end, and of a yellow colour. The noſtrils are compoſed of two large tubes, lodged in one ſheath; the head, neck, inferior part of the body, and tail are white; the back and coverts of the wings aſh-coloured; the quill-feathers duſky, and the legs yellowiſh. Inſtead of a back toe, it has only a ſort of ſpur, or ſharp ſtraight nail. The food of theſe birds is the blubber or fat of whales, of which they are very voracious; inſomuch that the whales are diſcovered at ſea by the flights of theſe birds; this is ſoon converted into oil and ſpouted from their bills in large quantities for their defence and for the ſupply of their young. This oil, it is ſaid, has been ſucceſsfully uſed in rheumatic caſes. The *fulmar* is of ſingular uſe to the iſlanders, as it ſupplies them with oil for their lamps, down for their beds, a delicacy for their tables, a balm for their wounds, and a medicine for their diſeaſes. The *fulmar* is alſo a certain prognoſticator of the change of the wind; becauſe, if it comes to land, no weſt wind is expected for ſome time; and the contrary, when it returns and keeps at ſea. Pennant.

FULMINANT, **Fulminans**, or **Fulminating**, an epithet applied to ſomething that thunders, or makes a noiſe like that of thunder.

We ſay, *Jupiter fulminans, aurum fulminans, pulvis fulminans, &c.* The *Jupiter fulminans* and the *Jupiter fulgurator* ſeem to have been very much of the ſame kind: but if they are diſtinguiſhed, we may conſider the former as the diſpenſer of the lightnings which are darted from the clouds, and the latter as the diſpenſer of thoſe leſſer lightnings that only ſhoot about and ſtruggle amidſt the clouds.

Fulminans, *Aurum*. See Aurum.

Fulminans, *Pulvis*, is a compoſition of three parts of nitre, two parts of ſalt of tartar, and one of ſulphur.

Both the *aurum* and *pulvis fulminans* produce their effect principally downwards: in which they differ from gunpowder, which acts *in orbem*; but principally upwards. If they be laid in braſs ladles, and ſo ſet on fire; after fulmination, the ladles will be found often perforated. Moreover, this powder does not require to be forcibly confined, as gun-powder does, in order to make a great exploſion, and the heat muſt be applied to it ſlowly. We may alſo obſerve that ſome inſtants before its exploſion, a light blue flame appears on its ſurface, which is nothing elſe than the phlogiſtic vapours beginning to kindle. No more fire or flame is perceived during its fulmination; the exploſion being ſo quick and the commotion ſo violent, that the flame is ſuffocated and extinguiſhed as ſoon as it is formed and before it can be perceived. Nor does the *fulminating* powder generally kindle the combuſtible bodies in contact with it, becauſe the time of its inflammation is too ſhort.

FULMINATING *damp*; ſee Damp.

Fulminating *Legion*. See Thundering *Legion*.

FULMINATION, in the *Romiſh canon law*, a ſentence of a biſhop, official, or other eccleſiaſtic appointed by the pope; whereby it is decreed, that ſome bull, diſpenſation, or reſcript, ſent from the pope, ſhall be executed.

Fulmination is the ſame thing with the verification, or recognition, of a letter, or inſtrument, of a prince in a lay court.

Fulmination is alſo uſed for the denunciation, or execution, of a ſentence of anathema, made in public, with due ſolemnity.

In *fulminating* anathemas, the biſhop who pronounces ſentence, is to be clothed in his epiſcopalia, and accompanied with two prieſts in ſurplices; after ſentence is pronounced, they caſt down to the ground the lighted wax-tapers which they held in their hands.

Fulmination, or **Fulguration**, in *Chemiſtry*, a vehement noiſe, or ſhock reſembling thunder, occaſioned by the ſudden exploſion and inflammation of divers preparations; as *aurum fulminans*, &c. when ſet on fire.

FULUSCULUM, in *Botany*, a name given by the ancient Romans to a peculiar ſpecies of mullein or *verbaſcum*, of which they uſed to make the wicks of the torches with which they kindled their funeral piles. The Greeks for the ſame reaſon called this ſpecies *necuia*. Dioſcorides indeed calls it *lychnitis*, λυχνιτις; and Nicander, *thryallis*, θρυαλλις. The way they uſed it was this: they beat out the ſtalk of the plant, as we do hemp, and when it was ſeparated into looſe fibres, they plunged it into melted reſin; this gave it a conſiſtence again, and when cold, it was a kind of flambeau.

FUMADOES, in *Commerce*, a name given to pilchards, garbaged and ſalted, then hung in the ſmoak and preſſed; ſo called in Spain and Italy, whither they are exported in great abundance. Vid. Stat. 14 Car. 2. cap. 31.

FUMAGE, a term uſed in ſome parts of the kingdom, for dung, or manuring with dung.

Fumage. See Fuage.

FUMARIA, ſee Fumitory.

FUMER, in *Zoology*; ſee Pole-*cat*.

FUMET, a term uſed among ſportſmen for the ordure or dung of harts: otherwiſe called fewmets.

FUMIGATION, in *Medicine*, and *Chemiſtry*, is underſtood of things taken in the way of fume, or ſmoke; or that are turned into ſmoke, or ſteam.

The *fumigations* preſcribed by diſpenſatory writers are reduced to two kinds; the one conducive to health, the other only to pleaſure; and of each kind ſome are of moiſt, or liquid ingredients, others of dry ones.

The *fumigations* for pleaſure are compoſed of fragrant and ſweet-ſcented ſubſtances, and are uſed in form of powders, troches, or medicated candles. The firſt are uſually prepared of ſtorax, benjamin, lignum aloes, cinnamon, camphor, muſk, ambergris, and civet, mixed in due quantities, and all reduced together to a powder. The ſecond kind, or troches, are compoſed of the ſame kind of powdered ingredients, and are made into a paſte with a mucilage of gum tragacanth, and then cut into form. And the laſt kind, or candle *fumigations*, are prepared of the melted ſweet gums, with labdanum, made up into the form of large candles, with as much of the before mentioned ſweet ingredients as can be received into the maſs. Theſe, though only meant for luxury and pleaſure, yet have medicinal virtues; and as they abound in cordial ſubſtances, cannot but revive the ſpirits, and reſiſt contagion. The moiſt *fumigations* of this kind conſiſt of the powders before named, blended among a large quantity of roſe and orange-flower water, and of ſolutions of ſtorax, and other of the ſweet gums in ſpirit of wine.

The *fumigations* uſed to reſtore health are of ſeveral kinds. Some are meant only as corroboratives, and theſe are compoſed of much the ſame ingredients with thoſe uſed for pleaſure; others are uſed to dry up abundant humors, to purge the lungs, or to promote the menſes. In all diſorders of the uterus, there ſhould be added to theſe *fumigations*, galbanum, caſtor, and aſſa fœtida. A common *fumigation* is alſo uſed, by throwing tobacco on coals, and receiving the ſmoke through a funnel; and to this are ſometimes added colt's foot leaves, with other pectoral herbs, and a little ſulphur. Theſe are very uſeful for drying up ulcerations of the lungs, and other diſorders of the breaſt.

The moiſt *fumigations*, for the ſake of health, conſiſt either of ſome ſimple liquor, ſuch as vinegar, wine, aqua vitæ, or roſe-water; and in ſome caſes, as for the diſcuſſing hard tumors, a red-hot brick, or ſtone, is thrown into vinegar, and the ſteam is received on the part. This is alſo a *fumigation* often uſed in times of peſtilential contagion, and that with great ſucceſs. Decoctions of uterine herbs are alſo frequently uſed for *fumigations* in ſeveral diſorders of the womb.

Olibanum, amber, ſtorax, and balſam of Tolu, make a fine dry *fumigation* for a catarrh: and in hyſteric caſes, great benefit is often found from holding the head, with the mouth open, over a hot ſolution of an ounce of aſſa fœtida in a pint of ſtrong wine-vinegar.

A northern phyſician has an expreſs treatiſe to juſtify the uſe of *fumigations* in many caſes.

It is dangerous taking mercury by *fumigation*. This *fumigation* is a kind of potential calcination; the vapour of mercury, laid on the fire, corroding and reducing into a calx the little laminæ of metals ſuſpended over it.

Fumigations with cinnabar have often been recommended as very efficacious in ſome of the worſt circumſtances of the venereal diſeaſe. From a caſe related in the Medic. Eſſ. Edinb. vol. iv. art. 8. it appears, that this practice may be attended with very violent effects. Half a dram of factitious cinnabar burnt under the noſe and mouth of the patient, is there mentioned as having raiſed a ſpitting in three hours.

FUMIGATION, *powder of*, was invented at Moſcow, in 1771, for preventing the infection of the plague. It is prepared of different degrees of ſtrength in the following manner: 1. Take leaves of juniper, juniper-berries pounded, ears of wheat, guaiacum wood pounded, or, if this cannot be had, the cones of pines or firs, of each ſix pounds; common ſalt-petre pounded, eight pounds; ſulphur pounded, ſix pounds; Smyrna tar or myrrh, or, inſtead of this, the common tar of pines and firs, two pounds; mix all theſe ingredients together, and they will produce a POOD of the powder of the firſt ſtrength. 2. Take ſouthernwood or mugwort, cut into ſmall pieces, five pounds; leaves of juniper, cut in the ſame manner, four pounds; juniper berries pounded, three pounds; common ſalt-petre pounded, four pounds; ſulphur pounded, two pounds and a half; Smyrna tar or myrrh, one pound and a half; mix theſe together, and they will yield half a POOD of the powder of the ſecond ſtrength. The efficacy of the powder of *fumigation* was tried on ten malefactors under ſentence of death, who were confined three weeks in a lazarette, and expoſed in every poſſible way to the infection of the plague, and none of them were at all injured by it.

FUMIGATION is alſo uſed for the act of making a ſuſpended body receive the fumes or ſteams of one or more other bodies, in order to calcine it, to correct it, or impart to it ſome new quality.

Ceruſs is made by the *fumigation*, or vapour, of vinegar, gnawing and corroding plates of lead.

FUMIGATOR, formed of *fumus*, *ſmoke*, in *Surgery*, an inſtrument uſed for injecting clyſters of the ſmoke of tobacco. Clyſters of this kind have been applied in the ILIAC *paſſion*, in the HERNIA *incarcerata*, and in other caſes of an obſtinate conſtipation, or obſtruction of the bowels; and as they are admirably adapted to excite the ſuſpended or extremely languid periſtaltic motion of the inteſtines, which are reckoned among the moſt irritable parts of the body, and are allowed to retain the vital influence longer than any other, they have been peculiarly ſerviceable in caſes of recovery from apparent death by DROWNING, &c. The inſtrument commonly uſed for the injection of theſe clyſters is formed with an iron or braſs capſula for containing a certain quantity of tobacco, to which capſula are faſtened two pipes; one of them made of bone, to be inſerted into the anus; and the other of ivory, in the ſhape of that end of the trumpet which is applied to the mouth; by means of which the ſmoke of the burning tobacco in the capſula is forced through the firſt pipe into the anus. The Dutch have made the bowl of this inſtrument large enough to contain three fourths of an ounce of tobacco; it is conſtructed of wood, lined with braſs or tin, and covered by a top of wood lined in the ſame manner; the top is ſcrewed upon the other; the inſtrument is uſed by means of a wooden tube or blow-pipe, ſcrewed to the top, and adapted either to the mouth, or to a pair of bellows. The inſtrument uſed by the French is compoſed of a box reſembling the bowl of a pipe, covered by a lid, at the upper part of which is a hole or chimney, for giving air to the tobacco at pleaſure. From the ſide of this cover proceeds a tube, about four inches in length, incorporated with it, and adapted at the other extremity to the end of a flexible tube. At the lower part of this box is inſerted a kind of tubular handle, which admits the nozzle of a pair of bellows, faſtened to it by means of an iron pin paſſing tranſverſely through both. By this contrivance, when the tobacco is lighted, it is not neceſſary to touch the heated box; and the bellows ſerves as a handle by which to direct all the neceſſary movements: the whole inſtrument is made of copper.

Mr. Wriggleſworth, in conſequence of hints and obſervations communicated to him by Dr. Cogan, has conſtructed a *fumigator* free from the inconveniences attending thoſe already mentioned. The bowl or body of this new inſtrument is made of caſt braſs, and is large enough to contain about an ounce and a half of tobacco. The pipe projecting from the lower part of it is bored out of a ſolid piece of braſs, and alſo thoſe to which each extremity of the leathern tube is affixed. The cover is likewiſe made of caſt braſs; from the upper extremity of which projects a neck about an inch and a half in length, the opening or bore of it being about half an inch in diameter. The cover is fixed to the box by means of two nitches made on each ſide of a circular ridge or edge, admitting two ears, that project from the upper part of the box, which by a circular motion lock upon the brim. The nozzle of the bellows is accurately adapted to the neck of the cover, and is about an inch and a half or two inches long; the lower end of the nozzle is rounded and ſmooth, like the lower extremity of a glyſter-pipe, and perforated like a cullender, in order to prevent the aſhes of the tobacco from riſing into the bellows. The bellows are faſtened upon the cover or lid in a manner ſimilar to the preceding; an ear projects from the upper part of the neck, and is admitted into a nitch, in a circular rim, upon the nozzle. The pipe projecting from the lower extremity of the bowl, locks into the croſs-pipe to which the leathern tube is affixed, in the manner of a bayonet. By this kind of faſtening the whole apparatus may be made ready in the ſpace of a minute, and forms one compact body, free from the hazard of falling in pieces, and thus interrupting the operation; and yet either part may be taken off when the occaſion requires, with the utmoſt eaſe and expedition. The bowl is incloſed in a thick caſe of wood, removeable at pleaſure; which ſecures the hand from injury during the whole proceſs. The ſame ingenious artiſt has alſo conſtructed a machine ſo formed, as to contain the above deſcribed *fumigator*, with every requiſite for beginning an operation in the recovery of perſons apparently drowned, &c. ſuch as brandy, ſalt, ſpirit of ſal ammoniac, tinder-box, flint and ſteel, and cloths to rub the body. This machine is light and portable, being not much larger than a caſe of ſurgical inſtruments. Reports of the Humane Society, 1775, p. 82, &c.

FUMING, in *Metallurgy*, the firſt calcination of the ores of metals, intended to diveſt them of their ſulphurs. See ROASTING.

FUMITORY, *Fumaria*, in *Botany*, a genus of the *diadelphia hexandria* claſs: the empalement of the flower is compoſed of two equal oppoſite leaves; the flower is of the ringent kind, approaching nearly to the butterfly flowers; the upper lip is plain, obtuſe, and reflexed; the nectarium at the baſe is obtuſe and little prominent; the under lip is like the upper; but the baſe is keel-ſhaped; the chaps of the flower are four-cornered, and perpendicularly bifid; there are two equal broad ſtamina in each flower, included in the two lips, each being terminated by three ſummits. In the centre is ſituated an oblong germen, which afterward becomes a ſhort pod with one cell, including roundiſh ſeeds. There are twelve ſpecies. Miller.

The common *fumitory*, which is frequent in our gardens and corn-fields, and flowers from April to June, is eſteemed a very great medicine in obſtructions of the liver and ſpleen; it attenuates ſerous, bilious, and aduſt humours, and carries them gently off by ſtool and urine. It is famous for the ſcurvy, and is alſo given in infuſion in the jaundice, and in the itch, and all other cutaneous diſorders.

FUNAMBULUS, among the Romans, was what we call a *rope*-DANCER, and the Greeks, *ſchœnobates*.

The term is alſo uſed for ſuch as, letting themſelves down by a rope, or cord, make their eſcape out of a city, or place beſieged, as is obſerved by Du-Cange.

Julius Capitolinus, and Horace, make mention of *funambuli*. Acron on Horace aſſures us, that it was the orator Meſſala who firſt introduced the word *funambulus*, in lieu of *ſchœnobates*, uſed by the Greeks. For the Greeks ſeem to have had ſome of theſe rope-dancers from the firſt inſtitution of their ſcenic games, which are ſaid to have been invented about the time of Icarius, father of Erigone; or of Dionyſius, ſurnamed Liber Pater, whom Theſeus firſt introduced into Athens.

At Rome, the *funambuli* firſt appeared under the conſulate of Sulpicius Pæticus and Licinius Stolo, who were the firſt introducers of the ſcenic repreſentations. It is added, that they were firſt exhibited in the iſland of the Tiber; and that the cenſors Meſſala and Caſſius afterwards promoted them to the theatre.

In the *Floralia*, or *ludi Florales*, held under Galba, there were *funambulatory* elephants, as we are informed by Suetonius. Nero alſo ſhewed the like, in honour of his mother Agrippina. Vopiſcus relates the ſame of the time of Carinus and Numerianus.

There was a *funambulus*, it ſeems, who performed at the time when the Hecyra of Terence was acted; and the poet complains, that the ſpectacle prevented the people from attending to his comedy: *Ita populus ſtudio ſtupidus in* funambulo *animum occupârat.*

FUNCTION, the act of doing ſomething for which the agent was appointed, or which he was obliged to.

Thus we ſay, the ſtomach performs its *function*, i. e. digeſts well; the fumes of wine diſturb the brain in the performance of its *functions*.

Phyſicians divide the *functions* of the human body into *vital*, *natural*, and *animal*.

Functions, *vital*, are thoſe neceſſary to life; and without which it cannot ſubſiſt: as, the actions of the heart, brain, lungs, &c.

Functions, *natural*, are thoſe which change the food, &c. ſo as to aſſimilate it to our own nature: ſuch are the actions of the viſcera, and the veſſels which receive, retain, ſecern, &c. the humours.

Functions, *animal*, are thoſe without which we cannot perceive, will, remember, &c. Such are feeling, ſeeing, imagining, judging, paſſions, voluntary motion, &c.

Function is alſo uſed figuratively in ſpeaking of the offices, duties, or occupations a perſon is engaged in.

The actions of an ambaſſador muſt be diſtinguiſhed from his *functions*; the one regard his character, the other his perſon.

Function. The term *function* is uſed in algebra, for an analytical expreſſion any way compounded of a variable quantity, and of numbers, or conſtant quantities: therefore every analytical expreſſion, in which, beſides a variable quantity x, there are conſtant quantities, is a *function* of x. Thus $a+3x$, $ax-4xx$, $ax+b\sqrt{aa-xx}$, c^x, &c. are *functions* of x.

The difference of *functions* conſiſts in the manner in which they are compounded; and depends, therefore, upon the operations by which quantities may be compounded and mixed. Theſe operations are, addition, ſubtraction, multiplication, and diviſion, the raiſing to powers, and extraction of roots, to which the reſolution of equations ought to be referred. Beſide theſe operations, which are called algebraical, there are other tranſcendental ones; ſuch as exponential, logarithmic, and many others, ariſing from the inverſe method of fluxions.

Functions may ariſe from the moſt ſimple and analytical operations: thus we have the multiple *functions* $2z$, $3z$, $\frac{3}{5}z$, az, &c. and the powers of z, as z^2, z^3, $z^{\frac{1}{2}}$, z^{-1}, &c. are called *functions*.

Functions are divided into *algebraical* and *tranſcendental*: *algebraical functions* are thoſe formed by algebraic operations only; ſuch are thoſe above ſpecified, except c^x, which belongs to the following ſpecies.

Tranſcendental functions are thoſe formed by tranſcendental operations: ſuch are exponential quantities or powers, the exponents of which are variable quantities; whereas, in algebraic *functions* the exponents are always conſtant quantities.

It is to be obſerved as to *tranſcendental functions*, that thoſe *functions* only of a variable quantity are to be deemed tranſcendental, which not only enter the compoſition with, but alſo affect the variable quantity: thus if z ſignifies a circular arc, or a logarithm, then will ca^z, and the like expreſſions, be *tranſcendental functions* of z. But if the tranſcendental operation appertains only to conſtant quantities, the *function* is no more than algebraic: thus if c denote the circumference of a circle, the radius of which is $=1$, c will be a tranſcendental quantity, and yet the expreſſions $c+z$, cz^2, $4z^c$, are but algebraic *functions* of z. Some indeed have doubted whether z^c ought to be ranked among algebraic *functions*, or not; but the doubt is of ſmall weight. And ſome chooſe to call the powers of z, the exponents of which are irrational numbers, *interſcendent functions*: thus, $z^{\sqrt{2}}$ is an interſcendent *function* of z.

On the ſubject of *functions*, their diviſions, transformations, explication by infinite ſeries, &c. Mr. Euler ſhould be conſulted, who has treated this matter very fully in the firſt chapter of his Analyſ. Infinitorum.

FUND, Fundus, a Latin term, uſed for the bottom of certain things; and particularly of certain parts of the body.

Fund *of the eye*, Fundus *oculi*, is that part poſſeſſed by the choroides and retina.

The images of objects are repreſented in an inverted ſituation, in the *fund* of the eye. See Vision.

Fundus *uteri*, or *bottom of the womb*, is the body or principal part thereof; ſo called in contradiction to the cervix, or neck; the oſculum, or mouth; and the vagina, or ſheath. See *Tab. Anat. (Splanch.) fig.* 9. *lit a. fig.* 11. *lit. d.*

Fundus *veſicæ*, or *bottom of the bladder*, is the cavity thereof, wherein the urine is contained. In men it is placed over the rectum; and in women over the matrix.

Fund *of the gall bladder*, the *ſtomach*, &c. See Gall-*bladder*, Stomach, &c.

Fundus *plantæ* is that part of a plant, where the ſtalk juſt meets and joins the root.

Fundus *cæli* is the point oppoſite to the point of culmination; or the point of the ecliptic, wherein it is interſected by the meridian beneath the horizon.

Fund, in *Commerce*, is uſed for the capital or ſtock of a merchant, company, or corporation; or the ſum of money they put into trade.

In this ſenſe we ſay abſolutely, the *funds*, the *public funds*, meaning the ſtock of the great companies, or corporations, as the Bank, South-ſea, Eaſt-India, &c.

Funds, *public*, are the taxes appropriated by parliament to the ſupport of civil government, and the payment of the principal and intereſt of money borrowed for public ſervices. Theſe *funds*, in Britain, have been all formed into the four following claſſes or diviſions: the Aggregate *Fund*, the South-sea *Fund*, the General *Fund*, and the Sinking *Fund*. Of all theſe, but more eſpecially the laſt, we ſhall give an account in the order in which they have been now named.

The *aggregate fund* was eſtabliſhed by an act of Geo. I. cap. 12. in 1715. It had this name given it, becauſe it conſiſted of a great variety of taxes and ſurpluſſes of taxes and duties which were in that year conſolidated, and given as a ſecurity for the diſcharge of the intereſt and principal of debts due to the Bank of England, and ſome other public debts; and alſo for the payment of 120,000*l.* per ann. to the civil liſt. Into this *fund* are brought the two thirds and one half ſubſidy of tonnage and poundage; half the inland duties on tea and coffee; the houſe money granted by the 7th of Will. III. the duty on hops; the duties on low wines, brandy, and Britiſh ſpirits; all arrears of land-taxes; all public monies not appropriated; the ſurpluſſes of the nine penny exciſe, of the five ſevenths of the Bank nine penny exciſe, of the revenues in the annuity acts of the 4th, 5th, and 6th of queen Anne, &c. and, by an act of the 1ſt of Geo. III. all the duties conſtituting the revenue of the civil liſt. The whole produce or income of this *fund* had been for a few years before 1778 about 2,600,000*l.* per ann.

The *South-ſea fund* was eſtabliſhed, by ſtat. 3 Geo. I. cap. 9. in 1716; and is ſo called, becauſe appropriated to pay the intereſt of the South-ſea company's capital. It conſiſts of a duty on candles, and certain impoſts on wines, vinegar, tobacco, and Eaſt-India goods. Its produce of late has been about half a million per ann.

The *general fund* was alſo eſtabliſhed, by ſtat. 3 Geo. I. cap. 7. in 1716, and conſiſts of a ſubſidy on goods exported; a tax on hackney-coaches and chairs; duties on ſoap, hides, ſtamps, and policies of inſurance; 700*l.* per week letter-money; a moiety of the inland duties on tea and coffee; and 39,855*l.* per annum out of the hereditary exciſe on beer for bankers annuities. All theſe taxes and payments have for ſome years amounted to a little more than a million per ann. and are appropriated to the diſcharge of the intereſt of 7,808,087*l.* (originally 10,000,000*l.*) capital ſtock of South-ſea annuities, together with charges of management.

All that remained of the produce of the taxes thus digeſted into theſe three *funds*, after ſatisfying the charges upon them, was in the ſame year (or 1716) carried into a fourth *fund*, to which was given the name of the *ſinking fund*, becauſe appropriated to the purpoſe of ſinking the public debts. The words of the act of the 3d of Geo. I. which eſtabliſhed this *fund*, are, "All the monies to ariſe from time to time, as well of the exceſs and ſurplus of an act made this ſeſſion for redeeming the *funds* of the Bank of England; and of the exceſs or ſurplus by virtue of one other act made likewiſe this ſeſſion for redeeming the *funds* of the South-ſea company; as alſo, of the exceſs or ſurplus of the duties and revenues by this act appropriated as aforeſaid; and the overplus monies of the ſaid *general fund* by this act eſtabliſhed; ſhall be appropriated to the diſcharging the principal and intereſt of ſuch national debts as were incurred before the 25th of December, 1716, and are declared to be national debts; and to or for no other uſe, intent, or purpoſe whatſoever."

The operations and progreſs of this *ſinking fund* form ſo important a part of the hiſtory of Britain, that a more particular account of it will be here proper.

Before its eſtabliſhment there had exiſted many ſmaller *funds* of the ſame nature; that is, ſuch duties or taxes had been provided for paying the intereſts of particular loans, as afforded ſurpluſſes by which the principal itſelf was to be gradually redeemed: this was the common practice in the reigns of king William and queen Anne. Moſt of the public duties were given for terms of years; and at the end of thoſe terms they ceaſed of courſe, unleſs continued for farther terms by new acts of parliament: and, in general, it was provided, when any money was raiſed, that the principal ſhould be cancelled either by time, as in the caſe of the ſale of long and ſhort annuities, or by the ſurpluſſes of the duties charged with the payment of the intereſt. This was an excellent plan; but it was by no means carried ſteadily into execution. In the year 1720, moſt of the long and ſhort annuities were converted into redeemable perpetuities, at the expence of above three millions; and the ſurpluſſes of the duties charged with particular loans were often ſo broken into, by being either charged with new loans before they had cancelled the old, or ſpent on current ſervices, as to be rendered incapable of anſwering the end intended by them. In conſequence partly of this bad management, the public debts at the acceſſion of the houſe of Hanover were ſo much increaſed as to be generally reckoned inſupportable; and their reduction was made one of the firſt objects of parliamentary attention. This gave riſe, in 1716, to the inſtitution of the *fund* of which we are giving an account, the father of which was (as has been generally ſaid) Sir Robert Walpole, but, in reality, the Earl of Stanhope. All the taxes, except the land-tax, and five pence per buſhel malt-tax, were now made perpetual, and diſtributed into the three *funds* which have been deſcribed, the ſurpluſſes of which, for ever afterwards, were to be held ſacred, and to be applied inviolably, according to the words of the act juſt recited, to the redemption of the national debt. Theſe taxes have been always voted by parliament from year to year: they are, on this account, diſtinguiſhed by the name of the annual taxes, and wholly employed, as far as they will go, in bearing the current expences of every year.

A conſiderate perſon might have ſuſpected, that the ſame cauſes which had rendered former partial appropriations ineffectual, would deſtroy the efficacy of this. There ſeemed, however, to be reaſon for hoping the contrary: for,

Firſt, the future happineſs and glory of the kingdom were thought to depend on this appropriation; and the law which eſtabliſhed it was declared to be a fundamental law of the realm. In conformity to this, ſecondly, the words of this law were made as ſtrong as they could well be; and, in order to give additional force to it, a repetition of it, in the ſame words, was inſerted in an act of the 5th of Geo. I. cap. 3. Particular notice ſhould be taken of theſe words: they order that all the ſurpluſſes of the taxes then made perpetual, ſhall be applied to the diſcharge of the public debts, and "to no other uſe or "intent whatever." When, therefore, a debt had been paid off, the addition ariſing from that payment to the ſurpluſſes (or the annuity diſengaged by it) became a part of the *fund*, and, together with it, was to be employed in diſcharging farther debts. And the ſame being true of every ſucceſſive annuity diſengaged by every payment, the *fund*, if never miſapplied, muſt neceſſarily have operated in ſinking the public debt, in the ſame manner that money accumulates, when put out to bear compound intereſt. And in this way this *fund* did in fact operate for a few years. While in its infancy, it was watched over with great care: the improvement, and the inviolable application of it, were recommended in moſt of the ſpeeches from the throne, and echoed back in the addreſſes of the houſe of commons. It is particularly obſervable, that ſo well did our miniſters then underſtand the nature and importance of this *fund*, that rather than encroach upon it, they frequently borrowed money in order to defray the neceſſary expences of government. From ſome publications in 1726 it appears, that ſome perſons had been led to apprehend this zeal of the miniſtry would not be permanent, becauſe it was not their intereſt to pay off the public debt, on account of the dependence and influence created by it. In anſwering this objection, the writers on the ſide of the court called ſuch an apprehenſion an indecent jealouſy, and took upon them to aſſure the public, "that in no "poſſible exigence of affairs could our miniſters ever "approve of or recommend the alienation of the *ſinking* "*fund*." Happy would it have been for Britain had this proved true: but in a little time it appeared, that the apprehenſions which had been ſtiled indecent jealouſies, were too well grounded. Men in power came ſoon to ſee, that this *fund* was advancing too faſt in its operations, and to change their zeal for it into a reſolution to deſtroy it: this will abundantly appear from the following facts.

Charging the income of the *ſinking fund* with the payment of the intereſt of new loans, is an encroachment upon it, no leſs ſubverſive of its efficacy, than depriving it of groſs ſums; there being no difference between taking from it the annual intereſt of a ſum, and that ſum itſelf. Between the years 1727 and 1732 ſeveral encroachments of this kind had been made upon it; but, being of a leſs obvious nature, they paſſed without meeting with any particular oppoſition. The finiſhing blow was given it in the year 1733. In that year, in order to keep the land-tax at one ſhilling in the pound, as it had been the year before, it was neceſſary either to borrow half a million for the current ſervice, or to take this ſum from the *ſinking fund*. The laſt method was choſen, and propoſed by Sir Robert Walpole to the houſe of commons. Long and warm debates enſued. A propoſal to alienate, in a time of profound peace, a *fund* which the law had made ſacred, and the alienation of which *no poſſible exigence of public affairs* could juſtify, only for the ſake of keeping the land-tax for one year at one ſhilling in the pound, juſtly kindled the indignation of the patriotic party. They urged the prohibition of the law, the faith of parliament, and the ſecurity of the kingdom. The propoſer of the alienation was reminded of his inconſiſtency and treachery, in endeavouring to beat down that very monument of glory which he had boaſted of having erected for himſelf; and Sir John Barnard warned him, that he was drawing upon himſelf the curſes of poſterity. But all arguments were vain. The miniſtry pleaded that the landed intereſt wanted eaſe; that there was no occaſion for being in a hurry to pay the national debt; and that the circumſtances of the kingdom had altered ſo much ſince the eſtabliſhment of the *ſinking fund*, that the competition then among the public creditors was, not who ſhould be firſt, but who ſhould be laſt paid. Thus argued, among others, Sir Robert Walpole. His reaſons prevailed; and the houſe of commons, not uſed to refuſe him any thing, conſented.

The practice of alienating the *ſinking fund* having been thus begun, went on of courſe. In the next year, or 1734, 1,200,000*l.* was taken from it. In 1735, and 1736, it was anticipated and mortgaged.

Thus expired, after an exiſtence of a few years, the *ſinking fund*; that ſacred bleſſing (as it was once thought) and the nation's only hope. Could it have eſcaped, it would long before this time have eaſed Britain of all its debts, and left it a ſafe and happy country.

In order to obtain a juſter ſenſe of this, let us here compare what it would have done had it never been miſapplied, with what it has done.

Though the act that eſtabliſhed it was paſſed, as already ſaid, in 1716, it did not begin its operations till 1719, when three quarters of a million in old Exchequer bills were paid off with it. The intermediate time had been employed in laying the foundations of this *fund*, and providing an income for it, by a general reduction of the public debts, from an intereſt of ſix per cent. and other higher intereſts, to five per cent. What made this reduction then practicable was a rapid fall of the intereſt of money, which begun (in conſequence of an increaſe of trade producing an influx of money) a little before the acceſſion. The legal intereſt of money was reduced in 1714, from ſix to five per cent. and the means uſed by government for accompliſhing this reduction were, firſt, the addition (at Michaelmas 1717) of the intereſt of ſome debts bearing five per cent. to the principal, in order to make uſe of the produce of the taxes which ſhould have paid that intereſt, in diſcharging the bankers debt and ſome other debts bearing ſix per cent.

Secondly, loans at five per cent. obtained chiefly from the Bank, and the South-ſea company, to pay off ſuch of the public creditors as did not chuſe to accept a lower intereſt than ſix per cent.

After this reduction, the three *funds*, before deſcribed, produced a ſurplus of above half a million per annum. In 1727 this ſurplus was increaſed to 939,103*l.* and in 1733 (the year when the practice of alienating it begun) it had been increaſed ſo much by the redemptions made with it, and by a ſecond reduction of intereſt in 1727 from five to four per cent. that its medium for five years had been 1,212,000*l.* per annum. Had it, from the year 1732, been allowed no increaſe beyond this (except from the intereſt of debts paid by it), and been applied for the firſt twenty-five years to the payment of debts bearing four per cent. intereſt, and afterwards to the payment of debts bearing three per cent. it would in the preſent year (1779) have completed the redemption of one hundred and forty-nine millions of debt, leaving the public, during this whole period, in poſſeſſion of all the ſurpluſſes which have ariſen in the revenue beyond 1,212,000*l.* except thoſe produced by redemptions. It is not poſſible to conceive the beneficial effects with which this would have been attended, or the vigour which would have been all along given to public credit by ſuch a *fund*, and by the proſpect it would have given of the total annihilation in this year of almoſt all the public debts, and the diſengagement of taxes bringing in above five millions per ann. to be either aboliſhed, or (ſhould a war prove neceſſary) to be continued a few years longer, for carrying it on without making any addition to the public burdens. No perſon who duly attends to this, and wiſhes well to England, can avoid execrating the policy which firſt produced, and has ſince continued, the alienation of the *ſinking fund*, and converted an expedient for ſaving the kingdom, into a ſupply for extravagance and a ſupport of corruption and deſpotiſm. This, however, is a policy which it may be expected men in power will always uſe when they can; for few of them have ever ſhewn themſelves ſuperior to the temptations of power, or virtuous enough to avoid uſing all means to ſtrengthen and extend it.

Many ſchemes of different kinds have been formed for paying the public debts; and certain it is, that nothing can be of more importance. But the nature of things doth not admit of any method of doing this ſo expeditiouſly and effectually as an unalienable *ſinking fund*; for in ſuch a *fund* (it has been ſhewn) money is improved at compound intereſt, and therefore in the moſt perfect manner. The writers, therefore, who have employed themſelves in contriving ſuch ſchemes might have ſpared their labour. The beſt of all ſchemes has been long known and eſtabliſhed, and received all the weight and efficiency which could be given it by the moſt ſolemn acts of legiſlature. But no legiſlature can give ſecurity againſt itſelf. No parliament can do any thing which it may not undo, eſpecially if under any undue influence.

We have now ſeen what the *ſinking fund* would have done, had it ſuited the views of the Britiſh miniſtry in 1733 to ſuffer it to go on with its operations. Let us next compare this with what it has done.

In 1737 and 1738, a million of the ſtock of Bank annuities and two millions of the ſtock of South-ſea annuities were redeemed with it. For twelve years after 1738, it was wholly applied to the current expences of every year. In 1749, the intereſt of near fifty-eight millions of the public debts was reduced from four to three one half per cent. intereſt for ſeven years, and afterwards to three per cent. for ever; and by this third reduction, an addition was made to the *ſinking fund* of near 600,000*l.* per ann. But notwithſtanding this addition, no more than three millions of the public debts were redeemed by it, during the interval of peace between the years 1748 and 1756.

By an act of the 25th of Geo. II. 1752, a change was made in the *ſinking fund*, which it is neceſſary to mention.

Before this act the *ſinking fund* conſiſted only of the clear ſurpluſſes of the aggregate, the general, and the South-ſea company's *funds*. By the war, which begun in 1740, there was an addition made to the public debts of near thirty-two millions. This occaſioned a great increaſe of taxes; and the practice was, whenever any new tax produced leſs than the intereſt with which it was charged, to make good the deficiency out of the *ſinking fund*, and afterwards to replace the ſum taken from it out of the ſupplies for the following year. But whenever a tax produced more than the charge upon it, the overplus, inſtead of being carried to the *ſinking fund*, was made a part of the ſupplies for the year. By the act juſt mentioned, all the new taxes, together with all the annuities to the payment of which they had been appropriated, were ordered to be carried into the *ſinking fund*, and formed into one general account. Moſt of the new taxes having proved deficient, this *fund* at firſt loſt more than it gained by the change. But the loſs was afterwards more than made up; firſt, by the ſaving which was produced by the reduction of intereſt from three one half per cent. to three per cent. in 1757; and, ſecondly, by the addition, in the ſame year, of the ſalt-duties to this *fund*, after they had completed the redemption of a million with which they had been charged in 1745.

The war which began in 1756, added ſeventy-one millions and a half to the public debts. This produced a new increaſe of taxes, which (in conformity to the conſolidating act juſt mentioned) have been brought to the general *ſinking fund* account, together with the annuities or intereſts with the payment of which they are charged. And it is now the conſtant practice, whenever a new *fund* or tax is created for paying the intereſt of a loan, to carry both into the *ſinking fund*; in conſequence of which this *fund* gains when the tax happens to produce more, but loſes when it produces leſs than the intereſt which it has been given to pay. The *ſinking fund*, therefore, which, before the conſolidating act, conſiſted only of the ſurpluſſes of the aggregate, general, and South-ſea company's *funds*, conſiſts now of the clear ſurplus of all the appropriated taxes. There is but one tax excepted; and that is, the additional tax upon houſes and windows, granted in 1758 towards paying the intereſt of four millions and a half then borrowed. This tax has never been made a part of the *ſinking fund*; and, having always proved deficient to the amount of about 45,000*l.* per ann. the deficiency is conſtantly made good by the *ſinking fund*, and afterwards replaced from the ſupplies.

Before the laſt reduction of the intereſt of the public debts, the *ſinking fund*, having ſuffered greatly from various encroachments upon it, produced little more than a million per ann. But after this reduction, and its increaſe by the addition of the ſalt-duties, it produced near two millions per ann. In 1764 it produced at Michaelmas, after making good deficiencies, 2,105,000*l.* nearly. For five years after 1764, its average produce, reckoned to Chriſtmas in every year, was 2,234,780*l.* For five years, ended in 1774, its average produce was 2,610,759*l.* In 1775, it produced 2,917,869*l.* In 1776, 3,166,517*l.* In 1777 it was charged with an annuity of 100,000*l.* per ann. to the civil liſt; and, after paying this annuity and half a year's intereſt of five millions borrowed in that year, it produced nearly 2,700,000*l.* In 1778 it was taken at three millions; but did not produce, after paying the ſaid annuity, and making good the intereſts of the new loans in 1777 and 1778, more than two.

It appears from this detail, that ſince the peace in 1763 the income of the *ſinking fund* has increaſed conſiderably. The cauſes of this have been partly the falling in of life-annuities, and the greater productiveneſs of the taxes occaſioned by the increaſe of luxury. But the principal cauſe has been the falling in of the intereſt of about ten millions and a half of the public debts, which had been diſcharged during the twelve years of peace between 1763 and 1775. This diminution of the public debts has been made, not by the *ſinking fund*, but by a contribution from the Eaſt-India company of 400,000*l.* per ann. begun in 1768, and continued for five years; by the profits of ten lotteries; by the compoſition for maintaining French priſoners; ſale of French prizes taken before the declaration of war in 1756; and other extraordinary receipts, amounting in all to above eight millions. This *fund*, therefore, did not pay off more than two millions and a half, the reſt of its produce having been employed in bearing the expences of the peace eſtabliſhment, which, during this period, was nearly double to what it had been in any former period.

To the ſum juſt mentioned, add three millions paid off in the peace between 1748 and 1756, and three millions paid off in 1736 and 1737, and it will appear that the whole amount of the public debts paid off by the *ſinking fund*, ſince its firſt alienation in 1733, is only eight millions and a half; whereas it has been ſhewn, that had only 1,212,000*l.* per ann. of it been applied inviolably to the redemption of the public debts, one hundred and forty-nine millions would have been paid, and conſequently the nation extricated and ſaved.

It has been ſaid, that when money is wanted for defraying public expences, it makes no difference whether it is obtained by diverting the *ſinking fund*, or by a new loan. There cannot be a worſe fallacy than this. Money in a *ſinking fund*, if never alienated, is improved at compound intereſt; but, when procured by a loan, bears only ſimple intereſt. A nation, therefore, whenever it applies the income of ſuch a *fund* to current expences rather than the redemption of its debts, chuſes to loſe the benefit of compound intereſt in order to avoid paying ſimple intereſt; and the loſs in this caſe is equal to the difference between the increaſe of money at compound and ſimple intereſt. The following calculation will ſhew what this difference is.

One penny put out at our Saviour's birth to five per cent. compound intereſt, would, before the preſent year 1779, have increaſed to a greater ſum than would be contained in a hundred and fifty millions of earths, all ſolid gold. But, if put out to ſimple intereſt, it would, in the ſame time, have amounted to no more than ſeven ſhillings and ſix pence. All governments that alienate *funds* deſtined for reimburſements, chuſe to improve money in the laſt rather than the firſt of theſe ways. See, on the ſubject of this article, Dr. Price's Appeal to the Public on the Subject of the National Debt. Alſo his Obſervations on Reverſionary Payments, &c. chap. iii. And Additional Obſervations on Civil Liberty, part iii.

FUNDAMENT, the anus or aperture, through which an animal voids his excrements.

FUNDAMENTAL, ſomething that ſerves as a baſe, reſt, ſupport, or foundation, for any thing.

The apoſtles creed contains the *fundamental* points of religion.

The Salic law is the *fundamental* law of the polity of France.

Fundamental, in *Muſic*, denotes the principal note of a ſong or compoſition, to which all the reſt are in ſome meaſure adapted, and by which they are ſwayed; called alſo the KEY of the ſong.

Fundamental *baſs*, is that which is formed only of the *fundamental* ſounds of HARMONY, in ſuch a manner, that in every concord it leads us to perceive the true *fundamental* ſound of that concord; whence it appears, that it can have no other contexture than that of the *fundamental* ſucceſſion of the harmony. The *fundamental* ſounds are the octave above the principal ſound, the twelfth and the ſeventeenth major above the ſame ſound.

In order to underſtand the nature of the *fundamental* baſs, it is neceſſary to know, that every concord, though compoſed of many ſounds, has only one ſound which is *fundamental*, viz. that which has produced that concord, and which ſerves for its baſs. But the baſs, which prevails below all the other parts, does not always expreſs the *fundamental* ſounds of the concords; for of all the ſounds of a concord, we are at liberty to transfer to the baſs that which we think preferable, with regard to the movement of this baſs, the pleaſantneſs of the tune, or the expreſſion. In this caſe, the true *fundamental* ſound, inſtead of being in its natural place, which is the baſs, is transferred to the other parts, or not expreſſed at all; and ſuch a concord is called a reverſed concord. See REVERSING.

In reality, there is no difference between a reverſed concord and the direct concord by which it is produced; for the ſounds are always the ſame: but theſe ſounds forming different combinations, the combinations reſulting from them have for a long while been conſidered as ſo many *fundamental* concords, and diſtinguiſhed by different names. M. Rameau has ſhewn, in his Traité de l'Harmonie, that many of theſe pretended concords are only different modifications and alterations of a ſingle concord: thus, the concord of the ſixth is only a perfect concord, the third of which is transferred to the baſs; in which, by introducing the fifth, we ſhall have another concord of the ſixth and fourth. Here, then, are three combinations of a concord which has but three ſounds; thoſe that have four are capable of four combinations; for each of the ſounds may be transferred to the baſs. But if below this another baſs be introduced, which, in all the combinations of the ſame concord, always affords the *fundamental* ſound, it is evident that the number of the conſonant concords is reduced to three, and that of the diſſonant to four; to which, if we add all the concords by SUPPOSITION, which may likewiſe be reduced to the ſame *fundamentals*, we ſhall find harmony ſimplified to a degree which could never have been expected, conſidering the ſtate of confuſion in which M. Rameau found the rules relating to this part of muſic. It is certainly, as this author obſerves, very aſtoniſhing, that perſons have been able to advance the art to its preſent pitch of perfection, without knowing its foundation, and to propoſe all its rules with ſuch exactneſs, without having diſcovered the principles on which they depend.

The movement of the *fundamental* baſs is regulated by the laws of harmonic ſucceſſion, in ſuch a manner, that if this baſs deviates from the order which is preſcribed, there is a fault in the harmony. With ſkill to regulate and obſerve the connection between the ſeveral ſounds that are united together, are the two moſt important rules relating to the *fundamental* baſs; and the principal mechanical rule which is ſuggeſted by it, is to let the *fundamental* baſs proceed only by conſonant intervals, except when the cadence is broken; i. e. when the *fundamental* baſs, inſtead of aſcending from the fourth, after a concord of the ſeventh, as in a perfect cadence, aſcends only by one degree; or after a concord of the ſeventh diminiſhed, in which caſe it riſes diatonically. As for the diatonic deſcent, this movement is not allowed in the *fundamental* baſs, or at moſt only in the caſe of two perfect concords ſeparated by a reſt or pauſe, either expreſſed or underſtood. This rule admits no other exception. M. Rameau, indeed, has made the *fundamental* baſs deſcend diatonically, for particular reaſons, in the concords of the ſeventh.

The *fundamental* baſs, whenever it is juſtly formed, conſiſts either of perfect concords with conſonant movements, without which theſe concords could have no proper connection, or diſſonant concords in the *acts of cadence*, which always reſult from two *fundamental* ſounds, one of which precedes, and the other terminates the cadence. In every other caſe, the diſſonance can neither be well placed, nor rightly preſerved. Hence it follows, that the *fundamental* baſs can never proceed but in one of theſe three ways: 1. By aſcending or deſcending from the third or from the ſixth; 2. From the fourth or the fifth; or, 3. By aſcending diatonically, by means of the diſſonance that forms the connection, or by particular licence, above the perfect concord. Every other movement of the *fundamental* baſs is faulty.

Although the *fundamental* baſs ought, in general, to be below the *thorough*-BASS, there are, however, caſes, in which the latter is below the former: ſuch are thoſe of *concords by* SUPPOSITION, ſo called, becauſe the thorough-baſs ſuppoſes below the concord a new ſound which does not belong to that concord, which exceeds its limits, and is, therefore, below the *fundamental* baſs.

The *fundamental* baſs, the ſole intention of which is to ſerve as a proof or teſt of the harmony, is ſuppreſſed in the execution, where it would have a very bad effect; producing, at leaſt, a very tedious monotony, by the frequent returns of the ſame concord, which are more agreeably diſguiſed and varied, by its different combinations, in the thorough-baſs. It may be added, in general, that the indiſpenſible rules of the *fundamental* baſs may be reduced to the three following.

1. There ought always to be at leaſt a common ſound in the harmony of two ſucceſſive *fundamental* ſounds. 2. In every DOMINANT, the diſſonance ought to be ſo managed, that the dominant may not become TONIC. 3. Every dominant ought to deſcend from the fifth, and every SUB-*dominant* ought to aſcend from the fifth.

But beſides it may be obſerved, that the *fundamental* baſs is ſometimes irregular; and in the number of its irregularities we may reckon the concords of the ſeventh diminiſhed, and the broken cadences. The thorough-baſs is only the *fundamental* baſs reverſed for the ſake of melody; ſo that when the *fundamental* baſs is compoſed, the thorough-baſs may be had by REVERSING the concords. E. gr. This *fundamental* baſs of one ſound, *ut ſol ut ſol ut ſol ut*, may give this more melodious thorough-baſs, *ut ſi ut rè mi fa mi*. The thorough-baſs muſt be made conformable to the *fundamental*, only when it approaches cadences, or is terminated there. The thorough-baſs admits alſo concords by SUPPOSITION. Every note in the thorough-baſs, which bears the concord of the falſe FIFTH, ought to riſe diatonically; and every note which bears the concord of the TRITONE, ought to deſcend diatonically. The knowlege of the *fundamental* baſs, or the rule for finding the *fundamental* baſs of a given tune, depends much upon that of the MODE or MODULATION. Encyclopedie, art. *Fondamentale* Basse.

Fundamental *concords* are of three kinds; viz. the perfect coneord, the concord of the ſixth, and the concord of the ſeventh. The firſt or perfect concord, is greater or leſs, according as the THIRD is greater or leſs. The ſecond is of three ſorts: in the two firſt ſorts, the SIXTH is always greater, and the third greater or leſs, as the mode is greater or leſs. Theſe two concords differ only by their third. Between theſe two there is another concord, which on many occaſions produces a very good effect, and is particularly uſed by the Italians; whence it is called the concord of the ſuperfluous ſixth, or of the Italian ſixth. It is compoſed of a greater third, or ſuperfluous fourth, or TRITONE, and a greater third, as *fa la ſi rè* ♯. There are ſeveral kinds of the *fundamental* SEVENTH: the firſt is formed of a greater third, and two leſſer thirds, as *ſol ſi rè fa*; the ſecond is formed of a leſſer third, a greater third, and a leſſer third, as *rè fa la ut*; the third is formed of two leſſer thirds, and a greater third, as *ſi rè fa la*; the fourth is formed of one greater third, one leſſer, and one greater, as *ut mi ſol ſi*; the fifth is called the concord of the diminiſhed ſeventh, and formed of three leſſer thirds, *ſol* ♯ *ſi rè fa*. Encyclopedie, art. *Accords* Fondamentaux.

FUNDAMENTO, in the *Italian Muſic*, is in general every part that plays or ſings the baſs; but the thorough-baſs is more particularly ſo called, becauſe it is the baſis or foundation of all harmony.

FUNDUCLÆ, an Ægyptian coin, a ſort of ſequin, of the value of a hundred and forty-ſix medines. Pococke's Egypt, p. 175.

FUNDULUS, in *Zoology*, a name uſed by many for the ſmall fiſh, called by others COBITIS, and by the generality of people in England, the LOACH.

Fundulus is uſed alſo by Schoneveldt, and ſome others, to expreſs the common gudgeon. The confuſion of calling two fiſh by the ſame name, which is peculiarly appropriated to neither, is very evident in this and numerous other inſtances; but it is always to be avoided by uſing expreſſive and genuine names. Thus even the word gobio, the common name of the gudgeon, confounds

founds that fiſh with another very different genus; and Artedi is greatly to be applauded, who has found that our common gudgeon is no peculiar genus of fiſh at all, but is a ſpecies of the cyprinus. As ſuch he has given it the proper ſpecific name of the five inch ſpotted cyprinus, with the lower jaw ſhorter than the upper, and with two cirri or beards at the mouth; under this name the ſpecies is always to be known at ſight, and can never be confounded with any other genus.

FUNERAL, the ceremonies performed at an interment; or the laſt offices paid to the deceaſed. See BURIAL.

The word is formed of the Latin *funus*; and that of *funalia*, on account of the torches (which were *funes, cera circumdati)* uſed in the *funerals* of the Romans; though others derive *funus* from the Greek φονος, *death*, or *ſlaughter*.

The firſt perſons who ſeem to have paid any particular reſpect to their dead were the Egyptians, who erected monuments for tranſmitting the remembrance of their virtues to future ages. See PYRAMID.

Whenever a perſon died among the Egyptians, his parents and friends put on mournful habits, and abſtained from all banquets and entertainments. This MOURNING laſted from forty to ſeventy days, during which time they embalmed the body. See EMBALMING.

When this ceremony was finiſhed, the embalmed body was reſtored to the parents, who placed it in a kind of open cheſt, which was preſerved either in their houſes, or in the ſepulchres of their anceſtors. Before the dead were allowed to be depoſited in the tomb, they underwent a ſolemn judgment, which extended even to their kings; and if the iſſue of the judgment proved unfavourable, they were deprived of the rites of burial; and this cuſtom ſeems to have been practiſed among the Iſraelites; for we read, that their wicked kings were not interred in the ſepulchres of their anceſtors.

The *funeral* rites among the ancient Romans were very numerous. The deceaſed was kept ſeven days; and every day waſhed with hot water, and ſometimes with oil, that, in caſe he were only in a ſlumber, he might be thus waked; and every now and then his friends meeting, made a horrible outcry or ſhout, with the ſame view; which laſt action they called *conclamatio*.

The third conclamation was on the ſeventh day; when, if no ſigns of life appeared, the defunct was dreſſed and embalmed by the pollinctores; placed in a bed near the door, with his face and heels towards the ſtreet; and the outſide of the gate, if the deceaſed were of condition, was garniſhed with cypreſs boughs.

In the courſe of theſe ſeven days, an altar was raiſed near his bed-ſide, called *acerra*; on which his friends every day offered incenſe; and the libitinarii provided things for the *funeral*.

On the ſeventh day a crier was ſent about the city, to invite the people to the ſolemnization of the *funeral* in theſe words: *Exequias* L. Tit. L. *filii, quibus eſt commodum ire, jam tempus eſt. Ollus* (i. e. ille) *ex ædibus effertur.*

The people being aſſembled, the laſt conclamation ended, and the bed was covered with purple; a trumpeter marched forth, followed by old women, called *præficæ*, ſinging ſongs in praiſe of the deceaſed; and laſtly, the bed followed, borne by the next relations. And if the perſon were of quality and office, the waxen images of all his predeceſſors were carried before him on poles.

The bed was followed by his children, kindred, &c. *atrati*, or in mourning: from which act of following the corpſe, theſe *funeral* rites were called *exequiæ*.

The body thus brought to the roſtra, the next of kin *laudabat defunctum pro roſtris*, made a *funeral* oration in his praiſe, and that of his anceſtors.

This done, the body was carried to the *pyra*, or *funeral* pile, and there burnt: his friends firſt cutting off a finger, to be buried with a ſecond ſolemnity.

The body conſumed, the aſhes were gathered; and the prieſt ſprinkling the company thrice with clean water, the eldeſt of the *præficæ* crying aloud, *ilicet*, diſmiſſed the people, who took their leave of the deceaſed in this form, *Vale, vale, vale: nos te ordine quo natura permiſerit, ſequemur.*

The aſhes, incloſed in an urn, were laid in the ſepulchre, or tomb. The firſt Romans did not burn their dead, but interred them, as we do. Pliny, lib. vii. cap. 54. aſſures us, that the cuſtom of burning was not introduced till after they had learnt that their enemies dug up, and expoſed, the bodies of their ſoldiers buried in remote countries. And yet Plutarch, in his Life of Numa, obſerves, that Numa was buried; as having expreſly forbid them by his teſtament to burn him: this ſhews that the Romans had practiſed burning before his time.

This cuſtom of burning the dead, ſo religiouſly obſerved by the Greeks and Romans, was held in abhorrence by ſeveral other nations. Herodotus relates, that the Perſians deteſted it, as holding fire to be a god. The Egyptians declined to burn their dead, as taking fire for an inanimate beaſt, and judging it impiety to commit the bodies of the deceaſed to be devoured by beaſts. The cuſtom of burning among the Romans ceaſed under the empire of the Antonines. See BURNING and MOURNING.

In the Romiſh church, when a perſon is dead, they waſh the body, and put a crucifix in its hand. At its feet ſtands a veſſel of holy water, that they who come in may ſprinkle both themſelves and the deceaſed. In the mean time ſome prieſt ſtands by the corpſe, and prays for the deceaſed till it is laid in the earth. In the *funeral* proceſſion the exorciſt walks firſt, carrying the holy water; next the croſs-bearer, afterwards the reſt of the clergy, and laſt of all the officiating prieſt. They ſing the *miſerere*, and ſome of the Pſalms; and at the end of each Pſalm, a *requiem*. We learn from Alet's ritual, that the faces of deceaſed laymen muſt be turned towards the altar, when they are placed in the church; and thoſe of the clergy towards the people. The corpſe is placed in the church, ſurrounded with lighted tapers; after the office for the dead, maſs is ſaid; then the officiating prieſt ſprinkles the corpſe thrice with holy water, and as often throws incenſe on it. The body being laid in the grave, the friends and relations ſprinkle the grave with holy water.

FUNERAL *charges* are not allowable againſt a creditor, except for the coffin, ringing the bell, parſon, clerk, and bearer's fees; but not for the pall and ornaments. See DEBT.

FUNERAL *column*. See *Funeral* COLUMN.

FUNERAL *games*, *ludi funebres*, were a part of the ceremony of the ancient *funerals*.

They conſiſted chiefly in proceſſions, and ſometimes in mortal combats of gladiators around the *funeral* pile.

The cuſtom was very ancient; though it had not always been the ſame. At firſt, they cut the throats of a number of captives before the pyra, as victims to appeaſe the manes of the deceaſed. This Achilles does in Homer, Iliad φ, at the *funeral* of Patroclus; and Æneas, in Virgil, lib. ix. at that of Pallas, ſon of Evander. Cæſar, in his Commentaries, lib. viii. relates, that the Gauls alſo did the like.

But at length it appeared barbarous, thus to butcher men; and therefore to ſave the horror of the ſpectacle, yet without the dead's loſing any thing thereby, they made the poor captives fight and kill one another, only ſaving ſome few of ſuch as came off victors.

This cuſtom was borrowed from the Greeks by the Romans; among whom the cruel diverſion was called *munus*.

The firſt who introduced it at Rome was Junius Brutus, at the obſequies of his father; or, according to others, Ap. Claudius, and M. Fulvius, during their conſulate.

The like horrible combats were alſo occaſionally exhibited by the magiſtrates; and ſometimes they were added to the theatrical pieces.

The emperor Claudius decreed, that whereas theſe accurſed games were till then frequent and arbitrary; it ſhould be the practice for the future, only to perform them regularly every year at the expence of the ſtate; and that the ædiles ſhould have the care and direction thereof. But he conceived a horror for them himſelf, and ſoon after aboliſhed them; though it was ſtill allowed particular perſons to have them, provided they were worth forty thouſand ſeſterces per annum. They were not finally aboliſhed before the time of Theodoric king of the Goths, at the end of the fifth century.

FUNERAL *honours*. See HONOURS.

FUNERAL *oration*, or *ſermon*, a diſcourſe pronounced in praiſe of a perſon deceaſed, at the ceremony of his *funeral*.

The cuſtom of making *funeral* orations is very ancient. The Romans had it of a long ſtanding; and it was always one of the neareſt relations that made the harangue. Auguſtus did the office to his grandmother Julia, when only twelve years of age. Suet. Aug. cap. 8. And we have divers parallel inſtances.

The cuſtom ſeems to have begun with the republic; at leaſt, the firſt *funeral* oration we read of, was that of Brutus, who expelled the kings, and was the firſt conſul; who, having been killed in a battle againſt the Hetrurians, *laudabatur pro roſtris*, was praiſed in the forum by Valerius Publicola his colleague.

Indeed, ſome authors will have the practice more ancient. They maintain it to have been in uſe among the Greeks; and that Solon, who, according to Aulus Gellius, gave laws to the Athenians, in the time when the elder Tarquin reigned in Rome, was the firſt author thereof; ſomething like which, it ſeems, the orator Anaximenes has left in writing. See Polydore Virgil De Invent. Rer. lib. iii. cap. 10.

FUNGIFER *lapis*, the *muſhroom-bearing ſtone*, a name given by authors to a coarſe ſtone found in Italy, and many other places lying near the ſurface of the earth, which they ſay will at any time produce *muſhrooms*, on being moiſtened with warm water.

FUNGITÆ, in *Natural Hiſtory*, a name given by authors to a ſpecies of ſea-coral, often found adhering to ſea-ſhells, or to the larger corals in its recent ſtate, and very often found alſo foſſile, or buried at great depths in the earth; they are uſually immerged in ſtone, and ſometimes in clay. The more frequent of theſe are of a conic ſhape; ſometimes they are flatted and diſcoide, and uſually ſtriated longitudinally; they ſometimes are found in their foſſil ſtate adhering to ſhells or corals, but more uſually ſeparate. To this and ſome other bodies of this kind, Mr. Lloyd has given the name *columella*; to one of them that of *branchiale*, from its reſembling the gills of a fiſh; and to another, that of *undulago*, from its undulated figure.

FUNGOIDES, *baſtard-muſhroom*, in *Botany*, the name of a genus of plants, the characters of which are the ſame with thoſe of the fungus, from which it differs only in being of a hollowed form, reſembling a cup, or empty open box. See CLAVARIA, ELVELA, and PEZIZA.

FUNGOUS *fleſh*, is a ſpongeous excreſcence, or (as we popularly call it) *proud fleſh*, frequently growing on the lips of wounds, ulcers, &c.

The *ſarcocele* is the effect of a ſort of *fungous* fleſh.

In ulcers, Wiſeman obſerves, there frequently ariſes a ſpongeous, or *fungous* fleſh, either from the too great afflux of humours, or through the ſurgeon's unſkilfulneſs. It muſt be ſuppreſſed, or taken off by drying medicines, or even by cauſtics; as lapis tutiæ, burnt alum, precipitate of mercury, Roman vitriol, &c.

Fungous *tumors*. See TUMOR.

FUNGUS, in *Natural Hiſtory*. See MUSHROOM.

Fungus, in *Surgery*, a fleſhy TUMOR, or excreſcence, very ſpongeous, ſoft, and pale; ariſing on the membranes, tendons, and other nervous parts, in conſequence of ulcers, wounds, contuſions, and ſtrains.

Funguſes are frequently formed on the meninges, or membranes of the brain, in wounds of the head when not well covered, or defended from the external air: they are alſo frequent about the joints; which laſt grow very inſenſibly.

But where the ſkin is open, finding more room, they grow to a prodigious degree in a very little time, aſſuming the form of a muſhroom, or *fungus*.

There are alſo *funguſes* of the anus, and uterus. They are all ſuppoſed to proceed from a retention and depravation of the nutritious juice.

The *fungus* is a general kind of excreſcence, whereof there are divers particular ſpecies: as the *ficus*, the *ſarcoma*, *condyloma*, &c.

Fungus *of the brain*. Mr. Queſney aſſures us, that ſpirits are not ſo proper for preventing the growth of *funguſes* from the brain, as balſam florivanti, or oleum terrebinth. Mem. de l'Acad. de Chirurg. tom. i.

Fungus, in *Mineralogy*, a name given by Dr. Liſter, to a blackiſh bituminous ſubſtance, found in ſome of the mines of Derbyſhire. It adheres to the ſides of the fiſſures of rocks, and lies in ſeams of the ſtrata. It is of a blackiſh colour and fatty ſubſtance, which never dries in the air, but always remains as moiſt as when taken out of the mine. Some maſſes of it are ſoft and like a jelly, others are hard and firm, and in theſe there are ſeveral lumps of pure bitumen in many parts. This is inflammable like reſin. It is light, but breaks finer, and ſhines like good aloes when freſh broken, but that it is a little darker coloured, and has ſome tinge of purple in it. In ſome pieces the purple is wanting, and there is a green in the place of it. On being diſtilled, it yields firſt a limpid and inſipid water, then a whitiſh water of a ſharp taſte, and finally a yellow and clear oil, much reſembling oil of amber, but the proceſs affords no volatile ſalt in the neck of the receiver, in which it differs from AMBER when treated in the ſame manner. Phil. Tranſ. N° 6.

Fungus *oculi*, a name given by ſome of the writers on the diſeaſes of horſes to a diſtemper of the eye, to which that animal alone is ſubject. The firſt author who has communicated an obſervation of this diſorder to the world is Dr. Lower, in the Philoſophical Tranſactions. He obſerves, that horſes alone are ſubject to it, and calls it a ſpungy excreſcence of the uvea; it is commonly of a dark muſk-colour, and grows out of the edge of the uvea, and though of little conſequence in its firſt ſtages, yet if it grows very large, or if the number of the *funguſes* increaſe, it weakens and obſtructs the creature's ſight, and ſometimes wholly takes it away. The uvea is a muſcular part, and its chief uſe is to dilate or contract itſelf in a proper manner for the admiſſion of objects with as much light as the eye can bear, ſo that the brighter the light is, to which the eye is expoſed, the more this membrane is contracted into a narrow compaſs, and the more dark the place is, the more the opening is dilated. This ſudden change, and the office of this part, may be more conveniently ſeen in the eye of a cat, than in that of any other animal, but it is the ſame in all, in a greater or leſs degree. If the edge of this coat be loaded with a very large excreſcence of this kind, or if ſeveral, though ſmaller, grow all round it, it muſt neceſſarily happen, that the pupil, or ſight, is very much if not totally obſtructed, and the animal ſees very little, or not at all. The horſes of this kind are very ill furniſhed for ſeeing in the ſunſhine, but do very well in dark days, or in the duſk of the morning or evening, when the diſeaſe is not too violent. It is obſervable, that when theſe *funguſes* grow in the eyes of young horſes, they become much ſmaller, when they are taken to dry meat in the ſtable, and increaſes again when they are turned out to graſs. Whether this be owing to the difference of dry and moiſt food, is not eaſy to determine, but it is moſt probably owing to the difference of paſture; the horſe at graſs, being obliged to carry its head much lower than thoſe which feed in the ſtable. Thoſe *funguſes* that are fixed on the upper part of the uvea, are apt to grow the largeſt, and to hinder the ſight moſt; and thoſe which grow in the middle of the uvea, hinder the ſight more by diſtracting the object, than thoſe which grow in either corner or angle of it. The cure is not eaſy; all that can be attempted muſt be by dry diet, and attenuating medicines; and a palliative remedy may be the hanging ſomething over to ſhade the eye, and keeping it from being expoſed nakedly to the ſun, the conſequence of which will be, that the pupil will not be ſo cloſely contracted, and conſequently the light not ſo much obſtructed. Phil. Tranſ. N° 32.

FUNICULUS *umbilicalis*. See UMBILICALIS.

FUNNEL *of a chimney*, the ſhaft, or ſmalleſt part, of the chimney, from the waiſt upwards.

Palladio orders, that the *funnel* be raiſed three, four, or five, feet at leaſt, above the roof, that it may carry the ſmoke clear from the houſe into the air.

Care, too, is to be taken, as to the width; becauſe, if it be too wide, the wind will drive back the ſmoke into the room; and if too narrow, the ſmoke will not be able to make its way. Chamber-chimneys, therefore, are not to be made narrower than ten or eleven inches; nor broader than fifteen. See CHIMNEY.

Funnel *faſhioned flowers*. See *Infundibuliform* FLOWERS.

Funnel *Polype*. See POLYPE.

FUR, in *Commerce* &c. See FURR.

FURBISHER, a perſon who furbiſhes, or poliſhes arms, and gives them a brightneſs and luſtre.

In the general ſenſe of the word, it includes what we now call *armourers* and *ſword cutlers*; in a more reſtrained ſenſe, it is appropriated to thoſe who clean, and ſcour up old ſwords, guns, and halberds, and put them in order.

Among the officers of the Tower, there is a *furbiſher* of ſmall arms, another of ſwords; and the like there is in moſt other armories of England; as at St. James's, Windſor, Cheſter, Plymouth, Hull, and Berwick.

FURBISHING, the act of cleaning, ſcouring, and poliſhing, arms; as guns, piſtols, ſwords, &c.

The word is formed of the French *fourbiſſure*, which Hicks derives from *furben*, which in the language of the ancient Franks ſignified to clean and poliſh: though M. Huet chooſes rather to derive the French *fourbir*, and *fourbiſſure*, from the Engliſh *furbiſh* and *furbiſhing*. Skinner obſerves, that ſome authors derive the Engliſh *furbiſh* from the Latin *furvus*, and *fervor*; but for his part, he rather derives it from the German *farb*, colour; and *farben*, to dye, or give a colour.

Furbiſhing is principally performed with emery.

FURCA, **Fork**, in *Antiquity*, a kind of puniſhment, or rather an inſtrument of puniſhment, among the Romans. The form of the Roman *furca* is very obſcurely deſcribed by the ancients, and much controverted by the moderns. All we know for certain is, that it was of wood, and reſembled a fork; whence it is called, in writers, ξυλον διπλȣν δικρȣν διδυμον, that is, *lignum duplex*, *bicornutum*, *geminum*; a double forked, or horned, timber. Plutarch, treating of the *furca*, ſays, it is originally the piece of timber wherewith the beam of the waggon is upheld; he adds, that it is the ſame with what the Greeks call *apoſtates*, and *ſterigma*; and the *ſterigma* is deſcribed, by Heſychius, as the forked piece of timber put under the yoke of the waggon.

From theſe accounts, Godwyn takes the *furca* to have been the beam of a waggon, to which the yokes are faſtened.

The puniſhment of the *furca* was of three kinds; the firſt, only *ignominious*, was when a maſter forced his ſervant, for ſmall offences, to carry a *furca*, or fork, on his ſhoulders,

ders, about the city; confeſſing his fault, and warning others to beware of the like: whence ſuch ſervant come to be denominated *furciſer*.

The ſecond kind was *penal*; when the party, having the *furca* on his neck, was led about the circus, or other place, and whipped all the way.

The third was *capital*; the malefactor having his head faſtened to the *furca*, and ſo being whipped to death.

In after-times of the empire, when this ſort of puniſhment became interdicted, the form of the *furca* was changed, and made like our GIBBETS, or gallows. See CROSS, &c.

FURCA *& flagellum*, in our old writers, denotes the meaneſt of all ſervile tenures, when the bondman was at the diſpoſal of his lord for life and limb. *Ipſe tenet in villenagio ad* furcam & flagellum *de domino ſuo, &c.*

FURCA, *and foſſa*, in our ancient cuſtoms, i. e. gallows and pit, denoted a right, or juriſdiction, of puniſhing felons; viz. men with hanging, women with drowning.

FURCHE, in *Heraldry*, a croſs forked at the ends. See CROSS.

FURCULA, in *Anatomy*, the ſame with CLAVICULA.

FURFUR literally ſignifies BRAN; and is therefore uſed for the ſcales, ſcurf, or dandriff, which grow upon the ſkin; having ſome likeneſs thereto. See CUTICULA.

FURFURATION, the falling off of *furfures*, in combing, &c.

FURIA, in the *Italian Muſic*, is uſed for a very quick and ſtrong manner of ſinging or playing.

FURIAN *Law*, in *Roman Antiquity*, a teſtamentary law, ſo called from C. Furius, the tribune, by whoſe intereſt it was enacted. This law forbad any Roman citizen to leave by legacy above the value of one thouſand aſſes to any one perſon, and at the ſame time condemned the legatee to pay four times the ſum which was given him above what the law ſtipulated. See VOCONIAN *Law*.

FURIES, *Eumenides, Diræ*, in the *Heathen Theology*, and *Poetry*, were infernal deities, ſuppoſed to be the diſpenſers of the divine vengeance, the puniſhers of wicked actions both here and hereafter, and the inflictors of terrors, wars, and peſtilence.

The *Furies* were reputed the miniſters of Pluto, and the avengers of crimes. Strabo paints them clothed in long robes falling to their heels, but girt about the breaſt. They were three in number; TISIPHONE, MEGÆRA, and ALECTO.

The poets ſpeak of great numbers of *Furies*, ſome of whom were employed in tormenting criminals in Tartarus, and others wandering over the earth to tempt, or to puniſh the wicked here. Thus Virgil ſpeaks of the

> —*agmina ſæva ſororum.* Æn. vi. ver. 571.

But the three, above named, were ſuppoſed to exceed all the reſt in cruelty and malice, and the power of doing miſchief, and are called, by way of eminence, *the Furies*, and ſometimes the *Diræ*, a name peculiar to theſe three. They were three ſiſters, and born at one birth of the goddeſs of night.

Patin, Spanheim, &c. will have it to be them which we ſee on a medal of the emperor Philip, ſtruck at Antioch, on whoſe reverſe are repreſented three women dreſſed as above mentioned, and armed with a key, and burning torches, poniards, and ſerpents.

Struvius, Antiq. Rom. Synt. cap. i. p. 182. adds, that the three *Furies* may probably be no other than the triple Hecate, whom the ancients believed to purſue and torment the wicked in hell, on earth, and in heaven.

Some of the poets add a fourth *Fury* called *Lyſſa*; a Greek word, ſignifying madneſs, or rage.

They repreſent the *Furies* as old, ſqualid, and meagre, with pale cheeks having a kind of feveriſh fluſh on them, with eyes inflamed, their heads twiſted round with ſnakes, and furniſhed with whips and burning torches in their hands, to puniſh the guilty.

The daffodil was ſacred to the *Furies*, and ſuch as offered ſacrifices to them were crowned therewith. This we learn from Euſtathius, on the firſt book of the Iliad, p. 87.

Theſe *Furies* were alſo called *Pœnæ*, Ποιναι, on account of the puniſhments they inflicted on criminals; as their denomination *Furies* aroſe from the rage and madneſs which they threw into the conſcience. Voſſ. De Idolol. lib. viii. cap. 18.

The Greeks called them *Eumenides*; the origin of which name is much controverted among the learned. The etymology that ſeems beſt authorized, derives it from ευμενης, *gentle, mild*; which was applied to them on occaſion of Oreſtes's being abſolved of the murder committed by him on the perſon of his mother. Minerva, it ſeems, appeaſed and pacified the *Furies*, ſo that they ceaſed to purſue him; upon which the Athenians ever after denominated them *Eumenides*.

But it muſt be obſerved, that, in truth, the Athenians called them by the ſame name long before Oreſtes's time, as appears from the Œdipus of Sophocles. There was a temple in Athens, near the Areopagus, conſecrated to the *Eumenides*, whom the Athenians called *venerable goddeſſes*: Ariſtides, and the ſcholiaſt of Thucydides, ſpeak of this temple as erected in memory of the judgment of Oreſtes.

FURIGELDUM, in *our old Writers*, a mulct paid for theft.

FURINALIA, in *Mythology*, feaſts inſtituted in honour of *Furina*, the goddeſs of robbers among the Romans. They were celebrated on the ſixth day before the calends of September. The goddeſs *Furina* had a Temple at Rome, and a prieſt called *flamen Furinalis*. Cicero repreſents this goddeſs as the ſame with the Furies; and Turnebus, in his Adverſaria, defends this opinion, alledging that Plutarch, in ſpeaking of the wood, conſecrated to *Furina*, where the younger Gracchus was killed, calls it the wood of the Erynnies, or of the FURIES.

FURLING *lines* are ſmall lines made faſt to the top-ſails, top-gallant-ſails, and the mizzen-yard-arms; ſerving to *furl* up thoſe ſails, i. e. to wrap and bind them up cloſe to the yard. The mizzen has but one *furling* line, but all the reſt have two, one at each end. Thoſe that are uſed for the larger ſails are generally flat, and are known by the name of gaſkets.

FURLONG, an Engliſh long meaſure, containing the eighth part of a mile.

The Engliſh *furlong* is equal to forty poles or perches, and the perch to 16½ feet. Though in an old law-book, printed in Henry the VIIIth's time, we read, that ſix hundred feet, of five ſcore to the hundred, make a *furlong*.

In Scotland the *furlong* is equal to forty FALLS.

Hercules is ſaid to have run a ſtadium, or *furlong*, at one breath.

FURLONG is alſo uſed for the eighth part of an acre, or half a rood.

FURLONG is ſometimes alſo uſed for a piece of land of more or leſs acres.

Omnibus Chriſti fidel. Johannes Blunt de Eye, arm.—Dedit Thomæ Croft & Franciſco Lovel, arm. unum furlongum *terræ arabilis continen. per æſtimationem quatuor acras, &c. Dat.* 20 *Jan.* 3 *Eliz.*

FURLOUGH, in *Military Language*, a licence granted by an officer to a ſoldier to be abſent for ſome time from his duty. See DESERTERS.

FURNACE, an utenſil, or veſſel, proper to contain fire, or to raiſe and maintain a vehement fire in, whether of coal or wood.

There are divers kinds of *furnaces*, of various forms, and for various uſes.

The domeſtic *furnace*, uſed in making confections, &c. is uſually of iron, or earth.

Thoſe uſed by the goldſmiths, refiners, &c. are much larger, and of a different ſtructure.

Thoſe wherein lime, bricks, &c. are burnt, are called *kilns*.

FURNACE is particularly uſed for a kind of oven, wherein the ores of metals, after beating, waſhing, &c. are melted down by a great coal or wood fire.

The ſtructure or application of theſe *furnaces* are ſomewhat different, for the different metals.

Swedenborg has laid down, from his own experience, certain rules for the general conſtruction of theſe *metallurgic furnaces*, by which they will always be made more advantageous to the proprietor, cæteris paribus, than any other kind. Theſe rules are, that the chimney be always placed as nearly as may be, behind the center of the *furnace*; that the ſmaller the depth of the fire-place, provided it be ſufficient to hold the coals, the better; that all *furnaces* muſt be the better, the wider they are forwards, and the higher they are, ſo as not to loſe the benefit of reverberation.

FURNACE is more ſtrictly applied to thoſe uſed in the melting of iron, which authors frequently confound with iron forges, though there is a conſiderable difference between them.

This *furnace* is a brick ſtructure, much in the ſhape of an egg ſet on end, wherein the iron ore, after it has been burnt in a kiln, is put, intermixed with cinders and charcoal, and the whole melted, till it trickle down in a receiver underneath; where the ſcum and droſs being taken away, the metal is thrown into furrows made in a bed of ſand, and thus is caſt into ſows or pigs of iron.

The forge is a place where the pigs are heated, and fuſed a ſecond, and even a third time, to prepare and fit them farther for uſe. See FORGE and IRON.

Theſe *furnaces*, as they are employed in running the moſt difficult of fuſion of all metals, ſo they are of all others contrived the largeſt, and capable of carrying heat to the greateſt degree. When they are to be uſed, they are firſt filled up to the top with coals; and the lower part being lighted, the top, and all other parts of the *furnace*, where the air could have paſſage, are cloſed firmly up with iron plates laid one over another. The conſequence of this is, that the fire is put out, and the whole is kept in this ſtate ten or twelve days. At the end of this time the *furnace* is opened, and the coals are found all black, without a ſingle ſpark of fire in any part, yet extremely hot, and reduced to a tenth part of their quantity. When the *furnace* has been thus opened about a quarter of an hour, the matter begins to take fire of itſelf by the mere contact of the air. The firſt appearance of this is very remarkable; there ariſes a very bright flame from ſome of the coals, which plays about their ſurface, and ſpreads itſelf from one to another, without the appearance of the leaſt ſpark of fire in any part of any of the coals. The ore of the iron is for the firſt day put only in the middle of the *furnace*, and that but in ſmall quantity; the next day more, and every day afterwards more and more is put on, and by degrees it is ſpread over the whole ſurface of the *furnace* to the edges. This is the method of working the ore to the utmoſt advantage, and with the moſt diſpatch. The whole proceſs for one *furnace* of ore is finiſhed in about eight days from the time of the opening the top; all the uſe of the firſt quantity of coal, is only thoroughly to warm the ſides and walls of the *furnace*; and it is after this to be kept carefully ſupplied with fuel, and the ore only ſpread out towards the ſides as the extreme heat, moſt ſenſible in the center, increaſes. If too much be laid on of the ore at firſt, there is always a loſs from the quantity of metal. The quantity of the coals neceſſary to any given quantity of ore, differs in proportion to the advantageous or faulty ſtructure of the *furnace*. In the very beſt conſtructed ones, the weight of the coals and of the ore need be no more than equal. The flame which makes its way out of the bottom of the *furnace* is of different colours, according to the nature of the ore and of the coals; ſometimes red, ſometimes yellow, and ſometimes green. That which iſſues out from the top of the *furnace* is of a red colour, and aſcends in a ſort of ſpiral line, reſembling the ſound of diſtant falls of water as it mounts up. With all the care that can be taken to heat the ſides of the *furnace*, and to keep them hot, the middle is always much the hotteſt, and the ore ſooneſt runs into metal there. Swedenborg de Ferro & Igni.

Furnace, in *Chemiſtry*, is a receptacle either of brick, iron, ſtone, or clay, wherein the fire, neceſſary for the ſeveral operations, is contained, determined, and directed.

The *furnace* conſiſts of ſeveral parts: as a place for the veſſel or body to be wrought on; a hearth, or hole for the aſhes; a chimney; a grate; a door; a dome; and a fan, or elſe regiſters, whereby to let in air, to increaſe or abate the fire.

The perfection of a *furnace* conſiſts in its maintaining a conſtant, equable fire; and this eaſily tempered, and at an eaſy expence.

To have the expence eaſy, the whole action of the fire, or fuel, muſt be employed on the ſubject that is to undergo the operation.

It muſt be equable, ſince different degrees of fire have different effects: ſo that if any given degree would anſwer any given intention, an alteration of that degree will prevent the intention from taking place. And on theſe circumſtances does all the variety of *furnaces* depend.

Furnaces are either *fixed* and immovable, called *athanors*; or *portable*, called *catholic*, i.e. univerſal, as being proper for all operations, where the body to be operated on is not too large.

The firſt ſpecies of athanor, or fixed *furnace*, is fitted to maintain an equal heat, and ſuch as ſhall laſt a long time without addition of freſh fuel.

The ſecond is the *furnace* of the *balneum Mariæ*, fit for the diſtillation of the more ſubtil ſpirits.

The third is the digeſting *furnace*. See Digestion.

The fourth is the anemius, or *wind furnace*, called alſo *melting furnace*, and *metallic furnace*; uſed in the fuſion of metals, minerals, and vitrifications.

It is called *wind furnace*, becauſe the air drives forcibly in, to blow up the coals.

For an account of the principal *furnaces* uſed in chemical and other operations, ſee the following articles.

Furnace, *almond*, or *almnan*. See Almond.

Furnace, *aſſaying*, *cupelling*, or *eſſay*. See *Tab.* III. *Chemiſtry*, *fig.* 37. is made in the following manner: 1. Make with iron plates a hollow quadrangular priſm, eleven inches broad and nine inches high *a a*, *b b*, ending at top in a hollow quadrangular pyramid *b b*, *c c*, ſeven inches high, terminating in an aperture at top ſeven inches ſquare. This priſm muſt be cloſed at bottom with another iron plate, which ſerves as a baſis or bottom to it *a a*. 2. Near the bottom make a door *e*, three inches high, and five inches broad, that leads to the aſh-hole. 3 Above this door, and at the height of ſix inches from the baſis, make another door *f*, of the figure of a ſegment of a circle, four inches broad at its baſis, and three inches and a half high in the middle. 4. Then faſten three iron plates on the forepart of this *furnace*; let the firſt of them *g g*, eleven inches long and half an inch high, be faſtened, ſo that its lower edge ſhall reſt againſt the bottom of the *furnace*, with three or four rivets, and in ſuch a manner, that there may be between the upper edge of the ſaid plate and the ſide of the *furnace* a groove ſo wide, as that the ſliders of the lower door *k k* may be put into it, and freely move backwards and forwards therein: theſe muſt be made of a thicker iron-plate. The ſecond iron-plate *h h*, eleven inches long, three inches high, and perfectly parallel to the foregoing plate, muſt be faſtened in the ſpace between the two doors, in ſuch manner, that both the upper and the lower edge of it may form a hollow groove with the ſide of the *furnace*. One of theſe grooves, which is turned downwards, ſerves to receive the upper edges of the ſliders that ſhut the lower door Nº 2. The other, that turns upwards, is to receive the inferior edges of the ſliders of the ſmall door above, Nº 3. The third plate, *i i*, which is like the firſt, muſt be rivetted cloſe above the upper door, in ſuch manner, that it may form a groove turning downwards, and contiguous to the upper edge of the upper door, Nº 3. 5. In order to ſhut up both doors, Nº 2 and 3, you muſt adapt to each of them two ſliders made of iron plates, that may move within the above mentioned grooves *k k*, *l l*; but the two ſliders belonging to the upper door, Nº 3. muſt have each a hole near the top; that is, one a ſmall hole one fifth part of an inch broad, and one inch and a half long *m*; and the other a ſemi-circular aperture, one inch high and two inches broad *n*. Let, beſides, each ſlider have a handle, that they may be laid hold of when they are to be moved. 6. Moreover, let five round holes, one inch broad, be bored in the *furnace*, two of which muſt be made in the fore-part of the *furnace o o*, two others in the back-part, all at the height of five inches from the bottom, but three inches and a half diſtant from each ſide of the furnace; and, finally, a fifth hole *p*, at the height of one inch above the upper edge of the upper door *f*. 7. In ſhort, let the inſide of the furnace be armed with iron-hooks, jetting out half an inch, and about three inches diſtant from each other, to faſten the lute with which the *furnace* is to be covered over within. 8. Let then an iron, moveable, hollow, quadrangular pyramid *q*, three inches high, be adapted to the upper aperture *d* of the *furnace*, at the baſis ſeven inches broad, ending upwards in a hollow tube *r*, three inches in diameter, two inches high, almoſt cylindrical, though ſomewhat convergent at top. This prominent tube ſerves to ſupport a funnel or flue, which is almoſt cylindrical, hollow, made of iron-plates, and two foot high, and which, when a very ſtrong fire is required, is put perpendicularly upon the ſhorter tube, in ſuch manner, that it enters cloſe into it, one inch and a half, or two inches deep, and may again be taken off at pleaſure, when there is no need of ſo ſtrong a fire. But this pyramidal cover *q* muſt beſides have two handles *s s*, adapted to it, that it may be laid hold of, and thus be taken away or put on again: and that this, being put on the aperture *d* of the *furnace*, may not be eaſily thrown down, let an iron plate be rivetted to the right and left upper edge of the furnace *c c*, and be turned down towards the inſide, ſo as to make a furrow open before and behind, into which the lateral edges of the cover may enter and be faſtened, and at pleaſure be moved backwards and forwards, whenever it muſt be put on, or moved. 9. Let a ſquare ledge, made of a thick iron-plate, be faſtened at the top of the upper edge of the lower door *e*; this is deſigned to ſupport the grate and the lute: but it muſt be made of two pieces, that it may be eaſily introduced into the cavity of the *furnace*. Thus you will have an aſſay-oven, which muſt afterwards be covered over on the inſide with Lute. This you are to do as follows: That the fire may be better confined, and that the iron may not be deſtroyed by growing red-hot, the whole inſide of the *furnace* muſt be covered over with lute, one finger or one finger and a half thick. But, before you cover the inſide of your *furnace* with this lute, you muſt firſt put within the *furnace* ſmall iron bars, equal in length to the diameter of the oven, quadranglar, priſmatical, half an inch thick, having their extremities ſupported by a ſquare iron ledge, and three-fourths of an inch diſtant from each other; and you muſt faſten them ſo, that their flat ſides may be oblique with regard to the tranſverſe ſection of the *furnace*, and that the two oppoſite angles may look one upwards and the other downwards; the bars muſt not be laid flat, but edgeways, by which ſituation you hinder the aſhes of the fuel of the fire from being detained too long between the interſtices of the ſaid iron-bars, and from making an obſtruction that would oppoſe the free draught of the air. The *furnace* being then covered over with lute, and dried up by a gentle heat, is at laſt fit for docimaſtical operations, and eſpecially for ſuch as muſt be performed in the aſſay-oven.

If then an operation is to be made in the *furnace* hitherto deſcribed, you muſt let through the four lower holes above deſcribed, of the *furnace o o*, placed before and behind, and directly oppoſite to each other, two iron-bars one inch thick, and long enough that their extremities on every ſide may jut out of the holes a ſmall matter. Theſe ſerve to ſupport the MUFFLE and its bottom. You then introduce the muffle through the upper aperture of the *furnace d*, and place it upon the above deſcribed iron-bars, in ſuch manner, that the open foreſide of it be contiguous to the inward border of the upper door *f*. The fuel of the fire is introduced through the top of the furnace *d*; the cover of which, on this account, muſt be moveable, and not very heavy *q*. The beſt fuel for the fire is charcoal made of the hardeſt wood, eſpecially of beech, broken into ſmall pieces of the bigneſs of an inch, wherewith the muffle muſt be covered over ſome inches high. We then reject larger bits of coals, becauſe they cannot fall through the narrow interſtices, between the ſides of the muffle and thoſe of the *furnace*, and cannot of courſe ſufficiently ſurround the circumference of the muffle. Whence it happens, that there are on every ſide places void of fuel, and the fire is either not ſtrong enough or unequal. But if, on the contrary, you uſe coals too ſmall, then a great part fall immediately through the interſtices of the grate into the aſh-hole; and the tendereſt particles of them turn too ſoon into aſhes, and by increaſing the heap of aſhes, obſtruct the free draught of the air, which is here greatly requiſite.

A perfect management of the fire is moſt commonly neceſſary in the performing of operations in this *furnace*; therefore the reader muſt give attention to what follows: if the door of the aſh-hole *e* is quite open; and the ſliders of the upper door *f* drawn towards each other, ſo as to touch one another in the middle of the door; and if, beſides, the cover *q*, and the funnel adapted to its tube *r*, is upon the top *q* of the *furnace*, the fire will be then in the higheſt degree poſſible; though, in the mean time, it is hardly ever neceſſary to put the funnel on, except in a very cold ſeaſon: but if, after having diſpoſed the furnace in the manner juſt deſcribed, you put red burning coals into the open upper door *f* of it, the fire is ſtill more increaſed thereby: however, this artifice is never, or very ſeldom, neceſſary. When you ſhut the upper door with only that ſlider that has a narrow oblong hole in it *m*, then the heat becomes a little leſs; but it diminiſhes ſtill more when you ſhut the door with the other ſlider that has in it the ſemi-circular hole *n*, which is larger than that of the firſt ſlider: nay, the heat again is leſs when you take away the funnel put at the top of the cover: finally, the door of the aſh-hole being either in part or totally ſhut, the heat is ſtill diminiſhed, becauſe the draught of the air, ſo neceſſary to excite the fire, is thereby hindered: but if, beſides all theſe, you likewiſe open the upper door quite, then the cold air, ruſhing into the muffle, cools the bodies put under it, that are to be changed, to a degree never required in any operation, and ſuch as will entirely hinder the boiling of lead. If, during the operation, the fire begins to decay, or to grow unequal, it is a ſign that there are places void of coals between the ſides of the *furnace* and thoſe of the muffle; therefore, in this caſe, you muſt ſtir your coals on every ſide with an iron rod, which is to be introduced through the upper hole *p* of the *furnace*, that they may fall together, and thus act in a proper manner and equally. See Cramer's Art of Aſſaying, by Dr. Mortimer, p. 75. See *portable* FURNACES.

FURNACE, called *Athanor*, or *tower-furnace*, is repreſented in *fig.* 38. See ATHANOR. It is thus conſtructed. 1. Let a ſmall ſquare hollow tower *a a a a* be formed of ſuch ſtones, or of bricks made of Stourbridge clay, or Windſor loam, as may reſiſt the fire; let the ſides of it be ſix inches thick, and forming a ſquare cavity within, of ten inches on each ſide *b b b b*. The height of it is determined according as it is to keep up the fire long, without any addition of new fuel: five or ſix feet are moſt commonly ſufficient. 2. At the bottom of this tower make an opening *c*, ſix inches broad, and as many inches high; hang to it an iron door, being on every ſide one inch broader than the opening, and ſuch as may ſhut it very cloſe: for which purpoſe the external edge of this opening muſt be excavated all round in ſuch a manner, that it may form a groove one inch broad, into which the edges of the door may be received. 3. At the diſtance of ten inches from the bottom of the tower, put a grate *d*, made of priſmatical quadrangular iron bars, one inch thick, and three quarters of an inch diſtant from each other: let alſo each of theſe iron bars be ſo ſituated with regard to the tower, that the two oppoſite acute edges of each may look perpendicularly, one downward, the other upwards, that, by this means, the aſhes may eaſily fall into the aſh-hole. 4. Make above this grate an opening circular at top *e*, ſix inches high, ſeven inches broad, that may, as well as the aſh-hole, N° 2. be opened and ſhut with an iron door. 5. Adapt to the top of the tower an iron cover *f*, exceeding the aperture of the tower all around two inches, and having a handle, wherewith it may be eaſily taken away, and put on again. Thus you are to make the *furnace* called in Latin *furnus primarius*. 6. Then cut out in any ſide of the tower, for inſtance in the left, an oblong ſquare aperture, going up obliquely towards the outſide *g g*, four inches and a half high, ten inches broad, having its inward inferior edge one inch and a half, or two inches above the grate *d*; that by the intervening of this hole, the cavity of this tower may communicate with another immediately to be deſcribed. 7. Nearly over-againſt the ſame ſide of the tower, make a cavity with ſtones, whoſe inferior part muſt be a hollow priſm *h, h, h, h*, ſix inches high, twelve inches broad, ending at top in a ſemi-cylindrical arch *i, i*, deſcribed by a radius of ſix inches; that by this means, the height of the whole cavity may be twelve inches in the middle. Let this anterior cavity be totally open, though, when requiſite, it is to be ſhut very cloſe with an iron plate *k, k*, whoſe inward ſurface is to be conſtructed in the ſame manner as is preſcribed for the ſliding door of the melting-furnace, and then luted two inches thick within. Moreover, let there be in the middle of this plate, a round hole, four or five inches in diameter, and let the circumference of this hole have an iron cylindrical border made to it, and prominent within; that by means of it, the lining of lute within may be ſupported, and kept from falling down eaſily. Let a notch one inch broad, and two inches deep be made in the outward circuit of the aperture of this cavity, to receive the extremity of the plate that ſhuts the aperture. The hole of this plate either is ſhut with a ſtopple, or ſerves to paſs the neck of the retort through. This plate likewiſe is faſtened with two bolts *n, n*, to be put horizontally with iron hooks *o, o, o, o*, driven into the wall near the edge of the aperture, ſo that one bolt may faſten the upper part of the plate, and the other the lower. 8. It is moreover proper, that the ſquare aperture *g, g*, through which the fire enters from the tower into the cavity hitherto deſcribed, N° 7. may be ſhut and opened at pleaſure with an iron ſlider: for if this is not done, an exceſſive fire, employed ſometimes by an unexperienced hand, cannot be ſo eaſily checked. For this purpoſe, let a ſlit half an inch broad, and eleven inches long, be left in the wall that conſtitutes the upper part of the cavity N° 7. and is contiguous to the tower; ſo that it may exceed the length of the ſquare aperture *g, g*, a ſmall matter on every ſide, and reach before and behind into the ſmall groove, going down along the perpendicular ſides of the ſaid aperture, *g, g*, and retain the iron ſlider to be put into it to keep it ſteady. However, let this iron-ſlider be ſix lines thick, eleven inches broad, and five inches high; and let a couple of ſmall iron chains, *p, p*, be faſtened on each ſide of its upper edge, wherewith the ſlider may be lifted up and let down again. Therefore let a couple of ſtrong iron nails be drove into the contiguous wall of the tower, perpendicularly over thoſe places in which the ſaid ſmall chains are faſtened to the iron ſlider, that any of the links of the chains may be ſuſpended on them at pleaſure. Moreover, let the upper edge of the ſlit above deſcribed be entirely ſhut up with ſtones and cement, leaving only two ſmall holes through which the ſmall chains may be paſſed. On the left of this cavity (N° 7.) and at the diſtance of eight inches from the bottom of it, let a ſquare, *q, q q, q*, chimney or funnel be erected with bricks, three inches and a half in the clear, four foot high, and a ſmall matter convergent upwards, ſo that the diameter of it at top may be three inches. This funnel muſt be contrived to be ſhut cloſely with an iron ſlider, having a handle to it, *r, r*, which ſlider muſt move freely between a double iron ſquare frame faſtened in the walls of the funnel, at ſuch a height from the hearth as ſhall ſeem convenient to any artificer. 10. Below this chimney let a ſquare aperture be made, like the foregofirſt filled up to the top with coals; and the lower part being lighted, the top, and all other parts of the *furnace*, where the air could have paſſage, are cloſed firmly up with iron plates laid one over another. The conſequence of this is, that the fire is put out, and the whole is kept in this ſtate ten or twelve days. At the end of this time the *furnace* is opened, and the coals are found all black, without a ſingle ſpark of fire in any part, yet extremely hot, and reduced to a tenth part of their quantity. When the *furnace* has been thus opened about a quarter of an hour, the matter begins to take fire of itſelf by the mere contact of the air. The firſt appearance of this is very remarkable; there ariſes a very bright flame from ſome of the coals, which plays about their ſurface, and ſpreads itſelf from one to another, without the appearance of the leaſt ſpark of fire in any part of any of the coals. The ore of the iron is for the firſt day put only in the middle of the *furnace*, and that but in ſmall quantity; the next day more, and every day afterwards more and more is put on, and by degrees it is ſpread over the whole ſurface of the *furnace* to the edges. This is the method of working the ore to the utmoſt advantage, and with the moſt diſpatch. The whole proceſs for one *furnace* of ore is finiſhed in about eight days from the time of the opening the top; all the uſe of the firſt quantity of coal, is only thoroughly to warm the ſides and walls of the *furnace*; and it is after this to be kept carefully ſupplied with fuel, and the ore only ſpread out towards the ſides as the extreme heat, moſt ſenſible in the center, increaſes. If too much be laid on of the ore at firſt, there is always a loſs from the quantity of metal. The quantity of the coals neceſſary to any given quantity of ore, differs in proportion to the advantageous or faulty ſtructure of the *furnace*. In the very beſt conſtructed ones, the weight of the coals and of the ore need be no more than equal. The flame which makes its way out of the bottom of the *furnace* is of different colours, according to the nature of the ore and of the coals; ſometimes red, ſometimes yellow, and ſometimes green. That which iſſues out from the top of the *furnace* is of a red colour, and aſcends in a ſort of ſpiral line, reſembling the ſound of diſtant falls of water as it mounts up. With all the care that can be taken to heat the ſides of the *furnace*, and to keep them hot, the middle is always much the hotteſt, and the ore ſooneſt runs into metal there. Swedenborg de Ferro & Igni.

FURNACE, in *Chemiſtry*, is a receptacle either of brick, iron, ſtone, or clay, wherein the fire, neceſſary for the ſeveral operations, is contained, determined, and directed.

The *furnace* conſiſts of ſeveral parts: as a place for the veſſel or body to be wrought on; a hearth, or hole for the aſhes; a chimney; a grate; a door; a dome; and a fan, or elſe regiſters, whereby to let in air, to increaſe or abate the fire.

The perfection of a *furnace* conſiſts in its maintaining a conſtant, equable fire; and this eaſily tempered, and at an eaſy expence.

To have the expence eaſy, the whole action of the fire, or fuel, muſt be employed on the ſubject that is to undergo the operation.

It muſt be equable, ſince different degrees of fire have different effects: ſo that if any given degree would anſwer any given intention, an alteration of that degree will prevent the intention from taking place. And on theſe circumſtances does all the variety of *furnaces* depend.

Furnaces are either *fixed* and immovable, called *athanors*; or *portable*, called *catholic*, i. e. univerſal, as being proper for all operations, where the body to be operated on is not too large.

The firſt ſpecies of athanor, or fixed *furnace*, is fitted to maintain an equal heat, and ſuch as ſhall laſt a long time without addition of freſh fuel.

The ſecond is the *furnace* of the *balneum Mariæ*, fit for the diſtillation of the more ſubtil ſpirits.

The third is the digeſting *furnace*. See DIGESTION.

The fourth is the anemius, or *wind furnace*, called alſo *melting furnace*, and *metallic furnace*; uſed in the fuſion of metals, minerals, and vitrifications.

It is called *wind furnace*, becauſe the air drives forcibly in, to blow up the coals.

For an account of the principal *furnaces* uſed in chemical and other operations, ſee the following articles.

FURNACE, *almond*, or *alman*. See ALMOND.

FURNACE, *aſſaying*, *cupelling*, or *eſſay*. See *Tab.* III. *Chemiſtry*, *fig.* 37. is made in the following manner: 1. Make with iron plates a hollow quadrangular priſm, eleven inches broad and nine inches high *a a*, *b b*, ending at top in a hollow quadrangular pyramid *b b*, *c c*, ſeven inches high, terminating in an aperture at top ſeven inches ſquare. This priſm muſt be cloſed at bottom with another iron plate, which ſerves as a baſis or bottom to it *a a*. 2. Near the bottom make a door *e*, three inches high, and five inches broad, that leads to the aſh-hole. 3 Above this door, and at the height of ſix inches from the baſis, make another door *f*, of the figure of a ſegment of a circle, four inches broad at its baſis, and three inches and a half high in the middle. 4. Then faſten three iron plates on the forepart of this *furnace*; let the firſt of them *g g*, eleven inches long and half an inch high, be faſtened, ſo that its lower edge ſhall reſt againſt the bottom of the *furnace*, with three or four rivets, and in ſuch a manner, that there may be between the upper edge of the ſaid plate and the ſide of the *furnace* a groove ſo wide, as that the ſliders of the lower door *k k* may be put into it, and freely move backwards and forwards therein: theſe muſt be made of a thicker iron-plate. The ſecond iron-plate *h h*, eleven inches long, three inches high, and perfectly parallel to the foregoing plate, muſt be faſtened in the ſpace between the two doors, in ſuch manner, that both the upper and the lower edge of it may form a hollow groove with the ſide of the *furnace*. One of theſe grooves, which is turned downwards, ſerves to receive the upper edges of the ſliders that ſhut the lower door N° 2. The other, that turns upwards, is to receive the inferior edges of the ſliders of the ſmall door above, N° 3. The third plate, *i i*, which is like the firſt, muſt be rivetted cloſe above the upper door, in ſuch manner, that it may form a groove turning downwards, and contiguous to the upper edge of the upper door, N° 3. 5. In order to ſhut up both doors, N° 2 and 3, you muſt adapt to each of them two ſliders made of iron plates, that may move within the above mentioned grooves *k k*, *l l*; but the two ſliders belonging to the upper door, N° 3. muſt have each a hole near the top; that is, one a ſmall hole one fifth part of an inch broad, and one inch and a half long *m*; and the other a ſemi-circular aperture, one inch high and two inches broad *n*. Let, beſides, each ſlider have a handle, that they may be laid hold of when they are to be moved. 6. Moreover, let five round holes, one inch broad, be bored in the *furnace*, two of which muſt be made in the fore-part of the *furnace o o*, two others in the back-part, all at the height of five inches from the bottom, but three inches and a half diſtant from each ſide of the furnace; and, finally, a fifth hole *p*, at the height of one inch above the upper edge of the upper door *f*. 7. In ſhort, let the inſide of the furnace be armed with iron-hooks, jetting out half an inch, and about three inches diſtant from each other, to faſten the lute with which the *furnace* is to be covered over within. 8. Let then an iron, moveable, hollow, quadrangular pyramid *q*, three inches high, be adapted to the upper aperture *d* of the *furnace*, at the baſis ſeven inches broad, ending upwards in a hollow tube *r*, three inches in diameter, two inches high, almoſt cylindrical, though ſomewhat convergent at top. This prominent tube ſerves to ſupport a funnel or flue, which is almoſt cylindrical, hollow, made of iron-plates, and two foot high, and which, when a very ſtrong fire is required, is put perpendicularly upon the ſhorter tube, in ſuch manner, that it enters cloſe into it, one inch and a half, or two inches deep, and may again be taken off at pleaſure, when there is no need of ſo ſtrong a fire. But this pyramidal cover *q* muſt beſides have two handles *s s*, adapted to it, that it may be laid hold of, and thus be taken away or put on again: and that this, being put on the aperture *d* of the *furnace*, may not be eaſily thrown down, let an iron plate be rivetted to the right and left upper edge of the furnace *c c*, and be turned down towards the inſide, ſo as to make a furrow open before and behind, into which the lateral edges of the cover may enter and be faſtened, and at pleaſure be moved backwards and forwards, whenever it muſt be put on, or moved. 9. Let a ſquare ledge, made of a thick iron-plate, be faſtened at the top of the upper edge of the lower door *e*; this is deſigned to ſupport the grate and the lute: but it muſt be made of two pieces, that it may be eaſily introduced into the cavity of the *furnace*. Thus you will have an aſſay-oven, which muſt afterwards be covered over on the inſide with LUTE. This you are to do as follows: That the fire may be better confined, and that the iron may not be deſtroyed by growing red-hot, the whole inſide of the *furnace* muſt be covered over with lute, one finger or one finger and a half thick. But, before you cover the inſide of your *furnace* with this lute, you muſt firſt put within the *furnace* ſmall iron bars, equal in length to the diameter of the oven, quadranglar, priſmatical, half an inch thick, having their extremities ſupported by a ſquare iron ledge, and three-fourths of an inch diſtant from each other; and you muſt faſten them ſo, that their flat ſides may be oblique with regard to the tranſverſe ſection of the *furnace*, and that the two oppoſite angles may look one upwards and the other downwards; the bars muſt not be laid flat, but edgeways, by which ſituation you hinder the aſhes of the fuel of the fire from being detained too long between the interſtices of the ſaid iron-bars, and from making an obſtruction that would oppoſe the free draught of the air. The *furnace* being then covered over with lute, and dried up by a gentle heat, is at laſt fit for docimaſtical operations, and eſpecially for ſuch as muſt be performed in the aſſay-oven.

If then an operation is to be made in the *furnace* hitherto deſcribed, you muſt let through the four lower holes above deſcribed, of the *furnace o o*, placed before and behind, and directly oppoſite to each other, two iron-bars one inch thick, and long enough that their extremities on every ſide may jut out of the holes a ſmall matter. Theſe ſerve to ſupport the MUFFLE and its bottom. You then introduce the muffle through the upper aperture of the *furnace d*, and place it upon the above deſcribed iron-bars, in ſuch manner, that the open foreſide of it be contiguous to the inward border of the upper door *f*. The fuel of the fire is introduced through the top of the furnace *d*; the cover of which, on this account, muſt be moveable, and not very heavy *q*. The beſt fuel for the fire is charcoal made of the hardeſt wood, eſpecially of beech, broken into ſmall pieces of the bigneſs of an inch, wherewith the muffle muſt be covered over ſome inches high. We then reject larger bits of coals, becauſe they cannot fall through the narrow interſtices, between the ſides of the muffle and thoſe of the *furnace*, and cannot of courſe ſufficiently ſurround the circumference of the muffle. Whence it happens, that there are on every ſide places void of fuel, and the fire is either not ſtrong enough or unequal. But if, on the contrary, you uſe coals too ſmall, then a great part fall immediately through the interſtices of the grate into the aſh-hole; and the tendereſt particles of them turn too ſoon into aſhes, and by increaſing the heap of aſhes, obſtruct the free draught of the air, which is here greatly requiſite.

A perfect management of the fire is moſt commonly neceſſary in the performing of operations in this *furnace*; therefore the reader muſt give attention to what follows: if the door of the aſh-hole *e* is quite open; and the ſliders of the upper door *f* drawn towards each other, ſo as to touch one another in the middle of the door; and if, beſides, the cover *q*, and the funnel adapted to its tube *r*, is upon the top *q* of the *furnace*, the fire will be then in the higheſt degree poſſible; though, in the mean time, it is hardly ever neceſſary to put the funnel on, except in a very cold ſeaſon: but if, after having diſpoſed the furnace in the manner juſt deſcribed, you put red burning coals into the open upper door *f* of it, the fire is ſtill more increaſed thereby: however, this artifice is never, or very ſeldom, neceſſary. When you ſhut the upper door with only that ſlider that has a narrow oblong hole in it *m*, then the heat becomes a little leſs; but it diminiſhes ſtill more when you ſhut the door with the other ſlider that has in it the ſemi-circular hole *n*, which is larger than that of the firſt ſlider: nay, the heat again is leſs when you take away the funnel put at the top of the cover: finally, the door of the aſh-hole being either in part or totally ſhut, the heat is ſtill diminiſhed, becauſe the draught of the air, ſo neceſſary to excite the fire, is thereby hindered: but if, beſides all theſe, you likewiſe open the upper door quite, then the cold air, ruſhing into the muffle, cools the bodies put under it, that are to be changed, to a degree never required in any operation, and ſuch as will entirely hinder the boiling of lead. If, during the operation, the fire begins to decay, or to grow unequal, it is a ſign that there are places void of coals between the ſides of the *furnace* and thoſe of the muffle; therefore, in this caſe, you muſt ſtir your coals on every ſide with an iron rod, which is to be introduced through the upper hole *p* of the *furnace*, that they may fall together, and thus act in a proper manner and equally. See Cramer's Art of Aſſaying, by Dr. Mortimer, p. 75. See *portable* FURNACES.

FURNACE, called *Athanor*, or *tower-furnace*, is repreſented in *fig.* 38. See ATHANOR. It is thus conſtructed. 1. Let a ſmall ſquare hollow tower *a a a a* be formed of ſuch ſtones, or of bricks made of Stourbridge clay, or Windſor loam, as may reſiſt the fire; let the ſides of it be ſix inches thick, and forming a ſquare cavity within, of ten inches on each ſide *b b b b*. The height of it is determined according as it is to keep up the fire long, without any addition of new fuel: five or ſix feet are moſt commonly ſufficient. 2. At the bottom of this tower make an opening *c*, ſix inches broad, and as many inches high; hang to it an iron door, being on every ſide one inch broader than the opening, and ſuch as may ſhut it very cloſe: for which purpoſe the external edge of this opening muſt be excavated all round in ſuch a manner, that it may form a groove one inch broad, into which the edges of the door may be received. 3. At the diſtance of ten inches from the bottom of the tower, put a grate *d*, made of priſmatical quadrangular iron bars, one inch thick, and three quarters of an inch diſtant from each other: let alſo each of theſe iron bars be ſo ſituated with regard to the tower, that the two oppoſite acute edges of each may look perpendicularly, one downward, the other upwards, that, by this means, the aſhes may eaſily fall into the aſh-hole. 4. Make above this grate an opening circular at top *e*, ſix inches high, ſeven inches broad, that may, as well as the aſh-hole, N° 2. be opened and ſhut with an iron door. 5. Adapt to the top of the tower an iron cover *f*, exceeding the aperture of the tower all around two inches, and having a handle, wherewith it may be eaſily taken away, and put on again. Thus you are to make the *furnace* called in Latin *furnus primarius*. 6. Then cut out in any ſide of the tower, for inſtance in the left, an oblong ſquare aperture, going up obliquely towards the outſide *g g*, four inches and a half high, ten inches broad, having its inward inferior edge one inch and a half, or two inches above the grate *d*; that by the intervening of this hole, the cavity of this tower may communicate with another immediately to be deſcribed. 7. Nearly over-againſt the ſame ſide of the tower, make a cavity with ſtones, whoſe inferior part muſt be a hollow priſm *h*, *h*, *h*, *h*, ſix inches high, twelve inches broad, ending at top in a ſemi-cylindrical arch *i*, *i*, deſcribed by a radius of ſix inches; that by this means, the height of the whole cavity may be twelve inches in the middle. Let this anterior cavity be totally open, though, when requiſite, it is to be ſhut very cloſe with an iron plate *k*, *k*, whoſe inward ſurface is to be conſtructed in the ſame manner as is preſcribed for the ſliding door of the melting-furnace, and then luted two inches thick within. Moreover, let there be in the middle of this plate, a round hole, four or five inches in diameter, and let the circumference of this hole have an iron cylindrical border made to it, and prominent within; that by means of it, the lining of lute within may be ſupported, and kept from falling down eaſily. Let a notch one inch broad, and two inches deep be made in the outward circuit of the aperture of this cavity, to receive the extremity of the plate that ſhuts the aperture. The hole of this plate either is ſhut with a ſtopple, or ſerves to paſs the neck of the retort through. This plate likewiſe is faſtened with two bolts *n*, *n*, to be put horizontally with iron hooks *o*, *o*, *o*, *o*, driven into the wall near the edge of the aperture, ſo that one bolt may faſten the upper part of the plate, and the other the lower. 8. It is moreover proper, that the ſquare aperture *g*, *g*, through which the fire enters from the tower into the cavity hitherto deſcribed, N° 7. may be ſhut and opened at pleaſure with an iron ſlider: for if this is not done, an exceſſive fire, employed ſometimes by an unexperienced hand, cannot be ſo eaſily checked. For this purpoſe, let a ſlit half an inch broad, and eleven inches long, be left in the wall that conſtitutes the upper part of the cavity N° 7. and is contiguous to the tower; ſo that it may exceed the length of the ſquare aperture *g*, *g*, a ſmall matter on every ſide, and reach before and behind into the ſmall groove, going down along the perpendicular ſides of the ſaid aperture, *g*, *g*, and retain the iron ſlider to be put into it to keep it ſteady. However, let this iron-ſlider be ſix lines thick, eleven inches broad, and five inches high; and let a couple of ſmall iron chains, *p*, *p*, be faſtened on each ſide of its upper edge, wherewith the ſlider may be lifted up and let down again. Therefore let a couple of ſtrong iron nails be drove into the contiguous wall of the tower, perpendicularly over thoſe places in which the ſaid ſmall chains are faſtened to the iron ſlider, that any of the links of the chains may be ſuſpended on them at pleaſure. Moreover, let the upper edge of the ſlit above deſcribed be entirely ſhut up with ſtones and cement, leaving only two ſmall holes through which the ſmall chains may be paſſed. On the left of this cavity (N° 7.) and at the diſtance of eight inches from the bottom of it, let a ſquare, *q*, *q q*, *q*, chimney or funnel be erected with bricks, three inches and a half in the clear, four foot high, and a ſmall matter convergent upwards, ſo that the diameter of it at top may be three inches. This funnel muſt be contrived to be ſhut cloſely with an iron ſlider, having a handle to it, *r*, *r*, which ſlider muſt move freely between a double iron ſquare frame faſtened in the walls of the funnel, at ſuch a height from the hearth as ſhall ſeem convenient to any artificer. 10. Below this chimney let a ſquare aperture be made, like the foregoing

ing (N° 6. *g*, *g*), leading obliquely up to the bottom of another cylindrical cavity, *u*, *u*, *u*, *u*, which is eight inches deep, deſcribed by a radius of ſix inches, open at top, and there converging inwardly into a border one inch thick, and ſix lines broad, deſigned to ſupport an iron pot. Likewiſe, cut in the anterior wall of this cavity, and at the upper part of its mouth, a ſegment two inches and a half deep, five inches broad, and ſtooping forward, *v*, *v*, to receive the neck of the retort. 11. To this cavity (N° 10.) belongs an iron pot, *w*, *w*, eleven inches broad, and about nine inches deep, which muſt be encompaſſed with an iron ring, *x*, *x*, one inch broad, and faſtened at the diſtance of one inch and a half from the upper end of the pot. Let a ſegment, *y*, be likewiſe cut off the upper edge of this pot, which ſegment muſt be four inches and a half deep, and five inches broad; the iron ring juſt deſcribed muſt be bent all round the edges of this ſegment. 12. Overagainſt the aperture, *t*, *t*, which communicates from the firſt cavity (N° 7.) into the ſecond (N° 10.) let another ſuch aperture, *z*, be made, two inches diſtant from the bottom of the ſecond cavity (N° 10.) perfectly like the foregoing, *g*, *g*, *t*, *t*, and communicating obliquely upwards with a third cavity, 1, 1, 1, 1, like and equal to the ſecond cylindrical cavity, *u*, *u*, *u*, *u*, that the fire may paſs from the latter into the former. 13. In the hinder part of the wall which makes the aperture juſt mentioned, *z*, let a chimney like the foregoing, *q*, *q*, *q*, *q*, and of the ſame height, 2, 2, 2, 2, be erected, which may be ſhut with a ſlider like that, 3. 14. Finally, on the left ſide of the third cavity let an aperture be made in the ſame manner, 4, and like the foregoing ones, *g g t t z*; more remote however from the bottom of the cavity, without a paſſage at the other extremity, and communicating only with the cavity of the third chimney, 5, 5, 5, which muſt be erected in the ſame manner as the two foregoing ones, *q*, *q*, *q*, *q*, 2, 2, 2, 2. Thus you will have a *furnace* very proper for a great many operations.

We are now to ſpeak of the uſe of the athanor juſt deſcribed; and chiefly to mention to what operations each of its parts ſerve in particular, and then how the fire may and muſt be governed in it. 1. You muſt put at the upper arched door, *e*, of the tower a ſemi-cylindrical muffle twelve inches long, which muſt be introduced through the door; which for this reaſon muſt be of the ſame height and breadth as that door, three quarters of an inch thick, and open behind, being ſhut there by the hinder part of the athanor, as far as which it muſt reach. For this purpoſe, a tile muſt be ſet upon the grate, *d*, to ſupport the muffle. Let alſo this muffle have ſmall pieces cut out near its baſis, as common aſſay muffles. You may put under this muffle your cement pots, or ſuch bodies as muſt be calcined with a long and violent fire; which can be done without a muffle, though not ſo neatly. 2. In the firſt chamber, *h*, *h*, *h*, *h*, *i*, *i*, you may make the moſt violent diſtillations with an open fire; for retorts or large veſſels are introduced into it, after you have taken away the door, *k*, *k*, *k*, and are put either upon the hearth itſelf of this chamber, or upon a particular ſupport of ſtone. But you muſt place theſe veſſels in ſuch manner, that their necks may eaſily paſs through the hole of the door, when put on again; for which purpoſe, they chuſe a ſupport ſometimes higher, ſometimes lower, according to the different heights of the veſſels. When afterwards the door is put on again, and faſtened with both its bolts, *n*, *n*, you muſt cloſe with lute all the chinks which lie open about the neck of the veſſel, and between the edges of the door and the entrance of the chamber. Then you apply to the neck of the veſſel a cylindrical ſegment, ten or more inches long; by means of which the heat and the boiling vapours coming forth are gradually diminiſhed; leſt the recipient, which is always choſen a glaſs veſſel, ſhould ſplit. The recipient, which muſt be united with the other orifice of the ſaid ſegment, is ſupported either by the pavement, or by a certain kind of trivet, the conſtruction of which is ſuch, that it may be ſet higher or lower by means of three ſcrews. 3. In this ſame chamber, inſtead of diſtillations, you may alſo make cementations, calcination, &c. in which caſe the round hole of the iron plate may be ſhut and again opened with a ſtopple, that one may view the inſide. 4. The ſecond and third cavities, *u*, *u*, *u*, *u*, 1, 1, 1, 1, ſerve chiefly to ſuch operations as are made in baths (or beds) of *ſand-aſhes*, or *filings*. For inſtance, you put into each of theſe cavities a pot, *v*, *v*, and you ſtop with thin lute or with ſand, which muſt previouſly be moiſtened, the ſlip between the iron ring, *x*, *x*, and the border of the cavity, upon which this ring reſts. 5. Beſides, you may alſo make in theſe two cavities, diſtillations by a reverberating fire, as well as in the firſt: only the fire is leſs violent in theſe, though ſufficient to extract aqua fortis. You then take out the iron pot, *v*, *v*, and inverting it, you put it upon the mouth of the chamber; ſo that the brim of the pot, being the depth of one inch and a half above the iron ring *x*, *x*, wherewith this pot is ſurrounded, may be received within the mouth of the cavity, and ſo that the ſegment cut in the pot *y* may, together with the ſegment cut out from the ſide of the cavity *v*, *v*, form a hole to let the neck of the veſſel through. 6. All the apparatus being thus ready, you firſt introduce through the top of the tower *b*, *b*, *b*, *b*, a few burning coals; and put upon them ſome of the unkindled fuel of the fire, that the cavity of the tower may, according as it is thought neceſſary, be filled either entirely or only in part. Then with all ſpeed you put upon it the iron cover *f*, and ſtrew the border of this on the outſide with ſand or aſhes, which you preſs gently with your hands: for if you ſhould neglect this point, all the fuel contained in the tower would be kindled, and may endanger ſetting the houſe on fire.

We ſhall here annex a few general rules concerning the regimen of the fire in this furnace: for it is hardly neceſſary to explain all particulars, ſince practice will eaſily hint them to ſuch as ſhall be ever ſo little acquainted with chemiſtry. The fire may be made very ſtrong in the firſt chamber *h*, *h*, *h*, *h*, *i*, *i*, when the door of the aſh-hole *c*, and the funnel *q*, *q*, *q*, *q*, of the chamber is quite open, and when the iron ſlider, ſuſpended with chains 6. *p*, *p*, does not hinder the fire from paſſing freely from the tower into this cavity. But the cloſer the funnel is ſhut, together with the door of the aſh-hole, the more the violence of the heat diminiſhes: and this will be ſoon effected, if the iron ſlider ſuſpended with chains is let down in part: for the fuel contained in the tower burns at leaſt as high as the ſpace between the lower edge of the iron ſlider and the grate *d*. Obſerve beſides, in thoſe operations wherein the round hole of the door is ſtopped with a plug, that when the ſtrongeſt fire is required, this hole muſt not be kept long open; becauſe the air ruſhing violently through it, ſoon cools the bodies put into the cavity. The operations above mentioned may be performed in the ſecond and third chamber, in, and at the ſame time, and with the ſame fire, as they are in the firſt chamber; for the fire penetrates from the firſt cavity into the ſecond, and increaſes when the funnel 2, 2, 2, 2, erected on it is opened: but before you do this, the funnel of the firſt cavity muſt be ſhut as much as that of the ſecond is opened. By the ſame means, you may hinder the fire, which ſerves for the operations made in the two firſt cavities, from going out through the funnels, and you force it out, on the contrary, through the third cavity and through its funnel 5, 5, 5, that it may alſo act upon the bodies placed in that cavity. For the more the funnel erected upon the third cavity is open, the more one, or even both funnels of the other two cavities muſt be cloſed: thence it is plain, that you cannot kindle the ſtrongeſt fire in the third cavity, unleſs there be one equally ſtrong in the other two; and that, on the contrary, the heat in the third cavity may be rendered leſs, by cloſing its funnel; though it be violent in the others. The ſame is true of the ſecond cavity, with regard to the firſt. Finally, you cannot make the ſtrongeſt fire under the muffle placed within the upper door *e* of the tower, unleſs you have an equal fire in the firſt cavity, which fire may conſequently be increaſed, by ſhutting the door quite againſt the muffle *e*, and diminiſhed by opening it; there being mean while an equal heat in the firſt chamber, and in the following ones. Cramer, and Chem. Dict. Appendix.

This ſort of *furnace* is now much neglected, ſince the long and laborious operations of the ancient chemiſts, who were in ſearch of the art of making gold, have been diſcontinued: it is alſo ſubject to an inconvenience, as the fuel in the tower is apt to ſtick there, or fall down at once in too great quantity.

FURNACE, *bellows*, or *blaſt*, is one of the two kinds of *furnaces* uſed in coinage for the fuſion of metals. It conſiſts of a flat hearth at bottom, into which the air may be admitted by a hole contrived therein.

On a level with the hearth is a ſecond aperture, which gives paſſage to the pipe of the bellows, from which the *furnace* is denominated: about a foot over this is a moveable grate, which may be taken off, and put on, at pleaſure: laſtly, over this is the place where the crucible is ſet, which is ſquare, and made of the ſame earth with the crucible, of breadth ſufficient to bear a range of coals around the crucible. To melt a metal in this *furnace*, they lay a little plate of forged iron over the grate, and on this they ſet the crucible, which is likewiſe covered with an iron or earthen lid; then they fill the *furnace* with charcoal, and when it is well lighted, and the crucible ſufficiently hot, they ſtop the vent-hole: laſtly, throwing on freſh coals, they ſtop the *furnace* with an iron lid; thus continuing to work the bellows, and ſupply

ply freſh fuel, till the metal be in fuſion. Theſe bellows ſhould be double, like thoſe uſed by the ſmiths, that the blaſt may be continual; though no heat can be produced by this means, to exceed that which may be obtained in a good *wind*-FURNACE. The principal uſe of bellows is to excite a great heat in a little time.

Dr. Lewis, in his ingenious contrivance of *portable* FURNACES, propoſes to fit up a black leaden crucible or pot for a *blaſt furnace*, in which no other aperture is required than a round one in the ſide, through which the noſe of the bellows paſſes; and the fuel is to be thrown in at the top. The pot choſen for this purpoſe ſhould be of the largeſt ſize; and if a cover or dome, or an additional part for enlarging its capacity be wanted, another pot, with a portion of its lower narrow part ſawed off, makes a very convenient one. A round plate or ſlip, ſawed from the ſolid part of the bottom, ſerves very commodiouſly both for a grate and for a ſupport to the crucible; eight or nine holes, about three quarters of an inch in diameter, are bored round the outer part of the plate, for the tranſmiſſion of the air forced in by the bellows, which holes are made to widen downwards, to prevent their being choked up by pieces of the fuel. Four or five ſmall crucibles may be placed together on the middle of this plate. See *fig.* 39. The bellows which Dr. Lewis chiefly employed is the organ bellows, ſo conſtructed, that the upper board, inſtead of riſing obliquely on hinges at one ſide, riſes equally on all ſides, and continues always horizontal. The leather of this kind of bellows is more flexible than that of the common ones, and does not, like them, reſiſt unequally according to the greater or leſs extenſion of the folds. The board is preſſed down, and the air forced out by a weight on the top, which weight, acting always perpendicularly, has always an equal power, and the air is driven out in one unvaried current. This advantage may alſo be given to the common bellows by hanging the weight at the extremity, on an arc, furniſhed with a groove for receiving the cord, and whoſe center is the point on which the board moves: by this contrivance, the heat is kept up uniform, and may be eaſily increaſed at pleaſure, by increaſing the weights; and for this purpoſe, the nozzle of the bellows ſhould be wider than uſual, that the air may be more freely diſcharged from it. The bellows is of no incumbrance in the LABORATORY, being incloſed in a wooden caſe, whoſe cover does the office of a common table; to the nozzle, which juſt comes through the croſs bar at the bottom of the table, is occaſionally fitted a pipe reaching to the *furnace*. The bellows, thus diſpoſed, will alſo ſerve for impelling and concentrating the flame of a lamp on bodies expoſed to it. For this purpoſe, an upright tin tube is fitted on the nozzle by a ſhort elbow at its lower end; and at its upper end is a moveable elbow, into which is inſerted a leſſer pipe, having a very ſmall aperture in its extremity; this aperture, being applied to the flame of a lamp placed upon the table, and the pipe blown through, the flame lengthens in the direction of the blaſt, and converges into a ſmall ſpace, producing there a very great heat. The bellows above deſcribed may be made lighter and more commodious, by uſing a ſtiff rod, for moving the lower board, inſtead of the flexible cord or chain commonly employed. Some, inſtead of a bellows, have ſubſtituted an ÆOLIPILE, which is about half filled with water, and ſet on burning charcoal, with its neck directed to and at a ſmall diſtance from the fire to be excited; as ſoon as the water begins to boil, an elaſtic vapour iſſues vehemently through the ſmall orifice, and animates the fire like air impelled by bellows; whence this inſtrument has been called the Æolian bellows and philoſophers bellows: ſome have employed the æolipile in the ſame manner as the common bellows, by inſerting its neck into the cavity beneath the grate of a *furnace*; but Dr. Lewis condemns this method, and obſerves, that, in all caſes, where the vapour does not paſs through a portion of the atmoſphere before its admiſſion to the burning fuel, it extinguiſhes, inſtead of exciting, the fire.

In operations, which require a conſiderable degree of concentrated heat, it has been propoſed to impel a number of flames into one point, by ſtreams of air driven from different parts of the circumference of the fuel to the middle, by means of ſeveral bellows placed round the *furnace*. But a number of bellows being incommodious, Dr. Lewis has contrived to multiply the ſtreams of air with one bellows. The pot, which ſerves as a *furnace* for this purpoſe, has a number of holes bored at ſmall diſtances, in ſpiral lines all over it, from the bottom up to ſuch height as the fuel is deſigned to reach to. The crucible is placed on a proper ſupport, in the bottom; and the holes are obliquely directed towards the crucible, ſo that the impelled heat plays in a kind of ſpiral upon its ſurface; the pot, which ſerves for the blaſt *furnace*, already deſcribed, with an iron ring at the top, receives this perforated pot ſo far, that all its holes are within the cavity, which cavity has no other outlet than the round aperture for the bellows; and, therefore, the air, thus blown in, will diſtribute itſelf through the perforations of the inner pot. See *fig.* 40. C repreſents the *furnace*, D a tranſverſe of it, and E is its cover, being an iron plate with a round hole in the middle, and a handle. By means of this contrivance, the crucible is expeditiouſly heated, and with a ſmall quantity of fuel, to an intenſe degree; and yet the exterior parts of the fuel have no great heat, ſo that the operator may approach the apparatus without inconvenience. A cloſe-bottomed pot, like that uſed for the blaſt *furnace* already deſcribed, without a grate, will make a *furnace* for the fuſion of metals, the revival of metallic calces, and the ſmelting or aſſaying of ores, *trans carbones*, as it is called, or in contact with the burning fuel, as practiſed in the large works. The *furnace* being intenſely heated, and almoſt filled with *fuel*, ſome of the ſubject-matter is ſprinkled upon the coals, chiefly about the middle, and towards the ſide oppoſite to the bellows, but with care that it no where touch the ſide; more charcoal is thrown over it; and the fire, according to the nature of the ſubject, is kept up ſtrong, or abated, by leſſening the weight upon the bellows; and the alternate injection of the ſubject-matter and charcoal continued; the metal and ſlag, melting and dropping down through the coals, are collected in the bottom. Lewis's Com. Phil. Techn. p. 18, &c.

FURNACES *for making the finer kinds of colours*, are thoſe for ſubliming CINNABAR for making VERMILION, for ſubliming *king*'s YELLOW, and for calcining blood for making *Pruſſian* BLUE, OKER, ULTRAMARINE, &c. For the method of their conſtruction and uſe, the curious reader is referred to Doſſie's Handmaid to the Arts, vol. i. p. 15, &c.

FURNACE, *enamelling*. See ENAMEL, and Handmaid to the Arts, vol. i. p. 267, &c.

FURNACE, *founders*, is of divers kinds, according to the different kinds of work to be caſt. See FOUNDERY *of ſmall works*, &c.

The ſtatuaries, or figure-makers, uſe two kinds of *furnaces*; which ſee deſcribed under FOUNDERY *of ſtatues*.

FURNACE, *glaſs-houſe*, is the place wherein the ingredients or materials of glaſs are fuſed and vitrified.

There are three kinds of *furnaces* uſed in the glaſs-works. The firſt, called the *calcar*, ſerves to prepare or calcine the frit in. It is made in faſhion of an oven, ten feet long, ſeven broad, and two deep. The fuel, which is ſea-coal, is put in a trench, on one ſide of the *furnace*; and the flame reverberates from the roof back upon the frit. The coals burn in an iron grate, and the aſhes fall hence into a hole underneath.

The ſecond is the *working furnace*, ſerving to melt the metal in, or make the glaſs. Its figure is round, three yards in diameter, and two high, being arched over: round the inſide there are eight or more pots placed, and piling-pots on theſe: the number of pots is always double that of the boccas or mouths, or that of the workmen, that each may have one pot refined to work out of, and another for metal to refine in, while he works out the former.

The *furnace* has two partitions: the lower ſeparating the pots from the fire-place, has a circular hole in the center, covered with a grate, through which the flame paſſes from the fire-place into the *furnace*; from the arched ſides and roof whereof it is reverberated into the melting-pots.

The ſecond partition divides this from the leer, or annealing *furnace*: through the boccas, or working-holes, the metal is taken out of the pots, and the pots put into the *furnace*; theſe boccas are ſtopped with moveable covers, made of lute and brick, to ſcreen the workmen's eyes from the fire: on each ſide the bocca is a boccarella, out of which coloured glaſs, or the finer metal, is taken from the piling-pot. To the *furnace*, likewiſe, belong ovens, or holes, near the leer, for the calcining of tartar, iron, &c.

The *leer*, which ſerves to anneal and cool the veſſels, and which Agricola makes a particular *furnace*, conſiſts of a tower, beſides the leer: the tower lies directly over the melting *furnace*, with a partition betwixt them a foot thick, having an aperture, called *occhio*, or *lumella*, through which the flame or heat aſcends out of the *furnace* into the tower: on the floor or bottom of this tower, the veſſels, faſhioned by the artiſts, are ſet to anneal; this has alſo two boccas, or mouths, by which the glaſſes are put in with a fork, and ſet on the floor.

The leer is an avenue five or ſix yards long, continued to the tower; through this the glaſſes, when annealed, are drawn in iron pans, called *fraches*, by which they come to cool by degrees; being quite cold, by that time they reach the mouth of the leer, which enters the ſaroſel, or room where the glaſſes are to be ſet.

The third is the *green-glaſs furnace*, which is a kind of compound of all the former. It is made ſquare (the two former being circular), having an arch at each angle thereof, for annealing and cooling the glaſſes. The metal is wrought on two oppoſite ſides, and on the other two they have their calcars, into which are made linnet-holes for the fire to come from the *furnace*, to bake the frit; as, alſo, to diſcharge the ſmoke. Fires are made in the arches, to anneal the veſſels; ſo that the whole proceſs is done in one *furnace*.

The materials wherewith the inſides of theſe *furnaces* are built, are not brick (which would ſoon melt down into glaſs, as alſo all the ſofter ſtones), but hard and ſandy kinds, by Imperatus called *pyramachia*. See Glass, and Glass-*pots*.

Furnace, *glaſs painters*. See *Painting in* Glass.

Furnace, *hatters*, are of three kinds; a little one under the mould whereon they form their hats; a larger, in the ſcouring room, under a little copper full of water and lees; and a very large one under the great copper, in which they dye their hats.

Furnace, *lamp*, is a kind of athanor, in which the heat is produced and maintained by the flame of a lamp introduced within it. This *furnace* has evidently no occaſion for an aſh-hole, a grate, or a fire-place. It has only one opening below, through which the lamp is introduced, and a kind of ſmall chimney made in its upper and lateral part, for circulation of air, to keep up the flame of the lamp, and to give vent to the ſmoke. A *furnace* of this kind is very convenient for diſtillations, which require little heat. It may be eaſily furniſhed with a water-bath, or ſand-bath; and it is particularly uſeful for digeſtions. Dr. Lewis obſerves, that in the common lamp-*furnaces*, the lamps require frequent ſnuffing, and ſmoke much; and the ſoot, accumulated on the bottom of the veſſel placed over them, is apt, at times, to fall down, and put out the flame. Theſe inconveniencies were, in a great meaſure, remedied by the following conſtruction.

The lamp conſiſts of a braſs pipe, ten or twelve inches long, and about a quarter of an inch wide, inſerted at one end into the reſervoir of the oil, and turned up at the other to an elbow, like the bole of a tobacco-pipe, the aperture of which is extended to the width of near two inches. On this aperture is fitted a round plate, having five, ſix, or ſeven ſmall holes, at equal diſtances, round its outer part, into which are inſerted as many pipes about an inch long: into theſe pipes are drawn threads of cotton, all together not exceeding what in the common lamps form one wick; by this diviſion of the wick, the flame expoſes a larger ſurface to the action of the air, the fuliginous matter is conſumed and carried off, and the lamp burns clear and vivid.

The reſervoir is a cylindric veſſel, eight or ten inches wide, compoſed of three parts, with a cover on the top. The middle partition communicates, by the lateral pipe, with the wicks; and has an upright open pipe ſoldered into its bottom, whoſe top reaches as high as the level of the wicks; ſo that, when this part is charged with oil, till the oil riſes up to the wicks in the other end of the lamp, any farther addition of oil will run down through the upright pipe into the lower diviſion of the reſervoir. The upper diviſion is deſigned for ſupplying oil to the middle one; and, for that purpoſe, is furniſhed with a cock in the bottom, which is turned more or leſs, by a key on the outſide, that the oil may drop faſt enough to ſupply the conſumption, or rather faſter, for the overplus is of no inconvenience, being carried off by the upright pipe; ſo that the oil is always, by this means, kept exactly at the ſame height in the lamp. For common uſes, the middle diviſion alone may be made to ſuffice; for, on account of its width, the ſinking of the oil will not be conſiderable in ſeveral hours burning. In either caſe, however, it is expedient to renew the wicks every two or three days; oftener or ſeldomer, according as the oil is more or leſs foul; for its impure matter, gradually left in the wicks, occaſions the flame to become more and more dull. For the more convenient renewing of them, there ſhould be two of the perforated plates; that, when one is removed, another, with wicks fitted to it, may be ready to ſupply its place.

One of the black-lead pots, deſcribed under the article *portable* Furnaces, makes a proper *furnace* for the lamp. A pot of this kind requires no other aperture than one in the bottom for admitting air, and one in the ſide for the introduction of the elbow of the lamp. The ſtopper of the ſide aperture conſiſts of two pieces, that it may be conveniently put in after the lamp is introduced; and it has a round hole at its bottom fitting the pipe of the lamp. By theſe means, the *furnace* being ſet on a trivet or open foot, the air enters only underneath, and ſpreads equally all round, without coming in ſtreams; whence the flame burns ſteady. The heat ſhould not be raiſed higher than about the 450th degree of Fahrenheit's thermometer, which degree of heat is ſomewhat more than ſufficient for keeping tin in perfect fuſion. See *fig.* 41.

Over the lamp *furnace*, as repreſented in the figure, there is a broad pan, which is employed as a water-bath, and contains a long-necked matraſs or bolt-head; a more commodious veſſel of the ſame kind, compoſed of a glaſs receiver, with a long pipe inſerted into its mouth; and a cucurbit, or body with a glaſs-head, for diſtillation. Lewis's Com. Phil. Techn. p. 29.

Furnace, *letter-founders*, is very ſmall, not exceeding a foot and a half in height, and a foot in diameter; being placed on a wooden ſtand, or bench, to raiſe it to a proper height for the artiſt, who works ſtanding. It is made of the ſame earth with crucibles. See *Letter*-Foundery.

Furnaces, *lute for*. See Lute.

Furnace, *melting*. See *Wind* Furnace.

Furnace, *plumbers*, is of three kinds: in the firſt they melt the lead, whereof ſheets are to be caſt.

This is only a ſort of large copper, or receptacle like a copper, made of free-ſtone, and coated well round with potters clay, having a little iron pan at bottom.

In the ſecond they melt the lead to be caſt in moulds for pipes, &c. which are not to be ſoldered.

The third is the tinning *furnace*, which is a ſquare frame of wood, or ſometimes a maſs of ſtone-work, with a brick hearth, whereon is made a charcoal fire, which ſerves them for the applying of thin tin leaves on the works. See Plumbery.

Furnaces *for baking and burning porcelain, or China ware.* See Porcelain.

Furnaces, *portable*, are thoſe, which, with regard to their ſize, and the facility and moderate charge of their conſtruction, are peculiarly adapted to experimental enquiries. The term *portable*, when applied to *furnaces* more generally, and in oppoſition to *fixed*, has been already explained. Under this head we ſhall give an account of Dr. Lewis's ingenious contrivance in the conſtruction of ſuch *furnaces*. For this purpoſe he makes uſe of two black lead crucibles, of the ſize marked 60, the dimenſions of which are about twelve inches high in the inſide, near eight inches wide at the mouth, and about the middle of their height ſix and a half. Each crucible has its mouth ground ſmooth and flat, upon a ſtone, with a little ſand; and a round hole ſawed in its bottom with the common compaſs ſaw of the carpenters. In the ſide, a little above the bottom, another round hole is made, and oppoſite to this a ſquare one; above which is cut a larger ſquare one. See *fig.* 42. A. All the apertures are fitted with ſtoppers, cut out of pieces of broken crucibles; the ſquare apertures are made a little narrower internally than externally, at each of their ſides, ſo that the ſtoppers, whoſe outward ſurface is even with that of the outſide of the pot, can neither be puſhed inwards, nor fall out, when the pot ſtands on either end. The round ſtoppers are made to fit cloſe, by grinding them into the apertures; and they are taken out with a kind of fork, the points of which are introduced into two ſmall holes in each ſtopper, and at the ſame diſtance from one another in all of them. The grate for this *furnace* conſiſts of an iron ring, with croſs bars fixed in it. See *fig.* 42. B. Three of theſe grates, of different widths, are required for different uſes; one of which is made to reſt againſt the converging ſides of the pot, in the lower narrow part, juſt above the lowermoſt ſquare hole; another ſo large that it may enter no farther than nearly to the top of the uppermoſt hole; and the third of the ſame width with the outſide of the mouth of the crucible. The lower and middle grates are ſupported either by grooves round the pot, or by pins in their circumference, reſting on notches within the pot. A grate might be made for theſe *furnaces* of four or five iron rings, placed within one another, each of which ſhould be furniſhed with three pins at equal diſtances, projecting from its circumference; and the pins of the inner ring ſhould be contrived to drop down into correſponding notches made in the next, and the pins of the ſecond rings into notches in the third; the notches being made in the middle of the ſpaces between every two pins. A grate of this kind, being compoſed of moveable parts, may be enlarged or diminiſhed at pleaſure, ſo as to fit *furnaces* of different widths, by adding or removing a ring on the outſide.

In order to render the *furnaces* ſufficiently durable, they are bound round in three or four different parts, with copper-wire, about the ſize of a crow quill, and made pliable by heating it on live coals, ſo as not to interfere with the doors or holes; or they may be ſurrounded by iron or copper hoops, inſtead of wire. In either caſe the mouth is effectually ſecured by a thin copper hoop, which prevents the edges from breaking or wearing; and the ſmall ſpace left between the *furnace* and the upper edge of the hoop is filled with a little moiſt loam, or with clay mixed with powdered pots. The inſide of the *furnace* ſhould be waſhed over with Stourbridge clay, diluted in water; and when it is deſigned for continued ſtrong fire, or for bearing the action of corroſive bodies, it ſhould be lined to ſome thickneſs with a lute, compoſed of Stourbridge clay, beaten up with about twice its meaſure of coarſe ſand, or of glaſs-houſe pots, in coarſe powder. The handle of theſe *furnaces* is made of an iron rod, or ſtrong iron wire, about three feet long, bent like the bale of a pail to the width of the *furnace*, and faſtened in two oppoſite holes made in the *furnace* through the copper hoop.

Beſides the black lead crucibles, which make the body of the *furnace*, there are required a foot for them to ſtand upon, a chimney, and an iron hoop. The beſt ſort of foot is a flat, heavy, iron ring, with three legs five or ſix inches high, in one of which is a ſcrew for raiſing or lowering it, ſo that the *furnace* may be made to ſtand level on an uneven floor. A foot may alſo be formed of an inverted crucible, by making an aperture in the bottom, and ſawing three arches at equal diſtances in the ſides, ſo as to leave between them legs of ſufficient ſtrength; or an inverted *furnace* will anſwer the purpoſe. The aſhes that fall down are received in an iron pan placed underneath.

The chimney is compoſed of three pipes of forged iron plate, not leſs than one eighth of an inch thick; and each of the pipes is a foot and a half or two feet long. The loweſt pipe is encompaſſed with a heavy ring about an inch above the lower end, which enters into the hole in the top of the inverted pot, in order to keep it ſteady; the upper end of the ſecond pipe is received into the lower end of the next, and the end of this is in the ſame manner received by the third. The upper end of the chimney is made ſquare, that it may fit into the larger door of the furnace, and ſerve occaſionally as a lateral chimney.

The hoop is formed of a forged iron plate, not leſs than one ſixth of an inch thick, turned round and welded together at the ends. See a perpendicular ſection of it, *fig*. 42. C. It is about ſix inches deep, and of the ſame width externally with the top of the *furnaces*, but its thickneſs being leſs than that of the *furnaces*, it is internally wider. One end of this hollow cylinder has an iron ring paſſing round it within ſide, and on this end it commonly ſtands upon the mouth of one of the pots: near this end is a ſemi-circular aperture, whoſe door is rivetted on a large iron plate, which opens downwards on hinges, and drops no lower than to an horizontal ſituation. See *fig*. 42. D.

One of the black-lead crucibles, prepared in the manner above deſcribed, with the lower ſmall grate introduced into it, is a *furnace* for open fire; the lower ſquare aperture under the grate is the door of the aſh-pit, and the upper one above the grate is a door to the fire-place. The fuel, which is always charcoal, is put in at the top, and is ſupplied with air through the apertures beneath the grate; by cloſing or opening which the fire is diminiſhed or increaſed.

By introducing into the open *furnace* an iron pot, empty, or containing ſand, this becomes a *furnace* for a *capella vacua*, or ſand *furnace*, in which caſe the fuel is put in through the fire-place door.

Farther, a veſſel broader than the *furnace* may be placed on the top, with three iron ſupporters under it, to procure a ſpace for the paſſage of the air. The flat iron pan, uſed on other occaſions for receiving the aſhes, may be employed in this manner as a veſſel for calcinations, for the evaporation of ſolutions of lixivial ſalts, &c. For veſſels of a deeper kind, as a copper ſtill, the capacity of the *furnace* is increaſed by placing over it the iron hoop, by which it is enabled to receive the body of a ſtill, of a ſize ſufficient for the purpoſes of an experimental laboratory. See Still.

If one pot be inverted over the other, with the iron hoop between them, we ſhall have a *furnace* for cupellation, calcination under a muffle, and the other purpoſes of that which is called the *aſſay* FURNACE; and alſo for experiments of enamelling, of baking colours on earthenware and glaſs, &c. The chimney, or a part of it, may be occaſionally ſet upon the top, for raiſing the fire when it proves too languid. The ſame combination of the two pots and hoop will ſerve as a *reverberatory*, for diſtillation in coated glaſs retorts, earthen retorts, or longnecks, provided that the middle grate be introduced into the undermoſt pot, and two iron bars are laid acroſs in its upper part, to ſupport the diſtilling veſſel, whilſt its neck comes out at the door of the hoop. The *reverberatory* and *aſſay* FURNACE are, in reality, no other than the *wind* FURNACE, with a muffle or a retort in the fire inſtead of a crucible.

Furnaces of this kind may be uſed as a common ſtove, for keeping a room warm with a ſmall quantity of fuel. For this purpoſe the ſmall grate is introduced into the lower part of the undermoſt pot, the fire-place door is cloſed, and the aſh-pit door or bottom hole left open for admitting air. It is then charged with ſmall pieces of charcoal with lighted coals thrown above them, its top is covered by the largeſt of the grates, on which is placed the hoop and dome, filled with balls of baked earth, or with pieces of brick, ſo diſpoſed as to leave ſmall vacuities between them. When the ſtove is placed in the middle of a room, its injurious air may be carried off by a pipe inſerted laterally into the larger door of the dome, and communicating at the other end, which ſhould be raiſed eight or ten inches, with the chimney of the room; and all other apertures of the dome ſhould be cloſed. The *furnace*, thus charged, will keep up a moderate and nearly equal warmth for many hours, without injury or offence. See *fig*. 43. See *Bellows* Furnace and *Wind* Furnace. See alſo Laboratory.

Furnace, *reverberating*, or *reverberatory*, is a ſimple *furnace*, the fire-place of which is covered with a piece of the ſame diameter and form as the *furnace*, which is generally cylindrical. This piece is croſſed in its lower part by two bars of iron placed horizontally and parallel to each other, and at its upper edge it has a ſemi-circular cut. This piece forms a third cavity, which is called the laboratory, becauſe it is intended to receive the retorts, containing the matter to be diſtilled. The ſemi-circular cut is made to give paſſage to the neck of the retort, which ought to be inclined at an angle of forty-five degrees. The two bars at the bottom of the laboratory are deſigned to ſupport the veſſel placed there. Above the piece laſt deſcribed there is placed a fourth piece, in the form of a ſpherical cap or an inverted dome, of equal diameter with that of the other piece to which it is fitted; in its lower edge there is a ſemi-circular cut, correſponding with that of the lower piece; and theſe together form a circular opening: the dome has in its top another opening or ſhort tube, through which the air contained in the *furnace* paſſes, and ſerving for a kind of chimney. The uſe of the dome is to keep the heat all round the retort, and to apply a certain degree of heat to the upper part or vault of the retort, by reflecting or reverberating it; whence it is called a *reverbatory*. In conſequence of this diſpoſition, the vapours which riſe in the retort are determined more efficaciouſly to paſs through its neck. Reverberatory *furnaces* are uſed for diſtillations with a retort, in which a certain degree of heat is neceſſary; and diſtillation may be performed in them either in naked fire, by placing the retort immediately on the bars, or in a ſand-bath, by placing on theſe bars an iron veſſel, with a ſemi-circular cut in its upper edge, containing fine ſand to the thickneſs of one or two fingers; then the retort is placed in the veſſel, and it is to be filled with ſand up to the arch of the retort: See *fig*. 44. in which *a* repreſents the aſh-hole door; *b* the fire-place door; *c*, *c*, *c*, *c*, the regiſters; *d*, the dome or reverberatory; *e*, the conical funnel; *f*, the retort in the *furnace*; *g*, the receiver; and *h*, *h*, the iron bars for ſuſtaining the retort.

Furnace, *ſimple*, is a kind of hollow tower, cylindrical or priſmatical, with two doors, or principal openings; the one below, called the door of the aſh-hole, and the other immediately above this, called the door of the fire-place. Between theſe two doors a grate is placed horizontally acroſs the interior part of the *furnace*, dividing its whole cavity into two parts, the lower part being called the aſh-hole, becauſe it receives the aſhes which fall from the fire-place. The door of the aſh-hole gives admittance to the air for maintaining the fire within the *furnace*. The upper cavity is called the fire-place, becauſe it contains the combuſtible matters; and freſh fuel is introduced through the door of the fire-place.

This *furnace* is ſufficient for many chemical operations: in the firſt place, amidſt the coals, crucibles may be placed for the fuſion of fuſible materials, as lead, tin, biſmuth, &c. or for the calcination of matters which require but little heat for their calcination, ſuch as the alkali for making Pruſſian blue, bezoar mineral, &c. On this *furnace* may alſo be placed baſons for evaporation, alembics for diſtilling in the water-bath, pots filled with ſand for digeſtions and diſtillations to be performed by means of a ſand-bath and a gentle heat, either with alembics or retorts. For operations requiring a longer duration, this *furnace* is formed into an ATHANOR. See Furnace, called *Athanor*. Macquer's Chem. Dict. Eng. edit.

FURNACES, *ſmelting*. See ORES and SMELTING.

FURNACE, *wind*, is the ſecond *furnace* uſed in the fuſion of metals for coinage. At bottom it has a hearth made hollow, in manner of a cupel, with a vent-hole in the fore part thereof; over the vent-hole is a grate ſealed in the maſſive of the *furnace*; over the grate is the place for the crucible, which is uſually of forged iron.

The fire being lighted, the crucible is ſet in, with a cover over it; and a capital, or cover of earth or iron, is laid likewiſe over the *furnace*; and at the top of this capital is a hole, five or ſix inches in diameter.

It is called *wind-furnace*, becauſe the air, entering through the vent-hole at bottom, which is always open, ſerves the ſame purpoſe as the bellows in other *furnaces*.

Gold is uſually melted in the bellows-*furnace*, as requiring an intenſer heat before it fuſes. Silver and copper are commonly melted by the *wind-furnace*.

Cramer, in his Art of Aſſaying Metals, gives the following account of the conſtruction and uſes of the *wind* or *melting furnace*: it is formed of iron plates, the inner ſurfaces of which are covered with lute. The cavity of it may be formed according to an elliptical mould. 1. Make an hollow ellipſis, the foci twelve inches aſunder, and the ordinate five inches long; cut it off in both its foci, that it may aſſume the figure *fig*. 45. 2. Then make in this hollow body, and near its lower aperture, four holes, eight lines in diameter, and directly oppoſite *c*, *c*. 3. Then faſten two flat iron rings *d*, almoſt one inch and a half broad, at both the upper and the lower inward edge of this oval cavity; and fill the inſide of it with ſmall iron hooks, jutting out about ſix lines, and three or four inches diſtant from each other. Theſe, together with the rings juſt mentioned, ſerve to faſten the lute. Thus will the body of the *furnace* be made: only you muſt add at the outſide two iron handles *e*, *e*, to be rivetted on each ſide of it, that it may be taken hold of and moved. 4. Then make the cover of the furnace, which may be formed like the part cut off from the ellipſis, ſee *fig*. 46. Let this have an opening *b* made in it, four inches high, five inches broad at bottom, and four inches at the top; and adapt to this an iron door hung on hinges to ſhut it cloſe, and having at the inſide a border faſtened to it, anſwering exactly to the circumference of the door, and as prominent inwardly as the thickneſs of the lute to be applied to it requires: for the ſame purpoſe, let ſmall iron hooks be faſtened to the inſide of the door, which is intercepted by the ſaid border. And leſt this cover ſhould be burnt within by the force of the fire, you muſt cover the inſide of it with the LUTE deſcribed under that article: therefore it muſt be likewiſe furniſhed with a ring and iron hooks to faſten the lute; as was ſaid before, when we ſpoke of the body of this *furnace*. Beſides this, you muſt faſten two iron handles *fig*. 46. *c*, *c*, on the outſide of this cover. Then a round hole muſt be made in the top of it, being three inches in diameter, prolonged into a hollow tube *d* almoſt cylindrical, and a few inches high, upon which the iron funnel deſcribed may, in caſe of neceſſity, be put after the manner mentioned in the ſame place where we ſpoke of the aſſay-oven. 5. After this, the lining of both the body and cover of the *furnace* within is made in the ſame manner above deſcribed. Moreover, you muſt make for this *furnace* two moveable bottoms, viz. one to receive the aſhes, and admit the air; the other to ſerve for reductions. The firſt is made with an iron plate, formed into a hollow cylinder, open at top, and to be ſhut at bottom with an orbicular iron plate, as with a baſis, five inches high, and of ſuch a diameter, as that it may receive the inferior orifice of the body of the *furnace*, *fig*. 45. the depth of half an inch, ſee *fig*. 47. therefore let an iron ring *c*, half an inch broad, be faſtened on the inſide of the ſaid bottom, and at the diſtance of half an inch from its upper border, to ſupport the body of the *furnace* put into it. Again, let this bottom have a ſquare door, four inches high, and as many inches broad, that may be ſhut cloſely with a door hung on hinges, that you may by means of it increaſe or diminiſh the draught of the air, and thus govern the fire at pleaſure. Then, on the left ſide of this door, and at about half the height of this bottom part, let a round hole *d* be made, one inch and a half in diameter, to admit the pipe of the bellows when need requires. Next to this, let another bottom part be made of the ſame matter and figure as the foregoing: let it be likewiſe of the ſame diameter, but two inches higher, ſo that it may be of the height of ſeven inches. Likewiſe let it have round it a like iron ring below its upper border, to ſupport the body of the *furnace* to be received in it. But let a hole two or three inches broad, and one inch high, *fig*. 48. *c*, be cut out juſt below the ring in the ſide of this bottom part; then let another round hole be made in the left ſide of this firſt hole, fit to admit the pipe of the bellows *d*. Farther, let another round hole like the foregoing *e* be made on the right, and at the diſtance of one inch from the bottom: then let the whole inſide of this bottom part (the part above the ring excepted) be overlaid with lute, and a bed be made at the bottom, of a figure like that repreſented by the line *f*, *g*, *h*. The matter of which this is made is common lute pulveriſed, paſſed through a ſieve, and mixed with ſuch a quantity of duſt of charcoal, ſifted in the ſame manner, ſo that the mixture being moiſtened and preſſed down, may at leaſt be lightly coherent. Of this matter preſſed on the bottom of the bottom part a bed is made, like a ſegment of a ſphere, having in the middle a ſmall cavity ſomewhat lower, and made extremely ſmooth, after the manner proper for large aſh veſſels or teſts.

This *furnace* is chiefly fit for fuſions, which may be made in it with and without veſſels. When you are to melt with a veſſel, put the body of the *furnace*, *fig*. 45. upon the firſt bottom, *fig*. 47. that has a door to it to open on hinges; introduce two iron bars through the holes of the *furnace*, *fig*. 45. *c*, *c*; put upon them the iron grate, which you are to introduce through the upper mouth of the *furnace*: then put in the middle of this grate a brick or ſquare tile, very ſmooth every where, warmed, and perfectly dry: otherwiſe, the veſſels put upon it, eſpecially the large ones, are eaſily ſplit by the moiſt vapours coming out of it in the operations. Let the height and width of this ſtone be a ſmall matter broader and higher than the bottom of the crucible or pot to be ſet upon it; for if it were leſs high, the bottom of the veſſel could not be ſufficiently warmed; and if it were leſs broad, the veſſel might eaſily fall from it: then put upon this tile the veſſel containing the matter to be melted, and ſurround it immediately with coals on every ſide, which muſt be ranged according to the method preſcribed before, in our deſcription of the *aſſay furnace*: then you govern the fire, by opening and ſhutting the door of the aſh-hole, *fig*. 47. *b*: you excite it by putting the cover, *fig*. 46. upon the body of the *furnace*; and if, beſides, you put a funnel upon the cylindrical mouth *d* of this cover, the melting fire becomes ſtill more violent: but if you moreover introduce the bellows through the hole of the bottom part, *fig*. 47. *d*; and the joint of the *furnace* with the bottom part, and the door of the aſh-hole, unleſs it can be ſhut very cloſe, being exactly ſtopt with thin lute, or Windſor loam, the fire thus excited by the blaſt of the bellows is carried to the higheſt degree, and far ſurpaſſes that which may be made in a ſmith's forge. Another advantage of this method is, that the veſſels are not ſo eaſily broken, becauſe the blowing of the bellows cannot affect them immediately, and becauſe a fire perfectly equal is excited on every ſide. One may eaſily examine with this apparatus, how ſtones are affected by the violence of the fire only. Now, if you have a mind to perform any operation without a veſſel, and with a naked fire; for inſtance, to melt and reduce the calxes or ſcoriæ of copper, tin, lead, and iron, or the ores of theſe metals; the body of the *furnace* muſt be put upon the other pedeſtal, having a bed in it, *fig*. 48. However, you muſt, before this, open with a knife the oblong hole *c*, and the round one *d* of this bottom part, which are ſtopped with the lute ſticking to the inſide: then you apply at the round hole *d* on the left ſide of the bellows, in ſuch manner that the nozzle of it, being directed obliquely downwards, may blow ſtrongly againſt the bed *f*, *g*, *h*: by this means, all the aſhes that fall into the bed are blown away, and the ſtrength of the fire determined to ſuch a degree, that all the melted bodies that fall into the ſaid bed remain in their ſtate of fuſion; and were it otherwiſe, the melted bodies would immediately wax cold, and adhere in grains to the bed, whereas they ought to have melted into one regulus. The oblong hole in the fore-part of this bottom-part *c*, ſerves to diſcover, by means of a poker, whether the matter in the bed be melted or not: it ſerves likewiſe to take away through it whatever might ſtop the bellows, and in ſome caſes to take away the ſcoria: then you put firſt coals into the *furnace* one ſpan high, and blow them well with the bellows, to make them burn, that the bed may be very hot before the matter to be melted is put into it; for if this is not previouſly done, the melted maſs ſeldom runs into a regulus, but remains diſperſed among the ſcoriæ, which ſoon grow hard. The bed being well heated, and freſh coals added to the fire, put into it ſuch quantity of the matter to be melted as cannot hinder the fire from being carried to the requiſite degree; which cannot be determined otherwiſe than by experience: again, put freſh coals, and upon them another quantity of the matter to be melted; they may be, like ſtrata, one upon another: but if the maſs, once melted, could not long ſuſtain the ſtrength of the fire, or if you had a mind to melt a greater quantity of matter than what can be contained in the bed, you muſt open the round lower hole, *fig*. 48. *e*, that you may make a channel paſſing from that hole through the lute, and reaching to the ſmall cavity at the bottom of the bed *g*: to this hole, at the outſide, apply an earthen diſh like the bed within, or any proper recipient, ſurrounded with burning coals, into which the matter melted running from the bed through the hole, *fig*. 48. *e*, may be collected, as repreſented by *fig*. 49.

With regard to the elliptic or parabolic figure of the ſides and dome of a *furnace*, we may obſerve, that many have recommended this form of conſtruction, expecting that the rays of fire, ſtriking all over the internal ſurface, would be reflected back into a ſmall focal ſpace, in the ſame manner as the ſolar rays are concentrated by burning concave ſpecula. An elliptic *furnace* was prepared with great care by Dr. Lewis; but he was much diſappointed in its effects; for he could not find, that any focal reflection obtained in it, or that any advantage reſulted from the exactneſs of its figuration, or from the preciſe ſpecies of its curvature. Com. Phil. Techn. p. 26.

The *melting furnace* uſed in the manufacture of braſs is in the form of the fruſtum of a hollow cone. At the bottom of the *furnace*, or greater baſis of the fruſtum, is a circular grate, or iron plate, which is covered with a coat of clay and horſe-dung, to defend it from the action of the fire, and pierced with holes, through which the air, maintaining the fire, paſſes. The crucibles, filled with the proper materials (ſee Brass), ſtand upon the circular plate, forming a circular row with one in the middle. The fuel is placed betwixt the crucibles, and is thrown into the *furnace* at the upper part of it, or the leſſer baſis of the fruſtum, in which is fitted a cover made of bricks or clay, kept together by bars of iron, and pierced with holes. This cover ſerves as a regiſter; when the heat is to be increaſed, the cover is partly or entirely taken off, and a free draught is permitted to the external air, which paſſes along a vault under-ground to the aſh-hole, through the holes in the circular grate or plate, betwixt the crucibles, and through the upper mouth, along with the ſmoke and flame, into an area, where the workmen ſtand, which is covered with a large dome or chimney, through which the ſmoke and air aſcend. When the heat is to be diminiſhed, the mouth of the *furnace* is cloſed with the lid, through the holes of which the air, ſmoke, and flame paſs. The crucibles are to be kept red-hot during eight or ten hours, and in ſome places much longer, even for ſeveral days, according to the quality of the calamine; during which time the zinc riſes in vapour from the calamine, unites with the copper, and renders that metal fuſible by conſiderably leſs heat than it is alone. To render the metal very fluid, that it may flow into one uniform maſs at the bottom, the fire is to be increaſed a little before the crucibles are taken out, for pouring the fluid metal into moulds. By this proceſs, ſixty pounds of braſs may be obtained from ſixty pounds of good calamine, and forty pounds of copper, though a conſiderable quantity of zinc is burnt and diſſipated during the operation; but leſs of this vapour eſcapes by uſing granulated copper. See Granulation. Macquer's Chem. Dict. Eng. ed. note, under Brass.

Dr. Lewis, in his apparatus of portable *furnaces*, conſtructs a wind *furnace*, for the fuſion of metals, the aſſaying of ores, and ſimilar operations, by inverting one pot over the other, and placing on the top either the entire chimney, deſcribed under *portable* Furnaces, or two, or one of its pipes, according to the degree of fire which is required. The ſecond ſized grate is preferable to the ſmaller one, becauſe it has more interſtices for admitting air to the fuel. The crucible, containing the materials for operation, is placed on a circular ſlip of brick, or of a broken pot, a little wider than its bottom, laid on the middle of the grate, to prevent the impact of the cold air. The charcoal is put in through the fire-place door, or larger aperture of the dome, or upper pot, which ſhould always be cloſed after each ſupply of fuel. The *furnace* ſtands on its trivet, or open foot, with the flat iron pan underneath, which ſerves to receive the aſhes, and to preſerve the fluid contents of the crucible, if it ſhould happen to fail, during the fuſion. The two oppoſite holes in the upper part of the dome afford the conveniency of paſſing an iron rod through, for ſafely lifting it when intenſely heated. See *fig*. 50. This *furnace* may be eaſily converted into a *blaſt furnace*, by introducing the noſe of a pair of double bellows into the round hole in its ſide; in which caſe, all the other apertures beneath the grate muſt be cloſed, while the bellows acts, that the air forced in by it may be prevented from eſcaping.

A ſtronger wind *furnace*, capable of bearing a long continuance of vehement fire, may be conſtructed of two large pots; the lowermoſt of which has only a round hole in the bottom for admitting air; and the upper one, or dome, a ſimilar hole, correſponding to the chimney, with a door in the ſide, through which the fuel is put in. The *furnace* is placed upon an inverted pot, which has a hole in its top anſwering to that in the bottom of the *furnace*, another large one in its ſide, and its mouth ground ſmooth, that it may apply itſelf every where cloſe upon the flat ſtone, or iron plate, which ſerves as a ſtand for it. Into the ſide aperture of this lower pot, which is both the foot and aſh-pit of the *furnace*, an iron pipe is inſerted, ſomewhat wider than the wideſt part of the chimney, and two or three feet long, on the end of which may be fitted a wooden one of more conſiderable length. The whole of this pipe may be laid horizontal, ſo as to reach into an adjoining apartment; or rather, if there is a conveniency, the wooden pipe may be ſunk perpendicularly through the floor into a room underneath, and the horizontal iron one joined laterally to it at the top; its uſe is for conveying into the *furnace*, inſtead of the adjacent air rarefied by the heat, the colder and denſer air at a diſtance; and its effect in animating the fire will be in proportion to the coldneſs and denſeneſs of the air to which it reaches.

This *furnace* is repreſented in *fig*. 51. The pipe of a bellows may be adapted to a hole made in the ſide of the foot, or aſh-pit, of this *furnace*, for producing a more vehement fire; and the air-pipe is at the ſame time ſtopped by means of a moveable regiſter in the end next the *furnace*. This regiſter is a circular iron plate, fixed on an axis, which is placed acroſs the pipe; the extremity of the axis projecting on the outſide, the plate is thereby readily turned, ſo as either to allow a free paſſage for the air, or to cloſe the whole bore of the pipe. Lewis's Com. Phil. Techn. p. 11. 24, &c.

Furnace *of a mine*, in the *Art of War*. See Chamber and Mine.

FURNAGE. See Fornage.

FURNITURE, in *Dialling*, certain additional points and lines drawn on a dial, by way of ornament.

Such are the ſigns of the zodiac, length of days, parallels of declination, azimuths, meridians of the principal cities, Babylonic and Italian hours, points of the compaſs, &c. See Dial.

For drawing *furniture* on dials, the analemma, or trigon of ſigns, is an inſtrument of principal uſe.

FURO, in *Zoology*, a name given by ſome authors to the ferret, called by others alſo *furunculus* and *ictis*.

FUROR *uterinus*, a ſpecies of madneſs, peculiar to women, exciting them to a vehement deſire of venery, and rendering them inſatiate therewith, and manifeſting itſelf by obſcene ſpeech and wanton behaviour. As the diſorder increaſes, the patient ſcolds, laughs, and cries by turns. The immediate cauſes of this diſeaſe are an inflammation, tenſeneſs, and irritability of the uterus and pudenda of women, and particularly of the clitoris and vagina, in which the venereal ſtimulus reſides, or the too great abundance and acrimony of the humours of theſe parts. In order to the cure, which, if the diſorder be taken in time, may be expected, the patient ſhould be bled in proportion to her ſtrength. Camphor, in doſes of fifteen or twenty grains, with nitre, and ſmall doſes of the Thebaic tincture, may be repeated at proper intervals. Some preſcribe the ſac. ſaturn. in doſes of three to five grains. Beſides bleeding, cooling purges ſhould alſo be repeated in proportion to the violence of the ſymptoms, &c. What is uſeful in maniac and hypochondriac diſorders, is alſo proper in this caſe, regard being had to the conſtitution and habit of the patient. Injections of barley water, with a ſmall quantity of hemlock juice, may be frequently thrown up into the uterus, and theſe have been much recommended.

FURR, or Fur, in *Commerce*, the ſkins of divers kinds of wild beaſts, dreſſed with the hair on; to be uſed as a lining, or doubling, of garments, robes, &c. either for warmth, ornament, or diſtinction of rank and dignity.

The word is formed of the French *fourrure*, a *lining*; which Du-Cange derives from *furrura*, uſed, in the barbarous Latin, for the ſame thing. We alſo meet with *forratura*, *foderata*, *fodraium*, and *fodratura*, in the ſame ſenſe.

The robes of kings, dukes, and peers, are lined with divers kinds of *furrs*, and, in particular, ermine, to render them more magnificent.

The ſame may be obſerved of ſeveral chief magiſtrates, judges, and doctors of different faculties, in the univerſities.

The kinds of *furrs*, or ſkins, chiefly dreſſed in alum, and with the hair on, are thoſe of the ermine, ſable, ſquirrel, coney, caſtor, otter, dog, fox, wolf, tiger, bear, &c.

The ſtatute 28 Hen. VIII. cap. 13. mentions divers kinds of *furr*, viz. *ſables*, which are a rich *furr*, of colour between black and brown, the ſkin of a beaſt called a ſable, in bigneſs between a pole-cat and an ordinary cat, bred in Ruſſia and Tartary; *lucerns*, the ſkin of a beaſt of that name, nearly the ſize of a wolf, in colour neither red nor brown, but between both, mingled with black ſpots; they are bred in Muſcovy, and their ſkins are a very rich *furr*; *genets*, a beaſt's ſkin ſo called, in ſize between a cat and a weazle, mailed like a cat, and of that nature; they are of two kinds, black and grey; the black is moſt precious, which hath black ſpots upon it, hardly to be ſeen: this beaſt is the product of Spain; *foins*, which are of faſhion like the ſable, the top of the *furr* black, and the ground whitiſh, bred for the moſt part in France; the *marten*, a beaſt very like the ſable, the ſkin ſomething coarſer, produced in England and Ireland, and all countries not too cold; but the beſt are from Ireland. Beſide theſe, there are the *fitch* and *pole-cat*; the *calabar*, a little beaſt in ſize near the ſquirrel; *miniver*, being the bellies of ſquirrels; and *ſhanks*, or what is called *budge*, &c. all of them *furrs* of foreign countries; ſome whereof make a large branch of their inland traffic.

FURRS, *timber of*. See TIMBER.

FURR, in *Heraldry*, a repreſentation of the ſkins of certain wild beaſts, ſeen, both in the doublings of the mantles of coat-armour, and in the armour itſelf.

The heralds uſe two metals, five colours, and two *furrs*, or hairy ſkins; viz. ermine and vair.

The origin of theſe *furrs* Mackenzy aſcribes to the ſhield's being anciently covered with ſkins; which ſkins, or coverings, were afterwards repreſented in the ſhields; a more probable derivation, in our opinion, than to ſay they were placed on ſhields, becauſe they had been worn in mantles and garments.

Furrs either conſiſt of one colour, which is white; or more than one; and theſe either two, or more than two. *Furrs* of two colours are either ermine, being white with black ſpots; ermines, black with white ſpots; erminois, whoſe ground is yellow, and the powdering black; or pean, which is black powdered with yellow.

Furrs of more than two colours are called VAIR, and VAIRY.

FURRIER, a perſon who trades, or works, in *furrs*, or lines robes, &c. therewith.

FURRING *of a ſhip*, is laying on double planks on her ſides. This is done after the ſhip is built, and is by the ſailors called *plank upon plank*. But there is another way of *furring*, which is more properly ſo called; and that is, when a ſhip's planks are ripped, and new timbers are put on the former timbers, and on them other planks; which is done ſometimes to make a ſhip bear the ſails the better.

FURRINGS, or FURRS, in *Architecture*, the making good of the rafter-feet in the cornice.

When rafters are cut with a knee, theſe *furrings* are pieces which go ſtrait along with the rafter, from the top of the knee to the cornice.

When rafters are rotten, or ſunk hollow in the middle, there are pieces cut thickeſt in the middle, and tapering towards each end, which are nailed upon them to make them ſtrait. Such pieces are called *furrs*; and the putting them on is called *furring* the rafters.

FURROW, among *Gardeners*, denotes a ridge or ſwelling on the ſide of a tree, ſtalk, or fruit.

FURROW is alſo uſed for the deep trench left between ridges, to drain off the ſuperfluous moiſture.

FURUNCULUS, in *Surgery*. See BOIL.

FURUNCULUS, in *Zoology*, the name given by many authors to the FERRET, called alſo the *furo* and *ictis*.

FURZE, GORSE, or WHINS, *Ulex*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower has a two-leaved empalement, is of the butterfly kind, and has five petals; the ſtandard is large, erect, oval, heart-ſhaped, and indented at the point; the wings are ſhorter and obtuſe; the keel is compoſed of two obtuſe petals, whoſe borders are joined at the bottom. It has ten ſtamina, nine joined, and one ſeparate, terminated by ſingle ſummits; with an oblong cylindrical germen ſupporting a riſing ſtyle, crowned by a ſmall obtuſe ſtigma; the germen afterward turns to an oblong turgid pod, with one cell, opening with two valves, incloſing a row of kidney-ſhaped ſeeds. There are two ſpecies, the common one of which is too well known to need deſcription.

Theſe plants propagate themſelves very plentifully by ſeeds; for as the ſeeds ripen, the pods open with the warmth of the ſun, and the ſeeds are caſt out by an elaſtic ſpring to a great diſtance all around; where they ſoon vegetate, and are not eaſily deſtroyed when well rooted.

Some years ago the ſeeds of this plant were ſown to form hedges about fields; where if the ſoil was light, the plants ſoon became ſtrong enough for a defence againſt cattle; but as theſe hedges in a few years became naked at the bottom, and ſome of the plants frequently failed, which made gaps in the FENCE, this method has of late been diſuſed. But ſome perſons who have ſown the ſeeds of this plant upon very poor, hungry, gravelly, or ſandy land, have reaped more profit than they could make of the ground by another crop, eſpecially in places where fuel is dear; where this *furze* is frequently uſed for heating ovens, drying malt, and burning lime and bricks. Miller.

The tops of *furze* bruiſed, in order to take off their ſharp points, have lately been found to be excellent fodder for cattle, particularly for horſes. Thoſe that have been lean and ſickly have often recovered, and plumped up in a ſhort time, by the uſe of this fodder. When *furze* is raiſed for this purpoſe, the ſeeds ſhould be ſown in February, March, or April, on ground previouſly prepared, as for barley, and afterwards barely covered over. Six pounds of ſeed will be ſufficient for an acre; the young plants muſt be preſerved from cattle during the firſt year, and in the next they will be fit for cutting; which may be begun in October. The plants will continue to ſhoot till Chriſtmas, and be fit for uſe till March. It is ſaid, that an acre of ground will produce fifteen tons of this fodder; and that it will anſwer the ſame purpoſe as an equal quantity of hay. In ſome places there are mills for bruiſing it; and it is mixed with chopped ſtraw in the proportion of an hundred of ſtraw to a ton of *furze*. It is ſaid, that the common Engliſh *furze* will grow upon the dry ſands, that are in the neighbourhood of the ſea, though ſubject to be waſhed ſometimes by the water; this is a thing extremely worth the trying, as it would then be of the greateſt advantage to thoſe who have walls or banks next the ſea, to plant it on them to preſerve them.

This being a very unprofitable plant in reſpect of many others, it is often neceſſary to deſtroy it. This may be done by plowing and burning the buſhes upon the land. Marling the land well in countries where marle is plentiful, is alſo a very good way; and there is yet another much better, which is to make wood-land, not arable, of the place; to this purpoſe it is only neceſſary to ſow or plant acorns at proper diſtances. The *furze* will ſhelter the acorns till the time of their growing up to two or three feet high, and then they will ſoon ſtarve and deſtroy all the *furze* and every other weed. Mortimer's Huſbandry, p. 308.

FUSA, in the *Italian Muſic*, the name of one of the muſical notes, frequently alſo called CHROMA, and by us QUAVER.

FUSANUS, in *Botany*, a name given by many authors to the ſhrub, more uſually called *euonymus*. See SPINDLE-*tree*. This was ſometimes called *attractylis* by the Greeks, and hath both this and its Roman name *fuſanus*, from its being of uſe for making the diſtaff, uſed by the women in ſpinning Some have ſuppoſed that this was the ſame with the *euonymus*, ευωνυμος, of Theophraſtus and the Greek writers, but very erroneouſly. See TETRASTOECHON.

FUSAROLE, in *Architecture*, a moulding, or ornament, placed immediately under the echinus, in the Doric, Ionic, and Compoſite, capitals.

The Italians call it *fuſciolo*; and the French, from whom we borrow it, *fuſarole*.

The *fuſarole* is a round member, carved, in manner of a collar, or chaplet, with oval beads. The *fuſarole* ſhould always anſwer exactly under the eye of the volute, in the Ionic capital.

FUSEE, or FUSY, in *Watch-work*, is that conical part, drawn by the ſpring, and about which the chain, or ſtring, is wound.

The word is French; where it literally ſignifies a *ſpindle*.

The ſpring of a watch is the firſt mover. It is rolled up in a cylindrical box, againſt which it acts, and which it turns round in unbending itſelf. The ſtring, or little chain, which at one end is wound about the *fuſee*, and at the other faſtened to the ſpring-box, diſengages itſelf from the *fuſee*, in proportion as the box is turned. And hence the motion of all the other parts of the ſpring-watch.

Now the effort, or action, of the ſpring, is continually diminiſhing from firſt to laſt; and, of conſequence, unleſs that inequality was rectified, it would draw the ſtring with more force, and wind a greater quantity of it upon the box at one time than another; ſo that the movement would never keep equal time.

To correct this irregularity of the ſpring, nothing could be more happily contrived than to have the ſpring applied to the arms of levers which are continually longer as the force of the ſpring is weaker. This foreign aſſiſtance, always increaſing as it is moſt needed, maintains the action and effect of the ſpring in an equality.

It is for this reaſon that the *fuſee* is made of a conical figure. Its axis, which is immovable, is the ſeries of the centers of all the unequal circumferences which compoſe the ſurface of the *fuſee*: according as the part of a ſtring, which is untwiſting, is applied to a larger circumference, it is at a greater diſtance from the fixed point in the axis correſponding thereto; and, of conſequence, the power which draws by this ſtring, viz. the ſpring, acts with the more advantage; the ſpring begins to draw from the vertex of the cone, the moſt diſadvantageous part, becauſe its own force is then the greateſt.

If the action of the ſpring diminiſhed equally, as the parallel baſes of a triangle do; the cone, which is generated of a triangle, would be the preciſe figure required for the *fuſee*: but, it is certain, the weakening of the ſpring is not in that proportion; and, of conſequence, the *fuſee* ſhould not be conical.

In effect, experience ſhews, that it ſhould not be ſtrictly ſo; but that it be a little hollow toward the middle, i. e. the arm of the lever, muſt be there a little ſhortened; becauſe the action of the ſpring is not ſufficiently diminiſhed of itſelf.

It is a matter of enquiry, among geometricians, what the preciſe figure of the *fuſee* ſhould be; that is, what the curve is, by whoſe revolution round its axis, the ſolid, whoſe figure the *fuſee* is to have, ſhall be produced.

M. Varignon has determined this curve. The axis of the *fuſee* is alſo the axis of the curve, which is convex on the ſide toward the axis, and, of conſequence, concave all the way on the other, or outer-ſide; and the ordinates are the different diſtances at which the ſtring is to be, with regard to all the ſucceſſive fixed points of the axis. The force of the ſpring multiplied by the arm of the lever it is applied to, each moment, being always to make an equal product; it follows, that when the ſolid of the curve ſhall be formed, an ordinate multiplied by the ſurface of the ſolid compriſed between that ordinate and the greateſt of all the ordinates, viz. that of the baſe, will always yield a product equal to that of any other ordinates multiplied in the ſame manner. For the ordinates are only arms of the lever; and the parts of the ſurface comprehended between them and the baſe are equal to the lengths of the ſtring which covers them, i. e. to the correſpondent forces of the ſpring; which is what conſtitutes the equation and the eſſence of the curve.

Fuſee, Fuze, or **Fuſe,** in *War*, an appendage of a bomb, or granado-ſhell, by which the powder, or compoſition, in the ſhell, is ſet on fire, to do the deſigned execution. The word is French, and literally denotes a *ſpindle*.

The *fuze* is a wooden pipe, or tap, commonly made of dry beech-wood, and ſometimes of horn-beam taken near the root, filled with wild-fire, or the like compoſition; and is deſigned to burn ſo long, and no longer, as is the time of the motion of the bomb or ſhell from the mouth of the mortar to the place where it is to fall, ſo that the *fuſee* muſt be contrived, either from the nature of the compoſition, or the length of the pipe which contains it, to burn juſt that time. *Fuzes* are turned rough and bored at firſt, and then kept for ſeveral years in a dry place; the diameter of the hole is about a quarter of an inch, which does not go quite through, but leaves about a quarter of an inch at the bottom, and the head is made hollow in the form of a bowl. The compoſition for *fuzes* is ſalt-petre three parts, ſulphur one, and mealed powder three, four, and ſometimes five, when it is required to burn quicker. This compoſition is drove in with an iron driver, whoſe ends are capped with copper to prevent it from taking fire, and as equally hard as poſſible; the laſt ſhovel-full being all mealed powder, and two ſtrands of quick-match laid acroſs each other are drove in with it, the ends of which are folded up into the bowl, and a cap of parchment is tied over it till it is uſed. When theſe *fuzes* are drove into the loaded ſhell, the lower end is cut off in a ſlope, ſo that the compoſition may ſet fire to the powder in the ſhell, and they muſt have ſuch a length as to burſt nearly as ſoon as the ſhell touches the ground. When the diſtance of the battery from the object is known, the time of the ſhell's flight may be computed nearly; which being known, the *fuze* may be cut accordingly, by burning two or three, and making uſe of a watch or a ſtring and weight for a pendulum, of ſuch a length as to vibrate ſeconds or any given parts of time. If the *fuzes* are to be kept for ſome time after they are drove, the top muſt be covered with a mixture of two parts of pitch, one of roſin, and three of bees wax, which will prevent any air from coming to the compoſition Muller's Treat. of Artillery, p. 294, &c.

Fuzee or **Fuſee,** is alſo ſometimes uſed to denote a FIRE-*lock*.

FUSIBILITY, that quality in metals, and minerals, which diſpoſes them for FUSION.

Gold is more *fuſible* than iron, or copper; but leſs ſo than ſilver, tin, and lead.

Borax is frequently mixed with metals, to render them more *fuſible*.

FUSIL, in *Heraldry*, by the French called *fuſee*, q. d. ſpindle, is a bearing of a rhomboidal figure, more ſlender than the lozenge; its upper and lower angles being more acute than the two middle ones. See *Tab. Herald fig.* 42.

Fusil, in the *Military Art*, ſee FIRE-*lock*.

FUSILE *column*, and *marble*; ſee the ſubſtantives.

FUSILIERS, or **Fuzileers,** in the *Military Art*, are ſoldiers armed like the reſt of the infantry, but wearing caps like the grenadiers, though ſomewhat ſhorter. Of theſe there are three regiments in the Engliſh ſervice; the royal regiment of Scotch *fuſiliers* raiſed in 1678; the royal regiment of Engliſh *fuſiliers* raiſed in 1685; and the royal regiment of Welch *fuſiliers* raiſed in 1688-9.

The word is formed from the French *fuſil*, a *fuſee*, fire-lock.

FUSILUS, in *Botany*, a name given by ſome to the FUSANUS, a more common name for the *euonymus*.

FUSILY, or **Fusile,** in *Heraldry*, is when a field, or ordinary, is entirely covered over, or divided into *fuſils*.

FUSION, the ſolution, or melting, of metals, minerals, &c. by means of fire; or the act of changing them from their ſolid ſtate to a fluor.

The word is derived from the Latin *fuſio*; of *fundo, I pour out*. Whence, alſo, *effuſion*, *infuſion*, *ſuffuſion*, and *transfuſion*; which ſee.

To give the ore its metallic form, they *fuſe* it: when it is in *fuſion*, the metalline ſubſtance, being the heavieſt, ſinks to the bottom of the furnace; the other terreſtrial matters riſing, in form of ſcoria, to the ſurface.

It is commonly imagined, that the *fuſion* and metalline form of ores is wholly the effect of fire; and we have theories of fuſibility founded on this principle; but it is a miſtaken one. Fire, no doubt, is the principal agent; but fire, alone, is not ſufficient. A mineral, or piece of metal not purified, being put alone in a crucible, melts with great difficulty, and never becomes a perfect metal: copper ore, for inſtance, being thus applied, its impure part forms a ſcoria, and vitrifies; the metalline part reſiding at bottom, under the appearance of a black regulus.

To promote the *fuſion* and ſeparation, they mix coals, or ſtones, or cinders, or old ſcoriæ, along with the ore; the inflammable principle in which, by help of fire, fuſes them perfectly, ſets the heterogeneous part at liberty, and raiſes it to the top. See FLUX.

The general reaſon of *fuſion* is pretty eaſily aſſigned. The firmneſs or ſolidity of a body ariſes from the force wherewith its particles cohere. And the COHESION of all bodies is as the quantity of contact in the component particles.

Now, the corpuſcles of fire, entering with rapidity into the pores of the metal, agitate, and, by degrees, looſen, divide, and diminiſh their contact; till at length there is not enough to hinder their rolling over each other, and giving way upon the leaſt impulſe.

The dilatation obſervable in all *fuſion*, is a proof that the particles of the bodies are ſeparated, and ſet at a diſtance from each other; and, conſequently, their contacts and coheſions diminiſhed.

In effect, rarefaction and dilatation are the neceſſary conſequences of fire and heat.

From the difference of coheſion proceeds that variety we obſerve in the *fuſion* of bodies: for ſuch as have leaſt contact of parts, ſooneſt give way to the fire; and ſome will melt away by the warmth of a vapour only: thus air and mercury are ſo fuſible, that the heat of the atmoſphere is always ſufficient to keep them fluid; when others, which have a ſtronger contact, are not to be ſeparated without much difficulty. Upon this account, vegetables very eaſily diſunite, minerals ſlower, and metals ſloweſt of all; and of the laſt, thoſe wherein the contact of part is leaſt, as in lead and tin, moſt readily melt; but thoſe which are moſt compact, as gold and ſilver, are not to be managed but by a violent heat.

If now the force of coheſion were proportional to the quantity of matter, or to the weight of bodies, we might from ſtatics account for all the variety that occurs in *fuſion*: for by knowing the ſpecific gravity of a body, we ſhould then know what force is required to melt it; but becauſe the ſame quantity of matter may be ſo variouſly diſpoſed, that in one body there ſhall be a much greater contact than in another, though the gravity be equal, or even greater in the latter, therefore the force of the coheſion cannot be eſtimated by gravity; for lead, though more ponderous than all other metals except gold, yet in the fire is more eaſily melted than almoſt any other; ſo that it neceſſarily follows, that in this metal there muſt be a leſs coheſion, or contact of parts, how much ſoever it may exceed others in the quantity of its matter.

Bodies after *fuſion* return again into a ſolid maſs, upon removing them from the fire; becauſe their particles hereupon approach nearer to one another by their attractive force, and are compelled to unite.

ſuch as conſiſt of homogeneous and unalterable parts, as wax, gums, and the purer metals, recover their ancient form: for when the ſame texture of parts remains in the whole body, it muſt of courſe reaſſume the ſame appearance, when the ſeparating power ceaſeth to act; but other bodies, whoſe parts with reſpect to denſity and ſurface are extremely different from one another, while ſome are carried off by the force of heat, and others are changed as to figure and poſition, muſt be forced to appear in another form: for they cannot recover their original phaſes, unleſs every particle could reinſtate itſelf in that very ſituation it had before, which may be hindered infinite ways; as may be experienced eaſily in heterogeneous bodies.

The difference, therefore, obſerved even in homogeneous bodies after liquefaction, is no ways to be accounted for but from the changeableneſs of ſurface in their parts: for thoſe bodies whoſe parts conſtantly retain the ſame ſurfaces, never loſe their form; but others, by having the ſurfaces of their parts altered, have a different texture, and put on another appearance.

It had been formerly an opinion, very generally received, that the ſolution of metals by lightning is effected by a kind of cold *fuſion*; and the inſtances that have been uſually alledged in ſupport of this opinion, are thoſe of a ſword being melted in its ſcabbard, and of money being melted in a bag, whilſt the ſcabbard and bag remained unhurt. But it appears, by a variety of experiments and obſervations, collected in the progreſs of ELECTRICITY to its preſent advanced ſtate, that this kind of *fuſion* is attended with heat and ignition, as in the caſe of common *fuſion*. Phil. Tranſ. vol. li. part i. art. 30 and 31.

FUST, in *Architecture*, the SHAFT of a column; or that part comprehended between the baſe and the capital; called alſo *the naked*.

The word is French, and literally ſignifies a *caſk*.

The *fuſt* is that cylindrical part, which makes, as it were, the body or trunk of the column, excluſive of the head and foot.

FUSTIAN, in *Commerce*, a kind of cotton ſtuff, which ſeems, as it were, quilted, or whaled on one ſide.

Manege derives the word from *fuſtanum*, which in the corrupt Latin writers is uſed in the ſame ſenſe, and is ſuppoſed to be formed from *fuſtis*, on account of the tree whereon the cotton grows. Bochart derives it from *fuſtat*, which, in Arabic, ſignifies the ancient city of Memphis, where cotton is produced in great abundance. Right *fuſtians* ſhould be made altogether of cotton thread, both woof and warp.

There are *fuſtians* of divers kinds, wide, narrow, coarſe, fine, with ſhag or knap, and without it. There are alſo a great many made, whereof the warp is flax, or even hemp.

FUSTIAN, in *Criticiſm*, a word uſed to expreſs bombaſt.

FUSTICK, or **FUSTOCK**, a yellow wood uſed by the dyers.

The colour it yields is a fine golden yellow; but there ſhould be ſome other ingredients mixed with it, to make it laſting. The tree that yields it grows in all the Carribbee iſlands; particularly in Barbadoes and Tobago, where it riſes to a great height.

The dyers uſe it chiefly for BLACK: but ſome of the ableſt and honeſteſt among them, who would dye none but the beſt and moſt laſting colours, are of opinion it ſhould be abſolutely excluded out of all dying.

Beſide this, there is another kind of *fuſtick* or *fuſtel*, growing in Italy, Provence, &c. which is uſed to dye a coffee-colour.

FUSTIGATION, in the *Roman Cuſtoms*, a puniſhment inflicted by beating with a cudgel. This puniſhment was peculiar to freemen; for the ſlaves were ſcourged or laſhed with whips.

FUSTIGATION, *fuſtigatio*, is alſo a penance enjoined by the Roman inquiſition.

FUSTUARIUM, in *Antiquity*, a Roman puniſhment, the ſame with FUSTIGATION.

FUSTUC, in *Botany*, a name given by ſome of the old writers to the tree which produces the piſtachia-nuts. The word ſounds ſo like the name of a wood uſed in dying, and called at this time *fuſtick*, that it might be ſuppoſed to expreſs ſome tree of the ſame kind; but it is of a very different origin. The Jews and Arabians have called the piſtachia-tree *fiſtic* and *fuſtack*, and from thence ſome have written the name *fuſtuck* or *fuſtuc*, the Greeks have written it φυςυκ, and the barbarous Latin writers *fiſticio*, which ſounds very like the name PISTACHIO.

FUT-FA, in *Muſic*. See F and CLEF.

FUTTOCKS, *in a ſhip*, the timbers raiſed over the keel, or the compaſſing timbers which make her breadth. Thoſe next the keel are called *ground-futtocks*, and the reſt *upper futtocks*.

FUTTOCK *ſhrouds*. See SHROUDS.

FUTURE, ſomething to come hereafter.

We ſay a *future* ſtate, a *future* contingency; there is none but God to whom *future* things are preſent.

FUTURE, or **FUTURE** *Tenſe*, in *Grammar*, denotes an inflexion of verbs, whereby they denote, that a thing will be in ſome time yet to come. As, the laſt day will come: I ſhall ſee an end.

The *future* time admits of two caſes: either we may intend to expreſs a thing that ſhall come to paſs in a ſhort time; or a thing that ſhall happen in any indefinite time. Thus the Greeks have their *paulo poſt futurum*, μετ' ολιγον μελλων, which marks a thing juſt going to be done; as ϖοιησομαι; beſide the common, indefinite *future*, ϖοιησω, *I will do it*; *ſcribam*, *I ſhall write*.

In Latin, Italian, French, and even in Engliſh, the *future* of the indicative expreſſes only the deſign or intention of doing a thing, or ſimply that the thing will be; as, I will praiſe, I will be approved: and the *future* of the ſubjunctive ſhews, that the thing will be done under certain circumſtances; when I ſhall have ſeen Verſailles, I will tell you. Sometimes the *future* is expreſſed in Engliſh by the preſent; if I meet your friend, I will ſend him to you; *ſi offendero*, *ſi incidero*, &c.

Mr. Harris, in his diſtribution of tenſes, reckons three definite *future* tenſes, beſides the common indefinite *future*, which he calls the aoriſt of the *future*, viz. the inceptive *future*, as *ſcripturus ero*, *I ſhall be beginning to write*; the middle or extended *future*, as *ſcribens ero*, *I ſhall be writing*; and the completive *future*, as *ſcripſero*, *I ſhall have done writing*. See TENSE.

FUZE, or **FUZEE**. See FUSEE.

FUZEE, in the *Manege*, two dangerous ſplents, joining from above downwards: commonly a *fuzee* riſes to the knee and lames the horſe.

Fuzees differ from ſcrews or thorough ſplents in this, that the latter are placed on the two oppoſite ſides of the leg. See SPLENT.

FUZILEERS. See FUSILIERS.

G.

G, The ſeventh letter of our alphabet, and the fifth conſonant: though in the alphabets of all the oriental languages, the Hebrew, Phœnician, Chaldee, Syriac, Samaritan, Arabic, and even Greek, *G* is the third letter.

The Hebrews call it *ghimel*, or *gimel*, q. d. *camel*; becauſe it reſembles in its form the neck of that animal; and the ſame appellation it bears in the Samaritan, Phœnician, and Chaldee: in the Syriac it is called *gomel*, in Arabic *giim*, and in Greek *gamma*.

The letter *G* is of the mute kind, and cannot be any way ſounded without the help of a vowel. It is formed by the reflection of the air againſt the palate, made by the tongue, as the air paſſes out of the throat; which Martianus Capella expreſſes thus, *G ſpiritus cum palato*; ſo that the *G* is a palatal letter.

G in Engliſh has two ſounds, one from the Greek Γ, and the Latin, which is called that of the hard *G*, becauſe it is formed by a preſſure ſomewhat hard of the fore-part of the tongue againſt the upper gum; which ſound it retains before *a*, *o*, *u*, *l*, *r*; as *gate*, *go*, *gull*. At the end of a word it is always hard, as *ring*, *ſing*, &c. The other ſound, called that of the ſoft *G*, reſembles that of *j*, and is commonly, though not always, found before *e* and *i*, as in *gem* and *gibbet*. To this rule, however, there are many exceptions; *G* is often hard before *i*, as *give*, &c. and ſometimes before *e*, as *get*, &c. It is alſo hard in derivatives from words ending in *g*, as *ſinging*, *ſtronger*, &c. and generally before *er*, at the end of words, as *finger*. *G* is mute before *n*, as *gnaſh*, *ſign*. *Gh* has the ſound of the hard *G* in the beginning of a word, as *ghoſtly*; in the middle, and ſometimes at the end, it is quite ſilent, as *right*, *though*. At the end of a word *Gh* has often the ſound of *f*, as *laugh*. Johnſon.

The Latins took the liberty to drop the letter *G* at the beginning of words, before an *n*; as in *gnatus*, *gnoſco*, *gnobilis*, *gnarrat*, &c. which they ordinarily wrote *natus*, *noſco*, *nobilis*, &c. They alſo frequently changed it into *c*; as *gamelus*, into *camelus*; *gragulus*, *graculus*; *quingentum*, *quincentum*, &c. Sometimes it was put inſtead of *n*, before a *c*, and for another *c*; as *Agchiſes*, *aggora*, *agguilla*, &c. for *Anchiſes*, *ancora*, *anguilla*, &c. And inſtead of *p*; as *magalia*, for *mapalia*, &c. *G* is alſo uſed inſtead of *q*, and *q* inſtead of *G*, as in *anquina*, *angina*, *anguina*, &c. inſtead of *r*, as in *aquagium*, for *aquarium*; *agger*, for *arger*, &c. And inſtead of *s*, as in *ſpargo*, *ſparſi*, *ſparſum*; or rather, it is retrenched from thoſe laſt words, to avoid the cacophony of *ſpargſi*, or *ſparcſi*. *G* is alſo put for *c*; as in *Cneius*, for *Gneius*; *Caius*, for *Gaius*; *Gaeta*, for *Caieta*; and for *v*; as in *figere*, for *fivere*. See N, P, &c.

The northern people frequently change the *G* into *v*, or *w*; as in *Gallus*, *Wallus*; *Gallia*, *Wallia*, *Vallia*, &c. For in this inſtance it muſt not be ſaid that the French have changed the *w* into *G*; becauſe they wrote *Gallus* long before *Wallus*, or *Wallia*, were known; as appears from all the ancient Roman and Greek writers.

And yet it is equally true, that the French change the *w* of the northern nations, and *v* conſonant, into *G*; as *Willielmus*, *William*, into *Guillaume*; *Wulphilas*, into *Gulphilas*; *Vaſco*, into *Gaſcon*, &c.

Diomed, lib. ii. cap. De Litera, calls *G* a new letter; his reaſon is, that the Romans had not introduced it before the firſt Punic war; as appears from the roſtral column, erected by C. Duilius, on which we every where find a *c* in lieu of *G*. It was Sp. Carvilius who firſt diſtinguiſhed between thoſe two letters, and invented the figure of the *G*; as we are aſſured by Terentius Scaurus. The *c* ſerved very well for *G*; it being the third letter of the Latin alphabet, as the *G* or γ was of the Greek.

The *G* is found inſtead of *c* on ſeveral medals: Vaillant, Num. Imperat. tom. i. p. 39. M. Beger produces a medal of the Familia Ogulnia, where GAR is read inſtead of CAR, which is on thoſe of M. Patin. But the *c* is more frequently ſeen on medals, in lieu of *G*; as AUCUSTALIS CALLAECIA CARTACINENSIS, &c. for AUGUSTALIS, &c. Not that the pronunciation of thoſe words was altered, but only that the *G* was unartfully or negligently cut by the workmen; as is the caſe in divers inſcriptions of the Eaſtern empire; where AUC, AUCC, AUCCC, are frequently found for AUG, &c.

The form of our *G* is taken from that of the Latins, who borrowed it from the Greeks; the Latin *G* being certainly a corruption of the Greek gamma, Γ, as might eaſily be ſhewn, had our printers all the characters and forms of this letter, which we meet with in the Greek and Latin MSS. through which the letter paſſed from Γ to *G*.

As to the gamma of the Greeks, it is manifeſtly the ג of the Hebrews or Samaritans. All the difference between the gamma and ghimel conſiſts in this, that the one is turned to the right, and the other to the left, according to the different manners of writing and reading, which obtained among thoſe different nations; ſo that all the pains Salmaſius has taken on Solinus, to prove that the *G* was derived from the Greek kappa, is loſt.

G, as a Roman abbreviature, has various ſignifications. It denotes *gratis*, *gens*, *gaudium*, &c. G. V. ſignifies *genio urbis*, and G. P. R. *gloria populi Romani*.

G has alſo been uſed as a numeral letter, ſignifying 400, according to the verſe,

> G *quadringentos demonſtrativa tenebit.*

When a daſh was added at the top, $\overline{\text{G}}$, it ſignified ſorty thouſand.

G, in *Chronology*, is the ſeventh dominical letter.

G, on the French *Coins*, denotes the city of Poitiers.

G is alſo uſed, in *Muſic*, to ſignify one of the clefts; viz. that of the higheſt part, called the *treble*, or *alt*. See CLEF, and TREBLE.

GABALE, in *Mythology*, a deity worſhipped at Heliopolis under the figure of a lion, with a radiant head; and it is thus repreſented on many medals of Caracallus.

GABARDINE, from the Italian *gavardina*, has been ſometimes uſed to denote a coarſe frock, or mean dreſs. In this ſenſe it is uſed by Shakſpeare in his Tempeſt and Merchant of Venice, and by Butler in his Hudibras, book i.

GABBARA, a name which the Egyptians gave the dead bodies, which they kept by them, inſtead of burying them.

That people, out of a cuſtom which they had received from their anceſtors, and which aroſe in ſome meaſure from the poſition of their country, which is expoſed to the inundations of the Nile, uſed to wrap up the bodies of perſons of eminence, particularly thoſe of ſaints and martyrs, in a great number of linen cloths, with balms and ſpices; and inſtead of interring them, they preſerved them in their houſes: thinking, that thereby they did them much more honour. See EMBALMING, and MUMMY.

And theſe, St. Auguſtine tells us, were what they called *gabbaras*. Sermon cxx. *de diverſis*, cap. 12.

Pliny makes mention of the ſame thing, lib. vii. cap. 16. where he relates, that in the time of Claudius, a *gabbara* was brought from Arabia, almoſt ten feet long.

The word is Arabic, Syriac, and Hebrew, formed of גבך, *gaber*, a *man*, and denotes an embalmed body.

GABEL, or GABELLE, in the *French Cuſtoms*, a duty or impoſition on ſalt.

Etymologiſts are divided as to the origin of the word.

Some derive it from the Hebrew *gab*, a *preſent*; others from קבל, *to deliver*; others from קבלה, *kabbalah*, *receipt*; others from *ghaud*, or *gabe*, *unjuſt law*; and others from the corrupt Latin *gabella*, or *gablum*, *tribute*.

The *gabel* is let out to farm; and makes the ſecond article in the king's revenue.

There are three farms of *gabels*: the firſt comprehends the greateſt part of the kingdom; the ſecond is that of the Lyonnois, and Languedoc; and the third that of Dauphiné and Provence. There are ſeveral provinces exempt from the *gabel*, having purchaſed that privilege of Henry II.

This duty is ſaid to have had its riſe in France, in 1286, under Philip the Fair. Philip the Long took a double per livre on ſalt, by an edict in 1318, which he promiſed to remit when he was delivered from his enemies; which was renewed by Philip de Valois, in 1345; and the duty was raiſed to four deniers per livre; king John reſumed it in 1355, and it was granted to the dauphin in 1358, to ranſom king John. It was continued by Charles V. in 1366; after his deceaſe it was ſuppreſſed, but revived again by Charles VI. in 1381. Louis XI. raiſed it to twelve deniers per livre; and Francis I. in 1542, to twenty-four livres per muid; and it has been conſiderably augmented ſince that time; ſo that a minot of ſalt pays a duty of 52 livres, 8 ſols, and 6 den. Philip de Valois firſt eſtabliſhed granaries and officers of the *gabelles*, and prohibited any other perſons from ſelling ſalt: from which time the whole commerce of ſalt, for the inland conſumption, has lain wholly in the king's hands, who ſells and diſtributes every grain thereof by his farmers, and officers created for the purpoſe.

The produce of this impoſt is ſo conſiderable, that it is computed to make one-fourth of the whole revenue of the kingdom.

GABEL, or GABLE, is alſo uſed, in ſome of our *Ancient Writers*, for any ſort of tax, or impoſition: as *gabel* of wines, of ſilks, &c.

GABINIA *toga*. See TOGA.

GABIONS, in *Fortification*, &c. are large cylindric baſkets, open at both ends, made of ozier twigs, about three feet high, and as much in diameter; having nine or ten ſtakes, about an inch and a half in diameter, which exceed the baſket-work about five or ſix inches, and are pointed. Theſe ſerve in ſieges to carry on the approaches under cover, when they come pretty near the fortification. See *Tab.* VII. *Fortification*, *fig.* 39.

They are commonly uſed in BATTERIES, to ſcreen the engineers, &c. in order to which one is placed on either ſide each gun, only leaving room for the muzzle to appear through.

There are alſo a ſmaller ſort of *gabions*, about one foot high, twelve inches in diameter at the top, and from eight to ten at bottom, uſed on parapets, in trenches, &c. to cover the muſqueteers; being placed ſo cloſe as that a muſquet can but juſt peep through.

They alſo ſerve as a parapet on lines, lodgments, &c. where the ground proves too hard to dig into.

GABIONS, *ſtuffed*, are five or ſix feet long, and as much in diameter, filled with branches and ſmall wood, and ſerving to roll before the workmen in trenches, and to cover them in front againſt muſket-ſhot. See MANTLET.

To render the *gabions* uſeleſs, they endeavour to ſet them on fire, by throwing pitched faggots among them.

GABIREA, in the *Materia Medica*, a name given by ſome of the old writers to ſuch myrrh as was remarkably fatty.

GABLE, or GABLE-*end* of a houſe, is the upright triangular end; from the cornice, or eaves, to the top of its roof.

GABLE, *land*. See LAND-*gable*.

GABLOCKS, the artificial ſpurs of a *game*-COCK.

GABRES, or GAVRES, a religious ſect in Perſia and India; called alſo *Gebres*, *Gevres*, &c. See MAGI.

The Turks call the Chriſtians *Gabres*, q. d. infidels, or people of a falſe religion; or, rather, as Leunclavius obſerves, Heathens, or Gentiles: the word *Gabre*, among the Turks, having the ſame ſignification as Pagan, or Infidel, among the Chriſtians; and denoting any thing not Mahometan.

In Perſia, the word has a more peculiar ſignification; wherein it is applied to a ſect diſperſed through the country, and ſaid to be the remains of the ancient Perſians, or followers of Zoroaſter, being worſhippers of fire. See FIRE, *everlaſting*.

They entertain the moſt profound veneration for this ancient philoſopher, whom they conſider as the great prophet ſent by God to communicate his law, and to inſtruct them in his will.

They have a ſuburb at Iſpahan, which is called Gaurabad, or the town of the Gaurs, where they are employed in the meaneſt and vileſt drudgery: ſome of them are diſperſed through other parts of Perſia; but they principally abound in Kerman, the moſt barren province in the whole country, where the Mahometans allow them liberty, and the exerciſe of their religion. Several of them fled many ages ago into India, and ſettled about Surat, where their poſterity remain to this day. There is alſo a colony of them at Bombay. They are a poor, ignorant, inoffenſive people, extremely ſuperſtitious and zealous for their rites, rigorous in their morals, and honeſt in their dealings. They profeſs to believe a reſurrection and a future judgment, and to worſhip only one God. And though they perform their worſhip before fire, and direct their devotion towards the riſing ſun, for which they have an extraordinary veneration, yet they ſtrenuouſly maintain that they worſhip neither, but that theſe are the moſt expreſſive ſymbols of the Deity; and for this reaſon they turn towards them in their devotional ſervices. See Thevenot's and Tavernier's Voyages, and Hyde's Rel. Vet. Perſ. cap. xxiv.

However, ſome have ſuppoſed, that theſe are Perſians converted to Chriſtianity, who, being afterwards left to themſelves, mingled their ancient ſuperſtitions with the truths and practices of Chriſtianity, and ſo formed for themſelves a religion apart: and they alledge that, throughout the whole of their ſyſtem of doctrine and practice, we may diſcern the marks and traces of Chriſtianity, though grievouſly defaced; the annunciation, the magi, the maſſacre of the infants, our Saviour's miracles, his perſecutions, aſcenſion, &c.

GABRIELITES, in *Eccleſiaſtical Hiſtory*, a ſect of anabaptiſts, that appeared in Pomerania in 1530. They derive their name from Gabriel Scherling, who, after having been for ſome time tolerated in that country, was obliged to remove, and died in Poland.

GAD, in *Mining*, an inſtrument uſed to dig out the ore. It is a ſmall punch of iron with a long handle of wood. One of the miners holds this in his hand, directing the point to a proper place, while the others ſtriking it with a large ſledge hammer, drive it into the vein.

The working by this inſtrument is thence called *gading*.

GAD-*fly*, in *Natural Hiſtory*, a ſpecies of OESTRUS, with ſpotted wings, yellow breaſt and brown band, and yellow abdomen, terminating in a black point; the common name for a winged inſect, called alſo the dun-fly or ox-fly, a creature very troubleſome to cows, horſes, &c. This creature, examined by the microſcope, has ſeveral peculiarities worthy obſervation. It has, like the gnat, a long proboſcis, with a ſharp dart, and two darts ſheathed within it; the uſe of which is to penetrate the fleſh of animals, and feed on their blood; whereas the proboſcis ſerves to ſuck the juices, &c. from fruits, flowers, and leaves of plants.

The eggs of this fly are laid in the water, and there produce a remarkable maggot, of a brown colour and long flatted figure, with a pencil of fine downy hairs at its tail, which it ſpreads into a circular form on the ſurface of the water, whilſt its head is plunged under it in ſearch of food. In deſcending, theſe hairs are drawn together in an oval form, and made to incloſe a bubble of air, by means of which the maggot is able to riſe again; and if this bubble happens to eſcape, the creature ſqueezes another out of its body to ſupply its place. The ſnout of this maggot has three diviſions, whence are thruſt out three little pointed bodies, like ſerpents tongues. Theſe maggots are very common on the ſurface of ditch-water, and the motion of their inteſtines is very ſingular and obſervable. Baker's Microſ. p. 207.

GADING, among *Miners*. See GAD.

GADUS, in *Ichthyology*, the name of a genus of the malacopterygious, or ſoft-finned fiſhes, in the Artedian ſyſtem, the characters of which are theſe: the branchioſtege membrane on each ſide contains ſeven bones of a ſomewhat cylindric form; the back in ſome ſpecies has three fins, and in others only two; the head in moſt ſpecies is compreſſed, but in ſome it is depreſſed.

Artedi enumerates the following diſtinctions, viz. thoſe which have three fins and no cirri, of which there are three ſpecies, the whiting, the cole-fiſh, and the whiting-pollack: thoſe which have three fins with cirri, to which belong the cod-fiſh, the haddock, the pouting, and the Corniſh poor: thoſe which have two fins in the back comprehend the hake, the ling, the eel-pout, and the bearded *gadus*, with a furrow at the firſt of the two back fins, called in Cornwall the whiſtle-fiſh.

The *gadus*, in the Linnæan ſyſtem, is a genus of the JUGULARES: it has a ſmooth head, ſeven ſlender branchioſtegous rays, an oblong body with deciduous ſcales; all the fins are covered with a common ſkin, and the ventral fins are ſlender, and terminate in a point.

GADWALL, *anas ſtrepera*. See DUCK.

GÆELÆUM, *earth-oil*, in *Natural Hiſtory*, a name given by ſome of the old writers to the PETROLEUM, or, as we uuſally call it, oil of petre.

GAFET, in the *Materia Medica of the Arabians*, a name given by Avicenna and others to the ſarcocolla of the Greeks.

GAFF, in *Sea-language*, a ſort of boom or pole uſed to extend the upper edge of the mizen: the foremoſt or inner extremity of it is furniſhed with two cheeks, forming a ſemi-circle, which incloſe the after-part of the maſt, ſo as to confine the *gaff* cloſe to its reſpective maſt whilſt the ſail is hoiſting or lowering.

GAFFS. See GABLOCKS.

GAFOLD-*land*, or GAFUL-*land*, *terra ſenſualis*, in *our old Writers*, land liable to taxes, and rented or let for rent.

GAGATES. See JET.

GAGATRONICA, a word uſed by the *Writers of the Middle Ages*, as the name of a diſtinct ſtone, but ſeeming only a falſe ſpelling of the word GARATRONIUM.

GAGE, in our *ancient Cuſtoms*, ſignifies a pledge, or pawn, given by way of ſecurity.

The word is only properly uſed in ſpeaking of moveables: for immoveables, the term *hypotheca* is uſed.

If the *gage* periſh, the perſon who received it is not to anſwer for it, but only for extreme negligence, &c.

GAGE is alſo uſed for a challenge to COMBAT.

In which ſenſe it was a pledge, which the accuſer, or challenger, caſt on the ground, and the other took up, as accepting the challenge: this was uſually a glove, gantlet, chaperoon, or the like.

The Grand Cuſtomary mentions *gages pleiges de duel*. Theſe were gentlemen of the relations or friends of the combatants. If he who had given the *gages pleiges* was overcome, he was to pay a mulct agreed on.

GAGE is only now retained as a ſubſtantive: as a verb, the *g* is changed into *w*; and of *gage* is formed *wage*. As, to *wage* law, to *wage* deliverance, q. d. to give ſecurity a thing ſhall be delivered.

If a perſon who has diſtrained be ſued for not having delivered what he had took by diſtreſs, he ſhould *wage*, or *gage*, or *gager*, deliverance; that is, put in ſurety that he will deliver them.

GAGE, *mort*, *mortuum vadium*, is that which is left in the hands of the proprietor, ſo that he reaps the fruits thereof: in oppoſition to *vif-gage*, *vivum vadium*, where the fruits or revenues are reaped by the creditor, and reckoned on the foot of the debt, which diminiſhes in proportion thereto. The ſecond acquits or diſcharges itſelf, and as it ſubſiſts, ſurvives the debt, and is therefore called living pledge; the firſt does not.

Pomey alſo uſes MORT-GAGE for the poſſeſſion of any effects, on condition of ſurrendering them up at the good pleaſure of the perſon who gave them.

GAGE, in the *Sea Language*. When one ſhip is to windward of another, ſhe is ſaid to have the *weather-gage* of her.

The ſeamen, alſo, call trying how much water a ſhip draws, *gaging*, or rather *gauging* of her; and it is done thus:

They drive a nail into a pike, near the end, and then put down this pike by the rudder, till the nail catch hold under it; for then, as many feet as the pike is under water is the ſhip's *gage*, or depth of water ſhe draws.

GAGE, in *Joinery*, is an inſtrument made to ſtrike a line truly parallel to the ſtrait ſide of any board, or piece of ſtuff.

Its chief uſe is for *gaging* of tenons true, to fit into mortiſſes; and for *gaging* ſtuff of an equal thickneſs.

It is made of an oval piece of wood, fitted upon a ſquare ſtick, to ſlide up and down ſtiffly thereon, and with a tooth at the end of a ſtaff, to ſcore, to ſtrike a line upon the ſtuff at any diſtance, according to the diſtance of the oval from it.

GAGE, among *Letter-founders*, is a piece of box, or other hard wood, variouſly notched; which is uſed to adjuſt the dimenſions, ſlopes, &c. of the different ſorts of letters. There are ſeveral kinds of theſe *gages*. See FOUNDERY.

GAGE, in *Pneumatics*, is of various ſorts, according to the purpoſes to which it is applied. Thus,

GAGE *of the air-pump*. See AIR-*pump*. The extraordinary powers of exhauſtion in Mr. Smeaton's air-pump, as they are indicated by his pear-*gage*, have lately been conſidered with peculiar attention by Mr. Nairne, F. R. S. He was led to proſecute a ſeries of experiments on this ſubject, by obſerving the remarkable difference between the indications of exhauſtion and rarefaction by this *gage*, and by the common barometer-*gage*. Having uſed every poſſible precaution in preparing his different *gages*, he nevertheleſs found, that, when they were put under a receiver, placed on a leather dreſſed in alum, and ſoaked in oil and tallow, according to his uſual method, and the pump was worked for ten minutes, the quickſilver in the barometer-*gage* roſe to within one tenth of an inch of the height of the quickſilver in the ſtandard barometer, which was at that time at thirty inches, and indicated that the air had been rareſied only about three hundred times; whereas Mr. Smeaton's pear-*gage* indicated a degree of exhauſtion equal to ſix thouſand times, the whole of its cavity, on dipping its open end into the cup of quickſilver and letting in the air, except a ſix thouſandth part, being filled by the quickſilver. The difference of indications by theſe two *gages* was found much more conſiderable in ſubſequent experiments. Having an opportunity of repeating ſome of theſe experiments before the honourable Henry Cavendiſh, Mr. Smeaton, and others, in April 1776, Mr. Cavendiſh accounted for the obſerved and aſtoniſhing difference, by referring to ſome experiments of his father, lord Charles Cavendiſh; from which it appeared, that water, whenever the preſſure of the atmoſphere on it is diminiſhed to a certain degree, is immediately turned into vapour, and reduced as ſuddenly to water again on reſtoring the preſſure: the degree of preſſure varies according to the temperature of the water; for when the heat is 72° of Fahrenheit's ſcale, it turns into vapour as ſoon as the preſſure is reduced to that of three quarters of an inch of quickſilver, or about one fortieth of the uſual preſſure of the atmoſphere; but when the heat is only 41°, the preſſure muſt be reduced to that of a quarter of an inch of quickſilver, or to one hundred and twentieth of the uſual preſſure, before the water turns into vapour. According to this theory, whenever the air in the receiver is exhauſted to the abovementioned degree, the moiſture adhering to the different parts of the machine, will be converted into an elaſtic vapour, and ſupply the place of the air, which is drawn away by the working of the pump; and the fluid left in the receiver and pear-*gage*, will be chiefly this vapour. When the air is let into the receiver, the vapour within the pear-*gage* will be reduced to water, and only the real air will remain uncondenſed; and therefore this *gage* only ſhews how much real air is left in the receiver, and not how much the preſſure or ſpring of the included air is diminiſhed; whereas the barometer-*gage* ſhews how much the included fluid is diminiſhed, and that equally, whether it conſiſts of air or vapour. In order to aſcertain the truth of this plauſible theory, Mr. Nairne proceeded to free every part of his apparatus as much as poſſible from any adhering moiſture, concluding that by this means he ſhould be able to bring the two *gages* to an agreement. Inſtead of placing the receiver on leather, as before, he put it on the pump-plate, made as clean and dry as poſſible, and applied a cement round its edge to exclude the outward air. When the pump in this ſtate was worked for ten minutes, the barometer-*gage* indicated a degree of exhauſtion nearly equal to ſix hundred; and, on letting the air into the receiver, the pear-*gage* indicated a degree of exhauſtion little more than ſix hundred alſo. In another experiment he put a piece of the oiled leather above mentioned in the receiver, and found, on working the pump, that the barometer-*gage* indicated a degree of exhauſtion of nearly three hundred, but the pear-*gage* indicated a degree of exhauſtion not leſs than four thouſand. But on taking out the piece of leather, and repeating the experiment, the two *gages* agreed, as before. Having thus concluded, in general, that a conſiderable quantity of vapour aroſe from the compound of leather, alum, oil, and tallow, it was his next object to find out from which of theſe ſubſtances the vapour was principally derived. For this purpoſe he ſeparately and ſucceſſively included in the receiver two ounces of tallow, the ſame quantity of oil and of alum, and a piece of leather as it comes from the leather-ſellers, weighing a hundred grains: from theſe experiments he found that the elaſtic vapour, which occaſioned ſo great a difference in the teſtimony of the *gages*, aroſe chiefly from the leather, and very little from the tallow, oil, and alum. In the experiment with the leather, it ſupplied the place of the exhauſted air ſo faſt, that he could not in ten minutes make the barometer-*gage* indicate a degree of exhauſtion of more than a hundred and fifty-nine; whereas that of the pear-*gage* was a hundred thouſand. In order to determine whether the difference in the *gages* was occaſioned by the moiſture of the leather, Mr. Nairne repeated the experiment with a piece of freſh leather, weighing a hundred grains. The pear-*gage* indicated a rarefaction of a hundred thouſand, and the leather had loſt two grains of its weight; when the ſame piece of leather was ſo thoroughly dried by the fire till it would loſe no more of its weight, and thus reduced to eighty grains, it gained two grains in the experiment, and the pear-*gage* exhibited a rarefaction only of two hundred and eighty. The leather was afterwards held in the ſteam of hot water till it had regained its former moiſture and weight, and the degree of exhauſtion indicated by the pear-*gage* was a hundred thouſand, and the loſs of weight two grains, as before. In the firſt of theſe experiments, the degree of rarefaction indicated by the barometer-*gage* was a hundred and thirty-four; in the ſecond, two hundred and ſixty-eight; and in the third, one hundred and forty-ſeven. The effect of the vapour ariſing from ſmall quantities of different fluids, and from other ſubſtances containing moiſture, was tried in a variety of inſtances; and having found that the ſmall quantity of moiſture which exhaled from the ſubſtances under the receiver, prevented the pump from exhauſting to a conſiderable degree, Mr. Nairne ſuſpected that whenever wet leather had been uſed to connect the receiver with the plate, there muſt have ariſen ſo great a quantity of vapour as to have prevented the degree of exhauſtion from being near ſo great as in other inſtances. This led him to another ſet of experiments, in order to aſcertain this fact. Having firſt placed the receiver on the pump-plate, made clean and dry, with only a little oil poured round the outſide edge of it, both *gages* agreed in indicating a rarefaction of ſix hundred, as before: but when the receiver was ſet on leather, that had been ſoaked for two days in water, the rarefaction indicated by the barometer-*gage* was uniformly fifty-one in three different trials; but the pear-*gage* exhibited firſt ſixteen thouſand, in the ſecond inſtance fifteen hundred, and in the third one thouſand: when the receiver was placed on a piece of leather, ſoaked in a mixture of water and ſpirit of wine, the barometer-*gage* in three trials always indicated a degree of exhauſtion equal to forty-ſeven; but the pear-*gage* was unaccountably various; in the firſt trial being twelve thouſand; in the ſecond, eleven hundred and fifty; and in the third, five hundred. By theſe experiments it ſufficiently appears, that the uſe of leather ſoaked in water, or in water and ſpirit of wine, prevents the pump from exhauſting to any conſiderable degree. By two other experiments, in which water was uſed for ſoftening the leathers of the piſtons of a common air-pump, we find that the higheſt degree of rarefaction that could be procured was thirty-ſeven, according to the barometer-*gage*; and thirty-eight, according to the pear-*gage*. Mr. Nairne's laſt experiment furniſhes a very extraordinary evidence of the effect of vapour on the barometer-*gage*: having put a phial of ether under the receiver, in order to produce artificial cold, and working the pump for half an hour, the degree of exhauſtion indicated by the barometer-*gage* was only ſixteen; though the ſame pump exhauſted above four hundred times before the ether was put under the receiver. The degree of cold produced by means of ether, in the exhauſted receiver, was 48° below 0 in Fahrenheit's ſcale, or 103° below 55°, which was the temperature of the air in the room where the experiment was made. Phil. Tranſact. vol. lxvii. part ii. art. 32. page 614, &c.

Gage *of the barometer*, is a contrivance for eſtimating the exact degree of the riſe and fall of the mercury in the Torricellian tube. It is well known, that whilſt the mercury riſes in the tube, it ſinks in the ciſtern, and *vice verſâ*; and, as the diſtance between the diviſions graduated on the annexed ſcale and the ſurface of the mercury in the ciſtern is not truly ſhewn by the numbers on the ſcale, errors muſt happen in determining the preciſe height of the mercury. To remedy this inconvenience, a line is cut upon a round piece of ivory, which is fixed near the ciſtern: this line is accurately placed at a given diſtance from the ſcale; e. gr. twenty-ſeven inches; and a ſmall float of cork, with a cylindric piece of ivory fixed to its upper ſurface, on which a line muſt be cut at the diſtance of two inches, exactly from the under ſurface of the cork, is left to play freely on the quickſilver, and the cylinder works in a groove made in the other piece: from this conſtruction it appears, that if theſe marks are made to coincide, by raiſing or lowering the ſcrew which acts on the quickſilver, then the diviſions on the ſcale will expreſs the true meaſure of the diſtance from the ſurface.

Gage *of the condenſer*, is a glaſs tube of a particular conſtruction, adapted to the condenſing engine, and deſigned to ſhew the exact denſity and quantity of the air contained at any time in the CONDENSER. For this purpoſe, let D *defc*, *Tab.* II. *Pneumatics*, *fig.* 22. be a ſmall glaſs tube, about one tenth of an inch in diameter, open at D, but hermetically ſealed at *c*; DE a larger tube, hermetically ſealed at D, and containing at that end a quantity of mercury, which takes up two or three inches in length, and covers the open end of the ſmaller tube: the other end C, of the large tube, is ſtrongly cemented into the braſs elbow-piece OE*o* at C, *fig.* 23. ſo as not to be quite at right angles with O*o*, but to incline a little downwards, that the mercury at D may not run towards C, and paſs into the condenſing glaſs GB. This *gage* is ſcrewed on at *o*, and the injecting ſyringe at O, a cock being interpoſed at O or *o*, or not uſed at all, according to the nature of the experiment. Whilſt air is injected into the condenſing glaſs, and the large tube of the *gage* at the ſame time, the air in the ſmaller tube, which has no communication with the injected air, muſt be rarer and weaker; and, therefore, the mercury at D will enter the tube, and advance in it, in proportion to the condenſation of the air in GB. In *fig.* 22. *d*, *e*, *f*, repreſent three rings of ſpringy wire, at ſuch diſtances as to ſhew, by the motion of the mercury in the ſmall tube, when the denſity of the air is doubled, tripled, or quadrupled; becauſe the air, which at firſt filled the whole ſmall tube, now takes up only the ſpaces *cd*, *ce*, *cf*; or, in Mr. Haukſbee's ſtyle, one, two, or three atmoſpheres are thrown in.

Another kind of *gage* may be put within the condenſing glaſs, at the bottom of it, when the uſe of the preceding *gage* would be inconvenient. This is a ſhort cylinder of wood, *fig.* 24. about an inch thick, with a hole through its middle between *a* and *b*, of about 1½ inch in diameter; the outward diameter of the cylinder muſt be about four inches, ſo that the cylinder may eaſily ſtand within the condenſing glaſs on the plate, ſupporting its bottom at B, *fig.* 23. There is a hole at A of about ¾ of an inch in diameter, and ¾ of an inch deep, filled with mercury. *acdb* is a ſmall glaſs tube, open at *a*, but hermetically ſealed at *b*, and bent to a right angle at *c*, the middle of the diſtance between *a* and *b*. When the open end *a* is immerſed in mercury, and the air on the ſurface of the mercury condenſed, the air in the tube will recede towards the elbow *c*, and the mercury, following it, ſhew to what degree it is condenſed. When the mercury is at *c*, then one additional atmoſphere bears upon its ſurface, and two atmoſpheres, if it be come to *d*; which places are marked by rings of ſpringing braſs wire; at *a* and *b*, about an inch of the ends of the tube are bent to a right angle, that the end *b* may go into the wood, whilſt the end *a* goes under the ſurface of the mercury, where it is held by a cork, whilſt air is injected into the condenſing glaſs. Deſaguliers, Exp. Phil. vol. ii. p. 394, &c.

Gage, *ſea*. See **Altitude**.

Gage, *bucket ſea*, an inſtrument contrived by Dr. Hales, to find the different degrees of coolneſs and ſaltneſs of the ſea, at different depths: it conſiſts of a common houſhold pail or bucket, with two heads. Theſe heads have each a round hole in the middle, about four inches in diameter, covered with ſquare valves opening upward; and that they may both open and ſhut together, there is a ſmall iron rod, fixed to the upper part of the lower valve, and the other end to the lower ſide of the upper valve. So that as the bucket deſcends with its ſinking weight into the ſea, both the valves may open by the force of the water, which by that means has a free paſſage through the bucket. But when the bucket is drawn up, then both the valves ſhut by the force of the water at the upper part of the bucket; ſo that the bucket is drawn up full of the loweſt ſea water to which it has deſcended.

When the bucket is drawn up, the mercurial thermometer fixed in it is examined; but great care muſt be taken to obſerve the degree at which the mercury ſtands, before the lower part of the thermometer is taken out of the water in the bucket, leſt it be affected by the different temperature of the air.

In order to keep the bucket in a right poſition, there are four cords fixed to it, reaching about three feet below it; to which the ſinking weight is fixed.

The reſult of ſeveral trials with this *gage* was, that, when it was let down to different depths, from 360 feet to 5346 feet, in lat. 25° 13′ N. and long. 25° 12′ W. it was diſcovered by the thermometer, that the cold increaſed gradually in proportion to the depths, till it deſcended to 3900 feet, viz. near ¾ of a mile, whence the mercury in the thermometer came up at 53°; and though it was afterwards ſunk to 5346 feet, i. e. a mile and 66 feet, it came up no lower: the warmth of the water upon the ſurface, and that of the air, was all that time 84°.

When the water in the bucket was become of the ſame temperature with that on the ſurface of the ſea, equal quantities of both were weighed and tried by the hydrometer: that from below was found to be the heavieſt, and, conſequently, the ſalteſt. See Treatiſe on Ventilators, part ii. p. 122, &c.

Dr. Hales was probably led to the conſtruction of this ſea-*gage* from an inſtrument invented by Dr. Hook, and deſigned for the ſame purpoſe. This conſiſts of a ſquare wooden bucket C, *Tab. Miſcellany*, *fig.* 16. whoſe bottoms are ſo contrived, that, as the weight A ſinks the iron B, to which the bucket C is faſtened by two handles D, D, on the end of which are the moveable bottoms or valves EE, and thereby draws down the bucket, the reſiſtance of the water keeps up the bucket in the poſture C, whereby the water, whilſt the bucket is deſcending, hath a free paſſage through it; whereas, as ſoon as the bucket is pulled upwards by the line F, the reſiſtance of the water to that motion beats the bucket downwards, and keeps it in the poſture G, whereby the included water is kept from getting out, and the ambient water kept from getting in. Phil. Tranſ. N° 9. p. 149. and N° 24. p. 447. or abr. vol. ii. p. 260.

Gage, *aqueo-mercurial*, is the name of an apparatus contrived by Dr. Hales, and applied, in various forms, to the branches of trees, in order to determine the force with which they imbibe moiſture. Let *e r*, *Tab. Miſcellany, fig.* 17. be a cylindric glaſs, e. gr. of an inch diameter within, and eight inches long. Into this glaſs is introduced the branch of a young thriving apple tree *b*, about three feet long, with lateral branches; the diameter of the tranſverſe cut *i* being $\frac{3}{4}$ of an inch. Having fitted the joint *r* to the tube at *r*, by folding a piece of ſheep's ſkin round the ſtem, it is cemented with a mixture of bees-wax and turpentine melted together in ſuch a proportion, as to make a very ſtiff clammy paſte when cold, and over the cement folds of wet bladders are bound firmly with packthread. To the lower end *e* of the large tube, a ſmaller tube *z e* is cemented, being about $\frac{1}{4}$ of an inch diameter, and eighteen inches long, and in ſubſtance full $\frac{1}{8}$ of an inch thick. Theſe tubes are cemented together at *e* with common hard brick-duſt or powdered chalk cement, and the joint is farther ſecured with the cement of bees-wax and turpentine, over which a wet bladder is bound. The apparatus being thus prepared, the branch is turned downwards, and the glaſs tube upwards, and then both tubes are filled with water; with the finger applied to the open end of the ſmall tube, it is inverted and immerſed in the glaſs ciſtern *x*, full of mercury and water. In this ſituation the lower end of the branch was immerſed ſix inches in water, viz. from *r* to *i*; the water was imbibed by the branch at its tranſverſe cut *i*; and during its aſcent into the ſap-veſſels of the branch, the mercury roſe in the tube *e z* from the ciſtern *x*, ſo that in half an hour it was riſen $5\frac{3}{4}$ inches high, as far as *z*. The height of the mercury indicated, in ſome meaſure, the force with which the ſap was imbibed, though not the whole force; becauſe, while the water was imbibed by the branch, its tranſverſe cut was covered with innumerable little hemiſpheres of air, and many air-bubbles iſſued out of the ſap veſſels, which partly filled the tube *e r*, as the water was drawn out of it: and, therefore, the height of the mercury could only be proportionable to the exceſs of the quantity of water drawn off above the quantity of the air, which iſſued out of the wood. If the quantity of air, iſſuing from the wood, had been equal to the quantity of water imbibed, it is plain that the mercury could not riſe at all, becauſe there would be no room for it in the tube: but, if nine parts in twelve of the water be imbibed by the branch, and only three ſuch parts of air iſſue into the tube in the ſame time, the mercury muſt riſe near ſix inches, and ſo proportionably in other caſes. Dr. Hales obſerved, that the mercury roſe higheſt, in moſt caſes, when the ſun was clear and warm, and that it ſubſided three or four inches towards evening, but roſe again the next day as it grew warm, though ſeldom ſo high as at firſt. Dr. Hales adapted the ſize and ſhape of the glaſs apparatus to a great variety of branches of ſeveral ſizes and of different kinds of trees, and repeated the experiment above deſcribed, *mutatis mutandis*, in a variety of inſtances. See his Vegetable Statics, vol. i. chap. ii. p. 84, &c.

Gage, *ſliding*, is a tool uſed by mathematical inſtrument makers, for meaſuring and ſetting off diſtances: it conſiſts of a beam, tooth, ſliding ſocket, and the ſhoulder of the ſocket.

Gage, *tide*, is the name of an inſtrument uſed for determining the height of the tides by Mr. Bayly, in the courſe of a voyage towards the ſouth-pole, &c. in the Reſolution and Adventure, in 1772, 1773, 1774, and 1775.

This inſtrument conſiſts of a glaſs tube, whoſe internal diameter was ſeven tenths of an inch, laſhed faſt to a ten feet fir rod, divided into feet, inches, and quarters: this rod was faſtened to a ſtrong poſt fixed upright and firm in the water. At the lower end of the tube was an exceeding ſmall aperture, through which the water was admitted. In conſequence of this conſtruction, the ſurface of the water in the tube was ſo little affected by the agitation of the ſea, that its height was not altered one tenth of an inch, when the ſwell of the ſea was two feet; and Mr. Bayly was certain, that with this inſtrument he could diſcern a difference of one tenth of an inch in the height of the tide.

Gage, *water*. See Altitude and Hydrometer.

Gage, *weather*, in *Sea-language*. See Gage, above.

GAGER *de ley*. See Wager *of law*.

Gager, and } in *Geometry*. See { Gauger.
GAGING, } { Gauging.

GAGNOLA, in *Ichthyology*, a name given by the Spaniards to a ſpecies of the acus, or ſyngnathus of Artedi. The particular ſpecies meant by it, is that called by Artedi, the hexagonal bodied ſyngnathus with the pinnated tail; others call it the acus Ariſtotelis, or acus ſecunda, and the French the trompette; we call it ſometimes the needle-fiſh, ſometimes the trumpet-fiſh, and ſometimes the tobacco-pipe-fiſh.

GAHALA, in *Botany*, a name given by ſome writers to the *colocaſia*, or great Egyptian Arum.

GAIANITES, Gaianitæ, a ſect of ancient heretics; ſprung from the Eutychians.

This ſect was of an older ſtanding than Gaian, a biſhop of Alexandria in the ſixth century; from whom, however, they took their name. They adhered to the opinion of Julian Halicarnaſſeus, the chief of the Incorruptibles and Phantaſtici; and came, at length, to be denominated *Gaianites*, upon *Gaian*'s putting himſelf at their head. They denied that Jeſus Chriſt, after the hypoſtatical union, was ſubject to any of the infirmities of human nature.

GAIDEROPSARUS, in *Ichthyography*, a name given by ſome to a fiſh of the truttaceous kind caught in the Mediterranean, and more uſually called Callarias.

GAIN, the profit, or lucre, a perſon reaps from his trade, employment, or induſtry.

Some derive the word from the German *gewin*; whereof the Italians had made *guadagno*; the French, and Engliſh, *gain*.

There are legal and reputable *gains*, as well as ſordid and infamous ones. What is *gained* beyond a certain ſum, by gaming, is all liable to be reſtored again, if the loſer will take the benefit of the law.

Gain, in *Architecture*, is the workmen's term for the bevelling ſhoulder of a joiſt, or other timber.

It is uſed, alſo, for the lapping of the end of the joiſt, &c. upon a trimmer, or girder; and then the thickneſs of the ſhoulder is cut into the trimmer, alſo, bevelling upwards, that it may juſt receive the *gain*; and ſo the joiſt and trimmer lie even and level with the ſurface. This way of working is uſed in floors and hearths.

To **Gain** *the wind*, in *Sea Language*, is to arrive on the weather-ſide, or to windward of ſome other veſſel in ſight, when both are plying to windward, or ſailing as near the wind as poſſible.

GAINAGE, Gainagium, in our *Ancient Writers*, ſignifies the draught-oxen, horſes, wain, plough, and furniture, for carrying on the work of tillage by the baſer ſort of ſokemen and villains.

Gainage is the ſame with what is otherwiſe called *wainage*. Bracton, lib. i. cap. 9. ſpeaking of lords and ſervants, ſays, *Ut ſi eos deſtruant*, *quod ſalvum non poſſit eis eſſe* wainagium *ſuum*. And again, lib iii. tract. 2 cap. 1. *Villanus non amerciabitur*, *niſi ſalvo* wainagio *ſuo*. For anciently, as it appears both by Mag. Chart. and other books, the villain, when amerced, had his *gainage*, or *wainage*, free; to the end his plough might not ſtand ſtill: and the law, for the ſame reaſon, does ſtill allow a like privilege to the huſbandman; that is, his draught-horſes are not, in many caſes, diſtrainable.

Gainage is alſo uſed for the land itſelf, or the profit raiſed by cultivating it.

GAIOPHRAGNIA, in *Natural Hiſtory*, a genus of the firſt order of Septariæ, divided by partitions of earthy matter.

GALACHIDES, or Garatides, in *Natural Hiſtory*, the name of a ſtone to which the writers of the middle ages have attributed many ridiculous virtues. They have left us no farther deſcription of it, than that it was of a blackiſh colour.

GALACTITES, in *Natural Hiſtory*, a ſtone, thus called, becauſe when broken, or ground with water, it yields a white liquor, like milk, which the Greeks call γαλα.

This ſubſtance much reſembles the morochthus, or French chalk, in many reſpects, but differs from it in colour. The ancients found it in the Nile, and ſome other rivers in Greece, and uſed it in medicine as an aſtringent, and for defluxions and ulcers of the eyes. It has been ſuppoſed to increaſe the milk of nurſes, and hung on the necks of children to promote dentition. At preſent it is common in Germany, Italy, and ſome parts of France, and is wholly overlooked, being eſteemed only a worſe kind of the Morochthus.

It is a very hard and dry ſubſtance, an indurated clay, of a cloſe compact texture, very heavy, and in colour of a pale grey, without the leaſt admixture of any other tinge. It is of a leſs even ſurface than the morochthus, and is leſs hard. It melts but ſlowly in the mouth, and leaves ſomething of a luſcious ſweetneſs on the tongue. It does not adhere to the lips or tongue, and if rubbed down on a marble with water, it diſſolves into a ſubſtance of a pure white, reſembling milk. It does not ferment with acids, and in burning becomes of a pure white. Hill's Hiſt. of Foſſ. p. 23.

GALACTOIDES, Γαλακτοειδης, of γαλα, *milk*, and ειδος, *form*, *milky*, a word uſed by the ancients in two or three different ſenſes. Some uſed it to expreſs tepid, or a little warm, with ſuch a heat as that of milk juſt drawn from the cow; others expreſſed by it a white, ſomewhat opake, or milky-colour; others expreſſed by it only a want of tranſparence in fluids. Galen frequently uſes it in the ſecond of theſe ſenſes, when treating of urines.

GALACTOPHAGI, and GALACTOPOTÆ, in *Antiquity*, perſons who lived wholly on milk, without corn, or the uſe of any other food.

The words are compounded of γαλα, γαλακτος, *milk*; φαγειν, *to eat*; and ποτης of πινω, *I drink*.

Certain nations in Scythia Aſiatica, as the Getæ, Nomades, &c. are famous, in ancient hiſtory, in quality of *galactophagi*, milk-eaters. Homer makes their eloge, Iliad, lib. iii.

Ptolemy, in his Geography, places the *galactophagi* between the Riphæan mountains on one ſide, and the Hircanian Sea on the other.

GALACTOPHOROUS *ducts*, are ſuch veſſels as to ſerve to convey milk.

GALACTOPOTÆ. See GALACTOPHAGI.

GALACTOPSIA, a method of curing diſeaſes by drinking milk only. The gout, conſumption, and many other chronical diſeaſes, are by many affirmed to be curable by this means. See Cheyne's Nat. Meth. of curing Diſeaſes.

GALACTOSPONDA, Γαλακτοσπονδα, of γαλα, *milk*, and σπονδη, *ibation*; in *Antiquity*, a LIBATION made with milk

GALACTOSIS, of γαλακτοομαι, *to be converted into milk*, the production of milk; or the action whereby the food, or chyle, is converted into milk.

GALADES, in *Natural Hiſtory*, an epithet given by Rondeletius to a ſpecies of CHAMA, remarkable for its milky whiteneſs. It is derived from the Greek γαλη, *milk*. This CHAMA is a very elegant ſhell.

GALANGAL, GALANGA, a medicinal root, brought from the Eaſt Indies; the produce of a plant of the ſame name.

Its characters are theſe. It hath a ſingle ſpatha of one leaf; the flower has one petal with a ſlender tube, divided in ſix parts, three of them alternately oval and ſpear-ſhaped, the other oval, and at bottom cut into two parts, which are vertically heart-ſhaped; and it hath one ſtamen which is membranaceous: it has a round germen, ſupporting a ſtyle the length of the tube; which afterwards becomes a roundiſh three-cornered capſule with three cells filled with ſeeds. We have but one ſpecies of this plant in England, known by botanical writers under the title of *Kæmpferia*, and is a genus of the *monandria monogynia* claſs.

There are two kinds of *galangals*, the *ſmall* and the *great*. The *ſmaller* is by far the moſt in eſteem, and is almoſt the only one heard of in preſcription. The *galanga minor*, or leſſer *galangal*, is a ſmall ſhort root, of an irregular figure, of the thickneſs of a man's little finger, and is ſeldom met with in pieces of more than an inch or two long. It has ſeveral protuberances at its ends, and on its ſurface, and is ſurrounded with many circular rings, that ſtand out a little beyond the reſt of the ſurface. It is of an extremely firm and compact texture, yet not heavy; it cuts difficultly with a knife, and leaves a poliſhed ſurface. Its colour is a browniſh-red on the outſide, and ſomewhat brighter-red within, though ſtill with a conſiderable admixture of brown.

The ſmall *galangals* are to be choſen full and plump, and of a bright colour, very firm and ſound, and of an acrid and inſupportable hot taſte.

They were formerly in common uſe as warm ſtomachic bitters, and generally made an ingredient in bitter infuſions; but they are now almoſt wholly laid aſide, on account of their unpleaſant flavour. Bitterneſs does not appear to be the proper medical character of this root; the heat and pungency greatly prevailing. A very fiery extract is made from it with rectified ſpirit, and the watery extract is alſo very hot and pungent: in diſtillation with water, it yields an eſſential oil, about a dram in quantity from ſixteen ounces, of little ſmell, and no great pugency: ſo that the pungent matter of the *galangal* appears to be of the ſame nature with that of pepper, reſiding not in the volatile oil, but in a more fixed matter. Lewis. Mat. Med.

The larger *galangal* grows chiefly in Java and Malabar, and anſwers pretty much to the above deſcription, only that it is larger in bulk, leſs unequal and tuberous, weaker, and more diſagreeable than the leſſer kind.

The *galangals* are both brought us from the Eaſt Indies, and are the roots of the ſame plant, which is of the number of the *herbæ bulboſis affines* of Mr. Ray. Herman calls that which produces the larger, *bauchale Indorum*; and that which produces the leſſer, *lagoudi Indorum*.

The people of the Eaſt Indies uſe theſe roots by way of ſpice.

GALANGALE, *Engliſh*, in *Botany*. See CYPERUS.

GALANT. See GALLANT.

GALANTHUS, in *Botany*. See SNOW-*drop*.

GALARCIDES, or GALARICTIS, in *Natural Hiſtory*, a name uſed by the *Writers of the Middle Ages* for a ſtone, to which they attribute great virtues. It is evidently only a corrupt way of ſpelling the word GALACTITES.

GALATEA, in *Mythology*, a ſea-nymph, the daughter of Nereus and Doris, thus called on account of the fairneſs and beauty of her complexion. See NEREIDS and NYMPH.

GALATIANS, *Epiſtle to the*. See EPISTLE.

GALAX, in *Botany*, a genus of the *pentandria monogynia* claſs: the characters of which are, that the calyx conſiſts of a ten-leaved perianthium, the corolla of a ſingle bowl-ſhaped petal, and the fruit is a ſingle-celled, double-valved, elaſtic capſule. There is only one ſpecies. Linnæus.

GALAXIUS, in *Natural Hiſtory*, a name by which many of the ancients have called the MOROCHTHUS, or French chalk.

GALAXY, in *Aſtronomy*, that long, white, luminous track, which ſeems to encompaſs the heavens like a ſwath, ſcarf, or girdle; and which is eaſily perceivable in a clear night, eſpecially when the moon does not appear.

The Greeks call it γαλαξιας, *galaxy*; of γαλα, γαλακτος, *milk*; on account of its colour, and appearance. The Latins, for the ſame reaſon, call it *via lactea*; and we, the *milky-way*.

It paſſes between Sagittary and Gemini, and divides the ſphere into two parts. It is unequally broad; and in ſome parts is ſingle, in others double.

The antient poets, and even philoſophers, ſpeak of the *galaxy* as the road, or way, by which the heroes went to heaven.

Ariſtotle makes it a kind of meteor, formed of a croud of vapours, drawn into that part by certain large ſtars diſpoſed in the region of the heavens anſwering hereto.

Others, finding that the *galaxy* was ſeen all over the globe, that it always correſponded to the ſame fixed ſtars, and that it tranſcended the height of the higheſt planets, ſet aſide Ariſtotle's opinion, and placed the *galaxy* in the firmament or region of the fixed ſtars; and concluded it to be nothing but an aſſemblage of an infinite number of minute ſtars.

Since the invention of the teleſcope, this opinion has been abundantly confirmed. By directing a good teleſcope to any part of the milky way, where, before, we only ſaw a confuſed whiteneſs; we now deſcry an innumerable multitude of little ſtars. Theſe ſtars are ſo remote, that a naked eye confounds them: the like we obſerve in other ſpots, called *nebuloſe ſtars*; which, when examined with the teleſcope, are diſtinctly perceived to be cluſters of little ſtars, too faint to affect the eye ſingly. See STAR.

M. le Monnier not being able to diſcover more ſtars in this ſpace than in other parts of the heavens diſputes the opinion above recited as to the reaſon of the whiteneſs, and ſuppoſes that this and the nebulous ſtars are occaſioned by the ſame kind of matter. Inſt. Art. p. 60.

GALBANETUM, a compoſition, or preparation, of galbanum formerly preſcribed, but now much out of uſe.

GALBANUM, in *Pharmacy*, a gum iſſuing from an inciſion in the root of a ferulaceous plant, called, in Latin, *ferula galbanifera*, growing in Arabia, Syria, &c. See BUBON.

The word is derived, according to Martinius, from the Hebrew *chelbenah*, *fat*.

There are two kinds of *galbanum*: the one in grains, or tears; the other in a coarſe maſs. The firſt is to be choſen of a golden yellow without-ſide, but much paler within; of a bitter taſte, and ſtrong diſagreeable ſmell: for the ſecond, take that which is fulleſt of tears, very dry, clear, and not ſtinking. This laſt is eaſily ſophiſticated with broken beans, reſin, and gum ammoniac, which it reſembles in its medical virtue as well as ſenſible qualities, being leſs efficacious in aſthmatic diſorders, and more ſo on account of its ſtronger flavour, in hyſteric caſes. It forms with water, by tituration, a milky liquor, but does not perfectly diſſolve in water, vinegar, or wine. Rectified ſpirit takes up more than either of theſe menſtrua, but not the whole: the tincture is of a bright golden colour. A mixture of two parts of rectified ſpirit and one of water diſſolves all but the impurities, which are conſiderable. The beſt way of purifying it is to include it in a bladder, and keep it in boiling water, till it becomes ſoft enough to be ſtrained, by preſſure, through a hempen cloth: its eſſential oil will be thus preſerved, which is carried off in evaporation both by water and ſpirit. The eſſential oil of *galbanum*, diſtilled with water, riſes to the ſurface, of a yellowiſh colour, and in quantity about the twentieth part of its weight. The empyreumatic oil is of a blue colour, and changes in the air into purple. Lewis and Neumann.

Galbanum is of an emollient and reſolutive nature; good in all hyſteric caſes, and in aſthmas, and inveterate coughs: it provokes the menſes, and brings on delivery; but it is chiefly uſed externally, in plaſters for the belly, which it alſo looſens, in what way ſoever applied.

GALBULA, in *Zoology*, the name of a bird of the thruſh kind, common in Italy and Germany, very remarkable for the elegant ſtructure and hanging of its neſt; and thence called by ſome *picus nidum ſuſpendens*, and by others *oriolus*, *chloreus*, and *icterus*, being ſuppoſed to be the icterus, or jaundice-bird of Pliny, and the old writers. This bird is ſomewhat larger than the common thruſh; its beak is a finger's breadth long, and red; its wing-feathers are black, but ſome are tipped, and others edged with white; others are varied with yellow, and the reſt are an extremely bright and beautiful yellow. The female is leſs beautiful, the yellow being more ſhaded with black and brown. The *galbula* feeds on inſects, and is in moſt places very much eſteemed at the table, but is no where to be had at all ſeaſons, being a bird of paſſage.

GALE, in *Botany*. See *Sweet*-Willow.

Gale, a *Sea Phraſe*, for the blowing of the wind.

When the ſea is not blown ſo hard, but that a ſhip can carry her top-ſails a trip, that is, hoiſted up to the higheſt, they ſay it is a *loom gale*.

When it blows very ſtrong, they ſay it is a *ſtiff gale*, or, at leaſt a *freſh gale*; but when it blows ſo hard, and violently, that a ſhip cannot bear any ſail, they ſay, it blows a *ſtorm*.

When two ſhips are near one another at ſea, and there being but little wind blowing, one feels more of it than another; they ſay the ſhip *gales* away from the other.

GALEA, or **GALERUS**, among the *Romans*, was a light caſque for the head, generally made of the ſkin of ſome wild beaſt, in order to appear the more terrible. Thus Virgil,

> —— *fulvoſque lupi de pelle galleros.*

The *galea* was alſo a head-piece, coming down to the ſhoulders, commonly of braſs, and ſometimes of iron; the lower part was called *buccula*, and on the top was the creſt.

Galea, in *Natural Hiſtory*, the name of a genus of the *echinodermata*, or ſea-hedgehogs, whoſe ſhape is that of a large elevated helmet, compoſed of ſeveral tranſverſely-joined plates, or aſſulæ, and covered with very ſmall and rough tubercles, in the ſhape of little granulæ. This genus, when foſſile, is called in Engliſh the helmet-ſtone, and is marked with ten rows of double lines, either crenated, or punctuated, and running from the top to the baſe; the anterior ones being much longer than the reſt.

Of this genus there are three known ſpecies, viz. 1. The ſcutated headed one, which has on its ſummit an oblong pentagonal plate like a ſhield. 2. The naked headed one without this ſhield. 3. That with the tæniæ laurated, and ſhewing that they have been once of the variolated kind. Klein's Echinod.

Galea *Piſcis*, in *Ichthyology*, a name given by Geſner, and ſome other writers, to the fiſh called by other writers *muſtela alia*, and by Artedi reduced to the genus of the *blenni*. It is the BLENNUS, with four bifid beards under the throat.

Galea *Venetorum*, in *Zoology*, a name given by ſome authors to the common MUSTELA.

GALEANTHROPIA, of γαλεη, *cat*, and ανθρωπος, *man*, in the writings of the *Ancient Phyſicians*, a term uſed to expreſs a ſpecies of madneſs, in which the patient fancied himſelf a cat, and endeavoured to perform all the motions of that animal.

GALEARII, in *Antiquity*, *helmet-bearers*; a name the Romans gave to the black guards, or ſervants of the ſoldiers. See Negetius iii. 6. and Salmatius on the third chapter of the life of Adrian by Spartian.

GALLEASSE. See Galley.

GALEATE *flowers*. See Flowers.

GALEETTO, in *Zoology*, the name of a fiſh of the alauda kind, called by Rondeletius, *alauda non criſtata*, and in Engliſh the mulgranoc and the bullcard. It is a ſmall fiſh of a greeniſh yellow, or olive colour, without any variegation in ſome, but in others a number of faint blue tranſverſe lines are diſpoſed on the back, the ſides, and the fins; the intermediate ſpaces between theſe lines on the back are of a reddiſh brown, and in ſome two olive-coloured and browniſh lines run longitudinally down the back. The colours, in ſhort, vary extremely in this fiſh. It is very full of life, and lives, like the eel, many hours without water. It is caught among rocks and ſtones about the ſhores in the Mediterranean, and alſo in our own ſeas. Willughby's Hiſt. Piſc. p. 103. Artedi reduces this fiſh to the genus of the blenni, and diſtinguiſhes it by the name of the *blennus* having the upper jaw longer than the under, and the top of the head acuminated.

GALEGA, in *Botany*. See Goat's *Rue*.

GALENA, a name given by *Mineraliſts* to a ſpecies of poor lead-ore. It was alſo the original name given by Andromachus to the theriaca, from its effect in bringing on a pleaſing calm over the blood and ſpirits on taking it.

Galena *inanis*, in *Mineralogy*, a name given by authors to a glittering ſubſtance, very much reſembling ſome of the plated ores of lead, but really containing none of that metal. It is more uſually called mock-lead, and blende or BLINDE.

GALENIA, in *Botany*, a genus of the *octandria digynia* claſs: its characters are theſe. The flower hath no petals, but eight hairy ſtamina of the length of the empalement. In the centre is ſituated a roundiſh germen; and the empalement afterward becomes a roundiſh capſule with two cells, containing two oblong angular ſeeds. We know but one ſpecies of this genus, which grows naturally at the Cape of Good Hope. Miller.

GALENIC, or **Galenical**, *medicine*, is that manner of conſidering and treating diſeaſes, founded on the principles of Galen, or introduced by Galen.

Claud. Galen was of Pergamus in Aſia, the ſon of Nicon, a famous geometrician, and architect; and was a pupil of Satyron and Pelops, two able phyſicians. He was born under the emperor Adrian, in the year of Chriſt 131, and firſt diſtinguiſhed himſelf at Athens, then at Alexandria, and laſtly at Rome; where he wrote a great deal; and where he alſo died.

He is ſaid to have compoſed two hundred treatiſes, whereof there are one hundred and ſeventy ſtill extant. There have been twenty-three ſeveral editions of this author. The firſt is that of Venice, in folio, in the year 1525, but the beſt is that of Paris, in thirteen volumes in folio, Greek and Latin, publiſhed in 1639.

This author, collecting and digeſting what the phyſicians before him had done, and explaining every thing according to the ſtricteſt doctrine of the Peripatetics, ſet phyſic on a new footing: he introduced the doctrine of the four elements; the cardinal qualities, and their degrees; and the four humours, or temperaments.

Galenic is more frequently uſed, as contradiſtinguiſhed from *chemical*.

In this ſenſe, *Galenical medicine*, and *Galenical pharmacy*, are thoſe which proceed upon the eaſier preparations of herbs, roots, &c. by infuſion, decoction, &c. and attain their ends, and make their remedies effectual, by the combining and multiplying of ingredients: in oppoſition to the chemical medicine, or pharmacy: which torture the materia medica by fire, and draw their more intimate and remote virtues by elaborate preparations; as calcination, digeſtion, fermentation, &c.

Medicine was wholly *Galenical*, till the time of Paracelſus. Geber, indeed, and after him Raymund Lully, Arnoldus de Villa Nova, and Baſil Valentine, made ſome attempts to apply chemiſtry to medicine; eſpecially the laſt of them; but no great advance was made. Paracelſus, and after him Van Helmont, altered the whole body of medicine; exploded *Galeniſm*, and the Peripatetic doctrine, and rendered medicine almoſt wholly chemical.

The late improvements in philoſophy have reformed and retrieved the *Galenical* medicine; which, however, has now little of *Galen*'s in it. It is become all mechanical, and corpuſcular: inſtead of qualities and degrees, every thing is now reduced to mechanical affections; to the figures, bulks, gravities, &c. of the component particles, and to the great principle of attraction.

Galenical *phyſicians*. See Physicians and Galenists.

GALENION, the name of an anodyne cataplaſm, preſcribed by Ægineta.

GALENISTS, a denomination given to ſuch phyſicians as practiſe, preſcribe, or write, on the *Galenical* principles.

The *Galeniſts* ſtand oppoſed to the *chemiſts*. The materia

teria medica of the firſt is chiefly of the vegetable kind, the virtues of which they procure by the more ſimple and eaſy means, and ſeldom go beyond decoction; the latter take in minerals, ſalts, ſtones, and even metals, and ſemimetals: theſe, they hold, afford more efficacious remedies; and their virtues are procured by long, artful, laboured proceſſes, with the help of fire, are obtained more pure, and in a leſſer compaſs.

At preſent, the *Galeniſts* and chemiſts are pretty well accommodated; and moſt of our phyſicians uſe the preparations and remedies of both.

GALENISTS, or GALENITES, are alſo a branch of Mennonites, or Anabaptiſts, who take in ſeveral of the opinions of the Socinians, or rather Arians, touching the divinity of our Saviour.

In 1664 the WATERLANDIANS were divided into two parties, of which the one were called *Galeniſts*, and the other APOSTOOLIANS.

They are thus called from their leader, Abr. Galenus, a learned and eloquent phyſician of Amſterdam, who conſidered the Chriſtian religion as a ſyſtem, that laid much leſs ſtreſs on faith than practice; and who was for taking into the communion of the Mennonites, all thoſe who acknowledged the divine origin of the books of the Old and New Teſtament, and led holy and virtuous lives.

GALEOBDOLON, in *Botany*, the name of a genus of plants deſcribed by Dillenius in his Hortus Elthamenſis, and ranked by Linnæus under the genus of GALEOPSIS.

GALEOLA, in *Natural Hiſtory*, the name of a genus of the *echinodermata*, or ſea hedge-hogs of the galeated or helmet kind.

They have their name from the Latin *galeola*, a diminutive of the word galea, and which ſignified with the ancient Romans a drinking veſſel, made in the ſhape of a ſmall helmet. Of this genus there are three known ſpecies. 1. A papilloſe kind, covered with ſmall eminences. 2. An undulated kind, with its ſtriæ reſembling waves. 3. The ſmooth kind. Klein.

GALEOPSIS, in *Botany*. See *Stinking Dead* NETTLE.

GALERICULATE *flowers*. See FLOWERS.

GALEUS. See *Blue* SHARK.

GALEUS *canis*, or SQUALUS *Galeus* of Linnæus. See CANIS *Galeus*.

GALEUS *lævis*, or SQUALUS *Muſtelus* of Linnæus, the *ſmooth hound fiſh*, in *Zoology*, the name of a fiſh of the ſame genus with the *galeus ſpinax*; but differing in ſize and many other particulars. It is called the ſmooth hound fiſh, not from any peculiar ſmoothneſs of the ſkin, for all the *galei* are rough in that particular, but by way of diſtinction from the *galeus ſpinax*, as it has no ſpines on the back. Its back and ſides are aſh-coloured; its belly white; its body long and round, the end of its ſnout is obtuſe, and runs out a great way beyond the mouth and eyes. The tail is forked. It has two fins on the back, and two pair of fins on the belly. It has properly ſpeaking no teeth, but the jaws are both rough and ſharp like a file.

GALEUS *rhodius*, in *Ichthyology*, a name given by Athenæus and ſome other of the old writers, to a very large and delicate fiſh. Schoneveldt is of opinion, that they meant by it the ſturgeon, and brings many good reaſons for his opinion.

GALEUS *acanthias*, or SQUALUS *ſpinax*, in *Zoology*, the name of a fiſh of the ſhark kind, called in Engliſh the picked dog fiſh and hound fiſh. It has a long and round body, and has no ſcales, but is covered with a rough ſkin, uſed by ſeveral artiſts for poliſhing their works.

It takes its name from a ſtrong and ſharp ſpine placed juſt before each of the back fins.

Its back is of a browniſh aſh colour. Its belly white and leſs rough, its noſe conſiderably long, ſomewhat flatted, and rounded at the end. The pupil of the eye is black, of an elliptic form, and ſtands tranſverſely. The mouth is placed about the middle of the ſnout, and in its lower part; and it has two rows of ſmall teeth. It is common in the Mediterranean and Engliſh ſeas.

GALEUS *ſtellatus*, the *ſtarred hound fiſh*, in *Zoology*, a kind of hound fiſh, remarkably ſpeckled, with white ſpots in form of ſtars.

GALEXIA, in *Ichthyology*, a name given by Galen and ſome of the other ancient writers, to the common LAMPREY.

GALGULUS, in *Zoology*. See GALBULA.

GALI, in the *Materia Medica*, a name given by ſome to the indigo, or fæculæ of the plant anil uſed in dying, &c. Garcias gives us this name, and ſays, that the plant is like the mangirique; but Cluſius tranſlating this word by ocymum or baſil, has ſtrangely perplexed the caſe: the anil or indigo plant not having any reſemblance of that herb.

GALILEANS, GALILÆI, a ſect, among the ancient Jews, denominated from Judas of *Galilee*, their chief; who, eſteeming it unworthy, that the Jews ſhould pay tribute to ſtrangers, raiſed up his countrymen againſt the edict of Auguſtus, which had ordered a cenſus, or enumeration, to be made of all his ſubjects.

Their pretence was, that God alone ſhould be owned as maſter, and called by the name of the *Lord*: in other reſpects they had much the ſame doctrine as the Phariſees; but as they judged it unlawful to pray for infidel princes, they ſeparated themſelves from the reſt of the Jews, and performed their ſacrifices apart.

As our Saviour, and his apoſtles, were of *Galilee*, they were ſuſpected to be of the ſect of *Galileans*; and it was on this principle, as St. Jerome obſerves, that the Phariſees laid a ſnare for him; aſking, Whether it was lawful to give tribute to Cæſar; that in caſe he denied it, they might have an occaſion of accuſing him. Vid. Joſeph. Art. Jud. lib. xviii.

GALIUM, in *Botany*. See LADIES *Bedſtraw*.

GALILEO'*s teleſcope*. See TELESCOPE.

GALL, a yellow, bitter juice, or humour, called alſo *bile*, ſecreted from the blood, in the glands of the liver, and depoſited in a peculiar reſervoir, called the *gall-bladder*.

The bile contained in the *gall*-bladder, properly called *gall*, is ſomewhat different from the bile depoſited in the porus biliarius; being of a brighter yellow, a greater conſiſtence, and more bitter and acrimonious. For the reſt, the manner of ſecretion, with the qualities, uſe, &c. of the two juices, are the ſame: which ſee, under BILE.

After all that has been ſaid about the bile by ancient and modern writers, there ſeems yet a doubt as to the true origin, and where it is generated. The commonly eſtabliſhed opinion is, that the bile contained in the *gall*-bladder has been filtrated into it by certain glands which are found on its inner cavity. Theſe glands, however, have been rather ſuppoſed than demonſtrated, and if writers mean by them, thoſe little protuberances found ſometimes within the cyſt, there is no certainty of their ſeparating the bile, ſince theſe glands, as they are called, are wanting in many, nay in the greater part of perfect ſound bodies, where the viſcera are in a good ſtate, and not affected by any obſtructions. When the world was beginning to believe that there were in reality no ſuch glands as theſe, it was ſaid that there were certain veſſels and canals which collecting the bile from the ſubſtance of the liver, carried it to the inner ſurface of the *gall*-bladder, where they opened and emptied their contents into its cavity; but theſe veſſels have in reality been no more demonſtrated to exiſt than the before mentioned glands, and there have ſometimes appeared caſes, where demonſtration has in a manner appeared on the contrary ſide, to prove, that the bile is not ſeparated in the *gall*-bladder, but is brought into it from elſewhere: of this kind there is one very remarkable inſtance mentioned in the Memoirs of the Academy of Sciences of Paris.

Mr. Lieutaud, on diſſecting a morbid body, found the *gall*-bladder ſo extremely ſhrunk up in ſize, that he could ſcarce at firſt believe that it was the *gall*-bladder; its neck was wholly filled, and as it were plugged up with a blackiſh matter, formed into a body of a ſpherical ſhape, and compoſed of ſeveral beds, or layers, in the manner of thoſe ſtones which are not unfrequently found in the *gall*-bladders of different animals; and the other part of this body of it, which was alſo much the largeſt, was contained in a bag made by the ſeparation of the two membranes of which the *gall*-bladder is naturally compoſed; this contained no fluid matter, except a few drops of a very clear water; and its inner ſurface, which was perfectly white, did not appear ever to have contained any bile; the cyſtic canal, and the biliary pore, were very much dilated, and the canal as full of bile as it could hold, and the whole ſubſtance of the liver was very ſound, and in a ſtate of perfect health. Now if either the glands in the inner membrane of the *gall*-bladder ſeparated the bile, or if any veſſels ſeparated it from the liver, and conveyed it immediately into that reſervoir by apertures in its inner ſurface; in either of theſe caſes all this might have been done in the bladder, though its neck were thus ſtopped up, but on the contrary there was no bile found there, and it ſhould appear very plainly from this, that the bile muſt have ſome other origin, ſince it ſeems to be conveyed into the *gall*-bladder no other way than through its neck. Mem. Acad. Scienc. Par. 1735.

The human bile taken out of the bodies of thoſe who died of the plague at Marſeilles, was alſo found to be of a blackiſh, or deep green colour. On the mixing ſpirit of vitriol with it, it always became of a fine green, which colour never changed in it: and when ſalt, or oil of tartar were mixed in it, it always became yellow. Spirit of nitre added to it turned it black, but the colour ſoon faded. This bile poured into a wound made in the leg of a dog, would always render him drowſy, dull, and not caring to eat, and all the dogs on which the experiment was tried, died within about four days, with all the circumſtances of a genuine plague upon them. Philoſ. Tranſ. Nº 170.

If half an ounce of alum in powder be added to a pound of ox-*gall*, and the whole ſtirred a little together, there riſes immediately an ebullition with a conſiderable efferveſcence, and the whole becomes thick and turbid like dung, and of a greeniſh yellow colour; but after a while, the *gall* will be precipitated, and its thicker parts ſeparating themſelves and falling to the bottom, the remainder will become of a clear hue and a reddiſh colour. After this has ſtood five or ſix days, ſeparate the clear liquor from the fæces at botom, and from what foulneſs ſwims at top, and ſet it in the ſun for three or four months in a vial well ſtopped; there will at the end of this time be found another precipitate at the bottom of the vial, and on the ſurface of the liquor, there will gradually gather together a white and hard fatty matter, and the red colour of the liquor finally will change into its primitive yellow again; and what is very remarkable, the whole will have the ſmell of boiled crayfiſh.

The obſervation that there is contained in this red liquor of the *gall*, though ſeemingly perfectly clear, a white fatty matter like ſuet, and that on the ſeparating of this white matter, the red liquor loſes its colour, and regains its primitive yellow together, proves that the ſubſtance naturally contained in the *gall*-bladder, is a kind of liquid ſoap.

The liquor of the *gall* appears red after its firſt precipitation, and loſes this colour again by degrees as the fat becomes ſeparated from it; the reaſon of this is, that almoſt all ſolutions of oily or fatty bodies are red, be the menſtruum what it will, and this being one of thoſe ſolutions muſt be red ſo long as it continues ſuch, that is, ſo long as the fat remains ſuſpended in it; but as ſoon as the fat is ſeparated, the cauſe of the red colour ceaſes, and the liquor becomes yellow.

This depurated liquor of *gall*, is one of the greateſt of all remedies for freckles in the face: the manner of uſing it is this; mix together equal parts of it, and of oil of tartar per deliquium: to a dram and a half of each of theſe, add an ounce of river water, mix them well by ſhaking, and keep them in a vial well ſtopped: the end of the finger being wetted with this, is to be touched upon the freckled part, and this repeated three or four times a day, letting it dry on, at length the part will look red, and there will be a ſort of tickling ſenſation felt in it; and after that, the ſkin will become ſcurfy, and both that and the freckles will fall off. If this does not ſucceed the firſt time, it is to be repeated, and it will clear the face for ſix or eight months, at the end of which time it is to be uſed again. Mem. Acad. Par. 1709.

The *gall* of divers animals is recommended for divers uſes. That of a hog is ſaid to make the hair grow; and deterges and heals ulcers of the ears: that of a lamb is recommended for the epilepſy: that of the pike, for intermitting fevers: that of the carp clears and ſtrengthens the ſight: that of the eel has been adminiſtered, as it is ſaid, with good ſucceſs, for opening obſtructions of the viſcera, promoting urine, the menſes, and labour pains. Boerhaave relates that he has cured pale ricketty children by pills made of the *galls* of the eel and pike; that the medicine operated powerfully by urine, and that the belly, before ſwelled, ſubſided ſurpriſingly: that of a kid, mixed with the white of an egg, bread, and oil of bays, and applied in form of poultice on the navel, has been extolled an approved remedy for a quotidian ague: that of a cock and a bullock, are reputed good in diſeaſes of the eyes, and to take away freckles, and other disfigurements of the ſkin: that of a roe-buck, or hare, deterges and carries off clouds, ſpecks, and cataracts of the eyes: that of the boar, externally applied, is reſolutive, and good in ſcrophulous tumours: thoſe of the ſheep, and partridge, ſerve to deterge and clean ulcers of the eyes. Fa. Roger adds, that the Mahometans of Paleſtine uſe no other remedy, againſt poiſons, but ſeven or eight drops of the *gall* of a bear.

With us theſe fluids are employed only for external purpoſes; a mixture of ox-*gall* with camphorated ſpirit of wine is ſaid to be an uſeful embrocation for ſprains, bruiſes, rheumatic pains, &c.

GALL-BLADDER, *veſicula*, or *folliculus fellis*, is a membranous receptacle, in figure ſomewhat like a pear; ſituate at the lower margin of the liver, on the concave ſide; being about the bigneſs of a pullet's egg. See *Tab. Anat. (Splanch.) fig.* 1. *lit. c. fig.* 5. *lit. e. (Angeiol.) fig.* 1. *n.* 34.

The *gall-bladder* adheres to the liver, both by its veſſels which it receives from it; and likewiſe by its membranes, whereof the external is common with that of the liver. The lower-part, which hangs out of the liver, reſts on the pylorus of the ſtomach, which it dyes yellow with the *gall* tranſuding through its membranes.

Its fundus is raiſed by a fulneſs, and depreſſed by the emptying of the ſtomach, whence that uneaſy ſenſation which attends hunger.

Its membranes are reckoned five: an outer, or common one, from the peritonæum; an inner one from the capſula of the porta, and porus biliarius; and three proper ones: the firſt, *vaſculous*, conſiſting of white fibres, interwoven with veſſels; the ſecond, *muſcular*, conſiſting of a double row of fleſhy fibres, the one longitudinal, the other angular; the third, or inner coat, *glandulous*, conſiſting of a great number of glands, like the cruſta villoſa of the ſtomach, which ſeparates a mucus that lines the inſide of the *gall-bladder*, and defends it from the acrimony of the bile.

But Dr. Drake, viewing a piece of dried *gall-bladder*, with a microſcope, found little reaſon for this accurate diſtinction: the ſeveral orders of fibres of the different coats appearing to be no other than an infinite perplexity of veſſels diverſly ramified.

This bladder is uſually divided into two parts: the *fundus*, or bottom; and the *collum*, or neck: at the orifice of which latter is placed a ring, or circle, of muſcular fibres, which ſerve as a ſphincter to conſtringe the orifice of the *gall-bladder*, and hinder the too liberal diſcharge of the bile.

The neck of the *gall-bladder*, being prolonged, terminates in a duct, called *meatus cyſticus*, or *bilarius*, which, at about two inches diſtance from the *gall-bladder* is joined to the *meatus hypaticus*, and theſe together form the *ductus communis*. The uſe of the *gall-bladder* is to receive the BILE, after it has been ſecreted in the glands of the liver, and to diſcharge it by the common duct into the duodenum.

There are ſome animals without *gall-bladders*, as deer, horſes, aſſes, mules, camels: and among fiſhes, the ſea-calf, and dolphin. The *gall* of theſe animals is incloſed in ducts, which terminate in the inteſtines.

Mr. Petit gives us the marks, by which a diſtention of the *gall-bladder* from the bile, making an external tumour with fluctuation, may be known and diſtinguiſhed from an abſceſs in the liver. See Mem. de l'Acad. de Chirurg. tom. i. and Med. Eſſ. Edinb. Abr. vol. ii. p. 491.

GALL *ſickneſs*. See BILIOUS *Fever* and FEVER.

GALL *ſtones*. See BILIARY *Concretions*.

Gall-ſtones, or thoſe concretions of earthy matter and bile that are found in the GALL-bladder, or bile ducts of beaſts, are uſed in the arts: when theſe are rubbed with water, and treated as GAMBOGE, they yield a deep warm yellow, which, on account of its brightneſs and dark ſhade, as well as durableneſs, is very valuable. A fictitious kind of *gall-ſtones* may be prepared in the following manner: take a quart of the freſh bile of oxen; boil it with a quarter of an ounce of clear gum Arabic in a pewter veſſel in *balneo Mariæ*: evaporate the whole to about an eighth, and remove the remainder into a china cup or baſon, and evaporate it to dryneſs, collecting it into a maſs as it becomes of a ſtiff conſiſtence. This being more tranſparent, will be found of very great advantage in water-painting.

GALL is alſo uſed by naturaliſts to expreſs any protuberance, or diſtortion of a part of a leaf, or ſtalk on a tree, or plant, occaſioned by an inſect living and growing within it. Theſe are all monſtrous and unnatural productions of the vegetables that bear them; but they often are ſo regular in their formation, that they have the appearance of fruits and flowers. On examination however it will always appear, that they are fruits containing no ſeeds, and flowers the product of which is animals. Among the ſmaller inſects, there are many which either in the whole ſtate of the worm, or in a part of it, are of ſo tender and delicate a ſtructure, that they cannot bear the contact of air; and others that are continually expoſed to the ravage of a number of deſtroyers; ſo that by one or other of theſe means they could never live to arrive at maturity, or to propagate their ſeveral ſpecies. Provident nature has therefore allotted for the habitation of theſe the *galls* of trees and plants; they never however find excreſcences ready formed, but by their own action make them for themſelves. Some of theſe inſects are produced from eggs laid by the parent animal on the ſtalks of leaves or plants, and as ſoon as ever they are hatched from theſe, make their way into the leaf, or ſtalk, and find a ſafe lodging in this receſs, and neceſſary food in its juices; others are lodged even in the egg-ſtate within the ſubſtance of the leaves and branches, and have no occaſion for eating their own way in. The parents of theſe are a peculiar race of flies, which have at their tail an inſtrument prepared for this purpoſe; with this they pierce the ſurfaces of vegetables, and lay their eggs in the holes they have made; ſo that the worms hatched from theſe have nothing to do, but to gnaw the tender fibres of the vegetable, and feed on the juices extravaſated from the apertures they make in them. Reaumur, Hiſt. Inſ. vol. vi. p. 176.

The manner of the production of *galls* is well deſcribed by Malpighi, in an expreſs treatiſe De Gallis. The proceſs, as obſerved in the cone-*galls*, or apples on the gems of oaks, is alſo given us by Dr. Derham.

Theſe cones, ſays that author, are in outward appearance perfectly like the gems or buds themſelves, only vaſtly bigger; and in effect, they are no other than the gems ſwelled out in bulk, which naturally ought to be puſhed out at length. The cauſe of this obſtruction of vegetation is this: into the very heart of the young tender bud, which begins to be turgid in June, and ſhoots out in a month more, an inſect, of the ichneumon fly kind, thruſts one, or more eggs; and, in all probability, ſome venomous ichor therewith. This egg ſoon becomes a maggot; which eats itſelf a little cell in the very heart or pith of the gem, which ſhould be the rudiment of the branch, leaves, and fruit.

The branch thus deſtroyed, or, at leaſt, its vegetation obſtructed; the ſap that was to nouriſh it, is diverted into the remaining parts of the bud, which are only the ſcaly teguments; and which by this means grow large and flouriſhing, and become a covering to the inſect caſe, as before they were to the tender branch.

The caſe lying within this cone, is, at firſt, but ſmall; but, by degrees, as the included maggot increaſes, ſo does the caſe; till it comes to the ſize of a large white pea, ſhaped like an acorn.

It may be added, that even nettles, ground-ivy, &c. have a kind of balls or caſes produced on their leaves, by the injection of the eggs of a fly of the ſame kind. Theſe caſes always grow in, or adjoining to, ſome rib of the leaf; and their production Malpighi and Dr. Derham deſcribe thus:

The parent-inſect, with its ſtiff ſetaceous tail, bores into the rib of the leaf, when tender, and makes way for its eggs into the very pith or heart thereof; emitting along with them a proper juice to pervert the regular vegetations.

From this wound riſes a ſmall excreſcence, which, when the maggot is hatched, increaſes and ſwells on each ſide the leaf, between the two membranes; extending itſelf into the parenchymous parts thereof, till it be grown as big as two grains of wheat. In this caſe lies a ſmall white, rough maggot; which turns to an aurelia, and afterwards to an ichneumon fly.

The *galls* cauſed by different inſects have a very different internal ſtructure, ſome of them have only one large cavity within, in which a number of the animals live in community, others have ſeveral ſmall cavities with communications between each, and others have different numbers of little cellules each ſeparate, and having no communication with the others: there are ſometimes a hundred of theſe cellules in one *gall*, ſometimes only two or three; and finally, there are others in which there is only one cavity inhabited by one inſect. The creatures of theſe two laſt kinds, live in perfect ſolitude during the worm ſtate, and can have no knowledge of any other living creature beſides themſelves, till they have paſſed through the intermediate ſtate of chryſalis, and become winged animals like thoſe to which they owed their origin, and are ready to lay eggs themſelves.

The general diviſion of *galls* into theſe claſſes, admits of a vaſt number of ſubdiſtinctions under each, from the different figure and conſiſtence of the ſeveral ſpecies. Some of them are ſo hard, that they equal, or exceed the hardneſs of the wood of the tree they grow upon; and when cut, appear compoſed of fibres, much more denſely and cloſely arranged: others are ſoft and ſpongy, and reſemble ſome of the tender fruits in appearance. The firſt kind are uſually called *gall*-nuts, and the latter apple-*galls*, or berry-*galls*. The common *galls* uſed in dying, are of the firſt kind, and what are called oak-apples, and oak-grapes are of the latter. The oak produces ſeveral of this laſt ſpecies of *galls*, ſome of which are oblong, others round, reſembling grapes, gooſeberries, and other fruits; theſe are alſo uſually beautifully coloured, ſome being of a bright red, others of a bright yellow. Theſe *galls* of the oak, are of the auſtere taſte of the juices of that tree; but thoſe of other plants, are often well taſted. There is a ſpecies of ſage, well known by the name of apple-ſage, the leaves of which afford a lodging to the worm of a peculiar ſpecies of fly, and this *gall* grows to a very conſiderable ſize, ſo as to have obtained the name of an apple from its reſemblance to this fruit; theſe are eaten by the people of the eaſtern nations, and are commonly ſold in the markets of Conſtantinople, and other places. A plant very common with us, the ground-ivy, has the ſame property: its leaves are often loaded with *galls* on their under ſide, which are very green and juicy, and of no diſagreeable taſte. Mr. Reaumur gives us an account of their being one year ſo plentiful in the neighbourhood of Paris, that the poor people eat them both raw and boiled as food. See *Tab. of Inſects*, N° 25. ſeq. Reaumur, Hiſt. Inſ. vol. vi. p. 182.

The round *galls* are by far the moſt numerous claſs of all others; but theſe have great differences in their appearance: ſome are perfectly ſmooth on the ſurface; others are very rough and knobby; ſome adhere immediately to the leaf or ſtalk of the vegetable; and others are placed on a longer or ſhorter pedicle. Some are whole on the ſurface, which ſhew that the creature by which they are formed is ſtill contained in them, and others are perforated, ſo that the animal has eſcaped.

There are two principal kinds of *oak-galls* in our ſhops, and uſed in DYING, making INK, STAINING, &c. one ſaid to be brought from the Levant, and the other from ſome of the ſouthern parts of Europe, particularly Sicily and Romania. They are nothing elſe than the caſes of inſects, formed of the juices of the oak-tree, iſſuing out through ſmall wounds made by theſe inſects, in the manner already deſcribed. See an account of theſe inſects in Phil. Tranſ. N° 245. and *Gall-inſect infra.*

Theſe excreſcences are not formed on any particular ſpecies of the oak-tree; for Mr. Ray ſays, that he has ſeen them on the ſame kind of oak with that which is common here. The firſt kind, called Aleppo *galls*, and in the ſhops of the dry-ſalters, blue *galls*, are generally of a bluiſh colour, or of a greyiſh or blackiſh verging to blueneſs, unequal and warty on the ſurface, hard to break, and of a cloſe compact texture. The ſecond kind, commonly called white *galls*, are of a pale browniſh or whitiſh colour, ſmooth, round, eaſily broken, leſs compact, and of a much larger ſize. The two ſorts differ in ſtrength, but in other reſpects they appear to be of the ſame quality. The Aleppo or blue *galls* are the ſtrongeſt; two parts of theſe are reckoned by the workmen to be equivalent to three of the white, and Dr. Lewis apprehends that the difference in their ſtrength is greater than in this proportion. The aſtringent and colouring matter of *galls* is diſſolved and extracted from the ſubject both by water and ſpirit of wine, and does not exhale in the evaporation of the liquors by heat. From ſixteen drams of *galls* fourteen drams were extracted by water, and from the ſame quantity twelve drams and two ſcruples by ſpirit.

Galls, with regard to their medicinal uſe, are found to be very aſtringent, and good under proper management in diarrhœas, dyſenteries, and hæmorrhages of all kinds. They have alſo a great virtue as a FEBRIFUGE, and are often found to cure an intermittent. In fevers half a dram or more of the powder of Aleppo *galls* may be given for a doſe. They are alſo uſed externally as a ſtrengthener, and aſtringent: a decoction of them is applied with ſucceſs by way of fomentation in *procidentia of the anus*, and has been injected in the fluor albus with great ſucceſs.

Galls may be made a very uſeful teſt for iron in the ſeveral ſpecies of vitriols; for it is certain that an infuſion of *galls* will become black with a ſolution of any vitriol that contains iron, and not at all ſo with ſuch as contain only copper, as the common blue vitriol and the like.

Dr. Lewis obſerves, that if a decoction or infuſion of *galls* is dropt into a ſolution of this vitriol largely diluted with water, the firſt drops produce bluiſh or purpliſh red clouds, which mingling with the liquor tinge it uniformly of their own bluiſh or reddiſh colour. With diſtilled water, or the common ſpring waters, the mixture is always blue; but if the ſmalleſt portion of alkaline ſalt be diſſolved in the water, or if the water is in the leaſt degree putrid, the colour produced will be purple or reddiſh. If more of the aſtringent infuſion be added to the blue or purple liquors, they will deepen to a black, which will be more or leſs intenſe according to the degree of dilution: and the colouring matter may be ſeparated from the liquors, unleſs they are of a full blackneſs, by dilution with water and depoſition. The ſeparation may be retarded or prevented, as is done in the preparation of ink, by adding ſome mucilaginous matter, as gum Arabic. This coloured matter is evidently a ferruginous precipitate; for, although it cannot be attracted by a magnet, this property may be given to it by a ſlight calcination. This precipitate is ſoluble by acids, as in the caſe of inks, whoſe colour is hereby deſtroyed, but it may be reſtored by the addition of alkalis. Lewis's Com. Phil. Techn. p. 344, &c.

Galls, *box*, in *Natural Hiſtory*, the name given by authors to a very ſingular kind of *galls*, of a conic figure, with a conic top, or cover reſembling a wooden box, and encloſing a white worm in the manner of the other vegetable lodgments of the ſame kind; this ſort of *gall* is found only on the leaves of the LIME-tree. Reaumur.

Galls, *bramble*, a ſpecies of *galls* found on the branches of the common wild bramble. Theſe are often no other than tumefactions of the ſtalk, for the ſpace of an inch, or thereabout, which ſometimes form only ſo many thick cylindric pieces; at other times they are of the ſhape of an olive, and ſometimes they affect only one ſide of the branch: in all caſes, however, the tumid part, or *gall*, is much harder than the other parts of the branch, which are in their natural ſtate. They are inhabited by a great number of worms, of an oblong figure, and yellow colour, which have a ſharp point, of a brown colour, and of the hardneſs of iron, proceeding from the extremity of the head, with which they tear and break the woody fibres, and near its end there is a ſlit, which is the mouth of the creature, and ſerves for receiving and conveying into the ſtomach, the fragments of wood which it breaks with the point. Reaumur.

Galls, *broom*. See Broom.

Galls, *lime*. See Lime.

Galls, *muſhroom*. See Mushroom.

Galls, *gooſeberry*. See Gooseberry.

Galls, *grape*. See Grape.

Galls, *oak-leaf*. See Oak *leaf galls*.

Galls, *roſe*. See Rose.

Galls, *willow*. See Willow.

Gall, *wind*. See Wind.

Gall-*inſect*, in *Natural Hiſtory*, the name of a claſs of inſects, ſo called, from their reſemblance to ſmall *galls*, or vegetable protuberances of a like kind upon trees. They are indeed ſo like theſe ſubſtances, as to have been by many miſtaken for them, and thought not of the animal, but of the vegetable kingdom. Theſe inſects paſs a very great part of their life, even many months together, faſtened againſt the leaves or ſtalks of plants, without any appearance of life or motion, and this is the time in which they acquire their ſtated growth. They are in this ſtate as immoveable as the branch they are fixed on, and ſeem to make a part of it. Their exterior form is remarkably plain and ſimple, and the more the creature increaſes in growth, the leſs appearance of life it ſhews; and even when it has acquired its maturity, and is in a condition to depoſit its eggs for the propagation of its ſpecies, it then appears leaſt of all of an animal form, and more, than in any other ſtate, reſembles a *gall*, or ſuch vegetable protuberance. Not only the vulgar and incurious have been deceived by this appearance, but the accurate count Marſigli, among others, after very attentively examining the *gall-inſects* of one ſpecies, remained ſeemingly convinced that they were real vegetable excreſcences.

They are uſually found on the ſtalks and branches of trees, ſhrubs, and perennial plants. They are very various in ſize, ſhape, and colour.

Theſe creatures have ſo little to attract the obſervation even of the curious, that they might probably have remained much longer unregarded, were it not that they multiply ſo exceſſively faſt on ſome fruit trees. The peach tree, in particular, are ſometimes in a manner covered with them, and theſe of more than one ſpecies; ſome of the globular kind, and others of the boat figure. The branches thus covered look rough and ſcabby, and the gardeners, ſenſible that whatever the things were, they muſt be nouriſhed at the expence of the juices of the tree, have attempted to deſtroy them. The leaves and fruit of theſe trees is often blackened by the wet that has run off from theſe inſects; and our orange trees, which are frequently full of them, firſt ſtirred up the attention of the more careful obſervers of them to clear them away: theſe are principally of that kind, whoſe form is that of the inverted boat. Meſſrs. de la Hire and Sedileau, were at the pains of making a ſet of obſervations, of a very curious kind, concerning them: theſe gentlemen call this ſpecies the *orange-tree-bug*, a name by which the gardeners alſo call them, though they have nothing in common with any known ſpecies of that animal. See the Memoirs of the Academy of Paris, 1692. If many of the ſpecies of theſe little animals, however, do miſchief to our fruit trees, there are ſome other kinds of them, the value and uſe of which may very well make us amends; ſince it is from one ſpecies of theſe little creatures, that the inhabitants of many places make ſuch great gains, gathering a harveſt of them without the trouble or expence of ſowing or cultivating. The KERMES, ſo well known by name, though ſo little truly underſtood, is of this kind, to which both the phyſician and the dyer are ſo greatly obliged. Reaumer's Hiſt. Inſects, vol. iv. p. 1.

Dr. Liſter, was perhaps the firſt diſcoverer of the *gall inſect* and *progal inſect* claſſes: he found theſe animals on the plum, cherry, vine, laurel, and many other trees, and calls them *patellæ* of theſe trees. He was well appriſed of their animal origin, and in the year 1671 diſcovered that ſome of them would ſtrike a carnation red colour, with ley of aſhes, which was not only a good but a permanent tinge. The principal kind on which he made the experiment was the ſemiglobular ſort, which he deſcribes as being entirely round, except when they are applied to the tree. They were of the ſize of half a large pea, of a cheſnut colour, and of a ſhining ſurface, faſtening themſelves to the bark of the tree, as the limpets do to the rocks, and were generally ſought after by ants and other vermin.

Gall, *peach inſect*. See Peach.

Gall, *ſhell inſect*. See Shell.

Gall, *vine inſect*. See Vine.

Gall, *inſect fly*, the male of the *gall-inſect* ſpecies. It is a two-winged fly of a very particular kind. There ſeems a great reſemblance between theſe flies in all the *gall-inſect* claſs, and that of the PEACH-*gall-inſect* may give a proper idea of all the reſt. This little creature, examined with the help even of the beſt glaſſes, ſhews, on the under part of its head, nothing analogous to the organs of other flies, deſtined to convey their nouriſhment; nothing that at all reſembles the trunks of the other two winged flies, nor any thing that can be compared to teeth. Where the teeth, if any, ought to be placed, nothing is to be ſeen but two hemiſpheric, or more than hemiſpheric bodies, black and ſhining, and in all reſpects reſembling eyes. If theſe are eyes, they are very remarkably ſituated; and juſt over againſt them, on the other ſide of the head, and near the baſes of the antennæ, there are two other ſimilar bodies, which indeed cannot be taken for any thing but eyes. It ſhould ſeem that this fly has therefore no organs to receive aliments, but has two eyes in the place of ſuch.

The want of theſe organs is nothing ſingular in the inſect world, ſince the moths and butterflies afford us inſtances of it. Many of theſe may be ſeen, as ſoon as produced from their chryſalis, in a ſtate to propagate their ſpecies, and depoſit their eggs; and this great end atchieved, they have no farther occaſion for life, nor any means for its ſupport; and probably the caſe is the ſame with theſe flies, which as ſoon as looſe from their ſhell, ſeek out and fecundate the females, and have after this no farther uſe for life. It is another ſingularity in this ſpecies, that they are produced from their ſhell by their hinder part firſt, whereas all other ſpecies of the two-winged flies are produced with the forepart of their body firſt; and if we cannot ſay what may be the reaſons for this ſingularity in the production of this fly, we can however eaſily perceive that every thing is prepared and deſtined accordingly for it. In the nymphs of other flies, all the legs are conſtantly applied cloſe to the body, whereas, on the contrary, in the nymph of the *gall-inſect-fly*, the legs placed next the head, or the firſt pair, are conſtantly ranged upwards, and each of them embraces one ſide of the head; the conſtant poſition of theſe legs in this direction, is a proof that it is the order and courſe of nature in the production of the animal; nor is it without reaſon that they are thus placed in a ſpecies which, contrary to all the others, is to force itſelf backward out of its ſhell, ſince they ſerve very properly for the creature to puſh himſelf backward by: and as the anterior part of the caſes of other flies naturally and eaſily opens, to give paſſage to the animal, ſo the poſterior part of this does. They ſeem alſo to be more than ordinarily ſlow in their getting out, ſome of them having been obſerved to be ten or twelve hours, from the time of the firſt appearance of a piece of each wing, to their perfect enlargement. Reaumur, Hiſt. Inſect. vol. iv. p. 40.

GALLÆ. See Galli.

GALLANT, or **Galant**, a French term, ſignifying civil, polite, well-bred; or a perſon of wit and addreſs, who does every thing with a good grace: in fine, a civil perſon, ſomewhat brighter, gayer, and more agreeable than ordinary.

It is difficult to define all the qualities annexed to the idea of a *gallant* man. It ſometimes implies one who has what the French call the *bon ton*; but it generally means one who has a great devotion for the fair ſex, with the manners adapted to pleaſe them. The French authors are very nice on this point; they diſtinguiſh *galant homme*, and *homme galant*.

GALLANTES, among the Romans, a ſurname given to the prieſts of Cybele; whence the modern terms of *gallant*,

lant, and *gallantry*, have been formed. See Mem. Acad. Inſcript. vol. v. p. 427.

GALLED, *ſaddle*. See SADDLE-*galled*.

GALLED, in *Sea-Language*, is applied to a maſt, yard, cable, &c. which is chafed and worn by friction. They are uſually covered with ſkins, mats, canvaſs, &c. in thoſe parts which are the moſt expoſed by the rocking of the veſſel, as a preſervative from this injury.

GALLEON. See GALLION.

GALLERICA *lapis*, a name given by the writers of the middle ages to a ſpecies of emerald, which was larger than the finer gems of that kind, and of a pleaſant green, but debaſed by an admixture of white.

GALLERY, in *Architecture*, a covered place in a houſe, much longer than broad; and which is uſually placed in the wings of the buildings, and ſerves to walk in.

Savot, in his Architecture, derives the word *gallery* from *Gaul*, as ſuppoſing the ancient Gauls to have been the firſt who uſed them. Nicod fetches it from the French *aller*, *to go*; q. d. *allerie:* others bring it from *galere*, *galley*; becauſe it bears ſome reſemblance thereto in reſpect of length. In the corrupt Latin we meet with *galilæa*, for the *gallery* of a monaſtery.

The *galleries* of the Louvre are magnificent; a *gallery* of painting; a complete apartment is to conſiſt of a hall, ante-chamber, chamber, cabinet, and *gallery*.

GALLERY alſo denotes a little aiſle, or walk, ſerving as a common paſſage to ſeveral rooms placed in a line, or row.

The *gallery* of a church is a kind of continued tribune, with a baluſtrade, built along the ſides or lower-end of a church, to make it hold the more people; and, in the Greek churches, to ſeparate the women from the men.

GALLERY, in *Fortification*, a covered walk, or paſſage, made acroſs the ditch of a town beſieged, with timbers faſtened on the ground, and planked over. See *Tab.* VII. *Fortif. fig.* 40.

The ſides of the *gallery* are to be muſquet-proof, and to conſiſt of a double row of planks, lined with plates of iron; and the top is ſometimes covered with earth, or turf, to hinder the effect of ſtones, artificial fires, &c. of the enemy.

Galleries are chiefly uſed to ſecure and facilitate the miners approach to the face of the baſtion, over the moat, which is already ſuppoſed filled up with ſaggots and bavins, and the artillery of the oppoſite flank diſmounted. Sometimes this is called a *traverſe*.

GALLERY, in *Gardening*, is a kind of covered walk, which is to be made in the following manner. A line is firſt to be drawn to the length of the intended *gallery*, and this is to be planted with hornbeam, which is to be the foundation of the *gallery*. Theſe require no farther care than to be ſheared a little, and ſometimes digged about, as there may be occaſion. But the chief curioſity is in the ordering the fore-part of the *gallery*, and forming the arches. The pillars of the porticoes, or arches, muſt be placed at four feet diſtance from one another, and the *gallery* muſt be twelve feet high, and ten feet wide, that there may be room for three perſons to walk abreaſt in it. When the hornbeams are grown to the height of three feet, the diſtance of the pillars well regulated, and the ground-work of the *gallery* finiſhed, the next thing is to form the frontiſpiece; to perform which, the hornbeam muſt be ſtopt between two pillars at the height, and a trellis, made for that purpoſe, muſt be run up, which forms the arch. As it grows up, thoſe branches which out-top the others muſt be levelled with the ſhears; and in time they will grow very ſtrong, and may be kept in regularity by the ſhears. Portico *galleries* may be covered with lime trees.

Galleries in general have been always but lightly eſteemed in England; they were once very much in repute in the gardens of Italy, and other hot countries, but now they are got out of credit even there. Miller.

GALLERY *of a mine* denotes the *branch*, or that narrow paſſage, under-ground, leading to a mine carrying on under any work deſigned to be blown up.

The beſiegers and beſieged do each of them carry *galleries*, or branches under ground, in ſearch of each other's mines; and theſe ſometimes meet and deſtroy each other.

GALLERY *in a ſhip*, is a kind of balcony, made upon the ſtern, without-board, into which there is a paſſage out of the great cabin. See *Tab. Ship. fig.* 1. *lit. m. fig.* 2. *n.* 98. and 101.

Theſe *galleries* are for ſhew, and the captain's pleaſure, rather than any other benefit; for, in ſhips of war, all open *galleries* of this kind are to be avoided; on account of the facility of an enemy's entrance, and boarding of the ſhip that way.

GALLERY-*ladder*, in a *Ship*. See LADDER.

GALLERY, *whiſpering*. See WHISPERING *places*.

GALLEY, in *Chemiſtry*, is the name given to reverberatory furnaces, in which ſeveral retorts may be placed at the ſides of each other. They are ſo called, becauſe they are oblong, and have lateral openings, in which they are ſuppoſed to reſemble *galleys*.

GALLEY, in *Naval Language*, a low-built veſſel, going both with oars and ſails; chiefly uſed by the ſtates bordering on the Mediterranean.

The *galley* is called by the Greek authors under the eaſtern empire γαλαια, and γαλεια; and by the Latin authors of the ſame time, *galea*; whence the modern denomination. Some ſay, it was called *galea*, on account of the figure of a caſk or helmet, which it bore on its head or prow, as Ovid atteſts, De Triſtib. The French call it *galere*; becauſe they ſay, that the top of the maſt is uſually cut in manner of a hat, which the Italians call *galero*. Others derive both *galea* and *galere* from a fiſh, by the Greeks called γαλιωτης, or ξιφιας, and by us the *ſword-fiſh*, whoſe ſhape this veſſel reſembles. Laſtly, others derive *galley*, *galea*, *galere*, *galeaſſe*, &c. from the Syriac and Chaldee *gaul* and *gallin*, a man expoſed on the water, or in a veſſel of wood.

The largeſt ſort of theſe veſſels, called *galeaſſe*, is employed only by the Venetians. They are commonly one hundred and ſixty-two feet long above, and one hundred and thirty-three feet by the keel; thirty-two feet wide, with twenty-three feet length of ſtern-poſt. They are furniſhed with three maſts, and thirty-two banks of oars; every bank containing two oars, and every oar being managed by ſix or ſeven ſlaves, who are uſually chained to it. In the fore-part they have three little batteries of cannon, of which the loweſt is of two thirty-ſix-pounders, the ſecond of two twenty-four-pounders, and the uppermoſt of two two-pounders; three eighteen-pounders are alſo placed on each quarter. The complement of men for one of theſe *galleys* is generally a thouſand, or twelve hundred. They are very convenient for bombarding, or making a deſcent on an enemy's coaſt, becauſe they draw little water; and on account of their oars, they have often the advantage of ſhips of war in light winds or calms, by cannonading the latter near the ſurface of the water, by ſcouring their whole length with their ſhot, and at the ſame time keeping on their quarter or bow, ſo as to be out of the direction of their cannon. The *galleys* next in ſize to theſe, called alſo *half-galleys*, are from one hundred and twenty to one hundred and thirty feet long, eighteen feet broad, and nine or ten feet deep. They have two maſts, which may be ſtruck at pleaſure, and are furniſhed with two large lateen ſails, and five pieces of cannon; they have commonly twenty-five banks of oars, as already deſcribed. Thoſe of a ſize ſtill leſs than this are called *quarter-galleys*, carrying from twelve to ſixteen banks of oars.

All the *galleys*, both ancient and modern, are of a finer and ſlenderer make than ſhips. Formerly they made divers kinds; at preſent the *galleys* are all alike: all the difference between them is as to ſize, and nothing as to figure. They uſually keep towards the coaſts; though ſometimes they croſs the ſea.

The king of France keeps up forty *galleys* for the uſe of the Mediterranean, the arſenal thereof being at Marſeilles. The general of the *galleys* bears a double anchor, placed in pale, behind the eſcutcheon of his arms, as a mark of his office.

Galleys in Latin are called *biremes*, *triremes*, and *quadriremes*; not on account of their having two, three, or four ranges of oars before one another, as many learned men have imagined, and particularly Scaliger and Snellius, though this laſt has wrote excellently on the ſubject of navigation; for this were impracticable; nor yet on account of their having but two, or three, or four oars, for then they would want ſtrength; but becauſe there were two, three, or four, rowers, faſtened to each oar, as in the *galleys* uſed among us; as is very well ſhewn by the jeſuit Dechales, in his Art of Sailing. The error was occaſioned by ſome ancient *galleys*, repreſented on medals, or baſſo-relievos, wherein are ſeveral ranges of rowers placed over each other; but all the mathematicians, pilots, and ſhip-builders, look on this as a mere viſion; inaſmuch as Pliny makes mention of *galleys* of fifteen, twenty, thirty, forty, fifty rows of rowers; ſo that, if they were ranged over each other, though we were only to allow four feet for each deck, there would be a diſtance of one hundred and ſixty feet between the loweſt rowers and the higheſt; and yet we are aſſured, that the higheſt veſſel ever built was only ſeventy-two feet high.

Scaliger affirms, that the firſt TRIREMIS, or *galley* of three ſtories, was built at Corinth; and is of opinion, that what Pliny calls *long ſhips*, were what we call *galleaſſes*; the firſt whereof was that of the Argonauts. Vegetius mentions a *galley* of five decks; and Memnon, another with eight, and only one man to each oar. See ENNERIS.

Galley, *captain*, is the principal *galley* of a ſtate, commanded by the captain-general of the *galleys*: in France the *royal galley* is the firſt.

Galley, *patroon*, denotes the ſecond *galley* both of France, Tuſcany, and Malta.

The ſecond general of the *galleys* is always on board the *royal galley*; and the lieutenant on board the patroon.

The terms peculiar to *galleys* are very numerous, and make a new ſyſtem of ſea-language, different from that uſed in ſhips.

Monſ. de Baras, an ancient officer on board the king of France's *galleys*, engaged himſelf in writing a new dictionary of the dialect of the *galleys*.

Galleys, *condemnation to the*, is a penalty impoſed on criminals and delinquents, particularly in France; whereby they are adjudged to ſerve the king, or ſtate, as ſlaves on board the *galleys*, either for ever, or for a limited time.

Condemnation to the *galleys* for ever imports confiſcation of lands, goods, &c. for in France, that which confiſcates the perſon, confiſcates the goods.

A man condemned to the *galleys* for perpetuity, is dead in a civil ſenſe. He cannot diſpoſe of any of his effects; cannot inherit; and, if he be married, his marriage is null; nor can his widow have any of her dower out of his goods.

The eccleſiaſtical courts cannot ſentence to the *galleys*: it is out of their juriſdiction.

By an ordonnance of Charles IX. in 1564, the judges are enjoined not to condemn a criminal to the *galleys* for leſs than ten years: and Hen. III. by another of 1579, enjoins the captains not to detain their *galley* ſlaves after their time is expired. But neither of theſe laws are now obſerved.

Galley, in *Printing*, a wooden frame, or inſtrument, formed of an oblong ſquare board, with a ledge on three ſides, and a groove to admit a falſe bottom called a *galley* ſlice, into which the compoſitor empties the letters out of his compoſing-ſtick, as often as it is filled.

The *galley*, when filled, contains the matter of one page; and when they have compoſed as many pages as are required for a whole ſheet, half ſheet, or the like, they impoſe them, i. e. they take the ſeveral pages out of the *galleys*; put them into a chaſe; lock them up with the furniture; and ſo make forms ready for the preſs.

Galley-*halfpence*, a kind of coin, which with *ſuſkins* and *doitkins*, were forbidden by the ſtatute 3 Hen. V. cap. 1. It is ſaid they were brought into this kingdom by the Genoeſe merchants, who trading hither in galleys, lived commonly in a lane near Tower-ſtreet, and were called *Galley-men*; landing their goods at *Galley-key*, and trading with their own ſmall ſilver coin, termed *galley-halfpence*.

GALLI, or **Gallæ**, in *Antiquity*, a name given in Phrygia to the eunuch-prieſts of the goddeſs Cybele.

The principal of them was called *Archi-Gallus*. The *Galli* were alſo called *Dactyli*, *Idæi*, *Corybantes*, &c. Authors are not agreed as to the reaſon of this denomination. Some derive the name from the river Gallus; becauſe theſe prieſts drank of its waters, which inſpired them with I know not what religious fury and enthuſiaſm, and deprived them of their ſenſes to ſuch a degree, that they mutilated themſelves.

Others hold, that the firſt prieſt of Cybele having been named *Gallus*, the name became appropriated to all his ſucceſſors. Voſſius, who propoſes theſe two opinions, ſeems to incline moſt to the latter; though Ovid, in the fourth of his *Faſti*, and Herodian, lib. i. favour the former.

When youth were initiated into this order, the cuſtom in Syria, according to Lucian, was to throw off their cloaths, to make loud cries, and with drawn ſwords to caſtrate themſelves; after which they ran about the ſtreets, carrying in their hands the marks of their mutilation, which were thrown into a houſe, and in that houſe they put on women's dreſs.

Theſe prieſts threw themſelves into a kind of phrenſy, when they performed the ceremonies of the goddeſs; apparently, in imitation of the young Atys, her favourite, whom they likewiſe imitated, by mutilating themſelves. For authors relate, that Cybele being deſperately in love with that young Phrygian, ſhe gave him the ſuperintendance of her ſacrifices, on condition he would keep his virginity; but that ſoon after, forgetting his promiſe, he had an affair with the nymph Sangaritis; that Cybele, provoked hereat, ſtruck him mad; that in a vehement acceſs of his phrenſy he was going to kill himſelf; and that the goddeſs, relenting, reſtored him to his underſtanding; that out of his own remorſe, he caſtrated himſelf; and that after his example all the prieſts of Cybele from that time did the like.

Their phrenſy, at the ſame time of the ſacrifices, conſiſted in throwing round the head with great rapidity, and making violent contorſions of the whole body: they had alſo drums and flutes, wherewith they played, and danced to them; as already obſerved under the articles Corybantes, and Curetes.

Galli, *caput*. See Caput.

Galli, *criſta*. See Crista.

GALLIAMBIC, in the *Ancient Poetry*. *Galliambic poem* is a compoſition in *Galliambic* verſes.

Galliambic *verſe*, a ſort of iambic, conſiſting of ſix feet; 1. an anapæſt, or a ſpondee; 2. an iambic, or an anapæſt, or tribrarch; 3. an iambus; 4. a dactyl; 5. a dactyl; and 6. anapæſt.

Though one might meaſure the *Galliambic* verſe in another manner, and make a different arrangement and combination of ſyllables, which would give different feet. It is certain the ancients regarded little more in the *Galliambic* verſe, beſide the number of meaſures, or intervals, without troubling themſelves about the number of ſyllables, or the kinds of feet whereof it was compoſed.

GALLIAMBUS, in *Poetry*, a pleaſant kind of verſe, uſed to be ſung by the Galli, prieſts of Cybele, in honour of that goddeſs.

The word is a compound of *Gallus*, a prieſt of Cybele, and *iambus*, a foot in the Greek and Latin verſe.

Galliambus alſo denotes a piece or compoſition in *Galliambic* verſes.

GALLIANA, in *Natural Hiſtory*, a name given by ſome authors to the Turquoise ſtone. It is only a corruption of the word *callaina gemma*, a name of this ſtone common among the Roman authors.

GALLIARD, or **Gagliarda**, in *Muſic* and *Dancing*, a ſort of dance, anciently in great requeſt; conſiſting of very different motions and actions, ſometimes proceeding *terra à terra*, or ſmoothly along; ſometimes capering; ſometimes along the room, and ſometimes acroſs.

The word is French, *gailliarde*, or rather Italian; and literally ſignifies *gay*, *merry*, *ſprightly*. This dance was alſo called *Romaneſque*, becauſe brought from Rome.

Thoinot Arbeau, in his Orcheſography, deſcribes it as conſiſting of five ſteps, and five poſitions of the feet, which the dancers performed before each other, and whereof he gives us the ſcore, or tablature, which is of ſix minims, and two triple times.

GALLIARDA, in the *Italian Muſic*, the name of a tune that belongs to a dance called a galliard. The air of it is lively in triple time.

GALLICAN *church* denotes the church of France; or the aſſembly or convocation of the prelates of France.

M. du Puy has an expreſs treatiſe of the liberties of the *Gallican* church.

Gallican *breviary* denotes the breviary uſed by the church of Agrigentum, in Sicily; which the modern writers call Breviarum Gallicanum.

The reaſon, no doubt, is its having been introduced by St. Gerlan, who was made biſhop of Agrigentum, after earl Roger had been driven out of Sicily by the Saracens; and by the other French biſhops, which the Norman princes brought thither. See Breviary.

Gallican *liturgy* is the manner of performing divine ſervice, anciently obſerved in the Gauls.

Fa. Mabillon ſhews wherein it differed from the Roman liturgy. 1 Liturg. Gall. cap. 5, &c.

Gallican *maſs*. See Mass.

GALLICISM, a phraſe, or conſtruction, peculiar to the French language; or which has ſomething contrary to the ordinary rules of grammar of other languages.

Thus, *Cet homme eſt ſur la bouche*, is a *Galliciſm*, having no regular conſtruction; and the ſame may be ſaid of *Faire de la terre le foſſe*; which no grammar could ever find out.

With us it is uſed to denote ſuch phraſes or modes of ſpeech in Engliſh, as are formed after the French idiom.

GALLIGASKINS, in our *Old Writers*, denoted wide hoſe or breeches, having their name from their being uſed by the Gaſcoigns.

GALLIMATHIAS, a dark, perplexed diſcourſe, where words and things are huddled together, ſo as to make an inconceivable jargon.

The word is French, formed, as ſome will have it, from *polymathia*, which ſignifies diverſity of ſciences; becauſe ſuch as have their memory burdened with ſeveral kinds of ſciences, are uſually confuſed, and expreſs themſelves ill. M. Huet rather takes the word *gallamathias* to have had the ſame origin with *aliborum*; and to have firſt ariſen at the time when all the pleadings at the bar were in Latin. There was a cauſe, it ſeems, upon the carpet, about a cock, belonging to the plaintiff Matthias; the counſel, in the heat of his harangue, by often repeating the words *gallus* and *Matthias*, happened to blunder; and, inſtead of ſaying *gallus Matthiæ*, ſaid *galli Matthias*; which at length became a general name for all confuſed, embroiled language, and diſcourſe.

GALLIMAWFRY, a ragou, hatche, or hotch-pot, made of the remains of ſeveral kinds of meats.

The word is French, *gallimafrée*, which ſignifies the ſame.

Hence the word is alſo uſed in a figurative ſenſe for a piece, or compoſition, of ſeveral different parts ill-digeſted, and embarraſſed.

GALLINÆ, in the Linnæan ſyſtem of *Ornithology*, the name of a large order of birds, the general character of which is, that their beak is conic and bent; the upper mandible is arched, and extends beyond the lower; the noſtrils are half covered with a cartilaginous convex membrane; the feathers of the tails are more than twelve, and the feet are cloven; but the outmoſt and inner toes are connected by the firſt joint of the middle toe by a ſmall membrane. The DODO, PEACOCK, the *maleagris* or TURKY, the CRAX, the PHEASANT, the *maleagris Numida*, or GUINEA-*hen*, and TETRAO, are of this order.

GALLINA *Guinea*. See GUINEA-*hen*.

GALLINA *Mozambicana*, in *Ornithology*, a name under which Nieremberg has deſcribed a ſort of hen, which he ſays has not only black feathers, but black fleſh, and black bones; a hiſtory Mr. Ray ſufficiently explodes.

GALLINA *piſcis*, in *Ichthyology*, the name of a fiſh of the cuculus kind, more uſually known by the name of the *corax piſcis*.

GALLINACEOUS, in *Ornithology*, the name of a ſpecies of birds of the pheaſant kind, including the common cock and hen, the characters of which are theſe. The beak is ſhort, ſtrong, and a little crooked, proper for the picking up of corn, which is the food of the whole ſpecies; the body is large, thick, and fleſhy; the wings are ſhort and hollowed, and not calculated for much flying; they all breed a numerous progeny; they build on the ground; the young are not fed by the parent, but immediately ſhift for themſelves; and ſome have long ſpurs behind their legs. See COCK and FOWL.

GALLINAGINIS *caput*. See CAPUT.

GALLINAGO, a general name for heath fowls, as the WOOD-*cock*, SNIPE, &c.

GALLINAGO *minor*. See SNIPE.

GALLINE, in *Ichthyology*, a name given by the Maſſilians to the flying-fiſh, called by authors *milvus* and *lucerna*. It is a ſpecies of TRIGLA, and is diſtinguiſhed by Artedi by the name of the *trigla* with the ſnout ſomewhat bifid at the end, and the lateral lines forked towards the tail.

GALLING, in *Medicine*, *Intertrigo*. Children are ſubject to inflammations and excoriations in ſeveral parts of their bodies, particularly behind the ears, in the neck, and thighs. Thoſe in the lower parts uſually proceed from the acrimony of the urine, which ſometimes frets off the epidermis, and leaves the cutis bare. The cure may be accompliſhed by waſhing the parts gently with warm water, twice or thrice a day, which diſſolves and drinks up the acrimonious ſalts of the urine lodged therein. Nurſes uſually diſſolve a little fuller's earth in the water, and apply it to the part after being well waſhed. Ceruſs, chalk, or calcined ſlate, finely powdered, will alſo ſerve for the ſame purpoſe. But where the inflammation and excoriation are conſiderable, it is proper to uſe, by way of fomentation, a ſolution of *trochiſcii albi rhaſis*, in plantain water, twice or thrice a day. In the mean time the parts ſhould by all means be kept dry, or prevented from rubbing againſt each other, by the interpoſition of fine linen rags, or the uſe of a little red deſiccative ointment, or diapompholygos, ſpread thin upon it.

Gallings, produced by the wringing of uneaſy ſhoes, are mollified and kept from ſwelling by the application of the lungs of a ſwine or lamb, warm, to the grieved part. Effectual for the ſame purpoſe, is the powder of a burnt old ſhoe ſprinkled on the place, or raw wool, or the flowers of the garden pomegranate, each of them burnt, and the aſhes ſprinkled thereon; or acacia rubbed on the galled part with vinegar. To thoſe who have tender fleſh apply the *emplaſtrum ex hordeo*.

For *gallings*, burns, and eruptions of *papulæ*, a moſt excellent plaſter is prepared of three ounces of litharge, four ounces of wax, one ounce of recent ſwine's fat, and a pound of oil of myrtle; to induce a cicatrix, omit the fat in the preſcription. Aetius Tetrab. 4. Serm. cap. 67.

Balauſtines are much commended by Oribaſius for ſpeedily cicatrizing *gallings* and old ulcers; the bark of the pine-tree, alſo, is ſaid by the ſame author to be excellent for *gallings*, being applied to the place. James's Med. Dict.

GALLING. See BARK-*galling*, SADDLE, &c.

GALLINULA, in *Ornithology*, the name of a genus of birds which ſwim on the water, and yet have not webbed feet, nor any membranes joined to their toes, to augment their breadth. The bill is thick at the baſe, ſloping to the point, the upper mandible reaching far up the fore-head, and callous; the wings are ſhort and concave, the body compreſſed, and the toes long, divided to their origin. The common moor-hen, and a great number of other birds, both Engliſh and exotic, are of this genus, as the water-rail, the grinetta, the ochropus, and ſeveral Braſilian birds.

GALLINULA *ærythropus*, in *Ornithology*, a name given by many authors to the bird commonly called in Engliſh the RED-SHANK.

GALLINULA *hypoleucos*, in *Ornithology*, a name given by ſome authors to the becaſſine, or, as we call it in Engliſh, the SANDPIPER. See TRINGA.

GALLINULA *melampus*, in *Ornithology*, a name given by Geſner, and ſome others, to the bird more uſually known by its German name, ROTKNUSSEL.

GALLINULA *rhodopus*, *phœnicopus*, and *ochropus*, names by which Geſner, and ſome others, have called the common TRINGA; a bird in which the legs are, at different ages, and in the different ſexes, greeniſh, yellowiſh, or reddiſh.

GALLINULA *ſerica*, in *Ornithology*, a name given indiſcriminately by many authors to the GRINETTA, and the water-rail; both birds of the moor-hen kind, but ſmaller than the common moor-hen.

GALLION, or **GALLEON**, formerly denoted a large veſſel, or ſhip of war, of three or four decks.

GALLEON is now only uſed in ſpeaking of the Spaniſh fleet; the *galleons* being a part of the ſhips employed in the commerce of the Weſt Indies.

The Spaniards ſend every year two fleets; the one for Mexico, which they call the FLOTA; and the other for Peru, which they call the *galleons*.

GALLEON, *Manila*, is a ſhip employed in the trade from Manila in the iſland of Luconia, the chief of the Philippine iſlands, to Acapulco on the coaſt of Mexico. This ſhip ſets ſail from Manila about July, and arrives at Acapulco in December, January, or February following. There is ſeldom more than one ſhip employed in this trade at a time; but there are three or four ſtout ſhips provided to carry on this commerce, one of which is always ready for the ſea when the other arrives. The largeſt of theſe ſhips is little leſs than one of our firſt rate men of war, and carries twelve hundred men; the others are of the burthen of twelve hundred ton and upwards, and carry from three hundred and fifty to ſix hundred men, with between fifty and ſixty guns. Theſe ſhips are commiſſioned and paid by the king of Spain, who pays the officers and crew; and one of the captains is called the general, and carries the royal ſtandard of Spain at the top-gallant-maſt-head. The trade from Manila to Acapulco conſiſts of ſuch commodities, collected in China and different parts of India, as are intended to ſupply the kingdoms of Mexico and Peru. Theſe are ſpices, all ſorts of Chineſe ſilks and manufactures, particularly ſilk ſtockings, of which the annual ſhip uſually carries no leſs than fifty thouſand pair, vaſt quantities of Indian ſtuffs, as callicoes, and chints, together with other minuter articles, as goldſmiths work &c. which is performed at Manila by the Chineſe, of whom there are no leſs than twenty thouſand who conſtantly reſide there. However this trade is not open to all the inhabitants of Manila, but is reſtrained by regulations ſimilar to thoſe of the regiſter ſhips from Cadiz to the Weſt Indies. The value of this trade is limited by the royal edicts, as it has been ſaid by ſome, to ſix hundred thouſand dollars; but it is reaſonable to conclude that the return of it cannot be much ſhort of three millions of dollars. The tonnage of the ſhips employed in this trade is divided into a certain number of bales of the ſame ſize, which are diſtributed amongſt the convents at Manila, but principally to the Jeſuits for the ſupport of their miſſions; and theſe convents have a right to embark ſuch a quantity of goods on board the Manila ſhip, as the tonnage of their bales amounts to, or to ſell this privilege to others. This ſhip, having diſpoſed of its effects at Acapulco, returns for Manila ſome time in March, where it generally arrives in June; ſo that the whole voyage takes up near a year. The principal return from Acapulco to Manila is always made in ſilver, the reſt of the cargo being inconſiderable and conſiſting of cochineal and ſweet-meats, the produce of the American ſettlements, European millinery ware for the women at Manila, and ſome Spaniſh wines, as tent and ſherry, which are intended for the uſe of their prieſts in the adminiſtration of the ſacrament. The *galleon* in its return is much leſs incumbered with her cargo than in her paſſage thither; and therefore her crew is conſiderably augmented and her lower tier of guns is mounted, which before was carried in her hold, at leaſt till ſhe came near cape St. Lucas and California and apprehended an enemy. Anſon's Voyage, chap. 10. p. 232—248.

Theſe are all ſhips of war, and go on the king's account;

but they are ſo loaden and embaraſſed with merchandizes, that, in caſe of an attack, they find it difficult to defend themſelves.

Beſide the king's *galleons*, there are uſually twelve or ſixteen merchant-ſhips, called REGISTER-*ſhips*, belonging to private perſons, who obtain leave for the ſame, or rather buy it; there being no Weſt India company in Spain.

The *galleons* are loaded at Cadiz, from whence they may put out at any time. They were formerly appointed to be out in January, that they might coaſt along the firm land, and come about the middle of April to Porto Bello, where, the fair being over, they might take aboard the plate, and be at the Havannah with it about the middle of June, where the New Spain fleet would ſoon join them, and they might come together more ſafely to Spain. For this purpoſe, the viceroy of Peru was to take care that the plate ſhould be at Panama by the middle of March; the plate is fifteen days in removing from Potoſi to Arica; eight days generally from thence, by ſea, to Callao, and twenty from Callao to Panama, taking in by the way the plate at Paita and Truxillo. But it has been found by experience, that the month of September is the fitteſt for the fleet to ſail: they are about two years in the whole voyage. However often or ſeldom the *galleons* go out, the next fleet never go out till the laſt are returned. When the *galleons* and flota put out together, they ſeparate about the Antilles iſlands; the *galleons* for Carthagena and Porto Bello; and the flota for Vera Cruz. At their return, they rejoin at the Havannah in the iſle of Cuba.

The loading of the *galleons* is always the richeſt: an eſtimate of the yearly returns or cargoes, both of the flota and *galleons*, was formerly as follows:

Of gold, the *galleons* bring yearly about two or three millions of crowns, and the flota about one. Of ſilver, the *galleons* bring eighteen or twenty thouſand crowns, and the flota ten or twelve. Of precious ſtones, the *galleons* bring as follow: two hundred thouſand crowns worth of pearls; two or three hundred thouſand crowns of emeralds; and twenty or thirty thouſand crowns worth of bezoards, amethyſts, and other ſtones of leſs value: the flota brings none at all. Of wools, the *galleons* bring forty or fifty thouſand crowns: the flota, none. Of quinquina, the *galleons* bring the value of twenty thouſand crowns: the flota, none. Of ſkins and leather, the *galleons* bring ſeventy thouſand crowns worth: the flota as much. Of Campechy wood, the *galleons* bring ſixty thouſand crowns worth: the flota, none. Of ſkins and leather from Buenos Ayres, the regiſter-ſhips may bring to about two hundred thouſand crowns; of cochineal, about a million of crowns; and of indigo, about ſix hundred thouſand crowns.

By a general ordinance in Spain, it has been eſtabliſhed that there ſhould be twelve men of war and five tenders fitted out annually for the armada of *galleons*; eight ſhips of ſix hundred tons burthen each; and three tenders, one of a hundred tons, for the iſland Margarita; and two of eighty each to follow the armada. For the New Spain fleet two ſhips of ſix hundred tons each, and two tenders of eighty each; and for the Honduras fleet, two ſhips of five hundred tons each; and in caſe no flota happened to ſail any year, three *galleons* and a tender ſhould be ſent to new Spain for the plate.

But the number of *galleons* has been different at different times; it has increaſed in time of war and diminiſhed in time of peace.

GALLIOT, a ſmall galley or a ſort of brigantine, built very ſlightly, and deſigned only for chace.

She hath but one maſt, and can both ſail and row. She uſually carries two or three pedreros, and hath ſixteen or twenty oars.

Some alſo call the bomb-ketches, *galliots*.

GALLITRICHUM, in *Botany*, a name by which ſeveral authors call the *horminum ſativum*, or garden clarey.

GALLIUM. See GALIUM.

GALLOGLASSES, a kind of militia or ſoldiery, in Ireland.

Camden, in his Annals of Ireland, p. 792, relates, that the Iriſh militia conſiſts of cavalry, or horſemen, called *galloglaſſes*, or *galloglaſſii*, who uſe a very ſharp ſort of hatchet; and infantry, called *kernes*.

GALLON, an Engliſh meaſure, for things both liquid and dry, containing two pottles, or four quarts.

The *gallon* always contains eight pints, or four quarts; but thoſe pints and quarts, and conſequently the *gallon* itſelf, are different, according to the quality of the things meaſured: the wine *gallon*, for inſtance, contains 231 cubic inches, and holds eight pounds, avoirdupois, of pure water; the beer, and ale *gallon*, contain 282 ſolid inches, and holds ten pounds three ounces and a quarter; and the *gallon* for grains, meals, &c. $272\frac{1}{4}$ inches, and holds nine pounds thirteen ounces of pure water. See MEASURE.

GALLOON, in *Commerce*, a thick, narrow kind of ferret, ribband, or lace, uſed to edge or border cloaths.

The term is ordinarily underſtood of that made of wool; ſometimes that of thread, or even gold or ſilver.

GALLOP, in the *Manege*, is the ſwifteſt natural pace of a horſe, performed by reaches or leaps; the two fore-feet being raiſed almoſt at the ſame time; and when theſe are in the air, and juſt ready to touch the ground again, the two hind-feet are lifted almoſt at once.

The word is borrowed from the barbarous Latin *calupare*, or *calpare*, *to run*. Some derive it from *caballicare*; others from the Greek *καλπαζειν*, or *καλπαν*, *to ſpur a horſe*.

In *galloping*, the horſe may lead with which fore-leg he pleaſes; the moſt uſual way is that with the right, in which caſe the *gallop* is ſaid to be *juſt*; but which ſoever it be, the hind-leg of the ſame ſide muſt follow it next, which forms an *even* or *equal gallop*; otherwiſe the legs are ſaid to be *diſunited*, and the *gallop* to be *falſe*; to remedy which diſorder, the rider muſt ſtay the horſe a little on the hand, and help him on the ſpur on the contrary ſide to that on which he is diſunited.

However, this rule has not been always ſtrictly obſerved; for hunting horſes have been trained to lead indifferently with both legs, becauſe it has been found, that a horſe which has never been ſuffered to *gallop* but with his right fore-leg, has been worn out on one ſide, when he has been freſh and ſound on the other. In order to make a ſtop in a *gallop* ſtrait forwards, the rider ſhould carefully put his horſe together, without altering or diſturbing the appuy, and throw his body back a little, to accompany the action, and to relieve the horſe's ſhoulders. In doing this, he ſhould ſeize the time of making the ſtop, keeping the hand and body quite ſtill, exactly when he feels the horſe put his fore-feet to the ground, in order that by raiſing them immediately by the next motion which he makes, he may be upon his haunches. When horſes do not put out their ſtrength ſufficiently, they ſhould be *galloped* briſkly, and then ſlowly again, by turns, and they will thus be compelled to obey the hand and heel. In the ſlow *gallop*, as well as in the trot, it is ſometimes neceſſary to cloſe the heels to the horſe's ſides, which is called *pinchery*; but this ſhould be done in ſuch a manner as not to make the horſe abandon himſelf upon the hand, and care muſt be taken that he be upon his haunches, and not upon his ſhoulders; and, therefore, when he is pinched, he ſhould be kept in the hand. To put a horſe well together, and make him bring his hinder-legs under him, the rider muſt cloſe his legs upon him, putting them very much back; this will oblige him to ſlide his legs under him; at the ſame inſtant let the hand be raiſed a little to ſupport him before, and yielded again immediately. Let him be thus ſupported, and have the rein again from time to time, till he begins to play and bend his haunches, and *gallops* leaning and ſitting down, as it were, upon them; let the rider then preſs him with the calves of the legs, and he will thus become quick and ſenſible to the touch. If a horſe has too fine a mouth, *gallop* him upon ſloping ground; this will oblige him to lean a little upon the hand, in order the better to put himſelf upon the haunches; and through fear of hurting his bars, he will be prevented from reſiſting the operation of the bit. If the horſe is heavy in hand, *gallop* him up ſloping ground; and when his appuy is too ſtrong, this will lighten him. The *gallop* ſerves to aſſure and make ſteady a weak and delicate mouth, and alſo to ſupple a horſe, and make him ſteady and active in his limbs. Berenger's Hiſt. and Art of Horſemanſhip, vol. ii. p. 104, &c.

In a circle the horſe is confined always to lead with his fore-leg, within the turn; otherwiſe he is ſaid to *gallop falſe*. But here, too, the hind-leg of the ſame ſide muſt follow.

We ſay, a *hand-gallop*, a *Canterbury-gallop*, a *ſchool-gallop*, &c. A ſmooth *gallop*, cloſe to the ground, the French call the *Engliſh gallop*, *galop à l'Angloiſe*.

GALLOPER, in *Artillery*, is the name of a carriage which ſerves for a pound and a half gun. This carriage has ſhafts ſo as to be drawn without a LIMBER, and is thought by ſome to be more convenient and preferable to other field carriages; and it may likewiſe ſerve for our light three and ſix pounders. See the dimenſions and drawing of a *galloper* carriage in Muller's Treatiſe of Artillery, p. 186.

GALLOWAYS is the name of a peculiar ſort of horſes, ſo called from the county of *Galloway* in Scotland, where they are bred. Tradition reports that this kind of horſes ſprung from ſome Spaniſh ſtallions, which ſwam on ſhore from ſome of the ſhips of the famous Spaniſh armada, wrecked on the coaſt, and coupling with the mares of the country, furniſhed the kingdom with their poſterity. They were much eſteemed, and of a middling ſize, ſtrong, active, nervous, and hardy.

GALLOWS, an inſtrument of puniſhment, whereon perſons convicted capitally of ſelony, &c. are executed by hanging.

Among our anceſtors it was called *furca, a fork*; a name by which it ſtill is denominated abroad, particularly in France and Italy. In this latter country, the reaſon of the name ſtill ſubſiſts; the *gallows* being a real fork driven into the ground, acroſs the legs whereof is laid a beam, to which the rope is tied.

Gallows *of a plough*, a name given by our farmers to a part of the common plough, from its reſembling a *gallows* made for the execution of maleſactors in its form; being compoſed of three pieces of timber, one placed tranſverſely over the heads of the other two. The *gallows* are a part of the plough head; they are fixed into the box of the plough, or that part through which the axis of the wheels paſſes. They make an angle with the box inclining upwards. The upper, or tranſverſe piece, is notched in ſeveral places, and ſerves to ſuſtain the WILDS, a pair of irons to which a ring and hooks are faſtened, and to theſe the chains of the harneſs, by which the whole plough is drawn along.

In ſome other parts of England they call this whole part of the plough, the three pieces being iron inſtead of timber, by the name of the wilds; and the *gallows* of the PLOUGH is then the tranſverſe piece at the top of the CROWSTAVES.

GALLS, or **Gall-nuts**. See Gall.

GALLUS. See Cock.

Gallus *grunniens*, in *Ichthyology*, the name of an Eaſt Indian fiſh, approaching to the nature of the *ſcorpius Marinus*, and called by the Dutch *knone haen*. Its body is thick, and rounded; its ſkin is free from ſcales, but is very uneven, full of tubercles, ſpotted, and variegated with ſhort ſtreaks of a blackiſh hue; its head is large and thick, and very full of tubercles; its noſe large, its eyes red, and its tail obtuſe; its belly fins are red. It is a very well taſted fiſh, and much valued there. When firſt taken out of the water, it makes a very remarkable grunting noiſe.

Gallus *marinus*, in *Ichthyology*, a name given by many writers to the fiſh called in Engliſh the DOREE, and more commonly known in Latin by the name FABER.

Gallus *marinus* is alſo a name by which ſome have called the fiſh more frequently known by the name of the ORBIS *piſcis*.

GALLY, on *ſhip-board*, a place in the cook-room, where the grates are put up, fires lighted, and the victuals boiled or roaſted.

Gally-*worm*, in *Zoology*, an inſect known by moſt writers under the name *julus*. It is a land inſect with a long body, compoſed of a great number of rings, and furniſhed with a great number of feet. It is found very frequently in gardens, and when touched, has the power of rolling itſelf up into a ball.

It is eſteemed a valuable medicine in the jaundice, and in ſuppreſſion of urine.

This animal is very common with us among rubbiſh, and is by ſome referred to the ſcolopendræ, but improperly; for though they agree in the great number of legs, ours is a harmleſs animal, and the ſcolopendræ are miſchievous creatures, armed with dangerous forceps. It is ſuppoſed by Liſter, that this creature, common with us, would, on diſtillation, yield the ſame ſort of animal acid that is procured from the ant. The reaſon of the conjecture is, that the ant and this creature both agree in emitting a ſharp and pungent ſmell on being bruiſed; but theſe are not eaſily procured in plenty enough to make the experiment, as they are not a gregarious inſect like the ant. Poſſibly ſome more of the inſects may be found, on trial, to have the ſame acid. Phil. Tranſ. N° 68.

GAMBETTA, in *Ornithology*, the name of a bird ſomewhat reſembling the common redſhank. Its head, neck, and breaſt, are grey, full of brown ſpots: theſe are larger on the back, and ſmaller on the breaſt and belly, and ſmalleſt of all on the head. Its whole back is of a grey, a little inclining to a reddiſh brown on the lower part of the back, and on the wings; its belly is white, and its beak black. It is common in Italy, and ſome other places. Aldrovand de Avib. lib xx. and xxvi.

Mr. Pennant deſcribes one of this ſpecies, the *tringa gambetta* of Linnæus, which was ſhot on the coaſt of Lincolnſhire, about the ſize of the green-ſhank; the head, back, and breaſt, being of an aſh-brown, ſpotted with dull yellow; the coverts of the wings, ſcapulars, cinereous, edged with yellow; the primaries duſky; the ſhaft of the firſt feather white; belly white; tail duſky, bordered with yellow; and legs yellow. Zoology, vol. ii. p. 495.

GAMBEZON, **Gambeyson**, **Gambeso**, in the *ancient Military Language*, was a kind of coat or doublet, worn under the cuiraſs, to make it ſit eaſy, and prevent its hurting the body.

It was made of wool or cotton, quilted between two ſtuffs; and was likewiſe called *counter-point*.

Others define the *gambezon* a kind of ſoft quilted waiſtcoat, worn under the coat of mail, and hanging down over the thighs.

> *Pectora tot coriis, tot* gambeſonibus *ornat.*

GAMBOGE is a concrete gummy-reſinous juice of certain trees growing in Cambogia or Cambodia, and ſome other parts of the Eaſt-Indies: it is brought over to us in large cakes or rolls, externally of a browniſh yellow, and internally of a deep reddiſh yellow or orange colour, changing to a pale bright yellow on being moiſtened. The gummy parts of this juice are ſo intimately blended with the reſinous, that the greateſt part of it is ſoluble either by water or ſpirit of wine: it is alſo inflammable, and eaſily melts with a very gentle heat. If mixed with an equal quantity of ſalt of tartar, it readily diſſolves in common water, in a few hours digeſtion; this ſolution, if kept over the fire, ſoon becomes a ſort of ſmooth glue or jelly; and this, by adding a large quantity of water, is eaſily reduced into a red clear liquor in a warm digeſtion: this liquor, evaporated over a gentle fire, yields a greyiſh ſalt, which eaſily imbibes moiſture from the air, if not kept in a glaſs well ſtopped; and this extract purges in a ſmaller doſe than the gum itſelf, and yet with leſs irritation; its taſte, however, is extremely acrimonious and fiery, and it muſt therefore be well diſguiſed before it is given. There is, however, another method of giving it, yet more to be recommended than this for general uſe; this preparation is as follows: tie up the gum in a piece of linen cloth, and put it into a loaf juſt drawn from the oven; the loaf muſt be cut open for this purpoſe, and afterwards tied cloſe together, and ſet in ſome place where it will remain warm four-and-twenty hours; after this the gum is to be taken out and reduced to powder, and this powder tied up again, and put into another loaf, and ſo on to the fourth or fifth time; after which it is to be powdered and kept for uſe. By this eaſy preparation this medicine loſes its violent operation, both as a purgative and emetic, and may be given with great ſafety; and the crumb of the firſt loaf, if eaten, proves purgative. Mem. Acad. Par. 1701.

In ſuch hydropic caſes as require the briſker cathartics, and in other diſorders accompanied with a redundance of ſerous humours, it is an uſeful and ſafe hydragogue; in hot, dry, bilious conſtitutions, it is never to be adminiſtered. In all caſes it is apt, on firſt uſing it, to vomit as well as purge. The doſe is from three or four grains to twelve, or at moſt fifteen. The emetic power of this medicine is reſtrained by joining it to mercurius dulcis. The pills of *gamboge* are prepared by mixing equal parts of *gamboge*, mercurius dulcis, aloes, and extract of black hellebore, with a ſixteenth of their weight of eſſential oil of juniper-berries, and making the whole into a maſs with ſyrup of buck-thorn. Solutions of *gamboge* in alkalized water, and in dulcified alkaline ſpirits, act only by ſtool and urine, and much more mildly than the juice in ſubſtance. The watery tincture is ſtill milder; but the ſpirituous tincture operates with extreme irritation both upwards and downwards. Lewis's Mat. Med.

Gamboge, diſſolved in water, forms a beautiful yellow pigment, and is much uſed as ſuch by painters. Dr. Lewis ſays, that it gives a beautiful and durable citron-yellow ſtain to marble, whether rubbed in ſubſtance on the hot ſtone, or applied, as dragon's blood ſometimes is, in form of a ſpirituous tincture. When it is applied on cold marble, the ſtone is afterwards heated, to make the colour penetrate. Neumann's Chem. by Lewis, p. 300. note *m*.

GAME, *ludus*, a regular diverſion, or a ſport preſcribed and limited by rules.

Games may be diſtinguiſhed into thoſe of *exerciſe* and *addreſs*; and thoſe of *chance* or *hazard*.

To the firſt belong *tennis*, *billiards*, *cheſs*, *bowls*, *cudgels*, *wreſtling*, *quoits*, *ſhooting with bows*, &c.

To theſe alſo belong the ancient *juſts* and *tournaments*.

Under the ſecond come *cards* and *dice*, &c.

Under cards, again, come ſeveral ſubordinate *games*; the principal whereof are OMBRE, PICQUET, BASSET, WHIST, &c.

Games, *ludi*, in the plural, were ſhews, or public repreſentations, uſed among the ancients on religious, funerary, and other ſolemn occaſions.

Such, among the Greeks, were the OLYMPIC, PYTHIAN, ISTHMIAN, and NEMÆAN *games*.

Among the Romans, there were three ſorts of *games*; *ſacred*, *honorary*, and *ludicrous*: and Auſonius obſerves a difference, ſomewhat of the ſame kind, among thoſe of the Greeks; two of their celebrated *games* being dedicated to gods, and two to heroes.

GAMES, *ſacred*, were thoſe inſtituted immediately in honour of ſome deity; of which kind there were the *ludi Cereales*, *Florales*, *Martiales*, *Apollinares*, *Megalenſes*, *Romani*, *Conſuales* or *Circenſes*, *Capitolini*, *ſeculares*, *plebeii*, *compitalitii*, *Auguſtales*, *Palatini*, and *votivi*. See each deſcribed in its place.

To this claſs may alſo be referred thoſe celebrated in memory of ſome illuſtrious perſon or action; as the *ludi Neroniani*, and *Actiaci*, &c.

Authors mention a decree of the Roman ſenate, by which it was enacted, that the public *games* ſhould be conſecrated, and united with the worſhip of the gods, as a part thereof; and, accordingly, feaſts, ſacrifices, and *games*, appear to have made up the greateſt part, or rather the whole, of the external worſhip or ſervice offered to the deities of the Romans.

GAMES, *funeral*. See FUNERAL *games*.

GAMES, *honorary*, *ludi honorarii*, were thoſe exhibited by private perſons, out of their own purſe, in order to gratify the people, or ingratiate themſelves with them, to make way for their own preferment. Such were the combats of gladiators, ſcenic *games*, tragedies, comedies, and other theatrical and and amphitheatrical ſports.

GAMES, *ludicrous*, were of the ſame kind with the *games* of exerciſe and hazard among us. Such were the *ludus Trojanus*, or *Pyrrhius*; the *teſſeræ*, and *tali* or dice; and the *latrunculi*, or cheſs; the *diſcus*, or quoit; the *pila*, ball; *trochus*, top; *nuces*, or *par impar*, odd and even, with nuts; *harpaſtum*, foot-ball; *capita vel navem*, croſs and pile, &c.

Others diſtinguiſh the ancient *games* into three claſſes, viz. *races*, *combats*, and *ſpectacles*. The firſt were called *equeſtrian*, or *curule games*, *ludi equeſtres*, or *curules*; being races of horſes and chariots, performed in the circus in honour of the Sun and Neptune.

The ſecond were called *agonales*, or *gymnici*; being combats of men or beaſts, in the amphitheatre, dedicated to Mars and Minerva.

The laſt, called *ſcenici*, *poetici*, and *muſici*, were tragedies, comedies, balls, &c. repreſented on the theatres, ſacred to Venus, Bacchus, Apollo, and Minerva.

Homer gives us a fine deſcription of the *games* which Achilles inſtituted at the funeral of his friend Patroclus, in his Iliad; and others of the different *games* held among the Pheaces, Ithacans, and at the court of Alcinous, in his Odyſſey. And Virgil's deſcription of the *games* celebrated by Æneas, at the funeral of old Anchiſes, is not inferior to any of them.

GAME is alſo uſed for all kinds of wild beaſts and birds fit for eating, and which are ſought after on that account.

Game includes wild beaſts of venery and chace; and alſo beaſts and fowls of warren.

Some authors divide *game* into *large*, which include red and fallow deer; and *ſmall*, to which belong hares, rabbits, pheaſants, and partridges.

A foreſt is a place ſet apart for preſerving, feeding, breeding, &c. of all ſorts of *game*, and conſiſts of divers things, viz. ſoil, covert, laws, courts, judges, officers, *game*, and bounds.

A CHASE differs from a FOREST in this, among other things, that it has no variety of *game*.

Ways of catching *game* are by hunting, hawking, fowling, &c.

There is a great number of *laws made for the ſecurity and preſervation of the game*. The reſtrictive laws relating to foreſts and *game* were introduced into Europe at the ſame time, and by the ſame people, as gave birth to the feudal ſyſtem: on the irruption of the northern barbarians, it behoved every conquering general, when he ſettled the œconomy of a vanquiſhed country, and partitioned it among his ſoldiers and feudatories, on condition of military ſervice, to keep the *ruſtici*, or natives of the country, who were not his military tenants, in as low a condition as poſſible, and eſpecially to prohibit them the uſe of arms. In order to this, it became neceſſary to prohibit hunting and ſporting, and that the conqueror ſhould reſerve this right to himſelf, and to ſuch capital feudatories, or barons, on whom he ſhould beſtow it. This excluſive privilege well ſuited the martial genius of thoſe conquering troops, who delighted in a ſport which bore reſemblance to war: and it is remarkable, that, in thoſe nations where the feudal policy remains the moſt uncorrupted, the foreſt or *game* laws continue in their greateſt rigour. In France all *game* is properly the king's: and in ſome parts of Germany it is death for a peaſant to be found hunting in the woods of the nobility. In the times of the Britons our whole iſland was repleniſhed with all ſorts of *game*, which they all enjoyed in common: but when huſbandry took place under the Saxon government, the beaſts fled into deſert tracts, called foreſts, which our royal ſportſmen reſerved for their own diverſion, on pain of a pecuniary forfeiture for ſuch as interfered with their ſovereign. But every freeholder had the full liberty of ſporting upon his own territories, provided that he abſtained from the king's foreſts; as is expreſſed in the laws of Canute, and Edward the Confeſſor: *Sit quilibet homo dignus venatione ſua, in ſylva & in agris, ſibi propriis, & in domino ſuo: et abſtineat omnis homo a venariis regis, ubicunque pacem eis habere voluerit*: which indeed was the ancient law of the Scandinavian continent, from whence Canute probably derived it: *Cuique enim in proprio fundo quamlibet feram quoquo modo venari permiſſum.* However, upon the Norman Conqueſt, the right of purſuing and taking all beaſts of chaſe, and other animals called *game*, was held to belong to the king, and to ſuch only as were authoriſed by him. This right was exerted, at and after the time of the Norman eſtabliſhment, with the utmoſt rigour. Blackſt. Com. vol. ii. p. 413, &c. See FOREST.

The firſt qualification relating to the *game* was eſtabliſhed by 13 Ric. II. ſtat. 1. cap. 13. which enacted that no layman, who hath not lands or tenements of 40*s.* a year, nor clergyman without preferment of 10*l.* a year, ſhall keep any greyhound or other dog for hunting, nor uſe ferrets, nets, and other engines for deſtroying *game*, on pain of a year's impriſonment.

By a ſtatute in 33 Hen. VIII. cap. 6. it is enacted, that no perſon ſhoot with, or keep in his houſe, any croſs-bow or ſtone-bow, hand gun or hagbut, under the length of one yard, unleſs he have lands, tenements, annuities, or offices, of the yearly value of 100*l.* on pain of a forfeiture of 10*l.* for every offence: nor ſhall any perſon travel with a croſs-bow bent, or gun charged, or ſhoot within a quarter of a mile of a city or town, except at a dead mark, or in defence of his houſe, under the like forfeiture, to be divided between the king and the proſecutor. This act continues ſtill in force, though the object of it, which was the encouragement of the uſe of the *long*-BOW, doth not now exiſt.

None under the degree of a baron, ſhall ſhoot with any hand-gun, within a city or town, or ſhoot at any fowl whatever with hail-ſhot, on the ſame forfeiture. 2 and 3 Edw. VI. cap. 14. This act was repealed by 6 and 7 Will. cap. 13.

Any perſon ſhooting in the night-time, or diſguiſed, ſhall be deemed a felon, if he deny; if he confeſs, he is fineable at the next general ſeſſions. 1 Hen. VII. cap. 7.

No perſon ſhall take any partridge or pheaſant by nets, &c. on the freehold of another perſon, without leave of the owner, under the penalty of 10*l.* half to him that ſues, and half to the owner of the ground. 11 Hen. VII. cap. 17.

No perſon ſhall keep any net, called deer-hays or buckſtalls, on pain of 10*l.* a month. 19 Hen. VII. cap. 11.

None ſhall break into an impaled park or incloſed ground, and chaſe out or kill any deer, under the penalty of 10*l.* to the party aggrieved, or treble damages and coſts, and finding ſureties for ſeven years. 5 Eliz. cap. 21. explained and amended by 3 Jac. cap. 13. and 7 Jac. cap. 13.

If any perſon, of what eſtate or condition ſoever, ſhall take, kill, or deſtroy any pheaſants or partridges in the night-time, and be convicted thereof at the aſſizes, ſeſſions, or leet, he ſhall forfeit for every pheaſant 20*s.* and for every partridge 10*s.* half to him that ſhall ſue, and half to the lord of the manor. 23 Eliz. cap. 10.

None ſhall kill or take pheaſants or partridges, with any net or engine, in the night-time, on forfeiture of 20*s.* for every pheaſant, and 10*s.* for every partridge. 33 Eliz.

None ſhall hawk or hunt with ſpaniels in ſtanding corn, or before it be ſhocked, unleſs on his own ground, on the penalty of 40*s.* half to the king, and the other half to the proprietor of the ground.

He that is convicted of killing or taking a pheaſant, partridge, duck, heron, hare, or other *game*; or of taking and deſtroying the eggs of ſwans, pheaſants, or partridges; ſhall pay 20*s.* for every ſuch fowl, hare, &c. to the uſe of the poor. 1 Jac. I. cap. 27.

Every perſon convicted to have kept a greyhound dog, or net, to kill or take deer, hare, pheaſant, or partridge, unleſs he have inheritance in his own right, or the right of his wife, of 10*l.* per annum, a leaſe for life of 30*l.* per annum, or be worth 200*l.* in goods, or be the ſon of a knight or lord, or heir apparent of an eſquire, ſhall pay 20*s.* for the uſe aforeſaid, or be committed to gaol for three months. This was the ſecond qualification by eſtate or degree for killing *game*. Nor ſhall any ſell, or buy to ſell again, any deer, hare, pheaſant, or partridge, on pain of 40*s.* for every deer, 10*s.* for every hare and partridge, and 20*s.* for every pheaſant, half to him that will ſue, and half to the poor. Id. ſtat. cap. 27.

The next qualification relates to deer and conies only: this forbids a perſon, not having hereditaments of 40*l.* a year, or goods of 200*l.* value, from uſing any gun or bow to kill deer or conies, or from keeping nets or coney dogs, except he hath incloſed grounds, in which the increaſe of the conies amounts to 40*s.* a year, or be a keeper or warrener, under the penalty of having his guns, nets, &c. liable to be taken away by any perſon having lands or hereditaments of 100*l.* a year in fee or for life. 3 Jac. I. cap. 13.

The lord of a manor, or one having inheritance of 40*l.* per annum, lives-eſtate of 80*l.* or goods worth 400*l.* or their ſervants licenſed by them, may take pheaſants or partridges within their own lands or precincts, in the day-time, between Michaelmas and Chriſtmas. 7 Jac. I. cap. 11.

Hawking of pheaſants and partridges between the firſt of July and the laſt of Auguſt is prohibited, under the penalty of 40*s.* for every ſuch hawking, and 20*s.* for every pheaſant or partridge deſtroyed. 7 Jac. cap. 11.

They that kill or take away any red or fallow deer, without conſent of the owner, ſhall forfeit 20*l.* to be taken by diſtreſs; one half to the owner, and the other to the informer; or, for want of ſuch diſtreſs, ſhall ſuffer a year's impriſonment. 13 Car. II.

Lords of manors, or other royalties, not under the degree of eſquire, may commiſſion one or more *game*-keepers, who may ſeize all guns, dogs, bows, &c. of perſons not having eſtates, in their own or wife's right, of 100*l.* per annum freehold, or for term of life; or 150*l.* per annum leaſehold, for ninety-nine years or upwards; or not being ſons and heirs of eſquires, or of higher degree; or owners or keepers of a foreſt, park, chaſe, or warren; and deſtroy, or convert ſuch guns, &c. to the uſe of the lord. 22 and 23 Car. II. cap. 25. For this purpoſe it has been adjudged neceſſary to have a warrant from a juſtice of peace, after information and oath of the offence firſt made. This is the laſt general qualification for killing *game*, and that which is now moſt to be regarded.

If any enter a coney-warren, though not incloſed, and chaſe or kill conies, he ſhall forfeit treble damages, and be impriſoned three months: and they that kill conies in the night time upon the borders of warrens, or grounds uſed for keeping conies, ſhall be amerced at the diſcretion of the juſtice of peace, in any ſum not exceeding 10*s.* Id. ſtat.

He who unlawfully hunts, takes in toils, kills, or takes away any deer, in any foreſt, chaſe, park, purlieu, or other incloſed ground, or ſhall be aiding and aſſiſting therein, ſhall forfeit 20*l.* for unlawfully courſing or hunting, though none ſhall be wounded or taken; and in caſe any be wounded, or killed, or taken, 30*l.* for every ſuch deer, one third to the poor, one third to the informer, and one third to the owner of the deer, to be levied by diſtreſs. 3 Will. and Mary. 5 Geo. I. cap. 15. 9 Geo. cap. 22. and 10 Geo. II. cap. 32. And if a keeper of a foreſt, &c. be an offender herein, or be aiding thereto, he ſhall forfeit 50*l.* 5 Geo. I. to be levied as above.

In caſe any hare, partridge, pheaſant, fiſh, fowl, or other *game*, ſhall be found in any offender's houſe, he ſhall forfeit a ſum not leſs than 5*s.* nor more than 20*s.* to be levied by diſtreſs, half to the informer, and half to the poor; or, in want thereof, he ſhall be committed to the houſe of correction for a ſpace of time not greater than a month, nor leſs than ten days. And if any perſon, not qualified by law, ſhall keep or uſe any bows, greyhounds, ſetting-dogs, ferrets, tumblers, ſnares, &c. he ſhall be ſubject to the ſame penalties. 4 and 5 Will. cap. 23.

If any higler, chapman, carrier, inn-keeper, or victualler, ſhall have in his keeping any hare, pheaſant, partridge, heath *game*, or growſe, not put in his hands by a perſon qualified by law, he ſhall forfeit 5*l.* for every ſuch hare, &c. half to the informer, and half to the poor, to be levied by diſtreſs; or, for want thereof, he ſhall be ſent to the houſe of correction for three months for the firſt offence, and for every other offence four months. 5 Anne, cap. 14.

If any perſon, whether he be qualified or not, ſhall ſell, or expoſe to ſale any hare, pheaſant, partridge, moor, heath *game*, or growſe, he ſhall be liable to the ſame penalty. 28 Geo. II. cap. 12.

Perſons not qualified, keeping greyhounds, lurchers, ſetting-dogs, or engines to deſtroy *game*; and *game*-keepers, who, under colour of office, kill and ſell *game* without their maſter's knowlege; are liable to the like penalty. 5 Anne, cap. 14.

No lord of a manor is to appoint more than one *game*-keeper, and his name to be entered with the clerk of the peace, who is to give a certificate thereof; otherwiſe he is liable to the penalties againſt higlers. And if any other *game*-keeper, whoſe name is not ſo entered, who ſhall not be otherwiſe qualified by the laws of this kingdom to kill *game*, ſhall kill, ſell, or expoſe to ſale any hare, pheaſant, partridge, moor, heath *game*, or growſe, he ſhall, on conviction before one juſtice, and on the oath of one witneſs, be liable to the ſame penalty for the firſt offence, and for every other offence be ſent to the houſe of correction for four months. 5 and 9 Anne, cap. 25.

If any hare, pheaſant, &c. be found in the poſſeſſion of a perſon not qualified, unleſs he be entitled to it by ſome perſon that is qualified, the ſame ſhall be adjudged an expoſing it to ſale. Perſons deſtroying a hare in the night, ſhall incur the forfeiture of 5*l.* 9 Anne, cap. 25. 28 Geo. II. cap. 12.

Any juſtice of the peace, and lord within his manor, may take away ſuch hare, &c. found in the cuſtody of a perſon not qualified; and any perſon that ſhall deſtroy, ſell, or buy any hare, &c. and ſhall in three months diſcover any higler, carrier, victualler, &c. that hath bought or ſold, or offered to buy or ſell, or had in their poſſeſſion any hare, &c. ſhall be diſcharged of the penalty annexed to his own offence, and receive the ſame benefit as any other informer. 5 Anne, cap. 14.

No lord of a manor ſhall appoint a *game*-keeper, with power to kill or deſtroy *game*, unleſs he be qualified by the laws of the realm, be truly a ſervant of ſuch lord, or be immediately employed to kill *game* for the ſole uſe of ſuch lord; nor ſhall any lord authorize a perſon not qualified to keep or uſe gun, greyhounds, &c. and ſuch perſons as ſhall be found offending in either of theſe points, ſhall, for every offence, forfeit 5*l.* 3 Geo. I. cap. 11.

If any perſon enter a park, paddock, or other incloſed ground, where deer are uſually kept, and wilfully wound or kill any red or fallow deer, he ſhall be tranſported to the plantations for ſeven years. 5 Geo. I. See BLACK *Act*.

If any perſon ſhall by hays, tunnels, or other nets, drive and take any wild duck, teal, widgeon, or any other water-fowl, in any place of reſort for wild-fowl in the moulting ſeaſon, between June 1 and Oct. 1, yearly, he ſhall, on conviction, forfeit for every ſuch fowl 5*s.* half to the informer, and half to the poor, by diſtreſs, or be committed to the houſe of correction for a time not exceeding one month, nor leſs than fourteen days: and the nets ſhall be ſeized and deſtroyed in the preſence of the juſtice. 9 Anne, cap. 25. 10 Geo. II. cap. 32. And perſons deſtroying the eggs of any mallard, teal, or other water-fowl, from March 31 to June 30, ſhall be liable to a year's impriſonment, or forfeiture of one penny for every egg. 25 Hen. VIII. cap. 11.

No perſon ſhall, on any pretence whatſoever, take, kill, carry, ſell, buy, or have in his poſſeſſion or uſe, any partridge, between Feb. 12 and Sept. 1; or any pheaſant, between Feb. 1 and Oct. 1, yearly; on pain of forfeiting, on conviction by one witneſs in any of the courts of record at Weſtminſter, 5*l.* for every ſuch fowl, with full coſts. 2 Geo. III. cap. 19.

And if any perſon ſhall ſhoot at, kill, or take any dove-houſe or pigeon, and be convicted by confeſſion, or oath of one witneſs, before one juſtice, where the offence was committed, or the party apprehended, he ſhall forfeit 20*s.* to the proſecutor, or be committed to gaol or the houſe of correction for a time not exceeding three calendar months, nor leſs than one. Id. ſtat.

If any perſon ſhall knowingly and wilfully kill, take, or deſtroy, or uſe any gun, dog, ſnare, net, or other engine, with intent to kill, take, or deſtroy any hare, pheaſant, partridge, moor *game*, or heath *game*, in the night, between the hours of ſeven at night and ſix in the morning, from the 12th day of October to the 12th day of February; and between the hours of nine at night and four in the morning, from the 12th day of February to the 12th day of October; or, in the day-time, upon a Sunday or Chriſtmas-day; he ſhall, on conviction by oath of one witneſs, before one juſtice, forfeit for the firſt offence a ſum not exceeding 20*l.* nor leſs than 10*l.* for the ſecond offence not more than 30*l.* nor leſs than 20*l.* and for the third and every ſubſequent offence 50*l.* each penalty to be levied by diſtreſs, and to be paid half to the informer, and half to the poor. In caſe of refuſal of payment of the fine of 50*l.* the offender ſhall be committed to the houſe of correction for no leſs than ſix, nor more than twelve calendar months, unleſs ſuch penalty ſhall be ſooner paid; and the offender may be once publicly whipped, if the juſtices think proper. 13 Geo. III. cap. 80.

No perſon ſhall take, deſtroy, carry, ſell, buy, or have in his poſſeſſion any heath fowl, called black *game*, between Dec. 10 and Aug. 20; nor any growſe, commonly called red game, between Dec. 10 and Aug. 12; nor any buſtard, between March 1 and Sept. 1, in any year; on pain of forfeiting for the firſt offence any ſum not exceeding 20*l.* nor leſs than 10*l.* and for the ſecond, and every ſubſequent offence, not exceeding 30*l.* nor leſs than 20*l.* half to the informer, and half to the poor. 13 Geo. III. cap. 55. See Fishing, Hawking, Herons, Swans, &c.

Game, *black*. See Grouse.

Game-*cock*. See Cock.

Game, *red*. See Gor-*cock*.

Game, *white*. See Ptarmigan.

Game-*keeper*, is one who has the care of keeping and preſerving the *game*, being appointed thereto by the lord of a manor. See Game, above.

GAMELIA, Γαμηλια, a nuptial feaſt, or rather ſacrifice, held in the ancient Greek families on the day before a marriage.

It was thus called from γαμος, *marriage*; whence alſo Γαμηλιος, an epithet, or ſurname, given to Jupiter and Juno, conſidered as preſiding over marriages.

GAMELION, Γαμηλιων, in *ancient Chronology*, the eighth month of the Athenian year. It contained twenty-nine days, and anſwered to the latter part of our January, and the beginning of February.

This month had its name from being ſacred to Jupiter and Juno, diſtinguiſhed by the epithet Γαμηλιος, becauſe they preſided over marriages.

Gamelion, or Gamelium, a poem, or compoſition in verſe, on the ſubject of a marriage; more uſually called an epithalamium.

GAMETRIA. See Gematria.

GAMING, the art or act of performing or practiſing a game, particularly a game of hazard.

All public *gaming* is ſeverely prohibited; and what money is thus loſt, is recoverable again by law.

In China, *gaming* is equally prohibited the common people, and the mandarins; and yet this does not hinder their playing, and frequently loſing all they have; their lands, houſes, children, and even wives, which are all ſometimes laid on a ſingle card. F. le Compte.

By 16 Car. II. cap. 7. if any perſon by playing or betting ſhall loſe more than 100*l.* at one time, he ſhall not be compellable to pay the ſame; and the winner ſhall forfeit treble the value, one moiety to the king, and the other moiety to him that ſhall ſue for it, with treble coſts. By 9 Anne, cap. 14. all notes, bills, bonds, judgments, mortgages, or other ſecurities, given for money won by playing at cards, dice, tables, tennis, bowls, or other games, or by betting on the ſides of ſuch as play at any of thoſe games, or for repayment of any money knowingly lent for ſuch *gaming* or betting, ſhall be void: and where lands are granted by ſuch mortgages or ſecurities, they ſhall go to the next perſon who ought to have the ſame, as if the granter were actually dead, and the grants had been made to the perſon ſo intitled, after the death of the perſon ſo incumbering the ſame. If any perſon playing at cards, dice, or other game, or betting, ſhall loſe the value of 10*l.* at one time, to one or more perſons, and ſhall pay the money, he may recover the money loſt, by action of debt within three months afterward: and if the loſer does not ſue, any other perſon may do it and recover the ſame, and treble the value with coſts, one moiety to the proſecutor, and the other to the poor; and the perſon proſecuted ſhall anſwer upon oath, on preferring a bill to diſcover what ſums he hath won.

Perſons by fraud or ill practice, in playing at cards, dice, or by bearing a ſhare in the ſtakes, &c. or by betting, winning any ſum above 10*l.* ſhall forfeit five times the value of the thing won, and ſuffer ſuch infamy and corporal puniſhment as in caſes of wilful perjury, being convicted thereof on indictment or information; and the penalty ſhall be recovered by action, by ſuch perſon as will ſue for the ſame: and if any one ſhall aſſault and beat, or challenge to fight any other perſon, on account of money won by *gaming*, upon conviction thereof he ſhall forfeit all his goods, and ſuffer impriſonment for two years. Stat. 9 Anne. Alſo by this ſtatute, any two or more juſtices of the peace may cauſe ſuch perſons to be brought before them, as they ſuſpect to have no viſible eſtates, &c. to maintain them; and if they do not make it appear, that the principal part of their expences is got by other means than *gaming*, the juſtices ſhall require ſecurities for their good behaviour for a twelvemonth, and in default of ſuch ſecurity, commit them to priſon until they find it: and playing or betting during the time, to the value of 20*s.* ſhall be deemed a breach of behaviour, and a forfeiture of their recognizances. Ibid.

This ſtatute of Anne is farther enforced by ſtat. 18 Geo. II. cap. 34. and ſome deficiencies are ſupplied; the forfeitures of that act may now be recovered in a court of equity: and, moreover, if any man be convicted, upon information or indictment, of winning or loſing at any ſitting 10*l.* or 20*l.* within twenty-four hours, he ſhall forfeit five times the ſums, which, deducting the charges, ſhall go to the poor. By ſeveral ſtatutes of the reign of king George II. viz. 12 Geo. II. cap. 28. 13 Geo. II. cap. 19. and 18 Geo. II. cap. 34. all private lotteries by tickets, cards, or dice, and particularly the games of faro, baſſet, ace of hearts, hazard, paſſage, roly poly, and all other games with dice, except back-gammon, are prohibited under a penalty of 200*l.* for him that ſhall erect ſuch lotteries, &c. and 50*l.* a time for the players. Public lotteries, unleſs by authority of parliament, and all manner of ingenious devices, under the denomination of ſales or otherwiſe, which in the end are equivalent to lotteries, were before prohibited by a great variety of ſtatutes, under heavy pecuniary penalties. 10 and 11 Will. III. cap. 17. 9 Anne, cap. 6. § 56. 10 Anne, cap. 26 § 109. 8 Geo. I. cap. 2. § 36, 37. 9 Geo. I. cap. 19. § 4, 5. 6 Geo. II. cap. 35. § 29, 30.

Gaming-houſes are prohibited under ſevere penalties by ſeveral ſtatutes. No perſon ſhall, for his gain or living, keep any common houſe or place of bowling, coyting, cloyſh, cayls, half-bowl, tennis, dicing-table, carding, or any unlawful game, on pain of 40*s.* a day; and every perſon frequenting ſuch houſes and play, and there playing, ſhall forfeit 6*s* 8*d.* And juſtices of the peace, and the head officers of corporations, have power to enter places ſuſpected of unlawful *gaming*, and to arreſt and impriſon the keepers and players, till they give ſecurity to keep and reſort to ſuch houſes no longer: and ſuch officers are bound to make ſearch for ſuſpected houſes, weekly or monthly, under a forfeiture of 40*s.* a month. Farther, artificers, labourers, ſervants, &c. are prohibited to play at tables, dice, tennis, cards, bowls, &c. out of Chriſtmas, on pain of 20*s.* and in Chriſtmas only in the houſes or preſence of their maſters. 33 Hen. VIII. cap. 9. Moreover, *gaming* in public-houſes is prohibited under a penalty to the keeper of the houſe, who knowingly ſuffers it, of 40*s.* for the firſt offence, and for every other offence 10*l.* by diſtreſs, three fourths of which ſhall be to the poor, and one fourth to the informer. And any journeyman, labourer, apprentice, or ſervant, who ſhall game in ſuch a houſe, ſhall forfeit on conviction by confeſſion, or the oath of one witneſs, not more than 20*s.* nor leſs than 5*s.* at the pleaſure of the juſtice, or be committed to hard labour for a term not exceeding a month. 30 Geo. II. cap. 24. And by 25 Geo. II. cap. 36. any houſe, or place kept for public dancing, muſic, or other entertainment, in London, or within twenty miles, (except places authorized by letters patent, or licence of the crown, or lord chamberlain,) without licence, granted at the preceding Michaelmas ſeſſions, and ſigned and ſealed by four juſtices in open court, and of which notice is given over the door or entrance of ſuch licenſed place in the following words, viz. Licenſed purſuant to act of parliament of the 25th of king George the Second; ſhall be deemed a diſorderly houſe or place, and the keeper thereof ſhall forfeit 100*l.* with full coſts. A conſtable, on notice given him in writing by any two inhabitants of the pariſh paying ſcot and lot, of any perſon keeping ſuch diſorderly houſe, and on their making oath to ſuch notice, and entering into a recognizance of 120*l.* each to produce evidence of the offence, ſhall enter into a recognizance of 30*l.* before a juſtice of the peace, to proſecute ſuch perſon; and the juſtice ſhall iſſue his warrant for bringing the accuſed perſon before him, and bind them over to appear at the next ſeſſions or aſſizes: if the conſtable neglect or refuſe to comply with ſuch notice, &c. he ſhall forfeit 20*l.* to each of the ſaid inhabitants; and the conſtable ſhall be allowed the reaſonable expences of the proſecution, to be paid by the overſeers of the poor; and on conviction of the offender, the overſeers ſhall pay 10*l.* to each of ſuch inhabitants.

The buſineſs of chance or hazard, on which the laws of *gaming* depend, is of mathematical conſideration; inaſmuch as it admits of more, and leſs. It is, or is ſuppoſed to be, an equality of chance, upon which the gameſters ſet out: this equality is to be broken in upon in the courſe of the game by the greater good fortune or addreſs of one of the parties, upon which he comes to have a better chance; ſo that his ſhare in the depoſit, or ſtakes, is now proportionably more or better than at firſt: this more and leſs is continually varying, and runs through all the ratios between equality and infinite difference; or from an infinitely little difference till it arrives at an infinitely great one, upon which the game is ended. The whole game, therefore, with reſpect to the event or iſſue thereof, is only a change of the quantity of each perſon's ſhare, or chance, or of the proportion their two ſhares bear to each other; which mathematics alone can meaſure.

Hence ſeveral authors have computed the variety of chance in ſeveral caſes and circumſtances that occur in *gaming*; particularly M. de Moivre, in a treatiſe intitled the Doctrine of Chances, the beſt edition being publiſhed in 1756; of which we ſhall here give the reader an abſtract.

Laws of chance applied to GAMING. If the reader, who is at all converſant with ſubjects of this nature, conſults the articles EXPECTATION and PROBABILITY, he will be at no loſs to underſtand the ſolution of the following caſes; which, as they are the moſt ſimple and eaſy, will lead to the illuſtration of more complex and intricate calculations.

1. *To find the probability of throwing an ace in two throws of one die.* The firſt part of the probability required is that of throwing an ace at the firſt throw, which is $\frac{1}{6}$; but, as the probability of miſſing it in this throw is $\frac{5}{6}$, and that of throwing it in the ſecond is $\frac{1}{6}$, the ſecond part of the probability required, being the product of both theſe, will be $\frac{5}{6}\times\frac{1}{6}=\frac{5}{36}$; and therefore the whole probability is $\frac{1}{6}+\frac{5}{36}=\frac{11}{36}$.

2. *To find the probability of throwing an ace in three throws.* The probability of throwing it in the firſt throw is $\frac{1}{6}$; and the probability of miſſing it is $\frac{5}{6}$, which, being multiplied by $\frac{11}{36}$, the probability of throwing it in the two remaining times by caſe 1, will give $\frac{5}{6}\times\frac{11}{36}=\frac{55}{216}$ for the ſecond part of the probability required; and, therefore, the whole probability will be $\frac{1}{6}+\frac{55}{216}=\frac{91}{216}$.

3. *To find the probability of throwing an ace in four throws.* This is evidently, by the preceding caſes, $\frac{1}{6}+\left(\frac{5}{6}\times\frac{91}{216}=\right)\frac{455}{1296}=\frac{671}{1296}$; and the probability of the contrary is $\frac{625}{1296}$, becauſe $\frac{671}{1296}+\frac{625}{1296}=\frac{1296}{1296}=1$, which denotes certainty.

4. *To find the probability of throwing two aces in two throws.* The probability required is $\frac{1}{6}\times\frac{1}{6}=\frac{1}{36}$, the events in this caſe being independent. See EXPECTATION.

5. *To find the probability of throwing two aces in three throws.* The probability of throwing an ace in the firſt throw is $\frac{1}{6}$, and the probability of throwing it once in the two remaining throws is $\frac{11}{36}$, by caſe 1: conſequently the firſt part of the probability required is $\frac{1}{6}\times\frac{11}{36}=\frac{11}{216}$. But if the ace be miſſed the firſt time, the probability of which is $\frac{5}{6}$, there remains the probability of throwing it twice together, which is $=\frac{1}{36}$ by caſe 4; therefore the probability of both events is $\frac{5}{6}\times\frac{1}{36}=\frac{5}{216}$; and the whole probability required is $\frac{11+5}{216}=\frac{16}{216}$.

6. *To find the probability of throwing two aces in four throws.* The probability of throwing an ace the firſt time is $\frac{1}{6}$, and the probability of throwing it in three times is $\frac{91}{216}$ by caſe 2: and the probability of both happening is $\frac{1}{6}\times\frac{91}{216}=\frac{91}{1296}$, the firſt part of the probability required. But the probability of miſſing the ace for the firſt time is $\frac{5}{6}$, and the remaining probability of throwing it twice in three throws is $\frac{16}{216}$ by caſe 5; therefore the probability of both together is $\frac{5}{6}\times\frac{16}{216}=\frac{80}{1296}$, the ſecond part of the probability required; and, therefore, the whole probability is $=\frac{91}{1296}+\frac{80}{1296}=\frac{171}{1296}$.

In the ſame manner we may find the probability of throwing an ace as often as ſhall be demanded in any given number of throws.

From theſe familiar and more reſtricted caſes, we may deduce a more general and comprehenſive theorem. Let a be the number of chances for the happening of an event, and b the number of chances for its failing; then the probability of its happening *once* in any number of trials will be expreſſed by the ſeries $\frac{a}{a+b}+\frac{ab}{\overline{a+b}|^{2}}+\frac{abb}{\overline{a+b}|^{3}}+\frac{ab^{3}}{\overline{a+b}|^{4}}+\frac{ab^{4}}{\overline{a+b}|^{5}}$, &c. continued till the number of terms be equal to the number of trials given: e. gr. let a be $=1$, $b=5$, and the number of trials given be $=4$, the probability required will be expreſſed by $\frac{1}{6}+\frac{5}{36}+\frac{25}{216}+\frac{125}{1296}=\frac{671}{1296}$.

Again, the probability of the event's happening *twice* in any given number of trials will be expreſſed by the ſeries $\frac{aa}{\overline{a+b}|^{2}}+\frac{2aab}{\overline{a+b}|^{3}}+\frac{3aabb}{\overline{a+b}|^{4}}+\frac{4aab^{3}}{\overline{a+b}|^{5}}+\frac{5aab^{4}}{\overline{a+b}|^{6}}$, &c. continued, till the number of terms, wanting one, be equal to the number of trials given: e. gr. let a be $=1$, $b=5$, and the number of trials be $=8$, the probability required will be expreſſed by $\frac{1}{36}+\frac{10}{216}+\frac{75}{1296}+\frac{500}{7776}+\frac{3125}{46656}+\frac{18750}{279936}+\frac{109375}{1679616}=\frac{663991}{1679616}$. And the probability of the event's happening *thrice* in any given number of trials will be expreſſed by the ſeries $\frac{a^{3}}{\overline{a+b}|^{3}}+\frac{3a^{3}b}{\overline{a+b}|^{4}}+\frac{6a^{3}b^{2}}{\overline{a+b}|^{5}}+\frac{10a^{3}b^{3}}{\overline{a+b}|^{6}}+\frac{15a^{3}b^{4}}{\overline{a+b}|^{7}}$, &c. continued, till the number of terms, wanting two, be equal to the number of terms given. Theſe particular ſeries may be comprehended under a general one in the following manner: let a and b be as before, and their ſum $=a+b=s$; l the number of times which the event is required to happen in any given number of trials repreſented by n; then the probability of the event's happening l times in n trials will be expreſſed by the ſeries $\frac{a^{l}}{s^{l}}\times\overline{1+\frac{lb}{s}+\frac{l.\overline{l+1}.bb}{1.2.ss}+\frac{l.\overline{l+1}.\overline{l+2}.b^{3}}{1.2.3.s^{3}}+\frac{l.\overline{l+1}.\overline{l+2}.\overline{l+3}.b^{4}}{1.2.3.4.s^{4}}}$ &c. continued to as many terms, excluſive of the common multiplicator $\frac{a^{l}}{s^{l}}$, as are denoted by the number $n-l+1$. On the other hand, the probability of the event's not happening ſo often as l times, making $\overline{n-l+1}=p$, will be expreſſed by the ſeries $\frac{b^{p}}{s^{p}}\times\overline{1+\frac{pa}{s}+\frac{p.\overline{p+1}.aa}{1.2.ss}+\frac{p.\overline{p+1}.\overline{p+2}.a^{3}}{1.2.3.s^{3}}+\frac{p.\overline{p+1}.\overline{p+2}.\overline{p+3}.a^{4}}{1.2.3.4.s^{4}}}$ &c. continued to as many terms, excluſive of the common multiplicator, as are denoted by the number l. The ſum of theſe two probabilities is always equal to unity; and, therefore, the firſt ſeries may be uſed when $n-l+1$ is leſs than l, and the ſecond when l is leſs than $n-l+1$: in other words, the firſt or ſecond may be uſed as l is leſs or greater than $\frac{n+1}{2}$. E. gr. let a be $=1$, $b=35$, $n=24$, and $l=1$: in this caſe twenty-four terms of the firſt ſeries would be neceſſary to anſwer the queſtion, but one term of the ſecond will be ſufficient; and the probability of an event's not happening *once* in twenty-four trials, which has one chance to happen, and thirty-five to fail, will be expreſſed by $\frac{35^{24}}{36^{24}}\times 1$: this quantity, by the help of logarithms, will be found nearly equal to the decimal 0.50871, which, ſubtracted from unity, leaves a remainder 0.49129, expreſſing the probability required; and, therefore, the odds againſt the happening of the event will be fifty to forty-nine nearly. Again, if $l=2$, $n=60$, and $n-l+1=59$, in this caſe fifty-nine terms of the firſt ſeries will be neceſſary, and only two of the ſecond; and, therefore, by the ſecond ſeries, the probability of an event's not happening *twice* in ſixty trials will be $\frac{35^{59}}{36^{59}}\times 1+\frac{59}{36}=0{,}5007$, which, ſubtracted from 1, leaves the remainder 0.4993, expreſſing the probability required; conſequently, the odds againſt the event's happening *twice* in ſixty times will be little more than 500 to 499.

7. *To find the probability of throwing one ace, and no more, in four throws.* From the unlimited probability of the ace's being thrown in four throws, ſubtract the probability of its being thrown twice in that number of throws; i.e. from $\frac{671}{1296}$ by caſe 3. ſubtract $\frac{171}{1296}$ by caſe 6. and the remainder $\frac{500}{1296}$ gives the probability required, and and $1-\frac{500}{1296}=\frac{796}{1296}$ the probability of the contrary; and

the odds againſt throwing one ace, *and no more*, in four throws, are 796 to 500, or 8 to 5 nearly.

8. *If* A *and* B *play together, and* A *wants one game of being up, and* B *wants two, what are their reſpective probabilities of winning the ſet?* It is plain that A wants only to win once in two games, and B wants to win twice together: and if both have an equal chance, the probability which B has of winning the firſt game will be $\frac{1}{2}$, and the probability of his winning twice together will be $\frac{1}{2}\times\frac{1}{2}=\frac{1}{4}$; and, therefore, the probability which A has of winning once in two games will be $1-\frac{1}{4}=\frac{3}{4}$: conſequently the odds of A's winning are three to one.

9. *If* A *and* B *play together, and* A *wants one game, and* B *wants two of being up; but the chances whereby* B *may win a game are double to thoſe of* A; *to find the reſpective probabilities of winning.* In this caſe, the probability which B has of winning a game is $\frac{2}{3}$, and the probability of his winning twice together is $\frac{2}{3}\times\frac{2}{3}=\frac{4}{9}$; and, therefore, the probability of A's winning the ſet is $1-\frac{4}{9}=\frac{5}{9}$; and the odds of A's winning one before B wins twice, which the queſtion requires, are as five to four.

In general, whatever be the number of games which A and B reſpectively want of being up, the ſet will be concluded at the moſt in ſo many games, wanting one, as is the ſum of the games wanted between them. For, if A wants three games, and B wants five of being up, the greateſt number of games which A can win of B, before the determination of the play, will be two, and the greateſt number which B can win of A will be four, and the whole number ſix: but, ſuppoſing they have played ſix games, the next game will terminate the play; and, therefore, the utmoſt number of games that can be played between them will be $7=5+3-1$.

10. *If* A *wants three games, and* B *wants ſeven of being up, and their reſpective chances of winning a game are as three to five; to find the reſpective probabilities of winning the ſet.* The ſum of the games is ten, and the ſet will be concluded in nine games, and, therefore, A undertakes to win three out of nine games, and B to win ſeven; then, by the ſecond ſeries of the preceding theorem, n being $=9$, $l=3$, $a=3$, $b=5$, and $n-l+1$, or $p=7$, the probability which B has of winning the ſet will be expreſſed by $\frac{5^7}{8^7}\times\overline{1+\frac{21}{8}+\frac{252}{64}}=\frac{5^7}{8^9}\times 484=0.28172$ nearly, which, ſubtracted from unity, leaves a remainder $=0.71828$, expreſſing the probability which A has of winning; conſequently, the odds of A's winning the ſet will be 71828 to 28172, or nearly as 23 to 9.

Mr. de Moivre has alſo illuſtrated the principles of *gaming*, applied in the preceding caſes, in a different and more general way, by ſuppoſing two dice, having the ſame or a different number of equal faces: it is obvious, that the number of all the variations which the two dice can undergo will be obtained by multiplying the number of faces of the one by the number of faces of the other. From hence it follows, that, if the faces of each die are diſtinguiſhed into white and black, and the number of white faces on the firſt is A, and that of the black faces B, and alſo the number of white and black faces on the ſecond a and b reſpectively, the product of $\mathrm{A}+\mathrm{B}$ multiplied by $a+b$, i. e. $\mathrm{A}a+\mathrm{A}b+\mathrm{B}a+\mathrm{B}b$ will exhibit all the variations of the two dice: $\mathrm{A}a$ will repreſent the number of all the chances whereby the two dice may exhibit two white faces; $\mathrm{A}b$ the number of all the chances whereby a white face of the firſt may be joined with a black face of the ſecond; $a\mathrm{B}$ the number of all the chances whereby a white face of the ſecond may be joined with a black face of the firſt; and $\mathrm{B}b$ the number of all the chances whereby a black face of the firſt may be joined with a black face of the ſecond. Moreover, as theſe ſeveral quantities may be connected together ſeveral ways, the ſum of two or more of any of them will anſwer ſome queſtion of chance: e. gr. the number of chances for throwing a white face with the two dice above mentioned, will be repreſented by the three parts $\mathrm{A}a+\mathrm{A}b+\mathrm{B}a$, becauſe every one of theſe comprehends a caſe wherein a white face is concerned: but if the queſtion were reſtricted by a previous ſtipulation, that, if a perſon threw two white faces together, the wager would be loſt, the two terms $\mathrm{A}b+\mathrm{B}a$ would repreſent all his chances. Farther, if a third die be added, whoſe white faces are α, and black faces β, the preceding product, viz. $\mathrm{A}a+\mathrm{A}b+\mathrm{B}a+\mathrm{B}b$, multiplied by the whole number of faces of the third die, viz. $\alpha+\beta$, or $\mathrm{A}a\alpha+\mathrm{A}b\alpha+\mathrm{B}a\alpha+\mathrm{B}b\alpha+\mathrm{A}a\beta+\mathrm{A}b\beta+\mathrm{B}a\beta+\mathrm{B}b\beta$, will exhibit the number of all the variations which the three dice can undergo: in this caſe $\mathrm{A}a\alpha$ repreſents the number of chances for throwing three white faces, $\mathrm{A}b\alpha$ the number of chances whereby both the firſt and third die may exhibit a white face, and the ſecond a black one, &c. and by joining two or more of theſe terms, ſome queſtion of chance will be anſwered; e. gr. the number of chances for throwing two white faces and a black one will be repreſented by $\mathrm{A}b\alpha+\mathrm{B}a\alpha+\mathrm{A}a\beta$, and the odds in favour of him who undertakes to throw them will be $\mathrm{A}b\alpha+\mathrm{B}a\alpha+\mathrm{A}a\beta$ to $\mathrm{A}a\alpha+\mathrm{B}b\alpha+\mathrm{A}b\beta+\mathrm{B}a\beta+\mathrm{B}b\beta$; and the probability of the event will be expreſſed by a fraction, whoſe numerator is the number of chances required, and the denominator the whole number of variations which all the dice can undergo. E. gr. the probability of throwing three white faces with the three dice above mentioned will be expreſſed by

$$\frac{\mathrm{A}a\alpha}{\mathrm{A}a\alpha+\mathrm{A}b\alpha+\mathrm{B}a\alpha+\mathrm{A}a\beta+\mathrm{B}b\alpha+\mathrm{A}b\beta+\mathrm{B}a\beta+\mathrm{B}b\beta},$$

or, ſeparating the factors in the denominator,

$$\frac{\mathrm{A}a\alpha}{\overline{\mathrm{A}+\mathrm{B}}\times\overline{a+b}\times\overline{\alpha+\beta}}=\frac{\mathrm{A}}{\mathrm{A}+\mathrm{B}}\times\frac{a}{a+b}\times\frac{\alpha}{\alpha+\beta}:$$

ſo that the probability of the happening of ſeveral events independent is the product of all the particular probabilities whereby each particular event may be produced. See EXPECTATION.

In the preceding caſe of two dice, if A be $=a$, and B $=b$, $\mathrm{A}a+\mathrm{A}b+a\mathrm{B}+\mathrm{B}b$ will become $=aa+2ab+bb$; and $2ab=\mathrm{A}b+a\mathrm{B}$ will expreſs the number of variations, whereby with two dice of the ſame reſpective number of white and black faces, a white face and a black one may be thrown. And in the caſe of three dice, $\mathrm{A}b\alpha+\mathrm{B}a\alpha+\mathrm{A}a\beta$ will become $=3aab$; or, one term of the binomial $a+b$, raiſed to its cube, will expreſs the number of variations, whereby three dice of the ſame kind would exhibit two white faces and a black one.

11. From the above reaſoning the following general rule may be deduced: viz. in a number of dice $=n$, each of which is diſtinguiſhed into white and black faces, repreſented reſpectively by a and b, if $a+b$ be raiſed to the power n, the firſt term of that power will expreſs the number of chances whereby n white faces may be thrown; the ſecond term will expreſs the number of chances whereby $n-1$ white faces and 1 black face may be thrown; the third term will expreſs the number of chances whereby $n-2$ white faces and 2 black faces may be thrown, &c. and the reſpective numbers of white and black faces are repreſented by the indices of a and b in any given term.

To find the probability of throwing an ace in four throws with a common die of ſix faces. Since the throwing of one die four times ſucceſſively is the ſame thing as throwing four dice at once, the chance of throwing an ace is the ſame in the one caſe as in the other. Let the ace, then, in each of the four dice, anſwer to one white face, and the reſt of the points to five black faces, or a be $=1$, and $b=5$; raiſe $a+b$ to its fourth power, and every one of the terms in $a^4+4a^3b+6a^2b^2+4ab^3+b^4$, that has an a, will be a part of the number of chances whereby an ace may be thrown: conſequently, $a^4+4a^3b+6a^2b^2+4ab^3$, i. e. $1+20+150+500=671$, will expreſs the number of chances whereby an ace may be thrown with four dice, or in four ſucceſſive throws of a ſingle die; but the number of all the chances is the fourth power of $a+b$ or $6^4=1296$; and, therefore, the probability required is meaſured by the fraction $\frac{671}{1296}$. See caſe 3. It is evident, that b^4, or the laſt term of the above power, expreſſes the number of chances whereby the ace may fail in every one of the dice; and the probability of that failing is $\frac{b^4}{\overline{a+b}|^4}=\frac{625}{1296}$; and, therefore, the probability of not failing, or of throwing an ace in four throws is $1-\frac{625}{1296}=\frac{671}{1296}$, as before. When the number of dice is n, b^n, the laſt term of the power $\overline{a+b}|^n$, will always repreſent the number of chances whereby the ace may fail in n times; and, therefore, $\frac{b^n}{\overline{a+b}|^n}$ is the probability of its failing; and the probability of throwing an ace, in a number of throws expreſſed by n, will be $1-\frac{b_n}{\overline{a+b}|^n}=\frac{\overline{a+b}|^n-b^n}{\overline{a+b}|^n}$.

To find the probability of throwing with one ſingle die two aces in four throws, or of throwing at once two aces with four dice. The three terms $a^4+4a^3b+6a^2b^2$ of the fourth power of the binomial $a+b$, in which the indices of a

equal or exceed the number of times that the ace is to be thrown, will denote the number of chances whereby two aces may be thrown; ſo that a being $= 1$, and $b = 5$, $a^4+4a^3b+6a^2b^2$, will be $= 1+20+150=171$, and the whole number of chances, viz. $\overline{a+b}|^{4} = 1296$; conſequently the probability required will be expreſſed by $\frac{171}{1296}$. See Caſe 6. The probability of the contrary will be $\frac{1125}{1296}$; for in the two terms of the fourth power of $a+b$, $4ab^3+b^4$, a is found only once in the firſt, and not at all in the ſecond; therefore, theſe will expreſs the number of chances againſt throwing two aces, which is $= 500+625=1125$. And the probability of ſucceeding will be $1-\frac{1125}{1296}=\frac{171}{1296}$, as before. And univerſally, the laſt term of any power $\overline{a+b}|^{n}$ being b^n, and the laſt but one nab^{n-1}, in neither of which a^2 enters, it follows that the two laſt terms of that power expreſs the number of chances that are contrary to the throwing of two aces, in any number of throws denominated by n; and that the probability of throwing two aces will be $1-\frac{nab^{n-1}+b^n}{\overline{a+b}|^{n}}=\frac{\overline{a+b}|^{n}-nab^{n-1}-b^n}{\overline{a+b}|^{n}}$. And likewiſe, in the three laſt terms of the power $\overline{a+b}|^{n}$, every one of the indices of a will be leſs than three, and conſequently thoſe laſt terms will ſhew the number of chances that are contrary to the throwing of an ace three times in any number of trials n; and the ſame rule will hold perpetually. If the chances for happening and failing in any particular trial be reſpectively repreſented by a and b, the preceding rules may be applied to the happening or failing of any other kind of event in any number of times.

12. If A lays a wager that a certain event will happen l times in n trials, and B lays to the contrary, and the number of chances of happening and failing in one trial be reſpectively a and b, the number of chances whereby B may win his wager will be determined by as many of the laſt terms of the power $\overline{a+b}|^{n}$ expanded, as are repreſented by l. And the number of chances whereby A may be a winner, will be expreſſed by as many of the firſt terms of the ſame power as are equal to p; p being aſſumed equal to $n-l+1$; becauſe B, by laying againſt A's winning l times, does in effect lay that he will not win above $l-1$ times; but the whole number of winnings and loſings being n, $\overline{n-l-1}$, or $n-l+1$, will be the number of times which B himſelf undertakes to win.

13. If A and B, being at play, reſpectively want l and p games of being up, and their reſpective chances for winning any one game be as a to b; raiſe the binomial $a+b$ to a power whoſe index is $l+p-1$, and the number of chances, whereby they may reſpectively win the ſet, will be in the ſame proportion as the ſum of ſo many of the firſt terms as are expreſſed by p, to the ſum of ſo many of the laſt terms as are expreſſed by l; for when A and B reſpectively undertook to win l games and p games, and n repreſented the whole number of games, in the preceding caſe, p was $= n-l+1$, and, therefore, $l+p=n+1$, and $n=l+p-1$, which will, conſequently, repreſent the power to which $a+b$ muſt be raiſed. E. gr. Let $l=3$, $p=7$, $a=3$, and $b=5$; then raiſe $a+b$ to the power repreſented by $l+p-1$, i. e. to the ninth power, and the ſum of the firſt ſeven terms will be to the ſum of the three laſt, in the proportion of the reſpective chances whereby A and B may win the ſet. The chances of B, or the three laſt terms, are $b^9+9ab^8+36aab^7$ $=37812500$, which, divided by $\overline{a+b}|^{9} = 134217728$, gives the fraction $\frac{37812500}{134217728}=\frac{9453125}{33554432}$, expreſſing the probabity of B's winning; and this fraction, ſubtracted from unity, or $1-\frac{9453125}{33554432}=\frac{24101307}{33554432}$, will expreſs the probability of A's winning; and the odds in favour of A are in the proportion of 24101307 to 9453125, or nearly as 23 to 9. See Caſe 10.

Examples often occur, as in this caſe, in which it is required to ſum up ſeveral terms of a high power of the binomial $a+b$, and to divide their ſum by that power: the moſt convenient method of doing this is to write 1 and q for a and b, having taken $q:1::b:a$, and to uſe a table of **LOGARITHMS**. Thus, in the preceding example, $a=3$, $b=5$, therefore $q=\frac{5}{3}$; and the quantity $\frac{b^9+9ab^8+36a^2b^7}{\overline{a+b}|^{9}}$ becomes $=\frac{q^9+9q^8+36q^7}{\overline{1+q}|^{9}}=\frac{q^7\times\overline{q^2+9q+36}}{\overline{1+q}|^{9}}$: but the factor $q^2+9q+36$ is $= \frac{25}{9}+\frac{45}{3}+36=\frac{484}{9}$, and its logarithm is the logarithm of $484-\log. 9. = 1.7306029$

To which add the log. of q^7,
or $7\times\overline{\log. 5-\log. 3.} =$ 1.5529409

And from the ſum — — 3.2835438

Subtract. the log. of $\overline{1+q}|^{9}$
or $9\times\overline{\log. 8-\log. 3.} =$ 3.8337183

And the remainder — — 1.4498255

will be the logarithm of B's chance, viz. 0.281725; and the complement of this to unity, or 0.718275, will be the chance of A. See another method of reducing ratios in larger numbers to their leaſt exacteſt terms, under **RATIO**.

The following **TABLE** ſhews the odds of winning, when the number of games wanting does not exceed ſix, and the ſkill of the contenders is equal.

Games wanting.	Odds of winning.	Games wanting.	Odds of winning.	Games wanting.	Odds of winning
1,2 -	3,1	2,3 -	11,5	3,5 -	99,29
1,3 -	7,1	2,4 -	26,6	3,6 -	219,37
1,4 -	15,1	2,5 -	57,7	4,5 -	163,93
1,5 -	31,1	2,6 -	120,8	4,6 -	382,130
1,6 -	63,1	3,4 -	42,22	5,6 -	638,386

14. *To aſſign the probability of throwing one ace, and no more, with four dice at one throw.* From the number of chances whereby one ace or more may be thrown, ſubtract the number of chances whereby two aces or more may be thrown, and the remainder will be the number of chances for throwing one ace, and no more. Having raiſed the binomial $a+b$ to its fourth power, which is $a^4+4a^3b+6a^2b^2+4ab^3+b^4$, it is evident, that the four firſt terms expreſs the number of chances for throwing one ace or more, and the three firſt terms expreſs the number of chances for throwing two aces or more; and, therefore, the ſingle term $4ab^3$ expreſſes the number of chances for throwing one ace and no more; and the probability required will be $\frac{4ab^3}{\overline{a+b}|^{4}}=\frac{500}{1296}=\frac{125}{324}$. See Caſe 7.

When it is required to aſſign the chances for throwing any number of aces, and no more than that number, one ſingle term of the power $\overline{a+b}|^{n}$ will always anſwer the queſtion; and this term may be expeditiouſly found, ſuppoſing n to be the number of dice, and l the preciſe number of aces to be thrown, when l is leſs than $\frac{1}{2}n$, by writing as many terms of the ſeries $\frac{n}{1}$, $\frac{n-1}{2}$, $\frac{n-3}{3}$, $\frac{n-3}{4}$, &c. as there are units in l; and when l is greater than $\frac{1}{2}n$, by writing as many of them as there are units in $\frac{1}{2}n-l$; then multiplying all thoſe terms together, and multiplying the product by $a^l b^{n-l}$; and this laſt product will exhibit the term expreſſing the number of chances required. E. gr. Let l be $= 3$, and $n = 10$; ſince l is leſs than $\frac{1}{2}n$, take three terms of the ſeries, which will be $\frac{10}{1}$, $\frac{9}{2}$, $\frac{8}{3}$; their product will be 120: $a^l b^{n-l}$, a being $= 1$, $b=9$, &c. will be $= 6042969$; and $6042969\times120=725156280$, which expreſſes the number of chances required. Divide this by $\overline{a+b}|^{10} = 10000000000$, and the quotient 0.0725156280, will expreſs the probability of throwing preciſely three aces with ten dice: ſubtract this quotient from unity, and the remainder 0.9274843720 will expreſs the probability of the contrary; and the odds againſt throwing preciſely three aces with ten dice, are 9274843720 to 725156280, or nearly 64 to 5.

Having thus given as compendious a view as poſſible of the principles and rules of *gaming*, from Mr. De Moivre's Introduction, we ſhall ſelect a few problems, for the farther illuſtration and exerciſe of theſe principles and rules.

Prob. I. *If* A *and* B *play with ſingle bowls, and* A *can give* B *two games out of three; what is the proportion of their ſkill*, or *what are the odds, that* A *may get any one game aſſigned?* Let the proportion of odds be as z to 1; now ſince A can give B two games out of three, A may, upon an equality of play, undertake to win three games together; but the probability of his winning the firſt time is $\frac{z}{z+1}$; and the probability of his winning three times together is $\frac{z}{z+1}\times\frac{z}{z+1}\times\frac{z}{z+1}=\frac{z^3}{\overline{z+1}|^{3}}$. See **EXPECTATION**. But, as A and B are ſuppoſed to play on equal terms, the probability which A has of winning three games together ought to be expreſſed by $\frac{1}{2}$; and, therefore, $\frac{z^3}{\overline{z+1}|^3} = \frac{1}{2}$, or $2z^3 = \overline{z+1}|^3$; and, extracting the cube root on both ſides, $z\sqrt[3]{2} = z+1$; and $z\sqrt[3]{2} - z = 1$; therefore $z = \frac{1}{\sqrt[3]{2}-1}$; and the odds in favour of A's getting any game aſſigned, are as $\frac{1}{\sqrt[3]{2}-1}$ to 1, or as 1 to $\sqrt[3]{2}-1$, i. e. as 50 to 13 very nearly.

Prob. II. *To find in how many trials any event will probably happen, ſo that* A *and* B *may lay a wager on even terms.* Let the number of chances for its happening in any one trial be a, and the number of chances for its failing be b; and the number of trials x. By Caſe 12. b^x will repreſent the number of chances of the event's failing x times ſucceſſively, and $\overline{a+b}|^x$ the whole number of chances for happening or failing; and, therefore, $\frac{b^x}{\overline{a+b}|^x}$ repreſents the probability of the event's failing x times together, which is equal to the probability of its happening once at leaſt in that number of trials; and either of theſe may be expreſſed by the fraction $\frac{1}{2}$; conſequently, $\frac{b^x}{\overline{a+b}|^x} = \frac{1}{2}$, or $\overline{a+b}|^x = 2b^x$; therefore, $x \times \text{logar. } \overline{a+b} = x \times \text{logar. } b + \text{logar. } 2$. and $x = \frac{\text{log. } 2.}{\text{log. } \overline{a+b} - \text{log. } b}$. Again, ſuppoſe $a : b :: 1 : q$, then the equation $\overline{a+b}|^x = 2b^x$, will be changed into $\overline{1+q}|^x = 2q^x$, or $\overline{\frac{1+q}{q}}\Big|^x = 2$, or $\overline{1+\frac{1}{q}}\Big|^x = 2$. Therefore, $x \times \text{log. } \overline{1+\frac{1}{q}} = \text{log. } 2$. If, in this equation, $q=1$, x will alſo be $=1$; but if q differs from unity, ſubſtitute in the room of log. $\overline{1+\frac{1}{q}}$ its value expreſſed in a ſeries, viz.

$\frac{1}{q} - \frac{1}{2q^2} + \frac{1}{3q^3} - \frac{1}{4q^4} + \frac{1}{5q^5} - \frac{1}{6q^6}$ &c. and we ſhall have the equation $\frac{x}{q} - \frac{x}{2q^2}$, &c. $= \text{log. } 2$. If q be infinite, or large in reſpect to unity, the firſt term of the ſeries will be ſufficient; and we ſhall have the equation $\frac{x}{q} = \text{log. } 2$, or $x = q \times \text{log. } 2$. Then taking the hyperbolic logarithm of 2, which is 0.693, &c. or 0.7 nearly, x will be equal to $0.7q$ nearly. Thus the limits of the ratio of x to q are aſſigned; for it begins with unity, and terminates at laſt in the ratio of 7 to 10 very nearly. This value of x may be aſſumed in all caſes, whatever be the value of q.

Ex. 1. *To find in how many throws one may undertake with an equality of chance to throw two aces with two dice.* The number of chances upon two dice being 36, of which there is but one chance for two aces, the number of chances againſt it is 35; multiply, therefore, 35 by 0.7, and the product 24.5 will ſhew that the number of required throws will be between 24 and 25.

Ex. 2. *To find in how many throws of three dice one may undertake to threw three aces.* The number of all the chances on three dice being 216, of which there is but one chance for three aces, and 215 againſt it, multiply 215 by 0.7, and the product 150.5, will ſhew that the number of required throws will be 150 nearly. See LOTTERY.

Prob. III. *To find how many chances there are upon any number of dice, each of them having the ſame number of faces, to throw any given number of points.* Let $p+1$ be the given number of points, n the number of dice, and f the number of faces in each dice: let $p-f=q$, $q-f=r$, $r-f=s$, $s-f=t$, &c. The number of chances required will be,

$$
\begin{aligned}
&+\frac{p}{1}\times\frac{p-1}{2}\times\frac{p-2}{3}\ \text{\&c.}\\
&-\frac{q}{1}\times\frac{q-1}{2}\times\frac{q-2}{3}\ \text{\&c.}\times\frac{n}{1}\\
&+\frac{r}{1}\times\frac{r-1}{2}\times\frac{r-2}{3}\ \text{\&c.}\times\frac{n}{1}\times\frac{n-1}{2}\\
&-\frac{s}{1}\times\frac{s-1}{2}\times\frac{s-2}{3}\ \text{\&c.}\times\frac{n}{1}\times\frac{n-1}{2}\times\frac{n-2}{3}\\
&+\ \text{\&c.}
\end{aligned}
$$

And theſe ſerieſes ought to be continued till ſome of the factors in each product become either $=0$, or negative: and ſo many factors are to be taken in each of the products $\frac{p}{1} \times \frac{p-1}{2}$ &c. $\frac{q}{1} \times \frac{q-1}{2}$ &c. as there are units in $n-1$. See the demonſtration of this rule in De Moivre's Doctrine of Chances, p. 41.

Ex. 1. *To find how many chances there are for throwing ſixteen points with four dice.* Here $p+1=16$ and $p=15$; and the foreging ſeries will be

$$
\begin{aligned}
&+\frac{15}{1}\times\frac{14}{2}\times\frac{13}{3} = +455\\
&-\frac{9}{1}\times\frac{8}{2}\times\frac{7}{3}\times\frac{4}{1} = -336\\
&+\frac{3}{1}\times\frac{2}{2}\times\frac{1}{3}\times\frac{4}{1}\times\frac{3}{2} = +6.
\end{aligned}
$$

And $455-336+6=125$ is the number of chances required.

Ex. 2. *To find the number of chances for throwing fifteen points with ſix dice.* The ſeries will be

$$
\begin{aligned}
&+\frac{14}{1}\times\frac{13}{2}\times\frac{12}{3}\times\frac{11}{4}\times\frac{10}{5} = +2002\\
&-\frac{8}{1}\times\frac{7}{2}\times\frac{6}{3}\times\frac{5}{4}\times\frac{4}{5}\times\frac{6}{1} = -336.
\end{aligned}
$$

And $2002-336=1666$ the number required. In like manner it may be found that the number of chances for throwing twenty-ſeven points with ſix dice is alſo 1666. We may obſerve in general, that all the points equally diſtant from the extremes, i. e. from the leaſt and greateſt points that are upon the dice, have the ſame number of chances by which they may be produced: thus, in finding the number of chances for throwing twenty-ſeven points with ſix dice, let 27 be ſubtracted from 42, the ſum of the extremes 6 and 36, and the remainder being 15, we may infer that the number of chances for throwing twenty-ſeven points is the ſame as for throwing fifteen points.

Ex. 3. *To find in how many throws of ſix dice one may undertake to throw fifteen points preciſely.* The number of chances for throwing fifteen points being 1666, and the whole number of chances upon ſix dice being 46656, it follows that the number of chances for failing is 44990; therefore, dividing 44990 by 1666, and the quotient is 27 nearly; multiply 27 by 0.7, and the product 18.9 will ſhew that the number of throws required will be very near 19.

Prob. IV. *To find how many trials are neceſſary to make it equally probable that an event will happen twice.* Let a, b, and x, be as in Prob. II. Then by caſe 12. $b^x + xab^{x-1}$ is the number of chances whereby the event may fail, and $\overline{a+b}|^x$ the whole number of chances whereby it may happen or fail, and, therefore, the probability of its failing is $\frac{b^x + xab^{x-1}}{\overline{a+b}|^x}$; but, as the probabilities of happening and failing are equal, we ſhall have the equation $\frac{b^x + xab^{x-1}}{\overline{a+b}|^x} = \frac{1}{2}$, or $\overline{a+b}|^x = 2b^x + 2xab^{x-1}$; or, making $a : b :: 1 : q$, $\overline{1+\frac{1}{q}}\Big|^x = 2 + \frac{2x}{q}$. Let $q=1$, and x will be $=3$. But if q be infinite, and $\frac{x}{q} = z$; and $z = \text{log. } 2 + \text{log. } \overline{1+z}$, and the value of z will be found $= 1.678$ nearly; therefore the value of x will always be between the limits $3q$ and $1.678q$, but will ſoon converge to the laſt of theſe limits; and if q be not very ſmall, x may in all caſes be ſuppoſed $= 1.678q$: but if x be ſuſpected to be too little, ſubſtitute this value in the original equation $\overline{1+\frac{1}{q}}\Big|^x = 2 + \frac{2x}{q}$, and note the error; if it be worth regarding, increaſe a little the value of x, and ſubſtitute this new value in the aforeſaid equation, and noting the new error, the value of x may be ſufficiently corrected by the rule of double falſe POSITION.

Ex. 1. *To find in how many throws of three dice one may undertake to throw three aces twice.* The number of all the chances on three dice being 216, of which there are 215 againſt throwing three aces; multiply, therefore, 215 by 1.678, and the product 360.8 will give the number of required throws.

Ex. 2. *To find in how many throws of ſix dice one may undertake to throw fifteen points twice.* The number of chances for throwing fifteen points is 1666, and the number of chances for miſſing 44990, See Prob. III. divide 44990 by 1666, and the quotient will be 27 nearly; therefore the chances for throwing and miſſing fifteen points are as 1 to 27 reſpectively: multiply 27 by 1.678, and the product 45.3 will be the number of required throws. See LOTTERY.

Prob. V. *To find how many trials are neceſſary to make it equally probable that an event will happen 3, 4, 5, &c. times.*

times. Let a, b, and x, be as before; and $a : b :: 1 : q$; then $\overline{1+\frac{1}{q}}^{x} = 2 \times \overline{1+\frac{x}{q}+\frac{x}{1}\times\frac{x-1}{2q2}}$ in the caſe of the triple event; and $\overline{1+\frac{1}{q}}^{x} = 2\times\overline{1+\frac{x}{q}+\frac{x}{1}\times\frac{x-1}{2q2}+\frac{x}{1}\times\frac{x-1}{2}\times\frac{x-2}{3q3}}$ in caſe of the quadruple event, &c. Then if q in the firſt equation be ſuppoſed $= 1$, x will be $= 5$; if q be infinite, or very large in reſpect to unity, the aforeſaid equation, making $\frac{x}{q} = z$, will become $z = \log. 2 + \log. \overline{1+z+\frac{1}{2}zz}$; and z will be found nearly $= 2.675$, and x will always be between $5q$ and $2.675q$. In the ſecond equation, if q be $= 1$, x will be $= 7q$; but if q be infinite, or very large in reſpect to unity, z will be $= \log. 2 + \log \overline{1+z+\frac{1}{2}zz+\frac{1}{9}z^3}$; and z will be found nearly $= 3.6719$, and x will be between $7q$ and $3.6719q$.

A TABLE *of the Limits.*

The value of x will always be

For a ſingle event, between	$1q$	and	$0.693q$
For a double event, between	$3q$	and	$1.678q$
For a triple event, between	$5q$	and	$2.675q$
For a quadruple event, between	$7q$	and	$3.672q$
For a quintuple event, between	$9q$	and	$4.670q$
For a ſextuple event, between	$11q$	and	$5.668q$

&c.

And if the number of events contended for, as well as the number q be pretty large in reſpect to unity; the number of trials required for thoſe events to happen n times will be $\frac{2n-1}{2}q$, or barely nq.

Prob VI. *Two gameſters* A *and* B, *each having twelve counters, play with three dice, on condition that if eleven points come up,* B *ſhall give one counter to* A; *if fourteen points come up,* A *ſhall give one counter to* B *and that he ſhall be the winner who ſhall ſooneſt get all the counters of his adverſary; what is the probability that each of them has of winning?* Let p be the number of counters of each, and a and b the number of chances they have reſpectively for getting a counter at each caſt of the dice; their probabilities of winning are reſpectively as a^p to b^p: and p being $= 12$, and $a = 27$, and $b = 15$, by Prob. III. the probabilities of winning are reſpectively as 27^{12} to 15^{12}, or as 9^{12} to 5^{12}, or as 282429536481 to 244140625 See the demonſtration of this rule in Doctrine of Chances, p. 52.

Prob. VII. *Two gameſters* A *and* B *lay by twenty-four counters, and play with three dice on this condition, that if eleven points come up,* A *ſhall take one counter out of the heap; if fourteen,* B *ſhall take one, and he ſhall be reputed the winner who ſhall ſooneſt get twelve counters.*

This problem differs from the preceding, in that the game muſt neceſſarily end in twenty-three throws, whereas in the former, the play may be unlimited, on account of the reciprocations of loſs and gain, which deſtroy one another. Let a and b repreſent the proportion of the chance for throwing 11 and 14; and raiſe $a+b$ to the twenty-third power, or to a power whoſe index is the number of all the counters wanting one, and the 12 firſt terms of that power will be to the 12 laſt in the ſame proportion as the probabilities of winning.

Prob VIII. *Three gameſters* A, B, *and* C, *out of a heap of twelve counters, of which four are white and eight black, draw blindfold one counter at a time, in this manner:* A *begins to draw.* B *follows* A, C *follows* B; *then* A *begins again; and they continue to draw in the ſame order, till one of them, who is to be reputed the winner, draws the firſt white: what are their reſpective probabilities of winning?* Let n be the number of counters, a the number of white, and b the number of black, and 1 the ſtake or ſum played for.

1. A has a chances for a white counter, and b chances for a black one; and, therefore, the probability of his winning is $\frac{a}{a+b} = \frac{a}{n}$; and his expectation on the ſtake 1, when he begins to draw, is $\frac{a}{n}\times 1 = \frac{a}{n}$: now $\frac{a}{n}$ being taken out of the ſtake, there will remain, $1 - \frac{a}{n} = \frac{n-a}{n} = \frac{b}{n}$.

2. B has a chances for a white counter, and the number of remaining counters is $n-1$; therefore his probability of winning will be $\frac{a}{n-1}$, and his expectation on the remaining ſtake $\frac{b}{n}$ will be $\frac{ab}{n\times\overline{n-1}}$: ſubtract $\frac{ab}{n\times\overline{n-1}}$ from $\frac{b}{n}$, and the remaining ſtake will be $\frac{b}{n}-\frac{ab}{n\times\overline{n-1}} = \frac{nb-b-ab}{n\times\overline{n-1}}$; but $nb-ab=bb$; therefore it will be $\frac{b\times\overline{b-1}}{n\times\overline{n-1}}$.

3. C has a chances for a white counter, and the number of remaining counters is $n-2$; therefore his probability of winning will be $\frac{a}{n-2}$; and his expectation in the remaining ſtake will be $\frac{b\times\overline{b-1}\times a}{n\times\overline{n-1}\times\overline{n-2}}$.

4. A may have out of the remainder the ſum $\frac{b\times\overline{b-1}\times\overline{b-2}\times a}{n\times\overline{n-1}\times\overline{n-2}\times\overline{n-3}}$, &c. till the whole ſtake be exhauſted.

Wherefore, write down the ſeries $\frac{a}{n}+\frac{b}{n-1}P+\frac{b-1}{n-2}Q+\frac{b-2}{n-3}R+\frac{b-3}{n-4}S$, &c. in which P, Q, R, S, &c. denote the preceding terms, and take as many terms of this ſeries as there are units in $b+1$ (for b repreſenting the number of black counters, the number of drawings cannot exceed $b+1$); then the ſums of the firſt, fourth, ſeventh &c. terms, of the ſecond. fifth, eighth &c. terms, and of the third, ſixth &c. terms will be the reſpective expectations of A, B, C; or, as the ſtake is fixed, theſe ſums will be proportional to their reſpective probabilities of winning. Let n, then, in the caſe of this problem, $= 12$, $a=4$, and $b=8$; and the general ſeries will become $\frac{4}{12}+\frac{8}{11}P+\frac{7}{10}Q+\frac{6}{9}R+\frac{5}{8}S+\frac{4}{7}T+\frac{3}{6}U+\frac{2}{5}X+\frac{1}{4}Y$; or, multiplying the whole by 495 in order to take away the fractions, the ſeries will be $165+120+84+56+35+20+10+4+1$: and A will have $165+56+10=231$, B, $120+35+4=159$, and C, $84+20+1=105$; therefore their reſpective probabilities of winning will be proportional to the numbers 231, 159, and 105, or 77, 53, and 35.

Prob IX. A *and* B *having twelve counters, four of them white, and eight black;* A *wagers with* B, *that taking out ſeven counters, blindfold, three of them ſhall be white: what is the ratio of their expectancies?* 1. Seek how many caſes there are for ſeven counters to be taken out of 12; they will be found from the doctrine of combinations, to be 792.

$$\frac{12}{1}\times\frac{11}{2}\times\frac{10}{3}\times\frac{9}{4}\times\frac{8}{5}\times\frac{7}{6}\times\frac{6}{7}=792.$$

2. Set aſide three white ones, and find all the caſes wherein 4 of the 8 black ones may be combined therewith; they will be found to be 70.

$$\frac{8}{1}\times\frac{7}{2}\times\frac{6}{3}\times\frac{5}{4}=70.$$

And ſince there are 4 caſes, in which 3 white may be taken out of four; multiply 70 by 4: thus the caſes, wherein three whites may come out with four blacks, are found to be 280

3. By the common laws of *gaming*, he is reputed conqueror, who produces an effect oftener than he undertook to do, unleſs the contrary be expreſly agreed on; and therefore, if A take out 4 whites with 3 blacks. he wins. Set aſide 4 whites, and then find all the caſes wherein 3 of the 8 blacks may be combined with 4 whites: theſe caſes will appear to be 56.

$$\frac{8}{1}\times\frac{7}{2}\times\frac{6}{3}=56.$$

4. A therefore, has $280+56=336$ chances, whereby he may win; which, ſubtracted from the whole number of chances 792, leaves 456, the number of chances wherein he may loſe. Divide 336 by 792, and the quotient $\frac{336}{792}=\frac{14}{33}$ will expreſs the probability of A's winning; and $1-\frac{14}{33}=\frac{19}{33}$ the probability of his loſing; and therefore the odds againſt taking 3 white counters are 19 to 14.

From the ſolution of this problem it appears, that, if a BE $=$ the number of white counters, b the number of black, n the whole number $= a+b$, c the number of counters to be taken out of n, and p the number of white counters to be found preciſely in c, then the number of chances for taking none of the white, or one ſingle white, or two white and no more, or three white and no more, or four white and no more, &c. will be expreſſed by $1\times\frac{a}{1}\times\frac{a-1}{2}\times\frac{a-2}{3}\times\frac{a-3}{4}$, &c. $\times\frac{b}{1}\times\frac{b-1}{2}\times\frac{b-2}{3}$ &c. continued till the number of terms in which there is a be equal to p, and the number of terms in which there is b be equal to $c-p$. And the number of all the chances for taking a certain number c of counters out of the number n is expreſſed by the ſeries $\frac{n}{1}\times\frac{n-1}{2}\times\frac{n-2}{3}$ &c. continued to as many terms as there are units in c, for a denominator. E. gr. Reſume the ſuppoſition of the problem, only that of the ſeven counters drawn, there ſhall not be one white; and let $p=0$, and $c-p=7=b-1$; then taking 1 of the firſt ſeries and 7 terms of the ſecond, the number of chances will be 1×8; the ratio of which to all the 7's that can be taken out of 12 is $\frac{8}{792}=\frac{1}{99}$: therefore the odds that there ſhall be one or more white counters among the 7 which are drawn are 98 to 1. The probability of drawing one white counter and no more will be $\frac{112}{792}=\frac{14}{99}$, or the odds 85 to 14: the probability of drawing all the 4 white among the 7 will be $\frac{56}{792}=\frac{7}{99}$; or the odds 92 to 7. If n and c were large, the foregoing method would be impracticable; and, therefore, the following theorem may be uſed. Let n, c, and p be as before; and and make $n-c=d$. The probability of taking preciſely the number p of white counters will be

$$\frac{c\times c-1\times c-2\ \&c.\times d\times d-1\times d-2\ \&c.\times\frac{a}{1}\times\frac{a-1}{2}\times\frac{a-2}{3}\ \&c.}{n\times n-1\times n-2\times n-3\times n-4\times n-5\times n-6\times n-7\times n-8\ \&c.}$$

Note, The firſt ſeries of the numerator contains as many terms as there are units in p; the ſecond as many as there are units in $a-p$; and the third as many as there are units in p; and the denominator as many as there are units in a. See LOTTERY.

To avoid tireſome prolixity in this article, we muſt deſiſt from farther inveſtigations; which, in the following problems, grow very long, and more perplexed. In the reſt, therefore, we ſhall content ourſelves to give the anſwer, or reſult, without the proceſs of arriving at it; which may be of uſe, as it furniſhes ſo many data, from whence, as ſtandards, we may be enabled occaſionally to judge of the probability of events of the like kinds; though without letting the mind into the preciſe manner and reaſon thereof.

Prob. X. A *and* B *play with two dice on this condition, that* A *ſhall win, if he throws ſix; and* B, *if he throws ſeven:* A *to have the firſt throw, in lieu of which* B *to have two throws; and both to continue with two throws each turn, till one of them wins: What is the ratio of the chance of* A, *to that of* B? *Anſ. As* 10355 *to* 12276.

Prob. XI. *If any number of gameſters,* A,B,C,D,E, *&c. equal in point of dexterity, depoſit each one piece of money; and engage, on theſe conditions, that two of them,* A *and* B, *beginning the game, which ever of them ſhall be overcome, ſhall give place to the third* C, *who is to play with the conqueror; and the conqueror here to be taken up by the fourth man* D; *and thus on, till ſome one, having conquered them all round, draws the ſtake: what is the ratio of their expectancies?* This problem, M. Bernouilli ſolves analytically. Here, calling the number of gameſters $n+1$, he finds that the probabilities of any two immediately following each other in the courſe of playing, are in the ratio $1+2^n$ to 2^n; and therefore the expectancies of the ſeveral gameſters, A, B, C, D, E, &c. are in a geometrical progreſſion $1+2^n : 2^n :: a : c :: c : d :: d : e$, &c. Hence it is eaſy to determine the ſtate of the probabilities of any two gameſters, either before the game, or in the courſe thereof. If, e. gr. there be three gameſters, A, B, C, then $n=2$ and $1+2^n : 2^n :: 5 : 4 :: a : c$; that is, their ſeveral probabilities of winning, before A have overcome B, or B, C, are as the numbers 5, 5, 4; and therefore their expectancies are $\frac{5}{14}$, $\frac{5}{14}$, $\frac{4}{14}$: for all of them taken together muſt make 1, or abſolute certainty. After A has overcome B, the probabilities for A, B, and C, will be $\frac{1}{7}$, $\frac{2}{7}$, $\frac{4}{7}$, as in the anſwer above. If there be four gameſters, A, B, C, D, their probabilities from the beginning will be as 81, 81, 72, 64. After A has beat B, the ſeveral probabilities of B, D, C, A, will be as 25, 32, 36, 56, reſpectively. After A has beat B and C, the probabilities of C, B, D, A, will be as 16, 18, 28, 87.

Prob. XII. *Three gameſters,* A, B, *and* C, *whoſe dexterities are equal, depoſit each one piece, and engage upon theſe terms: that two of them ſhall begin to play, and that the vanquiſhed party ſhall give place to the third, who is to take up the conqueror; and the ſame condition to go round: each perſon when vanquiſhed, forfeiting a certain ſum to the main ſtake; which ſhall be all ſwept by the perſon who firſt beats the other two ſucceſſively. How much, now, is the chance of* A, *and* B, *better or worſe than that of* C? 1. If the forfeiture be to the ſum each perſon firſt depoſited, as 7 to 6, the gameſters are upon an equal footing. 2. If the forfeiture be in a leſs ratio to the depoſit, A and B are on a better footing than C; if in a greater ratio, the advantage is on the ſide of C. 3. If there were no fines, the probabilities of winning would be proportional to the expectations; and the expectations, after the firſt game, would be $\frac{12}{7}$, $\frac{6}{7}$, $\frac{2}{7}$, the firſt belonging to B, the ſecond to C, and the third to A; and, therefore, dividing the ſum of the probabilities belonging to A and B into two equal parts, the probabilities of winning would be proportional to the numbers 5, 4, 5; and it is 5 to 2 before the play begins that either A or B win the ſet, or 5 to 4 that one of them who ſhall be fixed upon win it. 4. If three gameſters, A, B, and C are engaged in a *poule*, and have not time to play it out, but agree to divide (s) the ſum of the ſtake and fines, in proportion to their reſpective chances; $\frac{4}{7}s$ will be the ſhare of B, who has got one game: $\frac{2}{7}s$ that of C, who ſhould next come in, and $\frac{1}{7}s$ the ſhare of A, who was laſt beat.

M. Bernouilli gives an analytical ſolution of the ſame problem, only made more general; as not being confined to three gameſters, but extending to any number at pleaſure.

Prob. XIII. A *and* B, *two gameſters of equal dexterity, play with a given number of balls; after ſome time,* A *wants* 1 *of being up, and* B 3: *what is the ratio of their chances?* A's expectancy is worth $\frac{7}{8}$ of the ſtake, and B's only $\frac{1}{8}$; ſo that their chances are as 7 to 1.

Prob. XIV. *Two gameſters,* A, *and* B, *of equal dexterity, are engaged in play, on this condition, that as often as* A *exceeds* B, *he ſhall give him one piece of money; and that* B *ſhall do the like, as oft as* A *exceeds him; and that they ſhall not leave off till one has won all the other's money: and now having four pieces, two by-ſtanders,* R *and* S, *lay a wager on the number of turns in which the game ſhall be finiſhed;* viz. R, *that it ſhall be over in ten turns: what is the value of the expectancy of* S? $\frac{560}{1024}$, or $\frac{35}{64}$ of the wager; or it is to that of R as 560 to 464: and ſubtracting $\frac{35}{64}$ from 1, the remainder $\frac{29}{64}$ will expreſs the probability of the play ending in ten games; and it is 35 to 29, if two equal gameſters play together, that there will not be four ſtakes loſt on either ſide in ten games.

If each player has 5 pieces, and the wager were, that the game ſhall end in ten turns, and the dexterity of A were double that of B, the expectancy of S would be $\frac{3800}{6561}$.

If each gameſter have 4 pieces, and the ratio of the dexterities be required to make it an even wager, that the game ſhall end in 4 turns, it will be found that the one muſt be to the other as 5.274 to 1. And if the ſkill of either be to that of the other as 13.407 to 1, it is a wager of 3 to 1, that the play will be ended in four games.

If each gameſter have 4 pieces, and the ratio of their dexterities be required to make it an even lay, that the game ſhall be ended in 6 turns, the anſwer will be found to be as 2.576 to 1.

Prob. XV. *Two gameſters,* A, *and* B, *of equal dexterity, having agreed not to leave off playing till ten games are over; a ſpectator,* R, *lays a wager with another,* S, *that by that time, or before,* A *ſhall have beat* B *by three games: what is the value of the expectancy of* R? $\frac{350}{1024}$, or $\frac{11}{32}$ of the ſame wager; or it is to that of S, as 352 to 672. See BASSET, HAZARD, LOTTERY, PHARAON, PIQUET, QUADRILLE, RAFFLING, and WHISK.

GAMITES *lapis*, the *marriage ſtone*, a ſtone of a very ſingular kind deſcribed by Pliny, and ſome other of the ancients; he ſays it was of a white colour, and that it had in it the figure of two hands mutually infolding one another, which made it a ſymbol of that ſtate. We know nothing of any ſuch ſtone at preſent in the world; and it is eaſy to conjecture, that in Pliny's time either the ſtone muſt have been factitious, or elſe fancy muſt have been very far ſtretched to make the reſemblance.

GAMMADIUM, a triangular veſtment uſed in the primitive church.

GAMMER-*lamb*. See the article GIMMER-*lamb*.

GAMMONING, on *ſhip-board*, are ſeveral turns of rope taken round the bow-ſprit, and reeved through holes in the knees of the head, for the greater ſecurity of the bow-ſprit.

GAMMUT, GAMUT, or GAM-*ut*, in *Muſic*, a ſcale, whereon we may learn to ſound the muſical notes, *ut*, *re*, *mi*, *fa*, *ſol*, *la*, in their ſeveral orders, and diſpoſitions.

The invention of this ſcale is owing to Guido Aretin, monk of Arezzo, in Tuſcany, about the year 1009; though it is not ſo properly an invention, as an improvement on the DIAGRAM, or ſcale, of the ancients.

The *gammut* is alſo called the HARMONICAL HAND; becauſe Guido firſt made uſe of the figure of the hand to arrange his notes on.

Finding the Greek diagram of too ſmall extent, Guido added five more chords, or notes, to it; one below the proſlambanomenos, or graveſt note, of the ancients; and four above the nete hyperboreon, or acuteſt.

The firſt he called *hypo-proſlambanomenos*; and denoted it by the letter G, or rather the Greek Γ, gamma: which note being at the head of the ſcale, occaſioned the whole ſcale to be called by the barbarous name *gamm*, or *gammut*.

Some ſay, Guido's intention, in calling his firſt note Γ, *gamm*, was to ſhew that the Greeks were the inventors of muſic; others, that he meant hereby to record himſelf, this being the firſt letter of his own name.

Guido's ſcale is divided into three ſeries, or columns; the firſt called *molle*, or flat; the ſecond *natural*; and the third *durum*, or ſharp; as repreſented in the ſcheme *Tab. Muſic*, *fig*. 4. But, ſince his time, ſome alterations have been made therein. The uſe of this ſcale is, to make the paſſages, and tranſpoſitions, from B molle, to B durum, by means of the tones and ſemitones. The ſeries of B natural, ſtanding betwixt the other two, communicates with both; ſo that, to name the chords of the ſcale by theſe ſyllables, if we would have the ſemitones in their natural place; viz. *b c*, and *e f*; then we apply *ut* to *g*; and after *la* we go into the ſeries of B natural, at *fa*; and after *la* of this we return to the former at *mi*, and ſo on: or we may begin at *ut* in *c*, and paſs into the firſt ſeries at *mi*, and then back to the other at *fa*; by which means the one tranſition is a ſemitone; viz. *la*, *fa*; and the other a tone *la*, *mi*. To follow the order of B molle, we may begin with *ut* in *c*, or *f*; and make tranſitions after the ſame manner.

Hence came the barbarous names of *gammut*, *are*, *bmi*, &c. But it is a perplexed work, with ſo many different ſyllables applied to every chord, to mark the places of the ſemitones; which the ſimple letters *a*, *b*, *c*, &c. do as well, and with more eaſe.

Several alterations have ſince been made in the *gammut*. M. le Maire, particularly, has added a ſeventh note; viz. *ſi*; and the Engliſh uſually throw out both *ut* and *ſi*, and make the other five ſerve for all; as will be ſhewn under the article SOLFA-ING.

GAMMUT, or GAMM, is alſo the firſt or graveſt note in the modern ſcale of muſic; the reaſon of which is ſhewn under the preceding article.

GANACHES, in the *Manege*, are the two bones, one on each ſide of the hinder part of the head, oppoſite to the neck, or onſet of the head, which form the lower jaw, and give it motion. It is in this place that the glands, or kernels of the ſtrangles, and the glanders, are placed.

GANCHE, Fr. derived from the Italian *ganus*, *hook*, a kind of GALLOWS or gibbet uſed for the puniſhment of criminals in Turky. The executioner raiſes the condemned by means of a pulley, and ſuddenly ſlackening the rope, lets them fall on hooks of iron, which entangle and rend their bodies; in this condition they are left to die, and ſome have been known to languiſh for two or three days.

GANG, in the *Sea Language*, ſignifies a crew.

To man a boat is called, to *put a gang of men* (which is a company) into her; they are commonly called the *cockſwain's gang*, who have the charge of her.

GANG-*fiſh*, a name given by ſome authors to a ſmall fiſh caught in the German lakes, and ſent in pickle into many parts of the world. The more uſual name of this fiſh among writers is LAVARETUS.

The *gang-fiſh* is a ſpecies of the COREGONUS, diſtinguiſhed by Artedi by the name of the *coregonus*, with the upper jaw longeſt and flat, and with fourteen rays in the back fin.

GANG, *ox*. See OX.

GANG-WAY is applied to all the ſeveral entrances, ways, or paſſages, from one part of the ſhip to the other. Whatſoever is put in any of theſe paſſages, is ſaid to be laid or put in the *gang-way*. See *Tab. Ship. fig*. 2. *n*. 22. 84. 94.

GANG-*way* alſo denotes that part of a ſhip's ſide, both within and without, by which the paſſengers enter and depart: it is for this purpoſe provided with a ſufficient number of ſteps, or *cleats*, nailed upon the ſhip's ſide, nearly as low as the ſurface of the water; and ſometimes furniſhed with a ladder, whoſe lower end projects from the ſhip's ſide, being ſecured in this poſition by iron braces.

GANG, *water*. See WATER-*gang*.

GANGILES, or GANGALES, a name given by ſome to the *lapis* ÆTITES, or eagle-ſtone.

GANGLIO, GANGLION, in *Surgery*, a ſmall, hard, knotty tumour, generally moveable, and uſually formed on the tendons or ligaments, in the external or internal part of the carpus, without any diſcolouring of the ſkin, or any ſenſe of pain.

The word is Greek, γαγγλιον, which ſignifies the ſame.

The tumour, when on the nerves, tendons, articulations, or any of the membranous parts, retains its name *ganglio*; every where elſe it is called *nodus*.

The cauſe of the *ganglio* is a too great diſtention of the pores of the part; or the two great compreſſion; or a laceration thereof: any of theſe occaſion the nutritious juice to be there ſtopped, and retained; and even to exude, condenſe, and harden, into a tumour. The ſame effect is ſometimes alſo produced by a bruiſe, hard labour, or the like. Moſt authors hold the cauſe of the *ganglio* to be a very heavy viſcid pituita.

Authors in general who have treated of the *ganglion*, have referred it to the claſs of encyſted tumors, ſuppoſing it to be encloſed in a membranous ſack, in the manner of the atheromatous and ſteatomatous encyſted tumors. Mr. Eller, in the Memoirs of the Berlin Academy, gives a very different account of this tumor: he obſerved, that very bad ſymptoms often ſucceeded the extirpating the *ganglion*, in the way of the common encyſted tumors by the knife, and thence concluded, that they muſt be of a different nature and origin from thoſe tumors. The matter contained in the *ganglion* is uſually found to be of a gelatinous texture, like the jelly of hartſhorn, and of no bad ſmell, or ſharp taſte, and the membrane which contains it always contracts itſelf at the baſe into a kind of neck, and is there intimitately joined to, and united with the tendon on which it is placed. The appearance of the tendon, however, in the place where the *ganglion* adheres, never appears vitiated, nor any way different from other parts of it. Memoirs de Berlin, ann. 1748. p. 109.

In order to underſtand rightly the origin of the *ganglion*, we are to conſider, that every fibre of the muſcle to which the tendon is affixed, and of whoſe fibres it indeed is only an elongation in a more ſtraitened form, is, while in the muſcle, covered with a delicate fine membrane, which leaves it as ſoon as it leaves the muſcle to enter the compoſition of the tendon; and that all theſe membranes together form the general covering of the tendon, which loſes itſelf in the joining of that part to the bone. This membrane would be rather an incumbrance than an uſeful covering to the tendons, if it did not ſeparate a limpid and viſcous juice, which coats over the whole ſurface of the tendon, and facilitates its common motions. Anatomiſts in general have neglected to enquire into the nature and uſe of this membrane which covers the tendons, and therefore they have miſtaken the origin of the *ganglion*, which is not to be underſtood without this previous knowlege of the part to which it is wholly owing.

When this membrane ſuffers with the tendon any external violence from blows, or violent extenſions, it often burſts in ſome parts; and it neceſſarily follows, that the liquor it before contained muſt eſcape through the aperture, and it after this naturally lodges itſelf in the tunica adipoſa of the ſkin; and as the liquor by degrees increaſes in quantity, this tunic, or membrane, forms a part of a ſack for the reception of it. As the viſcous liquor continues to be voided through the aperture, the more ſubtile parts of it by degrees eſcape, and the remainder forms the viſcous and tough matter, which is found in opening the *ganglion*. In ſome caſes, where the rupture of the membrane has been incomplete, the ſurface of it riſes, and forms the covering of the ſwelling; and in this caſe repreſents the aneuriſm in an artery.

The *ganglio* is ſometimes removed, and reſolved, by mere dry friction, long continued; and ſometimes by friction with ſaliva; ſome chuſe to apply a plate of lead, anointed with mercury; others uſe gum ammoniac, or the emplaſter of vigo, with mercury. If theſe do not ſucceed, recourſe is had to ſection.

Mr. Sharp hath frequently ſucceeded by making an inciſion through the whole length of the *ganglion*, and at the ſame time dividing the ligament of the wriſt, and afterwards dreſſing as in common wounds. Mr. Warner gives two inſtances of his effectually extirpating them: he recommends cutting away part of the cyſt, and then digeſting the reſt away.

GANGLION, in *Anatomy*, denotes a tumour or knot frequently found in the courſe of the nerves; for wherever any nerve ſends out a branch, or receives one from another, or where two nerves join together, there is generally a *ganglion*, or knot, as may be ſeen at the beginning of all the nerves of the medulla ſpinalis, and in many other parts of the body. The *ganglions* of the intercoſtal nerves, firſt diſcovered by Fallopius, are oblong and very hard bodies; and their uſes have not yet been ſatisfactorily aſcertained. M. Lanciſi, who has paid particular attention to this ſubject, ſuppoſes that they are muſcles *ſui generis*, and capable of dilatation and contraction; and intended to impel and accelerate the nervous ſpirits with ſuch additional force, as he conceives to be neceſſary for producing motion in muſcles ſubject to the will. In order to furniſh an idea of the ſtructure of other *ganglions*, he has particularly deſcribed and delineated that of the firſt cervical *ganglion*. However, Haller, and other eminent anatomiſts, have not been able to diſcover this muſcular apparatus in the firſt cervical *ganglion*. Beſides, *ganglions*, inſtead of being inſtruments ſubſervient to the will, are almoſt peculiar to nerves, diſtributed to parts, whoſe motions are altogether involuntary. The office of *ganglions* has been conjectured, both by Lanciſi and Winſlow, to be analogous to that of the brain, and, therefore, they have conſidered them as a kind of ſubſidiary brains formed for impreſſing motion on the animal ſpirits. *Ganglions* are formed generally on nervous cords reſulting from the union of ſeveral different nerves; they abound with blood veſſels, and commonly exceed in bulk that of all the nerves and veſſels which ſeem to compoſe them; and hence Morgagni and others have concluded, that in *ganglions* the different nervous filaments are very intimately mixed, and form a nervous organization, or modification of the medullary ſubſtance, ſo as to ſecern new animal ſpirits, or alter the direction of thoſe already brought thither. Dr. Johnſtone, of Kidderminſter, has not long ſince publiſhed obſervations and conjectures on the ſtructure and uſes of the *ganglions* of the nerves. With regard to their ſtructure, he conſiders them as little brains, or germes, of the nerves detached from them, conſiſting of a mixture of cortical and nervous medullary ſubſtance, nouriſhed by ſeveral ſmall blood-veſſels, in which various nervous filaments are collected, and here loſing their rectilinear parallel direction, ſo that a new nervous organization probably takes place in them. As to their uſe, he ſuppoſes that they are inſtruments, by which the motion of the heart and inteſtines are, from the earlieſt to the lateſt periods of animal life, rendered uniformly involuntary; or, that they are the immediate origins of the nerves tranſmitted to organs moved involuntarily, and that they ſerve to check or reſtrain our volitions from extending to them. They are analogous to the brain in their office, and, being ſubordinate ſprings, or reſervoirs of nervous power, ſeem capable of diſpenſing it, long after all communication with the brain is cut off. From theſe *ganglions*, as ſubordinate brains, the vital organs derive their nervous power, and continue to move during ſleep; and to the ſame cauſe, as well as to its greater irritability, the motion of the heart, continued longer than that of the voluntary muſcles in perfect apoplexies, is aſcribed; and to the ſame cauſe, he apprehends, it is alſo owing, that the heart continues to move even after the ſpinal marrow and the intercoſtals in their deſcent along the neck are cut through, ſo that animals have ſometimes ſurvived this experiment for thirty hours. See Phil. Tranſ. vol. liv. p. 177. Art. 33. and vol. lvii. or Eſſay on the Uſe of the Ganglions of the Nerves, 1771.

GANGRENE, GANGRÆNA, in *Surgery*, is a dangerous degree of inflammation, wherein the parts affected begin to corrupt and putrefy; or a mortification, in its incipient ſtate, while yet the part retains ſome ſenſe of pain, and a ſhare of the natural heat. By which this diſeaſe is diſtinguiſhed from a *ſphacelus*, or thorough mortification, where there is no ſenſe or warmth left.

The word is Greek, Γαγγραινα, derived, by ſome authors, from the Paphlagonian *gangra*, a goat; it being the character of a goat to brouſe the graſs all around, without ſhifting its place. It is juſter, perhaps, to derive it from the Greek verb γραω, γραινω, *manduco*, *abſumo*, *I eat*, *conſume*.

The *gangrene* is a diſeaſe chiefly affecting the ſkin and fat, which it corrupts, conſumes, and turns black; and by degrees ſpreads and ſeizes the adjoining parts; and iſſues in a ſphacelus, which is never cured without amputation.

It ariſes from a ſtoppage, or interception, of the circulatory motion of the blood; which, by this means, fails to furniſh the part with the nutritious and ſpirituous juices neceſſary to preſerve its warmth and life.

This interception of circulation, which is the proximate cauſe of the *gangrene*, is itſelf occaſioned divers ways; as by large tumours, eryſipelaſes, great inflammations, violent cold, tight bandages or compreſſions, ſudden fluxions of ſome malignant humours, bites of venomous beaſts, fractures, wounds, and ulcers ill managed, &c.

It is diſtinguiſhed by the colour of the fleſh; which firſt turns pale, then duſky, or ſublivid; and by its growing looſe, and flabby, after being vehemently tenſe, which it was before. In the progreſs of the diſeaſe the part diſtils a fetid, diſcoloured water; and emits a cadaverous ſmell.

Upon the firſt ſeizure the ſkin turns pale; afterwards it becomes livid; veſications ariſe, and the colour, at length, changes to black; the fleſh becomes fetid, ſanious, and moiſt; then withers, and ſoon becomes inſenſible; the heat and pulſation of the part being likewiſe diminiſhed. Shaw.

If, in a large wound, the tumour of the lips does not ſuppurate, nor any flux of matter, or inflammation, ariſe; if the lips do not ſwell, or, after ſwelling, grow lank and flaccid again on a ſudden; it is reckoned a ſure ſign of an approaching *gangrene*.

When a *gangrene* proceeds from extreme cold, the part affected is firſt benumbed, or ſeized with a pricking pain: this is followed by a redneſs, which gradually changes to black.

When a tight bandage is the cauſe, a flaccidity of the part is joined to the inſenſibility thereof: when the ſcurvy, it often begins in the great toe, and appears in form of a blackiſh ſpot; which turns to a dry cruſt, ſucceeded by a ſtupor of the part, &c. When the bite of any venomous creature is the cauſe, a continual fever attends, &c. and pain is felt in the part; which uſually brings on a ſyncope, or delirium; and puſtules ariſe about the bite.

By the microſcope a *gangrene* has been diſcovered to contain an infinite number of little worms, ingendered in the morbid fleſh; and which continually producing new broods, ſwarm, and over-run the adjacent parts.

To ſtop the progreſs of the *gangrene*, phyſicians preſcribe, internally, ſudorifics, and alexipharmics; externally, decoctions of quick-lime, either ſimple, or with the addition of ſulphur, mercurius dulcis, and ſpirit of wine camphorated.

When a *gangrene* ſeizes a part, the great care to be taken is to prevent, if poſſible, its terminating in a ſphacelus. In ſtrong habits it is always proper in this caſe firſt to bleed largely, and repeat it as occaſion ſhall require; and it is a moſt neceſſary ſtep in theſe caſes, to be very careful in the beginning, to remove all violent external cauſes of inflammation; as too ſtrict a bandage in wounds and fractures, all foreign bodies, which are accidentally lodged in the parts, as thorns, ſplinters, needles, and the like; and all improper external applications, ſuch as oils and plaſters, with cooling and aſtringent things; and eſpecially in old or weak people, to keep up the failing ſtrength by ſuch diet as afford good and ſuitable juices for nouriſhment. If the patient is weak, and in years, and naturally of a cold habit; eſpecially if he has loſt much blood, and abounds in crudities, the moſt ſuitable diet for him will be ſoops and broths, made of chicken, or meat, with mace and other ſpices boiled in them; alſo draughts of cordial liquors, with yolks of eggs, cinnamon and ſugar; eggs themſelves poached and eaten ſoft; ſtrong jellies of calves feet, hartſhorn, and ivory ſhavings, and old and rich wines; or where the patient's circumſtances will not afford theſe, and nothing particular forbids the uſe of malt liquors, fine ales not too ſtale may ſerve very properly.

With reſpect to medicines, the proper ones are the cordial tinctures, waters, and electaries, as the confection of alkermes with ſpices, and other cordial ingredients mixed in it; and teas, made of ſage, ſcordium, and the like herbs, with the ſpices, or a few ſhavings of ſaſſafras, or yellow ſaunders; for by theſe means, the ſtagnating blood will be greatly reſolved and attenuated, and its ſound and healthy parts will be retained in a due circulation, and its noxious ones diſcharged and diſſipated: it is alſo of ſome ſervice in theſe caſes frequently to apply a ſpunge dipt in hungary water to the noſe, or to bind it to the wriſts, or temporal arteries: the crumbs of rye bread, mixed with powdered cloves, and ſteeped in ſtrong vinegar, and afterwards made up into a ball, and held frequently to the noſe, are alſo of no little ſervice.

For patients who are of a more warm, ſanguine, and bilious habit, ſoops and decoctions mixed with the acid juices of lemons, or other vegetable acids, are very proper ſtrengtheners; as alſo barley gruel, mixed with ſyrup of lemons, or mulberries, or with jelly of currants, to be taken daily for the common drink. But in theſe caſes, when the heat is ſmall, and the patient weak, or before accuſtomed to wine, it may be allowable to mix a little wine with the gruel: Rheniſh is of all wines the moſt proper on this occaſion, and a glaſs of that, or if neceſſary of a richer wine, may be given at proper intervals.

The temperate or cooling medicines, commonly given in fevers, may alſo be adminiſtered very properly in theſe caſes; but above all others, the bark is generally eſteemed the great internal remedy in this diſorder. To theſe muſt be added, the ſurgeon's utmoſt attention in the diſcharging the ſtagnating and corrupted blood from the parts, as ſoon as poſſible, and to prevent the neighbouring parts from being affected thereby; the principal methods of doing this are, while the proper internal medicines are given, to make ſcarifications as occaſion ſhall direct upon the parts affected, with the ſcalpel; theſe inciſions are to be made all lengthwiſe, and very numerous on the part, and are to be opened to a ſufficient depth; that not only the ſtagnating blood may be by that means diſcharged; but free way may be made by thoſe openings, for the ingreſs of the medicinal applications. And laſtly, diſcutient, balſamic, and ſtimulating fomentations and cataplaſms are to be with great care applied to the affected parts, and frequently renewed. A very excellent fomentation on theſe occaſions is made by mixing with a pint of lime water, three ounces of camphorated ſpirit of wine, with half an ounce of ſpirit of ſal armoniac, or of ſpirit of wine, with myrrh, aloes, and ſaffron infuſed in it, or ſpirit of wine camphorated, with a ſmall quantity of Venice treacle, and elixir proprietatis. A decoction of rue, wormwood, ſouthernwood, and camomile flowers alſo, with an admixture of four ounces of Venice treacle, and two ounces of Caſtile ſoap, and half an ounce of ſal gem to the quart makes a very valuable fomentation: this ſhould be applied hot ſeveral times in a day, by means of doubled linen or woollen cloths dipped in it, and a laſting warmth may often be ſerviceably kept, by means of a brick made hot by boiling water, and applied afterwards, wrapped up in a linen cloth.

The poor may find a cheap domeſtic remedy in the pickle of cabbages, or in horſe or cow dung, boiled in vinegar, or wine if that can be had; theſe ſhould be applied warm, on linen or woollen cloths, and it is much better to ſteep them hot, by means of a hot brick or tile, than to be frequently opening and expoſing the part to the air to renew them. A very efficacious fomentation for a *gangrene* may be made of ſcordium, wormwood, and ſouthernwood, either ſeparate or mixed and boiled in ſea water, or ſalt water, or vinegar, which ſhould be applied hot ſeveral times a day.

The more deſperate a *gangrene* is, and the nearer it approaches to a ſphacelus, the longer and deeper the ſcarifications muſt be made; they may now alſo if on the legs, arms, &c. be made tranſverſely, as well as longitudinally, down to the quick; and afterwards the injured parts are to be well rubbed and wetted with warm and ſtimulating medicines; and afterwards a penetrating and diſcutient cataplaſm is to be applied, that the blood in the vitiated parts may be reſtored as much as poſſible to its free and proper motion. A proper cataplaſm for this purpoſe may be made of a few handfuls of ſcordium, wormwood, feverfew, mallows, mint, and ſouthernwood, boiled in oxycrate to the conſiſtence of a cataplaſm and pultice, with half an ounce of ſal armoniac, and two ounces of linſeed meal, with half an ounce of the infuſed oils of rue or camomile added afterwards to it; before this cataplaſm is applied to the part, it is always proper to mix with it a little Venice treacle, or elſe ſpirit of wine camphorated to increaſe its virtue.

Theſe applications are beſt renewed about three times a day; if they are oftener, they expoſe the parts too much to the injuries from the external air by ſo frequent uncovering them; if more ſeldom, it is poſſible changes may happen between, with which the ſurgeon ought to have been timely acquainted. Care however muſt be taken, either by hot bricks, or ſome like means, to keep the applications warm all the time they are on, for when ſuffered to cool upon the part, they are not only uſeleſs but very hurtful. Heiſt. Surgery, p. 215.

Dr. Le Cat in his letter concerning the cure of dry *gangrenes*, obſerves, that the cauſe of theſe is the want of a flow of the arterial blood and ſpirits into the part affected, and therefore that the operation of ſcarification is not only uſeleſs, but pernicious: becauſe you thus increaſe the irritation of the ſolids, the conſtriction of the veſſels, the want of fluids and the exſiccation, and haſten death. The general indication which this diſtemper affords is to ſoften and relax the veſſels, and to draw thither the liquors by topics, whilſt all internal remedies ſhould be given, that are capable of bringing the blood and the ſpirits from the center to the circumference: and if this method fails, amputation can be of no uſe; but death is inevitable. As this diſorder, he ſays, ariſes from internal cauſes, its cure ſhould be chiefly attempted by internal remedies; and he accordingly adminiſters cordials, diaphoretics, and ſuch medicines as are capable of reviving the drooping ſpirits and quickening the circulation even to the extremities: to which ſhould alſo be added medicines adapted to the particular habit of each patient, which may have contributed to have brought on this particular ſpecies of *gangrene*. At the ſame time emollient, attractive, external remedies, moderately warmed with ſpices, applied to the part, concur to the ſame intention, by facilitating the flow of blood and ſpirits: but ſpirituous and aqueous topics, impregnated with volatiles and charged with ſaline, active, and violently ſtimulating particles, and others in uſe in ordinary *gangrenes*, are to be avoided like deadly poiſons. On the contrary, in humid *gangrenes*, it is chiefly the return of the blood which is hindered and thereby the fluids are accumulated, that ſwell and diſtend the diſeaſed part: and this diſtenſion, which characteriſes the humid *gangrene*, ſhews the neceſſity of ſcarifications and evacuations: after which ſtimulating tonics ſhould be applied. See the recital of caſes, in which his method has proved ſucceſsful in the Phil. Tranſ. vol. xlvi. Art. 16.

Belloſte preſcribes the following, as the moſt efficacious remedy known for *gangrenes*; viz. quickſilver, diſſolved in double the quantity of ſpirit of nitre, or aqua fortis, a linen cloth being dipped therein, and applied to the *gangrenous* part. This alone, he aſſures us, was ſufficient.

If the *gangrene* be occaſioned by an intenſe froſt, ſnow-water, or a linen cloth dipped in cold water, and applied to the part affected, Boerhaave directs as the beſt cure.

If the *gangrene* proceed to an utter ſphacelation, and be ſeated in any of the limbs or extreme parts, recourſe muſt be had to the operation of amputation.

GANGRINOS, in the *Materia Medica* of the ancients, a word uſed for foſſile ſalt; Myrepſus plainly uſes it in this ſenſe, and Fuchſius explains it by foſſile ſalt, called by the barbarous authors ſal gemmæ.

GANGUE, *Germ.* denotes the MATRIX of ores.

GANGYA, in the *Materia Medica*, a name by which ſome authors call the ſeſamum, or oily purging grain.

GANIMEDES, in *Chemiſtry*, a name given by ſome to white ſulphurs, raiſed by frequent ſublimation; theſe affected writers gave it this name from its being elevated by fire in the proceſs, as Ganimede is ſaid by the poets among the ancients to have been taken up from the earth, and raiſed to heaven.

GANNANAPERIDE, in *Botany*, a name by which ſome authors have called the tree which produces the famous Jeſuits bark. See CORTEX *Peruvianus*.

GANNET, in *Zoology*, the name uſed in Cornwall, and ſome other parts of England, for the *Pelecanus Baſſanus* of Linnæus, or the *Soland* GOOSE. Mr. Ray ſuppoſed the Corniſh *gannet* to be a ſpecies of large gull; and he was led into this miſtake by never having an opportunity of ſeeing this bird, except flying; and in the air it has the appearance of a gull. On this ſuppoſition he gave it the title of *cataractes*, a name borrowed from Ariſtotle, and which admirably expreſſes the rapid deſcent of this bird on its prey. Pennant.

GANTLET, or GAUNTLET, a large, ſtrong glove, made to cover the arm, or hand, of a cavalier, armed at all points.

The word is derived of the French *gantelet*; and that from *gand* or *gant*, *glove*.

The *gauntlet* was of iron, and the fingers plated. The caſk and *gauntlets* were always borne in the ancient marches in ceremony. *Gauntlets* were not introduced till about the thirteenth century.

The *gauntlet* was frequently thrown, like the glove, by way of challenge.

GANTLET, in *Surgery*, is a kind of BANDAGE for the hand, being a ſwathe, four or five yards long, wherewith they wrap up the hand, and all the fingers, one after another.

GANTLOPE, a military puniſhment. See *Military* EXECUTION.

GANTLOPE, or GAUNTLOPE, vulgarly pronounced *gauntlet*, is a puniſhment for felony, or ſome other heinous offence, in a ſhip of war. For this purpoſe, the whole ſhip's crew is diſpoſed in two rows, ſtanding face to face on both ſides of the deck, ſo as to form a lane, whereby to go forward on one ſide, and return aft on the other; each perſon being furniſhed with a ſmall twiſted cord, called a knittle, having two or three knots upon it. The delinquent is then ſtripped naked above the waiſt, and ordered to paſs forward between the two rows of men, and aft on the other ſide a certain number of times, rarely exceeding three; during which every perſon gives him a ſtripe as he runs along. This puniſhment, which is called *running the gauntlet*, is ſeldom inflicted, except for ſuch crimes as will naturally excite a general antipathy among the ſeamen.

GANYMEDE, Γανυμηδης, a term lately come in uſe to expreſs a catamite, or bardacio. See Sodomy.

The expreſſion takes its riſe from a young beautiful Trojan ſhepherd, thus called, whom Jupiter raviſhed, or carried off, by his eagle, or rather by himſelf, under the figure of an eagle, as he was hunting upon mount Ida; and made him his cup-bearer, in the place of Hebe; who, having made a falſe ſtep, and ſpilt her liquor, was turned out of that office.

Some ſay, that the Jupiter who raviſhed *Ganymede* was Tantalus, king of Phrygia; the eagle expreſſed the ſwiftneſs wherewith he was carried off.

The ſtatue of *Ganymede* was tranſported from Greece to Rome, and ſet up in the temple of Peace; and to this Juvenal refers, when he ſays,

Nuper enim repeto fanum Iſidis, et Ganymedem *hic facis.*

GAOL, a priſon, or place of legal confinement.

The word is formed of the French *geole*; and that of the barbarous Latin *geola*, *gaola*, *gayola*, a *cage*; whence the Picards ſtill call a bird-cage *gayolle*. The gaoler, geolier, was called *gaularius*, and *cajularius*. Scaliger derives the word *gaoler* from *janicularius*. And ſome Latin authors call him *commentarienſis*, becauſe he keeps a regiſter, or liſt, of all thoſe under his cuſtody.

Every county hath two *gaols*; one for debtors, which may be any houſe where the ſheriff pleaſes; the other for the peace and matters of the crown, which is the county *gaol*.

If a *gaol* be out of repair, inſufficient, &c. the juſtices of the peace in the quarter ſeſſions may agree with workmen for rebuilding, or repairing it; and by warrant under their hands and ſeals, order the ſum agreed upon to be levied upon the ſeveral hundreds and diviſions in the county, by a proportionate rate. 10 & 11 W. III. cap. 19. See Priſon-*breaking*.

Gaol *delivery*. See Justice.

GAOLER, is the maſter of a priſon; one that hath the cuſtody of the place where priſoners are kept. Sheriffs muſt make ſuch *gaolers* for whom they will anſwer: but if there is a default in the *gaoler*, action lies againſt him for an eſcape, &c. 2 Inſt. 592. In common caſes the ſheriff or *gaoler* are chargeable at the diſcretion of the party; though the ſheriff is moſt uſually charged. Wood's Inſt. 76.

By 8 and 9 W. III. cap. 27. marſhal and warden taking any reward to connive at priſoners eſcape, forfeits 500*l.* and his ſaid office, and is for ever after incapable of holding ſuch office. The office of marſhal of the king's bench, and warden of the Fleet, ſhall be executed by thoſe who have the inheritance of the ſaid priſons, or their deputies, &c. By 3 Geo. I. cap. 15. no one ſhall purchaſe the office of *gaoler*, or any other office pertaining to the high ſheriff, under pain of 500*l.*

Where a *gaol* is broken by thieves, the *gaoler* is anſwerable; not if it be broken by enemies. 3 Inſt. 52. It is enacted by 22 & 23 Car. II. cap. 20. that the rates of fees and government of priſons be ſigned by the lord chief juſtices, &c. and hung up in every *gaol*, fairly written; and alſo, that felons and priſoners for debt ſhall not be lodged together. No fees ſhall be taken by *gaolers* of priſoners, but ſuch as are allowed by law; and the judges, &c. are to ſettle the ſame: alſo the judges may determine petitions againſt the extortions of *gaolers*, bailiffs, &c. 2 Geo. II. cap. 22. 18 Geo. II. cap. 13.

The abuſes of *gaolers* and ſheriff's officers towards the unfortunate perſons in their cuſtody, are well reſtrained and guarded againſt by ſtatute 32 Geo. II. cap. 28.

Gaolers are not juſtified by law in fettering a priſoner, unleſs he is unruly, or has attempted an eſcape. 2 Inſt. 381. 3 Inſt. 34. The humane language of our ancient law-givers is, *Cuſtodes pœnam ſibi commiſſorum non augeant, nec eos torqueant*; *ſed omni* ſævitia remota, *pietateque adhibita, judicia debite exequantur.* Flet. lib. i. cap. 26.

Gaol *fever*. See Hospital *fever*.

GAONS, a certain order of Jewiſh doctors, who appeared in the Eaſt, after the cloſing of the Talmud. The word *gaons* ſignifies *excellent*, *ſublime*; as in the divinity ſchools we formerly had irrefragable, ſublime, reſolute, angelic, and ſubtile doctors. The *Gaons* ſucceeded the Sebūræans, or Opiners, about the beginning of the ſixth century. Chanan Meiſchtia was the head, and firſt of the excellents; he reſtored the academy of Pandebita, which had been ſhut up for the ſpace of thirty years.

GARAB, and Algarab, names given by Avicenna to the Ægilops, or wild oat.

GARAGAY, in *Zoology*, the name of a rapacious bird of Mexico, of the ſize of our kite; its head and the tips of its wings are white; it makes but ſhort flights; it is very fond of the eggs of tortoiſes and crocodiles, and hunts the places where they have buried them in the ſands.

GARATRONIUM, in *Natural Hiſtory*, the name of a foſſile body, commonly ſuppoſed the ſame with the bufonites, but very improperly; the only juſt account of it is that of Ferrante Imperato, who tells us, that it is a purple ſtone with variegations of a gold yellow, diſpoſed in the manner of the veins of many ſorts of marble; and that the Perſians, and many of the eaſtern people, cut it into the handles of their ſabres. It appears by this deſcription to be a kind of jaſper; and is very improperly confounded with the bufonites, a ſmall ſtone fit only to be worn in rings.

GARB, a name given by the Moors to an African ſpecies of willow.

GARBE, in *Heraldry*, a repreſentation of a ſheaf of corn, or other grain; ſometimes borne in coat-armour, to ſignify ſummer, or the month of Auguſt; as the bunch of grapes denotes autumn.

GARBLER *of ſpices*, an officer of great antiquity in the city of London, who is empowered to enter any ſhop, warehouſe, &c. to view and ſearch drugs, &c. and to *garble* and cleanſe them.

GARBLES, the duſt, ſoil, or filth, ſevered from good ſpice, drugs, &c.

GARBLING of ſpices, drugs, &c. is the cleanſing it from the droſs and duſt, mixed therewith, and ſevering the good from the bad.

The word comes from the Italian *garbellare*, *to ſhake*.

Garbling *of bow-ſtaves*, is the ſorting or culling out the good from the bad.

GARBOARD-*ſtrake*, in a *Ship*, is the firſt ſeam next to the keel.

Garboard-*plank*, in a *Ship*, the firſt plank faſtened on the keel.

GARCINIA, in *Botany*. See Mangoustan.

GARCON, or Garsoon, a French term, literally ſignifying a boy, or male child, any time before his marriage.

It is alſo applied to divers inferior officers, among us called *grooms*, *garçiones*. Thus all the ſervants in the French king's chambers, wardrobe, &c. who do the leſſer offices thereof under the proper officers, are called *garçons de la chambre*, *de la garderobe*, &c.

GARD. See Guard.

Gard, *raviſhment de*. See Ravishment.

Gard. *Corps de* Garde. See Corps.

GARDANT, in *Heraldry*. See Guardant.

GARDECAUT, or Gard du Cord, in a watch, that which ſtops the fuſee, when wound up, and for that end is driven up by the ſtring. Some call it *guard-cock*; others, *guard du gut*.

GARDEN, an incloſure, or plot of ground, curiouſly cultivated, and furniſhed with variety of plants, flowers, fruits, &c.

Gardens are diſtinguiſhed into *flower-gardens*, *fruit-gardens*, and *kitchen-gardens*; the firſt are for pleaſure, and ornament, and, therefore, are placed in the moſt conſpicuous parts; the two latter are for ſervice, and, therefore, made in more obſcure and retired places. Theſe were formerly diſtinct, but they are now generally united; becauſe they both require a good ſoil and expoſure, and are equally placed out of the view of the houſe.

The principal things to be conſidered with reſpect to a *pleaſure garden*, are the ſituation and expoſure, the ſoil, water, proſpect, and the method of deſigning or laying it out.

As to ſituation, it ſhould be neither too high nor too low; for the winds in one of theſe extremes, and the damps and vermin in the other, are equally to be avoided. The ſides of a hill are always the moſt eligible; and if the declivity be eaſy, and there are ſprings of water for ſupplying fountains, canals, and caſcades, and for fertilizing the adjacent valleys, the ſituation is peculiarly excellent. *Gardens* on level ground have their advantages, and are leſs expenſive; but they want proſpect, and ſeveral other agreeable circumſtances that attend thoſe on the ſides of hills, not too ſteep. See Exposure.

The ſecond article, or the ſoil, is greatly to be regarded, as it is not poſſible to make a good *garden* when this is bad. Great expences may be incurred in meliorating the ground; and when that is done, the advantages of it will be loſt in a little time; nay, where three feet of good earth have been laid over the whole ſurface of a *garden*, when the trees have been rooted enough to ſtrike into the natural bottom, the whole plantation has been known to dwindle away. Places naturally producing heath and thiſtles are to be rejected; and where the trees are ſeen to be ſtubbed, and ſtunted, it is an ill omen. When the graſs grows well, and there is not leſs than three feet earth, *gardens* are ſure to ſucceed. The ground muſt not be too ſtony, nor of all things a hard ſtiff clay, which is moſt to be avoided of all ſoils for gardening. A deep, rich, black mould, is beſt for plants; ſandy land is warm and forward, and good for flowers; chalky land is cold and backward; but both may be corrected and improved by compoſts of different kinds, ſuited to their reſpective qualities. A third requiſite is water, without which a *garden* muſt ſuffer extremely in droughts; beſides the uſefulneſs of it in forming ornamental canals, caſcades, &c. To theſe may be added a very advantageous and pleaſing, though not abſolutely neceſſary thing, the proſpect of a pleaſant country. A *garden* planted in a low place, without any kind of proſpect, will not only be diſagreeable, but unwholeſome. With regard to the method of deſigning and laying out a pleaſure *garden*, it may be obſerved, that the area of a handſome *garden* may take up thirty or forty acres, not more, and the following rules ſhould be obſerved in the diſpoſition of it. There ſhould always be a deſcent from the houſe to the *garden* of not fewer than three ſteps; this will render the houſe more dry and wholeſome, and the proſpect on entering the *garden* more extenſive.

The firſt thing preſenting itſelf to view in a pleaſure *garden* ſhould be an open lawn of graſs, whoſe extent ſhould be proportioned to that of the *garden*; in a large *garden* it ſhould not be leſs than ſix or eight acres; but in ſmaller *gardens* the width of it ſhould be conſiderably more than the front of the houſe, and its depth about one half more than the width. The figure of this lawn need not be regular; and if on the ſides there are trees planted irregularly by way of open grove, ſome of which may be planted forwarder upon the lawn than others, whereby the regularity of the lawn will be broken, the *garden* will more reſemble nature; for it ſhould be always conſidered, that a *garden* is only a natural ſpot of ground dreſſed and ornamented.

The great art in laying out *gardens* is to adapt the ſeveral parts to the natural poſition of the ground, ſo as to have as little earth to remove as poſſible. Inſtead of levelling hills in order to form large terraces, ſtiff ſlopes and even parterres, or ſinking of hollows, and raiſing of hills, it is much better only to ſmooth and well turf the ſurface of the ground, which would have a more pleaſing effect, and be attended with a leſs expence of time and money The *garden* ſhould be encompaſſed with a dry gravel walk, for the convenience of walking in damp weather. This walk may lead through the different plantations, winding about gently in an eaſy natural way, which is much preferable to long ſtrait walks. However, the turns ſhould be few and concealed, and ſo contrived as to lead into ſhade as ſoon as poſſible, and into ſome plantations of ſhrubs for ſhelter; for without ſhade and ſhelter no *garden* can be pleaſing. When the boundaries of the *garden* are fenced with walls or pales, they ſhould be hid by plantations of flowering ſhrubs, intermixed with laurels, and other evergreens. In ſituations where there is a good ſupply of water, it may be conducted through the garden in ſtreams or rivulets, and theſe, if they are formed with judgment, will have a better effect, and be much more ſalubrious and refreſhing than large ponds or canals of ſtagnant water, which render the air damp and unhealthy. If wilderneſſes are deſigned, they ſhould not be cut into ſtars, and other ridiculous figures, nor formed into mazes or labyrinths, but the walks ſhould be noble, and ſhaded by tall trees; and the ſpaces of the quarters planted with flowering ſhrubs and evergreens; and on the ſides of the walks may be ſcattered hardy ſorts of flowers, which will thrive with little care. Theſe wilderneſſes ſhould not be ſituated too near the houſe; but a communication and underſhade may be made between them and the houſe by open groves. Buildings properly and ſparingly introduced, ſtatues and vaſes not placed too near each other, fountains and caſcades, &c. where a conſtant ſupply of water can be obtained, will greatly contribute to the ornament of a pleaſure *garden*. When the ground is naturally uneven, with gentle aſcents and declivities, theſe may be ſo managed as to be rendered great beauties: for this purpoſe the inequalities of the ground ſhould not be cut into regular ſtiff ſlopes and amphitheatres, but be properly planted with clumps of trees or ſhrubs, and the ſloping ſides ſmoothed and left in their natural poſition.

In forming a new *garden*, or altering the diſpoſition of an old one, great care ſhould be taken to preſerve all the good trees, wherever they can be rendered either uſeful or ornamental: the trees and ſhrubs that are introduced ſhould alſo be adapted to the ſituation and ſoil of the *garden*, and be allowed ſufficient room. Before a *garden* is planned out, it ſhould be conſidered what it will be in twenty or thirty years time, when the trees and ſhrubs are grown up and ſpread; and the general diſtribution of the parts of a *garden* ſhould be regulated by this proſpect, as well as by the ſituation of the ground. The great art of deſigning is to adapt the plan to the ſituation, to make the moſt of the inequalities of the ground, to proportion the number and ſorts of trees and ſhrubs to each part of the *garden*, and to ſhut out, from the view of it, no objects that either are or may be made ornamental. Miller.

The chief furniture of pleaſure *gardens* are, parterres, viſtas, glades, groves, compartiments, quincunces, verdant halls, arbour-work, mazes, labyrinths, fountains, cabinets, caſcades, canals, terraces, &c. See each under its proper article.

GARDEN, *kitchen*. There are certain general rules always to be obſerved in making a *kitchen-garden*, which will render it much cheaper and more convenient than if undertaken at a venture, without the conſideration of them. It ſhould always be placed behind a houſe, that it may be both ſheltered and kept out of ſight, and always ſhould be as near as may be to the ſtables, that the dung may be ready, and coſt no great labour nor expence in carriage. A ſquare or oblong is the beſt figure for the ground; but this is not neceſſary, ſince all irregularities may be hid by the quarters. The ſoil muſt neither be very wet, nor very dry, nor too ſtiff; and if there are any riſings in any part of the ground, they are by no means to be levelled, as they will be of great uſe for different crops of ſeveral things. This *garden* muſt be fully expoſed to the ſun, and by no means overſhadowed by trees. See EXPOSURE. The quantity of ground is to be proportioned to the ſize of the family which it is to ſupply; for a ſmall one, an acre of ground will be enough, and there ſeldom requires more than three or four acres. It ſhould be walled all round with walls twelve feet high for the reception of fruit trees, and the ground, when the ſoil is ſtrong and ſtiff, ſhould be ploughed or dug up three or four times before any thing is planted in it; and if it be thrown up in ridges to receive the froſt in winter, this will be of great ſervice to meliorate and looſen its parts.

In this caſe it muſt alſo be manured with ſea-coal aſhes, the cleanſings of the ſtreets of large towns, or ſea-ſand, as alſo with rotten wood, and decayed and putrefied vegetables. On the contrary, if it be light and warm, it muſt be manured with rotten neat's dung; and if horſe-DUNG be uſed, it muſt be always very well rotted firſt. The ſoil muſt be at leaſt two feet deep, and there muſt be a ſupply of water, which, if it can be contained in baſons, or reſervoirs, will be very convenient and advantageous.

In the planting a fruit or *kitchen-garden*, if the ſoil be a hungry gravel, or ſand, Mr. Switzer directs the holes where the trees are to be planted, to be dug two feet deep, and three or four over, and filled with rotten horſes or cows dung, mixed with rich mould.

As ſoon as the walls are built, the firſt thing to be done is the laying out of the borders under them, which ſhould be at leaſt eight or ten feet broad; and on thoſe which are expoſed to the ſouth, the early crops are to be planted, and the later on thoſe to the north.

The trees being taken out of the nurſery, the biggeſt roots are to be ſhortened to about ſix inches; all the ſmall fibres to be taken off, and the head to be pruned, ſo as not to leave above two branches; and thoſe not above ſix inches long.

The wall trees are to be placed as far from the wall as may be, that there may be the more room for the roots to ſpread; then, filling up the whole with mould, there remains nothing but to ſecure the roots from the winter's froſt, by covering the ſpot with ſtraw, fern, dung, &c. and in ſummer from the ſun by ſand and pebble ſtones.

For trees planted in borders the common practice is to make a trench by the wall-ſide, two feet broad, and as many deep; this trench they fill with old dung, mixed with earth, lightly laid, near as high as the borders are intended to be, and then trodden down to half the height, in the places where the trees are intended to be. It is prudent to plant the trees ſhallow, and to raiſe the earth about them; eſpecially in a wet, clayey ſoil. See FRUIT-*trees* and PLANTING.

It is an obſervation of ſome importance, that wall trees and fruits thrive beſt when the walks that run parallel to them are gravel; more of the rays of the ſun being thereby reflected to them, than if they were graſs. Add, that no ſort of tall trees are to be ſuffered to grow in any of the oppoſite borders, or intermediate ſpaces, ſo that their ſhade might reach to the ſouth-eaſt, or ſouth-weſt walls. The places near the walls are moſt advantageouſly filled with DWARF-*trees*.

No large or deep rooting plants ſhould ever be ſet near the roots of the wall-fruit trees, but the beans and peas, required to be early, ſhould be planted in the other parts of the *garden*, and ſheltered by moveable reed-hedges, which will ſcreen and forward them as well as the walls. The next thing to be done, is the laying out the ground into quarters. Theſe ſhould never be too ſmall, but in a little *garden* it is better to have only a few of them. They muſt be ſurrounded with ESPALIERS of fruit-trees, and have walks tufted between them, which in a ſmall *garden* ought to be ſix feet wide; in a large one, ten; and on each ſide the walk there ſhould be allowed a border of three or four feet broad, between its edge and the eſpaliers. On theſe borders ſmall ſallading, or any thing that does not remain long, nor root deep, is proper to be ſown. If the walks are covered with lime-rubbiſh or ſand, inſtead of being turfed, it will be an advantage to the fruit in the eſpaliers, though it takes off from the beauty of the *garden*. The beſt figure for the quarters is either a ſquare, or an oblong; but when the nature of the ground does not admit this, they may be triangular, or of any other form. The ground in theſe quarters ſhould never be ſown or occupied by the ſame crop, for two years together; and when any part of the ground is not uſed, it ſhould be trenched up in ridges, to receive the better the benefit of the dews and froſt.

In one of the quarters which is neareſt the ſtables, and is moſt defended from bad weather, ſhould be the beds for cucumbers, melons, and other productions of the hot-bed; and it is a very good method to ſurround that part with a reed-hedge, which both ſhelters and hides the beds from ſight. This ſquare ſhould always be large enough for the beds of two years.

The moſt important points of culture and management are the well digging and manuring the ſoil, and the giving a proper diſtance to each plant. The quarters and dunghills are both alſo to be kept clear of weeds; for if they are ſuffered to ſcatter their ſeeds on the dunghills, it is in vain to root them out of the *garden*, as they will be continually renewed from thence. Miller's Gardener's Dict.

Robbing *gardens* and orchards of fruit growing in them, ſtealing underwoods and hedges, and ſtealing or deſtroying any turnips, or the roots of madder, when growing, are puniſhable criminally, by whipping, ſmall fines, impriſonment, and ſatisfaction to the party wronged, according to the nature of the offence, by the ſtatutes 43 Eliz. cap. 7. 15 Car. II. cap. 2. 23 Geo. II. cap. 26. and 31 Geo. II. cap. 35. And by ſtat. 6 Geo. III. cap. 36. and cap. 48. the ſtealing by night of any trees, or of any roots, ſhrubs, or plants, to the value of 5*s*. is made felony in the principal aiders and abettors, and in the purchaſers, knowing the ſame to be ſtolen; and the ſtealing of any timber-trees, as oak, beech, cheſnut, walnut, aſh, elm, cedar, fir, aſp, lime, ſycamore, and birch, and of any root, ſhrub, or plant, by day or night, is liable to pecuniary penalties for the two firſt offences, and for the third is a felony, liable to tranſportation for ſeven years.

GARDENS, *pendant*, or *hanging*. See PENSILES *horti*.

GARDENIA, *Cape jaſmine*, in *Botany*, a genus of the *pentandria monogynia* claſs: the ſtyle is elevated, and compoſed of two lobes; the calyx is divided into vertical ſegments, and the fruit is a polyſpermous berry. There is only one ſpecies.

GARDENING, *Horticulture*, the art of cultivating a *garden*.

Gardening has, in all ages, been eſteemed an employment worthy the greateſt heroes and philoſophers: the emperor Diocleſian, at Salona; and Epicurus and Metrodorus, at Athens, have ennobled the art beyond all encomium.

Goetzius, ſuperintendent of Lubeck, printed a diſſertation in 1706, intitled Κηποφιλος, ſeu de Eruditis Hortorum cultoribus, of the learned men who have loved and cultivated gardens: among which number he ranks Adam Gregory, Nazianzen, St. Auguſtine, Pliny, and Cicero; nor ſhould he have forgot the elder Cato, Democritus, Plato, and his academy.

The ſieur le Noſtre firſt carried *gardening* to any thing of perfection; M. la Quintinie has gone yet farther; nor have our own countrymen been wanting to its improvement; as London, Wiſe, Bradley, Laurence, Fairchild, Miller, Brown, &c.

M. Fatio has lately applied mathematical reaſoning to *gardening*; and ſhewn how to make the beſt uſe of the ſun's rays in gardens.

The principal operations in *gardening* are planting, tranſplanting, engrafting, inoculating, pruning, ſowing, &c. all which ſee under their proper articles.

Other particulars relating to the art of *gardening*, ſee under PINCHING, VARIEGATION, NURSERY, SEED, GREEN-HOUSE, HOT-BED, FRUIT-TREE, DWARF, SALLET, &c.

GARDENING, in *Falconry*. To *garden a hawk*, is to put her on a turf of graſs, to cheat her.

Some alſo uſe the ſame phraſe for the giving her an airing, or letting her fly at large.

GARDEROBE. See WARD-ROBE.

GARDEYN. See GUARDIAN.

GARDIAN. See GUARDIAN.

GARDON, in *Ichthyology*, the name of a fiſh of the roach kind, ſuppoſed by many not to differ in any thing eſſential from the common roach of the Engliſh rivers: ſome authors call it the *gardon* SARGUS, and cephalus; others LEUCISCUS.

GARDUS, in *Ichthyology*, a name given by ſome writers on fiſhes to that kind of cyprinus, called by Geſner and others, the ſargus. See GARDON and CYPRINUS.

GARE, in our *Old Writers*, a coarſe wool, full of ſtaring hairs, ſuch as grow about the ſhanks of ſheep. 31 Edw. III. cap. 8.

GAR-FISH. See ESOX and ACUS.

GARGANEY, in *Ornithology*, *anas querquedula* of Linnæus, the name of a freſh water-fowl of the duck kind; it is ſomewhat larger than the teal, but very like it in ſhape. Its beak, legs, and feet, are of a deep lead colour; the upper part of the head is duſky, but it has on each ſide a white ſtreak drawn from the eyes to the back part of the head; the throat and lower part of the neck are variegated with white and a reddiſh brown; juſt under the beak it has a black ſpot; the breaſt is beautifully variegated with tranſverſe undulated lines of black, and a duſty brown; the belly is white or yellowiſh. The female is ſmaller than the male, and has not the bright colours about the head, which are ſo beautiful in that. It has an obſcure white mark over the eye, and the reſt of the plumage is of a browniſh aſh colour. Theſe birds are in many places called the ſummer teal.

GARGARISM, GARGLE, in *Medicine*, a liquid form of remedy, for diſorders in the mouth, gums, throat, &c.

The word is Greek Γαργαρισμα, formed of γαργαριζειν, *colluere*, to waſh. Or the Hebrew *garghera*, the throat. *Gargariſms* are compoſed of honey, ſalt, ſyrups, ſpirits, vinegar, waters, and decoctions; and produce their effects by cleanſing, lubricating, &c. the parts.

Gargles are peculiarly uſeful in fevers and ſore throats; and they have this advantage above many other medicines, that they are eaſily procured and prepared: an uſeful *gargle* for ſoftening and cleaning the mouth may be made with a little barley water and honey, acidulated with vinegar. *Gargles* bear different appellations according to the uſes to which they are applied. An *attenuating gargle*, made by mixing ſix ounces of water, with one ounce of honey and a dram and a half of nitre, or by adding an ounce of honey and half an ounce of ſpirit of ſal ammoniac to the emollient *gargle*, may be uſed in the inflammatory quinſey or in fevers, for cleaning the tongue and fauces. A good *gargle* for this purpoſe may be made with ſtrong ſage tea, ſweetened with honey and ſharpened with vinegar. The *common gargle*, made by mixing ſix ounces of roſe water with half an ounce of ſyrup of clove July-flowers acidulated with ſpirit of vitriol, cleanſes the tongue and fauces, and ſerves alſo for a gentle repellent. The *detergent gargle*, prepared by mixing a pint of the emollient *gargle* with an ounce of tincture of myrrh and two ounces of honey, ſerves to cleanſe exulcerations and to promote the excretion of tough viſcid ſaliva. The *emollient gargle*, made by boiling an ounce of marſhmallow roots, and two or three figs in a quart of water till near one half of it be conſumed, and ſtraining out the liquor, is beneficial in fevers, when the tongue and fauces are rough and parched, to ſoften theſe parts and promote the diſcharge of the ſaliva. Sir John Pringle recommends a decoction of figs in milk and water, with the addition of ſal ammoniac, as an uſeful *gargle* in the inflammatory quinſey, or ſtrangulation of the fauces.

GARGET, a diſeaſe of cattle, conſiſting in a ſwelling of the throat and the neighbouring parts; to prevent which, bleeding in the ſpring is recommended.

GARGIL, a diſtemper in geeſe, which by ſtopping the head frequently proves mortal. Three or four cloves of garlic, beaten in a mortar with ſweet butter, and made into little balls, and given the creature faſting, are the ordinary cure.

GARHANA, in *Ichthyology*, a name by which ſome have called a large Braſilian fiſh, of the ſhape of our carp, more uſually known among authors, by its Braſilian name ACARAAYA.

GARICON, in the *Materia Medica*, a name given by the Arabian writers to the drug called agaric by the ancients.

The Arabians have ſaid nothing of this drug, but what they have tranſcribed from the Greek of Dioſcorides and others; it is certain however from the concurrent teſtimony of all the ancients, as to the form, nature, and virtues of AGARIC, that theirs was not the ſame ſubſtance which we call by this name.

The ancients knew two kinds of what they called agaric: they diſtinguiſhed theſe by the common terms of male and female; the male was a root reſembling the ſilphium of a cubit long, and of an inch or two in diameter; the female was the corrupted *wood* of certain trees, particularly of the cedar, and other odoriferous woods.

Pliny makes it indeed the decayed wood of the oak, which ſhines like fire in the dark, and calls it a fungus, but this was not the agaric of the Greeks.

The female agaric, or the decayed wood of the cedar, was what they gave as an antidote and cordial; the male, or as others called it, the black agaric, was poiſonous. Dioſcorides places it among the poiſonous roots, and Avicenna condemns it, as hard and unfit for internal uſe; the other, or female agaric, being ſoft, friable, and tender. When it was thus in a great degree, however, it was condemned by the more accurate writers; and Dioſcorides, in particular, condemns the agarics of Cilicia and Galatia as too friable, and of no value: ſo that they ſeemed to fix upon a proper ſtage in the decay, as the neceſſary qualification of good agaric.

GARIDELLA, ſo named by Tournefort in honour of Dr. Garidel, profeſſor of phyſic at Aix in Provence, in *Botany*. Its characters are theſe: the flower hath no petals, but five oblong equal nectariums occupy their place, which are bilabiate. It hath eight or ten awl-ſhaped ſtamina, which are ſhorter than the empalement. In the centre are ſituated three compreſſed germina, which become three oblong compreſſed capſules with two valves, incloſing ſeveral ſmall ſeeds. We know but one *ſpecies* of this *genus*.

GARLAND, an ornament for the head, made in manner of a crown or chaplet.

The word is formed of the French *guirlande*, and that of the barbarous Latin *garlanda*, or Italian *ghirlanda*. Menage traces its origin from *gyrus*, through *gyrulus*, to *gyrulare*, *gyrlandum*, *ghirlandum*; and at length *ghirlanda*, and *guirlande*; ſo that *guirlande*, and *gailand*, are deſcended, in the ſixth or ſeventh degree, from *gyrus*. Hicks rejects this derivation, and brings the word from *gardel handa*; which in the northern languages, ſignify, a *noſegay artfully wrought with the hand*.

Garlands are a ſort of chaplets, made of flowers, feathers, or even of precious ſtones, but eſpecially of flowers; to which the word, in our language, is more immediately appropriated. Janus paſſes in antiquity for the inventor of *garlands*. Athen. Dipnoſ. lib. xv.

GARLANDS alſo denote ornaments of flowers, fruits and leaves, intermixed; anciently much uſed at the gates of temples, where feaſts or ſolemn rejoicings, were held; or at any other places where marks of public joy and gaiety were deſired; as at triumphal arches, tournaments, &c. *Garlands* or feſtoons, were alſo put on the heads of victims, in the ancient heathen ſacrifices. St. Paulinus, in his poem on St. Felix, does not forget the *garlands*, and crowns of flowers, placed at the door of the church, and on the tomb of that ſaint.

The Italians have a ſort of artificers called *feſtaroli*; whoſe office is, to make *garlands*, or feſtoons, and other decorations for feaſts.

GARLAND, in a *Ship*, denotes a collar of ropes, wound about the head of the main-maſt, to keep the ſhrouds from galling.

GARLAND is alſo a ſort of net, whoſe opening is extended by a wooden hoop of ſufficient ſize to admit a bowl or platter within it. It is uſed by the ſailors as a locker or cupboard to contain their proviſions, being hung up to the deck within the birth, where they commonly meſs between decks.

GARLAND, *Shot*, is a piece of timber nailed horizontally along the ſhip's ſide from one gun port to another, and uſed to contain the round ſhot ready for charging the great guns in battle. For this purpoſe it is furniſhed with ſeveral ſemi-globular cavities, correſponding to the ſize of the cannon balls contained in it.

GARLICK, *Allium*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flowers are included in one common ſpatha, and are compoſed of ſix oblong erect petals, and ſix awl-ſhaped ſtamina, of the length of the petals, and crowned with oblong ſummits; the germen, which ſupports a ſingle ſtyle, crowned by an acute ſtigma, becomes a three-cornered capſule, opening into three parts, having three cells, filled with roundiſh ſeeds. There are nineteen ſpecies.

The common *garlick* and rocambole are eaſily propagated by planting the cloves, or ſmall bulbs, in the ſpring, in beds, about four or five inches diſtant from each other, keeping them clear from weeds. About the beginning of June, the leaves of the firſt ſort ſhould be tied in knots, to prevent their ſpindling or running to feed, which will greatly enlarge the bulb. In the middle of July the leaves will begin to wither and decay, at which time they ſhould be taken out of the ground, and hung up in a dry room, to prevent their rotting, and may be thus preſerved for winter uſe. The roots of the ſecond ſort may be left in the ground till the leaves are decayed, and their bulbs may then be taken up and dried.

Garlick is an extremely active and penetrating medicine. It is of the number of thoſe roots which ought always to be uſed freſh and full of juice, not dried; ſome eſteem it the greateſt of all alexipharmics. To warm and ſtimulate the ſolids, attenuate thick humours, and reſiſt putrefaction, are its primary virtues: on this account it is improper in hot bilious conſtitutions; but in cold, ſluggiſh, phlegmatic habits, it proves a ſalutary and powerful corroborant, expectorant, diuretic, and ſudorific. The German phyſicians frequently carry a clove of *garlick* in their mouths, when they viſit patients in malignant fevers: with us it is more in uſe among country people, than in the ſhops. They give a decoction of *garlick* in milk, as a remedy for worms, and alſo in the colic, and in ſuppreſſions of urine. Its moſt conſtant uſe, however, is in aſthmas, and catarrhous diſorders of the breaſt, in which it promotes expectoration. It has likewiſe been found ſerviceable in the beginning of dropſies, and for preventing a new accumulation of water, after evacuation. Sydenham relates, that he has known the dropſy cured by the uſe of *garlick* alone.

Whatever may be the virtues of *garlick*, it ought to be uſed in ſmall doſes, and that not too frequently, becauſe, if long continued, it is apt to heat and inflame the viſcera.

Garlick is ſometimes employed externally, in unguents and lotions, as an antiſeptic and diſcutient; and is frequently an ingredient in the ſtimulating epithems, applied to the ſoles of the feet, in the low ſtage of acute diſtempers, for raiſing the pulſe, and relieving the head; and it is much commended by Sydenham for this purpoſe. The roots loſe conſiderably of their weight by drying; ſo that ſix grains dry may be looked upon as equivalent to fifteen grains of the freſh root. The freſh root yields, on expreſſion, about a fourth of its quantity of a very viſcid, glutinous juice; and both the freſh and dry root communicate their virtue to water by warm infuſion. A quart of water poured boiling hot on a pound of the freſh root ſliced, with a proper quantity of ſugar, makes the ſyrup of *garlick* of the ſhops. The oxymel of *garlick* is prepared by infuſing an ounce and a half of the freſh root in half a pint of vinegar, and diſſolving in the ſtrained liquor, by the heat of a water-bath, ten ounces of clarified honey. The ill ſmell of the *garlick* may be in ſome degree prevented by boiling two drams of carraway, and the ſame quantity of ſweet fennel ſeeds bruiſed in the vinegar, before the *garlick* is put in. The *garlick* ſhould never be boiled, either with vinegar or watery liquors, becauſe the virtues of this root, reſiding in an eſſential oil, are exhaled with the ſteam. Rectified ſpirit of wine, digeſted on dry *garlick* root, extracts its virtues more readily and perfectly than either water or vinegar. Lewis's Mat. Med.

GARLICK, *wild*, a name given to a ſpecies of ONION.

GARLICK *pear*. See CRATEVA.

GARNET, in *Natural Hiſtory*. See GRANATE.

GARNET, in a *Ship*, is a tackle having a pendant coming from the head of the main maſt, with a block ſtrongly ſeized to the main ſtay juſt over the hatch-way; in which block is reeved the runner, which hath a hook at one end, in which are hitched the ſlings; and at the other end is a double block, in which the fall of the runner is reeved; ſo that by its means any goods, or caſks, that are not over heavy, may be hailed and hoiſed into, or out of the ſhip: when this *garnet* is not uſed, it is faſtened along by the ſtay at the bottom of it.

GARNET, *clew*. See CLEW-*garnet*.

GARNISH, in ſome ancient writings and ſtatutes. To *garniſh* the heir, ſignifies to warn the heir. 27 Eliz. cap. 3.

GARNISHEE, in *Law*, the party in whoſe hands money is attached within the liberties of the city of London; ſo called in the ſheriff's court, becauſe he has had *garniſhment*, or warning, not to pay the money, but to appear and anſwer to the plaintiff-creditor's ſuit.

GARNISHING is popularly uſed for the furniture, aſſemblage, or ſortment, neceſſary for the uſing or adorning any thing.

The word is French, formed of the verb *garnir*, to furniſh or fit out.

The *garniſhing* of a diſh conſiſts of certain things which accompany it, either as a part and ingredient thereof; in which ſenſe pickles, muſhrooms, oyſters, &c. are *garniſh-*

garniſhing: or as a circumſtance, or ornament; as when leaves, flowers, roots, &c. are laid about a ſervice to amuſe the eye.

The ſame word is uſed for the finer herbs, fruits, &c. laid about a ſallet: *garniſhings* are of lemon, piſtachos, pomegranate, yolks of hard eggs, artichoke-bottoms, capers, truffles, ſweetbread, &c.

GARNISHMENT, in *Law*, denotes a warning given any one to appear, for the better furniſhing of the cauſe, and court. Thus, if one be ſued for the detinue of certain charters; and ſays, they were delivered to him, not only by the plaintiff, but by J. S. alſo; and therefore prays, that J. S. may be warned to plead with the plaintiff, whether the conditions are performed, or no. In this petition he is ſaid to pray *garniſhment*; which may be interpreted, a warning to J. S. to provide himſelf for a defence; or elſe a furniſhing the court with all parties to the action, whereby it may thoroughly determine the cauſe.

GAROSMUS, in *Botany*, a name uſed by ſome authors for the atriplex olida, or ſtinking orach, a very ſtinking low plant common on dunghills.

GARRISON, in the *Art of War*, a body of forces diſpoſed in a fortreſs, to defend it againſt the enemy, or to keep the inhabitants in ſubjection, or even to be ſubſiſted during the winter ſeaſon.

Du Cange derives the word from the corrupt Latin *garniſio*; which the latter writers uſe to ſignify all manner of munition, arms, victuals, &c. neceſſary for the defence of a place, and the ſuſtaining of a ſiege.

Garriſon, and *winter quarters*, are ſometimes uſed indifferently for the ſame thing; and ſometimes they denote different things.

In the latter caſe, a *garriſon* is a place wherein forces are maintained to ſecure it, and where they keep regular guards; as, a frontier town, a citadel, caſtle, tower, &c. The *garriſon* ſhould always be ſtronger than the townſmen.

Winter quarters ſignify a place where a number of forces are laid up in the winter ſeaſon, without keeping the regular guard. The ſoldiers, therefore, like better to be in winter quarters than in *garriſon*.

GARRISON *carriages* are thoſe on which all ſorts of *garriſon* pieces are mounted. See CARRIAGE.

GARRISON *guns* conſiſt of 42, 32, 24, 18, 12, 9, and 6 pounders; and they are made either of braſs or iron. The following table exhibits their dimenſions.

Braſs *Garriſon* Pieces.						Iron *Garriſon* Pieces.					
Caliber	Length		Weight			Caliber	Length		Weight		
	f.	i.	c.	qr.	℔		f.	i.	c.	qr.	℔
42	10	0	64	0	0	32	9	8	56	0	0
32	9	2	49	2	18	24	9	8	48	0	0
24	8	4	37	0	0	18	9	0	36	0	0
18	7	6	27	3	0	12	7	8	24	0	0
12	6	7	18	2	0	9	7	0	18	0	0
9	6	0	13	3	0	6	6	1	12	0	0
6	5	3	9	1	0	4	5	4	8	0	0

See GUN.

GARRULUS *Bohemicus*, the *Bohemian magpie*, a name given by ſome to the bird more uſually called AMPELIS, from its love of grapes.

GARRULUS *Argentoratenſis*, in *Zoology*, the name given by authors to the ſpecies of magpie commonly called the ROLLER, a very beautifully variegated bird, brought to market in Italy, and ſome other places.

GARTER, περισκελις, a ligature to keep up the ſtockings; it is alſo particularly uſed for the badge or cognizance of a noble order of knights, hence denominated the

Order of the GARTER, a military order, next in dignity after the nobility, inſtituted by king Edward III. in 1344, under the title of the *ſovereign* and *knights-companions of the moſt noble order of the* garter.

This order conſiſts of twenty-ſix knights, or companions, generally peers or princes; whereof the king of England is the ſovereign, or chief.

They wear a *garter*, ſet with pearls and precious ſtones, on the left leg, between the knee and calf, with this motto; *honi ſoit qui mal y penſe*, q. d. *ſhame to him that thinks evil hereof*: and they bear this motto ſurrounding their arms. The meaning of which motto is ſaid to be, that king Edward having laid claim to the kingdom of France, retorted ſhame and defiance upon him that ſhould dare to think amiſs of the juſt enterprize he had undertaken for recovering his lawful right to that crown; and that the bravery of thoſe knights whom he had elected into this order was ſuch as would enable him to maintain the quarrel againſt thoſe who thought ill of it.

They are a college or corporation, having a great and little ſeal: their officers are, a prelate, chancellor, regiſter, king at arms, and uſher.

Beſides which, they have a dean, and twelve canons, with petty canons, vergers, and twenty-ſix penſioners, or poor knights

The prelate is the head; and the office is veſted in the biſhop of Wincheſter: next to him is the chancellor, which office is veſted in the biſhop of Saliſbury, who keeps the ſeals. All theſe officers, except the prelate, have fees and penſions.

The order is under the patronage or protection of St. George of Cappadocia, the tutelar ſaint of this kingdom. Their college is held at the caſtle of Windſor, within the chapel of St. George, and the chapter-houſe, erected by the founder for that purpoſe. Their robes, &c. are the *garter*, decked with gold and gems, and a buckle of gold, to be worn daily; and, at feaſts and ſolemnities, a fur-coat, mantle, high velvet cap, collar of SS's, compoſed of roſes enamelled, &c.

The mantle is the chief of thoſe veſtments made uſe of on ſolemn occaſions. Its colour is by the ſtatutes appointed to be blue. The length of the train of the mantle only diſtinguiſhes the ſovereign from the knights-companions: to the collar of the mantle is fixed a pair of long ſtrings, anciently wove with blue ſilk only, but now twiſted round, and made of Venice gold and ſilk, of the colour of the robe, with knobs or buttons, and taſſels at the end. The left ſhoulder of the mantle has from the inſtitution been adorned with a large *garter*, with the device HONI SOIT, &c. within this is the croſs of the order, which was ordained to be worn at all times by king Charles I. At length the ſtar was introduced, which is a ſort of croſs irradiated with beams of ſilver. The collar is appointed to be compoſed of pieces of gold in faſhion of *garters*, with the ground enamelled blue, and the motto gold.

When they wear not their robes, they are to have a ſilver ſtar on the left ſide; and they commonly bear the picture of St. George, enamelled on gold, and beſet with diamonds, at the end of a blue ribbon, croſſing the body from the left ſhoulder They are not to appear abroad without the *garter*, on penalty of 6*s.* 8*d.* paid to the regiſter.

The manner of electing a knight-companion into this moſt noble order, and the ceremonies of inveſtiture, are as follow. When the ſovereign deſigns to elect a companion of the *garter*, the chancellor of the order draws up the letters, which, paſſing both under the ſovereign's ſign manual and ſignet of the order, are ſent to the perſon by *Garter* principal king at arms, and are to this effect: "We, with the companions of our moſt noble order of "the *garter*, aſſembled in chapter, holden this preſent "day at our caſtle at Windſor, conſidering the virtuous "fidelity you have ſhewn, and the honourable exploits "you have done in our ſervice, by vindicating and main-"taining our rights, &c. have elected and choſen you "one of the companions of our order. Therefore, we "require you to make your ſpeedy repair unto us, to "receive the enſigns thereof, and be ready for your in-"ſtallation upon the day of this preſent month," &c.

The *garter*, which is of blue velvet bordered with fine gold wire, having commonly the letters of the motto of the ſame, is, at the time of election, buckled on the left leg by two of the ſenior companions, who receive it from the ſovereign, to whom it was preſented on a velvet cuſhion by *Garter* king at arms, with the uſual reverence, whilſt the chancellor reads the following admonition enjoined by the ſtatutes: "To the honour of God omni-"potent, and in memorial of the bleſſed martyr St. "George, tie about thy leg, for thy renown, this noble "*garter*; wear it as the ſymbol of the moſt illuſtrious "order, never to be forgotten or laid aſide; that thereby "thou mayeſt be admoniſhed to be courageous, and "having undertaken a juſt war in which thou ſhalt be "engaged, thou mayeſt ſtand firm, valiantly fight, and "ſucceſſively conquer." The princely *garter* being thus buckled on, and the words of its ſignification pronounced, the knight elect is brought before the ſovereign, who puts about his neck, kneeling, a ſky-coloured ribband, to which is appendant, wrought in gold within the *garter*, the image of St. George on horſeback, with his ſword drawn, encountering with the dragon. In the mean time, the chancellor reads the following admonition: "Wear this ribband about thy neck, adorned with "the image of the bleſſed martyr and ſoldier of Chriſt "St. George, by whoſe imitation provoked, thou mayeſt "ſo overpaſs both proſperous and adverſe adventures, "that having ſtoutly vanquiſhed thine enemies both of "body and ſoul, thou mayeſt not only receive the praiſe "of this tranſient combat, but be crowned with the "palm of eternal glory." Then the knight elected kiſſes his ſovereign's hand, thanks his majeſty for the great honour done him, riſes up and ſalutes all the companions ſeverally, who return their congratulations.

The order of the *garter* appears the moſt ancient and noble lay-order in the world. It is prior to the French order of St. Michael, by 50 years; to that of the Golden Fleece, by 80 years; to that of St. Andrew, by 190 years; and to that of the Elephant, by 209 years.

Since its inſtitution, there have been eight emperors, and twenty-ſeven or twenty-eight foreign kings, beſides numerous ſovereign princes, enrolled as companions thereof.

Its origin is ſomewhat differently related: the common account is, that it was erected in honour of a *garter* of the counteſs of Saliſbury, which ſhe dropped in dancing, and which king Edward picked up; but our beſt antiquaries ſet this aſide as fabulous.

Camden, Fern, &c. take it to have been inſtituted on occaſion of the victory obtained over the French at the battle of Creſſey: that prince, ſay ſome hiſtorians, ordered his *garter* to be diſplayed, as a ſignal of battle; in commemoration whereof, he made a *garter* the principal ornament of the order erected in memory of this ſignal victory, and a ſymbol of the indiſſoluble union of the knights.

Fa. Papebroche, in his Analecta on St. George, in the third tome of the Acta Sanctorum, publiſhed by the Bollandiſts, has a diſſertation on the *order of the garter*. This order, he obſerves, is no leſs known under the name of St. George than under that of *garter*; and that, tho' it was only inſtituted by king Edward III. yet it had been projected before him by king Richard I. in his expedition to the Holy-Land, if we may credit an author who wrote under Henry VIII. Papebroche adds, however, that he does not ſee what that author grounds his opinion on; and that, though the generality of writers fix the epocha of this inſtitution to the year 1350, he rather chuſes, with Froiſſard, to refer it to the year 1344, which agrees better with the hiſtory of that prince, where we read, that he called an extraordinary aſſembly of knights that year.

It appears from Raſtel's Chronicle, lib. vi. quoted by Granger in the Supplement to his Biographical Hiſtory, that this order was deviſed by Richard I. at the ſiege of the city of Acres, when he cauſed twenty-ſix knights, who firmly ſtood by him, to wear thongs of blue leather about their legs, and that it was perfected in the nineteenth year of Edward III.

In 1551, Edward VI. made ſome alterations in the ritual of this order: that prince compoſed it in Latin, the original whereof is ſtill extant in his own hand-writing. He there ordained, that the order ſhould no longer be called the order of St. George, but that of the *garter*; and, inſtead of the George, hung at the collar, he ſubſtituted a cavalier, bearing a book on the point of his ſword, with the word *protectio* graven on the ſword, and *verbum Dei* on the book; with a buckle in the left-hand, and the word *fides* thereon. Larrey.

For a farther account of the order of the *garter*, ſee Camden, Aſhmole, Dawſon, Leland, Polydore Virgil, Heylin, Legar, Glover, and Fauyn.

Erhard, Cellius, and the prince of Orange, adds Papebroche, have given deſcriptions of the ceremonies uſed at the inſtalment of knights. A Ciſtercian monk, named Mendocius Belvaletus, has a treatiſe, intituled La Garretiere, or Speculum Anglicanum, ſince printed under the title of the Catechiſm of the Order of the *Garter*; wherein he explains all the allegories, real or pretended, of thoſe ceremonies, with the moral ſignifications thereof.

Garter *principal king at arms*. This office was inſtituted by Henry V.

Garter, and *principal king at arms*, are two diſtinct offices united in one perſon: *Garter*'s employment is to attend the ſervice of the order of the *garter*; for which he is allowed a mantle and badge, a houſe in Windſor-caſtle, and penſions both from the ſovereign and knights, and, laſtly, fees. He alſo carries the rod and ſceptre at every feaſt of St. George, when the ſovereign is preſent, and notifies the election of ſuch as are new choſen; attends the ſolemnity of their inſtallations, and takes care of placing their arms over their ſeats; and carries the *garter* to foreign kings and princes, for which ſervice it has been uſual to join him in commiſſion with ſome peer, or other perſon of diſtinction.

Garter's oath relates only to ſervices being performed within the order, and is taken in chapter before the ſovereign and knights. His oath, as king at arms, is taken before the earl marſhal.

Garter is alſo a term in heraldry, ſignifying the moiety, or half of a bend.

GARTH. See **Fishgarth.**

Garth is uſed in ſome parts of England for a little back-ſide or cloſe. It is an ancient Britiſh word. *Gardd*, in that language, ſignifies *garden*, and is pronounced and written *garth*.

This word is alſo uſed for a dam or wear, &c.

Garth-*men* is uſed in our ſtatutes for thoſe who catch fiſh by means of fiſh-*garths*, or wears.

By ſtatute it is ordained, that no fiſher, nor *garth*-man, ſhall uſe any nets or engines to deſtroy the fry of fiſh, &c. 17 Ric. II cap. 9. The word is ſuppoſed by ſome to be derived from the Scotch word *gart*, which ſignifies *forced* or *compelled*; becauſe fiſh are forced by the wear to paſs in a loop, where they are taken.

GARUM, a word in very common uſe among the old writers on medicine, who expreſſed by it a pickle, in which fiſh had been preſerved. The principal kind of fiſh they preſerved in this manner was the mackarel.

The *garum* principally conſiſted of the juices of the fiſh and ſalt; but we find the old writers ſpeaking of ſeveral kinds of it: one they called Spaniſh *garum*, from the place whence they had it; another kind, from its colour, was termed the black *garum*: this laſt kind ſeems to have been that called *fæcoſum* by the Latin poets, as if the fæces and remains of the fiſh were left among it; and by others *garum ſanguineum*, from its being ſometimes tinged with their blood to a reddiſh colour. The Romans ſometimes called the Spaniſh kind, which was eſteemed the beſt, *garum ſociorum*; and Galen ſays, that the black *garum* was called *oxyporum*, but he only means by this, that it was uſed in the preparations called oxypora. It ſerved to dilute them, and thence took the name of them to itſelf, by way of diſtinction from the Spaniſh, and other kinds, not uſed to this purpoſe. Pliny tells us, that *garum* was compoſed of all the offals of fiſh, of every kind, macerated in ſalt; it had its name, he ſays, from its being originally made of a fiſh called by the Greeks *garos*, but in his time the beſt ſeems to have been made with the mackarel; but that there were ſeveral other kinds uſed, both in food and medicine, ſome of which muſt have been made from ſcarce fiſh, for they were of great price. They were uſed in glyſters, and externally applied in ſeveral kinds of cutaneous eruptions: the ancients had a great opinion of them in glyſters, for removing the pain in the ſciatica, and other like caſes; and the coarſer ſorts were their common medicine for curing cattle of the ſcab, by making inciſions in the ſkin, and laying over the part cloths wetted with it. See Strabo, lib. iii. 109. Plin. lib. xxxi. cap. 8.

The true way in which the ancients prepared their *garum*, which they ſo much valued as a delicacy at their tables, is unknown to us; but it appears that ſome kinds of *garum* had no fiſhy matter in them, from Aetius, who gives the following preſcription of a liquor, which he calls by this name: take of common water thirty one pints, of ſea ſalt two pints, and of dried figs fifty; let theſe all macerate together, and afterwards be ſtrained clear for uſe. All the *garums* were eſteemed hot and drying by the ancients, and were ſometimes given as laxatives before food. The modern writers underſtand the word *garum* in a much more limited ſenſe, meaning no more by it than the brine or pickle in which herrings or anchovies are preſerved.

GARYOPHYLLUS. See **Clove**-*tree*.

GAS, in *Chemiſtry*, derived, according to Junker, from the German *gaſcht*, a *frothy ebullition*, and by Lavoiſier, from the Dutch *ghoaſt*, or German *geiſt*, *ſpirit*, is a name given to the volatile inviſible parts which eſcape from certain bodies, and which cannot be retained and collected, at leaſt without great difficulty and mixture of other ſubſtances. The word is applied by Van Helmont to ſignify thoſe elaſtic fluids which are inviſible, and not condenſable by cold; ſeveral of which he has deſcribed: ſuch are the *gas ventoſum*, or atmoſpherical air; *gas ſylveſtre*, or the fluid expelled during fermentations and effervescences, called by later authors, fixed, factitious, and fixable air; *gas pingue*, or the fluid extricated from inflammable ſubſtances during their analyſis by heat; *gas flammeum*, or the fluid produced in the deflagration of nitre. He conſiders alſo, as ſo many kinds of *gas*, the noxious fluids which hover over the Grotto delle Cani in the kingdom of Naples, and at the bottom of mines and cellars, and that which ariſes in the burning of charcoal; the *gas* produced by the putrefaction of animal bodies; the matter which produces the plague; the *gas vitale*, or arterial ſpirit of life; and his celebrated **Archeus**. See **Air**, *fixable*, &c. and **Damp**. See an excellent treatiſe on the various kinds of *gas*, by the tranſlator of Macquer's Dict. of Chemiſtry, publiſhed as an appendix to the laſt edition of that valuable work, 1777: in which treatiſe the ingenious author maintains, that moſt of the known *gaſes* conſiſt principally of acid and phlogiſton.

GASCOIGN, or **Gaskoing**, the hinder thigh of a horſe, commencing from the ſtifle, and reaching to the ply, or bending of the ham.

Gascoign, or *bezoardic powder*, in *Medicine*, is formed of the compound powder of crab's claws one pound, of oriental bezoar prepared one ounce: this powder is made up into balls, called Gaſcoign balls, from the name of their inventor.

GASCONADE, a boaſt or vaunt of ſomething very improbable.

The term has its riſe from the Gaſcoons, or people of Gaſcony, in France, who, it ſeems, have been diſtinguiſhed for bragging and rhodomontado.

GASKETS, on *ſhip-board*, the ſmall cords uſed to faſten the ſails to the yards when furled up.

GAST *hound*. See *Gaze* Hound.

GASTALDUS, or Castaldus, an officer anciently entertained in the courts of divers princes.

The word is alſo written *gaſtaldius*, *gaſtaldio*, *gaſtaldatus*, *guaſtaldus*, &c. Macri derives it from the Arabic *chaſendar*, *purveyor of a houſe*; others from the German *gaſt*, and *halten*, *to retain travellers*.

The *gaſtaldus* was what in Italy and Spain is now called *major-domo*, viz. the maſter and ſteward of a houſhold. The *gaſtaldus* was a comes, or count; which ſhews his office to have been very conſiderable.

In the laws of Italy, we ſometimes alſo meet with *gaſtaldus* in the ſenſe of a courtier, and ſometimes as an eccleſiaſtical officer; ſo that it is ſomewhere expreſſed to be ſimony to buy the function of *gaſtaldus*.

GASTEROSTEUS, in *Ichthyology*, the name of a genus of the acanthopterygious fiſhes, the characters of which according to Artedi, are theſe: the branchioſtege membrane on each ſide contains three ſmall and ſlender bones; the belly is almoſt all over covered with bony ſcales; the belly-fins have only two rays, the one of which is much larger than the other, and is prickly. The ſpecies of this fiſh are three. This is a genus of the *thoracici* of Linnæus, who enumerates eleven ſpecies, diſtinguiſhed by the number of back-fins.

The name is of Greek origin, and is derived from the words γαϛηρ, *the belly*, and οϛεον, *a bone*; the greater part of the belly of this fiſh being fortified by bony plates. See Stickle-*back*.

GASTREPIPLOICA, in *Anatomy*, a vein which opens into the trunk of the vena porta, formed of ſeveral branches, derived from the ſtomach and epiploon. Whence its name, from γαϛηρ, *ſtomach*, and επιπλοον, *epiploon*.

GASTRIC, Gastricus, in *Anatomy*, is applied to divers veins, on account of their proceeding from the ſtomach or ventricle, which the Greeks call γαϛηρ.

The *gaſtricus major*, or greater *gaſtric* vein, is inſerted into the ſplenic vein; and the *minor*, or leſſer *gaſtric*, into the trunk of the vena porta.

Gastric is alſo applied to two arteries; one of which, called the *gaſtrica dextra*, or major, proceeds from the hepatic artery, and paſſing behind the pylorus, runs along the right ſide of the great curvature of the ſtomach, at laſt ends in the *gaſtrica ſiniſtra*, or minor, which is a branch of the *ſplenica*, and runs from the left to the right, along the left portion of the great curvature of the ſtomach.

Gastric *juice*, a name given by ſome authors to the proper juice of the ſtomach. This is a thin, pellucid, ſpumous, and ſaltiſh liquor, which continually diſtils from the glandulous kernels of the ſtomach, for the diſſolution, mixture, and dilution of our food, and is of great ſervice in digeſtion.

GASTRILOQUUS, or Gastriloquous, a perſon who ſpeaks inwardly, or within his ſtomach, and whoſe voice ſeems to come from afar off; more uſually called Ventriloquus.

The term is formed of the Greek, γαϛηρ, *belly*, *ſtomach*, and the Latin, *loqui*, *to ſpeak*.

GASTROCNEMIUS, from γαϛηρ, and κνημη, *the leg*, in *Anatomy*, a name common to two muſcles conſtituting the ſura, or calf of the leg; the one called *externus*, the other *internus*. See *Tab. Anat. (Myol.) fig.* 6, 11, 41.

Gastrocnemius *externus*, called alſo *ſuralis externus*, and *gemellus*, has two diſtinct fleſhy originations from the ſuperior and hindermoſt part of each tubercle of the lower appendage of the thigh-bone, which, in their deſcent, are each dilated into two ſmall fleſhy bellies, the innermoſt of which is thickeſt and largeſt, having each a different ſeries of fleſhy fibres, which at length uniting, make a broad, ſtrong tendon, which, narrowing itſelf, joins the great tendon of the ſolæus, four fingers breadth above its inſertion into the os calcis. See *Tab. Anat. (Myol.) fig.* 1. *n.* 66. *fig.* 2. *n.* 48.

When this muſcle acts, the foot is ſaid to be extended, or pulled backwards; which motion is very neceſſary in walking, running, leaping, or ſtanding on tip-toe, &c. whence it is, that thoſe who walk much, or carry heavy burdens, and who wear low-heeled ſhoes, have theſe muſcles larger than others.

Gastrocnemius, or *ſuralis internus*, called alſo *ſolænus*, from its figure reſembling a ſole-fiſh, is placed under the external. Its outer fleſhy part is covered with a tranſparent tendinous expanſion, which makes it appear of a livid colour. See *Tab. Anat. (Myol.) fig.* 1. *n.* 63. *fig.* 2. *n.* 47.

It begins partly tendinous, chiefly from the hindermoſt part of the upper appendix of the fibula, and back-part of the tibia, that is, below the inſertion of the ſubpoplitæus; and increaſes to a large fleſhy belly, compoſed of various orders of fleſhy fibres, ſome of them underneath aptly expreſſing the figure of the top of a feather, whoſe ſtamina, being here tendinous, join with the great tendon, which is about a finger's breadth long, and inſerted into the ſuperior and hindermoſt part of the os calcis.

The foot, together with the toes, being, as it were, a lever to the whole body, ought therefore to be attended with muſcles of great ſtrength to extend it; which is the reaſon that theſe muſcles ſo much exceed their antagoniſts.

GASTROLATER, of γαϛηρ, and λατρευω, *a glutton*, or *belly-god*; *cujus deus venter eſt*.

GASTROMANCY, or Gastromantia, a kind of divination, practiſed among the ancients, by means of words coming, or ſeeming to come, out of the belly.

The word is Greek, γαϛρομαντεια, compoſed of γαϛηρ, *belly*, and μαντεια, *divination*.

There is another kind of divination, called by the ſame name *gaſtromancy*, which is performed by means of glaſſes, or other round, tranſparent veſſels, within which certain figures appear by magic art. It is thus called, becauſe the figures appear as in the belly of the veſſels.

GASTRORAPHY, in *Surgery*, expreſſes the operation of the ſuture, or ſewing up wounds in the abdomen.

The word is derived from γαστηρ, *the belly*, or *abdomen*, and ῥαφη, *a ſuture*.

This operation is generally much dreaded by the patient, and is unneceſſary in ſeveral caſes: 1. where the wound is only in the muſcular part; and 2. where it is not very large, eſpecially if it be made lengthways: for if the wound ſhould penetrate into the cavity of the abdomen, and even let out a part of the omentum, or inteſtines; yet in caſes where it is very ſmall, as wounds generally are, which are made by puncture, or have happened lengthways; in theſe caſes, upon returning the parts which are puſhed out, ſtopping the wound with a ſoft tent, and ſecuring all with a proper bandage, it may be healed without the help of the needle. Beſides in fat perſons, this operation is very difficult: and it would be an act of great cruelty in a ſurgeon, to perform this operation upon a man, when he might be cured after an eaſier method.

But there are two caſes in which this operation is abſolutely neceſſary: the firſt is, where the wound is ſo large, that there is no poſſibility of retaining the inteſtines by any other method; for as the inteſtines are continually puſhed forward in the act of inſpiration, by the action of the diaphragm and the abdomen, the falling down of the inteſtines in this caſe is unavoidable, and therefore the operation is neceſſary; the other is in large tranſverſe wounds of the abdomen, where the muſcles are divided, but the peritoneum is not concerned.

In wounds of the Abdomen the chief inquiry is, whether the omentum or inteſtines are let out; if none of theſe have burſt through the wound, the lips of the wound muſt be kept as cloſe together as poſſible with the hands, and the patient kept with his head lying downwards, till the wound is ſufficiently ſecured from letting out the contents of the abdomen: but when the inteſtines are already fallen out, they muſt be returned with the greateſt expedition, leſt they ſhould receive any injuries from the external air. It is firſt to be examined, however, whether they have received any wound or not, and whether they preſerve their natural warmth and colour; for where they are cold, livid, or dry, or wounded, they are not to be returned ſuddenly, but fomented with warm milk and water, or wrapped up for ſome time in the cawl of ſome animal newly killed, till they have in ſome degree recovered their native warmth and condition.

You will eaſily perceive, that there is ſome hurt in the inteſtines, though the wound does not immediately appear, if there is a more than ordinary flaccidity in them; and when this is the caſe, the reſt of the inteſtines muſt be pulled gently forward till you find the wound. If nothing of this ſort is the caſe, but the inteſtines are in their natural ſtate and condition, they muſt be returned in the following manner: the patient muſt be placed in a ſupine poſture, and laid on that ſide that is oppoſite to the wound, and the inteſtine muſt be returned by the aperture of the wound with the two fore-fingers, taking care never to take off one finger till the other is on the gut; the patient is to be adviſed all the while to hold his breath, and the lips of the wound muſt be then brought together.

If the inteſtines have been forced through a ſmall wound, and are afterwards ſo diſtended with wind, that they cannot eaſily be returned, it is neceſſary to pull the inteſtine gently forward, that more of it may come out, and the wind take up by that means leſs room in any one part; an aſſiſtant muſt then gently dilate the wound as far as may be, either with his hand, or with two hooks fixed in the internal membrane, while the ſurgeon returns the inteſtines; when this is done, the wound muſt be ſecured firſt with the hand, and then with the proper dreſſings; and in this caſe the ſurgeon may avoid the uſe of this painful operation.

When it is found neceſſary to perform the operation, it muſt be done in the following manner: firſt paſs a ſtrong double or quadruple thread, well waxed, through two crooked needles, and with theſe ſtitch up both ends of the wound, beginning at one end with the upper lip of the wound, paſſing the needle through the peritoneum, muſcles of the abdomen, and the common integuments, from within outwards, leaving only the breadth of a thumb between the ſtitches and the mouth of the wound, obſerving the ſame method in paſſing the other needle through the lower lip; while you are paſſing the needle with one hand, it will be proper to ſupport the lips of the wound with the other, to prevent the inteſtines from being wounded. In a wound of two fingers breadth, one ſtitch in the middle will be ſufficient; but in larger wounds the ſtitches muſt be repeated in proportion to their ſize, leaving a thumb's breadth between each of the ſutures; the extremities of the thread are to be left hanging down on each ſide; and when the ſuture is finiſhed, while an aſſiſtant holds the lips of the wound together, theſe ends are to be tied in knots in the following manner: both ends of the threads are to be taken up, and to be tied firſt in a ſingle, then in a ſlip knot, paſſing a ſmall bolſter between the two knots, to prevent the ſkin from being hurt. Where there are more ſutures than one, you muſt begin at the upper part of the wound, tying them down in order, that before the laſt is tied, a ſoft tent of the ſize of a finger, with a thread faſtened to the end of it, may be introduced into the lower part of the wound. This tent will keep a paſſage open for the evacuation of grumous blood, or matter, which may be collected in the cavity of the abdomen. The wound, when all this is done, muſt be anointed with ſome vulnerary balſam, and covered with pledgets of lint, a ſticking plaſter, and bolſters, ſecuring all with the ſcapulary bandage. Large wounds alſo extending to the peritoneum, but not penetrating it, require this operation to prevent bad ſymptoms, and dangerous herniæ from a diſtenſion of that membrane; but in this caſe the needle muſt paſs only through the muſcles and common integuments. Heiſter's Surgery, book i. chap. 5.

GASTROTOMY, of γαςης, and τεμνο, *I cut*, the operation of cutting open the belly; otherwiſe called the CÆSARIAN *ſection*. See alſo LITHOTOMY.

GASULON, in the *Materia Medica*, a word uſed by Avicenna and Serapion, to expreſs ſometimes the plant hyſſop, and ſometimes nitre. Theſe are two very different things to be known under the ſame name; but the proper interpretation of the word being the *cleaning of clothes*, it was uſed probably at ſome time to ſignify every thing of an abſterſive quality; but among the many things of this kind once called by it, the two above mentioned are all that we find recorded, which may be eaſily diſtinguiſhed by the context.

GATE, in *Architecture*, a large door, leading or giving entrance into a city, town, caſtle, palace, or other conſiderable building.

Thebes, in Egypt, was anciently known by the appellation, *with a hundred gates*. Fez, in Africa, has thirty-one *gates*. In ancient Rome there was a triumphal *gate*, *porta triumphalis*. In modern Rome there is the *jubilee gate*, which is only opened in the year of a grand JUBILEE.

The *gates* of London were many of them converted into gaols or priſons, as *Ludgate*, *Newgate*, &c. but they are now removed. The leſſer, or *by-gates*, are called *poſterns*. *Gates*, through which coaches, &c. are to paſs, ſhould not be leſs than ſeven feet broad, nor more than twelve; the height to be $1\frac{1}{2}$ the breadth.

GATE, or GAIT, in the *Manege*, called in French *train*, is uſed for the going or pace of a horſe.

GATE, in a *military ſenſe*, is made of ſtrong planks, with iron bars, to oppoſe an enemy. They are generally made in the middle of the curtin, from whence they are ſeen, and defended by the two flanks of the baſtions They ſhould be covered with a good ravelin, that they may not be ſeen or enfiladed by the enemy. Theſe *gates*, belonging to a fortified place, are paſſages through the rampart, which may be ſhut and opened by means of doors and a PORTCULLIS. They are either private or public.

Private *gates* are thoſe paſſages by which the troops can go out of the town unſeen by the enemy, when they paſs to and from the relief of the duty in the outworks, or on any other occaſion which is to be concealed from the beſiegers.

Public *gates* are thoſe paſſages through the middle of ſuch curtins, to which the great roads or public ways lead. The dimenſions of theſe are uſually about thirteen or fourteen feet high, and nine or ten feet wide, continued through the rampart, with proper receſſes for foot paſſengers to ſtand in out of the way of wheel-carriages. The front of the *gate*-way on the outſide is commonly ornamented with architecture either of the Tuſcan or Doric order; and over the vault, which covers the paſſage, cloſe to the town wall, is erected a building of about eighteen or twenty feet ſquare, in which the portcullis is ſuſpended; and on the inſide of the rampart there is generally another building, of about a hundred feet in front, and thirty deep, and high enough to contain one or two floors of rooms for one of the town officers; the ground-floor ſerving for guard-rooms for the troops on duty at the *gates*. See HARROW, HERSE, ORGAN, and PORTCULLIS.

GATE, *poſtern*. See SALLY-*port*.

GATE *of the ſea*, or a *ſea-gate*, is uſed when two ſhips lie aboard one another in a wave or billow, and by that means ſometimes become *rib-broken*.

GATES, *opening of*, in *Aſtrology*. See OPENING.

GATHER, in the *Sea-language*. A ſhip is ſaid to *gather* on another, when ſhe gets the wind of her.

GATVISCH, in *Ichthyology*, a name given by ſome to an American fiſh, a ſpecies of the turdus or wraſſe, of a yellow colour, and beautifully variegated with red, called by moſt authors by its Braſilian name, PIRA *pixanga*.

GAVALI, in the *Materia Medica*, a name given by ſome of the old writers to BDELLIUM, particularly to the Arabian kind, which was the pureſt, and was uſually in form of ſmall tears, and of a pale yellowiſh colour.

GAVEL, or GABEL, in *Law*, ſignifies tribute, toll, cuſtom, yearly rent, payment, or revenue, of which there were anciently ſeveral kinds; *gavel-corn*, *gavel-malt*, *out-gavel*, *gavel-fodder*, &c.

GAVEL is ſometimes alſo uſed for what we more uſually call the GABLE.

GAVELET, GAVELETUM, in *Law*, a ſpecial and ancient kind of ceſſavit, uſed in Kent, where the cuſtom of gavel-kind continues; whereby the tenant ſhall forfeit his lands and tenements to the lord, if he withdraw from him his due rents and ſervices.

The proceſs of the *gavelet* is thus: the lord is firſt to ſeek by the ſteward of his court, from three weeks to three weeks, to find ſome diſtreſs upon the tenement, till the fourth court; and if, at that time, he find none, at this fourth court it is awarded, that he take the tenement in his hand, in name of a diſtreſs, and keep it a year and a day without manuring; within which time, if the tenant pays his arrears, and make reaſonable amends for the with-holding, he ſhall have and enjoy his tenement as before: if he come not before the year and day be paſt, the lord is to go to the next county-court, with witneſſes of what had paſſed at his own court, and pronounce there his proceſs to have farther witneſſes; and then, by the award of his own court, he ſhall enter and manure the tenement as his own: ſo that, if the tenant deſire afterwards to have and hold it as before, he muſt agree with the lord, according to this old ſaying: "has "he not ſince any thing given, or any thing paid, then "let him pay five pound for his were, ere he become "healder again." Other copies have the latter part with ſome variations: "let him nine times pay, and nine "times repay."

GAVELET, in London, a writ uſed in the huſtings of London: *Breve de* gaveleto *in London. pro reditu ibidem quia tenementa fuerunt indiſtringibilia*. And the ſtatute of *gavelet*, 10 Edw. II. gives this writ to lords of rents in the city of London, as well as in Kent. Here the parties, tenant and demandant, appear by *ſcire facias*, to ſhew cauſe why the one ſhould not have his tenement again, on payment of his rent, or the other recover the lands, on default thereof.

GAVELKIND, a tenure or cuſtom, whereby the lands of the father are equally divided, at his death, among all his ſons; or the land of the brother among all the brethren, if he have no iſſue of his own.

Lambard compounds this term of the three Saxon words *gyfe*, *eal*, *kyn*, *omnibus cognatione proximis data*. Verſtegan calls it *gavelkind*, quaſi *give all kind*, i. e. to each child his part; and Taylor, in his Hiſtory of *Gavelkind*, derives it from the Britiſh *gavel*, i. e. a hold or tenure, and *cenned*, or *cenedl*, *generatio*, or *familia*, and thus *gavel cenedl* might ſignify *tenura generationis*.

Teutonicis priſcis patrios ſuccedit in agros
Maſcula ſtirps omnis, ne foret ulla potens.

This cuſtom, which anciently obtained throughout England, is ſtill of force in a great part of Kent, Urchenfield in Herefordſhire, and elſewhere, though with ſome difference: but, by the ſtat. 34 and 35 Hen. VIII. c. 26. all *gavelkind* lands in Wales are made deſcendible to the heir, according to the courſe of common law; whereby it appears, that this tenure was alſo in that principality; and was probably of Britiſh original.

In an ancient book of records in Chriſt-church, Canterbury, of the time of Henry VIII. our Saxon aneeſtors are ſaid to have held all their lands either by writing, or without: the firſt were called *bockland*, whoſe owners were men, whom we now call *freeholders*: the ſecond was called *folkland*, the owners whereof were of ſervile condition, and poſſeſſed *ad voluntatem domini*. Now, the inheritance, or freehold, did not, in thoſe days, deſcend to the eldeſt ſon, but to all alike; which, in Saxon, was called *landeſcyſtan*, and, in Kent, *to ſhift land*; whence came the cuſtom *gavelkind*. And the reaſon why it was retained in Kent more than other places, was that the people of Kent, upon the Norman invaſion, could not be reduced to ſurrender to the Conqueror, but on theſe conditions, that they ſhould retain their ancient county-cuſtoms without any infringement or diminution; and eſpecially that called *gavelkind*.

In the reign of Hen. VI. there were not above thirty or forty perſons in the whole county of Kent, who held by any other tenure than this of *gavelkind*; which was afterwards altered upon the petition of ſeveral Kentiſh gentlemen, with regard to great part of the land of that county, ſo as to be deſcendible to the eldeſt ſon according to the courſe of common law: by 31 Hen. VIII. c. 3. Though the cuſtom to deviſe *gavelkind* land ſtill remains; and all lands in Kent ſhall be taken to be *gavelkind*, except thoſe which are *diſgavelled* by particular ſtatutes. The diſtinguiſhing properties of this tenure are various; ſome of the principal are theſe: the lands, held under this denomination of *gavelkind*, which is an ancient ſocage tenure, deſcend equally, and are divided, ſhare and ſhare alike, among all the male children; and, in defect of theſe, among the females. They are of age, or qualified to take the lands upon them, at fifteen; and may then give, vend, or alienate the ſame to any perſon, without the conſent of any lord: and children here inherit their father's land, though convicted of felony, murder, &c. according to the maxim, "The father to the bough, the ſon to the plough." The tenants in *gavelkind* are to do fealty, and to be in the tuition of the next akin, who is not next heir after them, till fifteen years of age; to pay acknowlegement to the lord for the lands, &c.

GAVELMAN, a tenant who is liable to tribute.

Villani de Terring, qui vocantur gavelmanni. Somner, *Gavelkind.*

GAVELMED, the duty or work of mowing graſs, or cutting of meadow land, required by the lord from his cuſtomary tenants. *Conſuetudo falcandi quæ vocatur* gavelmed. Somner.

GAVELRIP, bedreap, or duty of reaping, at the command of the lord—*de conſuetudine metendi* 40 *acras* & *dimid. de* gavelrip *in autumno* 40 *ſol.* & *ſex denar.*

GAVELSESTER, *ſextarius vectigalis*, a certain meaſure of rent ale. Among the articles to be charged on the ſtewards and bailiffs of the manors belonging to the church of Canterbury in Kent, according to which they were to be accountable, this of old was one: *de* gavelſeſter *cujuſlibet bracini braciati infra libertatem maneriorum, viz. Unam lagenam & dimidiam cerevifiæ*. This duty elſewhere occurs under the name of *tolſeſter*, in lieu whereof, the abbot of Abingdon was wont of cuſtom to receive the penny mentioned by Selden, in his diſſertation annexed to Fleta, c. 8. Nor doth it differ from what is called *oakgavel* in the gloſſary at the end of the laws of Henry I.

GAVELWERK, was either *manu-opera*, by the hands and perſon of the tenant, or *carr-opera*, by his carts or carriages.

GAUGE-*line*, a line on the common gauging-rod, whoſe deſcription and uſe ſee under the article GAUGING.

GAUGE-*point* of a ſolid meaſure, is the diameter of a circle, whoſe area is equal to the ſolid content of the ſame meaſure.

Thus, the ſolidity of a wine gallon being 231 cubic inches; if you conceive a circle to contain ſo many inches, the diameter of it will be 17.15; and that will be the *gauge-point* of wine-meaſure. And an ale gallon containing 282 cubic inches; by the ſame rule, the *gauge-point* for ale-meaſure will be found to be 19.15: and after the ſame manner may the *gauge-point* of any other meaſure be determined.

Hence we deduce, that when the diameter of a cylinder in inches is equal to the *gauge-point* in any meaſure (given likewiſe in inches) every inch in length thereof will contain an integer of the ſame meaſure. In a cylinder, whoſe diameter is 17.15 inches, every inch in height contains one entire gallon in wine-meaſure; and in another, whoſe diameter is 19.15, every inch in length contains one ale gallon.

GAUGER, an officer appointed by the king to gauge, i. e. to examine or meaſure, all caſks, tuns, pipes, barrels, hogſheads of beer, wine, oil, &c. and to give them a mark of allowance (which is a circle burnt with an iron) before they be ſold in any place within the extent of this office.

Of this officer, and his office, we have many ſtatutes; thus, by 27 Edw. III. c. 8. all wines, &c. imported, are to be gauged by the king's *gaugers* or their deputies; by 31 Edw. III. c. 5. ſelling wine before gauged, incurs forfeiture, or the value: and by 23 H. VI. c. 16. the gauge penny is to be paid *gaugers* on gauging wines. The 31 Eliz. ordains that beer, &c. imported, ſhall be gauged by the maſter and wardens of the cooper's company: ſee 12 Car. II. c. 4. See EXCISE.

GAUGING, the art or act of meaſuring the capacities or contents of all kinds of veſſels, and determining the quantity of fluids, or other matters, contained therein.

Gauging is the art of reducing the unknown capacity of veſſels of divers forms, cubical, parallelepepidal, cylindrical, ſpheroidal, conical, &c. to ſome known cubic meaſure; and of computing, for inſtance, how many gallons, quarts, pints, or the like, of any liquor, e. gr. ale, beer, wine, brandy, &c. are contained therein.

Gauging is a branch of ſtereometry.

The principal veſſels that come under its operation are pipes, barrels, rundlets, and other caſks; alſo backs, coolers, vats, &c.

The ſolid content of cubical, parallelepepidal, and priſmatical veſſels, is eaſily found in cubic inches, or the like, by multiplying the area of the baſe by the perpendicular altitude.

And for cylindrical veſſels, the ſame is found by multiplying the area of the circular baſe by the perpendicular altitude, as before.

Caſks of the uſual form of hogſheads, kilderkins, &c. may be conſidered as ſegments of a ſpheroid cut off by two planes perpendicular to the axis; which brings them to Oughtred's theorem for meaſuring ale and wine caſks; which is thus: add twice the area of the circle at the bung to the area of the circle of the head; multiply the ſum by one-third of the length of the caſk, the product is the content of the veſſel in cubic inches. But, for accuracy, Dr. Wallis, Mr. Caſwel, &c. think, that moſt of our caſks had better be conſidered as fruſtums of parabolic ſpindles, which are leſs than the fruſtums of ſpheroids of the ſame baſe and height, and give the capacity of veſſels nearer the truth than either Oughtred's method, which ſuppoſes them ſpheroids; or than that of multiplying the circles of the bung and head into half the length of the caſk, which ſuppoſes them parabolic conoids; or than that of Clavius, &c. who takes them for two truncated cones; which is fartheſt off of all.

The common rule for all wine or ale caſks is to take the diameters at the bung, and at the head, by which you may find the area of the circle there; then taking two thirds of the area of the circle at the bung, and one-third of the area of the circle at the head, and adding them together into one ſum, this ſum, multiplied by the internal length of the caſk, gives the content in ſolid inches; which are converted into gallons, by dividing by 282 for ale, and by 231 for wine gallons.

The readieſt method for common uſe is to reduce the caſk to a cylinder of equal contents; and this is done by conſidering what is called the variety of the caſk. Suppoſe a cylinder inſcribed in a caſk, and another circumſcribed about it, there will be a cylindrical ſpace included between the ſuperficies of the two cylinders, whoſe diameter or thickneſs is equal to the difference between the bung and head diameters of the caſk; the curvature of the ſtaves of the caſk takes in a certain proportion of this cylindrical ſpace, which is greater or leſs, as the curvatures bend, or bulging of the ſtaves is greater or leſs; and this determines what is called the variety; and it will be the firſt variety, if the caſk bulges very much, ſecond variety, if leſs, and ſo on; it is, therefore, evident, that the diameter of the inſcribed circle may be increaſed ſo as to take in a portion of the interjacent cylindrical ſpace equal to that taken in by the curvature of the ſtaves of the caſk; and then the caſk and

increaſed

increaſed cylinder will be equal in content. The diameter of the inſcribed cylinder is the head diameter of the caſk; the thickneſs of the cylindrical ſpace is equal to the difference between the bung and head diameters. The only difficulty, therefore, lies in determining what portion of this difference muſt be added to the head diameter of the caſk, in order to obtain the diameter of the mean cylinder, or the cylinder of equal content. Now experience ſhews, that if $\frac{7}{10}$ of the difference between the head and bung diameters of any caſk be added to the head diameter, the cylinder whoſe diameter is equal to this ſum, and whoſe length is equal to that of the caſk, will contain as much or more than that caſk, though the ſtave have the greateſt degree of curvature that is ever given to them. And as the difference between the bung and head diameters of caſks is ſeldom very great, the contents of a caſk whoſe ſtaves are quite ſtrait from bung to head, or of a caſk made up of two equal fruſtums of two equal cones, will generally be nearly equal to the contents of a cylinder, whoſe diameter is equal to the ſum of the head diameter of the caſk, and a little more than half the difference between the bung and head diameters, and whoſe length is equal to the length of the caſk. Therefore, all the varieties of which caſks are capable lie between $\frac{5}{10}$ and $\frac{7}{10}$ of the difference between the bung and head diameters; and the gauger has only to take ſuch a part of this difference (always between $\frac{5}{10}$ and $\frac{7}{10}$) as his judgment and experience inform him to be moſt ſuitable to the curvature of the caſk; and this, added to the head diameter, gives the diameter of the mean cylinder.

It may not be amiſs to note here, that the difference between the bung and head diameters may be very great, and yet the caſk have no bulging at all, for the bulging is the bend, or curvature of the half ſtave, between the bung and the head.

Mathematicians give us abſtruſe theorems, for computing the contents of caſks, upon the ſuppoſed reſemblance between the curvature of the caſk and that of an ellipſis, parabola, or hyperbola; but they may be as much miſtaken in judging of the curvature, as an experienced gauger between $\frac{5}{10}$ and $\frac{7}{10}$: for after all, the contents of caſks cannot be determined to a mathematical exactneſs; becauſe the forms of caſks do not exactly anſwer any mathematical figures. The buſineſs of *gauging* is at beſt but gueſs work; but it is ſuch a way of gueſſing, as comes near enough the truth for the common purpoſes of life.

Here we may add ſuch decimal multipliers, for the difference between bung and head diameters as have been found by experience to be the trueſt, and beſt ſuited to the ſeveral varieties or curvatures of caſks.

Firſt variety, or ſtaves very much bulging,	,7	or	,695
Second variety, or ſtaves not ſo much curved,	,65	or	,63
Third variety, or ſtaves ſtill leſs curved,	,6	or	,56
Fourth variety, or ſtaves almoſt ſtrait,	,55	or	,51

The following rule will ſerve for *gauging* caſks by the pen: take the difference of the bung and head diameters of any caſk, and multiply that difference by the number which ſtands againſt the name of the caſk given in the table; add the product to the head diameter; and the ſum will be the diameter of a cylinder, which, being of the ſame length with the given caſk, will contain as much; ſquare the diameter thus found, and multiply that ſquare by the length, and divide the product by 359 for beer gallons, and 294 for wine.

The multipliers for a caſk, which is taken for varieties.

The middle fruſtum	1.of a ſpheroid	,7	greateſt bulge.
	2.of a parab.ſpindle	,63	next leſs.
	3.two conoids	,56	next leſs to that.
	4.two cones	,51	next leſs to that.

Example. Let a caſk be taken as the middle fruſtum of a ſpheroid, the bung diameter of which is 32 inches, the head 26, and length 50 inches; what is the content in beer and wine gallons? $\overline{32-26}\times,7=4,2$. To which add 26, and we ſhall have 30,2 for the mean diameter; and $\overline{30,2}|^2=912,04$ which multiplied by the length 50 will give 45602; and $\frac{45602}{359}=127$ beer gallons; and $\frac{45602}{294}=155,1$ wine gallons. The contents of other caſks may be found in the ſame manner by uſing the proper multipliers. Poſt. Dict. Com. See Everard's SLIDING rule.

For the ready computation of the contents of veſſels, or of any ſolids in the meaſures in uſe in Great Britain, we ſhall here inſert the following rules taken from a Treatiſe of Practical Geometry, publiſhed at Edinburgh in 1745. 8°. Vid. pag. 137. ſeq.

1°. To find the content of a cylindric veſſel in Engliſh wine gallons, the diameter of the baſe and altitude of the veſſel being given in inches and decimals of an inch: ſquare the number of inches in the diameter of the veſſel; multiply this ſquare by the number of inches in the height, then multiply this product by the decimal fraction 0,0034, and you will have the contents of the veſſel in gallons, and decimals of a gallon. For example, let the diameter be $=D=51,2$ inches, the height $=H=62,3$ inches, then will the content be $DDH\times 0,0034=51,2\times 51,2\times 62,3\times 0,0034=555,27342$ wine gallons.

2°. Suppoſing the Engliſh ale gallon to contain 282 cubical inches, the content of a cylindric veſſel is computed in ſuch gallons, by multiplying the ſquare of the diameter of the veſſel by its height as before, and their product by the decimal fraction 0,0027851, that is, the ſolid content in the gallons will be $DDH\times 0,0027851$.

3°, If the Scotch pint contains 103,4 cubical inches, the content of ſuch a veſſel in Scotch pints, will be $DDH\times 0.0076$.

4°, Suppoſing the Wincheſter buſhel to contain 2178 cubic inches, the content of a cylindric veſſel is computed in thoſe buſhels, by multiplying the ſquare of the diameter of the veſſel by the height, and the product by the decimal fraction 0,0003606. But the legal Wincheſter buſhel containing only 2150.42 ſolid inches, the content of a cylindric veſſel is computed in ſuch buſhels, by multiplying the ſquare of the diameter by the height, and their product by the decimal 0,0003652. Or the content will be $DDH\times 0,0003652$. See BUSHEL.

5°. Suppoſing the Scotch wheat firlot to contain $21\frac{1}{4}$ Scotch pints, or about 2197 cubical inches, the contents of a cylindric veſſel in ſuch firlots will be $DDH\times 0,000358$. And if the bear firlot contain 31 Scotch pints, the contents of ſuch a veſſel in bear firlots will be $DDH\times 0,000245$. See FIRLOT.

6°. It is to be obſerved, that when the ſection of the veſſel is not a circle, but an ellipſis, the product of the greateſt diameter by the leaſt is to be ſubſtituted in theſe rules, for the ſquare of the diameter.

7°. To compute the content of a veſſel, which may be conſidered as the fruſtum of a cone in any of thoſe meaſures. Let A repreſent the number of inches in the diameter of the greater baſe, B the number of inches in the diameter of the leſſer baſe. Compute the ſquare of A, the product of A by B, and the ſquare of B. Take the third part of the ſum of all theſe, and ſubſtitute it in the preceding rules for the ſquare of the diameter, and proceed in all reſpects as before. Thus for example, the content in wine gallons will be $\overline{AA+AB+BB}\times\frac{1}{3}H\times 0,0034$. Or thus: to the ſquare of half the ſum of A and B add one third of the ſquare of half their difference; and ſubſtitute this ſum in the preceding rules for the ſquare of the diameter of the baſe of the veſſel. For the ſquare of $\frac{1}{2}A+\frac{1}{2}B$ added to $\frac{1}{3}$ of the ſquare of $\frac{1}{2}A-\frac{1}{2}B$ gives $\frac{1}{4}AA+\frac{1}{2}AB+\frac{1}{4}BB+\frac{1}{12}AA-\frac{1}{6}AB+\frac{1}{12}BB=\frac{1}{3}AA+\frac{1}{3}AB+\frac{1}{3}BB$.

8°. When the veſſel is the fruſtum of a parabolic conoid, meaſure the diameter of the ſection at the middle of the height of the fruſtum; and the content will be the ſame as of a cylinder of this diameter, of the ſame height with the veſſel.

9°. When a veſſel is a fruſtum of a ſphere, if you meaſure the diameter of the ſection at the middle of the height of the fruſtum, then compute the content of a cylinder of this diameter, and of the ſame height with the veſſel, and from this ſubtract $\frac{1}{3}$ of the content of a cylinder of the ſame height, on a baſe, the diameter of which is equal to that height; the remainder will give the content of the veſſel. That is, if D repreſent the diameter of the middle ſection, and H the height of the fruſtum, you are to ſubſtitute $DD-\frac{1}{3}HH$ for the ſquare of the diameter of the cylindric veſſel in the firſt ſix rules.

10°. When the veſſel is a fruſtum of a ſpheroid, if the baſes are equal, the content is readily found by the rule given from Oughtred. In other caſes, let the axis of the ſolid be to the conjugate axis, as n to 1; let D be the diameter of the middle ſection of the fruſtum, H the height or length of the fruſtum, and ſubſtitute in the firſt ſix rules $DD-\frac{HH}{3nn}$ for the ſquare of the diameter of the veſſel.

11°. When the veſſel is a hyperbolic conoid, let the axis of the ſolid be to the conjugate axis as n to 1, D the diameter of the ſection at the middle of the fruſtum, H the height or length, compute $DD+\frac{HH}{3nn}$ and ſubſtitute this ſum for the ſquare of the diameter of the cylindric veſſel in the firſt ſix rules.

12°. In general, it is uſual to meaſure any round veſſel, by diſtinguiſhing it into ſeveral fruſtums, and taking the diameter of the ſection at the middle of each fruſtum; thence to compute the content of each, as if it was a cylinder of the mean diameter; and to give their ſum as the content of the veſſel. From the total content computed in this manner they ſubtract ſucceſſively the numbers which expreſs the circular areas that correſpond to thoſe mean diameters, each as often as there are inches in the altitude of the fruſtum to which it belongs, beginning with the uppermoſt; and in this manner calculate a table for the veſſel, by which it readily appears how much liquor is at any time contained in it, by taking either the dry, or the wet inches; having regard to the inclination, or drip of the veſſel, if it has any.

This method of computing the content of a fruſtum from the diameter of the ſection at the middle of its height, is exact in that caſe only when it is a portion of a parabolic conoid; but in ſuch veſſels as are in common uſe the error is not conſiderable. When the veſſel is a portion of a cone or hyperbolic conoid, the content by this method is found leſs than the truth; but when it is a portion of a ſphere or a ſpheroid, the content computed in this manner exceeds the truth. The difference or error is always the ſame in the different parts of the ſame, or of ſimilar veſſels, when the altitude of the fruſtum is given. And when the altitudes are different, the error is in the triplicate ratio of the altitude. If exactneſs be required, the error in meaſuring the fruſtum of a conical veſſel, in this manner, is $\frac{1}{4}$ of the content of a cone, ſimilar to the veſſel, of an altitude equal to the height of the fruſtum. In a ſphere it is $\frac{1}{3}$ of a cylinder of a diameter, and height equal to the fruſtum. In the ſpheroid and hyperbolic conoid, it is the ſame as in a cone, generated by the right angled triangle contained by the two ſemiaxes of the figure revolving about that ſide which is the ſemiaxis of the fruſtum. Theſe are demonſtrated in a treatiſe of fluxions by Mr. Mac Laurin, where thoſe theorems are extended to fruſtums that are bounded by planes oblique to the axis in all the ſolids, that are generated by any conic ſection revolving about either axis. Vid. p. 25. and 715.

In the uſual method of computing a table for a veſſel, by ſubducting from the whole content the number that expreſſes the uppermoſt area, as often as there are inches in the uppermoſt fruſtum, and afterwards the numbers for the other areas ſucceſſively, it is obvious that the contents aſſigned by the table, when a few of the uppermoſt inches are dry, are ſtated a little too high, if the veſſel ſtands on its leſſer baſe, but too low when it ſtands on its greater baſe; becauſe, when one inch is dry, for example, it is not the area at the middle of the uppermoſt fruſtum, but rather the area at the middle of the uppermoſt inch, that ought to be ſubducted from the total content, in order to find the content in this caſe.

But *gauging*, as now practiſed, is chiefly done by means of inſtruments called *gauging-rods*, or *rules*, which do the buſineſs at once, and anſwer the queſtion without ſo much calculation; which is no inconſiderable addition, both to the eaſe and diſpatch of the work. This inſtrumental way of *gauging*, therefore, we ſhall here chiefly inſiſt upon.

Conſtruction of a GAUGING-*rod, whereby the content of any cylindrical, or common veſſel, is eaſily had.* Take the diameter AB of a cylindrical veſſel, ABDE, *Tab. Surveying. fig.* 11. that holds one of the meaſures wherein the fluid is eſtimated, e. gr. gallons, and join it at right angles to the indefinite line A 7. From A to 1, ſet off a right line equal to AB; then will B 1 be the diameter of a veſſel, that holds two meaſures, or gallons, of the ſame height as the former.

Again, let A 2 = B 1; then will B 2 be the diameter of a veſſel that holds three meaſures, but of the ſame height as that which only holds one. And, after the ſame manner, find the diameter of other large veſſels, B 3, B 4, B 5, B 6, B 7, &c.

Laſtly, ſet off the ſeveral diviſions thus found, A 1, A 2, A 3, &c. upon the ſide of a rod or rule; and, on the other, the height or depth of a cylinder, that holds one meaſure or gallon, repeated as oft as it will go. Thus is the *gauging-rod* complete.

For cylinders, that have the ſame altitude, are to each other as the ſquares of their diameters; conſequently the ſquare of the diameter of the veſſel that holds 2, 3, or 4 gallons, muſt be double, triple, or quadruple of that, which only holds one. And ſince in the firſt, AB = A 1, the ſquare of B 1 is double, that of B 2 triple, that of B 3 is quadruple, &c. it is evident, that the right lines A 2, A 3, A 4, &c. are the diameters of the veſſels required.

Theſe diviſions, therefore, being applied to the ſide of a cylindrical veſſel, it will immediately appear how many meaſures, e. gr. gallons, a cylindrical veſſel of that baſe, and of the height of that which holds one gallon, will contain.

Wherefore, finding by the diviſions on the other ſide of the rod, how often the height of one gallon is contained in the height of the given veſſel; and multiplying the diameter before found by this number; the product will be the number of gallons the veſſel contains.

Thus, e. gr. if the diameter of the cylindrical veſſel be 8, and its height 12, its contents will be 96 gallons.

Note, 1°. The leſs you take the height of the cylinder containing one gallon, the greater will the diameter of the baſe be: whence both that, and the diameters of the cylinders containing ſeveral gallons, will be the more eaſily diviſible into leſſer parts. Bayer directs ſuch height to be only one digit, or tenth of an inch.

2°. The diameters of veſſels holding one or more decimal parts of a gallon will be had, by dividing one or more decimal parts of the veſſel holding a whole gallon, by its height; which gives us the area of the circular baſe; from whence the diameter is eaſily found by the rules delivered under DIAMETER, CIRCLE, &c. And after the ſame manner, the diameters are found for the diviſions of veſſels, that hold two or more gallons.

GAUGING-*rod, uſe of the.* To find the content of a caſk; that is, to determine the number of meaſures, e. gr. gallons, it will hold: apply the *gauging-rod* to the veſſel, as directed in the preceding article, and find both the length of the caſk, AC, fig. 12. and both diameters, GH, and AB. Now, as we find, by experiment, how far ſoever it may be from geometrical exactneſs, that a common caſk of this form may ſafely enough be reputed as a cylinder, whoſe baſe is a medium between the head and the belly; find ſuch medium, which call the *equated diameter*.

Then multiplying the number thus found by the length of the caſk AC, the product will be the number of meaſures the veſſel contains.

Suppoſe, e. g. AB = 8, and GH = 12, and AC = 15, the equated diameter will be 10: which multiplied by 15, gives the capacity of a caſk, 150 meaſures.

If it happen, that the diameters of the two ends be not equal, meaſure them both, and take half their ſum from the diameter to work by.

There is another method whereby the content of a veſſel is had, without any calculation at all, which obtains in divers parts of Germany and the Low-Countries: but as this ſuppoſes all veſſels to be ſimilar to each other, and their length double of the equated diameter, that is, of half the ſum of the diameters AB, and GH, it is not ſafe to uſe it in all places. Kepler, however, prefers it ſo much before all others, as including all the precautions poſſible, that he recommends it to the public, to enact it by law, that all caſks be made in this proportion.

The methods of *gauging*, which chiefly obtain among us, are, by the four-foot *gauging rod*, and Everard's *ſliding-rule*.

GAUGING-*rod, deſcription and uſe of the four-foot.* The four-foot *gauging-rod*, repreſented in *Tab.* II. *Surveying, fig.* 20. is uſually made of box, and conſiſts of four rules each a foot long, and about three-eighths of an inch ſquare, joined together by three braſs joints; by which means the rod is rendered four feet long, when the four rules are quite opened, and but one foot when they are all folded together.

On the firſt face of this rod, marked 4, are placed two diagonal lines; one for beer, and the other for wine: by means of which the content of any common veſſel in beer or wine gallons may be readily found, by putting the rod in at the bung-hole of the veſſel, till it meets the interſection of the head of the veſſel with the ſtaves oppoſite to the bung-hole. For diſtinction of this line, there is written thereon, *beer* and *wine gallons*.

On the ſecond face, 5, are a line of inches, and the gauge-line; which is a line expreſſing the areas of circles, whoſe diameters are the correſpondent inches in ale gallons. At the beginning is written, *ale area*.

On the third face, 6, are three ſcales of lines; the firſt, at the end of which is written *hogſhead*, is for finding how many gallons there are in a hogſhead, when it is not full, lying with its axis parallel to the horizon. The ſecond line, at the end of which is written *B. L.* ſignifying a *butt lying*, is for the ſame uſe as that for the hogſhead. The third line is to find how much liquor is wanting to fill up a butt when it is ſtanding: at the end of it is written *B. S.* ſignifying a *butt ſtanding*. In the half of the fourth face of the *gauging-rod*, 7, there are three ſcales of lines, to find the wants in a firkin, kilderkin, and barrel, lying with their areas parallel to the horizon. They are diſtinguiſhed by letters *F. K. B.* ſignifying a *firkin*, *kilderkin*, and *barrel*.

GAUGING-*rod, uſe of the diagonal lines on the.* To find the content of a veſſel in beer or wine gallons, put the braſed end of the *gauging-rod* into the bung-hole of the caſk, with the diagonal lines upwards, and thruſt this braſed end to the meeting of the head and ſtaves; then with chalk, make a mark at the middle of the bung-hole of the veſſel, and alſo on the diagonal lines of the rod, right againſt, over one another, when the braſed end is thruſt home to the head and ſtaves: then turn the *gauging-rod* to the other end of the veſſel, and thruſt the braſed end home to the end, as before.

Laſtly, ſee if the mark made on the *gauging-rod* come even with the mark made on the bung-hole, when the rod was thruſt to the other end; which if it be, the mark made on the diagonal lines, will, on the ſame lines, ſhew the whole content of the caſk in beer or wine gallons.

If the mark made on the bung-hole be not right againſt that made on the rod, when you put it the other way, then, right againſt the mark made on the bung-hole, make another on the diagonal lines; and the diviſion on the diagonal line, between the two chalks, will ſhew the veſſel's whole content in beer or wine gallons.

Thus, e. gr. if the diagonal line of a veſſel be 28 inches four tenths, its contents in beer gallons will be near 51, and in wine gallons 62.

If a veſſel be open, as a half-barrel, tun, or copper, and the meaſure from the middle on one ſide, to the head and ſtaves be 38 inches, the diagonal line gives 122 beer gallons; half of which, viz. 61, is the content of the open half tub.

If you have a large veſſel, as a tun or copper, and the diagonal line, taken by a long rule, proves 70 inches; the content of that veſſel may be found thus:

Every inch, at the beginning-end of the diagonal-line, call ten inches. Thus ten inches becomes 100 inches; and every tenth of a gallon call 100 gallons; and every whole gallon call 1000 gallons.

Exam. at 44,8 inches, on the diagonal beer-line, is 200 gallons; ſo that 4 inches 48 parts, now called 44 inches 8 tenths, is juſt two-tenths of a gallon, now called 200 gallons: ſo alſo, if the diagonal line be 76 inches and 7 tenths, a cloſe caſk, of ſuch diagonal, will hold 1000 beer gallons; but an open caſk but half ſo much, viz. 500 beer gallons.

GAUGE-*line*, *uſe of the*. To find the content of any cylindrical veſſel in ale gallons: ſeek the diameter of the veſſel in inches, and, juſt againſt it, on the *gauge-line*, is the quantity of ale gallons contained in one inch deep: this, multiplied by the length of the cylinder, will give its content in ale gallons.

For example, ſuppoſe the length of the veſſel 32.06, and the diameter of its baſe 25 inches; to find what is the content in ale gallons?

Right againſt 25 inches, on the *gauge-line*, is one gallon, and 745 of a gallon; which multiplied by 32,06, the length, gives 55,9447 gallons for the content of the veſſel.

The bung diameter of a hogſhead being 25 inches, the head diameter 22 inches, and the length 32,06 inches; to find the quantity of ale gallons contained in it?

Seek 25, the bung diameter, on the line of inches; and right againſt it, on the *gauge-line*, you will find 1,745: take one-third of it, which is .580, and ſet it down twice: ſeek 22 inches in the head diameter, and againſt it you will find, on the *gauge-line*, 1,356; one-third of which added to twice ,580, gives 1,6096; which multiplied by the length 32,06, the product will be 51,603776, the content in ale gallons.

Note, this operation ſuppoſes, that the aforeſaid hogſhead is in the figure of the middle fruſtum of a ſpheroid.

The uſe of the lines on the two other faces of the rod, is very eaſy; you need only put it downright into the bung-hole (if the veſſel you deſire to know the quantity of ale gallons contained therein be lying) to the oppoſite ſtaves; and then where the ſurface of the liquor cuts any one of the lines appropriated to that veſſel, will be the number of gallons contained in that veſſel.

The deſcription and uſe of Everard's ſliding-rule for *gauging*, ſee under SLIDING-*rule*.

GAVIAON, in *Ornithology*, the name by which the Portugueſe called the CARACARA, a ſpecies of Braſilian hawk, of the bigneſs of our kite.

GAVILAN, in *Natural Hiſtory*, a name given by the Spaniards to a ſpecies of hawk, common in the Philippine Iſlands; it is ſomewhat larger than our ſparrow-hawk, and is of a yellowiſh colour on the back and wings, and whitiſh under the belly; it is the moſt common of all the birds of prey in that part of the world, and is very voracious, and miſchievous.

GAVIOTA, in *Ornithology*, the name given by the Portugueſe to a water-fowl of the gull kind, common in Braſil, and called by the natives *guacu guacu*. It is of the ſize of a common hen; its beak is long, ſtrait, and yellow; its head is black on the top, as is alſo the farther half of the wings and tail: the throat, breaſt, and belly are white: it lays in the ſand, and its eggs are of the ſize of thoſe of the hen, and are accounted very good, but the fleſh is not valued.

GAULISH *Language*. See ROMAN, and FRENCH.

GAULONITÆ, among the *Jews*, the name of a faction rather than a religious ſect, the ſame with the GALILÆANS.

GAULTHERIA, in *Botany*, a genus of the *decandria monogynia* claſs: the exterior calyx is double-leaved, the interior is divided into five ſegments; the corolla is ovated; the nectarium has ten ſharp points, and the fruit is a five-celled capſule.

GAULUS, in *Antiquity*, a ſhip of a roundiſh form, moſtly uſed by the people of Phœnicia.

GAULUS alſo ſignified a kind of cup.

GAUNT, an old word for lean, or lank. Thus, we ſay, a *gaunt*-bellied, or light-bellied horſe, when his belly ſhrinks up towards his flanks.

GAUNTLET. See GANTLET.

GAVOTTA, or GAVOTTE, derived from the *Gavots*, a people inhabiting a mountainous diſtrict in France, called Gap, in *Italian Muſic*, is a kind of dance, the air whereof has two ſtrains, briſk and lively, and in common time; each of its ſtrains are played twice over, the firſt has uſually four or eight bars, and the ſecond contains eight, twelve, or more. The time begins with a minim, or two crotchets, or notes of equal value, and the hand riſing; and ends with the fall of the hand upon the dominant, or mediant of the mode, never upon the final, unleſs it be a rondeau. And the laſt begins with the riſe of the hand, and ends with the fall upon the final of the mode.

The *Gavots* of Correlli, Albinani, Vivaldi and others of the Italians, correſpond with theſe rules as far as they relate to the meaſure, the number of bars in each ſtrain, and the cadences; but in reſpect to the initial notes of the air they deviate from it; for they ſometimes begin with a whole bar, and ſometimes with an odd quaver.

GAVOTTA, *tempo di*, in the *Italian Muſic*, is when only the time or movement of a *gavotte* is imitated, without any regard had to the meaſure or number of bars, or ſtrains. We often find parts of ſonatas, which have this phraſe to regulate their motions.

GAURA, in *Botany*, a genus of the *octandria monogynia* claſs: the calyx is tubulous and divided into four ſegments; the corolla conſiſts of four petals; and the fruit is a quadrangular nut, containing a ſingle ſeed.

GAURES, or rather GAVRES, or GABRES. See GABRES.

GAWSE, or GAWZE, in *Commerce*, a very thin, ſlight, tranſparent kind of ſtuff, woven ſometimes of ſilk, and ſometimes only of thread.

To warp the ſilk for making of *gawze*, they uſe a peculiar kind of mill, upon which the ſilk is wound: this mill is a wooden machine, about ſix feet high, having an axis perpendicularly placed in the middle thereof, with ſix large wings, on which the ſilk is wound from off the bobbins, by the axis turning round.

When all the ſilk is on the mill, they uſe another inſtrument to wind it off again on two beams: this done, the ſilk is paſſed through as many little beads as there are threads of ſilk; and thus rolled on another beam, to ſupply the loom.

The *gawze*-loom is much like that of the common weavers, though it has ſeveral appendages peculiar thereto. See LOOM.

There are figured *gawzes*; ſome with flowers of gold and ſilver, on a ſilk ground: theſe laſt are chiefly brought from China.

GAYAC. See GUAIACUM.

GAYTICPUA, in *Zoology*, the name of an American ſpecies of ſerpent, found as it is ſaid only in the kingdom of Razim. It grows to a vaſt ſize, and ſtinks ſo intolerably, that no creature can bear to be near it.

GAZA *giovane*, in *Zoology*, the name of a ſmall ſpecies of *heron*, of a fine white colour, called by other authors *ardea alba minor*, or the *ſmall white heron*. It is ſo ſmall as not to weigh a pound. Its whole body is of a pure and perfect ſnow white, and it has a ſhort creſt on the hinder part of its head, and a naked ſpace which is greeniſh about it's eyes. Its feet alſo are green, but are ſometimes covered with blackiſh ſcales. The feathers of the creſt are very ſoft and white, and are much valued. It is eaten in Venice and Italy, and is common enough in the markets there. The creſt feathers however are uſually pulled off before it is offered to ſale.

GAZAR, a name uſed by ſome authors for the bay-tree. Johnſon.

GAZE-*hound*. See HOUND.

GAZELLA, GAZELLE, or ANTELOPE, is a ſpecies of the *capra*, or GOAT, in the Linnæan ſyſtem; others have made it a diſtinct genus, with annulated, or twiſted horns, eight broad cutting teeth in the lower jaw, and body and limbs of a light and elegant form. Thus, they make it an intermediate genus between the GOAT and DEER, agreeing with the firſt in the texture of their horns, which have a core in them, and they never caſt them, and with the laſt in the elegance of their form and great ſwiftneſs The agility and ſpeed of this animal are ſurpriſing. ſo that the chace of it is a favourite diverſion in the eaſtern nations. Some ſpecies of the antelope form herds of two or three thouſand, while others keep in ſmall troops of five or ſix. There are ſeveral ſpecies and varieties of this animal, which, excepting two or three, inhabit the hotteſt part of the globe. Their proper climates ſeem to be thoſe of Aſia and Africa, where they are very numerous. See ANTELOPE, and *Tab.* II. *Quadrupeds*, N°. 14. which repreſents the white-footed *gazelle*, or antelope of India, with ſhort horns bending a little forward; large ears, marked with two black ſtripes; a ſmall black mane on the neck and half-way down the back; a tuft of long black hairs on the fore-part of the neck; above that a large ſpot of white; another between the fore legs on the cheſt; one white ſpot on each fore foot; two on each hind foot; long tail tufted with black hairs; the height, to the top of the ſhoulders, about four feet, and the colour a dark grey. The female is of a pale brown colour, without horns, and having on each foot three tranſverſe bands of black, and two of white. Pennant's Syn. of Quadr. p. 29.

GAZETTE, a news-paper, or printed account of the tranſactions of divers countries, in a looſe ſheet or half-ſheet.

The word is formed from *gazetta*, a kind of coin, formerly current at Venice, which was the ordinary price of the firſt news-paper printed there: though others derive it, by corruption, from the Hebrew *izgad*, which ſignifies, *nuntius*, a meſſenger; but this etymology is too much forced.

Gazettes, which moſt people look on as trifles, are by ſome held the moſt difficult kind of compoſitions that have appeared. They require a very extenſive acquaintance with the languages, and all the terms thereof, and a great facility and command of writing, and of relating with perſpicuity, and in few words.

To write a *gazette*, a man ſhould be able to ſpeak of war both by land and ſea; be throughly acquainted with every thing relating to geography, the hiſtory of the time, and that of the noble families; with the ſeveral intereſts of princes, the ſecrets of courts, and the manners and cuſtoms of all nations.

Vignuel de Marville recommends a ſet of *gazettes*, well written, as the fitteſt books for the inſtruction of young perſons coming into the world.

The firſt *gazette* publiſhed in theſe parts, is ſaid to have been that of Paris, begun in the year 1631, by Theophraſt Renaudot, a phyſician of Montpelier, in his office of intelligence.

GAZETTE, *extraordinary*. See EXTRAORDINARY.

GAZONS, in *Fortification*, turfs, or pieces of freſh earth covered with graſs, cut in form of a wedge, about a foot long, and half a foot thick, to line or face the outſides of works made of earth, in order to keep up the ſame, and prevent their mouldering.

GAZOPHYLACIUM, in the *Jewiſh Antiquities*, according to the Greek etymology of γαζα, *treaſure*, and φυλαττω, *I keep*, ſignifies the treaſury-chamber. There were ſeveral places in the temple of Jeruſalem, where the rich preſents conſecrated to God by kings, princes, or private perſons were kept. But the ſignification of this word *gazophylacium*, has been farther enlarged, ſo as to comprehend the rooms where the proviſions of the temple were laid up, both for ſacrifices, and for the ſupport and ſuſtenance of the prieſts, and in general this word is uſed for all the apartments of the temple. In the goſpel, by *gazophylacium* is meant the cheſt into which people caſt their offerings at the entrance of the temple. It has been alſo uſed by naturaliſts for a collection of figures of curious ſubjects. Mark xii. 41, 43. Luke xxi. 1. Calm. Dict. Bibl.

GAZOPHYLAX, Γαζοφυλαξ, in *Antiquity*, an officer who had the care and management of the treaſure belonging to the kings of Perſia.

GAZZA, in *Ornithology*, the name of a ſpecies of *heron* common in Italy, and called by many authors *ardea alba major*, the *greater white heron*. Its whole body is of a ſnow white, its beak yellow, and the membranes about its eyes green; though called large in compariſon of the leſſer white one, it is ſmaller than the common grey heron. Its tail alſo is much longer, and it has no creſt. It is ſometimes ſeen in England, and has been miſtaken for a common heron become accidentally white, as ſparrows and other birds ſometimes are.

GAZZETTA, in *Ornithology*, a name given by Geſner and others to a ſpecies of ſmall white heron, ſold in the markets of Italy, and ſeeming to be the *ardea alba minor* of authors, or GAZA GIOVANE of the Venetians.

GAZZETTO, in *Ichthyology*, the name of a fiſh of the TURDUS, or wraſſe kind, caught in the Mediterranean, and ſold in the markets of Italy. It is of a fine green colour, and is conſiderably thick, though broad; its fins are ſpotted, and it has a large purple tubercle near the anus. It has only one back fin which has twenty-four ribs or nerves, the firſt fifteen of which are rigid and prickly, the reſt ſmooth and flexile.

GEANNIDES, in *Natural Hiſtory*, a name given by ſome authors to the ſtone called by others encymonites. It ſeems to have been the ſame with our ſparry incruſtations on the tops of caverns, &c. but the word has been generally underſtood to mean the eagle ſtone. It was ſuppoſed to poſſeſs great virtues in helping delivery, and was given to women in their labours.

GEAR, or *about your* GEAR, at *Sea*, a command to work on all hands.

GEASTER, of γη, *earth*, and αστηρ, *ſtar*, in *Botany*, the name of a genus of funguſes: or according to Linnæus, of ſome ſpecies of the genus of the LYCOPERDON. Theſe funguſes have a radiated bottom like a ſtar, and in the center of this there grows a round ball which opens at the top when ripe, and is found to be full of impalpable ſeeds in form of powder. See a deſcription and drawing of this plant by Dr. Watſon, in Phil. Tranſ. vol. xliii. p. 234.

GECCO, in *Natural Hiſtory*, a name given by the Indians to their terrible poiſon, which kills in ever ſo ſmall a quantity when mixed with the blood. They ſay that this *gecco*, is a venomous froth or humour, vomited out of the mouths of their moſt poiſonous ſerpents, which they procure in this fatal ſtrength, by hanging up the creatures by the tails, and whipping them to enrage them: they collect this in proper veſſels as it falls, and when they would uſe it, they either poiſon a weapon with it, or wounding any part of the fleſh, introduce the ſmalleſt quantity imaginable of it, and this is ſaid to be immediate death.

GECHYTON, of γη, *earth*, and χυω, *I ſpread*, a name given by ſome authors to the external covering of the earth, commonly called garden-mould, which is ſoft and not ſtony.

GECOLITHUS, a corrupt way of ſpelling the word *tecolithus*, the name of the lapis Judaicus among the Romans. The writers of the middle ages often write it *gecolithus*.

GED, in *Ornithology*, an Engliſh name for the ſmall ſpecies of ſnipe, uſually called the JUDDOCK, and by authors GALLINAGO *minima*.

GEERS, a general term for trappings, harneſs, and all other things, that belong to draught-horſes or oxen.

GEERS, in a *Ship*. See JEERS.

GEGENES, Γηγενεις, in *Antiquity*. The acients generally called themſelves Γεγενεις, *ſons of the earth*, as Heſychius informs us. Alluding to the ſame original, the Athenians ſometimes ſtyled themſelves, Τεττιγες, *graſshoppers*; and ſome of them wore graſshoppers of gold, faſtened to their hair as badges of honour, to diſtinguiſh them from others of leſs antiquity, and leſs noble extraction, becauſe thoſe inſects were belived to be generated out of the ground. Pott. Archæol. Græc. lib. i. cap. i.

GEHENNA, Γεεννα, a ſcripture term, which has given ſome pain to the critics. It occurs in St. Matthew v. 22. 29. 30. x. 28. xviii. 9. xxiii. 15. 33. Mark ix. 43. 45. 47. Luke xii. 5. James iii. 6.

The authors of the Louvain and Geneva verſions retain the word *gehenna*, as it ſtands in the Greek; the like does M. Simon: the Engliſh tranſlators render it by *hell* and *hell-fire*; and the like do the tranſlators of Mons, and father Bohours.

The word is formed from the Hebrew *gehinnom*, i. e. valley of Hinnom. In that valley, which was near Jeruſalem, there was a place name *Tophet*, where ſome Jews ſacrificed their children to Moloch, by making them paſs through the fire. King Joſias, to render this place for ever abominable, made a cloaca or common-ſewer thereof, where all the filth and carcaſes in the city were caſt.

The Jews obſerve farther, that there was a continual fire kept up there, to burn and conſume thoſe carcaſes; for which reaſon, as they had no proper term in their language to ſignify *hell*, they made uſe of that of *gehenna*, or *gehinnon*, to denote a fire unextinguiſhable.

GEISON. See GISON.

GELÆOPACHIA, in *Natural Hiſtory*, the name of a claſs of mineral fluids, which are inflammable, and of a ſomewhat thick texture, and opake. The word is derived from the Greek γη, the *earth*, ελαιον, *oil*, and παχυς, *thick*. The bodies of this claſs are the Barbadoes tar, oil of earth, and the common piſſaſphaltum of the ſhops, which ſee under their ſeveral heads.

GELÆOPSILA, in *Natural Hiſtory*, the name of a claſs of foſſils. The word is derived from the Greek γῆ, *earth*, ελαιον, *oil*, and ψιλος, *thin*, and expreſſes a thin oily ſubſtance naturally found in the earth. Theſe are thin and pellucid inflammable liquid ſubſtances, commonly known by the name of liquid bitumens, but by that denomination confounded with the thicker and coarſer kinds. The only bodies of this claſs are thoſe commonly diſtinguiſhed by the names of NAPHTHA, and PETROLEUM.

GELALEAN *calendar*. See CALENDAR.

GELASANI *dentes*, a term uſed by ſome authors to expreſs the four middle fore teeth, both of the upper and under jaw. They have their name from the Greek, γελως, *laughter*, becauſe they are ſhewn when people laugh.

GELATINA. See JELLY.

GELATINOUS, among the *Phyſicians*, is applied to any thing approaching the glutinous conſiſtence of a JELLY.

GELATIO, properly ſignifies freezing, but is alſo uſed for that rigidity of the body and limbs, which comes on in the catalepſis, and other diſorders of that kind.

GELBUM, a name given by the Hungarian miners to a ſort of marcaſite or mundic, which contains a conſiderable quantity of ſilver.

GELD, or GILD, in our *Ancient Cuſtoms*, a mulct, or compenſation for a crime or delinquency. See GILD.

Hence *wergild* was anciently uſed for the value or price of a man ſlain; and *orfgild*, of a beaſt, &c.

Et ſint quieti de Geldis, & *Danegeldis*, *Horngeldis*, & *Fortgeldis*, & *de Blodwita*, & *Flitwita*, & *Leirwita*, & *Heingwita*, & *Fremineſeuda*, & *Werdpens*, & *Averpeni*, & *Hundredpeni*, & *Tolingpeni*. Charta Ric. II. Priorat. de Hatland, in Devon.

GELD *foot*, GELD *horn*, and GELD *wood*, ſee the ſubſtantives.

GELDABLE. See GILDABLE.

GELDER-*roſe*, in *Botany*. For the characters, ſee WAY-*faring-tree*.

The common marſh elder, which grows naturally in marſhy grounds, and on the ſides of rivers in many parts of England, is not often kept in gardens: it is called by ſome the *gelder-roſe*, with flat flowers, to diſtinguiſh it from the other, whoſe flowers are globular. The marſh elder is the original ſpecies, and the *gelder-roſe* is a variety which accidentally aroſe from it. The former has a border of male flowers, which are large, and the middle of the umbel is compoſed of hermaphrodite flowers, which are ſucceeded by oval, red berries: the latter has all male flowers, of the ſame ſize and ſhape with thoſe of the border of the firſt, ſo that they ſwell out into a round figure, which has occaſioned ſome country people giving it the name of ſnow-ball tree. This ſort is cultivated in gardens for the beauty of the flowers, which make a fine appearance during their continuance.

It will riſe to the height of eighteen or twenty feet, if permitted to ſtand. The ſtem becomes large, woody, and hard; the branches come out oppoſite, and are apt to grow irregular; they have a grey bark. The leaves are placed oppoſite; they are divided into three or four lobes, ſomewhat like thoſe of the maple; the flowers come out at the ends of the branches; thoſe of the firſt in large umbels, and thoſe of the ſecond in a corymbus; they are very white, and appear the beginning of June. Thoſe of the firſt have oval berries ſucceeding the hermaphrodite flowers, which turn of a ſcarlet colour when ripe, but the other having only male flowers are barren.

The common *gelder-roſe* ſends out plenty of ſuckers from the roots, by which it is frequently propagated; but as the plants ſo raiſed are very apt to put out ſuckers, they are not ſo good as thoſe which come from layers or cuttings; both ſorts love a moiſt ſoil. They are very hardy, and will thrive in the coldeſt ſituations, but not within the ſpray of the ſea. The common *gelder-roſe* is ſeldom ſuffered to ſtand very long in gardens; but one has been ſeen whoſe ſtem was more than two feet and a half round.

GELDING, the operation of caſtrating, and particularly horſes.

In *gelding* of horſes, regard is to be had to their age, the ſeaſon of the year, and, as the farriers ſay, to the ſtate of the moon. For the firſt, if it be a colt, the operation may be performed at nine, or at fifteen days old, if the teſticles be come down; becauſe the ſooner he is *gelt*, the better it will be for his growth, ſhape, and courage; though a horſe may be *gelded* at any age, if care be taken in the cure. As for the ſecond, the beſt time is about April or May, or elſe about the latter end of September; and for the third, the wane of the moon is preferred as the fitteſt time.

The manner of *gelding* is thus: the beaſt being caſt on ſome ſoft place, the operator takes the teſticles between his fore and great finger; ſlits the cod, and preſſes out the ſtones; then taking a pair of nippers made very ſmooth, either of ſteel, box, or brazil, he claps the ſtrings of the ſtones between them, very near to where the ſtones are ſet on, and preſſes them ſo hard, that there may be no flux of the blood, and then ſears away the ſtone with a thin cauterizing iron, made red-hot.

This done, he takes a hard plaſter, made of wax, reſin, and waſhed turpentine, melted together, and melts it on the head of the ſtrings with the hot iron, and afterwards ſears the ſtrings, and melts more of the ſalve, till there is a good thickneſs of the ſalve laid on the ſtrings.

This being done to the ſtone, the nippers are looſened, and the like is done to the other; and the two ſlits of the cod are then filled with white ſalt, and the outſide of the cod anointed with hog's greaſe; and thus they let him riſe, and keep him in a warm ſtable, without tying him up.

If he ſwells much in his cod or ſheath, they chaſe him up and down, and make him trot an hour in a day, and he ſoon recovers. See CASTRATION and EUNUCH.

GELDING, in the *Manege*, is alſo uſed for a horſe, whoſe teſticles are cut out.

GELDUM, a name given by ſome to the philoſopher's ſtone.

GELFUM, or GELBUM, an Hungarian name for a kind of mundic, which contains ſilver.

GELLOSIA, in *Natural Hiſtory*, a name by which ſome of the writers of the middle ages call the CHALAZIAS.

GELOSCOPY, GELOSCOPIA, of γελως, *laughter*, and σκοπεω, *I conſider*, a kind of divination, drawn from laughter; or a knowlege of any perſon's character and qualities, acquired from the conſideration of his laughter.

GEM, or GEMM, GEMMA, a common name for all precious ſtones or jewels; conſiſting of the ſiliceous, or what is improperly called vitrifiable earth, much valued for their luſtre, tranſparency, colour, hardneſs, weight, and rarity. Theſe are diamonds, rubies, ſapphires, topazes, emeralds, chryſolites, amethyſts, garnets, hyacinths or jacinths, beryls or aquæ marinæ; the order in which they are enumerated ſhews their relative degree of hardneſs.

Dr. Hill diſtributes *gems* into two claſſes; viz. the pellucid *gems*, which are bright, elegant, and beautiful FOSSILS, always found in ſmall maſſes, extremely hard, of great luſtre, compoſed of a very firm and pure ſubſtance, giving fire with ſteel, not fermenting with acid menſtrua, and calcinable in the fire with great difficulty; of which there are two genera, the CHROSTASIMA, and the CHROASTACES; and the ſemi-pellucid *gems*, which are defined to be ſtones, compoſed of a but ſlightly debaſed cryſtalline matter, of great beauty and brightneſs, of a moderate degree of tranſparence, and uſually found in ſmall maſſes. The bodies of this claſs are divided into two general orders, and under theſe into eight diſtinct genera. Of the firſt order are thoſe of but few variegations, and frequently of one plain ſimple colour, though ſometimes veined. Of the ſecond are thoſe remarkable for their veins, zones, and variegations. The genera of the firſt order, are the cornelians, chalcedonies, hydrophanæ, and pramnion. Thoſe of the ſecond, are the agates, onyxes, ſardonyxes, and cameæ. See each of theſe under its proper head.

Others diſtinguiſh precious ſtones into three kinds:

1. Such as are entirely tranſparent; which again may be divided into ſuch as are either colourleſs, as the *diamond*; or coloured, as the *emerald*, *ruby*, &c. Which diviſion of coloured *gems* may be ſubdivided into thoſe of one colour, as the *ruby*; and thoſe with ſeveral, as the *opa..*

2. Brilliant, or ſhining, but leſs tranſparent, as the *Bohemian granate*.

3. Semi-tranſparent, as the *onyx*.

Biſhop Wilkins divides *precious* ſtones into *more* and *leſs tranſparent*.

The *leſs tranſparent* he diſtinguiſhes by their colours; into red, as the ſardian and cornelian; pale fleſhy colour, like that of a man's nail, as the onyx; bluiſh, as the turquois; and thoſe of various colours, as opal and cat's eye.

The *more tranſparent* he diſtinguiſhes into ſuch as are colourleſs, as the diamond and white ſapphire; and coloured, which are either red, as the ruby, carbuncle, and granate; yellow, as the chryſolite and topaz; green, as the emerald, ſmaragd, and beryl; bluiſh, as the ſapphire; and purple or violaceous, as the amethyſt.

Dr. Woodward divides precious ſtones ſomewhat more preciſely, into *opake*, *ſemi-opake*, and *tranſparent*.

The *opake* are either of one colour, as the turquois; or of various colours, as the lapis lazuli, and jaſper.

Semi-opake either have their colours *permanent*, as the agat, chalcedony, onyx, ſardonyx, cornelian, and beryl; or their colours *vary* according to the poſition of the light, as in the oculus cati, and opal.

Tranſparent ſtones are either *with colours*; as the topaz and hyacinth, yellow, or partaking thereof; granate, ruby, and amethyſt, red; ſapphire, water-ſapphire, and aquamarine, blue; and emerald, or chryſolite, green, or partaking thereof; or *without colours*, as the cryſtal, pſeudo-diamond, white ſapphire, and diamond.

The natural hiſtory, characters, properties, &c. of each ſtone, ſee under DIAMOND, CORNELIAN, RUBY, TURQUOIS, ONYX, EMERALD, CHRYSOLITE, &c. For the medicinal virtues of *precious* ſtones, or *gems*, in the general, ſee below. The origin and formation of *precious* ſtones, ſee STONE. For the art of engraving on *precious* ſtones, ſee ENGRAVING. The art of cutting them, ſee LAPIDARY. Moſaic work of *precious* ſtones, ſee MOSAIC.

Pearls are alſo ranked among *gems*, though not ſtones.

Gems are ſometimes found of regular ſhapes with a natural poliſh, near the beds of rivers, after great rains, and theſe are of the pebble kind; and ſometimes of irregular ſhapes, with a rough coat, in mines, and the clefts of rocks. Thoſe of the firſt ſort are the *gems*, on which the ancients engraved, and which are commonly called intaglios; theſe are uſually of a long oval figure inclining to a point at each end, convex as well upon the engraved ſurface as on the others, and having a ridge running from end to end on the underſide, which is thereby as it were divided into two faces; both which are alſo, though not ſo diſtinctly, parted from the upper face by another ridge running quite round the oval. The ſtone moſt frequently engraved on, is what the jewellers call the beryl, a ſtone very different from that called the beryl by the ancients, which was the *gem* we call the aquamarine.

This beryl of the jewellers is only a finer kind of cornelian, and is of three kinds; the red, the yellow, and the white. The firſt is much the moſt valuable of theſe, and is of the greateſt luſtre; that which is moſt frequent next this beryl, is the praſius, or, as ſome call it, the *plaſma de ſmaraldo*. This our jewellers call the preme or prime emerald. It is of a ſomewhat duſky green, and is ſometimes tolerably clear, but moſt uſually it is full of black and white ſpecks, and rather opake.

The moſt frequent next to this is the jacinth or hyacinth. This alſo is not the *gem* known by the ancients under this name, that having been a ſort of amethyſt; but the ſtone we now call the hyacinth, which is of a tawny red, or a ſort of fire-colour, and is very bright and tranſparent. The chryſolite is ſometimes, but rarely, found engraved on. It is of a greeniſh colour, and is tranſparent, but not lively. Sometimes we alſo meet with the oriental pebble cryſtal, which is much more tranſparent and lively than the common cryſtal, and indeed but little inferior in beauty to the white ſapphire; the garnet, which is of a deep red, and not ſo lively as the hyacinth; and, finally, the amethyſt, which is of a deep purple, and is very lively and tranſparent. Theſe ſeem to have been all the ſtones uſed in the earlier times of the Roman empire. There are, indeed, ſometimes found ſome other ſpecies; but theſe are rarely of any time but the later ages of the empire, when the art itſelf was greatly upon the decline. The before mentioned ſtones are ſaid to have been brought to Rome from the borders of the Nile, or of the Ganges.

The onyx agate, onyx ſardonyx, and alabaſter of two colours, were alſo engraved on by the Romans in a different manner. Theſe, as alſo certain ſhells of different coats, were frequently engraved in relief, and theſe ſorts of engravings are commonly called cameos; they alſo ſometimes engrafted a head, or ſome other figure, in relief of gold upon a blood-ſtone.

Beſide theſe there are alſo ſome antiques, moſtly cornelians, which are covered with a ſtratum of white. This ſtratum has by ſome been looked on as natural, but it was really only a ſort of coat or enamel that was laid on: this was uſed only in the times of the lower empire.

The ancients engraved many of their ſtones juſt as they were found with their native poliſh, and in their native ſhape; but the beauty of the ſeveral ſpecies of the onyx could only be ſhewn by a proper cutting. The antique *gems* of Greek work are of all others the moſt eſteemed, and next to them the Roman, in the time of the higher empire. Phil. Tranſ. N° 483. or vol. xliv. p. 502, &c.

Several authors, both ancient and modern, relate wonders of the virtues and medicinal properties of *gems*; but their reputation, in this reſpect, is now a little fallen; and many even deny them any virtue at all; yet are the fragments of ſuch ſtones ſtill preſerved by ſome phyſicians in ſome of the moſt celebrated compoſitions; and there are ſeveral chemical preparations made of them.

In reality, as ſeveral perſons of the greateſt candour and experience have related ſome conſiderable effects of certain *gems*, on their own particular obſervations; and it is no way improbable, that ſome of the ſofter ſtones may have conſiderable operations on the human body, it might be imprudent indiſcriminately to exclude from them any medicinal virtue at all.

When much the greateſt part of their traditionary qualities is ſet aſide as fabulous, there will ſtill remain ſome, on as real and well-warranted a footing as many of our other medicines.

On ſuch conſiderations, Mr. Boyle was induced to give us a treatiſe of the Origin and Virtues of Gems; the purport whereof is to ſhew that ſuch ſtones were originally in a fluid ſtate, or made up of ſuch ſubſtances as were formerly fluid; and that many of their general virtues are probably derived from the mixture of metalline and other mineral ſubſtances uſually incorporated with them; while the great variety, and the particular efficacy of their virtues, ariſe from ſome happy concurrent circumſtances of that commixture; e. gr. the peculiar nature of the impregnating liquor, the proportion wherein it is mixed with the petreſcent juice, and the like.

To ſupport this hypotheſis of the virtues of *gems*, he ſhews, that ſeveral of them are not ſimple concretions of any petreſcent liquors; but that they conſiſt, alſo, of other mineral adventitious parts: which he argues, from the ſeparableneſs of ſuch ſubſtances in ſome ſtones, the ſpecific gravity in others, and the different waters, or tinctures to be met with in *gems* of the ſame ſpecies; as rubies, ſapphires, granates, and even diamonds; of which laſt ſome are yellow, ſome of other colours, and ſome green, almoſt like emeralds.

There may, therefore, be in ſome *gems* numberleſs adventitious corpuſcles; but there is great reaſon to think, that ſome of theſe corpuſcles may be indued with ſeveral properties, and medicinal virtues. There is a great difference among theſe impregnating particles; and, probably, a greater variety than known by us: and, laſtly, many *gems* are very richly impregnated with theſe particles: why, then, may not they exert ſome power? This is the ſubſtance of what is directly alleged in behalf of *gems*.

The ſtreſs of what is objected againſt them is, that the mineral ſubſtances they contain, are ſo cloſely locked up, that they can communicate nothing to the body, and ſo can have no medicinal operation, being unconquerable by ſo ſmall a heat as that of the ſtomach, and other parts of the body.

This objection might be plauſible enough to prevent one's aſcribing any medicinal virtues to them *a priori*; but can conclude nothing againſt what is warranted by ſo many facts and obſervations; eſpecially when there are ſeveral particulars that obviate this objection.

For a vigorous loadſtone, though frequently harder than many *gems*, is known to emit copious effluvia; and there are many which have been found to have a manifeſt and inconvenient operation on the human body, by being wore in the pocket, or long held in the hand. Mr. Boyle has found divers tranſparent pebbles, which, when cut, would reſemble diamonds, that might be immediately brought to emit copious and ſtrong ſcented ſteams: and if electrical attractions be owing to the effluvia of bodies excited by rubbing, very ſlight alterations may ſuffice to procure expirations from tranſparent *gems*, many of which are electrical, and even the hardeſt of all, viz. diamonds; one of which Mr. Boyle kept by him, which, upon a little friction, would attract very vigorouſly.

To that part of the objection which pretends *gems* not to be digeſtible by the heat of the ſtomach, it may be replied, that we do not know how far the digeſtion of things in the ſtomach is owing to heat: nor is it proved, that ſuch materials can have no operation on the body, without being digeſted, i. e. in paſſing through it, without undergoing any ſenſible change of bulk, figure, &c. as *gems*, when ſwallowed, are ſuppoſed to do.

For ſome chemiſts make a kind of bullets of regulus of antimony, which they call *pilulæ perpetuæ*; becauſe, when they have performed their operation in the body, and are caſt forth with the excrements, they may be uſed again, and again, for the ſame purpoſe, nor do we know what analogy there may be between ſome juices in the body, and thoſe mineral parts which impregnate *gems*. For though the oculus mundi be reckoned among the rare *gems*; yet, if one of the beſt ſort be, for a while, kept in common water, it will undergo an alteration obvious to the eye.

Add, that Mr. Boyle has, without heat, obtained a manifeſt tincture from ſeveral hard bodies, and even from a tranſparent ſort of *gems*, by means of a faint liquor diſtilled from a vegetable ſubſtance, as harmleſs, and as plentifully eaten, as bread: and whether ſome juices of the body, aſſiſted by the natural heat thereof, may not ſerve for menſtrua to ſome *gems*, we will not ſay: but even the natural heat of a human ſtomach, and, perhaps, of the external parts of the body, may be able, though not to digeſt precious ſtones, yet to fetch out ſome of their virtues: for it is certain, it makes a ſenſible alteration in the hardeſt ſort of them. Witneſs a diamond of Mr. Boyle's, whoſe electrical faculty might be excited, without rubbing, only by a languid degree of adventitious heat; and another, which, by means of water made a little more than lukewarm, might be brought to ſhine in the dark. See PHOSPHORUS. Boyle's Works abridged. vol. i. p. 62

Laſtly, if it be yet objected, that it is not likely *gems* ſhould part with any effluvia, or portions of themſelves, inaſmuch as they loſe none of their weight; it may be anſwered, that the antimonial glaſs and cup imbue wine, and other liquors, with a ſtrong emetic quality, without undergoing any ſenſible diminution of weight. Add, that though common water be not allowed a menſtruum fit to draw any thing from mercury; yet both Helmont, and others, inform us, that a large quantity of it, being kept a day, or two, upon a ſmall proportion of that drug, will acquire a virtue of killing worms, though the mercury retains its former weight.

GEMS, *imitation of antique*. There has been at different times a method practiſed by particular perſons of taking the impreſſions and figures of antique *gems*, with their engravings, in glaſs of the colour of the original *gem*. This has always been eſteemed a very valuable method, and greatly preferable to the more ordinary ones of doing it on ſealing-wax or brimſtone; but, to the misfortune of the world, this art being a ſecret only in the hands of ſome particular perſons, who got their bread by it, died with them, and every new artiſt was obliged to new invent the method, till at length Mr. Homberg, having found it in great perfection, gave the whole proceſs to the world to be no more forgotten or loſt, and ſince that time it has been very commonly practiſed in France, and ſometimes in other places.

Mr. Homberg was favoured in his attempts with all the engraved *gems* of the king's cabinet, and took ſuch elegant impreſſions, and made ſuch exact reſemblances of the originals, and that in glaſſes ſo artfully tinged to the colour of the *gems* themſelves, that the niceſt judges were deceived in them, and often took them for the true antique ſtones. Theſe counterfeit *gems* will ſerve, as well as the original ones, to make more copies from afterwards; ſo that there is no end of the numbers that may be made from one; and there is this farther advantage, that the copy may be eaſily made perfect, though the original ſhould not be ſo, but ſhould have ſuſtained ſome damage from a blow or otherwiſe. Mem. Acad. Par. 1712.

The great care in the operation is to take the impreſſion of the *gem* in a very fine earth, and to preſs down upon this a piece of proper glaſs, ſoftened or half melted at the fire, ſo that the figures of the impreſſion made in the earth may be nicely and perfectly expreſſed upon the glaſs. In general, the whole proceſs much reſembles that of the common founders. But when it is brought to the trial, there is found a number of difficulties which were not to be foreſeen, and which would not at all affect the common works of the founder. For his purpoſe every earth will ſerve, that is fine enough to receive the impreſſions, and tough enough not to crack in the drying: theſe all ſerve for their uſe, becauſe the metals which they caſt are of a nature incapable of mixing with earth, or receiving it into them, even if both are melted together, ſo that the metal always eaſily and perfectly ſeparates itſelf from the mould; but it is very difficult in theſe caſts of glaſs. They are compoſed of a matter which differs in nothing from that of the mould, but that it has been run into this form by the force of fire, and the other has not yet been ſo run; but is on any occaſion ready to be ſo run, and will mix itſelf inſeparably with the glaſs in a large fire; and, conſequently, if there be not great care uſed, as well in the choice of the glaſs, as in the manner of uſing it, when the whole is finiſhed, there will be found great difficulty in the ſeparating the glaſs from the mould, and often this cannot be done without wholly deſtroying the impreſſion.

All earths run more or leſs eaſily in the fire, as they are more or leſs mixed with ſaline particles in their natural formation. As all ſalts make earths run into glaſs, and as it is neceſſary to uſe an earth on this occaſion for the making a mould, it being alſo neceſſary to the perfection of the experiment, that this earth ſhould not melt or run, it is our buſineſs to ſearch out for this purpoſe ſome earth which naturally contains very little ſalt. Of all the ſpecies of earth which Mr. Homberg examined on this occaſion, none proved ſo much diveſted of ſalts, or ſo fit for the purpoſe, as the common tripela, or tripoli, uſed to poliſh glaſs and ſtones. Of this earth there are two common kinds, the one reddiſh, and compoſed of ſeveral flakes or ſtrata; the other yellowiſh, and of a ſimple ſtructure. Theſe are both to be had in the ſhops. The latter kind is from the Levant, and the former is found in England, France, and many other places. This tripela muſt be choſen ſoft and ſmooth to the touch, and not mixed with ſandy or other extraneous matter. The yellowiſh kind is the beſt of the two, and is commonly called Venetian tripoli. This receives the impreſſions very beautifully, and never mixes with the glaſs in the operation, which the red kind ſometimes does. Mr. Homberg uſually employed both kinds at once in the following manner: firſt, powder a quantity of the red tripela in an iron mortar, and ſifting it through a fine ſieve, ſet it by for uſe; then ſcrape with a knife a quantity of the yellow tripela into a ſort of powder, and afterwards rub it till very fine in a glaſs mortar with a glaſs peſtle. The finer this powder is, the finer will be the impreſſion, and the more accurately perfect the caſt. The artificer might naturally ſuppoſe, that the beſt method to obtain a perfect fine powder of this earth, would be by waſhing it in water; but he muſt be cautioned againſt this. There is naturally in this yellow tripoli a ſort of unctuoſity, which when it is formed into a mould keeps its granules together, and gives the whole an uniform gloſſy ſurface: now the waſhing the powder takes away this unctuoſity, and though it render it much finer, it makes it leave a granulated ſurface, not this ſmooth one in the mould, and this muſt render the ſurface of the caſt leſs ſmooth.

When the two tripelas are thus ſeparately powdered, the red kind muſt be mixed with ſo much water as will bring it to the conſiſtence of paſte, ſo that it may be moulded like a lump of dough between the fingers: this paſte muſt be put into a ſmall crucible of a flat ſhape, and about half an inch or a little more in depth, and of ſuch a breadth at the ſurface as is a little more than that of the ſtone whoſe impreſſion is to be taken. This crucible is to be nicely filled with this paſte, lightly preſſed down into it, and the ſurface of the paſte muſt be ſtrewed over with the fine powder of the yellow tripela not wetted. When this is done, the ſtone, whoſe impreſſion is to be taken, muſt be laid upon the ſurface, and preſſed evenly down into the paſte with a finger and thumb, ſo as to make it give a ſtrong and perfect impreſſion; the tripela is then to be preſſed nicely even to its ſides with the fingers, or with an ivory knife: the ſtone muſt be thus left a few moments, for the humidity of the paſte to moiſten the dry powder of the yellow tripela which is ſtrewed over it; then the ſtone is to be carefully raiſed by the point of a needle fixed in a handle of wood, and the crucible being then turned bottom upwards, it will fall out, and the impreſſion will remain very beautifully on the tripela.

If the ſides of the cavity have been injured in the falling out of the ſtone, they may be repaired, and the crucible muſt then be ſet, for the paſte to dry, in a place where it will not be incommoded by the duſt.

The red tripoli being the more common and the cheaper kind, is here made to fill the crucible only to ſave the other, which alone is the ſubſtance fit for taking the impreſſion. When the ſtone is taken out, it muſt be examined, to ſee whether any thing be lodged in any part of the engraving, becauſe if there be any of the tripela left there, there will certainly be ſo much wanting in the impreſſion. When the crucible and paſte are dry, a piece of glaſs muſt be choſen of a proper colour, and cut to a ſize proper for the figure; this muſt be laid over the mould, but in ſuch a manner that it does not touch the figures, otherwiſe it would ſpoil them. The crucible is then to be brought near the ſurface by degrees, and gradually heated till it cannot be touched without burning the fingers; then it is to be placed in the furnace under a muffle, ſurrounded with charcoal. Several of theſe ſmall crucibles may be placed under one muffle, and when they are properly diſpoſed, the aperture of the muffle ſhould have a large piece of burning charcoal put to it, and then the operator is to watch the proceſs, and ſee when the glaſs begins to look bright: this is the ſignal of its being fit to receive the impreſſion. The crucible is then to be taken out of the fire, and the hot glaſs muſt be preſſed down upon the mould with an iron inſtrument, to make it receive the regular impreſſion: as ſoon as this is done, the crucible is to be ſet at the ſide of the furnace out of the way of the wind, that it may cool gradually without breaking. When it is cold, the glaſs is to be taken out, and its edges ſhould be grated round with pincers, which will prevent its flying afterwards, which is an accident that ſometimes happens when this caution has been omitted, eſpecially when the glaſs is naturally tender. The different coloured glaſſes are of different degrees of hardneſs, according to their compoſition, but the hardeſt to melt are always the beſt for this purpoſe, and this is known by a few trials.

If it be deſired to copy a ſtone in relief, which is naturally in creux; or to take one in creux, which is naturally in relief; there needs no more than to take an impreſſion firſt in wax or ſulphur, and to mould that upon the paſte of tripela inſtead of the ſtone itſelf: then proceeding in the manner before directed, the proceſs will have the deſired ſucceſs. Mem. Acad. Par. 1712.

Gem, *Indian, Indica gemma*, a name given by Pliny, and ſome other of the ancients, to a *gem* of a reddiſh colour, which, according to their accounts, afforded a purple ſweat on being rubbed: another kind of it is alſo mentioned, which was white and looked duſty.

GEMARA, or Ghemara, the ſecond part of the Talmud.

The word גמרה, *gemara*, is commonly ſuppoſed to denote a ſupplement; but, in ſtrictneſs, it rather ſignifies complement, perfection: being formed of the Chaldee גמר, *gemar*, or *ghemar*, *to finiſh*, *perfect*, or *complete* any thing.

The rabbins call the Pentateuch, ſimply, the law. The firſt part of the Talmud, which is only an explication of that law, or an application thereof to particular caſes, with the deciſions of the ancient rabbins thereon, they call the Mischna, i.e. ſecond law: and the ſecond part, which is a more extenſive and ample explication of the ſame law, and a collection of deciſions of the rabbins poſterior to the Miſchna, they call *Gemara*, q. d. perfection, completion, finiſhing; becauſe they eſteem it the finiſhing of the law, or an explication, beyond which there is nothing farther to be deſired.

The *Gemara* is uſually called, ſimply, Talmud, the common name of the whole work. In this ſenſe we ſay, there are two *Gemaras*, or Talmuds; that of Jeruſalem, and that of Babylon: though, in ſtrictneſs, the *Gemara* is only an explication of the Miſchna, given by the Jewiſh doctors in their ſchools; much as the commentaries of our ſchool divines on St. Thomas, or the maſter of the ſentences, are an explication of the writings of thoſe authors.

A commentary, Monſ. Tillemont obſerves, was wrote on the Miſchna, by one Jochanan, whom the Jews place about the end of the ſecond century: but Fa. Morin proves, from the work itſelf, wherein mention is made of the Turks, that it was not wrote till the time of Heraclius, or about the year 620; and this is what is called the *Gemara*, or Talmud of Jeruſalem, which the Jews do not uſe or eſteem much, becauſe of its obſcurity.

They ſet a much greater value on the *Gemara*, or Talmud of Babylon, begun by one Aſa; diſcontinued for ſeventy-three years, on occaſion of the wars with the Saracens and Perſians; and finiſhed by one Joſa, about the cloſe of the ſeventh century. See Talmud.

Though the name Talmud, in its latitude, includes both the Miſchna, and the two *Gemaras*; yet it is properly that of Aſa and Joſa, alone, which is meant under that name. This the Jews prize above all their other writings, and even ſet it on a level with ſcripture itſelf: in effect, they conceive it as the word of God, derived by tradition from Moſes, and preſerved, without interruption, to their time. R. Jehuda, and afterwards R. Jochanan, R. Aſa, and R. Joſa, fearing the traditions ſhould be loſt in the diſperſion of the Jews, collected them into the Miſchna and the *Gemara*. See Caraites and Rabbinists.

GEMATRIA, or Gametria, the firſt kind of artificial cabbala uſed by the Jews.

The word is formed from the rabbinical Hebrew גימטריא, formed by corruption of the Greek.

Gematria is a geometrical or arithmetical method of explaining words, whereof there are two kinds; the firſt bearing a more immediate relation to arithmetic, and the latter to geometry.

The firſt conſiſts in taking the numerical value of each letter in a word or phraſe, and giving it the ſenſe of ſome other word, whoſe numerical letters, taken after the ſame manner, make the ſame ſum. For it is to be obſerved, that neither the Hebrews, nor the Greeks, have any numerical figures, beſide the letters of the alphabet.

Thus, a cabbaliſt, taking the two firſt words in Geneſis, בראשית ברא, and by addition getting the ſum total of all the numbers, ſignified by thoſe letters, finds that theſe two words ſignify the ſame as thoſe other three, השנהנברא:בראש. For, as to the firſt, ב is 2; ר, 200; א, 1; ש, 300; י, 10; ת, 400; ב, 2; ר, 200; and א, 1: which, together, make 1116. And, as to the latter, ב ſignifies 2; ר, 200; א, 1; ש, 300; ה, 5; נ, 50; ש, 300; ה, 5; נ, 50; ב, 2; ר, 200; and א, 1: which, ſummed up, yield the ſame number 1116. Whence the cabbaliſt concludes, בראשית־ברא *in the beginning he created*, ſignifies the ſame thing as השנה נברא בראש, *it was created at the beginning of the year*: and, accordingly, the received opinion of the cabbaliſts is, that the world was created at the beginning of the month Tiſri, which was anciently the firſt month in the year, and anſwers to our firſt month in autumn, viz. September.

So, again, in the prophecy of Jacob, Gen. xlix. 10. the words יבא שולה, are underſtood of the Meſſiah, becauſe they make the ſame number with משיח, which ſignifies the Meſſiah. The ſecond kind of *gematria* is much more obſcure and difficult; and, accordingly, is leſs uſed. It is employed in ſeeking for abſtruſe and hidden interpretations in the dimenſions and parts of the buildings mentioned in ſcripture, by dividing, multiplying, &c. thoſe meaſures by each other. Of this we ſhall give an example from ſome Chriſtian cabbaliſts.

The ſcripture ſays, that Noah's ark was 300 cubits long, 50 wide, and 30 high: now the cabbaliſt takes the length for the baſis of his operations; 300, in the Hebrew, is expreſſed by the letter ש, which length, divided by the height 30, gives the quotient 10, the Hebrew character whereof is י; this is to be placed on the right ſide of ש: he then divides the ſame length by the width, 50, the quotient whereof, 6, is expreſſed by a ו, which, being placed on the left ſide of ש, makes, together with the other two letters, the name Jeſus, ישו. Thus, by the rules of the cabbala, it appears, that there is no ſalvation but in Jeſus Chriſt; as, at the deluge, no perſon was ſaved but thoſe in the ark.

After the like manner is the ſame name ישו found in the dimenſions of Solomon's temple. But it is rather an injury than an advantage to the Chriſtian religion, to ſupport it by ſuch frivolous evidences.

GEMELLES, in *Heraldry*, a bearing of bars by pairs, or in couples, in a coat of arms. He beareth gules on a chevron argent, three bars *gemelles* ſable, by the name of Throgmorton.

GEMELLUS, in *Anatomy*, a muſcle of the arm, called alſo biceps *externus*, as having two heads. See *Tab. Anat. (Myol.) fig.* 1. *n.* 26. *fig.* 6. *n.* 14. *fig.* 7. *n.* 13. 13. 13. 13.

One of the heads of this muſcle riſes tendinous from the upper part of the inferior coſta of the ſcapula; whence paſſing between the muſcles to the back part of the humerus, it joins the other head, and both run together to their inſertion at the ancon or tip of the elbow. The *gemellus* is the firſt extenſor of the cubit, and is by many reckoned two diſtinct muſcles; the firſt called *longus*, the latter *brevis*.

GEMINATED *column*. See Column.

GEMINI, in *Aſtronomy*, the *twins*; a constellation, or sign of the zodiac, the third in order, repreſenting Caſtor and Pollux; and it is marked thus, ♊.

The ſtars in the ſign *Gemini*, in Ptolemy's catalogue, are 25; in Tycho's, 25; in Hevelius's, 38; in the Britannic Catalogue, 85. The order, names, longitudes, latitudes, magnitudes, &c. whereof, are as follow:

Names and ſituations of the ſtars.	Bayer's Cha.	Signs.	Longit.			Latitude.			Magnitude
			°	′	″	°	′	″	
That preced. Caſtor's foot, *Propus*	H	♊	26	37	24	0	12	19A	5
			27	13	25	0	9	50B	8
			27	54	29	0	21	05A	8
			28	5	24	0	28	05A	7
			28	18	10	0	57	59B	7
5.									
			28	30	20	0	32	35A	7
In preced. foot of Caſtor	η		29	6	33	0	56	00A	4.5
			29	23	55	0	32	20B	7.8
			29	33	5	0	18	48B	7
		♋	00	0	10	0	11	25B	8
10.									
			0	5	32	0	3	40B	8
			0	6	42	0	8	05A	8
Subſeq. in the ſame foot	μ		0	58	10	0	51	22A	3
			1	38	30	1	42	18A	7.8
			2	10	24	2	32	12A	7
15.									
			2	13	30	2	50	09A	7
			2	24	53	2	31	56A	8
In extrem. of Caſtor's right foot	ν		2	28	20	3	06	03A	4
			3	19	16	7	22	33A	7
			3	23	4	5	29	15A	7.8
20.									
			3	38	19	5	28	26A	6.7
			3	50	58	3	48	43A	7
			4	20	7	6	14	57A	5
Lucid in foot of Pollux	γ		4	46	18	6	47	19A	2.3
			4	48	34	5	2	43B	7
25.									

Names and ſituations of the ſtars.	Bayer's Cha.	Sign.	Longit.			Latitude.			Magnitude.
			°	′	″	°	′	″	
		♋	5	48	2	5	27	34A	5
In Caſtor's upper knee	ι		5	36	37	2	1	30B	3
			5	30	22	5	52	00B	6
			5	35	25	5	51	40B	6.7
	ξ		6	31	47	9	50	27A	6
30.									
In extrem. of Pollux's right foot	ξ		6	52	53	10	07	57A	5.4
			7	2	57	10	20	13A	6
			7	41	5	6	45	50A	6.7
In Caſtor's fore arm	θ		6	47	32	10	59	25B	4
			8	4	35	9	31	47A	6
55.									
That preced. Pollux's knee	d		7	37	39	1	11	15A	6
			8	9	46	2	29	9B	6.6
In the heel of Pollux's 2d foot	e		9	8	19	9	40	15A	6
			8	53	7	3	15	36B	6.7
			9	2	13	3	7	12B	6
40.									
			10	14	10	6	43	20A	6
In Caſtor's thigh	ω		9	52	20	1	30	14B	6
In hind knee of Pollux	ζ		10	39	31	2	5	27A	3.4
In Caſtor's groin	ω		10	42	25	0	0	11B	6.7
	ο		12	11	13	6	34	25A	6
45.									
In fore-arm of Caſtor	τ		11	9	4	7	43	7B	5
			11	34	30	4	21	25B	6
Loweſt in Caſtor's loins	m		12	9	12	1	41	5B	6
			12	3	8	3	17	26B	7
			13	13	35	7	13	25A	6
50.									
			13	21	51	6	13	13A	6.5
Upper in Caſtor's loins	η		12	33	46	2	29	56B	7.6
			12	28	55	5	28	39B	6.7
That againſt Pollux's leg	λ		14	27	14	5	40	37A	5
In Pollux's groin	δ		14	11	36	0	13	7A	3
55.									
In Pollux's belly	q		14	49	39	1	40	58A	6.7
That againſt Pollux's ſide	A		14	31	5[illegible]	2	55	41B	5.6
			14	49	33	0	50	57B	7.8
			14	23	25	5	31	6B	6
In hind ſhoulder of Caſtor	ι		14	38	10	5	43	35B	4 5
60.									
South againſt Pollux's ſide	r		16	00	45	1	41	55A	6
Againſt Caſtor's ear	s		14	44	55	9	45	10B	5
North againſt Pollux's ſide	p		16	01	29	0	29	28A	6
Againſt Caſtor's hind ſhoulder	b		15	22	58	6	9	23B	6
Contiguous thereto, but more S.	b		15	30	51	5	58	20B	6
65.									
In the head of the foremoſt twin, Caſtor	α		15	55	20	10	3	48B	1
			18	13	58	6	2	17A	7.8
Preced. of 4 under Pollux's ſide	k		18	15	17	5	50	21A	6
Subſeq. in Caſtor's ſhoulder	υ		17	01	34	5	11	1B	5
			16	10	28	13	18	13B	5
70.									
Over Caſtor's head	ο		16	23	22	12	52	49B	5
			17	35	36	6	26	15B	6
			17	43	29	6	14	26B	7.6
Second under Pollux's ſide	f		19	20	32	3	47	19B	6
Between the two heads	σ		18	17	56	7	25	46B	5
75.									
Over Pollux's hind ſhoulder	c		19	01	52	4	24	25B	6
In the hind ſhoulder of Pollux	κ		19	20	18	3	2	23B	4.5
In the head of Pollux, and called by his name	β		18	56	09	6	39	27B	2
			20	12	59	0	57	03A	7
Over Pollux's head	π		18	20	47	12	1	41B	5
80.									
Third under Pollux's ſide	g		20	45	53	2	40	59A	6
			20	29	59	1	57	19B	6
Preced. of thoſe that follow Pollux	φ		20	55	12	5	44	38B	5
			21	39	54	1	22	20B	5
Laſt of four under Pollux's ſide	l		22	43	34	0	54	41A	6
85.									

Gemini, in *Anatomy*, two muſcles of the thigh, which ariſe from the protuberance of the iſchium, and are inſerted with the pyriformis into the dent at the root of the great trochanter.

Theſe are called *gemelli* by Winſlow. The ſuperior or ſmaller *gemellus* is fixed to the lower part of the ſpine of the os iſchium, to the ſuperior part of the ſmall iſchiatic notch, and to a rough line which runs croſs the outſide of the iſchium, beginning at the ſpine, and continued under the acetabulum, where it is bent downward.

The inferior and largeſt *gemellus* is fixed to the ſuperior and back part of the tuberoſity of the iſchium, and to a rough impreſſion, which runs croſs the outſide of the iſchium, from the lower extremity of the iſchiatic notch, and is bent upward toward the other line, together with which it forms a ſort of irregular ſemi-circle. Both theſe muſcles have alſo a ſmall inſertion in the inſide of the iſchium, where being united together by a particular membrane, one of them joins the upper ſide, and the other the lower ſide of the *obturator internus*, a little after it has paſſed over the notch. They incloſe it as in a bag, and continue to be fixed to it by fleſhy fibres all the way to its extremity. The ſuperior muſcle terminates wholly with the tendon of the *obturator internus*; but the inferior, being broader, is inſerted likewiſe by fleſhy fibres in the orbicular ligament, and under the tendon of the ſame obturator. Winſlow's Anat. p. 210.

GEMMA. See Gem.

Gemmæ, *ſal*, is peculiarly uſed for *rock* salt, or ſalt dug out of mines.

The name *gemma* is applied to this on occaſion of its luſtre and brilliancy, which is not unlike that of cryſtal. The principal mines of this ſalt are thoſe of Wiliſca, in Poland; thoſe of Eperia, in Upper Hungary; and thoſe of Cardonna, in Catalonia.

The chief uſe of this ſalt is for the powdering or pickling of meats, in places deſtitute of ſalt ſprings, &c.

Gemma, or Gem, among old *Botaniſts*, the turgid bud of a vine, or other tree, when it is beginning to bear; called alſo *oculus*, *eye*.

Gemma *eſt a qua oriens uva ſe oſtendit.* Cic. de Senectute, cap. xv.

Gemma *veneris*, in *Natural Hiſtory*, a name given by ſome of the Latin poets, and other authors in that language, to a *gem*, which was much eſteemed by the Romans, and ſet in rings. It was called by the Greeks *aphrodites*. Many have ſuppoſed this to be the opal; but it is certain from the oldeſt accounts, that the moſt beautiful kind of the amethyſt was the *gem* they called by this name. They diſtinguiſhed the amethyſt, as all the other *gems*, into ſeveral kinds, according to the degrees of the colour; and to the moſt eminent of theſe they gave peculiar names, as is evident in the ſeveral kinds of the emerald and beryl. The worſt amethyſts were thoſe which had very little colour beyond that of cryſtal, and the very beſt were thoſe which had the fine red of the carbuncle, mixed with the purple of the violet, and the whole ſo pale, that a roſe-colour ſeemed blended with them, and predominating over the reſt. Theſe, Pliny tells us, were called *pæderotes* and *anterotes*, and were the *gems* called, from their beauty, *aphrodites lapis* and *gemma Veneris*; but all theſe names have been ſince given by others to the opal.

GEMMEUM, an epithet uſed by the Latins to expreſs ſuch veſſels as were called *dialitha* and *lithocolla* by the Greeks. The more correct Roman authors, however, call this *gemmatum poculum*, and not *gemmeum*; the word *gemmeum* ſignifying properly a vaſe or cup, cut out of a ſingle ſtone, as an agate, or the like; but *gemmatum* expreſſing thoſe fine vaſes of gold, which were ornamented with emeralds and other precious ſtones.

GEMONIÆ *ſcalæ*, or *gradus* Gemonii, among the *Romans*, was much the ſame as a gallows, or gibbet, in England.

Some ſay, they were thus denominated from the perſon who raiſed them; others, from the firſt criminals that ſuffered on them; and others, from the verb *gemo*, *I ſigh* or *groan*.

The *gradus gemonii*, according to Publius Victor, or Sextus Rufus, was a place raiſed on ſeveral ſteps, from whence they precipitated their criminals: others repreſent it as a place whereon offenders were executed, and afterwards expoſed to public view. The *gemoniæ ſcalæ* were in the tenth region of the city, near the temple of Juno. Camillus firſt appropriated the place to this uſe, in the year of Rome 358.

GEMONIDES, a name by which ſome of the ancients have called the peantides; probably the ſame with our ſtalactites, a ſtone famous with them for its ſuppoſed virtue in promoting delivery.

GEMOTE, or Gemot, *conventus*, a Saxon word, denoting a meeting or aſſembly.

Omnis homo pacem habeat eundo ad gemotum *& rediens de* gemoto, *niſi probatus fur fuerit.* LL. Ed. Conf. See Wittena.

GEMURSA, a word uſed by the ancient writers on *Medicine*, for a diſtemper which was an excreſcence of fleſh between the toes, a diſeaſe not known with us.

GENA. See Cheek.

GENÆ *quadratus*. See Quadratus.

GENDARMES, or Gens d'Armes, q. d. men of arms, a term uſed among the French for a ſelect body of horſe-guards; becauſe they ſucceeded the ancient men of arms, who were armed at all points, and thence were called *gendarmes*.

At preſent, the troops of the king's guard de corps, the muſqueteers, and light-horſe, are reputed to belong to the gendarmerie.

The *grand-gendarmes*, ſometimes called ſimply the *gendarmes*, are a troop of gentlemen, to the number of about 200, and in time of war 240, who guard the king's perſon. The king himſelf is their captain, and one of the prime peers the captain-lieutenant, under whom are two ſub-lieutenants, three enſigns, and three guidons. When the king marches with all his houſhold troops, the *gens d'armes* cloſe the march. They were eſtabliſhed about the year 1665.

Their device is a thunder-bolt falling from heaven, with the motto, *Quo jubet iratus Jupiter.* There are alſo, beſide theſe, *gens d'armes* of the queen, the dauphin, &c.

The *gendarmery*, at preſent, is a body of horſe, conſiſting of ſixteen companies, forming eight ſquadrons, viz. the Scotch *gendarmes*, the Engliſh *gendarmes*, the Burgundy *gendarmes*, and the Flemiſh *gendarmes*, which four companies compoſe the king's *gens d'armes*, or life-guard. The other companies take their names from the princes who command them as captains, viz. the queen's *gendarmes*, the queen's light-horſe; the dauphin's *gendarmes*, the dauphin's light-horſe; the duke of Burgundy's *gendarmes*, the duke of Burgundy's light-horſe; the duke of Orleans's *gendarmes*, &c. each troop, at a medium, conſiſts of ſeventy-ſix *gendarmes*, or light-horſe. Each company is divided into two brigades, one commanded by the captain-lieutenant, and the other by the ſub-lieutenant; and the ſubordinate officers are an enſign and guidon.

GENDER, Genus, in *Metaphyſics*. See Genus.

Gender, in *Grammar*, denotes a diviſion or diſtinction of nouns, or names, according to the different ſexes of the things they denote.

It has been thought proper, in order to render diſcourſe more expreſs and diſtinct, as alſo to embelliſh it by a variety of terminations, to contrive certain diverſities in adjectives, accommodated to the ſubſtantives they are applied to; whence, from a regard to that notable difference there is between the two ſexes, all nouns ſubſtantives have been diſtinguiſhed into maſculine and feminine; and the nouns adjectives alſo varied to correſpond therewith.

Mr. Harris obſerves, that in the diſtribution of *genders*, ſuch ſubſtantives might have been conſidered as maſculine, which were conſpicuous for the attributes of imparting or communicating; or which were, by nature, active, ſtrong, and efficacious, and that indiſcriminately whether to good or ill; or which had claim to eminence, either laudable or otherwiſe: the feminine, on the contrary, were ſuch as were conſpicuous for the attributes either of receiving, of containing, or of producing and bringing forth; or which had more of the paſſive in their nature than of the active; or which were peculiarly beautiful and amiable; or which had reſpect to ſuch exceſſes as were rather feminine than maſculine. Thus the ſun, the ſky, time, death, God, &c. are maſculine; but the moon, the earth, a ſhip, a city, country, virtue, fortune, &c. are feminine. Hermes, p. 44, &c.

But as there was an infinity of words, which had no proper relation, either to the one ſex, or the other, they had *genders* aſſigned them, rather out of caprice, than reaſon; and hence it is, that the *gender* of a noun is frequently dubious and fluctuating. Though, as there are ſubſtantives that have evidently no ſex, the neuter *gender* expreſſing ſuch ſubſtances is as natural and rational a diſtinction as either of the others.

It ſhould here, however, be obſerved, that this inſtitution of *genders* was not made with deſign and deliberation by the maſters of language, but was introduced by cuſtom and uſage. At firſt, there was only a difference between the names of animals, when ſpoke of males and females; and, by degrees, the ſame regulation was extended to other things: the grammarians have only noted and allowed what uſage had eſtabliſhed. The oriental languages frequently neglect the uſe of *genders*; and the Perſian language has abſolutely none at all, which is no diſadvantage; the diſtinction of *genders* being in great meaſure uſeleſs.

The Latins, Greeks, &c. generally content themſelves to expreſs the different *genders* by different terminations, as *bonus equus*, a *good horſe*; *bona equa*, a *good mare*, &c. But in Engliſh we frequently go farther, and expreſs the difference of ſex by different words; as *boar*, *ſow*; *boy*, *girl*; *buck*, *doe*; *bull*, *cow*; *cock*, *hen*; *dog*, *bitch*, &c.

We have only about twenty-four feminines, diſtinguiſhed from the males, by the variation of the termination of the male into *eſs*; of which number are *abbot*, *abbeſs*; *count*, *counteſs*; *actor*, *actreſs*; *heir*, *heireſs*; *prince*, *princeſs*, &c. which is all that our language knows of any thing like *genders*.

The eaſtern languages, as well as the vulgar languages of the weſt, have three *genders*; the maſculine, feminine, and neuter. The Greek and Latin have likewiſe the neuter, common, and the doubtful *gender*; and beſides theſe, they have the epicene, or promiſcuous, which under one ſingle *gender*, and termination, includes both the kinds.

The Engliſh language, with ſingular propriety, following nature alone, applies the diſtinction of maſculine and feminine only to the names of animals; all the reſt are neuter; except when by a poetical or rhetorical fiction, things inanimate and qualities are exhibited as perſons, and conſequently become either male or female. And this gives the Engliſh an advantage above moſt other languages in the poetical and rhetorical ſtyle; for when nouns naturally neuter are converted into maſculine or feminine, the perſonification is more diſtinctly and forcibly marked. Lowth's Grammar, p 44. ed. 1772.

Gender, in *Geometry*. Geometrical *lines* are diſtinguiſhed into *genders*, or *genera*, claſſes, or orders, according to the number of the dimenſions of the equation that expreſſes the relation between their ordinates, and the abſciſſes.

Gender, in *Botany*. } See Genus.
Gender, in *Muſic*, &c. }

GENEALOGICA *arbor*. See Arbor.

GENEALOGY, a ſeries or ſucceſſion of anceſtors, or progenitors; or, a ſummary account of the relations and kindred of a perſon, or family, both in the direct and collateral lines.

The word is Greek, γενεαλογια, which is formed of γενος, *genus*, *proſapia*, *race*, and *lineage*; and λογος, *ſermo*, *diſcourſe*.

In divers chapters, and military orders, it is required, that the candidates produce their *genealogy*, to ſhew that they are noble by ſo many deſcents.

Genealogical table, *genealogical tree*, *genealogical trunk*, or *column*, &c. ſee Arbor.

The *genealogical* degrees are uſually repreſented in circles, ranged over, under, and aſide of each other. The ancients had the like; which they called *ſtemmata*, from a Greek word, ſignifying *crown*, *garland*, or the like.

GENECANTHE, in *Botany*, a name uſed by ſome authors for the black bryony.

GENERAL, ſomething that comprehends all, or extends to a whole genus, or kind.

All the ſciences have ſome *general* principles, or axioms.

A *general* court; *general* councils are particularly called oecumenical.

General *aſſizes*, *averment*, *council*, *diet*, *fee-tail*, *fund*, *geography*, *gravity*, *iſſue*, *nature*. See the ſeveral ſubſtantives.

General *officers*, in an *Army*, are thoſe who do not only command over a ſingle company, or regiment, but whoſe office and authority extend over a body of ſeveral regiments of horſe and foot.

Such are brigadier-*generals*, lieutenant-*generals*, major-*generals*, *generals* of the horſe, of the foot. See General, below. See alſo Paymaster-*general*, Commissary-*general*, Muster-*maſter-general*, &c. and Pay.

We have alſo officers in law, in the revenues, &c. diſtinguiſhed by the appellation of *general*: as, attorney-*general*, solicitor-*general*, &c. receiver-*general*, comptroller-*general*, &c.

General *pauſe*, *qualities*, *tail*. See the ſubſtantives.

General *terms*, or *words*, are ſuch as expreſs or denote *general* ideas.

Ideas become *general*, by ſeparating from them the circumſtances of time, place, or any other ideas that may determine them to this or that particular exiſtence.

By this way of abſtraction they become capable of repreſenting more individuals than one; each of which having a conformity to that abſtract idea, is of that ſort.

All things, Mr. Locke obſerves, that exiſt, being particulars, it might be expected that words ſhould be ſo too in their ſignification; but we find it quite contrary; for moſt of the words that make all languages, are *general* terms.

This is the effect of reaſon and neceſſity: for, 1. It is impoſſible that every particular thing ſhould have a diſtinct, peculiar name; becauſe it is impoſſible to have diſtinct ideas of every particular thing, to retain its name with its peculiar appropriation to that idea. 2. It would be uſeleſs, unleſs all could be ſuppoſed to have the ſame ideas in their minds: for names applied to particular things, whereof one alone has the ideas in his mind, could not be ſignificant, or intelligible to another, who is not acquainted with all thoſe particular things which had fallen under his notice. 3. It would be of no great uſe for the improvement of knowledge; which though founded in particular things, enlarges itſelf by *general* views, to which things reduced into ſorts under *general* names, are properly ſubſervient.

In things, where we have occaſion to conſider and diſcourſe of individuals and particulars, we uſe proper names;

names: as in perſons, countries, cities, rivers, mountains, &c.

The firſt ideas children get, are only particular; as thoſe of the nurſe, or mother; and the names they give them are confined to theſe individuals: afterwards, obſerving that there are a great many other things in the world that reſemble them in ſhape, and other qualities, they frame an idea, which they find thoſe many particulars do partake in: to that they give, with others, the name, *man*, for example. In this they make nothing new, but only leave out of the complex idea they had of Peter, James, Mary, &c. that which is peculiar to each, and retain only what is common to all. And thus they come to have a *general* name, and a *general* idea.

By the ſame method they advance to more *general* names and notions; for, obſerving ſeveral things that differ from their idea of man, and which cannot, therefore, be comprehended under that name, to agree with man in ſome certain qualities; by retaining only thoſe qualities, and uniting them into one idea, they have another more *general* idea; to which, giving a name, they make a term of a more comprehenſive extenſion.

Thus, by leaving out the ſhape, and ſome other properties ſignified by the name, man; and retaining only body, with life, ſenſe, and ſpontaneous motion, we form the idea ſignified by the name *animal*. After the ſame manner, the mind proceeds to body, ſubſtance, and at laſt to being, thing, and ſuch univerſal terms, which ſtand for any ideas whatſoever.

Hence we ſee the whole myſtery of genus and ſpecies is nothing but abſtract ideas, more or leſs comprehenſive, with names annexed to them: this ſhews us the reaſon why, in defining words, we make uſe of the genus; namely, to ſave the labour of enumerating the ſeveral ſimple ideas, which the next general term ſtands for.

From what has been ſaid, it is plain, that *general* and univerſal belong not to the real exiſtence of things, but are the inventions of the underſtanding, made by it for its own uſe, and concern only ſigns, either words, or ideas. *General* words do not barely ſignify one particular thing; for then they would not be *general* terms, but proper names: neither do they ſignify a plurality; for then man and men would ſignify the ſame thing; but what they ſignify is a ſort of things; and this they do, by being made ſigns of abſtract ideas in the mind; to which ideas, as things exiſting are found to agree, ſo they come to be ranked under that name, or to be of that ſort.

The eſſences then of the ſorts, or ſpecies of things, are nothing but theſe abſtract ideas.

It is not denied here, that nature makes things alike, and ſo lays the foundation of this ſorting and claſſing; but the ſorts or ſpecies themſelves are the workmanſhip of human underſtanding; ſo that every diſtinct abſtract idea is a diſtinct eſſence; and the names that ſtand for ſuch diſtinct ideas, are the names of things eſſentially different. Thus oval, circle, rain, and ſnow, are eſſentially different. See this further illuſtrated under ABSTRACTION, ESSENCE, IDEA, and SUBSTANCE.

GENERAL *verdict*, *warrant*, *wind*. See the ſubſtantives.

GENERAL *of an army* is the chief commanding officer; whoſe buſineſs is to regulate the march and encampment of the army; to chooſe the moſt advantageous ground in the day of battle, to diſpoſe the army, to poſt the artillery, and to ſend his orders, wherever there is occaſion, by his aids-de-camp. At a ſiege he is to cauſe the place to be inveſted, to regulate the approaches and attacks, to viſit the works, and to ſend out detachments for ſecuring the convoy, and for foraging. See GENERALISSIMO.

The natural qualities of a *general* ſhould be a martial genius, a ſolid judgment, a healthy robuſt conſtitution, intrepidity and ſelf-poſſeſſion on critical occaſions, goodneſs of heart, liberality, and birth: he ſhould alſo be of a mean age, neither too young, becauſe he would want prudence and experience, nor too old, becauſe he would want vivacity and activity. He ſhould be ſteady and uniform in his conduct, affable in his diſpoſition, and yet inflexible in maintaining the diſcipline of his army. His acquired qualities ſhould be ſecrecy, juſtice, ſobriety, temperance, knowlege of the art of war both from theory and practice, the art of commanding and of ſpeaking with preciſion; great attention in preſerving the lives and ſupplying the wants of the ſoldiers, and a conſtant ſtudy of the characters of the officers of his army, ſo that he may be capable of employing them according to their reſpective talents. His conduct appears in eſtabliſhing his magazines in the moſt convenient places; in examining the country, that he may not engage his troops too far, while he is ignorant of the means of bringing them off; in procuring ſubſiſtence for them; and in ſelecting the moſt advantageous poſts for fighting, retreating, or ſhunning a battle. His experience inſpires his army with confidence; his quality, by creating reſpect, augments his authority; his liberality enables him to procure intelligence of the ſtrength and deſigns of the enemy, and thus to take the moſt ſucceſsful meaſures. In a word, a *general* ought to be fond of glory, to have an averſion to flattery, to render himſelf beloved, and to keep a ſtrict diſcipline and ſubordination.

GENERAL *of the artillery*. See ORDNANCE.

GENERAL *of horſe* is an officer next under the chief *general*, who has an abſolute command of the horſe of an army, above the *lieutenant-generals*.

GENERAL *of foot* is an officer under the chief *general*, who has an abſolute command of the foot of the army.

GENERAL, *adjutant*, is an officer who attends the *general*, aſſiſts in council, and carries the *general's* orders to the army. He diſtributes the daily orders to the majors of brigade. He is likewiſe charged with the general detail of the duty of the army. The majors of brigade ſend every morning to the adjutant-*general* an exact return by battalion and company, of the men of their brigade. In a day of battle the adjutant-*general* ſees the infantry drawn up; after which he places himſelf by the *general*, to receive any orders which may regard the corps of which he has the detail. In a ſiege, he orders the number of workmen required, and ſigns the warrants for their payment. He receives the guards of the trenches at their rendezvous, and examines their condition; he gives and ſigns all orders for parties; he has an orderly ſerjeant from each brigade of infantry in the line, to carry ſuch orders as he may have occaſion to ſend from the *general*.

GENERAL is alſo uſed, in a monaſtic ſenſe, for the chief of an order; or of all the houſes or congregations eſtabliſhed under the ſame rule.

Thus we ſay, the *general* of the Ciſtercians, the Franciſcans, &c.

F. Thomaſſin derives the origin of *generals* of orders from the privileges granted by the ancient patriarchs to the monaſteries ſituate in their capital cities. By ſuch means they were exempted from the juriſdiction of the biſhop, and immediately ſubjected to that of the patriarch alone.

GENERAL *of the Jeſuits*. See JESUITS, and ADJUTANT.

GENERAL is alſo uſed, in the *Military Art*, for a particular march, or beat of DRUM; being the firſt which gives notice, commonly in the morning early, for the infantry to be in readineſs to march.

GENERALISSIMO, called alſo *Captain*-GENERAL, and ſimply GENERAL, is an officer, who commands all the military powers of a nation; who gives orders to all the other general officers; and receives no orders himſelf but from the king.

Monſ. Balzac obſerves, that the cardinal de Richelieu firſt coined this word, of his own abſolute authority, upon his going to command the French army in Italy.

GENERATED, or GENITED, is uſed, by ſome mathematical writers, for whatever is produced, either in arithmetic, by the multiplication, diviſion, or extraction of roots; or in geometry, by the invention of the contents, areas, and ſides; or of extreme and mean proportionals, without arithmetical addition and ſubtraction.

GENERATING *line*, or *figure*, in *Geometry*, is that which, by its motion of revolution, produces any other figure, plane, or ſolid. See GENESIS.

GENERATION, in *Phyſics*, denotes the act of procreating, or producing a thing which before was not: or, the total change or converſion of a body into a new one, which retains no ſenſible part, or mark, of its former ſtate.

Thus, fire is ſaid to be *generated*, when we perceive it to be where before was only wood, or other fuel; or when the wood is ſo changed, as to retain no ſenſible character of wood: thus, alſo, a chick is ſaid to be *generated*, when we perceive the chick, where before was only an egg; or when the egg is changed into the form of a chick.

In *generation*, there is not properly any production of new parts, but only a new modification or manner of exiſtence of the old ones; by this, *generation* is diſtinguiſhed from *creation*.

It is diſtinguiſhed from *alteration*, in that the ſubject, in this latter, remains apparently the ſame; and only the accidents, or affections, are changed; as when the ſame body is to day well, and to-morrow ſick; or that braſs, which before was round, is now ſquare.

Laſtly, *generation* ſtands oppoſed to *corruption*, which is the utter extinction of a former thing: as, when that which before was wood, or an egg, is no longer the one or the other; whence it appears, that the *generation* of one thing is the corruption of another.

The Peripatetics explain *generation* by a change or paſſage from a privation, or want of a ſubſtantial form, to the having of ſuch a form. The moderns allow of no other change in *generation*, than what is local: according to them, it is only a tranſpoſition, or new arrangement of parts; and thus the ſame matter ſhall ſucceſſively undergo an infinity of *generations*.

A grain of wheat, e. gr. is committed to the ground: this, imbibing the humidity of the ſoil, becomes turgid, and dilates to ſuch a degree, that it becomes a plant; and, by a continual acceſſion of matter, ripens by degrees into an ear; and at length into new ſeed. This ſeed ground in the mill, appears in form of flour; which mixed up with water, makes a paſte; whereof with the addition of yeaſt, fire, &c. bread is *generated*; and this bread, broken with the teeth, digeſted in the ſtomach, and conveyed through the canals of the body, becomes fleſh.

Now, in all this ſeries of *generations*, the only thing effected is a local motion of the parts of the matter, and their ſettling again in a different order; ſo that, in reality, wherever there is a new arrangement or compoſition of elements, there is a new *generation*; and therefore *generation* is finally reducible to motion.

Generation is more immediately underſtood of the production of animal and vegetable bodies from ſeed, or the coition of others of different ſexes, but of the ſame genus, or kind.

Some modern naturaliſts maintain, after Monſ. Perrault, that there is not properly any new *generation*; that God created all things at firſt; and that what we call *generations*, are only augmentations and expanſions of the minute parts of the bodies of ſeeds; ſo that the whole ſpecies, to be afterwards produced, were really all formed in the firſt, and incloſed therein; to be brought forth and diſcloſed to view in a certain time, and according to a certain order and œconomy.

The manner wherein the ſeed of the male animal acts on that of the female, in order to impregnate, and render it prolific, has long been enquired after, and remains ſtill a myſtery.

The ancients diſtinguiſhed two kinds of *generation: regular*, called *univocal*; and *anomalous*, called alſo *equivocal*, or *ſpontaneous*.

The firſt is that effected by parent animals of the ſame kind; as that of men, birds, beaſts, &c. The ſecond was ſuppoſed effected by corruption, the ſun, &c. as that of inſects, frogs, &c. But this latter kind is now generally and deſervedly exploded. See Equivocal.

There are two principal theories, or methods of accounting for the *generation* of animals: the one ſuppoſes the embryo, or fœtus, to be originally in the ſeed of the male; the other, in the ovum, or egg of the female.

The *firſt* ſuppoſes the animalcules found in the male ſeed, to be the firſt rudiments of the fœtus; and that the female only furniſhes a proper nidus, and nutriment, to bring them forwards.

The *ſecond* ſuppoſes the firſt rudiments of the animal to be in the ova; and that the male ſeed only ſerves to warm, cheriſh, and ripen the ova, till they fall off out of the ovary into the womb.

Dr. Harvey was of opinion, that all females are furniſhed with eggs; and that *generation* is effected wholly by means of the womb; which conceives the fœtus by a kind of contagion communicated to it by the ſeminal fluid of the male, much in the ſame manner as the loaſt-ſtone communicates magnetiſm to iron. This contagion, he ſuppoſes, acts not only on the uterus, but is communicated to the whole body of the female, which is altogether prolific; though the uterus, he acknowleges, is the only part that is capable of conceiving the fœtus, juſt as the brain is alone capable of forming ideas and notions. This ingenious phyſician and naturaliſt maintains, that the prolific fluid of the male, neither does nor can enter into the womb of the female; but Verheyen has ſince actually found a great quantity of the male ſeed in the matrix of a cow, diſſected ſixteen hours after copulation: and the celebrated Ruyſch, having diſſected a woman who was ſurpriſed in adultery and aſſaſſinated on the ſpot, found a great quantity of the ſeminal liquor of the male, not only in the cavity of the womb, but alſo in the *tubæ uteri*. Other miſtakes into which Dr. Harvey has fallen through the imperfection of the microſcope in his time, notwithſtanding his accuracy and diligence in obſerving, have been ſince detected by Malpighi, Leewenhoeck, and others.

The *firſt* ſyſtem is well illuſtrated by Dr. Geo. Garden. That author, upon comparing the obſervations and diſcoveries of Harvey, Malpighi, De Graaff, and Leewenhoeck, together, concludes it moſt probable, “That all “animals are ex animalculo: that theſe animalcules are “originally in ſemine marium, and not in that of the “female; but that they can never come forward, nor “be formed into animals, without the ova in the fe-“male.”

The 1ſt of theſe points he argues from the three following obſervations.

1. That ſomething has often been obſerved by Malpighi, in the cicatricula of an egg before the incubation, like the rudiments of an animal, in form of a tadpole.

2. From the ſudden appearance and diſplaying of all the parts, after incubation, it ſeems probable, that they are not then actually formed out of a fluid; but that the ſtamina of them have been formerly there exiſtent, and are now expanded. The firſt part of the chick, which is diſcovered with the naked eye, is the punctum ſaliens, and that not till three days and nights of incubation are paſt; on the fifth day the rudiments of the head and body appear. This made Dr. Harvey conclude, that the blood had a being before any other part of the body, and that from it all the organs of the fœtus were both formed and nouriſhed: but by Malpighi's obſervations it appears, that the parts are then only ſo far extended, as to be made viſible to the naked eye; and that they were actually exiſtent before, and diſcernible by glaſſes. After a farther incubation of thirty hours, we ſee the head, the eyes, and the carina, with the vertebræ, diſtinct, and alſo the heart. After forty hours, its pulſe is viſible, and all the other parts more diſtinct, which cannot be diſcerned by the naked eye before the beginning of the fifth day: from whence it ſeems very probable, that even the ſo early diſcovery of thoſe parts of the fœtus by the microſcope, is not the diſcerning of parts newly formed, but only parts more dilated and extended by receiving of nutriment from the colliquamentum; ſo that they ſeem all to have been actually exiſtent before the incubation of the hen. And what Swammerdam has diſcovered in the tranſmutation of inſects, gives no ſmall light to this; ſince he makes it appear, that in thoſe large erucas which feed upon cabbage, if they be taken about the time they retire to be transformed into aurelias, and plunged often in warm water, to make a rupture of the outer ſkin; you will diſcern, through the tranſparency of their ſecond membrane, all the parts of the butterfly, the trunk, wing, feelers, &c. folded up: but that, after the eruca is changed into an aurelia, none of thoſe parts can be diſcerned; but ſo much drenched with moiſture, though they be there actually formed.

3. From the analogy between plants and animals. All vegetables, we ſee, do proceed ex plantula; the ſeeds of vegetables being no other but little plants of the ſame kind, folded up in coats and membranes: whence we may infer, that ſo curiouſly an organized creature as an animal, is not the ſudden product of a fluid, or colliquamentum, but does much rather proceed from an animalcule of the ſame kind, and has all its little members folded up according to their ſeveral joints and plicatures, which are afterwards enlarged and diſtended, as we ſee in plants.

The ſecond point, which our late diſcoveries have made probable, is, that theſe animalcules are originally in the ſeed of the male and not in the female. For,

1. There are obſerved innumerable animalcula in ſemine maſculino, of all animals. Hartſoeker and Leewenhoeck have made this ſo evident, that there ſeems little room to doubt of it. See Animalcules.

2. We obſerve the rudiments of a fœtus in eggs which have been fecundated by the male; though no ſuch thing is viſible in thoſe not yet fecundated. Malpighi, in his obſervations, makes it very probable, that theſe rudiments proceed originally from the male, and not from the female.

3. The reſemblance between the rudiments of the fœtus in ova, both before and after incubation, with the animalcule, makes it very probable that they are one and the ſame. The ſame ſhape and figure, which Mr. Leewenhoeck gives us of the animalcule, Malpighi gives of the rudiments of the fœtus, both before and after incubation; yea, and even the fœtuſes of viviparous animals appear ſo at firſt to the naked eye; whence Dr. Harvey acknowleges, that all animals, even the moſt perfect, are formed of a worm.

4. This gives a rational account of many fœtuſes at one birth; and how, at leaſt, a whole cluſter of eggs in a hen are fecundated by one coition of the male.

5. This gives a new light, as it were, to the firſt prophecy concerning the Meſſiah, that “the ſeed of the wo-“man ſhall bruiſe the head of the ſerpent,” all the reſt of mankind being thus moſt properly and truly the ſeed of the man.

6. The analogy already mentioned, which we may rationally ſuppoſe between the manner of the propagation of plants and animals, does likewiſe make this probable. Every herb and tree bears its ſeed after its proper kind; which ſeed is nothing elſe but a little plant of that kind; which being thrown into the earth, as into its uterus, ſpreads forth its roots, and receives thence its nouriſhment, but has its form within itſelf; and we may rationally conjecture ſome ſuch analogy in the propagation of animals.

The third thing which our diſcoveries make probable is, that animals cannot be formed of theſe animalcula without the ova in feminis, which are neceſſary for ſupplying them with proper nutriment; and this is evinced from the following conſiderations.

1. It appears that an animalcule cannot come forward, if it does not fall into a proper nidus: this we ſee in the cicatriculæ in eggs; and though a million of them ſhould fall into one egg, none of them would come forward, but what were in the centre of the cicatricula; and perhaps the nidus, neceſſary for their formation, is ſo proportioned to their bulk, that it can hardly contain more than one animalcule; which may be the reaſon why there are ſo few monſters. This, we ſee, is abſolutely neceſſary in the oviparous kinds; and the only difference that lies between them and the viviparous, ſeems to be this, that in the latter the ova are properly nothing but the cicatricula, with its colliquamentum, ſo that the fœtus muſt ſpread forth its roots in the uterus, to receive its nouriſhment; but the egg in oviparous animals may be properly termed an uterus, in relation to the fœtus; as it contains not only the cicatricula, with its amnion and colliquamentum; which is the immediate nouriſhment of the fœtus, but alſo the materials which are to be converted into that colliquamentum; ſo that the fœtus ſpreads forth its roots no farther than in the white and yolk of the egg, from whence it derives all its nouriſhment. Now, that an animalcule cannot come forward without ſome ſuch proper nidus, will not be denied; for if there were nothing needful but their being thrown into the uterus, we do not ſee why many hundreds of them ſhould not come forward at once, at leaſt while ſcattered in ſo large a field.

2. That this cicatricula is not originally in utero, ſeems evident from the frequent conceptions which have been found extra uterum: ſuch as the child which continued twenty-ſix years in the woman of Thoulouſe's belly; and the little fœtus found in the abdomen of Mad. de St. Mere, together with the teſticle torn and full of clotted blood; ſuch alſo ſeem to be the fœtus in the abdomen of the woman of Copenhagen, mentioned in the Nouv. de la Rep. des Lett. for Sept. 1685. all the members of which were eaſily to be felt through the ſkin of the belly, and which ſhe had carried in her belly for four years; the ſeven years gravidation related by Dr. Cole; and many other the like inſtances. Now, granting once the neceſſity of a proper nidus for the formation of an animalcule into an animal, theſe obſervations make it probable, that the teſtes are the ovaria appropriated for this uſe; for though the animalcules coming thither in ſuch caſes, may ſeem to be extraordinary, and that uſually the impregnation is in utero; yet it may be collected from hence, that the cicatriculæ or ova to be impregnated are in the teſtibus femineis; for if they were not ſo, the accidental coming of animalcules thither could not make them come forward more than in any other part of the body; ſince they cannot be formed and nouriſhed without a proper nidus.

3. It is acknowledged, that the fœtus in utero, for ſome conſiderable time after conception, has no connexion with the womb; that it ſits wholly looſe in it, and is no other than a little round egg, with the fœtus in the midſt; which ſends forth its umbilical veſſels by degrees, and at laſt lays hold of the uterus. Now from hence it ſeems evident, that the cicatricula, which is the fountain of the animalcule's nouriſhment, does not ſpout from the uterus, but has its origin elſewhere; and falls in thither as into a fit ſoil, from whence it may draw nutriment for the growth of the fœtus: elſe it cannot be eaſily imagined how it ſhould not have an immediate connection with the uterus, from the time of conception.

It is indeed difficult to conceive, how theſe eggs ſhould be impregnated per ſemen maris, both becauſe there is no connexion between the Fallopian tubes, and the ovary for its tranſmiſſion; and becauſe Dr. Harvey could never diſcover any thing of it in utero: but as to the laſt, Mr. Leewenhoeck has cleared that difficulty by the diſcovery of innumerable animals in the tubæ, or cornua uteri, and thoſe living a conſiderable time after coition. And as to the former, we may either ſuppoſe, that there is ſuch an inflation of the tubæ, at the time of coition, as makes them embrace the ovaries; and ſuch an approach of the uterus and its cornua, as that it may eaſily tranſmit the ſeed into the ovary: or elſe, that the ova are impregnated by the animalcules after they deſcend into the uterus, and not in the ovary. The former ſeems probable for this reaſon, that at leaſt a whole cluſter of eggs in a hen will be fecundated by one tread of the cock: now this fecundation ſeems to be in the vitellary, and not in the uterus, as the eggs paſs along from day to day: for it can hardly be ſuppoſed, that the animalcules ſhould ſubſiſt ſo long, being ſcattered looſely in the uterus, as to wait there for many days, for the fecundation of the eggs as they paſs along. The latter conjecture has this to ſtrengthen it; that the animalcules are found to live a conſiderable time in the uterus; and that, if they ſhould impregnate the ova in the ovary itſelf, the fœtus would increaſe ſo faſt, that the ova could not paſs through the tubæ uteri; but would either burſt the ovary, or fall down into the abdomen, from the orifices of the tuba; and from hence probably proceed thoſe extraordinary conceptions in the abdomen, out of the uterus. Thus much is urged for the ſyſtem *ab animalculo*. See Foetus.

The retainers to the ſyſtem of *generation ab ovo* contend, that the rudiments of the fœtus are laid in the ovary, and that the female furniſhes the whole matter of the body; which they chiefly ſupport from the conformation in rabbets, ſheep, cows, &c. where the vagina of the womb is ſo long, and ſinuous, that it is ſcarce poſſible the male ſeed ſhould ever arrive within the body of the uterus; eſpecially in cows, whoſe vagina is filled with a thick, viſcid ichor, and the inner orifice of the womb is exactly cloſed: beſides, that the thickneſs of the membranes of the ova ſhould ſeem impenetrable to ſo craſs a matter as the male ſeed. Add, that if animalcula be found in the male ſeed, which, however, will admit of ſome diſpute (that inteſtine motion and agitation of the groſſer particles thereof, which gave riſe to the opinion, being accountable for, from the common laws of warm fluids); yet are the ſame obſerved in vinegar, pepper, water, &c. Add, that it is highly improbable, that thoſe animalcules ſhould contain the rudiments of a future body; ſince their large numbers would produce too plentiful an offspring; inſomuch that it would be neceſſary for 9999 parts of them to be in vain, and periſh: which is contrary to the œconomy of nature in other things.

Analogy is likewiſe urged in favour of this ſyſtem: thus all plants are maintained to ariſe from eggs; ſeeds being no other than eggs under another denomination. All oviparous animals do unexceptionably ariſe from eggs, which the females caſt forth; and it is highly probable, that the viviparous only differ from the oviparous, in that the females lay and hatch their eggs within themſelves.

Againſt this hypotheſis it is urged, that what are uſually called *ova*, or *eggs*, in women, are no other than little cells, or bladders, full of a certain liquor: and how can a drop of liquor paſs for an egg? Add, that theſe imaginary eggs have no proper membrane belonging to them, nor any covering but that of the cell; which ſeems ſo inſeparable therefrom, that, when they are diſcharged, it is hard to conceive how they ſhould take it with them. And beſide, how ſhould they make themſelves a paſſage through the common membrane wherewith the ovary is inveſted, which is of ſo cloſe a texture that it muſt ſeem abſolutely impenetrable by a round body of ſo ſoft a conſiſtence as one of theſe veſicles? Laſtly, veſiculæ, in all reſpects perfectly like ova, have been found in other parts of the body, where it is apparent they could not ſerve for any purpoſes of *generation*. Mem. de l'Acad. Royal. de Scien. an. 1708, 1709.

To this it is anſwered, that ova or veſiculæ have been actually found in diſſections, detached and ſeparated from the ovary, and the ruptures in the membrane of the ovary, through which they had paſſed, remaining ſtill viſible. M. Littre even obſerved ſome of theſe ſeparated ova ſpread with blood-veſſels, like thoſe in the yolks of birds eggs. Nay, more; the ſame author is poſitive, that he ſaw an embryo in one of the ova not yet ſeparated; and could diſcern its head, mouth, noſe, trunk and funiculus umbilicalis, whereby it adhered to the membranes of the ovary. See Generation *of man*.

Sir John Floyer ſtarts a difficulty, which ſeems to preſs equally againſt each ſyſtem, taken ſingly: it is fetched from monſters. In a mule for inſtance, which is the production of a venereal copula between an aſs and a mare, the bulk of the body partakes of the form of the dam, and the feet, tail, and ears, of that of the ſire. Hence it is argued, that the rudiments of the greater part of the fœtus are laid in the ovum; and that the impregnation either conveys or changes the extremities. If the male ſupplied the animalcula, the fœtus ſhould always be of the ſame ſpecies as the male: if the female ſupply it, it ſhould be of her kind; whereas monſters are of both.

Three other ſyſtems of *generation*, which indeed ſo much reſemble one another, that they may be reduced to one, have been lately formed from the experiments and obſervations of Monſ. de Buffon, Monſ. de Maupertuis, and Mr. Needham.

Monſ. de Buffon has endeavoured to prove that the ova in women and quadrupeds are chimeras, and that the ſpermatic animalcule cannot be the FOETUS. He could never find any ova which had detached themſelves from the ovary, and paſſed through the Fallopian tube into the matrix. But he diſcovered a glandular body on the female teſticle, which anatomiſts had miſtaken for one of theſe; which glandular body, at certain times, ſwelled, opened and diſcharged a liquor full of the ſame animalcules, which Lewenhoek took for living creatures in the ſemen of males. And Monſ. de Buffon adds, that he found bodies perfectly ſimilar to theſe, not only in the ſemina of very different animals, but in the infuſions of plants, of grains, and in the juices of fiſh-meats, dreſſed and prepared by the fire ſo as to leave no creature living in them. From whence this ingenious gentleman concludes, that theſe pretended animalcules are not future animals of the ſpecies of the father: he does not even allow them to be true animals, but ſays they are ſomething of an intermediate nature between brute matter and animals; parts organized and animated, the aſſemblage of which forms the fœtus. See Lettres de Monſ. de Maupertuis, let 17.

But the chief difficulty conſiſts in conceiving how the fœtus is formed from theſe elements. Monſ. de Buffon thinks that every part, both of animals and vegetables, contains an infinite number of organic molecules; but that they are much more numerous in the ſeminal liquors of both ſexes, and in the ſeeds of plants, than in other parts. Theſe organic parts ſerve for the nutrition and growth of animals and plants; and the ſurplus of theſe parts, when the other purpoſes to which they are adapted are anſwered, being reunited in proper interior moulds, correſponding to the ſize and ſhape of the animal or vegetable to be produced, forms ſuch animals or vegetables. And thus the unity and diverſity of the ſeveral ſpecies are preſerved and continued. When the quantity of this organic matter is ſmall, as in man and moſt large animals, *generation* only takes place at a certain age, of maturity, and even then the number of animals is but ſmall. In other animals, as in fiſhes and moſt birds, abounding with theſe organic parts, the caſe is juſt the reverſe. With regard to the *generation* of mankind, he ſuppoſes, that the ſuperfluous organic parts are collected together into the ſeminal veſſels of the male and the teſticles of the female, which are the reſervoirs deſtined to receive them; and in theſe reſervoirs, they form a prolific liquor in each ſex, which has been previouſly extracted from every part of the body. Theſe ſeminal liquors, compoſed of parts alike active and perfectly analogous to one another, in form and motion, are mixed in the womb, and contribute, by uniting with each other, to the formation of the fœtus, which is either male or female, as the ſeed of the man or woman abounds moſt with organic molecules; and the infant reſembles either the father or mother, according to the different combinations of theſe molecules. The organic parts of theſe liquors, being equally active, fix and counterbalance each other; ſo that the molecules of each parent are determined to form ſimilar parts to thoſe of the individual that furniſhed them, as the head, arms, &c. The molecules proceeding from the genital parts fix themſelves firſt; and the other molecules arrange themſelves ſucceſſively round theſe in the ſame order which they before occupied in the parent. When a great quantity of the ſeminal liquors of both ſexes is received into the womb, there are formed different ſpheres of attraction, in different parts of theſe liquors; the conſequence of which is that ſeveral fœtuſes are formed at the ſame time. For a fuller account of Monſ. de Buffon's ſyſtem, we muſt refer to his Hiſtoire Naturelle, printed at Paris, 1752, where the ſubject of the *generation* of animals takes up the greateſt part of the third volume.

Monſ. de Maupertuis's ſyſtem, in his Venus Phyſique, has a near reſemblance to that of Monſ. de Buffon, and tends equally to overturn the ſyſtems of the ova, and of the ſpermatic animalcules, which have prevailed among modern phyſiologiſts. He aſcribes the formation of the fœtus to the mixture of the male and female ſeed, by means of the affinity and mutual attraction of the correſponding parts that compoſe them. And to confirm his own and Monſ. de Buffon's opinion, he adds an account of a ſexdigitary family, as he calls it, at Berlin, many of which had a ſupernumerary finger or toe, and ſometimes both. He ſays that this ſexdigitiſm, or quality of having ſupernumerary fingers or toes, has been tranſmitted equally by the father and by the mother; that it was loſt by alliances with thoſe who had but the common number of fingers. He adds, that he does not believe that any one will aſcribe the continuation of ſexdigitiſm in a family, to chance; theſe ſupernumerary parts might have been accidental varieties at firſt, but if they be once eſtabliſhed by a ſufficient number of *generations*, where both ſexes have had them, they then become a foundation for a diſtinct ſpecies; and perhaps all the different ſpecies, diſcernible in animals of the ſame kind, have been multiplied in this way. What we may obſerve in other animals gives ground for theſe ſuſpicions. See the letter before cited.

Mr. Turbervill Needham, in his Summary of Obſervations on the *Generation*, Compoſition, and Decompoſition of animal and vegetable Subſtances, having offered ſeveral objections againſt the ſyſtems of *generation* by eggs and by animalcules, recites a multitude of experiments, from which he concludes, that there are no pre-exiſtent germs formed for the production of animals and vegetables; but that matter, in ſome degree organized in its minute aſſemblages, gives birth to them, and that the gradation between animal and vegetable life is much more familiar and eaſy than it had before appeared to be. He ſuppoſes, in conformity to the doctrine of Monſ. de Buffon, that there are in matter certain organical parts, diſpoſed for the formation of animal and vegetable ſubſtances; that theſe by coalition, conſtitute the *prima ſtamina* of all animal and vegetable bodies, which are ſimple, uniform, and common to all, and conſequently to be found in a certain quantity in every portion of food, aliment, or nutritive juice; and from thence to be digeſted, and when the ſubject becomes adult, to be ſecreted and ſtrained, for the formation of the ſeed of every plant and animal; and in this fluid or ſubſtance to be afterwards found in great abundance. Their organic parts are declared to be moving when diſengaged, living in appearance, and endued with certain organs, but extremely ſimple in their compoſition; being perhaps little more than elaſtic ſprings more or leſs compreſſed, and more or leſs diverſified in the direction of their force. Into theſe organical principles Mr. Needham reſolves that claſs of beings which has been denominated microſcopic animals. He tells us, that ſeeds macerated in water firſt diſunite into ſmall particles, motionleſs and ſeemingly inert; but that theſe particles by degrees afterwards arrive at a power of motion, and ſeem alive, though in reality they are not ſo. The author deduces the ſame obſervations from experiments on the juices of animals, mutton gravy, and the like; and affirms, from the whole, that no axiom was ever more true than that of the ancients, *corruptio unius eſt generatio alterius*, though they draw it from falſe principles, and ſo eſtabliſhed it as to render *generation* equivocal. He then proceeds to the examination of the male ſemen of animals; and affirms, that thoſe animalcules appearing like tadpoles, which others have obſerved in this ſemen, are produced ſubſequently to the evacuation of this fluid, and have their origin from principles contained in this matter, either by evolution of organical parts, as Buffon ſuppoſes, or, as Mr. Needham thinks, from a real vegetation, and a change from the vegetable to the animal life. He ſays, that the ſemen, immediately evacuated, and viewed by the microſcope, appears an homogeneous fluid; that, after a few moments, it begins to liquefy; then to ſhoot out into long filaments and ramifications on every ſide; which afterwards open and divide into moving globules, trailing after them ſomething like long tails; theſe tails are in reality no parts of the animals, but long ſtrings or filaments of the viſcid ſeminal ſubſtance, which gradually become ſhorter and ſhorter, till at laſt the globules get rid of them, and ſwim equally in the fluid. This vegetative power, in parts of the ſemen, of ſhooting into filaments, Mr. Needham found to reſide in all ſubſtances animal and vegetable, and in every part of thoſe ſubſtances, as far as the ſmalleſt microſcopical point; and to this he attributes all that is called animal life in the fluids, produced from vegetables, or the infuſions of them: and from hence he concludes with M. Buffon, that there is a real productive force in nature. He adds, that there is a vegetative force in every microſcopical point of matter, and in every viſible filament of which the whole animal or vegetable texture conſiſts; and he alſo conjectures, that this force extends much farther; becauſe in all his obſervations, the whole ſubſtance, after a certain ſeparation of ſalts and volatile parts, divided into filaments and vegetated into numberleſs zoophytes, which yielded all the ſeveral ſpecies of common microſcopic animals; and theſe animals alſo, after a certain time, ſubſided to the bottom, became motionleſs, reſolved again into a gelatinous filamentous ſubſtance, and gave zoophytes and animals of a leſſer ſpecies. The caſe is the ſame, he ſays, with regard to the ſpermatic animalcules as well as the others, and, therefore, he reduces them all to the ſame claſs of beings. From theſe facts he infers, that every animal or vegetable ſubſtance advances as faſt as it can in its reſolution to return to one common principle, the ſource of all, or a kind of univerſal ſemen, from which its atoms may return again and aſcend to a new life. He obſerves farther, that the ſeveral ſpecies are kept diſtinct, becauſe the ſpecific ſeed of one animal muſt undergo many changes, and acquire ſingular properties peculiar to itſelf, ſince it proceeded from the homogeneous element, in which all kinds coincide. The active vegetating force that reſides in it muſt be preciſe; its quantity muſt be exactly proportioned to the nature, ſolidity, tenacity, quantity, and reſiſtance of the ductile matter through which it paſſes; and theſe combinations are very different in different ſubjects: beſides times and circumſtances produce a change in it, which is a ſource of variety, even during the time of geſtation. Thus, the ſpecific ſemen of one animal can never be moulded into another, and ſeeds may differ ſpecifically from one another by many inviſible principles totally unknown to us, and unattainable by experiments; ſo that there is no danger of falling into equivocal *generation*; however, theſe principles, though capable of diffuſing combinations, admit only of a limited variation, and never deviate farther than is conſiſtent with univocal *generation*. Mr. Needham alſo obſerves, that the animalcules in the ſemen of animals, and in the infuſions and juices of animal and vegetable ſubſtances, are not of the nature of any other beings, or to be ranked with them; that they conſtitute a claſs apart from all others, the characteriſtic of which is, that they are neither generated nor ſubſiſt by nutriment, as other plants and animals do, nor generate in the ordinary way. Of this claſs, he apprehends, is that ſpecies of POLYPE, called the bell animal; owing its formation to the decompoſition of ſome water plants, but approaching towards the nature of other animals, as, when once generated, it eats, and even generates as other animals do. He cloſes his ſyſtem with obſerving, that the lower this new claſs of beings is purſued, the leſs was its vegetating force impeded by reſiſting matter; that the degree of exaltation in the matter from which they were formed was always the higher, and their motion the ſwifter; and he hence conjectures, that an animal ſubſtance may be exalted this way into a poiſon, or a contagious vapour; and that in this way ſtagnating waters become poiſonous, and that even the poiſon of the viper, and other ſuch animals may be owing to the ſame principle; nay, that this vegetative active force, when confined, may be the ſpring of all the mechanical forces of the body, and of the impreſſions which affect the ſoul.

Mr. Needham's ſyſtem may be ſummed up in a few words: he ſuppoſes all ſemen of any kind to be an exalted portion of animal or vegetable matter, ſecreted from the aliment of every generating ſubject, when it is adult, and no farther demand is made for its increaſe or growth; this is endued with a proportionable vegetating force; and is various in various circumſtances, and heterogeneous in different ſubjects, but uniform in its productions, when it falls into a proper matrix, where it finds matter to aſſimilate of a proper quality, and in a quantity ſufficient to form that ſpecific being; whilſt in other circumſtances, it will, if it extravaſates, by the ſame vegetating force, produce the ſeveral phænomena which he has aſcribed to it. Phil. Tranſ vol. xlv. p. 615, &c.

GENERATION *of man*. As it is in human ſubjects that the gradual proceſs of *generation* has been principally inquired into, and the ſtructure and office of the organs ſubſervient thereto, chiefly examined; what the lateſt naturaliſts and anatomiſts have ſettled with regard to it, is reſerved for this head.

The parts of *generation*, then, are different in the different ſexes. Thoſe proper to the male, are the penis, the teſticles, the veſiculæ ſeminales, the vaſa deferentia, the paraſtatæ and the vaſa præparentia; which ſee deſcribed each under its proper article, PENIS, TESTICLE, &c.

The parts of *generation* proper to the female are the PUDENDUM, the CLITORIS, NYMPHÆ, HYMEN, UTERUS, FALLOPIAN TUBES, and OVARIES or TESTES.

The proceſs of *generation*, ſo far as the male contributes to it, is as follows. The penis being erected by an affuſion of blood; as ſhewn under ERECTION; the glans at the ſame time tumefied; and the nervous papillæ in the glans much rubbed, and highly excited, in coitu; an ejaculatory contraction follows, by which the ſeed is preſſed out of the ſeminal veſicles, and expelled with ſome conſiderable force.

The proceſs of *generation* on the one part of the female is thus: the clitoris being erected, after the like manner as the penis in man; and the neighbouring parts all diſtended with blood; they more adequately embrace the penis in coitu: and, by the intumeſcence, preſs out a liquor from the glands about the neck of the womb, to facilitate the paſſage of the penis.

At the ſame time, the fibres of the womb, contracting, open its mouth (which at other times is extremely cloſe) for the reception of the finer part of the ſeed.

Thus the ſeed pregnant with animalcules, is conveyed, with ſome impetus, into the uterus: where being retained by the convulſive reſtriction of the inner membrane thereof, and farther heated and agitated therein, it is prepared to impregnate the ovum.

During the act of coition, the Fallopian tubes growing ſtiff, embrace the ovaries with their ſtrong muſculous edges, like fingers, and compreſs them, till their mouths being dilated and expanded by this embrace, force the egg now ripened, into their cavities, and gradually drive it forwards, by their vermicular motion, till at laſt they protrude it into the cavity of the womb to meet the ſeed, ſome of the animalcules whereof, entering the dilated pores of the glandulous membrane of the egg, are there retained, nouriſhed, grow to its navel, and ſuffocate the reſt of the leſs lively animalcula. And thus is conception performed.

Others rather ſuppoſe the ſeed conveyed from the uterus, through the Fallopian tubes, to the ova; and thus take the impregnation to be firſt performed in the ovaries; or even in the tubæ themſelves, the ova and ſeed meeting by the way.

Others, conſidering the cloſeneſs of the mouth of the womb, and the thickneſs of the membranes of the ovaries, judge it impoſſible for the ſeed to paſs that way; and therefore ſuppoſe it is taken up by the veins which open into the cavity of the vagina, or even the womb; where circulating, it ferments with the maſs of blood; and hence all the ſymptoms which appear in conception. At length it enters and impregnates the egg by the ſmall twigs of arteries which are upon its membranes. This fermentation ſwelling the membranes of the tubæ, they open their cavity, and make room for the ova to paſs into the womb.

The egg impregnated, and cloſe ſhut up in the womb, ſwims in the humours thereof; which, growing more and more ſubtil, enter the patent pores found on one ſide the ovum, and ſoon diſtend, fill, and augment it; and there being ſtill farther attenuated, nouriſh the embryo; thicken and expand the membranes of the ovum, eſpecially in that part by which it grew to the ovary; and thus form the rudiments of a placenta.

The ſame cauſes ſtill continuing, and the pores both of the placenta and the membranes being enlarged; the egg begins to fill the capacity of the womb; and at length its ſtem or calyx grows to the concave ſurface thereof: and thus is the navel-ſtring, or funiculus formed. See FOETUS and *Funiculus* UMBILICALIS.

This ſyſtem is founded on the ſuppoſition of animalcula in the male ſeed. They who ſet them aſide as unconcerned in *generation*, account for it thus: the ſeed, containing volatile, oily, and ſaline parts, as appears from its fetid ſmell, oleaginous ſubſtance, &c. being lodged in the womb, and there farther digeſted and exalted, grows yet more volatile, fetid, pungent, and ſtimulating; and thus, adding to the heat occaſioned by coition, vellicates the nervous fibres of that part, and occaſions a fermentation, and gentle inflammation; and by that means an extraordinary flux of humours to that, and the adjacent parts.

By this means the tubæ become rigid, and fit to graſp the ovaries, which are alſo heated by the effluvia of the ſemen and the warmth of the parts ſurrounding. Upon this there is a greater flux into the ovaries; till at length, the ova, ſome of them at leaſt, by ſuch greater ſupply of nouriſhment, increaſe in bulk; and as thoſe graſped by the edges of the tubæ will be kept warmeſt, and the greateſt flux be made thereto, they will ſooneſt be ripened, fall off, and be received by the tubæ, and conveyed to the womb: where growing, after the manner of the ſeeds of plants, the placenta at length takes hold of, and adheres to, the uterus; from which time the embryo begins to be nouriſhed after a different manner. See GESTATION, NUTRITION and CIRCULATION.

GENERATION of *fiſhes*, *foſſils*, *inſects*, *metals*, *minerals*, *muſhrooms*. See FISH, FOSSILS, INSECTS, &c.

GENERATION of *plants*. See *Generation* of PLANTS. See alſo FARINA, FLOWER, FRUCTIFICATION, PISTIL, and STAMINA.

GENERATION of *ſhells*. See SHELLS.

GENERATION of *ſtones*. See STONES, SPAR, TROCHITES, and CRYSTALS.

GENERATION, in *Mathematics*, is uſed for formation or production. Thus we meet with the *generation* of equations, curves, ſolids, &c.

GENERATION, in *Theology*. The Father is ſaid by ſome divines, to have produced his Word, or Son, from all eternity, by way of *generation*; on which occaſion the word *generation* raiſes a peculiar idea: that proceſſion, which is really effected in the way of underſtanding, is called *generation*, becauſe in virtue thereof, the Word becomes like to him from whom he takes this original; or, as St. Paul expreſſes it, is the figure or image of his ſubſtance, i. e. of his being and nature. See TRINITY and PERSON.

And hence it is, they ſay, that the ſecond Perſon in the Trinity is called the Son.

GENERATION is alſo uſed, though ſomewhat improperly, for GENEALOGY, or the ſeries of children iſſued from the ſame ſtock. Thus, the goſpel of St. Matthew commences with *the book of the* generation *of Jeſus Chriſt*, &c. The latter, and more accurate tranſlators, inſtead of *generation* uſe the word *genealogy*.

GENERATION is alſo uſed to ſignify a people, race, or nation, eſpecially in the literal tranſlations of the ſcripture, where the word generally occurs wherever the Latin has *generatio*, and the Greek γενεα, γενεσις.

Thus, "A wicked and perverſe *generation* ſeeketh a ſign," &c. "One *generation* paſſes away, and another cometh," &c.

GENERATION is alſo uſed in the ſenſe of an age, or the ordinary period of man's life.

Thus we ſay, to the third and fourth *generation*. In this ſenſe, hiſtorians uſually reckon a *generation* the ſpace of thirty-three years, or thereabouts. See AGE.

Herodotus makes three *generations* in an hundred years; which computation appears, from the later authors of political arithmetic, to be pretty juſt. See CHRONOLOGY and POLITICAL *arithmetic*.

GENERICAL *name*, in *Natural Hiſtory*, the word uſed to ſignify all the ſpecies of natural bodies, which agree in certain eſſential and peculiar characters, and therefore all of the ſame family or kind; ſo that the word uſed as the *generical* name equally expreſſes every one of them, and ſome other words expreſſive of the peculiar qualities or figures of each are added, in order to denote them ſingly, and make up what is called the ſpecific name.

Thus the word ROSA, or roſe, is the *generical* name of the whole ſeries of flowers of that kind, which are diſtinguiſhed by the ſpecific names of the red roſe, the white roſe, the apple-roſe, &c. The ignorance of former ages, in the true principles of natural hiſtory, has occaſioned the bodies, which are the objects of it, to be arranged into very unnatural ſeries under the name of *genera*; and theſe have been called by names as improper as the characters they were diſtinguiſhed by. Linnæus has done a great deal in exploding the bad *generical* names in BOTANY, and Artedi has applied his rules about the formation of theſe names with very little difference to the ſubjects of ICHTHYOLOGY.

Many of the *generical* names of fiſh, till the time of this author, were ſo barbarous and obſcure, that it was not eaſy to trace them to their original, or to find whether they were truly Teutonic, Engliſh, Dutch, Swediſh, French, Italian, Spaniſh, Portugueſe, Latin, or Indian. The ignorance of the writers on theſe ſubjects, or their too ſcrupulous adherence to the cuſtoms of their predeceſſors, ſeem to have been principally the cauſes of this, and often an entire negligence. Artedi's rules for *generical* names for fiſh are theſe: whatever fiſh there are which agree in the ſame *generical* characters, and are properly of the ſame genus, theſe ought all to be called by the ſame *generical* name, their differences being only expreſſed by ſpecific ones. This appears ſo plain, ſo juſt, and ſo neceſſary a rule, that it is almoſt a ſhame to lay it down; yet the writers on fiſh, till the time of this author, had very ſeldom obſerved it.

Another barbariſm and impropriety in the *generical* names of fiſh among the old authors, is the uſing of the ſame words to expreſs them, which are alſo the names of other animals, quadrupeds, birds, and reptiles. Theſe are ſubject to great objection; becauſe when they are uſed, it is not eaſy to ſee, in ſome caſes, whether the author is ſpeaking of a bird, a beaſt, or a fiſh. It is therefore one of the general rules of Artedi, that all theſe names are to be aboliſhed, as alſo all thoſe which are common to fiſh, and to plants, minerals, and to the tools of huſbandry, or other ſervices.

Another rule of this excellent author is, that *generical* names that are compoſed of two whole words, unnaturally tied together, are to be aboliſhed, it being eaſy to contrive names leſs barbarous, and as expreſſive: next to theſe are to be exploded thoſe names which are formed of two *generical* words before in uſe, the one broken or cut ſhort, the other preſerved entire.

Another general rule in regard to theſe names is, that all ſuch as are not of either Latin or Greek origin, are to be proſcribed and wholly rejected. This rule cuts off a prodigious number of barbarous words, with which we find the books of authors of former ages on theſe ſubjects crowded.

A ſixth rule for the regulating *generical* names is, that all ſuch are to be aboliſhed as terminate in *oides*, as expreſſing a reſemblance often imaginary, and often alluding to ſomething unknown, or rendered difficult to trace from the changing which the names of other things have undergone ſince the time when it was formed. Theſe words convey no idea of the character of the genus expreſſed by them, except that they are like the other thing alluded to in ſome external, though perhaps not eſſential character: of this kind are the rhomboides, ſcorpoides, &c.

A ſeventh rule in regard to theſe names is, that all ſuch are to be rejected as are barely diminutives, and terminate in *ulus* or *ula*. Theſe convey no other idea, but that of the fiſh being like ſome other fiſh, only leſs: now bigneſs is no *generical* character; therefore if this genus, and that referred to, differ only in ſize, they have no *generical* difference at all; if they do differ otherwiſe, they ſhould be expreſſed. What makes many of theſe names alſo more intolerable is, that they allude not to fiſh, but to other things ſo different in their nature, that there muſt needs be many other more eſſential varieties between them, beſide ſize.

Another general rule is, that ſuch *generical* names as are pure Latin, but are mere adjectives, are to be exploded, there being no reaſon for uſing them as ſubſtantives.

A ninth general rule is, that ſuch names as are formed of Latin words, unknown to the ancient Romans, and formed by the later writers, are to be expelled as barbarous, and others of better credit placed in their ſtead.

Finally, ſuch *generical* names as have been given to fiſh from the places where they are caught are to be rejected; of this kind are the ſardella and ſardina from the iſland of Sardinia, and the ſturio from Aſturia, a province of Spain. Theſe ſorts of names can convey no idea of the nature of the fiſh, and may belong as well to one genus as to another. Artedi, Ichthyolog. p. 10. 69. 73. 79.

Theſe rules of proſcription baniſh ſo many of the received *generical* names of fiſh, that it might be ſuppoſed the whole number was exhauſted, and all the fiſh in the world to be named anew. But this is not the caſe; the *genera* are in reality much fewer in number than they have been uſually ſuppoſed, and therefore fewer words will ſerve to expreſs them, and there yet remain many truly Latin words uſed by the ancient Romans, by which the far greater part of the *genera* may be expreſſed, and the few remaining may be beſt denominated by compound Greek words, expreſſive of their real characters.

Among the the true and genuine Latin, and Græco-Latin names of the *genera* of fiſh, are theſe: accipenſer, amia, anthias, balæna, blennus, clupea, cobites, cyprinus, delphinus, elops, eſox, exocœtus, gobius, labrus, lamia, liparis, mugil, mullus, muræna, perca, phyſeter, priſtis, raja, ſalmo, ſalpa, ſcarus, ſcomber, ſilurus, ſparus, ſqualus, thynnus, torpedo, triton, turſio, uranoſcopus, xiphias, zeus. Theſe will go a great way toward the naming the true *genera*. Artedi has merited greatly of the world, in thus reforming the names of fiſh; and the rules he has laid down, thus given at large, may, with little variation, be made to ſerve for any other author, in whatever branch of knowlege he has occaſion to write.

GENERIS *ſecundi*. See SECUNDI.

GENEROSA, *a gentlewoman*. See GENTLEWOMAN and SPINSTER.

GENESIS, the firſt book of the Old Teſtament, containing the hiſtory of the creation, and the lives of the firſt patriarchs.

The book of *Geneſis* ſtands at the head of the Pentateuch. Its author is held to be Moſes: it contains the relation of 2369 years, viz. from the beginning of the world to the death of Joſeph. The Jews are forbid to read the beginning of Geneſis, and the beginning of Ezekiel, before thirty years of age.

The Hebrews called this book *Bereſchith*, becauſe it begins with that word, which in their language ſignifies *in principio*, or *in the beginning*. The Greeks gave it the name *Geneſis*, Γενεσις, q. d. production, generation, becauſe it begins with the hiſtory of the production or generation of all beings.

This book, beſides the hiſtory of the creation, contains an account of the original innocence and fall of man; the propagation of mankind; the riſe of religion; the general defection and corruption of the world; the deluge; the reſtoration of the world; the diviſion and peopling of the earth; and the hiſtory of the firſt patriarchs to the death of Joſeph. It was eaſy for Moſes to be ſatisfied of the truth of what he delivers in this book, becauſe it came down to him through a few hands: for, from Adam to Noah, there was one man, viz. Methuſelah, who lived ſo long as to ſee them both: in like manner Shem converſed with Noah and Abraham; Iſaac with Abraham and Joſeph, from whom the records of this book might eaſily be conveyed to Moſes by Amram, who was contemporary with Joſeph. Patrick.

GENESIS, in *Geometry*, denotes the formation of a line, plane, or ſolid, by the motion or flux of a POINT, LINE, or SURFACE. See FLUXION and CURVE.

The *geneſis*, or formation, e. gr. of a globe or ſphere, is conceived by ſuppoſing a ſemicircle to revolve upon a right line, drawn from one extreme thereof to the other, called its axis, or axis of circumvolution: the motion or revolution of that ſemicircle is the *geneſis* of the SPHERE, &c. See GLOBE.

In the *geneſis* of figures, &c. the line or ſurface that moves is called the *deſcribent*; and the line round which, or according to which, the revolution or motion is made, the *dirigent*.

GENET, or *Jennet*, ſaid to be derived from from ευγνης, *bene natus*, in the *Manege*, &c. a ſmall-ſized, well-proportioned Spaniſh horſe.

Some alſo give the term *geneta* to well-made Italian horſes.

To ride à la GENETTA, is to ride in the Spaniſh faſhion, i. e. with the ſtirrups ſo ſhort, that the ſpurs bear upon the flanks of the horſe. This is deemed a piece of gallantry in Spain, but not among us.

GENETHLIA, Γενεθλια, in *Antiquity*, a ſolemnity kept in memory of ſome perſon deceaſed.

GENETHLIACI, in *Aſtrology*, perſons who erect horoſcopes, or pretend to foretel what ſhall befal a man, by means of the ſtars which preſided at his nativity.

The word is formed of the Greek γενεθλη, *origin, generation, nativity*.

The ancients called them *Chaldæi*, and by the general name *mathematici*: accordingly, the ſeveral civil and canon laws, which we find made againſt the mathematicians, only reſpect the *genethliaci*, or aſtrologers.

They were expelled Rome, by a formal decree of the ſenate; and yet found ſo much protection from the credulity of the people, that they remained therein unmoleſted. Hence an ancient author ſpeaks of them as *hominum genus, quod in civitate noſtra ſemper & vetabitur, & retinebitur*.

Antipater and Archinapolus have ſhewn, that *genethliology* ſhould rather be founded on the time of the conception than on that of the birth. Vitruvius.

GENETHLIACUM, GENETHLIAC *poem*, is a compoſition in verſe, on the birth of ſome prince, or other illuſtrious perſon; wherein the poet promiſes him great honours, advantages, ſucceſſes, victories, &c. by a kind of prophecy or prediction. Such is the eclogue of Virgil to Pollio, beginning,

Sicelides Muſæ, paulo majora canamus.

There are alſo *genethliac* ſpeeches or orations, made to celebrate a perſon's birth-day.

GENETIDES, in *Natural Hiſtory*, a name given by the ancients to the ſtone, more generally known under the name enchymonites. This was the ſpar incruſted on the tops and ſides of ſubterranean caverns, which they ſuppoſed daily to bring forth more, and therefore gave the powder of it to women at the time of their lying-in, to promote their ſpeedy delivery.

GENETTA, a ſmall animal of the weaſel kind. See GINETTA.

GENETTE, in the *Manege*, a Turkiſh bit, the curb of which is all of one piece, and made like a large ring, and placed above the liberty of the tongue. When they bridle a horſe, they make his chin paſs through this curb, which ſurrounds his beard. This ſort of bit was much uſed at the court of France when Guillet wrote. See GENET.

GENETYLLIS, Γενετυλλις, in *Antiquity*, a ſolemnity celebrated by women in honour of *Genetyllis*, the goddeſs of that ſex.

GENEVA, or GIN, a popular name for a compound water, which is, or ought to be, procured from the berries of the juniper-tree, diſtilled with brandy or malt-ſpirits.

The word is formed from *genevre*, the French name of the juniper-berry.

The beſt *geneva* we now have, is made from an ordinary ſpirit, diſtilled a ſecond time with an addition of ſome juniper-berries; but the original liquor of this kind was prepared in a very different manner. It was a cuſtom in the diſtilling of ſpirits from wort, or other fermented liquors, to add in the working ſome aromatic ingredient, ſuch as ginger, cortex Winteranus, or grains of paradiſe, to take off the bad flavour, and to give a pungent taſte to the ſpirit. Among other things uſed with this intent, ſome tried the juniper-berries, and finding that they gave not only an agreeable flavour, but very valuable virtues alſo to the ſpirit, they brought it to a general cuſtom, and the liquor ſold under this name. The method of adding the berries was to the malt in the grinding: a proper proportion was allowed, and the whole was reduced to meal together, and worked in the common way. The ſpirit thus obtained was flavoured *ab origine* with the berries, and exceeded all that could be made by any other method. Our common diſtillers leave out the juniper-berries entirely from the liquor they now make and ſell under that name. Our chemiſts have let them into the ſecret, that the oil of juniper-berries, and that of turpentine, are very much alike in flavour, though not in price; and the common method of making what is called *geneva* in London, is with common malt ſpirit, and a proper quantity of oil of turpentine diſtilled together. Shaw's Eſſay on Diſtill. p. 7. See DISTILLER.

GENEVIEVE, St. GENEVIÈVE, or St. GENEVIEFVE, fathers or religious of St. *Genevieve*, the name of a congregation of regular canons of the order of St. Auguſtine, eſtabliſhed in France.

The congregation of St. *Genevieve* is a reform of the Auguſtine canons. It was begun by St. Charles Faure, in the abbey of St. Vincent de Senlis, whereof he was a member, in the year 1618.

In the year 1634, the abbey was made elective; and a general chapter, compoſed of the ſuperiors of fifteen houſes who had now received the reform, choſe F. Faure coadjutor of the abbey of St. *Genevieve*, and general of the whole congregation. Such were its beginnings.

It has ſince increaſed very much, and it now conſiſts of above a hundred monaſteries; in ſome whereof the religious are employed in the adminiſtration of the pariſhes and hoſpitals; and in others, in the celebration of divine ſervice, and the inſtruction of eccleſiaſtics in ſeminaries for the purpoſe.

The congregation takes its name from the abbey of St. *Genevieve*, which is the chief of the order, and whoſe abbot is the general thereof. The abbey itſelf took its name from St. *Genevieve*, the patroneſs of the city of Paris, who died in the year 512. Five years after her death, Clovis erected the church of St. *Genevieve*, under the name and invocation of St. Peter, where her relics are ſtill preſerved, her ſhrine viſited, and her image carried with great proceſſions and ceremonies, upon extraordinary occaſions, as when ſome great favour is to be intreated of heaven.

GENIAL, GENIALIS, an epithet applied by the ancients to certain deities, whom they ſuppoſed to preſide over generation.

They were thus called *a gerendo*, from bearing; or, according to the correction of Scaliger and Voſſius, *a genendo, to yean, produce*: yet Feſtus ſays, that they were alſo called *geruli*, which ſeems to require the former reading. M. Dacier, in a note, ſhews that *genere* has the ſenſe of πρατ]ειν.

Among the *genial* gods, *dii geniales*, ſays Feſtus, were water, earth, fire, and air, which the Greeks called *elements*. The twelve ſigns were ſometimes alſo ranked in the number; as alſo the ſun and moon.

GENICULARIS, in *Botany*, a name uſed by ſome authors for the great garden valerian, called *phu*. Ger. Emac. Ind. 2.

GENICULI, in *Botany*, the joints or knots which appear in the ſhoots of plants; whence botaniſts call thoſe marked therewith *geniculate plants*.

GENIO-GLOSSI, in *Anatomy*, the name of a pair of muſcles, proceeding inwardly from the fore-part of the lower jaw, under another called *genio-hyoidæus*; and which, enlarging themſelves, are faſtened into the baſis of the tongue. They ſerve to pull the tongue forward, and to thruſt it out of the mouth.

The word is formed from γενυς, *mentum, the chin*; and γλοσσα, *lingua, the tongue*.

GENIO-HYOIDÆUS, in *Anatomy*, a muſcle of the *os hyoides*, which, with its partner, is ſhort, thick, and fleſhy, ariſing from the internal parts of the lower jawbone, called the chin; and dilating themſelves, are ſoon leſſened again, and inſerted into the ſuperior part of the fore-bone of the *os hyoides*. Theſe pull upwards and forwards the *os hyoides*, and aſſiſt the *genio-gloſſi* in thruſting the tongue out of the mouth.

The word is formed from γενυς, *mentum, the chin*; and αοειδες, *hyoides*.

GENIO-PHARYNGÆUS, in *Anatomy*, is a name given by Winſlow to a muſcular portion, really diſtinct from the *genio-gloſſus*, inſerted in the ſide of the pharynx, and joined to the *genio-gloſſus* all the way to the chin.

GENIPA, in *Botany*, the name of a genus of plants of the *pentandria monogynia* claſs, the characters of which are theſe: the flower is of the monopetalous kind, and is ſhaped like a bell, and very wide at the mouth: the piſtil ariſes from the cup, and is fixed in the manner of a nail to the hinder part of the flower. The cup finally becomes an oval fleſhy fruit, divided into two cells, and containing a number of flatted ſeeds. There is only one known ſpecies of this genus, which is the oval-fruited *genipa* or *genipat* of authors.

GENISTA, in *Botany*. See BROOM.

GENISTELLA, in *Botany*, the name of a ſpecies of *geniſta*.

GENITA-*mana*, in *Mythology*, a goddeſs who preſided over child-birth, to whom the Romans ſacrificed a dog.

GENITAL, Genitalis, in *Anatomy*, ſomething that relates to generation.

Genital parts, denote the parts in both ſexes employed in generation, otherwiſe called αιδοια, *pudenda*, or *pudendum*. See *Tab. Anat. (Splanch.) fig.* 8, 9, 10, 11, 13, 15, &c. See Penis, Testicle, Clitoris, Hymen, &c.

Genital *gods*, *dii genitales*, are ſometimes uſed in the ancient Roman poets for thoſe we otherwiſe call INDIGITES.

Auſonius, in the argument of the fourth book of the Æneid, takes the word in a different manner: the *dii genitales*, he obſerves, were ſuch as were not born of human parents, and were not thus called *quaſi geniti ex hominibus*, but rather becauſe they themſelves had begot human children.

GENITALIA, or Genitories, in *Anatomy*, a name ſometimes given to the teſtes or teſticles of a man, on account of their office in generation.

GENITED, in *Geometry*. See Generated.

GENITES, Γεννητης, or Genetei, among the *Hebrews*, thoſe that deſcended from Abraham, without any mixture of foreign blood.

The Greeks diſtinguiſhed by the name of *genites* ſuch of the Jews as were iſſued from parents, who, during the Babyloniſh captivity, had not allied with any gentile family.

GENITIVE, in *Grammar*, the ſecond caſe of the declenſions of nouns.

The relation of one thing conſidered as belonging in ſome manner to another, has occaſioned a peculiar termination of nouns, called the *genitive* caſe.

In Engliſh, the *genitive* caſe is made by prefixing the particle *of*; in French, *de*, or *du*, &c. though, in ſtrictneſs, there are no caſes at all, or at moſt only two, in either of thoſe languages, inaſmuch as they do not expreſs the different relation of things by different terminations, but only by additional prepoſitions. See Case.

In the Latin, this relation is expreſſed in divers manners: thus we ſay, *caput hominis, the head of a man*; *color roſæ, the colour of a roſe*; *opus Dei, the work of God*, &c.

As the *genitive* caſe ſerves to expreſs very different, and even oppoſite relations, there ſometimes ariſes an ambiguity therefrom: thus, in the phraſe *vulnus Achillis, the wound of Achilles*, the *genitive*, *Achillis*, may either ſignify paſſively the wound Achilles has received, or actively the wound Achilles has given: thus, in that paſſage of St. Paul, *Certus ſum quod neque mors, neque vita, &c. nos poterit ſeparare a charitate Dei in Chriſto, &c.* the *genitive*, *Dei*, has been taken by interpreters in two different ſenſes; ſome, giving it the relation of object, underſtand the paſſage of the love which the elect bear to God in Jeſus Chriſt; whereas others give it the relation of ſubject, and explain it of the love which God bears the elect in Jeſus Chriſt.

In the Hebrew tongue, the *genitive* caſe is marked after a manner very different from that of the Greek and Latin; for whereas in thoſe languages the noun governed is varied, in the Hebrew the noun governing undergoes the alteration.

GENITURA, Geniture, a name which ſome authors give to the SEED, both that of the male and female.

Genitura, in *Botany*, a name given by ſome authors to the anethum or DILL, a plant common in gardens, and uſed in medicine and cookery.

GENIUS, in *Mythology*, a good or evil ſpirit, or demon, whom the ancients ſuppoſed ſet over each perſon, to direct his birth, accompany him in life, and be his guard, until death. Thoſe that attended women were females, and called *Junones*, but thoſe that attended men were males, and called *Genii*. They ſeem, in their original, to be nothing elſe but the particular bent and temper of each perſon deified; and as every one's own temper is in a great meaſure the cauſe of his happineſs or miſery, each of theſe were ſuppoſed to ſhare, and have an equal feeling in all the enjoyments and ſufferings of the perſons they attended. See Horace, lib. ii. ep. 2. ver. 189.

The ancients had their *Genii* of nations, of cities, of provinces, &c. Nothing is more common than the following inſcription on medals: GENIUS POPULI ROM. *the* Genius *of the Roman people:* or, GENIO POP. ROM. *to the* Genius *of the Roman people.*

In this ſenſe, *genius* and *lar* were the ſame thing; as, in effect, Cenſorinus and Apuleius affirm they were.

The Platoniſts, and other eaſtern philoſophers, ſuppoſed the *Genii* to inhabit the vaſt region, or extent of air, between earth and heaven. They were a ſort of intermediate powers, who did the office of mediators between gods and men. They were the interpreters and agents of the gods; communicated the will of the deities to men; and the prayers and vows of men to the gods. As it was unbecoming the majeſty of the gods to enter into ſuch trifling concerns, this became the lot of the *Genii*, whoſe nature was of a middle kind between the two; who derived immortality from the one, and paſſions from the other; and who had a body framed of an aereal matter. Moſt of the philoſophers, however, held that the *genii* of particular men were born with them, and died. Thus Plutarch attributes the ceaſing of oracles partly to the death of the *Genii*.

The heathens, who conſidered the *Genii* as the guardian ſpirits of particular perſons, believed that they rejoiced and were afflicted at all the good and ill fortune that befell their wards. They never or very rarely appeared to them; and then only in favour of ſome perſon of extraordinary virtue or dignity. They likewiſe held a great difference between the *Genii* of different men; and that ſome were much more powerful than others; on which principle it was, that a wizard in Appian bids Antony keep at a diſtance from Octavius, becauſe Antony's *Genius* was inferior to, and ſtood in awe of, that of Octavius.

There were alſo evil *Genii*, who took a pleaſure in perſecuting men, and bringing them evil tidings: ſuch was that in Paterculus, &c. which appeared to Brutus the night before the battle of Philippi. Theſe were alſo called *larvæ*, and *lemures*. See Dæmon.

Genius is more frequently uſed for the force or faculty of the ſoul, conſidered as it thinks or judges.

Thus, we ſay, a happy *genius*, a ſuperior *genius*, an elevated *genius*, a narrow confined *genius*, &c. In like ſenſe we alſo ſay, a work of *genius*, a want of *genius*, &c.

Genius is alſo uſed, in a more reſtrained ſenſe, for a natural talent, or diſpoſition to one thing more than another. In which ſenſe we ſay, a *genius* for verſe, for the ſciences, &c.

GENOA *balſam*, in *Medicine*, the name of a famous compoſition, called alſo the *balſam of Aquapendente* Its great virtues are the curing pains in the extremities of the body, and allaying the violent pains in the bowels, to which many women are ſubject after delivery. The preſcription is given at large in Velſcius, but the medicine is now out of uſe.

GENSD'ARMES. See Gendarmes.

GENTIAN, or Fellwort, *Gentiana*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it hath a permanent empalement to the flower, cut into five acute ſegments: the flower hath one petal, which is tubulous, and cut into five flat parts at the top; it hath five awl-ſhaped ſtamina, ſhorter than the petal, terminated by ſingle ſummits; in the center is ſituated an oblong, cylindrical germen, having no ſtyle, but crowned by two oval ſtigmas, which afterward becomes an oblong taper-pointed capſule with one cell, containing many ſmall ſeeds faſtened to the valves of the capſule. There are twelve ſpecies, one of which is the common *gentian* of the ſhops, whoſe root is one of the principal ingredients in bitters: it grows naturally in the paſtures in Switzerland, and in the mountainous parts of Germany; from whence it is brought to England for medicinal uſe.

The ancients, to render it the more conſiderable, denominated it from Gentius, king of Illyria, who is ſuppoſed to have been the firſt that diſcovered the admirable virtues of this plant.

The root *gentian* is of a yellowiſh colour, and extremely bitter: it is ſometimes as thick as the arm, but more commonly divided into branches no bigger than the thumb: its ſtem grows ſeveral feet high, being very ſmooth and gloſſy, though divided by knots from ſpace to ſpace, out of which ariſe the leaves, which ſomewhat reſemble thoſe of plantain. Its flowers, which likewiſe accompany the knots, are yellow; and its ſeed is flat, round, ſmooth, and light.

The root is to be choſen dry, new, of a moderate thickneſs, free from earth, and furniſhed with little branches or fibres; and if poſſible, that which is dried by the air, which is diſtinguiſhable by the colour, it being blackiſh withinſide when dried in the oven; and of a golden yellow, when in the air.

This root is one of the beſt ſtomachic bitters in the materia medica; it procures an appetite, and greatly aſſiſts digeſtion. It has alſo been extolled as a febrifuge and alexipharmic, and as a certain remedy for the bite of a mad dog. On this occaſion it is not only recommended internally but externally, in the form of a cataplaſm, made of Venice treacle, and the powder of this root, applied to the wound. An ounce of the *gentian* root, with the ſame quantity of freſh lemon-peel, and a dram and a half of dried orange-peel, infuſed for an hour or two in three quarters of a pint of boiling water, make a very elegant bitter. The bitter tinctures are commonly prepared by macerating the above quantity of the root, for ſome days, in a pint of proof ſpirit, with four drams of dried orange-peel, and two of leſſer cardamom ſeeds. See *Stomachic* Elixir.

Wines and malt liquors are likewiſe impregnated with the virtues of this root in different proportions. An ounce of the *gentian* root, the ſame quantity of freſh lemon-peel, and two drams of long pepper, communicate by maceration, without heat, a grateful warmth and bitterneſs to a quart of mountain. The virtue of the root is extracted by all theſe menſtrua, and alſo by rectified ſpirit. The tincture in rectified ſpirit is of an orange-yellow colour; inſpiſſated, it yields an intenſely bitter extract: the watery infuſions are of a dark browniſh red; and leave, when inſpiſſated, an extract, in larger quantity, but leſs bitter, than the other. Theſe extracts are made into pills, with or without aromatic additions. There is an Indian *gentian* brought from America by the Portugueſe, of a pale yellowiſh colour, jointed and marked with knots and circles like ipecacoanha, more intenſely bitter than any of the officinal bitter drugs. This root is greatly commended in obſtinate intermittents, and other diſorders; a ſcruple is ſaid to be more effectual than repeated half drams of bark.

There was a mixture of henbane root brought over ſome years ago with the common *gentian*, which occaſioned violent diſorders, and, in ſome inſtances, proved fatal. This root is of a paler colour than *gentian*, and its longitudinal wrinkles finer and cloſer; the poiſonous root, when cut, appears white, without any degree of the yellow hue, which is deep in *gentian*; and its taſte is not bitter, but mucilaginous. Lewis's Mat. Med.

GENTIAN *water*. See WATER.

GENTIANA *nigra*, a name given by ſome botanical authors to the *mountain* DAUCUS, or *black libanotis*.

GENTIANELLA, *little gentian*, a diminutive of the name *gentiana*, commonly applied to the ſmaller ſpecies of GENTIAN, or the broad-leaved Alpine gentian, with a large flower.

GENTILE, GENTILIS, a pagan, or perſon who adores falſe gods. The Hebrews applied the name גוים, *gentes*, *nations*, to all the people of the earth who were not Iſraelites or Hebrews.

Some will have it that the *gentiles* were thus called in contradiſtinction to the Jews, becauſe the latter had a poſitive law to obſerve in matters of religion, whereas the *gentiles* had only the natural law: hence they are called *gentiles, quia ſunt uti geniti fuerunt*, becauſe they remain as in a ſtate of nature.

The Jews apply the denomination *gentiles* much as the Chriſtians do that of infidels. St. Paul is called the *doctor*, or *apoſtle of the gentiles*, which appellation he firſt gave himſelf, Rom. xi. 13. "As I am the apoſtle of "the *gentiles*, I magnify mine office."

The calling of the *gentiles* to Chriſtianity had been predicted in the Old Teſtament, as it was accompliſhed in the New. See Pſal. ii. 8. Iſa. ii. Joel ii. 29. Matth. viii. 11. xii. 18. Acts xi. 18. xiii. 47, 48. xxviii. 28. Rom. i. 5. iii. 29. xi. 12, 13, 25. Eph. ii. 11. Rev. xi. 2. xxii. 2.

GENTILE, GENTILIS, in the Roman *Law* and *Hiſtory*, a name which ſometimes expreſſes thoſe whom the Romans otherwiſe call *Barbarians*; whether they were allies of Rome, or not. In which ſenſe the word occurs in Ammianus, Auſonius, and the Notitia Imperii.

GENTILIS was alſo uſed, in a more peculiar ſenſe, for all ſtrangers, or foreigners, not ſubject to the Roman empire; as we ſee in the Theodoſian Code, in the title De Nuptiis Gentilium; where the word *gentiles* ſtands oppoſed to *provinciales*, or the inhabitants of the provinces of the empire.

The word is likewiſe uſed, in this ſenſe, in the Greek; but it was not introduced either into that, or the Latin tongue, till after Chriſtianity was eſtabliſhed; it being taken from Scripture.

GENTILITIA *ſacra*, among the Romans. See SACRA.

GENTILITIUS, an epithet uſed by ſome authors, to expreſs DISEASES propagated from father to ſon, and running through whole families; ſuch as are more uſually called hereditary diſorders. Such is the gout very frequently, and often many others.

GENTLE *pit ore*, in *Mineralogy*, a name given by our miners in Suſſex, to a kind of iron ore found in conſiderable plenty in that county, and very readily running in the fire, though not over rich in metal. It is a ſtrong ſubſtance, and lies in ſeveral parts of that county in form of a moderately thick ſtratum. It is of a duſky brown colour, and in ſome places much paler than in others. It has always a great number of glittering ſpangles in it, and very often contains foſſile ſhells, and other extraneous ſubſtances in it.

GENTLEMAN, a perſon of good family, or deſcended of a family which has long borne arms, the grant of which adds gentility to a man's family.

The word is formed of the French *gentilhomme*, or rather of *gentil, fine, faſhionable*, or *becoming*; and the Saxon *man*, q. d. *honeſtus*, or *honeſto loco natus*. The ſame ſignification has the Italian *gentilhuomo*, and the Spaniſh *hidalgo*, or *hijo dalgo*, that is, the ſon of ſomebody, or of a perſon of note. If we go farther back, we ſhall find *gentleman* originally derived from the Latin *gentilis homo*, which was uſed among the Romans for a race of noble perſons, of the ſame name, born of free or ingenuous parents, and whoſe anceſtors had never been ſlaves, or put to death by law. Thus Cicero, in his Topics, *gentiles ſunt, qui inter ſe eodem ſunt nomine ab ingenuis oriundi, quorum majorum nemo ſervitutem ſervivit, qui capite non ſunt diminuti*, &c. Some hold, that it was formed from *gentile*, i. e. *pagan*; and that the ancient Franks, who conquered Gaul, which was then converted to Chriſtianity, were called *gentiles* by the natives, as being yet heathens. Others relate, that towards the declenſion of the Roman empire, as recorded by Ammianus Marcellinus, there were two companies of brave ſoldiers; the one called *gentilium*, and the other *ſcutariorum*; and that it was hence we derived the names *gentleman* and ESQUIRE. This ſentiment is confirmed by Paſquier, who ſuppoſes the appellation *gentiles* and *ecuyers* to have been tranſmitted to us from the Roman ſoldiery; it being to the *gentiles* and *ſcutarii*, who were the braveſt of the ſoldiery, that the principal benefices, and portions of lands, were aſſigned. See BENEFICE. The Gauls obſerving, that, during the empire of the Romans, the *ſcutarii* and *gentiles* had the beſt tenements, or appointments, of all the ſoldiers on the frontiers of the provinces, became inſenſibly accuſtomed to apply the ſame names, *gentilhommes*, and *ecuyers*, to ſuch as they found their kings gave the beſt proviſions or appointments to. Paſq. Rech. lib. ii. cap. 15.

In ſtrictneſs, Chamberlayne obſerves, a *gentleman* is one whoſe anceſtors have been freemen, and have owed obedience to none but their prince: on which footing, no man can be a *gentleman* who is not born ſo.

Among us, the term *gentleman* is applicable to all above yeomen; ſo that noblemen may be properly called *gentlemen*.

In our ſtatutes, *gentilis homo* was adjudged a good addition for a *gentleman*, 27 Edw. III. The addition of knight is very ancient; but that of eſquire, or *gentleman*, was rare, before 1 Hen. V.

We read that J. Kingſton was made a *gentleman* by king Richard II.

As it may juſtly be aſked, what conſtitutes a *gentleman* with us? the reply is eaſy; being a *gentleman*, is being entitled to bear arms. And Mr. Camden obſerves, that the diſtinction of a *gentleman* of coat-armour, or an upſtart, and a *gentleman* of blood, is the bearing of arms from the grandfather; and that he who bears arms from his grandfather, is to all intents and purpoſes a *gentleman* of blood; for which cauſe it is requiſite by the ſtatutes of the Bath, that every knight before his admiſſion, proves himſelf to be ſo qualified; which done it carries with it, if his merit be equal, a paſſport alſo to the order of the garter. Notitia Anglicana, p. 24. See alſo Doddridge's Honour's Pedigree, p. 147. Smith, De Republ. Angl. & Forteſcue, fol. 82.

Guillim, in his chapter of *Gentlemen*, ſays, that they have their beginning either of blood, as being born of worſhipful parents; or that they have done ſomething, either in peace or war, whereby they deſerve to bear arms, and be accounted *gentlemen*. He farther ſays, chap. xxiv. if a *gentleman* be bound apprentice to a merchant or other trader, he hath not thereby loſt his gentility; and he deſires it may be remembered, for the honour of trade, that king Henry VIII thought it no diſhonour to him, when he quitted his queen, to take to his wife Anne, the daughter of Thomas Bullen, ſome time mayor of London. To which may be added the thought, that the firſt William, who founded our royal race, was the grandſon of a tanner.

Sir Edward Coke ſays, that eſquires and *gentlemen* are only names of worſhip, and not of dignity. And before theſe the heralds rank all colonels, ſerjeants at law, and doctors in the three learned profeſſions. See PRECEDENCE.

GENTLEMAN *uſher of the black rod*. See BLACK.

GENTLEMEN *of the bed-chamber*. See BED CHAMBER.

GENTLEMEN *of the chapel*, are officers whoſe duty and attendance is in the royal chapel, being in number thirty; ten whereof are prieſts, and the other twenty called *clerks of the chapel*, who aſſiſt in the performance of Divine ſervice. One of the firſt ten is choſen for confeſſor of the houſhold, whoſe office it is to read prayers every morning to the houſhold ſervants; to viſit the ſick; examine and prepare communicants, and adminiſter the ſacrament.

Another, well verſed in muſic, is choſen firſt organiſt; who is maſter of the children, to inſtruct them in muſic, and what is neceſſary for the ſervice of the chapel; a ſecond is likewiſe an organiſt; a third a luteniſt; and a fourth a violiſt.

There are likewiſe three *vergers*, ſo called from the ſilver rods they uſually carry in their hands; being a ſerjeant, yeoman, and groom of the veſtry: the firſt attends the dean, and ſub-dean; finds ſurplices, and other neceſſaries, for the chapel: the ſecond has the whole care of the chapel; keeps the pews, and ſeats the nobility and gentry: the groom has his attendance within the chapel-door, and looks after it.

Gentlemen *penſioners*. See Pensioner.

GENTLEWOMAN, Generosa, is a good addition for the eſtate and degree of a woman, as *generoſus* is for that of a man; and if a *gentlewoman* be named spinster in any original writ, appeal, &c. it hath been held that ſhe may abate, and quaſh the ſame. 2 Inſt 668.

GENTOOS, in *Modern Hiſtory*, according to the common acceptation of the term, denote the profeſſors of the religion of the bramins, or brachmans, who inhabit the country called Hindoſtan, in the Eaſt Indies, from the word *ſtan*, a *region*, and *hind* or *hindoo*; which Feriſhteh, as we learn from colonel Dow's tranſlation of his Hiſtory, ſuppoſes to have been a ſon of Ham, the ſon of Noah. It is obſerved, however, that Hindoo is not the name by which the inhabitants originally ſtyled themſelves, but, according to the idiom of the shanscrit, which they uſe, *jumbodeep*, from *jumboo*, a *jackall*, an animal common in their country, and *deep*, a large portion of land ſurrounded by the ſea, or *bhertekhunt*, from *khunt*, i. e. a *continent*, and *bherrut*, the name of one of the firſt Indian rajahs. It is alſo obſerved, that they have aſſumed the name of Hindoos only ſince the æra of the Tartar government, to diſtinguiſh themſelves from their conquerors, the Muſſulmen. The term *Gentoo*, or *Gent*, in the Shanſcrit dialect, denotes *animal* in general, and in its more confined ſenſe *mankind*, and is never appropriated particularly to ſuch as follow the doctrines of Brhimā. Theſe are divided into four great tribes, each of which has its own ſeparate appellation; but they have no common or collective term that comprehends the whole nation under the idea affixed by the Europeans to the word *Gentoo*. Mr. Halhed, in the preface to his tranſlation of the Code of *Gentoo* Laws, conjectures, that the Portugueſe on their firſt arrival in India, hearing the word frequently in the mouths of the natives, as applied to mankind in general, might adopt it for the domeſtic appellation of the Indians themſelves, or, perhaps, their bigotry might force from the word *Gentoo* a fanciful alluſion to gentile or pagan. The Hindoos, or *Gentoos*, vie with the Chineſe as to the antiquity of their nation. They reckon the duration of the world by four jogues, or diſtinct ages: the firſt is the Suttee jogue, or age of purity, which is ſaid to have laſted about 3,200,000 years, during which the life of man was 100,000 years, and his ſtature twenty-one cubits; the ſecond, the Tirtah jogue, or the age in which one third of mankind were reprobate, which conſiſted of 2,400,000 years, when men lived to the age of 10,000 years; the third, the Dwapaar jogue, in which half of the human race became depraved, which endured to 600,000 years, when men's lives were reduced to a thouſand years; and fourthly, the Collee jogue, in which all mankind were corrupted, or rather diminiſhed, which the word *collee* imports. This is the preſent æra, which, they ſuppoſe, will ſubſiſt for 400,000 years, of which near five thouſand are already paſt, and man's life in this period is limited to a hundred years. It is ſuppoſed by many authors, that moſt of the *Gentoo* shasters, or ſcriptures, were compoſed about the beginning of the collee jogue; but an objection occurs againſt this ſuppoſition, viz. that the ſhaſters take no notice of the deluge; to which the bramins reply, that all their ſcriptures were written before the time of Noah, and the deluge never extended to Hindoſtan. Nevertheleſs, it appears from the ſhaſters themſelves, that they claim a much higher antiquity than this; inſtances of which are recited by Mr. Halhed.

The doctrine of tranſmigration is one of the diſtinguiſhing tenets of the *Gentoos*. With regard to this ſubject it is their opinion, according to Mr. Holwell, that thoſe ſouls which have attained to a certain degree of purity, either by the innocence of their manners, or the ſeverity of their mortifications, are removed to regions of happineſs, proportioned to their reſpective merits; but that thoſe who cannot ſo far ſurmount the prevalence of bad example, and the powerful degeneracy of the times, as to deſerve ſuch a promotion, are condemned to undergo continual puniſhment in the animation of ſucceſſive animal forms, until, at the ſtated period, another renovation of the four jogues ſhall commence, upon the diſſolution of the preſent. They imagine ſix different ſpheres above this earth, the higheſt of which, called *ſuttee*, is the reſidence of Brhimā, and his particular favourites. This ſphere is alſo the habitation of thoſe men who never uttered a falſhood, and of thoſe women who have voluntarily burned themſelves with their huſbands; the propriety of which practice is expreſly enjoined in the code of the *Gentoo* laws. This code, printed by the Eaſt India Company in 1776, is a very curious collection of Hindoo juriſprudence, which was ſelected by the moſt experienced pundits, or lawyers, from curious originals in the Shanſcrit language, who were employed for this purpoſe from May 1773 to February 1775; afterwards tranſlated into the Perſian idiom, and then into the Engliſh language, by Mr. Halhed.

The ſeveral inſtitutes contained in this collection are interwoven with the religion of the *Gentoos*, and revered as of the higheſt authority. The curious reader will diſcover an aſtoniſhing ſimilarity between the inſtitutes of this code and many of the ordinances of the Jewiſh law, between the character of the bramins or prieſts, and the Levites; and between the ceremony of the ſcape-goat, under the Moſaic diſpenſation, and a *Gentoo* ceremony, called the *aſhummeed jug*, in which a horſe anſwers the purpoſe of the goat. Many obſolete cuſtoms and uſages alluded to in many parts of the Old Teſtament, may alſo receive illuſtration from the inſtitutes of this code. It appears from the code, that the bramins, who are the prieſts and legiſlators of the country, have reſigned all the ſecular and executive power into the hands of another caſt or tribe; and no bramin has been properly capable of the magiſtracy ſince the time of the ſuttee jogue; the only privilege of importance which they have appropriated to themſelves is an exemption from all capital puniſhment; they may be degraded, branded, impriſoned for life, or ſent into perpetual exile; but it is every where expreſly ordained, that a bramin ſhall not be put to death on any account whatſoever.

We have already obſerved, that the Hindoos are divided into four great and original tribes, which, according to the *Gentoo* theology, proceeded from the four different members of Brhimhā, the ſuppoſed immediate agent of the creation under the ſpirit of the Almighty. Theſe tribes are the bramins, which proceeded from his mouth, and whoſe office is to pray, read, and inſtruct; the Chehteree, which proceeded from his arms, whoſe office is to draw the bow, to fight, and to govern; the Bice, proceeding from the belly or thighs, who are to provide the neceſſaries of life by agriculture and traffic; and the Sooder from the feet, which are ordained to labour, ſerve, and travel.

Few Chriſtians, ſays the tranſlator of the *Gentoo* Code, have expreſſed themſelves with a more becoming reverence of the grand and impartial deſigns of Providence in all its works, or with a more extenſive charity towards all their fellow-creatures of every profeſſion, than the *Gentoos*. It is, indeed, an article of faith among the bramins, that God's all merciful power would not have permitted ſuch a number of different religions, if he had not found a pleaſure in beholding their varieties. Thoſe who are deſirous of being farther acquainted with the principles, manners, and various inſtitutes of the *Gentoos*, may conſult Holweil's Intereſting hiſtorical Events, &c. 1766. Dow's Hiſtory of Indoſtan, 4to. 1768. and the Code of *Gentoo* laws. See alſo Shastah and Viedam.

GENUFLEXION, of *genu*, *knee*, and *flecto*, *I bend*, the act of bowing, or bending, the knee; or rather of kneeling down.

The jeſuit Roſweyd, in his Onomaſticon, ſhews, that *genuflexion*, or kneeling, has been a very ancient cuſtom in the church, and even under the Old Teſtament diſpenſation; and that this practice was obſerved throughout all the year, excepting on Sundays, and during the time from Eaſter to Whitſuntide, when kneeling was forbid by the council of Nice.

Others have ſhewn, that the cuſtom of not kneeling on Sundays had obtained from the time of the apoſtles; as appears from St. Irenæus, and Tertullian; and the Æthiopic church, ſcrupulouſly attached to the ancient ceremonies, ſtill retains that of not kneeling at divine ſervice. The Ruſſians eſteem it an indecent poſture to worſhip God on the knees. Add, that the Jews uſually prayed ſtanding. Roſweyd gives the reaſons of the prohibition of *genuflexion* on Sundays, &c. from St. Baſil, Anaſtaſius, St. Juſtin, &c.

Baronius is of opinion, that *genuflexion* was not eſtabliſhed in the year of Chriſt 58, from that paſſage in *Acts* xx. 36. where St. Paul is expreſly mentioned to kneel down at prayer: but Saurin ſhews, that nothing can be thence concluded.

The ſame author remarks, alſo, that the primitive Chriſtians carried the practice of *genuflexion* ſo far, that ſome of them had worn cavities in the floor where they prayed: and St. Jerome relates of St. James, that he had contracted a hardneſs on his knees equal to that of camels.

GENUS, in *Algebra*. The ancient algebraiſts diſtributed that art into two *genera*, or kinds; the logistic, and specious.

Genus, in *Anatomy*. The *genus nervoſum*, or nervous kind, or, as others ſay, the *nervous ſyſtem*, is an expreſſion pretty frequent among authors; ſignifying the nerves, conſidered as an aſſemblage, or ſyſtem, of ſimilar parts, diſtributed throughout the body.

Genus, **Gender**, in *Botany*, denotes a ſyſtem, or aſſemblage, of ſeveral plants, agreeing in ſome one or more common characters in reſpect of the ſtructure of certain parts; whereby they are diſtinguiſhed from all other plants.

The diſtribution of plants into *genera*, and ſpecies, is abſolutely neceſſary to eaſe the memory, and prevent its being oppreſſed, and overburdened with an infinity of different names. The knowlege of a *genus* comprehends, in a kind of miniature, that of all the plants belonging thereto; each being denominated from ſome circumſtance, common to the whole kind, to ſave the embarraſſment of ſo many particular names.

Something like this, even the common people do, eſpecially in the inſtance of ranunculuſes, &c. but in many other plants the difficulty is infinitely greater, as it is hard to find any thing in common among them, whereon to found their *genus*.

Hence botaniſts differ as to the manner of regulating theſe *genera*, and the characters whereon they are to be eſtabliſhed. Mr. Ray's diſtribution, ſee under Plant.

One of the later writers, Monſ. Tournefort, after a long and accurate diſcuſſion, has choſe, in imitation of Geſner and Columna, to regulate them by the flowers and fruit, conſidered together; ſo that all plants, which bear a reſemblance in thoſe two reſpects, are of the ſame *genus*; after which the reſpective differences, as to root, ſtem, or leaves, make the different ſpecies, or ſubdiviſions. See Botany.

Mr. Ray made ſome objections to this diſtribution, which grew into a conſiderable controverſy between the two authors. The queſtion was, whether the flowers and fruits were ſufficient to eſtabliſh *genera*; and to determine whether a plant was of this *genus*, or that.

The ſame M. Tournefort introduces another higher kind of *genus*, or claſs, which is only regulated by the flowers. He obſerves, that he has never hitherto met with above fourteen different figures of flowers; which, therefore, are all that are to be retained in the memory: ſo that a perſon who has a plant in flower, whoſe name he does not know, will immediately ſee what claſs it belongs to, in his Elements of Botany: and the fruit appearing ſome days afterwards, determines its *genus* in the ſame book; and the other parts give its ſpecies.

It is a wonderful eaſe to the memory, to have only fourteen figures of flowers to retain, and, by this means, to be enabled to deſcend to ſix hundred and ſeventy-three *genera*, which comprehend eight thouſand eight hundred and forty-ſix ſpecies of plants; which was the number of thoſe then known by land and ſea. The *genera* of plants, by the sexual *ſyſtem* of Linnæus, which is now generally adopted, are to be regulated by the fructification only: ſo that all vegetables which agree in their parts of fructification are to be put together under one *genus*, and all that differ in thoſe parts are to be ſeparated. The characteriſtic mark of each *genus* is to be determined by the number, figure, proportion, and ſituation of all the parts; but as there are few *genera*, in which all the parts are conſtant in every one of the ſpecies, we ought, wherever it is poſſible, to fix upon ſome one ſingle circumſtance that is conſtant, and make it the eſſential character. There is, however, no one part of fructification, that can be relied on as a conſtant characteriſtic mark of all *genera*; but in ſome, one part of the fructification is found to be the moſt conſtant; and in others, another: the more conſtant any part of the fructification is found through the ſeveral ſpecies of any *genus*, the more it may be relied on with certainty as a characteriſtic mark for that *genus* But if this characteriſtic mark is wanting in any particular ſpecies, caution ſhould be obſerved, leſt *genera* ſhould be confounded that ought to be diſtinguiſhed; and when it is obſerved in ſome ſpecies of another *genus* near akin to it, care ſhould be taken that the *genera* are not multiplied by parting ſpecies that ſhould really ſtand together. See Lee's Introd. to Botany, p. 154, &c.

Genus, **Kind**, in *Logic* and *Metaphyſics*, is that which has ſeveral ſpecies under it; or it is the origin and radix of divers ſpecies, joined together by ſome affinity, or common relation, between them.

Genus is a nature, or idea, ſo common and univerſal, that it extends to other general ideas, and includes them under it.

Thus, animal is ſaid to be a *genus*, in reſpect of man and brute; becauſe man and brute agree in the common nature and character of animal; ſo a right-lined figure, of four ſides is a *genus* in reſpect of a parallelogram, and a trapezium; and ſo, likewiſe, is ſubſtance, in reſpect of ſubſtance extended, which is body; and thinking ſubſtance, which is mind.

A good definition, ſay the ſchoolmen, conſiſts of *genus*, and difference.

In the general, *genus* may be ſaid to be a claſs of a greater extent than ſpecies; and which is not convertible therewith: for though we may ſay, that all body is ſubſtance; yet it cannot be ſaid all ſubſtance is body.

Add, that whatever may be ſaid of the *genus*, may likewiſe be ſaid of the ſpecies under it: e. gr. whatever is ſaid of *ens*, being, will equally hold of the body.

The ſchoolmen define the *genus logicum* to be, an univerſal which is predicable of ſeveral things of different ſpecies; and divide it into two kinds: the one, the *ſummum*, which is the higheſt, or moſt general; and has nothing above it to reſpect as a *genus*: the other the *ſubaltern*, which they likewiſe call *medium*.

Genus *ſummum* is that which holds the uppermoſt place in its claſs, or predicament; or that which may be divided into ſeveral ſpecies, each whereof is a *genus* in reſpect of other ſpecies placed below it.

Thus, in the predicament of things ſubſiſting of themſelves, *ſubſtance* has the place and effect of *genus ſummum*, and is predicated of all the things contained in that claſs: for both Plato, and man, and animal, and even ſpirit, are properly called ſubſtance.

Accordingly, there are as many *ſumma genera*, as there are claſſes of predicaments, or categories.

Genus, *ſubaltern*, is that which, being a medium between the higheſt *genus* and the loweſt ſpecies, is ſometimes conſidered as a *genus*, and ſometimes as a ſpecies.

Thus, bird, when compared with animal, is a ſpecies when to a crow, and eagle, or the like, it is a *genus*.

Genus, again, is divided into *remotum*, remote, where between it and its ſpecies there is another *genus*; and *proximum*, or next, where the ſpecies is immediately under it; as man under animal.

Genus is alſo uſed for a character, or manner applicable to every thing of a certain nature, or condition. In which ſenſe it ſerves to make capital diviſions in divers ſciences; as muſic, rhetoric, botany, anatomy, &c. E. gr.

Genus, in *Muſic*, by the ancients called *genus melodiæ*, denotes a certain manner of ſubdividing the principles of melody, i. e. the conſonant intervals, into their concinnous parts.

The moderns, conſidering the octave as the moſt perfect interval, and that whereon all the other concords depend in the preſent theory of muſic; the diviſion of that interval is conſidered as containing the true diviſion of the whole ſcale.

But the ancients went to work ſomewhat differently: the diateſſaron, or fourth, was the leaſt interval which they admitted as concord; and therefore they ſought, firſt, how that might be moſt concinnouſly divided; from which they conſtituted the diapente, or fifth; and diapaſon, or octave.

The diateſſaron being thus, as it were, the root, or foundation, of the ſcale; what they call the *genera*, kinds, aroſe from its various diviſions; and hence they defined the *genus modulandi*, the manner of dividing the tetrachord, and diſpoſing its four ſounds as to ſucceſſion.

The Greeks conſtituted three ſuch *genera* known by the names of enharmonic, chromatic, and diatonic. The enharmonic was not ſubdivided, but the chromatic was divided into three ſpecies, and the diatonic into two; ſo that the ancients had ſix ſpecies, or different diviſions of the fourth in uſe. The moderns know but four, and one of theſe, the enharmonic, is ſcarce ever met with.

It does not appear that the ancients themſelves could accurately define theſe ſeveral ſpecies. Ariſtoxenus left it to the ear and practice, and did not pretend to aſſign any true proportions in numbers. However, he has attempted to convey ſome idea of theſe *genera* and ſpecies, by ſuppoſing the fourth divided into thirty parts. That is (as Ptolemy underſtands him) he ſuppoſes the difference of a chord and its fourth to be divided into thirty parts; and then aſſigns a certain number of theſe parts to each interval, or diviſion of the various ſpecies. Hence the fourth, containing two tones and a half, the tones will each have twelve parts, and the ſemi-tone ſix.

In the enharmonic, he makes the interval between the hypate and parypate, as alſo between the parypate and the lichanus, to be a *dieſis quadrantalis*, or $\frac{1}{12}$; and from the lichanus to the nete he makes a ditonus, or $\frac{24}{30}$. So that the enharmonic diviſions will be $3+3+24=30$.

In the chromaticum molle, he makes the interval between the hypate and parypate, as alſo from the parypate to the lichanus a triental dieſis, or $\frac{4}{12}$; and from the lichanus to the nete $\frac{22}{12}$, that is, an undivided interval equal to a tone, a ſemitone, and a triental dieſis. Hence the intervals of this ſpecies will be repreſented by the numbers $4+4+22=30$.

In the chromaticum hemiolium, or ſeſquialterum, he makes the interval from the hypate to the parypate, and from thence to the lichanus, a dieſis ſeſquialtera, that is $\frac{3}{2}$ of the enharmonic dieſis, or $4\frac{1}{2}$ parts of his diviſion of the fourth. The remaining undivided interval is of 21 parts; being equal to a tone, a hemitone, and a quadrantal dieſis. This ſpecies will be repreſented by the numbers, $4\frac{1}{2}+4\frac{1}{2}+21=30$; or, to avoid fractions, $9+9+42=60$.

In the chromaticum tonicum, or toniæum, he makes the interval between the hypate to the parypate, and from thence to the lichanus, a hemitone, or $\frac{6}{12}$, and from thence to the nete, a tone and a half, or $\frac{18}{12}$. Hence the ſpecies will be expreſſed by the numbers, $6+6+18=30$.

In the diatonicum molle, he makes the interval between the hypate and parypate a hemitone, or $\frac{6}{12}$, from hence to the lichanus $\frac{9}{12}$, and from this to the nete $\frac{15}{12}$; ſo that this ſpecies will be repreſented by the numbers $6+9+15=30$.

In the diatonicum intenſum or ſyntonum, the interval between the hypate and parypate, is according to him a hemitone; and between the parypate and lichanus, as alſo between the lichanus and nete, is a tone. Hence the expreſſion of this ſpecies will be $6+12+12=30$.

The ſame diviſions are in Euclid; and Ptolemy gives the like proportions from Ariſtoxenus, only doubling the numbers to avoid fractions.

Ariſtoxenus does not pretend that the diviſions he propoſes are accurate. He ſeems to doubt of the diateſſaron being two tones and a half; and of its being at all meaſurable by any ſmall interval, as the hemitone or dieſis. He queſtions whether the enharmonic dieſis be preciſely the fourth part of a tone; or if the chromatic dieſis be its third part; all which doubts are very well grounded. And it ſeems as if this famous muſician had only propoſed his diviſions of the tetrachord, as approximations to convey ſome idea of the different ſpecies to the imagination; and not as an accurate ſtandard to guide the voice, and hand, in ſinging and playing.

This is the doctrine of the ancients concerning their ſix ſpecies of fourths. How to reconcile this to modern notions, and with the true principles of muſic, might be a work of ſome difficulty. Dr. Pepuſch has given us his opinion as to what theſe ſix ſpecies ought accurately to be. How far his opinion is deducible from the remains of the ancient muſicians, has not yet been publicly ſhewn. We have mentioned his doctrine under the heads CHROMATIC, DIATONIC and ENHARMONIC, and ſhall here give them in one ſhort view.

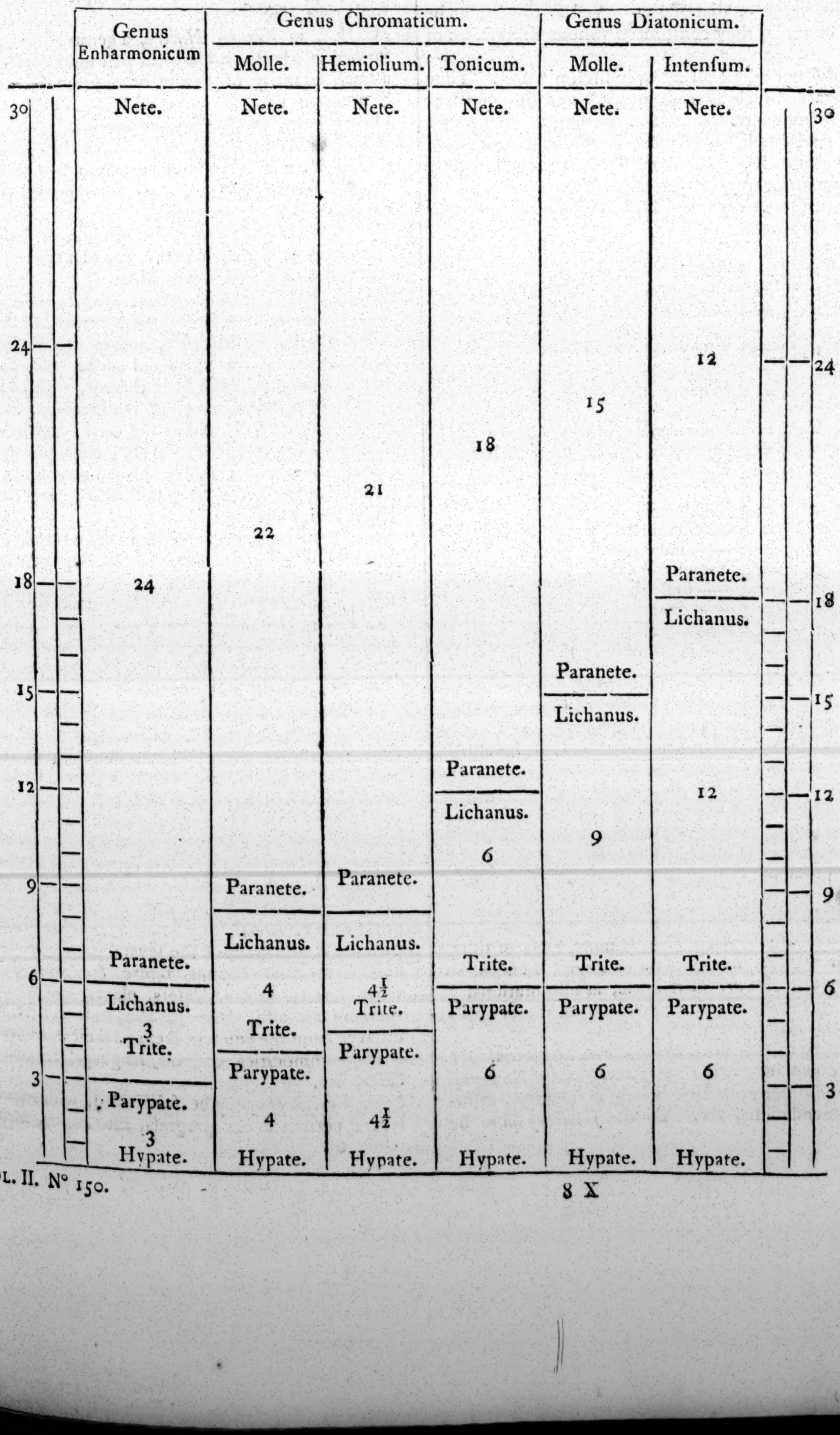
Intervals of the

Enharmonic, $\text{IV}=s+d+\text{III}$.
Chromaticum molle, $\text{IV}=s+s+(3+d)$
Chromaticum ſeſquialterum, $\text{IV}=S+s+3$.
Chromaticum toniæum, $\text{IV}=S+S+(T+s.)$
Diatonicum molle, $\text{IV}=S+2s+(T+d.)$
Diatonicum intenſum, $\text{IV}=S+t+T$.

To underſtand which, obſerve, that *d* ſtands for the dieſis enharmonica, *s* for the ſemi-tone minor, *S* for the ſemi-tone major, *t* for the tone minor, *T* for the tone major, 3 for the third minor, III for the third major, IV for the fourth; and when two intervals are placed within a parentheſis, it ſignifies a ſingle interval equal to the two joined by the ſign of addition +. Thus $(3+d)$ is an interval equal to the third minor and dieſis enharmonica; $(T+s)$ is equivalent to the tone major and ſemi-tone minor, commonly called a ſuperfluous tone; and laſtly $(T+d)$ ſignifies a tone major and dieſis enharmonica, which interval, no more than $(3+d)$ has no particular name. Phil. Tranſ. N° 481. p. 272.

Dr. Wallis has given us a ſynopſis of the *genera* and ſpecies according to Ariſtoxenus; we ſhall here inſert it, as it gives light to the doctrine of the ancient tetrachords.

Generum Synopſis ſecundum Ariſtoxenum.


30
24
18
15
12
9
6
3

Genus Enharmonicum	Genus Chromaticum.			Genus Diatonicum.	
	Molle.	Hemiolium.	Tonicum.	Molle.	Intenſum.
Nete.	Nete.	Nete.	Nete.	Nete.	Nete.
24	22	21	18	15	12
Paranete.	Paranete.	Paranete.	Paranete.	Paranete.	Paranete.
Lichanus.	Lichanus.	Lichanus.	Lichanus.	Lichanus.	Lichanus.
3	4	$4\frac{1}{2}$	6	9	12
Trite.	Trite.	Trite.	Trite.	Trite.	Trite.
Parypate.	Parypate.	Parypate.	Parypate.	Parypate.	Parypate.
3	4	$4\frac{1}{2}$	6	6	6
Hypate.	Hypate.	Hypate.	Hypate.	Hypate.	Hypate.

The gradual approach of the paranete, in the different ſpecies, to the nete, ſhews why this chord was called lichanus. The length of this ſcheme, or the ſide divided into thirty parts, is ſuppoſed to be the difference of any chord, and its fourth. Ptolemy takes theſe diviſions in an aſcending fourth; that is, the longeſt of the two chords, or the whole of one chord, is terminated at hypate; and the termination of the ſhorter chord, or of that part of the long chord ſounding a fourth to the whole, is at nete. So that we muſt imagine ninety parts added upwards to this ſcheme beyond nete; and then, for inſtance, the lengths of the chords, or parts of a chord repreſenting the *diatonicum intenſum* of Ariſtoxenus. according to Ptolemy, will be 120, 114, 102, and 90. Ptolem. Harmon. pag. 92. Edit. Wallis in Oper. tom. iii.

But we muſt obſerve, that the ninety parts might be added downwards in the foregoing ſcheme, from hypate; and then we ſhould have a deſcending fourth expreſſed by the following numbers, 90, 96, 108, and 120, which is moſt perfectly in tune, and gives us the ſemitone major, the tone major, and the tone minor. For $\frac{90}{96}=\frac{15}{16}$ is the proportion of lengths of chords expreſſing the ſemitone major; $\frac{96}{108}=\frac{8}{9}$ is in like manner a tone major; and $\frac{108}{120}=\frac{9}{10}$ is the expreſſion of the tone minor. On the other hand, Ptolemy's numbers are much out of tune, and ſuch as a muſician like Ariſtoxenus dividing a ſtring by his ear could not fall upon. We do not know that any commentator of the ancients ever made this obſervation; but if we purſue it through all the ſpecies, we ſhall find a very ſenſible difference in the expreſſions of the proportions of the various intervals found according to Ptolemy's manner, and thoſe found in the way here mentioned, and exemplified in the diatonicum intenſum. Ariſtoxenus and his followers determined the ſeveral ſpecies, or diviſions of the fourth by intervals, making the whole diateſſaron equal to two tones and a half. But the Pythagoreans ſetting aſide this method, took another, whereby they ſought for three ratios, which added together would produce the ratio of 4 to 3, being the expreſſion of the fourth or diateſſaron. And as this might be variouſly done, ſo they conſtituted various differences of *genera*.

But they did not admit all ratios indiſcriminately. They chiefly regarded ſuch as were multiple and ſuperparticular; and did not admit of the ſuperpartient, but through neceſſity, and much leſs of incommenſurable expreſſions. Ptolemy gives us ſeveral diviſions of the tetrachord, partly of his own and partly of others, which we ſhall here place in one ſhort view from Dr. Wallis's Appendix to Ptolemy's Harmonics.

$\frac{28}{27}$	×	$\frac{36}{35}$	×	$\frac{5}{4}$	=	$\frac{4}{3}$	Enharmonic	of Archytas.
$\frac{28}{27}$	×	$\frac{243}{224}$	×	$\frac{32}{27}$	=	$\frac{4}{3}$	Chromatic	
$\frac{28}{27}$	×	$\frac{8}{7}$	×	$\frac{9}{8}$	=	$\frac{4}{3}$	Diatonic	
$\frac{40}{39}$	×	$\frac{39}{38}$	×	$\frac{19}{15}$	=	$\frac{4}{3}$	Enharmonic	of Eratoſthenes.
$\frac{20}{19}$	×	$\frac{19}{18}$	×	$\frac{6}{5}$	=	$\frac{4}{3}$	Chromatic	
$\frac{256}{243}$	×	$\frac{9}{8}$	×	$\frac{9}{8}$	=	$\frac{4}{3}$	Diatonic	
$\frac{32}{31}$	×	$\frac{31}{30}$	×	$\frac{5}{4}$	=	$\frac{4}{3}$	Enharmonic	of Didymus.
$\frac{16}{15}$	×	$\frac{25}{24}$	×	$\frac{6}{5}$	=	$\frac{4}{3}$	Chromatic	
$\frac{16}{15}$	×	$\frac{10}{9}$	×	$\frac{9}{8}$	=	$\frac{4}{3}$	Diatonic	
$\frac{46}{45}$	×	$\frac{24}{23}$	×	$\frac{5}{4}$	=	$\frac{4}{3}$	Enharmonic	of Ptolemy.
$\frac{28}{27}$	×	$\frac{15}{14}$	×	$\frac{6}{5}$	=	$\frac{4}{3}$	Chroma molle	
$\frac{22}{21}$	×	$\frac{12}{11}$	×	$\frac{7}{6}$	=	$\frac{4}{3}$	—— intenſum	
$\frac{21}{20}$	×	$\frac{10}{9}$	×	$\frac{8}{7}$	=	$\frac{4}{3}$	Diatonum molle	
$\frac{28}{27}$	×	$\frac{8}{7}$	×	$\frac{9}{8}$	=	$\frac{4}{3}$	—— tonicum	
$\frac{256}{243}$	×	$\frac{9}{8}$	×	$\frac{9}{8}$	=	$\frac{4}{3}$	—— ditonicum	
$\frac{16}{15}$	×	$\frac{9}{8}$	×	$\frac{10}{9}$	=	$\frac{4}{3}$	—— intenſum	
$\frac{12}{11}$	×	$\frac{11}{10}$	×	$\frac{10}{9}$	=	$\frac{4}{3}$	—— æquabile	

Genus. By the word *genus*, in *Natural Hiſtory*, we underſtand a certain analogy of a number of ſpecies making them agree together in the number, figure, and ſituation of their parts in ſuch a manner, that they are eaſily diſtinguiſhed from the ſpecies of any other *genus*, at leaſt by ſome one article. This is the proper and determinate ſenſe of the word *genus*, whereby it forms a ſubdiviſion of any claſs or order of natural beings, whether of the animal, vegetable, or mineral kingdoms, all agreeing in certain common and diſtinctive characters. See GENERICAL NAME.

Genus, in *Rhetoric*, is one of the common places or TOPICS, and contains under it two or more ſorts of things differing in nature. See Genus in *Logic*. Beſides, authors diſtinguiſh the art of rhetoric, as alſo orations, or diſcourſes, produced thereby, into three *genera*, or kinds; *demonſtrative*, *deliberative*, and *judiciary*.

To the *demonſtrative* kind belong PANEGYRICS, GENETHLIACONS, EPITHALAMIUMS, *funeral harangues*, &c. To the *deliberative* kind belong perſuaſions, diſſuaſions, commendations, &c. To the *judiciary* kind belong defences, and accuſations. See Rhetoric, Oration, &c.

GEOCENTRIC, of γη, *earth*, and κεντρον, *centre*, in *Aſtronomy*, is applied to a planet, or its orbit, to denote it concentric with the earth: or, as having the earth for its center, or the ſame center with the earth.

All the planets are not *geocentric*: the moon, alone, is properly *geocentric*.

Geocentric *latitude* of a planet is its latitude ſeen from the earth; or the inclination of a line connecting the planet and the earth, to the plane of the earth's (or true) ecliptic.

Or it is the angle which the aforeſaid line (connecting the planet and the earth) makes with a line drawn to meet a perpendicular let fall from the planet to the plane of the ecliptic. See Latitude.

Thus in *Tab. Aſtronomy*, *fig.* 40. the angle ♀ *T e* is the meaſure of that planet's *geocentric* latitude, when the earth is in *T*; and the angle *e t* ♀ the meaſure of it when the earth is in *t*.

Geocentric *place* of a planet is the place wherein it appears to us, from the earth, ſuppoſing the eye there fixed: or, it is a point in the ecliptic, to which a planet, ſeen from the earth, is referred.

Geocentric *Longitude* of a *planet*, is the diſtance meaſured on the ecliptic, in the order of the ſigns between the *geocentric* place and the firſt point of Aries.

GEODÆSIA, that part of practical geometry which teaches how to divide, or lay out, lands, or fields, between ſeveral owners.

The word is Greek, γεωδαισια, formed of γη, *terra*, *earth*, and δαιω, *divido*, *I divide*.

Geodæsia is alſo applied, by ſome, to all the operations of geometry which are performed in the field.

This is more uſually called SURVEYING, when employed in meaſuring of lands, grounds, roads, countries, provinces, &c.

Vitalis defines *geodæſia*, the art of meaſuring ſurfaces and ſolids, not by imaginary right lines, as is done in geometry, but by ſenſible and viſible things; as by the ſun's rays, &c.

GEODES, in *Natural Hiſtory*, a genus of cruſtated bodies formed into large and in great part empty caſes, incloſing a ſmall quantity of earthy or arenaceous matter. See Siderochita.

Of this genus are five known ſpecies.

GEOFFRŒA, in *Botany*, a genus of the *diadelphia decandria* claſs: the calyx is parted into five ſegments, the drupe is ovated, and the nucleus compreſſed. Of this genus there is only one ſpecies.

GEOGRAPHICAL *mile* is the minute, or ſixtieth part of a DEGREE of a great circle. See Mile.

Geographical *table*. See Map.

GEOGRAPHY, formed of γη, *terra*, *earth*; and γραφω, *ſcribo*, *I write*, *I deſcribe*; the doctrine or knowledge of the earth, both as in itſelf, and as to its affections; or a deſcription of the terreſtrial globe, and, particularly, of the known habitable part thereof, with all its parts.

Geography makes a branch of mathematics, of the mixed kind; becauſe it conſiders the earth, and its affections, as depending on quantity; and, conſequently, as meaſureable; viz. its figure, place, magnitude, motion, celeſtial appearances, &c. with the ſeveral circles imagined on its ſurface.

Geography is diſtinguiſhed from coſmography, as a part from the whole; this latter conſidering the whole viſible world, both heaven and earth.

From TOPOGRAPHY, and CHOROGRAPHY, it is diſtinguiſhed, as the whole from a part.

Golnitz conſiders *geography* as either *exterior* or *interior*: but Varenius more juſtly divides it into *general* and *ſpecial*; or *univerſal* and *particular*.

Geography, *general*, or *univerſal*, is that which conſiders the earth in general, without any regard to particular countries or the affections common to the whole globe: as its figure, magnitude, motion, land, ſea, &c. And this may be ſubdivided into *abſolute geography*, which reſpects the body of the earth itſelf, its parts and peculiar properties, &c. *relative*, which accounts for the appearance and accidents owing to celeſtial cauſes, and *comparative*, which explains thoſe properties, that ariſe from comparing different parts of the earth together.

Geography, *ſpecial*, or *particular*, is that which conſiders the conſtitution of the ſeveral particular regions, or countries; their bounds, figure, &c. with the mountains, foreſts, mines, waters, plants, and animals, &c. therein; as, alſo, their climates, ſeaſons, heat, weather, diſtance from the equator, &c. and their inhabitants, arts, foods, commodities, cuſtoms, language, religion, policy, cities, &c.

Special *geography* may be ſubdivided, with regard to the ſeveral periods of its progreſs, into *ancient*, including a deſcription of the earth conformably to the knowledge which the ancients had till the decline of the Roman empire; of this kind Cellarius's Ancient Geography is an excellent ſummary: the *geography* of the *mean* age, which extended from the fall of the Roman empire to the reſtoration of learning; and *modern geography*, comprehending the actual deſcription of the earth ſince that time. With regard to its objects and uſes, *ſpecial geography* may be divided into *natural*, which treats of the diviſions and diſtinctions which nature has made in the ſurface of the globe, and the complexion, language, &c. of its inhabitants; *hiſtorical*, comprehending the different revolutions which any country or town has undergone; *civil*, or *political*, including the government of any country; *ſacred*, deſcribing thoſe countries and places that are mentioned in ſcripture and eccleſiaſtical hiſtory; *eccleſiaſtical*, giving an account of the eccleſiaſtical juriſdiction eſtabliſhed and exerciſed in various countries; and *phyſical*, which conſiders not only the ſurface of the globe, but alſo its intrinſic nature and ſubſtance.

Geography is very ancient, at leaſt the ſpecial part thereof; for the ancient writers ſcarce went beyond the deſcription of countries.

The Chaldeans and Egyptians, who were diſtinguiſhed by their ſkill in geometry and aſtronomy, were of courſe the firſt perſons that paid any particular attention to *geography*; and it is ſaid that the firſt map was made by order of Seſoſtris I. who conquered Egypt.

It was a conſtant cuſtom among the Romans, after they had conquered and ſubdued any province, to have a map, or painted repreſentation thereof, carried in triumph, and expoſed to the view of the ſpectators.

Hiſtorians relate, that the Roman ſenate, about a hundred years before Chriſt, ſent geographers into divers parts, to make an accurate ſurvey and menſuration of the whole globe; but they ſcarce ever ſaw the twentieth part thereof.

Before them, Neco, king of Egypt, ordered the Phœnicians to make a ſurvey of the whole coaſt of Africa; which they accompliſhed in three years: Darius procured the Ethiopic ſea, and the mouth of the Indus, to be ſurveyed. Thales of Miletus, Anaximander his diſciple, who is ſaid to have conſtructed the firſt ſphere; Democritus, Eudoxus, &c. who made the uſe of maps common in Greece; Ariſtagoras of Miletus, who preſented to Cleomenes, king of Sparta, a table of braſs, on which he had deſcribed the known earth, with its ſeas and rivers; and other Greeks, availing themſelves of the aſſiſtance derived from the Chaldæans and Egyptians, proſecuted the ſtudy and enlarged the extent of this ſcience. It appears that in the time of Socrates geographical maps were uſed at Athens, for this philoſopher humbled the pride and boaſt of Alcibiades, by deſiring him to point out his territories in Attica in a map: and Pliny relates, that Alexander, in his expedition into Aſia, took two geographers, Diognetus and Bæton, to meaſure and deſcribe the roads; and that from their itineraries, the writers of the following ages took many particulars. Indeed, this may be obſerved, that whereas moſt other arts are ſufferers by war, *geography* and fortification have been improved thereby.

Pytheas the famous geographer of Marſeilles flouriſhed in the time of Alexander; and Ariſtotle ſeems to have been no leſs converſant with *geography* than philoſophy: after Alexander, Seleucus Nicanor, Theophraſtus, the diſciple of Ariſtotle, Eratoſthenes, who publiſhed three books of geographical commentaries, and corrected a chart of Anaximander, Hipparchus, who corrected the obſervations of Eratoſthenes, and thus furniſhed occaſion for a diſpute which greatly contributed to the improvement of *geography*, Agatharcides of Cnidus, who lived under Ptolemy Philometor, and Mneſias, who, about fifty years after him, publiſhed a deſcription of the whole world, Artemidorus of Epheſus, who gave a deſcription of the earth in eleven books, often cited by Strabo and Pliny, and many others, whoſe names it would be tedious to enumerate, diſtinguiſhed themſelves by the cultivation and improvement of this ſcience. *Geography* was tranſmitted, with the other arts, from Greece to Rome: Polybius, under a commiſſion from Scipio Æmilianus, reconnoitred the coaſts of Africa, Spain, and France, and meaſured the diſtances of all thoſe places which Hannibal had viſited in his march over the Pyrennees and Alps. Varro's works contain many geographical remarks: Zenodoxus, Theodorus and Polycletus were employed under the conſulſhip of Julius Cæſar and Mark Anthony in ſurveying and meaſuring the globe. The Commentaries of Cæſar are well known: Ptolemy encouraged Poſidonius, who made an imperfect menſuration of the earth by celeſtial obſervations, in different places under the ſame meridian. Auguſtus was a diſtinguiſhed patron and promoter of this ſcience; under whom Strabo publiſhed his *geography*. And the taſte for the ſtudy and advancement of *geography* was greatly encouraged under Tiberius, Claudius, Veſpaſian, Domitian, and Adrian. Iſidore of Charax, who lived to the commencement of the firſt century of the Chriſtian æra; Pomponius Mela, who publiſhed a book intitled De Situ Orbis; Metius Pompoſianus, who, having depicted the earth on a parchment, fell a ſacrifice to the jealouſy of Domitian, the emperor ſuſpecting that he aimed at the empire; Pliny the naturaliſt, who has deſcribed the countries known in his time in the third, fourth, fifth, and ſixth books of his Natural Hiſtory; Marinus the Tyrian, who corrected and enlarged the diſcoveries of preceding geographers; and the emperor Antoninus, deſerve particular mention. This abſtract of the hiſtory of ancient geographers, notwithſtanding whoſe ſucceſſive labours *geography* was ſtill in a very imperfect ſtate, brings us to a period, about the 150th year of the Chriſtian æra, in which Ptolemy of Alexandria contributed greatly to the improvement of this ſcience, by a more ample and accurate deſcription of the terreſtrial globe than any had yet given of it. He availed himſelf of numerous obſervations and ancient charts; he corrected the miſtakes and ſupplied many defects of others; and by reducing the diſtances of places on the earth to degrees and minutes, after the manner of Poſidonius, making uſe of the degrees of longitude and latitude, and ſettling the ſituation of places by aſtronomical obſervations, he reduced *geography* into a regular ſyſtem, and laid a foundation for thoſe farther diſcoveries and improvements, which naturally reſulted from the progreſſive, and at preſent advanced ſtate of geometry, aſtronomy, navigation, and commerce. Many valuable geographical works appeared under Diocleſian, Conſtantius, and Maximian, &c. Under the emperor Theodoſius the provincial and itinerary chart or table, ſince known under the name of Peutinger, was digeſted and formed: and the laſt work, that ought to be claſſed with thoſe of the ancients, was the Notitia Imperii, attributed to Ethicus, who lived between the years 400 and 450 of the Chriſtian æra. The ages of barbariſm ſucceeded the fall of the Roman empire; and the arts and ſciences were obliged to ſeek refuge and protection from the Arabians and Orientaliſts in Aſia; the principal of whom, diſtinguiſhed by their attention to *geography*, were Almamom, caliph of Babylon, and Abulfeda, a Syrian prince. After the revival of learning in Europe, and particularly during the two laſt centuries, *geography* has derived very conſiderable acceſſions from travels, voyages, and a variety of nautical and aſtronomical obſervations. For a fuller account of the hiſtory of ancient *geography*, ſee the preface to Bertius's edition of Ptolemy's Theatrum Geographiæ Veteris, Fol.

The art, however, muſt needs have been exceedingly defective; as a great part of the globe was then unknown: particularly all America, the northern parts of Europe and Aſia, with the Terra Auſtralis, and Magellanica; and as they were ignorant of the earth's being capable of being ſailed round, and of the torrid zone's being habitable, &c.

The principal writings on this art, among the ancients, are, Ptolemy's eight books: among the moderns are, Johannes De Sacroboſco De Sphæra, with Clavius's comment: Ricciolus's Geographia and Hydrographia Reformata: Weigelius's Speculum Terræ; De Chales's Geography, in his Mundus Mathematicus; and, above all, Varenius's Geographia generalis, with Jurin's additions: to which may be added, Leibnecht's Elementa Geographiæ generalis; Sturmius's Compendium Geographicum; Wolfius's Geographia, in his Elementa Matheſeos, Gordon's, Salmon's and Guthrie's Grammars, &c.

GEOMANCY, Geomantia, a kind of divination, performed by means of a number of little points, or dots, made on paper at random: and conſidering the various lines and figures, which thoſe points preſent; and thence forming a pretended judgment of futurity, and deciding any queſtion propoſed.

The word is formed of the Greek γη, *terra*, *earth*; and μαντεια, *divination*; it being the ancient cuſtom to caſt little pebbles on the ground, and thence to form their conjectures; inſtead of the points afterwards made uſe of.

Polydore Virgil defines *geomancy* a kind of divination performed by means of clefts, or chinks made in the ground; and takes the Perſian Magi to have been the inventors thereof.

GEOMETRICAL, ſomething that has a relation to *geometry*.

Thus we ſay a *geometrical* method, a *geometrical* genius, *geometrical* ſtrictneſs, a *geometrical* conſtruction, *geometrical* demonſtration.

Geometry itſelf ſeems to lead us into errors: after once reducing a thing to *geometrical* conſideration, and finding that it anſwers pretty exactly, we purſue the view, are pleaſed with the certainty and agreeableneſs of the demonſtrations, and apply the *geometry* farther and farther, till we often out-run nature.

Hence it is, that all machines do not ſucceed: that all compoſitions of muſic, wherein the concords are the moſt rigidly obſerved, are not agreeable: that the moſt exact aſtronomical computations do not always foretel the preciſe time and quantity of an eclipſe, &c.

The reaſon is, that nature is not a mere abſtract; mechanical leavers and wheels are not *geometrical* lines and circles; as they are often ſuppoſed to be: the taſte for tunes is not the ſame in all men; nor at all times in the ſame man: and as to aſtronomy, as there is no perfect regularity in the motions of the planets; their orbits hardly ſeem reducible to any fixed, known figure.

The errors, therefore, we fall into in aſtronomy, muſic, mechanics, and the other ſciences to which *geometry*, is applied, do not properly ariſe from *geometry*, which is an infallible ſcience, but from the falſe uſe, or the miſapplication, of it.

Geometrical *conſtruction* of an equation, is the contriving and drawing of lines and figures, whereby to demonſtrate the equation, theorem, or canon, to be geometrically true. See Construction *of equations*.

Geometrical *line* or *curve*, called alſo *algebraic line*, or *curve*, is that wherein the relations of the abſciſſes to the ſemiordinates may be expreſſed by an algebraic equation. See *Algebraic* Curves.

Geometrical lines, are diſtinguiſhed into claſſes, orders, or genera, according to the number of the dimenſions of the equation that expreſſes the relation between the ordinates and the abſciſſes: or, which amounts to the ſame, according to the number of points in which they may be cut by a right line.

Thus, a line of the firſt order will be only a right line: thoſe of the ſecond, or quadratic order, will be the circle, and the conic ſections; and thoſe of the third, or cubic order, will be the cubical and Nelian parabolas, the ciſſoid of the ancients, &c.

But a curve of the firſt gender (becauſe a right line cannot be reckoned among the curves) is the ſame with a line of the ſecond order; and a curve of the ſecond gender, the ſame with a line of the third order; and a line of an infiniteſimal order is that, which a right line may cut in infinite points; as the ſpiral, cycloid, the quadratrix, and every line generated by the infinite revolutions of a radius.

However, it is not the equation, but the deſcription, that makes the curve a *geometrical* one: the circle is a *geometrical* line, not becauſe it may be expreſſed by an equation, but becauſe its deſcription is a poſtulate: and it is not a ſimplicity of the equation, but the eaſineſs of the deſcription, which is to determine the choice of the lines for the conſtruction of a problem. The equation that expreſſes a parabola, is more ſimple than that which expreſſes a circle; and yet the circle, by reaſon of its more ſimple conſtruction, is admitted before it.

The circle and the conic ſections, if you regard the dimenſions of the equations, are of the ſame order; and yet the circle is not numbered with them in the conſtruction of problems; but by reaſon of its ſimple deſcription is depreſſed to a lower order; viz. that of a right line; ſo that it is not improper to expreſs that by a circle, which may be expreſſed by a right line, but it is a fault to conſtruct that by the conic ſections, which may be conſtructed by a circle.

Either, therefore, the law muſt be taken from the dimenſions of equations, as obſerved in a circle, and ſo the diſtinction be taken away between plane and ſolid problems: or the law muſt be allowed not to be ſtrictly obſerved in lines of ſuperior kinds; but that ſome, by reaſon of their more ſimple deſcription, may be preferred to others of the ſame order, and be numbered with lines of inferior orders.

In conſtructions that are equally *geometrical*, the moſt ſimple are always to be preferred: this law is ſo univerſal as to be without exception. But algebraic expreſſions add nothing to the ſimplicity of the conſtruction; the bare deſcriptions of the lines here are only to be conſidered; and theſe alone were conſidered by thoſe geometricians, who joined a circle with a right line. And as theſe are eaſy or hard, the conſtruction becomes eaſy, or hard: and therefore it is foreign to the nature of the thing, from any thing elſe to eſtabliſh laws about conſtructions.

Either, therefore, with the ancients, we muſt exclude all lines beſide the circle, and perhaps the conic ſections, out of geometry; or admit all according to the ſimplicity of the deſcription: if the trochoid were admitted into geometry, we might, by its means, divide an angle in any given ratio: would you therefore blame thoſe, who would make uſe of this line to divide an angle in the ratio of one number to another; and contend, that this line was not defined by an equation, but that you muſt make uſe of ſuch lines as are defined by equations? If, when an angle were to be divided, for inſtance, into 1001 parts, we ſhould be obliged to bring a curve defined by an equation of above a hundred dimenſions to do the buſineſs; which nobody could deſcribe, much leſs underſtand; and ſhould prefer this to the trochoid, which is a line well known, and deſcribed eaſily by the motion of a wheel, or circle: who would not ſee the abſurdity?

Either, therefore, the trochoid is not to be admitted at all in geometry; or elſe, in the conſtruction of problems, it is to be preferred to all lines of a more difficult deſcription; and the reaſon is the ſame for other curves. Hence, the triſections of an angle by a conchoid, which Archimedes in his Lemmas, and Pappus in his Collections, have preferred to the invention of all others in this caſe, muſt be allowed to be good; ſince we muſt either exclude all lines, beſide the circle, and right line, out of geometry, or admit them according to the ſimplicity of their deſcriptions; in which caſe, the conchoid yields to none, except the circle. Equations are expreſſions of arithmetical computation, and properly have no place in geometry, except ſo far as quantities truly geometrical (that is, lines, ſurfaces, ſolids, and proportions) may be ſaid to be ſome equal to others: multiplications, diviſions, and ſuch ſort of computations, are newly received into geometry, and that apparently contrary to the firſt deſign of this ſcience; for whoever conſiders the conſtruction of problems by a right line and a circle, found by the firſt geometricians, will eaſily perceive, that geometry was introduced that we might expeditiouſly avoid, by drawing lines, the tediousneſs of computation.

It ſhould ſeem, therefore, that the two ſciences ought not to be confounded together: the ancients ſo induſtriouſly diſtinguiſhed them, that they never introduced arithmetical terms into geometry; and the moderns, by confounding both, have loſt a great deal of that ſimplicity, in which the elegance of geometry principally conſiſts. Upon the whole, that is arithmetically more ſimple, which is determined by more ſimple equations; but that is geometrically more ſimple, which is determined by the more ſimple drawing of lines; and in geometry, that ought to be reckoned beſt, which is geometrically moſt ſimple.

Geometrical *locus*, or *place*, called alſo ſimply *locus*. See Locus.

Geometrical *medium*. See Medium.

Geometrical *method of the ancients*. It is to be obſerved, that the ancients eſtabliſhed the higher parts of their *geometry* on the ſame principles as the elements of that ſcience, by demonſtrations of the ſame kind; and that they ſeem to have been careful not to ſuppoſe any thing done, till by a previous problem they had ſhewn how it was to be performed. Far leſs did they ſuppoſe any thing to be done that cannot be conceived, as a line or ſeries to be actually continued to infinity, or a magnitude to be diminiſhed till it becomes infinitely leſs than what it was. The elements into which they reſolved magnitudes were finite, and ſuch as might be conceived to be real. Unbounded liberties have been introduced of late, by which *geometry*, which ought to be perfectly clear, is filled with myſteries. See Mac Laurin's Fluxions, Intr. p. 39 ſeq.

Geometrical *oſculum*. See Evolute, and Osculum.

Geometrical *pace*, is a meaſure conſiſting of five feet. See Pace, and Foot.

Geometrical *plan*, in *Architecture*. See Plan.

Geometrical *plane*. See Plane.

Geometrical *progreſſion*. See *Geometrical* Progression.

Geometrical *proportion*, called alſo abſolutely, and ſimply, *proportion*, is a ſimilitude or identity of ratios. See Ratio.

Thus, if A be to B, as C to D, they are in *geometrical* proportion: ſo 8, 4, 30, and 15, are *geometrical* proportionals. See Proportion.

Geometrical *ſolution* of a problem, is when the problem is directly ſolved according to the ſtrict principles, and rules of geometry, and by lines that are truly *geometrical*.

In this ſenſe we ſay, *geometrical* ſolution in contradiſtinction to a mechanical, or inſtrumental ſolution, where the problem is only ſolved by ruler and compaſſes.

The ſame term is likewiſe uſed in oppoſition to all indirect and inadequate kinds of ſolutions, as by infinite ſerieſes, &c.

We have no *geometrical* way of finding the quadrature of the circle, the duplicature of the cube, or two mean proportionals; mechanical ways, and others, by infinite ſerieſes, we have.

The ancients, Pappus informs us, in vain endeavoured at the triſection of an angle, and the finding out of two mean proportionals by a right line, and a circle. Afterwards they began to conſider the properties of ſeveral other lines; as the conchoid, the ciſſoid, and the conic ſections; and by ſome of theſe endeavoured to ſolve thoſe problems. At length, having more thoroughly examined the matter, and the conic ſections being received into geometry, they diſtinguiſhed *geometrical* problems into three kinds; viz.

1. *Plane* ones, which deriving their original from lines on a plane, may be regularly ſolved by a right line, and a circle.

2. *Solid* ones, which are ſolved by lines deriving their original from the conſideration of a ſolid; that is, of a cone.

3. *Linear* ones, to the ſolution of which are required lines more compounded.

According to this diſtinction, we are not to ſolve ſolid problems by other lines than the conic ſections; eſpecially if no other lines but right ones, a circle, and the conic ſections, are to be received into geometry.

But the moderns, advancing much farther, have received into geometry all lines that can be expreſſed by equations; and have diſtinguiſhed, according to the dimenſions of the equations, thoſe lines into kinds; and have made it a law, not to conſtruct a problem by a line of ſuperior kind, that may be conſtructed by one of an inferior kind.

GEOMETRICAL *ſquare*. See SQUARE.

GEOMETRICAL *table*. See PLAIN *table*.

GEOMETRICALLY *proportionals*, are quantities in continual proportion; or which proceed in the ſame conſtant ratio; as 6, 12, 24, 48, 96, 192, &c.

They are thus called, in contradiſtinction to equidifferent quantities; which are called, though ſomewhat improperly *Arithmetically* PROPORTIONALS.

GEOMETRY, the ſcience, or doctrine of extenſion, or extended things; that is, of lines, ſurfaces, or ſolids.

The word is Greek, γεωμετρια, formed of γεα, or γη, *earth*; and μετρεω, *meaſure*; it being the neceſſity of meaſuring the earth, and the parts and places thereof, that gave the firſt occaſion to the invention of the principles and rules of this art; which has ſince been extended and and applied to numerous other things; inſomuch that *geometry* with arithmetic, is now the general foundation of all mathematics.

Herodotus, lib. ii. p. 109. edit. Weſſelingii, Diodorus, lib. i. § 81. or vol. i. p. 91. edit. Amſt. 1746. and Strabo, lib. xvii. vol. ii. p. 1136. edit. Amſt. 1707, aſſert the Egyptians to have been the firſt inventors of *geometry*; and the annual inundations of the Nile to have been the occaſion of it; for that river bearing away all the bounds and land-marks of men's eſtates, and covering the whole face of the country, the people, ſay they, were obliged to diſtinguiſh their lands by the conſideration of their figure and quantity; and thus, by experience and habit, formed themſelves a method, or art, which was the origin of *geometry*. A farther contemplation of the draughts of figures of fields thus laid down, and plotted in proportion, might naturally enough lead them to the diſcovery of ſome of their excellent and wonderful properties; which ſpeculation continually improving, the art became gradually improved, as it continues to do to this day. Joſephus, however, ſeems to attribute the invention to the Hebrews: and others, among the ancients, make Mercury the inventor. Polyd. Virgil, de Invent. Rer. lib. i. cap. 18.

From Egypt *geometry* paſſed into Greece, being carried thither, as ſome ſay, by Thales; where it was much cultivated and improved by himſelf, Pythagoras, Anaxagoras of Clazomene, Hippocrates of Chios, and Plato, who teſtified his conviction of the neceſſity and importance of *geometry* in order to the ſucceſsful ſtudy of philoſophy by the following inſcription on the the door of his academy, ȣδεις αγεωμετριτος εισειτω, *let no one ignorant of geometry enter here.* About fifty years after Plato lived Euclid, who collected together all thoſe theorems which had been invented by his predeceſſors in Egypt and Greece, and digeſted them into fifteen books, entitled the ELEMENTS of *geometry*; and thoſe propoſitions which were not ſatisfactorily proved, he more accurately demonſtrated. The next to Euclid of thoſe ancient writers, whoſe works are extant, is Apollonius Pergæus, who flouriſhed in the time of Ptolemy Euergetes, about two hundred and thirty years before Chriſt, and about a hundred years after Euclid. The third ancient geometer, whoſe writings remain, is Archimedes of Syracuſe, who was famous about ten years after Apollonius. We can only mention Eudoxus of Cnidus, Archytas of of Tarentum, Philolaus, Eratoſthenes, Ariſtarchus of Samos, Dinoſtratus, the inventor of the QUADRATRIX, Menechmus, his brother, and the diſciple of Plato, the two Ariſteus's, Conon, Thraſideus, Nicoteles, Leon, Theudius, Hermotimus, and Nicomedes, the inventor of the CONCHOID; beſides whom, there are many other ancient geometers, to whom this ſcience is indebted. The Greeks continued their attention to *geometry*, even after they were ſubdued by the Romans. Whereas the Romans themſelves were ſo little acquainted with this ſcience, even in the moſt flouriſhing time of their republic, that they gave the name of mathematicians, as Tacitus informs us, to thoſe who purſued the chimeras of divination and juſticiary aſtrology. Nor were they more diſpoſed to cultivate *geometry*, as we may reaſonably imagine during the decline, and after the fall of the Roman empire. The caſe was different with the Greeks; among whom we find many excellent geometers ſince the commencement of the Chriſtian æra, and after the tranſlation of the Roman empire. Ptolemy lived under Marcus Aurelius; and we have extant the works of Pappus of Alexandria, who lived in the time of Theodoſius; the commentary of Eutocius, the Aſcalonite, who lived about the year of Chriſt 540, on Archimedes's menſuration of a circle; and the commentary on Euclid, by Pappus, who lived under the empire of Anaſtaſius. The conſequent inundation of ignorance and barbariſm was unfavourable to *geometry* as well as the other ſciences; and thoſe few who applied themſelves to this ſcience, &c. were calumniated as magicians. However, in theſe times of European darkneſs, the Arabians were diſtinguiſhed as the guardians and promoters of ſcience; and from the ninth to the fourteenth century they produced many aſtronomers, geometers, geographers, &c. At the revival of letters, there was ſcarcely one European capable of tranſlating and commenting on the works of the ancient geometers; and *geometry* made little progreſs till the time of Des Cartes, who publiſhed his *Geometry* in 1637. However, in 1635, Bonaventure Cavalerius, an Italian of the order of JESUITS, publiſhed his *Geometry of Indiviſibles*; Gregory St Vincent, in 1647, publiſhed his treatiſe, intitled Quadratura Circuli & Hyperbolæ, a work abounding with excellent theorems and paralogiſms; and Paſcal, about the ſame time, publiſhed his treatiſe of the cycloid. *Geometry*, as far as it was capable of deriving aid and improvement from the arithmetic of infinities, was indebted to the labours of Fermat, Barrow, Wallis, Mercator, Brouncker, J. Gregory, Huygens, and others; to whom we may add Newton and Leibnitz. See FLUXIONS. But Sir Iſaac Newton contributed to the progreſs of pure *geometry* by his two treatiſes De Quadratura Curvarum, and Enumeratio Linearum Tertii Ordinis; ſee CURVE: and ſtill farther by his incomparable and immortal work, intitled Philoſophiæ Naturalis Principia Mathematica, which will always be conſidered as the moſt extenſive and ſucceſsful application of *geometry* to phyſics. We cannot forbear tranſcribing in this place the compliment paid to this author by the editors of the Encyclopedie, who, conſidering the various monuments of the author's genius, and that he had made his principal diſcoveries before the age of twenty-four, are tempted, they ſay, to ſubſcribe to the words of Pope, that the ſagacity of Newton aſtoniſhes even celeſtial intelligences, and that they contemplate him as a being occupying a kind of middle ſtation between man and themſelves; or at leaſt they cannot forbear exclaiming, *homo homini quid præſtat!* what a diſtance does there ſubſiſt between one man and another!

The modern geometers are innumerable; and the names of Cotes, Maclaurin, Simpſon, &c. will always be held in eſteem and veneration by thoſe that are devoted to the ſtudy of *geometry* and mathematics.

The province of *geometry* is almoſt infinite: few of our ideas but may be repreſented to the imagination by lines, upon which they become of *geometrical* conſideration; it being *geometry* alone that makes compariſons, and finds the relations of lines.

Aſtronomy, muſic, mechanics, and, in a word, all the ſciences which conſider things ſuſceptible of more and leſs, i. e. all the preciſe and accurate ſciences may be referred to *geometry*; for all ſpeculative truths conſiſting only in the relations of things, and in the relations between thoſe relations, they may be all referred to lines. Conſequences may be drawn from them; and theſe conſequences, again, being rendered ſenſible by lines, they become permanent objects, which may be conſtantly expoſed to a rigorous attention and examination: and thus we have infinite opportunities both of enquiring into their certainty, and purſuing them farther.

The reaſon for inſtance, why we know ſo diſtinctly, and mark ſo preciſely, the concords called *octave*, *fifth*, *fourth*, &c. is that we have learnt to expreſs ſounds by lines, i. e. by chords accurately divided; and that we know, that the chord, which ſounds octave, is double of that with which it makes octave; that the fifth is the ſeſquialterate ratio, or as three to two; and ſo of the reſt.

The ear itſelf cannot judge of ſounds with ſuch a nice preciſion; its judgments are too faint, vague, and variable, to form a ſcience. The fineſt beſt tuned ear, cannot diſtinguiſh many of the differences of ſounds; whence many muſicians deny any ſuch differences; as making their ſenſe their judge. Some, for inſtance, admit no difference between an octave and three ditones: and others, none between the greater and leſſer tone; the comma, which is the real difference, is inſenſible to them; and much more the ſciſma, which is only half the comma.

It is only by reaſon, then that we learn, that the length of the chord which makes the difference between certain ſounds, being diviſible into ſeveral parts, there may be a great number of different ſounds contained therein, uſeful in muſic, which yet the ear cannot diſtinguiſh. Whence it follows, that had it not been for arithmetic and *geometry*, we had had no ſuch thing as regular fixed muſic; and that we could only have ſucceeded in that art by good luck, or force of imagination; i. e. muſic would not have been any ſcience founded on inconteſtable demonſtrations: though we allow, that the tunes compoſed by force of genius and imagination, are uſually more agreeable to the ear, than thoſe compoſed by rule. So, in mechanics, the heavineſs of a weight, and the diſtance of the centre of that weight from the fulcrum, or point it is ſuſtained by, being ſuſceptible of plus and minus, they may both be expreſſed by lines: whence *geometry* becomes applicable thereto; in virtue whereof, infinite diſcoveries have been made, of the utmoſt uſe in life.

Geometrical lines and figures are not only proper to repreſent to the imagination the relations between magnitudes or between things ſuſceptible of more and leſs; as ſpaces, times, weights, motions, &c. but they may even repreſent things which the mind can no otherwiſe conceive, e. gr. the relations of incommenſurable magnitudes.

It muſt be obſerved, that this uſe of *geometry* among the ancients was not ſtrictly ſcientifical, as among us; but rather ſymbolical: they did not argue, or reduce things and properties unknown from lines; but repreſented or delineated by them things that were known. In effect, they were not uſed as means or inſtruments of diſcovering, but as images or characters, to preſerve, or communicate, the diſcoveries that were already made.

“ The Egyptians, Gale obſerves, uſed *geometrical* figures,
“ not only to expreſs the generations, mutations, and
“ deſtructions of bodies; but the manner, attributes,
“ &c. of the ſpirit of the univerſe, who, diffuſing him-
“ ſelf from the centre of his unity, through infinite con-
“ centric circles, pervades all bodies, and fills all ſpace.
“ But of all other figures they moſt affected the circle,
“ and triangle; the firſt, as being the moſt perfect,
“ ſimple, capacious, &c. of all figures: whence Her-
“ mes borrowed it to repreſent the divine nature; de-
“ fining God to be an intellectual circle or ſphere, whoſe
“ centre is every-where, and circumference no-where.”
See Kirch. Oedip. Ægyptiac. and Gale Phil. General. lib. ii. cap. 2.

The ancient *geometry* was confined to very narrow bounds, in compariſon of the modern. It only extended to right lines and curves of the firſt order, or conic ſections; whereas into the modern *geometry* new lines of infinitely more and higher orders are introduced.

Geometry is commonly divided into four parts, or branches; PLANIMETRY, ALTIMETRY, LONGIMETRY, and STEREOMETRY.

Geometry, again, is diſtinguiſhed into *theoretical* or *ſpeculative*, and *practical*.

The firſt contemplates the properties of continuity; and demonſtrates the truth of general propoſitions, called THEOREMS.

The ſecond applies thoſe ſpeculations and theorems to particular uſes in the ſolution of PROBLEMS.

GEOMETRY, *ſpeculative*, again may be diſtinguiſhed into *elementary* and *ſublime*.

GEOMETRY, *elementary* or *common*, is that employed in the conſideration of right lines, and plain ſurfaces, and ſolids generated therefrom.

GEOMETRY, *higher* or *ſublime*, is that employed in the conſideration of curve lines, conic ſections, and bodies formed thereof.

The writers who have cultivated and improved *geometry* may be diſtinguiſhed into elementary, practical, and thoſe of the ſublimer *geometry*.

The principal writers of elements, ſee enumerated under ELEMENTS.

Thoſe of the higher *geometry* are Archimedes, in his books De Sphæra, Cylindro, and Circuli Dimenſione; as alſo De Spiralibus, Conoidibus, Sphæroidibus, De Quadratura Parabolæ, and Arenarius: Kepler, in his Stereometria Nova; Cavelerius, in his Geometria Indiviſibilium; and Torricellius, De Solidis Sphæralibus: Pappus Alexandrinus, in Collectionibus Mathematicis; Paulus Guldinus, in his Mechanics and Statics; Barrow, in his Lectiones Geometricæ; Huygens, De Circuli Magnitudine; Bullialdus, De Lineis Spiralibus; Schooten, in his Exercitationes Mathematicæ; De Billy, De Proportione Harmonica; Lalovèra, De Cycloide; Fer. Erneſt. Com. ab Harbenſtein, in Diatome Circulorum; Viviani, in Exercit. Mathemat. de Formatione & Menſura Fornicum; Bap. Palma, in Geomet. Exercitation. and Apoll. Pergæus, De Sectione Rationis.

For practical *geometry*, the fulleſt and completeſt treatiſes are thoſe of Mallet, written in French, but without the demonſtrations; and thoſe of Schwenter and Cantzlerus, both in High Dutch. In this claſs are likewiſe to be ranked Clavius's, Tacquet's, and Ozanam's Practical Geometries; De la Hire's Ecole des Arpenteurs; Reinholdus's Geodæſia; Hartman Beyers's Stereometria; Voigtel's Geometria Subterranea; all in High Dutch: Hulſius, Galileus, Goldmannus, Scheffelt, and Ozanam, on the Sector, &c.

GEOMETRY, *characters in.* } See { CHARACTER.
GEOMETRY, *ſpherical.* } See { SPHERICAL.

GEOMORI, Γεωμοροι, in *Antiquity*, the diviſion or claſs of of the ancient Athenians, employed in agriculture.

GEOPONIC, ſomething deſcribing or relating to AGRICULTURE. Cato, Varro, Columella, Palladius, and Pliny, are ſometimes called *geoponic* writers.

GEORGE, *St.* a name whereby ſeveral orders, both military and religious, are denominated. It took its riſe from a ſaint famous throughout all the Eaſt, called by the Greeks Μεγαλομαρτυς, q. d. *great martyr*.

On ſome medals of the emperors John and Manuel Commeni, we have the figure of St. *George* armed, holding a ſword or javelin in one hand, and in the other a buckler, with this inſcription; an O, and therein a little

P
A, and ΓΕ—ΓΙΟC, making Ο ΑΓΙΟΣ ΓΕΟΡΓΙΟΣ, *O*
O

Holy George. He is generally repreſented on horſeback, as being ſuppoſed to have frequently engaged in combats in that manner.

He is highly venerated throughout Armenia, Muſcovy, and all the countries which adhere to the Greek rite: from the Greek, his worſhip has long ago been received into the Latin church; and England and Portugal have both choſen him for their patron ſaint.

GEORGE, *St.* is particularly uſed for an Engliſh order of knights, more commonly now called the *order of the garter*. See GARTER.

GEORGE, *knights of St.* There have been various orders under this denomination, moſt of which are now extinct; particularly one founded by the emperor Frederic III. in the year 1470, to guard the frontiers of Bohemia and Hungary againſt the Turks; another, called St. *George* of Alfama, founded by the kings of Arragon; another in Auſtria and Carinthia; and another in the republic of Genoa, ſtill ſubſiſting, &c.

GEORGE, *religious of the order of St.* Of theſe there are divers orders and congregations; particularly canons regular of St. *George* in Alga, at Venice, eſtabliſhed by authority of pope Boniface IX. in the year 1404. The foundation of this order was laid by Bartholomew Colonna, who preached, in 1396, at Padoua, and ſome other villages in the ſtate of Venice. Pope Pius V. in 1570, gave theſe canons precedence of all other religious. Another congregation of the ſame inſtitute in Sicily, &c.

St. GEORGE'*s croſs*. See CROSS.

GEORGE *noble*, a piece of gold, current at ſix ſhillings and eight pence in the reign of king Henry VIII.

GEORGIAN *monks and nuns* are religious of Georgia, in Aſia, who follow the rule of St. BASIL.

GEORGIC, ſomething that relates to the culture or tilling of the ground.

The word is borrowed from the Latin *georgicus*, and that of the Greek γεωργικος, of γη, *terra*, *earth*; and εργαζομαι, *opero*, *I work*, *labour*, of εργον, *opus*, *work*.

The *Georgics* of Virgil are four books compoſed by that poet on the ſubject of agriculture.

GEOSCOPY, a kind of knowlege of the nature and qualities of the ground or ſoil, gained by viewing and conſidering it.

The word is formed of the Greek γη, *earth*, and σκοπεω, *I ſee*, *view*.

Geoſcopy is only conjectural; but its conjectures are very well grounded.

GEOSTATICS. See STATICS.

GERANITES, of γερανος, *a crane*, in *Natural Hiſtory*, a name given by ſome authors to ſuch pieces of AGATE, or any other of the ſemi-pellucid gems, as have round ſpots in them, reſembling in colour the eye of a crane.

GERANIUM, *cranes bill*, in *Botany*, a genus of the *monadelphia decandria* claſs. Its characters are theſe: the flower hath a permanent empalement, compoſed of five ſmall oval leaves, and five oval or heart-ſhaped petals, ſpreading open, which are in ſome ſpecies equal, and in others the upper two are much larger than the three lower. It has ten ſtamina, alternately longer than each other, but ſhorter than the petals, and terminated by oblong ſummits. In the bottom of the flower is ſituated a five-cornered germen, which is permanent. The flower is ſucceeded by five ſeeds, each being wrapped up in the huſk of the beak, where they are twiſted together at the point, ſo as to form the reſemblance of a ſtork's beak. There are forty-three ſpecies. Miller.

The common wild ſorts of this plant, and thoſe alſo which are brought to the curious from the colder climates, are hardy enough, and require little care; but the African ſpecies, and the others from hot countries, which make ſo very beautiful a figure in our green-houſes, require great care in their culture and propagation.

Theſe may be propagated by ſeed, which ſhould be ſown toward the end of March in beds of light earth, and carefully ſhading them from the ſun, and giving them frequent, but gentle waterings, till they are well rooted. The mats with which theſe beds are covered are to be taken off in gentle ſhowers, and always in the hot weather at nights, that the plants may have the benefit of the dew. They ſhould remain about two months in this bed, by which time they will have taken root. Some pots of about ſeven inches wide are then to be filled with light earth, and the plants are to be carefully taken up with as much as poſſible of their own earth about them, and planted ſeverally in the middle of theſe pots; when they are to be ſet in a ſhady place, and watered at times till they have taken root. When they are well-rooted, they ſhould be ſet in a more expoſed place to harden them, and ſhould ſtand out till the middle of October; but when the mornings begin to grow froſty, they muſt be removed into the green-houſe, and then placed as near the windows as poſſible, and the windows ſhould be opened upon them till the weather is very cold. During the winter, they muſt be frequently watered a little at a time, and their dead leaves ſhould be pulled off. They muſt not ſtand under the ſhade of other plants, nor need any artificial heat.

Thoſe who are deſirous that their plants ſhould be large and flower ſoon, ſow the ſeeds on a moderate hot-bed in the ſpring; when they are come up, they ſhould not be drawn weak, and the pots into which they are tranſplanted ſhould be plunged into another moderate hot-bed, ſhading them from the ſun, till they have taken root, and gradually inuring them to the open air, into which they ſhould be removed in the beginning of June, and placed in a ſheltered ſituation with other exotic plants.

The ſhrubby African *geraniums* are commonly propagated by cuttings, which, planted in a ſhady border, in June or July, will take good root in five or ſix weeks; and they may then be taken up and planted in ſeparate pots, placing them in the ſhade till they have taken new root; after which they may be removed into a ſheltered ſituation, and treated as the ſeedling plants.

Geranium ſtands recommended as one of the greateſt vulneraries and abſtergents of the vegetable world, and is highly extolled for its power of ſtopping profluvia of the menſes, and hæmorrhages of all kinds. Experience confirms the truth of this, eſpecially among the poor people in the country; and it were to be wiſhed that the plant could be brought into more eſteem in the ſhops, where at preſent it is diſregarded.

GERANOS, Γερανος, in *Antiquity*, a remarkable dance performed in the feſtival called DELIA.

GERARDIA, in *Botany*, the name of a genus of plants of the *didynamya angioſpermia* claſs, the characters of which are theſe: the perianthium is compoſed of one leaf divided into five ſegments, and remains after the flower is fallen: the flower is of the labiated kind, and compoſed only of one leaf: the tube is longer than the cup, and of a cylindric figure: the upper lip is erect, plain, broad, obtuſe, and emarginated: the lower lip is bent backwards, and divided into three ſegments: the two ſide ones are long and emarginated, and the middle one ſhorter and bifid. The ſtamina are four filaments, ſomewhat ſhorter than the flower, and two of theſe are a little ſhorter than the other two. The antheræ are ſmall. The germen of the piſtil is ſmall and oval. The ſtyle is ſimple and ſhort, and the ſtigma is obtuſe. The fruit is an oval bivalve capſule, containing two cells, and opening at the bottom when ripe: the ſeeds are ſingle and oval.

GERBERA, in *Botany*. See ARNICA.

GE RE SOL, in *Muſic*, one of the CLEFS.

GERFALCON, or GYRFALCON. See FALCON. This is naturally a very bold, wild, and fierce bird, and is therefore very difficult to be reclaimed; but when that is done, it proves one of the very beſt kinds, and will fly at almoſt any thing. The beak of the *gerfalcon* is always blue, and the claws are remarkably long and ſtrong.

In going up to the gate, as the ſportſmen expreſs it, theſe birds do not hold the ſame ſort of courſe that others do, but immediately climb up upon the train on ſight of the bird, and as ſoon as they have reached her, they immediately make the attack, and generally pull her down at the firſt encounter; but if not, always at the ſecond or third.

This ſort of hawk is to be fed and rewarded like the others. It is of a very ſly and crafty nature, and is ſo ſlothful, that it loves to keep the caſting a long time; therefore, inſtead of cotton, it is proper to give them ſometimes a caſting of tow, and to keep them ſharp ſet.

As to the reclaiming this ſort of hawk, it is only to be done by gentleneſs and kindneſs; and when ſhe has been taught to be turned looſe, ſhe is next to be learned to come to the pelts of hens or other fowl. But ſhe muſt never be ſuffered to taſte any living fleſh, for that will be apt to draw away her love from the hand and voice. Whenever ſhe eats the falconer muſt be cloſe to her, and muſt make her eat the choiceſt pieces out of his hand. There is great care to be taken in the making theſe birds, for as they are made at firſt, ſo they are for ever; and it is a neceſſary caution, with birds of this bold and fierce nature, not to hurry over the buſineſs, but to repeat the ſame thing very often till it is perfectly fixed. See HAWK.

GERM. See GERMEN.

GERMAN, in *matters of Genealogy*, ſignifies whole, entire, or own.

Germani, quaſi eadem ſtirpe geniti. Feſt. Hence,

GERMAN, *brother*, denotes a brother both by the father's and mother's ſide, in contradiſtinction to uterine brothers, &c. who are only ſo by the mother's ſide.

GERMAN, *couſins*, are thoſe in the firſt or neareſt degree, being the children of brothers or ſiſters.

Among the Romans we have no inſtance of marriage between couſins *german* before the time of the emperor Claudius, when they were very frequent.

Theodoſius prohibited them under very ſevere penalties, even fine and proſcription. See CONSANGUINITY.

GERMAN *acacia, bezoar, bible, black, coins, compaſſes, empire, flute, language, meaſures, monies.* See the ſeveral ſubſtantives.

GERMANDER, *teucrium*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the empalement of the flower is of one leaf, cut into five acute equal ſegments at the top, and is permanent: the flower is of the lip kind, with one petal, having a ſhort cylindrical tube, a little incurvated at the chaps; the upper lip is erect, and deeply cut into two acute ſegments; the lower lip ſpreads, and is cut into three; the middle one is large and roundiſh, the two ſide ones acute and erect: it hath four awl-ſhaped ſtamina, which are longer than the upper lip, and are prominent between the ſegments, terminated by ſmall ſummits. It has a germen divided in four parts, ſupporting a ſlender ſtyle, crowned by two ſlender ſtigmas; the germen afterward turns to four roundiſh naked ſeeds, which ripen in the empalement. There are nineteen ſpecies.

The ſmaller creeping *germander*, or *chamædrys minor repens*, having oval leaves with crenated cuts, foot-ſtalks, and flowers growing almoſt in whorls, grows wild in the ſouth of France and Germany; but with us it is raiſed in gardens, and flowers in June and July. The leaves and tops have been recommended as diuretic and diaphoretic. Theſe are an ingredient in many of the compoſitions of the ſhops, and are given in infuſion in fevers, in ſuppreſſions of urine, in the ſcurvy, the gout, and jaundice; and where the uſe of it is continued ſufficiently, generally with ſucceſs. The tops, gathered when the ſeeds are formed, are generally preferred to the leaves. Their doſe, in ſubſtance, is from half a dram to a dram, or more. They give out their virtues both to watery and ſpirituous menſtrua.

The water *germander*, or *ſcordium*, having oblong ſaw-indented leaves, ſitting cloſe to the branches, and flowers growing by pairs at the wings of the ſtalk which is diffuſed, grows naturally in the iſle of Ely, and other fenny parts of England, is perennial, and flowers in July. The whole plant has an odour like that of garlic. The leaves, moderately and newly dried, give out their ſmell and taſte both to water and rectified ſpirit; and tinge the former of a browniſh, and the latter of a deep green colour. They are eſteemed a great ſudorific, alexipharmic, and corroborant, and have been preſcribed in malignant and peſtilential fevers, and even the plague itſelf. They are attenuant and diſſolvent, and are uſed to deſtroy worms. Externally they cleanſe foul ulcers, and, applied by way of cataplaſm, mitigate pain. They are never uſed alone, but merely kept in the ſhops as an ingredient in the *confectio Fracaſtorii*, which, though it contains ſeveral medicines of more virtue, yet takes its name *diaſcordium* from it.

The *teucrium* with a trifid leaf, or the common yellow ground-pine, called alſo *chamæpitys lutea vulgaris*, is an annual plant, growing wild in ſandy and chalky grounds in ſome parts of England, and flowering in July. This is a low hairy plant, with whitiſh clammy leaves, cut deeply into three long narrow ſegments, like thoſe of the pine-tree, ſet in pairs at the joints, and yellow labiated flowers without pedicles, and wanting the upper lip. The leaves of this plant are recommended as aperients and corroborants of the nervous ſyſtem, and ſaid to be particularly ſerviceable in female obſtructions, paralytic diſorders, and when continued for a length of time, either by themſelves, or with the aſſiſtance of common *germander*, in rheumatic, iſchiadic, and gouty pains. The doſe of the leaves dried and powdered is from half a dram to a dram. Their virtues are extracted both by water and ſpirit, but moſt perfectly by the latter. Lewis.

GERMEN, or **Germ**, that part of a ſeed which germinates, i. e. ſprouts or ſhoots out the firſt, for the production of a new plant.

Botaniſts call it the PLUME and BUD. See Plant, Seed, and Germination.

GERMINATION, the act of germinating; that is, of a plant's ſprouting, or ſhooting in the ground.

Some uſe the word in a more extenſive ſenſe, ſo as likewiſe to include the firſt ſhooting out of leaves, bloſſoms, branches, flowers, fruits, and ſeeds.

The modern philoſophers have been very attentive to the *germination* of plants, as well as the formation of the chick in the egg.

The progreſs of *germination* has been very accurately obſerved by the curious Malpighi, in the ſeed of a gourd. See Plants, Seminal *leaves*, and Vegetation.

Germination, *metallic*. Borrichius, in his Hiſtory of Chemiſtry, gives us ſome very remarkable accounts of this ſort of *germinations*, and of one in particular, for which he quotes a witneſs, as he ſays, of ſo great veracity and ſo little credulity, that he might be abſolutely depended on. A quantity of powder, about the weight of a barley-corn, was put into three or four pounds of river water in a glaſs, and partly diſſolved in it: the water was then decanted into a clear veſſel, and eight ounces of crude mercury put into it, upon which the mercury ſhot out a multitude of filaments, or branches of ſilver, extending themſelves over the veſſel, and riſing above the ſurface of the water; and when the liquor was poured off, this ſilver was found to ſtand the ſevereſt teſts of fire, and acknowleged to be pure ſilver. Borrichius de Ortu Chemiæ.

But this is only a ſecond-hand ſtory, and had Borrichius himſelf ſeen it, it would have ſcarce been credible without ſome farther proofs. Phil. Tranſ. N° 39.

GEROCOMIA, of γερων, *aged*, and κομιζω, *I cheriſh*, a term uſed by the ancients for that ſort of medicinal practice, which treated of the proper regimen to be obſerved in old age.

GERONTES, in *Antiquity*, a kind of judges, or magiſtrates, in ancient Sparta, anſwering to what the Areopagites were at Athens. See Areopagus.

The word is formed of the Greek γερων, which ſignifies *old man*. Whence alſo the words *gerontic*, ſomething belonging to an old man; and *Geronicon*, a famous book among the modern Greeks, containing the lives of the ancient monks. The ſenate of *gerontes* was called *geruſia*, that is, aſſembly or council of old men.

The *gerontes* were originally inſtituted by Lycurgus: their number, according to ſome, was twenty-eight; and, according to others, thirty-two. They governed in conjunction with the king, whoſe authority they were intended to balance, and to watch over the intereſts of the people. Polybius defines their office in few words, when he ſays, *per ipſos, & cum ipſis omnia adminiſtrari.* None were to be admitted into this office under ſixty years of age, and they held it for life. They were ſucceeded by the EPHORI.

GEROPOGON, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs: the receptacle of which is formed of a briſtly kind of chaff, the calyx is ſimple, the ſeed is contained in the pulmous down of the diſc, and has five ariſtæ or beards in the form of rays.

GERRES, **Geruli**, or **Giroli**, in *Ichthyology*, names given by the Venetians to a fiſh common in that part of the world. It is the Smaris, or Mæna alba of authors. Artedi very judiciouſly makes it a ſpecies of the ſparus, and diſtinguiſhes it from the others, by its having a black ſpot on each ſide, and the pectoral and tail-fins red.

GERRHA, Γέῤῥα, among the Greeks, wicker hurdles, reſembling the Roman *vineæ*, which the ſoldiers held over their heads to ſhelter themſelves.

GERSA, a word uſed by ſome authors for CERUSS, or white lead.

GERUND, in *Grammar*, a ſort of tenſe, or time, of the infinitive mood; very like to the participle, but indeclinable.

The word is formed of the Latin *gerundivus*; and that from the verb *gerere, to bear*.

The *gerund* expreſſes not only the time, but alſo the manner of an action; as, he fell in running poſt.

It differs from the participle, in that it expreſſes the time, which the participle does not.

And from the tenſe properly ſo called, in that it expreſſes the manner, which the tenſe does not.

Grammarians are much embarraſſed to ſettle the nature and character of the *gerunds*: it is certain they are no verbs, becauſe they do not mark any judgment or affirmation of the mind, which is the eſſence of a verb: and beſides, they have their ſeveral caſes, which verbs have not.

Some, therefore, will have them to be adjectives paſſive, whoſe ſubſtantive is the infinitive of the verb: on this footing they denominate them *verbal* NOUNS, or names formed of verbs, and retaining the ordinary regimen thereof.

Thus, ſay they, *tempus eſt legendi libros*, or *librorum*, is as much as to ſay, *tempus eſt τε legere libros*, vel *librorum*. But others diſpute this deciſion.

GERYON, a name given by ſome of the affected chemical writers to quickſilver.

GESNERA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower hath one petal which is tubulous, and firſt bent inward, and afterwards out again, like a bugle horn; the brim is divided into five obtuſe ſegments: it hath four ſtamina, which are ſhorter than the petal: the germen, which ſits under the petal, afterward becomes a roundiſh capſule, with two cells filled with ſmall ſeeds, which are fixed on each ſide the partition. There are three ſpecies, natives of Jamaica, and Carthagena in New Spain.

GESSERIT, *quamdiu*. See Quamdiu *ſe bene geſſerit*.

GESSES is the furniture belonging to a hawk. See Jesses.

GESOR, a name uſed by ſome of the Arabian writers for GALBANUM.

GESTATION, the time of a woman's going with child, or the interval between CONCEPTION and DELIVERY. See Foetus and Pregnancy.

Gestation is alſo a term in the *Ancient Medicine*, uſed for a ſort of exerciſe, by us called carriage.

It conſiſted in making the patient ride on horſeback, or in a chariot, or a boat; or even in rocking him in his bed, if he could not endure a more violent agitation.

Aſclepiades firſt brought frictions and *geſtation* into practice. The deſign of *geſtation* was to recover ſtrength after a fever, &c. was gone.

GESTICULATION, the making of affected, indecent, or unſuitable geſtures, or even of proper ones in too great number.

Geſticulation is a grievous fault in an orator.

GESTU & *fama*, an ancient writ, where a perſon's good behaviour was impeached, now out of uſe.

GESTURE, a motion of the body, intended to ſignify ſome idea or paſſion of the mind.

Quintilian defines *geſture*, *totius corporis motus & conformatio*. *Geſtures* are a kind of natural language, which ſupplies the uſe of ſpeech in thoſe naturally dumb. The mimes and pantomimes were very great proficients in the ſtyle of *geſture*.

Geſture conſiſts principally in the action of the hands and face; and may be defined, a ſuitable conformity of the motions of the countenance, and of ſeveral parts of the body, in ſpeaking to the ſubject matter of the diſcourſe. See Action. With regard to oratory, *geſture* may properly be called the ſecond part of PRONUNCIATION; in which, as the voice ſhould be ſuited to the impreſſions it receives from the mind, ſo the ſeveral motions of the body ought to be accommodated to the various tones and inflections of the voice. When the voice is even and moderate, little *geſture* is required; and nothing is more unnatural and diſguſting than violent motion, in diſcourſing upon ordinary and familiar ſubjects. The motions of the body ſhould, therefore, riſe in proportion to the vehemence and energy of the expreſſion, as the natural and genuine effect of it. *Geſture* is either *natural*, or from *imitation*. The former denotes ſuch actions and motions, either of the whole body, or of ſome particular part of it, as naturally accompany our words, juſt as theſe reſult from the impreſſions of our minds. As to the whole body, it ſhould not continue long in the ſame poſition, but be conſtantly changing, with a gentle and moderate motion. As to the ſeveral parts of the body, the head is the moſt conſiderable: to lift it up too high, has the air of arrogance and pride; to ſtretch it out too far, or throw it back, appears clowniſh and unmannerly; to hang it downwards on the breaſt, ſhews an unmanly baſhfulneſs and want of ſpirit; and to ſuffer it to lean on either ſhoulder, argues ſloth and indolence: in calm and ſedate diſcourſes, the head ſhould keep its natural ſtate and upright poſture, occaſionally moving, and turning gently ſometimes on one ſide, and ſometimes on the other, as occaſion requires, and then returning back to its natural poſition. It ſhould always accompany the other actions of the body, except in averſion, which is expreſſed by ſtretching out the right hand, and turning the head to the left. But nothing is more indecent than violent motions and agitations of the head.

The paſſions are principally repreſented by the countenance; and the ſeveral parts of the face contribute to the proper and decent *geſture* of the whole. In a calm and ſedate diſcourſe, all the features retain their natural ſituation. In ſorrow, the forehead and eye-brows lowr, and the cheeks hang down; but in expreſſions of joy and chearfulneſs, the forehead and eye-brows are expanded, the cheeks contracted, and the corners of the mouth drawn upwards. Anger and reſentment contract the forehead, draw the brows together, and thruſt out the lips: and terror elevates both the brows and forehead. To theſe natural ſigns of the paſſions, the orator ſhould endeavour to conform.

The motions of the eyes require the moſt careful management; becauſe, as Cicero obſerves, other parts of the countenance have but few motions; whereas all the paſſions of the ſoul are expreſſed in the eyes by ſo many different actions, that cannot poſſibly be repreſented by any *geſtures* of the body, if the eyes be kept in a fixed poſture. De Orat. lib. iii. cap. 59. Thus, in ſpeaking on pleaſant and delightful ſubjects, the eyes are briſk and chearful; but they ſink and are languid in delivering any thing melancholy and ſorrowful. In anger, the eyes diſcover a certain vehemence and intenſeneſs; in expreſſions of hatred and deteſtation, the eyes are turned either aſide or downwards: thus Virgil has expreſſed Dido's reſentment and diſdain of Æneas,

Illa ſolo fixos oculos averſa tenebat. Æn. lib. vi. ver. 469.

The eyes are alſo ſometimes turned downwards, to expreſs modeſty; and they ſhould be always turned towards the object which is addreſſed. A gentle and moderate motion of the eyes is commonly moſt ſuitable, whereby they may be directed to ſome of the audience with an air of reſpect and modeſty; but their motions ought to vary, according to the different nature of the paſſions which they are deſigned to diſcover in the ſpeaker, and convey to his hearers.

The ſhoulders ſhould neither be elevated nor depreſſed: a continued motion of the arms ſhould be avoided; their action ſhould be very moderate, and follow that of the hands, which need never be idle: Quintilian lays great ſtreſs on the action of the hands, when he ſays, "The hands, without which all *geſture* is lame and weak, have a greater variety of motions than can well be expreſſed; for they are almoſt equal to our words. Do we not deſire with them, promiſe, call, diſmiſs, threaten, beſeech, deteſt, fear, enquire, deny? Do not they expreſs joy, ſorrow, doubt, confeſſion, penitence, meaſure, plenty, number, and time? Do not they excite, reſtrain, prove, admire, and ſhame? That in ſo great a variety of ſpeech among all nations and countries, this ſeems to me the common language of mankind." Inſt. Orat. lib. xi. cap. 3.

As all bodily motion is either upward or downward, to the right or left, forward or backward, or circular, the hands are employed by the orator in all theſe, except the laſt; and as they ſhould correſpond with our expreſſions, they ought to begin and end with them. In admiration, and addreſſes to heaven, they muſt be elevated, but never raiſed above the eyes; and in ſpeaking of things below us, they are directed downwards. Side motion ſhould generally begin from the left, and terminate gently on the right: in demonſtrating, addreſſing, and on ſeveral other occaſions, they are moved forward; and in threatening, ſometimes thrown back: when the orator ſpeaks of himſelf, his right-hand ſhould be gently laid on his breaſt. When no other motion is neceſſary, the hands ſhould be kept about as high as the breaſt, ſo as to make nearly a right angle with the arm. They ſhould never be ſuffered to hang down, nor to loll upon the cuſhion or bar. The left-hand ſhould never move alone, but accommodate itſelf to the motions of the right: in motions to the left, the right-hand ſhould not be carried beyond the left ſhoulder: in promiſes and expreſſions of compliment, the motion of the hands ſhould be gentle and ſlow; but in exhortations and applauſe, more ſwift. The hands ſhould be generally open; but in expreſſions of compunction and anger, they may be cloſed. Neither the breaſt nor the belly ſhould be thruſt out; the trunk ſhould be eaſy and flexible, ſuiting itſelf to the motions of the head and hands; and the feet ſhould be kept ſteady.

There are other *geſtures*, which ariſe from *imitation*; as when the orator deſcribes ſome action, or perſonates another ſpeaking: but here he ſhould be careful not to overact his part, by running into any ludicrous or theatrical mimicry, or changing his action or voice in a manner unſuitable to his own character. See farther on this ſubject, Ward's Oratory, vol. ii. p. 344, &c. p. 360, &c. Sheridan's Lect. on Elocution, lect. vii. p 113, &c. See alſo ACTION, IMITATION, PRONUNCIATION, and VOICE.

GESTUS *bonus*, in *Law*. See GOOD *a-bearing*.

GETHYLLIS, in *Botany*, the name of a genus of plants of the *dodecandria monogynia* claſs; the characters of which are theſe: the cup is a ſpatha of a lanceolated form, compoſed of one membranaceous inflated leaf, and containing only one flower: the flower conſiſts of one petal: its tube is extremely ſlender and long: the limb is plain, and is divided into ſix equal ſegments of a lanceolated form, which are of about a third part of the length of the tube: the ſtamina are either twelve or eighteen ſetaceous filaments ſtanding in the cup; they are ſhort and erect, and the antheræ are oblong: the germen of the piſtil is oblong, and ſtands low in the ſpatha under the baſe of the flower. The ſtyle is capillary, and of the length of the ſtamina, and the ſtigma is trifid and obtuſe. The fruit is an oblong, inflated, triangular capſule, containing three cells, in which are numerous ſeeds.

GEUM, in *Botany*, *Avens*, or *Herb Bennet*. See HERB *Bennet*.

GEZIRA *cubros*, in the *Materia Medica* of the ancients, a name given to talc, by Avicenna, Serapion, and others. Theſe authors do not give any explication of what ſort of ſubſtance they mean by this name, but ſeem to ſuppoſe it a thing univerſally known, and only give a liſt of its qualities.

GHALGHULUWA, in *Zoology*, the Ceyloneſe name of a ſpecies of Eaſt Indian ſerpent, a ſnake of a pale brown, variegated with tranſverſe ſtreaks of white, and found among rocks and ſtones.

GHAN is a name given in Muſcovy to CARAVANSERAS.

GHEMARA. See GEMARA.

GHERKINS. See GUERKINS.

GIAGH, or JEHAGH, a cycle of twelve years, in uſe among the Turks and Cathayans.

Each year of the *giagh* bears the name of ſome animal: the firſt, that of a mouſe; the ſecond, that of a bullock; the third, of a lynx or leopard; the fourth, of a hare; the fifth, of a crocodile; the ſixth, of a ſerpent; the ſeventh, of a horſe; the eighth, of a ſheep; the ninth, of a monkey; the tenth, of a hen; the eleventh, of a dog; and the twelfth, of a hog.

They alſo divide the day into twelve parts, which they call *giaghs*, and diſtinguiſh them by the names of the ſame animals. Each *giagh* contains two of our hours, and is divided into eight *keh*, as many as there are quarters of hours in our day.

GIALLOLINO, in *Natural Hiſtory*, a ſpecies of yellow ochre uſed in painting, and called in the colour-ſhops, Naples yellow. It is uſed both as an oil and a water-colour, and likewiſe in enamelling, encauſtic painting, and the colouring of china-ware. Dr. Hill, Hiſt. of Foſſ. p. 56. conſiders it as a kind of bolar earth, impregnated with a ferrugineous calx, and deſcribes it as a very beautiful earth, of a bright and elegant yellow, between a gold and ſaffron colour, and is of a very looſe, ſpongy, porous, and ſhattery texture. It is remarkably heavy, of a duſty ſurface, and gritty to the touch; it breaks eaſily between the fingers, and ſtains the hands. It adheres but ſlightly to the tongue, and makes a very briſk fermentation with aqua fortis. It is found in ſome parts of Italy, particularly about Naples, whence it it is ſaid to have its common name. It ſometimes, ſays Dr. Hill, lies on the ſurface of the earth, and in other places is dug at great depths. Others have ſuppoſed that it is one of the numerous heteroclite productions of the fire in Mount Veſuvius. But M. Fougeroux has lately demonſtrated, that it is produced by art; the perſon who prepares it at Naples, ſcrupulouſly conceals every circumſtance that might lead to a diſcovery of its nature and preparation, which are known only to himſelf. M. Fougeroux has, however, found, that it contains an abſorbent earth, a vegetable acid united with lead, an aluminous and ammoniacal ſalt, and a calx of antimony. Accordingly, on mixing together intimately twelve ounces of ceruſs or white lead, one of alum, one of ſal ammoniac, and three ounces of diaphoretic antimony, in an unglazed earthen pan covered over, and expoſing the mixture to the heat of a moderate fire, during the ſpace of ſeven or eight hours, he obtained a ſubſtance of the ſame colour with the *giallolino*, and poſſeſſing all its properties; as he has been aſſured by the moſt able painters who have uſed it, and have found no difference between it and the true Naples yellow. Hiſt. Acad. Sciences, 1766.

GIANT, γιγας, a man of extraordinary, enormous ſtature and bulk.

The reality of *giants*, and of nations of *giants*, is much controverted among the learned. Travellers, hiſtorians, and relations, both ſacred and profane, furniſh various inſtances thereof; a great part of which naturaliſts and antiquaries ſet aſide.

Thoſe among the ancients who ſpeak of *giants*, as hiſtorians, and affirm there were ſuch things, are Cæſar, De Bello Gallico, lib. i. Tacitus, De Morib. Germanor. and Annal. lib. ii. Florus, lib. iii. cap. 3. St. Auguſtine, De Civit. Dei, lib. xv. cap. 9. and Saxo-Grammaticus, at the end of his preface: among the moderns, Hieron. Magius, Miſcellan. de Gigantibus; Chaſſagonus, De Gigantibus; Kircher, Mund. Subterran. lib. viii. ſect. ii. cap. 4. and ſo many others, that Stephanus, in his notes on Saxo-Grammaticus, affirms, nothing can be more extravagant than to deny or allegorize the authorities we have concerning them.

Dr. Derham obſerves, that though we read of *giants* before the flood, Gen. vi. 4. and more plainly after it, Numb. xiii. 33. yet it is highly probable the ſize of man has always been the ſame from the creation; for as to the Nephilim, Gen. vi. the ancients vary about them, ſome taking them for monſters of impiety, atheiſm, rapine, tyranny; as to thoſe, Numb. xiii. which were evidently ſpoken of as men of a *gigantic* ſize, it is probable the fears of the ſpies might add thereto.

Be this as it will, it is manifeſt, that in both theſe places *giants* are ſpoken of as rarities and wonders of the age, not of the common ſtature: and ſuch inſtances we have had in all ages. There are many fabulous relations; ſuch as we take to be that of Theutobocchus, who is ſaid to have been dug up anno 1613, and to have been higher than the trophies, and twenty-ſix feet long: and no better we ſuppoſe the *giants* to have been, which Ol. Magnus gives an account of in his fifth book; ſuch as Harthen and Starchater, among the men; and among the women, *reperta eſt* (ſaith he) *puella—in capite vulnerata, mortua, induta chlamyde purpurea, longitudinis cubitorum* 50, *latitudinis inter humeros quatuor*. Ol. Mag. Hiſt. lib. v. cap. 2.

But, as for the more credible relations of Goliath (whoſe height was ſix cubits and a ſpan, 1 Sam. xvii. 4. which, according to biſhop Cumberland, is ſomewhat above eleven feet Engliſh), of Maximinus the emperor (who was nine feet high), and others in Auguſtus's and other reigns, of about the ſame height; to which might be added the dimenſions of a ſkeleton, dug up in the place of a Roman camp, near St. Alban's, by an urn inſcribed Marcus Antoninus, of which an account is given by Mr. Cheſelden, who judged by the dimenſions of the bones, that the perſon was eight feet high, Phil. Tranſ. N° 333. theſe antique examples and relations, we ſay, may be matched, nay outdone, with modern ones; of which we have divers in J. Ludolph. Comment. in Hiſt. Æthiop. lib. ii. cap. 2. ſect. 22. Magius, Conringius, D. Hakewel, and others; which laſt ſpeaks from Nannez, of porters and archers belonging to the emperor of China, fifteen feet high; and of others from Purchas, of ten and twelve feet high, and more. See that learned author's Apol. p. 208.

The exiſtence of a race of men above the common ſtature, on the coaſt of Patagonia in South America, has been the ſubject of diſpute for the two laſt centuries. In one century almoſt all navigators, of every country, affirmed that there were ſuch perſons, and in the next the fact is denied by the greater number, and their predeceſſors are treated as timid or boaſting fabuliſts. The Ynca Garcilaſſo de la Vega, in his Hiſtory of Peru, relates, that, according to a tradition univerſally received, a number of veſſels or junks came to St. Helena with a company of *giants* on board, of a ſtature ſo enormous, that the natives of the country were not higher than their knees; that their eyes were as broad as the bottom of a plate, and their limbs proportionably large. But theſe are fables, ſimilar to thoſe relative to the ſame ſubject in other parts of the world. See GIANTS *bones*.

Turner, the naturaliſt, reports that he had ſeen, near the river Plata, on the coaſt of Braſil, a race of *giants*, who went ſtark naked, one of whom was twelve feet high; but he acknowleges that he ſaw no others ſo tall.

The ocular witneſſes on the affirmative ſide of the queſtion are, Magellan, Loaiſa, Sarmiento, and Nodal, among the Spaniards; Cavendiſh, Hawkins, and Knivet, among the Engliſh; Sebald, De Noort, Le Maire, and Spilberg, among the Dutch; and among the French, thoſe who went in the expedition from Marſeilles and St. Maloes, in the year 1704.

Knivet affirms, that he meaſured ſeveral dead bodies, which he found buried at Port Deſire, which were from fourteen to ſixteen ſpans high; and that he had frequently ſeen, at Braſil, one of the Patagonians, who, though a youth, meaſured no leſs than thirteen ſpans; and that the Engliſh priſoners at Braſil aſſured him, that they had ſeen many men of the ſame gigantic ſtature upon the coaſts of the Streight: this account is alſo confirmed by Sebald de Weſt, and Oliver de Noort. Aris-Claſz, a commiſſary on board Le Maire's fleet, declares that he found, in the ſepulchres on the coaſt of Patagonia, the bones of men who were between ten and eleven feet high. Nodal and Sir Richard Hawkins merely relate, that theſe ſavages were a head taller than the inhabitants of Europe, and of ſuch a ſtature, that the people on board their veſſels called them *giants*.

Thoſe who bear teſtimony to the contrary, are Winter, the Dutch admiral Hermite, Froger in De Gennes's Narrative, and Sir John Narborough. Sir Francis Drake alſo is ſilent with reſpect to the ſtature of the inhabitants of Patagonia; but Winter poſitively affirms, that the accounts of their being *giants* are falſehoods invented by the Spaniards. Narborough meaſured the ſkulls and the print of the feet of the ſavages on the coaſt of the ſtreight of Magellan, which, he ſays, were of the common ſize; and he had often ſeen companies of them at Port St. Julian, who were neither taller nor bigger than other men. However, it may be obſerved, in general, that the greater part of thoſe who hold the affirmative in this queſtion, ſpeak of people that inhabited the deſert coaſts of Patagonia to the eaſt and weſt; and that, on the contrary, thoſe who hold the negative, ſpeak of thoſe who inhabit the ſtreight upon the ſides of the utmoſt point of America to the north and ſouth. Frezier relates, not from his own knowlege, but from the teſtimony of eye-witneſſes, that there was, at a conſiderable diſtance within the country from the coaſt of Chili, an Indian nation, called by their neighbours *Caucohues*, who ſometimes came down to the Spaniſh ſettlements, that were more than nine feet high, and were the ſame race with the Patagonians who live on the eaſtern coaſt. It appears, from various relations, that the inhabitants of the two borders of the ſtreight are of the common ſtature; and that the race, diſtinguiſhed by the name of Patagonians, make their conſtant reſidence upon the deſert coaſts, ſcarcely acceſſible to any but themſelves; and when European ſhips frequented the ſtreight, they removed and ſettled in the interior part of the country: however, the current teſtimony of late navigators, particularly commodore Byron, captain Wallis, and captain Carteret, will put an end to the doubts that have been hitherto entertained of the exiſtence of ſuch perſons. Commodore Byron, who viſited the coaſt of Patagonia in 1764, ſpeaks of the inhabitants as of a gigantic ſtature; but he did not meaſure any of them, and only concluded, by the proportion of their ſtature to his own and that of his companions, that they could not be leſs than ſix and a half, or ſeven feet in height, and proportionably ſtrong and bulky. Captain Wallis had an interview with theſe people in 1766, and found, by meaſuring them, that the ſtature of the greater part of them was from five feet ten inches to ſix feet, though there were ſome who were ſix feet five and ſix feet ſix inches, and one who was ſix feet ſeven inches. Captain Carteret, who attended Captain Wallis on this occaſion, confirms the above account in his letter to Dr. Maty. See Phil. Tranſ. vol. lx. art. 2. p. 20. &c. See Hawkſworth's Voyag. vol. i. Introd. and p. 28. 154.

GIANTS, *rebel*, in *Ancient Mythology*, were the ſons of Terra, or the Earth, who made war againſt Jupiter and the celeſtial deities, to avenge the defeat of the Titans. Theſe *giants* are repreſented as of an enormous height and ſize, and poſſeſſed of ſtrength proportioned to their bulk: each of them had a hundred hands, and ſerpents inſtead of legs. Being determined to dethrone Jupiter, they reared Mount Oſſa upon Pelion, and Olympus upon Oſſa, and from thence attacked the gods with huge rocks, ſome of which fell into the ſea and became iſlands, and others fell on the earth and formed mountains. Jupiter ſummoned a council of the gods, and being informed that it was neceſſary to obtain the aſſiſtance of ſome mortal, with the advice of Pallas he called up Hercules, and with the aid of this hero, exterminated the *giants* Enceladus, Polybotes, Alcyon, Porphyrion, the two ſons of Alœus, Ephialtus, Othus, Eurytus, Clytius, Tythyus, Pallas, Hippolitus, Agrius, Thoon, and Typhon, the laſt of whom it was more difficult to vanquiſh than all the others. Jupiter, having thus gained a complete victory, caſt the rebels down to Tartarus, where they were to receive the full puniſhment of their enormous crimes: according to the accounts of ſome of the poets, he buried them alive under Mount Etna and different iſlands.

Giants *bones*, a name too haſtily given by the vulgar to certain bones and parts of ſkeletons, of an enormous ſize, found in England and other places. Of all the numbers of theſe, which have been publicly ſhewn about as wonders in nature, not one but has proved, on examination, a bone of an elephant; or elſe of a whale; the firſt, however, is uſually the caſe, as the bones of elephants are much more frequently found buried in the earth than thoſe of the whale. We had not long ago the fore-fin of a whale, not foſſile, but recent, taken clean from the ſkin, and ſhewn about London for the hand of a *giant*.

Sir Hans Sloane mentions a vertebra of the loin of a whale ſent him from Oxfordſhire, where it was dug up under ground, and afterwards uſed as a ſtool to ſit upon, and vulgarly ſuppoſed part of a human back-bone. Now, if the whole ſize of the body had been calculated from this piece, the account would have been ſuch a ſize as would have far exceeded all the fabulous ſtories of *giants* ſkeletons extant in the world.

Many ſkeletons of this kind have been found, which have been called the ſkeletons of *giants:* ſuch are thoſe of Philoſtratus, which are ſaid to be the bones of men of twelve, twenty, and even thirty cubits high; that found in a mountain of Crete, and mentioned by Plato, forty-ſix cubits high; another of ſixty cubits, found near Tangier in Mauritania, mentioned by Strabo, and ſuppoſed to be the ſkeleton of Anteus; the ſkeleton of Pallas, found in Rome, and ſaid to be taller than the walls of that city; another, found in England in 1171, fifty feet long. St. Auſtin alledges, in proof of the exiſtence of *giants* before the flood, a grinder tooth, which he ſaw on the ſhores of Utica, which was in reality that of an elephant. The tooth in the church of St. Chriſtopher, at Hiſpulla, and the ſhoulder-bone of St. Chriſtopher, preſerved in a church at Venice, are of the ſame kind. The tooth preſerved and ſhewn at Antwerp, is only the grinder of an elephant; and another, belonging to a ſkeleton which was dug up near Tunis in 1630, was ſent to the learned Piereſc, who took the impreſſion of it in wax, and comparing it with the tooth of an elephant ſhewn near the place, found it to be of the ſame ſhape and ſize. Sir Hans Sloane has given an accurate and learned account of ſeveral other miſtakes on this ſubject, for which we muſt refer to the Philoſ. Tranſact. N° 404. However, Monſ. Le Cat, in a memoir not long ſince read before the Academy of Sciences at Rouen, recites a number of inſtances, in which ſkeletons, or parts of ſkeletons, of an uncommon magnitude, have been found; theſe have been examined by anatomiſts, he ſays, and have been by them reputed real bones; and hence he infers the exiſtence of *giants*.

Giants *Cauſeway*, a name given by the common people of the county of Antrim, in Ireland, to a vaſt quantity of that kind of black marble, called BASALTES, which ſtands in columns, and is natural to that marble, and runs out a great way into the ſea.

The ignorance of the vulgar as to the nature of this ſtone, has occaſioned this great pile of it to be ſuppoſed artificial, and the work of *giants*, once inhabitants there. But the truth is, that the baſaltes, in whatever part of the world it is found, is always naturally of this figure. Whoever conſiders this amazing ſeries of columns in Ireland, will be ſoon convinced no human hands could have formed them, and will find an accuracy in their figures, greater than could have been expected from the moſt curious hand. The length of the ſeveral columns, and their joints ſo regularly placed in ſeries, and the niceneſs of their articulations, by which no ſpace or vacuity is left between, are wonderful.

Nature has been abundantly curious in the ſtructure and formation of animal and vegetable bodies, but the foſſils in general are leſs curiouſly put together; but this cauſeway of baſaltes ſeems one of the works in this part of the creation, in which her greateſt accuracy has been employed.

The ſingle columns, of which this maſs of piles conſiſts, are ſometimes octangular, ſometimes of ſeven, or fewer ſides, but, generally, from three to nine ſides; and, when examined, they are found juſt ſuch as muſt neceſſarily be required in the places where they ſtand to fill up between others, ſo as to leave no vacuity. Each of theſe columns is compoſed of a great many ſeries of joints, each of which is ſo well fitted to the place, that the joining appears only a crack or crevice in the ſtone: yet theſe are regularly articulated, there being always a ball on one part, and a ſocket in the other to receive it, ſo that the joints cannot ſlip off from one another. The triangular and ſquare columns are fewer in number than the others, but they ſtand principally in the inner part of the large ſeries, and are ſeldom ſeen, unleſs ſearched after by a curious eye.

The regular figure of the ſtone, compoſing this cauſeway, is not more woderful than its quantity. Other figured ſtones, as cryſtals, ſpars, and the remains of animals, ſuch as *entrochi* and *aſteriæ*, are found only ſcattered thinly up and down; but nature has been profuſe in this part of her workmanſhip, the whole country for many miles being full of it, and a vaſt maſs running no one knows how far into the ſea: for, beſides what vulgarly goes by the name of the *Giants Cauſeway*, which is itſelf of vaſt extent, there are great numbers of the ſame pillars at diſtances in other places.

There are two other ſmaller and imperfect cauſeways to the left hand of the great one, and farther in the ſea, a great number of rocks ſhew themſelves at low water, which appear plainly all to conſiſt of the ſame ſort of columns. In going up the hill from the cauſeway there are found, in different places, a vaſt number of the ſame columns; but theſe do not ſtand erect, but are laid ſlanting upwards in different angles and directions. Beyond this hill, eaſtward, alſo, at ſeveral diſtances, there ſtand a great number of the ſame pillars, placed ſtraight and erect, and in cluſters of different ſizes. Theſe are ſeen ſcattered, as it were, over the ſeveral parts of the hills.

One parcel of them is much admired, and called by the country people the looms or the organs. It ſtands in an elegant form, and faces the bottom of the hill. The columns, of which this cluſter conſiſts, are fifty in number, and they are ſo nicely put together, that the talleſt ſtand in the middle, and the ſhorter gradually on each ſide of it to the end, ſo that they look like the pipes of a church organ viewed from the front. The talleſt one of all theſe, which ſtands exactly in the center, is forty feet high, and conſiſts of forty-four diſtinct joints.

Five miles weſtward of the *Giants Cauſeway* ſeveral ranges of tall pillars, of the ſame kind with thoſe of the cauſeway, ſhew themſelves in cluſters, and ſmaller piles ſtanding for a long way on the ſides of the rocks. A neighbouring church was built of the ſtone of ſome like pillars found thereabout; and this ſtone, on examination, proves to be the very ſame with that of the pillars of the *giants cauſeway*. Other pillars have been obſerved at a ſtill greater diſtance, ſo that their whole extent is not leſs than about eleven Iriſh miles, or fourteen Engliſh.

The inland pillars differ from thoſe which run into the ſea, and are called the cauſeway only in the following particulars: ſome of the inland pillars are much larger than thoſe of the cauſeway, being two feet and a half in diameter, and among theſe there are only found ſuch as have three, four, five, and ſix ſides, none of them having yet been found to have ſeven or eight ſides, as many of thoſe of the cauſeway itſelf have. And, finally, theſe inland pillars, though compoſed of as many joints as thoſe of the cauſeway, yet have not that curious articulation of the ball and ſocket, but are only joined by the laying one ſmooth ſurface on another; ſo that a joint of a ſingle column may be ſlipped off from the reſt, by a conſiderable force preſſing againſt it. There is ſomething like this obſervable alſo in ſome of the columns of the cauſeway itſelf; for, among the numbers which are jointed by the ball and ſocket, there are ſome which only adhere by being applied ſurface to ſurface. This is found only in a few of the columns, however, and they always ſtand within the cluſters, and are compoſed of leſs than ſeven ſides. In theſe alſo the joint is not made by the application of two horizontal planes, but by ſuch as ſlant, ſo that it looks very like the breaking of an entrochus or aſteria, or ſome other ſuch ſparry body of extraneous or animal origin.

Great numbers of the upper ends of the columns, which compoſe the cauſeway itſelf, are hollowed at the top, as if intended to receive another joint with a ball at its end, or as if ſuch a joint had fallen off from them. Theſe hollows are of great uſe to the neighbouring poor, for they make a kind of ſalt-pans of them, and thus very eaſily procure themſelves a kind of bay-ſalt in ſummer. They fill theſe little baſons with ſea-water at high tides, and the heat of the ſun and of the ſtone contributing greatly to the evaporation, as well as the ſhallowneſs of the baſon, the whole humidity is found evaporated in the time of four tides, and they take out the ſalt ready for uſe. The joints, of which theſe pillars conſiſt, are generally convex at one end, and concave at the other; the firſt part ſerving as a ball for the ſocket of the joint next below, and the other as a ſocket for the ball of the joint next above. But this is not an unalterable law in their formation; for there are ſome joints found which are convex at both ends, and others which are concave at both ends, to receive balls, or enter ſockets both ways. The vaſt height of theſe ſtraight-jointed pillars, eſpecially of the more ſlender and perfect ones, is amazing. Forty feet is a very conſiderable height for a pillar, of perhaps leſs than a foot in diameter, yet this is far from being the whole real length of the pillar, for this appears above ground, but what is buried in the earth is not yet known. Some curious people have dug down eight feet at the baſe, and found the column run in the ſame ſhape and regularity to that depth; and there appeared no room to doubt of its having gone in reality much farther.

The joints, as we ſee the pillars above the ſurface, are uſually as many in number, as the pillar is feet high; but they are not regularly each of a foot long, for they are ſhorteſt at the upper part of the columns, and run gradually longer and longer as they approach the baſe. This is obſerved both in the inland-columns, and in thoſe of the cauſeway; but though the length of the joints differs, their convexities and hollows are much the ſame in all parts of the column.

It is to be obſerved, that where the top of any pillar ſeems complete, and no part to have been broken off, the ſummit of the topmoſt joint is uſually flat and ſmooth, nature having provided no convexity or cavity in a part where it had no uſe.

There ſeems a very great difficulty to conceive by what means the ſtony joints, ſo bulky and ponderous, and ſo perfectly diſtinct, and diſcontinued bodies from one another, could arrive at the places where they now are placed, or be carried to the tops of ſuch high columns; but when we conſider many other natural phenomena, we ſhall find ſo many things equally wonderful, that this will not appear the leſs a work of nature becauſe it is beyond our comprehenſion.

Dr. Richard Pococke endeavours to account for the joints in theſe pillars, by ſuppoſing that the ſeveral parts of the pillars were at firſt formed either in the ſhape of a cylinder, with the upper end, if not both ends, of a ſpherical figure; or that they were either ſperical or oblate ſpheroids. For the pillars being compoſed, as he imagines, of cryſtal of ſix ſides, and ſpar of three, and of a very fine black ſand, he apprehends that as the cryſtals and ſpars united, and formed an irregular body, the fine black ſand filled up the interſtices, and formed ſuch cylindrical or ſpherical bodies in a ſoft ſtate, but in thin horizontal laminæ or plates like talc; becauſe they moſtly appear to be of this figure, the ſtones ſeparate in ſuch plates between the joints and thoſe parts of the pillars which have been expoſed to the weather and corroded by it appear in ſuch plates: though in ſome caſes there are perpendicular joints, as in a remarkable pillar which ſeems to be ſplit through its whole length. It is, therefore probable, ſays Dr. Pococke, that, when this matter was in a fluid ſtate, and when the ſtratum of rock was formed, on which it was made, the fluid contiguous to the rock continued in motion; that, after a time, ſome of the particles of matter, which compoſe theſe pillars, being diſengaged from the particles of water, ceaſed to move and formed the parts of theſe pillars, which are next to the rock, in the above mentioned figures; ſo much being formed only at once, or in a very ſhort time, as extends to the firſt joint; that then, either by change of ſeaſon, or ſome other accident, ſo much more water mixed with theſe particles, as prevented their continuing to form themſelves into ſuch a ſhape and gave the former motion; that, afterwards, the decreaſe of the water might again be the cauſe of the former effect, and ſo on, till the pillars were formed; and the top of the laſt that was formed being convex, that which was formed upon it would probably be concave and adapt itſelf to it, either by its gravity or being ſofter. Whilſt all were in one or other of theſe figures, the gravitation of the ſecond ſtratum above the firſt joint might operate in ſuch a manner on that which was firſt formed, and ſtill ſoft, as to preſs it down; and thus eight ſtones being round one ſtone would naturally preſs the middle ſtone into the form of an octagon.

The internal ſubſtance of the ſtone compoſing theſe columns, is extremely hard and compact. Its greet, or grain, is ſo very fine, that the eye does not perceive it, unleſs examined very nicely, and that in the ſurface of a piece newly broken. It then ſhews itſelf like a very fine glittering ſand, thickly interſperſed among a more opake matter; the whole is heavier than almoſt any other ſimple ſtone; yet it contains not the leaſt particle of any metal ſo far as has been yet diſcovered. It is the pureſt and moſt homogene of any ſtone of this country; having no extraneous matter, no foſſils of the animal kind in it, ſuch as ſhells, entrochi, and the like; which are well known to be very common in the various ſtrata of ſtone, in Ireland, and in many other parts of the world. However, Mr. Drury, well known for his models of ſeveral ſtones of this cauſeway, and his engravings of the proſpects of the cauſeway itſelf, found in one of the ſtones a rough pebble in the ſhape of an egg, about ¾ of an inch long, and above an inch thick; which, when it was poliſhed, proved to be a white cornelian.

Marbles, in general, are very ſubject alſo to cracks, which, when filled up, as they uſually are with ſparry matter, make a ſort of white veins; but ſuch cracks and veins are not to be ſeen in the marble of theſe columns. It has been tried in a glaſs-houſe, and found to melt with kelp, ſo as to make the black glaſs bottles.

From theſe obſervations ſome have concluded, that there is an analogy between this marble and cryſtal in their origin and formation, as the columns of cryſtal are alike pure and homogeneous, alike of a regularly angular figure, and both are alike free from veins, cracks, and extraneous ſubſtances. See Philoſ. Tranſ. N° 199, 212, 241. Lowth. Abridg. vol. ii. p. 511. ſeq. Phil. Tranſ. vol. xlvii. vol. xlviii. art. 34 and 35. See alſo the article TOUCHSTONE.

There are other priſmatic columns, ſimilar to thoſe above deſcribed, in our own iſland; particularly in the mountain of Caderidris, near Dolgelly, in Merionethſhire: where they probably form a group as in other places. Mr. Strange has given an account of two groups of priſmatic baſaltine columns, which he diſcovered in the Venetian ſtate in Italy; one in Monte Roſſo, about ſeven miles nearly ſouth from Padua, and the other in Monte del Diavolo, near San Giovanni Illarime, about ten miles north-weſt of Vicenza. The form of the latter is nearly circular, reſembling that of the *giants cauſeway*; that of the former approaching more to an oblong or oval figure: the columns of San Giovanni are much about the ſame ſize, and meaſure about a foot in diameter; thoſe of Monto Roſſo are very unequal, ſome being a foot, while others ſcarcely exceed three inches in diameter: thoſe, of both theſe Venetian groups manifeſt all the varieties of priſmatic forms obſervable in the *Giants Cauſeway*, and other ſuch groupes; but they are commonly of five, ſix, or ſeven ſides, and the hexagonal form ſeems moſtly to prevail. The texture of the former ſort is ſolid and uniform; the ſurface ſmooth, and the internal parts of a dark iron-grey colour; thoſe of Monte Roſſo have a rough and knotty ſurface; and, when broken, manifeſt a variegated colour, and unequal texture of parts; reſembling an inferior ſort of granite, of which the mountain is formed, and which ſerves as a baſe for this range of columns.

Other groups of articulated baſaltine columns have alſo been obſerved in the province of Velay and Auvergne in France; particularly by M. De Varennes, at Blaud near Langeac, and by M. Deſmareſts, near le Mont d'Or; and M. Sage mentions another near St. Alcon, in the ſame province. Kircher has long ago deſcribed a group of the ſame columns near Viterbo in Italy. Mundus Subterran. lib. viii. § i. cap. 9, &c. And Mr. Strange mentions another at Caſtel Nuovo, in the Euganean hills, about four miles ſouth-weſt of that of Monte Roſſo. The ſyſtematical mineralogiſts have, generally, aſſigned the ſame common origin to moſt lapideous ſolids, which they ſuppoſe to be generated by depoſition from an aqueous fluid: but the ſtructure and other phænomena of theſe baſaltine columns prove them to be cryſtallizations or concretions of a particular kind, and generated immediately from an igneous fluid; and to be the effects of ſome intrinſic principle of organization, as Mr. Strange imagines, by which they appear to have been produced ſimultaneouſly, in a manner, upon the conſolidation of the whole maſs of matter, in which they lie, and with which they conſtantly bear the greateſt analogy; and he ſuppoſes, that theſe regular bodies have been generated locally, and not in the midſt of thoſe violent convulſions of nature, which are commonly aſſigned for the origin of volcanic mountains in general. Phil. Tranſ. vol lxv. part i. art. 2. p 5, &c. vol. lxv. part ii. art. 41. p. 418, &c. See BASALTES.

GIAR *alnabar*, in *Botany*, a name given by Avicenna, Serapion, and the reſt of the Arabian writers, to the potamogeiton of thoſe times. This is tranſlated by ſome the water-ruſh, but that is founded on an error; it is certain that the plant thus called by the Arabians, was very different from the potamogeiton of our times. Avicenna tells us, it had flowers reſembling thoſe of the water-lily; and it ſeems either to have been the ſagitta aquatica, or water arrow-head, or elſe the butomus, or ſome of the ſmaller ſpecies of nymphæa.

GIAROLA, in *Zoology*, the name of a bird of the lark kind, remarkable for its very long heel. It is of the ſize of the common lark. Its head, neck, back, and wings, are of a mottled colour, reſembling that of the quail. The general colour of the feathers is a cheſnut brown, and their edges are variegated with white, yellow, and red; the back part of its head has a ſort of crown or ring of white feathers; its belly is white: its tail is ſo ſhort, that it ſeems to have none; it is bifid, however, and is elegantly variegated with cheſnut-colour and white. Aldrovand. de Avibus, lib. xvii. cap. 39.

GIAROLO, in *Zoology*, a name by which a ſmall bird of the ſnipe kind, remarkable for its white tail, is known in the markets of Italy. It very much reſembles the bird we call in Engliſh the STINT, but its beak is broad at the baſe, and tapers to a point, and its legs are thicker and ſhorter. It is not known among authors by any Latin name, except that Aldrovandus has called it the CINCLUS *tertius*, and cinclus is a very indeterminate name, being applied by different authors to ſeveral different birds.

GIB, in *Mechanics*. See CRANE.

GIBBOUS, in *Surgery*, is uſed to denote a perſon bunched or hump-backed.

GIBBOSITY is a preternatural incurvation of the ſpina dorſi either backward, or on one ſide. Infants are more ſubject to this diſorder than adults, and it oftener proceeds from external, than from internal cauſes. A fall, blow, or the like violence frequently thus diſtorts the tender bones of infants. When it proceeds from an internal cauſe, it is generally from a relaxation of the ligaments that ſuſtain the ſpine, or a caries of its vertebræ; though the ſpine may be inflected forward, and the back thrown out, by a too ſtrong and repeated action of the abdominal muſcles; and this, if not timely redreſſed, uſually grows up and fixes as the bones harden, till in adults it is totally irretrieveable: but when the diſorder is recent, and the perſon young, there are ſome hopes of a cure. The common method is by a machine of paſtboard, wood, or ſteel, which is made to preſs principally upon the *gibbous* part, and this by long wearing may ſet all right. The ſurgeons, however, have a different inſtrument which they call a croſs, much more efficacious though not quite ſo convenient in the wearing; by the uſe of this, the parts are always prevented from growing any worſe, and are often cured. During the application of theſe aſſiſtances, the parts ſhould be at times rubbed with Hungary-water, ſpirit of lavender, and the like, and defended with a ſtrengthening plaſter of oxycroceum, opodeldoc, or the like. Heiſter's Surg. part ii. p. 21.

That part of the liver, out of which the vena cava ariſes, is alſo called the *gibbous* part.

GIBBOUS is alſo uſed in reference to the enlightened parts of the moon, while ſhe is moving from full to the firſt quarter, and from the laſt quarter to full again; for all that time the dark part appears horned, or falcated, and the light one bunched out, convex, or *gibbous*.

GIBBOUS *fiſh*, *gibboſus piſcis*, in *Zoology*, a name given by Mr. Ray to the fiſh called by the Dutch *kromrugh*. It is a ſmooth fiſh without ſcales, its belly is white, its fins and tail black. It grows to a conſiderable ſize, ſometimes to four feet. It is caught all over the Eaſt Indies, near the ſea ſhores, and is very firm, and much eſteemed at table. It has its name from the remarkable riſing of its back, which is like that of the pearch, but much higher. Ray's Ichthyolog. Append. p. 4.

GIBELINS, GIBELLINS, GIBELLING, or GHIBELINS, a famous faction in Italy, oppoſite to another called the Guelphs.

The Guelphs and *Gibelins* ravaged and laid waſte Italy for a long ſeries of years: ſo that the hiſtory of that country, for the ſpace of three centuries, is only a detail of their mutual violences, and mortal wars.

The Guelphs ſtrenuouſly aſſerting the power of the ſee of Rome, as the *Gibelins* did the emperor's right of ſovereignty.

We have but a very obſcure account of their origin, and the reaſon of their names: the generality of authors affirm, that they aroſe about the year 1240, upon the emperor Frederic the IId's being excommunicated by pope Gregory IX.

That prince, ſay they, making a tour among the cities of Italy, gave the name *Gibelins* to ſuch as he found well affected to him; and that of Guelphs to thoſe who adhered to the pope. But as to the reaſon and ſignification of thoſe words, there is a deep ſilence; *Gibelin* might poſſibly be formed of *gebieter*, *imperator*; whence *gebieteriſch*, *imperioſe*. Of *gebieter*, the Italians might make, by corruption, *Gibelin*; ſo that *Gibelins*, in this light, ſhould be the ſame with *Imperialiſts*, or ſuch as followed the emperor's party.

By the way, ſome writers maintain, that the two factions aroſe ten years before; though ſtill under the ſame pope and emperor.

Other hiſtorians relate, that Conrad III. marching into Italy, in the year 1139, againſt the Neapolitans, Roger, count of Naples and Sicily, in order to defend his ſtates, called to his aſſiſtance Guelph, duke of Bavaria; and that one day, when the two armies were ready to join in battle, the Bavarians cried out in High Dutch, *hie, Guelph!* or, as others ſay, in Flemiſh, *hier, Guelph!* that is *here, Guelph!* and that the Imperialiſts anſwered on their ſide, with the words *hie*, or *hier*, *Gibelin! here, Gibelin!* calling the emperor by the name of the place where he had been bred.

Hornius refers the names to the war in 1140, between Henry the Proud, duke of Bavaria and Saxony, and Conrad III. duke of Suabia; the two princes preparing to engage near the town of Winſberg, the Bavarians began to cry out, *Guelph*, which was the name of duke Henry's brother; and the partiſans of the emperor *Weibelingen*, which was the name of the place where that prince was born and bred, in the duchy of Wirtemberg, whoſe ſurname he bore: from which *Weibelingen* the Italians at length formed *Gibelin*.

This account is confirmed by Martin Cruſius: *Initium* Gibelinæ *(Wibelinæ à patria Conradi regis) & Welficæ concertationis*. Conrad being of Weibelingen, that word ſays Cruſius, gave riſe to *gibellingue*, and that to *gibelling*, *Gibelins*, *Gibellini*.

Platina, on the other hand, aſſures us, that the name *Gibelins* aroſe from that of a German at Piſtoya; whoſe brother, named Guelph, gave likewiſe his name to the oppoſite faction: the two brethren, it ſeems, bearing an irreconcileable hatred. Others maintain, that the emperor gave the appellation *Gibelins* to thoſe of his party, from the German word *gipffel*, ſignifying *ridge*, or *top*; becauſe the empire reſted on them, as the rafters of a houſe lean on the ridge, which joins them a-top.

Karus, a learned canon of Straſbourg, in the lives of the emperors of the houſe of Brunſwick is of the ſecond opinion above related: in a battle, ſays he, between Welff, or Guelff, and Frederic, the army of the firſt crying out, *hie, Welf, hie, Welf!* the ſecond commanded his to cry out, *hie, Gibeling! hie, Gibeling!* the name of his birth-place; and the French and Lombards aſking the ſignification of thoſe words, they were anſwered, that by *Welff* was meant the pope's party; and, by *Gibelin*, the emperor's.

Yet others contend, that the word *Gibelin* is only a ſoftening of the word *gibertin*, or *guibertin*; and that it aroſe from Guipert, an antipope, ſet up by the emperor Henry III. in the year 1080.

Among many other conjectures, Maimbourg, in his Hiſt. de la Decad. de l'Emp. advances another opinion, that the two factions, and their names, aroſe from a quarrel between two very ancient and illuſtrious houſes on the confines of Germany, that of the Henrys of *Gibeling*, and that of the Guelphs of Adorf. See Machiavel.

It is ſaid by ſome, that the *Gibelins*, when driven out of Italy long after the year 1229, at which period the conteſt between them and the Guelphs ran very high, and ſettled at Amſterdam, were the inventors of the mercantile practice of re-change, or re-exchange, on bills of exchange, on account of the damages and charges they were put to, and the intereſt of the money of their bills proteſted, which had been given to them for the effects they had been obliged to leave behind them. Anderſon's Hiſt. Commerce, vol. i. p. 110.

GIBET, or GIBBET, a machine in manner of a gallows, whereon notorious criminals, after execution, are hung in irons, or chains: as ſpectacles, in terrorem.

The word in French, *gibet*, properly denotes what we call *gallows*: it is ſuppoſed to come originally from the Arabic *gibel*, *mount*, *elevation of ground*, by reaſon *gibets* are uſually placed on hills, or eminences.

GIBLETS, the offals, or entrails of a gooſe; including the heart and liver, with the feet, gizzard, &c.

The word is ſuppoſed to be formed of *goblets*, from the French *gobeau*, *mouthful*.

Giblets make a conſiderable article in cookery: they boil *giblets*, ſtew *giblets*, make ragous of *giblets*, *giblet*-pies, &c.

GIBUR, a general name given by ſome chemical writers, to all medicines drawn by their art from metallic or mineral ſubſtances.

GIDDINESS, the popular name for the diſtemper, called phyſicians VERTIGO.

Giddineſs in horſes is cured by a glyſter and blood-letting, to be repeated after two days moderate exerciſe. Dict. Ruſt. in voc.

GIFT MEHL, the name given by the German chemiſts and metallurgiſts, to the firſt appearance of arſenic, or the grey flowers ariſing from the roaſting of cobalt, and ſticking to the long wooden funnel, which they carry from the furnaces. The grey colour of theſe flowers is occaſioned by the ſmoak of the fuel; and when they are afterwards ſublimed in a cloſe veſſel, the arſenical flowers begin to grow clammy in that part of the veſſel which is laſt made hot by the continuation of the fire, and there form themſelves into a ponderous thick ſublimate.

Nevertheleſs this ſublimate neither runs out, nor gets to the bottom of the veſſel when the fire is increaſed. A tenacious doughy clammineſs is indeed communicated to arſenic by the fire; but the fire alone cannot make it melt, but reſolves it into a ſmoak, which when it can find no way to eſcape, often burſts the veſſels in which it is confined. The yellow arſenic, which has one tenth part ſulphur, is by that mixture much more eaſily formed into a ſolid ſublimate than the white arſenic alone; but the red arſenic, which contains double that quantity of ſulphur, cannot eaſily be formed into a ſublimation by aſcent, becauſe of its extreme readineſs to fuſe. The beſt way of preparing this is therefore to raiſe it out of a retort in the large and long neck of which it may be condenſed, and thence fall while yet fluid into the receiver. Arſenic of this kind may be immediately produced out of ſome ſpecies of pyrites without any previous addition; or by mixing a ſulphureous pyrites of the common kind with one of the white ones, or with any other ore of arſenic; and by this proceſs there will be ſeparated an arſenic either yellow or red, according to the ſmaller or larger proportion of the ſulphur in the mixture of the whole.

The word *gifft mehl*, is German, and ſignifies poiſonous meal or flour.

GIFT, *donum*, in *Law*, is a conveyance which paſſeth either lands or goods, and is of a larger extent than a grant, being applied to things moveable and immoveable; yet as to things immoveable, when taken ſtrictly, it is applicable only to lands and tenements given in tail; but *gift* and GRANT are often confounded. See DONATION.

A *gift* may be by deed, by word, or in law: thus, all a perſon's goods and chattels, except in ſome ſpecial caſes, may be given without deed; though ſuch a *gift* is liable to ſuſpicion. When ſuch a *gift* is made in ſatisfaction of a debt, it ſhould be done before witneſſes of credit; the goods and chattels ſhould be, at the ſame time, appraiſed to the full value; and the *gift* be expreſly made in full ſatisfaction of the debt. As to *gifts* in law; if a man be married, all the goods and chattels of his wife belong to the huſband: alſo, if a perſon be made EXECUTOR of a will, by *gift* in law, all the teſtator's goods are his, after paying the teſtator's debts. And as to deed of *gift*, all things that lie in livery, as meſſuages, lands, woods, &c. may be given or granted in fee, for life or years, at firſt; and be aſſigned over for ever, afterwards. Such a deed may be made upon condition; and if it be of goods and chattels, the delivery of a ſixpence is a good ſeiſin of the whole.

GIG-*fiſh*. See FISH-*gig*.

GIGANTIC. See GIANT.

GIGANTOMACHIA, the battle of the giants againſt the fabulous gods of the ancient heathens.

The word is Greek, *γιγαντομαχια*, formed of *γιγας*, *γιγαντος*, *giant*; and *μαχη*, *combat*, of *μαχομαι*, *pugno, I fight*.

Several of the poets have compoſed *gigantomachias*: that of Scarron is the fineſt of all his pieces.

GIGAROS, in *Botany*, a name given by ſome writers to the dracontium.

GIGARTON, the ſtone or kernel of a grape or raiſin. Ægineta obſerves, that grape-ſtones are drying and refrigerating; and the ſtones of raiſins, on analyſis, afford an acid ſpirit, and empyreumatic oil, and as ſome ſay, a very conſiderable quantity of a volatile ſalt.

GIGERIÆ, a term uſed by ſome writers, to expreſs the offals of poultry of any kind, including the inteſtines, extremities, and whatever elſe is thrown away before the dreſſing. See GIBLETS.

GIGG, GIGA, or JIG, in *Muſic* and *Dancing*, a gay, briſk, ſprightly compoſition, and yet in full meaſure, as well as the allemand, which is more ſerious.

Menage takes the word to ariſe from the Italian *giga*, a muſical inſtrument mentioned by Dante.

Others ſuppoſe it to be derived from the Teutonic *gieg*, or *ghiighe*, *a fiddle*. This is a favourite air in moſt nations of Europe: its characteriſtic is duple time, marked $\frac{6}{8}$, or $\frac{12}{8}$: it conſiſts of two ſtrains, without any determinate number of bars.

GIGGS, among *Farriers*, ſmall bladders or bliſters on the inſide of a horſe's lips. They muſt be laid open, and cleanſed with ſalt and vinegar, or alum-water.

GIGGE, in the *Manufacture of Flax*, denotes a hole made in the earth, where fire is made to dry the flax laid over it.

GIGMILLS, a kind of fulling mills, for fulling and burling of woollen cloth, prohibited, anno 5 and 6 Ed. VI. c. 22.

GIGOT, in the *Manege*, a branch after the form of a *gigot*, or leg, is a BRANCH, the lower part of which is round, and called in French *gargouille*.

GILAM-HIO, in the *Materia Medica*, a name uſed by ſome authors, for a peculiar ſort of the lignum-aloes, which is ſoft, whitiſh, and very ſweet-ſcented.

GILARUM, in *Botany*, a name uſed by Marcellus for the SERPYLLIUM.

GILBERTINES, an order of religious, thus called from St. Gilbert, of Sempringham, in the county of Lincoln, who founded the ſame about the year 1148: the monks of which obſerved the rule of St. Auguſtine; and were accounted canons: and the nuns that of St. Benedict. The founder of this order erected a double monaſtery, or rather two different ones, contiguous to each other, the one for men, the other for women, but parted by a very high wall.

St. Gibert himſelf founded thirteen monaſteries of this order, viz. four for men alone, and nine for men and women together, which had in them ſeven hundred brethren, and fifteen hundred ſiſters. At the diſſolution there were about twenty-five houſes of this order in England and Wales.

GILD, or GUILD, originally ſignifies a fraternity, or company.

The word is formed from the Saxon *gildan*, *to pay*, becauſe every man was *gildare*, i. e. to pay ſomething towards the charge and ſupport of the company. Hence alſo our Guildhall, q. d. the hall of the ſociety or fraternity, where they meet, and make orders and laws among themſelves.

The original of *gilds*, or *guilds*, is thus related: it being a law among the Saxons, that every freeman of fourteen years old ſhould find ſureties to keep the peace, or be committed; certain neighbours, conſiſting of ten families, entered into an aſſociation, and became bound for each other, either to produce him who committed an offence, or to make ſatisfaction to the injured party: that they might the better do this, they raiſed a ſum of money among themſelves, which they put into a common ſtock; and when one of their pledges had committed an offence, and was fled, then the other nine made ſatisfaction out of this ſtock, by payment of money, according to the offence.

Becauſe this aſſociation conſiſted of ten families, it was called a *decennary*: and from hence came out later kinds of fraternities.

But, as to the preciſe time when theſe *guilds* had their origin in England, there is nothing of certainty to be found; ſince they were in uſe long before any formal licence was granted to them for ſuch meetings.

It ſeems to have been about the cloſe of the eleventh century, ſays Anderſon, in his Hiſtory of Commerce, vol. i. p. 70, that merchant-*guilds*, or fraternities, which were afterwards ſtyled corporations, came firſt into general uſe in many parts of Europe. Mr. Madox, in his Firma Burgi, chap. i. § 9. thinks, they were hardly known to our Saxon progenitors, and that they might be probably brought into England by the Normans; although they do not ſeem to have been very numerous in thoſe days. The French and Normans might probably borrow them from the free cities of Italy, where trade and manfactures were much earlier propagated, and where poſſibly ſuch communities were firſt in uſe. See CITY.

Edward the Third, in the fourteenth year of his reign, granted licence to the men of Coventry, to erect a merchant's *gild* and fraternity, of brethren and ſiſters, with a maſter, or warden; and that they might found chantries, beſtow alms, do other works of piety, and conſtitute ordinances touching the ſame.

So Henry the Fourth, in his reign, granted a licence to found a *gild* of the Holy Croſs, at Stratford upon Avon.

GILD, in the royal boroughs of Scotland, is ſtill uſed for a company of merchants, who are freemen of the borough.

Every royal borough has a dean of *gild*, who is the next magiſtrate below the bailiff. He judges of controverſies among men concerning trade; diſputes between inhabitants touching buildings, lights, watercourſes, and other nuiſances; calls courts, at which his brethren of the *gild* are bound to attend: manages the common ſtock of the *gild*; and amerces, and collects fines.

GILD, or **GELD**, according to Camden, alſo ſignifies a tribute, or tax. See GELD.

GILD, according to Crompton, alſo ſignifies an amercement. As in foot-*geld*, which he interprets a preſtation within the foreſt.

Hence, to be quit of all manner of *gild*, is to be diſcharged of all manner of preſtations to be made for gathering ſheaves of corn, lamb, and wool, to the uſe of foreſters.

GILD, or **GELD**, is alſo uſed among our ancient writers for a compenſation, or mulct, for a fault committed. See UNGELD.

Hence, *weregeld* is the price of a man; *orfgeld* is the price of cattle: *angeld*, the ſingle value of a thing; *twigeld*, the double value, &c.

There are divers other words which end with *geld*, and ſhew the ſeveral kinds of payments; as *danegeld*, *vadegeld*, *ſenegeld*, *horngeld*, *ſotgeld*, *penigeld*, &c. which ſee.

GILD, or **GUILD** *rents*, are rents payable to the crown by any *gild*, or fraternity; or ſuch rents as formerly belonged to religious *gilds*, and came to the crown at the general diſſolution: being ordered for ſale by the ſtat. 22 Car. II.

GILDABLE, or **GELDABLE**, denotes a perſon tributary, that is, liable to pay tax, or tribute.

Camden, dividing Suffolk into three parts, calls the firſt *gildable*, becauſe liable to tax; from which the two other parts were exempt, becauſe eccleſiæ donatæ.

GILDABLE is alſo explained in an ancient MS. to be that land or lordſhip which is *ſub diſtrictione curiæ vicecom.*

GILDER. See GUILDER.

GILDHALDA *Teutonicorum* was uſed for the fraternity of Eaſterling merchants in London; called alſo the STILLYARD.

GILD-HALL, q. d. *Gildæ aula*, the chief hall in the city of London. See GUILD-*hall*

GILD-MERCHANT, *gilda mercatoria*, was a certain priviledge, or liberty, granted to merchants, whereby they were enabled, among other things, to hold certain pleas of land within their own precincts.

King John granted *gildam mercatoriam* to the burgeſſes of Nottingham.

GILDING, or **GUILDING**, the art, or act, of ſpreading or covering certain ſubſtances with gold, either in leaf, or in amalgam with quickſilver.

The art of *gilding* was not unknown among the ancients, though it never arrived among them at the perfection to which the moderns have carried it

Pliny aſſures us, that the firſt *gilding* ſeen at Rome, was after the deſtruction of Carthage, under the cenſorſhip of Lucius Mummius, when they began to *gild* the cielings of their temples and palaces; the Capitol being the firſt place on which this enrichment was beſtowed. But he adds, that luxury advanced on them ſo haſtily, that in a little time you might ſee all, even private and poor perſons, *gild* the very walls, vaults, &c. of their houſes.

We need not doubt but that they had the ſame method with us, of beating gold, and reducing it into leaves; though, it ſhould ſeem, they did not carry it to the ſame height; if it be true, which Pliny relates, that they only made ſeven hundred and fifty leaves four fingers ſquare of a whole ounce. Indeed he adds, that they could make more; that the thickeſt were called *bracteæ Prænestinæ*, on account of a ſtatue of the goddeſs Fortune at Præneſte, gilt with ſuch leaves; and that the thinner ſort were called *bracteæ quæſtoriæ*.

The modern gilders alſo make uſe of gold leaves of divers thickneſſes: but there are ſome ſo fine, that a thouſand do not weigh above four or five drachms. The thickeſt leaves are uſed for *gilding* on iron, and other metals: and the thinneſt on wood, But we have another advantage above the ancients, in the manner of uſing and applying the gold: the ſecret of painting in oil, diſcovered of late ages, furniſhes us with means of *gilding* works that ſhall endure all the injuries of time and weather, which to the ancients was impracticable. They had no way to lay the gold on bodies that would not endure the fire but with whites of eggs, or ſize; neither of which will endure the water: ſo that they could only *gild* ſuch places as were ſheltered from the moiſture of the weather.

The Greeks called the compoſition on which they applied their *gilding* on wood, *leucophæum*, or *leucophorum*; which is deſcribed as a ſort of glutinous compound earth, ſerving, in all probability, to make the gold ſtick, and bear poliſhing. But the particulars of this earth, its colour, ingredients, &c. the antiquaries and naturaliſts are not agreed upon.

There are ſeveral methods of *gilding* in uſe among us; viz. *gilding on an oily ſize*; *gilding on a water ſize*; *gilding by the fire*, which is peculiar to metals; *gilding of books*, &c.

Method of GILDING *in oil, or an oily ſize.* The baſis, of matter, whereon the gold is applied, in this method, according to M. Felibien, is the remains of colours found ſettled to the bottom of the pots wherein the painters waſh their pencils. This matter, which is very viſcid, they firſt grind; then paſs it through a linen cloth; and thus lay it with a pencil on the matter to be gilt, after having firſt waſhed it once or twice over with ſize; and, if it be wood, with ſome white paint.

But however this method may obtain in France, the Engliſh *gilders*, in lieu hereof, generally make uſe of a gold ſize, made of yellow oker, ground fine with water, and laid to dry, on a chalk-ſtone; and then ground up with a due proportion of fat drying oil, to give it the body or degree of ſtiffneſs required.

Linſeed oil may be prepared for this purpoſe, by putting ſuch a quantity of it into a broad veſſel as may cover the bottom about an inch deep, and adding to it as much water as will riſe ſix inches or more above the bottom. Let the veſſel be expoſed to the ſun and rain, and the contents be occaſionally ſtirred for five or ſix weeks, till the oil appear of the conſiſtence of treacle. Then ſeparate the oil from the water, and place it in a long bottle or ſeparating funnel uſed by the chemiſts, in ſuch heat as will render it perfectly fluid; pour off the clear part, and ſtrain the remainder through a funnel, and the whole will be fit for uſe. The water helps to clear and bleach the oil, and improve it in other reſpects.

If the piece to be *gilded* has not already had a coat of oil paint, prime it with the above compoſition, to which a ſmall portion of vermillion may be added. When the priming is dry, the next operation is ſizing the work; which may be done by laying the above ſize on the fat oil, mixed with the *japanner's* GOLD *ſize*, thinly over the work to be gilt, by means of a bruſh, or a large pencil. But care ſhould be taken, that the bruſh or pencil be made to paſs into all the cavities and projecting parts, if the ſubject be carved. When great perfection is required, the work ſhould be ſized a ſecond time, and ſome add a third ſizing

When the work is almoſt dry, but while yet unctuous enough to catch and retain the gold, the workmen ſpread their gold leaves thereon, either whole or cut in pieces.

To take up and apply the leaves, they make uſe of a piece of fine, ſoft, well-carded cotton; or of a pallet for the purpoſe; or barely the knife, wherewith the leaves were cut, according to the parts of the work they are to *gild*, or the breadth of the gold to be applied.

In proportion as the gold is laid, they preſs it down ſmooth with a bunch of cotton, a hare's foot, or ſquirrel's tail, to make it ſtick, and, as it were, incorporate with the ground: and with the ſame hare's foot, or a camel's hair pencil, they mend any cracks that may happen therein, after the ſame manner as will be hereafter ſhewn in *Water*-GILDING.

The ſquirrel's tail uſed in *gilding* is cut ſhort, and ſometimes ſpread in the fan-faſhion, by means of a piece of wood formed like a pencil-ſtick, but broad at both ends, and ſplit to receive the tail; but it will equally ſerve in its own form, when the hair is cut to a proper length. The cotton alſo ſhould be formed into a ball, by tying it up in a piece of fine linen rag; for if it be uſed without the rag, the fibres adhere to the gold ſize, and embarraſs the work. Small pieces of the gold leaf may be applied to thoſe parts of the work, which the ſquirrel's tail and cotton cannot reach, by the point of a fitch pencil, firſt breathed upon, and thus conveyed to their proper place. When the whole of the work is covered and dry, it may be bruſhed over with a camel's-hair pencil, or ſoft hog's-hair bruſh, to take off from it all looſe parts of the gold.

This ſort of *gilding* is chiefly uſed for domes, and the roofs of churches, courts, banqueting-houſes, &c. and for figures of plaſter, lead, &c. that are to ſtand expoſed to the weather.

Method of GILDING *on a water ſize.* Water *gilding*, or burniſh *gilding*, is not performed without more apparatus; nor is it uſed ſo frequently, nor on ſuch large works as the former: wooden works, and thoſe of ſtucco, are almoſt the only one sgilt in this way; which beſides, muſt be ſheltered from the weather. The ſize made uſe of for *gilding*, is to be made of ſhreds, &c. of parchment, or gloves, boiled in water, in the proportion of about a pound of the ſhreds to ſix quarts of water, to the conſiſtence of a jelly, and then ſtrained through flannel while hot.

If it be wood that is to be *gilt*, thoſe parts that admit of it being firſt well rubbed with fiſh-ſkin, and then with Dutch ruſhes, it is primed with the above ſize, mixed with as much whiting as will give it a tolerable body of colour; and this mixture is made by melting the ſize, and ſtrewing the powdered whiting into it gradually, and well ſtirring them together. For this whiting, ſome uſe plaſter of Paris, well beaten and ſifted; others Spaniſh white, or ceruſs, &c. It is laid on with a ſtiff bruſh, and oftener or ſeldomer repeated, according to the nature of the work: for pieces of ſculpture, ſeven or eight lays ſuffice; for flat, or ſmooth works, they uſe ten or twelve. In the latter caſe they are applied by drawing the bruſh or pencil over the work: in the former, by dabbing it ſmartly on, that the ſize may enter all the dents of the carving.

After the laſt coat is laid on, and before it be quite dry, a bruſh pencil, dipped in water, ſhould be paſſed over the whole, to ſmooth it, and take away any inequalities that may have been formed; and when it is dry, the parts that admit of it ſhould be again bruſhed over till they are perfectly even. The work ſhould then be repaired, by freeing all the cavities from the priming; after which a water poliſh ſhould be given to the parts deſigned to be burniſhed, by rubbing them gently with a fine linen rag moiſtened with water.

The white thus finiſhed, they proceed to yellow it, obſerving, that, if it be a piece of ſculpture in relievo, they always firſt touch up and repair the ſeveral parts, which the white ground may have disfigured, with little iron inſtruments, as gravers, chiſſels, gouges, &c.

The yellow which they uſe is only common oker well ground and ſifted, and thus mixed up with the ſize uſed for the white, only weaker by one half. This colour is laid on hot, and in works of ſculpture it ſerves to ſupply the place of gold, which frequently cannot be carried into all the cavities and dentings of foliages and other ornaments.

Over this yellow, which is now often omitted, is applied a lay, which is to ſerve for the ground whereon the gold is to be immediately laid; for the preparation of which ſee Gold-*ſize*. The ingredients being all ground together with warm ſize, mixed with two thirds of water, they apply two or three lays of the compoſition upon the yellow, each after the other is dried, taking care not to put any in the ſmall cavities of the work, to hide the yellow. Some add a little vermilion to the *gilding* ſize. The bruſh uſed in this application is to be ſoft; and when the matter is well dried, they go over it with a ſtronger bruſh or ſoft cloth, to rub it down, and take off the little prominent grains, and thus facilitate the burniſhing of the gold.

In order to proceed to *gild*, they muſt have three ſorts of pencils; one to wet, another to touch up and amend, and a third to flatten: there is alſo required a cuſhion, to ſpread the gold leaves on when taken out of the book; a knife to cut them; and a hare's foot, or ſquirrel's tail, fitted with a handle, or elſe a piece of cotton, to take them up, direct, and apply them.

They begin with the wetting pencils, by which they moiſten the layer laſt laid on with water, that it may the better receive and retain the gold: the leaves are then laid on the cuſhion, and taken up, if whole, with the ſquirrel's tail; if in pieces, with the other inſtrument, or even the knife with which they are cut, and laid and ſpread gently on the parts of the work before moiſtened. When the leaves happen to crack or break in laying on, they make up the breaches with little pieces of leaf taken up on the repairing pencil; and with the ſame pencil, or another ſomewhat bigger, they ſmooth the whole; preſſing the gold into the dents, where it could not ſo well be carried with the ſquirrel's tail.

The work being thus far gilt, when dry, and fit for the purpoſe, which it will uſually be in about twenty-four hours, remains either to be burniſhed, or matted.

To burniſh it, is to ſmooth and poliſh it with a burniſher, which is uſually a dog's or woolf's tooth, or a bloodſtone, an agat, or a pebble, or ſomething elſe very ſmooth, fitted in a handle for that purpoſe.

To mat, is to give it a light lick in the places not burniſhed, with a pencil dipped in ſize, wherein a little vermilion ſometimes has been mixed. This helps to preſerve it, and prevent its flawing, when handled.

Some recommend for this purpoſe red lead, with a little vermilion ground with the white of an egg; but yellow oker, or Dutch pink, with red lead, would better anſwer the end; or the *terra di Sienna*, very ſlightly burnt, or mixed with a little red lead, would have a much better effect, and be more durable than any other mixture ſo near the colour of gold in ſhade. Iſinglaſs ſize will likewiſe ſupply the place of the whites of eggs. This operation of matting ſuperſedes the neceſſity of yellowing, which is intended to give the appearance of *gilding* to the deeper and obſcure parts of the carving where the gold cannot, nor is thought neceſſary to be laid on.

The laſt thing is to apply a vermeil, or lacker, in all the little lines and cavities; and to ſtop and amend any little faults with ſhell-gold.

The compoſition here called *vermeil*, is made of gum gutta, vermilion, and a little of ſome ruddy brown colour, ground together, with Venice varniſh, and oil of turpentine. Some *gilders* in lieu hereof, content themſelves with fine lacca, or dragons blood, with gum-water.

Sometimes, inſtead of burniſhing the gold, they burniſh the ground or compoſition laid on laſt before it; and content themſelves afterwards to waſh the part over with ſize. This method is chiefly practiſed for the hands, face, and other nudities in relievo; which, by this means, do not appear ſo very brilliant as the parts burniſhed; though much more ſo than the parts perfectly flat, or matted.

To gild a work, and yet preſerve white grounds, they uſe to apply a layer of Spaniſh white mixed with a weak fiſh-glue, on all the parts of the ground whereon the yellow, or the layer next under the gold, might run.

Gilding, *japanners*, is performed by means of gold powder, or imitations of it, cemented to the ground by a kind of gold ſize; for the method of preparing which, ſee Gold-*ſize*. This kind of *gilding* may be practiſed on almoſt any ſubſtance whatever, whether wood, metal, leather, or paper; nor is there any preparation neceſſary, beſides making the ſurface on which the ſize is to be laid, even, and perfectly clean. Then ſpread the japanner's ſize, mixed with a due proportion of oil of turpentine and vermilion, with a bruſh over the work, if the whole ſurface is to be gilt; or draw with it, by means of a pencil, the proper figure deſired, avoiding carefully any other parts; when it is almoſt dry, ſo as to be capable, by its clammineſs, of receiving the gold, dip a piece of waſh-leather wrapped round the finger in the gold powder, deſcribed under *ſhell* Gold, and rub it lightly over the ſized work; or ſpread the powder with a ſoft camel's hair-pencil; and with a camel's hair-bruſh clear away the looſe powder, after the gilded ſurface is dry. When leaf-gold is uſed, the method of ſizing muſt be the ſame as for the powders; but great care is neceſſary in laying them on, while the ſize is in a proper ſtate of dryneſs.

There is a *falſe kind* of *gilding*, in which a colour of gold is given by painting and varniſhes, without employing gold. Thus a very fine golden colour is given to braſs and to ſilver, by applying on theſe metals a gold-coloured varniſh, which, being tranſparent, ſhews all the brilliancy of the metals underneath. Many ornaments of braſs are varniſhed in this manner, which is called *gold lacquering*, to diſtinguiſh them from thoſe that are really gilt. Silver leaves thus varniſhed are put upon leather, which is then called gilt leather; and many picture frames have no other than this counterfeit *gilding*, which may be diſcovered by waſhing it with a little rectified ſpirit of wine; for the ſpirit will diſſolve the varniſh, and leave the ſilver leaf of its own whiteneſs. For plain picture-frames, thick tin-foil may be uſed inſtead of ſilver; the tin-leaf fixed on with glue is to be burniſhed, then poliſhed with emery and a fine linen cloth, and afterwards with putty, applied in the ſame manner; being then lacquered over with the varniſh five or ſix times, it looks like burniſhed gold. See Lacquering. Among the *falſe gildings* may alſo be reckoned thoſe which are made with thin leaves of copper or braſs, called Dutch leaf. In this manner are made all the kinds of what is called gilt paper. See Gilding *of paper*.

Gilding *of books*. See Book-*binding*, and Gilding *of paper*.

Gilding *on china-ware*. The gold is very much valued on *china-ware*, and would be much more ſo, were it not that it is very liable to loſe its luſtre, and to rub off. The Chineſe at preſent have a method of preventing both theſe accidents in a great meaſure, by means of a ſort of poliſhing, which they give it after it is laid on. They prepare for this purpoſe a fine piece of agate, which they poliſh on one ſurface in as perfect a manner as poſſible. With this they rub over the gold as it lies on the porcelain ſeveral times, when it firſt comes from the baking. This gives the gold a luſtre which it would not otherwiſe have, and fixes it down to the ware in ſuch a manner, that it cannot eaſily be got off. The principal miſchief that gold thus laid on is ſubject to, is the tarniſhing, or growing dull; this is remedied by the ſame ſort of means. They wet the veſſel upon which they would revive the luſtre of the gold, in common clean water; and while it is wet, they rub it with the ſame poliſhed agate, adding a little fair water at times to keep it moiſt. If the gold has not been well laid on at firſt, this may poſſibly raiſe it or take it off in ſome places; but if it was originally put on with the help of this ſtone, as all the gold on porcelain now is, the rubbing it with it a ſecond time never gives it any ſcratches, but recovers its priſtine luſtre and beauty. It muſt be obſerved, that the rubbing with this ſtone muſt be all done one way, both in the firſt laying on the gold, and in the brightening of it up afterwards. This may ſerve as a method for us as well as the Chineſe, not only to recover the beauty of our tarniſhed gilt *china-ware*, but alſo to lay gold upon ſome of our home manufactures of this kind. Obſerv. ſur les Coutûmes de l'Aſie. See Porcelain.

Gilding *on enamel and glaſs* is performed by burning or annealing, i. e. by producing a coheſion of the gold with the glaſs or enamel, by the intermediation of a flux, or by producing the like effect without any In both theſe methods, the gold is made to adhere to the enamel or glaſs, in conſequence of the fuſion or approach to that ſtate, either of the flux uſed, or of the body of the enamel or glaſs itſelf, by which the gold is cemented to ſuch body. The flux, when any is uſed, may be either ſimple glaſs of borax, or any of the preparations of fluxes powdered; and the gold is uſed, either in the form of *leaf* gold, or in that of powder made mechanically, or by precipitation. See Gold *powder*. When leaf gold is employed without any flux, the enamel or glaſs may be moiſtened with a very weak ſolution of gum arabic, and again dried. After being thus prepared, it ſhould be breathed upon till it becomes a little adheſive or ſticky, and then laid upon a ſufficient number of leaves of gold; when the gold is thus united to the enamel or glaſs by the cementing quality of the gum arabic, the work is ready for burning. If a flux be uſed, it ſhould be finely levigated, tempered with a very weak ſolution of gum arabic, and very thinly ſpread on the part of the work to be gilded; and when the gum water is almoſt dry, the leaf gold ſhould be laid on the part thus prepared for it, which is then in a ſtate proper for burning. In the preſent practice, the *aurum fulminans*, or precipitation of gold by alkaline ſalts, is made by thoſe who gild glaſs in the greateſt perfection; and the volatile alkali is employed for the precipitation by the chemiſt, who prepares it for this purpoſe. But when this kind of precipitate is choſen, the uſe of any flux muſt be avoided, and a very conſiderable degree of heat applied. The manner of uſing the precipitate powders of gold, the *aurum fulminans* excepted, as well as the leaf gold, may be varied, by adding to it or omitting any flux; but in what way ſoever the powder is uſed, it is to be tempered with the oil of ſpike, and worked as the enamel colours; and the quantity of flux, when any is uſed, may be a third of the weight of the gold. In caſes where the glaſs is very hard, or where the opportunity of a ſtrong heat cannot be conveniently obtained, the expedient of uſing a flux in the following manner may be adopted with great advantage. Grind glaſs of borax to a fine powder; and, having tempered it with oil of ſpike, lay it on the glaſs where the *gilding* is to be made; then burn the glaſs with a degree of heat, that will cauſe the borax to run; and when it is cold, apply the precipitate or leaf gold, and burn it again, as in other caſes. After the work is burnt, if it be intended to be burniſhed, a proper luſtre may be given to it, by rubbing the gilded part with a dog's tooth, or with a fine agate, or iron burniſhers. Handmaid to the Arts, vol. i. p. 374, &c. See *Ruby* Glass.

Drinking glaſſes, with gilt edges, have been much admired in this country; the beſt of theſe are brought from Germany; thoſe that are made in England, though equal in beauty to the foreign, being greatly inferior in the durability of the *gilding*. Dr. Lewis made ſeveral experiments with a view of diſcovering this art; from which he concludes, that the gold is cemented to them by means of an intervening matter, which will adhere to glaſs ſo as not eaſily to be rubbed off. He tried maſtich, and other reſinous bodies rubbed warm on the glaſs, and ſeveral ſpirituous varniſhes; but none of theſe were found to adhere ſufficiently to the glaſs. He recommends to the trial of the artiſts in this way the harder oil varniſhes; and glaſſes have been ſince prepared in England, probably on the principles which he has pointed out, with as durable *gilding* as thoſe brought from Bohemia and Thuringia.

M. Zeigler, in a German tranſlation of the Commercium Philoſophico-Technicum, deſcribes a varniſh for this purpoſe, with the method of uſing it, which appeared from his experiments to be the beſt. This varniſh is prepared by boiling fine tranſparent amber, reduced to powder, in a braſs veſſel, to the cover of which a valve is fitted, with as much drying oil as will juſt cover it; and by diluting the above ſolution with four or five times its quantity of oil of turpentine. This varniſh may be made to dry ſooner, and acquires greater firmneſs, by grinding it with a little white lead, or rather with a mixture of white lead and minium. It is to be applied very thin on the glaſs, and the gold leaf laid lightly on the varniſhed part; when the varniſh is thoroughly hardened, the gold may be burniſhed, by laying a piece of ſmooth paper between the tooth or ſteel burniſher, and the gold. This *gilding*, M. Zeigler obſerves, is durable, and of a fine luſtre. Com. Phil. Techn. p. 65, and 614.

Gilding *of figures and letters on paper*, and for the embelliſhments of manuſcripts, is performed with *ſhell*-gold, tempered with gum-water; or the characters may be drawn with a milky ſolution of gum ammoniacum made in water, and gold leaf applied upon them when almoſt dry; or if all or any part of them is become quite dry, they may be again ſufficiently moiſtened for receiving the gold by breathing on them. Letters raiſed from the ſurface of paper or parchment, in the manner of emboſſed work, ſuch as are ſeen on ancient manuſcripts, may be formed either by friction on a proper body with a ſolid piece of gold, or by leaf gold. The former method is practiſed by tempering pulverized cryſtal with ſtrong gum water, and with this paſte forming the letters; when they are dry, they are rubbed with a piece of ſolid gold, as in poliſhing, and the letters will appear as if gilt with burniſhed gold. The letters are formed with an emboſſed figure, either of the ſeparate letters, or of whole words, cut in ſteel; and each letter of theſe ſtamps, when they are uſed, is anointed evenly with a feather dipt in oil. Then fill theſe concave letters with the above paſte, and ſtrike the ſtamps in a perpendicular direction on the paper or vellum, laid over ſome ſheets of paper.

When the emboſſed letters are formed with leaf gold, the following, or a ſimilar compoſition, muſt be uſed. Thicken beaten whites of eggs with as much vermilion as is neceſſary to give them the conſiſtence of paſte; uſe the ſtamps as before; and when the letters are dry, moiſten them by a ſmall pencil with ſtrong gum water; and when this is almoſt dry, cover the letters with leaf gold, preſſing it cloſe to every part of them with cotton or ſoft leather; after the *gilding* is dry, poliſh it with proper burniſhers. Com. Phil. Techn. p. 64. and Handmaid to the Arts, p. 450, &c.

Gilding *of live fiſh*, as craw-fiſh, carps, &c. may be performed without injuring the fiſh, by means of a cement, which Mr. Hooke, in his poſthumous papers, directs to be prepared in the following manner: put ſome Burgundy pitch into a new earthen pot, and warm the veſſel till it receives ſo much of the pitch as will ſtick round it; then ſtrew ſome finely powdered amber over the pitch when growing cold; add a mixture of three pounds of linſeed oil, and one of oil of turpentine; cover the veſſel, and boil the contained ingredients over a gentle fire; grind the mixture as it is wanted, with ſo much pumice-ſtone in fine powder as will reduce it to the conſiſtence of paint. When the fiſh has been wiped dry, this mixture is ſpread upon it, and the gold leaf laid over it, and gently preſſed down: after which, the fiſh may be immediately put into water, and the cement will harden, and be in no danger of falling off.

Gilding *on leather*. See Lacquering.

Gilding *of metals* may be done by cleaning the ſurface of the metal, and applying gold leaves to it, which, by means of rubbing with a poliſhed blood-ſtone, and a certain degree of heat, are made to adhere perfectly well. In this manner ſilver leaf is fixed and burniſhed upon braſs, in making French plate; and ſometimes alſo gold leaf is burniſhed upon copper and upon iron. Some metals, and particularly ſilver, may be gilt in the following manner: dip pieces of linen in the ſolution of gold by aqua regia, and then burn them to aſhes; rub theſe aſhes on the ſurface of the ſilver, well cleaned from any unctuous matter, with a wet linen rag, and the particles of gold contained in them will thus be applied to the ſilver, and adhere to it, without the application of heat, or intervention of any other body. Burniſh the ſilver with a blood-ſtone, till it acquires the colour of gold. Moſt gilt ornaments on fans, ſnuff-boxes, and other toys of much ſhow and little value, are nothing but ſilver gilt in this manner. See *Method of* Gilding *metals by the fire*.

Gilding *on paper*, *parchment*, and *vellum*. There are various methods uſed for this purpoſe, according to the ſeveral ends which the *gilding* is deſigned to anſwer. But for the moſt part ſize, properly ſo called, and gum water, are uſed as the cements, and the powders are more generally employed than the leaf gold. See the three firſt articles in Gilding.

The *gilding* proper to be uſed with water colours may be either with the leaf gold or powder: the leaf gold may be laid on the deſigned ground by means either of gum water, or iſinglaſs ſize; obſerving, that the gum water or ſize be of the weaker kind, and laid ſparingly on the ground, and that proper time be allowed for it to be dry; and then the gold is applied to it, as in the articles above cited; and it may be poliſhed, if neceſſary, by the dog's tooth, or other kind of burniſher. In *gilding* larger ſurfaces, it will be found uſeful to colour the ground with the gall-ſtone; and when colours are to be laid on the *gilding*, the gall of any beaſt bruſhed over the gold will adapt it for receiving the colours. When the gold powders are uſed along with paintings in water colours, they are previouſly formed into *ſhell*-GOLD. The *gilding* proper for the coloured paper uſed in binding books, and for other ſuch purpoſes, is performed much in the ſame manner; only, that the gum water and ſize may be much ſtronger, and that they are generally conveyed to the ground by means of a wooden plate or print, or by an engraved roller, which make an impreſſion of the intended figure or deſign. In this kind of *gilding*, the japanners gold ſize may be alſo commodiouſly employed; and this ſhould be always uſed when the emboſſed appearance is wanted in the greateſt degree; and for this purpoſe it ſhould be thickened with yellow oker, mixed with as much red lead as the proper working of the print will admit. Inſtead of the genuine leaf gold, or gold powder, the German powder, formed of the leaves called Dutch gold, is commonly uſed in this kind of *gilding*. The edges of books or paper are gilt in the manner directed under the article BOOK-*binding*. The cement to be uſed for this purpoſe may be ſtrong gum-water, iſinglaſs ſize, or glover's ſize; or iſinglaſs melted, with the addition of ſome common proof ſpirit of wine, and a ſixth part of honey or ſugar-candy, to which ſhould be added a third part of bole armoniac. Or the following compoſition may be uſed: mix equal parts of bole armoniac and ſugar-candy, well powdered with the whites of eggs beaten to an oily conſiſtence.

GILDING *on thread and wire*. See GOLD-*thread*, and GOLD-*wire*.

GILDING *on wood*. See the three firſt articles in GILDING.

Method of GILDING *metals, or of* gilding *by the fire*. There are two ways of *gilding* by fire; viz. that with liquid gold, and that with leaf gold.

The firſt is performed with gold amalgamated with mercury, in the proportion of about ſix or eight parts of mercury to one of gold.

In order to this operation, they heat a crucible red-hot, then put the gold and mercury in it, and ſtir them gently about, till the gold be found melted and incorporated into a maſs with the mercury. See AMALGAMATION *of gold*. They then cleanſe it by grinding it in a glaſs, ſtone, or wooden mortar, with ſome common ſalt and water, and occaſionally renewing the water, till the amalgam ceaſes to diſcolour it, and appears of a pure vivid brightneſs. From the maſs they ſeparate the mercury not united therewith, by ſqueezing it between the fingers through a piece of ſhamoy ſkin, or a linen cloth.

To prepare the metal to receive this amalgam, they ſcrub it with a wire-bruſh, and wet it with water or beer; continuing to rub and wet it till all the foulneſs which might hinder the cloſe union of the metals be removed; which done, to quicken the work farther, they rub a mixture of quickſilver and aqua fortis over it; the aqua fortis ſerving not only to cleanſe the ſurface of the metal from any ruſt or tarniſh it may have acquired, but alſo to facilitate the application of the amalgam to its ſurface, by diſſolving part of the mercury of the amalgam; and beſides, when this ſolution is applied to the copper, this latter metal having a ſtronger diſpoſition to unite with the nitrous acid than the mercury has, precipitates the mercury upon its ſurface.

They proceed now to apply the amalgam of gold, in order to which they uſe a little knife, or a bruſh made of braſs wire for the purpoſe; with which they ſpread or overlay the whole work, as evenly as may be, being careful to miſs no part. Then giving the work a gentle heat before the fire, with the hair-bruſh they dab and ſpread the amalgam farther and evener on it.

Thus far advanced, the metal is ſet over the fire, upon a grate, or in a ſort of cage, under which is a pan of charcoal, yielding a heat juſt ſufficient for evaporating the mercury; by which means the mercury is raiſed in fumes, and leaves the gold alone adhering to the work: in proportion as the mercury, evaporating and flying off, diſcovers places where gold is wanting, they take care to ſupply them, by adding new pieces of amalgam with the knife or bruſh.

If a thicker *gilding* be required than can reſult from ſo much of the amalgam as is applied at once, the metal, after the firſt quantity has left its gold fixed on the ſurface, is rubbed afreſh with the mixture of mercury and aqua fortis, and more of the amalgam ſpread upon it. After the evaporation of the mercury from this, another quantity may be applied in the ſame manner. When the mercury is evaporated, ſo that the ſurface becomes uniformly of a pale yellow colour, the metal is made to undergo other operations, by which its colour and luſtre are heightened. For this purpoſe, it is firſt rubbed with a ſcratch bruſh, compoſed of fine braſs wire, till its ſurface is made clean and ſmooth; then it is covered over with a compoſition called *gilding* wax, and again expoſed to the fire till the wax be burnt off; and this application is repeated till the gold appears of a proper colour. This *gilding* wax is compoſed of bees wax, mixed with ſome of the following ſubſtances; viz. red oker, verdegriſe, copper ſcales, alum, vitriols, and borax. Thus the colour of the *gilding* is heightened by a perfect diſſipation of ſome mercury remaining after the former operation. The gilt ſurface is then covered over with a ſaline compoſition, conſiſting of equal quantities of nitre, ſal ammoniac, green vitriol, and verdegriſe, finely powdered, and mixed up into a paſte with water or urine. The piece of metal thus covered is heated till the mixture ſmokes, and quenched in water or urine. This effect ſeems to be produced by the acid of nitre, which is diſengaged by the vitriolic acid of the alum, or other vitriolic ſalt, during the expoſure to heat, acting upon any particles of copper which may happen to lie on the gilded ſurface. Some artiſts think they give an additional luſtre to their gilt work, by dipping it in a liquor prepared by boiling ſome yellow materials, as ſulphur, orpiment, or turmeric. The only advantage of this operation is, that a part of the yellow matter remains in ſome of the hollows of the carved work, in which the *gilding* is apt to be more imperfect, and to which it gives a rich and ſolid appearance.

This method of *gilding* by amalgamation is chiefly uſed for *gilding* copper, or rather copper mixed with a ſeventh part of braſs, thus forming a compoſition of copper and zinc; which more readily receives the amalgam, and yields a colour more reſembling that of gold than the colour of copper.

Iron cannot be gilt by amalgamation, unleſs it be previouſly coated with copper, by dipping it in a ſolution of blue vitriol, or rubbed with the vitriol itſelf a little moiſtened. Iron may alſo receive a golden coat from a ſaturated ſolution of gold in aqua regia, mixed with ſpirit of wine; becauſe the iron, having a greater affinity with the acid, precipitates the gold from it. But the method commonly uſed of fixing gold upon iron is that mentioned in the next article.

GILDING *by the fire with gold leaves*. To prepare the metal for this *gilding*, it muſt be firſt well ſcratched, or raked, then poliſhed with a poliſher; and thus ſet to the fire to blue, i. e. to heat, till it appear of a blue colour. This done, the firſt lay of gold is clapped thereon, and lightly rubbed down with a poliſher; and thus expoſed to a gentle fire.

They uſually only give it three ſuch lays, or four at moſt, each lay conſiſting of a ſingle leaf for the common works, and of two for the extraordinary ones; after each lay they ſet it afreſh to the fire. After the laſt lay, the gold is in a condition to be burniſhed.

Another method is mentioned by authors of *gilding* upon metals, and alſo upon earthen-ware and glaſs; which is, to fuſe gold with regulus of antimony, to pulverize this maſs, and ſpread the powder upon the piece to be gilt; afterwards to expoſe it to ſuch a fire that the regulus may be evaporated while the gold remains fixed. But Dr. Lewis mentions the following inconveniencies to which this method is ſubject: the powder does not adhere to the piece, and cannot be equably ſpread; part of the gold is diſſipated along with the regulus; glaſs is fuſible with the heat neceſſary for the evaporation of regulus of antimony; and copper is liable to be corroded by the regulus, and to have its ſurface rendered uneven. Lewis's Com. Phil. Techn. p. 77, &c. p. 81. 88. and 108. Macquer's Dict. Chem. Eng. edit. 1777. art. GILDING.

GILDING-*cuſhion*. See CUSHION.

GILDING-*knife*, a ſlip of the hollow Spaniſh cane, cut up to a ſmooth and ſharp edge, with a good pen-knife: this cane knife cuts the gold leaf better than one of ſteel, as it is apt to ſtick to this laſt.

GILDING-*pallet*, a flat piece of wood, about three inches long, and an inch broad, covered with a piece of fine woollen cloth.

By breathing upon this pallet, to moiſten the cloth a little, and then clapping it gently down upon the gold leaf, this may be raiſed from the cuſhion, and conveyed to the work to be gilded.

GILDING-*wax*. See GILDING *of metals*

GILEAD, *balm of*. See BALSAM.

GILEAD, *falſe balm of*, *Dracocephalum*, in *Botany*. See DRAGON'*s head*.

GILGUL *hammethin*, a Hebrew phraſe, literally ſignifying the *rolling of the dead*. To conceive the uſe of this expreſſion it is to be obſerved, that the Jews have a tradition that, at the coming of the Meſſiah, no Iſraelite ſhall riſe any-where but in the Holy Land. What, then, ſhall become of all the faithful interred in other parts? ſhall they periſh, and remain in the ſtate of death?

No, ſay the Jewiſh doctors; but God will dig them ſubterraneous canals, or cavities, through which they ſhall roll from their tombs to the Holy Land; and, when they are arrived there, God will blow on them, and raiſe them again.

This imaginary paſſage of the carcaſes, or aſhes, of the Jews, from their tombs to the Holy Land, by rolling under-ground, is what they call *gilgul hammethin*, the rolling of the dead.

GILL. See GROUND-IVY.

GILLA, in *Chemiſtry* and *Pharmacy*, is an *Arabic* term for ſalt, peculiarly uſed among us for the emetic ſalt of vitriol.

This ſalt is prepared from that mineral, by three or four repeated operations; viz. diſſolution, in May-dew; filtration, and cryſtallization. In defect of May-dew, rainwater may ſerve.

Gilla is uſed in tertians, and all fevers ariſing from a corruption of humours in the firſt paſſages. It deſtroys worms, and prevents putrefaction. The doſe is from twenty grains to half a drachm, taken in broth, or in cordial waters.

GILLAROO, *trout*. See TROUT.

GILLS, *Branchiæ*, in *Natural Hiſtory*, thoſe membranous cartilaginous parts in fiſhes, whereby they reſpire.

What we call *gills*, in fiſhes, ſerve the purpoſes of lungs: reſpiration of air is as neceſſary to fiſhes as to terreſtrial animals: there is always a quantity of air incloſed among water; and it is this air that fiſhes reſpire. The whole mechaniſm of their *gills* is contrived with this view; viz. to ſeparate, and imbibe this air, from the water, and preſent it to the blood, after the ſame manner as it is preſented to the lungs of other animals. All fiſh, therefore, have theſe *gills* except the cetaceous and petromyzon.

M. du Verney has unravelled this infinitely complicated piece of mechaniſm, in the *gills* of a carp: the firſt thing that offers is a fabric, conſiſting of a great number of bony laminæ, each ſubdivided into an infinity of bony fibres, whoſe office is, to ſuſtain the innumerable ramifications of an artery diſpatched thither from the heart: the uſe of theſe ramifications is, to preſent the blood, extremely ſubdivided, and, as it were, each globule of blood by itſelf, to the water. Between theſe laminæ, and throughout the whole contexture of the *gills*, are an infinite number of very narrow paſſages, deſtined to receive and ſubdivide the water which the fiſh takes in by the mouth, into little parcels. In this ſtate the air, its priſon-doors being now in ſome meaſure opened, makes its eſcape, and joins itſelf to the blood of all the little arteries.

The *gills* have neceſſarily an alternate motion of dilatation and compreſſion, which is effected by another very curious piece of mechaniſm; when they dilate, the water is taken in; and when they contract, it is expelled again. Hence it is probable, that it is in the very inſtant of contraction, that the air expreſſed from the water is forced to enter the pores of the little blood-veſſels, becauſe the force is then greater than at any other time; and this action requires a conſiderable force. The ſame reaſon holds with reſpect to the lungs of men: accordingly, M. du Verney maintains, that though the air enter the lungs in the time of inſpiration, it is only received into the blood in that of expiration, when the ſuperfluous air is carried off by the trachea; ſo that the real inſpiration, i. e. the entrance of the air into the blood, ſhould be the expiration.

The water is taken in by the mouth, and carried off again, freed of its air, by the *gills*; and the air gained from it, is diſtributed, firſt to the arteriolæ of the *gills*; and thence, by the law of circulation, to all the little veins inoſculated therewith.

The *gills* in all fiſh are eight in number, four being placed on each ſide the throat. The loweſt *gill* is always much ſmaller than either of the others; the other three on each ſide are gradually larger to the upper one, which is in all fiſh the largeſt. Every one of theſe *gills* is compoſed of a bony ſubſtance formed into a ſemicircle, in moſt kinds, or bent into the ſhape of a bow. On the convex ſide of which there is formed a ſort of plume, or the reſemblance of a leaf.

Each leaf (to uſe that word) is compoſed of a double row of bony lamellæ, formed like ſo many ſickles, and each of theſe lamellæ is fixed to the convex part of the bow, by means of the membrane with which that bow is covered. Theſe lamellæ have one part convex, and the other concave. The convex ſide is covered with numerous hairs in all parts, and theſe are longeſt near the baſe, and ſhorteſt toward the apex. They are leſs hairy on the concave ſide; the hairs there being ſhorter, and continued only to the middle of the lamellæ, not running all the way along it. Theſe hairs are all the way connected to the *gill* by a very tender membranous ſubſtance which covers the lamellæ, but they are each ſingle at the baſe. Artedi, Ichthyolog.

The concave part of every lamina is applied to the convex part of the next oppoſite lamina, and the laminæ are all connected one with another, by means of a membrane which ariſes at their baſe, and is continued by half their length; at this part the membrane becomes ſtronger, and forms a ſort of cord. The reſt of the lamina is free and terminates in an extremely fine and flexile point. Every one of theſe laminæ is inveſted with a fine and thin membrane, and each ſerves to receive the ramifications of the veſſels which are brought into the branchia. The inſide of every bow or bony ſemicircle which makes one *gill*, gives place to one artery, one vein, and one nerve. The conformation of this hollow part of each *gill* is different in different fiſh; in ſome it contains a number of ſmooth tubercles, which are ſhort, and ſcarce ſtand out beyond the ſurface: this is the caſe in the *gills* of the cyprinus, &c. In ſome it is in this manner beſet with very rough tubercles, as in the cotti; in ſome others theſe tubercles are rough, and reſemble teeth, as in the ſalmons, &c. In ſome alſo this ſurface, inſtead of tubercles, is beſet with a ſort of long hairs reſembling rays as in the clupeæ; and finally, in ſome this part is beſet with real, but ſhort prickles, as in the eſoces. The uſe of the *gills* in fiſh ſeems to be to receive the blood which is protruded from the heart into the aorta, and drive it to the utmoſt parts of the lamina, from whence it is returned by veins which diſtribute it to every part of the body, and to ſerve for the office of reſpiration. The motion of the *gills* of fiſh is no way ſo beautifully ſeen as in the viewing thoſe of a ſmall eel with a microſcope. Two rows of theſe are always bended roundiſh one againſt the other, while their ends play againſt one another, touching and going back again very regularly and ſucceſſively, and imitating the opening and ſhutting of a pair of bellows, in a regular ſucceſſion; and, in the generality of fiſh, one pair does this, while another pair only continues advanced, ſo as to cloſe with their baſe, and this is done alternately by one and another pair all the time that the obſervation is continued. Philoſ. Tranſ. Nº 222.

GILLS, *apertures of the*. See BRANCHIA.

GILLS, *leaf of the*. See FOLIUM *branchiarum*.

GILLY-*flower*, or JULY-*flower*. See PINK.

GILLY-*flower, queen's*. See *Dame's* VIOLET.

GILLY-*flower, ſtock*. See STOCK *Gilly-flower*.

GILT-*head*, *Aurata*, in *Ichthyology*, the name of a broad and flat ſea-fiſh, not unlike the bream in ſhape. It ſometimes grows to eight or ten pounds weight; its ſcales are moderately large, its back is of a blackiſh green, and its ſides of a duſky brown, with a faint caſt of yellow. At the upper angle of the coverings of the *gills* it has uſually a black ſpot, and under that often a purple one between its eyes. It has a fine gold-coloured, arched, or lunated mark, the convex or gibboſe part of which is toward the mouth, the points toward the eyes; and, therefore, in the Linnæan ſyſtem, it is the SPARUS *lunula aurea inter oculos*. The dorſal fin extends almoſt the whole length of the back, and conſiſts of twenty four rays, the eleven firſt ſpiny, the others ſoft: the pectoral fins conſiſt of ſeventeen ſoft rays; the ventral of ſix rays, the firſt of which is very ſtrong and ſpiny; the anal fin of fourteen, the three firſt ſpiny: and the tail is much forked. The grinders of this fiſh are flat and ſtrong, like thoſe of certain quadrupeds; beſides which they have certain bones in the lower part of the mouth, which aſſiſt in grinding their food.

It is common in the markets of Rome, Venice, &c. and caught in great plenty in the ſummer months in different parts of the Mediterranean; in winter it is more ſcarce, but more valued. Some have confounded this fiſh with the ſea-bream or SPARUS *pagrus* of Linnæus. See PAGRUS.

GIMBOLS, denote the braſs-rings by which a ſea-compaſs is ſuſpended in its box that uſually ſtands in the BINACLE.

GIMBLETING, in *Sea-language*, is applied to the anchor, to denote the action of turning it round by the ſtock, ſo that the motion of the ſtock appears ſimilar to that of the handle of a gimblet, when it is employed to turn the wire.

GIMMER-*lamb*, or GAMMER-*lamb*; a term uſed for the female or ewe lamb.

GIN, in *Artillery* and *Mechanics*, is a machine for raiſing great weights, compoſed of three long legs, two of which are kept at a proper diſtance by means of two iron, or wooden bars fixed to one of the legs by means of a bolt at one end, and by the other end to the other leg with a bolt and key, ſo that it may be put on or off at pleaſure. At three feet from the bottom is a roller moving in checks, that are faſtened to theſe poles by two iron bands and two iron bolts. The three legs of this machine are joined together with an iron bolt, about which they move; to this bolt is fixed an iron half ring to hook on the windlaſs, containing two braſs pullies. When the *gin* ſtands upright, and its legs are at a proper diſtance, one end of the cable is fixed to the dolphins of a gun or mortar with another windlaſs, containing likewiſe two braſs pullies, and the other paſſes through the pullies and round the roller, which is turned round by means of handſpikes paſſing through the holes in the ends of the roller: while a man holds the cable tight, the *gin* is raiſed to ſuch a height as to admit a carriage being put under it.

Gin, in *Diſtillery*. See Geneva.

GINETTA, or Genetta, Genet, the viverra *genetta* of Linnæus, the name of a ſmall animal of the weaſel-kind, of a tawny red colour, ornamented with ſeveral black ſpots in different parts of the body, and the ridge of the back marked with a black line. It is naturally a very tame and inoffenſive creature. It is uſually found about rivers, feeding on what it finds about their banks. It is found in ſome parts of Spain, and at Conſtantinople, and in ſome other parts of the Turkiſh dominions. It runs looſe about the houſes like a cat, and is as uſeful in catching mice; its tail, which is long, is variegated with circles of black and tawny colours; its feet are black, its ears a little pointed, and its ſkin is of a ſomewhat perfumed ſmell.

GINGER, *Amomum*, in *Botany*, a genus of the *monandria monogynia* claſs. Its characters are theſe: the flowers are collected in a ſcaly ſpike, each having a double ſheath; the flower is of one leaf, tubulous below, and divided into three parts at the brim. In the boſom of the flower is ſituated an oblong thick nectarium; from the tube of the flower ariſe two ſlender ſtamina, crowned with thick, ſhort ſummits. Under the receptacle of the flower is placed the round germen, ſupporting a ſingle ſtyle as long as the tube of the flower, and crowned with a hairy ſtigma, which afterward becomes an oval three-cornered ſeed-veſſel, opening in three parts, containing ſeveral ſeeds. There are three ſpecies.

The firſt, which is the common *ginger*, is cultivated for ſale in moſt of the iſlands in America; but is a native of the Eaſt Indies, and alſo of ſome parts of the Weſt Indies, where it is found growing naturally without culture. The dried roots of this ſort furniſh a conſiderable export from the Britiſh colonies in America.

The ſecond ſort grows naturally in India: the roots of this are much larger than thoſe of the firſt, but are jointed in the ſame manner. The latter hath thick fleſhy roots, reſembling thoſe of the large flag iris. Theſe ſorts are tender, and require a warm ſtove to preſerve them in this country.

They are propagated by parting the roots; the beſt ſeaſon for doing which is early in ſpring, before they begin to ſhoot. Every large part of the root may then be divided into ſeveral ſlips, with two or three eyes to each, all which will ſucceed: theſe are to be planted ſeparately in pots of a light rich earth, and plunged into a hot-bed of tanners bark, where they muſt be ſparingly watered, till their ſtalks appear above ground; afterwards, during the ſummer months, more plentifully; but in autumn and winter leſs frequently; and in hot weather muſt often have the glaſſes raiſed with a brick to give them air. They will increaſe greatly at the root, and ſometimes flower with us; but they muſt be kept in the hot-bed all the ſummer, and in winter be removed into the back ſtove. Miller.

When arrived at maturity, they dig the root up, and dry it on hurdles, either in the ſun, or an oven: the beſt is that which is new, dry, well filled, hard to break, of a browniſh colour without, reſinous within, and of a hot, pungent taſte.

They uſe to candy the root, when green, with ſugar and honey; having firſt ſteeped it ſome time in water, to take away part of its acrimony, and to diſpoſe it to let go the outer ſkin. They alſo make a marmelade of it, and dry cakes.

The northern people make great uſe of this confection, as holding it ſovereign againſt the ſcurvy. The Indians eat the root, when green, by way of ſallad, firſt chopping it ſmall, mixing it with other herbs, and ſeaſoning it with oil and vinegar.

This warm aromatic root appears to be much leſs liable to heat the conſtitution than might be expected from the penetrating heat and pungency of its taſte, and the fixedneſs of its active principles. It gives part of its virtue to water, and the whole to rectified ſpirit, tinging the latter of a deep, and the former of a pale yellow colour. In the ſhops is kept a ſyrup made from an infuſion of three or four ounces of the root in three pints of boiling water, which is agreeably impregnated with its warmth and flavour; and the candied *ginger*, brought from abroad, which is likewiſe moderately aromatic. Lewis.

As to its medicinal uſe, it is hot and penetrating; it is alſo held good to ſtrengthen the ſtomach, and promotes appetite: it promotes alſo digeſtion, prevents putrefaction, &c. and is an ingredient in many of the compoſitions, and powders of the ſhops.

Ginger may be preſerved by waſhing it, and laying it to ſteep for ten or twelve days in white wine and water, ſtirring them every day; then boil a pound of roots with two quarts of white wine, and about a pint of lemon juice, for a quarter of an hour; then add two pounds and a half of fine ſugar, and boil it to a ſyrup, ſcumming it as it riſes; ſet it by till the next day in a glazed pan; then boil it for half an hour, and repeat this boiling at the ſame interval till the *ginger* is clear. Put it into glaſſes, and cover them with paper, and it will afford a fine ſweet meat for the winter ſeaſon.

GINGERBREAD, a richer kind of bread; the flavour and taſte whereof are heightened and improved with ſpices, and particularly *ginger*; whence the name.

There are various forms and preparations of *gingerbread*: we ſhall content ourſelves with the following receipt, which is well recommended.

Into a pound of almonds, blanched and pounded, grate a penny white loaf; ſift and beat them together; to the mixture add an ounce of ginger, ſcraped fine; and liquorice, and aniſeed in powder, of each a quarter of an ounce; pour in two or three ſpoonfuls of roſe-water, and make the whole into a paſte, with half a pound of ſugar; mould and roll it, print it, and dry it in a ſtove. Others make it of treacle, citron, lemon, and orange-peel; with candied *ginger*, coriander, and caraway-ſeeds, mixed up with as much flour as will make it into a paſte.

GINGIBRACHIUM, a name given by ſome medicinal authors to the ſcurvy, when it affects the arms and other extremities.

GINGIDIUM. See Artedia.

This is alſo a term uſed by *Botaniſts* for a ſpecies of fennel.

GINGIPEDIUM, a name given by ſome authors to the ſcurvy when it affects the feet.

GINGIVA, in *Anatomy*, the gum; a hard ſort of fleſh, inveſting the alveoli, or ſockets, of the teeth.

The *gingivæ* are formed by the union of two membranes; one of which is a production of the perioſteum, and the other of the internal membrane of the mouth.

GINGLYMUS, Γιγγλυμος, in *Anatomy*, one of the ſpecies of articulation.

The *ginglymus* is that jointure of the bones where each bone mutually receives the other; ſo that each bone both receives, and is received.

There are three ſpecies of *ginglymus*: the firſt, when the ſame bone, at the ſame extremity, receives, and is reciprocally received by another bone, after the manner of a hinge; ſuch is that of the cubitus and humerus.

The ſecond, when a bone receives another at one of its extremes; and is received into another, at the other; as the vertebræ do.

The third is that where a bone is received into another, after the manner of a wheel, or the axis of a wheel, in a box; ſuch is that of the ſecond vertebra of the neck in the firſt.

GINGRA, in *Antiquity*, a kind of dance uſed at funerals.

GINGRINA, in *Antiquity*, a name given to a ſmall kind of flute fit for beginners.

GINORA, in *Botany*, a genus of the *dodecandria digynia* claſs: the characters of which are, that the calyx is divided into ſix ſegments; the number of petals is ſix; and the fruit is a ſingle celled, four-valved, coloured, polyſpermous capſule.

GIN-SENG, or Nin-seng, *Panax*, in *Botany*, a genus of the *polygamia dioecia* claſs. Its characters are theſe: it hath male and hermaphrodite flowers on diſtinct plants; the male have ſimple globular umbels, compoſed of ſeveral coloured rays which are equal: the flower has five narrow, oblong, blunt petals, which are reflexed, ſitting on the empalement, and five oblong, ſlender ſtamina inſerted in the empalement, terminated by ſingle ſummits: the hermaphrodite umbels are ſimple, equal, and cluſtered; the involucrum is ſmall, permanent, and compoſed of ſeveral awl ſhaped leaves: the flowers have five oblong equal petals, which are recurved, and five ſhort ſtamina, terminated by ſingle ſummits which fall off, with a roundiſh germen under the empalement, ſupporting two ſmall erect ſtyles, crowned by ſimple ſtigmas: the germen afterwards becomes an umbellicated berry with two cells, each containing a ſingle, heart-ſhaped, convex, plain ſeed. There are two ſpecies, both of which grow naturally in North America; one of them is believed to be the ſame with the Tartarian *gin-ſeng*, the figures and deſcription of that plant, which have been ſent to Europe by the miſſionaries, agreeing perfectly with the American plant.

This hath a fleſhy taper root, as large as a man's finger, which is jointed, and frequently divided into two ſmaller fibres downward: the ſtalk riſes above a foot high, naked to the top, where it generally divides into three ſmaller footſtalks, each ſuſtaining a leaf compoſed of five ſpear-ſhaped lobes, which are ſawed on their edges; they are of a pale green and a little hairy: the flowers ariſe on a ſlender foot-ſtalk, juſt at the diviſion of the foot-ſtalks which ſuſtain the leaves, and are formed into a ſmall umbel at the top; they are of a herbaceous yellow colour, compoſed of five ſmall petals, and recurved: theſe appear the beginning of June, and are ſucceeded by compreſſed heart-ſhaped berries, which are firſt green, but afterward turn red, incloſing two hard, compreſſed, heart-ſhaped ſeeds, which ripen in the beginning of Auguſt. Miller.

The *gin-ſeng* is one of the principal medicines of the Chineſe and Tartars; and their moſt eminent phyſicians have written many volumes concerning its virtues.

It is known among them by divers other names, expreſſing only *ſpirit*, or *the pure ſpirit of the earth*; *the plant that gives immortality*, &c. It makes, in effect, the whole materia medica for the people of condition, but is too precious for the populace.

All the writers of the Chineſe affairs make mention of the *gin-ſeng*: as Martinius, in his Atlas; F. Kercher, in his China Illuſtrata; F. Tachard, in his Voyages; and F. Le Comte, in his Memoirs.

And yet we knew but very little of this plant before F. Jartoux, a Jeſuit, and miſſionary in China; who, being employed, by order of the emperor, in making a map of Tartary, in the year 1709, had an opportunity of ſeeing it growing, in a village about four leagues from the kingdom of Corea, inhabited by Tartars, called *Calca-Tatze*.

That father took this opportunity to make a draught of the plant, and give an accurate deſcription thereof, with its virtues and manner of preparing it; which, being a great curioſity, we ſhall here gratify the reader with.

The *gin-ſeng*, repreſented *Tab. Nat. Hiſtory, fig.* 10. has a white root, ſomewhat knotty, about thrice the thickneſs of the ſtem, and which goes tapering to the end; at a few inches from the head it frequently parts into two branches, which gives it ſome reſemblance of a man, whoſe thighs the branches repreſent; and it is hence it takes the denomination *gin-ſeng*, which ſignifies a figure of a man.

It is hard to ſay, why the Chineſe ſhould call it *gin-ſeng*, a word which ſignifies *figure* or *repreſentation of a man*: neither that father, nor any he enquired of, could ever find, that it bore more reſemblance to the figure of a man than is ordinarily ſeen among other roots. The Tartars, with more reaſon, call it *orhota*, that is, the firſt of plants. It grows to the height of about eighteen inches.

The plant dies away every year: the number of its years may be known by the number of ſtalks it has ſhot forth, of which there always remains ſome mark, as is ſhewn in the figure by the letters *b b b*, &c. from whence it appears, that the root A was ſeven years old.

Thoſe who gather the *gin-ſeng* preſerve only the root; and all they can get of it in ten or fifteen days time they bury together, in ſome place under ground; then they take care to waſh it well, and ſcour it with a bruſh; then dip it in ſcalding water, and prepare it in the fumes of a ſort of yellow millet, which gives it part of its colour. The millet is put in a veſſel, with a little water, and boiled over a gentle fire; the roots are laid over the veſſel, upon ſmall tranſverſe pieces of wood, being firſt covered with a linen cloth, or ſome other veſſel placed over them.

They may alſo be dried in the ſun, or by the fire; but then, though they retain their virtue well enough, they have not that yellow colour which the Chineſe ſo much admire. When the roots are dried, they muſt be kept cloſe in ſome very dry place; otherwiſe they are in danger of corrupting, or of being eaten by worms.

As to the place where this root grows, it is between the thirty-ninth and forty-ſeventh degree of north latitude, and between the tenth and twentieth degree of eaſt longitude, reckoning from the meridian of Pekin. Here is found a long tract of mountains, which thick foreſts, that cover and encompaſs them, render almoſt impaſſable: it is upon the declivities of theſe mountains, and in theſe thick foreſts, upon the banks of torrents, or about the roots of trees, and amidſt a thouſand other different ſorts of plants, that the *gin-ſeng* is found; it is not to be met with in plains, valleys, marſhes, the bottoms of rivulets, or in places too much expoſed and open.

If the foreſt takes fire and be conſumed, this plant does not appear till two or three years after; it alſo lies hid from the ſun as much as poſſible, which ſhews that heat is an enemy to it.

The places where the *gin-ſeng* grows are, on every ſide, ſeparated from the province of Quan-tong by a barrier of wooden ſtakes, which encompaſſes this whole province, and about which guards continually patrol, to hinder the Chineſe from going out and looking after this root.

Yet, how vigilant ſoever they are, greedineſs after gain incites the Chineſe to lurk about privately in theſe deſerts, ſometimes to the number of two or three thouſand, at the hazard of loſing their liberty, and all the fruits of their labour, if they are taken either as they go out of or come into the province.

The emperor, in order that the Tartars ſhould reap all the advantage that is to be made of this plant, rather than the Chineſe, gave orders, in 1709, to ten thouſand Tartars, to go and gather all they could find of the *gin-ſeng*, upon condition that each perſon ſhould give him two ounces of the beſt, and that the reſt ſhould be paid for, weight for weight, in pure ſilver.

It was computed, that, by this means, the emperor would get this year above twenty thouſand Chineſe pounds of it, which would not coſt him above one fourth part of its value.

We met, by chance, ſays F. Jartoux, with ſome of thoſe Tartars, in the midſt of thoſe frightful deſerts; and their mandarins, who were not far out of the way, came, one after another, and offered us oxen for our ſubſiſtence, according to the commands they had received from the emperor.

This army of herbaliſts obſerved the following order: after they had divided a certain tract of land among their ſeveral companies, each company, to the number of a hundred perſons, ſpread itſelf out in a right line, to a certain fixed place, every ten of them keeping at a diſtance from the reſt.

Then they ſearched carefully for the plant, going on leiſurely in the ſame order; and in this manner, in a certain number of days, they run over the whole ſpace of ground appointed them.

When the time was expired, the mandarins, who were encamped in their tents in ſuch places at were proper for the ſubſiſtence of their horſes, ſent to view each troop, to give them freſh orders, and to inform themſelves if their number was complete.

If any one of them was wanting, as it often happened, either by wandering out of the way, or being attacked by wild beaſts, they always looked for him a day or two, and then returned again to their labour as before.

The *gin-ſeng*, we have obſerved, is an ingredient in moſt of the medicines which the Chineſe phyſicians preſcribe to the better ſort of patients: they affirm, that it is a ſovereign remedy for all weakneſſes occaſioned by exceſſive fatigues, either of body or mind; that it attenuates and carries off pituitous humours; cures weakneſs of the lungs and the pleuriſy; ſtops vomitings; ſtrengthens the ſtomach, and helps the appetite; diſperſes fumes or vapours; fortifies the breaſt; is a remedy for ſhort and weak breathing; ſtrengthens the vital ſpirits, and is good againſt dizzineſs of the head and dimneſs of ſight; and that it prolongs life to extreme old age. Nobody can imagine, that the Chineſe and Tartars would ſet ſo high a value upon this root, if it did not conſtantly produce a good effect: thoſe that are in health often make uſe of it to render themſelves more vigorous and ſtrong.

And I am perſuaded, adds the father juſt mentioned, it would prove an excellent medicine in the hands of any European who underſtands pharmacy, if he had but a ſufficient quantity of it to make ſuch trials as are neceſſary to examine the nature of it chemically, and to apply it in a proper quantity, according to the nature of the diſeaſe for which it may be beneficial.

It is certain, that it ſubtilizes, increaſes the motion of and warms the blood, that it helps digeſtion, and invigorates in a very ſenſible manner.

After I had deſigned the root, he goes on, I obſerved the ſtate of my pulſe, and then took half of a root, raw as it was, and unprepared; in an hour after I found my pulſe much fuller and quicker; I had an appetite, and perceived myſelf much more vigorous, and could bear labour better and eaſier than before. Four days after, finding myſelf ſo fatigued and weary, that I could ſcarce ſit on horſeback, a mandarin, who was in company with us, perceiving it, gave me one of theſe roots; I took half of it immediately, and an hour after I was not in the leaſt ſenſible of any wearineſs. I have often made uſe of it ſince, and always with the ſame ſucceſs. I have obſerved alſo, that the green leaves, and eſpecially the fibrous part of them, chewed, would produce nearly the ſame effect. The Tartars often bring people the leaves of *gin-ſeng* inſtead of tea; and I always find myſelf ſo well afterwards, that I ſhould readily prefer them before the beſt tea: their decoction is of a grateful colour, and, when one has taken it twice or thrice, its taſte and ſmell become very agreeable.

As for the root, it is neceſſary to boil it a little more than tea, to allow time for extracting its virtue, as is practiſed by the Chineſe, when they give it to ſick perſons; on which occaſion they ſeldom uſe more than the fifth part of an ounce of the dried root.

To prepare the root for exhibition they cut it into thin ſlices, and put it into an earthen pot well glazed, with about half a pint of water: the pot is to be well covered, and ſet to boil over a gentle fire; and, when the water is conſumed to the quantity of a cup full, a little ſugar is to be mixed with it, and to be drank: immediately after this, as much more water to be put to the remainder, and to be boiled as before, to extract all the juice, and what remains of the ſpirituous part of the root.

Theſe two doſes are to be taken, the one in the morning, and the other in the evening. Phil. Tranſ. N° 337. or Abridg. vol. iv. part ii. p. 314, &c.

The *gin-ſeng* root, though far unequal to the character that has been commonly given of it, promiſes, from its ſenſible qualities, to be an uſeful addition to the officinal drugs. To the taſte it diſcovers a mucilaginous ſweetneſs, approaching to that of liquorice, accompanied with ſome degree of bitteriſhneſs, and a ſlight aromatic warmth, with little or no ſmell. The ſweet matter of the *gin-ſeng* is preſerved entire in the watery as well as in the ſpirituous extract; and the ſlight aromatic impregnation is partly retained in the former, and perfectly in the latter, which laſt is a very pleaſant, bitteriſh, warm ſweet. Lewis.

GIOAR, in the *Materia Medica* of the ancient Arabians, a word applied to ſeveral different ſubſtances, and ſometimes uſed as the diſtinct names of them; ſometimes only as an epithet to them. It is generally uſed by Avicenna as a name for arſenic, ſometimes for antimony; and in Serapion, we often find it ſtanding for any of the mineral poiſons. The original meaning of the word is no more than what the Greeks expreſſed by the word ουσια, *ſubſtance*; but it became applied to ſeveral things moſt eminent in their way; as to arſenic, the moſt fatal of poiſons; to antimony, ſuppoſed at that time the moſt valuable of medicines; and to pearls, as the moſt valuable of gems.

GIOMELU, a body of the ſpahis, or horſe, in the ſervice of the grand ſignior.

GIR, a name by which ſome of the chemical writers have called quick-lime.

GIRAFFE, or *Camelopardal*, in *Zoology*. See *Tab. Quadrupeds, fig.* 7. and CAMELOPARDAL.

GIRANDOLE, a large kind of branched candleſtick. See BRANCH and JESSE.

GIRDERS, in *Architecture*, the largeſt pieces of timber in a floor. Their ends are uſually faſtened into the ſummers, or breſt-ſummers; and the joiſts are framed in at one end to the *girders*.

By the ſtatute for rebuilding London, no *girder* is to lie leſs than ten inches into the wall, and their ends to be always laid in loam, &c.

	From		to		muſt be in	
	F.	In.	F.	In.	Breadth, Inches.	Depth, Inches.
Girders and Summers in length.	10	0	15	0	11	8
	15	0	18	0	13	9
	18	0	21	0	14	10
	21	0	24	0	16	12
	24	0	26	0	17	14

GIRDING-*beams*, in *Building*, the ſame as GIRDERS.

GIRDING-*girt*, in *Sea-language*. The ſeamen ſay a ſhip is *girt*, or hath a *girding-girt*, when her cable is ſo tight or ſtrained, that upon the running of the tide ſhe cannot go over it with her ſtern part, but will lie acroſs the tides.

GIRDLE, *Cingulus*, or *Zona*, a belt or band of leather, or other matter, tied about the reins, to keep that part more firm and tight.

It was anciently the cuſtom for bankrupts, and other inſolvent debtors, to put off and ſurrender their *girdle* in open court. The reaſon hereof was, that our anceſtors uſed to carry all their neceſſary utenſils, as purſe, keys, &c. tied to the *girdle*; whence the *girdle* became a ſymbol of the eſtate. Hiſtory relates, that the widow of Philip I. duke of Burgundy, renounced her right of ſucceſſion by putting off her *girdle* upon the duke's tomb.

The Romans always wore a *girdle*, to tuck up the tunica when they had occaſion to do any thing: this cuſtom was ſo general, that ſuch as went without *girdles*, and let their gowns hang looſe, were reputed idle, diſſolute perſons.

GIRDLE, *Maidens* or *Virgins*. It was the cuſtom among the Greeks and Romans, for the huſband to untie his wife's *girdle*. Homer, lib. xi. of his Odyſſey, calls the *girdle* παρθενιην ζωνην, *maids girdle*. Feſtus relates, that it was made of ſheep's wool, and that the huſband untied it in bed: he adds, that it was tied in the Herculean knot; and that the huſband untied it, as a happy preſage of his having as many children as Hercules, who, at his death, left ſeventy behind him.

The poets attribute to Venus a particular kind of *girdle*, called CESTUS, to which they annexed a faculty of inſpiring the paſſion of love.

GIRDLE, *quickſilver*, in *Medicine*, is a ſort of *girdle*, ſmeared over with mercury, or having mercury incloſed within it.

It is made of leather, linen, cloth, cotton, ſtuff, or the like; and the mercury is prepared or killed various ways; as with faſting ſpittle, fat, or the like.

It is applied as a topical medicine about the waiſt, ſometimes with good effect; but, frequently, it proves dangerous, principally in weak conſtitutions, and thoſe ſubject to convulſions. Its intention is, the cure of the itch, driving away vermin, killing lice, &c.

GIRDLE, *Queen's*, is an ancient duty or tax, raiſed at Paris every three years, at the rate of three deniers upon each muid of wine, and ſix for each queue: it was intended for the maintenance of the queen's houſhold; afterwards they augmented and extended it to other commodities, as coals, &c.

Vigenere ſuppoſes it to have been originally thus called, becauſe the *girdle* anciently ſerved for a purſe; but he adds, that a like tax had been raiſed in Perſia, and under the ſame name, above two thouſand years ago; as appears from Plato, in his Alcibiades, Cicero, Athenæus, &c.

GIRDLE, *Chriſtians of the*. Motavackkel, tenth caliph of the family of the Abaſſides, enjoined the Chriſtians and Jews, in the year of the Hegira 235, of Jeſus Chriſt 856, to wear a large leathern *girdle*, as a badge of their profeſſion; which they bear to this day throughout the Eaſt: from which time the Chriſtians of Aſia, and particularly thoſe of Syria and Meſopotamia, who are almoſt all Neſtorians or Jacobites, have been called *Chriſtians of the Girdle*.

GIRDLE, *order of the*, the order of Cordeliers. See CORD and CORDELIER.

GIRDLE, in *Architecture*. See CINCTURE.

GIRDLE, among *Jewellers*, the line which encompaſſes the ſtone, parallel to the horizon; or, which determines the greateſt horizontal expanſion of the ſtones.

GIRDLE-*wheel*, a ſmall ſpinning-wheel, made for hanging to a woman's girdle or apron-ſtring, ſo that ſhe may ſpin with it though walking about.

GIRGILIM, in the *Materia Medica*, a name given by ſome authors to the ſeſamum, or oily purging grain.

GIRGITES, a name uſed by ſome chemical writers for a ſort of white ſtones found in rivers, of which they make a peculiarly ſtrong lime. The ſtones are of the ſparry kind, worn into roundneſs by the motion of the water; and they have their name *girgites*, from the word *gir*, uſed by the chemiſts for lime.

GIRKIN, among *Gardeners*. See GUERKIN.

GIRLE, among *Sportſmen*, denotes the roe-buck in its ſecond year.

GIRMER, a word uſed by ſome of the chemical writers to ſignify tartar.

GIRON, or GUIRON, in *Heraldry*, denotes a triangular figure, having a long ſharp point, not unlike a wedge, terminating in the center of the eſcutcheon.

The word is French, and literally ſignifies the *geremium*, or *lap*; becauſe, in ſitting, the knees being ſuppoſed ſomewhat aſunder, the two thighs, together with a line imagined to paſs from one knee to the other, form a figure ſomewhat ſimilar to this.

When a coat has ſix, eight, or ten of theſe *girons*, meeting or centring in the middle of the coat, it is ſaid to be *gironne* or *gironny*.

GIRROCK, the common Engliſh name of the fiſh called the LACERTUS, a large ſpecies of gar-fiſh, caught in the Mediterranean and Engliſh ſeas.

GIRRONNE', GIRONY, in *Heraldry*, is when a ſhield or coat is divided into ſeveral girons, which are alternately colour and metal. See *Tab.* II. *Herald. fig.* 65. which is blazoned *gironné* of ſix argent and ſable.

When there are eight pieces, or girons, it is abſolutely ſaid to be *gironné*; when there are more, or fewer, the number is to be expreſſed: *gironné* of four, of fourteen, &c.

Some, inſtead of *gironné*, ſay, *parti*, *couppé*, *tranché*, and *taillé*, becauſe the girons are formed by ſuch diviſions of the field. Four girons form a SALTIER, and eight a croſs.

GIRT, in meaſuring TIMBER, is uſed for the circumference of a tree. See *Coggleſhall*'s SLIDING-*rule* and DENDROMETER.

Some call the fourth part of the circumference the *girt*, and ſuppoſe the ſquare of this equal to the area of the ſection of the tree.

GIRT, in *Architecture*, the ſame with fillet. See FILLET.

GIRT, *girdle*, in *Sea-language*. See GIRDING-*girt*.

GIRT-*line* is a rope paſſing through a ſingle block, on the head of the lower maſts, to hoiſt up the rigging thereof: this is the firſt rope employed to rig a ſhip, and by means of this all the reſt are drawn up and fixed; after which it is removed till the ſhip is to be unrigged.

GIRTHS *of a ſaddle*, the ſtrong ſtraps, made of a canvas ſtuff called *girth*-web, which being buckled under the horſe's belly, ſerve to fix the SADDLE.

GISARMS, or GUISARMES, in *our old Writers*, an halbert or hand-ax: it comes from the Latin *bis arma*, becauſe it wounds on both ſides. Shene. *Eſt armorum genus longo manubrio & porrecta cuſpide*. It is mentioned in the ſtatute 13 Edw. I. cap. 6.

GISCARA, a name uſed by ſome botanical authors for the *palma conifera minor Braſilienſis*, a ſmall palm common in the Braſils.

GISON, or GEISON, in the *Jewiſh Antiquities*, a little wall about breaſt high, made round the temple properly ſo called, and the altar of burnt ſacrifices, to keep the people at a diſtance. Joſephus, in his Book of Antiquities, makes it to be three cubits high; and but one, in his Hiſtory of the Jewiſh war. Joſ. Antiq. lib. viii. cap. 2. p. 262. & de Bello Jud. lib. vi. p. 918. Calm. Dict. Bibl.

GITHAGO, in *Botany*, a name uſed by ſome authors, particularly by Pliny, for the lolium or darnel-graſs.

GITTITH. This word occurs frequently in the Pſalms, and is generally tranſlated *wine-preſſes*. The conjectures of interpreters are various concerning this word *gittith*. Some think it ſignifies a ſort of muſical inſtrument; others, that the Pſalms, with this title, were ſung after the vintage; laſtly, others, that the hymns of this kind were invented in the city of Gath. Calmet is rather of opinion, that it was given to the claſs of young women, or ſongſtreſſes of Gath, to be ſung by them. Pſ. viii. 1. lxxxi. 1. lxxxiv. 1. Dr. Hammond thinks that the Pſalms, with this title, were all ſet to the ſame tune, and made on Goliah the Gittite.

GIVEN, *datum*, a term very frequently uſed in *Mathematics*, ſignifying a thing which is ſuppoſed to be known.

Thus, if a magnitude be known, or we can find another equal to it, we ſay, it is a *given* magnitude, or that ſuch a thing is *given* in magnitude.

If the poſition of any thing be ſuppoſed as known, we ſay, *given* in poſition.

Thus, if a circle be actually deſcribed on a plane, its center is *given* in poſition, its circumference *given* in magnitude, and the circle is *given* both in poſition and magnitude.

A circle may be *given* in magnitude only; as when only its diameter is *given*, and the circle not actually deſcribed.

If the kind or ſpecies of any figure be given, they ſay, *given* in ſpecie. If a ratio between any two quantities is known, they are ſaid to be *given* in proportion. See DATA.

GIZER, in the *Materia Medica* of Galen and the ancients, a name given to the fineſt and beſt kind of caſſia fiſtula. The ancients had ſeveral ſorts of this drug, ſome collected ſeparate from the wood, ſome with it; the young ſhoots being cut bark and all, and preſerved together.

GLABELLA, *quaſi glabra*, a term uſed by ſome writers to expreſs the ſpace between the two eye-brows: it is ſo called from its ſmoothneſs, being uſually without hair.

GLACIALIS, *icy*, of *glacies*, *ice*, ſomething relating to ice; and particularly a place that abounds in ICE.

Thus we ſay, the *Mare Glaciale*, or *Congelatum*, that is, the Icy or Frozen Sea; called alſo the Chronian or Sarmatian Sea.

GLACIES *Mariæ*. See SPECULARIS *lapis*.

GLACIS, in *Building*, an eaſy inſenſible ſlope or declivity.

The deſcent or inclination of the *glacis* is leſs ſteep than that of the talut. In gardening, a deſcent ſometimes begins in talut, and ends in *glacis*.

The *glacis* of the cornich is an eaſy imperceptible ſlope in the cymatium of the cornich, to promote the deſcent and draining off of the rain-water.

GLACIS, in *Fortification*, is particularly uſed for that of the counterſcarp, being a ſloping bank, which reaches from the parapet of the counterſcarp, or covert-way, to the level ſide of the field, at the diſtance of about twenty fathom. See *Tab: Fort. fig.* 21. *lit. a a a* and *c*.

The conſtruction of the covert-way and *glacis* is more diſtinctly illuſtrated in *Tab.* VII. *Fortif. fig.* 41. When the body of the place, and all the neceſſary out-works are conſtructed, lines are drawn parallel to the outermoſt counterſcarps of the ditches, at ſix toiſes diſtant from it; and the ſpace *m n m n*, included between that line and the counterſcarp, will be the COVERT-*way* required. If lines are drawn parallel to the lines which terminate the covert-way, and the places of arms *m*, *m*, &c. at twenty toiſes diſtant from them, the ſpace *x*, *x*, *x*, between theſe lines will be the *glacis*. A, in this figure, repreſents the ARROW; B, the *detached* REDOUBT; *v*, *v*, the TRAVERSES; *z*, *z*, the SALLY-*ports*. When the ground is low, and water to be found, there is often a ditch of about ten or twelve toiſes made round the *glacis*; beyond which there is a ſecond covert-way of four toiſes, with traverſes and places of arms, and a ſecond *glacis* from fifteen to eighteen toiſes broad. Muller's Fort. p. 42.

GLADDON, or GLADWIN, the name of a plant otherwiſe called SPURGE-*wort*.

GLADE, in *Agriculture*, *Gardening*, &c a viſta, or open and light paſſage made through a thick wood, grove, or the like, by lopping off the branches of trees along the way.

GLADE, in *Zoology*. See GLEAD.

GLADIATORS, in *Antiquity*, perſons who were retained to fight ordinarily in the arena, for the entertainment of the people.

The *gladiators* were uſually ſlaves, and fought out of neceſſity; though, ſometimes, freemen made profeſſion thereof, like our prize-fighters, for a livelihood. After a SLAVE had ſerved on the arena three years, he was diſmiſſed.

The Romans borrowed this cruel diverſion from the Aſiatics: ſome ſuppoſe that there was policy in this practice, the frequent combats of *gladiators* tending to accuſtom the people to deſpiſe dangers and death.

The origin of ſuch combats ſeems to be as follows: from the earlieſt times with which we have any acquaintance in prophane hiſtory, it had been the cuſtom to ſacrifice captives, or priſoners of war, to the manes of the great men who had died in the engagement: thus Achilles, in the Iliad, lib. xxiii. ſacrifices twelve young Trojans to the manes of Patroclus; and in Virgil, lib. xi. ver. 81. Æneas ſends captives to Evander, to be ſacrificed to the funeral of his ſon Pallas.

In courſe of time they came alſo to ſacrifice ſlaves at the funerals of all perſons of condition; this was even eſteemed a neceſſary part of the ceremony; but, as it would have appeared barbarous to have maſſacred them like beaſts, they were appointed to fight with each other, and endeavour to ſave their own lives by killing their adverſary. This ſeemed ſomewhat leſs inhuman, becauſe there was a poſſibility of avoiding death, by an exertion of ſkill and courage.

This occaſioned the profeſſion of *gladiator* to become an art: hence aroſe maſters of arms, and men learned to fight and exerciſe this art.

Theſe maſters, whom the Latins called *laniſtæ*, bought them ſlaves to be trained up to this cruel trade, whom they afterwards ſold to ſuch as had occaſion to preſent the people with ſo horrible a ſhew.

They were at firſt performed near the ſepulchre of the deceaſed, or about the funeral pile; but were afterwards removed to the circus and amphitheatres, and became ordinary amuſements.

The firſt ſhew of *gladiators*, called *munus gladiatorum*, was exhibited at Rome, according to Valerius Maximus, by M. and D. Brutus, upon the death of their father, in the year of the city 490. On this occaſion there were probably only three pair of *gladiators*: in the year of Rome 537, the three ſons of M. Æmilius Lepidus the augur, who had been three times conſul, entertained the people with the cruel pleaſure of ſeeing twenty-two *gladiators* fight in the forum. In the year of Rome 547, the firſt Africanus diverted his army at New Carthage with a ſhew of *gladiators*, which he exhibited in honour of his father and uncle, who had begun the reduction of Spain. In proceſs of time, the Romans became ſo fond of theſe bloody entertainments, that not only the heir of any great and rich citizen lately deceaſed, but all the principal magiſtrates, preſented the people with ſhews of this nature, to procure their affection. The ædiles, pretors, conſuls, and, above all, the candidates for offices, made their court to the people, by entertaining them frequently with theſe fights: and the prieſts were ſometimes the exhibitors of the barbarous ſhews; for we meet with the *ludi pontificales* in Suetonius, Auguſt. cap. 44. and with the *ludi ſacerdotales*, in Pliny. Epiſt. lib. vii. As for the emperors, it was ſo much their intereſt to ingratiate themſelves with the populace, that they obliged them with combats of *gladiators* almoſt upon all occaſions; and as theſe increaſed, the number of combatants increaſed likewiſe. Accordingly, Julius Cæſar, in his ædileſhip, diverted the people with three hundred and twenty couple. Titus exhibited a ſhew of *gladiators*, wild beaſts, and repreſentations of ſea-fights, which laſted a hundred days; and Trajan continued a ſolemnity of this nature for a hundred and twenty-three days, during which time he brought out a thouſand pair of *gladiators*. Before this time, under the republic, the number of *gladiators* was ſo great, that when the conſpiracy of Catiline broke out, the ſenate ordered them to be diſperſed into the garriſon and ſecured, leſt they ſhould have joined the diſaffected party. See GLADIATOR'S *war*.

Theſe ſports were become ſo common, and their conſequences, in a variety of reſpects, ſo dangerous, that Cicero preferred a law, that no perſon ſhould exhibit a ſhew of *gladiators* within two years before he appeared candidate for any office. Julius Cæſar ordered, that only a certain number of men of this profeſſion ſhould be in Rome at a time. Auguſtus decreed, that only two ſhews of *gladiators* ſhould be preſented in a year, and never above ſixty couple of combatants in a ſhew. And Tiberius provided by an order of ſenate, that no perſon ſhould have the privilege of gratifying the people with ſuch a ſolemnity, unleſs he was worth four hundred thouſand ſeſterces. They were alſo conſiderably regulated by Nerva.

The emperor Claudius reſtrained them to certain occaſions; but he ſoon afterwards annulled what he decreed, and private perſons began to exhibit them at pleaſure, as uſual; and ſome carried the brutal ſatisfaction ſo far, as to have them at their ordinary feaſts.

And not ſlaves only, but other perſons, would hire themſelves to this infamous office.

The maſter of the *gladiators* made them all firſt ſwear, that they would fight to death; and if they failed, they were put to death, either by fire, or ſwords, clubs, whips, or the like.

It was a crime for the wretches to complain when they were wounded, or to aſk for death, or ſeek to avoid it, when overcome; but it was uſual for the emperor, or the people, to grant them life, when they gave no ſigns of fear, but waited the fatal ſtroke with courage and intrepidity: Auguſtus even decreed, that it ſhould always be granted them.

From ſlaves and freedmen, the inhuman ſport at length ſpread to people of rank and condition; ſo that Auguſtus was obliged to iſſue a public edict, that none of the ſenatorian order ſhould become *gladiators*; and ſoon after he laid the ſame reſtraint on the knights: nevertheleſs, Nero is related to have brought upwards of four hundred ſenators, and ſix hundred Roman knights upon the arena; though Lipſius takes both thoſe numbers to be falſified, and, not without reaſon, reduces them to forty ſenators, and ſixty knights: yet Domitian, that other monſter of cruelty, refined upon Nero, exhibiting combats of women in the night-time.

Conſtantine the Great is ſaid to have firſt prohibited the combats of *gladiators* in the Eaſt; at leaſt, he forbad thoſe who were condemned to death for their crimes, to be employed; there being an order ſtill extant to the præfectus prætorii, rather to ſend them to work in the mines in lieu thereof: it is dated at Berytus, in Phœnicia, the firſt of October, 325.

The emperor Honorius forbad them at Rome, on occaſion of the death of Telemachus, who coming out of the Eaſt into Rome, at the time of one of theſe ſpectacles, went down into the arena, and uſed all his endeavours to prevent the *gladiators* from continuing the ſport; upon which the ſpectators of that carnage, fired with anger, ſtoned him to death.

It muſt be obſerved, however, that the practice was not entirely aboliſhed in the Weſt before Theodoric, king of the Oſtrogoths. Honorius, on the occaſion firſt mentioned, had prohibited them; but the prohibition does not ſeem to have been executed. Theodoric, in the year 500, aboliſhed them finally.

Some time before the day of battle, the perſon who preſented the people with the ſhews, gave them notice thereof, by programmas, or bills, containing the names of the *gladiators*, and the marks whereby they were to be diſtinguiſhed; for each had his ſeveral badge, which was, moſt commonly, a peacock's feather, as appears from the ſcholiaſt of Juvenal, on the 158th verſe of the third ſatire, and Turnebus Adverſ. lib. ii. cap. 8.

They alſo gave notice what time the ſhews would laſt, and how many couples of *gladiators* there were; and it even appears, from the 52d verſe of the ſeventh Satire of the ſecond book of Horace, that they ſometimes made repreſentations of theſe things in painting, as is practiſed among us by thoſe who have any thing to ſhew at fairs.

The day being come, they began the entertainment by bringing two kinds of weapons; the firſt were ſtaves, or wooden files, called *rudes*; and the ſecond were effective weapons, as ſwords, poniards, &c.

The firſt were called *arma luſoria*, or *exercitoria*; the ſecond *decretoria*, as being given by decree or ſentence of the prætor, or of him at whoſe expence the ſpectacle was exhibited. They began to fence or ſkirmiſh with the firſt, which was to be the prelude to the battle; and from theſe, when well warmed, they advanced to the ſecond, at the ſound of the trumpets, with which they fought naked.

Then they were ſaid *vertere arma*; the terms of ſtriking were *petere & repetere*; of avoiding a blow, *exire*; and when one of the combatants received a remarkable wound, his adverſary or the people cried out, *habet*, or *hoc habet*. The firſt part of the engagement was called *ventilare*, *præludere*; and the ſecond, *dimicare ad certum*, or *verſis armis pugnare*: and ſome authors think, with much probability, that it is to theſe two kinds of combat that St. Paul alludes, in the paſſage 1 Cor. ix. 26, 27. "I fight, "not as one that beateth the air; but I keep my body, "and bring it into ſubjection."

If the vanquiſhed ſurrendered his arms, it was not in the victor's power to grant him life; it was the people, during the time of the republic, and the prince or people, during the time of the empire, that were alone impowered to grant the boon.

The reward of the conqueror was a branch of palm-tree, and a ſum of money, probably collected among the ſpectators; ſometimes they gave him his congé, or diſmiſſed him, by putting one of the wooden files or RUDIS in his hand; and ſometimes they even gave him his freedom, putting the pileus on his head.

The ſign or indication, whereby the ſpectators ſhewed that they granted the favour, was *premere pollicem*, which M. Dacier takes to be a clenching of the fingers of both hands between one another, and ſo holding the two thumbs upright cloſe together; and, when they would have the combat finiſhed and the vanquiſhed ſlain, they *verterunt pollicem*, bent back the thumb; which we learn from Juvenal, Sat. iii. ver. 36.

The *gladiators* challenged or defied each other, by ſhewing the little finger; and, by extending this, or ſome other, during the combat, they owned themſelves vanquiſhed, and begged mercy from the people: *Victi oſtenſam digiti veniam a populo poſtulabant*, ſays the old ſcholiaſt on Perſius. Vide Plin. lib. xxviii. cap. 2. Prudentius, lib. ii. contra Symm. ver. 1098. Horace, lib. iv. 18. ver. 66. Politian. Miſcel. cap. 42. Turneb. Adverſ. lib. xi. cap. 6. Lipſ. Saturn. lib. ii. cap. 22.

There were divers kinds of *gladiators*, diſtinguiſhed by their weapons, manner, and time of fighting, &c. as,

The *andabatæ*, of whom we have already given an account under ANDABATÆ.

The *catervarii*, who always fought in troops or companies, number againſt number; or, according to others, who fought promiſcuouſly, without any certain order. Lipſ. lib. ii. cap. 16.

The *conſummati*, whom authors mention as a ſpecies of *gladiators*, the ſame with the rudiarii and veterani; founding the opinion on a paſſage in Pliny, lib. viii. cap. 7. But Lipſius ſhews, that they have miſtaken Pliny, Saturn. lib. ii. cap. 16. and Turneb. Adverſ. lib. xxx. cap. 36.

The *cubicularii*, which are a little precarious, being chiefly founded on a paſſage in Lampridius, in the life of the emperor Commodus: *Inter hæc, habitu victimarii, victimas immolavit, in arena rudibus, inter cubicularios*; gladiatores *pugnavit lucentibus aliquando mucronibus.*

Turnebus reads *rudiarios* inſtead of *cubicularios*; and underſtands it of thoſe who had been diſmiſſed, and could no longer be obliged to fight, except with files.

Salmaſius reads *gladiator*; and refers it to the emperor, who fought not only on the arena, and with files, or blunted inſtruments, but at home, with his ſervants and valets de chambre, and with ſharps.

Lipſius will have nothing altered in the text: the *gladiatores cubicularii*, he obſerves, were thoſe who fought at private houſes, during feaſts, &c. Accordingly, Dion ſays expreſly, that Commodus ſometimes fought at home, and even killed ſome perſons in ſuch rencounters; but that, in public, he only fought with blunted weapons.

The *dimachæ*, who fought armed with two poniards, or ſwords; or with ſword and dagger. Lipſ. Saturn. lib. ii. cap. 13.

The *eſſedarii*, who fought in cars; called alſo, in an inſcription lately diſcovered at Lyons, *aſſedarii*. Saturn. ſerm. lib. ii. cap. 13.

The *fiſcales*, or *Cæſariani*, who belonged to the emperor's company; and who, being more robuſt and dexterous than the reſt, were frequently called for; and therefore named alſo *poſtulatitii*. Saturn. lib. ii. cap. 16 The other kinds were, the *hoplomachi*, *meridiani*, *myrmillones*, *ordinarii*, *pinnirapi*, *provocatores*, *retiarii*, *rudiarii*, *Samnites*, *ſecutores*, *ſpectatores*, and *Thraces*: which ſee deſcribed under Meridiani, Retiarii, Secutores, &c.

Some authors, and particularly Vigenere on Livy, rank the *obſequentes*, mentioned by Spartian, in his life of Marcus Aurelius, among the number of *gladiators*; Lipſius laughs at him, Saturn. lib ii cap. 16. and with ſome reaſon: the obſequentes properly were the troops which that emperor raiſed among the *gladiators*; or whom of *gladiators* he made ſoldiers.

Gladiators *war*, *bellum* Gladiatorium, or *Spartacium*, called alſo the *ſervile war*, was a war which the Romans ſuſtained about the year of their city 680. Spartacus, Crinus, Oenomaus, having eſcaped, with other *gladiators*, to the number of ſeventy-four, out of the place where they had been kept at Capua, gathered together a body of ſlaves, put themſelves at their head, rendered themſelves maſters of all Campania, and gained ſeveral victories over the Roman prætors. At length they were defeated, in the year 682, at the extremity of Italy; having, in vain, attempted to paſs over into Sicily.

This war proved very formidable to the Romans. Craſſus was not able to finiſh it: the great Pompey was forced to be ſent as general.

Gladiator, *dying*, is a moſt valuable monument of ancient ſculpture, which is now preſerved in the palace of Chighi. This man, when he had received the mortal ſtroke, is particularly careful, *ut procumbat honeſte*, that he might fall honourably; he is ſeated in a reclining poſture on the ground, and has juſt ſtrength ſufficient to ſupport himſelf on his right arm; and in his expiring moments it is plainly ſeen that he does not abandon himſelf to grief and dejection, but is ſolicitous to maintain that firmneſs of aſpect, which the *gladiators* valued themſelves on preſerving in this ſeaſon of diſtreſs, and that attitude which they had learnt of the maſters of defence. He fears not death, nor ſeems to betray any tokens of fear by his countenance, nor to ſhed one tear: *quis mediocris* gladiator *ingemuit*, *quis vultum mutavit unquam*, *quis non modò ſletit*, *verùm etiam decubuit turpiter*, ſays Cicero, in that part of his Tuſculan, where he is deſcribing the aſtoniſhing firmneſs of theſe perſons. We ſee, in this inſtance, notwithſtanding his remaining ſtrength, that he has but a moment to live, and we view him with attention, that we may ſee him expire and fall: thus the ancients knew how to animate marble, and to give it almoſt every expreſſion of life. Encyclopedie.

GLADIOLUS, in *Botany*. See *Corn*-flag.

GLADIUS, *ſword*. *Jus* Gladii, or *right of the ſword*, is uſed, in our ancient Latin authors, and in the Norman laws, for ſupreme juriſdiction.

Camden, in Britannia, writes *Comitatus Flint pertinet ad* gladium *Ceſtriæ*: and Selden, Tit. of Honour, p. 640. *Curiam ſuam liberam de omnibus placitis*, *&c. exceptis ad* gladium *ejus pertinentibus*.

And it is probably from hence, that, at the creation of an earl, he is *gladio ſuccinctus*; to ſignify, that he had a juriſdiction over the county.

Gladius *piſcis*, in *Zoology*, a name uſed by many for the sword-*fiſh*, called alſo the xiphias.

GLADWIN. See Iris.

GLAIR *of eggs*, is the ſame as the white of eggs, and is uſed as a varniſh for preſerving paintings. For this purpoſe it is beat to an unctuous conſiſtence, and commonly mixed with a little brandy or ſpirit of wine, to make it work more freely, and with a lump of ſugar to give it body and prevent its cracking: and then ſpread over the picture or painting with a bruſh.

GLAMA, in *Natural Hiſtory*, the name of a ſpecies of camel, called alſo *elaphocamelus*, by many authors, and by many erroneouſly accounted a ſheep; its length from head to tail is about ſix feet; its height about four feet; its head, neck, and the general appearance of the upper part of the body, greatly reſembles the camel; and its upper lip is divided in the ſame manner as in that creature. Its parts of generation are alſo the ſame as in the camel; and it is deſtitute of the fore-teeth, and chews the cud like other animals that are ſo. It has no horns, and its feet are divided into two portions, which terminate in a ſort of claws, and are faſtened by a ſkin round the anterior part of the foot; the ſole of the foot is tender, and covered over only with a thick ſkin, as in the camel.

It has at the place where the breaſt joins to the belly a protuberance, like that which the camel and dromedary have in the ſame part, and in this animal Matthiolus obſerves that there is a continual diſcharge of a ſort of liquid excrement from it: but this has been ſuppoſed by ſome to be only accidental. It is a very tame animal, and fit for domeſtic uſes. It never offends any creature; but when provoked, revenges itſelf by diſcharging the contents of its ſtomach, by vomit, upon whatever injures it; and this it will do to a great diſtance.

The fleſh of this animal is eaten, and ſaid to be as good as mutton.

It is a native of Peru, and is of vaſt uſe to the inhabitants for carrying burdens; the weaker of them very eaſily carry a hundred and fifty pounds weight, and the ſtronger two hundred and fifty. Ray's Syn. Quad. p. 143.

The guanaco of Peru may probably be the *glama* in its wild and ſavage ſtate: theſe are very timid and wary animals; for, whilſt they are feeding in great herds on the hills, one keeps watch, and on perceiving the approach of any one, neighs, and thus gives the alarm to the herd, which run off with incredible ſpeed. They are killed for the ſake of their fleſh, and of their hair, which the Indians weave into cloth. Pennant's Synop. of Quad. p. 66.

Glama, in the *Old Writers of Medicine*, is ſometimes uſed to ſignify the ſordes of the eyes in lippitudes, and other diſorders attending them.

GLAND, Glandula, in *Anatomy*, a ſoft, ſpongy, lax kind of body; ſerving to ſeparate ſome particular humour from the maſs of blood.

The ancients took the *glands* to be nothing more than a kind of pillows, or cuſhions, for the neighbouring parts to reſt on. Some of them, at length, began to fancy them ſponges; deſtined to receive and imbibe the ſuperfluous moiſture of the other parts.

Later phyſicians thought proper to aſſign them nobler and more important uſes. They conſidered them as ciſterns, which contained proper ferments, whereby the blood, upon its mixing therewith, was put into a fermentation; in the progreſs whereof it worked, or threw off certain of its parts, and ſent them away by excretory ducts.

The moderns, who allowed the *glands* to be the organs whereby the vital fluids are ſeparated for the uſes of the body, conſidered them as filtres, the pores whereof, being of different ſizes, would only admit of ſimilarly figured particles to paſs through them.

But the lateſt authors rather conceive the *glands* as ſieves, whoſe perforations, being of different ſizes, though of the ſame figure, only ſeparate ſuch particles whoſe diameters are leſs than their own.

The *glands*, to the eye appear a ſort of whitiſh, membranous maſſes compoſed of an outer cover, or integument; within which a vaſcular plexus is contained. They are denominated from their reſemblance, in form, to acorns, which the Latins call *glandes*.

By diſſection, and the microſcope, they are found to be real plexuſes or pelotoons, of veſſels, variouſly wound, and implicated among themſelves: but the modern anatomiſts Malpighi, Bellini, Wharton, Nuck, Peyer, &c. have gone farther; and diſcovered them to be no more than continued convolutions of the capillary arteries.

Their formation appears to be thus. An artery, arriving at a certain part, is divided into an infinite number of exceedingly fine branches, or ramifications: theſe capillary branches are laid in various beds, and circumvolutions; and from the returns thereof ariſe new branches, or veſicles for veins; which a little farther unite, or terminate, in ſome larger branch.

All theſe ramifications, both veins and arteries, are rolled up in a bundle; making numerous gyres, and circumvolutions: and from the various bends and angles, formed by both kinds, ariſe numerous other minute veſſels, which make the principal and moſt eſſential part of the *gland*.

The blood brought from the heart by the artery, into the glandular plexus, purſues all the turns and meanders in the arterial part thereof, till, arriving at the venous part, it is by it brought back again to the heart: in the mean time, during its progreſs through the arterial and venous folds, ſome part of it is abſorbed, or drained off, at the orifice of the tubules ariſing from the flexures thereof.

What is thus received into theſe, which we may call the *ſecretory ducts*, is commonly taken up by other tubules, ſpringing out of them: theſe, joining together, form a ſingle canal, which is called the *excretory duct*; which, paſſing out of the body of the *gland*, carries off the ſecreted matter into ſome proper receptacle deſtined to retain or receive it.

Though, ſometimes, the ſecretory veſſels themſelves terminate in a baſon or reſervoir; and depoſit their contents therein. Such is the general ſtructure, and office of the *glands*; which we ſhall farther illuſtrate, under Secretion.

A *gland*, then, is a compoſition of divers kinds of veſſels; viz. an artery, and a vein; ſecretory and excretory ducts: to which may be added, a nerve, which is found in every *gland*, diffuſed through the whole ſubſtance thereof, to furniſh ſpirits for promoting the ſecretion; and a membrane, which ſupports the convolutions of the vein and artery, accompanying them together through all the minuteſt diviſions; to which add, lymphatics, which have been diſcovered in ſeveral *glands*.

The ſecretory tubes, however, are what we principally conſider as the organ of the *gland:* theſe, alone, ſometimes form the greateſt part of what is called a *gland*, or *glandulous body*.

The *glands* are liable to be ſo altered by accidents as to be ſcarce known for what they really are; and their diſtemperatures are too often productive of the moſt miſchievous conſequences. The Paris Memoirs give an account of a woman, who, attempting to lift a large weight, had a ſwelling that appeared the ſame day on the lower part of her arm, which continued increaſing in ſize for eighteen months. After this there appeared a hole in the inner part of the hand, from which there was diſcharged a quantity of matter daily, but yet the ſwelling continued to increaſe. At the end of two years ſhe conſented to have it laid open. There was very little matter diſcharged, the whole not amounting to more than two ſpoonfuls of a thick viſcous fluid; all the reſt of the tumour was ſolid, and contained about two hundred white bodies, of a roundiſh, but ſomewhat oblong figure, and not unaptly reſembling ſome of the kinds of kidney-beans. Theſe were covered with a ſolid membrane, and had no cavity within: and ſome of them had at one end a ſort of ſtalk, or pedicle, by which they ſeemed to have been faſtened to ſome other body. Theſe were the *glands* which had loſt their natural uſe, and were become hard, and what ſeemed a pedicle or ſtalk to ſome of them was their excretory duct which had not periſhed. Mem. Acad. Par. 1708.

The *glands* which have no particular ſecretory ducts, are called *glanduæ cæcæ*, or *clauſæ*.

Dr. Quietſchius argues for theſe *glands* being deſigned to prepare nouriſhment for the other parts, from the obſervation that they decreaſe after birth to full growth, then continue in the ſame condition till old age comes on; after which they gradually ſhrivel. Select. Medic. Francofurt. tom. ii. vol. i. § 3.

M. Winſlow has diſcovered a kind of tomentum, or down, within their cavity; which he ſuppoſes to do the office of a filtre, and to be that whereby ſuch a certain humour is ſeparated from the common maſs of blood. His ſyſtem will be explained, when we come to treat of SECRETION.

The down-veſſel being the grand organ of ſecretion, its ſtructure and application are diverſified, according to the different purpoſes nature has in view. Sometimes the liquor, filtrated through it, trickles out, drop by drop, upon a membrane, to which one extremity of the veſſel is faſtened; as where the filtration is only intended for moiſtening and lubricating the part with that liquor: in which caſe, the down-veſſel is both ſecretory, and excretory; which is the moſt ſimple caſe. Such are thoſe innumerable *glands* ſpread through the greater part of the viſcera.

Sometimes a great number of theſe down-veſſels are ſpread over the inner ſurface of a little membranous cell, into which they all pour their liquor, which is diſcharged hence at a little aperture in the cell. Such are the folitary *glands* of the inteſtines, which appear like ſo many little ſeparate grains.

Sometimes a veſſel is bent, and has only down in the firſt part thereof, which alone is ſecretory, and the reſt excretory, pouring the liquor into ſome other common cavity. Such are the *glands* that compoſe a calf's kidney.

The ſecretory veſſels are ſometimes of a very great length, notwithſtanding that they take up but little room; being wound over themſelves, again and again, ſometimes in a ſingle pelotoon, or knot; and ſometimes in ſeveral, incloſed in a common membrane.

The *glands* are of ſeveral kinds, in reſpect of their form, ſtructure, office, and uſe: authors uſually divide them into *conglobate* and *conglomerate*.

GLANDS, *ſimple*, or *conglobate*, are thoſe conſiſting of one continuous maſs, with an uniform ſurface. Such are ſubcutaneous *glands*.

A conglobate *gland* is, more ſtrictly, a little ſmooth body, wrapped up in a fine double ſkin, by which it is ſeparated from all the other parts; only admitting an artery and nerve to paſs in, and a vein and excretory duct to go out.

Theſe *glands* either diſcharge their ſecreted humour into the chyle, or venous blood; or elſe it tranſpires through the pores of the ſkin, or the coats of the looſer membranes found in moſt parts of the body.

Of the conglobate kind are the *glands* in the cortical part of the brain, in which the animal ſpirits are ſuppoſed to be ſecreted: ſuch, alſo, are the labial *glands* and the teſtes. See LYMPHATICS.

GLAND, *conglomerate*, or *compound*, is an irregular aſſemblage of ſeveral ſimple *glands* tied together, and wrapped up under one common membrane. Such are the maxillary glands, &c.

The humours ſecreted in theſe *glands* are ſometimes diſcharged at a common excretory duct, formed of an union of the excretory ducts of all the particular ones: this is the caſe in the pancreas, and parotides.

Sometimes the ducts, uniting, form ſeveral tubes, only communicating with each other by croſs canals; as in thoſe of the breaſts.

Some again, have ſeveral excretory tubes, without any communication together: as the glandulæ lacrymales, and proſtatæ.

Others have their ſeveral excretory ducts inſerted into a common canal, which opens, at laſt, into ſome of the greater cavities: as the ſalival *glands*, inteſtinal *glands*, &c.

Laſtly, In others, each *gland* has its own excretory duct, through which it tranſmits its liquor into a common baſon: ſuch are thoſe of the kidneys.

Some ſuppoſe and endeavour to prove the neceſſity of veſicles to the conglomerate *glands*, in order to receive all the different particles required in the compoſition of ſecerned liquors, which muſt be conveyed in different ſeries of veſſels, to be intimately blended in the veſicle, which will be conſiderably aſſiſted by the ſyſtole and diaſtole, which it is ſuppoſed the veſicle undergoes. See Acad. Bonon. Com. p. 336.

The *glands* are again divided into *vaſcular*, and *veſicular*.

GLANDS, *vaſcular*, are only cluſters of little veſſels, which, uniting together, form the canal, or excretory duct, through which their ſecreted juice is diſcharged.

GLANDS, *veſicular*, are aſſemblages of veſiculæ communicating with each other, and all terminating in two or three larger veſſels; by a prolongation whereof, the excretory duct is formed.

The *glands*, again, are divided into the *adventitious*, and the *perpetual*, or *natural*.

GLANDS, *adventitious*, are thoſe kernels ariſing occaſionally under the arm-pits, on the neck, &c. Such are the ſtrumæ, and the tumours found on the larynx, and middle of the trachea.

GLANDS, *perpetual*, or *natural*, are of two kinds; conglobate, and conglomerate, as above deſcribed.

GLANDS of the *arteria aſpera*. See ASPERA *Arteria*.

GLANDS, *axillary*, are thoſe ſituated in the AXILLA, or arm-pit. See HIRCUS.

GLANDS of the *Breaſt*. See BREAST.

GLANDS, *bronchial*. See BRONCHIAL.

GLANDS, *buccal*. See BUCCALES.

GLANDS, *ceruminous*, are thoſe which ſerve to ſeparate the ear-wax, or CERUMEN. See EAR.

GLANDS, *ciliary*. See CILIA.

GLANDS, *cyſtic* and *hepatic*. See LIVER and BILE.

GLAND, *dorſal*, is found in the thorax, about the fifth vertebra of the back, adhering to the poſterior part of the œſophagus. In different ſubjects it is of various ſizes: but it is commonly about the ſize of an almond; though it is ſometimes ſo ſmall as not to be found without great difficulty. Two *glands* are ſometimes ſeen in this part. The *dorſal gland* has been deſcribed by Veſalius and other ancient anatomiſts. Some have ſuppoſed that this *gland* ſerves to ſecrete a fluid to aſſiſt digeſtion, and others that it diſeharges a mucous fluid into the cavity of the œſophagus.

GLANDS, *inguinal*, are ſituated on each ſide in the groin, near the crural veſſels, and, in various diſeaſes, are apt to become tumid and inflamed. Abſceſſes are often formed in theſe *glands*.

GLANDS, *inteſtinal*. See INTESTINES.

GLANDS, *jugular*. See JUGULAR.

GLANDS *labial*. See LIPS.

GLANDS, *lachrymal*. See LACHRYMAL.

GLANDS, *lumbal*, *glandulæ lumbares*, are three *glands* thus called by Bartholine, as lying on the loins.

The two largeſt lie upon one another, betwixt the deſcending cava and aorta, in the angle made by the emulgents with the cava; the third, and ſmalleſt, ſtands over the former, under the appendices of the diaphragm: they communicate, and are connected together by ſmall lacteal veſſels. Bartholine concluded them to ſerve as a common receptacle of the chyle; but Dr. Wharton's opinion is more probable, viz. that they ſupply the place of thoſe larger *glands* found in the meſentery of brutes.

GLANDS, *lymphatic*. See LYMPHATICS.

GLANDS, *maxillary*. See MAXILLARY.

GLANDS, *meſenteric*. See MESENTERY.

GLANDS, *miliary*, *glandulæ miliares*. See MILIARY *glands*.

Glands, *molar*. See Molar.

Glands, *mucilaginous*. See Mucilaginous *glands*.

Glands, *mucous*, *glandulæ mucoſæ*. See Mucous *glands*.

Glands, *myrtiform*, are contractions of the hymen, broke by the firſt act of venery. See Carunculæ *myrtiformes* and Hymen.

Glands, *Nuckian*. See Nuckianæ.

Glands, *odoriferous*, *glandulæ odoriferæ*, are certain ſmall *glands*, diſcovered by Dr. Tyſon, in that part of the penis where the prepuce is contiguous to the balanus. He gave them the name from the briſk ſcent which their ſeparated liquor emits. In ſuch perſons as have the prepuce longer than ordinary, theſe are not only more in number, but larger, and ſeparate a greater quantity of juice, which, lodging there, often grows rancid, and corrupts the *glands*. Theſe *glands* are very conſpicuous in moſt quadrupeds, eſpecially in dogs and the boar.

Glands *of the œſophagus*. See Oesophagus.

Glands, *palatine*. See Palate.

Glands, *parotid*. See Parotides.

Gland, *pineal*, *glandula pinealis*. See Pineal *gland* and Conarion.

Gland, *pituitary*, *glandula pituitaria*. See Pituitary *gland*.

Glands, *renal*, *glandulæ renales*, called alſo *capſulæ atrabilares*, are two *glands*, firſt diſcovered by Euſtachius, between the aorta and the kidneys, a little above the emulgent veſſels, though their ſituation and figure are varied; in ſome they are round, in others ſquare, triangular, &c. The right is uſually bigger than the left, and each about the ſize of a nux vomica: they are incloſed in fat.

Their uſe is not certainly known: it is ſuppoſed to be to ſeparate a liquor from the arterial blood, before it goes to the kidneys. See Capsulæ *atrabilares*.

Mr. Du Vernoy remarks the *glandulæ renales* to be very variable in their magnitude, figure, &c. but that they are always contiguous, and firmly connected to the kidneys. In ſome fœtuſes they appear ſolid, without any cavity; in others, they are diſtended with thin blood; in adults, they are always flat: they are readily diſtended, by blowing air into them by their vein. When the *glands* are opened, and quickſilver is injected, a great many ducts are ſeen, at which the mercury runs out. Two arteries and a vein belong to each *gland*, and a great many ducts, like rays, make a circle round it. An artery, ariſing from the aorta, is ſent down from the lower edge of the *gland* to the teſtes of men, and ovaria of women, which Valſalva miſtook for ducts. Comment. Acad. Petrop. tome v. See Renes *ſuccenturiati*.

Glands, *ſalival*. See Saliva.

Glands, *ſebaceous*, *glandulæ ſebaceæ*, are a number of *glands* placed under the ſkin of the auricle of the ear, firſt diſcovered by Valſalva, and thus denominated, becauſe they ſeparate a greaſy matter, like ſebum, or tallow.

This ſebum, he aſſerts, being carried to the ſurface of the ſkin, turns it into a ſcaly ſubſtance, not unlike bran. There are many *glands*, of different kinds, which bear this name from their uſe.

Glands, *ſplenic*. See Spleen.

Glands, *ſublingual*. See Sublingual.

Glands, *thyroid*. See Thyroideæ.

Glands, *diſeaſes of*. See Cancer and Scirrhus.

GLANDES *terræ*, a name uſed by ſome authors for the tuberous roots of a plant of the Lathyrus kind, called the *lathyrus repens tuberoſus*.

GLANDERS, a filthy diſeaſe in a horſe, conſiſting in a corrupt ſlimy matter, running from the noſe, of a different colour according to the degree of the malignity, or as the infection has been of a ſhorter or longer continuance; being white, yellow, green, or black, ſometimes tinged with blood.

Authors aſcribe it to various cauſes: ſome to infection; ſome to a diſorder of the lungs; others to the ſpleen; ſome to the liver; and others to the brain. After it has been of ſo long ſtanding, that the matter is of a blackiſh colour, which is uſually in its laſt ſtage, they ſuppoſe it to come from the ſpine; and hence they call it the *mourning of the chine*.

Kernels and knots are uſually felt under the caul in this diſorder; and as theſe grow bigger and more inflamed, ſo the *glanders* increaſe more.

M. La Foſſe, farrier to the king of France, has lately taken great pains, by repeated diſſections, to diſcover the ſource and cauſe of this diſorder, and to aſcertain the proper and effectual method of cure. He has diſtinguiſhed ſeven different kinds of *glanders*, four of which are incurable. The firſt proceeds from ulcerated lungs, the purulent matter of which comes up the trachea, and is diſcharged through the noſtrils, like a whitiſh liquor, appearing ſometimes in lumps and grumes: the ſecond is a waſting humour, that uſually ſeizes horſes at the decline of a diſeaſe cauſed by too hard labour, and proceeds from the lungs: the third is a malignant diſcharge, which ſometimes attends the Strangles, falls upon the lungs, and is diſcharged at the noſtrils: the fourth is when an acrimonious humour in the Farcy ſeizes theſe parts: the fifth ariſes from a horſe's taking cold: the ſixth is a diſcharge from the ſtrangles, which ſometimes vents itſelf at the noſtrils: the ſeventh, or real *glanders*, is that above deſcribed.

M. La Foſſe, after examining, by diſſection, the carcaſes of glandered horſes, and making a ſtrict ſcrutiny into the ſtate of the viſcera, aſſiſted in his enquiry by ingenious anatomiſts for the ſpace of ten years, aſſirms this diſeaſe to be altogether local, and that the true ſeat of it is in the pituitary membrane which lines the partition along the inſide of the noſe, the maxillary ſinuſſes or cavities of the cheek-bones on each ſide of the noſe, and the frontal ſinuſſes or cavities above the orbits of the eyes; that the viſcera, as the liver, lungs, &c. of glandered horſes are, in general, very ſound; and, therefore, that the ſeat of the diſorder is not in thoſe parts, as many authors have aſſerted.

He found theſe cavities more or leſs filled with a viſcous ſlimy matter; the membrane, which lines both them and the noſtrils, inflamed, thickened, and corroded with ſordid ulcers, which, in ſome caſes, had eat into the bones. He obſerves, that, when glandered horſes diſcharge matter from both noſtrils, both ſides of the membrane and cavities were affected; but when they ran at one noſtril only, that ſide only was found diſtempered: and if one gland only was affected, the horſe diſcharged from one noſtril only; but if both were affected, the diſcharge was from both. It has been obſerved, that the *glanders* in horſes very much reſembles a diſorder in men, called the Ozena.

In this diſeaſe, if the matter ſticks to the inſide of the noſtrils, like glue or ſtiff paſte; if the inſide of the noſe is raw, and appears of a livid or leaden hue, and the matter becomes bloody, fœtid, and of an aſh-colour; theſe ſymptoms are very unfavourable: but when only a limpid fluid is firſt diſcharged, and afterwards a whitiſh matter, the gland under the jaw does not much increaſe, and the diſorder has been of no long continuance, a ſpeedy cure may be expected. The cure of this milder kind of *glanders* may firſt be attempted by injections and fumigations. When theſe latter ſymptoms appear, the horſe ſhould firſt be bled, and treated as in the common diſorder of a cold; and then, let an emollient injection, prepared with a decoction of linſeed, marſh-mallows, elder, chamomile flowers, and honey of roſes, or ſuch like, be thrown up as far as poſſible with a ſtrong ſyringe, and repeated three times a day: if the running is not leſſened or removed in a fortnight by theſe means, a reſtringent injection may be prepared with tincture of roſes, lime-water, &c. and the noſtrils fumigated with the powders of frankincenſe, maſtick, amber, and cinnabar, burnt on an iron heated for that purpoſe, the fumes of which may eaſily be conveyed through a tube into the noſtrils. When the diſeaſe is inveterate, recourſe muſt be had to the operation of trepanning, which M. La Foſſe performed on three horſes, two of which diſcharged from one noſtril only, and the third from both: he trepanned the two firſt on that ſide of the head which was affected, and the other on both ſides, and found that the wound and perforation filled up with good fleſh in twenty-ſix days, and the horſes ſuffered no inconvenience from the operation. The method of performing this operation will be underſtood by means of *fig.* 22. *Tab. Miſcellany*, and the following explication: B, B, are two lines repreſenting the bounds of the cerebellum, or back part of the brain, which commences from the line D. CC is a line, where the ſuperior part of the ſinus frontalis commences, together with a view of the bottom of the ſinus, terminating between the lines D and E, where appears a ſubſtance in the form of a pear, which is the os ethmoides, or ſieve-like bone, through which the olfactory nerves paſs, communicating ſenſibility to the pituitary membrane. E repreſents the beginning of the maxillary ſinus, terminating at M: the ſhaded ſpace between theſe lines repreſents the great cavities. F is a bony partition, ſeparating this ſinus into two parts that have no communication; of which partitions there are ſometimes two, repreſented by F and G. Some horſes have neither of theſe. N ſhews the place of the cornets or horns; O, the redoublings; P, their middle part; Q, the lower part of them; and M, the bony pipe or canal which guards the maxillary nerve: A A is the ſeptum narium, dividing the noſe from top to bottom, and ſeparating the two noſtrils; L ſhews the place where the trepan ſhould be applied, when there is reaſon to apprehend that the *glanders* is ſpread into the frontal ſinus; E is the place where it ſhould be applied to cleanſe the maxillary ſinus, though the round ſpot between D and E is preferable, becauſe one orifice in this place will ſerve to waſh all the parts, both above and below, with one injection. H ſhews the place where another perforation ſhould be made, as a drain for diſcharging the foul matter waſhed away by the injection; and this hole, kept open by a hollow leaden pipe, would, in all recent caſes, be ſufficient. I repreſents the injection thrown in by the ſyringe, which flows out by the orifice and the noſtril K; and, during this part of the operation, the noſtrils ſhould be held cloſe. If there ſhould be two bones in the maxillary ſinus, it is abſolutely neceſſary to pierce through both, with a ſtilletto or ſharp-pointed tuck, as in the figure. The trepan ſhould be directed towards the interior part of the noſe, to prevent its being obſtructed by the roots of the teeth. R is the trepan, S the handle which turns it, and T the ſaw-part to be applied to the bone. The ſurgeon's trephine will anſwer the purpoſe for this operation; but before the inſtrument is applied, a circular piece of the ſkin, of about the ſize of half a crown, ſhould be firſt cut off with the membrane which covers the bone. The ſyringe ſhould be large enough to contain half a pint of injection. The injection firſt uſed ſhould be of a deterſive nature, as a decoction of birth-wort, gentian, and centaury, to a quart of which may be added two ounces of Egyptiacum and tincture of myrrh; and when the diſcharge abates, and the matter becomes of a thick conſiſtence and white colour, this injection may be changed for barley-water, honey of roſes, and tincture of myrrh; and for completing the cure, Bates's alum-water, or a ſolution of colcothar, vitriol, lapis medicamentoſus, and ſuch like, in lime-water, will ſerve to dry up the moiſture, and to reſtore the tone of the relaxed glands. For this purpoſe Dr. Bracken recommends the following mixture: take of alum and white vitriol, powdered, of each four ounces; calcine them in a crucible; when cold, powder the calx, and mix it with a gallon of lime-water and a quart of vinegar, and decant the mixture clear for uſe. The perforations that are made in this operation ſhould be kept open, after the uſe of the injection, by fitting to the upper one a piece of cork waxed over, and a hollow leaden tent to the lower, through which there will be a conſtant drain of matter from the ſinuſſes; and both may be ſecured by a proper bandage. The growth of the fleſh ſhould be alſo checked by rubbing with cauſtic medicines, or applying the actual cautery. The cure will be expedited, by giving every day a quart or three pints of a ſtrong decoction of guaiacum chips, by purging at proper intervals, and putting a rowel into the horſe's cheſt: and if theſe fail, mercurials may be adminiſtered with the phyſic, and the alterative powders with lime-water may be given and continued for ſome time.

The following remedy is ſaid to have ſucceeded, in fifty caſes out of ſixty, for curing the *glanders*, without trepanning. Keep the horſe a day or two with ſmall quantities of choice hay, and ſcalded bran; then blow up his noſtrils as much aſſarabacca, in fine powder, as will lie on a ſix-pence, evening and morning, giving him for drink ſmall lime-water during four or five days: then boil two ounces of elecampane roots in a quart of milk, till they mix, and give it once a day during three or four days more; then boil two handfuls of the white moſs that grows on oaken pales, in two quarts of milk, till one is conſumed; ſtrain it and ſqueeze the moſs, and give the milk juſt warm: repeat this for four or five days. About an hour after the horſe has had his drink each day, take a piece of ſweet butter, about the ſize of an egg, and about half an ounce of brimſtone finely powdered, and work them well together; then take two clean gooſe feathers, as long as they can be procured, and make a hole in each of the quill ends, in which faſten two long threads; then anoint the feathers well with the mixture, and roll them in dry flour of brimſtone: open the horſe's noſtrils, and thruſt the feathers up into his head, faſtening the threads to the top of his head, to prevent their dropping out: ride him an hour or two morning and evening, and let him ſtand half an hour after he returns to the ſtable before the feathers are taken out: purſue this courſe eight or nine days, bathing his head with camphorated ſpirits of wine, and afterwards confining his head over a tub of hot grains, that he may breathe the ſteam. A rowel may prevent a relapſe.

GLANDULA, in *Anatomy*, the ſame as GLAND.

The word is a diminutive of the Latin *glans, acorn*; and is here uſed on account of ſome external reſemblance between the glands of the body and the fruit of the oak.

GLANDULA *Guidonis*, among *Surgeons*, is a tumour reſembling a gland; ſoft, ſingle, moveable, with roots, and ſeparate from the adjacent parts.

GLANDULE, in *Engliſh*, ſignifies a little gland. Thus the amygdalæ, or almonds of the ears, are by ſome called *glandules*.

GLANDULOUS, or **GLANDULAR**, ſomething compoſed of glands, or that abounds with glands.

The BREASTS are *glandulous* bodies. The cortical ſubſtance of the brain is commonly reputed to be *glandulous*; though Ruyſch, from the diſcoveries made by his admirable injections, holds, that there is no ſuch thing as a gland therein.

The ancients diſtinguiſhed a particular kind of fleſh, which they called *caro glanduloſa*, or *glandulous* FLESH.

GLANDULOUS *body*, *glanduloſum corpus*, more particularly denotes the PROSTATA.

GLANDULOUS *roots*, among *Botaniſts*, ſuch tuberoſe roots as are faſtened together in large numbers by ſmall fibres or threads.

GLANIS, in *Zoology*, the name of a fiſh, called in Engliſh the ſheat-fiſh, and in Latin SILURUS.

GLANS, *Acorn*, in *Natural Hiſtory*, a fruit contained within a ſmooth but hard bark, including a ſingle ſeed; its hind-part being covered with a kind of cup, and the fore-part bare. See ACORN and OAK.

GLANS, in *Anatomy*, the tip or button of the PENIS, or that part covered with the prepuce, called alſo *balanus*. See *Tab. Anat. (Splanch.) fig.* 10. *lit. d. fig.* 15. *lit. o.*

The *glans* is only a dilatation of the extremity of the ſpongeous ſubſtance of the urethra, which is here bunched, and turned back to the two conical tips of the corpora cavernoſa, which terminate therein.

The extremity of the prepuce is apt to grow ſo ſtreight in old men, that they cannot bare the *glans*; perhaps through the defect of frequent erections.

We read of a *glans penis* regenerated after amputation, in the Medical Eſſ. Edinb. vol. v. art. 35.

GLANS is alſo uſed to denote the tip or extremity of the CLITORIS, from its reſemblance, both in form and uſe, to that of the penis. See *Tab. Anat. (Splanch.) fig.* 13. *lit. c.*

The principal difference conſiſts in this, that it is not perforated. This *glans* is alſo covered with a preputium, formed of the inner membrane of the labia.

GLANS *marinus*, in *Natural Hiſtory*, a name given to a genus of ſhell-fiſh, more uſually called BALANUS, and in Engliſh the centre-ſhell.

GLANS *trochitifera*, in *Natural Hiſtory*, a name given by Geſner, and ſome other writers, to a kind of figured foſſil, found uſually among the trochitæ and entrochi, and evidently appearing to have in ſome manner belonged to them. All the writers, who have themſelves examined the places where the trochitæ are found, have mentioned theſe under the names of *glandes trochitiferæ*, others under leſs determinate ones. Agricola calls them *lapides informes*; and Liſter, after him, *rude ſtones*, having impreſſions of the entrochi. See farther, Philoſ. Tranſ. Nº 100.

GLANUS, or **GLANIS**, in *Ichthyology*, a name given by Pliny, and many other of the old writers, to that ſpecies of the ſilurus which we in England call the ſheat-fiſh, the *glanus* and SILURUS of authors, diſtinguiſhed by Artedi by the name of the ſilurus with four beards on the chin.

GLAREANA, in *Ornithology*, the name of a bird deſcribed by Geſner from the figure, and ſuſpected to be no way different from the SPIPOLETTA, called tordino by the Venetians, a kind of lark.

GLASS, *vitrum*, a tranſparent, ſolid, brittle, factitious body, produced of a ſalt and ſand, or ſtone, by the action of fire.

The word is formed of the Latin *glaſtum*, a plant called, by the Greeks, *iſatis*; by the Romans, *vitrum*; by the ancient Britons, *guadum*; by the Engliſh, WOAD. We find frequent mention of this plant in ancient writers, particularly Cæſar, Vitruvius, Pliny, &c. who relate, that the ancient Britons painted or dyed their bodies with glaſtum, guadum, vitrum, &c. i. e. with the blue colour procured from this plant. And hence the factitious matter, we are ſpeaking of, came to be called *glaſs*, as having always ſomewhat of this bluiſhneſs in it.

The chemiſts hold that there is no body but may be vitrified, i. e. converted into *glaſs*. By intenſe heat, even GOLD itſelf gives way to the ſun's rays collected in a BURNING *glaſs*, and becomes *glaſs*.

Add, that as *glaſs* is the effect or fruit of fire, ſo it is the laſt effect of that element; all the chemiſt's art, and all the force of fire not being able to carry the change of any natural body beyond its VITRIFICATION.

GLASS, *nature and characters of*. Naturaliſts are divided in what claſs of bodies to rank *glaſs*. Agricola conſiders it as a concrete juice; Bellovacenſis, as a ſtone; Fallopius ranks it among the *media mineralia*; and the workmen, when in fuſion, call it metal: but Dr. Merret, with reaſon, ſets aſide all theſe opinions, from this conſideration, that all the forementioned bodies are natural concretes; whereas *glaſs* is a compound made by art, and is never found in the earth as the others.

Fallopius, indeed, contends, that *glaſs* is no more artificial than a metal, and that they are both equally extracted or educed from other bodies; the one from ſand, the other from its ore. He adds, that though ſalts or aſhes be added to ſand for the making of *glaſs*, yet it is falſe that they contribute to the compoſition of *glaſs*; their uſe, according to him, being only for the better extracting of the *glaſs* from the mineral ſtone.

This Dr. Merret eaſily confutes: for if *glaſs* were extracted from ſtones or ſand only, the weight of the metal muſt be much leſs than that of the ſtones alone; whereas it is, in reality, much greater, a hundred weight of ſand ſufficing for one hundred and fifty of *glaſs*.

In effect, the aſhes contribute a deal of ſalt to the compoſition of *glaſs*. Accordingly, in pieces of old *glaſs* one may ſometimes pick out grains of ſalt, eaſily diſcoverable to the taſte; beſide that the fineſt *glaſs*, ſtanding long in a ſubterraneous place, will moulder or reſolve into its firſt ingredients, ſalt and ſand, by the decay of the union thereof: whence it appears, that the ſalt remains in the *glaſs* in ſpecie. To which may be added that experiment of Van Helmont: “ Melt *glaſs*-duſt with “ ſandiver, and ſet them in a moiſt place, and the *glaſs* “ will reſolve into water; pour on aqua regia, enough “ to ſaturate the ſandiver, and the ſand will precipitate “ to the bottom in the ſame quantity and weight as was “ firſt uſed.” Helm. cap. De Terra.

Here, then, is a true analyſis of *glaſs*, or a ſolution into its firſt principle or ingredients, the ſalt being imbibed by the ſandiver and aqua regia. Merret. Not. in Ant. Neri De Art. Vitrar.

The learned and curious author juſt mentioned gives us the following characters or properties of *glaſs*, whereby it is diſtinguiſhed from all other bodies, viz. 1. That it is an artificial concrete of ſalt and ſand, or ſtones. 2. Fuſible by a ſtrong fire. 3. When fuſed, tenacious and coherent. 4. It does not waſte or conſume in the fire. 5. When melted, it cleaves to iron. 6. Ductile, when red-hot, and faſhionable into any form, but not malleable; and capable of being blown into a hollowneſs, which no mineral is. 7. Frangible, when thin, without annealing. 8. Friable when cold. 9. Always diaphanous, whether hot or cold. 10. Flexible and elaſtic. 11. Diſſoluble by cold and moiſture. 12. Only capable of being graven, or cut with a diamond or other hard ſtones, and emery. 13. Receives any colour or dye, both externally and internally. 14. Not diſſolvable by aqua-fortis, aqua-regia, or mercury. 15. Neither acid juices, nor any other matter, extract either colour, taſte, or any other quality, from it. 16. It admits of poliſhing. 17. Neither loſes of weight nor ſubſtance, by the longeſt and moſt frequent uſe. 18. Gives fuſion to other metals, and ſoftens them. 19. The moſt pliable thing in the world, and that which beſt retains the faſhion given it. 20. Not capable of being calcined. 21. An open *glaſs*, filled with water in the ſummer-time, will gather drops of water on the outſide, juſt ſo far as the water on the inſide reaches; and a man's breath blown upon it will manifeſtly moiſten it. 22. Little glaſs balls, filled with water, mercury, or other liquor, and thrown into the fire, as alſo drops of green *glaſs* broken, fly aſunder with a loud noiſe. 23. Neither wine, beer, nor any other liquor, will make it muſty, nor change its colour, nor ruſt it. 24. It may be cemented as ſtones and metals. 25. A drinking-*glaſs*, partly filled with water, and rubbed on the brim with a wet finger, yields muſical notes, higher or lower, as the *glaſs* is more or leſs full; and this makes the liquor friſk and leap.

GLASS, *ductility of.* See DUCTILITY.

GLASS, *origin and hiſtory of.* De Neri will have *glaſs* as ancient as Job; for that writer, chap. xxviii ver. 17. ſpeaking of wiſdom, ſays, Gold and *glaſs* ſhall not be equalled to it.

This, we are to obſerve, is the reading of the Septuagint, Vulgate Latin, St. Jerom, Pineda, &c. for in the Engliſh verſion, inſtead of *glaſs*, we read *cryſtal*; and the ſame is done in the Chaldee, Arias Montanus, and the king of Spain's edition. In other verſions, &c. it is read *ſtone*; in others, *beryl*: in the Italian, Spaniſh, French, High and Low Dutch, &c. *diamond*; in others, *carbuncle*; and in the Targum, *looking-glaſs*.

In effect, the original word is *zechuchib*, which is derived from the root *zacac*, *to purify*, *cleanſe*, *ſhine*, *be white*, *tranſparent*: and the ſame word, Exod. xxx. 34. is applied to frankincenſe; and rendered in the Septuagint, *pellucid*. Hence the reaſon of ſo many different renderings; for the word ſignifying *beautiful* and *tranſparent*, in the general, the tranſlators were at liberty to apply it to whatever was valuable and tranſparent.

Moſt authors will have Ariſtophanes to be the firſt author who mentions *glaſs*: that poet, in his comedy called the Clouds, ſcene i. act ii. uſes the word *hyalus*, ὕαλος, which is now ordinarily rendered *glaſs*. He there introduces Strepſiades, teaching Socrates a new way to pay old debts, viz. “ by placing a fair tranſparent ſtone, “ ſold by the druggiſts, from which the fire is ſtruck, “ between the ſun and the writing, and ſo melting away “ the letters thereof.” This ſtone Socrates calls ὕαλος; which the ſcholiaſt on Ariſtophanes derives from ὕειν, *to rain*, from the likeneſs it bears to ice, which is rain, or water congealed; though, it muſt be owned, the word ὕαλος is ambiguous, and ſignifies *cryſtal* as well as *glaſs*: and Gorræus obſerves, that the ancients had a kind of yellow amber, tranſparent as *glaſs*, called by ſome ὕαλος.

Ariſtotle has two problems upon *glaſs*: the firſt, Why we ſee through it? The ſecond, Why it is not malleable? If theſe problems be Ariſtotle's, which the learned doubt very much, this would properly be the earlieſt teſtimony in favour of the antiquity of *glaſs*; but the firſt author, who makes unqueſtionable mention of this matter, is Alexander Aphrodiſæus, who uſes it in a ſimile: “ As the floridneſs of a colour is ſeen through “ *glaſs*,” &c.

After him the word occurs commonly enough: Lucian mentions large drinking-*glaſſes*; and Plutarch, in his Sympoſiacon, ſays, that the fire of tamariſk-wood is the fitteſt for the making of *glaſs*.

Among the Latin writers, Lucretius is the firſt that takes notice of *glaſs*. *Niſi recta foramina tranant, Qualia ſunt vitri.* Dr. Merret, however, adds, that *glaſs* could not be unknown to the ancients, but that it muſt needs be as ancient as pottery itſelf, or the art of making bricks; for ſcarcely can a kiln of bricks be burnt, or a batch of pottery ware be made, but ſome of the bricks and ware will be at leaſt ſuperficially turned to *glaſs*.

Hence, Ferrant. Imperatus, lib. xxv. cap. 7. “ *Glaſs*, “ like the common kind, is found under ground, in “ places where great fires have been. Other *glaſſes* are “ found in round clods, like fire-ſtone, ſome brittle, “ others firm, &c. This foſſil *glaſs* is wrought by the “ Americans, and uſed inſtead of iron.”

And no doubt but vitrifications were more common in the ancient bricks than they are in ours; as they tempered their earth two years together, and burnt them better.

Pliny relates the manner of the diſcovery of *glaſs*. It was found, according to that author, by accident, in Syria, at the mouth of the river Belus, by certain merchants driven thither by the fortune of the ſea. Being obliged to live there, and dreſs their victuals by making a fire on the ground, and there being ſtore of the plant kali upon the ſpot, this herb being burnt to aſhes, and the ſand or ſtones of the place accidentally mixed with it, a vitrification was undeſignedly made; from whence the hint was taken, and eaſily improved.

Indeed, how old ſoever *glaſs* may be, the art of making and working it appears of no great antiquity. The firſt place mentioned for the making hereof, is Sidon in Syria, which was famous for *glaſs* and *glaſs*-houſes, as obſerved by Pliny, lib. xxxvi. cap. 26. § 66. Mr. Nixon, in his obſervations on a plate of *glaſs*, found at Herculaneum, which was deſtroyed A. D. 80, on which occaſion Pliny loſt his life, offers ſeveral probable conjectures as to the uſes to which ſuch plates might be applied.

Such plates, he ſuppoſes, might ſerve for *ſpecula*, or looking-*glaſſes*; for Pliny, in ſpeaking of Sidon, adds, *ſiquidem etiam ſpecula excogitaverat*: the reflection of images from theſe ancient ſpecula being effected by beſmearing them behind, or tinging them through with ſome dark colour. Another uſe in which they might be employed, was for adorning the walls of their apartments, by way of wainſcot, to which Pliny is ſuppoſed to refer by his *vitreæ cameræ*, lib. xxxvi. cap. 25. § 64. Mr. Nixon farther conjectures, that theſe *glaſs* plates might be uſed for windows, as well as the lamina of *lapis* SPECULARIS and PHENGITES, which were improvements in luxury mentioned by Seneca, and introduced in his time, Ep. xc. However, there is no poſitive authority relating to the uſage of *glaſs*-windows earlier than the cloſe of the third century: *Manifeſtius eſt*, ſays Lactantius, *mentem eſſe, quæ per oculos ea quæ ſunt oppoſita, tranſpiciat, quaſi per feneſtras lucente vitro aut ſpeculari lapide obductas.* De Opificio Dei, cap. 5. See Phil. Tranſ. vol. l. art. 80. p. 601. vol. lii. art. 23. p. 123.

The firſt time we hear of *glaſs* made among the Romans was in the time of Tiberius, when Pliny relates, that an artiſt had his houſe demoliſhed for making *glaſs* malleable, or rather flexible; though Petronius Arbiter, and ſome others, aſſure us, that the emperor ordered the artiſt to be beheaded for his invention.

According to venerable Bede, artificers ſkilled in making *glaſs* were brought over into England, in the year 674, by abbot Benedict, who were employed in glazing the church and monaſtery of Weremouth. According to others, they were firſt brought over by Wilfrid, biſhop of Worceſter, about the ſame time. Till this time the art of making *glaſs* was unknown in Britain; though *glaſs* windows did not begin to be uſed before the year 1180: till this period they were very ſcarce in private houſes, and conſidered as a kind of luxury, and as marks of great magnificence. Italy had them firſt, next France, from whence they came into England.

Venice, for many years, excelled all Europe in the fineneſs of its *glaſſes*; and in the thirteenth century, the Venetians were the only people that had the ſecret of making cryſtal looking-*glaſſes*. The great *glaſs*-works were at Muran, or Murano, a village near the city, which furniſhed all Europe with the fineſt and largeſt *glaſſes*.

The *glaſs* manufacture was firſt begun in England in 1557: the finer ſort was made in the place called Crutched Friars, in London; the fine flint *glaſs*, little inferior to that of Venice, was firſt made in the Savoy-houſe, in the Strand, London. This manufacture appears to have been much improved in 1635, when it was carried on with ſea-coal or pit-coal, inſtead of wood, and a monopoly was granted to Sir Robert Manſell, who was allowed to import the fine Venetian flint *glaſſes* for drinking, the art of making which was not brought to perfection before the reign of William III. But the firſt *glaſs* plates, for looking-*glaſſes* and coach windows, were made in 1673, at Lambeth, by the encouragement of the duke of Buckingham; who, in 1670, introduced the manufacture of fine *glaſs* into England, by means of Venetian artiſts, with amazing ſucceſs. So that within a century paſt, the French and Engliſh have not only come up to, but even ſurpaſſed the Venetians, and we are now no longer ſupplied from abroad.

The French made a conſiderable improvement in the art of *glaſs*, by the invention of a method to caſt very large plates, till then unknown, and ſcarce practiſed yet by any but themſelves and the Engliſh.

That court applied itſelf with a laudable induſtry to cultivate and improve the *glaſs* manufacture. A company of *glaſs*-men was eſtabliſhed by letters patent; and it was provided by an arret, not only that the working in *glaſs* ſhould not derogate any thing from nobility, but even that none but nobles ſhould be allowed to work therein.

Glass, *ingredients of*. The materials uſed in the compoſition of *glaſs*, we have obſerved, are ſalt and ſand, or elſe ſome kind of ſtone.

The ſalt is of the fixed kind, ſuch as will not evaporate with the moſt intenſe heat: the ſand or ſtone muſt be ſuch as will melt eaſily; this is what gives firmneſs and conſiſtence to the *glaſs*.

1. This ſalt is procured chiefly from a kind of aſhes, called POLVERINE, or *rochetta*, brought from the Levant, and particularly from Alexandria and Tripoly. The aſhes are thoſe of a vegetable, frequent in the country, commonly called KALI; ſometimes *kalli*, *kallu*, *cali*; by Geſner, *alkali*; by Lobel, *ſoda*; by Dodonæus, *ſalſola*; and by Camer, Gordoſus, Fuchſius, &c. *anthyllis*. Dr. Merret calls it *Engliſh ſalt-wort*, from its ſaline taſte; and *glaſs-weed*, from the uſe made of its aſhes in making of *glaſs*.

Bauhin mentions ten ſpecies of this plant, whereof there are four uſed by the Alexandrians, &c. for the making of polverine and ſoap, viz. *kali geniculatum*, *kali ſecunda ſpecies*, *kali Ægyptiacum*, and *kali ſpinoſum*.

The firſt and laſt our own coaſts afford, where they are called by the people *frog-graſs* and *ſea-graſs*; but they are of no uſe for making of *glaſs*: being laid on a hot iron, they fly off almoſt wholly in fumes, leaving almoſt no aſhes at all; whereas the kalis brought from the Levant, applied on the ſame iron, are ſoon converted almoſt wholly into polverine, i. e. very ſaline aſhes of a dark colour.

To get this ſalt from the polverine, they pulverize and ſift it very fine; then boil it in a braſs copper, with fair water and tartar, till a third part of the water is conſumed, taking care to ſtir it from time to time; then, filling up the copper with freſh water, they boil it a ſecond time, till half be conſumed: this done, they have a lee impregnated with ſalt. To get the ſalt from the lees, they boil them till the ſalt ſhoots at the top, which they ſcum off as it riſes into earthen pans, and thence into wooden vats to drain and dry.

When the ſalt is dry, they beat it groſly, and put it into a furnace, to dry it farther with a gentle heat. When it is made ſufficiently dry, they pound and ſift it very fine, and lay it by to make FRIT.

Note, Inſtead of the aſhes of the plant kali, thoſe of fern will alſo yield a ſalt which makes excellent *glaſs*, nothing inferior to that of polverine: the method of preparation is the ſame. Add, that the aſhes of the cods and ſtalks of beans, as alſo thoſe of coleworts, bramble-buſh, millet-ſtalks, ruſhes, cyperuſes, and many other plants, may be uſed for the like purpoſe, and after the ſame manner.

Pearl-aſhes form a leading flux in the manufacture of *glaſs*, and moſtly ſupply the place of the Levant-aſhes, the barillas of Spain, and many other kinds, which were formerly brought here for making both *glaſs* and ſoap. See PEARL-*aſhes*.

There are other fluxes uſed for different kinds of *glaſs*, and for various purpoſes, as calcined lead, nitre, ſea-ſalt, borax, arſenic, ſmiths clinkers, and wood-aſhes, containing the earth and lixiviate ſalts as produced by incineration. With regard to theſe ſeveral fluxes, we may obſerve, in general, that the more calx of lead, or other metallic earth enters into the compoſition of any *glaſs*, ſo much the more fuſible, ſoft, coloured, and denſe this *glaſs* is, and reciprocally.

The colours given to *glaſs* by calxes of lead, are ſhades of yellow: on the other hand, *glaſſes* that contain only ſaline fluxes partake of the properties of ſalts; they are leſs heavy, leſs denſe, harder, whiter, more brilliant, and more brittle than the former; and *glaſſes* containing both ſaline and metallic fluxes, do alſo partake of the properties of both theſe ſubſtances. *Glaſſes* too ſaline are eaſily ſuſceptible of alteration by the action of air and water; eſpecially thoſe in which alkalis prevail; and theſe are alſo liable to be injured by acids. Thoſe that contain too much borax and arſenic, though at firſt they appear very beautiful, quickly tarniſh and become opake when expoſed to air. By attending to theſe properties of different fluxes, phlogiſtic or ſaline, the artiſt may know how to adjuſt the proportions of theſe to ſand, or powdered flints, for the various kinds of *glaſs*. If a *glaſs* be required that is denſe, fuſible, and not ſaline, one part and a half of red lead or litharge may be mixed with one part of ſand, and fuſed together: if equal parts of ſand and of calx of lead be employed, a *glaſs* ſomewhat leſs denſe and harder will be produced: if a *glaſs* be required of very little denſity, only ſaline fluxes muſt be employed. A *glaſs* of this kind may be compoſed of ſix parts of ſalt of tartar, or of pot-aſh, or of purified ſoda, mixed with eight parts of ſand or of flints; or of four parts of any of the above mentioned alkalis, mixed with two parts of nitre or of borax, and eight parts of vitrifiable earth. When a cryſtal *glaſs* is required, which ſhall be of an intermediate quality betwixt the metallic and ſaline *glaſſes*, it may be made from a mixture of one part of the above mentioned ſalts, one part of calx of lead, and two parts of ſand or other vitrifiable earth. By varying the proportion of theſe ingredients, many different kinds of *glaſſes* may be produced, each of which may be good, if the quantity of each of the fluxes employed be proportionable to its vitrifying power. Dict. Chem. art. *Vitrification*

2. For ſtone, the ſecond ingredient in *glaſs*. The beſt, we have obſerved, is that which will melt, is white, and tranſparent. This is found principally in Italy, being a ſort of ſtony ſubſtance, called *tarſo*: the next is *puccoli*, or cuogola, a ſort of pebbles found at the bottoms of rivers, and gathered for the Venetian manufacture out of the river Po, which are ſaid not to be inferior in whiteneſs to alabaſter.

Indeed, nothing makes finer and clearer *glaſs* than common flint, diſtinguiſhed for this uſe by their clear, tranſparent, black colour; but the charge of preparing it deters the *glaſs*-men from uſing it. The preparation neceſſary for ſtone is to calcine, powder, and ſierce it.

Ant. Neri obſerves, that all white tranſparent ſtones, which will not burn to lime, are fit to make *glaſs*; and that all ſtones which will ſtrike fire with ſteel, are capable of being employed in making of *glaſs*. But this latter rule, Dr. Merret obſerves, does not hold univerſally.

Where proper ſtone cannot be had, ſand is uſed; and it is now almoſt the only kind of ſubſtance employed in the Britiſh manufactures of *glaſs*. The beſt for this purpoſe is that which is white, ſmall, and ſhining; examined by the microſcope, it appears to be ſmall fragments of rock cryſtal. For green *glaſs*, that which is of a ſoft texture, and more gritty; it is to be well waſhed, which is all the preparation it needs. Our glaſs-houſes are furniſhed with white ſand for their cryſtal *glaſſes* from Lynn in Norfolk, and Maidſtone in Kent; and with the coarſer, for green *glaſs*, from Woolwich.

Some mention a third ingredient in *glaſs*; viz. mangaeſe, or MAGNESIA, or *ſyderea*, a kind of pſeudo-loadſtone, dug up in Germany, Italy, and even in Mendip hills in Somerſetſhire. But the proportion hereof to the reſt is very inconſiderable; beſide, that it is not uſed in all *glaſs*. Its office is to purge off the natural greeniſh colour, and give it ſome other tincture required.

For this purpoſe it ſhould be choſen of a deep colour, and free from ſpecks of a metalline appearance, or a lighter caſt; magneſia requires to be well calcined in a hot furnace, and then to undergo a thorough levigation The effect of magneſia in deſtroying the colours of *glaſs*, and hence called the ſoap of *glaſs*, is accounted for by M. Montamy, in his Traité des Couleurs pour la Peinture en Email, in the following manner: the magneſia deſtroys the green, olive, and blue colours of *glaſs*, by adding to them a purple tinge, and by the mixture producing a blackiſh brown colour; and, as blackneſs is cauſed merely by an abſorption of the rays of light, the blackiſh tinge given to the *glaſs* by the mixture of colours, prevents the reflection of ſo many rays, and thus renders the *glaſs* leſs coloured than before. But the black produced by this ſubſtance ſuggeſts an obvious reaſon for uſing it very ſparingly in thoſe compoſitions of *glaſs*, which are required to be very tranſparent. Nitre or ſalt-petre is alſo uſed with the ſame intention; for by deſtroying, in a certain degree, the phlogiſton, which gives a ſtrong tinge of yellow to *glaſs* prepared with lead as a flux, it ſerves to free it from this coloured tinge; and in ſaline *glaſſes*, nitre is requiſite in a ſmaller proportion to render them ſufficiently tranſparent, as in the caſe of looking-*glaſs*, and other kinds of plates. For an account of Mr. Dollond's excellent contrivance for deſtroying the colours in the object glaſſes of teleſcopes, &c. ſee ABERRATION.

After all, the moſt tranſparent *glaſs* is ſubject to bubbles and veins, the methods of preventing which are yet little known; and this is an inconvenience by which Mr. Dollond's excellent diſcovery is affected; for the flint *glaſs*, which he uſes, is peculiarly ſubject to ſmall veins, that diſturb the rays in their paſſage, and render the viſion confuſed. This effect is owing to the denſity of theſe veins being greater than that of the reſt of the *glaſs*, as appears from their image received on white paper, when the *glaſs* is held between the paper and a candle, or other luminous object; for this image of a vein, thus received, is a line brighter than the reſt of the image of the *glaſs*, and this bright line is defined by a dark edge on each ſide. But the bright line evidently ſhews a convergency of rays, which can only be effected by the veins being denſer than the medium in which they are placed. The reaſon why flint *glaſs* is more ſubject to veins than any other *glaſs* is, ſays the tranſlator of Macquer's Chemical Dictionary, becauſe it is compoſed of materials of more different denſities.

M. Macquer, with a view of improving the manufacture of this *glaſs*, propoſes to facilitate the union of the calx of lead and ſand, of which it is compoſed, by depriving the calx of lead, as much as poſſible, of its phlogiſton, which may be done by combining the vitriolic acid with minium, or red-lead, and expoſing this compoſition to the operation of fire, to diſengage it from the acid; and alſo by giving theſe two ſubſtances the greateſt poſſible degrees of fluidity and mobility, which may be done by mixing with the compoſition of them a conſiderable quantity of ſolvents. Hiſt. Acad. Scienc. for 1773.

As impenetrable as *glaſs* is to the common menſtruums, we find it eaten by the air in length of time, when expoſed in old windows; but the effects of its being kept in a ſubterraneous place are much more ſtrange. Borrichius tells us, that at the time when he was at Rome, there was dug up a whole houſe from under the kitchen garden of a citizen. The houſe had been buried there ten ages, and there were found in it ſeveral glaſs urns, or lacrymatories. The *glaſs* of theſe had no holes made in it, as our old *glaſs* in chamber-windows has, but ſtill retained its ſmooth ſurface and tranſparence; but it was ſplit into a vaſt number of thin laminæ, which were as pellucid and fine as Muſcovy glaſs; and in ſome places were tinged with all the beautiful colours that art could have given. We are not acquainted perfectly with the ancient way of working their *glaſs*; but it is not probable there could be any thing particular in the formation of the veſſel, to determine it to ſplit thus into flakes; but that *glaſs* of the ſame kind, in any form, would have done the ſame. Borrich. De Ortu Chemiæ.

GLASS, *kinds of*. The manufactured *glaſs* now in uſe may be divided into three general kinds; white tranſparent *glaſs*, coloured *glaſs*, and common green or bottle *glaſs*. Of the firſt kind, there is a great variety; as the flint *glaſs*, as it is called with us, and the German cryſtal *glaſs*, which are applied to the ſame uſes; the *glaſs* for plates for mirrors or looking-*glaſſes*; the *glaſs* for windows and other lights; and the *glaſs* for phials and ſmall veſſels. And theſe again differ in the ſubſtances employed as fluxes in forming them, as well as in the coarſeneſs or fineneſs of ſuch as are uſed for their body. The flint and cryſtal, mirror and beſt window *glaſs*, not only require ſuch purity in the fluxes, as may render it practicable to free the *glaſs* perfectly from all colour; but for the ſame reaſon likewiſe, either the white Lynn ſand, calcined flints, or white pebbles, ſhould be uſed. The others do not demand the ſame nicety in the choice of the materials; though the ſecond kind of window *glaſs*, and the beſt kind of phial, will not be ſo clear as they ought, if either too brown ſand, or impure ſalts, be ſuffered to enter into their compoſition.

Of coloured *glaſs* there is a great variety of ſorts, differing in their colour, or other properties, according to the occaſions for which they are wanted. The differences in the latter kind depend on the accidental preparation and management of the artiſts by whom they are manufactured. See the ſubſequent articles.

GLASS, *inſtruments for manufacturing*. Theſe are ſubſervient to two different purpoſes; viz. the levigation and mixture of the ingredients, and the fuſion or vitrification of them. To the former claſs belong horſe or hand-mills, mortars and peſtles, flat ſtones and mullars, and ſearces or ſieves. The other ſort of utenſils are furnaces, with the proper iron work, pots for containing the compoſition when put into the fire, and iron inſtruments for ſhifting the matter out of one into the other, in caſe of accidents; and for taking out ſmall portions, in order to judge of the progreſs of the vitrification, and the qualities of the *glaſs*, &c. See the following articles.

GLASS, *method of making white and cryſtal*. There are three ſorts of furnaces uſed in the *glaſs*-works: one to prepare the frit, called the *calcar*; a ſecond, to work the *glaſs*; and a third, called the *leer*, to anneal it. See them all deſcribed under the article FURNACE.

To make cryſtal *glaſs*, take of the whiteſt *tarſo*, pounded ſmall, and ſierced as fine as flour, two hundred pounds; of the ſalt of polverine, a hundred and thirty pounds: mix them together, and put them into the furnace, called the *calcar*, firſt heating it. For an hour keep a moderate fire, and keep ſtirring the materials with a proper rake, that they may incorporate and calcine together; then increaſe the fire for five hours; after which take out the matter; which, being now ſufficiently calcined, is called FRIT. From the calcar put the frit in a dry place, and cover it up from the duſt for three or four months.

Now, to make the *glaſs*, or cryſtal: take of this cryſtal frit, called alſo *bollito*; ſet it in pots in the furnace, adding to it a due quantity of magneſia, or mangameſe: when the two are fuſed, caſt the fluor into fair water, to clear it of the ſalt, called *ſandiver*; which would otherwiſe make the cryſtal obſcure and cloudy. This lotion muſt be repeated again and again, as often as needful, till the cryſtal be fully purged; or, this ſcum may be taken off by means of proper ladles. Then ſet it to boil four, five, or ſix days; which done, ſee whether it have mangameſe enough; and if it be yet greeniſh, add more manganeſe, at diſcretion, by little and little at a time, taking care not to overdoſe it, becauſe the manganeſe inclines it to a blackiſh hue. Then let the metal clarify, till it becomes of a clear and ſhining colour; which done, it is fit to be blown, or formed into veſſels at pleaſure.

GLASS, *flint*, as it is called in our country, is of the ſame general kind with that which in other places is called cryſtal *glaſs*. It has this name from being originally made with calcined flints, before the uſe of the white ſand was underſtood; and retains the name, though no flints are now uſed in the compoſition of it. This flint *glaſs* differs from the other, in having lead for its flux, and white ſand for its body; whereas the fluxes uſed for the cryſtal *glaſs* are ſalts or arſenic, and the body conſiſts of calcined flints, or white river pebbles, tarſo, or ſuch ſtones. To the white ſand and lead a proper proportion of nitre is added, to burn away the phlogiſton of the lead, and alſo a ſmall quantity of magneſia; and in ſome works they uſe a proportional quantity of arſenic to aid the fluxing ingredients. The moſt perfect kind of flint *glaſs* may be made by fuſing with a very ſtrong fire a hundred and twenty pounds of the white ſand, fifty pounds of red lead, forty pounds of the beſt pearl-aſhes, twenty pounds of nitre, and five ounces of magneſia. Another compoſition of flint *glaſs*, which is ſaid to come nearer to the kind now made, is the following: a hundred and twenty pounds of ſand, fifty-four pounds of the beſt pearl-aſhes, thirty-ſix pounds of red-lead, twelve pounds of nitre, and ſix ounces of magneſia. To either of theſe a pound or two of arſenic may be added, to increaſe the flux of the compoſition. A cheaper compoſition of flint *glaſs* may be made with a hundred and twenty pounds of white ſand, thirty-five pounds of the beſt pearl-aſhes, forty pounds of red-lead, thirteen pounds of nitre, ſix pounds of arſenic, and four ounces of magneſia; or, inſtead of the arſenic, may be ſubſtituted fifteen pounds of common ſalt; but this will be more brittle than the other. The cheapeſt compoſition for the worſt kind of flint *glaſs* conſiſts of a hundred and twenty pounds of white ſand, thirty pounds of red-lead, twenty pounds of the beſt pearl-aſhes, ten pounds of nitre, fifteen pounds of common ſalt, and ſix pounds of arſenic. The beſt German cryſtal *glaſs* is made of a hundred and twenty pounds of calcined flints, or white ſand, ſeventy pounds of the beſt pearl-aſhes, ten pounds of ſalt-petre, half a pound of arſenic, and five ounces of magneſia. And a cheaper compoſition is formed of a hundred and twenty pounds of calcined flints or white ſand, forty-ſix pounds of pearl-aſhes, ſeven pounds of nitre, ſix pounds of arſenic, and five ounces of magneſia.

A *glaſs* much harder than any prepared in the common way, may be made by means of borax in the following method: take four ounces of borax, and an ounce of fine ſand; reduce both to a ſubtile powder, and melt them together in a large cloſe crucible ſet in a wind-furnace, keeping up a ſtrong fire for half an hour; then take out the crucible, and when cold break it, and there will be found at the bottom a pure hard *glaſs*, capable of cutting common *glaſs* like a diamond. This experiment, duly varied, may lead to ſeveral uſeful improvements in the arts of *glaſs*, enamels, and factitious gems, and ſhews an expeditious method of making *glaſs*, without any fixed alkali, which has been generally thought an eſſential ingredient in *glaſs*, and it is not yet known whether calcined cryſtal, or other ſubſtances, being added to this ſalt inſtead of ſand, it might not make a *glaſs* approaching to the nature of a diamond. Shaw's Lectures, p. 426.

There are three principal kinds of *glaſſes*, diſtinguiſhed by the form or manner of working them; viz. *round glaſs*, as thoſe of our veſſels, phials, drinking *glaſſes*, &c. *table* or *window-glaſs*, of which there are divers kinds; viz. *crown-glaſs*, *jealous-glaſs*, &c. and *plate-glaſs*, or *looking-glaſs*.

Glass, *working or blowing round*. The working furnace, we have obſerved, is round, and has ſix boccas, or apertures: at one of theſe, called the *great bocca*, the furnace is heated, and the pots of frit are at this ſet in the furnace; two other ſmaller holes, called *bocarellas*, ſerve to lade or take out the melted metal, at the end of an iron, to work the *glaſs*. At the other holes they put in pots of fuſible ingredients, to be prepared, and at laſt emptied into the lading-pot.

There are ſix pots in each furnace, all made of tobacco-pipe clay, proper to ſuſtain not only the heat of the fire, but alſo the effect of the polverine, which penetrates every thing elſe. There are only two of theſe pots that work: the reſt ſerve to prepare the matter for them. The fire of the furnace is made and kept up with dry hard wood, caſt in, without intermiſſion, at ſix apertures.

When the matter, contained in the two pots, is ſufficiently vitrified, they proceed to blow or faſhion it: the proceſs whereof we ſhall here deliver from Agricola, Dr. Merret, the French Diction. de Commerce, &c.

The operator, or ſervitor (the veſſel being now ſufficiently refined), takes his blowing iron, which is a hollow tube, about two feet and a half long; and dipping it in the melting-pot, there turns it about: the metal ſticks to the iron like ſome glutinous, or clammy juice; much like, but more firmly than turpentine, or honey.

For each *glaſs* he dips four times, and at each dip rolls the end of his inſtrument, with the *glaſs* thereon, on a piece of iron, over which is a veſſel of water; the coolneſs whereof helps to conſolidate the *glaſs* more readily, and diſpoſes it the better to bind with the next to be taken out of the pot.

After they have dipt a fourth time, and when there is now matter enough on the inſtrument, the operator begins to blow gently through the iron; by which he raiſes or lengthens it nearly a foot; much as we do by blowing in a bladder, or globe; and to give it a poliſh, he rolls it to and fro on a ſtone, or marble.

This done, he blows a ſecond time, and thus forms the bunch, or belly of the *glaſs*. The matter, by this ſecond blaſt, aſſumes the figure of a gourd, or calebaſs, eighteen or twenty inches in diameter. As often as the operator blows into the iron (which muſt be very often), he removes it haſtily from his mouth to his cheek, leſt he ſhould draw the flame into his mouth, when he re-applies it to the iron.

The operator whirls his iron many times round his head, to lengthen and cool the *glaſs*; ſometimes the *glaſs*, thus blown round, is returned to the fire, where it flattens a little of itſelf: when flatted, it is again taken out, and cooled; and, if needful for the deſign, the workman flats its bottom, by preſſing it on the marble, or moulds it in the ſtamp-irons; and thus delivers it to the maſter workman, to break off the collet.

The collet, or neck, is the narrow part which cleaves to the iron: to ſet the *glaſs* at liberty, they lay a drop of cold water on the collet; which, by its coldneſs, cuts or cracks about a quarter of an inch: after which, giving it a ſlight blow, the fracture is communicated all around the collet. The waſte piece is thrown by to make green *glaſs*.

This done, they dip an iron rod, or ponteglo, in the melting-pots; and with the matter that ſticks thereto, they apply and faſten it to the bottom of the veſſel, oppoſite to the collet. The veſſel, thus ſuſtained by the iron rod, is carried to the great bocca to be heated and ſcalded; and while another perſon takes care thereof, the former operator reſts, and prepares himſelf for the branching.

To branch, or make the bowl, they thruſt in an iron inſtrument, called the *paſſago*; and the aperture, opened thereby, they farther augment, and widen with the *procello*: in turning this inſtrument about, to form the bowl, the edge becomes thickened; the *glaſs* being, as it were, doubled in that part; whence the hem obſerved on the circumference of our *glaſſes*. What is ſuperfluous, they cut off with the ſheers.

The veſſel, thus opened, is returned to the great bocca; where being ſufficiently heated a ſecond time, the workman gives the bowl its finiſhing, by turning it about with a circular motion; which it increaſes, in proportion as the bowl opens, and enlarges by means of the heat and agitation.

The *glaſs* thus finiſhed, they carry it from the bocca, ſtill turning it round, to a kind of earthen bench, covered with brands, or coals extinguiſhed: here they let it cool a little, and come to its conſiſtence, having firſt detached it from the iron rod by a ſtroke or two with the hand.

Thus, with blowing, preſſing, ſcalding, ampliſying, and cutting, the *glaſs* is framed into the ſhape preconceived in the workman's mind. If need be, he proceeds to put on a foot and handle, or any other decoration.

When the maſter has finiſhed a number of theſe, another ſervitor takes them with an iron fork, and ſpeedily places them in the tower, or leer, to anneal and harden.

What has been here ſaid of white, or cryſtal *glaſs*, holds equally of common, or green *glaſs*, the working being the ſame in all; and the difference only in the ſalt, or polverine, made uſe of.

So many maſters as there are, ſo many pots, at the leaſt, and ſo many boccas there muſt be; each man having his proper ſtation: where, ſays Dr. Merret, they receive thoſe ſcorching heats ſallying directly into their faces, mouths, and lungs; whence they are forced always to work in their ſhirts, like the Cyclopes, and nudimembra Pyracmones, with a ſtraw broad-brimmed hat on their heads, to defend their eyes from the exceſſive heat and light. They ſit in large, wide, and wooden chairs, with two long elbows, to which their inſtruments are hung. They work ſix hours at a time, meaſured by a ſingle glaſs; after which they are relieved by others, for the like time; ſo that the furnaces are never idle.

Working, or blowing window, or table Glass. The method of making crown window-*glaſs*, now practiſed in England, is ſaid to have been borrowed from the French. An Engliſh *glaſs* maker went over to work in France, on purpoſe to get into the ſecret; which when he had attained to, he returned, and ſet up a *glaſs-work*, wherein he far outdid the French, his teachers.

This *glaſs* is blown much after the manner of looking-*glaſs*. Some writers, from wrong intelligence, have ſaid that it was run, or caſt in ſand; but the real proceſs is as follows:

The furnace, melting-pots, materials, and fire, are the ſame for window, or *table-glaſs*, as they are for round *glaſs*; and the difference in the operation only commences after the ſervitor has dipped his blowing iron the fourth time in the melted metal.

The *glaſs* then being in this condition, they blow it; but inſtead of rounding, or forming it into a bunch, the particular motion the workman gives it in the directing and managing the wind, and the way of rolling it on the iron, make it extend in length two or three feet, and form a cylinder, which at firſt is but two inches in diameter; but which, by being recommitted to the fire, and blown afreſh when taken out, becomes of the extent required for the table of *glaſs* to be formed; with this circumſtance, however, that the ſide which is faſtened to the iron, goes gradually diminiſhing, and ends in a kind of cone or pyramid.

To render the two ends nearly of the ſame diameter, after adding a little *glaſs* to that oppoſite to the iron, they draw it out with a pair of iron pinchers. Then they cut off the ſame end with a little water; and carrying the cylinder back to the bocca, they cut it likewiſe with water in two other places; one place being at the diſtance of eight or ten inches from the iron, and the other through the whole length.

The *glaſs* cylinder, thus abridged of both its extremities, is next heated on a kind of earthen table, ſomewhat raiſed in the middle, in order to promote its opening at the place cut longitudinally. The workman here makes uſe of an iron, wherewith he alternately lowers and raiſes the two ſides, or halves of the cylinder, which now begin to open, and unfold like a ſheet of paper, which at length grow perfectly flat. The table of *glaſs* is now in its laſt perfection, and needs nothing farther but to be heated over again. When taken out, they lay it on a table of copper; whence, after it has cooled, and come to its conſiſtence, they carry it on forks to the tower of the furnace, where they leave it to anneal for twenty-four hours.

The number of tables annealed at a time, which ſometimes amount to a hundred, or more, with the perpendicular ſituation they are ſet in, occaſioned, anciently, that thoſe ſet in firſt, ſuſtaining in ſome meaſure the preſſure of the laſt, were bent, and thus rendered inconvenient for uſe; but this inconvenience is now remedied, by ſeparating them into tens, with an iron ſhiver; which, diminiſhing the weight, by dividing it, keeps the tables as flat and even as they were put in.

Glass, *kinds of table or window.* There are divers ſorts of this *glaſs* made in divers places, for the uſe of building: thoſe moſt known among us, are given us by the author of the Builder's Dictionary, as follows:

Glass, *crown*, of which, ſays Neve, there are two kinds, diſtinguiſhed by the places where they are wrought; viz.

1. *Ratcliff crown glaſs*, which is the beſt and cleareſt, and was firſt made at the Bear-garden, on the Bank-ſide, Southwark, but ſince at Ratcliff: of this there are twenty-four TABLES to the CASE, the tables being of a circular form, about three feet ſix inches in diameter.

2. *Lambeth crown glaſs*, which is of a darker colour than the former, and more inclining to green.

The beſt window, or crown *glaſs*, is made of white ſand, ſixty pounds; of purified pearl-aſhes, thirty pounds; of ſalt-petre, fifteen pounds; of borax, one pound; and of arſenic, half a pound. If the *glaſs* ſhould prove yellow, magneſia muſt be added. A cheaper compoſition for window *glaſs* conſiſts of ſixty pounds of white ſand, twenty-five pounds of unpurified pearl-aſhes, ten pounds of common ſalt, five pounds of nitre, two pounds of arſenic, and one ounce and a half of magneſia. The common, or green window *glaſs*, is compoſed of ſixty pounds of white ſand, thirty pounds of unpurified pearl-aſhes, ten pounds of common ſalt, two pounds of arſenic, and two ounces of magneſia. But a cheaper compoſition for this purpoſe conſiſts of a hundred and twenty pounds of the cheapeſt white ſand, thirty pounds of unpurified pearl-aſhes, ſixty pounds of wood aſhes, well burnt and ſifted, twenty pounds of common ſalt, and five pounds of arſenic.

Glass, *French*, as alſo called *Normandy glaſs*, and formerly *Lorraine glaſs*, becauſe made in thoſe provinces: at preſent it is made wholly in the nine *glaſs* works; five whereof are in the foreſt of Lyons, four in the county of Eu; the laſt at Beaumont, near Rouen. It is of a thinner kind than our crown *glaſs*; and when laid on a piece of white paper, appears of a dirtyiſh green colour. There are but twenty-five TABLES of this to the CASE.

Glass, *German*, is of two kinds, the *white*, and the *green*: the firſt is of a whitiſh colour, but is ſubject to thoſe ſmall, curved ſtreaks, obſerved in our Newcaſtle *glaſs*, though free from the ſpots and blemiſhes thereof. The *green*, beſides its colour, is liable to the ſame ſtreaks as the white; but both of them are ſtraiter, and leſs warped, than our Newcaſtle *glaſs*.

Glass, *Dutch*, is not much unlike our Newcaſtle *glaſs*, either in colour or price. It is frequently much warped, like that; and the tables are but ſmall.

Glass, *Newcaſtle*, is that moſt uſed in England. It is of an aſh colour, and much ſubject to ſpecks, ſtreaks, and other blemiſhes; and beſides is frequently warped. Leybourn ſays, there are forty-five tables to the caſe, each containing five ſuperficial feet: ſome ſay there are but thirty-five tables, and ſix feet in each table.

Glass, *phial*, is a kind of *glaſs* betwixt the flint *glaſs* and the common bottle, or green *glaſs*. The beſt kind may be prepared with a hundred and twenty pounds of white ſand, fifty pounds of unpurified pearl-aſhes, ten pounds of common ſalt, five pounds of arſenic, and five ounces of magneſia. The compoſition for green or common phial *glaſs*, conſiſts of a hundred and twenty pounds of the cheapeſt white ſand, eighty pounds of wood aſhes well burnt and ſifted, twenty pounds of pearl-aſhes, fifteen pounds of common ſalt, and one pound of arſenic.

Glass, *common bottle*, or *green*, is formed of ſand of any kind fluxed by the aſhes of burnt wood, or of any parts of vegetables; to which may be added the *ſcoriæ* or clinkers of forges. When the ſofteſt ſand is uſed, two hundred pounds of wood aſhes will ſuffice for a hundred pounds of ſand, which are to be ground and mixed together. The compoſition with the clinkers conſiſts of a hundred and ſeventy pounds of wood aſhes, a hundred pounds of ſand, and fifty pounds of clinkers, or *ſcoriæ*, which are to be ground and mixed together. If the clinkers cannot be ground, they muſt be broke into ſmall pieces, and mixed with the other matter without any grinding.

Working of PLATE, *or* LOOKING-GLASS. The materials whereof *looking-glaſs* is made, are much the ſame of thoſe of other works of *glaſs*, viz. an alkali ſalt, and ſand.

The ſalt, however, it is to be obſerved, ſhould not be that extracted from polverine, or the aſhes of the Syrian kali; but that from barillia, or the aſhes of a plant of that name of the genus of kalis, but growing about Alicant in Spain. It is very rare that we can have the barillia pure; the Spaniards, in burning the herb, make a practice of mixing another herb along with it, which alters its quality; or of adding ſand to it, to increaſe the weight, which is eaſily diſcovered, if the addition be only made after the boiling of the aſhes, but next to impoſſible, if made in the boiling. It is from this adulteration that thoſe threads and other defects in *plate-glaſs* ariſe. To prepare the ſalt, they clean it well of all foreign matters; pound or grind it with a kind of mill, and finally ſift it pretty fine.

Pearl aſhes, properly purified, will furniſh the alkali ſalt requiſite for this purpoſe; but it will be neceſſary to add borax, or common ſalt, in order to facilitate the fuſion, and prevent the *glaſs* from ſtiffening in that degree of heat, in which it is to be wrought into plates. For purifying the pearl aſhes, diſſolve them in four times their weight of boiling water, in a pot of caſt iron, always kept clean from ruſt. Let the ſolution be removed into a clean tub, and remain there twenty-four hours, or longer. Having decanted the clear part of the fluid from the dregs or ſediment, put it again in the iron pot, and evaporate the water till the ſalts are left perfectly dry. Preſerve them in ſtone jars, well ſecured from air and moiſture.

Pearl-aſhes may alſo be purified in the higheſt degree, ſo as to be proper for the manufacture of the moſt tranſparent *glaſs*, by pulverizing three pounds of the beſt pearl-aſhes with ſix ounces of ſalt-petre in a *glaſs* or marble mortar, till they are well mixed; and then putting part of the mixture into a large crucible, and expoſing it in a furnace to a ſtrong heat. When this is red-hot, throw in the reſt gradually; and when the whole is red-hot, pour it out on a moiſtened ſtone or marble, and put it into an earthen or clean iron pot, with ten pints of water; heat it over the fire, till the ſalts be entirely melted; let it then ſtand to cool, and filter it through paper in a pewter cullender. When it is filtered, put the fluid again into the pot, and evaporate the ſalt to dryneſs, which will then be as white as ſnow; the nitre having burnt all the phlogiſtic matter that remained in the pearl-aſhes after their former calcination.

As to the ſand, it is to be ſifted and waſhed, till ſuch time as the water come off very clear; and when it is well dried again, they mix it with the ſalt, paſſing the mixture through another ſieve. This done, they lay them in the annealing furnace for about two hours; in which time the matter becomes very light and white: in this ſtate they are called *frit*, or *fritta*; and are to be laid up in a dry clean place, to give them time to incorporate: they lie here for at leaſt a year.

When they would employ this frit, they lay it for ſome hours in the furnace, adding to ſome the fragments or ſhards of old and ill made *glaſſes*; taking care firſt to calcine the ſhards by heating them red-hot in the furnace, and thus caſting them into cold water. To the mixture muſt likewiſe be added manganeſe, to promote the fuſion and purification.

The beſt compoſition for *looking-glaſs* plates conſiſts of ſixty pounds of white ſand cleanſed, twenty-five pounds of purified pearl-aſhes, fifteen pounds of ſalt-petre, and ſeven pounds of borax. If a yellow tinge ſhould affect the *glaſs*, a ſmall proportion of magneſia, mixed with an equal quantity of arſenic, ſhould be added. An ounce of the magneſia may be firſt tried; and if this proves inſufficient, the quantity ſhould be increaſed.

A cheaper compoſition for *looking-glaſs* plate conſiſts of ſixty pounds of the white ſand, twenty pounds of pearl aſhes, ten pounds of common ſalt, ſeven pounds of nitre, two pounds of arſenic, and one pound of borax. The matter of which the *glaſſes* are made at the famous manufacture of St. Gobin, in France, is a compoſition of ſolder, and of a very white ſand, which are carefully cleaned of all heterogeneous bodies; afterwards waſhed for ſeveral times, and dried ſo as to be pulverized in a mill, conſiſting of many peſtles, which are moved by horſes. When this is done, the ſand is ſifted through ſilk ſieves, and dried.

The matter, thus far prepared, is equally fit for *plate-glaſs*, to be formed either for blowing or by caſting.

The largeſt *glaſſes* at St. Gobin are run; the middle-ſized and ſmall ones are blown.

Blowing looking-GLASS *plates.* The workhouſes, furnaces, &c. uſed in the making of this kind of *plate-glaſs*, are the ſame, except that they are ſmaller, and that the carquaiſſes are diſpoſed in a large covered gallery, over againſt the furnace, as thoſe in the following article, to which the reader is referred.

After the materials are vitrified by the heat of the fire, and the *glaſs* is ſufficiently refined, the workman dips in his blowing iron, ſix feet long, and two inches in diameter, ſharpened at the end, which is put in the mouth, and widened at the other, that the matter may adhere to it. By this means he takes up a ſmall ball of matter, which ſticks to the end of the tube by conſtantly turning it. He then blows into the tube, that the air may ſwell the annexed ball; and carrying it over a bucket of water, which is placed on a ſupport at the height of about four feet, he ſprinkles the end of the tube to which the matter adheres, with water, ſtill turning it, that, by this, cooling, the matter may coaleſce with the tube, and be fit for ſuſtaining a greater weight. He dips the tube again into the ſame pot, and proceeds as before; and, dipping it in the pot a third time, he takes it out, loaded with matter, in the ſhape of a pear, about ten inches in diameter, and a foot long, and cools it at the bucket; at the ſame time blowing into the tube, and, with the aſſiſtance of a labourer, giving it a balancing motion, he cauſes the matter to lengthen; which, by repeating this operation ſeveral times, aſſumes the form of a cylinder, terminating like a ball at the bottom, and in a point at the top. The aſſiſtant is then placed on a ſtool three feet and a half high; and on this ſtool there are two upright pieces of timber, with a croſs beam of the ſame, for ſupporting the glaſs and tube, which are kept in an oblique poſition by the aſſiſtant, that the maſter workman may, with a punchion ſet in a wooden handle, and with a mallet, make a hole in the maſs: this hole is drilled at the center of the ball that terminates the cylinder, and is about an inch in diameter. When the *glaſs* is pierced, the defects of it are perceived; if it is tolerably perfect, the workman lays the tube horizontally on a little iron treſſel, placed on the ſupport of the aperture of the furnace. Having expoſed it to the heat for about half a quarter of an hour, he takes it away, and with a pair of long and broad ſhears, extremely ſharp at the end, widens the *glaſs*, by inſinuating the ſhears into the hole made with the punchion, whilſt the aſſiſtant, mounted on the ſtool, turns it round, till, at laſt, the opening is ſo large as to make a perfect cylinder at bottom. When this is done, the workman lays his *glaſs* upon the treſſel at the mouth of the furnace, to heat it: he then gives it to his aſſiſtant on the ſtool, and with large ſhears cuts the maſs of matter up to half its height. There is at the mouth of the furnace an iron tool, called *pontil*, which is now heating, that it may unite and coaleſce with the *glaſs* juſt cut, and perform the office which the tube did before it was ſeparated from the *glaſs*. This pontil is a piece of iron, ſix feet long, and in the form of a cane or tube, having at the end of it a ſmall iron bar, a foot long, laid equally upon the long one, and making with it a T. This little bar is full of the matter of the *glaſs*, about four inches thick. This red-hot pontil is preſented to the diameter of the *glaſs*, which coaleſces immediately with the matter round the pontil, ſo as to ſupport the *glaſs* for the following operation. When this is done, they ſeparate the tube from the *glaſs*, by ſtriking a few blows with a chiſſel upon the end of the tube, which has been cooled; ſo that the *glaſs* breaks directly, and makes this ſeparation, the tube being diſcharged of the *glaſs* now adhering to the pontil. They next preſent to the furnace the pontil of the *glaſs*, laying it on the treſſel to heat, and redden the end of that *glaſs*, that the workman may open it with his ſhears, as he has already opened one end of it, to complete the cylinder; the aſſiſtant holding it on his ſtool as before. For the laſt time, they put the pontil on the treſſel, that the *glaſs* may become red-hot, and the workman cuts it quite open with his ſhears, right over-againſt the forementioned cut; this he does as before, taking care that both cuts are in the ſame line. In the mean time, the man who looks after the carquaiſſes, comes to receive the *glaſs* upon an iron ſhovel, two feet and a half long without the handle, and two feet wide, with a ſmall border of an inch and a half to the right and left, and towards the handle of the ſhovel. Upon this the *glaſs* is laid, flattening it a little with a ſmall ſtick a foot and a half long, ſo that the cut of the *glaſs* is turned upwards. They ſeparate the *glaſs* from the pontil, by ſtriking a few gentle blows between the two with a chiſſel. The *glaſs* is then removed to the mouth of the hot carquaiſſe, where it becomes red-hot gradually; the workman, with an iron tool, ſix feet long, and widened at the end in form of a club at cards, four inches long, and two inches wide on each ſide, very flat, and not half an inch thick, gradually lifts up the cut part of the *glaſs*, to unfold it out of its form of a flattened cylinder, and render it ſmooth, by turning it down upon the hearth of the carquaiſſe. The tool, already deſcribed, being inſinuated within the cylinder, performs this operation, by being puſhed hard againſt all the parts of the *glaſs*. When the *glaſs* is thus made quite ſmooth, it is puſhed to the bottom of the carquaiſſe, or annealing furnace, with a ſmall iron raker, and ranged there with a little iron hook. When the carquaiſſe is full, it is ſtopped and cemented as in the caſe of run *glaſſes*, and the *glaſs* remains there for a fortnight to be annealed; after which time, they are taken out to be poliſhed. A workman can make but one *glaſs* in an hour, and he works and reſts for ſix hours alternately.

It may be obſerved, that *looking-glaſſes*, thus blown, ſhould never be above forty-five, or at moſt fifty inches long, and of a breadth proportionable. Thoſe exceeding theſe dimenſions, as we frequently find among the Venice *glaſſes*, cannot have the thickneſs ſufficient to bear the grinding; and beſides are ſubject to warp, which prevents them from regularly reflecting objects.

Caſting or running large Looking-GLASS *plates.* This art is of French invention, and not quite one hundred years old. It is owing to the Sieur Abraham Thevart, who firſt propoſed it to the court of France, in 1688.

It is performed much like the caſting of ſheet lead, among the plumbers; and by means hereof we are not only enabled to make *glaſſes*, of more than double the dimenſions of any made by the Venetian way of blowing; but alſo to caſt all kinds of borders, mouldings, &c.

The furnaces for melting the materials of this manufacture are of enormous ſize; and thoſe for annealing the *glaſſes*, when formed, are much more ſo. Round a melting-furnace, there are at leaſt twenty-four annealing furnaces or ovens; each from twenty to twenty-five feet long; they are called carquaiſſes: each carquaiſſe has two tiſſarts, or apertures, to put in wood, and two chimneys. Add, that beſide the annealing furnaces, &c. there are others for making of frit, and calcining old pieces of *glaſs*.

All theſe furnaces are covered over with a large ſhed; under which are likewiſe forges, and workhouſes for ſmiths, carpenters, &c. continually employed in repairing and keeping up the machines, furnaces, &c. as alſo lodges, and apartments for theſe, and the other workmen employed about the *glaſs*, and keeping up a perpetual fire in the great furnace; ſo that the *glaſs-houſe*, as that in the caſtle of St. Gobin, in the foreſt of Fere, in the Soiſſonois, appears more like a little city, than a manufactory.

The inſide of furnaces is formed of a ſort of baked earth, proper to ſuſtain the action of fire; and the ſame earth ſerves alſo for melting-pots, ciſterns, &c. The furnaces ſeldom laſt above three years; after which they are to be rebuilt, from bottom to top; and to keep them good, even for that time, the inſide muſt be refitted every ſix months, at which time the fire is extinguiſhed. The ſmelting-pots are as big as wine hogſheads, about three feet in height, and in diameter; and contain above two thouſand weight of metal. The ciſterns, or pans, are much ſmaller, being about thirty-ſix inches long, eighteen inches wide, and as many deep; and ſerve for the conveyance of liquid *glaſs*, which is drawn out of the pots, to the caſting-tables.

When the furnace is in a condition to receive the pots and ciſterns, they heat it red-hot, which requires fifty cords, or a hundred cart-loads of wood: this done, they fill the pots with the materials, or ſolder and ſand, which is done at ſeveral times, to facilitate the fuſion. When the matter is ſufficiently vitrified, refined, and ſettled, which uſually happens in thirty-ſix hours, they fill the ciſterns, which are in the ſame furnace, and which are left there about ſix hours longer, till ſuch time as they appear all white, through the exceſſive heat.

To get the ciſterns with the metal out of the furnace, they make uſe of a large iron chain, which opens and ſhuts with hooks and eyes. From the middle hereof, on each ſide, ariſe two maſſive iron pins, whereby, with the aſſiſtance of pullies, the ciſterns are raiſed upon a kind of carriage of a proper height; and thus conducted to the table where the *glaſs* is to be run. The ciſtern is then raiſed above the tables with an engine, in form of a crane, by means of two iron bars, ſo contrived as to throw the ciſtern into an inclined poſition, which diſcharges

charges a torrent of matter, all on fire, wherewith the table, prepared for that purpoſe, is preſently covered.

The table, whereon the *glaſs* is to be run, is of caſt iron, about ten feet long, and five feet broad. It is ſupported on a wooden frame, with truckles, for the convenience of removing from one carquaiſſe, or annealing furnace, to another, in proportion as they are filled.

To form the thickneſs of a *glaſs*, there are two iron rulers or rims, placed round the edge of the table; and on theſe reſt the two extremes of a kind of roller, of caſt iron, which ſerves to drive the liquid matter before it to the end of the table, or mould. The iron rulers, being moveable, and capable of being ſet cloſer, or farther apart, at pleaſure, determine the width of the *glaſſes*, and retain the matter, that it does not run off at the edges.

As ſoon as the matter is arrived at the end of the table, and the *glaſs* is come to a conſiſtence, examined by the directors of the manufacture, and approved, they ſhove it off into the annealing furnace, with an iron raker, as wide as the table, that has a handle two fathoms long; being aſſiſted by workmen on the other ſide of the carquaiſſe, who, with iron hooks, pull the *glaſs* to them, and range it in the carquaiſſe, which holds ſix large *glaſſes*.

What is moſt ſurpriſing throughout the whole of this operation, is, the quickneſs and addreſs, wherewith ſuch maſſy ciſterns, filled with a flaming matter, are taken out of the furnace, conveyed to the table, and poured therein, the *glaſs* ſpread, &c. The whole is inconceivable to ſuch as have not been eye-witneſſes of that ſurpriſing manufacture.

As faſt as the ciſterns are emptied, they carry them back to the furnace and take freſh ones, which they empty as before. This they continue to do, ſo long as there are any full ciſterns; laying as many plates in each carquaiſſe as it will hold, and ſtopping them up with doors of baked earth, and every chink with cement, as ſoon as they are full, to let them anneal, and cool again, which requires about fourteen days.

The firſt running being diſpatched, they prepare another, by filling the ciſterns anew, from the matter in the pots; and after the ſecond, a third; and even a fourth time, till the melting-pots are quite empty.

The ciſterns at each running ſhould remain at leaſt ſix hours in the furnace to whiten; and when the firſt annealing furnace is full, the caſting-table is to be carried to another. It need not here be obſerved, that the carquaiſſes, or annealing furnaces, muſt firſt have been heated to the degree proper for them. It may be obſerved, that the oven-full, or the quantity of matter commonly prepared, ſupplies the running of eighteen *glaſſes*, which is performed in eighteen hours, being an hour for each *glaſs*. The workmen work ſix hours, and are then relieved by others.

When the pots are emptied, they take them out, as well as the ciſterns, to ſcrape off what *glaſs* remains, which otherwiſe would grow green by continuance of fire, and ſpoil the *glaſſes*. They are not filled again in leſs than thirty-ſix hours, ſo that they put the matter into the furnace, and begin to run it every fifty-four hours.

The manner of heating the large furnaces is ſingular enough: the two tiſors, or perſons employed for that purpoſe, in their ſhirts, run round the furnace without making the leaſt ſtop, with a ſpeed ſcarce inferior to that of the lighteſt courier: as they go along, they take two billets, or pieces of wood, which are cut for the purpoſe; theſe they throw into the firſt tiſſart; and continuing their courſe, do the ſame for the ſecond. This they hold without interruption for ſix hours ſucceſſively; after which they are relieved by others, &c. It is ſurpriſing that two ſuch ſmall pieces of wood, and which are conſumed in an inſtant, ſhould keep the furnace to the proper degree of heat; which is ſuch, that a large bar of iron, laid at one of the mouths of the furnace, becomes red-hot in leſs than half a minute.

It is computed, that a furnace, before it be fit to run *glaſs*, coſts above three thouſand five hundred pounds; that at leaſt ſix months are required for the building it anew, and three months for the refitting it; and that when a pot of matter burſts in the furnace, the loſs of matter and time amounts to above two hundred and fifty pounds.

The *glaſs*, when taken out of the melting-furnace, needs nothing farther but to be ground, poliſhed, and foliated.

There is an inland duty of 9*s*. 4*d*. a hundred weight on all materials, &c. for making of crown, plate, and flint *glaſs*, and all white *glaſs*, and of 2*s*. 4*d*. a hundred weight on all materials for making common bottles, and other green *glaſs*. Upon all crown, plate, and flint *glaſs* imported, there is a duty of 3*d*. per pound weight; and on all green, or other *glaſs* imported, 2*d*. per pound weight; and on all quart bottles and flaſks imported, 2*s*. per dozen; and on all bottles and flaſks imported, containing more or leſs than a quart, 2*s*. per dozen quarts. And if any of the above be landed before entry and payment of duties, they ſhall be forfeited; and no perſon is allowed to import into Ireland any of theſe, that are not of the manufacture of Great Britain, under the penalty of forfeiting the ſame and ſhip, and 10*s*. a pound. *Glaſs* exported is entitled to a drawback of the duty. 19 Geo. II. cap. 12.

Glass, *annealing of*. The operation of annealing of *glaſs* is performed in a peculiar furnace called the *leer*, which conſiſts of two parts, the *tower* and the *leer*. The veſſels as ſoon as made are placed by the ſervitors on the floor of the former, to anneal; which done, they are drawn ſlowly in a ſort of pan, called *fraches*, by an operator called the *ſarole-man*, all along the *leer*, the ſpace of five or ſix yards, to give them time to cool gradually; ſo that when they reach the mouth of the *leer*, they are found quite cold. Merret, Not. to Neri, p. 243, ſeq.

The particles of *glaſs* by annealing are ſuppoſed to loſe part of their ſpringineſs, and their brittleneſs at the ſame time. A gradual heating or cooling of *glaſs*, according to Dr. Hook, *anneals* or reduces its parts to a texture more looſe, and eaſy to be broke; but withal more flexible than before. And hence in ſome meaſure the phænomena of *glaſs-drops*.

Borrichius, in his Chemiſtry, ſeems to think that the rendering *glaſs* ductile or malleable, is not ſo impracticable as it is uſually thought: in ſupport of this, he alleges the inſtance of the *luna cornea*, which is a ſort of ſalt made of ſilver diſſolved in an acid, and which is in ſome degree ductile, and ſo far altered from the nature of ſilver, that it may be melted at a candle, and reduced into ſmall tranſparent leaves; and adding to this the proceſs for making a ductile ſalt out of common ſal armoniac, diſſolved in a large *glaſs*, and cryſtallized a vaſt many times, the cryſtals of this ſalt, he ſays, at laſt became half a foot long, and were flexile and elaſtic, and in ſome degree ductile under a hammer. From theſe changes in bodies naturally brittle as ſalts are, he judges that the ſame changes may be made in *glaſs*. Phil. Tranſ. Nº 39.

Glaſſes unannealed are ſo exceſſively brittle, as to fly and break of themſelves, even frequently before they are well cold. Hence, the practice of nealing or annealing was deviſed.

Some of the phænomena depending on the fragility of unannealed *glaſs* deſerve the attention of the curious. Thoſe of the lacrymæ, or *glaſs-drops*, were among the firſt taken notice of; and it has alſo been obſerved, that hollow bells made of unannealed *glaſs*, with a ſmall hole in them, will fly to pieces, by the heat of the hand only, if the hole by which the internal and external air communicate, be ſtopped with a finger. Phil. Tranſ. Nº 477. § 3. See RUPERT's *Drops*.

But lately ſome veſſels made of ſuch unannealed *glaſs* have been diſcovered, which have the remarkable property of reſiſting very hard ſtrokes given from without, though they ſhiver to pieces by the ſhocks received from the fall of very light and minute bodies dropped into their cavities. Thoſe *glaſſes* may be made of any ſhape; all that needs be obſerved in making them, is, to take care that their bottoms may be thicker than their ſides. The thicker the bottom is, the eaſier do the *glaſſes* break. One whoſe bottom is three fingers breadth in thickneſs, flies with as much eaſe at leaſt as the thinneſt *glaſs*. Some of theſe veſſels have been tried with ſtrokes of a mallet, ſufficient to drive a nail into wood tolerably hard, and have held good without breaking. They alſo reſiſt the ſhock of ſeveral heavy bodies let fall into their cavities, from the height of two or three feet. For inſtance, muſket-balls, pieces of iron, or other metal; pyrites, jaſper, wood, bone, &c. but this is not ſurpriſing, as other *glaſſes* of the ſame ſize do the ſame. But the wonder is, that taking a ſhiver of flint of the ſize of a ſmall pea, and letting it fall into the *glaſs* only from the height of three inches, in about two ſeconds the *glaſs* flies, and ſometimes in the very moment of the ſhock: nay, a bit of flint no larger than a grain, dropt into ſeveral *glaſſes* ſucceſſively; though it did not immediately break them, yet they all flew, being ſet by, in leſs than three quarters of an hour. Phil. Tranſ. ibid. p. 509.

Some other bodies produce a like effect with flint: for inſtance, ſapphire, porcelain, diamonds, hard tempered ſteel, as alſo marbles, ſuch as boys play with; to which add pearls from the animal kingdom.

The experiments ſucceeded alſo when the *glaſſes* were held in the hand, reſted on a pillow, put in water, or filled with water. It is alſo remarkable, that the *glaſſes* broke, upon their bottoms being ſlightly rubbed with the finger, though ſome of them did not fly till half an hour after the rubbing.

If the *glaſſes* be every where extremely thin, they do not break in theſe circumſtances.

Some have pretended to account for theſe phænomena, by ſaying, that the bodies dropped into theſe veſſels cauſe a concuſſion, that is ſtronger than the coheſion of the parts of the *glaſs*, and that conſequently a rupture of the ſame muſt enſue. But why does not a ball of gold, ſilver, iron, copper, or ſeveral other bodies, even a thouſand times heavier than a ſhiver of flint, equally cauſe this concuſſion, and break the *glaſſes*?

Mr. Euler has endeavoured to account for theſe appearances from his principles of percuſſion. He thinks this experiment entirely overthrows the opinion of thoſe who meaſure the FORCE of percuſſion by the *vis viva*; and he thinks the principles he has eſtabliſhed give a clear ſolution of this phænomenon. According to theſe principles, the extreme hardneſs of the flint, and alſo its angular figure, which makes the ſpace of contact with the *glaſs-veſſel* extremely ſmall, ought to cauſe an impreſſion on the *glaſs* vaſtly greater than lead or any other metal; and this may account for the flint's breaking the veſſel, though the bullet, even falling from a conſiderable height, does no damage. Mem. Acad. Berlin. 1745. p. 47.

Hollow cups made of the green *bottle-glaſs*, ſome of them three inches thick at bottom, were inſtantly broken, by a ſhiver of flint weighing about two grains, though they had reſiſted the ſhock of a muſket-ball from the height of three feet. Phil. Tranſ. ibid. p. 515.

Glass *of antimony*, in *Chemiſtry*. See *Glaſs of* Antimony, and Vitrum *antimonii ceratum*.

Glass, *axungia of*. See Axungia and Sandiver.

Glass *of borax*. See Borax.

Glass, *colouring of*. That the colours given to *glaſs* may have their full beauty, it muſt be obſerved, that every pot when new, and firſt uſed, leaves a foulneſs in the *glaſs* from its own earthy parts; ſo that a coloured *glaſs* made in a new pot can never be bright, or perfectly fine. For this reaſon, the larger of theſe, when new, may be glazed with white *glaſs*; but the ſecond time of uſing, the pots loſe this foulneſs.

The glazing may be done by reducing the *glaſs* to powder, and moiſtening the inſide of the pot with water; while it is yet moiſt, put in ſome of the powdered *glaſs*, and ſhake it about, till the whole inner ſurface of the pot be covered by as much as will adhere to it, in conſequence of the moiſture. Throw out the redundant part of the powdered *glaſs*; and the pot being dry, ſet it in a furnace ſufficiently hot to vitrify the *glaſs* adhering to it, and let it continue there ſome time; after which, care muſt be taken to let it cool gradually.

Thoſe pots which have ſerved for one colour muſt not be uſed for another; for the remainder of the old matter will ſpoil the colour of the new. The colours muſt be very carefully calcined to a proper degree; for if they are calcined either too much or too little, they never do well; the proper proportion, as to quantity, muſt alſo carefully be regarded, and the furnaces muſt be fed with dry, hard wood. And all the proceſſes ſucceed much the better if the colour be uſed dividedly, that is, a part of it in the frit, and the reſt in the melted metal.

A hard *glaſs*, proper for receiving colours, may be prepared by pulverizing twelve pounds of the beſt ſand, cleanſed by waſhing in a *glaſs* or flint mortar, and mixing ſeven pounds of pearl-aſhes, or any fixed alkaline ſalt, purified with nitre (ſee *Plate* or *Looking*-Glass, above) one pound of ſalt-petre, and half a pound of borax, and pounding them together. A *glaſs* leſs hard may be prepared of twelve pounds of white ſand cleanſed, ſeven pounds of pearl-aſhes, purified with ſalt-petre, one pound of nitre, half a pound of borax, and four ounces of arſenic, prepared as before.

Glass, *amethyſt coloured*. See *Purple* Glass, and Amethyst.

Glass, *balas-coloured*, is made thus: put into a pot cryſtal frit, thrice waſhed in water; tinge this with mangeneſe, prepared into a clear purple; to this add *alumen cativum*, ſifted fine, in ſmall quantities, and at ſeveral times: this will make the *glaſs* grow yellowiſh, and a little reddiſh, but not blackiſh, and always diſſipates the mangeneſe. The laſt time you add manganeſe give no more of the *alumen cativum*, unleſs the colour be too full. Thus will the *glaſs* be exactly of the colour of the *balas-ruby*. See *Ruby* Glass.

Glass, *to give the common black colour to*, the *glaſs-makers* uſe the following method: they take old broken *glaſs* of different colours, grind it to powder, and add to it, by different parcels, a ſufficient quantity of a mixture of two parts zaffer, and one part manganeſe: when well purified, they work it into veſſels, &c.

Glaſs beads are coloured with manganeſe only. See *Black* Enamel.

To give Glass *the colour of black velvet*. The manner of giving this deep and fine colour to *glaſs*, is this: take of cryſtalline and pulverine frit, of each twenty pounds; of calx of lead and tin four pounds; ſet all together in a pot in the furnace, well heated; when the glaſs is formed and pure, take ſteel well calcined and powdered, ſcales of iron that fly off from the ſmith's anvil, of each an equal quantity; powder and mix them well; then put ſix ounces of this powder to the above deſcribed metal while in fuſion; mix the whole thoroughly together, and let all boil ſtrongly together; then let it ſtand in fuſion twelve hours to purify, and after this work it. It will be a moſt elegant *velvet* black.

There is another way of doing this, which alſo produces a very fair black. It is this: take a hundred weight of rochetta frit, add to this two pounds of tartar, and ſix pounds of manganeſe, both in fine powder; mix them well, and put them to the metal while in fuſion, at different times, in ſeveral parcels; let it ſtand in fuſion after this for four days, and then work it. Neri.

A *glaſs* perfectly black may alſo be formed of ten pounds of either of the compoſitions for hard *glaſs* above deſcribed, one ounce of zaffer, ſix drams of manganeſe, and an equal quantity of iron ſtrongly calcined.

Glass, *blue, of a full colour*, may be made by adding ſix drams of zaffer, and two drams of manganeſe, to ten pounds of either of the compoſitions for hard *glaſs*, deſcribed above under *Colouring of* Glass. For a very cool or pure blue *glaſs*, half an ounce of calcined copper may be uſed inſtead of the manganeſe, and the proportion of zaffer diminiſhed by one half. *Glaſs* reſembling sapphire may be made with ten pounds of either of the compoſitions for hard *glaſs*, three drams, and one ſcruple of zaffer, and one dram of the *calx caſſii*, or precipitation of gold by tin; or inſtead of this latter ingredient, two drams and two ſcruples of manganeſe. Or, a ſapphire-coloured *glaſs* may be made by mixing with any quantity of the hard *glaſs* one eighth of its weight of ſmalt.

Glass, *brown Venetian, with gold ſpangles*, commonly called the *philoſopher's ſtone*, may be prepared in the following manner: take of the ſecond compoſition for hard *glaſs* above deſcribed, and of the compoſition for paste, of each five pounds, and of highly calcined iron an ounce; mix them well, and fuſe them till the iron be perfectly vitrified, and has tinged the *glaſs* of a deep tranſparent, yellow brown colour. Powder this *glaſs*, and add to it two pounds of powdered *glaſs* of antimony; grind them together, and thus mix them well. Take part of this mixture, and rub into it fourſcore or one hundred leaves of the counterfeit leaf gold, called Dutch gold; and, when the parts of the gold ſeem ſufficiently divided, mix the powder containing it with the other part of the *glaſs*. Fuſe the whole with a moderate heat, till the powder run into a vitreous maſs, fit to be wrought into any of the figures or veſſels into which it is uſually formed; but avoid a perfect liquefaction; becauſe that, in a ſhort time, deſtroys the equal diffuſion of the ſpangles, and vitrifies, at leaſt in part, the matter of which they are compoſed; converting the whole into a kind of tranſparent, olive-coloured *glaſs*. This kind of *glaſs* is uſed for a great variety of toys and ornaments with us, who, at preſent, procure it from the Venetians. Handmaid to the Arts, vol. ii. p. 317. See *Gold-coloured* Glass.

Glass-*chalcedony*. A mixture of ſeveral ingredients, with the common matter of *glaſs*, will make it repreſent the ſemi-opake gems, the jaſpers, agates, chalcedonies, &c. The way of making theſe ſeems to be the ſame thing with the method of making marbled paper, by ſeveral colours diſſolved in ſeveral liquors, which are ſuch as will not readily mix with one another when put into water, before they are caſt upon the paper which is to be coloured. There are ſeveral ways of making theſe variouſly coloured *glaſſes*, but the beſt is this: diſſolve four ounces of fine leaf ſilver in a *glaſs* veſſel in ſtrong aqua fortis; ſtop up the veſſel, and ſet it aſide.

In another veſſel, diſſolve five ounces of quickſilver in a pound of aqua fortis, and ſet this aſide.

In another *glaſs* veſſel, diſſolve in a pound of aqua fortis three ounces of fine ſilver, firſt calcined in this manner: amalgamate the ſilver with mercury, mix the amalgama with twice its weight of common ſalt well purified, put the mixture in an open fire in a crucible, that the mercury may fly off, and the ſilver be left in form of powder. Mix this powder with an equal quantity of common ſalt well purified, and calcine this for ſix hours in a ſtrong fire; when cold, waſh off the ſalt by repeated boilings in common water, and then put the ſilver into the aqua fortis. Set this ſolution alſo aſide.

In another veſſel, diſſolve in a pound of aqua fortis three ounces of ſal armoniac; pour off the ſolution, and diſſolve in it a quarter of an ounce of gold. Set this alſo aſide.

In another veſſel, diſſolve three ounces of ſal armoniac in a pound of aqua fortis; then put into the ſolution cinnabar, crocus martis, ultramarine, and ferretto of Spain, of each half an ounce. Set this alſo aſide.

In another veſſel, diſſolve in a pound of aqua fortis three ounces of ſal armoniac; then put into it crocus martis made with vinegar, calcined tin, zaffer, and cinnabar, of each half an ounce; let each of theſe be powdered very fine, and put gently into the aqua fortis. Set this alſo aſide.

In another veſſel, diſſolve three ounces of ſal armoniac in a pound of aqua fortis, and add to it braſs calcined with brimſtone, braſs thrice calcined, mangaueſe, and ſcales of iron which fall from the ſmith's anvil, of each half an ounce; let each be well powdered, and put gently into the veſſel. Then ſet this alſo aſide.

In another veſſel, diſſolve two ounces of ſal armoniac in a pound of aqua fortis, and put to it verdigriſe an ounce, red lead, crude antimony, and the caput mortuum of vitriol, of each half an ounce; put theſe well powdered leiſurely into the veſſel, and ſet this alſo aſide.

In another veſſel, diſſolve two ounces of ſal armoniac in a pound of aqua fortis, and add orpiment, white arſenic, painters lake, of each half an ounce: keep theſe nine veſſels in a moderate heat for fifteen days, ſhaking them well at times. After this pour all the matters from theſe veſſels into one large veſſel, well luted at its bottom; let this ſtand ſix days, ſhaking it at times, and then ſet it in a very gentle heat, and evaporate all the liquor, and there will remain a powder of a purpliſh green.

When this is to be wrought, put into a pot very clear metal, made of broken cryſtalline and white *glaſs*, that has been uſed; for with the virgin-frit, or ſuch as has never been wrought, the chalcedony can never be made, as the colours do not ſtick to it, but are conſumed by the frit. To every pot of twenty pounds of this metal put two or three ounces of this powder at three ſeveral times; incorporate the powder well with the *glaſs*, and let it remain an hour between each time of putting in the powders. After all are in, let it ſtand twenty-four hours; then let the *glaſs* be well mixed, and take an aſſay of it, which will be found of a yellowiſh blue; return this many times into the furnace; when it begins to grow cold, it will ſhew many waves of different colours very beautifully. Then take tartar eight ounces, ſoot of the chimney two ounces, crocus martis made with brimſtone, half an ounce; let theſe be well powdered and mixed, and put them, by degrees, into the *glaſs* at ſix times, waiting a little while between each putting in; when the whole is put in, let the *glaſs* boil and ſettle for twenty-four hours; then make a little *glaſs* body of it, which put in the furnace many times, and ſee if the *glaſs* be enough, and whether it have on the outſide veins of blue, green, red, yellow, and other colours, and have beſide theſe veins, waves like thoſe of the chalcedonies, jaſpers, and oriental agates, and if the body kept within looks as red as fire.

When it is found to anſwer thus it is perfect, and may be worked into toys and veſſels, which will always be beautifully variegated; theſe muſt be well annealed, which adds much to the beauty of their veins. Maſſes of this may be poliſhed at the lapidary's wheel as natural ſtones, and appear very beautiful. If in the working the matter grow tranſparent, the work muſt be ſtopped, and more tartar, ſoot, and crocus martis, muſt be put to it, which will give it again the neceſſary body and opacity, without which it does not ſhew the colours well. Neri.

Glass *reſembling the* CHRYSOLITE may be made of ten pounds of either of the compoſitions for hard *glaſs*, deſcribed above, and ſix drams of calcined iron.

Galss reſembling the *red* CORNELIAN may be formed by adding one pound of *glaſs* of antimony, two ounces of the calcined vitriol, called *ſcarlet* OKER, and one dram of manganeſe, or magneſia, to two pounds of either of the compoſitions for hard *glaſs*. The *glaſs* of antimony and magneſia are firſt fuſed with the other *glaſs*, and then powdered and ground with the ſcarlet oker; the whole mixture is afterwards fuſed with a gentle heat, till all the ingredients are incorporated. A *glaſs* reſembling the white cornelian may be made of two pounds of either of the compoſitions for hard *glaſs*, and two drams of yellow oker well waſhed, and one ounce of calcined bones. Grind them together, and fuſe them with a gentle heat.

Glass, *emerald.* See *Green* Glass.

Glass, *garnet-coloured.* To give this colour to *glaſs*, the workmen take the following method. They take equal quantities of cryſtal and rochetta frit, and to every hundred weight of this mixture they add a pound of manganeſe, and an ounce of prepared zaffer; theſe are to be powdered ſeparately, then mixed and added by degrees to the frit while in the furnace: great care is to be taken to mix the manganeſe and zaffer very perfectly; and when the matter has ſtood twenty-four hours in fuſion, it may be worked. Neri.

Glaſs of this kind may be made by adding one pound of *glaſs* of antimony, one dram of manganeſe, and the ſame quantity of the precipitate of gold by tin, to two pounds of either of the compoſitions for hard *glaſs*: or the precipitate of gold may be omitted, if the quantities of the *glaſs* of antimony and manganeſe be doubled.

Glass, *gold-coloured.* This kind of *glaſs* may be made by taking ten pounds of either of the compoſitions for hard *glaſs*, omitting the ſalt-petre; and for every pound adding an ounce of calcined borax, or, if this quantity doth not render the *glaſs* ſufficiently fuſible, two ounces; ten ounces of red tartar, of the deepeſt colour, two ounces of magneſia, and two drams of charcoal of ſallow, or any other ſoft kind. Precipitates of ſilver baked on *glaſs* will ſtain it yellow, and likewiſe give a yellow colour on being mixed with and melted with forty or fifty times their weight of vitreous compoſitions; the precipitate from aqua fortis by fixed alkali ſeems to anſwer beſt. Yellow *glaſſes* may alſo be obtained with certain preparations of iron, particularly with *Pruſſian* BLUE. But Dr. Lewis obſerves, that the colour does not conſtantly ſucceed, nor approach to the high yellow of gold, with ſilver or with iron. The neareſt imitations of gold which he has been able to produce, have been effected with antimony and lead. Equal parts of the *glaſs* of antimony, of flint calcined and powdered, and of minium, formed a *glaſs* of a high yellow; and with two parts of *glaſs* of antimony, two of minium, and three of powdered flint, the colour approached ſtill more to that of gold. The laſt compoſition exhibited a multitude of ſmall ſparkles interſperſed through its whole ſubſtance, which gave it a beautiful appearance in the maſs, but were really imperfections, owing to air-bubbles.

Neri directs, for a gold-yellow colour, one part of red tartar, and the ſame quantity of manganeſe, to be mixed with a hundred parts of frit. But Kunckel obſerves, that theſe proportions are faulty; that one part, or one and a quarter of manganeſe, is ſufficient for a hundred of frit; but that ſix parts of tartar are hardly enough, unleſs the tartar is of a dark red colour, almoſt blackiſh; and that he found it expedient to add to the tartar about a fourth of its weight of powdered charcoal. He adds, that the *glaſs* ſwells up very much in melting, and that it muſt be left unſtirred and worked as it ſtands in fuſion. Mr. Samuel More, in repeating and varying this proceſs, in order to render the colour more perfect, found that the manganeſe is entirely uneſſential to the gold colour, and that the tartar is no otherwiſe of uſe, than in virtue of the coaly matter, to which it is in part reduced by the fire; the phlogiſton or inflammable part of the coal appearing, in ſeveral experiments, to be the direct tinging ſubſtance. Mr. Pott alſo, in his Neue Wichtige Phyſicaliſhch-Chymiſche Materien, &c. printed in 1762, obſerves, that common coals give a yellow colour to *glaſs*; that different coaly matters differ in their tinging power; that caput mortuum of ſoot and lamp-black anſwer better than common charcoal; and that the ſparkling coal, which remains in the retort after the rectification of the thick empyreumatic animal oils, is one of the moſt active of theſe preparations. This preparation, he ſays, powdered, and then burnt again a little in a cloſe veſſel, is excellent for tinging *glaſs*, and gives yellow, brown, reddiſh, or blackiſh colours, according to its quantity; but the fritt muſt not be very hard of fuſion; for, in this caſe, the ſtrong fire will deſtroy the colouring ſubſtance before the *glaſs* melts; and he has found the following compoſitions to be nearly the beſt; viz. ſand two parts, alcali three parts; or ſand two, alcali three, calcined borax one; or ſand two, alcali two, calcined borax one; and, though ſalt petre is hardly uſed at all, or very ſparingly, for yellow *glaſſes*, as it too much volatilizes the colouring ſubſtance; yet here for the moſt part a certain proportion of it, eaſily determined by trial, is very neceſſary; for, without it, the concentrated colouring matter is apt to make the *glaſs* too dark, and even of an opake pitchy blackneſs. It does not certainly appear that there is any material diverſity in the effects of different coals; the difference being probably owing to the different quantities of the inflammable matter, which they contain; ſo that a little more ſhall be required of one kind than of another, for producing the ſame degree of colour in the *glaſs*. Nor does the ſoftneſs or fuſibility of the frit appear to be in any reſpect neceſſary.

Gold-coloured ſpangles may be diffuſed through the ſubſtance of *glaſs*, by mixing the yellow talcs with powdered *glaſs*, and bringing the mixture into fuſion. See Lewis's Com. Phil. Techn. p. 626. 223, &c.

Glass, *green*, may be made by adding three ounces of copper, precipitated from aqua fortis, and two drams of precipitated iron to nine pounds of either of the compoſitions for hard *glaſs*. The fineſt method of giving this beautiful colour to *glaſs* is this. Take five pounds of cryſtalline metal, that has been paſſed ſeveral times through water, and the ſame quantity of the common white metal of polverine, four pounds of common polverine frit, and three pounds of red-lead; mix the red-lead well with the frit, and then put all into a pot in a furnace. In a few hours the whole maſs will be well purified; then caſt the whole into water, and ſeparate, and take out the lead; then return the metal into the pot, and let it ſtand a day longer in fuſion; then put in the powder of the reſiduum of the vitriol of copper, and a very little crocus martis, there will be produced a moſt lively and elegant green, ſcarce inferior to that of the Oriental emerald. There are many ways of giving a green to *glaſs*, but all are greatly inferior to this. Neri. See Emerald.

Glass, *ſea-green*. To make this colour in the *glaſs-trade*, the fineſt cryſtalline *glaſs* only muſt be uſed, and no mangeneſe muſt be added at firſt to the metal. The cryſtal frit muſt be melted thus alone, and the ſalt, which ſwims like oil on its top, muſt be taken off with an iron ladle very carefully. Then to a pot of twenty pound of this metal, add ſix ounces of calcined braſs, and a fourth part of the quantity of powdered zaffer: this powder muſt be well mixed, and put into the *glaſs* at three times, it will make the metal ſwell at firſt, and all muſt be thoroughly mixed in the pot. After it has ſtood in fuſion three hours, take out a little for a proof; if it be too pale, add more of the powder. Twenty-four hours after the mixing the powder the whole will be ready to work, but muſt be well ſtirred together from the bottom, leſt the colour ſhould be deepeſt there, and the metal at the top leſs coloured, or even quite colourleſs. Some uſe for this purpoſe half cryſtal frit, and half rochetta frit, but the colour is much the fineſt when all cryſtal frit is uſed. Neri.

Glass *for counterfeiting lapis lazuli*. See *Lapis* Lazuli.

Glass *reſembling opal*. See Opal.

Glass, *purple, of a deep and bright colour*, may be produced, by adding to ten pounds of either of the compoſitions for hard *glaſs*, above deſcribed, ſix drams of zaffer and one dram of gold, precipitated by tin: or to the ſame quantity of either compoſition one ounce of mangeneſe, and half an ounce of zaffer. The colour of amethyst may be imitated in this way. See *Ruby* Glass.

Glass, *red*. A blood-red *glaſs* may be made in the following manner: put ſix pounds of *glaſs* of lead, and ten pounds of common *glaſs*, into a pot glazed with white *glaſs*. When the whole is boiled and refined, and by ſmall quantities, and at ſmall diſtances of time, copper calcined to a redneſs, as much as on repeated proofs is found ſufficient; then add tartar in powder by ſmall quantities at a time, till the *glaſs* is become as red as blood; and continue adding one or other of the ingredients till the colour is quite perfect. Neri.

Glass, *ruby*. The way to give the true fine red of the ruby, with a fair tranſparence, to *glaſs*, is as follows. Calcine in earthen veſſels gold diſſolved in aqua regia, the menſtruum being evaporated by diſtillation, more aqua regia added, and the abſtraction repeated five or ſix times, till it becomes a red powder. This operation will require many days in a hot furnace; when the powder is of a proper colour take it out; and when it is to be uſed, melt the fineſt cryſtal *glaſs*, and purify it, by often caſting it into water; and then add, by ſmall quantities, enough of this red powder to give it the true colour of a ruby, with an elegant and perfect tranſparence. Neri.

The proceſs of tinging *glaſs* and enamels, by preparations of gold, were firſt attempted about the beginning of the laſt century. Libavius, in one of his tracts, entitled Alchymia, printed in 1606, conjectures, that the colour of the ruby proceeds from gold, and that gold diſſolved, and brought to redneſs, might be made to communicate a like colour to factitious gems and *glaſs*. On this principle Neri, in his Art of *Glaſs*, dated 1611, gives the proceſs above recited. Glauber, in 1648, publiſhed a method of producing a red colour by gold, in a matter which is of the vitreous kind, though not perfect *glaſs*. For this purpoſe he ground powdered flint or ſand with four times its weight of fixed alkaline ſalt; this mixture melts in a moderately ſtrong fire, and when cold looks like *glaſs*; but expoſed to the air runs into a liquid ſtate. On adding this liquor to ſolution of gold in aqua regia, the gold and flint precipitate together in form of a yellow powder, which by calcination becomes purple; by mixing this powder with three or four times its weight of the alkaline ſolution of flint, drying the mixture, and melting it in a ſtrong fire for an hour, a maſs is obtained, of a tranſparent ruby colour, and of a vitreous appearance, which nevertheleſs is ſoluble in water, or by the moiſture of the air, on account of the redundance of the ſalt. The honourable Mr. Boyle, in a work publiſhed in 1680, mentions an experiment, in which a like colour was introduced into *glaſs* without fuſion; for, having kept a mixture of gold and mercury in digeſtion for ſome months, the fire was at laſt immoderately increaſed, ſo that the *glaſs* burnt with a violent exploſion; and the lower part of the *glaſs* was found tinged throughout of a tranſparent red colour, hardly to be equalled by that of rubies. See Poroſity of Bodies, in Shaw's Abridgment of Boyle's Works, vol. i. p. 459. and Appendix to the Sceptical Chymiſt.

About the ſame time Caſſius is ſaid to have diſcovered the precipitation of gold by tin, and that *glaſs* might be tinged of a ruby colour by melting it with this precipitate: though he does not appear, ſays Dr. Lewis, from his treatiſe De Auro, to have been the diſcoverer of either. He deſcribes the preparation of the precipitate, and its uſe, but gives no account of the manner of employing it, only that he ſays, one dram of gold, duly prepared, will tinge ten pounds of *glaſs*. See Gold *precipitate with tin*.

This proceſs was ſoon after brought to perfection by Kunckel; who ſays, that one part of the precipitate is ſufficient to give a ruby colour to 1280 parts of *glaſs*, and a ſenſible redneſs to upwards of 1900 parts; but that the ſucceſs is by no means conſtant. Kunckel alſo mentions a purple-gold powder, reſembling that of Neri, which he obtained by inſpiſſating ſolution of gold to dryneſs, abſtracting from it freſh aqua regia three or four times, till the matter appears like oil; then precipitating with ſtrong alkaline ley, and waſhing the precipitate with water. By diſſolving this powder in ſpirit of ſalt, and precipitating again, it becomes, he ſays, extremely fair; and in this ſtate he directs it to be mixed with a due proportion of Venice *glaſs*.

Orſchal, in a treatiſe entitled Sol ſine Veſte, gives the following proceſs for producing a very fine ruby. He directs the purple precipitate, made by tin, to be ground with ſix times its quantity of Venice *glaſs* into a very fine powder, and this compound to be very carefully mingled with the frit or vitreous compoſition to be tinged. His frit conſiſts of equal parts of borax, nitre, and fixed alkaline ſalt, and four times as much calcined flint as of each of the ſalts; but he gives no directions as to the proportion of the gold precipitate, or mode of fuſion.

Hellot deſcribes a preparation, which, mixed with Venice *glaſs*, was found to give a beautiful purple enamel. This preparation conſiſts of equal parts of ſolution of gold, and of ſolution of zinc in aqua regia, mixed together, with the addition of a volatile ſalt prepared from ſal armoniac, by quicklime, in ſufficient quantity to precipitate the two metals. The precipitate is then gradually heated, till it acquires a violet colour. However, though a purple or red colour, approaching to that of ruby, may, by the methods above recited, be baked on *glaſs* or enamels, and introduced into the maſs by fuſion, the way of equally diffuſing ſuch a colour through a quantity of fluid *glaſs*, is ſtill, ſays Dr. Lewis, a ſecret.

The following proceſs for making the ruby *glaſs* was communicated to Dr. Lewis by an artiſt, who aſcribed it to Kunckel. The gold is directed to be diſſolved in a mixture of one part of ſpirit of ſalt, and three of aqua fortis, and the tin in a mixture of one part of the former of theſe acids with two of the latter. The ſolution of gold being properly diluted with water (ſee Gold *precipitate*, &c.) the ſolution of tin is added, and the mixture left to ſtand till the purple matter has ſettled to the bottom. The colourleſs liquor is then poured off, and the purple ſediment, while moiſt and not very thick, is thoroughly mixed with powdered flint or ſand. This mixture is well ground with powdered nitre, tartar, borax, and arſenic, and the compound melted with a ſuitable fire. The proportions of the ingredients are 2560 parts of ſand, 384 of nitre, 240 of tartar, 240 of borax, 28 of arſenic, 5 of tin, and 5 of gold. Lewis's Com. Phil. Techn. p. 171. 621, &c.

Glass *reſembling the* topaz may be made by pulverizing ten pounds of either of the compoſitions for hard *glaſs*, with an equal quantity of the *gold-coloured glaſs*, and fuſing them together.

Glass, *white opake*, and *ſemi-tranſparent*, may be made of ten pounds of either of the compoſitions for hard *glaſs*, and one pound of well calcined horn, ivory, or bone; or an opake whiteneſs may be given to *glaſs*, by adding one pound of very white arſenic to ten pounds of flint *glaſs*. Let them be well powdered and mixed, by grinding them together; and then fuſed with a moderate heat, till they are thoroughly incorporated. A *glaſs* of this kind is made in large quantities at a manufacture near London, and uſed not only for different kinds of veſſels, but as a white ground for enamel in dial-plates and ſnuff-boxes, which do not require finiſhing with much fire; becauſe it becomes very white and fuſible with a moderate heat.

Glass, *yellow*. See *Gold-coloured* Glass.

Glass-*balls*, which are circular or otherwiſe ſhaped hollow veſſels of *glaſs*, may be coloured within, ſo as to imitate the ſemi-pellucid gems. The method of doing it is this: make a ſtrong ſolution of ichthyocolla, or iſinglaſs, in common water, by boiling; pour a quantity of this while warm into the hollow of a white *glaſs* veſſel; ſhake it thoroughly about, that all the ſides may be wetted, and then pour off the reſt of the moiſture. Immediately after this, throw in red-lead, ſhake it and turn it about, throw it into many places with a tube, and the moiſture will make it ſtick and run in waves and pretty figures. Then throw in ſome of the painter's blue ſmalt, and make it run in waves in the ball as the red-lead; then do the ſame with verdigriſe, next with orpiment, then with red lake, all well ground; always caſting in the colours in different places, and turning the *glaſs*, that the moiſture within may run them into the waves. Then take fine plaiſter of Paris, and put a quantity of it into the ball; ſhake it alſo nimbly about; this will every where ſtick firmly to the *glaſs*, and give it a ſtrong inner coat, keeping all the colours on very fairly and ſtrongly. Theſe are ſet on frames of carved wood, and much eſteemed as ornaments in many places. Neri.

Glass-*drops*. See Rupert's *drops*.

Glass, *foliating of*. See Foliating and Looking-*glaſs*.

Glass, *gilding of*. See Gilding *of enamel*, and *glaſs*.

Glass, *grinding of*. See Grinding.

Glass *of lead*, a *glaſs* made with the addition of a large quantity of lead, of great uſe in the art of making counterfeit gems. The method of making it is this: put a large quantity of lead into a potter's kiln, and keep it in a ſtate of fuſion with a moderate fire, till it is calcined to a grey looſe powder; then ſpread it in the kiln, and give it a greater heat, continually ſtirring it to keep it from running into lumps; continue this ſeveral hours, till the powder become of a fair yellow; then take it out, and ſift it fine: this is called calcined lead.

Take of this calcined lead fifteen pounds, and cryſtalline, or other frit, twelve pounds; mix theſe as well as poſſible together; put them into a pot, and ſet them in the furnace for ten hours; then caſt the whole, which will be now perfectly melted, into water; ſeparate the looſe lead from it, and return the metal into the pot; and after ſtanding in fuſion twelve hours more, it will be fit to work. It is very tender and brittle, and muſt be worked with great care, taking it ſlowly out of the pot, and continually wetting the marble it is wrought upon. Neri.

It is well known, that ceruſs, or white lead, minium, litharge, and all the other preparations and calces of lead, are eaſily fuſed by a moderate fire, and formed into a tranſparent *glaſs* of a deep yellow colour. But this *glaſs* is ſo penetrating and powerful a flux, that it is neceſſary to give it a greater conſiſtence, in order to render it fit for uſe. With this view, two parts of calx of lead, e. g. minium, and one part of ſand, or powdered flints, may be put into a crucible of refractory clay, and baked into a compact body. Let this crucible, well cloſed with a luted lid, be placed in a melting furnace, and gradually heated, for an hour, or an hour and a half; and afterwards let the heat be increaſed, ſo as to obtain a complete fuſion, and continued in that ſtate for the ſame time: let the crucible remain to cool in the furnace, and when it is broken, a very tranſparent yellow-coloured *glaſs* will be found in it. Some add nitre and common ſalt to the above mixture, becauſe theſe ſalts promote the fuſion and the more equal diſtribution of the ſand. This *glaſs* of lead has a conſiderable ſpecific gravity, and its loweſt part is always the heavieſt. It is an important flux in the aſſays of ores to facilitate their ſcorifications.

Glaſs of lead is capable of all the colours of the gems in very great perfection. The methods of giving them are theſe: for green, take polverine frit twenty pounds, lead calcined ſixteen pounds; ſift both the powders very fine; then melt them into a *glaſs*, ſeparating the unmixed lead, by plunging the maſs in water; after this return it into the pot, and add braſs thrice calcined ſix ounces, and one penny-weight of crocus martis made with vinegar; put this in at ſix different times, always carefully mixing it together; let it finally ſettle an hour, then mix it together, and take a proof of it; when the colour is right, let it ſtand eight hours, and then work it. If inſtead of the calcined braſs the ſame quantity of the caput mortuum of the vitriolum veneris be uſed, the green is yet much finer.

For topaz-colour, take cryſtal frit fifteen pounds, calcined lead twelve pounds; mix them well together, by ſifting the powders through a fine ſieve; then ſet them in a furnace not too hot, and ſeparate the ſuperfluous unmixed lead, by caſting the whole into water; repeat this twice; then add half gold yellow *glaſs*, and let them incorporate and purify, and they will be of the true and exact colour of the oriental topazes.

For ſea-green, take cryſtal frit ſixteen pounds, calcined lead ten pounds; mix and ſift them together, and ſet them in a pot in a furnace; in twelve hours the whole will be melted; then caſt it into water, and ſeparate it from the looſe lead; put them into the furnace again for eight hours; then ſeparate the looſe lead by waſhing a ſecond time, and return it to the pot for eight hours more. Neri.

Glass, *painting in*. The primitive manner of painting in *glaſs* was very ſimple, and of conſequence very eaſy: it conſiſted in the mere arrangement of pieces of *glaſs* of different colours, in ſome ſort of ſymmetry; and conſtituted a kind of what we call Mosaic *work*.

Afterwards, when they came to attempt more regular deſigns, and even to repreſent figures raiſed with all their ſhades, their whole addreſs went no farther than to the drawing the contours of the figures in black, with water colours, and hatching the draperies, after the ſame manner, on *glaſſes* of the colour of the object intended to be painted. For the carnations, they choſe *glaſs* of a bright red; upon which they deſigned the principal lineaments of the face, &c. with black.

At laſt the taſte for this ſort of painting being conſiderably improved, and the art being found applicable to the adorning of churches, baſilicas, &c. they found means of incorporating the colours with the *glaſs* itſelf, by expoſing them to a proper degree of fire, after the colours had been laid on.

A French painter at Marſeilles is ſaid to have given the firſt notion hereof, upon going to Rome, under the pontificate of Julius II. But Albert Durer, and Lucas of Leyden were the firſt that carried it to any height.

The colours uſed in painting on *glaſs* are very different from thoſe uſed either in painting in oil, or water.

The *black* is made of two thirds of flakes, or ſcales of iron, beaten up, and mixed with another third of rocaille, or little glaſs beads. *White*, with ſand, or little white pebbles, calcined, pounded in a mortar, and afterwards ground on marble; with one fourth part of ſalt-petre added thereto, and the mixture calcined and pulverized over again: to which, when they are ready to uſe it, is added a little gypſum, or plaiſter of Paris well ground, &c. For *yellow*, they uſed leaf-ſilver ground, mixed up in a crucible, with ſulphur, or ſaltpetre; then, well beaten and ground on a porphyry ſtone; and, at length, ground over again with nine times as much red oker. *Red* is made of litharge of ſilver, and ſcales of iron, gum Arabic, ferretta, glaſs-beads, and blood-ſtone, nearly in equal quantities. This is one of the moſt difficult colours; and the preparation only to be learned by experience. *Green* is made of æs uſtum, one ounce; as much black lead, and four ounces of white ſand, incorporated by the fire. After calcination, they add a fourth part of ſaltpetre; after a ſecond calcination, a ſixth part more: after which they make a third coction before it is uſed. *Azure*, *purple*, and *violet*, are prepared like green, only leaving out the æs uſtum, and in the lieu thereof uſing ſulphur for azure; perigueux, for purple; and both theſe drugs for violet. *Carnations* are made of ferretta and rocaille. And laſtly, colours for the hair, trunks of trees, &c. are made of ferretta, rocaille, &c.

This account of colours we have from M. Felibien's excellent work Des Principes d'Architecture, &c. though it muſt be owned, that all the painters on *glaſs* do not uſe them; there being few artiſts of that kind but have invented their own particular ones, whereof they uſually make great ſecrets. But this is certain, that theſe above deſcribed are ſufficient for the beſt paintings of all ſorts; provided the perſon has but the ſkill to manage them.

In the windows of divers ancient churches, chapels, colleges, &c. we meet with the moſt beautiful and lively colours imaginable; ſuch as far exceed any uſed among us: but it is not that the ſecret of making thoſe colours is loſt; but that the moderns would not go to the expence of them; nor take all the neceſſary pains; becauſe this ſort of painting is not now ſo much eſteemed as formerly.

Mr. Walpole in his Anecdotes of Painting in England, has traced the hiſtory of this art from the Reformation, when miſguided zeal deſtroyed moſt of the monuments of it in our churches, through a ſeries of profeſſors to the preſent time. Among the later proficients in this art were Iſaac Oliver, who painted the windows at Chriſt-church, Oxford in 1700, William Price, who in the ſame year painted the window in Merton-chapel, William Price the ſon, to whoſe art we owe the windows at Queen's, New-college, and Maudlin, of whom Mr.

Walpole ſays, that his colours are fine, his drawing good, and his taſte in ornaments and Moſaic far ſuperior to any of his predeceſſors, and equal even to the antique.

In 1761 Mr. Paterſon, an auctioneer, late of Eſſex-houſe in London, exhibited the two firſt auctions of painted *glaſs* imported from Flanders; and undertook alſo to eſtabliſh a manufacture of painted *glaſs*: ſeveral of the pieces of this ingenious artiſt exhibited colours vying in perfection with the old paintings.

Thoſe beautiful works, among the painters in *glaſs*, which were made in the glaſs-houſe, were of two kinds: in ſome, the colour was diffuſed through the whole body of *glaſs*; in others, which were the more common, the colour was only on one ſide, ſcarce penetrating within the ſubſtance above one third of a line; though this was more, or leſs, according to the nature of the colour; the yellow being always found to enter the deepeſt.

Theſe laſt, though not ſo ſtrong and beautiful as the former, were of more advantage to the workmen; becauſe, on the ſame *glaſs*, though already coloured, they could ſhew other kind of colours, where there was occaſion to embroider draperies, enrich them with foliages, or repreſent other ornaments of gold, ſilver, &c.

In order to this, they made uſe of emery; grinding, or wearing down the ſurface of the *glaſs*, till ſuch time as they were got through the colour, to the clear *glaſs*: this done, they applied the proper colours on the other ſide of the *glaſs*. By this means the new colours were prevented from running, and mixing among the former, when the *glaſſes* came to be expoſed to the fire, as will hereafter be ſhewn.

When the intended ornaments were to appear white, or ſilvered, they contented themſelves to bare the *glaſs* of its colour with emery, without applying any new colour at all; and it was in this manner, that they wrought the lights and heightenings on all kinds of colours.

The painting with vitreous colours on *glaſs* depends entirely on the ſame principles as *painting in* ENAMEL; and the manner of executing it is likewiſe the ſame; except that in this the tranſparency of the colours being indiſpenſibly requiſite, no ſubſtances can be uſed to form them but ſuch as vitrify perfectly: and, therefore, the great object is to find a ſet of colours, which are compoſed of ſuch ſubſtances, as, by the admixture of other bodies, may promote their vitrification and fuſion; are capable of being converted into *glaſs*; and melting, in that ſtate, with leſs heat than is ſufficient to melt ſuch other kinds of *glaſs* as may be choſen for the ground or body to be painted; to temper theſe colours, ſo as to make them proper to be worked with a pencil; and to burn or reduce them by heat, to a due ſtate of fuſion, without injuring or melting the *glaſs* which conſtitutes the body painted.

The firſt thing to be done, in order to paint on glaſs, in the modern way, is to deſign, and even colour, the whole ſubject on paper. Then they make choice of pieces of *glaſs* proper to receive the ſeveral parts, and proceed to divide or diſtribute the deſign itſelf, or the paper it is drawn on, into pieces ſuitable to thoſe of *glaſs*: having always a view that the *glaſſes* may join in the contours of the figures, and the folds of the draperies; that the carnations, and other finer parts, may not be damaged by the lead wherewith the pieces are to be joined together.

The diſtribution being made, they mark all the *glaſſes*, as well as papers, with letters, or numbers; that they may be known again; which done, applying each part of the deſign on the *glaſs* intended for it, they copy or transfer the deſign upon this *glaſs*, with the black colour, diluted in gum-water; by tracing and following all the lines and ſtrokes, as they appear through the *glaſs*, with the point of a pencil.

When theſe firſt ſtrokes are well dried, which happens in about two days, the work being only in black and white, they give it a ſlight waſh over, with urine, gum Arabic, and a little black; and this ſeveral times repeated, according as the ſhades are deſired to be heightened: with this precaution, never to apply a new waſh, till the former is ſufficiently dried. This done, the lights and riſings are given, by rubbing off the colour in the reſpective places, with a wooden point, or the handle of the pencil.

As to the other colours above mentioned, they are uſed with gum-water, much as in painting in miniature; taking care to apply them lightly, for fear of effacing the outlines of the deſign; or even, for the greater ſecurity, to apply them on the other ſide, eſpecially yellow, which is very pernicious to other colours, by blending therewith.

And here too, as in pieces of black and white, particular regard muſt be always had, not to lay colour on colour, or lay on a new lay, till ſuch time as the former are well dried. It may be added, that the yellow is the only colour that penetrates through the *glaſs*, and incorporates therewith by the fire: the reſt, and particularly the blue which is very difficult to uſe, remaining on the ſurface, or at leaſt entering very little. When the painting of all the pieces is finiſhed, they are carried to the furnace or oven, to anneal or bake the colours. The furnace here uſed is ſmall, built of brick, from eighteen to thirty inches ſquare: at ſix inches from the bottom is an aperture, to put in the fewel, and maintain the fire. Over this aperture is a grate, made of three ſquare bars of iron, which traverſe the furnace, and divide it into two parts. Two inches above this partition is another little aperture, through which they take out pieces, to examine how the coction goes forward.

On the grate is placed a ſquare earthen pan, ſix or ſeven inches deep; and five or ſix inches leſs, every way, than the perimeter of the furnace. On one ſide hereof is a little aperture, through which to make the trials, placed directly oppoſite to that of the furnaces deſtined for the ſame end.

In this pan are the pieces of *glaſs* to be placed in the following manner: firſt, the bottom of the pan is covered with three ſtrata, or layers of quicklime, pulverized; thoſe ſtrata being ſeparated by two others, of old broken *glaſs*: the deſign whereof is to ſecure the painted *glaſs* from the too intenſe heat of the fire. This done the *glaſſes* are laid horizontally on the laſt, or uppermoſt, layer of lime.

The firſt row of *glaſs* they cover over with a layer of the ſame powder an inch deep; and over this they lay another range of *glaſſes*: and thus alternately, till the pan is quite full; taking care that the whole heap always ends with a layer of the lime-powder.

The pan thus prepared, they cover up the furnace with tiles, on a ſquare table of earthen-ware, cloſely luted all round; only having five little apertures, one at each corner, and another in the middle, to ſerve as chimneys.

Things thus diſpoſed, there remains nothing but to give the fire to the work. The fire for the two firſt hours muſt be very moderate; and muſt be increaſed, in proportion as the coction advances, for the ſpace of ten or twelve hours; in which time it is uſually completed. At laſt, the fire, which at firſt was only of charcoal, is to be of dry wood: ſo that the flame covers the whole pan, and even iſſues out at the chimneys.

During the laſt hours, they make aſſays from time to time, by taking out pieces laid for that purpoſe, through the little aperture of the furnace, and pan, to ſee whether the yellow be perfect, and the other colours in good order. When the annealing is thought ſufficient, they proceed with great haſte to extinguiſh the fire, which otherwiſe would ſoon burn the colours, and break the *glaſſes*.

GLASS, *painting on*, by *means of prints*. See BACK-*painting*.

GLASS, *poliſhing of*. See POLISHING and GRINDING.

GLASS-*porcelain*, the name given by many to a modern invention of imitating the china-ware with *glaſs*. The method given by Mr. Reaumur, who was the firſt that carried the attempt to any degree of perfection, is delivered by that gentleman in the memoirs of the academy of ſciences of Paris to this effect. This change of *glaſs* was firſt taken notice of by Neumann, who, in diſtilling milk in a *glaſs* retort obſerved, that the bottom of the veſſel acquired the appearance of porcelain, which he attributes to the fine white earthy matter of the milk forced into the *glaſs* by heat. Neum. Chem. Works by Dr. Lewis, p. 571.

The mixing *glaſs* reduced to powder, with other leſs eaſily vitriſiable ſubſtances for the forming a paſte to be afterwards made into a ſort of porcelain, has been a contrivance long practiſed, but it is very troubleſome, and the reſult ſubject to many faults; but this new ware is made of *glaſs* alone, and that with much leſs trouble, and without the reducing it to powder. By this art, veſſels of *glaſs* are changed into veſſels of a ſort of porcelain, without altering their form, and the meaneſt *glaſs* ſerves as well as the beſt for that purpoſe; our common coarſe green quart-bottles, or the great bell *glaſſes* with which gardeners cover their melons, &c. being by this means changeable into a beautiful white ſort of porcelain-ware; and this is to be done in ſo eaſy a manner, and with ſo ſmall expence, that it requires no more trouble or charge, than that of baking a common veſſel of our coarſe earthen-ware, and for this reaſon the veſſels of this ſort of ware may be afforded extremely cheap.

It is very certain, that all porcelain-ware is a ſubſtance in the ſtate of ſemivitrification; and in order to bring *glaſs*, which is a wholly vitrified ſubſtance, into the condition of porcelain, there requires no more than to reduce it to a leſs perfectly vitrified ſtate.

The queſtion which would naturally be ſtarted on this occaſion, is, whether it be poſſible to reduce *glaſs* to a leſs vitrified ſtate, it having already undergone what is eſteemed the laſt change by fire. But when we conſider, that the *glaſs* of antimony, the vitrifications of many of the metals, as the *glaſs* of lead, and the counterfeit gems coloured by the metals, are more or leſs eaſily reduced again by chemiſtry to metals, &c. the reducing ſand, flints, &c. after they are vitrified, at leaſt a little way back toward their native or priſtine ſtate, may appear not wholly impracticable; and the attempts which Mr. Reaumur made on this occaſion, were what gave him the firſt hints of the *glaſs*-porcelain.

The method of making it is this. The *glaſs*-veſſels to be converted into porcelain, are to be put into a large earthen veſſel, ſuch as the common fine earthen diſhes are baked in, or into ſufficiently large crucibles; the veſſels are to be filled with a mixture of fine white ſand, and of fine gypſum or plaiſter-ſtone burnt in to what is called plaiſter of Paris, and all the interſtices are to be filled up with the ſame powder, ſo that the *glaſs* veſſels may no where touch either one another, or the ſides of the veſſel they are baked in. The veſſel is to be then covered down and luted, and the fire does the reſt of the work; for this is only to be put into a common potter's furnace, and when it has ſtood there the uſual time of the baking the other veſſels, it is to be taken out, and the whole contents will be found no longer *glaſs*, but converted into a white opake ſubſtance, which is a very elegant porcelain, and has almoſt the properties of that of China. Memoirs Acad. Sciences Par. 1739.

The powder which has ſerved once, will do again as well as freſh, and that for a great many times: nay, it ſeems ever ſo often. The cauſe of this transformation, ſays Macquer, is probably that the vitriolic acid of the gypſum quits its baſis of calcareous earth, and unites with the alkaline ſalt and ſaline earth of the *glaſs*, with which it forms a kind of ſalt or ſelenites, different from the calcareous ſelenites, by the interpoſition of which matter the *glaſs* acquires the qualities of porcelain. Dr. Lewis from a variety of experiments on the nature and qualities and method of producing this porcelain has deduced the following concluſions: 1. Green *glaſs* cemented with white ſand received no change in a heat below ignition: in a low red-heat, the change proceeded very ſlowly; but in a ſtrong red-heat, approaching to whiteneſs, the thickeſt pieces of *glaſs* bottles were thoroughly changed in three hours. 2. The *glaſs* ſuſtained the following progreſſion of changes. Its ſurface firſt became blue; its tranſparence was diminiſhed, and when held between the light and the eye, it appeared of a yellowiſh hue: afterwards it was changed a little way on both ſides into a white ſubſtance, externally ſtill blueiſh; and as this change advanced ſtill farther and farther within the *glaſs*, the colour of the vitreous part in the middle approached nearer to yellow: the white coat was of a fine fibrous texture, and the fibres were diſpoſed nearly parallel to one another, and tranſverſe to the thickneſs of the piece: by degrees the *glaſs* became throughout white and fibrous, the external blueiſhneſs at the ſame time going off, and being ſucceeded by a dull whitiſh or dun colour: by a ſtill longer continuance in the fire, the fibres were changed gradually from the external to the internal part, and converted into grains; and the texture then was not unlike that of common porcelain. The grains, at firſt fine and ſomewhat gloſſy, appeared afterwards larger and duller, and at length the ſubſtance of the *glaſs* became porous and friable, like a maſs of white ſand ſlightly cohering. 3. Concerning the qualities of the converted *glaſs* Dr. Lewis obſerves, that the whiteneſs of the internal part was not inferior to that of porcelain, but that its ſurface was the leaſt beautiful, that the thick pieces were quite opake, and that ſeveral thin pieces were ſemi-tranſparent: that while it remained in a fibrous ſtate, its hardneſs became greater than that of *glaſs*, or of the common kinds of porcelain; it was capable of ſuſtaining ſudden changes of heat and cold better than any porcelain; and in a moderate white heat, it was fuſible into a ſubſtance not fibrous, but vitreous and ſmooth, like white enamel: that when its texture had become coarſely granulated, it was now much ſofter and unfuſible: and, laſtly, that when ſome coarſely granulated unfuſible pieces which, with the continuance of a moderate heat, would have become porous and friable, were ſuddenly expoſed to an intenſe fire, they were rendered remarkably more compact than before; the ſolidity of ſome of them being ſuperior to that of any other ware. 4. No differences appeared in the internal colour, hardneſs, texture, or the regular ſucceſſion of changes, from the uſe of different cementing ſubſtances; though in external appearances the differences were conſiderable. All the pieces which had been ſurrounded with charcoal or with ſoot were externally of a deep black colour, which did not diſappear by expoſure to a ſtrong fire during an hour, with free acceſs of air. Coloured clays and ſands communicated different ſhades of a brown colour; and white earths gave whitiſh, greyiſh, or browniſh tinges. White ſand, calcined flints, and gypſum, gave in general the greateſt whiteneſs, and tobacco-pipe clay the greateſt gloſſineſs, and brightneſs. *Glaſſes* compoſed of earths without alkaline ſalt, *glaſs* of lead, flint-*glaſs*, crown-*glaſs*, looking-*glaſs* plates, a *glaſs* prepared with calcined flints and a fixed alkaline ſalt, and even green *glaſs* which had been fuſed together with a ninth part of alkaline ſalt, ſuffered none of the above alterations by cementation. Green bottle-*glaſs* and common window-*glaſs* were moſt ſuſceptible of theſe alterations. 6. The changes produced by cementation could not proceed from any abſorption of matter from the cementing ſubſtance; becauſe no increaſe of weight was given, and becauſe the ſame changes were produced upon a piece of *glaſs* merely by heat, without any cementing ſubſtance. See Com. Phil. Tehcn. p. 230—255. See Porcelain.

Glass-*pots*, the veſſels in the *glaſs* trade uſed for melting the *glaſs*. Thoſe for the white *glaſs* works are made of a tobacco-pipe clay, brought from the Iſle of Wight, which is firſt well waſhed, then calcined, and afterwards ground to a fine powder in a mill; which being mixt with water, is then trod with the bare feet till it is of a proper conſiſtence, to mould with the hands into the proper ſhape of the veſſels. When theſe are thus made, they are afterwards annealed over the furnace. Thoſe for the green *glaſs* work are made of the nonſuch, and another ſort of clay from Staffordſhire; they make theſe ſo large as to hold three or four hundred weight of metal. And beſides theſe, they have a ſmall ſort called piling-pots, which they ſet upon the larger, and which contain a finer and more nice metal fit for the niceſt works. Neri.

The clay that is uſed for this purpoſe ſhould be of the pureſt and moſt refractory kind, and well cleanſed from all ſandy, ferruginous, and pyritous matters; and to this it will be proper to add ground crucibles, white ſand, calcined flints duly levigated, or a certain proportion of the ſame clay baked, and pounded not very finely. The quantity of baked clay that ought to be mixed with the crude clay, to prevent the pots from cracking when dried, or expoſed to a great heat, is not abſolutely determined, but depends on the quality of the crude clay, which is more or leſs fat. M. D'Antic, in a memoir on this ſubject, propoſes the following method of aſcertaining it: the burnt and crude clay, being mixed in different proportions, ſhould be formed into cakes, one inch thick, and four inches long and wide. Let theſe cakes be ſlowly dried, and expoſed to a violent heat, till they become as hard and as much contracted as poſſible, and in this ſtate be examined; and the cake, he ſays, which has ſuffered a diminution of its bulk equal only to an eighteenth part, is made of the beſt proportions. He obſerves, in general, that moſt clays require that the proportion of the burnt ſhould be to the freſh as four to five.

Glass *tubes* are of various lengths, diameters, and forms, according to the experimental purpoſes to which they are applied. It has been obſerved, that *glaſs* tubes, laid before the fire in an horizontal poſition, and with their extremities ſupported, have had a rotatory motion about their axis; and alſo a progreſſive motion towards the fire, even when their ſupports are inclining from the fire, ſo that the tubes will move a little upwards. See Phil. Tranſ. N° 476. § 1.

When the progreſſive motion of the tube is ſtopped by any obſtacle, its motion about its axis will ſtill continue. When the tubes are placed in a nearly upright poſture leaning to the right hand, the motion will be from eaſt to weſt; but if they lean to the left, the motion will be from weſt to eaſt; and the nearer they are placed to the perfectly upright poſture, the leſs the motion will be either way.

If the tube be placed horizontally on a *glaſs* plane, the fragment, for inſtance, of coach WINDOW-*glaſs*, inſtead of moving towards the fire, it will move from it, and about its axis, in a contrary direction to what it had done before. Nay, it will recede from the fire and move a little upwards, when the plane inclines towards the fire.

Neither the draught of air up the chimney, nor attraction or repulſion, are the cauſe of theſe phænomena. It ſeems rather owing to the ſwelling of the tube towards the fire; for allowing ſuch ſwelling, gravity muſt pull the tube down, when ſupported near its extremities horizontally; and a freſh part being expoſed to the fire, and ſwelling out again, muſt fall down again, and ſo on ſucceſſively; which will produce a rotatory motion towards the fire.

If the tube be ſupported by two other tubes, and theſe be brought near to each other, and to the center of the ſupported tube, then its parts hanging over on each ſide, being larger than the part which lies between the ſupporters, will, by their weight, pull downwards, and conſequently force the middle part, reſting upon its two props, upwards; and being leſs advanced towards the fire, as being leſs heated, will, by their oblique ſituation, pull the middle part backwards alſo from the fire, which will cauſe a rotatory regreſſive motion, quite contrary to what the tube had when ſupported near its extremities And when a ſingle tube lies inclining oppoſite to the fire, either to the right hand or to the left, out of a plane perpendicular to the ſurface of the fire, gravity will not permit the curved part to reſt, but pull it down till it coincides with a plane perpendicular to the horizon; and conſequently, as new curves are generated, new motions will be ſo too; that is, the tube will be made to move about its axis, with this difference, when the tube inclines to the right hand, the motion will be from eaſt to weſt; when to the left hand, from weſt to eaſt. The juſtneſs of this reaſoning is made manifeſt, by bending a wire, and ſupporting it firſt near its extremities, then near its center on each ſide, afterwards inclining it to the right and to the left; the bending in every caſe repreſenting the curved part of the tube next the fire. This ſolution of the phænomena is rendered the more probable from hence, that when four ſupporters were made uſe of, one at each extremity, and two near the middle, there was no motion at all, either backward or forward. Nor does the increaſe of contact hinder the motion, becauſe the plate of *glaſs* was ſo broad as to have a much greater contact with the tube, and yet both the rotatory and regreſſive motions were manifeſt.

Theſe experiments ſucceeded beſt with tubes about twenty or twenty-two inches long; the diameter about one-tenth of an inch; and they had in each a pretty ſtrong pin fixed in cork, for an axis to roll with on the ſupporting tubes. Phil. Tranſ. N° 476.

Glass *receivers, how to cement the cracks of.* See Cæment and Receiver.

Glass, *how to take the impreſſions of antique gems in.* See Gem.

The property which *glaſs* poſſeſſes in common with other ſubſtances of being expanded by heat, and contracted by cold, was long ago obſerved and evinced by Mr. Hook. See Birch's Hiſt. of the Royal Society, vol. i. p. 411. See Thermometer.

Glasses are diſtinguiſhed, with regard to their form, uſe, &c. into various kinds, as, *drinking-glaſſes*, *optic glaſſes*, *looking-glaſſes*, *burning-glaſſes*, &c.

Glasses, *drinking*, are ſimple veſſels of common *glaſs* or cryſtal, uſually made in form of an inverted cone.

Each *glaſs* conſiſts of three parts, viz. the calyx, or bowl; the bottom; and the foot; which are all wrought or blown ſeparately.

Nothing can be more dextrous and expeditious than the manner wherein theſe parts are all blown; two of them opened, and all three joined together. An idea is only to be had thereof, by ſeeing them actually at work.

The *glaſſes* chiefly uſed in England are made of the aſhes of fern; cryſtal *glaſſes* being leſs frequent in uſe. The exceeding brittleneſs of this commodity, notwithſtanding the eaſy rate of each *glaſs*, renders the conſumption thereof very conſiderable. For the method of gilding the edges of drinking *glaſſes*, ſee Gilding *on enamel and glaſs.*

Glasses, *optic*, are thoſe made uſe of to ſtrengthen, improve, or preſerve the ſight. See Optic *glaſſes.*

Glasses, *convex.* See Convexity.

Glasses, *concave.* See Concave.

Glass, *infernal.* See Infernal.

Glasses, *lenticular.* See Lens.

Glasses, *meniſcus.* See Meniscus, &c.

Glasses, *plain.* See Plain *glaſs.*

Glasses, *plano-concave.* See Plano-concave.

Glasses, *plano-convex.* See Plano-convex.

Glasses, *teleſcope.* See Telescope.

Glass, *object.* See Object *glaſs.*

Glasses, *eye.* See Eye *glaſs.*

Glass, *magnifying.* See Magnifying.

Glass, *multiplying.* See Multiplying.

Glasses, *muſical.* See Armonica.

This method of producing muſical ſounds, though firſt introduced among us by Mr. Puckeridge has been long ſince practiſed in Germany: and the Perſians have alſo done the ſame by ſtriking ſeven cups of porcelain, containing a certain quantity of water with ſmall ſticks. Encyclopedie.

Glass, *perſpective.* See Perspective.

Glass, *looking.* See Looking *glaſs*, Mirror, and Foliating.

Glass, *burning.* See Burning *glaſs.*

Glass, *weather.* See Weather *glaſs.*

Glass, *cupping.* See Cupping *glaſs.*

Glass, *window.* See Window.

Glass, *axis of a.* See Axis.

Glass, *pole of a.* See Pole.

Glass, *hour.* See Hour *glaſs.*

Glass, *tin.* See Bismuth.

Glass, *watch.* See Watch.

Glass-*wort.* See Kali.

Glass-wort, *berry-bearing*, *Anabaſis*, in *Botany*, a genus of the *pentandria digynia* claſs: the characters of which are, that the calyx is three-leaved, the corolla has five petals, and the fruit is a ſingle-ſeeded berry.

Glass-*wort*, *jointed.* See Salt-*wort*, and Kelp.

GLASSY *humour.* See Humours and Vitreous.

GLASTONBURY *thorn.* See Medlar.

GLAUBER'S *ſalts.* See Sal *mirabile.*

GLAUCEDO, a term uſed by ſome *Medical* writers, for the diſeaſe more uſually called glaucoma. See Cataract.

GLAUCIDIUM, in *Zoology*, the name uſed by ſome authors, for the ſmaller ſpecies of glaucus, the ſecond ſpecies of Rondeletius.

GLAUCIUM, in *Ornithology*, the name given by Bellonius to a ſpecies of duck, ſeeming by his deſcription to be the ſame with the capo-*roſſo*, or *anas fera fuſca minor*, the ſmall brown wild duck of authors.

Glaucium, in *Botany.* See Celandine.

GLAUCOMA, Γλαυκωμα, in *Medicine*, the name of a diſeaſe in the eye, wherein the chryſtalline humour is turned of a blueiſh or greeniſh colour, and its tranſparency hereby diminiſhed.

The word comes from γλαυκος *glaucus*, *cæſius*, ſea-green, ſky-coloured, or greyiſh.

Thoſe in whom this diſorder is forming, diſcover it hence, that all objects appear to them as through a cloud or miſt; when entirely formed, the viſual rays are all intercepted, and they ſee nothing at all.

It is reckoned incurable, when inveterate, and in aged perſons: and even under other circumſtances, is very difficult of cure; externals proving of little ſervice.

The internals beſt ſuited to it, are thoſe uſed in the gutta ſerena. Jul. Cæſar Claudinus, Conſul. 74. gives a remedy for the *glaucoma.*

The *glaucoma* is uſually diſtinguiſhed from the cataract or ſuffuſion, in this, that in the cataract the whiteneſs appears in the pupil, very near the cornea; but it ſhews deeper in the *glaucoma.*

Some late French authors, however, maintain the cataract and *glaucoma* to be one and the ſame diſeaſe. According to them, the cataract is not a film, or pellicle, formed before the pupil, as had always been imagined; but an inſpiſſation or induration, of the humour itſelf, whereby its tranſparency is prevented; which brings the cataract to the *glaucoma.* According to Mr. Sharp the *glaucoma* of the ancient Greeks is the preſent cataract; but M. St. Yves ſays it is a cataract accompanied with a gutta *ſerena.*

GLAUCUS, in *Zoology*, the name of a genus of fiſhes, of which Rondeletius has deſcribed three ſpecies. The firſt, or more common kind, is a broad fiſh approaching to the figure of the turbot, but very thin; its colour on the back and ſides is a duſky olive, and on the belly white, and it has on each ſide three or four black ſpots. Its ſcales are ſmall and rounded, its mouth large, its teeth ſmall, and the whole inſide of its mouth tinged with blue. Its gill-fins are ſmall, with two back fins.

The tail is extremely large, and more forked than almoſt in any other fiſh; the tips of the forks are tinged black. This is caught in the Mediterranean. Willughb. Hiſt. Piſc. p. 298. The ſecond ſpecies is much of the ſame figure with the firſt, but of a ſmaller ſize, and therefore called by ſome *glaucidium.* This alſo has an undulated line, running on each ſide from the membrane of the gills to the middle of the body, from whence it is continued ſtraight to the tail; whereas in the common *glaucus*, this line runs ſtraight all the way. The third ſpecies differs from the former in having very ſtrong and ſharp teeth, and having its ſide-lines from the gills much more waved. The back to thoſe lines is of a deep blueiſh black, and below them perfectly white. Rond. de Piſc. p. 400. 460.

GLAUX, *ſea milk-wort*, or *black ſalt-wort*, in *Botany*, a genus of the *pentandria monogynia* claſs: having a ſingle-leaved calyx, no corolla, and a ſingle-celled, five-valved, and five-ſeeded capſule. This is a low trailing perennial plant, with white flowers iſſuing from the boſom of the leaves. It grows upon the ſea ſhores in moſt parts of England, and is called the ſea chick-weed.

GLAZIER, an artificer or dealer in glaſs.

GLAZING. The Roman method of *glazing* ſome of their urns, might give our workmen a hint toward a method greatly ſuperior to any thing now in practice for the *glazing* earthen-ware. There are a ſort of red urns found in Yorkſhire, which are, inſtead of *glazing*, covered all over inſide and out with a fine coral-coloured varniſh, that gives them a beauty, which no earthen-ware of our times can attain; and is not only far more durable than our way of doing it with lead, which is apt to crack and fly, both with wet and with heat, but far more ſafe and wholſome; lead being well known to be a vapourable metal, and its fumes very noxious, there is great reaſon to ſuſpect that it muſt be unwholſome when brought to the fire. This ancient *glazing* ſeems to have been done either by the bruſh, or elſe by dipping, for both the inſide and outſide are varniſhed with equal regularity; and ſomething may be gueſſed at as to the materials they uſed in it from what Pliny has left us This author occaſionally obſerves, that ſuch earthen-ware as was painted with bitumen, never loſt its beauty; and afterwards, that it was a cuſtom to cover over whole ſtatues with this ſort of *glazing*, which he obſerves did not only make a ſmooth coat, but ſunk into the matter of the ſtone or earth, and therefore this could not be likely to crack and fly off like our lead-coats on plates, &c. which is merely a cruſt laid over them. Hook's Philoſ. Collect p. 89

A common *glazing* for any kind of earthen-ware may be made of white ſand forty pounds, of red lead twenty pounds, of pearl-aſhes twenty pounds, and of common ſalt twelve pounds. Powder the ſand by grinding it, and then add it to the other ingredients and grind them together: after which calcine them for ſome time with a moderate heat, and when the mixture is cold, pound it to powder; and when wanted for uſe temper it with water. The proportion of theſe ingredients may be occaſionally varied. We may obſerve, in general, that lead ought to be excluded from the compoſition of *glazings* and other fluxes ſubſtituted in its ſtead. See Colica *Dammoniorum*.

A tranſparent *glazing* may be prepared, without lead, by calcining forty pounds of white ſand, twenty-five pounds of pearl-aſhes, and fifteen pounds of common ſalt; and proceeding as before: and a more perfect tranſparent *glazing* may be made of ſand forty pounds, of wood-aſhes, perfectly burnt, fifty pounds, of pearl-aſhes ten pounds, and of common ſalt twelve pounds. The following recipes are taken, for the moſt part from Kunckel, who ſays, that they are the true *glazings* uſed at Delft, and other Dutch manufactories.

Glazing, *black*, is made of eight parts of red-lead, iron filings three, copper-aſhes three, and zaffer two meaſures. This, when melted, will make a brown black; and if you want it blacker, add more zaffer to it.

Glazing, *blue*, is thus prepared: take lead-aſhes, or red-lead, one pound, clear ſand, or powdered flints, two pounds, common ſalt two pounds, white calcined tartar one pound, Venice or other glaſs half a pound, zaffer half a pound; mix them well together, and melt them for ſeveral times, quenching them always in cold water. If you would have it fine and good, it will be proper to put the mixture into a glaſs furnace for a day or two.

Another blue *glazing* may be formed of one pound of tartar, a quarter of a pound of red-lead, half an ounce of zaffer, and a quarter of a pound of powdered flints, which are to be fuſed and managed as in the laſt recipe. Or, take two pounds of calcined lead and tin, add five pounds of common ſalt, five pounds of powdered flints, and of zaffer, tartar, and Venetian glaſs, each one pound. Calcine and fuſe the mixture as before.

Or, again, take of red-lead one part, of ſand three parts, and of zaffer one part. For a violet blue *glazing*, take four ounces of tartar, two ounces of red-lead, five ounces of powdered flints, and half a dram of manganeſe.

Glazing, *brown*, is made of red-lead and flints, of each fourteen parts, and of manganeſe two parts, fuſed: or, of red-lead twelve parts, and manganeſe one part, fuſed. A brown *glazing*, to be laid on a white ground, may be made of manganeſe two parts, and of red-lead and white glaſs, of each one part, twice fuſed.

Glazing, *fleſh-coloured*, is made of twelve parts of lead-aſhes, and one of white glaſs.

Glazing, *gold-coloured*. To make gold-coloured *glazing*, take of litharge three parts, of ſand, or calcined flint, one part; pound, and mix theſe very well together; then run them into a yellow glaſs with a ſtrong fire. Pound this glaſs, and grind it into a ſubtile powder, which moiſten with a well ſaturated ſolution of ſilver; make it into a paſte, which put into a crucible, and cover it with a cover. Give at firſt a gentle degree of fire; then increaſe it, and continue it till you have a glaſs, which will be green. Pound this glaſs again, and grind it to a fine powder; moiſten this powder with ſome beer, ſo that by means of an hair pencil you may apply it upon the veſſels, or any piece of earthen-ware. The veſſels that are painted or covered over with this *glazing*, muſt be firſt well heated, then put under a muffle; and as ſoon as the glaſs runs, you muſt ſmoak them, by holding them over burning vegetables, and take out the veſſels. Mr. Heinſius of Peterſburgh, who ſent this receipt to the Royal Society, uſes the words *aſſare debes fumum*, which is rendered *ſmoak them*, in the Tranſactions. Phil. Tranſ. N° 465. § 6.

Kunckel gives ſeveral preparations for a gold-coloured yellow *glazing*. This may be produced by fuſing a mixture of three parts of red-lead, two parts of antimony, and one part of ſaffron of Mars; by again melting the powdered maſs, and repeating the operation four times: or, by fuſing four or five times a compoſition of red-lead and antimony, of each an ounce, and of ſcales of iron half an ounce: or, by calcining and fuſing together eight parts of red-lead, ſix parts of flints, one part of yellow oker, one part of antimony, and one part of white glaſs. A tranſparent gold-coloured *glazing* may be obtained by twice fuſing red-lead and white flints, of each twelve parts, and of filings of iron one part.

Glazing, *green*, may be prepared of eight parts of litharge, or red-lead, eight parts of Venice glaſs, four parts of braſs-duſt, or filings of copper; or, of ten parts of litharge, twelve of flint or pebble, and one of Æs *uſtum*, or copper-aſhes.

A fine green *glazing* may be produced by fuſing one part of the Bohemian granate, one part of filings of copper, one part of red-lead, and one part of Venetian glaſs: or, by fuſing one part of white glaſs, the ſame quantity of red-lead, and alſo of filings of copper; powdering the maſs, and adding one part of Bohemian granate to two parts of this powder. A fine green may be obtained by mixing and grinding together any of the *yellow* GLAZINGS with equal quantities of the *blue* GLAZINGS; and all the ſhades and teints of green will be had by varying the proportion of the one to the other, and by the choice of the kind of yellow and blue.

Glazing, *iron-coloured*, is prepared of fifteen parts of lead-aſhes, or red-lead, fourteen of white ſand, or flints, and five of calcined copper. This mixture is to be calcined and fuſed.

Glazing, *liver-coloured*, is prepared of twelve parts of litharge, eight of ſalt, ſix of pebble or flint, and one of manganeſe.

Glazing, *purple-brown*, conſiſts of lead-aſhes fifteen parts, clear ſand, or powdered flints, eighteen parts, manganeſe one part, and white glaſs fifteen meaſures; to which ſome add one meaſure of zaffer.

Glazing, *red*, is made of antimony three pounds, litharge, or red-lead, three, and ruſt of iron, one; grind them to a fine powder. Or, take two pounds of antimony, three of red-lead, and one of calcined ſaffron of Mars, and proceed as before.

Glazing, *ſea-green*, is made of five pounds of lead-aſhes, one pound of tin-aſhes, three pounds of flint, three quarters of a pound of ſalt, half a pound of tartar, and half a pound of copper-duſt.

Glazing, *white*. A fine white *glazing* for earthen-ware is thus prepared. Take two pounds of lead, and one of tin; calcine them to aſhes: of this take two parts, calcined flint, white ſand, or broken white glaſs, one part, and ſalt one part; mix them well together, and melt them into a cake for uſe. The trouble of calcining the tin and lead may be prevented, by procuring them in a proper ſtate.

The white *glazing* for common ware is made of forty pounds of clear ſand, ſeventy-five pounds of litharge or lead-aſhes, twenty-ſix of pot-aſhes, and ten pounds of ſalt: theſe are three times melted into a cake, quenching it each time in clear cold water. Or, it may be made of fifty pounds of clean ſand, ſeventy of lead-aſhes, thirty of wood-aſhes, and twelve of ſalt.

A very fine white *glazing* may be obtained by calcining two parts of lead, and one part of tin; and taking one part of this maſs, and of flints and common ſalt, of each one part, and fuſing the mixture. See Delf-*ware*.

A white *glazing* may be prepared by mixing one hundred pounds of MASTICOT, ſixty pounds of red-lead, twenty pounds of calcined tin or putty, and ten pounds of common ſalt, and calcining and powdering the mixture ſeveral times.

Glazing, *yellow*, is prepared of red-lead, three pounds; calcined antimony and tin, of each two pounds: or, according to ſome, of equal quantities of the three ingredients. Theſe muſt be melted into a cake, then ground fine; and this operation repeated ſeveral times: or, it may be made of fifteen parts of lead-ore, three parts of litharge of ſilver, and fifteen parts of ſand.

A fine yellow *glazing* may be procured by mixing five parts of red-lead, two parts of powdered brick, one part of ſand, one part of the white *glazings* and two parts of antimony, calcining the mixture and then fuſing it. Or, take four parts of white glaſs, one part of antimony, three parts of red-lead and one part of iron ſcales, and fuſe the mixture: or, fuſe ſixteen parts of flints, one part of iron-filings, and twenty-four parts of litharge. A light yellow *glazing* may be produced with ten parts of red-lead, three parts of antimony, and three of glaſs, and two parts of calcined tin. See *Gold-coloured* GLAZING.

Glazing, *citron-yellow*, is made of ſix parts of red-lead, ſeven parts of fine red brick-duſt, and two parts of antimony. This mixture muſt be calcined day and night for the ſpace of four days, in the aſh-hole of a glaſs-houſe furnace, and at laſt urged to fuſion.

Glazing *of Delf-ware.* See Delf-*ware.*

Glazing *of porcelain.* See Porcelain.

Glazing *of ſtone-ware, and queen's ware.* See Pottery.

GLEAD, or **Glade**, a name uſed in the northern parts of the kingdom for the *milvus*, or KITE.

GLEAM is popularly uſed for a RAY or beam of light. Among falconers, a hawk is ſaid to *gleam*, when ſhe caſts or throws up filth from the gorge.

GLEANING, the act of gathering, or picking up the ears of corn left behind after the field has been reaped, and the crop carried home.

By the cuſtoms of ſome countries, particularly thoſe of Melun and Eſtampes, all farmers, and others are forbidden, either by themſelves or ſervants, to put any cattle into the fields, or prevent the *gleaning* in any manner whatever, for the ſpace of twenty-four hours after the carrying off the corn; on penalty of confiſcation, &c.

GLEBA *alana*, a name by which ſome call the yellowiſh white TRIPOLI.

GLEBE, **Gleba**, in *Natural Hiſtory*, *Chemiſtry*, &c. a clod or piece of ſtone or earth, frequently containing ſome metal, or mineral.

The *glebes* are carried to the forges to be waſhed, purified, and melted, &c.

Glebe, or **Glebe** land, is properly uſed for church-land. *Dos vel terra ad eccleſiam pertinens.*

Glebe-land is moſt commonly uſed for land belonging to a pariſh-church, beſide the tithes.

Thus, Lindwood: Glebe *eſt terra in qua conſiſtit dos eccleſiæ; generaliter tamen ſumitur pro ſolo, vel pro terra culta.* Though in the moſt general, and extenſive uſe of the word, *glebe* is applicable to any land or ground belonging to any benefice, fee, manor, inheritance, or the like.

If any parſon, vicar, &c. hath cauſed any of his *glebe* lands to be manured and ſowed at his own coſts, with any corn or grain; the incumbents may deviſe all the profits and corn growing upon the ſaid *glebe* by will. Stat. 28 H. 8. cap. 11. and if a parſon ſows his *glebe* and dies, the executors ſhall have the corn ſowed by the teſtator. But if a *glebe* be in the hands of a tenant, and the parſon dies after ſeverance of the corn, and before his rent due; it is ſaid, neither the parſon's executors nor his ſucceſſor can claim the rent, but the tenant may retain it and alſo the crop, unleſs there be a ſpecial covenant for the payment to the parſon's executors proportionably, &c. Wood's Inſt. 163.

Glebæ, *addicti.* In the civil law, ſlaves were ſaid to be annexed to the *glebe*, i. e. they went with it, were ſold with it, &c.

The right of PATRONAGE ſhould be annexed to a *glebe.*

GLECHOMA, in *Botany*, the name by which Linnæus calls GROUND-*ivy.*

GLECHONITES, a name given by the ancient *Phyſicians* to a ſort of wine impregnated with penny-royal, much recommended in all obſtructions. It takes its name from *glechon*, the Greek name of PENNY *royal* or *pulegium.*

GLEDE. See Glead.

GLEDITSIA, in *Botany.* See Honey *Locuſt.*

GLEET, in *Medicine*, a flux of thin humour from the urethra.

A *gleet*, or gonorrhœa ſimplex, often ſucceeds the cure of a gonorrhœa virulenta; and ſometimes remains obſtinate, even after the uſe of a ſalivation.

The *gleet* may happen either from a too great relaxation of the glands of the urethra, or from a corroſion or exulceration of them. It appears moſt frequently after a gonorrhœa has been of long ſtanding, or ill managed in the cure; as by the uſe of acrid or corroding injections, and the like.

The glands may here alſo happen to be ulcerated by the matter of the running, which is often ſharp and corroſive enough for that purpoſe.

When the diſcharge proves very obſtinate, and receives little or no check from aſtringent remedies, there is ground to ſuſpect that it is owing to ulcers; but if it be inconſtant and only occaſional, when the patient is ſtimulated by laſcivious ideas, or upon ſtraining to go to ſtool, it is chiefly owing to relaxation.

A *gleet* is diſtinguiſhed from a gonorrhœa ſimplex, not only by the colour and conſiſtence of the matter evacuated, but alſo by the manner wherein it comes away: the matter of a *gleet* comes away as well at one time as another; but that of a gonorhœa ſimplex chiefly in erections, and when the patient goes to ſtool. The matter of a *gleet* is commonly browniſh, but that of a gonorrhœa ſimplex is white. Add, that the continuance of a true *gleet* is unattended with weakneſs, or other ill conſequences and dangerous ſymptoms; nor does it unfit men for procreation, as a gonorrhœa ſimplex will.

In the cure of a *gleet* proceeding from relaxation, the principal deſign is to brace and to reſtore a proper degree of tenſion to the debilitated and relaxed veſſels. For this purpoſe, beſides the medicines that are recommended in the laſt ſtage of the GONORRHOEA, the patient ſhould have recourſe to ſtronger and more powerful aſtringents, as the Peruvian bark, alum, vitriol, galls, tormentil, biſtort, balauſtines, &c. The bark may be combined with other medicines in the following manner: take of Peruvian bark bruiſed, ſix drams; of freſh galls bruiſed, two drams; boil them in a pound and a half of water to a pound, and add to the ſtrained liquor three ounces of the ſimple tincture of the bark. A ſmall tea-cup full of this may be taken three times a day, adding to each cup fifteen or twenty drops of the acid elixir of vitriol. The cure may be promoted by aſtringent injections, ſuch as are recommended under GONORRHOEA, with the addition of a few grains of alum, or white vitriol. The cold bath ſhould be conſtantly uſed every morning for three or four weeks, unleſs the uſe of it be unſafe on account of the patient's full habit, which may be remedied by purging and bleeding, or an unſound ſtate of the viſcera. The diet is the ſame as in the laſt ſtage of the gonorrhœa, and the drink ſhould be Spa, Pyrmont, or Briſtol waters, occaſionally mixed with a ſmall quantity of claret or red wine. If there be reaſon to apprehend, from the failure of this courſe of regimen and medicine, or other circumſtances, that the *gleet* proceeds from ulcers, recourſe muſt be had to mercury and ſuch medicines as tend to correct any predominant acrimony of the juices; as the decoction of ſarſaparilla, ſaſſafras, and the like. Mercurial injections have proved effectual in very obſtinate caſes; and they have been recommended to be joined with terebinthate and other agglutinating medicines. Dr. Chapman recommends pills made of calomel and Venice turpentine, in the proportion of half a dram of the former to half an ounce of the latter, which may be formed into ſixty pills, and five or ſix of them taken night and morning, accompanied with a decoction of guaiacum or ſarſaparilla. The laſt kind of remedy preſcribed for the cure of ulcers in the urinary paſſage are the BOUGIES. Buchan's Dom. Med. p. 545, &c.

GLENE, Γληνη, properly ſignifies the cavity or ſocket of the EYE.

Glene is more frequently uſed by anatomiſts for the ſhallower cavities of bones, into which ſome other bone is received and articulated.

By which it ſtands diſtinguiſhed from *cotyle* or *acetabulum*, which is a deeper cavity, intended by nature for the like purpoſe.

GLENOIDES, an appellation given to the two cavities in the lower part of the firſt vertebra of the neck.

The word is compoſed of γληνη, and ειδος, *form.*

GLESUM, or **Glæsum**, in *Natural Hiſtory*, a name given by many of the ancients to the common yellow amber or ſuccinum. The word ſeems to have been originally German, and to have been adopted by the Romans in their conqueſts in that part of the world. They ſeem to have uſed the word in general for any tranſparent ſubſtance, and thence to have applied it to amber as a tranſparent ſtone. The iſland Auſtravia, of the Germans, afforded a very great quantity of fine amber on its ſhores, and the Roman ſoldiers thence gave it the name of *Gleſaria.* This is a proof of the word *gleſum* being received into common uſe as the name of AMBER.

GLEUCINUM, a term uſed by the old Greek writers, to expreſs a compoſition made of the oil of unripe olives, in which there were infuſed ſchænanth, ſpikenard, and many other of the aromatic drugs, with a conſiderable quantity of muſk; all theſe were put together into a veſſel, which was ſurrounded with the preſſings of grapes, the fermentation of which gave it a gentle heat, and it was left thus thirty days, being well ſtirred about every day; at the end of this time it was ſtrained off, and the clear oil reſerved for uſe It was eſteemed warming, emollient, and relaxing, and was uſed externally in many caſes.

GLICYRRHIZA, or **Glycyrrhiza.** See Liquorice.

GLINUS, in *Botany*, a genus of the *dodecandria pentagynia* claſs; the calyx of which conſiſts of five leaves; it has no corolla; the nectaria are formed by bifid briſtles; and the fruit is a pentangular, five-celled, five-valved, polyſpermous capſule.

Glinus, in *Ichthyology*, a name by which Bellonius and ſome other authors have called a ſmall ſea fiſh, more commonly known by the name of the DRACUNCULUS.

GLIS. In the common acceptation of the word, this only ſignifies the dormouſe: but Linnæus has uſed *glires* in a larger ſenſe; and, in his Syſtem of Zoology, makes it the name of the fourth order of the MAMMALIA claſs of animals. The characters of the creatures of this claſs are, that they have only two fore-teeth in each jaw; they have no *dentes canini*, or dog-teeth; and the feet have toes, and are formed for leaping when they run. The animals of this claſs are the ſeveral ſpecies of the porcupine, the hare, the ſquirrel, the beaver, the mouſe, and noctilio or American bat.

Glis is commonly uſed as the name of an animal of the mouſe kind, but ſo differently deſcribed by different authors, and ſo imperfectly and erroneouſly by many, that it is a queſtion, whether we can properly call any known animal by the name.

Geſner, deſcribing it by hearſay, ſays, that it is larger than a ſquirrel, and either black or brown on the back, and white on the belly; its tail ſhort, and its general figure ſomewhat approaching to that of the bear. In the Linnæan ſyſtem it is the grey ſquirrel with a white belly.

Glis-*volans*, the *flying-dormouſe*, in *Zoology*, the name of an animal, properly of the veſpertilio or bat kind; it is diſtinguiſhed by Linnæus by the name of *ſpaſma* or *veſpertilio ecaudatus naſo foliato obcordato*.

GLISCHROCOLOUS, an epithet uſed by ſome writers to expreſs excrements which are at once viſcid and very highly ſated with gall.

GLISCHROMICTHES, in *Natural Hiſtory*, the name of a genus of compound earths. The word is derived from γλισχρος, *tough*, and μιχθεις, *mixed*. The bodies of this genus are loams compoſed of ſand and a more viſcid clay, and are of a tough and firm texture.

The earths of this genus are uſed in making bricks, and on ſome other occaſions, and are of ſeveral diſtinct ſpecies.

GLISOMARGA, a word uſed by ſome authors as a name for CHALK.

GLISSA, in *Zoology*, the name of a ſea fiſh of the tunny kind, but of a perfectly ſmooth ſkin, and wholly free from ſcales. It uſually grows to the length of two cubits, and the thickneſs of a man's body: it is of a very round body, and has very rough jaws, but no diſtinct teeth; its tail is forked, but not ſo arched or lunated as that of the tunny; it lives in deep water, and is a fiſh of very delicate taſte. Geſner. De Piſc. p. 1158.

GLISTER. See Clyster.

GLIZADE, in *Fencing*, is an operation performed by dextrouſly making your ſword ſlip along your adverſary's blade, and forming at the ſame time your extenſion, &c.

GLOBE, in *Geometry*, a round or ſpherical body, more uſually called a SPHERE.

The earth and water together, are ſuppoſed to form a *globe*; hence called the *terraqueous globe*.

The planets, both primary and ſecondary, are ſuppoſed, as well as our earth, to be ſolid *globes*.

The earth is, in a particular ſenſe, called the *globe*, or *globe of earth*; though it is now well known that this is not its true figure. See *Figure of the* Earth.

Globe, *reſiſtance of a*. See Resistance.

Globe is more particularly uſed for an artificial ſphere of metal, plaiſter, paper, or ſome other matter; on whoſe convex ſurface is drawn a map, or repreſentation, either of the earth or heavens, with the ſeveral circles conceived thereon.

Globes are of two kinds, *terreſtrial* and *celeſtial*; each of very conſiderable uſe, the one in aſtronomy, and the other in geography, to perform many of the operations thereof in an eaſy, ſenſible manner, ſo as to be conceived without any knowlege of the mathematical grounds of thoſe arts.

The fundamental parts, common to both *globes*, are an axis, repreſenting that of the world, and a ſpherical ſhell or cover, which makes the body of the *globe*, on whoſe external ſurface the repreſentation is drawn.

Globes, we have obſerved, are made of divers materials, viz. ſilver, braſs, paper, plaiſter, &c. Thoſe commonly uſed are of plaiſter and paper; the conſtruction whereof is as follows.

Globes, *conſtruction of* A wooden axis is provided, ſomewhat leſs than the intended diameter of the *globe*; and into the extremes hereof two iron wires are driven for poles: this axis is to be the beam or baſis of the whole ſtructure.

On the axis are applied two ſpherical, or rather hemiſpherical caps, formed on a kind of wooden mould or block. Theſe caps conſiſt of paſteboard or paper, laid, one lay after another, on the mould, to the thickneſs of a crown piece; after which, having ſtood to dry and embody, making an inciſion along the middle, the two caps, thus parted, are ſlipped off the mould.

They remain now to be applied on the poles of the axis, as before they were on thoſe of the mould; and to fix them in their new place, the two edges are ſown together with packthread, &c.

The rudiments of the *globe* thus laid, they proceed to ſtrengthen and make it ſmooth and regular. In order to this, the two poles are haſped in a metalline ſemi-circle of the ſize intended; and a kind of plaiſter, made of whiting, water, and glue, heated, melted, and incorporated together, is daubed all over the paper ſurface. In proportion as the plaiſter is applied, the ball is turned round in the ſemi-circle, the edge whereof pares off whatever is ſuperfluous, and beyond the due dimenſion, leaving the reſt adhering in places that are ſhort of it. After ſuch application of plaiſter, the ball ſtands to dry; which done, it is put again in the ſemi-circle, and freſh matter applied: thus they continue alternately to apply the compoſition, and dry it, till ſuch time as the ball every-where accurately touches the ſemi-circle; in which ſtate it is perfectly ſmooth, regular, firm, &c.

The ball thus finiſhed, it remains to paſte the map or deſcription thereon: in order to this, the map is projected in ſeveral gores or guſſets, all which join accurately on the ſpherical ſurface, and together cover the whole ball. To direct the application of theſe gores, lines are drawn by a ſemi-circle on the ſurface of the ball, dividing it into a number of equal parts correſponding to thoſe of the gores, and ſubdividing thoſe again anſwerably to the lines and diviſions of the gores.

The papers thus paſted on, there remains nothing but to colour and illuminate the *globe*, and to varniſh it, the better to reſiſt duſt, moiſture, &c.

The *globe* itſelf thus finiſhed, they hang it in a braſs meridian, with an hour-circle and quadrant of altitude, and thus fit it into a wooden horizon.

Globes, *deſcription of the*. The things common to both *globes* are either delineated on the ſurface, or added as appendages without it.

Without the ſurface are, 1. The two poles, whereon the *globe* is turned, repreſenting thoſe of the world. See Pole. 2. The brazen meridian, which is divided into degrees, and paſſes through the poles. 3. The wooden horizon, whoſe upper ſide repreſents the horizon, and is divided into ſeveral circles; the innermoſt whereof contains the twelve ſigns of the zodiac, ſubdivided into their degrees; the next the Julian; and the third the Gregorian calendar: withoutſide of all theſe, are drawn the points of the winds. 4. A braſs quadrant of altitude, divided into 90 degrees, to be faſtened on the meridian at the diſtance of 90 degrees from the horizon. 5. The hour-circles, divided into twice twelve hours, and fitted on the meridian, round the poles, which carry an index pointing to the hour. A mariner's compaſs is ſometimes added on the bottom of the frame, and ſometimes a ſemi-circle of poſition.

On the ſurface are delineated, 1. The equinoctial line, divided into 360 degrees, commencing from the vernal interſection. 2. The ecliptic, divided into twelve ſigns, and theſe ſubdivided into degrees. 3. The zodiac. 4. The two tropics. And, 5. The polar circles. All which ſee under their proper articles.

What elſe belongs to *globes*, either as to conſtruction or deſcription, is different as the GLOBE is either *celeſtial* or *terreſtrial*.

Our common *globes*, though inſtructive inſtruments for explaining the firſt rudiments of geography and the ſpherical doctrine of aſtronomy, yet labour under ſeveral defects; as they do not ſhew how the phenomena, illuſtrated by them, ariſe from the motion of the earth, which is the principal thing beginners eſpecially ſhould have in view; and as they are only formed for the preſent age, and do not ſerve the purpoſes of chronology and hiſtory, which they might be made to do, if the poles, whereon they turn, were contrived to move in a circle round thoſe of the ecliptic, according to its preſent obliquity.

Mr. John Senex, F. R. S. invented a contrivance for remedying theſe defects, by fixing the poles of the diurnal motion to two ſhoulders or arms of braſs, at the diſtance of $23^{\circ}\frac{1}{2}$ from the poles of the ecliptic. Theſe ſhoulders are ſtrongly faſtened at the other end to an iron axis, which paſſes through the poles of the ecliptic, and is made to move round with a very ſtiff motion; ſo that, when it is adjuſted to any point of the ecliptic, which the equator is made to interſect, the diurnal motion of the *globe* on its axis will not be able to diſturb it. When it is to be adjuſted for any time, paſt or future, one of the brazen ſhoulders is brought under the meridian, and held faſt to it with one hand, whilſt the *globe* is turned about with the other, ſo that the point of the ecliptic, which the equator is to interſect, may paſs under o degree of the brazen meridian: then, holding a pencil to that point, and turning the *globe* about, it will deſcribe the equator according to its poſition at the time required; and transferring the pencil to 23°½, and 66°½ on the brazen meridian, the tropics and polar circles will be ſo deſcribed for the ſame time. By this contrivance, the celeſtial *globe* may be ſo adjuſted, as to exhibit not only the riſings and ſettings of the ſtars, in all ages and in all latitudes, but likewiſe the other phenomena that depend upon the motion of the diurnal axis round the annual axis. Senex's celeſtial *globes*, eſpecially the two greateſt, of ſeventeen and twenty-eight inches in diameter, have been conſtructed on this principle; ſo that, by means of a nut and ſcrew, the pole of the equator is made to revolve about the pole of the ecliptic. Phil. Tranſ. N° 447. p. 201, 203. or Martyn's Abr. vol. viii. p. 217. and N° 493. art. 18. in Phil. Tranſ. vol. xlvi. p. 290.

Mr. Joſeph Harris, late aſſay-maſter of the mint, contrived to remedy the former of the defects above mentioned, by placing two horary circles under the meridian, one at each pole: theſe circles are fixed tight between two braſs collars placed about the axis, ſo that when the *globe* is turned they are carried round with it, the meridian ſerving as an index to cut the horary diviſions. The *globe*, in this ſtate, ſerves readily for ſolving problems in north and ſouth latitudes, and alſo in places near the equator; whereas, in the common conſtruction, the axis and horary circle prevent the braſs meridian from being moveable quite round in the horizon. This *globe* is alſo adapted for ſhewing how the viciſſitudes of day and night, and the alteration of their lengths, are really occaſioned by the motion of the earth: for this purpoſe, he divides the braſs meridian, at one of the poles, into months and days, according to the ſun's declination, reckoning from the pole. Therefore, by bringing the day of the month to the horizon, and rectifying the *globe* according to the time of the day, the horizon will repreſent the circle ſeparating light and darkneſs, and the upper half of the *globe* the illuminated hemiſphere, the ſun being in the zenith. Mr. Harris alſo gives an account of a cheap machine for ſhewing how the annual motion of the earth in its orbit cauſes the change of the ſun's declination, without the great expence of an orrery. Phil. Tranſ. N° 456. p. 321, &c. or Martyn's Abr. vol. viii. p. 352.

The late Mr. George Adams, mathematical inſtrument-maker to his majeſty, has made ſome uſeful improvements in the conſtruction of the *globes*. His *globes*, like others, are ſuſpended at their poles in a ſtrong braſs circle, and turn therein upon two iron pins, which are the axis. They have, beſides, a thin braſs ſemi-circle, moveable about the poles, with a ſmall, thin, ſliding circle upon it On the terreſtrial *globe*, the thin braſs ſemi-circle is a moveable meridian, and its ſmall ſliding circle the viſible horizon of any particular place to which it is ſet. On the celeſtial *globe* the ſemi-circle is a moveable circle of delination, and its ſmall annexed circle an artificial ſun or planet. Each *globe* hath a braſs wire circle, placed at the limits of the twilight, which, together with the *globe*, is ſet in a wooden frame, ſupported by a neat pillar and claw, with a magnetical needle at its baſe. On the terreſtrial *globe*, the diviſion of the earth into land and water is laid down from the lateſt diſcoveries: there are alſo many additional circles, as well as the rhumb-lines, for ſolving all the neceſſary geographical and nautical problems. On the celeſtial *globe*, all the ſouthern conſtellations, lately obſerved at the Cape of Good Hope by M de la Caille, and all the ſtars in Mr. Flamſteed's Britiſh Catalogue, are accurately laid down, and marked with Greek and Roman letters of reference in imitation of Bayer. Upon each ſide of the ecliptic are drawn eight parallel circles. at the diſtance of one degree from each other, including the zodiac; and theſe are croſſed at right angles with ſegments of great circles at every fifth degree of the ecliptic, for the more readily noting the place of the moon, or of any planet upon the *globe*. The author has alſo inſerted, from Ulugh Beigh, printed at Oxford in 1665, the Manſions of the Moon of the Arabian Aſtronomers, ſo called, becauſe they obſerved the moon to be in or near one of theſe every night during her monthly courſe round the earth, to each of which the Arabian characters are fixed. On the ſtrong braſs circle of the terreſtrial *globe*, and about 23°½ on each ſide of the north-pole, the days of each month are laid down according to the ſun's declination: and this braſs circle is ſo contrived, that the *globe* may be placed with the north and ſouth poles in the plane of the horizon, and with the ſouth-pole elevated above it. The equator, on the ſurface of either *globe*, ſerves the purpoſe of the horary circle, by means of a ſemi-circular wire placed in the plane of the equator, carrying two indices, one of which is occaſionally to be uſed to point out the time. For a farther account of theſe *globes*, with the method of uſing them, the reader may conſult Adams's Treatiſe on their Conſtruction and Uſe, &c. 1769.

Globe, *celeſtial*, is an artificial ſphere, on whoſe convex ſurface the fixed ſtars are laid down, at proportionable diſtances, together with the principal circles of the ſphere.

The ſurface of the celeſtial *globe* may be eſteemed a juſt repreſentation of the concave expanſe of the heavens, notwithſtanding its convexity; for if the eye were placed in the center of it, and the *globe* made of glaſs, the ſtars that are drawn upon it would appear in a concave ſurface, exactly correſponding to thoſe in the heavens.

The uſe of theſe *globes* is to exhibit the phenomena of the motions of the ſun and ſtars, in an eaſy and obvious manner; which, though ſomewhat inaccurate, is yet exact enough for the common uſes of life, and may ſave the trouble of trigonometrical calculation.

To exhibit the ſtars, circles, &c. on the ſurface of a given ſphere or ball, and fit for the uſes of aſtronomy. 1. Aſſume any two points diametrically oppoſite to each other, as P and Q (*Tab. in Aſtronomy, fig.* 58.) and in theſe fix up axes, P A and Q C, for the ball to turn round on. The points P and Q, or A and C, will exhibit the poles of the world.

2. Divide a brazen circle A B C D into four quadrants, A E, E C, C F, and F D; and ſubdivide each quadrant into 90 degrees, numbered from the points E and F, towards the poles A and C.

3.Incloſe the *globe* in this circle, as in a meridian, at the points A and C, ſo as it may freely turn therein.

4. Apply a ſtyle or pin to the ſurface of the *globe*, in the firſt degree of the meridian, and turn the ball round; by this means will a circle be deſcribed on the ſurface, repreſenting the equator to be divided into degrees.

5. From the pole of the world P towards M, and from the other pole C towards N, number 23½ degrees; the points M and N will be the poles of the ecliptic.

6. Apply a ſtyle to the meridian, in the point M, and turn the *globe* round; by this rotation will the arctic polar circle be deſcribed: and after the ſame manner is the antarctic polar to be deſcribed about the point N.

7. Number 23½ deg. from the equator towards the poles P and Q, and note the points H and I; then applying a ſtyle to the meridian, as before, two circles will be deſcribed parallel to the equator, whereof that drawn through H will be the tropic of Cancer, and the other through I the tropic of Capricorn.

8. Hang the *globe* within the meridian, in the poles of the ecliptic, as before in the poles of the world; and applying a ſtyle to E, turn it round: by this means will the ecliptic be delineated, which remains to be divided into twelve ſigns; and each of theſe, again, divided into thirty degrees.

9. While the *globe* remains thus ſuſpended, bring the degree of longitude of any ſtar under the meridian; and in the meridian, number as many degrees towards the pole as is the degree of latitude of the place: the point of interſection is the place of that ſtar on the ſurface of the *globe*. After the like manner may the place of the ſtar be determined from the right aſcenſion and declination given, the *globe* being ſuppoſed ſuſpended from the poles of the world, or the equator.

10. All the ſtars of a conſtellation thus laid down, the figure of the conſtellation is to be deſigned; after which it may either be coloured or engraven.

11. Place the *globe* with the meridian, in a wooden frame or horizon, D B L, ſupported on four feet, in ſuch manner as to be divided thereby into two hemiſpheres, and that the pole A may be raiſed or depreſſed at pleaſure.

12. On the limb or edge of the horizon deſcribe a circle, which divide into 360 degrees, and inſert the calendars and winds.

13. Laſtly, To the pole A fit a brazen circle, divided into twenty-four horary parts, and numbered twice twelve, ſo that the line of diviſion of XII. may be in the plane of the meridian, on either ſide the pole; and on the pole itſelf apply an index, to turn round with the *globe*. See *Horary* CIRCLE. Thus is the *globe* complete.

It may be here obſerved, that as the longitude of the ſtars is continually increaſing, a common *globe* does not remain of perpetual uſe: but the increaſe in ſeventy-two years only amounting to a degree, the whole will make no conſiderable error in a hundred years; the deſign of a *globe* being only to repreſent things ſomething near the truth.

Globe, *to make a celeſtial.* This method is that the moſt frequently uſed; and we only premiſed the former as being the moſt eaſily conceived, and leading more naturally to this.

1. From the given diameter of the *globe*, find a right

line AB, *fig.* 59. *n.* 2. equal to the circumference of a great circle, and divide it into twelve equal parts.

2. Through the ſeveral points of diviſion, 1, 2, 3, 4, &c. with the interval of 10 of them, deſcribe arches, mutually interſecting each other in D and E: theſe figures or pieces, duly paſted or joined together, will make the whole ſurface of the *globe*.

3. Divide each part of the right line AB into thirty equal parts, ſo that the whole line AB, repreſenting the periphery of the equator, may be divided into 360 degrees.

4. From the poles D and E, *fig.* 60. with the interval of $23\frac{1}{2}$ deg. deſcribe arches *ab*; theſe will be twelve parts of the polar circles.

5. After the like manner, from the ſame poles D and E, with the interval of $66\frac{1}{2}$ deg. reckoned from the equator, deſcribe arches *cd*; theſe will be twelfth parts of the tropics.

6. Through the degree of the equator *e*, correſponding to the right aſcenſion of any given ſtar, and the poles D and E, draw an arch of a circle, and taking in the compaſſes the complement of the declination from the pole D, deſcribe an arch, interſecting it in *i*; this point *i* will be the place of that ſtar.

7. All the ſtars of a conſtellation being thus laid down, the figure of the conſtellation is to be drawn according to Bayer, Hevelius, or Flamſteed.

8. Laſtly, after the ſame manner are the declinations and right aſcenſions of each degree of the ecliptic *dg* to be determined.

9. The ſurface of the *globe* thus projected on a plane is to be engraven on copper, to ſave the trouble of doing this over again for each *globe*.

10. A ball, in the mean time, is to be prepared of paper, plaiſter, &c. after the manner above directed, and of the intended diameter of the *globe*: on this, by means of a ſemi-circle and ſtyle, is the equator to be drawn; and through every 30th degree a meridian. The ball thus divided into twelve parts, correſponding to the ſegments before projected, they are to be cut from the printed paper, and paſted on the ball.

11. Nothing now remains but to hang the *globe*, as before, in a brazen meridian and wooden horizon; to which may be added, a quadrant of altitude HI, *fig.* 61. made of braſs, and divided in the ſame manner as the ecliptic and equator.

If the declinations and right aſcenſions of the ſtars be not given, but their longitudes and latitudes in lieu thereof, the ſurface of the *globe* is to be projected after the ſame manner as before; except that, in this caſe, D and E, *fig.* 59. are the poles of the ecliptic, and *fh* the ecliptic itſelf; and that the polar circles and tropics, with the equator *gd*, and the parallels thereof, are to be determined from their declinations.

One of the fulleſt catalogues of the ſtars is that of Mr. Flamſteed; wherein the right aſcenſions and declinations, as well as the longitudes, latitudes, &c. are every-where expreſſed.

GLOBE, *uſe of the celeſtial.* The uſe of this inſtrument is very extenſive; ſcarce any thing in the ſpherical aſtronomy but may be exhibited thereby.

The principal points are contained in the following problems, with their ſolution; which will let the reader enough into the nature and reaſon of this noble inſtrument, to apply it, of his own accord, in any other caſes.

To find the right aſcenſion and declination of a ſtar, repreſented on the ſurface of the globe. Bring the ſtar to the graduated ſide of the brazen meridian: then the number of degrees intercepted between the equator, and the point of the meridian cut by the ſtar, gives its declination; and the degree of the equator which comes under the meridian together with the ſtar is its right aſcenſion.

To find the longitude and latitude of a ſtar. Apply the center of the quadrant of altitude over the pole of the ecliptic in the ſame hemiſphere with the ſtar, and bring its graduated edge to the ſtar: the degree on the quadrant cut by the ſtar is its latitude, reckoned from the ecliptic; and the degree of the ecliptic cut by the quadrant its longitude.

To find the ſun's place in the ecliptic. Seek the day of the month in the proper calendar on the horizon, and againſt the day in the circle of ſigns is the ſign and degree the ſun is in for that day: this done, find the ſame ſign upon the ecliptic, on the ſurface of the *globe*; this is the ſun's place for that day.

To find the declination of the ſun. The ſun's place for the day given being brought to the meridian, the degrees of the meridian intercepted between the equinoctial and that place, are the ſun's declination for that day at noon.

To find the place of a planet, with its right aſcenſion and declination; its longitude and latitude for the time being given. Apply the center of the quadrant of altitude on the pole of the ecliptic (the pole, we mean, of the ſame denomination with the latitude), and bring it to the given longitude in the ecliptic: this point is the planet's place; and bringing it to the meridian, its right aſcenſion and declination will be found, as already ſhewn of a ſtar.

To rectify the globe, *or adjuſt it to the place, &c. ſo as it may repreſent the preſent ſtate or ſituation of the heavens.* 1. If the place be in north latitude, raiſe the north pole above the horizon; if in ſouth, raiſe the ſouth pole; till the arch intercepted between the pole and horizon be equal to the given elevation of the pole. 2. Fix the quadrant of altitude on the zenith, i. e. on the latitude of the place. 3. By means of a compaſs or meridian line, place the *globe* in ſuch a manner as that the brazen meridian may be in the plane of the terreſtrial meridian. 4. Bring the degree of the ecliptic the ſun is in to the meridian, and ſet the horary index to twelve: thus will the *globe* exhibit the face of the heavens for the noon of that day. 5. Turn the *globe* till the index come to any other given hour: thus will it ſhew the face of the heavens for that time.

To know all the ſtars and planets by means of the globe. 1. Adjuſt the *globe* to the ſtate of the heavens for that time. 2. Look on the *globe* for ſome one ſtar which you know; e. gr. the middlemoſt ſtar in the tail of the great bear. 3. Obſerve the poſitions of the other more conſpicuous ſtars in the ſame conſtellation; and, by transferring the eye from the *globe* to the heavens, you will eaſily note the ſame there. 4. After the ſame manner may you proceed from this to the neighbouring conſtellations, till you have learned them all.

If the planets be repreſented on the *globe*, after the manner above deſcribed, by comparing them with the neighbouring ſtars you will likewiſe know the planets.

To find the ſun's oblique aſcenſion, his eaſtern amplitude and azimuth, with the time of riſing. 1. Rectify the *globe* for the hour of twelve, and bring the ſun's place to the eaſtern ſide of the horizon: then the number of degrees, intercepted between that degree of the equator now come to the horizon and the beginning of Aries, is the ſun's oblique aſcenſion. 2. The degrees on the horizon, intercepted between the eaſt point thereof and the point wherein the ſun is, is the ortive or riſing amplitude. 3. The hour, pointed to by the index, is the time of the ſun's riſing. 4. Turning the *globe* till the index points to the preſent hour, lay the quadrant to the ſun's place; the degree cut by the quadrant, in the horizon, is the ſun's azimuth.

To find the ſun's oblique deſcenſion, weſtern amplitude, and azimuth, with the time of ſetting. The ſolution of this problem is the ſame as that of the former; excepting that the ſun's place muſt be here brought to the weſtern ſide of the horizon, as in the former it was to the eaſtern.

To find the length of day and night. 1. Find the time of the ſun's riſing, which being numbered from midnight, the double thereof gives the length of the night. 2. Subtract the length of the night from the whole day, or twenty-four hours, and the remainder is the length of the day.

To find the riſing, ſetting, and culminating of a ſtar; its continuance above the horizon for any place and day; together with its oblique aſcenſion and deſcenſion, and its eaſtern and weſtern amplitude and azimuth. 1. Adjuſt the *globe* to the ſtate of the heavens at twelve o'clock that day. 2. Bring the ſtar to the eaſtern ſide of the horizon: thus will its eaſtern amplitude and azimuth, and the time of riſing, be found, as already taught of the ſun. 3. Bring the ſame ſtar to the weſtern ſide of the horizon: thus will the weſtern amplitude and azimuth, and the time of ſetting, be found. 4. The time of riſing, ſubtracted from that of ſetting, leaves the continuance of the ſtar above the horizon. 5. This continuance above the horizon, ſubtracted from twenty-four hours, leaves the time of its continuance below the horizon. 6 Laſtly, the hour to which the index points, when the ſtar is brought to the meridian, gives the time of its culmination.

To find the altitude of the ſun, or a ſtar, for any given hour of the day or night. 1. Adjuſt the *globe* to the poſition of the heavens, and turn it till the index point at the given hour. 2. Fix on the quadrant of altitude, at 90 degrees from the horizon, and bring it to the ſun's or ſtar's place: the degrees of the quadrant, intercepted between the horizon and the ſun or ſtar, is the altitude required.

The altitude of the ſun by day, or of a ſtar by night, being given, to find the time of that day or night. 1. Rectify the *globe* as in the preceding problem. 2. Turn the *globe* and quadrant, till ſuch time as the ſtar, or degree of the ecliptic the ſun is in, cut the quadrant in the given degree

gree of altitude; then does the index point at the hour ſought.

The azimuth of the ſun or a ſtar given, to find the time of the day or night. Rectify the *globe*, and bring the quadrant to the given azimuth in the horizon; turn the *globe*, till the ſtar come to the ſame: then will the index ſhew the time.

To find the interval of time between the riſings of two ſtars, or their culminations. 1. Raiſe the pole of the *globe* ſo many degrees above the horizon, as is the elevation of the pole of the place. 2. Bring the firſt ſtar to the horizon, and obſerve the time the index points to. 3. The ſame do by the other ſtar: then ſubtracting the former time from the latter, the remainder is the interval between the riſings.

After the like manner is the interval between two culminations found, by bringing both ſtars to the meridian.

The day of the month being given, to find when any ſtar will come to the meridian. Rectify for the ſun's place; turn the *globe* till the given ſtar comes to the meridian: then the index will point to the time ſought.

To find when a given ſtar will come to the meridian, at any given hour of the night. Bring the given ſtar to the meridian; ſet the index to twelve at noon; then turn the *globe* eaſtward, till the index points to an hour as far diſtant in the forenoon from twelve as the given hour is in the afternoon: obſerve the degree of the ecliptic then at the meridian, over againſt which degree, in the calendar, is the day of the month, when the given ſtar will be upon the meridian at the given hour.

By obſervation of a ſtar upon the meridian, to find the hour of the night. Rectify for the latitude and the ſun's place; bring the given ſtar to the meridian, and the index will ſhew the hour of the night.

To find the beginning and ending of the crepuſculum or twilight. 1. Rectify the *globe*, and ſet the index to the twelfth hour, the ſun's place being in the meridian. 2. Note the ſun's place, and turn the *globe* weſtward, as alſo the quadrant of altitude, till the point oppoſite the ſun's place cut the quadrant of altitude in the eighteenth degree above the horizon: the index will then ſhew the time when the twilight commences in the morning. 3. Taking the point oppoſite to the ſun, bring it to the eaſtern hemiſphere, and turn it, till it meet with the quadrant of altitude in the eighteenth degree: then will the index ſhew the time when the twilight ends.

To explain the phenomena of the harveſt-moon by the globe. See Moon.

Globe, *terreſtrial*, is an artificial ſphere, on whoſe ſurface are delineated the principal places of the earth, in their proper ſituations, diſtances, &c. together with their circles imagined on the ſurface of the terreſtrial ſphere.

The uſe of the terreſtrial *globe* is to exhibit the ſeveral affections and phenomena of the different places of the earth, depending on magnitude, &c. in an eaſy, obvious manner, without the trouble of trigonometrical calculation.

Globe, *to conſtruct a terreſtrial.* The conſtruction of a terreſtrial *globe*, whether of metal, plaiſter, paper, &c. is the ſame as that of a celeſtial. The ſame circles are delineated on both: and as for the places, viz. cities, towns, &c. they are laid down from the longitudes and latitudes given, as the ſtars are from their right aſcenſions and declinations.

Hence all problems, depending on the circles, may be equally wrought on either *globe*; as the aſcenſions, deſcenſions, amplitudes, azimuths, riſings, ſettings, altitudes, &c. of the ſun; the lengths of day and night; hours of the day and night; crepuſcula, &c.

We ſhall here, therefore, only give what is peculiar to the terreſtrial *globe*.

Globe, *uſe of the terreſtrial* *To find the longitude and latitude of any place delineated on the* globe. Bring the place to the graduated ſide of the braſs meridian: the degree of the meridian it cuts is the latitude required; and the degree of the equator, at the ſame time under the meridian, is the longitude required.

The longitude and latitude given, to find the place on the globe. Seek, in the equator, the given degree of longitude, and bring it to the meridian; then count from the equator on the meridian the degree of latitude given, towards this or that pole, as the latitude is either north or ſouth: the point under this is the place required.

The hour being given at any place, to find what hour it is in any other part of the world. Bring the given place to the meridian, and ſet the hour-index to the given hour; then, by turning the *globe*, bring any place to the meridian, and the index will point to the hour of that place.

To find the antœci, periœci, and antipodes of any place. 1. The given place being brought to the meridian, count as many degrees on the meridian from the equator towards the other pole: the point which is thus arrived at is the place of the antœci. 2. Note the degree of the meridian over the given place and its antœci, and turn the *globe* till the oppoſite degree of the equator come under the meridian; or, which amounts to the ſame, till the index, which before ſtood at twelve, come to the other twelve: then will the place, correſponding to the former degree, be the periœci; and the latter, that of the antipodes.

To find what place of the earth the ſun is vertical to at any time aſſigned. 1. Bring the ſun's place found in the ecliptic to the meridian, and the index to the hour of twelve, noting what point of the meridian correſponds thereto. 2. If the given hour be before noon, ſubtract it from twelve hours, and turn the *globe* towards the weſt, till the index point at the hours remaining: thus will the place required be under the point of the meridian before noted. 3. If the hour be after noon, turn the *globe* in the ſame manner towards the weſt, till the index points at the given hour: thus, again, will the place required be found under the point of the meridian before noted.

If, at the ſame time, you note all the places which are under the ſame half of the meridian with the place found, you will have all the places to which the ſun is then in the meridian; and the oppoſite half of the meridian will ſhew all the places in which it is then midnight.

A place being given in the torrid zone, to find the two days in the year wherein the ſun is vertical to the ſame. 1. Bring the given place to the meridian, and note the degree of the meridian correſponding thereto. 2. Turn the *globe* about, and note the two points of the ecliptic paſſing through that degree. 3. Find on what days the ſun is in theſe points of the ecliptic: for on thoſe days he is vertical to the given place.

To find thoſe places in the torrid zone to which the ſun is vertical on a given day. Bring the ſun's place in the ecliptic to the meridian; then turning the *globe* round, note all the places which paſs through that point of the meridian: thoſe are the places required.

After the ſame manner may be found what people are Ascii for any given day.

The day and hour at any place being given, to find where the ſun is vertical at that hour. Bring the ſun's place to the meridian, and the degree over it is the ſun's declination at that time; then bring the given place to the meridian, and ſet the index to the given hour; turn the *globe* till the index points to twelve at noon, and the place on the *globe* which lies under the degree of the ſun's declination has the ſun then vertical.

A place being given in the frigid zone, to find the time when the ſun begins to appear above the horizon, and when it begins to diſappear; and alſo the length of the longeſt day or night in that place. Rectify for the latitude; bring the aſcending part of the ecliptic, i. e. for latitudes north of the tropic of Cancer the ſemi-circle intercepted between Capricorn and Cancer, to the ſouth point of the horizon; obſerve the degree of the ecliptic which cuts that point, and find when the ſun enters that degree, and this will give the time when the ſun begins to appear in that latitude. Bring the deſcending part of the ecliptic to the ſame point of the horizon, and the calendar will ſhew when the ſun leaves that latitude and diſappears. Again, bring the aſcending part of the ecliptic to the north point of the horizon, and the degree, as before, will ſhew in the calendar when the longeſt day begins; and by bringing the deſcending part of the ecliptic to the ſame north point, we ſhall find, in the ſame manner, when the longeſt day ends.

To find the latitude of the places wherein any given day is of any given length. 1. Bring the ſun's place for the given day to the ecliptic, and ſet the index to the hour of twelve. 2. Turn the *globe*, till the index point at the hour of riſing or ſetting. 3. Raiſe and depreſs the pole till the ſun's place appear in the eaſtern and weſtern ſide of the horizon: then will the pole be duly elevated, and, conſequently, the latitude given.

To find the latitude of thoſe places in the frigid zone where the ſun does not ſet for a given number of days. 1. Count ſo many degrees from the next tropic, towards the equinoctial point, as there are units in half the number of the given days; becauſe the ſun, in its proper motion, goes nearly a degree every day. 2. Bring the point of the ecliptic, thus found, to the meridian; and its diſtance from the pole will be equal to the elevation of the pole, or latitude of the places required.

Any hour of the day or night being given, to ſhew all thoſe places to which the ſun riſes and ſets; where it is noon or midnight; and where day or night. 1. Find what place the ſun is at that time vertical to, as already taught. 2. Let this place be brought to the zenith of the wooden horizon, i. e. elevate the pole as the latitude of that place requires: then will the places on the eaſtern ſide of the horizon be thoſe the ſun is ſetting to; and on the weſtern ſide, thoſe he riſes to: thoſe under the upper ſemi-circle of the meridian have it noon; and thoſe under the lower, midnight. Laſtly, to thoſe of the upper hemiſphere it is day; and to thoſe in the lower, night.

Hence, as in the middle of an eclipſe, the moon is in that degree of the ecliptic oppoſite to the ſun's place; by the preſent problem it may be ſhewn what places of the earth then ſee the middle of the eclipſe, and what the beginning or ending.

To find what places of the earth a planet, e. gr. the moon, is vertical to any day of the year. 1. Mark the planet's place on the *globe*, as above taught. 2. Bring this place to the meridian, and note the degree over it. 3. Turn the *globe* round, and the places which paſs under the point are thoſe required.

The declination of a ſtar, or any other phenomenon, given, to find what parts of the earth the ſame is vertical to. Count as many degrees in the meridian, from the equator towards one pole, as are equal to the given declination; viz. towards the north, if the declination be to the northward; and towards the ſouth, if the declination be ſouth. Then turning it round, the places that paſs through the extremity of this arch in the meridian are the places required.

To determine the place of the earth where any ſtar, or other celeſtial phenomenon, will be vertical at a given hour. 1. Elevate the pole according to the latitude of the place, from whoſe noon or midnight the hours are numbered. 2. Bring the ſun's place for that day to the meridian, and ſet the index at twelve o'clock. 3. Determine the place of the ſtar on the ſurface of the *globe*, and bring it to the meridian; the index will ſhew the difference of time between the impulſe of the ſun and ſtar to the meridian of the place: note the point of the meridian over the place of the ſtar. 4. Find in what places of the earth it is then noon, and ſet the index to twelve o'clock. 5. Turn the *globe* towards the weſt, till the index have paſſed over the interval of time between the culmination of the ſun and ſtar. Then, under the point of the meridian, before obſerved, will the place required be found. And hence may always be found what place a ſtar, or other phenomenon, riſes or ſets to at any given time.

To place the globe *in ſuch manner, under any given latitude, as that the ſun ſhall illuminate all thoſe regions which he actually illumines on earth.* 1. Rectify the *globe*, i. e. elevate the pole according to the latitude of the place; bring the place to the meridian, and ſet the *globe* north and ſouth by the compaſſes: thus, the *globe* having the ſame ſituation with regard to the ſun as the earth has, that part thereof will be illuminated which is illuminated on earth. Hence alſo the *globe* being ſituate in the ſame manner, when the moon ſhines, it will ſhew what parts are then illuminated by the moon.

And, in the like manner, we may find when the ſun and moon riſe and ſet at any given time.

To find the diſtance of two places on the globe. Take the given places in the compaſſes, and apply them to the equator: the degrees which there ſubtend being reduced into miles, leagues, or the like, give the diſtances required.

The ſame may be done, and that more commodiouſly, by laying the graduated edge of the quadrant of altitude over the two places, and noting the degree intercepted.

To find how any one place bears from another. Bring one place to the meridian, and lay the quadrant of altitude over the other, and it will ſhew on the horizon the point of the compaſs on which the latter bears from the former.

To find the proportion which the land bears to the ſea. For this purpoſe Dr. Long propoſes to take the papers of a large terreſtrial *globe*, and after ſeparating the land from the ſea with a pair of ſciſſars, to weigh them carefully in ſcales. This method ſuppoſes the *globe* to be exactly delineated, and all the papers of equal thickneſs. By an experiment on the papers of Mr. Senex's ſeventeen inch *globe*, he found that thoſe comprehending the ſea weighed 349 grains, and the others only 124; whence he infers, that almoſt three fourth parts of the ſurface of our earth between the polar circles are covered with water, and that little more than one fourth is dry land. Dr. Long omitted weighing the papers within the polar circles, becauſe the proportion which the land bears to the ſea within them is not aſcertained. Long's Aſtron. vol. i. p. 168. See *Magnitude of the* EARTH.

GLOBE, *to conſtruct a dial by the.* See DIAL.

The *celeſtial globe* has been improved by Mr. Ferguſon: in this *globe* (ſee *Tab.* III. *Aſtronomy*, *fig.* 76.) an arch MKH, of $23\frac{1}{2}^{\circ}$, is fixed on the north pole of the axis, above the hour circle; and at the end is fixed an upright pin HG, ſtanding directly over the north pole of the ecliptic, and perpendicular to that part of the ſurface of the *globe*. On this pin are two moveable collets at D and H, to which are annexed the quadrantal wires N and O; carrying two little balls repreſenting the ſun and moon. The collet D is fixed to the circular plate F, on which are engraven the $29\frac{1}{2}$ days of the moon's age, beginning under the wire N, which wire, as it turns round, carries with it the plate F. Theſe wires are fixed or ſlackened by the ſcrew G, and the two little balls are made to riſe and ſet at the ſame time and on the ſame point of the horizon, for the day to which they are rectified, as the ſun and moon do in the heavens. The ball repreſenting the moon may be ſcrewed as many degrees to either ſide of the ecliptic, as her latitude amounts at any given time; and for this purpoſe, S is a ſmall piece of paſteboard, the curved edge of which at S is to be ſet upon the *globe* at right angles to the ecliptic, and the dark line over S to ſtand upright upon it: from this line, on the convex edge, are drawn the $5\frac{1}{3}$ degrees of the moon's latitude on both ſides of the ecliptic; and when this piece is ſet upright on the *globe*, its graduated edge reaches to the moon on the wire O, by which means ſhe is eaſily adjuſted to her latitude found by an ephemeris. The horizon of this *globe* is ſupported by two ſemi-circular arches, becauſe pillars would ſtop the progreſs of the balls, when they go below the horizon in an oblique ſphere. This *globe* is rectified by elevating the pole to the latitude of the place, bringing the ſun's place in the ecliptic for the given day to the brazen meridian, and ſetting the hour-index to twelve at noon; then, ſetting the ſun directly over his place in the meridian, and the moon over her place in the ecliptic, by fixing her wire under the number that expreſſes her age for that day on the plate F; and, laſtly, laying the curved edge of the paſteboard S over the ecliptic below the moon, and adjuſting the moon to her latitude over the graduated edge of the paſteboard. Having thus rectified the *globe*, turn it round, and obſerve on what point of the horizon the ſun and moon balls riſe and ſet; for theſe agree with the points of the compaſs on which the ſun and moon riſe and ſet in the heavens on the given day; and the hour-index ſhews the times of their riſing and ſetting, and alſo the time of the moon's paſſing over the meridian. This *globe* is alſo contrived for exhibiting the phenomena of the *harveſt*-MOON, &c. Phil. Tranſ. Nº 483. art. 21. in vol. xliv. p. 535. or Ferguſon's Aſtron. p. 291.

GLOBE, *dialling.* See DIALLING.

GLOBES, *patent*, are thoſe with the improvements of Mr. Neale, for which he obtained his majeſty's letters patent; by means of which he ſolves ſeveral aſtronomical problems, which do not admit of ſolution by the common *globes*.

GLOBE, *planetary*, is a machine, contrived and deſcribed by Mr. Ferguſon; in which T (ſee *Tab.* III. *Aſtronomy*, *fig.* 77.) is a terreſtrial *globe* fixed on its axis ſtanding upright on the pedeſtal CDE, on which is an hour-circle, having its index fixed on the axis, which turns ſomewhat tightly in the pedeſtal, ſo that the *globe* may not be liable to ſhake: to prevent which, the pedeſtal is about two inches thick, and the axis goes quite through it, bearing on a ſhoulder. The *globe* is hung in a graduated brazen meridian, much in the uſual way; and the thin plate N, NE, E, is a moveable horizon, graduated round the outer edge, for ſhewing the bearings and amplitudes of the ſun, moon, and planets. The brazen meridian is grooved round the outer edge; and in this groove is a ſlender ſemi-circle of braſs, the ends of which are fixed to the horizon in its north and ſouth points: this ſemi-circle ſlides in the groove as the horizon is moved in rectifying it for different latitudes. To the middle of the ſemi-circle is fixed a pin, which always keeps in the zenith of the horizon, and on this pin the quadrant of altitude *q* turns; the lower end of which, in all poſitions, touches the horizon as it is moved round the ſame. This quadrant is divided into 90 degrees from the horizon to the zenithal pin on which it is turned, at 90. The great flat circle or plate AB is the ecliptic, on the outer edge of which the ſigns and degrees are laid down; and every fifth degree is drawn through the reſt of the ſurface of this plate towards its center. On this plate are ſeven grooves, to which ſeven little balls are adjuſted by ſliding wires, ſo that they are eaſily moved in the grooves, without danger of ſtarting out of them. The ball next the terreſtrial *globe* is the Moon, the next without it is Mercury, the next Venus, the next the Sun, then Mars, then Jupiter, and laſtly Saturn; and in order to know them, they are ſeparately ſtampt with the following characters: ●, ☿, ♀, ⊙, ♂, ♃, ♄. This plate or ecliptic is ſupported by four ſtrong wires, having their lower ends fixed into the pedeſtal at C, D, and E, the fourth being hid by the *globe*. The ecliptic is inclined 23½ degrees to the pedeſtal, and is therefore properly inclined to the axis of the *globe* which ſtands upright on the pedeſtal.

To rectify this machine. Set the Sun, and all the planetary balls, to their geocentric places in the ecliptic for any given time, by an ephemeris: then ſet the north point of the horizon to the latitude of your place on the brazen meridian, and the quadrant of altitude to the ſouth point of the horizon; which done, turn the *globe* with its furniture till the quadrant of altitude comes right againſt the Sun, viz. to his place in the ecliptic; and keeping it there, ſet the hour-index to the XII. next the letter C.

By this machine the following problems, as well as many others, may be reſolved.

To find the amplitude, meridian altitudes, and times of riſing, culminating, and ſetting of the ſun, moon, and planets. Turn the *globe* round eaſtward, or according to the order of the ſigns; and as the eaſtern edge of the horizon comes right againſt the ſun, moon, or any planet, the hour-index will ſhew the time of its riſing; and the inner edge of the ecliptic will cut its riſing amplitude in the horizon. Turn on, and as the quadrant of altitude comes right againſt the ſun, moon, or planets, the ecliptic cuts their meridian altitudes in the quadrant, and the hour-index ſhews the times of their coming to the meridian. Continue turning, and as the weſtern edge of the horizon comes right againſt the ſun, moon, or planets, their ſetting amplitudes are cut in the horizon by the ecliptic; and the times of their ſetting are ſhewn by the index on the hour-circle.

To find the altitude and azimuth of the ſun, moon, and planets, at any time of their being above the horizon. Turn the *globe* till the index comes to the given time in the hour-circle; then keep the *globe* ſteady, and moving the quadrant of altitude to each planet reſpectively, the edge of the ecliptic will cut the planet's mean altitude on the quadrant, and the quadrant will cut the planet's azimuth, or point of bearing on the horizon.

The ſun's altitude being given at any time either before or after noon, to find the hour of the day, and the variation of the compaſs, in any known latitude. With one hand hold the edge of the quadrant right againſt the ſun; and, with the other hand, turn the *globe* weſtward, if it be in the forenoon, or eaſtward if it be in the afternoon, until the ſun's place at the inner edge of the ecliptic cuts the quadrant in the ſun's obſerved altitude; and then the hour-index will point out the time of the day, and the quadrant will cut the true azimuth, or bearing of the ſun for that time: the difference between which, and the bearing ſhewn by the azimuth compaſs, ſhews the variation of the compaſs in that place of the earth. Ferguſon's Aſtron. p. 292, &c.

Globe *amaranth*. See Gomphræna.

Globe *animalcule*, in *Natural Hiſtory*, is a ſingular, minute, aquatic animal, whoſe form ſeems exactly globular, without either head, tail, or fins. It moves in all directions, either rolling like a bowl, or gliding along ſmoothly without turning itſelf at all. Its whole body is tranſparent, except where it is covered with circular black ſpots; ſome of which have ſix or ſeven, ſome one, two, three, four, or five, and others none at all. Theſe ſpots are probably the eggs or young ones of the animal. The general appearance of the body exhibited a kind of ſhort moveable hairs or briſtles, by means of which it is conjectured the motions of the animal may be performed. Baker's Microſ. 1753, p. 322, &c.

Globe *crow-foot*, a *ranunculus*. See Hellebore.

Globe *daiſy*. See Daisy.

Globe *fiſh*, a name by which ſome ſpecies of the oſtracion are called. See Ostracion.

Globe *flower*, *ſphæranthus*, in *Botany*, a genus of the *ſyngeneſia polygamia ſegregata* claſs; the characters of which are theſe: the flowers are compoſed of hermaphrodite florets and female half florets, included in one ſcaly empalement: the hermaphrodite florets are placed in the center; they are funnel-ſhaped, and cut into five parts at the brim, with five ſhort hair-like ſtamina, terminated by cylindrical ſummits and a germen, which decay, ſupporting a thick longer ſtyle having a ſingle ſtigma; theſe are barren: the female half florets are ſituated round the border, and have ſcarce any petals, but an oblong germen, ſupporting a briſtly ſtyle, crowned by a double ſtigma; theſe have one oblong naked ſeed. Linnæus enumerates three ſpecies, and Miller only two, which are annual plants, that muſt be kept in a hot-bed, and, in a cold ſummer, under a glaſs caſe, in order to ripen their ſeeds in our climate.

Globe *thiſtle*. See *Globe* Thistle.

GLOBULAR *chart*, a repreſentation of the ſurface, or ſome part of the ſurface, of the terraqueous globe upon a plane; wherein the parallels of latitude are circles nearly concentric; the meridians, curves bending towards the poles; and the rhumb-lines alſo curves.

The merits of this chart conſiſt in this, that the diſtances between places on the ſame rhumb are all meaſured by the ſame ſcale of equal parts; and the diſtance of any two places in the arch of a great circle, is nearly repreſented in this chart by a ſtrait line. Hence land maps, made according to this projection, would indiſputably have great advantages above thoſe made any other way. See Map.

But for ſea charts, and the uſe of navigation, it is yet controverted, whether the *globular* chart be preferable to Mercator's, where the meridians, parallels, and particularly the rhumb-lines, are all ſtrait lines; inaſmuch as ſtrait lines are found more eaſy to draw and manage than curves, eſpecially ſuch as rhumb-lines on the *globular* chart are. This projection is not new, though not much taken notice of till of late. It is mentioned by Ptolemy, in his Geography; as alſo by Blundeville, in his Exerciſes. See Chart.

Globular *ſailing*. See *Great-circle* Sailing.

GLOBULARIA, in *Botany*. See *Blue* Daisy.

GLOBULE, Globulus, a little globe; otherwiſe called a *ſpherule*.

Thus the red particles of the blood are called *globules* of the blood, on account of their redneſs and ſmallneſs. The Carteſians call the particles broken off the matter of the firſt element, *globules of the ſecond element*. See Cartesian, &c.

GLOBULUS *naſi*, is uſed for the lower, flexible, cartilaginous part of the noſe.

GLOKEN-*ſpeiſſe*, in *Mineralogy*, a term uſed by the Germans to expreſs a ſort of impure regulus of biſmuth, obtained by accident, ſometimes in the making of ſmalt. The biſmuth ores are often ſo intimately mixed with the cobalt, that they cannot be ſeparated from them. In this caſe, the arſenic being raiſed in flowers, there remains at the bottom, inſtead of the fixed vitrifiable earth of the cobalt, a ſort of impure regulus of a reddiſh colour. This is biſmuth, with an admixture of the earth of cobalt, and other extraneous matter. They ſometimes call this whole matter by the common name of *ſpeiſſe*, but more uſually they ſeparate it into two parts, and call the under part, which is moſt ſolid, *gloken-ſpeiſſe*, and the upper part they diſtinguiſh by the name of *æs caldarium*.

GLOMERELLS, in *our old Writers*, commiſſaries appointed to determine differences between ſcholars of a ſchool or univerſity, and the townſmen of the place. In the edict of the biſhop of Ely, anno 1276, there is mention of the maſter of the *glomerells*.

GLORIA *Patri*, in the Liturgy, a formula of words repeated at the end of each Pſalm, and on other occaſions, to give glory to the Trinity; called alſo the Doxology. It is thus denominated, becauſe beginning in the Latin office with theſe words, *Gloria Patri*, q. d. *Glory be to the Father*, &c.

Pope Damaſcus is commonly held to have firſt ordered the rehearſal, or rather ſinging the *Gloria Patri* at the end of Pſalms. Baronius, indeed, will have it to have been uſed in the times of the apoſtles; but its uſe, then, he allows to have been more obſcure, and that it did not become popular till after the riſe of Arianiſm, when it was made a kind of ſymbol of orthodoxy.

The fifth canon of the council of Vaiſon, held in 529, decrees, "that the name of the pope ſhall always be "rehearſed in the churches of France, and after the "*Gloria Patri* ſhall be added *ſicut erat in principio*, as is "done at Rome, in Africa, &c. on account of the he-"retics, who ſay, that the Son of God had his begin-"ning in time." Fleury.

Gloria *in excelſis* is alſo a kind of hymn rehearſed in divine ſervice, beginning with the words *Gloria in excelſis Deo, & in terra pax hominibus*, &c. *Glory be to God on high, on earth peace*, &c.

GLORIOSA, in *Botany*. See *Superb* Lily.

GLOSS, Glossa, a comment on the text of any author, to explain his ſenſe more fully and at large, whether in the ſame language, or in any other. See Commentary.

The word, according to ſome, comes from γλωσσα, *tongue*; the office of a *gloſs* being to explain the text, as that of the tongue is to diſcover the mind. Others derive it from the Latin *glos*, of γαλως, *a ſiſter-in-law*, which, among lawyers, ſometimes ſtands for ſiſter; the *gloſs* being, as it were, ſiſter to the text.

Nic. de Lyra compoſed a poſtil or *gloſs* on the Bible, in ſix volumes folio. The French ſay, proverbially, of an ill comment, that it is *gloſe d'Orleans, plus obſcure que le texte*.

Gloss is alſo uſed for a literal tranſlation, or an interpretation of an author in another language, word for word. Young ſcholars need an interlineary *gloſs* for the underſtanding of Juvenal, Horace, Salluſt, Perſius, &c.

Gloss is alſo uſed in matters of *Commerce*, &c. for the luſtre of ſilk, ſtuff, or the like.

GLOSSARY, Glossarium, a kind of dictionary for explaining the obſcure, ancient, and barbarous words and phraſes of an altered, corrupted, or refined language.

Spelman's *Gloſſary*, intitled Archaiologicum, is an excellent work; though that author did not begin to ſtudy in this way till fifty years of age. M. Du-Cange's Latin *Gloſſary* in three volumes, and his Greek *Gloſſary* in two volumes folio, are excellent performances, full of uncommon erudition. Lindenbroek has a *Gloſſary* on the laws of Charlemagne, &c.

GLOSSOCATOCHOS, a word uſed by ſome writers to expreſs a chirurgical inſtrument, uſed to depreſs the tongue for examining the mouth. See Glossospatha.

GLOSSOCOMON, a ſurgeon's inſtrument, anciently uſed in ſetting broken and diſlocated thighs and legs; as alſo in extending thoſe which remained too ſhort after ſetting. The word is formed of γλωσσα, *tongue*, and κομειν, *to take care*; and was properly and primarily given by the ancients to a little box, wherein they kept the reeds of their hautbois, &c.

The *gloſſocomon* is deſcribed as conſiſting of a hollow trunk, wherein the thigh or leg is laid: at the bottom hereof is a kind of wheel; and towards the top are two pullies on each ſide. Several thongs of leather are tied both above and below the fractured place: thoſe below are faſtened to the axis of the wheel, which they are near; thoſe above go over the pullies to come to the axis, which they are likewiſe faſtened to; ſo that the ſame turning of the wheel both draws the part of the leg or thigh, which is above the fracture, upwards; and that below, downwards.

Glossocomon, in *Mechanics*, is a name given by Hiero to a machine compoſed of divers dented wheels, with pinions ſerving to raiſe huge burdens.

GLOSSOGRAPHE, in *Botany*, a name uſed by ſome authors for the *fumaria*, or common FUMITORY.

GLOSSOIDES, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of ſtone, reſembling the figure of the human tongue. This is a mere accidental configuration of a common flint or pebble, perfectly indeterminate in ſize and colour, and owing its form to no animal mould, as the ſtones found in ſhells uſually do, but is a mere *luſus naturæ* in the concretion of the ſtone.

GLOSSOPETRA, or Glottopetra, in *Natural Hiſtory*, a kind of extraneous foſſil, ſomewhat in form of a ſerpent's tongue; frequently found in the iſland of Malta, and divers other parts. See *Tab. Foſſils*, *claſs* 8.

Naturaliſts have been much divided as to the nature and origin of theſe bodies. Steno, De Corpore ſolido intra ſolidum Contento; Ol. Wormius, Diſſert. de *Gloſſopetra*; and Reyſchius, De *Gloſſopetris* Lunebergenſibus; treat of them at large.

The vulgar notion is, that they are the tongues of ſerpents petrified; and hence their name, which is a compound of γλωσσα, *tongue*, and πετρα, *ſtone*. Hence, alſo, their traditionary virtue in curing the bites of ſerpents.

The general opinion of naturaliſts is, that they are the teeth of fiſhes, left at land by the waters of the deluge, and ſince petrified.

They even ſpecify the very kind of fiſh, and take it to be that which Theophraſtus and the Greek writers call καρχαριας, and the moderns the *ſhark*, or *ſea-dog*.

Camerarius cannot perſuade himſelf that the *gloſſopetræ*, found in England, Malta, and round Montpelier, were ever the teeth of a ſea-dog, or any other fiſh. The chief difficulty, he ſuggeſts, is the ſmall quantity of volatile ſalt and oil which they afford by diſtillation. To which Dr. Woodward anſwers, in defence of the common ſyſtem, that having lain ſo long buried under ground, it is no wonder they ſhould have loſt the beſt part of their volatile principles. It is certain, that human bones and ſkulls, long interred, do not afford near the quantity of thoſe principles that they would have done immediately after the perſon's death.

Another ſcruple, propoſed by Camerarius, is, that the *gloſſopetræ*, when expoſed to the naked fire, turn to a coal, and not to a calx; contrary to what is aſſerted by Fabius Columna. Dr. Woodward anſwers, that it is likely enough the *gloſſopetræ*, in burning, may aſſume the form of a coal, before it arrive to that of a calx.

The ſeveral ſizes of the teeth of the ſame ſpecies, and thoſe of the ſeveral different ſpecies of ſharks, afford a vaſt variety of theſe foſſil ſubſtances. Their uſual colours are black, bluiſh, whitiſh, yellowiſh, or brown; and in ſhape, they uſually approach to a triangular figure. Some of them are ſimple; others are tricuſpidate, having a ſmall point on each ſide of the large one: many of them are quite ſtrait, but they are frequently found crooked, and bent in all directions: many of them are ſerrated on their edges, and others have them plain: ſome are undulated on their edges, and ſlightly ſerrated on theſe undulations. They differ alſo in ſize as much as in figure; the larger being four or five inches long, and the ſmaller of leſs than a quarter of an inch.

They are moſt uſually found with us in the ſtrata of blue clay, though ſometimes alſo in other ſubſtances, and are frequent in the clay-pits of Richmond and other places. They are very frequent alſo in Germany, but no where ſo plentiful as in the iſland of Malta.

The Germans attribute many virtues to theſe foſſil teeth; they call them cordials, ſudorifics, and alexipharmics: and the people of Malta, where they are extremely plentiful, hang them about their children's necks to promote dentition. They may poſſibly be of as much ſervice this way as an anodyne necklace; and if ſuſpended in ſuch a manner, that the child can get them to its mouth, may, by their hardneſs and ſmoothneſs, be of the ſame uſe as a piece of coral.

GLOSSO-PHARYNGÆI, in *Anatomy*, are fibres which run along the lateral edges of the tongue, from which they are parted backward, and run down on the ſides of the pharynx under the *ſtylo-pharyngæi*.

GLOSSO-STAPHYLINI, in *Anatomy*, are two ſmall muſcles fixed each in the lower and lateral part of the baſis of the tongue, from whence they run up obliquely backward, along the anterior half arches of the ſeptum palati, and terminate inſenſibly on each ſide near the uvula.

Mylo-Glossi and *Stylo*-Glossi. See Mylo-*gloſſi* and Stylo-*gloſſi*.

GLOSSOSPATHA, in *Surgery*, an inſtrument, called by ſome *ſpeculum linguæ*, and uſed to depreſs the tongue, in order to look into the fauces.

There are many inflammatory diſorders of the mouth, fauces, and palate, which require a depreſſion of the tongue, while they are inſpected and treated with proper remedies. The handle of a ſilver ſpoon is made to ſupply the place of this inſtrument in moſt caſes, and anſwers the purpoſe very well. Whichever is uſed, care ſhould be taken to depreſs very gently, to avoid giving the patient pain, as alſo to avoid irritating the mouth and inflamed parts.

When injections are to be made into the mouth, this inſtrument or the ſpoon ſhould alſo be applied, and the ſyringe ſhould be conveyed into the mouth over it.

GLOTTIS, in *Anatomy*, a cleft or chink in the larynx, ſerving for the formation of the voice.

The *glottis* is in form of a little tongue, whence its name, from γλωττα, *tongue*. For the ſame reaſon, the Latins call it *lingula*, i. e. *little tongue*.

Through this chink the air deſcends and aſcends in reſpiring, ſpeaking, ſinging, &c. It has an apparatus of muſcles, whereby we contract and enlarge it; and hence all the variety of tones of the voice.

The *glottis* is covered and defended with a thin, ſoft cartilage, called the *epiglottis*.

Glottis, in *Ornithology*, a name given by many authors to a bird of the long-legged kind, approaching to the nature of our red-ſhank, but larger and longer-legged, and generally known by the name LIMOSA.

GLOVE, *chirotheca*, a habit or covering for the hand and wriſt, uſed both for warmth, decency, and as a ſhelter from the weather.

Gloves are diſtinguiſhed, with reſpect to commerce, into leathern *gloves*, ſilk *gloves*, thread *gloves*, cotton *gloves*, worſted *gloves*, &c.

There are alſo *gloves* of velvet, ſattin, taffaty, &c. Leather *gloves* are made of ſhamoy, kid, lamb, doe, elk, buff, &c. There are, alſo, perfumed *gloves*; waſhed, glazed, waxed *gloves*; and white, black, ſnuff-colour, &c. *gloves*; ſingle, lined, topped, laced, fringed with gold, ſilver, ſilk, fur, &c.

It is a proverb, for a *glove* to be good and well made, three kingdoms muſt contribute to it; Spain to dreſs the leather, France to cut it, and England to ſew it. But, of late, the French ſeem to have appropriated the functions of the other two; the *gloves* of the French manufacture being now ſaid to have the advantage, in point of dreſſing and ſewing, as much as of cutting.

To throw the Glove was a practice or ceremony very uſual among our fore-fathers, being the challenge whereby another was defied to ſingle combat. It is ſtill retained at the coronation of our kings, when the king's champion caſts his *glove* in Weſtminſter-hall.

Favyn ſuppoſes the cuſtom to have aroſe from the eaſtern nations, who in all their ſales and deliveries of lands, goods, &c. uſed to give the purchaſer their *glove* by way of livery or inveſtiture. To this effect he quotes Ruth iv. 7. where the Chaldee paraphraſe calls *glove* what the common verſion renders by *ſhoe.* He adds, that the rabbins interpret by *glove*, that paſſage in the cviiith Pſalm, *In Idumeam extendam calceamentum meum, Over Edom will I caſt out my ſhoe.* Accordingly, among us, he who took up the *glove*, declared thereby his acceptance of the challenge; and as part of the ceremony, continues Favyn, took the *glove* off his own right-hand, and caſt it upon the ground, to be taken up by the challenger. This had the force of a mutual engagement on each ſide, to meet at the time and place which ſhould be appointed by the king, parliament, or judges.

The ſame author aſſerts, that the cuſtom which ſtill obtains of bleſſing *gloves*, in the coronation of the kings of France, is a remain of the eaſtern practice of giving poſſeſſion with the *glove*. Lib xvi. p. 1017, &c.

The delivery of a *glove* was in frequent uſe formerly, as a ſymbol of inveſtiture. See Du-Cange, Gloſſ. Lat.

Gloves was alſo uſed to ſignify the ſteward's or bailiff's fee, or part of the price of the inveſtiture or purchaſe-money of the land. *Si aliquam territorii partem venundari contigerit, domini venditiones habebunt; ſcilicet, tot denarios quot venditor inde habuerit ſolidos. Major vero terræ illius pro* wantis *accipient duos denarios.* Where *wanti* ſignifies *gloves*, or, in French, *gants*.

Hence the common cuſtom, in many bargains, of giving ſervants money for a pair of *gloves*.

Anciently it was prohibited the judges to wear *gloves* on the bench; and at preſent, in the ſtables of moſt princes, it is not ſafe going in without pulling off the *gloves*.

GLOUTIUS, in *Anatomy*, a name given by Riolan, and ſome others, to the muſcles of the thigh, generally called *glutæi*, or ſingly *glutæus major*, &c.

GLOW-*worm*, *cicindela*, in *Zoology*, a genus of inſects of the *coleoptera* order; the antennæ of which are ſetaceous, the jaws prominent and dentated, the eyes in a ſmall degree prominent, the thorax of a roundiſh marginated figure.

Cantharis and *cincindela* have been often uſed, indiſcriminately, for the *glow-worm*; but they form two diſtinct genera of the ſame order, comprehending ſeveral ſpecies, in the Linnæan ſyſtem. The ſpecies of the *cantharis* have ſetaceous antennæ; the thorax is marginated and ſhorter than the head, the exterior wings are flexile, and the ſides of the abdomen are plicated and papilloſe. In moſt ſpecies the thorax is flatted, but in ſome roundiſh. Of this genus Linnæus reckons twenty-ſix ſpecies. See Cantharides. Of the *cincindela* he enumerates fourteen ſpecies, diſtinguiſhed by their colour and the ſpots on their exterior wings: thus, the field or green *glow-worm* hath five white ſpots on theſe wings; the black *glow-worm*, that frequents woody places, two; the braſſy *glow-worm*, common in moiſt places, has broad excavated ſpots on the wings; the black *glow-worm*, with a round thorax, common in rocky places, has two ferrugineous ſpots, &c.

The male and female differ greatly in this ſpecies of inſect. The male has wings, and is a ſmall fly; the female has no wings, but is a large crawling worm.

The body of the male is oblong, and ſomewhat flatted; the wings are ſhorter than the body; the head is broad, dun, and flat; the eyes are large and black. This has no light iſſuing from it, and is not commonly ſuppoſed to be at all of kin to the *glow worm*.

The female is what we expreſsly call by this name: this is a very ſlow-paced animal, without wings, and ſomewhat reſembling a caterpillar; the head is ſmall, flat, hard, and black, and ſharp towards the mouth; it has ſhort antennæ, and ſix moderately long legs; the body is flat, and is compoſed of twelve rings, whereas the body of the male conſiſts only of five; it is of a duſky colour, with a ſtreak of white down the back. It is often ſeen in the day-time, but is not known except in the dark; at which time it is eaſily diſtinguiſhed by the glowing light, or lambent flame, that is ſeen near the tail, iſſuing from the under part of the body.

The common *glow-worm* is frequently met with under our hedges, and, if carefully taken up, may be kept alive many days on freſh turfs of graſs; all which time it will continue to ſhine in the dark.

The light of this little inſect is ſo ſtrong, that it will ſhew itſelf through ſeveral ſubſtances, in which the creature may be put up; a thin pill-box eaſily ſhews it through, and even though lined with paper, the light is not impeded in its paſſage by both. The creature is ſluggiſh, and appears dead in the day-time, and its light is not diſtinguiſhable, even if carried into a darkened room, unleſs the creature be turned upon its back, and diſturbed, ſo as to be put in motion, and then it is but very faint: after ſun-ſet the light begins to return, and with it the life and motion of the animal. The motion and light of this creature ſeem, in ſome meaſure, to depend upon one another: it never ſhines but when its body is in ſome ſort of motion; and when it ſhines moſt, the body is extended to one third more than its length in the day-time. In the time of brighteſt ſhining, it will ſometimes on a ſudden turn its body about, and the light will not be larger than the head of a pin; and, on being touched, ſhe will then immediately extend herſelf, and the light will become as large and bright as ever. Phil. Tranſ. N° 71. The whole inſect is uſed in medicine, and recommended by ſome againſt the ſtone. Cardan aſcribes an anodyne virtue to it.

Glow-*worm*, *flying*, *cicindela volans.* In the warmer months of the year, this creature is ſometimes caught in our houſes flying to the flame of a candle, and when examined in the dark, it is found luminous at theſe times, though perhaps leſs, or not at all ſo, at others; which may be a reaſon of its not being known, though caught in the fields: and to this it may be owing, that many who have deſcribed it have thought it not a native of England. See *Tab. of Microſcopical Objects, claſs* 1. Without wings it is frequently enough found in form of the common *glow-worm*, and then always ſhines. Aldrovand has very well deſcribed the *cicindela volans*, and ſays, that it lays eggs which hatch into ſmall worms, and that theſe after a time become flies, by the ſame ſort of change which happens to caterpillars and other reptiles which become butterflies, and other ſpecies of winged inſects. Mouffett, and Thomas Bartholine, both deſcribe the animal much as Aldrovand has done, but they allow only the male to have wings; but Julius Scaliger contradicts this, and ſays, that he has caught them both winged in the act of generation: this is a plain proof that both ſexes are winged; yet it has not happened that both ſexes have been acknowledged to be ſo, even by thoſe who have quoted this paſſage. And Mr. Waller, who gives an account of them in the Philoſophical Tranſactions, obſerved them in the ſame manner in the act of copulation both winged, and with no other difference between them, but that the female was the larger of the two, which is the caſe in regard to many inſects. Julius Scalig. Exerc. 191. Phil. Tranſ. N° 167. p. 841.

The male and female in this winged ſtate both ſhine in hot weather, and their light is ſo vivid as to be eaſily ſeen even while there is a candle in the room; the vibrations of it are irregular, and its colour greeniſh. The luminous parts are two ſmall ſpecks under the tail at the end, and the light continues in theſe ſome time after the tail is cut off, but then gradually goes out.

The parts of inſects continue alive in ſome degree for a conſiderable time after they are cut off, and probably the light in the tail of this animal continues juſt as long as that ſort of life remains in it. Mouffet, cap. 15.

The uſe of this light ſeems to be to direct the animal in its courſe, and in the taking of its prey, and to this purpoſe it is admirably placed. The tail is eaſily bent under the belly, and then throws the light full upon any object about, or under the head of the animal, and the eyes are placed not on the upper part, but on the under ſide of the head; ſo that they have all the advantages of it, while the light in this part is not offenſive to the eyes, as it naturally would have been if carried before the head. The creature can, upon occaſion, cover this light ſo as not to be known, or purſued by it, by its enemies. Thomas Barthol. De Luce Anim. lib. ii. cap. 12.

This inſect is of the beetle kind, of a brown and duſky colour. It has hard caſe or ſhell wings, as the other beetles have, and when theſe are expanded, there appear a pair of very large membranous ones; its head is covered with a ſort of ſhield or broad-brimmed hat; under this hat are placed the eyes, which are black and large, and are moveable, ſo that the creature can, upon occaſion, thruſt them forward; it has two hairy antennæ, and its legs are like thoſe of the common fly, hard, ſhelly, and hairy. Its eyes afford an elegant object for the microſcope, being compoſed of an infinite number of lenſes, as thoſe of the libellæ and other inſects. Aldrovand. De Inſect. lib. i. cap. 8.

GLUE, **Gluten**, a viſcid, tenacious matter, ſerving as a cement to bind or connect divers things together.

There are divers kinds of *glues* made uſe of in the divers arts; as the *common glue*, *glove glue*, *parchment glue*: but the two laſt are more properly called size.

The *common* or *ſtrong* **Glue** is a commodity uſed by numerous kinds of artificers; as joiners, cabinet-makers, caſe-makers, hatters, book-binders, &c. and the conſumption thereof is very conſiderable. The beſt is that made in England, in ſquare pieces, of a ruddy brown colour: Flanders *glue* is held the next after the Engliſh.

Glue is made of the ſkins of all kinds of beaſts; as oxen, cows, calves, ſheep, &c. The older the beaſt is, the better is the *glue* that is made of its hide. Indeed, it is rare they uſe whole ſkins for this purpoſe; thoſe being capable of being applied to better purpoſe: but they make uſe of the ſhavings, parings, or ſcraps thereof; and ſometimes they make it of the feet, ſinews, nerves, &c. of beaſts.

That made of whole ſkins is the beſt; and that of ſinews, &c. the worſt: and hence, chiefly, ariſes the difference of *glues*, and the advantage of Engliſh and Flemiſh *glues*.

Glue, *method of making*. To make *glue* of parings, they firſt ſteep them two or three days in water; then waſhing them well out, they boil them to the conſiſtence of a thick jelly; this done, they paſs the jelly, while yet hot, through oſier baſkets, to ſeparate from it any impurities; and, in order to purify it ſtill farther, they let it reſt ſome time. When the ordures, or foreign matters, are precipitated to the bottom of the veſſel, they melt and boil it a ſecond time.

This done, they pour it into flat frames, or moulds; whence it is taken out, when pretty hard and ſolid, and then cut into ſquare pieces or cakes. Nothing now remains but to dry it in the wind, on a ſort of coarſe net, and afterwards to ſtring it to finiſh the drying.

The *glue* made of feet, ſinews, &c. is managed after the ſame manner, with this only difference, that they bone and ſcour the feet, and do not lay them to ſteep.

The beſt *glue* is that which is oldeſt: the ſureſt teſt of its goodneſs is, to lay a piece to ſteep three or four days in water; if it ſwell conſiderably without melting, and, when taken out, reſume its former dryneſs, it is excellent.

Glue, *bees*. See Wax.

Glue, *fiſh*, is a ſort of *glue* made of the nervous and mucilaginous parts of a large fiſh, found chiefly in the Ruſſian ſeas.

Theſe parts being boiled, bear a near reſemblance to that viſcid matter found on the ſkins of cod-fiſh. When boiled to the conſiſtence of a jelly, they ſpread it on a leaf of paper, and form it into cakes; in which ſtate it is ſent to us.

Fiſh-glue is of conſiderable uſe in medicine, and divers other arts; where it is better known under the name of *iſinglaſs* and ICHTHYOCOLLA.

A ſtrong and fine *glue* may be prepared with iſinglaſs and ſpirit of wine thus: ſteep the iſinglaſs for twenty-four hours in ſpirit of wine or common brandy. When the menſtruum has opened and mollified the iſinglaſs, they muſt be gently boiled together, and kept ſtirring till they appear well mixed, and till a drop thereof, ſuffered to cool, preſently turns to a ſtrong jelly. Then ſtrain it, while hot, through a clean linen cloth, into a veſſel to be kept cloſe ſtopped. A gentle heat ſuffices to diſſolve this *glue* into a tranſparent and almoſt colourleſs fluid, but very ſtrong; ſo that pieces of wood, *glued* together with it, will ſeparate elſewhere than in the parts joined. Boyle's Works, abridg. vol. i. p. 130.

A ſtrong compound *glue* may be made by infuſing a mixture of common *glue*, in ſmall pieces, with iſinglaſs *glue*, in as much ſpirit of wine as will cover them, for about twenty-four hours: then melt the whole together, and add as much powdered chalk as will make it an opake white.

A ſtrong *glue*, that will reſiſt moiſture, may be obtained by diſſolving gum ſandarac and maſtic, of each two ounces, in a pint of ſpirit of wine, and adding about an ounce of clear turpentine: then take equal parts of iſinglaſs and parchment *glue*, and having pounded them into ſmall pieces, pour the ſolution of the *gums* upon them, and melt the mixture in a covered veſſel, with a heat leſs than that of boiling water: then ſtrain the *glue* through a coarſe linen cloth, and putting it again over the fire, add about an ounce of powdered glaſs.

Or, a ſtrong *glue*, that will reſiſt water, may be made by adding half a pound of common iſinglaſs *glue* to two quarts of ſkimmed milk, and evaporating the mixture to a due conſiſtence.

A *glue*, that will hold againſt fire and water, may be made by mixing a handful of quick-lime with four ounces of linſeed oil, boiling them to a good thickneſs, and ſpreading the mixture on tin plates in the ſhade: it will thus become exceeding hard, but will eaſily be diſſolved over a fire, and be fit for uſe. See Cæment.

GLUME, *gluma*, among *Botaniſts*, a ſpecies of cup, conſiſting of two or three membranous valves, which are often pellucid at the edges. This kind of cup belongs to the graſſes. See Grass.

GLUT, among *Falconers*, the ſlimy ſubſtance that lies in a hawk's paunch.

GLUTÆUS, in *Anatomy*, is a name common to three muſcles, whoſe office it is to extend the thigh. The firſt, Glutæus *major*, or the *greater*, ariſes ſemi-circularly from the os coccygis, the ſpines of the ſacrum, the ſpine of the ilium, and a ſtrong ligament which runs between the ſacrum and tubercle of the iſchium; and deſcending, is inſerted into the linea aſpera, four fingers breadth below the great trochanter. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 51. *fig.* 6. *n.* 33.

Glutæus *medius*, or the *middle* one, called *minor*, or *leſs*, ariſes from the ſpine of the ilium, under the former; and is inſerted into the ſuperior and external part of the great trochanter. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 50. *fig.* 2. *n.* 33. *fig.* 6. *n.* 32. *fig.* 7. *n.* 23.

Glutæus *minimus*, or *leaſt*, ariſes from the lower part of the external ſide of the ilium, under the former, and is inſerted at the ſuperior part of the great trochanter. See *Tab. Anat.* (*Myol.*) *fig.* 7. *n.* 21.

GLUTINATIVE, Agglutinative, or Conglutinative, in *Medicine* and *Pharmacy*. See Conglutination and Agglutination.

GLUTTA, a name given by ſome authors to the *gutta gamba* or GAMBOGE.

GLUTTON *of Buffon*, in *Zoology*, is the MUSTELA *gulo* of Linnæus, and mentioned by authors under the names of wolverene, carcajou, quick-hatch, &c. Mr. Pennant has deſcribed this animal as a ſpecies of BEAR, with a black ſharp-pointed viſage; ſhort rounded ears, almoſt hid in the hair; hairs on the head, back, and belly, reddiſh, with black tips; ſides of a yellowiſh brown, which paſſes in the form of a band over the hind-part of the back, above the tail; a white ſpot on the throat; a white mark, like a creſcent, on the breaſt; ſtrong and ſhort legs of a deep black; five toes on each foot, not deeply divided, though Mr. Edwards only obſerved four on the fore-feet of the animal which he deſcribes; the bottom of the feet covered thickly with hair; claws ſtrong and ſharp, and white at their ends; tail clothed with long coarſe hairs, thoſe at the baſe reddiſh, and at the end black, ſome of which are ſix inches long. The length of this animal from the noſe to the tail is twenty-eight inches. The whole body is covered with long and thick hair, which varies in colour according to the ſeaſon. M. Buffon has deſcribed this animal (ſee *Tab.* II. *Quadrupeds*, N° 16.) as two feet two inches in length, from the tip of the noſe to the root of the tail; the face, as far as the eye-brows, is black; the eyes are ſmall and black; from the eye-brows to the ears the hair is black mixed with brown; the ears are ſhort, or about an inch long; the hair under the lower jaw and between the fore-feet is ſpotted with white; the fore-legs are eleven inches long, and the hind-legs twelve inches; the tail is eight inches, and the hair of the tail four inches: the four legs, the tail, and the back, and the lower part of the belly, are black; from the ſhoulders to the root of the tail the hair is reddiſh; on the ſides it is ſoft, thin, and white: the fore-feet, to the extremity of the claws, are $3\frac{3}{4}$ inches in length, and $2\frac{1}{2}$ inches in breadth; they are furniſhed with five hooked claws, the middle one being $1\frac{1}{2}$ inch long: the hind feet are $4\frac{3}{4}$ inches long, and $2\frac{3}{4}$ broad: the upper jaw has ſix cutting teeth, one on each ſide being ſomewhat thicker than the reſt; two large teeth, ſeven lines long, a little bent, and five grinders, two of which are conſiderably larger than the others: in the lower jaw there are five grinders, one of which is very large; two large teeth that are a little bent, and ſix ſmall ones: about the throat and under the eyes there is a little hair, which is about two inches in length.

This animal is found in the northern parts of Europe and Aſia, and in Hudſon's Bay, and Canada. It has been repreſented as a very voracious and cruel animal, whence its name *glutton*: it has been ſaid, that it feeds to ſuch a degree, as to be obliged to diſcharge its load by preſſing between two trees; though M. Buffon apprehends that the relations of voyagers have been exaggerated. It is very ſlow in its motion, and, therefore, takes its prey by ſurprize. In America it is called the *beaver-eater*, becauſe it devours thoſe animals. It will often lurk on trees, and fall on quadrupeds that paſs under it, and faſten to animals of a very large ſize, and will eat a hole in their bodies, or tear out their eyes. It is particularly eager after the iſatis or white fox. In its wild ſtate it is very fierce, but capable of being tamed. It burrows under ground. The ſkin of the *glutton* is much valued in Siberia and Kamtſchatka, and the fur is greatly eſteemed in Europe: that of the north of Europe and Aſia is much finer and of a more gloſſy black than that of the American kind. See Pennant's Britiſh Zoology, p. 195, &c. Buffon's Hiſt. Nat. tom. xxvii. p. 70. edit. 1766. and Supplement, tom. vi. p 67, &c. edit. 1777.

GLYCOPICROS, in *Botany*, a name by which ſome authors have called the ſolanum lignoſum, or dulcamara.

GLYCYCALAMUS, a word uſed ſingly as the name of a vegetable ſubſtance by ſome of the Greek writers; but by the moſt ancient it is only uſed as an epithet for a peculiar kind of lotus. This LOTUS *glycycalamus* is a name given by Myrepſus and others to the caſſia fiſtula; but by other of the ancients it ſeems to have been made the name of the ſugar-cane.

GLYCINE, *Carolina Kidney-bean tree*, or *Knobbed-rooted Liquorice Vetch*, in *Botany*, a genus of the *diadelphia decandria* claſs: the characters are, that the empalement of the flower is of one leaf, divided into two lips at the top, the upper lip being obtuſe and indented, and the lower lip longer, trifid, and acute: the flower is of the butterfly kind; the ſtandard is heart-ſhaped, deflexed on the ſides, gibbous on the back, and indented at the point: the wings are ſmall, oblong, and oval towards their end, and bend backward: the keel is narrow, fickle-ſhaped, turning upward with its point to the ſtandard, where it is broadeſt: it hath ten ſtamina, nine of which are joined in one body, and the other ſtands ſingle, terminated by ſingle ſummits: in the center is ſituated an oblong germen, ſupporting a ſpiral cylindrical ſtyle, crowned by an obtuſe ſtigma: the germen afterward becomes an oblong pod with two cells, incloſing kidney-ſhaped ſeeds. Miller enumerates five ſpecies, and Linnæus ten

GLYCONIAN, GLYCONIUS, in the Greek and Latin poetry.

A *Glyconian* verſe is that conſiſting of two feet and a ſyllable; at leaſt this is Scaliger's opinion: who adds, that the *Glyconian* verſe was alſo called the *Euripidean* verſe. See VERSE.

Others hold, that the *Glyconian* verſe conſiſted of three feet, a ſpondee and two dactyls; or rather a ſpondee, choriambus, and an iambus or a pyrrhic: which opinion is the moſt followed.

Sic te diva potens Cypri is a *Glyconian* verſe.

GLYCYRRHIZA, in *Botany* and *Medicine*, *liquorice*. See LIQUORICE.

GLYPHE, or GLYPHIS, in *Sculpture* and *Architecture*, a general name for a cavity or canal, whether round, or terminating in an angle; uſed as an ornament in any part.

The Greek word is γλυφη, which literally ſignifies *graving*, *nitching*.

Γλυφις is properly a nitch or indenture made in graving; or, more properly, it is the notch in the end of an arrow, in which the ſtring goes.

GLYSTER. See CLYSTER.

GMELINA, in *Botany*, a genus of the *didynamia angioſpermia* claſs: the calyx of which is quadridented; the corolla campanulated and divided into four ſegments; two of the antheræ are bipartite, and two ſimple; and the fruit is a drupe incloſed in a bilocular nut or kernel.

GNAPHALIUM. See CUDWEED.

GNAPHEUS, in *Ichthyology*, a name given by Athenæus and other of the Greek writers to the TENCH.

GNAT, *culex*, a genus of the order of *diptera*, or two winged inſects, whoſe mouth is furniſhed with briſtly ſtings included in a flexile ſheath.

There is no ſpecies of inſect that we have ſo much reaſon to diſlike in regard to the injury it does us as the *gnat*. Others indeed give us more pain with their ſtings, but it is but by accident that we are ſtruck by them; the *gnats* thirſt for our blood, and follow us about in whole companies for it. There are many marſhy places where the legs and arms are all the ſummer ſwelled to an enormous ſize by the repeated bitings of theſe inſects, and in many other countries they are much more troubleſome than with us.

But as troubleſome enemies as theſe little creatures are to us, there is that about them which is extremely worthy our admiration; nor can we indeed fail greatly to admire even the very inſtrument of the miſchief they do. They have beſide this many very obſervable particulars in the courſe of their lives.

All the naturaliſts of late years have applied the microſcope to the examination of the parts of this little animal, and Swammerdam, Hook, Bonanni, Lewenhoeck, &c. have given very good accounts, and very valuable drawings of the creature.

There is a great number of very ſmall ſpecies of *gnats*, and though ſome are conſiderably large, yet none even of theſe approaches to the ſize of the tipula, or father long-legs, as commonly called. The larger tipulæ are therefore eaſily diſtinguiſhed from the *gnats*; but Swammerdam, Goedart, Liſter, and others, have very often given us the ſmaller tipulæ among the ſpecies of *gnats*. Both have long ſlender bodies, and both prominent corcelets, which make them look hump-backed; but when either of theſe inſects is taken into the hand it is very eaſily known, the *gnat* having a very long trunk, and the tipula no trunk at all.

There is a prodigious number of ſpecies of the *gnat* kind, taking in the ſmaller ones; Dr. Derham obſerved near forty different ſpecies about Upminſter in Eſſex: but of thoſe of a ſize to be remarked with eaſe, and without the help of glaſſes, there are three principal kinds: the one has its body variegated with white and black; this is the larger kind, and its corcelet is ſtreaked with black or deep brown, and white lines or greyiſh ones; theſe have brown eyes: another is ſmaller than this ſpecies, and has a plain brown body, the colour of the corcelet, and that of the eyes is the ſame as in the larger or firſt ſpecies: the third kind is the ſmalleſt of the three and the moſt common, has its corcelet reddiſh, or of a faded reddiſh yellow, and the body whitiſh, and on the under part of the belly every ring has one ſingle brown ſpot; the reſt is grey: the eyes of this ſpecies are of a very pleaſant green.

All the *gnats* have a long cylindric body compoſed of eight rings; their corcelet is ſhort but large, in proportion to the ſize of the fly, and to this are fixed the ſix legs, which are hairy, with ſix joints to each, and at the end two little claws, the wings, and the balancers; four ſtigmata are alſo found here, as is the caſe in other flies: the two firſt of theſe are placed near the head, and have been miſtaken for ears.

The antennæ of *gnats* are extremely worth obſervation, and differ much from one another. Some of them are elegantly feathered; theſe belong to the males of certain ſpecies, for the antennæ of the females are not ſo beautiful. The bruſh-horned or male *gnat* has two pair, one of which is ſurrounded, at ſmall diſtances, with long hairs, iſſuing out circularly, each circle leſſening as it approaches the extremity of the antennæ: the other pair are longer and much thicker, and hairy from end to end. In the great bellied or female *gnat*, the firſt pair of antennæ, though of the ſame figure as the male's, has hairs not near ſo long, and the ſecond pair is ſhorter than the firſt by at leaſt three parts in four. Reaumur, Hiſt. Inſ. vol. iv. p. 574, &c. Baker's Microſ. 1743. p. 203, &c.

For the trunk and wings of the *gnat*, ſee TRUNK and WINGS.

GNATS, *eggs of*. See EGGS.

For the *eyes of* GNATS, ſee EYES *of Flies*.

GNAT-*worm*, in *Natural Hiſtory*, a ſmall water inſect, produced of a *gnat*, and which is, after its ſeveral changes, transformed into a *gnat* again.

From the eggs, depoſited by the *gnat* on the ſurface of the water, proceed a number of minute worms, which ſinking to the bottom of the water, form for themſelves coverings of fine ſand or earth, cemented together with a ſort of glue, but open at both ends, that they may come out and enter as occaſion requires.

Theſe worms do not frequent rivers; but ditches, ponds, and other ſtanding waters, afford them in vaſt abundance, from the middle of May till toward the beginning of winter. This is the reaſon why watery and marſhy places are found moſt to abound with *gnats*, and why the wet ſummers are found to produce the greateſt numbers of them; becauſe in dry ſeaſons, the ponds and ditches, where they are to paſs their worm-ſtate, are dried up, and the worms killed. Theſe are creatures, however, that one need not go far to ſeek, ſince a veſſel of water, expoſed in any open place in the ſummer months, will not fail to afford plenty of theſe worms in a little time.

Before theſe worms are arrived at their full growth, though they are then but ſmall, they are eaſily found, becauſe they are under a neceſſity of coming frequently to the top of the water, by having occaſion for frequent reſpiration; and to do this, they are obliged to keep the end of a ſmall pipe they are furniſhed with, from the laſt ring of their body, above water. The end of this pipe is hollow and indented, and forms a ſort of funnel on the ſurface of the water: it is of the length of about three rings of the body, and is ſomewhat thicker at its inſertion than at its extremity.

As there is a vaſt number of ſpecies of *gnats*, there is no leſs of the worms from whence they are produced; and to this is in a great meaſure owing the variety in the figures given of the worms by the authors who have treated of them; which may alſo be not a little added to by the particular views in which thoſe draughts have been taken. Notwithſtanding all the variations of theſe figures, the general form of the animal is however the ſame in all, and the ſpecies cannot but be known from any of them. While the worm is young, the body is whitiſh or greeniſh; but when it is at its full growth, and draws near the time of its changes, it becomes greyiſh. The great tranſparence of the body of this worm gives a fine view of what paſſes within it; it is at any time eaſy to ſee into the motion of the inteſtines, by which the food is puſhed on towards the anus. The two principal tracheæ are alſo ſeen very diſtinctly in this creature; they are two white tubes placed in a parallel direction one to another, and run from the firſt ring to the tube of reſpiration.

The great worm ſeveral times changes its ſkin in the courſe of its life. After three changes of this kind, which uſually happen in the ſpace of three weeks, or thereabout, it undergoes a fourth, where the old ſkin is as eaſily thrown off as in the reſt, but the animal now appears in a new form, that of a nymph; it is now ſhorter and rounder than before, and the body is ſo bent that the tail is applied to the under part of the head; this, however, is only its form in a voluntary ſtate of reſt, for it can yet move, and when it pleaſes extends its tail, and ſwims about as ſwiftly as when in its other ſtate.

When the creatures have quitted their firſt habitations and the figure of worms, they reaſcend to the top of the water, incloſed in a kind of ſhell, with a large head and mouth, two black eyes, two horns, ſeveral tufts of hairs on different parts of the body, and a tail with a bruſh of hair at the end of it, which, being ſmeared over with an oily fluid, ſerves to keep them above water; their heads being ſometimes lifted in the air, and ſometimes plunged into the water, while the tail ſlides along the ſurface: and when the oil on the tail begins to dry, they ſhed from their mouth a freſh ſupply, which renders it capable of ſteering where they pleaſe, without being wetted and damaged by the water.

All the parts of the future *gnat* may be ſeen in this nymph; the ſkin of it is extremely thin and tranſparent, yet ſufficiently tough and firm for the uſe it is intended for. It is uncertain how long exactly the animal lives in this nymph ſtate; but after the time is accompliſhed, its change into a *gnat* is very quick, and is attended with great danger to the animal, ſince multitudes are drowned in the act of getting out and ſpringing into the air. Reaumur, Hiſt. Inſt. vol. iv. Baker's Microſ. 1743. p. 88.

GNETUM, in *Botany*, a genus of the *monoecia monadelphia* claſs, with male and female flowers on the ſame plant, neither of which have any corolla; the amentum in both is ſcaly; the filament of the male is ſingle, with double antheræ; the ſtyle of the female is furniſhed with a trifid ſtigma: the fruit is a monoſpermous drupe.

GNIDIA, in *Botany*, a genus of the *octandria monogynia* claſs; the calyx of which is infundibuliform, and divided into four ſegments; the flower conſiſts of four petals, inſerted into the calyx; the fruit is in the ſhape of a berry, containing a ſingle feed

GNOMES, **Gnomi**, a name which the Cabbaliſts give to certain inviſible people, whom they ſuppoſe to inhabit the inner parts of the earth, and to fill it to the center.

They are repreſented as very ſmall of ſtature, tractable, and friendly to men; and are made the guardians of mines, quarries, hidden treaſures, &c Vigenere calls them *Gnomons:* the females of this ſpecies are called *Gnomides.*

Vigneul de Marville, in his Melange de Hiſtoire & de Literature, tome i. p. 100 gives a relation of a conference with a philoſopher of this claſs, who held, that an infinity of ſpirits inhabited each of the four elements, fire, air, water, and earth, under the denomination of *Salamanders*, *Sylphs*, *Oudins*, and *Gnomes*; that the *Gnomes* are employed in working or actuating the machines of brutes upon earth.

He added, that ſome philoſophers of that ſect held that theſe ſpirits were of two ſexes, for the two ſexes of beaſts or moving machines; that they were more or leſs perfect as the brutes were; and that there was an infinite number of exceedingly ſmall ones, to actuate the infinite number of inſects and animalcula, both thoſe that are viſible, and thoſe which are too ſmall to come under our ſenſes; that all theſe ſpirits, in general, govern their reſpective machines according to the diſpoſition of the parts or organs, the humours, temperaments, &c. that they do not lay hold of all machines indifferently, but of thoſe ſuited to their own character, element, &c. that a haughty one, for inſtance, ſeizes a Spaniſh gennet; a cruel one a tyger, &c.

Gnome, Γνωμη, or *chria*, is alſo uſed for a ſhort, pithy, and ſententious obſervation, reflection, or the like, which is worthy to be treaſured up and remembered.

Such is that of Juvenal, *Orandum eſt, ut ſit mens ſana in corpore ſano.* The writers of rhetoric diſtinguiſh ſeveral kinds of *gnomes*, according as they turn on words, on actions, or both; denominating them *verbal*, *active*, and *mixed gnomes* or *chriæ*. See Apophthegm.

GNOMON, in *Dialling*, is the ſtyle, pin, or cock of a dial, the ſhadow whereof pointeth out the hours.

The word is Greek γνωμων, which literally imports ſomewhat that makes a thing known; becauſe the ſtyle or pin indicates or makes the hour, &c. known.

The *gnomon* of every dial is ſuppoſed to repreſent the axis of the world; and therefore the two ends or extremities thereof muſt directly anſwer to the north and ſouth poles. See Dial and Dialling.

Gnomon, in *Geometry*. If a parallelogram be divided into four leſſer ones, by two lines interſecting each other, and one of theſe parallelograms be retrenched or taken away, the other three will make a *gnomon*, ordinarily called a *ſquare.*

Or, a *gnomon*, in a parallelogram, may be ſaid to be a figure formed of the two complements, together with either of the parallelograms about the diameter. Thus, in the parallelogram AC, *Tab.* II. *Geometry*, *fig.* 47. the *gnomon* is $M+x+z+N$; or $M+N+X+Z$.

Gnomon, in *Aſtronomy*, denotes an inſtrument or apparatus for meaſuring the meridian, altitudes, and declinations of the ſun and ſtars.

Thoſe converſant in obſervations prefer the *gnomon* by ſome called the *aſtronomical gnomon*, to the ſmaller quadrants, both as more accurate, eaſier made, and more eaſily applied.

Accordingly, both ancients and moderns have made uſe of *gnomons*, or upright pillars of a known height, erected on a level pavement, for making their more conſiderable obſervations.

The moſt ancient obſervation of this kind, extant, is that made by Pytheas, in the time of Alexander the Great, at Marſeilles, where he found the height of the *gnomon* was to the meridian ſhadow, at the ſummer ſolſtice, as $213\frac{1}{8}$ to 600; juſt the ſame as Gaſſendus found it to be, by an obſervation made at the ſame place, almoſt two thouſand years after, viz. in the year 1636. Ricciol. Almag. vol. i. lib. iii. cap 14.

Ulugh Beigh, king of Parthia, &c. uſed a *gnomon* in the year 1437, which was one hundred and eighty Roman feet high: that erected by Ignatius Dante, in the church of St. Petronius, at Bologna, in the year 1576, was ſixty-ſeven feet high: M Caſſini erected another twenty feet high, in the ſame church, in the year 1655.

The Egyptian Obelisks were alſo uſed as *gnomons*; and we may add, that the Spaniards, in their conqueſt of Peru, found pillars of curious and coſtly workmanſhip ſet up in ſeveral places, by the meridian ſhadows of which their amautas or philoſophers had, by long experience and repeated obſervations, learned to determine the times of the equinoxes; which ſeaſons of the year were celebrated with great feſtivity and rich offerings, in honour of the Sun. Garcillaſſo de la Vega Hiſt Peru. lib. ii. cap. 22 See Meridian *line.*

To erect an aſtronomical Gnomon, *and obſerve the meridian altitude of the ſun by the ſame.* Erect a perpendicular ſtyle, of a conſiderable height, on the meridian line; note the point where the ſhadow of the *gnomon* terminates when projected along the meridian line; meaſure the diſtance of that extreme from the *gnomon*, i. e. the length of the ſhadow: thus having the height of the *gnomon*, and the length of the ſhadow, the meridian altitude of the ſun is eaſily found.

Suppoſe, e gr. TS (*Tab. Optics*, *fig.* 13.) the *gnomon*, and TV the length of the ſhadow. Here, in the right-angled triangle STV, having the two ſides TV and TS, the angle V, which is the quantity of the ſun's altitude, is found out by this analogy: as the length of the ſhadow TV: is to the altitude of the *gnomon* TS:: ſo is the whole ſine or radius to the tangent of the ſun's altitude above the horizon.

The following example will ſerve to illuſtrate this propoſition: Pliny tells us, Nat. Hiſt. lib. ii. cap. 72. that at Rome, at the equinoxes, the ſhadow is to the *gnomon* as 8 to 9: ſuppoſe, then, the *gnomon* TS to be 90 feet, and the ſhadow TV 80 feet, and we ſhall have the angle V equal to 48° 22′, which is the height of the equator at Rome, and the elevation of the pole there is 41° 38′.

Ricciolus takes notice of the following defects in the obſervations of the ſun's height, made with the *gnomon* by the ancients, and ſome of the moderns: they did not reckon the ſun's parallax, which makes his apparent altitude leſs, by the quantity of the parallax, than it would be, if the *gnomon* were placed at the center of the earth: they did not conſider refraction, by which the apparent height of the ſun is a little increaſed; and they made their calculations from the length of the ſhadow, as if it were terminated by a ray coming from the center of the ſun's diſk, whereas the ſhadow is really terminated by a ray coming from the upper edge of the ſun's diſk; ſo that, inſtead of the height of the center of the ſun, their calculations gave the height of the upper edge of his diſk; and, therefore, to the altitude of the ſun found by the *gnomon*, the ſun's parallax muſt be added, and from the ſum, the ſun's ſemi-diameter and refraction, which is different in different altitudes, muſt be ſubtracted: conſequently, the height of the equator at Rome, corrected, will be 48° 4′ 13″, the complement of which, or 41° 55′ 47″, is the elevation of the pole. Ricciol. Geogr. ref. lib. vii cap. 4.

The preceding problem may be reſolved more accurately thus: make a circular perforation in a braſs plate, to tranſmit enough of the ſun's rays to exhibit his image on the floor; fix it parallel to the horizon in a high place, proper for obſervation; then let fall a line and plummet, wherewith to meaſure the height of the perforation from the floor. Take care the floor be perfectly level and exactly horizontal, and let it be whitened over, to exhibit the ſun more diſtinctly. Draw a meridian line thereon, paſſing through the foot or center of the *gnomon*, i. e through the point the plummet points out: note the extreme points of the ſun's diameter on the meridian line K and I, and from each ſubtract a right line equal to the ſemi-diameter of the aperture; viz. K H (*Tab. Aſtron. fig.* 57.) on one ſide, and L I on the other. Then will H L be the image of the ſun's diameter, which, biſected in B, gives the point on which the rays fall from the center of the ſun.

Now having given the right line A B, and the altitude of the *gnomon*, with the angle A, which is right, the angle A B G, or the apparent altitude of the ſun's centre, is eaſily found: for, aſſuming one of the given ſides A B for radius, A G will be the tangent of the oppoſite angle B. Then ſay, as one leg, A B: is to the other A G:: ſo is the whole ſine: to the tangent of the angle B.

GNOMONIC *column*. See COLUMN.

GNOMONIC *polyhedron*. See POLYHEDRON.

GNOMONIC, or GNOMONICAL *projection*, that which repreſents the circles of a hemiſphere, upon a plane touching it in the vertex, by lines or rays from the center of the hemiſphere to all the points of the circles to be projected.

In this projection, all the great circles of the ſphere are projected into right lines. Any leſſer circle parallel to the plane of projection is projected into a circle. And any leſſer circle not parallel to the plane of projection, is projected into a conic ſection.

The *gnomonic projection* is alſo called the *horologiographic projection*, becauſe it is the foundation of DIALLING. In other reſpects it is not much uſed, becauſe the circles of the ſphere are projected into conic ſections, which are difficult to deſcribe. However this projection has its conveniences in the ſolution of ſome problems of the ſphere, on account of the great circles being all projected into right lines.

Mr. Emerſon, known by an ingenious treatiſe upon Fluxions, and a variety of other publications, has given the theory and practice of the *gnomonic projection*, in his Treatiſe on the Projection of the Sphere, Lond. 1749, 8vo.

GNOMONICA, Γνωμονικη, or GNOMONICS, the art of DIALLING, or of drawing ſun and moon-dials, &c. on any given plane.

It is thus called, as it ſhews how to find the hour of the day, &c. by the ſhadow of a *gnomon* or ſtyle.

GNOSIMACHI, an ancient ſect in religion, whoſe diſtinguiſhing character was, that they were profeſſed enemies of all ſtudied knowlege in divinity.

The word is γνωσιμαχος, q. d. an enemy of wiſdom or knowlege.

Damaſcenus ſays, that they were perfectly averſe to all the gnoſes of Chriſtianity, i. e. to all the ſcience or technical knowlege thereof. They held it an uſeleſs labour to ſeek for gnoſes in the holy ſcriptures; and ſaid, that God requires nothing of men but good works; that it were, therefore, much better to walk with more ſimplicity, and not to be ſo ſolicitous about the dogmata of the gnoſtic life.

GNOSTICS, ancient heretics, famous from the firſt riſe of Chriſtianity, principally in the Eaſt.

It appears from ſeveral paſſages of the ſacred writings, particularly 1 John ii. 18. 1 Tim. vi. 20. and Col. ii. 8. that many perſons were infected with the *Gnoſtic* hereſy in the firſt century; though the ſect did not render itſelf conſpicuous, either for number or reputation, before the time of Adrian, when ſome writers erroneouſly date its riſe.

The word is formed of the Latin *gnoſticus*, and that of the Greek γνωϛικος, *knowing*, of γινωσκω, *I know*.

The name *Gnoſtic* was adopted by thoſe of this ſect, as if they were the only perſons who had the true knowlege of Chriſtianity. Accordingly, they looked on all other Chriſtians as ſimple, ignorant, and barbarous perſons, who explained and interpreted the ſacred writings in a too low, literal, and unedifying ſignification.

At firſt, the *Gnoſtics* were only the philoſophers and wits of thoſe times, who formed themſelves a peculiar ſyſtem of theology, agreeable to the philoſophy of Pythagoras and Plato; to which they accommodated all their interpretations of ſcripture. But

GNOSTICS afterwards became a generical name, comprehending divers ſects and parties of heretics, who roſe in the firſt centuries, and who, though they differed among themſelves as to circumſtances, yet all agreed in ſome common principles. They were ſuch as corrupted the doctrine of the goſpel by a profane mixture of the tenets of the oriental philoſophy, concerning the origin of evil and the creation of the world, with its divine truths. Such were the VALENTINIANS, SIMONIANS, CARPOCRATIANS, NICOLAITANS, &c.

GNOSTICS was ſometimes alſo more particularly attributed to the ſucceſſors of the firſt Nicolaitans and Carpocratians, in the ſecond century, upon their laying aſide the names of the firſt authors. Such as would be thoroughly acquainted with all their doctrines, reveries, and viſions, may conſult St. Irenæus, Tertullian, Clemens Alexandrinus, Origen, and St. Epiphanius; particularly the firſt of theſe writers, who relates their ſentiments at large, and confutes them at the ſame time: indeed, he dwells more expreſsly on the Valentinians than any other ſort of *Gnoſtics*; but he ſhews the general principles whereon all their miſtaken opinions were founded, and the method they followed in explaining ſcripture. He accuſes them with introducing into religion certain vain and ridiculous genealogies, i. e. a kind of divine proceſſions or emanations, which had no other foundation but in their own wild imagination.

In effect, the *Gnoſtics* confeſſed, that theſe æons or emanations were no-where expreſsly delivered in the ſacred writings; but inſiſted at the ſame time, that Jeſus Chriſt had intimated them in parables to ſuch as could underſtand him. They built their theology not only on the goſpels and the epiſtles of St. Paul, but alſo on the law of Moſes and the prophets.

Theſe laſt laws were peculiarly ſerviceable to them, on account of the allegories and alluſions with which they abound; which are capable of different interpretations. Though their doctrine, concerning the creation of the world by one or more inferior beings of an evil or imperfect nature, led them to deny the divine authority of the books of the Old Teſtament, which contradicted this idle fiction, and filled them with an abhorrence of Moſes and the religion he taught; alledging, that he was actuated by the malignant author of this world, who conſulted his own glory and authority, and not the real advantage of men. Their perſuaſion that evil reſided in matter, as its center and ſource, made them treat the body with contempt, diſcourage marriage, and reject the doctrine of the reſurrection of the body and its re-union with the immortal ſpirit. Their notion, that malevolent genii preſided in nature, and occaſioned diſeaſes and calamities, wars, and deſolations, induced them to apply themſelves to the ſtudy of magic, in order to weaken the powers or ſuſpend the influence of theſe malignant agents.

The *Gnoſtics* conſidered Jeſus Chriſt as the Son of God, and, conſequently, inferior to the Father, who came into the world for the reſcue and happineſs of miſerable mortals, oppreſſed by matter and evil beings: but they rejected our Lord's humanity, on the principle that every thing corporeal is eſſentially and intrinſically evil; and, therefore, the greateſt part of them denied the reality of his ſufferings. They ſet a great value on the beginning of the goſpel of St. John, where they fancied they ſaw a great deal of their æons or emanations under the *Word*, the *Life*, the *Light*, &c. They divided all nature into three kinds of beings, viz. *hylic*, or material; *pſychic*, or animal; and *pneumatic*, or ſpiritual.

On the like principle they alſo diſtinguiſhed three ſorts of men; *material*, *animal*, and *ſpiritual*. The firſt, who were material, and incapable of knowlege, inevitably periſhed, both ſoul and body; the third, ſuch as the *Gnoſtics* themſelves pretended to be, were all certainly ſaved; the pſychic, or animal, who were the middle between the other two, were capable either of being ſaved or damned, according to their good or evil actions.

With regard to their moral doctrines and conduct, they were much divided. The greateſt part of this ſect adopted very auſtere rules of life, recommended rigorous abſtinence, and preſcribed ſevere bodily mortifications, with a view of purifying and exalting the mind. However, ſome maintained, that there was no moral difference in human actions; and thus, confounding right with wrong, they gave a looſe rein to all the paſſions, and aſſerted the innocence of following blindly all their motions, and of living by their tumultuous dictates. They ſupported their opinions and practice by various authorities: ſome referred to fictitious and apocryphal writings of Adam, Abraham, Zoroaſter, Chriſt and his apoſtles; others boaſted that they had deduced their ſentiments from ſecret doctrines of Chriſt, concealed from the vulgar; others affirmed, that they arrived at ſuperior degrees of wiſdom by an innate vigour of mind; and others aſſerted, that they were inſtructed in theſe myſterious parts of theological ſcience by Theudas, a diſciple of St. Paul, and by Matthias, one of the friends of our Lord. The tenets of the ancient *Gnoſtics* were revived in Spain, in the fourth century, by a ſect called the PRISCILLIANISTS. See Moſheim's Eccl. Hiſt. vol. i. p. 107, &c. edit. octavo, 1758.

The appellation *Gnoſtic* ſometimes alſo occurs in a good ſenſe, in the ancient eccleſiaſtical writers, and particularly Clemens Alexandrinus, who, in the perſon of his *Gnoſtit*, deſcribes the characters and qualities of a perfect Chriſtian. This point he labours in the ſeventh book of his Stromata, where he ſhews, that none but the *Gnoſtic*, or learned perſon, has any true religion. He affirms, that were it poſſible for the knowlege of God to be ſeparated from eternal ſalvation, the *Gnoſtic* would make no ſcruple to chooſe the knowlege; and that if God would promiſe him impunity in doing of any thing he has once ſpoken againſt, or offer him heaven on thoſe terms, he would never alter a whit of his meaſures.

In this ſenſe the father uſes *Gnoſtics*, in oppoſition to the heretics of the ſame name; affirming, that the true *Gnoſtic* is grown old in the ſtudy of the holy Scripture; and that he preſerves the orthodox doctrine of the apoſtles, and of the church; whereas the falſe *Gnoſtic* abandons all the apoſtolical traditions, as imagining himſelf wiſer than the apoſtles.

At length the name *Gnoſtic*, which originally was the moſt glorious, became infamous, by the idle opinions and diſſolute lives of the perſons who bore it; much as, in the preſent age, it has fared with the name *quietiſt*, *pietiſt*, &c.

GO, in *Ichthyography*, a name given by ſome to the common rock-fiſh, or ſea-gudgeon. See GOGET.

Go is ſometimes uſed, in *Law*, in a ſpecial ſignification. Thus, to *go without day*, and to *go to God*, denote as much as to be diſmiſſed the court, and to be acquitted.

GOACONEZ, in *Botany*, the name of an American tree, which affords a white balſam, but little known in Europe; it is called by ſome authors *balſamum album*, and by others *balſamum purius*.

GOAD, *Stimulus*, a ſtick armed at one end with a pointed iron, to prick, and urge on oxen, and other cattle.

GOAL. See GAOL.

GOAN, the name of a Perſian tree, of the aſhes of which they make a ſort of antiſpodon, or medicinal powder, for diſeaſes of the eyes.

GOARING, on ſhip-board. The ſeamen ſay a ſail is cut *goaring*, when it is cut ſloping by degrees, and is broader at the clew than at the ear-ring, as all top-ſails and top-gallant ſails are.

GOAT, *Capra*, in the Linnæan ſyſtem of *Zoology*, makes a diſtinct genus of animals of the order of the *pecora*, the diſtinguiſhing characters of which are, that its horns are hollow, turned upward, and not ſmooth, but annulated on their ſurface; that it has eight cutting teeth in the lower jaw, and none in the upper, and that the male is generally bearded. This genus comprehends all the goat kind, the *gazella*, *ibex*, *rupicapra*, &c. the characters of which, according to Mr Ray, are theſe: that it is covered with hairs, not with wool; that its horns are leſs crooked than thoſe of the ſheep, and that it has a beard hanging down from its chin, and is of a ſtrong ſmell.

It is very ſingular, that this genus of animals are all able to run and climb about the rugged parts of mountains without falling, though their feet ſeem by no means contrived by nature for any ſuch purpoſes. Linnæus enumerates twelve known ſpecies of this animal. 1. The *capra hircus*, or common kind, ſufficiently known. Linnæus reckons the Angora *goat* of Aſiatic Turkey a variety of this: the hair of this animal is of a ſilky fineneſs and ſilvery whiteneſs, in curled locks of eight or nine inches in length, and forms the baſis of our fine CAMBLETS. The hair is imported in form of thread; for the Turks will not ſuffer it to be exported raw, becauſe the ſpinning employs multitudes of poor. This variety is confined to a diſtrict of two or three days journey in extent; for if they change climate, the hair grows coarſer. 2. The *capra mambrina*, or Syrian *goat*. This is remarkable for the length of its ears, which reach almoſt to the ground, and are very like thoſe of the common hunting hound; the horns are black and ſhort, and are very little inflected backwards; it is of the ſhape of the common *goat*, but larger; its colour is that of the fox, and is a creature eaſily tamed, and feeds on hay and other vegetables. This ſpecies is very common in the Eaſt, and ſupplies the inhabitants of Aleppo with milk. 3. The *capra depreſſa Africana*, or African *goat*, deſcribed in the German Ephemerides; it is of a duſky grey colour, and has a bundle of erect hairs growing on the middle of its head; and on each ſide, between the eyes and noſe, it has two cavities, which contain a thick, fat, yellowiſh liquor, which afterwards congeals into a black ſubſtance, of a mixed ſmell between thoſe of muſk and caſtor. As ſoon as the matter contained in theſe cavities is taken away, there returns more in its place, which is in like manner dried and hardened by the air. Theſe cavities have no communication with the eyes, and therefore the matter deſcribed here is nothing of the nature of the *lachryma cervi*, mentioned in the catalogues of the materia medica. This creature is figured without horns, becauſe they are very ſmall, and ſcarce perforate the ſkin. The male of this ſpecies is covered with rough hair; and beneath the chin hang two long hairy wattles; the hair of the female is ſmooth, its horns leſs, and it has no wattles. 4. The *capra reverſa*, which is alſo African; with ſhort ſmooth horns, turning a little forwards. Linnæus ſays, that theſe two laſt ſpecies came from America; but Mr. Pennant obſerves, that the *goat*, and every other domeſtic animal, was unknown in that country, before its diſcovery by the Spaniards. 5. The IBEX, or wild *goat*. 6. The *rupicapra*. See CHAMOIS and ÆGAGROPILA. 7. The *capra gazella*, or Indian antelope. 8. The *capra cervicapra*, or African antelope, with upright horns, twiſted ſpirally, and ſurrounded almoſt to the top with prominent rings: the ſize of this animal is rather leſs than that of the fallow deer, or buck; its colour, brown mixed with red, and duſky; the belly and inſide of the thighs white; the tail ſhort, black above, and white below: the female wants horns. 9. The *capra bezoartica*, with very long, ſlender, upright horns, bending at the upper part inward towards each other; ſome are much annulated, and others ſmoother. This animal is of the ſize of the common *goat*, and its colour is red mixed with aſh-colour. It inhabits the inhoſpitable mountains of Laar, in Perſia, and produces the BEZOAR. 10. The *capra dorcas*, or African *gazella* of Ray, with round horns, inclining firſt backwards, bending in the middle, reverting forwards at their ends, and annulated. See GAZELLA and ANTELOPE. 11. The *capra Tartarica*, Scythian antelope, *ibex imberbis*, or *ſaiga* of Buffon, is a ſpecies of *goat* with horns, about a foot long, bending in the middle, the points inclining inwards, the ends ſmooth; the other part ſurrounded with prominent annuli, of a pale yellow colour, and for the moſt part ſemipellucid. The head of this animal is like that of a ſheep; its noſe large and arched, marked through its whole length with a ſmall line, cauſed by the elevation of the *ſeptum narium*; the noſtrils large; the upper lip hangs over the under, and the cutting teeth are ſo looſe in their ſockets as to move with the leaſt touch. The male is covered with rough hair, and has a ſtrong ſmell; the female is ſmoother, timid, and without horns; when attacked by wolves or dogs, the males place them in a circle, ſtand round them, and defend them. The ſkin is ſoft, and excellent for gloves, belts, &c. They are found in flocks of many thouſands between the Tanais and Boriſthenes. See Phil. Tranſ. 1767, p. 344.

12. The *capra ammon*, the *muſimon* of Pliny, the *tragelaphus* of Belon, or Siberian *goat*, with large horns, bending backwards, cloſe at their baſe, diſtant at their points, with circular *rugæ* or folds. This animal is of the height and ſize of the ram, covered with pale, ferruginous, long hair; the hind legs, belly, and rump, are white; the tail is ſhort and black. The horns of the male are much larger than thoſe of the females. Theſe animals inhabit the north-eaſt parts of Aſia, Barbary, Sardinia, Corſica, and Greece; they live in the mountains, and run ſwiftly among the rocks. They are ſuppoſed by M. Buffon to be the ſheep in a wild ſtate.

Goats may be of great advantage to the farmers in ſome parts of the kingdom, as they will live in rocky barren countries, where nothing elſe can get a ſupport for life. They will climb the ſteepeſt rocks, and there browſe upon briars, heath, and ſhrubs, of various kinds, which other creatures will not taſte of. They will feed on graſs in paſtures; but as they love browſing on trees much better, great care muſt be taken to keep them from valuable plantations.

The rutting ſeaſon of theſe animals is from the beginning of September to November; they go with young four months and a half, and bring forth from the latter end of February to the latter end of April. They are much affected by the weather; a rainy ſeaſon makes them thin; and a dry ſunny ſeaſon makes them fat and blythe; they are very libidinous animals, and ſeldom live in our climate above eleven or twelve years.

The beſt kind of *goats* for keeping to advantage ſhould be choſen in this manner: the male ſhould have a large body, his hair ſhould be long, and his legs ſtraight and ſtiff; the neck ſhould be plain and ſhort, the head ſmall and ſlender, the horns large, the eyes prominent, and the beard long. The female ſhould have a large udder, with large teats, and no horns, or very ſmall ones. They ſhould be kept in flocks, that they may not ſtraggle, and they ſhould have good ſhelter both in ſummer and in winter, the heat and cold being both prejudicial to them. They ſhould have no litter in winter, but only a paved floor kept clean. The kids are to be brought up for the table in the ſame manner as our lambs are. They are recommended to lie among horſes, their ſmell, as is ſuppoſed, preventing many diſtempers in thoſe animals. The greateſt advantage of theſe creatures is their milk, which they yield in large quantities. It is ſweet, nouriſhing, and medicinal; an excellent ſuccedaneum for aſſes milk; and has been, with a tea-ſpoon full of hartſhorn, drank warm in bed in the morning, and at four in the afternoon, and thus repeated for ſome time, a cure for phthiſical people, before their diſorder has become inveterate. In ſome parts of Scotland, Ireland, and Wales, the milk is made into whey, which has been of great ſervice in this and other caſes, where coolers and reſtoratives are neceſſary. The blood of the he-*goat*, dried, has been recommended for the pleuriſy and inflammatory diſorders, and is taken notice of by Dr. Mead in this intention.

They mix *goat's* milk and cow's milk together in many parts of the kingdom, and a very valuable kind of cheeſe is made of it. Beſide this, the kids or young *goats* are very fine food, and the beſt kinds bring forth theſe two or three at a time, and that twice a year.

The haunches of the *goat* are frequently ſalted and dried in ſome parts of Wales, where it is called hung veniſon. The fleſh of a ſpayed *goat*, ſix or ſeven years old, is reckoned the beſt, and is generally very ſweet and fat. It is called rock-veniſon, and is little inferior to that of the deer. The ſuet of *goats*, killed about four or five years old, is in great eſteem, and makes excellent candles.

Goats hair alſo is of value; it may be ſheared as the wool from ſheep, and is excellent for making ropes that are to be uſed in the water, as they will laſt a great while longer than thoſe made in the common way. A ſort of ſtuff is alſo made of it in ſome places.

The whiteſt wigs are made of the hair of the male *goat*; the whiteſt and cleareſt is ſelected from that which grows on the haunches, where it is longeſt and thickeſt. That of the Welch *goats* is preferable to all others, both in length and fineneſs. The horns are alſo uſed for the handles of tucks and pen-knives; and the ſkin is applied to various uſes by glovers, &c. Mortimer's Huſb. p. 246, &c. Pennant's Britiſh Zool. vol. i. p. 36, &c.

Goat *of Greenland, capra Greenlandica*, in *Zoology*, the name of an animal of the northern parts of the world. We are not perfectly acquainted with the ſhape or figure of the creature; but its horns are preſerved in the muſeum of the Royal Society, and in ſome other collections, and are uſually an ell long, very much branched, and the branches not flat but rounded, covered all over with a velvety down, compoſed of ſhort filaments ſtanding erect every way, and about a quarter of a finger's breadth long.

Goat-*fiſh*, *Capriſcus*, in *Ichthyography*, the name of a fiſh, called alſo by ſome *caper*. In the middle of its back it has three very ſtrong and large prickles, the firſt of which is three times as large as any of the others, and all are connected by a membrane. See *Tab. of Fiſh*, N° 5.

The whole fiſh is covered with a ſcaly ſkin; but the ſcales have more the appearance of thoſe of a ſerpent, than thoſe of the fiſh; for they are placed in cancellated lines interſecting one another, and are ſo well fixed, that they with difficulty come off; and wood or ivory may be poliſhed with the ſkin, as with the common fiſh-ſkin uſed by the turners, &c. It is of a bluiſh-green colour, ſpotted with a fine blue, and the back and belly-fins are black, with ſome blue and red ſpots. Its whole figure is very broad and flat, as well as ſhort, ſo that it approaches to a round form. It ſeldom exceeds two pounds in weight. It is caught in the Mediterranean, but not commonly. The ſkin of it is frequently found in the cabinets of the curious.

Goat-*ſucker*, in *Zoology*, a name by which the *caprimulgus* is called in ſome parts of England; but its more uſual name with us is the *churn*-owl.

Goat's-*beard*, *Tragopogon*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the common empalement of the flower is ſingle, compoſed of eight acute-pointed leaves, which are alternately large, joined at their baſe: the flower is compoſed of many hermaphrodite florets, which are uniform, of one petal, ſtretched out like a tongue, indented at the points in five parts, and lying over each other like the ſcales of fiſh; theſe have each five ſhort hair-like ſtamina, terminated by cylindrical ſummits, and an oblong germen ſituated under the floret, ſupporting a ſlender ſtyle the length of the ſtamina, crowned by two revolving ſtigmas: the empalement of the flower afterwards ſwells to a belly, incloſing many oblong, angular, rough ſeeds, ſlender at both ends, crowned by a feathery down. Miller enumerates ſix, and Linnæus eleven ſpecies.

There are two or three ſpecies of this plant well known among us, the one wild in our meadows and paſtures, by the name of *go to bed at noon*, from its flowers always ſhutting up in the middle of the day; another kept in our gardens for its beautiful red flowers; and a third cultivated for its eſculent root, and known by the name of ſalſafy. This was originally from Italy, and is ſtill kept in many gardens as a good root; but it is not common in our markets.

Theſe plants are propagated by ſowing their ſeeds in ſpring on an open ſpot of ground. The ſalſafy ſhould be ſowed in rows at nine or ten inches diſtance; and when the plants are come up, they ſhould be left at about ſix inches aſunder in the rows; they then require no farther care but to be kept clear from weeds; and if the ſoil be light, and not too dry, they will grow to a conſiderable ſize by winter. The roots are to be taken up for uſe when the leaves are decayed, and continue in ſeaſon till March; and then the young ſhoots, which are very large and thick, are by many boiled as aſparagus, and make a very delicate diſh. Miller.

Goat's *eye*. See Eye.

Goat's *rue*, *Galega*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower is of the butterfly kind; the ſtandard oval, large, and reflexed; the wings are near the length of the ſtandard; the keel erect, oblong, and compreſſed; and hath ten ſtamina, which join above their middle: in the center is ſituated a narrow, cylindrical germen, which afterward becomes a long pointed pod, incloſing ſeveral oblong kidney-ſhaped ſeeds. Miller reckons three ſpecies, natives of warm climates, and Linnæus ten.

In medicine, the common ſort, with blue flowers, is eſteemed a great alexipharmic and ſudorific. It is much uſed in Italy; but amongſt us only as an ingredient in ſome compoſitions.

Mr. Boyle celebrates the virtues of *goat's rue* in peſtilential and malignant diſeaſes, from his own obſervation and experience.

Goat's *ſtones, greater*. See Satyrium.

Goat's *ſtones, leſſer*. See Orchis.

Goat's *thorn*, *Tragacantha*, in *Botany*. Its characters are theſe: the empalement of the flower is indented in five parts, the lower ſegments being the ſhorteſt: the flower is of the butterfly kind, the ſtandard long, erect, and indented at the point; the borders reflexed; the wings ſhorter than the ſtandard; the keel is of the ſame length with the wings, and is indented: it has ten ſtamina, nine of them joined, and one ſeparated, terminated by roundiſh ſummits; and a ſharp taper germen, ſupporting an awl-ſhaped ſtyle, crowned by an obtuſe ſtigma. The germen afterward becomes a ſhort ſwelling pod, having two longitudinal cells, incloſing kidney-ſhaped ſeeds. There are four ſpecies. Linnæus has joined this genus to that of Astragalus.

From one ſpecies of this genus, M. Tournefort ſays the gum adragant, or dragon, is produced in Crete. See Tragacanth.

GOBELINS, a celebrated manufactory, eſtabliſhed at Paris, in the Fauxbourg St. Marcel, for the making of tapestry, and other furniture for the uſe of the crown.

The houſe where this manufactory is carried on, was built by two brothers, Giles and John *Gobelins*, both excellent dyers; and the firſt that brought to Paris, in the reign of Francis I. the ſecret of dying that beautiful ſcarlet colour, ſtill known by their name; as well as the little river Bievre, on whoſe banks they fixed their dye-houſe; and which is now known by no other name than that of the river of the *Gobelins*.

It was in the year 1667 that this place, till then called *Gobelins Folly*, changed its name into that of *Hotel Royal des Gobelins*, in conſequence of an edict of Louis XIV. Monſ. Colbert having re-eſtabliſhed, and with new magnificence enriched and completed the king's palaces, particularly the Louvre and Tuilleries, began to think of making furniture ſuitable to the grandeur of thoſe buildings: with this view he called together all the ableſt workmen in the divers arts and manufactures throughout the kingdom; particularly painters, tapeſtry-makers, ſculptors, goldſmiths, eboniſts, &c. and by ſplendid offers, penſions, privileges, &c. called others from foreign nations.

And to render the intended eſtabliſhment firm and laſting, he brought the king to purchaſe the *Gobelins*, for them to work in, and draw up a ſyſtem of laws, or policy, in ſeventeen articles.

By theſe it is provided, that the new manufactory ſhall be under the adminiſtration of the ſuperintendant of the king's buildings, arts, &c. that the ordinary maſters thereof ſhall take cognizance of all actions and proceſſes brought againſt any of the perſons in the ſaid manufactory, their ſervants and dependents; that no other tapeſtry work ſhall be imported from any other country, &c.

The *Gobelins* has ever ſince remained the firſt manufactory of this kind in the world. The quantity of the fineſt and nobleſt works that have been produced by it, and the number of the beſt workmen bred up therein, are incredible; and the preſent flouriſhing condition of the arts and manufactures of France is, in a great meaſure, owing thereto.

Tapeſtry work, in particular, is their glory. During the ſuperintendance of M. Colbert, and his ſucceſſor, M. de Louvois, the making of tapeſtry is ſaid to have been practiſed to a degree of perfection, ſcarce inferior to what was before done by the Engliſh and French.

The battles of Alexander, the four ſeaſons, four elements, the king's palaces, and a ſeries of the principal actions of the life of Louis XIV. from the time of his marriage to the firſt conqueſt of Franche Comté, done from the deſigns of M. le Brun, director of the manufactory of the *Gobelins*, are maſter-pieces in their kind.

GOBEMOUCH, the *fly-catcher lizard*, a ſpecies of American lizard that is always employed in catching of flies. It is the ſmalleſt of all the lizard kind, and is very beautiful, its ſkin often appearing as if covered with leaf-gold, or leaf-ſilver, and in ſome others of a green, or red and gold, wonderfully bright and beautiful. They are not at all ſhy or fearful of men; but as they do not hurt, ſo they ſeem to dread none; they enter chambers and cloſets, and do no ſort of damage, but deſtroy the flies and other troubleſome vermin they find there. Their whole lives ſeem ſpent in the chace of theſe inſects, and it is a very pleaſing thing to obſerve the various ways they have of catching them. They are very cleanly creatures, and may be ſuffered to run over the table at meal time; where if they ſee a fly, they will purſue it over the very hands or cloaths of people, or over the diſhes, without doing the leaſt hurt.

Notwithſtanding their great beauty while alive, they are only of a duſky grey when dead, all their other colours immediately vaniſhing.

GOBIO *capitatus*, a name by which many writers in *Zoology* have called the *cottus*, being the *cottus lævis*, with two ſpines on his head, of Linnæus. This is a ſmall fiſh, called in Engliſh the BULL-*head*, or *miller's thumb*.

GOBIONARIA, in *Ichthyology*, a name given by Gaza and others to the little fiſh called *cobitis*, and APHUA *cobitis* by the ancient Greeks, and by many of the modern authors; and by ſome *marſio*, or ſimply *cobitis*.

GOBIUS, in *Ichthyology*, the name of a genus of fiſhes of the acanthopterygious, or prickly-finned kind; the characters of which are theſe: the branchioſtege membrane contains on each ſide very diſtinct bones; theſe are very irregular in their ſize, the firſt and fourth being much broader than the others: the belly-fins grow together ſo as to form one ſingle fin, of the ſhape of a funnel; theſe, and the pectoral fins, are placed at the ſame diſtance from the head: there are two fins on the back, the anterior of which conſiſts of ſomewhat rigid bones: the ſcales are rough, the body is oblong, the head compreſſed, and the eyes covered with the common ſkin of the head. It is eaſy to ſee from theſe characters, that the common river gudgeon is no *gobius*, as thus diſtinguiſhed. The ſpecies properly belonging to this genus are four. Artedi.

According to Willughby, there are only three kinds of this fiſh.

In the Linnæan ſyſtem, the *gobius* is a genus of the *thoracic* order, with eyes placed near each other, and two ſmall holes between them, four branchioſtegous rays, and ventral fins united. Of this genus Linnæus enumerates eight ſpecies; viz. *gobius niger*, *paganellus*, *eleotris*, with the anal fin compoſed of nine rays, or *gobius albeſcens* of Gronovius, found in China; *aphya*, *jozo*, *pectinirostris*, with horizontal teeth in the lower mandible, found alſo in China; *barbarus*, with pectoral fins, forming a kind of fan, and the firſt dorſal fin containing twelve, and the laſt thirteen rays; and *anguillaris*, with a ſingle dorſal fin. See GOGET, PAGANELLUS, APHUA, and JOZO.

GOBIUS *aſper*, in *Ichthyology*, a name given by Geſner and others to a ſpecies of PEARCH called by many *aſper piſciculus*, a name confounding it with many other different fiſhes, and by Linnæus *perca aſper*. It is diſtinguiſhed among the pearch tribe by Artedi under the name of the pearch with eight or nine black lines on each ſide.

GOBIUS *fluviatilis*, in *Zoology*. See GUDGEON.

GOBIUS *marinus*. See GOGET.

GOBLET, or GOBELET, a kind of drinking cup, or bowl, ordinarily of a round figure, and without either foot, or handle.

The word is French, *gobelet*; which Salmaſius, and others, derive from the barbarous Latin *cupa*. Budeus deduces it from the Greek κυπελλον, a *ſort of cup*.

GOBLETS, made of the wood tamariſk, are ranked among medicinal drugs; becauſe the liquors infuſed awhile therein, are ſuppoſed to acquire a quality which renders them good in diſeaſes of the ſpleen.

GOBONE, or GOBONY, in *Heraldry*, the ſame as COMPONE'.

GOD, an immaterial, intelligent, and free being; of perfect goodneſs, wiſdom, and power; who made the univerſe, and continues to ſupport it, as well as to govern and direct it by his providence.

The Rabbins and Hebraiſts, particularly St. Jerom, and the interpreters, reckon up ten different names of *God* in Scripture; which are אל *El*, אלהים *Elohim*, אלהי, *Elohi*, or in the ſingular, אלה *Eloah*, צבאות, *Tſebaoth*, עליון, *Elion*, אהיה, *Ehjeh*, אדוני, *Adonai*, יה, *Jah*, שדי, *Shaddai*, יהוה, *Jehovah*: but it is wrong to divide אלהי from צבאות; they ſhould be but one name אלהיצבאות, *Elohetſeboath*, i. e. *God of hoſts*. Of theſe names there are three which expreſs the eſſence of *God*, and are proper names; viz. אהיה, *Ehjeh*, יה, *Jah*, and יהוה, *Jehovah*: the others are only names of attributes. St. Jerom gives a particular explanation of theſe ten names, in his epiſtle to Marcella; and Buxtorf the younger has an expreſs diſſertation on the ſame, Diſſertatio de Nominibus Dei. The Jeſuit Souciet has three ſeveral diſcourſes on the three names, *El*, *Shaddai*, and *Jehovah*, printed at Paris, 1715. The Hebrews call the name of *God* כוזארנע אותיוה, and the Greeks, after this example, Τετραγραμματον; as conſiſting of four letters, which it is obſerved to do in moſt languages: thus, in the Hebrew, *God* is called יהוה, *Jehovah*; in the Greek, Θεὸς; in Latin, *Deus*; in Spaniſh, *Dios*; in Italian, *Idio*; in French, *Dieu*; in the ancient Gauliſh, *Diex*; in ancient German, *Diet*; in the Sclavonic, *Buch*; in Arabic, *Alla*; in the Poliſh, *Bung*; in the Pannonian, *Iſtu*; in the Egyptian, *Tenu*; in the Perſian, *Sire*; in the language of the Magi, *Orſi*. But a diſtinction ought here to be made between the name *God*, and the name of *God*; it being the latter, not the former, that in the Hebrew conſiſts of four letters. The name or word *God*, in the Hebrew, is אלה, *Eloah*, which conſiſts but of three letters; or in the plural אלהים, *Elohim*, which conſiſts of five. The name of God is יהוה, *Jehovah*; which is the true τετραγραμματον, or the name of four letters, among the Hebrews and Greeks. But it is not this name that anſwers to the Greek Θεὸς, Latin *Deus*, Engliſh *God*, &c. In reality, none of theſe languages have any proper name of *God*, as יהוה, *Jehovah*, is in the Hebrew.

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" that are to be known: he is not eternity, or infinity,
" but eternal and infinite: he is not duration or ſpace,
" but he endures, and is preſent: he endures always, and
" is preſent every where; and by exiſting always, and
" every where, he conſtitutes the very thing, duration
" and ſpace, eternity and infinity.

" Since every particle of ſpace is always, and every in-
" diviſible moment of duration every where, the Cre-
" ator and Lord of all things can never be *nunquam*, or
" *nuſquam*.

ſuppoſed, preventing many diſtempers in thoſe animals. The greateſt advantage of theſe creatures is their milk, which they yield in large quantities. It is ſweet, nouriſhing, and medicinal; an excellent ſuccedaneum for aſſes milk; and has been, with a tea-ſpoon full of hartſhorn, drank warm in bed in the morning, and at four in the afternoon, and thus repeated for ſome time, a cure for phthiſical people, before their diſorder has become inveterate. In ſome parts of Scotland, Ireland, and Wales, the milk is made into whey, which has been of great ſervice in this and other caſes, where coolers and reſtoratives are neceſſary. The blood of the he-*goat*, dried, has been recommended for the pleuriſy and inflammatory diſorders, and is taken notice of by Dr. Mead in this intention.

They mix *goat's* milk and cow's milk together in many parts of the kingdom, and a very valuable kind of cheeſe is made of it. Beſide this, the kids or young *goats* are very fine food, and the beſt kinds bring forth theſe two or three at a time, and that twice a year.

The haunches of the *goat* are frequently ſalted and dried in ſome parts of Wales, where it is called hung veniſon. The fleſh of a ſplayed *goat*, ſix or ſeven years old, is reckoned the beſt, and is generally very ſweet and fat. It is called rock-veniſon, and is little inferior to that of the deer. The ſuet of *goats*, killed about four or five years old, is in great eſteem, and makes excellent candles.

Goats hair alſo is of value; it may be ſheared as the wool from ſheep, and is excellent for making ropes that are to be uſed in the water, as they will laſt a great while longer than thoſe made in the common way. A ſort of ſtuff is alſo made of it in ſome places.

The whiteſt wigs are made of the hair of the male *goat*; the whiteſt and cleareſt is ſelected from that which grows on the haunches, where it is longeſt and thickeſt. That of the Welch *goats* is preferable to all others, both in length and fineneſs. The horns are alſo uſed for the handles of tucks and pen-knives; and the ſkin is applied to various uſes by glovers, &c. Mortimer's Huſb. p. 246, &c. Pennant's Britiſh Zool. vol. i. p. 36, &c.

GOAT *of Greenland, capra Greenlandica*, in *Zoology*, the name of an animal of the northern parts of the world. We are not perfectly acquainted with the ſhape or figure of the creature; but its horns are preſerved in the muſeum of the Royal Society, and in ſome other collections, and are uſually an ell long, very much branched, and the branches not flat but rounded, covered all over with a velvety down, compoſed of ſhort filaments ſtanding erect every way, and about a quarter of a finger's breadth long.

GOAT-*fiſh*, *Capriſcus*, in *Ichthyography*, the name of a fiſh, called alſo by ſome *caper*. In the middle of its back it has three very ſtrong and large prickles, the firſt of which is three times as large as any of the others, and all are connected by a membrane. See *Tab. of Fiſh*, N° 5.

The whole fiſh is covered with a ſcaly ſkin; but the ſcales have more the appearance of thoſe of a ſerpent, than thoſe of the fiſh; for they are placed in cancellated lines interſecting one another, and are ſo well fixed, that they with difficulty come off; and wood or ivory may be poliſhed with the ſkin, as with the common fiſh-ſkin uſed by the turners, &c. It is of a bluiſh-green colour, ſpotted with a fine blue, and the back and belly-fins are black, with ſome blue and red ſpots. Its whole figure is very broad and flat, as well as ſhort, ſo that it approaches to a round form. It ſeldom exceeds two pounds in weight. It is caught in the Mediterranean, but not commonly. The ſkin of it is frequently found in the cabinets of the curious.

GOAT-*ſucker*, in *Zoology*, a name by which the *caprimulgus* is called in ſome parts of England; but its more uſual name with us is the *churn*-OWL.

GOAT'*s-beard*, *Tragopogon*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the common empalement of the flower is ſingle, compoſed of eight acute-pointed leaves, which are alternately large, joined at their baſe: the flower is compoſed of many hermaphrodite florets, which are uniform, of one petal, ſtretched out like a tongue, indented at the points in five parts, and lying over each other like the ſcales of fiſh; theſe have each five ſhort hair-like ſtamina, terminated by cylindrical ſummits, and an oblong germen ſituated under the floret, ſupporting a ſlender ſtyle the length of the ſtamina, crowned by two revolving ſtigmas: the empalement of the flower afterwards ſwells to a belly, incloſing many oblong, angular, rough ſeeds, ſlender at both ends, crowned by a feathery down. Miller enumerates ſix, and Linnæus eleven ſpecies.

There are two or three ſpecies of this plant well known among us, the one wild in our meadows and paſtures, by the name of *go to bed at noon*, from its flowers always ſhutting up in the middle of the day; another kept in our gardens for its beautiful red flowers; and a third cultivated for its eſculent root, and known by the name of ſalſafy. This was originally from Italy, and is ſtill kept in many gardens as a good root; but it is not common in our markets.

Theſe plants are propagated by ſowing their ſeeds in ſpring on an open ſpot of ground. The ſalſafy ſhould be ſowed in rows at nine or ten inches diſtance; and when the plants are come up, they ſhould be left at about ſix inches aſunder in the rows; they then require no farther care but to be kept clear from weeds; and if the ſoil be light, and not too dry, they will grow to a conſiderable ſize by winter. The roots are to be taken up for uſe when the leaves are decayed, and continue in ſeaſon till March; and then the young ſhoots, which are very large and thick, are by many boiled as aſparagus, and make a very delicate diſh. Miller.

GOAT'*s eye*. See EYE.

GOAT'*s rue*, *Galega*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower is of the butterfly kind; the ſtandard oval, large, and reflexed; the wings are near the length of the ſtandard; the keel erect, oblong, and compreſſed; and hath ten ſtamina, which join above their middle: in the center is ſituated a narrow, cylindrical germen, which afterward becomes a long pointed pod, incloſing ſeveral oblong kidney-ſhaped ſeeds. Miller reckons three ſpecies, natives of warm climates, and Linnæus ten.

In medicine, the common ſort, with blue flowers, is eſteemed a great alexipharmic and ſudorific. It is much uſed in Italy; but amongſt us only as an ingredient in ſome compoſitions.

Mr. Boyle celebrates the virtues of *goat's rue* in peſtilential and malignant diſeaſes, from his own obſervation and experience.

GOAT'*s ſtones, greater*. See SATYRIUM.

GOAT'*s ſtones, leſſer*. See ORCHIS.

GOAT'*s thorn*, *Tragacantha*, in *Botany*. Its characters are theſe: the empalement of the flower is indented in five parts, the lower ſegments being the ſhorteſt: the flower is of the butterfly kind, the ſtandard long, erect, and indented at the point; the borders reflexed; the wings ſhorter than the ſtandard; the keel is of the ſame length with the wings, and is indented: it has ten ſtamina, nine of them joined, and one ſeparated, terminated by roundiſh ſummits; and a ſharp taper germen, ſupporting an awl-ſhaped ſtyle, crowned by an obtuſe ſtigma. The germen afterward becomes a ſhort ſwelling pod, having two longitudinal cells, incloſing kidney-ſhaped ſeeds. There are four ſpecies. Linnæus has joined this genus to that of ASTRAGALUS.

From one ſpecies of this genus, M. Tournefort ſays the gum adragant, or dragon, is produced in Crete. See TRAGACANTH.

GOBELINS, a celebrated manufactory, eſtabliſhed at Paris, in the Fauxbourg St. Marcel, for the making of TAPESTRY, and other furniture for the uſe of the crown. The houſe where this manufactory is carried on, was built by two brothers, Giles and John *Gobelins*, both excellent dyers; and the firſt that brought to Paris, in the reign of Francis I. the ſecret of dying that beautiful ſcarlet colour, ſtill known by their name; as well as the little river Bievre, on whoſe banks they fixed their dye-houſe; and which is now known by no other name than that of the river of the *Gobelins*.

It was in the year 1667 that this place, till then called *Gobelins Folly*, changed its name into that of *Hotel Royal des Gobelins*, in conſequence of an edict of Louis XIV.

Monſ. Colbert having re-eſtabliſhed, and with new magnificence enriched and completed the king's palaces, particularly the Louvre and Tuilleries, began to think of making furniture ſuitable to the grandeur of thoſe buildings: with this view he called together all the ableſt workmen in the divers arts and manufactures throughout the kingdom; particularly painters, tapeſtry-makers, ſculptors, goldſmiths, eboniſts, &c. and by ſplendid offers, penſions, privileges, &c. called others from foreign nations.

And to render the intended eſtabliſhment firm and laſting, he brought the king to purchaſe the *Gobelins*, for them to work in, and draw up a ſyſtem of laws, or policy, in ſeventeen articles.

By theſe it is provided, that the new manufactory ſhall be under the adminiſtration of the ſuperintendant of the king's buildings, arts, &c. that the ordinary maſters thereof ſhall take cognizance of all actions and proceſſes brought againſt any of the perſons in the ſaid manufactory, their ſervants and dependents; that no other tapeſtry work ſhall be imported from any other country, &c.

The *Gobelins* has ever ſince remained the firſt manufactory of this kind in the world. The quantity of the fineſt and nobleſt works that have been produced by it, and the number of the beſt workmen bred up therein, are incredible; and the preſent flouriſhing condition of the arts and manufactures of France is, in a great meaſure, owing thereto.

Tapeſtry work, in particular, is their glory. During the ſuperintendance of M. Colbert, and his ſucceſſor, M. de Louvois, the making of tapeſtry is ſaid to have been practiſed to a degree of perfection, ſcarce inferior to what was before done by the Engliſh and French.

The battles of Alexander, the four ſeaſons, four elements, the king's palaces, and a ſeries of the principal actions of the life of Louis XIV. from the time of his marriage to the firſt conqueſt of Franche Comté, done from the deſigns of M. le Brun, director of the manufactory of the *Gobelins*, are maſter-pieces in their kind.

GOBEMOUCH, the *fly-catcher lizard*, a ſpecies of American lizard that is always employed in catching of flies. It is the ſmalleſt of all the lizard kind, and is very beautiful, its ſkin often appearing as if covered with leaf-gold, or leaf-ſilver, and in ſome others of a green, or red and gold, wonderfully bright and beautiful. They are not at all ſhy or fearful of men; but as they do not hurt, ſo they ſeem to dread none; they enter chambers and cloſets, and do no ſort of damage, but deſtroy the flies and other troubleſome vermin they find there. Their whole lives ſeem ſpent in the chace of theſe inſects, and it is a very pleaſing thing to obſerve the various ways they have of catching them. They are very cleanly creatures, and may be ſuffered to run over the table at meal time; where if they ſee a fly, they will purſue it over the very hands or cloaths of people, or over the diſhes, without doing the leaſt hurt.

Notwithſtanding their great beauty while alive, they are only of a duſky grey when dead, all their other colours immediately vaniſhing.

GOBIO *capitatus*, a name by which many writers in *Zoology* have called the *cottus*, being the *cottus lævis*, with two ſpines on his head, of Linnæus. This is a ſmall fiſh, called in Engliſh the BULL-*head*, or *miller's thumb*.

GOBIONARIA, in *Ichthyology*, a name given by Gaza and others to the little fiſh called *cobitis*, and APHUA *cobitis* by the ancient Greeks, and by many of the modern authors; and by ſome *marſio*, or ſimply *cobitis*.

GOBIUS, in *Ichthyology*, the name of a genus of fiſhes of the acanthopterygious, or prickly-finned kind; the characters of which are theſe: the branchioſtege membrane contains on each ſide very diſtinct bones; theſe are very irregular in their ſize, the firſt and fourth being much broader than the others: the belly-fins grow together ſo as to form one ſingle fin, of the ſhape of a funnel; theſe, and the pectoral fins, are placed at the ſame diſtance from the head: there are two fins on the back, the anterior of which conſiſts of ſomewhat rigid bones: the ſcales are rough, the body is oblong, the head compreſſed, and the eyes covered with the common ſkin of the head. It is eaſy to ſee from theſe characters, that the common river gudgeon is no *gobius*, as thus diſtinguiſhed. The ſpecies properly belonging to this genus are four. Artedi.

According to Willughby, there are only three kinds of this fiſh.

In the Linnæan ſyſtem, the *gobius* is a genus of the *thoracic* order, with eyes placed near each other, and two ſmall holes between them, four branchioſtegous rays, and ventral fins united. Of this genus Linnæus enumerates eight ſpecies; viz. *gobius niger*, *paganellus*, *eleotris*, with the anal fin compoſed of nine rays, or *gobius albeſcens* of Gronovius, found in China; *aphya*, *jozo*, *pectiniroſtris*, with horizontal teeth in the lower mandible, found alſo in China; *barbarus*, with pectoral fins, forming a kind of fan, and the firſt dorſal fin containing twelve, and the laſt thirteen rays; and *anguillaris*, with a ſingle dorſal fin. See GOGET, PAGANELLUS, APHUA, and JOZO.

GOBIUS *aſper*, in *Ichthyology*, a name given by Geſner and others to a ſpecies of PEARCH called by many *aſper piſciculus*, a name confounding it with many other different fiſhes, and by Linnæus *perca aſper*. It is diſtinguiſhed among the pearch tribe by Artedi under the name of the pearch with eight or nine black lines on each ſide.

GOBIUS *fluviatilis*, in *Zoology*. See GUDGEON.

GOBIUS *marinus*. See GOGET.

GOBLET, or GOBELET, a kind of drinking cup, or bowl, ordinarily of a round figure, and without either foot, or handle.

The word is French, *gobelet*; which Salmaſius, and others, derive from the barbarous Latin *cupa*. Budeus deduces it from the Greek κυπελλον, a *ſort of cup*.

GOBLETS, made of the wood tamariſk, are ranked among medicinal drugs; becauſe the liquors infuſed awhile therein, are ſuppoſed to acquire a quality which renders them good in diſeaſes of the ſpleen.

GOBONE, or GOBONY, in *Heraldry*, the ſame as COMPONE'.

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“ but he endures, and is preſent: he endures always, and
“ is preſent every where; and by exiſting always, and
“ every where, he conſtitutes the very thing, duration
“ and ſpace, eternity and infinity.

“ Since every particle of ſpace is always, and every in-
“ diviſible moment of duration every where, the Cre-
“ ator and Lord of all things can never be *nunquam*, or
“ *nuſquam*.

“ He is omnipreſent, not only virtually, but alſo ſubſtantially; for power without ſubſtance cannot ſubſiſt. All things are contained, and move, in him; but without any mutual paſſion: he ſuffers nothing from the motions of bodies; nor do they undergo any reſiſtance from his omnipreſence.

“ It is confeſſed, that *God* exiſts neceſſarily; and by the ſame neceſſity he exiſts always, and every where. Hence, alſo, he muſt be perfectly ſimilar; all eye, all ear, all brain, all arm, all the power of perceiving, underſtanding, and acting; but after a manner not at all corporeal, after a manner not like that of men, after a manner wholly to us unknown.

“ He is deſtitute of all body, and all bodily ſhape; and therefore cannot be ſeen, heard, nor touched; nor ought to be worſhipped under the repreſentation of any thing corporeal.

“ We have ideas of the attributes of *God*, but do not know the ſubſtance even of any thing: we ſee only the figures and colours of bodies, hear only ſounds, touch only the outward ſurfaces, ſmell only odours, and taſte taſtes; and do not, cannot, by any ſenſe, or any reflex act, know their inward ſubſtances; and much leſs can we have any notion of the ſubſtance of *God*.

“ We know him by his properties, and attributes; by the moſt wiſe and excellent ſtructure of things, and by final cauſes; but we adore and worſhip him only on account of his dominion: for *God*, ſetting aſide dominion, providence, and final cauſes, is nothing elſe but fate and nature.” Newt. Philoſ. Nat. Princip. Math. in calce.

An ingenious divine has wrought theſe thoughts of that admirable philoſopher into form, and ripened them into a more expreſs ſyſtem, in a diſcourſe on this ſubject. Maxwell's Diſc. concerning *God*.

We ſhall here ſubjoin a compendious abſtract of the principal arguments that have been alleged in proof of the exiſtence of *God*. The admirable metaphyſician and divine, Dr. Clarke, has demonſtrated this truth, with that clearneſs and force of reaſoning, for which he is ſo eminently diſtinguiſhed, by a ſeries of propoſitions, mutually connected and dependent, and forming a complete and unanſwerable argument in proof both of the being and attributes of the Deity. 1. Something has exiſted from all eternity; for, ſince ſomething now is, ſomething always was: otherwiſe the things that now are muſt have been produced out of nothing, abſolutely and without cauſe; which is a plain contradiction in terms. 2. There has exiſted from eternity ſome one unchangeable and independent being: or elſe, there has been an infinite ſucceſſion of changeable and dependent beings produced one from another in an endleſs progreſſion, without any original cauſe at all. From without, this ſeries of beings can have no cauſe of its exiſtence, becauſe it includes all things that are or ever were in the univerſe; nor is any one being in this infinite ſucceſſion ſelf-exiſtent or neceſſary, and therefore it can have no reaſon of its exiſtence within itſelf; and it was equally poſſible, that from eternity there ſhould never have exiſted any thing at all, as that a ſucceſſion of ſuch beings ſhould have exiſted from eternity. Conſequently, their exiſtence is determined by nothing; neither by any neceſſity in their own nature, becauſe none of them are ſelf-exiſtent; nor by any other being, becauſe no other is ſuppoſed to exiſt. 3. That unchangeable and independent being, which has exiſted from eternity, without any external cauſe of its exiſtence, muſt be ſelf-exiſtent, i. e. it muſt exiſt by an abſolute neceſſity originally in the nature of the thing itſelf, and antecedent in the natural order of our ideas to our ſuppoſition of its being. For whatever exiſts muſt either have come into being out of nothing without cauſe; or it muſt have been produced by ſome external cauſe; or it muſt be ſelf-exiſtent: but the two former ſuppoſitions are contrary to the two firſt propoſitions. From this laſt propoſition it follows, that the only true idea of a ſelf-exiſtent, or neceſſarily exiſting being, is the idea of a being, the ſuppoſition of whoſe non-exiſtence is an expreſs contradiction; and this idea is that of a moſt ſimple being, abſolutely eternal and infinite, original and independent. It follows alſo, that nothing is ſo certain as the exiſtence of a ſupreme independent cauſe; and likewiſe, that the material world cannot poſſibly be the firſt and original being, uncreated, independent, and of itſelf eternal; becauſe it does not exiſt by an abſolute neceſſity in its own nature, ſo as that it muſt be an expreſs contradiction to ſuppoſe it not to exiſt. With reſpect both to its form and matter, the material world may be conceived not to be, or to be in any reſpect different from what it is, without a contradiction. 4 and 5. The ſubſtance or eſſence of the ſelf-exiſtent being is abſolutely incomprehenſible by us; nevertheleſs, many of the eſſential attributes of his nature are ſtrictly demonſtrable, as well as his exiſtence. The ſelf-exiſtent being, having no cauſe of its exiſtence but the abſolute neceſſity of its own nature, muſt of neceſſity have exiſted from everlaſting, without beginning; and muſt of neceſſity exiſt to everlaſting, without end. 6. The ſelf-exiſtent being muſt of neceſſity be infinite and omnipreſent. Such a being muſt be every where, as well as always, unalterably the ſame. It follows from hence, that the ſelf-exiſtent being muſt be a moſt ſimple, unchangeable, incorruptible being; without parts, figure, motion, diviſibility, and other properties of matter, which are utterly inconſiſtent with complete infinity. 7. The ſelf-exiſtent being muſt of neceſſity be but one; becauſe in abſolute neceſſity there can be no difference or diverſity of exiſtence; and, therefore, it is abſolutely impoſſible, that there ſhould be two independent ſelf-exiſtent principles, ſuch, e. g. as *God* and matter. 8. The ſelf-exiſtent and original cauſe of all things muſt be an intelligent being. This propoſition cannot be demonſtrated ſtrictly and properly *à priori*; but *à poſteriori*, the world affords undeniable arguments to prove that all things are the effects of an intelligent and knowing cauſe. The cauſe muſt be always more excellent than the effect; and, therefore, from the various kinds of powers and degrees of excellence and perfection, which viſible objects poſſeſs; from the intelligence of created beings, which is a real diſtinct quality or perfection, and not a mere effect or compoſition of unintelligent figure and motion; from the variety, order, beauty, wonderful contrivance, and fitneſs of all things to their proper and reſpective ends; and from the original of motion, the ſelf-exiſtent creating being is demonſtrated to be intelligent. 9. The ſelf-exiſtent and original cauſe of all things is not a neceſſary agent, but a being endued with liberty and choice. Liberty is a neceſſary conſequent of intelligence: without liberty, no being can be ſaid to be an agent, or cauſe of any thing; ſince to act neceſſarily is really and properly not to act at all, but to be acted upon. Beſides, if the ſupreme cauſe be not endued with liberty, it will follow, that nothing which is not could poſſibly have been; that nothing which is could poſſibly not have been; and that no mode or circumſtance of the exiſtence of any thing could poſſibly have been in any reſpect otherwiſe than it now actually is. Farther, if there be any final cauſe in the univerſe, the ſupreme cauſe is a free agent; and on the contrary ſuppoſition, it is impoſſible that any effect ſhould be finite; and in every effect, there muſt have been a progreſſion of cauſes *in infinitum*, without any original cauſe at all. 10. The ſelf-exiſtent being, the ſupreme cauſe of all things, muſt of neceſſity have infinite power; ſince all things were made by him, and are entirely dependent upon him; and all the powers of all things are derived from him, and perfectly ſubject to him; nothing can reſiſt the execution of his will. 11. The ſupreme cauſe and author of all things muſt of neceſſity be infinitely wiſe. This follows from the propoſitions already eſtabliſhed; and the proof *à poſteriori*, of the infinite wiſdom of *God*, from the conſideration of the exquiſite perfection and conſummate excellency of his works, is no leſs ſtrong and undeniable. 12. The ſupreme cauſe and author of all things muſt of neceſſity be a being of infinite goodneſs, juſtice, and truth, and all other moral perfections; ſuch as become the ſupreme governor and judge of the world. The will of a being, infinitely knowing and wiſe, independent and all-powerful, can never be influenced by any wrong affection, and can never be miſled or oppoſed from without; and, therefore, he muſt do always what he knows fitteſt to be done; that is, he muſt act always according to the ſtricteſt rules of infinite goodneſs, juſtice, and truth, and all other moral perfections; and, more particularly, being infinitely and neceſſarily happy and all-ſufficient, he muſt be unalterably diſpoſed to do and to communicate good or happineſs. See Clarke's Demonſtration of the Being and Attributes of *God*, paſſim.

To this more abſtruſe argument *à priori*, for the exiſtence of *God*, we may add another, more generally obvious, and carrying irreſiſtible conviction, which is deduced from the frame of the univerſe, and from the traces of evident contrivance and fitneſs of things for one another, that occur through all the parts of it. Theſe conſpire to prove, that the material world, which in its nature is originated and dependent, could not have been the effect of chance or neceſſity, but of intelligence and deſign. The beautiful, harmonious, and beneficial arrangement of the various bodies, that compoſe the material ſyſtem; their mutual dependence and ſubſerviency; the regularity of their motions, and the aptitude of theſe motions for producing the moſt beneficial effects; and many other phenomena reſulting from their relation, magnitude, ſituation, and uſe, afford unqueſtionable evidences of the creating power and wiſe diſpoſal of an intelligent and almighty agent. The power of gravity, by which the celeſtial bodies perſevere in their revolutions, deſerves our particular conſideration. This power penetrates to the centers of the ſun and planets, without any diminution of its virtue, and is extended to immenſe diſtances, regularly decreaſing, and producing the moſt ſenſible and important effects. Its action is proportional to the quantity of ſolid matter in bodies, and not to their ſurfaces, as is uſual in mechanical cauſes; and, therefore, ſeems to ſurpaſs mere mechaniſm. But however various the phenomena that depend on this power, and may be explained by it, no mechanical principles can account for its effects; much leſs could it have produced, at the beginning, the regular ſituation of the orbs, and the preſent diſpoſition of things. Gravity could not have determined the planets to move from weſt to eaſt in orbits nearly circular, almoſt in the ſame plane; nor could this power have projected the comets with all the variety of their directions. If we ſuppoſe the matter of the ſyſtem to be accumulated in the center by its gravity, no mechanical principles, with the aſſiſtance of this power, could ſeparate the huge and unwieldy maſs into ſuch parts as the ſun and planets; and, after carrying them to their different diſtances, project them in their ſeveral directions, preſerving ſtill the equality of action and reaction, or the ſtate of the centre of gravity of the ſyſtem. Such an exquiſite ſtructure of things could only ariſe from the contrivance and powerful influences of an intelligent, free, and moſt potent agent. The ſame powers, therefore, which at preſent govern the material univerſe, and conduct its various motions, are very different from thoſe, which were neceſſary to have produced it from nothing, or to have diſpoſed it in the admirable form in which it now proceeds.

But we ſhould far exceed the proper limits of this article, if, confining our obſervation to the earth, our own habitation, we were to enumerate only the principal traces of deſign and wiſdom, as well as goodneſs, which are diſcernible in its figure and conſtituent parts, in its diurnal and annual motion, in the poſition of its axis with regard to its orbit, in the benefit which it derives from the light and heat of the ſun, and the alternate viciſſitude of the ſeaſons; in the atmoſphere which ſurrounds it, and in the different ſpecies and varieties of vegetables and animals with which it is repleniſhed. No one can ſurvey the vegetable productions of the earth, ſo various, beautiful, and uſeful, nor the various gradations of animal life, in ſuch a variety of ſpecies, all preſerved diſtinct, and propagated by a ſettled law, each fitted to its own element, provided with proper food, and with inſtincts and organs ſuited to its rank and ſituation, and eſpecially with the powers of ſenſation and ſelf-motion, and all more immediately or remotely ſubſervient to the government and uſe of man, without admiring the ſkill and deſign of the original Former. But theſe are more ſignally manifeſted in the ſtructure of the human frame, and in the noble powers and capacities of the human mind; more eſpecially in the moral principles and faculties, which are a diſtinguiſhing part of our conſtitution, and lead to the perception and acknowlegement of the exiſtence and government of *God*. In thoſe inſtances that have now been recited, and a variety of ſimilar inſtances ſuggeſted by them, or naturally occurring to the notice of the curious and reflecting mind, contrivance is manifeſt, and immediately, without any nice or ſubtle reaſonings, ſuggeſts a contriver. It ſtrikes us like a ſenſation; and artful reaſonings againſt it may puzzle us, without ſhaking our belief. No perſon, for example, that knows the principles of optics, and the ſtructure of the eye, can believe that it was formed without ſkill in that ſcience; or that the ear was formed without the knowlege of ſounds; or that the male and female, created and preſerved in due proportion, were not formed for each other, and for continuing the ſpecies. All our accounts of nature are full of inſtances of this kind. The admirable and beautiful ſtructure of things for final cauſes, exalt our idea of the contriver; and the unity of deſign ſhews him to be one. The great motions in the ſyſtem, performed with the ſame facility as the leaſt, ſuggeſt his almighty power, which gave motion to the earth and the celeſtial bodies, with equal eaſe as to the minuteſt particles; the ſubtility of the motions and actions in the internal parts of bodies, ſhews that his influence penetrates the inmoſt receſſes of things, and that he is equally active and preſent every where. The ſimplicity of the laws that prevail in the world, the excellent diſpoſition of things, in order to obtain the beſt ends, and the beauty which adorns the works of nature, far ſuperior to any thing in art, ſuggeſt his conſummate wiſdom. The uſefulneſs of the whole ſcheme, ſo well contrived for the intelligent beings who enjoy it, with the internal diſpoſition and moral ſtructure of thoſe beings, ſhews his unbounded goodneſs. Theſe are arguments which are ſufficiently open to the views and capacities of the unlearned, while at the ſame time they acquire new ſtrength and luſtre from the diſcoveries of the learned. The Deity's acting and interpoſing in the univerſe ſhew that he governs it as well as formed it; and the depth of his counſels, even in conducting the material univerſe, of which a great part ſurpaſſes our knowlege, tends to preſerve an inward veneration and awe of this great being, and diſpoſes us to receive what may be otherwiſe revealed to us concerning him. His eſſence, as well as that of all other ſubſtances, is beyond the reach of all our diſcoveries; but his attributes clearly appear in his admirable works. We know that the higheſt conceptions we are able to form of them are ſtill beneath his real perfections; but his dominion over us, and our duty towards him, are manifeſt. See Maclaurin's Account of Sir I. Newton's Phil. Diſc. book iv. chap. 9.

Thoſe who wiſh to ſee the argument, which has been now ſketched out in ſome of its leading outlines, more fully illuſtrated and urged, may conſult the works of Ray, Nieuwentyt, Baxter in his Matho, Derham, De la Pluche in his Nature diſplayed, &c.

Another argument to prove the exiſtence of *God*, as the creator and governor of the univerſe, may be deduced from the univerſal conſent of mankind, and the uniform tradition of this belief through every nation and every age; it is impoſſible to conceive, that a fallacy, ſo perpetual and univerſal, ſhould be impoſed on the united reaſon of mankind. No credible and ſatisfactory account can be given of this univerſal conſent, without aſcribing it to the original conſtitution of the human mind, in conſequence of which it cannot fail to diſcern the exiſtence of a deity, and to the undeniable traces of his being, which his works afford. Fear, ſtate-policy, and the prejudices of education, to which the concurrence of mankind in this principle has been ſometimes reſolved, are founded on this univerſal principle, ſuppoſe its being and influence, and are actuated by it. It is much more reaſonable to imagine, that the belief of a *God* was antecedent to their operation than that it ſhould have been produced by them; and that it was dictated by reaſon and conſcience, independent of the paſſions and policy of men. The uniform and univerſal tradition of this belief, and of the creation of the world by the divine power, affords concurring evidence both of the principle and of the fact.

The exiſtence of *God* is alſo farther evinced by thoſe arguments which have been uſually alleged to prove, that the world had a beginning, and, therefore, that it muſt have been created by the energy of divine power. In proof of this, the hiſtory of Moſes, conſidered merely as the moſt ancient hiſtorian, deſerves particular regard. His teſtimony is confirmed by the moſt ancient writers among the heathens, both poets and hiſtorians. It may be alſo fairly alleged, that we have no hiſtory or tradition more ancient than that which agrees with the received opinion of the world's beginning, and of the manner in which it was produced; and that the moſt ancient hiſtories were written long after that time. And this conſideration is urged by Lucretius, the famous Epicurean, as a ſtrong preſumption that the world had a beginning:

—— *Si nulla fuit genitalis origo*
Terrarum & cœli, ſemperque æterna fuere:
Cur ſupra bellum Thebanum, & funera Trojæ,
Non alias alii quoque res cecinere poetæ?

Beſides, the origin and progreſs of learning, and the moſt uſeful arts, confirm the notion of the world's beginning, and of the common æra of its creation: to which alſo may be added, that the world itſelf, being material and corruptible, muſt have had a beginning; and many phenomena occur to the obſervation of the aſtronomer and natural hiſtorian, which furniſh a ſtrong preſumption, that it could have had no long duration, and that it gradually tends to diſſolution. From all theſe conſiderations we may infer the exiſtence, attributes, and providence of *God*.

GOD is alſo uſed in ſpeaking of the falſe deities of the heathens, many of which were only creatures to which divine honours and worſhip were ſuperſtitiouſly paid.

The Greeks and Latins, it is obſervable, did not mean, by the name *God*, an all-perfect being, whereof eternity, infinity, omnipreſence, &c. were eſſential attributes: with them, the word only implied an excellent and ſuperior nature; and, accordingly, they give the appellation *gods* to all beings of a rank, or claſs, higher and more perfect than that of men; and eſpecially to thoſe who were inferior agents in the divine adminiſtration, all ſubject to the one ſupreme.

Thus men themſelves, according to their ſyſtem, might become *gods*, after death; inaſmuch as their ſouls might attain to a degree of excellence ſuperior to what they were capable of in life.

The firſt divines, father Boſſu obſerves, were the poets: the two functions, though now ſeparated, were originally combined; or, rather, were one and the ſame thing.

Now the great variety of attributes in *God*, that is, the number of relations, capacities, and circumſtances, wherein they had occaſion to conſider him, put theſe poets, &c. under a neceſſity of making a partition, and of ſeparating the divine attributes into ſeveral perſons; becauſe the weakneſs of the human mind could not conceive ſo much power and action in the ſimplicity of one ſingle divine nature.

Thus the omnipotence of *God* came to be repreſented under the perſon and appellation of Jupiter; the wiſdom of *God*, under that of Minerva; the juſtice of *God*, under that of Juno.

The firſt idols, or falſe *gods*, that are ſaid to have been adored, were the ſtars, ſun, moon, &c. on account of the light, heat, and other benefits, which we derive from them.

Afterwards, the earth came to be deified, for furniſhing fruits neceſſary for the ſubſiſtence of men and animals; then FIRE and WATER became objects of divine worſhip, for their uſefulneſs to human life.

In proceſs of time, and by degrees, *gods* became multiplied to infinity; and there was ſcarce any thing but the weakneſs, or caprice, of ſome devotee or other, elevated into the rank of deity; things uſeleſs, or even deſtructive, not excepted.

The principal of the ancient *gods*, whom the Romans called *dii majorum gentium*, and which Cicero calls *celeſtial gods*, Varro *ſelect gods*, Ovid *nobiles deos*, others *conſentes deos*, were, Jupiter, Juno, Veſta, Minerva, Ceres, Diana, Venus, Mars, Mercury, Neptune, Vulcan, and Apollo.

Jupiter is conſidered as the *god* of heaven; Neptune as *god* of the ſea; Mars as the *god* of war; Apollo of eloquence, poetry, and phyſic; Mercury of thieves, Bacchus of wine, Cupid of love, &c.

A ſecond ſort of *gods*, called *demi-gods*, *ſemi dii*, *dii-minorum gentium*, *indigetes*, or *gods* adopted; were men canonized and deified. As the greater *gods* had poſſeſſion of heaven by their own right; theſe ſecondary deities had it by right and donation; being tranſlated into heaven becauſe they had lived as *gods* upon earth.

The heathen *gods* may be all reduced to the following claſſes.

1. Created ſpirits, angels, or dæmons: whence good and evil *gods*; Genii, Lares, Lemures, Typhones, guardian *gods*, infernal *gods*, &c.

2. Heavenly bodies; as the ſun, moon, and other planets: alſo the fixed ſtars, conſtellations, &c.

3. Elements; as air, earth, ocean, Ops, Veſta; the rivers, fountains, &c.

4. Meteors. Thus the Perſians adored the wind; thunder and lightning were honoured under the name of Geryon; and ſeveral nations, of India and America, have made themſelves *gods* of the ſame. Caſtor, Pollux, Helena, and Iris, have alſo been preferred from meteors to be *gods*; and the like has been practiſed in regard to comets: witneſs that which appeared at the murder of Cæſar. Socrates deified the clouds, if we may give credit to Ariſtophanes; and the primitive Chriſtians, Tertullian aſſures us, were reproached with the ſame thing.

5. They erected minerals, or foſſils, into deities. Such was the Bætylus; the Finlanders adored ſtones; the Scythians iron; and many nations ſilver and gold.

6. Plants have been made *gods*. Thus leeks and onions were deities in Egypt; the Sclavi, Lithuanians, Celtæ, Vandals, and Peruvians, adored trees and foreſts; the ancient Gauls, Britons, Druids, bore a particular devotion to the oak; and it was no other than wheat, corn, ſeed, &c. that the ancients adored under the names of Ceres and Proſerpina.

7. They took themſelves *gods* from among the waters. The Syrians and Egyptians adored fiſhes; and the Tritons, Nereids, Syrens, &c. what were they but fiſhes? Several nations have adored ſerpents; particularly the Egyptians, Pruſſians, Lithuanians, Samogitians, &c.

8. Inſects, as flies, and ants, had their prieſts, and votaries: theſe among the Theſſalians, and thoſe in Acarnania, where bullocks were offered to them.

9. Among birds, the ſtork, raven, the ſparhawk, ibis, eagle, griffon, and lapwing, have had divine honours; the laſt in Mexico, the reſt in Egypt, and at Thebes.

10. Four-footed beaſts have had their altars; as the bull, dog, cat, wolf, baboon, lion, and crocodile, in Egypt, and elſewhere; the hog in the iſland of Crete; rats and mice in the Troas, and at Tenedos; weaſels at Thebes, and the porcupine throughout all Zoroaſter's ſchool.

11. Nothing was more common than to place men among the number of deities: and from Belus or Baal, to the Roman emperors before Conſtantine, the inſtances of this kind are innumerable: frequently they did not wait ſo long as their deaths for the apotheoſis. Nebuchadnezzar procured his ſtatue to be worſhipped while living; and Virgil ſhews that Auguſtus had altars and ſacrifices offered to him, Eclog. i. 6. 7. As we learn, from other hands, that he had prieſts called *Auguſtales*; and temples, at Lyons, Narbona, and ſeveral other places: and he muſt be allowed the firſt of the Romans, in whoſe behalf idolatry was carried to ſuch a pitch. The Ethiopians deemed all their kings *gods*: the Velleda of the Germans; the Janus of the Hungarians; and the Thaut, Woden, and Aſſa, of the northern nations, were, indiſputably, men.

12. Not men only, but every thing that relates to man, has alſo been deified: as labour, reſt, ſleep, youth, age, death, virtues, vices, occaſion, time, place, numbers, among the Pythagoreans; the generative power, under the name of Priapus. Infancy, alone, had a cloud of deities; as Vagetanus, Levana, Rumina, Edufa, Potina, Cuba, Cumina, Carna, Oſſilago, Statulinus, Fabulinus, &c.

They alſo adored the *gods* health, fever, fear, love, pain, indignation, ſhame, impudence, opinion, renown, prudence, ſcience, art, fidelity, felicity, calumny, liberty, money, war, peace, victory, triumph, &c.

Laſtly, nature, the univerſe, or *το παν*, was reputed a great *god*.

Heſiod has a poem under the title of Θεογονια, i. e. the generation of the *gods*; wherein he explains their genealogy and deſcent; ſets forth who was the firſt, and principal; who next deſcended from him, and what iſſue each had: the whole making a ſort of ſyſtem of heathen theology.

Beſide this popular theology, each philoſopher had his ſyſtem: as may be ſeen from the Timæus of Plato, and Cicero De Natura Deorum.

Juſtin Martyr, Tertullian in his Apologetics, and in his book Contra Gentes; Arnobius, Minutius Felix, Lactantius, Euſebius, Præpar. & Demonſt. Evangel. St. Auguſtine De Civit. Dei, and Theodoret Adverſ. Gentes, ſhew the vanity of the heathen *gods*.

It is very difficult to diſcover the real ſentiments of the heathens, with reſpect to their *gods*: they are exceedingly intricate and confuſed, and even frequently contradictory. They admitted ſo many ſuperior and inferior *gods*, who ſhared the empire, that all was full of *gods*. Varro reckons up no leſs than 30,000 adored within a ſmall extent of ground, and yet their number was every day growing. The way to heaven was ſo eaſy for the great men of thoſe days, that Juvenal brings in Atlas complaining he was ready to ſink under the load of ſuch a number of new *gods* as were daily placed in the heavens: yet father Mourgues ſeems to have proved that all the philoſophers of antiquity, have acknowleged that there was but one god. Plan. Theol. des Sect. Sçavant. de la Grece.

GOD, *act of.* See DISABILITY.

GOD, *peace of.* See PEACE.

GOD, *Son of.* See SON.

GOD, *truce of.* See TRUCE.

GOD, *worſhip of.* See WORSHIP.

GOD-BOTE, in our *Ancient Saxon Cuſtoms*, an eccleſiaſtical or church fine, for crimes and offences committed againſt God.

GODDESS, *dea*, *diva*, a heathen deity, to whom they attributed the female ſex.

The ancients had almoſt as many *goddeſſes* as gods. Such were Juno, the *goddeſs* of air; Diana, the *goddeſs* of woods and chaſtity; Proſerpina, the *goddeſs* of hell; Venus, of beauty; Thetis, of the ſea: ſuch alſo were Victory, Fortune, &c.

Nay, they were not contented to make women gods, and admit both ſexes into the roll; but they had, alſo, hermaphrodite gods. Thus Minerva, according to ſeveral of the learned, was both man and woman, and worſhipped both under the appellation of Lunus and Luna. Mithras, the Perſian deity, was both god and *goddeſs*; and the ſexes of Venus and Vulcan are very dubious: whence, in the invocations of thoſe deities, they uſed this formula; Be thou god, or *goddeſs*: as we learn from A. Gellius.

It was a privilege peculiar to *goddeſſes*, that they might be repreſented, on medals, naked. The imagination, it was ſuppoſed, muſt be awed, and kept from taking liberties, by the conſideration of the divine character.

GOD-FATHERS, and **GOD-MOTHERS**, perſons who direct and attend at the baptiſm of infants, or other perſons; and who give the name.

The number of *god-fathers* and *god-mothers* is now reduced to three in the church of England, and two in that of Rome: anciently, they had as many as they pleaſed.

The Romaniſts have alſo *god-fathers* and *god-mothers*, at their confirmation. They even give *god-fathers*, &c. to bells, at their baptiſm.

Among the ancients it was the cuſtom for perſons of quality to have others of like quality cut their children's hair, the firſt time; by which they became reputed a ſort of *god-fathers:* and the like was practiſed with regard to the hair of the beard.

GOD-FATHER was alſo a name anciently given to a kind of ſeconds, who attended and aſſiſted the knights in tournaments, or ſingle combats.

The *god-fathers* of duels were a kind of advocates, who were choſen by the two parties, to repreſent the reaſons of their combat to the judges.

Something of this kind was long retained at ſolemn carrouſals. There were two, or more, in each quadrille. See QUADRILL.

The inſtitution of *god-fathers* and *god-mothers*, *patrimi* and *matrimi*, is originally Roman. They are ſaid to have been people who, in the games of the Circus, attended the chariots, ſhews, and images, of the gods. Cicero makes mention of them, in his oration De haruſpicum Reſponſis. Their office was much like that of the children in ſome Romiſh ceremonies, who are dreſſed in the habit of angels, to ſtrew flowers, bear incenſe-pots, lights, &c. and accompany the relics and images of ſaints.

GOD-GILD, in our *Ancient Cuſtoms*, that which is offered to God, or for his ſervice.

GODWIT, in *Ornithology*, the SCOLOPAX *ægocephala* of Linnæus, the *ægocephalus* of other authors, and called alſo the *yarwhelp* or *yarwhip*, is a ſpecies of birds, taken in the fens, in the ſame ſeaſon and in the ſame manner with the ruffs and reeves, and, when fattened, eſteemed a great delicacy. This ſpecies weighs $12\frac{1}{2}$ ounces; the length is ſixteen inches, and the breadth twenty-ſeven; the bill is four inches long, turns up a little, being black at the end and in the other part of a pale purple: from the bill to the eye is a broad white ſtroke; the feathers of the head, neck and back are of a light reddiſh brown, marked in the middle with a duſky ſpot; the belly and vent feathers are white; the tail regularly barred with black and white; the ſix firſt quill-feathers are black with their interior edges of a reddiſh brown; the legs of ſome are duſky and of others a greyiſh blue; and the exterior toe is connected as far as the firſt joint of the middle toe with a ſtrong ſerrated membrane. The male is diſtinguiſhed from the female by ſome black lines on the breaſt and throat. Theſe birds appear in ſmall flocks on our coaſt in September, and continue with us the whole winter: they walk on the ſands like the curlew, and feed on inſects. Pennant.

GODWIT, *red*, or SCOLOPAX *Lapponica* of Linnæus, is larger than the former; the bill is ſomewhat ſhorter but of the ſame figure; the lower half is black and the upper yellow; the head, neck, breaſt, ſides, ſcapulars, and upper part of the back are of a bright ferruginous colour; the head is marked with oblong duſky lines; the neck is plain; the breaſt, ſides, ſcapulars, and back varied with tranſverſe black bars, and the edges of the feathers with a pale cineritious brown; the middle of the belly is white, marked ſparingly with ſimilar ſpots; the legs are black and four inches long; and the thighs above the knees are naked for the ſpaces of $1\frac{3}{4}$ inch. This is not a very common ſpecies in England. Pennant.

GODWIT, *leſſer*, the totanus of Aldrovand, is ſometimes called the *ſtone-plover*, and at Venice the VETOLA.

GOGET, in *Ichthyology*, a name frequently uſed for the GOBIUS *niger*, of Linnæus, the ſea-gudgeon or rock-fiſh, and by which it is known in moſt parts of the world.

This is a long and ſlender fiſh, of a rounded not flat body, and ſeldom exceeds ſix inches in length. Its colour is very various, being either a brown variegated with white and yellow, or a blueiſh white with lines of a faint olive-colour, and black ſpots. The dorſal and anal fins are of a pale blue, the rays being marked with ſmall black ſpots. The firſt dorſal fin conſiſts of ſix rays; the ſecond of fourteen; the pectoral fins of ſixteen or ſeventeen, cloſely ſet together; the middle being the longeſt and the others on each ſide gradually ſhorter. *Tab. of Fiſh.* N° 8. The belly-fins join together into one, and make a ſort of funnel-ſhaped hollow, by which the fiſh is ſuppoſed to apply itſelf, and ſtick faſt to the rocks, whence it has its name of rock-fiſh. It is very ſoft and ſlippery, yet is covered with ſcales, but they are very ſlender and ſoft. It is caught about the Engliſh and Italian ſhores, and lives in ſhallow water. It is conſtantly in the markets of Rome, &c.

GOGGLES, in *Surgery*, are inſtruments uſed for curing SQUINTING, or that diſtortion of the eyes, which occaſions this diſorder. They are ſhort conical tubes, compoſed of ivory ſtained black, with a thin plate of the ſame ivory fixed in the tubes near their anterior extremities. Through the center of each of theſe plates is a ſmall circular hole, about the ſize of the pupil of the eye, for the tranſmiſſion of the rays of light. Theſe *goggles* muſt be continually worn in the day-time, till the muſcles of the eye are brought to act regularly and uniformly, ſo as to direct the pupil ſtrait forwards; and by theſe means the cure will be ſooner or later effected. Warner on the Eye, p. 32.

GOHDAKADURA, in *Botany*, a name given by ſome authors to the tree which produces the *nux vomica*.

GOHKATHU, in *Botany*, a name given by ſome authors to the tree which produces the gamboge, or *gutta gamba* of the ſhops.

GOING, in the *Manege*, called in French *alleure*, is the pace or gait of a horſe.

GOLD, *aurum*, a yellow metal; the heavieſt, pureſt, moſt ductile, and ſhining; and, on thoſe accounts, the moſt valuable of all metals.

The yellow colour of *gold* is rendered paler by fuſion with borax; but this may be prevented or corrected by fuſion with nitre, or ſal ammoniac. The colour of *gold* is heightened by an alloy of copper, and this property of copper has given riſe to ſundry proceſſes for exalting the colour of this noble metal. Other metals render it paler.

The chemiſts call *gold*, *ſol*, the ſun; to denote its preeminence over the other metals, which are called by the names of the planets. Its ſymbol, or character, is O; which, in their hieroglyphical way of writing, denotes perfection, ſimplicity, ſolidity, &c.

The weight of *gold* is to that of water, as 19637 to 1000. Fine *gold*, immerſed in water, weighs near one nineteenth part leſs than in air, and conſequently it is upwards of nineteen times heavier than its own volume of water.

The *ſpecific* GRAVITY of *gold*, or its comparative weight with an equal volume of water has been variouſly aſſigned: ſome have made it 19,637, others 19,640, and in the Swediſh Tranſactions it is made no leſs than 20,000; that of water being 1,000. But from the experiments of Mr Ellicot, it does not appear to have exceeded 19,207; and from thoſe of Dr. Lewis, on the pureſt *gold*, well hammered, its gravity is ſtated between 19,300 and 19,400. In all experiments of this kind, the reſult ſhould be ſpecified with an account of the ſenſibility of the balance, and the quality and warmth of the water. An increaſe of heat rareſying water more than it does *gold*, the *gold* muſt turn out proportionably heavier than an equal volume of the expanded fluid; and this difference is more conſiderable than it has generally been ſuppoſed. From freezing to boiling water, or by an augmentation of heat equivalent to 180° of Fahrenheit's thermometer, Dr. Lewis found that a rod of *gold* was lengthened about one part in 700, and conſequently its volume increaſed about one part in 233, while the volume of water is increaſed one twenty-ſixth or more; hence it appears, that by an augmentation of 40° of the thermometer, or from a little above freezing to the ſummer heat, the volume of *gold*, if its expanſion be uniform, is increaſed one part in 1048, and that of water one in 117; and the gravity of *gold*, weighed in the water ſo warmed and expanded, ſhould be greater than when the *gold* and water are 40° colder, in the proportion of about 19,265 to 19,400: and this calculation gives a difference, in the gravity, of 0,034 for every 10° of the thermometer; but ſome trials ſeemed to make it greater. It has been imagined, that the comparative gravity of *gold* to braſs weights, which are more than double in volume to an equal weight of *gold*, muſt be ſo far influenced by the variable gravity of the atmoſphere, that there muſt be an advantage in buying *gold* by weight when the air is lighteſt. But Dr. Lewis obſerves, that this difference appears too inconſiderable to be regarded in a commercial view. For the loſs of weight of the two metals in the air being as much leſs than their loſs in water as air is lighter than water; and air, as appears from an experiment of Mr. Hawkſbee, being in its lighteſt ſtate about a 937th, and in its heaviſt ſtate about an 848th part of the weight of water; it will be found on calculation, that the *gold* preponderates above the braſs, in the heavieſt more than in the lighteſt air, only by one part in 145000, or one grain in about 302 ounces; which is a difference too minute to be ſenſible in the niceſt balance. If the mean gravity of *gold* be reckoned 19,300, as a cubic inch of water weighs about 254 grains, a cubic inch of *gold* will conſequently weigh about 4902 grains, or 10 ounces, 102 grains. The pound weight, or twelve ounces, Troy, of *gold*, is divided into twenty-four caracts.

The value of *gold* to that of ſilver, was anciently only as twelve to one. Indeed, this proportion varies as *gold* is more or leſs plentiful: for Suetonius relates, that Cæſar brought ſuch a quantity of *gold* from Italy, that the pound of *gold* was only worth ſeven pounds and a half of ſilver. In our coinage the value of fine *gold* to fine ſilver is as $15\frac{1}{5}$ to 1. See STANDARD. Sir Iſaac Newton obſerves, in a repreſentation to the lords of the treaſury in the year 1717, that in the mints of Spain and Portugal, the value of *gold* is ſixteen times that of ſilver; but that in thoſe countries, payments in ſilver bearing generally a premium of ſix per cent. the proportion may be conſidered as fixed by commerce at $15\frac{1}{25}$ to 1; that in the other parts of Europe, the value of *gold* is at moſt fifteen, and in China and Japan but nine or ten times that of ſilver; ſo that *gold* is rated higher in England than in any other part of Europe, and higher in Europe than in the Eaſtern countries. Hence, in great meaſure, ariſe the profits of exchanging *gold* for ſilver in one place, and re-exchanging them in another: and hence the greater diſparity between the relative quantities of *gold* and ſilver in one commercial nation than in another; this metal being brought in moſt abundance which is rated higheſt in proportion to the other, and that which is rated loweſt being drained away. There are various ways of determining the fineneſs of *gold*; or the proportion of alloy which it contains. Thoſe who are uſed to this buſineſs can judge nearly the proportion of alloy from the colour of any given maſs, provided that the ſpecies of alloy be known. For the method of doing this, ſee TOUCH-*needles*. The great exceſs of the weight of *gold*, above that of the metals uſed for its alloy affords another method of determining the quantity of alloy in any given maſs, where the ſpecies of alloy is known. Thus fine *gold* loſes in water one grain in every 19,3 nearly; and fine ſilver loſes one grain in about eleven; from whence it is eaſy to find the loſs of any number of grains of each, and conſequently of any aſſignable mixture of the two metals. Thus, fifty grains of *gold* will loſe above $2\frac{1}{2}$, and fifty grains of ſilver ſomewhat more than $4\frac{1}{2}$; ſo that a mixture of equal parts of the two will loſe above ſeven in a hundred, or one in fourteen. A mixture of *gold* with half its weight of ſilver will loſe one part in 15,4; with a third of ſilver, one in 16,2; with a fourth, one in 1,67; and with an eleventh of ſilver, which is the ſtandard proportion of alloy, one in 18,1. On this principle, the ſpecific gravity, or proportional loſs in water, of *gold* alloyed with different quantities of ſilver, copper, and mixtures of both, may be computed and formed into tables for uſe. The accuracy of this method, it ſhould be obſerved, depends on the ſuppoſition, that each of the two metals, that are melted together, retains its own proper gravity, which is the caſe in mixtures of *gold* and ſilver; but *gold* and copper, melted together, are ſpecifically lighter than if they were weighed ſeparately; and this alſo is the caſe in mixtures of *gold* with zinc, tin, iron, and platina; but the reverſe happens in mixtures of it with lead and biſmuth. It appears, therefore, that the hydroſtatic balance cannot diſcover, with certainty, the exact fineneſs of *gold*, unleſs when ſilver is the metal mixed with it.

GOLD, *alchemical hiſtory of*. See PHILOSOPHER'*s ſtone*, and TRANSMUTATION.

GOLD, *chemical hiſtory of*. The firſt characteriſtic or property of *gold* is, that it is the heavieſt of all bodies; ſo that whoever would make *gold*, muſt be able to add the weight of other matters, and make them equiponderate with *gold*.

In every maſs of matter, therefore, heavier than mercury, there muſt of neceſſity be a ſhare of *gold*; there being no body in nature, known till of late years, of intermediate gravity; i. e. no body whoſe gravity is to that of *gold*, more than as fourteen to nineteen.

The diſcovery of the ponderous metal PLATINA has now afforded an exception to this long received axiom, and ſhewn that weight alone is no criterion of *gold*; for pure platina, perfectly void of *gold*, is nearly as ponderous as *gold* itſelf.

Its ſecond character is, that of all known bodies it is the moſt ductile and malleable, and of all bodies its parts have the greateſt degree of attraction, i. e. they cohere with the greateſt force. Our gold-beaters and wire-drawers furniſh us with proofs of this property. They every day reduce *gold* into leaves or lamellæ, inconceivably thin; yet without leaving the leaſt aperture, or chaſm, viſible to the beſt microſcope, or even pervious to the light. See this property conſidered more at large under the article DUCTILITY.

The tenacity of the parts of *gold* is alſo much greater than that of any other metal; for five hundred pounds can be ſupported by a wire of one-tenth of an inch in diameter made of *gold*, but not of any other metal. The malleability of *gold* is very little affected by a mixture of ſilver; it is not much diminiſhed by copper, which renders it harder than ſilver does; and next to theſe two metals, platina injures its malleability the leaſt. But all the reſt of the metallic bodies render it brittle in different degrees; and its malleability is deſtroyed by fumes of lead, and of moſt other metallic ſubſtances, but may be recovered by fuſion with nitre. It has been ſaid by many that this property of *gold* is injured by the fumes of charcoal; but Dr. Lewis believes this to be a miſtake. The malleability of *gold* is alſo diminiſhed by cooling it, in a ſtate of fuſion, too haſtily; for preventing which, artiſts heat the mould into which the *gold* is to be caſt. Mr. Boyle mentions an anti-elixir, which he tried; that is, one that would debaſe *gold*, and which changed its malleability, colour, homogeneity, and ſpecific gravity; ſo that though the powder did not weigh the thouſandth part of the *gold*, yet the ſpecific gravity of the metal to which it was debaſed, was to that of water but as $15\frac{1}{3}$ to 1, inſtead of 19 to 1. Boyle's Works abr. vol. i. p. 78. It is obſerved by Dr. Lewis, that, though the expanſion of *gold* is leſs than that of other metallic ſubſtances with ſmall degrees of heat, it nevertheleſs expands more than moſt of the other metals, when fuſed; and as it thus ſhrinks more when it becomes ſolid, it is leſs capable of receiving ſharp and perfect figures, when caſt into moulds, than ſilver, copper, lead, and tin, which do not ſhrink ſo much, and much leſs than iron and biſmuth, which expand in paſſing from a fluid to a ſolid ſtate. *Gold*, when melted with a low white heat, has a bright bluiſh green colour.

It is the received opinion, that whatever has been done to this metal, the common way of purifying it by the copel reſtores it eaſily to itſelf again; but this is not always ſo certain, or ſo eaſy, as is generally imagined. Mr. Homberg put into the copel an ounce of *gold*, which he had uſed in ſeveral chemical experiments, in order to reſtore it to its original ſtate; but after four times copelling it, he found, that whatever quantity of lead he uſed, ſtill the metal, though of the right and beautiful colour, was brittle, and not at all in the ductile ſtate of pure *gold*. Finding, therefore, that lead would not anſwer his purpoſe, he incorporated the *gold* with four times its quantity of ſilver; and having performed the operation of the depart in the common manner, he fuſed it with borax; but after all this the *gold* was as brittle as before, though ſtill of the ſame beautiful colour. He then melted it again without any addition, but ſtill it remained in the ſame brittle ſtate. His next trial was by antimony, not doubting but that the particles, whatever they were, that had ſtood the operation of the depart, and of lead, would be abſorbed by this powerful ſemi-metal, and the *gold* left in its natural malleable ſtate. He melted it twice to this purpoſe with eight ounces of antimony; but after ſeparating the antimony, and then melting the *gold* ſeveral times with ſalt-petre, and many times without any mixture, it was found of the moſt perfect and beautiful colour imaginable, but ſtill brittle, and not in the leaſt malleable. Surpriſed to ſee all the common methods fail, he melted it again with ſix ounces of antimony, and afterwards melted this regulus with three times its own weight of lead, and ſet the whole in a copel in a proper degree of fire, to evaporate both the antimony and the lead. But when the fire was out, he was ſurpriſed to find the *gold* covered with a browniſh ſubſtance, reſembling a muſhroom, which fell to powder on being touched by the fingers. The *gold* itſelf was become of a grey colour, and was full of wrinkles on the upper ſurface, from whence this fungous matter had been thrown out; but on the under ſurface, where it ſtuck to the copel, it was ſtill of a fine and beautiful *gold* colour. He then melted ſeveral times the *gold* and the fungous ſubſtance together, and every time there appeared the ſame ſort of fungous cruſt at the top. At laſt he gathered this fungous ſubſtance carefully off from the *gold*, and then melting the metal by itſelf, there was no more any fungous matter thrown out upon it, but only a thin layer of a powder of the ſame nature and colour with the former. Three times it was melted, and at every time threw of a quantity of this powder; and after this being fuſed with borax, it at length became perfect malleable *gold*. He then fuſed together the fungous matter, and all the quantities of powder which he had ſaved, there appeare a new fungous on the matter, and that for ſeveral time melting; but at laſt this diſappeared, and there wa found a ſmall lump of pure *gold* in the copel. It is no eaſy to gueſs at the cauſe of this obſtinate brittleneſs o the *gold*, becauſe it had paſſed ſeveral experiments, an been mixed with ſeveral ſalts and ſeveral metals, particu larly at laſt with iron and with emery. The emer ſeemed moſt to be ſuſpected as the cauſe; but this brit tleneſs cannot be given to *gold* by emery alone, and muſ have been owing to the mixed effect of ſome of the ſalt and emery together, as by means of the ſalts, the particle o of emery are thrown farther, and more intimately mixed with thoſe of the *gold* than they could otherwiſe be. We have been told of the degradation of *gold*. This *gold* would have been declared degraded, and robbed of one of its greateſt qualities, its malleability, had it fallen into any hands but thoſe of ſo great a chemiſt; and it is much to be doubted, whether Mr. Homberg would not have been able to reduce the degraded *gold* of any other chemiſt, and reſtore it to its natural ſtate and purity, though the common methods of operating on it ſhould all have failed, as they did in this caſe. Mem. Acad. Par. 1693.

The third character of *gold* is its fixedneſs in the fire; in which it exceeds all other bodies. This property ſeems to reſult from the homogeneity and equality of its parts, which equally aid and ſupport each other, and have equal pores, or interſtices, through which the fiery corpuſcles find an eaſy paſſage. The prince of Mirandola, Mr. Boyle, and moſt other chemiſts, furniſh divers experiments to illuſtrate this wonderful fixity. After laying a quantity of *gold* two months in the intenſeſt heat imaginable, it is taken out without any ſenſible diminution of weight; whereas the other metals, platina and ſilver excepted, are ſoon deprived by fire of their metallic appearance, and either diſſipated in flames, or changed into an earthy or glaſſy form.

It muſt be added, however, that in the foci of the large BURNING-*glaſſes* of Meſſ. Tſchirnhauſen and Villette, even *gold* itſelf volatilizes and evaporates. After this manner, we are told from the Royal Academy at Paris, a quantity of pure *gold* was vitrified; being firſt fuſed in a ſort of calx, which emitted fumes, and loſt of its weight. But the ſame calx, fuſed again with a quantity of greaſe, was reſtored into *gold*.

Mr. Homberg found by experiment, that *gold* properly managed in the focus of the great burning glaſs, after the evaporation of ſome of its conſtituent parts, was vitrifiable, like other metals. That part of this metal which flies off in fume, he ſays, is the mercury which entered its compoſition, and what then remains, which is an earth penetrated by ſulphurs, runs into glaſs, as all other ſubſtances of a like kind muſt with a like fire. But he ought to have previouſly aſcertained the purity of the *gold* which he employed; for want of which the glaſs produced in this experiment might proceed from copper, or other metal, with which the *gold* might have been alloyed. Beſides, as the ſubſtances expoſed to the focus of the burning glaſs are laid upon a piece of charcoal, and that charcoal is always in part reduced to aſhes about the body in trial, and theſe aſhes often fly over and all about it; it was objected to Mr. Homberg, by ſome who ſaw his experiments, that theſe aſhes alone vitrified on the *gold*, and not any part of the *gold* itſelf; but Mr. Homberg replies, that if this were the caſe, theſe aſhes would alſo be vitrified upon ſilver in the like trials and circumſtances, and give an appearance of the ſilver's vitrifying; but often repeated experiments have proved, that ſilver expoſed to the focus of the burning glaſs, gives not the leaſt ſign of vitrification in any circumſtance, unleſs it has been refined with antimony; that is to ſay, unleſs there has been given to it by art more ſulphurs than it is naturally poſſeſſed of; but in that caſe, theſe unnatural abundant ſulphurs will always vitrify a part of its earth. Mem. Acad. Par. 1702. 1707.

With regard to this experiment, Dr. Lewis obſerves, that the aſhes might caſually have been accumulated on the metal, ſo as to produce a ſenſible vitrification, in one inſtance, without being ſo in another, and that, at beſt, it is too imperfect for any ſtreſs at all to be laid upon it. The ſame experiment has been repeated by others without ſucceſs; and though the *gold*, expoſed to the focus of a burning lens, does really decreaſe in weight, this diminution appeared to be owing to the ſeparation of minute globules in ſubſtance, which were found to be perfect unchanged *gold*. The true alchemiſts have made no doubt of the poſſibility of decompoſing, or entirely deſtroying *gold*, and of tranſmuting the baſer metals into this; their books are filled with various proceſſes for theſe purpoſes; notwithſtanding which, the producibility and deſtructibility of *gold* ſtill continue problems in chemiſtry: nor is there any experiment from which the poſſibility of either can be inferred; though there is reaſon to believe, that its reſiſtance to all our operations is owing to our inability to raiſe a ſufficient heat.

Its fourth character is, that it is not only unalterable by air and water, but that it reſiſts, while its aggregation is entire, the action of the ſtrongeſt ſimple chemical menſtruums, either in the dry or humid way. It is ſaid not to be ſoluble by the ſtrongeſt mineral acids, when they are pure, nor by ſulphur, nor by alkalis. However, though it has been generally ſuppoſed by the aſſayer and refiner, that *gold* is abſolutely indiſſoluble by the nitrous acid; yet Dr. Brandt has lately publiſhed, in the Swediſh Tranſactions for the year 1748, a diſcovery of certain circumſtances, in which *gold* is diſſolved by this acid in conſiderable quantity. For, having boiled a mixture of *gold* and ſilver, amounting to about fifteen pounds, in which the proportion of the ſilver, containing a little copper, to the *gold*, was as 16 to 3, with freſh portions of ſtronger and ſtronger aqua fortis, in a glaſs body, to which was fitted a head and recipient for collecting the acid vapours that aroſe; he poured off the ſolution from the *gold*, when all the ſilver and copper were nearly diſſolved, and boiled down the next portion of aqua fortis, till the matter at the bottom appeared like a dry ſalt. He then added more aqua fortis, which, after boiling for ſome time, appeared yellow, and was poured off into a ſeparate glaſs: this yellow aqua fortis he afterwards uſed for diſſolving ſome ſilver, and found a conſiderable quantity of *gold* at the bottom of the glaſs, though the ſilver had been very carefully purified from *gold*. In this experiment, pure ſilver, which exhibited no appearance of *gold* with common aqua fortis, precipitated from the yellow aqua fortis a ſpongy lump of *gold*. In keeping, a part of the *gold* ſeparated ſpontaneouſly in form of a brown powder: after it had been long kept, and depoſited much of its *gold*, it was found on an aſſay to contain more *gold* than ſilver, in the proportion of 19 to 12. In this ſtate, a quantity of it, ſufficient to diſſolve four parts of ſilver, yielded during the diſſolution one part of *gold*; ſo that the nitrous acid is capable of diſſolving above one fourth part as much *gold* as of ſilver. This experiment affords a neceſſary and uſeful caution to thoſe that are concerned in the parting of gold and ſilver by aqua fortis.

Gold is ſaid to be diſſolved by ſeveral compound menſtrua; as, by the marine acid mixed with a ſmall proportion of ſpirit of urine; by a mixture of the vitriolic acid with the ſame urinous ſpirit; by a mixture of the vitriolic acid with a little fixt alkaline ſalt; by the vapour which ariſes during the efferveſcence of the vitriolic acid with fixt alkaline ſalt, collected by diſtillation; by a ſpirit, prepared by ſaturating the vitriolic acid with volatile alkaline ſalt, exſiccating the mixture, diſſolving it in twice or thrice its quantity of aqua fortis, and diſtilling the ſolution. But Dr. Lewis could not diſcover, in any of his experiments, that any of theſe liquors had any action on *gold*. But the moſt effectual menſtruum of *gold* is AQUA *regia*, which, in a moderate heat, readily and totally diſſolves it into a tranſparent yellow liquor, and, therefore, ſerves to ſeparate *gold* from ſilver. Another ſolvent of *gold* is a combination of ſulphur with fixed alkali, called liver of ſulphur. See Refining.

Nevertheleſs, though a maſs of *gold* reſiſts the action of ſimple ſolvents, we muſt not conclude, that it is abſolutely incapable of ſolution by any of them. An inſtance to the contrary has been already produced; and Mr. Margraaf has diſcovered, that this metal, precipitated by an alkali from its ſolution in aqua regia, is then rendered ſoluble by any, even of the vegetable acids. See Mercury and Silver.

Beſides, *gold* diſſolved in aqua regia is not precipitated, when the proportions of the two acids of this compound menſtruum are changed, by adding to this ſolution any quantity of nitrous or marine acids. Farther, *gold* may be diſſolved in alkali, by the proceſs of the martial alkaline tincture of Stahl; that is, by pouring into a concentrated ſolution of fixed alkali in water, a ſmall quantity of ſolution of *gold* in aqua regia, in which the acids are not too much ſaturated, the *gold* will be quickly ſeized and diſſolved by the alkali.

A ſolution of *gold* in aqua regia affords a very curious object for the microſcope. Mr. Lewenhoeck took great pains to obſerve the configurations it would put on in its concretions: he found, that in warm weather, if a drop of the ſolution was laid on a clean glaſs, and examined by the microſcope, the ſalts ſoon coagulated, but appeared very irregular in their manner of concretion. They ſometimes aſſumed a regular hexangular form, but more frequently they were rendered irregular, by the application of other ſubſtances, in form of ſmaller cryſtals upon them. One thing in this is very remarkable, that is, the cryſtals formed at different times ſeem very differently impregnated with the metal, thoſe which concrete firſt being uſually large, and perfectly clear and tranſparent, and thoſe which afterwards form themſelves upon theſe, and alter and injure their figures, being ſmaller and ſeemingly much more impregnated with the metal, as being all of a fine *gold*-yellow. Sometimes alſo it happens, that the ſmall ſalts ſated with the particles of the *gold* ſhoot firſt, and when the other clear and tranſparent cryſtals of ſalt form themſelves afterwards, it not unfrequently happens that they form about the others, and incloſe them within their own bodies. Thus it is not uncommon to ſee one of theſe large and tranſparent cryſtals with a ſmall *gold*-coloured cryſtal immerſed in its center.

This is a very elegant and entertaining ſight by the microſcope, but it is only to be obſerved in dry ſeaſons, for in moiſt weather the cryſtals either do not form themſelves at all, or elſe it is done but very confuſedly, and they melt and diſſolve away on the acceſs of freſh damp air.

If a ſmall piece of copper be put into this ſolution of *gold* in aqua regia, the liquor immediately operates upon it, and not only diſſolves the copper, but precipitates the *gold* it had before held in a ſtate of ſolution upon the ſurface of the copper, in the place of what copper it had taken away. The ſame thing happens when a piece of copper is put into a ſolution of ſilver in aqua fortis, but in this laſt caſe the effect is more beautiful; for the ſilver particles precipitated on the copper arrange themſelves in the form of trees and ſhrubs, like the ARBOR *Dianæ*; but in the caſe before us, the *gold* is only precipitated in form of irregular filaments, or ſmall granules, and ſeems rather to imitate that proceſs obſerved in the famous water of the Ziment, or Cement ſprings in Hungary; where the water being highly impregnated with a ſolution of blue vitriol, containing a very large portion of copper, if a piece of iron be put into it, immediately it works upon the iron, and diſſolving it, precipitates copper in ſmall irregular granules in its place: ſo that, in the opinion of the vulgar, the copper is made of the iron, but in reality the iron is all diſſolved, and the copper left in a ſolid form by the menſtruum which diſſolved it; as in this experiment, the copper put into the ſolution of *gold* is diſſolved, and taken up into the liquor, and the *gold* which was before diſſolved is precipitated in its place.

If the aſſiſtance of art be called in, and the ſolution of *gold* be made according to the rules of chemiſtry in a ſand heat, and the menſtruum ſo ſated with it, that it can diſſolve no more, then it readily ſhoots into cryſtals, on being expoſed to dry in drops before the microſcope on plates of glaſs; and the cryſtals which it forms are in this caſe all of one kind, all ſated with *gold*, of a regularly angular figure, and their angles very ſharp.

Theſe cryſtals appear only like ſo many pieces of pure *gold*, of a fine luſtre and brightneſs, and ſeem maſſes of native *gold* of this form juſt taken from ſome mine. In order to procure theſe *gold* cryſtals as regularly formed as can be, the ſmall drop, laid on the plate of glaſs, muſt be poured off again at one ſide, and by this means the liquor being ſpread extremely thin, the cryſtals will be formed extremely regular; but then they will be ſo ſmall, that they are only viſible through very powerful glaſſes; when thus managed, however, they ſhew their true form, which is regularly hexangular, but that not in form of a column, as in the hexangular cryſtals; but in a ſhort and thick maſs, reſembling a die, only more long-ſhaped, not ſo exactly ſquare. Notwithſtanding that theſe ſmall cryſtals are yellow, they are as tranſparent as cryſtal, and the liquor remaining about them is alſo yellow and tranſparent. Some of theſe cryſtals, though of the ſame figure with the others, appear not of the ſame even and plain ſtructure, but are plainly ſeen to be formed of a great number of rings, or concentric circles, extended round each other. Copper being put into this ſolution, ſo highly ſated with *gold*, is not preyed upon ſo faſt as in a weaker ſolution; ſome few air-bubbles, however, are driven to the ſurface, but without any great effect, but if the ſolution be diluted with a little water, the acid then preys with violence upon a piece of copper put into it. A part of the copper is ſoon diſſolved, and the liquor becomes green, and a ſmall portion of the *gold*, out of the ſolution, is precipitated on the copper, in the place of that part of it which was diſſolved. In this caſe alſo the *gold*, in ſome meaſure, emulates the appearance of the ſilver in its concretion; for though it does not form regular trees and branches, it forms long and ſlender filaments, and theſe do not look of a pure fine yellow, or like pure *gold*, but ſeem duſky, and to have ſome copper among them.

If a ſmall parcel of this ſolution be evaporated on a glaſs plate over a gentle heat, the nature of the metal, and its effects on vitrified bodies, are more eaſily diſcovered than one would expect in ſuch ſmall quantities. Where the liquor has lain the thinneſt in this caſe, the glaſs is tinged red by the entrance of the particles of *gold*, into its ſurface, which they do eaſily; becauſe in thoſe places where the liquor lay thin, they formed themſelves into extremely minute concretions, according to the foregoing obſervations, and it is well known, that red is the colour which *gold* imparts in the earth to cryſtals and other ſtones, and in the experiments of the chemiſts, to glaſs of any kind. In ſuch places as the liquor has lain thicker in, and has been conſequently evaporated in larger quantity, and from a larger portion of the *gold*, the glaſs is not tinged red, but there is ſeen a remainder of the ſolution ſticking to it: this however is not formed into cryſtals, but is in this caſe pure *gold*, left from the evaporation in its proper metalline form. This however was in ſuch minute concretions, that where they lay ſingle, or ſeparate, they were not viſible, according to Mr. Lewenhoeck's account, to the naked eye, and he computes that many thouſand millions of them were not equal in ſize to a ſingle grain of ſand: in moſt places they were not however thus ſeparate, but were formed into oblong and ſlender concretions, which were ſometimes ſimple, and ſometimes ramoſe, and the microſcope ſhews theſe concretions very elegantly, ſome in form of ſimple threads, ſome of branches of trees or plants.

The denſity of *gold* is no way better ſeen than in this experiment; for though it may eaſily be conceived, that ſuch particles of theſe as were but of a thouſand millionth part, or much leſs than that, of the bigneſs of a grain of ſand, muſt needs be of an almoſt inconceivable thinneſs, yet not the ſmalleſt of theſe would tranſmit any light through it, but all were as perfectly opake as a piece of ſheet-lead. A ſmall drop of a ſolution of *gold* in aqua regia being laid over a ſtrong fire, approaching it by degrees, till being expoſed to its utmoſt fury, both the *gold*, and the glaſs on which it lies, begin to melt; in this caſe the *gold* is found concreted in like manner into filaments compoſed of globules, or of particles nearly round; and if it be taken from the fire juſt at that time, when the glaſs only begins to run, it affords to the microſcope a very diſtinct way of obſerving the ramifications of the *gold* and ſilver-ores in their firſt ſtate, and ſhews how they are formed. Phil. Tranſ. N° 286.

Solutions of *gold* in the pure marine acid, and in mixtures of the pure acids of nitre and ſea-ſalt, are not made to cryſtallize without great difficulty; in order to which, the liquor ſhould be evaporated, till only about one half of it remains, and then ſet by in the cold, with the addition of a few drops of pure ſpirit of wine. The cryſtals obtained from high coloured ſaturated ſolutions are generally of a red colour, and ſometimes, as it has been ſaid, of a deep ruby red. If any light eſſential oil be poured upon a ſolution of *gold* in aqua regia, and the mixture be ſhook, the *gold* will paſs into the oily matter, float with it upon the ſurface, and be kept for a little time diſſolved by it; the metal, however, will gradually ſeparate, and be thrown off to the ſides in bright yellow films, which on ſhaking the veſſel fall to the bottom. ÆTHER, poured on in the ſame manner, will float diſtinct on the ſurface, become yellow by imbibing the *gold*, as the yellow tinge of the acid diminiſhes, keep it permanently diſſolved, and, when loaded with the ponderous metal, continue ſtill to float upon the acid; and, as *gold* is the only one of the known metals, which the ether takes up from acids, this fluid affords a ready method of diſtinguiſhing *gold* contained in acid ſolutions. See AURUM *potabile*.

Liquors containing a groſſer inflammable matter, as wine, vinegar, ſolution of tartar, are likewiſe found to extricate *gold* from aqua regia in its metallic form; but with this difference from the preceding, that the *gold*, inſtead of floating on the ſurface, falls generally to the bottom. *Gold* may be precipitated from ſolutions in aqua regia by adding the ſolution of any fixt alkaline ſalt, or a volatile alkaline ſpirit, in ſufficient quantity to ſatiate the acid; the mixture will become turbid, and after ſtanding for ſome hours, the *gold* will fall to the bottom, in form of a browniſh yellow muddy ſubſtance, retaining ſome of the ſaline matter. To accelerate the precipitation, the ſolution ſhould be diluted with three or four times its quantity of water, or more; and the alkaline liquor ſhould be added gradually, and in ſmall quantities. If the aqua regia has been prepared with ſal ammoniac, or if the precipitation is performed with a volatile alkali, we ſhall have the *fulminating gold*, or AURUM *fulminans*. Farther, all the metallic bodies that diſſolve in aqua regia, platina excepted, precipitate *gold* from it. Some of them precipitate it alſo, when they are previouſly diſſolved in other acids, and even in aqua regia itſelf. The precipitate occaſioned by adding tin is the moſt remarkable of theſe. A plate of pure tin, put into a ſolution of *gold*, largely diluted with water, changes the yellow colour of the liquor into a beautiful purple or red; and, by degrees, a powder of the ſame colour ſlowly ſubſides, and leaves the menſtruum colourleſs. Solutions of tin, made in aqua regia, have the ſame effect with tin itſelf, with regard both to the precipitation and the colour; and hence characters, drawn on paper with a diluted ſolution of *gold*, not viſible when dry, become immediately red or purple on paſſing over them a diluted ſolution of tin. On dropping a ſolution of ſilver into a ſolution of *gold*, both metals precipitate: the ſame double precipitation happens, on mixing ſolution of *gold* with ſolution of lead in aqua fortis. Pure ſulphur has no action on *gold*. See REFINING. However, it unites perfectly, as we have already obſerved, with the *hepar ſulphuris*, or liver of ſulphur. The addition of any acid to this ſolution, abſorbing the alkaline ſalt, precipitates the *gold* united with the ſulphur; and the ſulphur may be diſſipated by fire, or more readily ſeparated, by adding a little copper for abſorbing the ſulphur. Copper and iron likewiſe added to the mixture of *gold* and *hepar* in fuſion, will precipitate the *gold*, and unite with the ſulphur.

The fifth character of *gold* is, that it readily and ſpontaneouſly, as by ſome magnetic virtue, attracts and abſorbs mercury: though what lord Bacon writes, viz. that *gold*, in imbibing mercury, increaſes in ſpecific gravity, we doubt, is but ill warranted. It is more than probable it muſt be increaſed in bulk, more than in weight, and conſequently muſt be ſpecifically lighter.

It may be added, that as ſoon as the mercury enters the *gold*, the metal becomes ſoft, like a paſte. See AMALGAMATION *of gold*, and GILDING.

The ſixth character is, that it withſtands the violence both of lead and antimony, i. e. being fuſed in the copel along with either of thoſe matters, it does not diſſipate and fly off with them in fume, but remains fixed and unchanged.

All other metals, except *gold* and ſilver, melted with lead, periſh with it, and evaporate by fire; and in antimony, all other metals, except *gold*, even ſilver itſelf, undergo the ſame fate. Thus, if a maſs conſiſting of *gold*, ſilver, ſtones, copper, &c. be fuſed together with antimony, the ſeveral matters become ſeparated, and all but the *gold* riſes to the ſurface in form of a ſcoria, and is blown off with bellows; but the *gold* remains behind, much purified, as having loſt all its heterogeneous parts along with the other metals. And hence antimony is uſed as the teſt of *gold*. See REFINING.

The ſeventh character is, that of all bodies it is the ſimpleſt (the primary elements being here excepted). By ſimple we here mean that whoſe minuteſt part has all the phyſical properties of the whole maſs. Thus, if a grain of *gold* be diſſolved in aqua regia, and a ſingle drop of the ſolution be taken, a quantity of *gold* may be ſeparated therefrom, which ſhall only be the millionth part of the grain, and yet ſhall have all the characters of *gold*. Or, if you fuſe a grain of *gold* with a large maſs of ſilver, and mix the two together, ſo that the *gold* becomes equally diffuſed through the whole maſs, you will have in every particle of the maſs a particle of perfect *gold*. Accordingly, diſſolve any part of the mixture in aqua fortis, and a quantity of *gold* will precipitate to the bottom, bearing the ſame proportion, as ſome have ſuppoſed, to the grain that the part diſſolved did to the whole maſs. On which principle depends the art of ASSAYING.

But this does not appear to be ſtrictly true: for, in many caſes, there is a ſenſible inequality in the diſtribution of the *gold*. M. Hellot melted upwards of twenty pounds of ſilver, containing about a fifty-ſixth part of *gold*, in a crucible, and poured it into cold water, in order to reduce it into grains; and by dipping at different times an iron ladle into the water, under the ſtream of metal, he received a part of the firſt running, a part of the middle, and a part of the laſt; the three parcels, aſſayed ſeparately, were all found to differ with regard to the quantity of *gold* contained in them.

GOLD, *hiſtory of*. All the known parts of the earth afford this precious metal; though with great difference, in point of purity and abundance. Europe, ſo fertile in other reſpects, comes ſhort of all other quarters in *gold*. The moſt conſiderable mines in this quarter of the globe are thoſe of the Upper Hungary; and particularly that of Chremnitz, which has continued to yield *gold* for ten centuries. America furniſhes the moſt; and particularly the mines of Peru, Mexico, and Chili, and other provinces of the Spaniſh Weſt Indies; to which may be added the Braſils, belonging to the king of Portugal.

In many parts of Aſia, particularly Sumatra, Pegu, China, and Japan, the Philippine iſlands, and Borneo, *gold* is found in conſiderable quantities. At Canton, the *gold* is caſt into ſhoes of about ten tale weight, or twelve ounces two penny-weights four grains, of an equal fineneſs: theſe ſhoes are bigger at both their ends than in the middle, formed with their brims riſing above the reſt, ſo that the upper ſide ſomewhat reſembles a boat; from the middle, which, in cooling, ſinks into a ſmall pit, ariſe circles one within another; and the ſmaller and cloſer theſe are, the finer the *gold* is. *Gold* in bars or ingots comes chiefly from Cochinchina and Tonquin; the ſhoes and bars are very often debaſed and gilt. By the laws of China, *gold* is forbidden to be exported.

The coaſt and interior parts of Africa likewiſe afford great quantities of this precious metal. Some *gold* has been diſcovered in Britain, at different times, though hitherto in ſmall quantities. It is chiefly found in that kind of tin-ore, called the ſtream tin.

Glauber, an eminent chemiſt, aſſerts, that there is not any ſand or ſtone, but *gold* may be procured from, limeſtone only excepted; the misfortune is, that the expence of ſeparating it much ſurmounts the profits.

Many of the common ſands, particularly the yellow, red, black, and thoſe inclining to a violet colour, appear to be rich in *gold*. Becher and Cramer preſume, that there is no ſand in nature entirely free from it; Becher undertook to ſeparate it with profit from the common ſea-ſands, and entered into engagements with the ſtates of Holland for eſtabliſhing a mineral work on this foundation; but the iſſue, though favourable, does not appear to have been ſufficiently lucrative; for the ſcheme was never proſecuted.

Gold is chiefly found in mines; though there is ſome alſo found in the ſand and mud of rivers and torrents; particularly in Guinea. This laſt is in form of a fine duſt, and is called *αμμοχρυσος*, *gold duſt*. From Cape-coaſt, on the coaſt of Guinea, we receive yearly between two and three thouſand ounces of the duſt; and three or four hundred ounces are ſaid to be collected yearly from the ſands of the Gambia, and caſt into bars at James-fort, one of our ſettlements on that river. The *gold* duſt from Africa, in its pureſt ſtate, is ſaid to be from twenty-one to upwards of twenty-two carats fine; but the natives frequently mix with it filings of braſs. However, this adulteration may be eaſily detected by the hydroſtatic balance, or by pouring on the mixture a ſmall quantity of aqua fortis, which will receive a blue tincture from the copper in the braſs.

There are many European rivers, which roll particles of *gold* in their ſand; from collecting which the neighbouring inhabitants derive ſome advantage: ſuch are the Rhine, the Rhone, the Garonne, the Danube, the Elb, &c. and the Schwartz, in Upper Saxony, is ſaid to be rich in this metal, and its ſands to be worked with great profit. The *gold* is found moſt plentifully in theſe rivers, where their courſe is ſlow and uninterrupted, where the ſand is reddiſh or blackiſh, which, being more ponderous than the white ſand, determines the particles of *gold* to ſubſide with it, and when the water has ſubſided after a flood.

Glauber tells us, that there is a third ſort of *gold*, ſcarce found any where but in the drains of the mountains of Chili, which they ſeparate from the earth by waſhing; whence the places where it is found, or ſeparated, are called *lavaderos*.

This earth is uſually reddiſh, and very fine: at about ſix feet deep it is mixed with grains of large duſt, and from hence commences the ſtratum, or bed of *gold*. Between are banks of ſoft bluiſh ſtone, mixed with yellow threads, which yet are not *gold*, but only pyrites, or marcaſite of *gold*.

When they have diſcovered any of this earth, they endeavour to bring rivulets to it (which in theſe mountains are very frequent, in order, by force thereof, to tear off the upper earth, and lay the golden ſtratum bare. This they forward by looſening it, and digging with ſpades, &c. As ſoon as the golden earth is uncovered, they turn off the water, and dig up the ſoil by force of arm; and loading it on mules, carry it to the lavaderos, i. e. a ſort of baſons of water, where the earth undergoing divers repeated lotions, in different waters, the earthy and impure part is all ſeparated and carried off by the ſtream, and the *gold* left at bottom. This method of getting *gold* is immenſely gainful; the expences being but trifling, compared with thoſe accruing in the common way by machines, fire, and quickſilver: the richeſt of theſe lavaderos is that de l'Eſtancia del Rey, twelve leagues from the Conception, a port of the South Sea. Thuringia, and ſome other places along the Rhine, are the only places in Europe where *gold* is got in this manner.

The way of ſeparating it is this: they have a long trough made with a declivity, and lined at the bottom with flannel, or coarſe cloth; the ſand is received into this; and while it is ſtirred about in the water by the hand, the ſand is waſhed off, and the ſmall particles of *gold* left in the pores, and among the woolly matter of the flannel, which is afterwards waſhed out from thence. The *gold* is afterwards extracted from the remaining matter by mercury.

This is the method where the ſand is fine; but when it is mixed with large gravel, they ſift it through wire ſieves, whoſe meſhes are of one determinate ſize, or a kind of baſket made of rods, placed at the upper end of the trough, by which means all the *gold* is ſure to go through with the ſand, and the gravel or larger ſtones are left behind, and thrown away. The ſand thus ſeparated is treated as before; and there is no danger of any *gold* being thrown away with the gravel, becauſe it is extremely rare to meet with any one grain of *gold* in this ſtate ſo large as a barley-corn; and therefore as the meſhes of their ſieves are kept to more than that ſize, there is no fear of loſing any of the metal.

The *gold* of mines is of two kinds; the one in ſmall pieces, or grains, of different forms and weights. Of this ſort, among the ſpecimens ſent by Columbus into Spain, to let them ſee the richneſs of his diſcovery, there were ſome of eighteen ounces weight; and the relations of thoſe days aſſure us, that in 1502 there were others found of thirty-two pounds weight.

Reaumur reports, that a piece was ſhewn to the French academy, which weighed four hundred and forty-eight ounces; and another, in the cabinet of Antonio Portocarero, weighed upwards of five hundred and twenty-eight ounces; both which pieces, on being aſſayed, were found to be of different fineneſs in different parts of the maſs. However, it is rare to meet with maſſes of the weight even of an ounce: the largeſt in the Britiſh Muſuem weighs but fifteen penny-weights.

The other kind of *gold* is dug up in the ſtony glebes, which is what they call the *mineral*, or *ore of gold:* theſe glebes are of various colours, and lie uſually one hundred and fifty, or one hundred and ſixty fathom deep. They ſtrike fire with ſteel, and are not ſoluble in aqua fortis. Along with the *gold* they uſually contain ſome other mineral and metallic matter, particularly ſilver; without ſome ſhare of which it is ſcarce ever found.

The quantity of *gold*, in proportion to the earthy and ſtony matter mixed with it, appears to be in general exceeding ſmall. Voyagers of credit relate, that the common yield is no more than five or ſix ounces of *gold* upon the caxon, or fifty hundred pounds of the mineral.

Gold, *manner of ſeparating*. They firſt break the metalline ſtone with iron mallets, pretty ſmall; then carry it to the mills, where it is ground into a very fine powder; and laſtly paſs it through ſeveral braſs-wire ſieves one after another, the laſt as fine as any of our ſilk ſieves.

The powder thus prepared is laid in wooden troughs, and ſoaked for ſome time in a ſolution of common ſalt; the proper quantity of mercury is then ſqueezed in through a linen cloth, ſo as to fall like a dew over the ſurface; and the mixture being well ſtirred and kneaded, the *gold* is incorporated, with the application of a gentle heat, in five or ſix days. After this the water, with the recrementitious earth, is driven out of the tubs by means of other hot waters poured thereon. This done, there remains nothing but a maſs of mercury with all the *gold* that was in the ore. The mercury they ſeparate from it by diſtillation in large alembics. The *gold*, in this ſtate, is called *virgin gold*; as well as that found in the ſand of rivers, or that in grains in the mines, becauſe none of them have paſſed the fire. After this they uſually fuſe it in crucibles, and caſt it into plates, or ingots.

The method of working this ore at Chremnitz in Hungary, does not differ much from that already deſcribed, and is as follows: they waſh the pounded ore very often, and lay it in powder upon cloths, and by the gentle and oblique deſcent of the water over it, and their continual ſtirring of it, the earthy, clayiſh, and lighter parts are all clean waſhed away, while the heavier and metalline remain in the cloth. Not much unlike to this proceeding is that with ſheeps ſkins and wool, which they place either in the water that comes from the works, or in the ſtreams of rivulets, which have their origin in hills where there is much gold; ſo that while the water or fluid parts paſs through or over them, the more ſolid, heavy, and metalline are inſnared and detained, and by this means the ſkin becomes a golden-fleece. The cloths which are by the Chremnitz-works in this manner impregnated with *gold*, are waſhed in large tubs of water, and after ſettling, the water is decanted ſlowly off; the ſediment which is left behind is, after this, waſhed in three or four other waters, and to the clean remainder they add quickſilver, which they then work and knead into an amalgam, like dough or paſte. When they have worked this together for an hour or two, they throw it into water, and waſh off the quickſilver, which did not adhere, and then there remains a pure and perfect maſs of the amalgam. They ſqueeze as much of the quickſilver as they can from this, firſt through coarſe cloths and then through fine ones; they then put the remainder on a perforated plate, which they place over a deep pan, ſet in the earth, in the bottom of which there is put ſome quickſilver; they then cover with a hollow earthen-lid, luting it carefully on, and when the lute is dry they make a charcoal fire over it. By this means the quickſilver yet remaining with the *gold* in the amalgam, is driven off, and runs down through the holes of the plate, mixing itſelf with the reſt in the bottom of the pan, and the *gold* is left alone in a ſpungy maſs, which only needs once melting in the common way to be pure and malleable *gold*. Brown's Travels, p. 67. See other proceſſes deſcribed under the article AMALGAMATION *of gold*.

When the *gold* is intimately combined in the compoſition of ferrugineous ſands, the ſand ſhould be made red hot, and quenched in water, and the ignition and extinction repeated four times or oftener. Mix the ſand, thus calcined, with twice its weight of granulated lead, and its own weight of black flux, conſiſting of one part of nitre, and two or three of tartar, mixed and burnt in a covered veſſel to a black alkaline coal, and then put the mixture into a crucible, and cover it with ſea ſalt dried over the fire till it has ceaſed to crackle. Expoſe the crucible in a blaſt furnace to a ſtrong fire, and ſtir the matter occaſionally with an iron rod; when the ſcoria is become thin as water, which is known by the rod's coming out almoſt clean, let the crucible be left to cool; and the *gold* contained in the ſand will be transferred to the lead, and may be ſeparated from it with a cupel or teſt. The ſilver contained in theſe ſands, may be ſeparated from the *gold*, after cupellation, either by aqua regia or aqua fortis. Inſtead of the black flux, four parts of pot-aſh, and three of powdered charcoal, will anſwer the purpoſe when applied to thirty-two parts of lead, and ſixteen of the calcined ſand. Or, the calcined ſand may be boiled in melted lead, without any inflammable or ſaline addition. When *gold* is intimately combined with other metals in their ores, the ore is to be run down in the ſame manner as the ſame kind of ore without *gold:* and the *gold* may be afterwards ſeparated by different proceſſes according to the nature of the metal.

There are various methods of ſeparating *gold* from gilt works: it may be ſeparated from the ſurface of ſilver, either by ſpreading over the gilt ſilver a paſte made of powdered ſal ammoniac moiſtened with aqua fortis, and heating it till the matter ſmokes, and is nearly dry; throw it into water, and the *gold* will eaſily come off by rubbing it with a ſcratch bruſh: or, by putting the gilt ſilver into common aqua regia, nearly boiling and turning the metal frequently, till it becomes all over black: then waſh it with water and rub it with the ſcratch bruſh, which will diſengage the *gold* left by the aqua regia. See GILDING.

Gold may be ſeparated from gilt copper, by applying a ſolution of borax to the gilt parts with a pencil, and ſprinkling over the place thus moiſtened, a little powdered ſulphur; when the piece is made red-hot, and quenched in water, the *gold* may be wiped off with a bruſh.

Gold may be recovered from wood, gilt on a water ſize, by ſteeping it for a quarter of an hour, in a quantity of very hot water, ſufficient to cover it; then ſcrub the wood in a little warm water, with ſhort ſtiff briſtle bruſhes of different ſizes: boil the whole mixture of water, ſize, *gold*, &c. to dryneſs; make the dry matter red hot in a crucible to burn off the ſize, and grind the remainder with mercury. The *gold* will be more eaſily laid hold of by the mercury, by the addition of ſome clean ſand.

Gold, *manner of aſſaying*. This is performed with the TOUCH-*ſtone*, and TOUCH-*needles*, but more ſecurely by fire; which latter method conſiſts of two proceſſes; the one for ſeparating *gold* from ſilver by aqua fortis, and the other from baſe metals, by keeping the mixt infuſion for ſome time upon a cupel or COPPEL, with the addition of lead. See ASSAYING.

Gold, *manner of refining*. There are three principal methods of refining *gold*; the firſt with antimony; the ſecond with ſublimate; and the third with aqua fortis. This laſt method is called *departing*, or *parting*. See DEPART, PARTING, and QUARTATION.

For the two former, ſee REFINING.

There are ſeveral other methods of refining *gold*, with aqua regia, with the vitriolic acid, with lead and aſhes, called cupellation, COPPELLING, or teſting, with a compoſition of nitre, or ſea-ſalt, green vitriol calcined, and brick-duſt, called *cementation*, which the reader will find deſcribed under the articles ASSAYING, CÆMENTATION, PARTING, REFINING, and TESTING.

Gold, *for the making of*. See PHILOSOPHER'S *ſtone*, and TRANSMUTATION.

Gold *beating*, and **Gold** *beater's ſkin*. See GOLD *leaf*.

Gold, *burniſhed*, is that which is poliſhed with a ſteel inſtrument called a BURNISHER, if it be wrought *gold*, or gilding on metal; or with a wolf's tooth, if it be gilding in water. See GILDING.

Gold *chain*. See CHAIN.

Gold *coin*, or *ſpecies of gold*. See COIN and COINAGE. Anderſon, in his Hiſtory of Commerce, vol. i. p. 174, dates the firſt coining of *gold* in England in the year 1344; for it appears by 18 Edw. III. cap. 6. that three different coins of *gold* were then ordered to be coined; viz. one of the value of ſix ſhillings, being the weight of two ſmall florins of Florence; a ſecond of half that value and weight; and a third of a quarter of the firſt. The *gold* was 23 carats $3\frac{1}{2}$ grains fine, with half a grain of alloy. Three other *gold* coins were alſo coined in the ſame year; viz. one of 6*s.* 8*d.* value, called a *gold* noble; others of half that value, called *maille* nobles, and a third a quarter of the firſt, called *ferling*, or farthing noble. For an inſtrument invented by Mr. Boyle for detecting counterfeit *gold* coin, ſee *Floating* LOAD-STONE.

GOLD *colour on glaſs and china.* See GLASS, GILDING, and PORCELAIN.

GOLD-*coloured glazing.* See GLAZING.

GOLD-*coloured metal* is produced by melting zinc with copper. According to the purity of the zinc and copper, the proportions in which they are mixed, and the intimacy of their union, the compound metal proves more or leſs malleable, and approaches more or leſs to the colour of *gold.* Some direct the zinc to be taken only in a fifth or ſixth part of the weight of the copper, and others in an equal weight or more. Dr. Lewis obſerves, from the reſult of many experiments, that both with the ſmalleſt and largeſt of theſe quantities of zinc, the metal proves more like *gold* than with the intermediate proportions.

The colour of theſe compounds is improved by a ſmall mixture of ſome other metallic bodies. Cramer recommends the addition of a ſmall quantity of pure tin to copper, melted with a fourth or ſixth part of zinc, which forms a compound metal, that acquires, on being well cleaned, and laid in the air for ſome days, a ſuperficial colour of fine *gold.* Geoffroy ſays that iron has the beſt effect; with the proportions of ten parts of zinc, eight of copper, and one of iron-filings, he produced a metal of a fine ſmooth grain, compact, hard, and bright, and of a beautiful *gold* colour. By making the copper firſt into braſs, and then melting it with a ſuitable quantity of zinc, a metal may be obtained of ſuperior quality to that produced either by melting the copper and zinc, or by impregnating the copper with zinc, by cementation and fuſion with calamine; which is a method ſometimes practiſed. A very ingenious artiſt, ſays Dr. Lewis, who now prepares a *gold*-coloured metal in great perfection, has a fine kind of braſs made on purpoſe for this uſe. The union of the copper and zinc in fuſion, ſucceeds beſt and with leaſt loſs of the zinc; according to Dr. Lewis, by uſing a mixture of black flux and borax, or a compoſition of twelve parts of green glaſs powdered, ſix parts of pot-aſh, two of borax, and one of powdered charcoal: when this flux is fuſed in the crucible, the copper and zinc are dropped into it; and when they appear perfectly melted, they are to be well ſtirred together with an iron rod, and expeditiouſly poured out. The ſame flux will ſerve for melting ſeveral freſh quantities of the metal. Dr. Hooke gives the following receipt for making a *gold*-coloured metal: eight parts of diſtilled verdigriſe, i. e. of verdigriſe purified by ſolution in diſtilled vinegar and cryſtallization, and four parts of Alexandrian tutty, with two of nitre, and one of borax, are directed to be mixed with oil to the conſiſtence of pap; then melted in a crucible, and poured into a flat mould firſt well warmed. A compoſition of this kind is called AURUM *ſophiſticum.*

The following method is recommended by Homberg for giving a *gold* colour to copper, without the addition of zinc: make an amalgam of one part pure copper, and three parts quickſilver; ſee AMALGAMATION *of Copper:* boil this in river water for two hours, then diſtil off the quickſilver in a retort, and cohobate it once; take out the copper and fuſe it, and it will be found of a beautiful *gold* colour, more ductile than common copper, and extremely well fitted for watch-work, gilding and the finer machines and utenſils. The celebrated Mr. Pott affirms, that a *gold*-coloured metal may be made from a mixture of copper and tin, and directs it to be compounded in the following manner: take one half ounce of tin aſhes, and four half ounces of copper; melt them well together in a cloſe luted crucible, with a ſtrong fire: or, take one half ounce of the pureſt tin cut in pieces, and ſixteen half ounces of pure copper beaten into thin plates; lay the tin between the copper-plates, lute the crucible cloſe, and melt with a ſtrong fire. See *Prince's* METAL and TOMBAC.

Silver is tarniſhed ſuperficially, by certain vapours, as that of putrified urine, to a colour ſo like that of *gold*, that ſeveral edicts have been iſſued in France to prevent frauds of this kind with regard to wire and laces.

GOLD-*coloured pigments.* See PIGMENTS.

GOLD-*coloured varniſh.* See LACQUER.

GOLD, *Crown.* See STANDARD.

GOLD, *Dutch*, is a kind of leaf uſed in GILDING &c. which is copper gilt, or braſs beaten into leaves like the genuine GOLD *leaf.*

GOLD, *farthing of.* See FARTHING.

GOLD, *fine* or *pure*, is that purged by the fire of all its impurities, and all alloy. The Latins call it *aurum purum, aurum primum, aurum obrizum, aurum coctum.*

The moderns frequently call it *gold of twenty-four carats*; but, in reality, there is no ſuch thing as *gold* ſo very pure; and there is always wanting at leaſt a quarter of a carat. *Gold* of twenty-two carars has one part of ſiver, and another of copper: that of twenty-three carats has half a part, i. e. half a twenty-fourth of each.

Bouteroue maintains, that the electrum of the ancients was *gold* of nineteen carats; or four parts *gold*, and a fifth ſilver.

From an ordinance of king John of France, it appears that the *gold* then ſtruck at Paris was of 19 carats 1-5th; and yet it is added that it was the beſt and fineſt *gold* then known on earth. See STANDARD.

GOLD, *fulminating*, *aurum fulminans.* See AURUM and *Chemical Hiſtory of* GOLD, above.

GOLD, *leaf*, or *beaten* GOLD, is *gold* beaten with a hammer into exceedingly thin leaves. It is aſtoniſhing to conſider the fineneſs to which a body of *gold* is thus reduced. In an experiment of Reaumur's, forty-two ſquare inches and three tenths of *gold* leaf, weighed one grain troy; and Mr. Boyle found that fifty and ſeven tenths weighed but a grain. As a cubic inch of *gold* weighs 4902 grains, the thickneſs of the *gold* leaf examined by the one was the 207355th, and of that by the other only the 248532nd part of an inch. See DUCTILITY of *Gold.*

This *gold* is beat on a ſmooth block of black marble, from two hundred to ſix hundred pounds in weight, and about nine inches ſquare on the upper ſurface, fitted into the middle of a wooden frame, about two feet ſquare, ſo as that the ſurface of the marble and frame form one even plane. Three of the ſides are furniſhed with a high ledge, and the front, which is open, has a leather flap faſtened to it, which the *gold* beater uſes as an apron, for preſerving the fragments of *gold* that fall off. Three hammers are employed in this buſineſs, having two round and ſomewhat convex faces; the firſt, called the cutch hammer, is about four inches in diameter, and weighs fifteen or ſixteen pounds: the ſecond, called the ſhodering hammer, weighs about twelve pounds, and is about the ſame diameter: the third, called the *gold* hammer, or finiſhing hammer, weighs ten or eleven pounds, and is nearly of the ſame width. The French uſe four hammers, differing both in ſize and ſhape from thoſe of our workmen.

The *gold beaters* alſo uſe three kinds of animal membranes; ſome of which are laid between the leaves to prevent their uniting together, and others over them to defend them from injury by the action of the hammer. For the outſide cover, they uſe common parchment made of ſheep ſkin; for interlaying with the *gold*, firſt, the ſmootheſt and cloſeſt vellum made of calves ſkin; and afterwards, the much finer ſkins of ox-gut, ſtript off from the large ſtraight gut ſlit open, prepared on purpoſe for this uſe, and hence called *gold beater's ſkin.* The general proceſs of their preparation, is ſaid to conſiſt in applying one upon another, by the ſmooth ſides, in a moiſt ſtate, in which they readily cohere and unite inſeparably, ſtretching them on a frame, and carefully ſcraping off the fat and rough matter, ſo as to leave only the fine exterior membrane of the gut; beating them between double leaves of paper, to force out the remaining unctuoſity; moiſtening them once or twice with an infuſion of warm ſpices, and laſtly, drying and preſſing them. It is ſaid, that ſome calcined gypſum, or plaiſter of Paris, is rubbed with a hare's foot, both on the vellum and ox-gut ſkins, which fill up their pores, and prevent the *gold* leaf from ſticking. Theſe ſkins, after ſeventy or eighty repetitions become unfit for uſe; but their virtue may be reſtored by interlaying them with leaves of paper moiſtened with vinegar or white wine, beating them for a whole day, and afterwards rubbing them over with plaiſter of Paris: and even holes in them may be repaired by the dextrous application of freſh ſkins.

GOLD, *the manner of preparing and beating.* They firſt melt a quantity of the pureſt *gold* in a black lead crucible, with ſome borax, in a wind furnace, and pour it into an iron ingot mould, ſix or eight inches long, and $\frac{3}{4}$ of an inch wide, previouſly greaſed and heated; the bar of *gold* is made red hot and forged on an anvil into a long plate, which is farther extended, by being paſſed repeatedly between poliſhed ſteel rollers, till it becomes a ribbon, as thin as paper. This ribbon is divided by compaſſes, and cut with ſheers into equal pieces, which are forged on an anvil till they are an inch ſquare, and afterwards well nealed. Two ounces of *gold*, which is the quantity melted at a time, make a hundred and fifty of theſe ſquares, ſo that each of them weighs ſix grains and two fifths; and as 4902 grains of *gold* make a cubic inch, the thickneſs of the ſquare pieces is about the 766th part of an inch. All theſe ſquares are interlaid with leaves of vellum, three or four inches ſquare; one leaf being laid between every two of them, and about twenty more of the leaves are laid on the outſides: over theſe is drawn a parchment caſe, open at both ends, and over this another, in a contrary direction, ſo that the vellum and *gold* leaves are kept tight and cloſe. The whole is then beaten with the heavieſt hammer, till the *gold* is ſtretched to the extent of the vellum: the pieces, taken out of this caſe or MOULD, are cut in four with a ſteel knife; and the ſix hundred pieces thus produced are interlaid, in the ſame manner, with pieces of the ox-gut ſkins, five inches ſquare. The beating is repeated with a lighter hammer, till the golden plates have acquired the extent of the ſkin; when they are divided into four, by a piece of cane cut to an edge. The whole number of leaves is then divided into four parcels, which are interlaid, as before, and beaten ſeparately, till they are ſtretched for the third time to the ſize of the ſkins. The French repeat the diviſion and beating once more. After the laſt beating, the leaves are taken up by the end of a cane inſtrument, and being thrown flat on a leathern cuſhion, are cut to a ſize, one by one, with a ſquare frame of cane made of a proper ſharpneſs, or with a frame of wood edged with cane. They are then fitted into books of twenty-five leaves each, the paper of which is well ſmoothed, and rubbed with red bole to prevent their ſticking to it. The ſize of the French *gold* leaves is from ſomewhat leſs than three inches to 3^{3} ſquare; that of ours, from three inches to 3^{3}.

The French prepare what is called green *gold* leaf, from a compoſition of one part of copper and two of ſilver, with eighty of *gold*; but Dr. Lewis obſerves that ſuch an admixture gives no greenneſs to *gold*, and that this kind of leaf is made from the ſame fine *gold*, as the higheſt *gold*-coloured ſort, the greeniſh hue being a ſuperficial teint given to the *gold* in ſome part of the proceſs: this leaf is chiefly uſed for the gilding of books. A kind of leaf, called *party gold*, is formed by laying a thick leaf of ſilver, and a thinner one of *gold*, flat on one another; they are then heated and preſſed together, ſo as to unite and cohere: and being beaten into fine leaves, as in the foregoing proceſs, the *gold*, though only in quantity a fourth of that of the ſilver, extends over it and every where covers it.

GOLD, *million of*, a phraſe often uſed to ſignify a million of crowns.

GOLD *money*. See MONEY and COIN.

GOLD, *Moſaic*, is *gold* applied in pannels on a proper ground, diſtributed into ſquares, lozenges, and other compartments; part of which is ſhadowed to raiſe or heighten the reſt. See MOSAIC.

GOLD *plates for enamelling* are generally made of ducat *gold*, whoſe fineneſs is from $23\frac{1}{2}$ to $23\frac{3}{4}$ carats; and the fineſt *gold* is the beſt for this purpoſe, unleſs where ſome parts of the *gold* are left bare and unpoliſhed, as in watch-caſes, ſnuff-boxes, &c. for which purpoſe a mixture of alloy is neceſſary, and ſilver is preferred to copper, becauſe the latter diſpoſes the plates to tarniſh, and turn green. See ENAMELLING.

GOLD, *potable*, *aurum potabile*. See AURUM *potabile*, and the *Chemical hiſtory of* GOLD.

GOLD *powder*, for the purpoſes of GILDING, may be made by grinding *gold* leaf with honey; ſee *Shell*-GOLD: by diſtilling to dryneſs a ſolution of *gold* in aqua regia; by evaporating the mercury from an amalgam of *gold*, taking care well to ſtir the maſs near the end of the proceſs; or by precipitating *gold* from its ſolution in aqua regia; by applying to it a ſolution of common green vitriol in water, or ſome copper, &c. See *Chemical hiſtory of* GOLD.

GOLD *precipitate with tin*, called alſo, from its ſuppoſed diſcoverer, *calx Caſſii*, is prepared with great care both in diſſolving the tin, and diluting the ſolution. For this purpoſe, a mixture of two parts of aqua fortis, and one of ſpirit of ſalt, is ſuppoſed to be the beſt menſtruum for the tin. Into this mixture ſome fine block tin, granulated, is to be let fall, grain by grain, waiting till one grain is diſſolved before another is dropped in, that the diſſolution may go on ſlowly, without any heat or diſcharge of fumes. The *gold* is diſſolved in common aqua regia; and a few drops of this ſolution being mixed with ſome ounces of pure water, as many drops of the ſolution of tin are added. If the mixture changes immediately to a clear bright purpliſh red colour, the due degree of dilution has been determined; if the colour appears dull, a greater quantity of water muſt be added for the reſt of the ſolutions. After the mixture has depoſited its red matter, and become clear, a little more of the tin ſolution is to be dropped in, for diſcovering and precipitating any *gold* that may ſtill remain in it: the liquor being then poured off, the precipitate is waſhed and dried. Lewis's Com. Phil. Techn. p. 176. See *Ruby* GLASS.

For other methods of precipitating *gold*, ſee *Chemical hiſtory of* GOLD.

GOLD, *queen*. See QUEEN *gold*.

GOLD, *ſhell*, is that uſed by the gilders and illuminers, and with which *gold* letters are written. It is made by grinding *gold* leaves, or *gold* beaters fragments, with a little honey, and afterwards ſeparating the honey from the powdered *gold* by means of water. When the honey is waſhed away, the *gold* may be put on paper, or kept in ſhells; whence its name. When it is uſed, it is diluted with gum-water, or ſope-ſuds. The German GOLD-*powder*, prepared from the Dutch *gold* leaf in the ſame manner, is generally uſed, and, when it is well ſcoured with varniſh, anſwers the end in *japanner's* GILDING, as well as the genuine.

GOLD-*ſize* for burniſhed GILDING is prepared of one pound and a half of tobacco-pipe clay, half an ounce of red chalk, a quarter of an ounce of black lead, forty drops of ſweet oil, and three drams of pure tallow: grind the clay, chalk, and black-lead, ſeparately, very fine in water; then mix them together, add the oil and tallow, and grind the mixture to a due conſiſtence.

GOLD-*ſize of japanners* may be made by pulverizing gum animi and aſphaltum, of each one ounce; red-lead, litharge of *gold*, and umbre, of each one ounce and a half, mixing them with a pound of linſeed oil, and boiling them, obſerving to ſtir them till the whole be incorporated, and appears, on growing cold, of the conſiſtence of tar; ſtrain the mixture through a flannel, and keep it, ſtopped up in a bottle, for uſe. When it is uſed, it muſt be ground with as much vermilion, as will give it an opake body, and diluted with oil of turpentine, ſo that it may be worked freely with the pencil. A ſimple preparation conſiſts of one pound of linſeed oil, and four ounces of gum animi; powder the gum, and mix it gradually with the boiling oil: let it continue to boil, till it becomes of the conſiſtence of tar; ſtrain it through a coarſe cloth, keep and uſe it as the other.

GOLD-*ſmith*, or as ſome chuſe to expreſs it, *ſilver-ſmith*, the artiſt who makes veſſels, utenſils, and ornaments in *gold* or ſilver. The *goldſmiths* work is either performed in the mould, or beat out with the hammer or other engine. All works that have raiſed figures are caſt in moulds, and afterwards poliſhed and finiſhed; plates or diſhes of ſilver or *gold* are beat out from thin flat plates, and tankards and other veſſels of that kind are formed of plates ſoldered together, and their mouldings are beat, not caſt. The buſineſs of the *goldſmith* formerly required much more labour than it does at preſent, for they were obliged to hammer the metal from the ingot to the thinneſs they wanted: but there are now invented flatting-mills, which reduce metal to the thinneſs that is required, at a very ſmall expence. The *goldſmith* is to make his own moulds, and for that reaſon ought to be a good deſigner, and have a taſte in ſculpture: he alſo ought to know enough of metallurgy to be able to aſſay mixed metals, and to mix the alloy.

The *goldſmith* in London employs ſeveral hands under him, for the various articles of his trade. In this great city there are always hands that excel in every particular branch of the trade, and there is commonly employment enough for every one in his particular branch. The jeweller, the ſnuff-box and toy-maker, the ſilver-turner, the gilder, the burniſher, the chaſer, the refiner, and the *gold*-beater, are all employed by and under the *goldſmith*.

GOLD-*ſmiths, Company of, in London*. See COMPANY.

GOLD *thread*, or *ſpun gold*, is a flatted gilt wire, wrapped or laid over a thread of yellow ſilk, by twiſting it with a wheel and iron bobins. By means of a curious but complex machinery, a number of threads is thus twiſted at once by the turning of one wheel. The principal art conſiſts in ſo regulating the motion, that the ſeveral circumvolutions of the flatted wire on each thread may juſt touch one another, and form, as it were, one continued covering. At Milan, it is ſaid, they make a ſort of flatted wire, gilt only on one ſide, which is wound upon the thread, ſo that only the gilt ſide appears. There is alſo a gilt copper wire, made, in the ſame manner as the gilt ſilver, chiefly at Nuremberg: and the ordinances of France require it to be ſpun on flaxen or hempen threads. The Chineſe, inſtead of flatted gilt wire, uſe ſlips of gilt paper, which they interweave in their ſtuffs and twiſt upon ſilk threads.

GOLD, *tun of*, is a kind of money of account, uſed by the Dutch, and in ſome other countries, containing a hundred thouſand florins.

A hundred pounds of, or in, *gold*, is found to weigh two pounds ten ounces: the ſum in ſilver weighs twenty-ſix pounds four ounces. Twenty-two pence, in copper farthings and halfpence, weigh one pound avoirdupois. A tun of *gold*, at 4*l.* the ounce, amounts to 96000*l.* A tun of ſilver, at 5*s.* 2*d.* the ounce, to 6200*l.* A pound ſterling of *gold*, to 48*l* An ounce is worth 4*l* The penny-weight 4*s.* One grain 2*d.* A pound of ſterling ſilver amounts to 3*l.* 2*s.* An ounce is worth 5*s.* 2*d.* The penny-weight 3*d* and ſomething more; one grain a halfpenny A pound of ſilver avoirdupois comes to 3*l.* 5*s* 3*d.* halfpenny.

Gold, *virgin*, is pure *gold*, juſt as it is taken out of the mines, before it has undergone any action or preparation of fire; whence the Greeks call it απυρος.

Such is the αμμοχρυσος, or *gold*-duſt, and that got by lotion in the lavaderos in Chili: it is added, that there are maſſes or lumps of pure *gold* found in the mines, particularly thoſe of Hungary. Accordingly, in the emperor's collection, are ſtill preſerved ſeveral plates of *gold*, ſaid to have been thus found.

Virgin *gold* is ſometimes very pale, and ſo ſoft, that it may be moulded into any figure with the hand; it even takes an impreſſion from a ſeal, like the ſofteſt wax. To harden it, as alſo to heighten its colour, they mix emery with it

Gold, *white*. See Platina.

Gold *wire* is a cylindrical ingot of ſilver, above an inch thick, two feet in length, and weighing about twenty pounds, ſuperficially gilt, or covered with *gold*, at the fire, and afterwards drawn ſucceſſively through a great number of little round holes of a wire-drawing iron, each leſs than the other, till it be ſometimes no bigger than a hair of the head. There is very little wire made entirely of *gold*; and this chiefly for one particular purpoſe, that of filligree work.

It is amazing to what degree of fineneſs the *gold* is here drawn; and yet it ſtill keeps firm together, and never ſhews the leaſt ſigns of the ſilver underneath it. The reader may ſee a computation hereof, as alſo a more particular account of the manner of proceeding, under the article Ductility *of gold*.

Gold *wire flatted*, is the former wire flatted between two rollers of poliſhed ſteel, to fit it to be ſpun in ſilk, or to be uſed flat as it is, without ſpinning, in certain ſtuffs, laces, embroideries, &c.

Manner of forming Gold *wire and* Gold *thread, both round and flat.* The firſt object, which is of the utmoſt conſequence, is the choice of the pureſt *gold*; for on this chiefly depends the beauty and durability of the colour of the laces, brocades, and other commodities prepared from it To a difference in this reſpect, the boaſted ſuperiority of the French laces to the generality of thoſe made in England, till of late, has been wholly owing. With regard to the ſilver that forms the body of the wire, it is ſaid that there is an advantage in its being alloyed. The French ſilver for gilding is ſaid to be alloyed with five or ſix penny-weight, and ours with twelve penny weight of copper, in the pound troy. The *gold* is employed in thick leaves, which are applied all over the ſilver rod, and preſſed down ſmooth with a ſteel burniſher. Several of theſe leaves are laid over one another, as the gilding is required to be more or leſs thick. The ſmalleſt proportion allowed by act of parliament, is 100 grains of *gold* to a pound, or 5760 grains of ſilver. The largeſt proportion for the beſt double gilt wire was formerly 120 grains to a pound; but the proportion of *gold* has been of late increaſed. The firſt part of the drawing proceſs, as well as the preparation and gilding of the ſilver rod, is performed by the refiner, who uſes plates of hardened ſteel, with a piece of tough iron welded on the back to prevent the ſteel from breaking. The holes in theſe plates are conical, being larger in the back part than in the ſteel, that the rod may not be ſcratched againſt the outer edge, and that they may contain bees-wax, which makes the rod paſs more freely, and preſerves the *gold* from being rubbed off. One end of the rod, made ſmaller than the reſt, is puſhed through a hole that will admit it, when the plate has been properly ſecured, and laid hold of by ſtrong pincers, called clamps, adapted to the purpoſe; to theſe pincers, which are ſo contrived, that the force, which pulls them horizontally, ſerves at the ſame time to preſs them together, a rope is faſtened by one end, and the other end goes round a capſtan with croſs bars, which requires the ſtrength of ſeveral men to turn it. The rod, thus drawn through, is well nealed; it is then paſſed through the next hole; and the nealing and drawing are repeated, till, being reduced to about the ſize of a large quill, it is delivered in coils to the wire-drawers. The remainder of the proceſs requires plates of a different quality, which are brought from Lyons in France, and are formed of a metallic maſs, whoſe prevailing ingredient is iron: the holes are drilled in them here. Theſe plates are of two ſorts; ſome of conſiderable thickneſs, for the wire in its larger ſtate, and others about half as thick, for the finer wire. In the uſe of theſe plates, furniſhed with a variety of holes, the dexterity of the workman principally conſiſts in adapting the hole to the wire: for this purpoſe he uſes a braſs plate, called a ſize, on which is meaſured, by means of notches like ſteps cut at one end, the increaſe which a certain length of wire ſhould gain in paſſing through a freſh hole; and if the wire is found to ſtretch too much or too little, the hole is widened or contracted. Slits of different widths, in thick poliſhed iron rings, ſerve alſo as gages for meaſuring the degree of fineneſs of the wire.

The wire-drawer's proceſs begins with nealing the large wire received from the refiner, which he does, by placing it, coiled up, on ſome lighted charcoal, in a cylindrical cavity, called the pit, under a chimney, and throwing more burning charcoal over it. When it is cooled by being quenched in water, one end is paſſed through the firſt hole in the thick plate, and faſtened to an upright wooden cylinder ſix or eight inches in diameter; in the top of which are two ſtaples, and through theſe is paſſed the long arm of a handle, by which the cylinder is turned on its axis by ſeveral men. By this proceſs, called *degroſſing*, the wire is frequently nealed and quenched, after paſſing through every hole, or every other hole, till it is brought to about the ſize of the ſmall end of a tobacco-pipe; and then cut into portions for the fine wire-drawer. In this laſt part of the wire-drawing proceſs, nealing is not neceſſary; but the wire is waxed at every hole. The contrivance for drawing the wire through the plate in this caſe, when leſs force is needful, is a kind of wooden wheel placed horizontally, leaving in its upper ſurface ſmall holes at different diſtances from the axis, into one or other of which, according to the force required, is inſerted the end of an upright handle, whoſe upper end is received in a hole made in a croſs bar above. From this the wire is wound off upon a ſmaller cylinder, called a rochett, placed on the ſpindle of a ſpinning-wheel; and this cylinder being placed behind the plate, the wire is again drawn through upon the firſt; and being brought to the proper fineneſs, it is nealed for the flatting mill. In this nealing, the wire is wound on a large hollow copper bobin, ſet upright, including ſmall-coal, and encompaſſed with lighted charcoal or ſmall-coal, communicating a gradual heat. The wire, in this ſtate, muſt be watched and removed from the heat, when it appears of the proper colour. The next operation is that of the flatting-mill, which conſiſts of two perfectly round and exquiſitely poliſhed rollers, formed internally of iron, and welded over with a plate of refined ſteel: theſe rollers are placed with their axes parallel, and their circumferences nearly in contact; they are both turned with one handle: the lowermoſt is about ten inches in diameter, the upper little more than two, and their width or thickneſs is about an inch and a quarter. Theſe rolls are ſometimes repoliſhed with putty, prepared by calcining a mixture of lead and tin The wire, unwinding from a bobin, and paſſing between the leaves of a book gently preſſed, and through a narrow ſlit in an upright piece of wood, called a ketch, is directed by a ſmall conical hole in a piece of iron, called a guide, to any particular part of the width of the rollers, ſome of the beſt of which are capable of receiving, by this contrivance, forty threads When the wire is flatted between the rollers, it is wound again on a bobin, which is turned by a wheel, fixed on the axis of one of the rolls, and ſo proportioned, that the motion of the bobin juſt keeps pace with that of the rolls. See on the ſubject of the preceding articles, Dict. of Chemiſtry, Eng. edit. 1777. and particularly Dr. Lewis's Philoſophical Commerce of Arts *paſſim*.

Gold, in *Medicine* and *Chemiſtry*. The chemiſts make ſeveral preparations of *gold* for medicinal uſes; as ſalts, mercuries, and tinctures of *gold*; but it is a point not yet well agreed on, whether *gold* have any real property whereby it may be of uſe in medicine.

Some mechanical phyſicians have had a notion, that if the particles of *gold* could be rendered fine enough, ſo as to circulate with the blood, that it would prove more effectual in the cure of diſeaſes than mercury. But this is a mere hypotheſis. The *aurum fulminans* has been uſed, and other preparations of *gold* are to be met with in authors; but they ſeem to meet with little credit among modern practitioners.

Gold, in *Heraldry*, is one of the metals, more uſually called by the French name, or.

Gold-*finch*, in *Ornithology*, is the fringilla *carduelis* of Linnæus. This bird is peculiarly beautiful in its colour, the elegance of its form, and the muſic of its notes. The bill is white, tipt with black, the baſe being ſurrounded with a ring of rich ſcarlet feathers; a black line runs from the corner of the mouth to the eyes; the cheeks are white; the top of the head is black; the hind part of the head is white; the back, rump, and breaſt, are of a fine pale tawny brown; the belly is white; the covert-feathers of the wings, in the male, are black, in the female, brown; the quill-feathers black, marked in their middle with a beautiful yellow, the tips white; the tail black, but moſt of the feathers are marked near their ends with a white ſpot; the legs are white. The black and yellow in the wings of the female are leſs brilliant than thoſe of the male. The young bird, before it moults, is grey on the head, and called by the bird-catchers a *grey-pate*. There is another variety of *gold-finch*, which is ſcarce, and called a *cheverel*, from the manner in which it concludes its jerk: it is diſtinguiſhed from the common ſort by a white ſtreak, or by two, and ſometimes three white ſpots under the throat. The *gold-finch* is very docile, and its note is very ſweet. In winter theſe birds feed on ſeeds, particularly thoſe of the thiſtle. They are fond of orchards, and often build in an apple or pear-tree; their neſt is elegantly formed of fine moſs, liver-worts, &c. on the outſide and within lined with wool and hair. The *gold-finch* lays five white eggs, marked with deep purple ſpots on the upper end. Some have ſuppoſed this bird to be the *acanthis* of the ancients; but Pennant appropriates that appellation to the LINNET. Brit. Zool. vol. i. p. 332, &c.

GOLD *fiſh*, in *Ichthyology*, is the CYPRINUS *auratus* of Linnæus. The form of this fiſh reſembles the carp; its noſtrils are tubular; the tail is naturally bifid, but in many is trifid, and in ſome quadrifid; the anal fins are placed oppoſite to each other like the ventral fins, which diſpoſition conſtitutes the moſt diſtinguiſhing character of this ſpecies: the colours are various; ſome are marked with a fine blue, with brown, with bright ſilver; but the general predominant colour is *gold* of a ſurpriſing ſplendor. They were firſt introduced into England about the year 1691, but not generally known before 1728. In China, the moſt beautiful kinds are taken in a ſmall lake in the province of Che-Kyang, and are ſaid to grow to the ſize of our largeſt herring; with us they have been known to arrive at the length of eight inches. Pennant.

GOLD *fiſh* is alſo a name by which ſome authors have called the *alauſa* or SHAD, from the yellow colouring it frequently has on the covering of the gills.

GOLD *of pleaſure, myagrum*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs. Its characters are theſe: the empalement of the flower is compoſed of four oblong coloured leaves; the flower hath four roundiſh obtuſe petals, placed in form of a croſs; it hath ſix ſtamina the length of the petals, four of which are a little longer than the other; in the center is ſituated an oval germen, which afterward becomes a turbinated, heart-ſhaped, little pod, having two valves, with the rigid ſtyle in the top, incloſing roundiſh ſeeds. Miller enumerates five ſpecies, and Linnæus eight.

This plant is poſſeſſed of the ſame virtues with the *rapiſtrum*, but is not recommended for any particular purpoſe. The oil, however, obtained from it by expreſſion, is excellent for rendering the ſkin ſoft and ſmooth.

GOLDEN, ſomething that has a relation to gold, or conſiſts of gold, is valuable like gold, or the like.

GOLDEN *Bull*, *Bulla Aurea*. See BULL.

GOLDEN *Calf* was a figure of a calf, which the Iſraelites caſt in that metal, and ſet up in the wilderneſs to worſhip, during Moſes's abſence in the mount, and which that legiſlator, at his return, burnt, ground to powder, and mixed with the water the people were to drink of, as related Exod. xxxii.

The commentators have been greatly divided on this article: the pulverizing of gold, and rendering it potable, is an operation in chemiſtry of the laſt difficulty; and it is hard to conceive how it ſhould be done at that time, before chemiſtry was ever heard of, and in a wilderneſs too! many, therefore, ſuppoſe it done by a miracle; and the reſt, who allow of nothing ſupernatural in it, advance nothing but conjectures as to the manner of the proceſs.

Moſes could not have done it by ſimple calcination, nor amalgamation, nor antimony, nor calcination; nor is there one of thoſe operations that quadrates with the text.

M. Stahl has endeavoured to remove this difficulty. The method Moſes made uſe of, in making his *aurum potabile*, according to this author, was the ſame with that which now obtains; only, inſtead of tartar, he made uſe of the Egyptian natron, which is common enough throughout the Eaſt.

GOLDEN *cups*, a name by which ſome call the RANUNCULUS, or *crow-foot*.

GOLDEN *eye*, in *Ornithology*. See DUCK.

GOLDEN *eye*, a ſpecies of fly. See CHRYSOPIS.

GOLDEN *Fleece*, in the *Ancient Mythology*, was the ſkin or fleece of the ram, upon which Phryxus and Hella are ſuppoſed to have ſwam over the ſea to Colchis; and which, being ſacrificed to Jupiter, was hung upon a tree in the grove of Mars, guarded by two brazen-hoofed bulls, and a monſtrous dragon that never ſlept; but at laſt taken and carried off by Jaſon and the ARGONAUTS. Many authors have endeavoured to ſhew, that this fable is an allegorical repreſentation of ſome real hiſtory, particularly of the philoſophers ſtone.

Order of the **GOLDEN** *Fleece* is a military order, inſtituted by Philip the Good, duke of Burgundy, in 1429. It took its denomination from a repreſentation of the *golden* fleece, borne by the knights on their collars, which conſiſted of flints and ſteels. The king of Spain is now grand maſter of the order, in quality of duke of Burgundy: the number of knights is fixed to thirty-one. It is uſually ſaid to have been inſtituted on occaſion of an immenſe profit which that prince made by wool; though others will have a chemical myſtery couched under it, as under that famous one of the ancients, which the adepti contend to be no other than the ſecret of the elixir, written on the fleece of a ſheep.

GOLDEN *flower-gentle*, a name ſometimes given to ſeveral ſpecies of the AMARANTH.

GOLDEN *head*, in *Ornithology*, a water-fowl, otherwiſe called *anas arctica*. See DUCK.

GOLDEN *lung-wort*, in *Botany*. See HAWKWEED.

GOLDEN *maiden-hair*. See ADIANTUM *aureum*.

GOLDEN *mouſe-ear*. See HAWKWEED.

GOLDEN *Number*, in *Chronology*. See CYCLE *of the moon* and NUMBER.

GOLDEN *prebendary of Hereford*. See PREBENDARY.

GOLDEN *rod*, or *Saracen's* WOUND-WORT, *virga aurea*, or *ſolidago*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: it has a compound flower, made up of hermaphrodite florets and female half florets, incloſed in one long imbricated empalement; the hermaphrodite flowers, which compoſe the diſk, are funnel-ſhaped, cut into five parts at the brim; they have five very ſhort hair-like ſtamina, terminated by cylindrical ſummits; and a crowned germen, ſupporting a ſlender ſtyle as long as the ſtamina, crowned by a bifid open ſtigma; the germen afterward turns to a ſingle ſeed, crowned with hairy down; the female half florets are tongue-ſhaped, indented in three parts; theſe have a crowned germen with a ſlender ſtyle, crowned by two revolving ſtigmas, and are ſucceeded by a ſingle ſeed, like the hermaphrodite florets. Miller enumerates thirty-three ſpecies, and Linnæus fourteen.

We have ſeveral very beautiful ſpecies of this plant cultivated in our gardens, where they are very great and laſting ornaments, beginning to flower in May, and one kind or other of them continuing to flower till October. They are all eaſily propagated by parting their roots in ſpring, before they begin to ſhoot; they will grow in any ſoil or ſituation, but they ſucceed beſt in a light freſh earth and an open expoſure, and ſhould be planted in the middle of large flower-beds: they are perennial plants, dying down to the ground as ſoon as they have ripened their ſeeds, but riſing again the following ſpring; theſe ſeeds ſown will very freely grow, and often produce varieties in the flower. Miller.

The ſpecies of *golden rod*, called the *virga aurea anguſtifolia minus ſerrata*, or narrow-leaved *golden rod* leſs ſawed, with linear ſpear-ſhaped leaves almoſt entire, and flowers in cluſters ſitting cloſe at the wings of the ſtalk, grows wild in woods and heaths, and flowers in Auguſt. The flowers and leaves of this ſpecies are recommended as corroborants and aperients, in urinary obſtructions, nephritic caſes, ulcerations of the bladder, cachexies, and incipient dropſies. It communicates its virtues to water and ſpirit. The extracts are the beſt preparations. Lewis.

GOLDEN *rod tree*. See BOSEA.

GOLDEN *Rule*, in *Arithmetic*, a rule or praxis of great uſe and extent in the art of numbers, whereby we find a fourth proportional to three quantities given. The *Golden Rule* is alſo called the *Rule of Three* and *Rule of Proportion*. See its nature and uſe under the article RULE *of Three*.

GOLDEN *ſamphire* is a ſpecies of the *inula* or ELECAMPANE, with narrow fleſhy leaves ending in three points. It grows naturally on the ſea-coaſts in many parts of England, and is ſometimes ſold in the London markets for the true SAMPHIRE, though entirely deſtitute of its warm aromatic taſte.

GOLDEN *ſaxifrage*. See *Golden* SAXIFRAGE.

GOLDEN *Stole, order of the*. See STOLE.

GOLDEN *ſulphur of antimony*. See ANTIMONY.

GOLDEN *thiſtle*, in *Botany*. See *Golden* THISTLE.

GOLDSINNY, in *Ichthyology*, a fiſh diſcovered on the coaſt of Cornwall, in the whole form of the body, lips, teeth, and fins, reſembling the WRASSE, which is ſaid never to exceed a palm in length; near the tail is a remarkable black ſpot; the firſt rays of the dorſal fin are tinged with black. Pennant.

GOLDYLOCKS, *chryſocoma*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the flower is compoſed of many hermaphrodite florets, contained in an imbricated empalement, which are tubular and funnel-ſhaped, cut into five parts at the brim, and have five ſhort ſlender ſtamina; they have an oblong germen, which becomes a ſingle, oblong, compreſſed ſeed, crowned with hairy down. Miller reckons five ſpecies, and Linnæus nine.

GOLDYLOCKS is alſo a name ſometimes given to the GNAPHALIUM.

GOLF, or GOUF, the name of a diverſion or exerciſe, much uſed in Scotland, and played upon the lawns or links, as they are there called.

It conſiſts in driving a ball with clubs, between two goals or holes, half a mile or a mile aſunder. He who can do this with the feweſt ſtrokes of his club is the conqueror.

GOLPS, in *Heraldry*, are roundles, or torteaux, of a purple colour.

GOLTBERGENSIS *terra*, in the *Materia Medica*, a whitiſh earth, uſed in the ſhops of Germany and Italy as an aſtringent, a cordial, and a ſudorific, but little known among the Engliſh apothecaries. It is dug in many parts of Germany, as Goldberg and Strigaw, and Lignitz in Sileſia; but particularly at this time in the neighbourbourhood of Haſſelt, in the biſhoprick of Liege, in the circle of Weſtphalia. It is taken up there in conſiderable quantities, and uſually is ſealed with the impreſſion of an eagle, and with its old name *Goltbergenſis terra* under it. It was imagined to contain ſome particles of ſilver, and thence to derive ſome of its virtues: on this account Montanus called it *axungia lunæ*, but experience ſhews that it doth not contain a particle of that metal. It is a denſe compact earth of a dull greyiſh white, ſoft and friable, and adheres firmly to the tongue, and makes no efferveſcence with acids.

GOMARA, or GOMARIS, in *Natural Hiſtory*, a name given by ſome of the old authors to *talc*; ſome have alſo called it *gamara:* this laſt ſeems only a corruption of the word *gomaris*, and that of *comaros* or *comaris*, a name this ſtone was often called by among the Greek writers of the middle ages. Some have alſo called the ſelenites by this name, and it ſeems to have originally belonged to that foſſil; but both being foliaceous foſſils, both were often confounded together.

GOMATUS, in *Zoology*, a name uſed by many for the GURNARD, more frequently called by authors *gurnardus*.

GOMER, or OMER, an Hebrew meaſure. See CORUS.

GOMPHOSIS, in *Anatomy*, a kind of ARTICULATION of the bones, wherein one is chaſed, or fitted immoveably into another, after the manner of a peg or nail.

The word is γομφωσις, formed of γομφος, *clavus, a nail* or *peg*.

The teeth are ſet in the jaws by *gomphoſis*. See TEETH and MAXILLA.

GOMPHRENA, in *Botany*, *globe amaranth*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the flower hath a large coloured empalement, which is permanent; the petal is erect, and cut into five parts at the brim, which ſpread open; and it hath five ſtamina, ſcarcely diſcernible, ſituated in the brim of the nectarium: in the center is ſituated an oval pointed germen, which becomes one large roundiſh ſeed, incloſed in a thin cruſted capſule with one cell. There are ſeven ſpecies, natives of the Eaſt and Weſt Indies. See AMARANTHOIDES.

GOMUTTRA *ſelagitta*, in *Natural Hiſtory*, the name given by the Indians to a kind of foſſil, found in great plenty on the mount Vindy in the Eaſt Indies, in places, as they obſerve, where the cows frequently urine. It is a bituminous ſubſtance, and after calcination the reſiduum is given in caſes of internal ulcers and in gonorrhœas. The Indians ſuppoſe it is formed by the drying up of the cow's urine.

GONAGRA, in *Medicine*, the gout in the knee, See GOUT.

The word is compoſed of γονυ, *knee*. and αγρα, *captura*, *ſeizing*.

GONAMBUCH, in *Zoology*, a name by which many called the *guainumbi*, or HUMMING *bird*, the ſmalleſt of all birds.

GONANDINA, the name of a Braſilian tree, remarkable for its great height.

GONARCHA, a term in the ancient dialling. Mr. Perrault, in his notes on Vitruvius, lib. ix. cap. 9. takes the *gonarcha* to have been a dial drawn on divers ſurfaces or planes; ſome of which being horizontal, others vertical, others oblique, &c. formed divers angles.

Whence the appellation, from γονυ, *knee*, or γωνια, *angle*.

GONDOLA, a little flat BOAT, very long and narrow, chiefly uſed at Venice to row on the canals.

The word is Italian, *gondola*. Du Cange derives it from the vulgar Greek κουντελας, *a bark*, or *little ſhip*; Lancelot deduces it from γονδυ, a term in Athenæus for a ſort of vaſe.

The middle-ſized *gondolas* are upwards of thirty feet long, and four broad: they always terminate at each end in a very ſharp point, which is raiſed perpendicularly to the full height of a man.

The addreſs of the Venetian gondoliers, in paſſing along their narrow canals, is very remarkable: there are uſually two to each *gondola*, and they row by puſhing before them. The fore-man reſts his oar on the left ſide of the *gondola:* the hind-man is placed on the ſtern, that he may ſee the head over the tilt or covering of the *gondola*, and reſts his oar, which is very long, on the right ſide of the *gondola*.

GONDOLA is alſo the name of a paſſage-boat of ſix or eight oars, uſed in other parts of the coaſt of Italy.

GONDOLA-*ſhell*, in *Natural Hiſtory*, a name given by authors to a peculiar kind of *concha globoſa*, ſuppoſed, in ſome degree to repreſent the ſhape of a Venetian boat. It is of the genus of the DOLIUM, and there are ſeven ſpecies of it.

GONFALON, or GONFANON, a kind of round tent, borne as a canopy, at the head of the proceſſions of the principal churches at Rome, in caſe of rain; its verge or banner ſerving for a ſhelter, where there is not a great deal of attendance.

GONGOLARA, in *Botany*, a name by which Imperatus has called a very beautiful ſea plant, known among botanical writers by the name of *fucus ericæ foliis*, or ERICA *marina*, the ſea heath.

GONGRONA, a word uſed by many authors to expreſs a round and hard tubercle in the trunk of a tree: it is alſo uſed in medicine to expreſs any round and hard tumour of the nervous parts, but principally a bronchocele.

GONGRUS, in *Ichthyology*, a name given by Ælian, Appian, and ſome other of the Greek writers, to the CONGER or *ſea* EEL.

GONIOMETRICAL *lines*, derived from γωνια, *angle*, and μετρω, *I meaſure*, in *Geometry*, lines uſed for meaſuring or determining the quantity of angles. Such are ſines, tangents, ſecants, verſed ſines, &c.

We have a paper by Mr. Jones, in the Philoſophical Tranſactions, containing a commodious diſpoſition of equations for exhibiting the relations of *goniometrical* lines: from whence a multitude of curious theorems may be derived. See Phil. Tranſ. N° 483. ſect. 26.

GONINON, in *Ichthyology*, a name given by the French to the common GUDGEON.

GONIOSIS, a term uſed by Archigenes to expreſs a peculiar ſort of pulſe, which ſeems to ſtrike, not with the whole circle of the artery, but with an angle of it; or when the elevated artery is not felt like the curve of a circle, but like the vertex of a triangle. The cauſe of this is an imbecillity in the motion of the blood, which renders it incapable of elevating the whole artery.

GONORYNCHUS, in *Ichthyology*, a ſpecies of cyprinus, with eight rays in the anal fin, a cylindric body, and bifid tail. It is found at the Cape of Good Hope.

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The word is formed of the Greek γονος, *genitura*, *ſeed*; and ῥεω, *fluo*, *I flow*.

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GONORRHOEA, *ſimple*, or that without virus or malignity, takes its riſe from violent exerciſes and ſtrainings, the immoderate uſe of hot foods and ſpirituous liquors, cold, violent or frequent purging, exceſſive coition, &c. It is cured by indulging, nouriſhing foods, broths, &c.

This ſpecies is again divided into two; the one *true*, the *gonorrhœa vera*, wherein the humour diſcharged is real ſeed; the other *ſpurious*, the *gonorrhœa notha*, wherein the dripping humour is not ſeed, but a whitiſh and mild matter from the glands about the PROSTATÆ and URETHRA.

This latter kind bears ſome reſemblance to the fluor albus or whites in women, and frequently remains a long time without much diminution of the patient's ſtrength. Some call it a *catarrhal gonorrhœa*. Its ſeat is in the glands of the proſtatæ and urethra, which are either too much relaxed, or ulcerated. See GLEET.

GONORRHOEA, *virulent*, *gonorrhœa virulenta*, ariſes from ſome impure commerce, and is the firſt ſtage of the runs from the corner of the mouth to the eyes; the cheeks are white; the top of the head is black; the hind part of the head is white; the back, rump, and breaſt, are of a fine pale tawny brown; the belly is white; the covert-feathers of the wings, in the male, are black, in the female, brown; the quill-feathers black, marked in their middle with a beautiful yellow, the tips white; the tail black, but moſt of the feathers are marked near their ends with a white ſpot; the legs are white. The black and yellow in the wings of the female are leſs brilliant than thoſe of the male. The young bird, before it moults, is grey on the head, and called by the bird-catchers a *grey-pate*. There is another variety of *gold-finch*, which is ſcarce, and called a *cheverel*, from the manner in which it concludes its jerk: it is diſtinguiſhed from the common ſort by a white ſtreak, or by two, and ſometimes three white ſpots under the throat. The *gold-finch* is very docile, and its note is very ſweet. In winter theſe birds feed on ſeeds, particularly thoſe of the thiſtle. They are fond of orchards, and often build in an apple or pear-tree; their neſt is elegantly formed of fine moſs, liver-worts, &c. on the outſide and within lined with wool and hair. The *gold-finch* lays five white eggs, marked with deep purple ſpots on the upper end. Some have ſuppoſed this bird to be the *acanthis* of the ancients; but Pennant appropriates that appellation to the LINNET. Brit. Zool. vol. i. p. 332, &c.

GOLD *fiſh*, in *Ichthyology*, is the CYPRINUS *auratus* of Linnæus. The form of this fiſh reſembles the carp; its noſtrils are tubular; the tail is naturally bifid, but in many is trifid, and in ſome quadrifid; the anal fins are placed oppoſite to each other like the ventral fins, which diſpoſition conſtitutes the moſt diſtinguiſhing character of this ſpecies: the colours are various; ſome are marked with a fine blue, with brown, with bright ſilver; but the general predominant colour is *gold* of a ſurpriſing ſplendor. They were firſt introduced into England about the year 1691, but not generally known before 1728. In China, the moſt beautiful kinds are taken in a ſmall lake in the province of Che-Kyang, and are ſaid to grow to the ſize of our largeſt herring; with us they have been known to arrive at the length of eight inches. Pennant.

GOLD *fiſh* is alſo a name by which ſome authors have called the *alauſa* or SHAD, from the yellow colouring it frequently has on the covering of the gills.

GOLD *of pleaſure*, *myagrum*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs. Its characters are theſe: the empalement of the flower is compoſed of four oblong coloured leaves; the flower hath four roundiſh obtuſe petals, placed in form of a croſs; it hath ſix ſtamina the length of the petals, four of which are a little longer than the other; in the center is ſituated an oval germen, which afterward becomes a turbinated, heart-ſhaped, little pod, having two valves, with the rigid ſtyle in the top, incloſing roundiſh ſeeds. Miller enumerates five ſpecies, and Linnæus eight.

This plant is poſſeſſed of the ſame virtues with the *rapiſtrum*, but is not recommended for any particular purpoſe. The oil, however, obtained from it by expreſſion, is excellent for rendering the ſkin ſoft and ſmooth.

GOLDEN, ſomething that has a relation to gold, or conſiſts of gold, is valuable like gold, or the like.

GOLDEN *Bull*, *Bulla Aurea*. See BULL.

GOLDEN *Calf* was a figure of a calf, which the Iſraelites caſt in that metal, and ſet up in the wilderneſs to worſhip, during Moſes's abſence in the mount, and which that legiſlator, at his return, burnt, ground to powder, and mixed with the water the people were to drink of, as related Exod. xxxii.

The commentators have been greatly divided on this article: the pulverizing of gold, and rendering it potable, is an operation in chemiſtry of the laſt difficulty; and it is hard to conceive how it ſhould be done at that time, before chemiſtry was ever heard of, and in a wilderneſs too! many, therefore, ſuppoſe it done by a miracle; and the reſt, who allow of nothing ſupernatural in it, advance nothing but conjectures as to the manner of the proceſs.

Moſes could not have done it by ſimple calcination, nor amalgamation, nor antimony, nor calcination; nor is there one of thoſe operations that quadrates with the text.

M. Stahl has endeavoured to remove this difficulty. The method Moſes made uſe of, in making his *aurum potabile*, according to this author, was the ſame with that which now obtains; only, inſtead of tartar, he made uſe of the Egyptian natron, which is common enough throughout the Eaſt.

GOLDEN *cups*, a name by which ſome call the RANUNCULUS, or *crow-foot*.

GOLDEN *eye*, in *Ornithology*. See DUCK.

GOLDEN *eye*, a ſpecies of fly. See CHRYSOPIS.

GOLDEN *Fleece*, in the *Ancient Mythology*, was the ſkin or fleece of the ram, upon which Phryxus and Hella are ſuppoſed to have ſwam over the ſea to Colchis; and which, being ſacrificed to Jupiter, was hung upon a tree in the grove of Mars, guarded by two brazen-hoofed bulls, and a monſtrous dragon that never ſlept; but at laſt taken and carried off by Jaſon and the ARGONAUTS. Many authors have endeavoured to ſhew, that this fable is an allegorical repreſentation of ſome real hiſtory, particularly of the philoſophers ſtone.

Order of the **GOLDEN** *Fleece* is a military order, inſtituted by Philip the Good, duke of Burgundy, in 1429. It took its denomination from a repreſentation of the *golden* fleece, borne by the knights on their collars, which conſiſted of flints and ſteels. The king of Spain is now grand maſter of the order, in quality of duke of Burgundy: the number of knights is fixed to thirty-one. It is uſually ſaid to have been inſtituted on occaſion of an immenſe profit which that prince made by wool; though others will have a chemical myſtery couched under it, as under that famous one of the ancients, which the adepti contend to be no other than the ſecret of the elixir, written on the fleece of a ſheep.

GOLDEN *flower-gentle*, a name ſometimes given to ſeveral ſpecies of the AMARANTH.

GOLDEN *head*, in *Ornithology*, a water-fowl, otherwiſe called *anas arctica*. See DUCK.

GOLDEN *lung-wort*, in *Botany*. See HAWKWEED.

GOLDEN *maiden-hair*. See ADIANTUM *aureum*.

GOLDEN *mouſe-ear*. See HAWKWEED.

GOLDEN *Number*, in *Chronology*. See CYCLE *of the moon* and NUMBER.

GOLDEN *prebendary of Hereford*. See PREBENDARY.

GOLDEN *rod*, or *Saracen's* WOUND-WORT, *virga aurea*, or *ſolidago*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: it has a compound flower, made up of hermaphrodite florets and female half florets, incloſed in one long imbricated empalement; the hermaphrodite flowers, which compoſe the diſk, are funnel-ſhaped, cut into five parts at the brim; they have five very ſhort hair-like ſtamina, terminated by cylindrical ſummits; and a crowned germen, ſupporting a ſlender ſtyle as long as the ſtamina, crowned by a bifid open ſtigma; the germen afterward turns to a ſingle ſeed, crowned with hairy down; the female half florets are tongue-ſhaped, indented in three parts; theſe have a crowned germen with a ſlender ſtyle, crowned by two revolving ſtigmas, and are ſucceeded by a ſingle ſeed, like the hermaphrodite florets. Miller enumerates thirty-three ſpecies, and Linnæus fourteen.

We have ſeveral very beautiful ſpecies of this plant cultivated in our gardens, where they are very great and laſting ornaments, beginning to flower in May, and one kind or other of them continuing to flower till October. They are all eaſily propagated by parting their roots in ſpring, before they begin to ſhoot; they will grow in any ſoil or ſituation, but they ſucceed beſt in a light freſh earth and an open expoſure, and ſhould be planted in the middle of large flower-beds: they are perennial plants, dying down to the ground as ſoon as they have ripened their ſeeds, but riſing again the following ſpring; theſe ſeeds ſown will very freely grow, and often produce varieties in the flower. Miller.

The ſpecies of *golden rod*, called the *virga aurea anguſtifolia minus ſerrata*, or narrow-leaved *golden rod* leſs ſawed, with linear ſpear-ſhaped leaves almoſt entire, and flowers in cluſters ſitting cloſe at the wings of the ſtalk, grows wild in woods and heaths, and flowers in Auguſt. The flowers and leaves of this ſpecies are recommended as corroborants and aperients, in urinary obſtructions, nephritic caſes, ulcerations of the bladder, cachexies, and incipient dropſies. It communicates its virtues to water and ſpirit. The extracts are the beſt preparations. Lewis.

GOLDEN *rod tree*. See BOSEA.

GOLDEN *Rule*, in *Arithmetic*, a rule or praxis of great uſe and extent in the art of numbers, whereby we find a fourth proportional to three quantities given. The *Golden Rule* is alſo called the *Rule of Three* and *Rule of Proportion*. See its nature and uſe under the article RULE *of Three*.

GOLDEN *ſamphire* is a ſpecies of the *inula* or ELECAMPANE, with narrow fleſhy leaves ending in three points. It grows naturally on the ſea-coaſts in many parts of England, and is ſometimes ſold in the London market for the true SAMPHIRE, though entirely deſtitute of its warm aromatic taſte.

GOLDEN *ſaxifrage*. See *Golden* SAXIFRAGE.

GOLDEN *Stole, order of the*. See STOLE.

GOLDEN *ſulphur of antimony*. See ANTIMONY.

GOLDEN *thiſtle*, in *Botany*. See *Golden* THISTLE.

GOLDSINNY, in *Ichthyology*, a fiſh diſcovered on the coaſt of Cornwall, in the whole form of the body, lips, teeth, and fins, reſembling the WRASSE, which is ſaid never to exceed a palm in length; near the tail is a remarkable black ſpot; the firſt rays of the dorſal fin are tinged with black. Pennant.

GOLDYLOCKS, *chryſocoma*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the flower is compoſed of many hermaphrodite florets, contained in an imbricated empalement, which are tubular and funnel-ſhaped, cut into five parts at the brim, and have five ſhort ſlender ſtamina; they have an oblong germen, which becomes a ſingle, oblong, compreſſed ſeed, crowned with hairy down. Miller reckons five ſpecies, and Linnæus nine.

GOLDYLOCKS is alſo a name ſometimes given to the GNAPHALIUM.

GOLF, or GOUF, the name of a diverſion or exerciſe, much uſed in Scotland, and played upon the lawns or links, as they are there called.

It conſiſts in driving a ball with clubs, between two goals or holes, half a mile or a mile aſunder. He who can do this with the feweſt ſtrokes of his club is the conqueror.

GOLPS, in *Heraldry*, are roundles, or torteaux, of a purple colour.

GOLTBERGENSIS *terra*, in the *Materia Medica*, a whitiſh earth, uſed in the ſhops of Germany and Italy as an aſtringent, a cordial, and a ſudorific, but little known among the Engliſh apothecaries. It is dug in many parts of Germany, as Goldberg and Strigaw, and Lignitz in Sileſia; but particularly at this time in the neighbourbourhood of Haſſelt, in the biſhoprick of Liege, in the circle of Weſtphalia. It is taken up there in conſiderable quantities, and uſually is ſealed with the impreſſion of an eagle, and with its old name *Goltbergenſis terra* under it. It was imagined to contain ſome particles of ſilver, and thence to derive ſome of its virtues: on this account Montanus called it *axungia lunæ*, but experience ſhews that it doth not contain a particle of that metal. It is a denſe compact earth of a dull greyiſh white, ſoft and friable, and adheres firmly to the tongue, and makes no efferveſcence with acids.

GOMARA, or GOMARIS, in *Natural Hiſtory*, a name given by ſome of the old authors to *talc*; ſome have alſo called it *gamara:* this laſt ſeems only a corruption of the word *gomaris*, and that of *comaros* or *comaris*, a name this ſtone was often called by among the Greek writers of the middle ages. Some have alſo called the ſelenites by this name, and it ſeems to have originally belonged to that foſſil; but both being foliaceous foſſils, both were often confounded together.

GOMATUS, in *Zoology*, a name uſed by many for the GURNARD, more frequently called by authors *gurnardus*.

GOMER, or OMER, an Hebrew meaſure. See CORUS.

GOMPHOSIS, in *Anatomy*, a kind of ARTICULATION of the bones, wherein one is chaſed, or fitted immoveably into another, after the manner of a peg or nail.

The word is γομφωσις, formed of γομφος, *clavus, a nail* or *peg*.

The teeth are ſet in the jaws by *gomphoſis*. See TEETH and MAXILLA.

GOMPHRENA, in *Botany*, *globe amaranth*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the flower hath a large coloured empalement, which is permanent; the petal is erect, and cut into five parts at the brim, which ſpread open; and it hath five ſtamina, ſcarcely diſcernible, ſituated in the brim of the nectarium: in the center is ſituated an oval pointed germen, which becomes one large roundiſh ſeed, incloſed in a thin cruſted capſule with one cell. There are ſeven ſpecies, natives of the Eaſt and Weſt Indies. See AMARANTHOIDES.

GOMUTTRA *ſelagitta*, in *Natural Hiſtory*, the name given by the Indians to a kind of foſſil, found in great plenty on the mount Vindy in the Eaſt Indies, in places, as they obſerve, where the cows frequently urine. It is a bituminous ſubſtance, and after calcination the reſiduum is given in caſes of internal ulcers and in gonorrhœas. The Indians ſuppoſe it is formed by the drying up of the cow's urine.

GONAGRA, in *Medicine*, the gout in the knee, See GOUT.

The word is compoſed of γονυ, *knee*. and αγρα, *captura*, *ſeizing*.

GONAMBUCH, in *Zoology*, a name by which many called the *guainumbi*, or HUMMING *bird*, the ſmalleſt of all birds.

GONANDINA, the name of a Braſilian tree, remarkable for its great height.

GONARCHA, a term in the ancient dialling. Mr. Perrault, in his notes on Vitruvius, lib. ix. cap. 9. takes the *gonarcha* to have been a dial drawn on divers ſurfaces or planes; ſome of which being horizontal, others vertical, others oblique, &c. formed divers angles.

Whence the appellation, from γονυ, *knee*, or γωνια, *angle*.

GONDOLA, a little flat BOAT, very long and narrow, chiefly uſed at Venice to row on the canals.

The word is Italian, *gondola*. Du Cange derives it from the vulgar Greek κουντελας, *a bark*, or *little ſhip*; Lancelot deduces it from γονδυ, a term in Athenæus for a ſort of vaſe.

The middle-ſized *gondolas* are upwards of thirty feet long, and four broad: they always terminate at each end in a very ſharp point, which is raiſed perpendicularly to the full height of a man.

The addreſs of the Venetian gondoliers, in paſſing along their narrow canals, is very remarkable: there are uſually two to each *gondola*, and they row by puſhing before them. The fore-man reſts his oar on the left ſide of the *gondola:* the hind-man is placed on the ſtern, that he may ſee the head over the tilt or covering of the *gondola*, and reſts his oar, which is very long, on the right ſide of the *gondola*.

GONDOLA is alſo the name of a paſſage-boat of ſix or eight oars, uſed in other parts of the coaſt of Italy.

GONDOLA-*ſhell*, in *Natural Hiſtory*, a name given by authors to a peculiar kind of *concha globoſa*, ſuppoſed, in ſome degree to repreſent the ſhape of a Venetian boat. It is of the genus of the DOLIUM, and there are ſeven ſpecies of it.

GONFALON, or GONFANON, a kind of round tent, borne as a canopy, at the head of the proceſſions of the principal churches at Rome, in caſe of rain; its verge or banner ſerving for a ſhelter, where there is not a great deal of attendance.

GONGOLARA, in *Botany*, a name by which Imperatus has called a very beautiful ſea plant, known among botanical writers by the name of *fucus ericæ foliis*, or ERICA *marina*, the ſea heath.

GONGRONA, a word uſed by many authors to expreſs a round and hard tubercle in the trunk of a tree: it is alſo uſed in medicine to expreſs any round and hard tumour of the nervous parts, but principally a bronchocele.

GONGRUS, in *Ichthyology*, a name given by Ælian, Appian, and ſome other of the Greek writers, to the CONGER or *ſea* EEL.

GONIOMETRICAL *lines*, derived from γωνια, *angle*, and μετρω, *I meaſure*, in *Geometry*, lines uſed for meaſuring or determining the quantity of angles. Such are ſines, tangents, ſecants, verſed ſines, &c.

We have a paper by Mr. Jones, in the Philoſophical Tranſactions, containing a commodious diſpoſition of equations for exhibiting the relations of *goniometrical* lines: from whence a multitude of curious theorems may be derived. See Phil. Tranſ. N° 483. ſect. 26.

GONINON, in *Ichthyology*, a name given by the French to the common GUDGEON.

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GONORRHOEA, *virulent*, *gonorrhœa virulenta*, ariſes from ſome impure commerce, and is the firſt ſtage of the venereal diſeaſe, being what we popularly call a CLAP. The parts here primarily affected, are the proſtatæ in men, and lacunæ in women, which, being ulcerated by ſome contagious matter received in coition, occaſion an itching, with a ſmall degree of pain in the genitals, and then emit, firſt, a whitiſh watery liquor that ſtains the linen with ſpots, whoſe edges are of a darker colour than the center, accompanied with a ſmall degree of titillation, particularly at the time of making water, and, by degrees, with greater heat and more acute pain, perceived chiefly at the extremity of the urinary paſſage, where a ſlight degree of redneſs and inflammation likewiſe begin to appear: this liquor afterwards grows yellowiſh, then ſharper, and at length greeniſh or bluiſh, ſometimes of a bloody colour, and frequently fœtid.

It is attended with a tenſion and inflammation of the yard, and an ardor urinæ, or ſharpneſs of urine, which gives a painful ſenſation in the emiſſion, and is diſcharged ſparingly and with difficulty; the urinary paſſage being torn and excoriated by the acrimony of the humour.

Hence ariſe tumours of the prepuce and glans, with ulcers on the ſame; and ſometimes in the urethra.

The cauſe of the virulent *gonorrhœa*, according to M. Littre, is ſome ſharp or acid humour, heated, rarefied, and raiſed at the time of coition, from the internal parts of the pudendum of a woman infected, and lodged in the urethra of the man. It has different ſeats in the body: ſometimes it only fixes on Cowper's mucous glands, ſometimes on the proſtatæ, and ſometimes on the veſiculæ ſeminales; ſometimes it poſſeſſes two, and ſometimes all three of thoſe places at once.

From this diverſity of ſeats of the *gonorrhœa virulenta*, M. Littre makes two ſorts; *ſimple*, which only affects one of the three parts; *compound*, or complicated, where ſeveral are affected.

That ſeated in the mucous glands, he obſerves, may remain ſimple through the whole courſe of the diſeaſe, becauſe the mouths of thoſe glands open into the urethra an inch and half on this ſide the proſtatæ, and alſo look down towards the glans, ſo that their liquor is eaſily diſcharged. The other two ſorts mutually produce each other, becauſe the ducts of the veſiculæ ſeminales terminate in the urethra in the middle of thoſe of the proſtatæ, ſo that there is an eaſy communication between them.

That ſeated in the mucous glands is much the rareſt caſe, and is the eaſieſt cured. The cure is effected by emollient cataplaſms and fomentations upon the part, and a half-bath. Mem. de l'Acad. ann. 1711.

For the other ſpecies more powerful means are to be uſed. The principal remedies are mercurial purges, an emulſion of green hemp-ſeed, cuttle-fiſh-bone, turpentine, ſacch. ſaturni, &c. We have likewiſe great commendations of green precipitate of mercury and mercur. dulcis. Balſ. ſaturni terebinthinatum, prepared with a gentle fire, of ſacch. ſaturni and oil of turpentine, is much applauded where the heat is great about the reins and genitals; as alſo camphor. An infuſion of cantharides in wine is the noſtrum of a noted Dutch phyſician. Reſin of the wood guaiacum is alſo recommended; and balſam of Copaiba is held a ſort of ſpecific: to which muſt be added antimonium diaphoreticum, bezoardicum minerale, water wherein mercury has been boiled, injections of lime-water, mercurius dulcis, ſaccharum ſaturni, &c.

Pitcairn's method of curing the *gonorrhœa virulenta* is as follows: in the beginning of the diſeaſe he purges with a laxative ptiſan of ſena, ſalt of tartar, and melilot-flowers; and gives the patient whey for his drink. After three or four days ſpent in this purging, if the ſcalding of the urine and the flux be abated, and the colour and conſiſtence of the matter improved, he adminiſters boluſes of turpentine and rhaponticum for ſix or ſeven days; and if they keep the body looſe, ſo much the better. By all means, aſtringents are to be avoided; the *gonorrhœa* being ſcarce ever known to degenerate into a pox, unleſs too haſtily ſtopped.

Du Blegny directs the cure of the *gonorrhœa* to begin with a gentle cathartic of caſſia, ſenna, cryſtal mineral, tamarinds, althæa, and rhubarb, adminiſtered every other day; then diuretics, particularly thoſe of turpentine; and laſtly, gentle aſtringents, as mineral waters, crocus martis aſtringens, tincture of roſes, tincture of coral in cochineal, &c.

A ſlight infection may ſometimes be carried off in a few days by bathing the parts in warm milk and water, and injecting frequently up the urethra a little ſweet oil or linſeed tea, warmed to the degree of new milk. Aſtringent injections ſhould be very cautiouſly uſed, and only in a ſlight and recent ſtage of the diſorder: an injection of this kind may be prepared by diſſolving half a dram of the ſugar of lead in ſix or ſeven ounces of roſe-water; and a ſmall ſyringe full of it, a little warm, may be injected up the urethra five or ſix times a day, and continued till the running ſtops. Gentle cooling purges are always proper in the *gonorrhœa*: for this purpoſe, the patient may take ſix drams or an ounce of ſalts, and half an ounce of manna, diſſolved in a pint of boiling water, whey, or water-gruel, early in the morning: or, two drams of ſenna and an ounce of tamarinds may be infuſed all night in a pint of boiling water, and half an ounce of Glauber's ſalts diſſolved in the ſtrained infuſion; and a tea-cup of this may be taken every half hour till it operates. Or, the patient may take two or three tea-ſpoonſuls of the following electary at night, and the ſame quantity in the morning: take of the lenitive electary four ounces, cream of tartar two ounces, powdered jalap two drams, rhubarb one dram, and as much of the ſyrup of roſes as will ſerve to make the whole into a ſoft electary.

When the ſymptoms of inflammation are high, bleeding is always neceſſary at the beginning. Diuretics are alſo proper in this ſtage of the diſorder: an ounce of nitre, and two ounces of gum Arabic, pounded together, and divided into twenty-four doſes, one of which may be taken frequently, will anſwer this purpoſe: or, equal parts of gum Arabic and cream of tartar, pounded together, and taken four or five times a day, in the quantity of a tea-ſpoonful, will ſerve both as a diuretic and laxative.

Emollient clyſters are very uſeful, when the pain and inflammation are ſeated high towards the neck of the bladder; and ſoft poultices, made of the flour of linſeed, or of wheat bread and milk, ſoftened with freſh butter or ſweet oil, or cloths wrung out of warm water, or bladders filled with warm milk and water, may be applied with great benefit. If this treatment fails to effect a cure, the patient muſt have recourſe to the uſe of mercury: two at night and one in the morning of the common mercurial pills will be a ſufficient doſe at firſt, which may be diminiſhed or increaſed according to its effect: or, two or three grains of calomel may be formed into a bolus with the conſerve of hips, and taken at bed-time, and the doſe gradually increaſed to eight or ten grains: or, again, corroſive ſublimate may be taken in the manner preſcribed under VENEREAL *diſeaſe*. Theſe mercurial medicines ſhould never be taken in ſuch quantities as to raiſe a ſalivation, unleſs in a very ſlight degree: for preventing which, they may be combined with purgatives; and the griping or purging of the mercury may be prevented by taking with the above pills or bolus half a dram or two ſcruples of DIASCORDIUM, or of the Japonic confection. See CONFECTIO *Japonica*. Mercury may be taken in a liquid form, by rubbing a dram of it with two drams of gum Arabic reduced to a mucilage, in a marble mortar, till the mucilage diſappears, and adding gradually, during the trituration, half an ounce of balſamic ſyrup, and eight ounces of ſimple cinnamon water: two table-ſpoonfuls of this ſolution may be taken night and morning. Mercury may alſo be adminiſtered by means of friction: a dram of mercurial ointment, prepared by rubbing together equal quantities of hog's lard and quickſilver, may be uſed at a time. The beſt time for rubbing it on the body is at night, and the moſt proper place the inner ſide of the thighs. In whatever way mercury is adminiſtered, its uſe muſt be perſiſted in as long as any virulency is ſuſpected to remain. When, by the preceding treatment, the pain and heat are abated, and the quantity of the diſcharged matter is leſſened, and it is become whitiſh, thick, and void of ill ſmell, which ſymptoms conſtitute the third or laſt ſtage of the *gonorrhœa*, aſtringent or agglutinating medicines may be cautiouſly uſed: but it is dangerous to ſtop the running till the contagion is removed, becauſe, in this caſe, ſwelled teſticles, a ſore throat, buboes, or ſome other ſymptoms of the pox, will enſue; and, when this happens, the diſcharge muſt be again promoted by purges, and more mercury muſt be uſed. At firſt, therefore, it may be proper to mix gentle aſtringents with purgative medicines: thus, to two ounces of the lenitive electary add cream of tartar and powdered rhubarb, of each half an ounce, and balſam of Capivi an ounce and a half; take of theſe, made into an electary with the ſyrup of pale roſes, about the quantity of a large nutmeg, evening and morning: the patient may then proceed to the uſe of Venice turpentine, the Peruvian balſam, balſam of Gilead, &c. or, inſtead of theſe, he may take fifteen or twenty drops of the acid elixir of vitriol in a glaſs of red wine, or a cup of the infuſion of the bark, twice or thrice a day. If the running ſtill continues, without any ſigns of virulency, injections may be uſed; for this purpoſe gum Arabic may be diſſolved in three or four ounces of roſe-water, and ten or twelve grains of ſugar of lead may be added to the ſolution: two or three drams of this, made a little warm, and adapted in ſtrength to the nature of the caſe, may be daily injected up the urethra with a ſmall ſyringe. If all theſe means ſhould fail to ſtop the diſcharge, though the virulence is entirely removed, the diſorder is denominated a GLEET.

Regard muſt be paid to the regimen in the ſeveral ſtages of the *gonorrhœa*. In the firſt ſtage, the perſon, who ſuſpects that he has been infected, ſhould obſerve a cooling regimen, and avoid every thing of a heating nature, as wines, ſpirituous liquors, rich ſauces, ſpiced, ſalted, high-ſeaſoned, and ſmoke-dried proviſions, and alſo all aromatic and ſtimulating vegetables, as onions, muſtard, cinnamon, ginger, &c. His food ſhould conſiſt chiefly of mild vegetables, milk, broths, puddings, gruels, &c. his drink may be barley-water, milk and water, decoctions of marſh-mallows and liquorice, linſeed tea, or clear whey, which he ſhould uſe freely. He ſhould avoid violent exerciſe and cold. When the inflammation has ſubſided, or in the ſecond ſtage of the diſorder, all intemperance ſhould be avoided: the food ſhould be light, plain, and of eaſy digeſtion; and a little wine, diluted with much water, may be allowed, but ſpirituous liquors are dangerous. In the laſt ſtage, the patient ſhould uſe moderate exerciſe in the open air; his diet ſhould be rice, millet, jellies, and other things of a ſtrengthening nature; his drink may be Briſtol water, claret or port with the addition of water. Buchan's Domeſtic Med. p. 534, &c. See VENEREAL *diſeaſe*.

GONYALGIA, of *γονυ*, *knee*, and *αλſος*, *pain*, a term uſed by ſome authors to expreſs a violent pain in the knee.

GOOD, or GOODNESS, denotes whatever tends or conduces to preſerve or improve human nature or ſociety; in oppſition to *evil*, which tends to deſtroy, injure, or impair the ſame.

Hence *good* is divided by the philoſophers into, 1. *Bonum ſui*, private *good*; which is that whereby a thing tends to preſerve, &c itſelf; under which comes that popular diviſion of *goods* of body, mind, and fortune.

2. *Bonum communionis*, whatever promotes the intereſt and welfare of ſociety; as all the civil offices, &c.

GOOD, in *Metaphyſics*, or *metaphyſical* GOOD, called alſo *abſolute* or *real* GOOD, and GOOD *per ſe*, is the eſſential perfection or integrity of a thing, whereby it has every thing that belongs to its nature.

In this ſenſe, all things that are are *good*, inaſmuch as they have the perfections naturally belonging to things of their kind Thus, a thinking ſubſtance is *good*, or perfect, as it has all the eſſential attributes of thought; ſo an extended ſubſtance is *good*, as it poſſeſſes all the parts neceſſary to conſtitute it ſuch.

In effect, as it is abſurd to imagine a being without its eſſence, ſo is it to imagine a being without the requiſites of its eſſence; ſo that it appears an error in ſome philoſophers, who divide beings into good or perfect, and evil or imperfect. See ESSENCE.

Others define metaphyſical, or tranſcendental *goodneſs*, by congruency with the divine will, which, they ſay, conſtitutes the meaſure of all real *goodneſs*.

GOOD, *phyſical* or *natural*, is that whereby a thing poſſeſſes all things neceſſary to its *bene eſſe*, i. e. its well being, or ſecond perfection, and to the performance of its functions and uſes.

In this ſenſe, phyſical *goodneſs* coincides with phyſical perfection.

To this are required the ſeveral powers and faculties, in their proper degree; a due ſituation, figure, and proportion of parts, &c.

Note, beſide abſolute phyſical *goodneſs*, there may be a *relative* one; as in foods, which to one are ſalutary, to another poiſon, &c. To this head alſo belong the things *good pro tempore*, or according to circumſtances; as the amputation of a mortified limb, &c.

Natural *good* may be otherwiſe defined to be that which makes or denominates a being happy, or prepares him for happineſs; or, at leaſt, prevents or removes his miſery: accordingly, *good* is either objective or formal; objective *good* is that which makes us happy; formal *good*, or the pleaſure reſulting from the application of the faculty to the object, is that which denominates us happy.

GOOD, *moral* or *ethical*, is the agreement of a thinking, reaſonable being, and of the habits, acts, and inclinations thereof with the dictates of right reaſon, and the will of the Creator, as diſcovered by natural light. See VIRTUE.

In order to this, it is not enough that a thing done, ſaid, thought, deſired, be juſt and *good*; but it muſt be done, thought, &c. well, i. e. from *good* principles, and to *good* ends.

Others define moral *good* more largely. *Moral*, which they alſo call *relative good*, according to them, is ſomething that is good to another, or that tends ſome way to the perfection thereof. In this ſenſe they divide it into three kinds, *honeſtum*, *jucundum*, and *utile*.

The firſt, *bonum honeſtum*, is what agrees with right reaſon, and is deſirable for itſelf; as all things virtuous; e gr. to love God, reſpect our parents, &c. It is conſidered without any regard to pleaſure; not but there is ſincere pleaſure annexed to it. Zeno and the Stoics allow of no other *goods*; thoſe of the body, &c. they call *commoda*, *conveniencies*, not *goods*.

Bonum jucundum is that which is *good*, as it tends to give us pleaſure, and is deſired on that account; but without any repugnancy to virtue or right reaſon; as muſic to the ears, painting to the eyes, &c.

Bonum utile, or *commodum*, is that which is *good* on account of ſomething elſe for which it is deſired; as money, riches, &c.

GOOD, *chief*, *ſovereign*, or *ſupreme*, *ſummum bonum*, is that, the enjoyment of which renders men truly and completely happy. The ſchools diſtinguiſh this chief *good* of man into that which is ſimply and adequately ſo, and beyond which there can be no other; and an inferior, ſubordinate kind, which is, in ſome meaſure, attainable in this imperfect ſtate. This laſt they call *felicitas viatorum*, and the former *felicitas comprehenſorum*. The chief or ſovereign *good*, according to the idea collected of it from the original, natural, and univerſal preconceptions of all mankind, is ſomething agreeable to our nature, conducive to well-being, accommodate to all places and times, durable, ſelf-derived, and indeprivable; and this conſiſts, ſays Mr. Harris, in rectitude of conduct, or in living perpetually ſelecting, as far as poſſible, what is congruous to nature, and rejecting what is contrary, making our end that ſelecting and rejecting only. Three Treatiſes, &c. 1765, p. 121, &c. 205, &c.

Philoſophers are divided as to what the chief *good* of man conſiſts in; whether in the *goods* of fortune, of body, or of mind. Some hold riches and honours the ſupreme *good*; others, as Ariſtippus, and the Cyrenaic ſchool, bodily pleaſures; and others, as Zeno, and the Stoics, virtue, or living according to nature. The Peripatetics agreed with the Stoics in maintaining that virtue is the *ſummum bonum*: but the Stoics aſſerted farther, that virtue was the *only good*; whilſt the Peripatetics denied, with reaſon, that virtue was ſelf-ſufficient, and therefore required ſeveral other things as auxiliaries, ſuch as health, proſperity, friends, &c. which are to the virtuous man in the nature of inſtruments or ornaments to his felicity. An excellent writer lays down the following *criteria* or characteriſtics of the *ſummum bonum*, or *chief good*, which reaſon can demonſtrate to be actually deſigned for man: it is ſomething which all men, if not wanting to themſelves, may be poſſeſſed of; it is one and the ſame to all mankind; and while in itſelf fitted to make the poſſeſſor happy, is not prevented in its operation by ſome other thing which keeps him from reliſhing it: and as to the higheſt *good* which it is poſſible for man to enjoy, it muſt be referred to no other, but all others muſt be embraced for the ſake of this; and it muſt be ſufficient to furniſh a happineſs adequate to the capacities of human nature, and of equal duration; i. e. it muſt be not be only perfect whilſt it laſts, but everlaſting. According to theſe characters we may infer, that neither the *goods* of fortune, nor thoſe of the body, nor even virtue itſelf, conſtitute the *chief good*. Virtue rightly underſtood is the perfection of human nature; it is the inſtrument of obtaining happineſs: but this alone will not make a man happy; it is farther neceſſary that he be perfect as to liſe, or happy in the circumſtances of his being: and, therefore, natural reaſon demonſtrates, that the favour of God, ſecured by virtue, is properly man's *ſupreme good*. Grove's Syſtem of Moral Philoſophy, vol. i. part 1. paſſim. See EPICUREANS, PERIPATETICS, and STOICS.

GOOD-*will*. See BENEVOLENCE.

GOOD *works*. See MERIT and SUPEREROGATION.

GOOD *abearing*, *bonus geſtus*, in a *Law Senſe*, is particularly uſed for an exact carriage or behaviour of a ſubject towards the king and his liege people; to which ſome men, upon their miſbehaviour, are bound.

The juſtices are empowered by 34 Edw. III. cap. 1. to bind in this manner all them that be not of good fame; under which general expreſſion, it is holden that a man may be bound to his *good behaviour* for cauſes of ſcandal, *contra bonos mores*, as well as *contra pacem*; as, for haunting bawdy-houſes; for keeping bad women in his own houſe; or for words tending to ſcandalize the government, or in abuſe of the officers of juſtice, eſpecially in the execution of their office: a juſtice may alſo bind over all night-walkers, eaves-droppers, ſuch as keep ſuſpicious company, or are reported to be pilferers and robbers, common drunkards, whore-maſters, the putative fathers of baſtards, cheats, idle vagabonds, and any other perſons, whoſe miſbehaviour may reaſonably bring them within the general words of the ſtatute. Perſons of this deſcription may be bound, with one or more ſureties, in a RECOGNIZANCE or obligation to the king, entered on record, and taken in ſome court, or by ſome judicial officer, whereby the parties acknowlege themſelves to be indebted to the crown in the ſum required, e. gr. 100*l.* with condition to be void and of none effect, provided that they behave themſelves well, either generally or ſpecially, for the time therein limited, as for one or more years, or for life. This recognizance, if taken by a juſtice of the peace, muſt be certified to the next ſeſſions, by 3 Hen. VII. cap. 1. and if the condition of it be broken, the recognizance becomes forfeited or abſolute; and being eſtreated or extracted, i. e. taken out from among the other records and ſent up to the exchequer, the party and his ſureties are become the king's debtors, and are ſued for the ſeveral ſums in which they are bound. All perſons under the king's protection may obtain ſuch ſecurity, upon due cauſe ſhewn; and the juſtice may be compelled to grant it by a mandatory writ, called SUPPLICAVIT: but this writ is ſeldom uſed, for, when application is made to the ſuperior courts, they uſually take the recognizances there, under the direction of the ſtatute 21 Jac. I. cap. 8. A recognizance may be diſcharged, either by the demiſe of the king, or by the death of the principal party bound thereby, or by order of the court to which it is certified by the juſtices. He that is bound to this, Lambard ſays, is more ſtrictly bound than to the PEACE; becauſe, whereas the peace is not broken without an affray, battery, or ſuch like, this ſurety *de bonu geſtu* may be forfeited by the number of a man's company, or by his or their weapons or arms, by ſpeaking words tending to ſedition, or by committing any of thoſe acts of miſbehaviour which the recognizance was intended to prevent.

GOOD *aller*. See ALLER.

GOOD *behaviour*. See GOOD *abearing* and PEACE.

GOOD *taſte*. See TASTE.

GOODS, *bona*, in *Law*, and particularly the *Civil Law*, include all kinds of effects, riches, lands, poſſeſſions, &c. There are two kinds of *goods*; *moveable*, *res moventes* or *mobiles*; and *immoveable*, called *res non moventes* or *immobiles*.

It is a maxim in the civil juriſprudence, that he who confiſcates the body, confiſcates the *goods*; meaning, that all the effects of a perſon condemned to a capital puniſhment, or perpetual baniſhment, are forfeited to the king.

A man is ſaid to bind himſelf body and *goods*; meaning, that beſides his *goods*, he obliges his perſon, and ſubmits to remain in priſon, provided he do not execute his promiſe.

Goods, again, are divided into, 1. *proper*, *paternal*, *patrimonial*, *hereditary*; 2. *acquired* or *acqueſts*, *alio quam hæreditatis jure acquiſita*; and, 3. *conqueſts*, *viro & uxori ſtante ſocietate acquiſita*.

Goods, again, are divided into *real* and *perſonal*. See CHATTELS and ESTATE. And, laſtly, into *noble* or FREE, and *ſervile* or BASE.

Goods belonging to the domain of the crown, *ad fiſcum ſpectantia*, cannot be alienated for ever, unleſs it be done by way of exchange: they may be ſold under the faculty of perpetual redemption.

GOODS, *adventitious*, *adventitia*, are thoſe which ariſe otherwiſe than by ſucceſſion from father or mother, or from direct anceſtor to deſcendant. See ADVENTITIOUS.

GOODS, *dotal*, *dotalia*, thoſe accruing from a dowry, and which the huſband is not allowed to alienate. See DOWRY.

GOODS, *fugitives*. See FUGITIVE.

GOODS, *paraphernal*. See PARAPHERNALIA.

GOODS, *prohibited*. See PROHIBITED.

GOODS, *profectitious*, *profectitia*, are thoſe ariſing by direct ſucceſſion.

GOODS, *receptitious*, were thoſe which the wife might reſerve the full property of to herſelf, and enjoy them independently of her huſband; ſo called, in diſtinction from *dotal* and *paraphernal goods*.

GOODS, *vacant*, *vacantia*, are thoſe abandoned, or left at large, either becauſe the heir renounces them, or that the defunct has no heir.

GOODS, *allotting of*. See ALLOTTING.

GOODS, *conſignment of*. See CONSIGNMENT.

GOODS, *running of*. See RUNNING.

GOOGINGS, in *Sea-language*, are clamps of iron bolted on the ſtern-poſt of a ſhip, whereon to hang the rudder and keep it ſteady; for which purpoſe there is a hole in each of them, to receive a correſpondent ſpindle bolted on the back of the rudder, which turns thereby as upon hinges.

GOOLE, a breach in a ſea-bank or wall; or a paſſage worn by the flux and reflux of the ſea. Vide 16 and 17 Car. II. cap. 11.

The word comes from the French *goulet*, the gullet or neck.

GOOSANDER, in *Zoology*, the Engliſh name for the male MERGANSER; the female of that ſpecies having been univerſally eſteemed a different bird, and called the DUNDIVER and *mergus cirratus longiroſter*.

GOOSE, *anſer*, forms an order of birds in the Linnæan ſyſtem. See ANSERES. The ſeveral ſpecies of *geeſe* belong to the genus of ANAS or DUCK under this order. The common or domeſtic *gooſe* is a variety of the *anſer ferus*, or wild *gooſe*; and derived from the *grey lag*, or fen-*gooſe* of Liſter, which is the only ſpecies that the Britons could take young and familiarize. The length of the *grey lag* is two feet nine inches, and the extent five feet: the bill is large and elevated, of a fleſh-colour edged with yellow; the nail white; the head and neck cinereous, mixed with yellow; the hind part of the neck very pale, and at the baſe a yellowiſh brown: the breaſt and belly are whitiſh, clouded with grey; the back grey; the leſſer coverts of the wings almoſt white; the middle row deep cinereous, ſlightly edged with white; the primaries grey, tipt with black, and edged with white; the ſecondaries entirely black, and grey at their baſe; the ſcapulars of a deep aſh colour, edged with white: the coverts of the tail and the vent feathers of a pure white; the middle feathers of the tail duſky, tipt with white; the exterior feathers almoſt wholly white: the legs are of a fleſh colour. This ſpecies reſides in the fens during the whole year; breeds there, and hatches about eight or nine young, which are eaſily tamed, and their meat is much ſuperior to that of the domeſtic *gooſe*. The common *gooſe* retains the whiteneſs of the coverts of the tail and vent-feathers of its wild ſtate; but the variety of colours in the tame ſort is leſs than in the other. Tame *geeſe* are of vaſt longevity: Mr. Willughby mentions an inſtance of one that attained eighty years.

Multitudes of tame *geeſe* are kept in the fens of Lincolnſhire; a ſingle perſon will keep a thouſand old *geeſe*, each of which will rear ſeven, ſo that towards the end of the ſeaſon he will become maſter of eight thouſand.

The *geeſe* are plucked five times in the year: the firſt plucking, in purſuance of this barbarous practice, is at Lady-day, for FEATHERS and quills; and the ſame is renewed, for feathers only, four times more between that and Michaelmas. See FOWL.

There is another variety of the wild *gooſe*, called, from the ſhape of the nail of its bill reſembling a horſe-bean, the *bean gooſe*, which is ſomewhat ſmaller than the *grey lag*, and diſtinguiſhed from it by a ſmaller bill, much compreſſed near the end, whitiſh, and ſometimes pale red in the middle, and black at the baſe and nail. This ſpecies, which lights on corn-fields, and feeds much on the green wheat, comes to the fens in Lincolnſhire in autumn, never breeds there, but diſappears in May. They fly very high, and make a cackling noiſe in their flight: they preſerve a great regularity in their motions, ſometimes forming a ſtrait line, and at other times aſſuming the ſhape of a wedge, for their more eaſy progreſs through the air.

There is alſo another ſpecies of wild *gooſe* known in this country, called the *laughing* or *white-fronted gooſe*, being the female *anas crythropus* of Linnæus, which is ſmaller than the former, and viſits the fens and other parts of England during the winter, in ſmall flocks: they keep always in marſhy places, and never frequent the cornlands: theſe are never ſeen after the middle of March. Mr. Pennant obſerves, that the *gooſe* was one of the forbidden foods of the Britons in the time of Cæſar. Brit. Zool. vol. ii. p. 570, &c.

Beſides theſe, there are other kinds of *geeſe*, which Linnæus enumerates as ſpecies of the ANAS: ſuch are, 1. The *bernacle*, or BARNACLE, being the male *anas crythropus* of Linnæus. This is alſo in ſome places called CLAKIS. Theſe birds appear in vaſt flocks during the winter, on the north-weſt coaſts of this kingdom; they are very ſhy and wild, but, on being taken, grow as familiar as our tame *geeſe* in a few days: in February they quit our ſhores, and retire as far as Lapland, Greenland, and even Spitzbergen, to breed. They were formerly called *tree-geeſe*, from a miſtaken notion that they were generated out of wood, or rather out of a ſpecies of ſhell, called the *lepas anatifera*, that is often found ſticking to the bottoms of ſhips. Pennant.

2. The *brent-gooſe*, or BRENTA. This is the *anas bernicla* of Linnæus. Theſe birds frequent our coaſts in the winter, and are called in Ireland *bernacles*, appearing in great numbers in Auguſt, and leaving it in March. They feed on the root of a long graſs that grows in the water; are caught in nets placed acroſs the rivers near Londonderry, Belfaſt, and Wexford, and much eſteemed

for their delicacy. Mr. Willughby, Mr. Ray, and M. Briſſon, deſcribe the *bernacle* and *brent* as different ſpecies; but Linnæus makes them ſynonymous. Pennant.

3. The *anſer hiſpanicus*, or *ſwan-gooſe*, being the *anas cygnoides* of Linnæus, which always moves in a ſtately manner, and with its head erect like a ſwan. Its back is of a browniſh grey, its belly white, and its breaſt a little tinged with a reddiſh brown; and it has a line of blackiſh brown running ſtrait down the middle of the neck to the back.

4. The *anſer gambenſis*, or *gambo-gooſe*, which in figure and ſize reſembles the *Muſcovy* DUCK, but has very long red legs, and a fine ſhining purple back; its belly is white, its beak red, and its head has a red caruncle; but its moſt obſervable character is, that it has a ſtrong ſpur ſtanding out from the firſt joint of the wings, as ſome of the Braſilian birds deſcribed by Margraave have.

5. The *anſer Canadenſis*, *Canada gooſe*, or *anas Canadenſis* of Linnæus: this is of the ſhape of the common *gooſe*, but a little longer in the body; its back is of a browniſh grey, its rump black, its neck black at the bottom and white in every other part, its belly white, and its tail and wings black.

6. The *rat-gooſe*, or *road-gooſe*, which is about half the ſize of the common *gooſe*, and of a bluiſh grey on the back, and white at the belly. This is wild in the northern counties of England. Mr. Pennant ſuppoſes that this is the ſame with the *brent gooſe*.

7. The *anſer lanuginoſus*, or *anas molliſſima* of Linnæus. See *Cuthbert's* DUCK. Linnæus, Ray, and Pennant.

GOOSE, *ember*. See EMBER.

GOOSE, *ſoland* or *ſolan*, ſometimes called GANNET, the Engliſh name of a large water-fowl, called by authors *anſer Baſſanus*, and by Linnæus *pelecanus Baſſanus*. This bird is remarkable for the quickneſs of its ſight; and, according to Martin, *ſolan* is derived from an Iriſh word expreſſive of that quality. See *Tab.* II. *Birds*, *fig.* 11.

It is of the ſize of the common *gooſe*, and its wings are very long and capable of extending to a very remarkable breadth; its beak is long and ſtraight, and of a duſky grey, and a little hooked at the end: it has alſo near the hooked part two ſmall appendages like teeth: it is naked behind the eyes: its mouth opens to a great width, and it ſeems to have no noſtrils; but, in the place of them, has a long furrow running nearly the whole length of the bill; it has alſo a row of ſerratures or indentings all along, provided by nature for its holding fiſh more firmly: its feet are black, and all the four toes are connected by the ſame membrane: it is all over of a clear white when full grown, except that the larger wing-feathers have ſome blackneſs, and the head with age is apt to become yellow: its ſkin adheres but looſely to its fleſh, and the young are mottled with grey and brown: from the corner of the mouth is a narrow ſlip of black bare ſkin, that extends to the hind part of the head; beneath the chin is another, which, like the pouch of the pelican, is dilatable, and of ſize ſufficient to contain five or ſix whole herrings, which, in the breeding ſeaſon, it carries at once to its mate or young: it flies well, but if it fall on the ground does not eaſily raiſe itſelf. They are birds of paſſage, and build in the iſland of the Baſs in Scotland, and the rocks of St. Kilda, in vaſt numbers. Their firſt appearance is in March, and their continuance there till Auguſt or September; but, in general, the time of their breeding and of their departure ſeems to coincide with the arrival of the herring, and the migration of that fiſh, which is their principal food, out of theſe ſeas. It is probable that theſe birds attend the herrings and pilchards during their whole circuit round the Britiſh iſlands. They are known to migrate as far ſouth as the mouth of the Tagus, being frequently ſeen off Liſbon, during the month of December, plunging for ſardinæ, a kind of fiſh reſembling, if not the ſame with our pilchards. Each female, if undiſturbed, lays only one egg; but if that be taken away, it will lay another; and if that alſo is taken, a third; but never more that ſeaſon. The young *geeſe* are eſteemed a great delicacy, and ſell at a great price. Ray and Pennant.

GOOSE, *Magellanic*, *anſer Magellanicus*, in *Zoology*, the name given, though improperly, by Cluſius, to a bird of the diver kind. It is a ſea bird, and is uſually very fat; it is of the ſize of the largeſt *geeſe*, and is black on the back and white on the belly: the neck is ſhort and thick, and has a ring or circle of white feathers round it: its ſkin is thick and tough like that of a hog, and it has only two coriaceous or leather-like fans in the place of wings, hanging from its ſides like two arms, covered with a few feathers which are ſhort and partly black, partly white, and by no means of any uſe to fly with, but very ſerviceable to the creature in ſwimming. It lives continually in the water, except at its breeding time; the tail is very ſhort, and the beak as large as a raven's, but not protuberating on the top, but flatted.

GOOSE-*dung*, in *Agriculture* and *Medicine*. See DUNG and CHENOCOPRUS.

GOOSE-*foot*, or WILD ORACH, or *Good Henry*, *chenopodium*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the flower has no petal, but in the center hath five ſtamina placed oppoſite to the leaves of the empalement; it hath a round germen, which afterward becomes a five-cornered fruit incloſed in the empalement, containing one roundiſh depreſſed ſeed.

There are many ſpecies of this genus, ſome of which grow naturally on dunghills and the ſides of ditches in moſt parts of England, where they often become very troubleſome weeds.

The firſt ſpecies, called alſo Engliſh mercury, all-good, or good Henry, is found growing naturally in ſhady lanes, but it is doubtful whether the ſeeds have not been caſt out of gardens originally, becauſe this plant was formerly cultivated in kitchen-gardens; and in ſome of the northern countries the people ſtill preſerve it in gardens as an eſculent herb, which in the ſpring they boil as a ſubſtitute for ſpinage: but as the latter is a much better herb, it has juſtly obtained the preference.

GOOSE-*graſs*. See CLEAVERS.

GOOSE-*graſs*, *great*. See ASPERUGO.

GOOSE-*neck*, in *Sea-language*, is a ſort of iron hook fitted on the inner end of a boom, and introduced into a clamp of iron or eye-bolt, which encircles the maſt, or is fitted to ſome other place in the ſhip, ſo that it may be unhooked at pleaſure.

GOOSE-*wings of a ſail* denote the clues or lower corners of a ſhip's main-ſail or fore-ſail, when the middle part is furled or tied up to the yard.

GOOSE-*wing*, at *Sea*, a certain manner of fitting a ſail, which is thus performed: when a ſhip ſails before a wind, or with a quarter-wind, and in a freſh gale, the ſeamen ſometimes, to make the more haſte, unparal the mizen-yard, and then they launch out both ſail and yard over the quarter on the lee-ſide, fitting guyes at the farther end, to keep the yard ſteady with a boom, and this booms out the mizen-ſheet. This they do to give the ſhip the more way, which otherwiſe, with theſe winds, the mizen-ſail could not do; and this ſail, ſo fitted, is called a *gooſe-wing*, and ſometimes a *ſtudding-ſail*.

GOOSEBERRY-*buſh*, *groſſularia*, in *Botany*. Its characters are theſe: the flower has a permanent empalement, cut into five parts at the top, which is concave and coloured; it has five ſmall, obtuſe, erect petals, which riſe from the border of the empalement; and five awl-ſhaped ſtamina, which are inſerted into the empalement; the germen is ſituated below the flower, and afterward becomes a globular berry, having a navel, with one cell, which is filled with roundiſh compreſſed ſeeds incloſed in a pulp. There are five ſpecies, including ſeveral varieties, bearing the names of the perſons who raiſed them. This is a ſpecies of the *ribes* in the Linnæan ſyſtem. See CURRANT-*tree*.

The *gooſeberry-buſh* is propagated either by ſuckers or cuttings, but the latter way is preferable, as the roots are leſs ſubject to ſhoot out ſuckers afterwards.

The beſt ſeaſon for planting the cuttings is in autumn, juſt before the leaves begin to fall; obſerving always to take the handſomeſt ſhoots, and to pick them from ſuch branches as produce the greateſt quantity of fruit. The cuttings ſhould be about ſix or eight inches long, and ſhould be planted in a bed of light earth expoſed to the morning ſun; they muſt be planted about three inches deep, and watered to help their taking root. The ſhoots ſhould all be rubbed off from theſe plants as they put out, except thoſe at the top, that there may be a regular ſtem. In the October following, they ſhould be removed to a bed of fine light earth, and planted in rows at three feet diſtance, and one foot aſunder in the rows. They ſhould remain here one year, and the croſs branches at times be cut off, as alſo the lower ones, ſo as to keep a clean ſtem about a foot above the ground. They will be then fit to plant out where they are to ſtand, which ſhould be in a light ſandy loam. They ſhould be kept from the ſhade of other trees; and to have the fruit in its utmoſt perfection, ſhould be ſet in an expoſed place in rows of eight feet aſunder, and each of the ſhrubs ſix feet from the others in the rows. The beſt time for tranſplanting them is in October, when the leaves begin to decay. Miller.

GOOSEBERRY *of Barbadoes*. See *Melon* THISTLE.

GOOSEBERRY-*tree*, *American*, *melaſtoma*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower has five roundiſh petals, which are inſerted into the border of a permanent empalement; and ten ſhort ſtamina, terminated by long recurved ſummits: under the flower is ſituated a roundiſh germen, which turns

turns to a berry with five cells, covered by the empalement which crowns it, and contains many ſmall ſeeds. There are ſixteen ſpecies, natives of the warm parts of America. Miller.

Gooseberry-*galls*, in *Natural Hiſtory*, the name given by authors to a ſpecies of protuberances of the gall kind, found very frequently on the oak. They are of a roundiſh figure, and ſometimes adhere to the tree by a ſhort pedicle, but more frequently by a part of their ſpheric ſurface. They are uſually found on the under ſide of the leaves of the oak, but ſometimes on the young ſhoots, and ſometimes on the pedicles of the leaves.

They are moſt frequent in ſpring, but they are found at all times when the leaves are upon the trees. Theſe galls are greeniſh at firſt, and afterwards become yellowiſh, and finally red; in which laſt ſtate they very much reſemble the ſmall red *gooſeberry*. They are very ſoft to the touch, and when opened are found to contain a juicy ſubſtance, with a cavity in the midſt, in which there is lodged a ſingle inſect. This, according to the time in which the gall is opened, is found in the form of a white worm, or elſe of a white chryſalis, or finally of a ſmall ſhort-bodied four-winged fly of a black colour; for the creature does not leave the gall to go through any of its changes, but paſſes all its ſtates in it. The gall, in all theſe caſes, is found whole and unhurt; but if one is opened in which there is a hole pierced, this is ſure to be found empty, that being the paſſage by which the fly has made its way out. Reaum. Hiſt. Inſ. vol. vi. p. 214.

Gooseberry-*worm*, in *Natural Hiſtory*, the name of an inſect, found very frequently on the *gooſeberry*-buſhes, and uſually ſuppoſed to be a caterpillar, but differing eſſentially from that genus of animals, and being one of thoſe which the French call *fauſſe-chenilles*. It has a round head, and has twenty-two legs, and finally becomes not a butterfly, but a common four-winged fly. This worm is at firſt of a greeniſh colour, with ſome yellow variegations, and ſeveral black tubercles; but on the laſt change of its ſkin it becomes whitiſh or cream-coloured, and loſes its tubercles. Reaum. Hiſt. Inſ. vol. ix. p. 18.

GOR, a name given by ſome writers to a very lofty tree, which bears a fruit like a cheſnut; it grows principally on the banks of the river Niger, and that not near the ſea, but far up the country.

Gor-*cock*, in *Ornithology*, the name of a bird of the gallinaceous kind, called by authors the lagopus altera, and by many the moor-cock, or red game; it is of the ſhape of the partridge, but is half as large again. Its beak is black and ſhort, and it is very remarkable for the bare ſpace over its eyes, which is very broad and of a fine bright red, and in the cock is ſurrounded by a prominence of the ſame bright colour, bare of feathers, and fimbriated like a cock's comb. The male is alſo diſtinguiſhed from the female, by having a black plumage at the baſe of the bill interſperſed with frequent white ſpots, and ſome large white ſpots near the origin of the under chap: the male is alſo redder than the female in all parts, and on his throat and breaſt is of a fair red, without the mixture of any other colour. The head, neck, back, and wings, are all variegated with red and black: the breaſt and belly are of the ſame colours with the back, but on the breaſt there are ſome variegations of white. The legs and feet are covered with a very long and thick plumage to the very ends of the toes; the wings are browniſh, with ſome reddiſh variegations; and the tail is almoſt wholly black. It is ſeldom found but on the tops of very high hills, and is very common in Derbyſhire, Yorkſhire, and Wales, where it feeds on mountain berries and the tops of heath. It lays ſeven or eight eggs, which are of a mixed red and black colour, and are all over covered with ſmall ſpots, except for one or two ſpaces, which are clear near the ſmall end. The young brood follow the hen during the whole ſummer: in the winter they join in flocks of forty or fifty, and are remarkably ſhy and wild. This is a very well taſted bird. The Italians call this, as well as the lagopus, by the common name of *francolino*, and Mr. Ray imagines that the lagopus of Pliny and this are indeed the ſame ſpecies of bird, though different in colour; but Mr. Pennant obſerves, that the account left us by Pliny ſeems too brief and uncertain to determine, at this time, what ſpecies he intended, and that the *francolino* is not the ſame with our grous is evident from the figure exhibited of it by Mr. Edwards. Ray and Pennant.

GORAIS, in *Ichthyology*, a name uſed by ſome authors for the more common ſpecies of the CARASSIUS: the third ſpecies, as it is called by Geſner, &c.

GORCE, or Gourt, denotes a wear. By ſtat. 25 Edw. III. cap. 4. it is ordained, that all *gorces*, mills, wears, &c. levied or ſet up, whereby the king's ſhips and boats are diſturbed, and cannot paſs in any river, ſhall be utterly pulled down, without being renewed. Sir Edward Coke derives this word from *gurges*, *a deep pit of water*, and calls it a *gors*, or *gulf*; but this ſeems to be a miſtake, for in Doomſday it is called *gourt* and *gort*, the old French word for a *wear*.

GORDIAN, a term in *Hiſtory*. Gordian *knot* was a knot made in the leathers or harneſs of the chariot of Gordius, king of Phrygia, and father of Midas; ſo very intricate, that there was no finding where it began or ended.

The inhabitants had a tradition, that the oracle had declared, that he ſhould be maſter of Aſia who could untie this knot. Alexander having undertaken it, and fearing that, if he ſhould not be able to effect it, it would be deemed an ill augury, and prove a check in the way of his conqueſts, cut it aſunder with his ſword; and thus, ſays Quintus Curtius, either accompliſhed the oracle, or eluded it. But Ariſtobulus gives a different account of this matter. See Arrian, lib. iii. cap. 20. and Plut. in Vit. Alex.

Some will have the phraſe derived from Gordius, who tied the fatal knot; others from Gordium, a city in Phrygia, where the knot was made.

GORDONIA, *loblolly bay*, in *Botany*, a genus of the *monadelphia polyandria* claſs. Mr. Miller has erroneouſly claſſed this elegant American evergreen-tree under the genus of *hibiſcus*, and Linnæus under that of *hypericum*; but Mr. Ellis has made it a diſtinct genus, under the name of *Gordonia*, in compliment to Mr. James Gordon, ſome time a diſtinguiſhed gardener and botaniſt in the neighbourhood of London. Its characters are theſe: the perianthium conſiſts of five concave, roundiſh, downy leaves, hairy on their edges; the flower is compoſed of five large, fleſhy, concave, inverted-oval petals, united at the baſe, which includes a funnel-ſhaped fleſhy ſubſtance, like a nectarium, ſurrounding the germen; the filaments of the ſtamina are numerous and linear, inſerted in the top of the funnel-ſhaped tube, but equally diſtinct from each other; the antheræ are of an oval form and erect, having a cell on each ſide full of farina of a globular ſhape; the germen is oval and acuminated towards the top, where the ſtyle begins: the ſtyle is ſhort, and formed with five ſmall ridges on the ſides, which terminate in five acute ſtigmata, diſpoſed horizontally in a radiated form; on the upper part of each of theſe is a longitudinal cavity, covered with down: the capſule, which is egg-ſhaped and acuminated at the top, is of a woody conſiſtence, and opens, when ripe, into five valves with five cells; each of which contains two ſeeds that are kidney-ſhaped, and winged obliquely on one ſide. Phil. Tranſ. vol. lx. N° 44. p. 518, &c.

GORE, in *Heraldry*, denotes one of the regular ABATEMENTS, uſed, according to Guillim, to denote a coward. It conſiſts of two arches or curve lines, drawn, one from the ſiniſter chief, the other from the ſiniſter baſe, and meeting in an acute angle in the middle of the feſſe-point, as repreſented in *Tab.* II. *Heraldry*, *fig.* 66.

GOREING, or Goring, is ſaid of a ſail when cut flanting, ſo that it is broader at the clew than at the earing, as all top-ſails and top-gallant-ſails are.

GOREL, a name or title given to the prince of Georgia. The *gorel* is always a Mahometan. The ſophi of Perſia obliges him to obſerve the religion of the Alcoran, in order to preſerve the dignity of *gorel* in his family.

GORGE, in *Falconry*, is the uppermoſt bag or ſtomach of a hawk or falcon, being that which receives the food the firſt.

The *gorge*, *ingluvies*, is the ſame, in birds of prey, with what we call the *craw* or *crop*. When the bird is fed, he is ſaid to be *gorged*.

Gorge, in *Architecture*, denotes a ſort of concave moulding, wider but not ſo deep as a SCOTIA; uſed chiefly in frames, chambranles, &c. See *Tab. Archit. fig.* 6 *and* 8.

Gorge *of a chimney* is the part between the chambranle and the crowning of the mantle. Of this there are divers forms; ſtrait, perpendicular, in form of a bell, &c.

Gorge is ſometimes alſo uſed for a moulding that is concave in the upper part, and convex at bottom; more properly called GULA and CYMATIUM.

Gorge is alſo uſed for the neck of a column; more properly called *colarin* and GORGERIN.

Gorge, in *Fortification*, the entrance of a BASTION, or of a RAVELIN or other OUT-*work*.

The Gorge *of a baſtion* is what remains of the ſides of the polygon of a place, after retrenching the curtins; in which caſe it makes an angle in the center of the baſtion. Such is AHD, *Tab. Fortif. fig.* 1.

In flat baſtions, the *gorge* is a right line on the curtin, reaching between the two flanks.

GORGE *of a half-moon* or *ravelin*, is the ſpace between the two ends of their faces next the place.

Gorge of the other out-works is the interval betwixt their ſides next the ditch.

All the *gorges* are to be made deſtitute of parapets; otherwiſe the beſiegers, having taken poſſeſſion of a work, might make uſe thereof to defend themſelves from the ſhot of the place: ſo that they are only fortified with paliſadoes, to prevent a ſurprize.

GORGE. *Half the* GORGE, DEMI GORGE, that part of the polygon between the flank and the center of the baſtion; as A H.

GORGED, in *Heraldry*, is when a crown, coronet, or the like thing, is borne about the neck of a lion, a ſwan, &c. In that caſe they ſay, the lion or cygnet is *gorged* with a ducal coronet, &c.

GORGED is alſo uſed when the gorge or neck of a peacock, ſwan, or the like bird, is of a different colour or metal from the reſt.

GORGED, among *Farriers*, &c. ſignifies as much as ſwelled. In which ſenſe they ſay, the legs of a horſe are *gorged*; the paſtern joint is *gorged*; you muſt walk him out, to *diſgorge* his ſhoulder.

GORGERIN, a part of the ancient armour; being that which covered the throat or neck of a perſon armed at all points.

GORGERIN, or GORGE, in *Architecture*, the little freeze, in the Doric capital, between the aſtragal, at the top of the ſhaft of the column, and the annulets. See *Tab. Archit. fig.* 25. N° 18.

Some call it *collarino.* Vitruvius gives it the name *hypotrachelium.*

GORGET, in *Military Affairs*, a piece of braſs or ſilver, worn by the officers of foot upon their breaſts when on duty. The *gorget* hangs round the neck by a ribband; they are ſometimes gilded, and have commonly ſome device engraved on them; as the ſovereign's, or even the colonel's coat of arms, creſt, or cypher.

GORGET, or GORGERET, in *Surgery*, is the name which the French give to the concave or cannulated CONDUCTOR, uſed in LITHOTOMY. See *Tab.* III. *Surgery, fig.* 30. In *fig.* 31. there is exhibited the *gorget*, as it has been improved by Mr. Le Cat, and which he calls *gorgeret urethro-ciſtitome.* A is a ring for paſſing the middle finger of a right hand, which graſps the handle G. B is another ring, which is ſlid by the fore-finger towards *d*, to puſh the blade *a b* out of the groove EF. The figure repreſents the inſtrument in the ſtate in which it is at the very inſtant when the inciſion is made into the neck of the bladder. The ſame fore-finger draws the piece B back towards A, when the operator intends to make the blades return into the groove F; where they lie hid, while he introduces the inſtrument from *d* to *e*, in order to ſecure the pieces *a*, *b*, *c*, *d*, *e*, in their proper ſituation. The pins which bind the hinges *a*, *b*, *c*, muſt not be in the center of the pieces, but as they are expreſſed in the figure: where *b* is pretty near the outer edge, and the other two, *a*, *e*, on the oppoſite ſide; ſo that, when the ring B is thruſt forward, the hinge *b* may bend and iſſue out of the groove F, by making the angle *a b c*. Phil. Tranſ. vol. xlvi. p. 100.

GORGONIA, in *Natural Hiſtory*, a name given by ſome writers to CORAL, on occaſion of its ſuppoſed change from a ſoft ſubſtance to an abſolute ſtone, on being brought out of the water into the air; but this is known now to be a fabulous opinion, coral being as hard while growing to the rocks, as when it has been ever ſo long out of the ſea.

The *gorgoniæ* are a genus of ZOOPHYTES, which formerly were called *ceratophytons*, and are known in Engliſh by the names of ſea-fans, ſea-feathers, and ſea-whips. Dr. Linnæus and Dr. Pallas conſider them as of a mixed nature in their growth, between animals and vegetables; but Mr. Ellis has clearly proved, that they are true animals of the POLYPE kind, growing up in a branched form reſembling a ſhrub, and in no part vegetable. They differ from the freſh water polype in many of its qualities, and particularly in producing from its own ſubſtance a hard and ſolid ſupport, ſerving many of the purpoſes of the bone in other animals. This is formed by a concreting juice thrown out from a peculiar ſet of longitudinal parallel tubes, running along the internal ſurface of the fleſhy part: in the coats of theſe tubes are a number of ſmall orifices, through which the oſſeous liquor exudes, and, concreting, forms the layers of that hard part of the annular circles, which ſome, judging from the conſiſtence rather than the texture, have erroneouſly denominated wood. The ſurface of the *gorgonia* is compoſed of a kind of ſcales, ſo well adapted to each other as to ſerve for defence from external injuries: and the fleſh, or, as ſome have called it, the bark or cortex, conſiſts of proper muſcles and tendons for extending the openings of their cells; for ſending forth from thence their polype ſuckers in ſearch of food; and for drawing them in ſuddenly, and contracting the ſphincter muſcles of theſe ſtarry cells, in order to ſecure theſe tender parts from danger; and alſo of proper ſecretory ducts, to furniſh and depoſit the oſſeous matter that forms the ſtem and branches as well as the baſe of the bone. Mr. Ellis affirms, that there are ovaries in theſe animals, and thinks it very probable, that many of them are viviparous. Phil. Tranſact. vol. lxvi. part i. art. 1. See CORALLINES.

GORGONEI *fontes*, an affected term uſed by ſome of the writers in chemiſtry, to expreſs thoſe ſprings or waters which turn things into ſtone. We have ſeveral ſprings in England, which cover over things with a ſtony matter, without introducing it into their inner ſtructure; but there are very few certain inſtances of waters, which at this day abſolutely petrify wood, that is, fill its pores with true ſtony matter. The famous water of Lough Neagh, in Ireland, is much diſputed by ſome as to its having this quality, and many fruitleſs experiments have been made in attempting to prove that it has.

GORGONEUM, Γοργονειὸν, in *Antiquity*, a kind of maſque uſed on the ancient theatre to repreſent hideous and frightful figures, in imitation of the GORGONS. Mem. Acad. Inſcript. tome v. p. 184.

GORGONIUM, in *Botany*, a name given by ſome authors to the common eryngium or eryngo, the roots of which we uſe candied.

GORGONS, in *Antiquity* and *Mythology*. Authors are not agreed in the account they give of the *Gorgons*. The poets repreſent them as three ſiſters, whoſe names were Stheno, Euryale, and Meduſa; the latter of whom was mortal, and having been deflowered by Neptune, was killed by Perſeus; the two former were ſubject neither to age nor death. They are deſcribed with wings on their ſhoulders, with ſerpents round their heads, their hands were of braſs, and their teeth of a prodigious ſize, ſo that they were objects of terror to mankind. After the death of Meduſa, her ſiſters, according to Virgil, were appointed to keep the gate of the palace of Pluto.

> *Multaque præterea variarum monſtra ferarum*—
> GORGONES, *Harpeiæque*——

Diodorus Siculus will have the *Gorgons* and Amazons to have been two warlike nations of women, who inhabited that part of Libya which lay on the lake Tritonidis. The extermination of theſe female nations was not effected till Hercules undertook and performed it.

Pauſanias ſays, the *Gorgons* were the daughters of Phorbus, after whoſe death Meduſa, his daughter, reigned over the people dwelling near the lake Tritonidis. The queen was paſſionately fond of hunting and war, ſo that ſhe laid the neighbouring countries quite waſte. At laſt, Perſeus having made war on them, and killed the queen herſelf, when he came to take a view of the field of battle, found the queen's corpſe ſo extremely beautiful, that he ordered her head to be cut off, which he carried with him to ſhow his countrymen, the Greeks, who could not behold it without being ſtruck with aſtoniſhment.

Others repreſent them as a kind of monſtrous women, covered with hair, who lived in woods and foreſts. Others, again, make them animals, reſembling wild ſheep, whoſe eyes had a poiſonous and fatal influence. For a farther account of them, ſee Mem. Acad. Inſcript. vol. iv. p. 72. ſeq. See MEDUSÆ *caput.*

GORSE. See FURZE.

GOSHAWK, in *Zoology*, the Engliſh name for the *accipiter* or *falco palumbarius*, a very large hawk, which preys on pheaſants, geeſe, and hares, and is remarkable for the ſhortneſs of its wings.

It is larger than the common buzzard, but of a longer and more elegant form. The bill is blue towards the baſe, black at the tip; the cere is a yellowiſh green; over each eye is a white line, and on the ſide of the neck a bed of broken white; the head, hind part of the neck, back, and wings, are of a deep brown colour; the breaſt and belly white, beautifully marked with numerous tranſverſe bars of black and white; the tail is long, of a browniſh aſh-colour, marked with four or five duſky bars placed remote from each other. The legs are yellow; the claw of the back and that of the inner toe very large and ſtrong. This bird breeds in Scotland, and builds its neſt in trees. Ray and Pennant.

GOSLINGS, the name given to young geeſe.

GOSPEL, a hiſtory of the life, actions, death, reſurrection, aſcenſion, and doctrine of Jeſus Chriſt.

The word is Saxon, and of the ſame import with the Latin term *evangelium*, or the Greek ευαγγέλιον, which ſignifies *glad tidings*, or *good news*; the hiſtory of our Saviour being the beſt hiſtory ever publiſhed to mankind. This hiſtory is contained in the writings of St. MAT-

THEW, St. MARK, St. LUKE, and St. JOHN; who from thence are called Evangeliſts. The Chriſtian church never acknowledged any more than theſe four Goſpels as canonical; notwithſtanding which, ſeveral apocryphal goſpels are handed down to us, and others are entirely loſt.

GOSSAMER is the name of a fine filmy ſubſtance, like cobwebs, which is ſeen to float in the air, in clear days in autumn, and is more obſervable in ſtubble-fields, and upon furze and other low buſhes. This is probably formed by the flying ſpider, which, in traverſing the air for food, ſhoots out theſe threads from its anus, which are borne down by the dew, &c.

GOSSAMPINUS, a name given by Pliny and the ancients to a tree growing in the Eaſt Indies, which produced a ſort of cotton, the threads of which were too ſhort to be ſpun or carded; ſo that it ſerved only for the ſtuffings of beds and the like, for which it was very proper, being very light and ſoft. It was in ſome eſteem in medicine alſo, to recall the heat and ſpirits into parts to which it was applied. It is called by Piſo *arbor lanigera, the wool-tree*, and had its ancient name from the words *goſſipium, cotton*, and *pinus, the pine-tree*, being ſomewhat like the pine in external appearance, yet bearing a ſort of cotton.

GOSSYPIUM. See COTTON.

GOTHIC, or GOTHICK, ſomething that has a relation to the Goths, an ancient people, originally inhabiting that part of Sweden called Gothland; whence they ſpread themſelves over Greece, Dalmatia, Bulgaria, Italy, Spain, &c.

We ſay, the *Gothic* manner; *Gothic* ignorance; the tyrant Maximian was of *Gothic* race.

It has been a general opinion, ſtrenuouſly maintained by Cluverius and Pelloutier, and adopted by Mallet in his Northern Antiquities, that the *Gothic* and Celtic nations were the ſame: but the ingenious Engliſh tranſlator of Mr. Mallet's work has produced a variety of teſtimonies from ancient authors to prove, that the Celtic and Teutonic or *Gothic* nations were, *ab origine*, diſtinct, and that they differed conſiderably in perſon, manners, laws, religion, and language. The former were the anceſtors of the Gauls, Britons, and Iriſh; and the Germans, Saxons, and Scandinavians derived their origin from the latter. The Celtic tribes were probably the firſt that travelled weſtward; and the *Goths*, or Getæ of the ancients, who emigrated at different times from the eaſtern countries after them, might borrow ſome of their opinions and practices, which will account for the reſemblance that has been obſerved between them, without admitting that they were deſcended from them, or that they ſhould be conſidered as the ſame people. In the ſame way we may account for thoſe reliques both of Celtic and *Gothic* ſuperſtitions which are diſcernible in Gaul and Britain and many other countries, the inhabitants of which derive their deſcent equally from the Celts and *Goths*, who were at different times maſters of theſe kingdoms, and whoſe deſcendants are now blended together: thus, the firſt inhabitants of Gaul and Britain being of Celtic race, followed the Druidical ſuperſtition. The ancient Germans, Scandinavians, &c. being of *Gothic* race, profeſſed that ſyſtem of polytheiſm which was afterwards delivered in the EDDA: and the Franks and Saxons, who afterwards ſettled in Gaul and Britain, being of *Gothic* race, introduced the polytheiſm of their own nation, which was in general the ſame that prevailed among all the other *Gothic* or Teutonic people. With regard to the *Gothic* and Celtic languages, they are radically different from each other; and from theſe two mother-tongues the following particular languages are ſeverally derived: from the *Gothic* are derived the old Saxon or Anglo-Saxon, the Francic or Franco-theotiſe, and the Cimbric or old Icelandic; of the old Saxon are formed the Engliſh, the broad or Lowland Scotch, the Belgic or Low Dutch, and the Friſic or Friezeland tongue; from the Francic proceed the German or High Dutch, the German of Swabia, and the Swiſs; and the Cimbric is the immediate ſource of the Icelandic, Norwegian or Norſe, Daniſh, and Swediſh. From the Celtic language are derived the ancient Gauliſh, the ancient Britiſh, from which proceeded the Welch, Armorican or Bas-Bretagne, and Corniſh; and the ancient Iriſh, from which ſprung the Iriſh, Erſe or Highland Scotch, and the Manks or language of the Iſle of Man. See the preface and notes to the Engliſh edition of Mallet's Northern Antiquities, 1770. See TEUTONIC.

GOTHIC *Bible*. See BIBLE.

The *Gothic* verſion of the four Goſpels, firſt printed at Dort in 1665, was publiſhed at Oxford in 1750, by Mr Lye: this edition was deſigned and prepared by Benzelius, archbiſhop of Upſal, with a Latin tranſlation and notes, in which the editor introduced ſome ſmall variations, and added a *Gothic* grammar. The ancient manuſcript of the *Gothic* verſion is preſerved in the library of the univerſity of Upſal, in Sweden, under the name of the *Codex Argenteus*, or *ſilver book*, becauſe the letters, which ſeem to have been ſtamped on the vellum leaves with hot metal types, are of ſilver, except the initials, which are gold. Another fragment of this curious verſion, containing part of the Epiſtle to the Romans, has been ſince diſcovered in the library at Wolfenbuttle, and publiſhed a few years ago in a ſplendid volume in quarto, by the Rev. F. A. Knitell, archdeacon of Wolfenbuttle.

GOTHIC *character* or *writing*, is a character or manner of writing which, in the main, is the ſame with the Roman, only that it is very full of angles, turns, and bendings, eſpecially at the beginning and ending of each letter.

The manuſcripts in *Gothic* characters are not very ancient. Ulphilas, biſhop of the Goths, was the firſt inventor of the *Gothic* characters, and the firſt that tranſlated the Bible into the *Gothic* tongue.

The letters uſed in the *Gothic* goſpels are twenty-five in number, and formed, with ſlight variations, from the capitals of the Greek and Latin alphabet.

The Runic characters are alſo frequently called *Gothic* characters. See Mabillon, De Re Diplomat. lib. i. cap. 2. But they who take the *Gothic* characters to be the ſame with the Runic, are miſtaken; as is ſhewn by Ol. Wormius, Junius in his Preface to the Goſpels wrote in *Gothic* letters, and Dr. Hicks on the Runic Tongue.

GOTHIC *architecture* is that which deviates from the proportions, characters, &c. of the antique.

The *Gothic* architecture is frequently very ſolid, heavy, and maſſive; and ſometimes, on the contrary, exceedingly light, delicate, and rich. An abundance of little whimſical ornaments are its moſt uſual character.

Authors diſtinguiſh two kinds of *Gothic* architecture; the one *ancient*, the other *modern*. The *ancient* is that which the Goths brought with them from the North, in the fifth century: the edifices built in this manner were exceedingly maſſive, heavy, and coarſe. The characteriſtic marks of this ſtyle are theſe: the walls are very thick, generally without buttreſſes; the arches, both within and without, as well as thoſe over the doors and windows, ſemi-circular, and ſupported by very ſolid or rather clumſy columns, with a kind of regular baſe and capital: in ſhort, plainneſs and ſolidity conſtitute the ſtriking feature of this method of building. However, the architects of thoſe days, when this ſtyle prevailed, did not wholly neglect ornaments.

Thoſe of the *modern Gothic*, or, as it ſhould rather be called, the ARABESC, was introduced about the tenth century, and run into the other extreme, being light, delicate, and rich to a fault; witneſs Weſtminſter-abbey, the cathedral of Litchfield, the croſs of Coventry, &c.

The laſt kind continued long in uſe, eſpecially in Italy; viz. from the thirteenth century to the reſtauration of the antique building in the ſixteenth. All the ancient cathedrals are in this kind.

The inventors of the *Gothic* architecture thought, no doubt, they had far ſurpaſſed the Greek architects; a Greek building has not a ſingle ornament but what adds a beauty to the whole: the parts neceſſary to ſuſtain or ſhelter it, as the columns, corniches, &c. derive all their beauty from their proportions; every thing is ſimple, meaſured, and reſtrained to the uſe it is intended for; no daring out-of-the-way ſtrokes; nothing quaint to impoſe on the eye; the proportions are ſo juſt, that nothing appears very grand of itſelf, though the whole be grand. On the contrary, in the *Gothic* architecture, we ſee huge vaults raiſed on ſlender pillars, which one would expect every minute to tumble down, though they will ſtand for many ages. Every thing is crammed with windows, roſes, croſſes, figures, &c.

The marks which conſtitute the character of modern *Gothic* or Saracenical architecture, are its numerous and prominent buttreſſes, its lofty ſpires and pinnacles, its large and ramified windows, its ornamental niches or canopies, its ſculptured ſaints, the delicate lace-work of its fretted roofs, and the profuſion of ornaments laviſhed indiſcriminately over the whole building: but its peculiar diſtinguiſhing characteriſtics are, the ſmall cluſtered pillars and pointed arches, formed by the ſegments of two interſecting circles; which arches, though laſt brought into uſe, are evidently of a more ſimple and obvious conſtruction than the ſemi-circular arches. The firſt appearance of this ſtyle of building in our country was towards the latter end of the reign of Henry II. In the reign of Henry III. it ſeems to have gained a complete footing: the preſent cathedral church of Saliſbury, which is entirely in this ſtyle, was begun early in this reign, and finiſhed in the year 1258. From the reign of Henry VIII. or the cloſe of that of Henry VII. the *Gothic*

Gothic architecture began to decline, and was ſoon after ſupplanted by a mixed ſtyle, wherein the Grecian and *Gothic* are blended together. The Roman or Grecian architecture did not prevail in England till the time of Inigo Jones; yet there were ſome earlier ſpecimens of this ſtyle, particularly Somerſet-houſe in the Strand, built in 1549, but lately pulled down, and rebuilt.

Moſt of the great buildings of queen Elizabeth's reign have a ſtyle peculiar to themſelves; in which, though much of the old *Gothic* is retained, and great part of the new taſte is adopted, yet neither predominates; while both, thus indiſtinctly blended, compoſe a fantaſtic ſpecies, hardly reducible to any claſs or name. One of its characteriſtics is, the affectation of large and lofty windows. See ARCHITECTURE.

GOTHIC *column* is any round pillar in a *Gothic* building, either too thick or too ſmall for its height.

There are ſome found even twenty diameters high, without either diminution or ſwelling.

GOTHIC *medals*. See MEDAL.

GOTTORUGINE, in *Ichthyology*, the name of a ſmall fiſh common in the Mediterranean, and brought to market at Rome, Venice, &c. It has no ſcales, but is ſoft and lubricous to the touch, large toward the head, and ſmaller toward the tail, and of a flatted ſhape. Its colour is mottled with olive-colour and a browniſh red, diſpoſed in lines running half-lengths, and parted by other lines of a pale blue. It is uſually of about ſix or ſeven inches long. It has no ſwimming-bladder, and the anus is ſituated nearer the head than the tail. See ADONIS and FLYING-*fiſh*.

GOUANIA, in *Botany*, a genus of the *polygamia monoecia* claſs. This genus bears hermaphrodite and male flowers: the hermaphrodite have a calyx divided into five ſegments; no corolla; five antheræ; and a trifid ſtyle; the fruit is compoſed of three parts: the male reſemble the former, but has neither germen nor ſtigma.

GOUD, or GAUD. See WELD.

GOVERNMENT, a quality or office which gives a man power or right to command or rule over a place, a city, a province, a kingdom, or the like, either ſupremely or by deputation.

Government is either *general* and ſupreme, as that of a whole kingdom, empire, ſovereign ſtate, &c. or *particular* and ſubordinate; which, again, is ſubdivided into *civil*, *military*, and *eccleſiaſtical*.

Our cities, corporations, and boroughs, are uſually governed by mayors, with aldermen and common-councilmen.

GOVERNMENT is alſo uſed for the country, city, or place to which the power of governing or commanding is extended.

There are thirty-eight *governments* or provinces in France, independent of each other. Beſide theſe, there is another diviſion into *governments*, called *grand governments*, whereof there are twelve; viz. thoſe of the Iſle of France, Burgundy, Normandy, Britanny, Picardy, Dauphiny, &c. which are not proper provinces, commanded each by its ſeparate governor, but rather ſo many claſſes of governors or *governments*, contrived for the better and eaſier regulating the ſeats, &c. of ſo many governors, bailiffs, provoſts, &c. as were obliged to aſſiſt at the holding of the general eſtates.

GOVERNMENT, again, is uſed for the manner or form of *governing*, i. e. for the policy of a country, ſtate, &c.

In this ſenſe, *governments* are divided into MONARCHIES, ARISTOCRACIES, and DEMOCRACIES.

The *government* of France is *monarchic*; that of Venice, *ariſtocratic*; and that of the United Provinces, *democratic*: the *government* of England is *mixt*; being monarchical, ariſtocratic, and democratic, all in one.

Civil *government* and ſociety originate in the wants and fears of individuals, who, being naturally free, equal, and independent, aſſociate together, either by expreſs or tacit conſent, for the mutual preſervation of their lives, liberties, and eſtates, on this fundamental principle, that the whole ſhould protect all its parts, and that every part ſhould pay obedience to the will of the whole. However the ſeveral forms of *government*, that now ſubſiſt, actually began, there is and muſt be in all of them a ſupreme, irreſiſtible, abſolute, uncontrolled authority, in which the *jura ſummi imperii*, or the rights of ſovereignty, reſide: and this authority is placed in thoſe hands, wherein, according to the opinion of the founders of ſuch reſpective ſtates, either expreſly given, or collected from their tacit approbation, the qualities requiſite for ſupremacy, viz. wiſdom, goodneſs, and power, are the moſt likely to be found.

Individuals unite for mutual protection and benefit; and, therefore, the legiſlative and executive authority of *government*, originally derived from themſelves, ſhould be invariably directed to no other end but their ſafety and welfare: and that form of *government* is moſt eligible, which is beſt adapted to theſe purpoſes. Cicero declares himſelf of opinion, in his fragments De Rep. lib ii. "*eſſe optimam conſtitutam rempublicam, quæ ex tribus generibus illis, regali, optimo & populari, ſit modicè confuſa.*" Of this kind is the Britiſh conſtitution, which lodges the executive power of the laws in a ſingle perſon, and the legiſlative in three diſtinct powers, entirely independent of each other; viz. the king; the lords ſpiritual and temporal, forming an ariſtocratical aſſembly; and the houſe of commons, freely choſen by the people, which renders it a kind of democracy: and each branch of this aggregate body, actuated by different views, and attentive to different intereſts, is armed with a negative power, ſufficient to repel any innovation which it ſhall think inexpedient or dangerous. Nothing can endanger or hurt the conſtitutional *government* of Britain, but deſtroying the equilibrium of power between one branch of the legiſlature and the reſt: for if ever it ſhould happen that the independence of any one of the three ſhould be loſt, or that it ſhould become ſubſervient to the views of the other two, there would ſoon be an end of our conſtitution: the legiſlature would be changed from that which was originally ſet up by the general conſent and fundamental act of the ſociety; and ſuch a change, however effected, is, according to Mr. Locke, at once an entire diſſolution of the bands of *government*, and the people are thereby reduced to a ſtate of anarchy, with liberty to conſtitute to themſelves a new legiſlative power. Locke on Government, book ii. chap. 19. Blackſt. Com. vol. i. Introd. See LAW, LIBERTY, PARLIAMENT, &c.

GOVERNMENT, in *Grammar*, is underſtood of that conſtruction of nouns and verbs, wherein they require ſome alteration to be made in others joined or conſtructed with them.

Conſtruction is divided into two parts; that of CONCORD, and that of *government*, called alſo REGIMEN.

GOVERNOR, an officer veſted by a king, or ſovereign prince, with the command and adminiſtration of a province, place, &c.

A *governor* repreſents the king; and not only commands the garriſon, troops, &c. but the citizens, &c. A *governor* of a fortified place was anciently required to hold out three attacks, before he ſurrendered.

GOVERNOR is alſo frequently uſed for a preſident, or ſuperintendant.

Thus we ſay, the *governor* of the bank; the *governor* and directors of the South Sea company; the *governor* of an hoſpital, &c.

GOVERNORS *of the cheſt at Chatham*, are officers appointed to take care of, and relieve the poor and maimed ſeamen belonging to the royal navy. Vid. 22 and 23 Car. II.

GOUF. See GOLF.

GOUGE, an inſtrument uſed by divers artificers; being a ſort of round, hollow chiſſel; ſerving to cut holes, chanels, grooves, &c. in wood, ſtone, &c.

GOUMA, in *Mineralogy*, the name given by the natives of the iſland of Samos, to the Samian earth, called *terra Samia* by the old writers.

GOURD, *Cucurbita*, in *Botany*, a genus of the *monoecia ſyngeneſia* claſs. Its characters are theſe: it hath male and female flowers, which are bell-ſhaped, adhering to a bell-ſhaped empalement of one leaf, and compoſed of one petal, divided at the top into five parts, on the ſame plant; the male flowers have three ſtamina, which are connected at the extremity, but are diſtinct at their baſe; the female flowers have a large germen, which becomes a large fleſhy fruit, having three ſoft membranaceous cells, which are diſtinct, incloſing two rows of ſeeds, which are bordered. Miller reckons five ſpecies, and Linnæus ſix, one of which is the common pompion or PUMPKIN, and another the calabaſh or MELOPEPO.

Gourds are eſteemed cooling and diuretic, are uſed in emulſions, and eſteemed good in fevers, and all diſorders ariſing from the acrimony of the blood or humours. Emulſions of theſe, and the other cold ſeeds, are anodyne, and are generally uſed to take off ſtranguries occaſioned by bliſters: but thoſe prepared from ſweet almonds are now univerſally preferred.

GOURD, *bitter*. See COLOCYNTHIS.

GOURD, *Indian tree*. See CALABASH *tree*.

GOURD, *ſour*. See BAOBAB.

GOURD-*worm*, the Engliſh name of a ſpecies of worm found in the inteſtines of ſeveral animals. It has this name from its reſembling the ſeed of the *gourd* in figure.

GOURDY *legs of horſes*. See GREASE.

GOURY *paſhnum*, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a kind of orpiment of a deep yellow colour, veined with red in ſeveral places, and in ſome with white. It is found principally at the bottoms of mountains. They calcine it ſeveral times, and afterwards give it internally in intermitting fevers, and uſe it externally in ointments for the itch.

GOUST, *Goût*, a French term, for what the Italians call *guſto*, and we TASTE.

GOUT, *Arthritis*, in *Medicine*, a painful diſeaſe, occaſioned by a flux of ſharp humour upon the joints of the body.

Some phyſicians define the *gout*, an inflammation, ſwelling, and painfulneſs of the joints. Its origin is uſually attributed to wine, venery, gluttony, idleneſs, and grief, or any violent perturbation of the mind. Intemperance and indolence are the principal cauſes of the *gout*; however, a paroxyſm in thoſe who are ſubject to it may be occaſioned by intenſe ſtudy, too free a uſe of acid liquors, night-watching, vexation and uneaſineſs, an obſtruction or defect of any of the cuſtomary diſcharges, as the menſes, ſweating of the feet, perſpiration, &c. The prediſpoſing cauſe is the magnitude of the lacteals, and the ſtraitneſs of the ſmall veſſels, particularly the perſpiratory. The groſs tartarine *gouty* particles, ſays Dr. Hales, are moſt apt to ſettle and cauſe inflammatory obſtructions in the extremities of the body, as in the feet and hands, where the progreſſive force of the blood is the leaſt, as being fartheſt from the heart. And when theſe humours fix in the trunk of the body, they are more apt to ſettle in the ſtomach than in the guts; becauſe in the former they have as much greater a length of capillary veſſels to retard the motion of the blood, as half the circumference of the ſtomach is greater than that of the guts; for the arteries of the ſtomach do not enter its coats on one ſide only, as thoſe of the guts do, but it is ſupplied with blood by arteries which enter, ſome on the upper hand, ſome on its lower ſide; their converging branches inoſculating about the middle of the ſides. Hales's Statical Eſſays, vol. ii. p. 108. ed. 1769.

The *gout* is ſuppoſed to ariſe from two cauſes; a redundancy of humours, and a weakneſs of the joints. Its proper ſeat is in the limbs, not in the trunk of the body; in the latter caſe it frequently proves mortal; not in the former.

Muſgrave makes the apoplexy a *gout*, becauſe it ariſes from the abundance of pituita, or phlegm. According as this redundant pituita throws itſelf on the lungs, the liver, or any other part, it makes, according to him, an apoplectic *gout*, a *gout* of the liver, of the lungs, of the ſpleen, &c.

The *gout* may be conſidered as a painful, periodical, and critical paroxyſm, tending to free the body of an offenſive or corroſive matter, by throwing it upon the extremities, breathing it out inſenſibly, or comminuting it ſo as to render it harmleſs, or capable of circulating freely along with the juices; till, by collecting again, gradually increaſing, or ſeparating from the blood, it cauſes another paroxyſm.

As this diſeaſe receives different appellations, according to the places it affects, the following diſtinctions will be found neceſſary, to prevent confuſion on this head.

Arthritis is a word very differently underſtood by different authors, ſome expreſſing by it only what we call the *gout*; others making it the general name of that and many other diſeaſes of the ſame nature and origin, and diſtinguiſhing that particular ſpecies of it which we call the *gout*, by the term *podagra*. Stahl, and from him Junker, define the *arthritis* to be a ſpaſtic affection of the joints in any part of the body, afflicting the patient with a violent and laſting pain, and never coming to that ſalutary end, which nature ſeemed to intend by her motions in it. The *podagra* in particular is thus defined to be a ſpaſtic and painful affection of the foot, taking its origin from a congeſtion of blood, which ſhould have been voided by the hæmorrhoidal veſſels, and which finding no means of evacuation there, becomes very painful in its emotions, and growing into a habit afterwards, recurs on any ſlight occaſion.

When the *arthritis* is taken in its general ſenſe, it comprehends ſeveral diſeaſes ſubdiſtinguiſhed by their ſeveral ſpecific names, as the hemicrania, the ſpurious pleuriſy, the ſciatica, the chiragra, the gonagra, and finally the podagra, or *gout* in the feet.

Some authors take the word *arthritis* in a more ſpecific ſenſe than this, and yet diſtinguiſh it ſufficiently from the *podagra*; theſe expreſs by it thoſe ſpaſtic affections which happen in the upper limbs and parts of the body; it is then made of the ſame genus with the *podagra*, and diſtinguiſhed from it, as one ſpecies from another, by the following particulars.

The *arthritis* affects young perſons, the *podagra* thoſe more advanced in years. The *arthritis* is naturally the firſt of theſe two diſeaſes in perſons who have them both; and as people afflicted with it grow into years, it very naturally degenerates into a *podagra*. This is a diſtinction of ſome very judicious authors; yet in reality the ſeveral appearances of the *arthritis*, as taken in its moſt general ſenſe, differ no otherwiſe than as to the place they affect, and the times at which they happen; for they all agree in their eſſential conditions and general cauſes. The true *arthritis* is however to be carefully diſtinguiſhed from what is called the *arthritis vaga*, the wandering, ſimple, or ſcorbutic *arthritis*. This very ſuddenly flies from one part of the body to another, and changes places from the feet to the thorax, from thence to the hips, and ſo on. Junker's Conſp. Med. p. 615.

The rheumatiſm and *arthritis* are diſeaſes alſo not greatly different from, but properly ſubordinate to one another, and a light *arthritis* is very often called a fit of the rheumatiſm. The rheumatiſm is no other than a ſtagnation of the maſs of blood about particular parts of the body; taking its origin from a copious congeſtion of the blood, particularly directed by nature to that part. The rheumatiſm has its ſeat in the muſcular parts of the body, the *arthritis* principally affects the joints of the ſeveral limbs. The rheumatiſm naturally precedes the *gout*, and very often degenerates into it; it is even certain that the rheumatiſm and *arthritis* often are complicated together. Simple congeſtions and commotions of the blood differ extremely from the *arthritis*; firſt in regard to their effects, for they uſually terminate in an eruption of the blood by ſome means, but the *arthritis* never arrives at that end.

Secondly in their duration, for they are uſually terminated ſome way within a very ſhort period; but this diſeaſe is of very long and terrible duration. They differ, thirdly, in regard to the parts they affect: the ſimple congeſtions affect the internal parts and the blood veſſels; but the *arthritis* affects the external, and the muſcular fibres. Finally, they differ not leſs in regard to the event; for the ſimple congeſtions bring on inflammations and ulcerations, but the *arthritis* contractions and extenuations of the limbs.

The ſigns of the ſciatica are a vehement and excruciating pain in the hip, which remains a long time, and is felt principally in the tendons, and in the junctures of the bones. This ſpaſm ſo violently affects the muſcles of the whole ſide, that the patient is compelled to walk in a crooked poſture.

The other *arthritic* complaints, as the hemicrania, &c. are deſcribed under their ſeveral heads, and the general method of cure is the ſame in all of them.

The *gout* is either *regular*, or *irregular*. *Regular*, when it appears to be ſeated in the extremities of the body, when it chiefly and immediately affects the tendons, nerves, membranes, and ligaments of the body, about the joints, returns at ſtated periods, and with a gradual increaſe and decline of the ſymptoms. *Irregular*, when the paroxyſms are frequent, and uncertain; when the ſymptoms vary, or happen promiſcuouſly, and the diſeaſe appears to be ſeated in the internal parts of the body; as the ſtomach, brain, &c. leaving the extreme parts, as the hands, feet, &c. free from pain. According as different parts are affected by this diſtemper, it goes by ſeveral different names: when it ſeizes the feet, it is called PODAGRA; when the knees, GONAGRA; when the hands, CHIRAGRA; and when the hip-joint, SCIATICA.

Sometimes it attacks the whole body at the ſame time, and then it is called the *general* or *univerſal gout*.

The immediate cauſe of the *gout* appears to be an alkaline, or acrimonious matter in the blood; which being ſeparated from it at particular times, falls upon the joints, but moſt frequently upon the feet and hands; which, if it be repelled, or if the blood be overcharged therewith, ſo that a criſis cannot be procured in the extremities (as generally happens in old age), it falls upon the nobler parts, and then produces the irregular *gout*: but it is the tunica cellularis of the affected parts, that is the immediate ſeat of the diſeaſe.

Dr. Stevens endeavours to prove the *gouty* humours to be rather of an alkaline than acid nature.

Dr. Cajetanus Tacconus tried many experiments with the mucilage of the joints of brutes, and of men, both ſound and *gouty*, in order to diſcover whether the *gouty* matter is acid or alkaline, and concludes, that its matter is ſometimes of the one, and ſometimes of the other nature. If the *gout* produces no *tophi*, or knots, or does it very ſlowly, and eſpecially if it is attended with œdematous ſwellings, he pronounces it to depend on an alkaline humour; but if the knots are large, and quickly formed, it is owing to an acid.

Dr. Hunter thinks that the oſſeous matter is ſeparated by ſmall arteries, and thrown upon the membranes or cartilages, and that there is more or leſs ſeparated as the *vis vitæ* is greater or leſs; and that in the *gout* there is a redundancy of bony matter, which probably forms the chalk ſtones.

Dr. Cheyne ſays, that the chief reaſon why the *gouty* matter generally fixes on the joints is the preſſure there from the heads of the bones, which leſſens the capacity of the ſmall veſſels: to which may be added the ſmallneſs of the glands in the joints, and the natural coldneſs of theſe parts, occaſioned by the diſtance from the heart. The earthy particles, whoſe acrimony occaſions the *gout*, are conveyed into the *tunica cellularis* of the ligaments, tendons, &c. where the veſicles are leſs than in the bellies of the muſcles and fleſhy ſubſtances, and retained in them; and as they are more or leſs acrimonious, produce greater or leſs heat, and cauſe that inflammatory appearance and intolerable pain, which accompany this diſorder; but the parts affected ſoon loſing their ſenſibility, the ſpaſm abates, and the offending matter is again returned into the circulation, and diſcharged out of the body through the pores.

It is obſerved, that women, children, and young men, are ſeldom troubled with the *gout*, unleſs it be hereditary; and that it rarely attacks before the patient is thirty-five or forty years old, and ſometimes not till the decline of life; that the corpulent are more ſubject to it than thoſe who are ſpare and lean; that the pain increaſes towards night, and decreaſes towards the morning; that the longer the intervals between the paroxyſms, the more ſevere they prove, and the longer they generally continue. The diſeaſe uſually returns twice a year; viz. in the ſpring and autumn; and, in the latter, the paroxyſm is ſometimes two or three months before it comes to a period; though its duration is, at other times, not above three or four weeks.

Theſe are called *cardinal paroxyſms*, to diſtinguiſh them from others of leſs duration, which happen between the ſpring and autumn. The more high-coloured the urine, and the leſs ſediment it depoſits, the farther is the diſeaſe from the ſtate of *concoction*, as it is termed. According to the violence and continuance of the fever, the paroxyſm proves more or leſs ſevere.

In conſtitutions much broken or ſhattered with the *gout*, there are uſually ſtony or chalky concretions formed in the joints of the fingers, or toes, and thence tranſlated to the viſcera; which caſe is often attended with irregular, frequent, and ſhort paroxyſms, in the extremities: in the decline of life, when the uſual fits do not happen; or if the gouty matter be ſuddenly repelled from the extremities by an improper regimen, or medicines, it uſually ſeizes the internal parts, and frequently the ſtomach, head, inteſtines, &c. cauſing want of appetite, reaching to vomit, indigeſtion, a cachexia, the jaundice, aſthma, diarrhœa; and, at laſt, ſo obſtructs the fine capillary, nervous tubes (eſpecially thoſe of the ſtomach and brain) as, poſſibly, to hinder the flux of the animal ſpirits; upon which death ſuddenly enſues.

Sydenham gives us an accurate hiſtory of a regular fit of the *gout* in the feet: it begins towards the cloſe of January, or beginning of February, without the leaſt previous notice; except, perhaps, a crudity, or apepſy, for ſome weeks before-hand; with a ſort of windy intumeſcence, a heavineſs of the body, and a dejection of ſpirits, which continually increaſe, till at laſt a paroxyſm breaks out; being preceded, ſome days, with a ſort of torpor, and a ſenſible deſcent of the flatulencies through the fleſh of the thighs, with ſome ſpaſmodic ſymptoms. The day before the paroxyſm, the patient's appetite is very greedy, and there is a ſlight pain in paſſing the urine; an hour or two after midnight he is waked by a pain, commonly in his great toe, ſometimes in the heel, ancle, or the calf of the leg, not unlike the pain felt upon a diſlocation of the ſaid bones; with a ſenſe as if water was ſprinkled on the part affected. This is ſucceeded by a chillineſs, and ſome approach to a fever: the pain, in the mean time, which at firſt was more remiſs, gradually increaſes; and in proportion to this the chillineſs abates. By night it is arrived at its height, and ſettled about the ligaments of the bones of the tarſus and metatarſus; where it ſometimes reſembles a violent tenſion, and ſometimes a laceration of theſe ligaments; ſometimes the biting or gnawing of a dog, or a ſqueezing, or coarctation. Thus far the part affected has ſuch an exquiſite ſenſe, that it cannot bear the weight of the linen, nor even the ſhaking of the room occaſioned by a perſon's ſtepping. Hence, a thouſand vain endeavours to get eaſe, by changing the poſture of the body, the poſition of the foot, &c. till about two or three o'clock in the morning (the ſpace of nychthemeron from its acceſs) when a remiſſion is firſt perceived; the morbid matter being by this time tolerably digeſted, or even diſſipated. The patient finds his pains much abated, but the part inflamed, ſwelled, and covered with a little moiſture. Towards morning he drops aſleep, and generally falls into a gentle breathing ſweat. A few days after this the other foot often undergoes the ſame fate; ſometimes both are attacked from the firſt. From the time it has ſeized on both legs, the ſymptoms become more irregular and precarious, both as to the time of invaſion, and the duration thereof. But this ſtill holds, that the pain recruits in the night, and remits again in the morning. A ſeries of theſe little, alternate acceſſes, &c. conſtitutes a fit of the *gout*, which holds longer or leſs according to the age and ſtrength of the patient, the ſeaſon of the year, and the diſpoſition of his body to the diſeaſe. The paroxyſms, however, grow milder every day, till at length the diſeaſe is carried off by perſpiration, urine, and the other evacuations. In ſtrong people, and thoſe who have had it often, fourteen days is a moderate fit: in old people, and thoſe long uſed to it, it will hold two months; though the tenderneſs and ſwelling in ſevere fits will ſometimes remain longer, and cauſe an uneaſineſs upon motion; and any violent exerciſe will bring it on again. For the firſt fourteen days the patient is uſually coſtive; a loſs of appetite, a chillineſs towards evening, and a heavineſs and uneaſineſs even of the parts not affected, attend the whole paroxyſm. As it goes off, he is ſeized with an intolerable itching, eſpecially between the fingers; a furfur falls off, and his toes ſcale, as if he had drunk poiſon.

Such is the courſe of a regular *gout*; but when through improper treatment it is diſturbed, or prolonged, it ſeizes the hands, wriſts, elbows, knees, and ſeveral other parts; ſometimes diſtorting the fingers, and taking away their uſe; ſometimes generating tophaceous concretions, or knots about the ligaments of the joints, reſembling chalk, or crabs eyes; ſometimes raiſing a whitiſh, inflammable tumor, almoſt as big as an egg, about the elbows, &c. See NODE, TOPHUS, &c.

It may be added, that where a perſon has laboured under the *gout* for many years, the pain is ſenſibly leſſened each paroxyſm, till at length it becomes rather an uneaſineſs than a pain: hence that reflection of the great Sydenham, *Dolor in hoc morbo amariſſimum eſt naturæ pharmacum.*

Method of cure. The *gout* is ranked among the number of incurable diſeaſes: in effect, we have no thorough and aſſured remedy yet diſcovered for it; thoſe that now obtain are little more than palliatives; they tend to aſſuage the pain, to diminiſh it for a time, but not to extirpate it. Bleeding, and purging, and diaphoretics, are to be uſed with great caution. Emetics, according to Pitcairn and Etmuller, may do good in the beginning of the diſeaſe. But, upon the whole, nothing, in Sydenham's opinion, proves of more ſervice than digeſtives, or medicines which ſtrengthen the ſtomach, and promote digeſtion: as, angelica root, enul. campan. the theriac. Andromach. the Jeſuit's bark, and antiſcorbutics: theſe are chiefly to be adminiſtered in the intervals between the paroxyſms. Muſgrave, however, recommends, internally, repellents, and principally cardiacs; externally, emplaſters of gum. caran. or oxycroc. or cephalic. with Burgundy pitch; or the green ſear-cloth, commonly called *hat-caſe*, &c. Yet Dolæus affirms, that repellents do more harm than good; and gives us the following recipe, as more than equal to all others. ℞ Confect. hamech. ℥j. pulv. jalap. ℥ſs. extract trifol. fibrin. ʒij. litharg. aur. ℥vj. ſapæ antimon. ʒſs. ſacchar. canth. ℥vj. ol. olivar. q. ſ. ceræ et picis parum. f. ſ. a. An emplaſter to be laid on the joint affected, till the pain, and the morbid matter, be driven away.

According to ſome, the material cauſe, which is a plethoric habit, is to be removed by bleeding at proper times, and by applying leeches to the hæmorrhoidal veins to promote a diſcharge that way; and in perſons of a moiſt habit, cupping is very proper. After this, the crudities of the primæ viæ, eſpecially ſuch as are of a bilious nature, are to be abſterged, and gently carried off, as they always are the occaſion of all ſpaſtic pains being greatly exaſperated. The digeſtive ſalts, ſuch as *tartarum vitriolatum*, *arcanum duplicatum*, and the like, are very good abſtergents; and the proper method of evacuating the matter is by gentle laxatives, ſuch as purging draughts of ſena and rhubarb, with a little ſoluble tartar. Glauber's ſalt, or the common purging ſalt, called Epſom ſalt, ſucceeds alſo very well; and great ſervice is done by the medicated wines, impregnated with the abſtergent, diuretic, and purging ingredients. A ſickneſs or uneaſineſs in the ſtomach may be removed by carduus or camomile tea, or by a little ipecacuanha. Vomits promote perſpiration; and in the circumſtance now mentioned, no danger need be apprehended. The violent emotions of the blood, and its ſulphureo-ſaline acrid quality, are to be attemperated, and the rigors of the ſolids ſoftened and taken off. This is excellently done by nitrous medicines, with ſaline abſorbents; and in the more robuſt habits, ſometimes the ſtronger acids are neceſſary: after this nature is to be aſſiſted in making an equal and regular diſtribution of the humours. This is to be done in perſons of choleric habits, by means of the neutral ſalts, and the drinking large draughts of warm and diſcutient decoctions, ſuch as a tea made of the herb veronica, which has of late years been celebrated as a medicine able to cure all the diſeaſes of this kind alone. In other habits, the temperate alexipharmics are to be added on this occaſion, ſuch as decoctions of the woods of ſaſſafras and guaiacum, and of china and ſarſaparilla, and pimpernel root.

Dr. Dawſon's ſucceſs with the uſe of the tinct. guaiac. vol. and an occaſional bleeding, deſerves the attention of medical practitioners. He recommends it in the *gout* with or without fever, and in both the acute and chronical rheumatiſms. His general mode of preſcribing is as follows: ℞. Tinct. guiac. vol. ℥ſs. mucil. e gum. Arab. q ſ. deinde adde gradatim aq. hordeat. ℥iſs. ſyr. balſ. ℥ſs. m. fiat hauſt. h. ſ. ſumend. & repet. bis vel ter in die. See his Caſes in the Acute Rheumatiſm and *Gout*.

Finally, the vehement ſpaſtic and painful ſtate of the parts is to be mitigated and taken off. To this purpoſe, ſmall doſes of cinnabar, with the powder of earth-worms, are to be given, and with theſe the gentle diaphoretics; at the ſame time that theſe are given internally, there may be applied externally ſpirit of wine with camphor mixed with tincture of ſaffron; the acid ſpirit diſtilled from ants, and the ſpirit of earth-worms. Tincture of caſtor may alſo be applied in this manner, and in ſome caſes Venice ſoap diſſolved in ſpirit of wine, or our famous opodeldoc ointment. A cerate, with a large portion of galbanum, has alſo been known to have good effect; and ſome have applied with ſucceſs the common ſoap plaſter; others prefer bags with the warm vegetables, ſuch as the leaves of germander ground-pine, origanum, and ſerpyllum, with the roots of pimpernel, angelica, and ſolomon's ſeal, and the ſeeds of aniſe and daucus ſylveſtris; others make theſe bags in a ſhorter way, uſing only oatmeal, elder-flowers, and ſaffron, and ſprinkling the bag over with camphorated ſpirit of wine, or elſe dipping it all over in hot wine, and applying it immediately to the part. Some greatly recommend alſo the applying cheeſe beaten to a ſort of paſte to the part, covering it with a piece of a hare-ſkin; and many ſpeak largely of the effects of ſuffumigations made by burning under the part the flowers of ſtœchas, or of maſtic and olibanum, with the woods of ſaſſafras and guaiacum, with rhodium and yellow ſaunders. The vapour of the decoctions of warm and aromatic herbs is alſo greatly recommended, and ſome preſcribe gentle rubbing on the parts with a fleſh-bruſh, or with flannels which have before been thoroughly impregnated with the fumes of the before mentioned dry fumigations. Theſe are the principal means of a cure; but there is not leſs judgment required in the time and manner of giving and applying them, than in the ſelecting them. In the time of the fits, it will be proper for the patient to take three or four times a day, a powder prepared of nitre and tartar vitriolated, each half an ounce; crabs eyes ſaturated with lemon juice, three drams; cinnabar, four ſcruples; theſe are to be all perfectly mixed together, and a ſcruple weighed out for every doſe, and after theſe it will be proper to take ſome gently diaphoretic draught; during the internal uſe of theſe, rags dipped in camphorated ſpirit of wine, impregnated with ſaffron, are to be applied to the parts; and to keep the bowels lax and ſoluble, a glyſter of the common emollient kind is to be given as occaſion ſhall require, with a ſmall quantity of nitre diſſolved in the decoction; and afterwards ſmall doſes of the common Epſom ſalt will be very proper for the keeping them in a due lax ſtate. After a fortnight's continuance in the uſe of the nitrous powders, it will be proper to take every day two or three doſes of a mixture of tincture of ſalt of tartar, and ſpirit of ſal armoniac, of which twenty-five drops are a doſe, and every night a ſmall doſe of the ſtorax pill may be taken, when the violence of the fit is abated. The gentle alexipharmics are to be taken without keeping up a hot regimen, and the frequent waſhing the feet in warm water, impregnated with an alkaline ſalt from the aſhes of vegetables, or otherwiſe, proves of the greateſt ſervice to complete the carrying it off, and reſtore the parts to their natural tone. Junker's Conſp. Med. p. 623.

It is a general obſervation in all *arthritic* caſes, that all kinds of excretion, moderately promoted, leſſen the pains, and, on the contrary, that the ſuppreſſion of any of them render them much more violent and intenſe. Hence opiates are to be, as much as poſſible, avoided in the height of the fits; for though they give ſome eaſe for the preſent, they always increaſe the pain afterwards. However, when the patient is reſtleſs, thirty or forty drops of laudanum, more or leſs, according to the violence of the ſymptoms, taken at bed-time, will eaſe the pain, promote perſpiration, and forward the criſis of the diſeaſe. The aſtringent ſteel preparations, with the boles and other medicines of this claſs, ſuppreſs the excretions, conſtringe the viſcera, and ſometimes bring on dropſies. Volatile ſalts given imprudently, and in too large doſes, conſtringe the viſcera, and at the ſame time excite a violent emotion in the humours: hence they are often the occaſion of great miſchiefs; and it is very unhappy that the preſent practice is ſo free in the uſe of them in theſe caſes.

Among the external applications, thoſe which are aſtringent, cooling, ſaturnine, and the like, all give a temporary relief; but they are of very dangerous, and often of fatal conſequences, as they bring on nodes, tophs, and contractions of the parts in ſome caſes, and in others forcibly repel the matter to the internal parts, and bring on fatal ſymptoms, which no other medicines can relieve.

The acrid, hot, and nervine medicines uſed externally, ſuch as the chemical oils, and the natural balſams, all exaſperate the ſymptoms, and bring on intolerable pains and inflammations; for there is in theſe caſes no weakneſs of the parts to be ſtrengthened by ſuch medicines, but a too great ſtricture and tenſion of them, which all medicines of this kind, by their acrid qualities, muſt neceſſarily add to.

Strong purges given in the time of the fit have often proved fatal, by drawing in the morbid matter to the internal parts; and bleedings in the time of the fits always make them more violent, ſubject the patient to more frequent returns, and bring on a neceſſity of repeating the bleedings every time, before any medicines can take effect. But bleeding in the very beginning, or at the coming on of the fit, as alſo at its decline, has its real uſe; eſpecially the applying four or five leeches to the hæmorrhoidal veins; or in the ſciatica, the cupping with deep ſcarification on the part. By this means alone this diſeaſe has ſometimes been abſolutely cured, ſo as never to return again. Camphorated ſpirit of wine, and the bags of dry ingredients ſprinkled with it, are proper in all ſtages of the diſeaſe, and in all conſtitutions.

A cerate of galbanum and camphor often gives immediate relief. This ſhould be applied after bleeding in the acceſs of the fit; and if it does not take effect in three hours time, it ſhould be taken off again. The ſoap-plaſter, with a large portion of camphor, is often alſo found of great ſervice in the beginnings of theſe caſes. The waſhing the feet in warm water, if uſed juſt before the coming on of a fit of the *gout*, always makes it much more ſevere; but if uſed afterwards, it often proves of ſervice. The proper time for it is in the decline of the fits.

As the moſt ſafe and efficacious method of diſcharging the *gouty* matter is by perſpiration, this ought to be promoted, eſpecially in the affected part. For this purpoſe the leg and foot ſhould be wrapt in ſoft flannel, fur, or wool. In Lancaſhire they conſider wool as a kind of ſpecific in the *gout*; and they wrap a great quantity of it about the leg and foot, and cover it with a ſkin of ſoft dreſſed leather: the wool which they uſe is generally greaſed, and carded or combed; and they ſeldom remove it till the fit is entirely gone off. The diet and drink ſhould be adapted to the conſtitution of the patient, and his uſual mode of living. If the patient be young and ſtrong, his diet ſhould be thin and cooling, and his drink of a diluting nature; but where the conſtitution is weak, and the patient has been accuſtomed to live high, he muſt keep nearly to his uſual diet, and frequently take a cup of ſtrong negus, or a glaſs of generous wine.

Wine whey, with the addition of a tea-ſpoonful of *ſal volatile oleoſum*, or ſpirits of hartſhorn, taken in the quantity of a cup twice a day, will promote perſpiration, without greatly heating the patient; and a tea-ſpoonful of the volatile tincture of guaiacum, in a large draught of warm wine-whey at bed-time, will promote perſpiration through the night. Mead ſeems to be an unexceptionable cordial in this diſeaſe. A warm and dry air is very ſalutary to a gouty patient; and daily exerciſe, during the intervals of the fit, frictions with coarſe flannel, the fleſh-bruſh, &c. and regular labour, are very conducive to that due and conſtant perſpiration, by which the *gout* may be either removed or prevented. The patient ought likewiſe to be kept quiet and eaſy during the fit; for every thing that affects the mind diſturbs the paroxyſm, and tends to throw the *gout* on the nobler parts. We may obſerve, in general, that as the *gout* is an effort of nature to free herſelf from an offending cauſe, it ought to be promoted, and not reſtrained, by any repellent applications or remedies.

The uſe of ſalivation has been recommended by ſome in theſe caſes; and Dr. James has found, after repeated trials, a common mercurial courſe very efficacious in the cure of the *gout*.

A total milk and ſeed diet will, it is ſaid, cure the *gout*. See Cheyne's Nat. Meth. of Curing, p. 266.

Dr. Dover ſays, a *gouty* patient will be free in two or three hours at fartheſt, after taking a doſe, from forty to ſeventy grains, of the following powder: take ſalt-petre, and tartar vitriolated, each four ounces; put them into a red-hot mortar, ſtir them with a ſpoon till they have done flaming, then powder them very fine, and after that ſlice in an ounce of opium; grind thoſe to powder, then mix it with an ounce of the powder of ipecacuanha, and as much of the powder of liquorice. This is to be taken going to bed, in a glaſs of white wine poſſet-drink, covering up warm, and drinking a quart or more of poſſet drink while ſweating.

The doctor is alſo of opinion, that Mynſicht's elixir of vitriol often taken, though it may cauſe pain for ſome time, yet moſt certainly deſtroys the *gouty* matter in the end. Med. Eſſ. Edinb.

The *gout* powder of the duke of Portland, who brought the receipt with him from Switzerland a few years ago, has been much recommended both for this diſorder and the rheumatiſm. The manner of preparing it is as follows: take of the root of ariſtolochia rotunda, or birthwort, and of gentian, and of the tops and leaves of germander, ground-pine and centaury, dried, powdered, and ſifted, equal weights; mix them well together, and take one dram of this mixed powder every morning faſting in a cup of wine and water, broth, tea, or any other liquid; keep faſting an hour and a half after it; and continue this courſe for three or four months without interruption; then diminiſh the doſe to three-fourths of a dram for three months longer, then to half a dram for ſix months more, taking it regularly every morning, if poſſible. After the firſt year it will be ſufficient to take half a dram every other day. As this medicine operates inſenſibly, it muſt be perſiſted in for two years or more, and in the uſe of it the patient is not confined to any particular diet, ſo that he lives ſoberly, and abſtains from thoſe meats and liquors that have always been accounted pernicious to the *gout*, as Champagne, drams, high ſauces, &c. Dr. Clephane has ſhewn, that the *diacentaureon* of Cœlius Aurelinus, and the *antidotos ex duobus centaureæ generibus* of Aëtius, were the ſame medicine, and are the old names for the duke of Portland's powder. This medicine is at preſent in high eſteem with many; but an indiſcriminate uſe of it in all caſes may bring it into diſrepute. Med. Obſ. &c. vol. i. art. 14. p. 126, &c.

When the fits are thoroughly off, bleeding ſhould never be omitted, ſpring and autumn; and in people of ſucculent habits, cupping upon the parts is often very uſeful; with women, the menſes are to be conſidered before all things, and brought to their regular periods before any hope of a cure can be had. In men, the application of leeches to the hæmorrhoidal veins is of ſervice, and four times, at leaſt, in the year purging remedies, ſuch as rhubarb, ſena, and the like, are to be taken in decoctions, or infuſions, mixing with them ſuch things as are known to ſweeten the blood. And in the general regimen, a ſufficient quantity of weak liquors is to be always drank, and a moderate exerciſe of the body is to be kept up. And finally, as the ſpring and autumn are the times at which the fits of all *arthritic* diſeaſes uſually return, it will be proper, by way of prevention, to take at ſuch times decoctions or infuſions of ſaſſafras, or the other woods, in the manner of tea, and with them a few moderate doſes of ſome of the nitrous medicines.

Above all things, when a fit is gone off, the occaſional cauſes of its return are to be avoided; theſe are a too rich diet, the drinking too much wine, an immoderate uſe of venery, violent emotions of the mind by anger, or other paſſions, and violent and immoderate exerciſes; if theſe are not reſtrained, the return of eaſe will probably be of but very ſhort duration.

The patient ſhould alſo take a gentle doſe or two of the bitter tincture of rhubarb, or ſome other warm ſtomachic purge. He ſhould likewiſe drink a weak infuſion of ſtomachic bitters in ſmall wine or ale, as the Peruvian bark, with cinnamon, Virginian ſnake-root, and orange-peel. His diet ſhould be light and nouriſhing, and his exerciſe regular and gentle. In order to prevent the *gout*, univerſal temperance and ſufficient exerciſe are of principal importance. Going to bed betimes, and riſing early, will be of great uſe. Night ſtudies, and intenſe application, late and full ſuppers, and all ſtrong liquors, eſpecially generous wines and ſour punch, ſhould be avoided. Beſide the courſe already preſcribed, an iſſue, or perpetual bliſter, has a great tendency to prevent the *gout*. Bath waters are of great ſervice in promoting digeſtion, and invigorating the habit. Cheyne obſerves, that a dram of powdered ſulphur, or flour of brimſtone, taken regularly in a ſpoonful of milk, has prevented the fit for many years.

Though there is little room for medicine during a regular fit of the *gout*, yet when it leaves the extremities, and falls on ſome of the internal parts, proper applications to remove and fix it become abſolutely neceſſary. Muſgrave had a high opinion of the ALCOHOL *martis* in this view. When the *gout* affects the head, the pain of the joints ceaſes, and the ſwelling diſappears, while either ſevere head-ach, drowſineſs, trembling, giddineſs, convulſions, or delirium, come on. When it ſeizes the lungs, great oppreſſion, with cough and difficulty of breathing enſue. In theſe caſes, the feet muſt be frequently bathed in warm water, and acrid cataplaſms applied to the ſoles. Bliſtering plaſters ought likewiſe to be applied to the ancles or calves of the legs. Bleeding in the feet or ancles is alſo neceſſary, and warm ſtomachic purges. The patient ſhould alſo be kept warm. When the *gout* attacks the ſtomach, extreme ſickneſs, vomiting, anxiety, pain in the epigaſtric region, and total loſs of ſtrength ſucceed. In this caſe, the moſt warm cordials are neceſſary, as ſtrong wine boiled up with cinnamon or other ſpices, cinnamon-water, peppermint-water, or even rum and brandy. The patient ſhould keep his bed, and promote a ſweat by drinking warm liquors; and if he be troubled with a nauſea, drink camomile tea, or any thing that will make him vomit freely.

When the *gout* attacks the kidneys, and reſembles gravel pains, the patient ſhould drink freely of the decoction of marſhmallows, and have the parts fomented with warm water. An emollient clyſter ſhould be adminiſtered; and when the pain is violent, twenty or thirty drops of laudanum may be taken in a cup of the decoction.

The approaches of the *gout* ſhould be attentively obſerved, and this diſorder diſtinguiſhed from all others, leſt by an improper treatment the patient ſhould fix laſting head-achs, coughs, and pains of the ſtomach and inteſtines, and at laſt fall a victim to this diſeaſe, by its attack on ſome of the more noble and vital parts. Buchan's Dom. Med. chap. 38.

Monſieur de Sault being of opinion, that the *gout* depends on the want of perſpiration, propoſes warm baths, exerciſe, keeping always warm, and defending from cold; clean cloaths, moderate eating, abſtaining from ſupper, tranquillity of mind, friction, and milk diet, as preſervatives from it. Garlic being obſerved by Sanctorius to increaſe perſpiration, is recommended; as are cortex Peruvianus and ſteel in winter. When the ſtomach is attacked he lets blood at the ancles, and applies epiſpaſtics of different kinds to the feet, and then endeavours to procure a general ſweat. When the pain is very violent he blunts it, by applying a cloth dipped in liquid laudanum to the pained part, and exhorts the patient to uſe exerciſe after this. Medic. Eſſ. Edinb.

Cheyne obſerves, that mercurial vomits are not only proper for the *gout* in the ſtomach, but that they are abſolutely neceſſary, as well as the mercurial purges, when the *gout* becomes fixed to and permanent in any part, and alſo when it is diſperſed all over the habit like a rheumatiſm; that theſe active medicines muſt firſt render the humours fluid, which gum guaiacum, with diaphoretic antimony, will afterwards carry off.

GOUT-*wort*, in *Botany*. See ANGELICA.

GOUTY *land*, in *Agriculture*, a term uſed by the farmers to denote a hollow fuzzey black earth with little ſprings, that have no free outlet, and therefore ſwell and elevate the ſurface in many places.

GOWN, *robe*, a long upper garment, worn by lawyers, divines, and other graduates, who are hence called *gentlemen of the gown*, or *gown-men*.

The *gown* is an ample ſort of garment, worn over the ordinary cloaths, hanging down to the feet. It is faſhioned differently for eccleſiaſtics, and for laymen.

At Rome, they give the name *virile gown*, *togas viriles*, to a plain kind of *gown*, which their youth aſſumed when arrived at puberty. This they particularly denominated, *prætexta*.

In ſome univerſities, phyſicians wear the ſcarlet *gown*.

In the Sorbonne the doctors are always in *gowns* and caps.

Beadles, &c wear *gowns* of two colours.

Among the French officers, &c. they diſtinguiſh thoſe of the *ſhort gown*, or robe; which are ſuch as have not been regularly examined. They have alſo barbers of the *ſhort gown*, who are ſuch as are obliged to practiſe in an inferior way to ſurgeons, or thoſe of the long robe.

GOWN is alſo taken, in the general, for the civil magiſtrature, or the profeſſion oppoſite to that of arms.

In this ſenſe it was thas Cicero ſaid, *Cedant arma togæ*.

GRABATARII, GRABBATARII, in *Church Antiquity*, ſuch perſons as deferred the receiving of baptiſm till the hour of death; or who did not receive it till they were dangerouſly ill, and out of hopes of life: from an opinion, that baptiſm abſolutely waſhed away all former ſins.

The word is formed of *grabatum*, bed; and that from the Greek γραϐατος, a hanging bed, of κρεμαω, I ſuſpend: ſuch as was the bed of ſlaves, poor people, Cynic philoſophers, &c. who are enemies of luxury and eaſe.

GRACCULUS, in *Ornithology*. See JACK-*daw*.

GRACE, GRATIA, in *Theology*, any gift which God confers on men, of his own free liberality, and without their having deſerved it at his hands; whether ſuch gift regard the preſent or a future life.

Grace is uſually divided into *natural*, and *ſupernatural*.

GRACE, *natural*, includes the gifts of being, of life, of ſuch and ſuch faculties, of preſervation, &c. St. Jerom. Epiſt. 139. allows it a *grace* of God, that man was created: *Gratia Dei eſt, quod homo creatus eſt*. So alſo it is by the *grace* of God, that angels and human ſouls are immortal; that man has free-will, &c.

GRACE, *ſupernatural*, is a gift from above, conferred on intelligent beings, in order to their ſalvation.

It is theſe only, that are called *graces* in the rigour of theology; and it is for the conveyance, improvement, and ſtrengthening of theſe, that the ſacraments are conferred, the miniſtry of the word inſtituted, &c.

Divines diſtinguiſh ſupernatural *grace* into *habitual*, and *actual*; *juſtifying* and *ſanctifying*.

GRACE, *habitual*, is that which reſides ſtatedly in us, is fixed in the ſoul, and remains till ſome grievous wilful ſin expunge it. This is alſo called *juſtifying grace*, as it makes us appear righteous and innocent before God: and *ſanctifying grace*, as it makes us holy and devoted to God.

GRACE, *actual*, is that which God gives us for the ſpecial performance of ſome particular good thing; as to convert us, enable us to reſiſt a temptation, &c.

This the divines ſubdivided into divers kinds; *preventing*, *concomitant*, and *ſubſequent grace*.

It is an article of faith, 1. That actual *grace* is neceſſary for the beginning, carrying on, and finiſhing every good work. 2. That the will is able to reſiſt the *grace*, and reject it.

And hence *grace* becomes farther divided into *efficacious*, and *ſufficient*. It is *efficacious*, or efficient, when it produces the effect; and *ſufficient* when it does not, though it might have produced it.

Some of the more rigid Calviniſts, &c. admit a neceſſitating *grace*.

We alſo ſay *the law of grace*, *the covenant of grace*, in oppoſition to the Moſaic LAW, &c. See REVELATION, &c.

GRACE, *act of*, properly denotes an act of amneſty, or oblivion; for the pardon of all offenders who are qualified, or come within the conditions of it.

The term is alſo ſometimes extended to an act made for relief of inſolvent debtors in the ſeveral priſons; by ſetting thoſe who are qualified, at liberty from their debts, and confinement.

GRACE, *days of*, or *reſpite*. See DAYS *of Grace*.

GRACE, in *Law*, is ſometimes uſed for a faculty, licence or diſpenſation; but this ſeemeth to be only in a caſe, where the matter proceedeth, as it were, *ex gratia*, of *grace* and favour; and not where the licence or diſpenſation is granted of courſe or of neceſſity.

GRACE is alſo a term in the formula of all patents, &c. which begin, George, by the *grace* of God, king of Great Britain, &c The Romiſh biſhops frequently began their mandates in the like manner: ſuch-a-one, by the *grace* of God, and the holy ſee, biſhop of, &c.

The Engliſh ARCHBISHOPS ſay, by divine *grace*, or divine providence.

All ſovereigns uſe the phraſe *grace* of God; as emperors, kings, princes, &c. Anciently dukes, counts, and even lords, talked in the ſame ſtyle. In the new collection of Fath. Martene we meet with a mere ſeigneur, or lord, qualified by the *grace* of God ſeigneur de Comborn. Louis XI. forbad the duke of Britany to ſtyle himſelf by the *grace* of God.

GRACE is alſo a title of dignity, attributed to princes of inferior rank, and who are not qualified for that of highneſs.

In former times the kings of England were addreſſed under the title of *grace*, as they now are under that of majeſty. See KING.

Our Engliſh dukes and archbiſhops are ſtill addreſſed under the title of *grace*. But that title is moſt frequent in Upper Germany, and particularly Auſtria where it is borne by the barons, as being inferior to that of excellence.

GRACE is alſo applied to perſons, and various kinds of performances, to denote a quality, or rather the reſult of a combination of qualities, which attracts peculiar notice, and affords peculiar pleaſure.

GRACE is alſo uſed for a ſhort prayer offered before and after meat. This practice is very ancient, and has very generally obtained both in the heathen and Chriſtian world; and hence *grace-cup* is uſed by ſome of our poets for the cup or health drank after *grace*.

GRACE, *herb of*, in *Botany*. See RUE.

GRACES, GRATIÆ, in the *canon law*, are the ſame with what we otherwiſe call *proviſions*.

GRACES, *expective*, *gratiæ expectativæ*. See EXPECTATIVE.

GRACES, GRATIÆ, *Charites*, in the *Heathen Theology*, were fabulous deities, three in number, who attended on Venus.

Their names are Aglia, Thalia, and Euphroſyne; i. e. ſhining, flouriſhing, and gay; and they were ſuppoſed by ſome to be the daughters of Jupiter and Eurynome, the daughter of Oceanus; and by others to be the daughters of Bacchus and Venus. Voſſius de Idol. lib. xiii. cap. 15.

Some will have the *Graces* to have been four, and make them the ſame with the *Horæ*, HOURS, or rather with the four ſeaſons of the year.

A marble in the king of Pruſſia's cabinet repreſents the three *Graces* in the uſual manner, with a fourth, ſeated, and covered with a large veil, with the words underneath, AD SORORES IIII. Yet Monſ. Beger will by no means allow the *Graces* to have been four: the company there preſent, he underſtands to be the three *Graces*, and Venus, who was their ſiſter, as being daughter of Jupiter, and Dione.

They are always ſuppoſed to have hold of each other's hands, and never parted. They were painted naked to ſhew that the *Graces* borrow nothing from art, and that they have no other beauties than what are natural.

Yet, in the firſt ages, they were not repreſented naked, as appears from Pauſanias, lib. vi. and lib. ix. who deſcribes their temple and ſtatues. They were of wood, all but their head, feet, and hands, which were white marble. Their robe, or gown, was gilt; one of them held in her hand a roſe, another a dye, and the third a ſprig of myrtle.

GRACILIS, in *Anatomy*, a muſcle of the leg, thus called from its ſlender ſhape. See *Tab. Anat.* *(Myol.)* *fig.* 1. *n.* 54. *fig.* 2. *n.* 37. *fig.* 6. *n.* 37.

It ariſes partly tendinous, and partly fleſhy, from the os pubis internally, between the firſt and ſecond heads of the triceps; and in its deſcent on the inſide of the thigh, grows narrow, and becomes tendinous, a little below the ſartorius, and is thus inſerted into the tibia. It aſſiſts in bringing the thigh and leg inwards.

GRACILIS *rectus*, in *Anatomy*, a name given by Riolan to one of the muſcles of the leg, called by Winſlow the *rectus cruris anterior*, and by Cowper the *rectus femoris*. Albinus calls it the *rectus cruris*.

GRACULA, in the Linnæan ſyſtem of *Ornithology*, a diſtinct genus of birds, of the order of the *Picæ*. The diſtinguiſhing character of which is, that the beak is of a convex ſharp figure, almoſt naked at the baſe; the tongue is entire, a little acute and fleſhy; and the feet are ambulatory. Of this genus, Linnæus reckons eight ſpecies, none of which are found in Europe.

GRACULUS *palmipes*, in *Ornithology*, a name given by ſome to a bird, called in England the ſhagge, and by Mr. Ray the CORVUS *aquaticus minor*, or leſſer cormorant, being regularly a ſpecies of that bird.

GRADATION, the act of aſcending ſtep by ſtep, to any pitch or eminence: from the Latin *gradus*, degree, ſtep.

GRADATION, in *Architecture*, ſignifies an artful diſpoſition of parts, riſing, as it were, by ſteps or degrees, after the manner of an amphitheatre; ſo that thoſe placed before do no diſſervice, but rather ſervice, to thoſe behind.

The painters alſo uſe the word *gradation* for an inſenſible change of colour, by the diminution of the teints and ſhades.

GRADATION, in *Chemiſtry*, is a kind of proceſs belonging to metals. It conſiſts in gradually raiſing, or exalting them to a higher degree of purity and goodneſs, ſo as both to increaſe their weight, colour, conſiſtence, &c.

GRADATION, in *Logic*, is an argumentation, conſiſting of four or more propoſitions, ſo diſpoſed as that the attribute of the firſt is the ſubject of the ſecond; and the attribute of the ſecond the ſubject of the third; and ſo on, till the laſt attribute come to be predicated of the ſubject of the firſt propoſition. As in Porphyry's tree: man is an animal; an animal is a living thing; a living thing is a body; a body is a ſubſtance: therefore man is a ſubſtance.

An argument of this kind is liable to many fallacies; both from the ambiguity of words and things; e. gr. Peter is a man; man is an animal; animal is a genus; genus is an univerſal: therefore Peter is an univerſal.

GRADATION, in *Rhetoric*, is when a ſeries of conſiderations or proofs is brought, riſing by degrees, and improving each on the other. See CLIMAX.

Such is that in Cicero to Herennius: *Africano induſtria virtutem, virtus gloriam, gloria æmulos comparavit.*

GRADO, in the *Italian Muſic*, ſignifies *degree*; thus *di grado* is uſed to denote *conjoint degrees*, which is when the notes riſe or fall from ſpace to line, or from line to ſpace, without making any leap of a third, fourth, or other interval. See SALTO.

Di grado aſcendente intimates, that all the notes riſe by *conjoint degrees*, as *ut, re, mi, fa*, &c.

Di grado deſcendente, is when all the notes deſcend or fall by *conjoint degrees*, as *ſol, fa, mi, re, ut*. See DEGREE and CONJOINT.

GRADUAL, GRADUALE, was anciently a church-book, containing divers prayers, rehearſed, or ſung, after the epiſtle.

In ſome of our ancient writers it is read *gradile, graduale, graile*, &c.

After reading the epiſtle, the chantor aſcended the ambo with his *gradual*, and rehearſed the prayers, &c therein; being anſwered by the choir: whence the name *gradual*, on account of the ſteps or degrees of the AMBO.

The *gradual*, or *graile*, which the provincial conſtitutions of archbiſhop Winchelſey, made at Merton, A. D. 1305, required to be in every church, was a book containing all that was to be ſung by the choir at high maſs; the tracts, ſequences, hallelujahs; the creed, offertory, triſagium, and alſo the office for ſprinkling the holy water. Gradale, *ſic dictum, à gradalibus in tali libro contentis.*

It is ſometimes taken for a maſs-book, or part of it, inſtituted by pope Celeſtine, anno 430. See ſtat. 37 Hen. VI. cap. 32.

In the Romiſh church, *gradual* is an appellation ſtill given to a verſe which they ſing after the epiſtle, and which was anciently rehearſed on the ſteps of the altar: though Ugutio gives us another account, and ſays it took its denomination *gradual*, becauſe ſung in the *gradual* aſcent from note to note. Magri ſpeaks differently ſtill, and will have it to have taken its name, becauſe ſung while the deacon went up the ſteps to the pulpit, to ſing the Goſpel.

GRADUAL, GRADUALIS, is alſo applied to the fifteen Pſalms, ſung among the Hebrews, on the fifteen ſteps of the temple. Others are rather of opinion, that they were thus denominated, becauſe the ſingers raiſed their voice by degrees, from the firſt to the laſt.

Cardinal Bona, in his treatiſe of Divine Pſalmody, ſays, the fifteen *gradual* Pſalms are intended to repreſent to the mind, that we only arrive at the perfection of goodneſs, or holineſs, by degrees. He goes on to lay down the fifteen degrees of virtue, correſponding to the fifteen Pſalms; five of them are for beginners; five for proficients; and the reſt for the perfect.

GRADUATE, a perſon who has the degrees in any FACULTY. A *graduate* in phyſic, in divinity, &c. See DEGREE, DOCTOR, &c.

In France, one-third of the benefices of the kingdom are appropriated to *graduates*; viz. all that become vacant in the months of January, July, April, and October.

This privilege of *graduates* is no older than the fifteenth century: it being obſerved, that men of learning were much neglected by the collators, and patrons of churches, complaint therefore was made to the council of Baſil, where this decree was made; which was afterwards confirmed by the Pragmatic ſanction, and again by the Concordat.

GRADUATION is uſed, in *Mathematics*, for the act of *graduating*, or dividing any thing into degrees.

For an account of the various methods of *graduating* mathematical and aſtronomical inſtruments by ſtrait and circular diagonals, and by concentric arcs, &c. ſee *Plain* SCALE, NONIUS, and VERNIER.

For an account of Mr. Bird's improved method of dividing aſtronomical inſtruments, ſee MURAL *arch*.

We ſhall here only obſerve, that Mr. Ramſden, an ingenious mathematical inſtrument maker of London, has lately publiſhed, by order of the commiſſioners of longitude, an explanation and deſcription of an engine, contrived by him for dividing mathematical inſtruments, accompanied by proper drawings, in conſideration of which the ſaid commiſſioners have granted to him the ſum of 615*l*. This engine conſiſts of a large wheel of bell-metal, ſupported on a mahogany ſtand, with three legs; on each leg of the ſtand is placed a conical friction pulley, whereon the dividing-wheel reſts; and to prevent the wheel from ſliding off the friction pullies, the bell-metal center under it turns in a ſocket on the top of the ſtand. The circumference of the wheel is ratched or cut into two thouſand one hundred and ſixty teeth, in which an endleſs ſcrew acts; ſo that ſix revolutions of the ſcrew will move the wheel through one degree. A circle of braſs is fixed on the ſcrew-arbor, whoſe circumference is divided into ſixty parts, and, therefore, each diviſion will anſwer to a motion of the wheel of ten ſeconds, and ſix of them will be equal to a minute, &c. Several different arbors of tempered ſteel are truly ground into the ſocket in the center of the wheel. The upper parts of the arbors that ſtand above the plane are turned of various ſizes, to ſuit the centers of different pieces of work to be divided. When any inſtrument is to be divided, the center of it is very exactly fitted on one of theſe arbors, and the inſtrument is fixed down to the plane of the dividing-wheel by means of ſcrews, which fit into holes made in the radii of the wheel for that purpoſe. The inſtrument being thus fitted on the plane of the wheel, the frame which carries the dividing-point is connected at one end by finger ſcrews with the frame which carries the endleſs ſcrew; while the other end embraces that part of the ſteel arbor, which ſtands above the inſtrument to be divided, by an angular notch in a piece of hardened ſteel. The frame carrying the dividing-point or tracer is made to ſlide on the frame which carries the endleſs ſcrew to any diſtance from the center of the wheel, as the radius of the inſtrument to be divided may require, and may be there faſtened by tightening two clamps; and the dividing-point being connected with the clamps by the double jointed frame, admits a free and eaſy motion towards, or from the center, for cutting the diviſions, without any lateral ſhake. In this way an inſtrument, fitted on the dividing-wheel, may be moved to any angle by the ſcrew and divided circle on its arbor, and this angle may be marked on the limb of the inſtrument with the greateſt exactneſs by the dividing-point or tracer, which can only move in a direct line tending to the center, and is altogether freed from the inconveniencies that attend cutting, by means of a ſtrait edge. This method of drawing lines will alſo prevent any error that might ariſe from an expanſion or contraction of the metal during the time of dividing.

The ſcrew-frame is fixed on the top of a conical pillar, which turns freely round its axis, and alſo moves freely towards or from the center of the wheel, ſo that the ſcrew-frame may be entirely guided by the frame which connects it with the center. By this means any eccentricity of the wheel and the arbor would not produce any error in dividing; and, by a particular contrivance, the ſcrew when preſſed againſt the teeth of the wheel always moves parallel to itſelf; ſo that a line joining the center of the arbor and the tracer continued, will always make equal angles with the ſcrew. For the farther conſtruction and uſe of this engine, ſee Deſcription of an Engine for dividing Mathematical Inſtruments, by Mr. J. Ramſden. 4to. 1777.

GRADUS *gemonii*. See GEMONIÆ.

GRÆA, Γραια, a name uſed by the old Greek writers for the wrinkled pellicle which ariſes upon milk in the boiling.

It was alſo uſed in a figurative ſenſe for the wrinkles in the ſkin of old people.

GRÆCUM. *Album* GRÆCUM. See ALBUM.

GRAFFER, from the French *greffier*, i. e. *ſcriba*, a *notary*, or *ſcrivener*. It is uſed in the ſtat. 5 Hen. VIII. cap. 1.

GRAFFIO, or GRAVIO, in our *Old Writers*, denotes a *landgrave* or *earl*. *Nec princeps nec* graffio, *hanc lenitatem mutare audeat.*

GRAFFIUM, in our *Old Writers*, is uſed for a writing-book, regiſter, or cartulary of deeds and evidences.

GRAFT, or GRAFF, in *Agriculture* and *Gardening*, a little ſhoot, cion, bud, or eye of a tree, inſerted into another tree to make it yield fruit of the ſame nature and kind as thoſe of the tree whence the *graft* is taken.

The word is formed of the French *greffe*, which ſignifies the ſame thing; and *greffe*, in this ſenſe, is ſuppoſed to have been derived from the reſemblance the ſhot bears to the point of a penknife, which was anciently called *greffe*. Du-Cange goes farther, and derives the ancient *greffe* from *graphiolum*; Menage, from *graphium*, a Latin word, ſignifying a little ſtyle, or iron bodkin, one end whereof was pointed, and ſerved to write on waxen tablets; and the other flat, ſerving to efface, or rub out what was written.

A *graft* is a little portion of a tree, incloſed in a cleft or inciſion made in another, in order to correct, qualify, or improve the ſtate of its fruit; or even to make it bear a different ſort of fruit

In the choice of *grafts*, the following directions ſhould be obſerved: that they are ſhoots of the former year; that they be taken from healthy fruitful trees, neither ſickly, nor young and luxuriant; that they be taken from the lateral or horizontal branches, and cut off from the trees before their buds begin to ſwell, which is generally three weeks or a month before the ſeaſon for grafting; and, therefore, they ſhould be laid in the ground with the cut downwards, burying them half their length, and covering their tops with dry litter, to prevent their drying. If a ſmall joint of the former year's wood be cut off with the *graft*, it will help to preſerve it, and when they are grafted, this may be cut off. When the *grafts* are carried to a conſiderable diſtance, their cut ends ſhould be put into a lump of clay, and wrapped up in moſs, and thus they will be preſerved freſh for a month or longer; but theſe ſhould be cut off earlier from the trees than thoſe which are to be grafted near the place where the trees are growing. Miller. See Fruit-*trees*.

GRAFTING, or Graffing, or Ingrafting, in *Agriculture* and *Gardening*. See Engrafting.

Grafting *wax*. See Wax, &c.

GRAIN, Granum, primarily denotes a fruit, or ſeed, growing in a ſpica, or ear.

In this ſenſe, *grain* comprehends all ſorts of corn; as WHEAT, RYE, BARLEY, OATS, &c.

Grain, *ſtructure of*. There are three particulars obſervable in every *grain*, whether it be wheat, barley, oat, or whatever elſe of that kind. Theſe are, 1. The outer coat or pellicle, which contains all the reſt. This in the ſame ſpecies of *grain* is found to be very different in thickneſs in different ears, and as it has grown in different ſoils. 2. The germ or bud; this is always hid within the ſeed or *grain*, and is the plant in miniature that is to ariſe from it. And, 3. The meal, or that farinaceous matter which is incloſed in the ſkin, and which ſurrounds the germ, and ſerves to give it nouriſhment when firſt put into the earth, before it is capable of drawing it from the earth itſelf. Dr. Grew, in his Anatomy of Plants, has treated of this at large. See Vegetation, &c.

The whole ſtructure of the plant which produces theſe ſeeds is equally admirable. The chaffy huſk is admirably adapted to ſhield and defend the ſeed as long as that is neceſſary, and then to let it fall; and the ſtalk formed hollow and round is neceſſarily at once light and ſtrong, capable of ſuſtaining the ear, without abſorbing too much of the juices deſtined to its nouriſhment; and the beards of many kinds are a defence againſt the birds, that would otherwiſe deſtroy the ſeed before its ripening. The covering of the ſeed is formed of two membranes, which meeting in a line on one part of the ſeed, form together that furrow we ſee on it. This is the place at which the ſeed is to burſt open on being moiſtened. Had not nature provided this means of the germ's coming out, the toughneſs neceſſary to the coat of the ſeed, as a defence from injuries, would have ſuffered the farinaceous matter and the germ to rot together, within it, before it would have given them way to come out, and for the germ to grow.

Nor is this the only uſe of this place of opening. The great Creator of all things has provided theſe ſeeds, not only for a ſupply of the ſame ſpecies of plant, but for our food, and for that of birds, &c. We have art enough to erect machines for the reducing the farina to powder, and the freeing it from its covering membrane; but the birds eat it as it is, and it would paſs through them whole, and without doing them any good, were it not that the juices of the ſtomach ſwelling it up, it burſts open at this furrow, and all the nutritive matter pours itſelf out. Des Landes, Trait. Phyſ. p. 62.

This farinaceous matter is compoſed of an infinite number of white and tranſparent bodies, of a globular figure: theſe every way ſurround and incloſe the young plant, and by their figure being eaſily put in motion, as ſoon as the heat and humidity of the earth act upon them, they, by degrees, force themſelves into the veſſels of the plant, and give it increaſe from time to time till they are received into it; and they then have ſo far given it ſtrength, that it is in a condition to feed on the juices in the earth. The ſame proceſs of nature is obſervable in the caſe when *grains* of corn grow out of time, on being thrown too careleſly together in a moiſt place.

When the corn is ground into powder, it is theſe farinaceous globules that make what we call the flour. The germs are always leſs white, and leſs tranſparent than they, but they are of great uſe; ſince it is principally to them that we owe the agreeable flavour of bread, and almoſt wholly to them, that the fermentation of dough is owing; their little parts being, of all others of the *grain*, the moſt eaſily put in motion. And it is alſo to theſe, that the rotting of wheat, preſerved in damp granaries, is to be attributed, their natural tendency being to motion and to corruption, if that motion be given without the neceſſary accidents. That the obſervation of the fermentation of dough, and the lightneſs of bread, being owing to theſe germs, may not ſeem advanced at random, it may be proper to confirm it, by the obſervations of the people employed in making bread for the army. Theſe people always find, that fine flour, if well dried, and put up in dry barrels, will keep good a long time; but that after it has been thus kept long, though it will make biſcuit, and ſerve for many other neceſſary uſes, it will never make the fine light bread eaten at table; and this they attribute to the life of the flour being ſpent; that is, to theſe germs being deſtroyed, as to their vegetative power, by having been a long time broken to pieces. See Corn.

For the laws relating to the importation and exportation of ſeveral ſorts of *grain*, as wheat, barley, oats, &c. ſee Wheat, Hordeum, Oats, &c.

Grain is alſo applied to the fruits or ſeeds of divers plants; as a *grain* of millet, of pepper, &c.

Grain is alſo extended to a minute body, or parcel of a body pulverized. In which ſenſe we ſay, a *grain* of ſand, a *grain* of ſalt, a *grain* of gunpowder, &c.

Grain denotes alſo a ſmall weight, uſed in eſtimating divers ſubſtances.

The *grain* is the ſmalleſt of all weights known in England. It is taken from the weight of a *grain* of wheat, gathered out of the middle of the ear, and well dried. By ſtat. 12 Hen. VII. cap. 7. every ſterling or pennyweight was to weigh thirty-two ſuch *grains*; but now twenty-four grains make a penny-weight, and twenty penny-weights an ounce. See Penny and Weight.

The *grain* is troy-weight, and uſed in the weighing of gold, ſilver, jewels, bread, and liquors.

Among the ancients, the *grain* was the fourth part of the ſiliqua, or twelfth of the obolus, and the twenty-ſecond of the drachma. It coincided with lens.

Fernelius, lib. iv. cap. 6. Method. Medend. affirms it as a thing known and certain, that the *grain* is of the ſame weight every where; but he is miſtaken. Mr. Greaves, in his treatiſe of the Denarius, in his Miſcell. Works, vol. i. p. 276, has ſhewn, that 179 Dutch *grains*, which Snellius had found to be the weight of a Philip of gold, only amount to 134½ Engliſh *grains*. Add, that Monſ. Perrault has computed the French *grain* to be leſs than the Engliſh, and yet bigger than the Dutch; to the Engliſh, it is as 158 to 134½; and to that of Holland, as 158 to 179. See Weight.

The *grain* uſed by the apothecaries is the ſame with that of the goldſmiths; though they make a difference in the weights raiſed therefrom. Thus, 20 *grains*, with them, make a ſcruple, ℈; 3 ſcruples, a drachm, ʒ; 8 drachms, an ounce, ℥, &c.

The carat uſed in eſtimating the fineſt of gold, as well as in weighing diamonds and precious ſtones, is alſo divided into four *grains*; and the carat is about the one hundred and fiftieth part of an ounce troy, according to Mr. Jeffreys, in his treatiſe on Diamonds and Pearls.

Hence, the jewellers *grain* is to the troy *grain*, inverſely, as 600 is to 480, that is directly as 4 to 5.

Grain is alſo uſed for the figure or repreſentation of *grains* on ſtones, ſtuffs, leathers, &c. Thus, we ſay, morocco has a bolder and richer, that is, a larger *grain*, than ſhagreen.

In ſome marbles, the *grain* is very fine; in others coarſer. Steel is known by its *grain*, which is much finer than that of iron.

Grain *of iron*. Even iron has its *grain* as well as wood, and that not the ſame in all iron, though all iron is very evidently the ſame ſpecies of body. The common caſt iron has a *grain* very different from that which has been hammered, or wrought, the granules which compoſe the maſs being in this laſt ſtate forced as it were into combinations with one another, by the repeated blows of the hammer: the tempering of iron into ſteel alſo alters its *grain*, partly by means of the ſalts and ſulphurs, which are by that operation introduced into it, and partly by the ſtopping the effect of the fiery particles received into it at a certain time.

But beſide theſe differences, the common wrought iron has in its ſeveral pieces, or ſometimes in the ſeveral parts of the ſame piece, different *grains*. Firſt a laminated one, ſecondly a granulated one, and thirdly a fibroſe or ſtringy one. Theſe, however, are not ſo different, in reality, as they appear to be; for the laminæ, as they become ſmaller, become granules; and arrangements of theſe granules, in long lines, make the fibres of the thready kind. The artificers, however, know by theſe marks of the *grain* what iron is fitteſt for tempering into ſteel; and they find the laminated pieces to be the worſt of all, and the granulated ones the beſt. Mem. Acad. Scien. Par. 1722. See Iron and Steel.

The world has talked much about the different *grains* of lead-ores, but theſe are three, juſt as in iron, and are owing only to the ſize and arrangement of the ſame ſhaped particles as in the iron. The broad grained lead-ore being analogous to the laminated kind of iron, the ſteel grained being equally analogous to the granulated iron, and what is called the antimoniated lead-ore, being in the ſame manner analogous to the fibrous grained iron, and all in the ſame manner ariſing out of one an other.

GRAINS, in *Chemiſtry*, or the ſeeds of vegetables, are diſtinguiſhed into emulſive, which yield a conſiderable quantity of mucilage and oil, which may be ſeparately extracted from them; ſuch are almonds, and the ſeeds of almoſt all fruits; and farinaceous, which are entirely compoſed of a dry ſubſtance, eaſily reducible into a fine powder, called meal. Of this kind are the *grains* of all gramineous and leguminous plants.

GRAIN, *cochineal.* See COCHINEAL.

GRAIN, *ſcarlet.* See SCARLET.

GRAIN, *oily, Myagrum*, in *Botany*. See GOLD *of pleaſure.*

GRAINS *of Paradiſe.* See CARDAMOMUM and AMOMUM.

GRAINED *medals.* See MEDAL.

Croſs GRAINED *ſtuff.* See CROSS *grained.*

GRAINING, in *Ichthylogy*, the name of a fiſh found in the Merſey, near Warrington: it reſembles the DACE, but is more ſlender, and has a ſtraiter back.

GRAINING *board* is a board uſed by the curriers, to give the grain to their leather.

It is made with teeth, or notches, running quite acroſs; into which the ſoft, moiſtened, ſuppled leather being preſſed, its ſurface readily takes the impreſſion. See CURRYING.

GRALLÆ, in *Ornithology*, is an order of birds analogous to the *bruta* in the claſs of MAMMALIA, in the Linnæan ſyſtem; the characters of which are, that the beak is ſubcylindric and ſomewhat obtuſe; the tongue is entire and fleſhy; and the thighs above the knees are bare. This order comprehends eighteen genera, among which are the PHOENICOPTERUS, the ARDEA, SCOLOPAX, TRINGA, &c.

GRAMEN, in *Botany*. See GRASS.

GRAMEN *murorum*, *Micalongiſſima.* See FESTUCA.

GRAMINIA, in *Antiquity*, is applied to a crown formed of graſs, *gramen*, beſtowed by the Romans on certain of their generals, in conſideration of their having ſaved or reſcued an army.

The *graſſy crown*, *corona graminea*, was but rarely conferred, and for ſome ſignal exploit; when, through the courage or dexterity of a general, an army reduced to the laſt extremities had been ſaved, or delivered, and the enemy put to flight.

GRAMINEOUS *herbs*, among *Botaniſts*, are ſuch as have a long, narrow leaf, with no foot-ſtalk.

GRAMINIFOLIA, in *Botany*, a name given by Dillenius to a genus of plants, called by Micheli and Linnæus ZANNICHELLIA.

GRAMMAR, the art of ſpeaking properly; that is, of expreſſing one's thoughts, by ſigns mutually agreed on for that purpoſe.

The ſigns, here found moſt convenient, are articulate ſounds; but as theſe are tranſient, others have been invented more permanent, viz. *grammata*, *γραμματα*, letters, whence the name *grammar*.

So that *grammar* is the art of rightly expreſſing our thoughts by words: and it is either *univerſal* or *particular*. *Univerſal grammar* explains the principles, which are common to all languages. See *Philoſophical* GRAMMAR. And the *grammar* of any *particular* language, applies thoſe common principles to that particular language, according to the eſtabliſhed uſage and cuſtom of it.

Grammar is more extenſively defined, after Mr. Johnſon, the art of expreſſing the relations of things in conſtruction, with due quantity in ſpeaking, and orthography in writing, according to the cuſtom of thoſe whoſe LANGUAGE we learn.

Grammar is divided by ſome authors into four parts, ETYMOLOGY, ORTHOGRAPHY, PROSODY, and SYNTAX.

Others chooſe to divide *grammar* ſomewhat more obviouſly into the doctrine of *letters*, or *ſounds*, which coincides with orthography and orthoepy; that of *ſyllables*, their accent, time, &c. which falls in with proſody; that of *words*, their kinds, derivations, changes, analogy, &c. which amounts to etymology; and that of *ſentences*, which conſiders the placing, or joining of words together, called *ſyntax*.

The chief buſineſs of *grammar* is, to decline, conjugate, conſtruct, and ſpell nouns, verbs, and other parts of ſpeech. It teaches the propriety, and natural force, of each part of diſcourſe; and the reaſon of all expreſſions uſed therein.

So that the *grammar* of any particular language enables us to expreſs ourſelves with propriety in that language, and to judge of every phraſe and form of conſtruction, whether it be right or not. Beſides, there is a ſecondary uſe to which it may be applied; viz. the facilitating of the acquiſition of other languages, whether ancient or modern.

Some have called *grammar* the door, or gate, of the arts and ſciences; becauſe none of theſe are attainable, but by means hereof. *Grammar*, according to Quintilian, is that to eloquence, which the foundation is to the building: they who deſpiſe it, as only dealing in low, trivial things, are exceedingly miſtaken: it has really more ſolidity than ſhew.

Diogenes Laertius relates, after one Hermippus, that Epicurus was the firſt who gave the rules of *grammar* for the Greek tongue; but that Plato was the firſt who had taken the thing into conſideration, and that he had even made ſome diſcoveries on that ſubject.

At Rome, Crates, ſurnamed Mallotes, contemporary with Ariſtarchus, gave the firſt lectures on *grammar* to the Romans, during the time of his being ambaſſador for king Attalus, to the commonwealth, between the ſecond and third Punic wars, ſoon after Ennius's death. Before him, it was not known at Rome what *grammar* meant. Polydore Virgil de Invent. Rer. lib. i. cap. 7.

Grammar is the ſame in all languages, as to its general principles, and notions, which it borrows from philoſophy to explain the order and manner wherein we expreſs our ideas by words: but, as each language has its particular turns, its ſeveral character, and genius, different from the genius and character of other languages; hence ariſe as many *grammars* as languages. An example will ſuffice to ſhew this: we ſay in Engliſh, *draw a ſtrait line*, not, *a line ſtrait:* in French, they ſay, *tirer ligne droite*, a line ſtrait, not *droite ligne*, a ſtrait line: and in Latin there is a liberty to ſay it either the one way, or the other, *rectam lineam*, or *lineam rectam, ducere.* And if there be a language which in the phraſe above mentioned follows the ſame analogy as the Engliſh, it differs from it on a hundred other occaſions.

Hence Dr. Wallis very juſtly finds fault with our Engliſh grammarians, where he ſays, that all of them forcing our Engliſh tongue too much to the Latin method, have delivered many uſeleſs things concerning caſes, genders, and declenſions, of nouns; tenſes, moods, and conjugations, of verbs; as alſo the government of nouns and verbs; which our language has nothing to do with.

GRAMMAR is alſo uſed for a book concerning the rules of *grammar*, which obtain in any language. See LANGUAGE.

The ancient *grammars* are; for the *Hebrew*, that of rabbi Juda Chiug, which is commonly held the firſt Hebrew *grammar* that appeared; though it is certain, rabbi Saadias Haggaon, who lived before rabbi Juda, compoſed two works in the ſame kind: one, expreſly of *grammar*; and the other of the elegancies of the Hebrew tongue.

For the *Greek*, the oldeſt *grammar* is that of Gaza: the *Latin* ones are the works of Martianus Capella, Priſcian, and Aſconius Pedianus.

The modern *grammars* are; 1. For the Hebrew, that of Pagninus, the edition of Hen. Stephens, or le Preux; at Geneva, in 1592; that of Petrus Martinius at Rochel 1592, that of Buxtorf; that of Ludovicus Deus, in three languages; that of Sixtinus Amama, which is a collection from Martinius and Buxtorf; that of Bellarmine, with the notes of Muis; thoſe of F. Sglanther, of W. Schickard, and of Vict. Bythner, to the latter of which is annexed a brief account of the Chaldee, are uſeful for beginners. 2. For the *Chaldee*, the beſt are thoſe of Martinius, Buxtorf, and Lud. Deus, in three languages. 3. For the *Syriac*, thoſe of Amira, Myricæus, Waſerus, and Beveridge; with the Chaldee and Syriac ones of Buxtorf, of Lud. Deus in three languages, and that of Lembden. 4. For the *Coptic*, the Prodomus Coptus, and Lingua Ægyptiaca Reſtituta of Kircher. 5. For the *Arabic*, that of Erpenius, and that of Golius, which is only Erpenius's a little augmented. 6. For the *Ethiopic*, that of J. Ludolphus. 7. For the *Perſian*, that of Lud. Deus. 8. For the *Armenian*, thoſe of Schroder, and Galanus. 9. For the *Greek*, thoſe of Mart. Rulandus, Sylburgius, F. Moquet, Voſſius, Buſby, and Port Royal. 10. For the *Latin*, thoſe of Deſpauter, the Minerva of Sanctius, thoſe of Voſſius, and Sprat; that of Port Royal, which is only a collection from the reſt; and that of Lowe, the moſt exact of all. 11. For the *Italian*, thoſe of Berger, Lanfredini, Port Royal, and Veneroni. 12. For the *Spaniſh*, thoſe of Salazar, Port Royal, the abbot de Vairac, &c. 13. For the *Portugueſe*, that of Pereira. 14. For the *French*, thoſe of the abbé Regnier, and F. Buffier. 15. For the *High Dutch*, thoſe of Claius, Heitſburgenſis, Schottelius, Boedicher, and Steinbach. 16. For the *Engliſh*, thoſe of Wallis, Brightland, Greenwood, Lowth, and Prieſtley.

GRAMMAR is alſo uſed in the ſame ſenſe with elements; as geographical *grammar*.

Philoſophical GRAMMAR, is that which, without regarding the ſeveral idioms of particular languages, only reſpects thoſe principles that are eſſential to them all. One of this kind was propoſed by lord Bacon; not upon the analogy of words, but ſuch as ſhould diligently examine the analogy or relation between words and things. He diſapproves too curious an enquiry about the original impoſition and etymology of names. This he thinks an elegant, and as it were, a waxen ſubject, that may be handſomely wrought and twiſted, but is attended with little truth and advantage. But, ſays he, it would be a noble kind of *grammar*, if any one well verſed in languages, both the learned and the vulgar, ſhould treat of their various properties, ſhewing wherein each of them excel and fall ſhort: for thus languages might be enriched by mutual commerce, and one beautiful image of ſpeech, or one grand model of language, for juſtly expreſſing the ſenſe of mankind, be formed like the Venus of Apelles, from the excellencies of ſeveral. And thus at the ſame time we ſhould have ſome conſiderable marks of the genius and manners of people and nations, from their reſpective languages. See Bacon's Doctrine of Delivery, § 7. and De Augm. Scient. vi. 1.

The object of philoſophical or univerſal *grammar* is ſpeech or language, as divided into its conſtituent parts, as a ſtatue may be divided into its ſeveral limbs; or elſe, as reſolved into its matter and form, as the ſame ſtatue may be reſolved into its marble and figure: and thus it is diſtinguiſhed from the art of LOGIC, which conſiders ſpeech as combined or compounded; ſo that by this ſyntheſis, ſimple terms are combined to produce a truth, and two truths are combined to produce a third, &c. In this kind of *grammar*, the deſign is to point out the ſeveral powers and modes of expreſſion which ſounds are capable of, to trace their connections with, or relation to the ideas they repreſent; and to ſhew the actual variety of the external expreſſions of the ſame mental conceptions which different languages exhibit. By this compariſon we ſhall be enabled to judge which is the moſt adequate and convenient method of expreſſion, what is defective and what is redundant in the ſtructure of any particular language, and direct to the moſt proper method of ſupplying the defect, or leſſening the inconveniences ariſing from the ſuperfluity. See LANGUAGE. See an excellent and well known work of this kind by the ingenious and learned Mr. Harris, called the Hermes, or a Philoſophical Enquiry concerning Univerſal Grammar, 2d. Ed. 1765.

GRAMMAR, *characters in*. See CHARACTER.

GRAMMARIAN, GRAMATICUS, a perſon well verſed in grammar; or who teaches grammar.

The denomination *grammarian* is, like that of critic, now frequently uſed as a term of reproach; a mere *grammarian*; a dry, plodding *grammarian*, &c. The *grammarian* is conceived as a perſon wholly attentive to the minutiæ of language; induſtriouſly employed about words, and phraſes; and incapable of perceiving the beauties, the delicacy, fineſſe, extent, &c. of a ſentiment.

Scaliger, however, conſidered *grammarians* in another light. *Utinam eſſem* ſays he, *bonus* grammaticus? *ſufficit enim ei, qui omnes auctores probe vult intelligere, eſſe* grammaticum.

The title *grammarian*, it is certain, was anciently a title of honour; being given not only to ſuch as applied themſelves to grammar, or excelled in philology; but to all who were reputed learned in any art or faculty whatever, as is ſhewn by Ger. Voſſius, in his book of grammar.

The word was properly a title of literature and erudition, and was frequently given to perſons who excelled in all, or many arts, called alſo *polyhiſtores*.

Thus, Philoponus, a famous philoſopher in Juſtinian's time, remarkable for the extent and variety of his knowlege, was ſurnamed *grammaticus*, as appears from Photius's Bibliothec.

So Saxo, the Daniſh hiſtorian, in the thirteenth century, got the appellation *grammaticus*: and as late as the year 1580, Thomas d'Averſa, a celebrated Neapolitan lawyer, was ſurnamed the *grammarian*.

The title *grammarian* was anciently beſtowed on thoſe we now call *critics*, men of learning, erudition, letters, &c. and particularly ſuch as wrote well, and politely, in every kind.

It is in this ſenſe that Suetonius intitles his book which he wrote on the beſt Latin authors, *Of the celebrated grammarians*; and that Cornelius Nepos calls the commentators on the orators and poets, *grammarians*; and laſtly, it is in this ſenſe the appellation is attributed by the ancients to Apion, Philoponus, and Solinus.

The moſt celebrated *grammarians* of the ſecond century, were Aper, Pollio, Eutychius, Proculus, Athenæus, Julius Pollux, Macrobius, and Aulus Gellius: the works of theſe laſt authors are an aſſemblage of abundance of very different things, and ſubjects relating to the criticiſm of the ancient writers, and the polite literature.

If the name have loſt its ancient honour, it is through the fault of thoſe who have aſſumed it; by their treating of grammar in a low, pedantic, dogmatic manner; reducing it to words and ſyllables; and dwelling altogether on trifling puerile remarks, and cenſures: whereas its ancient office was to make an accurate and thorough examen of an author; to enter into all his views; to point out the beauties, and the defects thereof; to diſtinguiſh the true beauties from the falſe; and the genuine productions of an author, from the ſuppoſititious; that is, a *grammarian* was then, what we call a *critic* now.

Thoſe who only taught to read, underſtand, and explain authors, were called *grammatiſts*, *grammatiſtæ*; in contradiſtinction from *grammatici*: though, in courſe of time, the *grammatiſtæ* have riſen in the place of *grammatici*; who are now preferred to that of *critici*.

GRAMMATICAL, ſomething relating to GRAMMAR.

We ſay, *grammatical* conſtruction; *grammatical* ſignification, &c. Idioms, as Angliciſms, Latiniſms, Greciſms, Galliciſms, &c. deviate from *grammatical* ſtrictneſs. Such a phraſe is not *grammatically* juſt; it is an idiom.

GRAMMATICAL *criticiſm*. See CRITICISM.

GRAMMELOUC, in *Natural Hiſtory*, the name of an Eaſt Indian ſhrub, very common in the woods and foreſts. It grows to five or ſix feet high: its leaves are very long and narrow, and terminate in a point; they are of a lively green; the fruit is carried in a bag of a triangular ſhape, of the ſize of a hazel-nut, but ſomething longer; on opening this there appear three cells, in each of which is contained one fruit, reſembling the ſeed of the palma Chriſti, but covered with a tranſparent pellicle, and a black one under that: the inſide of the fruit is white, and is of a ſharp and pungent taſte. It is a very violent medicine, operating both by ſtool and vomit, and that often ſo as to endanger the life of the perſon who has taken it. They allay its operation by eating BETEL. Mem. Acad. Par. 1699.

GRAMPUS, in *Ichthyology*, the *delphinus orca* of Linnæus, an Engliſh name given to one of the cetaceous fiſhes, properly of the genus of the DELPHINUS, or dolphin, according to the new Artedian ſyſtem, and diſtinguiſhed from the others of that genus, by the name of the *dolphin* with the ſnout bending upwards, and with broad ſerrated teeth. This is the orca of almoſt all the ancient as well as modern writers, and is called the *loper* and *north-caper* by the people of Scotland. Sir Robert Sibbald gives it the name of the *balæna*; but he diſtinguiſhes it from the common whale by its ſmaller ſize, and having teeth in both the jaws; and his account of the teeth of this fiſh differs from that of Linnæus and Artedi. According to him, there are thirty in each jaw; thoſe before are blunt, round, and ſlender; the fartheſt ſharp and thick; between each is a ſpace adapted to receive the teeth of the oppoſite jaw, when the mouth is cloſed. Paulus Jovius calls it alſo *capidolius*. Theſe are all the names it is known by; and that of PORPESSE is ſometimes ignorantly given to it, but properly belongs to another ſpecies of the ſame genus, the PHOCÆNA.

The ſpout-hole of this fiſh is in the neck; the ſituation and number of the fins agree with the dolphin; the colour of the back is black, but on each ſhoulder is a large white ſpot, the ſides marbled with black and white, and the belly of a ſnowy whiteneſs; its length is from fifteen to twenty-five feet, and it is remarkably thick in proportion to its length. This fiſh is extremely voracious; deſtroys the porpeſſe, and is ſaid to be a great enemy to the whale, faſtening on it like a dog on a bull, till it roars with pain. The *grampus* is ſometimes found on our coaſts, but moſt abounds off the North Cape in Norway. Pennant.

GRANA *figlia*, in the *Materia Medica*, the fruit of a ſpecies of RICINUS.

GRANA *paradiſe*, or greater CARDAMOMS, are the ſeeds of the AMOMUM of Linnæus.

GRANA *regia*, in the *Materia Medica*, the ſeeds of the common RICINUS, called by ſome PALMA *Chriſti*.

GRANADIER, GRENADIER, or GRANADEER, a ſoldier who is armed with a firelock, bayonet, and hanger, a pouch full of hand-grenades to be thrown among the enemy, and a cartridge-box that will hold twenty-four rounds. They wear a high cap, fronted formerly with a piece of braſs, but now with fur, and a piece of cloth upon their ſhoulders, called a wing. They were firſt eſtabliſhed in France in 1667, and ſoon after formed into companies: they were firſt known in England in 1685.

There are companies of *foot granadiers*, and *horſe granadiers*, or *granadiers* of horſe, by the French called *granadiers*

nadiers volans, or *flying granadiers*, who are mounted on horſeback, but fight on foot and on horſeback. Theſe were firſt eſtabliſhed in France by Lewis XIV. in 1676, and formed into ſquadrons.

Every battalion of foot, of late years, has generally a company of *granadiers* belonging to it; or elſe four or five *granadiers* belonging to each company of the battalion; which, on occaſion, are drawn out, and form a company of themſelves. Theſe generally take the right of the battalion; and are the firſt in attacks.

We have in England two troops of *horſe granadier* guards, the firſt raiſed in the year 1693, and the ſecond in 1702.

GRANADILLA. See PASSION *flower*.

GRANADO, GRANADA, or GRENADE, in the *Military Art*, a hollow ball or ſhell, of iron, braſs, or even glaſs, or potters earth, filled with gunpowder, and fitted with a fuzee to give it fire.

The name *granado* takes its riſe hence, that it is filled with grains of powder, as a pomegranate is with kernels.

Of theſe there are two kinds; the one large, the other ſmall: the firſt are to be thrown at the enemy by a mortar, properly called BOMBS, or SHELLS. The latter to be caſt with the hand, and thence denominated *hand-granados*.

The beſt way, Caſimir obſerves, to ſecure a man's ſelf from the effect of a *granado*, is, to lie flat down on the ground, before it burſt.

The common, or hand *granado*, is a little, hollow ball of iron, tin, wood, paſteboard, or other matter, filled with ſtrong powder, lighted with a fuzee, and thus thrown by hand into places where men ſtand thick; and particularly into trenches and lodgments.

Their compoſition is the ſame with that of BOMBS; which ſee. For ſize, they are uſually between two and three inches in diameter, about the bigneſs of a common iron bullet, and weigh about three pounds: as to dimenſions, they are commonly in thickneſs one eighth, one ninth, or one tenth of their diameter; their aperture, or orifice about $\frac{3}{13}$ wide, as preſcribed by Caſimir.

Thuanus obſerves, that the firſt time *granados* were uſed, was at the ſiege of Wachtendonck, a town near Gueldres; and that the inventor was an inhabitant of Venlo; who, in making an experiment of the effect thereof, occaſioned two-thirds of that city to be burnt; the fire being kindled by the fall of a *granado*.

Bombs were known long before the invention of *granados*. The ancients had a ſort of ollæ, or fire-pots, ſomewhat of the ſame nature with our *granados*, but they were much leſs perfect.

Caſimir mentions a ſort of *blind granados*, without any aperture, or fuzee, as not needing to be lighted; but being thrown with a mortar, take fire of themſelves whenever they fall on any hard ſolid object.

GRANARY, a building to lay or ſtore corn in, particularly for keeping.

Sir Henry Wotton adviſes, to make it look towards the north as much as may be; becauſe that quarter is moſt cool and temperate.

Mr. Worlidge obſerves, that the beſt *granaries* are built of brick, with quarters of timber wrought in the inſide, whereto to nail the boards, with which the inſide of the *granary* muſt be lined ſo cloſe to the bricks, that there be no room for vermin to ſhelter themſelves. There may be many ſtories one above another, which ſhould be near to one another; for the ſhallower corn lieth, the better, and it is the eaſier turned.

Some have had two *granaries*, the one above the other, and filled the upper with wheat, or other corn: this upper one had a ſmall hole in the floor, by which the corn deſcended into the lower one, like the ſand in the hour-glaſs; and when it was all come down into the lower *granary*, it was then carried up again into the upper one; and ſo it was kept continually in motion: which is a great preſervation to the corn. A large *granary*, full of ſquare wooden pipes, may alſo keep corn from heating.

In the care of public *granaries*, or magazines of corn, one great caution neceſſary, is, the laying up in them ſuch corn as will be leaſt ſubject to decay; and the ſingle thing to be conſidered in this, is the laying up only ſuch as is the product of hot and dry countries. In France the corn of the ſouthern provinces keeps many years longer than that of the other parts of the kingdom; and ancient and modern hiſtory both inform us, that the corn which is the produce of Africa, particularly of the country about Algiers and Tunis, will keep much longer than that of any other country. The Romans, in old time, annually imported vaſt quantities of corn from Egypt; this they found not only to produce much larger crops than ſuch as was the produce of their own country, but to keep many years in their public *granaries* without injury. The marquis of Santa Cruz, the author of many excellent obſervations on the politic and military ſtate of different nations, obſerves, that in Galicia and the Aſturias the corn will hardly keep in the *granaries* from one year to another, and that it is the humidity it contains that rots and decays it; and that the corn brought from Caſtile will keep good many years. This corn, he tells, is the only kind they ever venture to lay up in the public *granaries* of Spain; and that the whole difference between this and the other, is, that it grows in a country where there is leſs rain in ſummer. Des Landes Trait. Phyſ.

It would be eaſy to import corn from Barbary in ſufficient quantity for all the ſeed-corn of the kingdom; and in countries where the people are ſubject to famine, even for the ſupport of the nation; and the advantage this African corn would have over the European, would be much greater than that of Caſtile is obſerved to have over the produce of the other parts of Spain. Flat bottomed veſſels, of conſiderable burthen, yet not made to draw much water, would be very proper for this ſort of ſervice; and the voyage through the Streights of Gibraltar would, at a proper ſeaſon of the year, be ſhort, and performed at ſmall expence. We might thus be furniſhed with ſeed-corn, vaſtly better than any we can purchaſe at preſent; and France with corn that would guard ſufficiently againſt the miſeries of a famine, which a long war generally brings upon that nation; and if the public magazines for receiving and laying up this corn, were erected near the mouths of the ſeveral larger rivers, the water-carriage would eaſily diſperſe it in time of want to all parts of the kingdom.

The kingdoms of Fez and Morocco might be alſo as good marts for us, though the French are forbid trading for corn in them, on any other condition than that of exchanging military ſtores for them, which they make a point of it not to do. The keeping up a good underſtanding with Algiers and Tunis, is however of ſo much conſequence to us, that we do not ſcruple purchaſing their friendſhip at this price; and we therefore might, if we pleaſed, as well traffic for corn with fire-arms in Fez and Morocco, as with any other of the commodities of our country.

The choice of the *grain* being made, and the manner of procuring it regulated, the next conſideration is how to preſerve it; for this purpoſe, we have the concurrent teſtimony both of the ancients and moderns, that ſubterranean caverns, made in a dry ſoil, and preſerved from the ingreſs of the damp air, are the propereſt places. Pliny tells us, that in his time they kept corn a long time in theſe ſort of ſtore-rooms, covering the bottom with ſtraw, and laying upon that the corn in the ear. We find that corn will be preſerved thus very well; for five, ſix, or ſeven years. And an accident, ſome years ago, diſcovered a parcel of corn thus preſerved at Amiens, which, though it had been laid up a great number of years, was found to be freſh and good, not worm-eaten, not rotten, nor even mouldy. This is certainly owing to the moiſt air having been kept out, and with it the eggs of animals, and ſeeds of thoſe minute vegetables, which we ſee in form of mouldineſs on ſuch corn, as has been leſs carefully defended from the acceſs of them. Experimental philoſophy has proved, that the air is the great ſource of corruption; keep out that, and all is kept out; and the moſt corruptible ſubſtances, ſuch as meal, butter, milk, and the like, have been preſerved freſh four months in the exhauſted receiver of an air-pump.

The only objection to this ſcheme for public *granaries* is the expence, but it is not proper that any but a monarch ſhould undertake them; and there does not appear any way in which the public money could be better employed than in ſo general a good. They have near Grand Cairo a magazine of this kind, defended with good walls, and called Joſeph's *granaries*. It is not probable, that they are quite ſo old as the days of that patriarch, but they abundantly prove the utility of ſuch ſtorehouſes, by the vaſt quantities of *grain* annually preſerved in them.

Many parts of Africa abound with *granaries* of this kind. There are ſo many deep pits made in the ſolid rock, the deſcent into them is but juſt large enough for a man to go down into them by, but they grow larger as ſoon as the perſon is in, and are uſually ſquare, and from thirty to forty feet in diameter. In theſe the great men of the country preſerve their corn; they firſt ſtrew over the floor with ſtraw, then they lay the corn on; ſtill as the heap riſes, placing a thin bed of ſtraw between the corn and the ſides, as they did at the bottom. In this manner they proceed till the whole cavity is filled: when this is done, they cover the mouth of the entrance with a ſort of hurdle of green boughs of trees, interwoven one with another. This they cover with about two feet thickneſs of ſand, and over this they raiſe a ridge of earth, well beat together, in order to throw off the rain both ways, that none may ſettle on the place and ſoak into the magazine.

The corn thus ſtored up always keeps three, four, or more years very good; and not unfrequently, the proprietor being taken off by the ſeverity of the eaſtern governments, under which they live, the magazine is forgotten, and ſome accident diſcovering it many years afterwards, the corn is almoſt always found perfectly good in it. All the care they take, in regard to the corn, is to expoſe it two or three days to the ſun's heat, to dry it thoroughly before they carry it into the magazine.

In the duchy of Lithuania, and in the Ukraine, the people always preſerve their corn in the ſame manner in wells or pits made in dry places; but in theſe countries great care is to be taken in the opening theſe ſtore-rooms; for if people deſcend into them, before they have had ſufficient communication with the freſh air, they are often killed by the damps; this, however, is eaſily guarded againſt; and by theſe and numerous other inſtances of the practice of other countries, it appears evident, that the advantage of thoſe ſubterranean *granaries* over all others is very great.

Though theſe are to be recommended before all others, yet the common *granaries* may, with proper care, be rendered much more uſeful than they are at preſent. The grand caution neceſſary to this purpoſe is to guard againſt the too great humidity, which there always is in places, where there is a great number of doors and windows. A two free acceſs of the external air is alſo to be carefully guarded againſt; for this brings in with it the eggs of a vaſt number of different inſects, which prey upon and deſtroy the corn. A third caution is, when the corn is the produce of the country, where it is preſerved, not to fill the place with the crop of one place only, but to mix the harveſts of two as different provinces as may be, the one dry, the other moiſt, or otherwiſe differing as much as may be; thus the contrary qualities of the one will prevent the deſtruction of the other. Theſe are the three great rules to prevent the corrupting of corn; but when the miſchief is once begun, it will prove very difficult to ſtop it: all the care that can be employed ſhould therefore be taken in regard to theſe.

The two great cautions to be obſerved in the erecting of *granaries* are to make them ſufficiently ſtrong, and to expoſe them to the moſt drying winds. The ordering of the corn in many parts of England, particularly in Kent, is thus: to ſeparate it from duſt and other impurities after it is thraſhed, they toſs it with ſhovels from one end to the other of a long and large room; the lighter ſubſtances fall down in the middle of the room, and the corn only is carried from ſide to ſide, or end to end of it. After this they ſcreen the corn, and then bringing it into the *granaries*, it is ſpread about half a foot thick, and turned from time to time about twice in a week; once a week they alſo repeat the ſcreening it. This ſort of management they continue about two months, and after that they lay it a foot thick for two months more, and in this time they turn it once a week, or twice, if the ſeaſon be damp, and now and then ſcreen it again. After about five or ſix months they raiſe it to two feet thickneſs in the heaps, and then they turn it once or twice in a month, and ſcreen it now and then. After a year, they lay it two and a half, or three feet deep, and turn it once in three weeks or a month, and ſcreen it proportionably. When it has lain two years, or more, they turn it once in two months, and ſcreen it once a quarter, and how long ſoever it is kept, the oftener the turning and ſcreening is repeated, the better the *grain* will be found to keep.

It is proper to leave an area of a yard wide on every ſide of the heap of corn, and other empty ſpaces, into which they turn and toſs the corn as often as they find occaſion. In Kent they make two ſquare holes at each end of the floor, and one round in the middle, by means of which they throw the corn out of the upper into the lower rooms, and ſo up again to turn and air it the better. Their ſcreens are made with two partitions, to ſeparate the duſt from the corn, which falls into a bag, and when ſufficiently full this is thrown away, the pure and good corn remaining behind.

Corn has by theſe means been kept in our *granaries* thirty years; and it is obſerved, that the longer it is kept the more flour it yields in proportion to the corn, and the purer and whiter the bread is, the ſuperfluous humidity only evaporating in the keeping. At Zurich in Swiſſerland, they keep corn eighty years, or longer, by the ſame ſort of methods.

The public *granaries* at Dantzick are ſeven, eight, or nine ſtories high, having a funnel in the midſt of every floor to let down the corn from one to another. They are built ſo ſecurely, that though every way ſurrounded with water the corn contracts no damp, and the veſſels have the convenience of coming up to the walls for their lading. The Ruſſians preſerve their corn in ſubterranean *granaries* of the figure of a ſugar-loaf, wide below and narrow at top: the ſides are well plaiſtered, and the top covered with ſtones. They are very careful to have the corn well dried before it is laid into the ſtore-houſes, and often dry it by means of ovens; the ſummer dry weather being too ſhort to effect it ſufficiently.

Dantzic is the grand ſtore-houſe, or repoſitory of all the fruitful kingdom of Poland. The wheat, barley, and rye, of a great part of the country, are there laid up in parcels of twenty, thirty, or ſixty laſts in a chamber, according to the ſize of the room; and this they keep turning every day or two, to keep it ſweet and fit for ſhipping. A thunder ſtorm has ſometimes been of very terrible conſequences to thoſe ſtores. All the corn of the growth of former years having been found ſo much altered by one night's thunder, that though over-night it was dry, fit for ſhipping or keeping, and proper for uſes of any ſort, yet in the morning it was found clammy and ſticking. In this caſe there is no remedy, but the turning all ſuch corn three or four times a day for two months or longer; in which time it will ſometimes come to itſelf, though ſometimes not.

This effect of thunder and lightning is only obſerved to take place in ſuch corn as is not a year old, or has not ſweated thoroughly in the ſtraw before it was threſhed out. The latter inconvenience is eaſily prevented by a timely care; but as to the former, all that can be done is carefully to examine all ſtores of the laſt year's corn after every thunder ſtorm, that if any of this have been ſo affected, it may be cured in time; for a neglect of turning will certainly utterly deſtroy it. Phil. Tranſ. N° 25. or Abr. vol. ii. p. 629. &c.

According to Virtruvius's rules, a *granary* ſhould always be at the top of a houſe, and have its openings only to the north or eaſt, that the corn may not be expoſed to the damp winds from the ſouth and weſt, which are very deſtructive to it; whereas the contrary ones are very neceſſary and wholeſome to it, ſerving to cool and dry it from all external humidity, from whatever cauſe. There muſt alſo be openings in the roof to be ſet open in dry weather, partly to let in freſh air, and partly to let out the warm effluvia which are often emitted by the corn. The covering of the roofs ſhould always be of tiles, becauſe in the worſt ſeaſons, when the other openings cannot be ſafe, there will always be a conſiderable inlet for freſh air, and a way out for the vapours by their joinings, which are never cloſe. If there happen to be any windows to the ſouth, great care muſt be taken to ſhut them up in moiſt weather, and in the time of the hot ſouthern winds.

There muſt never be a cellar, or any other damp place, under a *granary*, nor ſhould it ever be built over ſtables; for in either of theſe caſes the corn will certainly ſuffer by the vapours, and be made damp in one, and ill-taſted in the other. Mem. Acad. Par. 1708.

Monſ. Du Hamel and Dr. Hales recommend various contrivances for ventilating or blowing freſh air through corn, laid up in *granaries*, or ſhips, in order to preſerve it ſweet and dry, and to prevent its being devoured by weevels or other inſects. This may be done by nailing wooden bars or laths on the floor of the *granary* about an inch diſtant from each other, when they are covered with hair-cloth only; or at the diſtance of two or three inches, when coarſe wire-work, or baſket-work of oſier is laid under the hair-cloth, or when an iron-plate full of holes is laid upon them. Theſe laths may be laid acroſs other laths, nailed at the diſtance of fifteen inches, and two or more deep, that there may be a free paſſage for the air under them. The under laths muſt come about ſix inches ſhort of the wall of the *granary* at one end of them; on which end a board is to be ſet edgeways, and ſloping againſt the wall; by this diſpoſition a large air-pipe is formed, which having an open communication with all the interſtices between and under the bars, will admit the paſſage of air below forcibly through a hole at the extremity of it, into all the corn in the *granary*, that will conſequently carry off the moiſt exhalations of the corn. The ventilators for ſupplying freſh air may be fixed againſt the wall, on the inſide or outſide of the *granary*; or under the floor, or in the cieling; but wherever they are fixed, the handle of the lever that works them muſt be out of the *granary*, otherwiſe the perſon who works them will be in danger of ſuffocation, when the corn is fumed with burning brimſtone, as is ſometimes done for deſtroying weevels.

Small moveable ventilators will anſwer the purpoſe for ventilating corn in large bins in *granaries*, and may be eaſily moved from one bin to another. If the *granary* or corn-ſhip be very long, the main air-pipe may paſs lengthwiſe along the middle of it, and convey air, on both ſides, under the corn. In large *granaries*, large double ventilators, laid on each other, may be fixed at the middle and near the top of the *granary*, that they may be worked by a wind-mill fixed on the roof of the building, or by a water-will. The air is to be conveyed from the ventilators through a large trunk or trunks, reaching down through the ſeveral floors to the bottom of the *granary*, with branching trunks to each floor, by means of which the air may be made to paſs into a large trunk along the adjoining croſs walls: from theſe trunks ſeveral leſſer trunks, about four inches wide, are to branch off, at the diſtance of three or four feet from each other, which are to reach through the whole length of the *granary*, and their farther ends are to be cloſed: ſeams of one-tenth or one-twelfth of an inch are to be left open at the four joinings of the boards, where they are nailed together, that the air may paſs through them into the corn. In ſome of theſe leſſer trunks there may be ſliding ſhutters, in order to ſtop the paſſage of the air through thoſe trunks which are not covered with corn; or to ventilate one part of the *granary* more briſkly than others, as there may be occaſion. There muſt alſo be wooden ſhutters, hung on hinges at their upper part, ſo as to ſhut cloſe of themſelves; theſe muſt be fixed to the openings in the walls of the *granary* on their outſide: by theſe means they will readily open to give a free paſſage for the ventilating air, which aſcends through the corn, to paſs off, but will inſtantly ſhut when the ventilation ceaſes, and thereby prevent any dampneſs of the external air from entering: to prevent this, the ventilation ſhould be made only in the middle of dry days, unleſs the corn, when firſt put in, is cold and damp.

In leſſer *granaries*, where the ventilators muſt be worked by hand, if theſe *granaries* ſtand on ſtaddles, ſo as to have their loweſt floor at ſome diſtance from the ground, the ventilators may be fixed under the loweſt floor, between the ſtaddles, ſo as to be worked by men ſtanding on the ground, without or within the *granary*. A very commodious and cheap ventilator may be made for ſmall *granaries*, by making a ventilator of the door of the *granary*; which may be eaſily done by making a circular ſkreen, of the ſize of a quarter of a circle, behind the door: but in order to this, the door muſt be open, not inwards but outwards of the *granary*, ſo that as it falls back, it may be worked to and fro in the ſkreen; which muſt be exactly adapted to it in all parts of the circular ſide of the ſkreen, as well as at the top and bottom. But there muſt be a ſtop at about eight or ten inches diſtance from the wall, to prevent the door's falling back farther; that there may be room for a valve in the ſkreen to ſupply it with air; which air will be driven in by the door, through a hole made in the wall near the floor, into the main air-trunk, in which there muſt be another valve over the hole in the wall, to prevent the return of the air. See on this ſubject, and the advantages of ventilating different ſorts of grain, Hales' Uſes of Ventilators, part i. p. 81, &c. part ii. p. 220, &c. See Ventilator.

GRANATARIUS, in *Middle Age Writers*, an officer in monaſteries who took care of the proviſions.

GRANATE, popularly called Garnet, in *Natural Hiſtory*, a gem, or precious ſtone, of a high red colour; thus called from the reſemblance it bears to that of the kernel of a pomegranate.

Granates are either *oriental*, or *occidental*: the firſt are brought from divers parts of the Eaſt Indies; the ſecond from Spain, Bohemia, and Sileſia.

Thoſe from the *Eaſt*, are diſtinguiſhed by their colour into three kinds: the firſt, of a deep browniſh red, like black clotted blood; of which kind there are ſome as big as an hen's egg: the ſecond are nearly of the colour of a hyacinth, with which it were eaſy to confound them, but for their ſuperior redneſs. The laſt, having a mixture of violet with their red, are called by the Italians, *rubini della rocha*.

The *occidental granates* are of divers reds, according to the places they are found in. Thoſe of Spain imitate the colour of the kernel of a pomegranate: thoſe of Bohemia have a golden caſt with their red, glittering like a live coal: thoſe of Sileſia are the darkeſt of all, and ſeldom thoroughly tranſparent.

Of the occidental *granates*, thoſe of Bohemia are the moſt valued: ſome even give them the preference to the oriental kind. They are found near Prague; not in any particular mines, but picked up by peaſants in the fields, from among the ſands and pebbles.

This is a gem very ſubject to faults and blemiſhes, and is of different degrees of colour in its different ſpecimens, and when perfectly pure and well coloured, it is little inferior to the ruby in beauty.

This gem is the eighth ſtone in hardneſs from diamonds, and fuſible by fire. It is ſound of various ſizes, from that of a large pin's head, to an inch in diameter; but ſuch large ones are very rare, the largeſt of thoſe uſually found not exceeding a fifth of that ſize. It is almoſt always found oblong, or of an irregularly rounded and pebble-like figure, and never in angular columns. Its ſurfaces, which are ſometimes ſix, and ſometimes more, are never ſo naturally ſmooth and poliſhed as thoſe of the ruby are, and its colour is a ſtrong red, which taken in different lights, never fails to ſhew the bluiſh caſt. Its degree of colour is very different in the different ſpecimens, and it wants much of the brightneſs of the ruby, as well in its poliſhed as in its native or rough ſtate. Theſe are the determinate characters by which the *garnet* is to be known from all the other red gems. Among our lapidaries and jewellers, genuine *garnets*, according to their different degrees of colour, are known by three different names. 1. The *garnet*, ſimply ſo called; this is the fineſt and moſt valuable kind. It is of a very deep blood-red, with a faint admixture of blue. 2. The *rock-ruby*. This is the name they very improperly give to the *garnet*, when it is of a very ſtrong but not deep red, and has a fairer caſt of the blue. This, when pure and perfect, is an extremely elegant gem. 3. The *ſorane*, or as they ſpeak it, the *ſerain-garnet*. This is the name by which they call thoſe *garnets*, which are of a yet brighter red, approaching to the colour of native cinnabar, with a faint tinge of blue. 4. The *almandine*. This is the name given to the *garnet* when of the ſame admixture of tinge with what they call the rock-ruby, but only a little paler. Hill's Hiſt. of Foſſ. p. 591.

Theſe are the names by which the more expert among our jewellers diſtinguiſh the various appearances of the *garnet*; and which, though to the naturaliſt they are but varieties of the ſame ſtone, yet are to them diſtinct ſpecies of gems, ſince they are of ſeveral different values. But among the leſs judicious of theſe artificers, the names are ſtrangely confounded with one another, and even with different ſtones of other kinds; the bluer amethyſts being by ſome of them called rock-rubies, and the deeper hyacinths ſorane-*garnets*.

The ancients, though they have not diſtinguiſhed this gem by any peculiar name, yet ſeem to have been very well acquainted with it, and mention its ſeveral appearances, as to its different degrees of colour, as ſo many ſpecies of the carbuncle, the common name by which they called all the red gems: and their træzenius, ſandaſter, and ſandareſus, ſeem to have been only varieties of it.

Some authors, of very diſtinguiſhing judgment, have taken the deeper *garnet* to be the very ſpecies of gem known by the name carbuncle by Theophraſtus; but on comparing the two ſtones together, it appears plainly, that the *garnet*, whoſe colour goes off into a blue, could never give them the idea of a lighted charcoal, or make ſo true a fire-colour in the ſun as the carbuncle, whoſe deep red goes off into a ſcarlet.

Cronſtedt forms a diſtinct order of the *garnets* and the basaltes, which he calls *terræ granatæ* The diſtinguiſhing property of theſe *garnet* earths is, that they are more fuſible in proportion as they contain leſs metallic matter, and are more tranſparent and glaſſy in their texture. In other reſpects they reſemble the ſiliceous order of earths. All *garnets* contain iron; moſt of them contain tin alſo, and ſome are ſaid to contain iron and lead. The *granate* is of ſome uſe in medicine: its powder is ſometimes an ingredient in the cordial electaries. The ancients held it excellent againſt heavineſs and melancholy.

Granate *paſte*. The counterfeit *garnet* in paſte, is formed with three different proportions of the ingredients, which are theſe:

Take prepared cryſtal two ounces, common red-lead ſix ounces, mangane ſe ſixteen grains, zaffer three grains; mix all well together, and put them into a crucible; cover it with a lute, and ſet it in a potter's kiln for twenty-four hours.

Or, take cryſtal two ounces, minium five ounces and a half, mangane ſe fifteen grains, zaffer four grains; mix them well together, and leave room for their ſwelling in the pot; bake them twenty-four hours in a potter's kiln.

The laſt method is this: take cryſtal prepared two ounces, minium five ounces; mix them, and add manganeſe fifty-two grains, zaffer ſix grains; mix them well together, and let all be baked, in a pot well luted, in a potter's kiln for twenty-four hours.

The firſt of theſe makes a very handſome *garnet* of the common tinge; the ſecond, a deep one, with ſomething of a violet tinge, as many of the natural *garnets* have; but the third makes much the fineſt and brighteſt. Neri's Art of Glaſs, p. 134. See GLASS and PASTE.

GRAND, a term rather French than Engliſh, though uſed on many occaſions in our language. It has the ſame import with *great*, being formed of the Latin *grandis*.

In this ſenſe we ſay, the *grand* maſter of an order, the *grand* maſter of Malta, of the free-maſons, &c.

So alſo, the *grand* ſignor, the *grand* viſier, &c. *grand*-father, *grand*-mother, &c.

In the French polity and cuſtoms there are divers officers thus denominated, which we frequently retain in Engliſh; as *grand* almoner, *grand* ecuyer, *grand* chambellan, *grand* voyer, &c.

GRAND *aſſiſe*. See ASSISE.

GRAND *cape*. See CAPE and ATTACHMENT.

GRAND *days*. See DAY, in *Law*.

GRAND *diſtreſs*, *diſtrictio magna*, a writ of diſtreſs, ſo called on account of its extent, which reaches to all the goods and chattels of the party within the county.

This writ lies in two caſes: either when the tenant or defendant is attached and appears not, but makes default; or where the tenant or defendant hath once appeared, and after makes default. On ſuch occaſions, this writ lies by common law, in lieu of a petit cape.

GRAND *dorſal*, in *Anatomy*, the name given by Winſlow, and the other French anatomiſts, to the muſcle generally called *latiſſimus dorſi*: by ſome the *aniſcalptor* and *aniterſor*, and by Fallopius *quartus humeri*.

GRAND *guſto* is a term uſed by painters, to expreſs that there is ſomething in the picture very great and extraordinary, calculated to ſurpriſe, pleaſe, and inſtruct.

Where this is found, they ſay, the painter was a man of *grand guſto*; and they uſe the words ſublime and marvellous, when they ſpeak of a picture, in much the ſame ſenſe.

GRAND *elixir*, *guard*, *jury*, *larceny*, *prior*, *provoſt of France*, *ſergeanty*. See ELIXIR, GUARD, &c.

GRANDEE is underſtood of a lord of the firſt rank or prime quality.

In Spain, the term *grandees* is uſed abſolutely to denote the prime lords of the court, to whom the king has once given leave to be covered in his preſence: there are ſome *grandees* for life only; made by the king's ſaying ſimply, Be covered. Others are *grandees* by deſcent; made by the king's ſaying, Be covered for thyſelf and heirs. Theſe laſt are reputed far above the former.

There are ſome who have three or four *grandeeſhips* in their family.

GRANDGOR is uſed in Scotland for the pox. In the Philoſophical Tranſactions, Nº 469. ſect. 5. we have a proclamation of king James the IVth of Scotland, ordering all who had this diſeaſe, or who had attended others under it, forthwith to repair to an iſland in the Frith of Forth. If the *grandgor* was the pox, and this diſtemper came into Europe at the ſiege of Naples in 1495, it muſt have made a very quick progreſs to cauſe ſuch an alarm at Edinburgh in 1497.

GRANDO, in *Natural Hiſtory*, a ſtone more uſually called CHALAZIAS.

GRANGE, an ancient term for a barn, or place wherein to lay up and threſh corn.

The word is formed of the Latin *granea*; or of *granum*, *grain*, *corn*, &c. Hence alſo *granger* or *grangier*, *a grange-keeper* or *farmer*.

GRANCE is alſo uſed, in a more extenſive ſenſe, for a whole farm, with all the appendages of ſtables for horſes, ſtalls for cattle, &c. and for an inn.

GRANI, in *our ancient Writers*, muſtachoes or whiſkers of a beard.

The word ſeems formed from the ancient Britiſh or Iriſh, *greann*, *a beard*.

It is given for a reaſon why the cup is refuſed to the laity, *Quia barbati, & prolixos habent* granos, *dum poculum inter epulas ſumunt, prius liquore pilos inficiunt, quam ori infundunt*.

GRANITES, in *Natural Hiſtory*, are defined to be ſtones compoſed of ſeparate and very large concretions, rudely compacted together, ſo as not to form one maſs or ſubſtance, like marble, but to remain diſtinct from each other, of great hardneſs; giving fire with ſteel, not fermenting with acids, and ſlowly calcining in a ſtrong fire. The parts of which the *granites* conſiſt are not homogeneous, but are compoſed of common quartz, feltſpar or rhomboidal quartz, and of mica, with which are alſo often accidentally mixed particles of other ſtones and metallic earths. From this granuloſe ſtructure, they derive their name *granites*, i. e. *è granis compoſita*. Some writers in mineralogy have injudiciouſly made the *granite* either a variety or ſpecies of the PORPHYRY; and others have given the name of *granites* to all marbles, variegated with red, black, yellow, &c. ſpots, merely on account of their being ſpeckled marbles.

The ſpecies of this genus are the following: 1. The *granite* with a black ground, having a ſlight tincture of green ſpotted with white: nodules of this are frequent on moſt of our Engliſh ſhores, and large maſſes of it abound in the pavements of the ſtreets of London. 2. The black and white *granite*, called MOOR-*ſtone*. 3. The *granite* with a duſky white ground, irregularly and thickly ſpotted with ſmall black ſpots: this ſtone takes a very fine poliſh and ſurface; it is called by the Italians *granitello*, and by modern travellers the *grey granite*: there are great quantities of it found in the ancient temples and other buildings of Egypt, Aſia, and Italy; and there is ſcarce an iſland in the Archipelago that does not abound with it: the moſt common *granite* of Europe is of this ſpecies; there are large quarries of it in the provinces of Normandy and Provence in France, where it is uſed for door-caſes and chimney-pieces. 4. The white *granite*, with a few black ſpots, found in nodules and maſſes on many of the ſhores of Europe. 5. The white *granite* with large green ſpots; this is a beautiful ſpecies, and takes a fine poliſh and ſurface: there are ſtrata and maſſes of this *granite* in the county of Downe in Ireland, eſpecially about Newry, which town is partly built with this ſtone. 6. The red, black, and white *granite*, commonly known by the name of oriental *granite*.

The oriental *granite* of the moderns, is the ſtone deſcribed by the ancients under the name of *pyropœcilos* and *ſyenites*, and from its extreme hardneſs and beauty has been always greatly eſteemed. It is, when in its rough ſtate, a very rude, coarſe, and irregular maſs, but of a very firm and compact ſtructure, and is of a very beautiful pale red, variegated with white and black; the red parts are of an irregular ſtructure and marbly appearance. The white are tabular, or compoſed of flat concretions, and many of them are very bright and pellucid, others of rough ſurfaces and ſemi-opake; the former are compoſed of a talcy, the latter of an earthy cryſtal. The black parts are plainly foliaceous, and are compoſed of a black cryſtalline talc. And beſide theſe, there are, in different parts of the ſtone, many flakes both of black and white unaltered talc. The whole is of a very ſingular hardneſs, but takes an extremely elegant and beautiful poliſh.

There are many varieties of this oriental *granite*: the true oriental red *granite*, of which the temples, obeliſks, and other ancient buildings that abound in Egypt, Aſia, and Italy, were built, was procured from Upper Egypt, and particularly from Syene in the Thebais: the quarries in this place have been deſcribed by Dr. Pococke, in his Deſcription of the Eaſt, vol. i. p. 117. The whole country of Arabia Petræa is a maſs of *granites*; and this red *granite* is alſo found in many parts of Europe: there are many fine tables, &c. equal to the fineſt oriental *granite*, at Mount Edgecumbe in Devonſhire, which have been wrought from ſtone found in thoſe parts. Maſſes of this ſtone are likewiſe found in many other counties of England. The whitiſh red *granite*, which is ſometimes found in large ſtrata, but more frequently in large looſe nodules, is a variety of the ſame ſpecies. It is very plentiful in many parts of the iſland of Minorca, from whence we might have it in abundance, and it would make very beautiful tables, &c. The rough maſſes of it are ſometimes found alſo on the ſhores of our iſland of Guernſey, whence they are taken up for ballaſt for ſhips, and are ſometimes by this means brought among us, and uſed in the pavements of our ſtreets.

7. The *granite* of a pale yellowiſh colour, ſpotted with ſmall irregular black ſpots: this is a rare ſpecies; but ſome maſſes of it are found in the county of Donnegal, in Ireland; and there are pillars of it at Conſtantinople, and a coloſſal ſtatue twelve feet high near Thebes in Upper Egypt, mentioned by Pococke ubi ſupra, p. 103. 8. The *granite* of a fine graſs-green colour, thickly ſpotted with black: this is a rare but elegant ſtone; ſmall nodules of it are ſometimes found on our ſhores; and *granite* of this ſpecies is alſo dug near Sienna in Italy. Hill's Foſſ. p. 498, &c. Mend. da Coſta's Foſſ. p. 273, &c.

GRANIVOROUS, an epithet or denomination given to ſuch animals as feed upon corn, or any other grain or ſeeds.

Granivorous animals are chiefly of the BIRD kind. Theſe have a peculiar proviſion for the digeſting of ſo dry and hard a food.

GRANT, in *Law*, a gift in writing of ſomething incorporeal, not lying in livery, and which cannot aptly be paſſed or conveyed by word only; as rents, reverſions, ſervices, advowſons in groſs, tythes, &c.

Or, it is a gift made by ſuch perſons as cannot give but by deed; as the king, and all bodies politic. See DONATION.

This difference is often, in ſpeech, neglected; and the word *grant* taken generally for any gift whatſoever, made of any thing, by any perſon.

In this ſenſe, he that granteth is named *granter*; and he to whom it is made, the *grantee*.

A thing is ſaid to *lie in grant*, which cannot be aſſigned without deed.

GRANULATED *oil*. See OIL.

GRANULATION, in *Chemiſtry*, an operation performed on metals, whereby they are reduced into ſmall grains or globules.

It is done by melting them, and, when in fuſion, caſting them from a certain height into cold water; in which they congeal into granules, as required, and are hereby rendered more eaſy to be diſſolved. The beſt way is to pour the fluid metal through a colander, or a new birchen broom, or to agitate the water with the broom, thus giving it a circular motion whilſt the metal is poured in. Copper is *granulated* for making BRASS in a cylindrical wooden reſervoir, four or five feet deep, in which a circular braſs or copper bottom may be raiſed or lowered by means of a chain. The reſervoir is covered with a copper lid, in the middle of which is a hole half a foot in diameter, intended to receive an iron ladle pierced with holes and coated with clay. The reſervoir being filled with water, the melted copper is poured through the holes in the ladle into the water; where it is broken by its fall into ſmaller drops or grains, rendered ſolid by the cold water; and collected in the moveable bottom, which is raiſed by the annexed chain, that the *granulated* copper may be taken out. Macquer. Dict. Chem. Eng. edit. art. *Braſs*.

Lead, tin, and braſs, which are very brittle, when they are ſo hot as to be almoſt fuſed, may be *granulated* by pouring them, in a ſtate of fuſion, into a box, the inner ſurface of which is rubbed with powdered chalk, and by ſhaking the box: the metals in the box are no ſooner become ſolid, and conſequently very brittle, than they are ſhivered, by being daſhed againſt the ſides of the veſſel, into a fine duſt. Silver and gold, and the more tenacious metals, muſt be *granulated* in either of the firſt methods above mentioned with water. Cramer, Art of Aſſ. p. 70.

The term *granulation* is alſo applied to GUN-*powder*.

GRANULOSE *roots* are thoſe compoſed of ſmaller knobs than the grumoſe ones, and reſembling ſo many grains of corn; of this ſort is the white ſaxifrage.

GRANUM *viride*, in *Botany*, a name given by ſome authors to the turpentine-tree. The fruit of this tree is reddiſh while unripe; but as it ripens, it becomes of a deep bluiſh green colour, and hence the name.

GRAPE, the fruit of the vine. See VINE and WINE. See alſo CURRANTS and RAISINS.

GRAPE *hyacinth*. See HYACINTH.

GRAPE, *mangrove* or *ſea-ſide*, *coccoloba*, a genus of the *octandria trigynia* claſs. Its characters are theſe: the flower has one permanent petal, which is cut into five ſegments; it has a fleſhy umbilical nectarium which ſurrounds the germen, and ſix, ſeven, or more erect ſpreading ſtamina, with an oval germen, which turns to a fleſhy berry, including an oval nut, which is wrapped up in the petal of the flower. There are ſix ſpecies, natives of the Weſt Indies, where growing on the ſea-ſhore, they have obtained the name of *ſea-ſide grapes*.

The leaves of theſe plants continuing in verdure all the year, make a fine appearance in the hot-houſe in winter; but they do not produce flowers here.

They muſt be propagated by ſeeds, ſown in pots of light rich earth, and plunged into a hot-bed of tanner's bark: the plant muſt conſtantly remain in a ſtove, being too tender to live in the open air, even in our warmeſt weather; only in ſummer they may be frequently refreſhed with water, and have freſh air admitted to them. Miller.

GRAPES, *wolf*. See LYCOSTAPHYLÆ.

GRAPE-*galls*, in *Natural Hiſtory*, a name given by authors to a ſpecies of protuberances reſembling cluſters of *grapes*, and when ripe of a reddiſh colour, which are found hanging from the oak at ſome ſeaſons of the year. Theſe are genuine galls, though of a peculiar kind, and owe their origin to a very ſmall four-winged black fly. This little creature depoſits its eggs either on the ſurface, or within the ſubſtance of thoſe pedicles of the oak which nature has deſtined for producing the catkins or ſmall flowers of that tree. The biting and ſucking of the worms, which are produced from theſe, occaſion a wrong derivation of the juices to the part; and the conſequence of this is, that, inſtead of flowers, there appears a protuberance over the part where each of theſe inſects is lodged. This tubercle at firſt is ſmall, and of a pale greeniſh colour; but it finally becomes yellowiſh or reddiſh, and is juicy and large. A number of theſe ſtanding cloſe together upon the ſtalk, give the appearance of a cluſter of *grapes* on the bunch; and when any one of theſe is opened, there is found in it either a worm, a chryſalis, or a fly, the animal never quitting its habitation till in its perfect ſtate, but paſſing through all its changes in it. Reaumur, Hiſt. Inſect. vol. vi. p. 16.

GRAPE-*ſhot*, in *Artillery*, is a combination of ſmall ſhot, put into a thick canvaſs bag, and corded ſtrongly together, ſo as to form a kind of cylinder, whoſe diameter is equal to that of the ball adapted to the cannon. The number of ſhot in a *grape* varies according to the ſervice or ſize of the guns: in ſea-ſervice nine is always the number; but by land it is increaſed to any number or ſize, from an ounce and a quarter in weight to three or four pounds. In ſea-ſervice the bottoms and pins are made of iron, whereas thoſe uſed by land are of wood.

GRAPES, in the *Manege*, a term uſed to ſignify the ARRETS or mangy tumours that happen in a horſe's legs.

GRAPHICAL *perſpective*, in *Optics*, is an inſtrument deſcribed by Mr Martin, conſiſting of a tube containing two convex lenſes, which are placed at twice their focal diſtance from each other; and in their common focus is another glaſs, divided into equal parts with the point of a diamond. Though this inſtrument does not magnify any object, yet the angle under which an object is ſeen is eaſily known by it; and ſince this angle varies with the diſtance of objects, it is eaſily applied to the purpoſe of meaſuring inacceſſible heights and diſtances; and ſince the field of view is divided into equal ſquares, it is uſeful in drawing the perſpective appearance of objects. Moreover, as all foreign light is excluded by the tube in which theſe lenſes are incloſed, pictures ſeen through it have a fine relievo, on which account, and alſo becauſe objects appear inverted through it, the images of a CAMERA *obſcura* are viewed with it to peculiar advantage. If a lens of a greater focal length be fixed at a proper diſtance from the center of the tube, this inſtrument will be a teleſcope, and will magnify the prints which are looked at through it; and if a ſmall lens be uſed, it will be a microſcope, and the ſame micrometer will ſerve for them both. Martin's Optics, chap. xvii. p. 280, &c.

GRAPHIDA, in *Natural Hiſtory*, a name by which ſome authors have called the MOROCHTHUS, or French chalk.

GRAPHISCUS, in the *Writings of the Ancients*, a name given to an inſtrument uſed for the extracting darts from wounds. It is ſaid to have been the invention of Diocles, and is deſcribed by Celſus.

GRAPHOIDES, or GRAPHIOIDES, γραφιοειδης, in *Anatomy*, an appendage of the bones of the temples, long, ſmall, ſharp, and a little crooked, like a cock's ſpur; called alſo *ſtyloides*.

The ſame name is ſometimes alſo applied to the muſculus digaſtricus.

Likewiſe to an extenſion of the brain, reſembling a writing pen.

GRAPHOMETER, a name which ſome authors, particularly the French, give to a ſurveying inſtrument, by us commonly called a SEMICIRCLE.

GRAPLINGS, in a *Ship*. See GRAPNEL.

GRAPNEL, or GRAPPLING, on *Ship-board*, a kind of ſmall anchor for boats or gallies to ride by. It differs from other anchors, as having four or five flukes and no ſnack. though there are ſome with three flukes, with which they uſe to ſweep for hawſers or ſmall cables. In men of war alſo, the *grapnels*, or at leaſt a lighter kind of them, whoſe flukes are furniſhed with ſtrong barbs on their points, are uſed to be thrown into an enemy's ſhip, in order to catch hold of ſome of her gratings, rails, gun-wales, &c. this is done in order to boarding of her. They are particularly uſeful in FIRE-*ſhips*, and called *fire-graplings*.

GRAPPLE, in the *Manege*. A horſe is ſaid to *grapple* with one or both legs, when he catches or raiſes them more haſtily and higher than ordinary, as if he were curvetting.

GRASS, *gramen*, in *Botany*. To enumerate all the ſpecies of graſs which are found growing naturally in England, would greatly exceed the bounds which can be allowed for this article; it will ſuffice, therefore, to mention a few ſpecies, which are either uſed in medicine, or cultivated as a pabulum for cattle; for there is ſcarcely a paſture in this country where great numbers of different ſpecies are not to be found intermixed. Mr. Ray has ranged them in the following order, viz. wheat-*graſs*, rye-*graſs*, darnel-*graſs*, panick-*graſs*, canary-*graſs*, fox-tail-*graſs*, cat's-tail-*graſs*, hedge-hog-*graſs*, creſted-*graſs*, oat-*graſs*, cock's-foot-*graſs*, buck-*graſs*, and millet-*graſs*. Theſe and other *graſſes* Linnæus has arranged into diſtinct genera.

The common creeping *graſs* with a ſpike like wheat, called dog or couch-*graſs*, which is a ſpecies of the TRITICUM in the Linnæan ſyſtem, has a creeping root which ſpreads far in the ground, and is a very troubleſome weed in gardens and arable land. The common method of deſtroying it in the former, is to fork out the roots as often as the blade appears above ground; where this is two or three times carefully repeated, it may be totally rooted out: but when the ſurface of the ground is very full of the roots of this *graſs*, the ſhorteſt way of deſtroying it is to trench the ground two ſpits and a ſhovelling deep, turning all the couch to the bottom, where it will rot and never ſhoot up; but in ſhallow ſoils, the roots cannot be buried ſo deep as to lie below the depths at which they naturally ſhoot.

Where the roots of this *graſs* get poſſeſſion of arable fields, the uſual method of eradicating it is by laying the land fallow in ſummer, and frequently harrowing it well to draw out the roots: where this is carefully practiſed, the ground may be ſo well cleaned in one ſummer, that the roots cannot much injure the crop which may be ſown upon it: but ſuch land ſhould be ſown with articles which require the horſe-hoeing culture; for where the land can be frequently ſtirred or harrowed afterward, it will be of great ſervice in cleaning it from the roots of this *graſs* and other bad weeds. The blade of this *graſs* is ſo rough that cattle will not feed upon it.

The roots of this couch-*graſs* are uſed in medicine, and are accounted aperitive and diuretic, opening obſtructions in the reins and bladder, provoking urine, and are of ſervice againſt the gravel and ſtone. The juice of the leaves and ſtalks was greatly eſteemed by Dr. Boerhaave, who generally preſcribed it in all caſes where he ſuppoſed there were any obſtructions in the biliary ducts.

The darnel with a chaffy ſpike, commonly called ray or rye-*graſs*, which is a ſpecies of the LOLIUM in the Linnæan ſyſtem, is a hardy ſort of *graſs*, much eſteemed among the farmers for that quality. It will grow on any land, and therefore produces crops where nothing elſe will. It thrives beſt of all on ſour, clayey, and weeping grounds, and equally endures the ſevereſt droughts of ſummer, and froſts of winter, ſuffering no damage from either. It is the beſt of all winter foods for cattle, the ſhorter it is eaten the better, and it ſprings the earlieſt of any. There is no danger of overſtocking it, for if it be left to grow too much, the ſtalk becomes hard and ſticky. It is beſt for horſes and for ſheep, and very much prevents the rotting of the latter. The beſt way of ſowing it is with clover. The common quantity of ſeed is two buſhels to an acre, but three buſhels are much better; though in ſome lands, where the clover is likely to ſucceed very well, they ſow eight pounds of clover-ſeed, and one or two buſhels of rye-ſeed to an acre, and this makes a crop that will laſt ſeven or eight years. The ſpecies of *graſs* uſually cultivated in this manner is called the red darnel.

Some mow it as hay, and threſh it for the ſeed, which, about London, ſells from half a crown a buſhel to three ſhillings. Four or five quarters of this ſeed will be ſometimes produced from an acre of the *graſs*. If at any time a field of this *graſs* is found to grow thin, it is only neceſſary to ſtrew on a buſhel of the ſeed, and roll it with a wooden roller, and the plants ariſing from this addition will make the whole crop ſufficiently thick. Rye-*graſs* has this great advantage, that it kills weeds without any other ſown plant; even thiſtles cannot grow among it. When the rye-*graſs* is cut for hay before it is perfectly ripe, the hay is the better, but the ſeed will not grow ſo well. When the ſeed is newly threſhed, it muſt not be laid too thick, for it is very apt to heat and ferment, and the whole will be ſpoiled. Mortimer's Huſbandry, p. 40.

The meadow *graſs* with large panicles and a narrow leaf, and that ſort with a broad leaf, which are ſpecies of the POA in the Linnæan ſyſtem, are the two beſt ſpecies of *graſs* for paſtures; ſo that if the ſeeds of theſe were carefully collected and ſown ſeparately, without any other mixture of *graſs*, there would not only be a greater quantity of ſeed on the ſame ſpace of land, but the *graſs* would be better, the hay ſweeter, and the verdure more laſting than any other ſort; but there requires ſome attention to the ſaving the ſeed pure without mixture.

The taller meadow oat-*graſs* with a yellowiſh panicle and ſmall huſks, which is a ſpecies of the AVENA of Linnæus, and the tall meadow rye-*graſs*, are alſo very good *graſſes* for paſtures, and have perennial roots. Theſe are a very leafy kind of *graſs*, and their ſtalks do not become ſtiff and harſh, like thoſe of ſome other ſpecies; but with proper care may be made very fine, and if daily rolled, the roots will mat and form a very cloſe ſward.

The greateſt quaking *graſs*, or cow-quakes, is mentioned for variety, not for uſe; this has an annual root. The heads hang by long ſlender foot-ſtalks, which being moved by every wind, they generally appear ſhaking, and gained it the title of quaking *graſs*. See Briza.

The cock's foot-*graſs*, capon's tail-*graſs*, and millet *graſſes*, are too coarſe to deſerve attention in England.

The land upon which *graſs* is intended to be ſown, ſhould be well ploughed and cleared from the roots of noxious weeds, eſpecially if the *graſs* is to remain for paſture. Therefore, in places where weeds abound, it will be a good method to plough up the ſurface in April, and let it lie ſome time to dry; and then harrow the roots into ſmall heaps and burn them. The aſhes ſo produced will be good manure for the land when ſpread upon it: but when couch, fern, or reſt harrow is in plenty, whoſe roots run far under ground, the land ſhould be ploughed two or three times, ſomewhat deep, in dry weather, and the roots be carefully harrowed off after each ploughing, which is the moſt ſure way to deſtroy them. Where the land is very low, and of a ſtiff clayey nature, which holds water in winter, it will be of ſingular ſervice to make ſome under-ground drains to carry off the wet, which, if long detained on the ground, will render the *graſs* ſour.

Before the ſeed is ſown, the ſurface of the ground ſhould be made fine and level, and the ſeed ſhould be harrowed in, and the ground rolled with a wooden roller. When the *graſs* comes up, if there ſhould be any bare ſpots they may be ſowed again, and the firſt kind ſhowers will bring up the *graſs* and make it very thick. Miller.

Grass, *arrow-headed.* See Triglochin.

Grass, *bent.* See Agrostis.

Grass, *bird.* See Bird-*graſs*.

Grass, *canary*, in *Botany.* See Phalaris.

Grass, *capon's-tail.* See Festuca.

Grass, *cat's-tail.* See Phleum.

Grass, *clover.* See Trefoil.

Grass, *cock's-foot*, *dactylis*, a genus of the *triandria digynia* claſs; the calyx of which is compreſſed and bivalve.

Grass, *cotton.* See Eriophorum.

Grass, *couch.* See Grass ſupra.

Grass, *creſted.* See Dog's-*tail.*

Grass, *dog's.* See Grass ſupra.

Grass, *ſea-dog's*, a name ſometimes given to the double ſpiked ſecale or rye. See Rye.

Grass, *dog's-tail.* See Dog's-*tail.*

Grass, *feſcue.* See Festuca.

Grass, *fox-tail*, *alopecurus*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are theſe: the calyx is a glume compoſed of two valves, and incloſing a ſingle flower; theſe valves are oval-pointed and hollow; the flower is compoſed only of one valve, which is hollow, and of the ſame length with the calyx, and has a long awn or beard inſerted on its back part near its baſis; the ſtamina are three capillary filaments; the antheræ are oblong; the germen of the piſtil is roundiſh; the ſtyles are two in number, hairy, reflex, and exceed the length of the cup; the ſtigmata are ſimple; and the flower incloſes the ſeed, which is ſingle and roundiſh.

Grass, *gooſe.* See Asperugo.

Grass, *hair*, *aira*, a genus of the *triandria digynia* claſs. The calyx is of two valves, incloſing a double flower, and the floſculi have no ſeparating rudiment.

Grass, *hare's-tail*, *lagurus*, a genus of the *triandria digynia* claſs. The calyx is compoſed of two valves, with a downy beard.

Grass, *knot*, in *Botany*, a name given to ſeveral diſtinct genera of plants. See Knot-*graſs.*

Grass, *love*, or *quaking* Grass. See ſupra.

Grass, *meadow.* See Grass ſupra.

Grass, *hard meadow.* See Dog's-*tail.*

Grass, *millet.* See Millet.

Grass, *oat*, a name given to a ſpecies of the FESTUCA.

Grass, *panic.* See Panic.

Grass *of Parnaſſus*, *Parnaſſia*, in *Botany*, a genus of the *pentandria tetragynia* claſs. Its characters are theſe: the flower has a ſpreading empalement, cut into five parts, and has five roundiſh concave petals, which have five heart-ſhaped concave nectariums, and five ſtamina terminated by depreſſed ſummits, with a large oval germen having no ſtyle, but four obtuſe ſtigmas in their place; the germen turns to an oval four-cornered capſule with one cell, containing ſeveral oblong ſeeds. There are two ſpecies.

Grass, *pepper.* See Pilularia.

Grass, *pudding*, a name ſometimes given to PENNY-ROYAL.

Grass, *quaking.* See Grass ſupra, and Briza.

Grass, *rattle.* See Louse-*wort.*

Grass, *ruſh.* See Rush.

Grass, *rye.* See Grass and Lolium.

Grass, *ſcorpion.* See Caterpillars.

Grass, *ſcurvy.* See Scurvy-*graſs.*

Grass, *ſhave.* See Horse-*tail.*

Grass, *ſilk.* See Aloe and Dog's-*bane.*

Grass, *ſword.* See *Corn*-Flag.

Grass, *trefoil.* See Trefoil.

Grass, *vernal.* See Anthoxanthum.

Grass, *vetch.* See *Chickling* Vetch.

Grass, *viper's*. See Viper's-*graſs*.

Grass, *whitlow*. See Draba.

Grass, *worm*. See Spigelia.

Grass, *wrack*. See Zostera.

See alſo for other kinds, under Lucern and Saintfoin.

Grass-*plats* and *walks* make a conſiderable article in *Gardening*, our turf being, like our gravel, ſuperior to that of any other country.

The common way of making theſe is by laying on turfs from a common, and the plats thus made are greatly ſuperior to thoſe made by ſowing, there being great nicety and art required in bringing the latter to good order, and in procuring the proper ſeed, that from common hay-lofts being of a mixture of good and bad kinds, and by no means fit for the purpoſe, as containing the ſeeds of weeds, as well as very improper *graſſes*.

If the ſoil be dry, it is beſt to lay theſe quite even and level; but if damp, they may be laid a little rounding, but not more than an inch in twenty feet. If the ſoil is rich, the ſurface of the ground under the turf ſhould be covered with ſand or poor earth, which will keep the *graſs* fine. The oftener theſe walks are mowed and rolled in ſummer, the thicker their bottoms will be, and in autumn they ſhould be kept ſhorter than at any other ſeaſon, for if the blade runs up high at that ſeaſon, the bottom will be bare in winter. All *graſs*-walks ought alſo to be frequently polled, as the gardeners call it: this operation is diſperſing the worm-caſts all over the walks with long aſh-poles; this, beſide deſtroying the worm-caſts, is very beneficial to the *graſs* of the walk. When turf is deſigned to remain for years without renewing, a dreſſing of rotten dung, aſhes, or rotten tan, ſhould be laid upon it every other year; and theſe dreſſings ſhould be laid on early in winter.

In order to ſow *graſs*, the ground muſt be dug, then finely and evenly raked over, all the clods and ſtones taken off, and an inch thickneſs of good mould ſifted on it. This done, the ſeed muſt be ſown very thick, that the blade may come up cloſe and ſhort; and the ground muſt be then raked over again, to bury the ſeed, otherwiſe, if it ſhould happen to be windy weather, a great part of it may be blown away.

The beſt ſeaſon for ſowing *graſs* is the latter end of Auguſt, and it is beſt to ſow it in a mild day, when there is a likelihood of rain. When *graſs* is ſown in gardens, for lawns or walks, the ſeed of the beſt paſture-*graſs* ſhould be mingled with a good quantity of the white trefoil or Dutch clover, which will make a finer turf, and continue a better verdure than any other *graſs*. When it is come up to any height it muſt be mowed, and this repeated very frequently, for the oftner it is mowed the thicker it grows. It ſhould be rolled alſo frequently with a wooden roller. In autumn, whereever there are naked patches, the ground ſhould be ſown with freſh ſeed. Miller

Grass-*hearth*, in *our Cuſtoms*, *graſing*, or turning up the earth with a plough Hence the cuſtomary ſervice for the inferior tenants of the manor of Amerſden in Oxfordſhire, to bring their ploughs to do one day's work for their lord, was called *graſs-hearth* or *graſs-hurt*.

GRASSA, a name given by ſome authors to native *borax*.

GRASSETTE, in *Botany*, the name given by the French to the *pinguicula* or butter-wort, called alſo in Yorkſhire sanicle.

GRASSHOPPER, a ſpecies of gryllus. See Locust.

GRATICULATION, a term ſome writers uſe for the dividing a draught or deſign into ſquares, in order to the reducing it thereby.

GRATINGS, in a *Ship*, are ſmall ledges of ſawed plank, framed one into another like a lattice or priſon grate, lying on the upper deck, between the main-maſt and fore-maſt, ſerving for a defence in a cloſe fight, and alſo for the coolneſs, light, and conveniency of the ſhip's company.

GRATIOLA, in *Botany*. See *Hedge* Hyssop.

GRATITUDE, in *Ethics*, a virtue diſpoſing the mind to an inward ſenſe and outward acknowlegement of benefits received.

GRAVE, in *Grammar*, a ſpecies of accent oppoſite to acute. The grave accent is expreſſed thus, (\`); and ſhews, that the voice is to be depreſſed, and the ſyllable over which it is placed, pronounced in a low, deep tone.

Grave, in *Muſic*, is applied to a ſound which is in a low or deep tone.

The thicker the chord or ſtring, the more *grave* the tone or note, and the ſmaller the acuter.

Notes are ſuppoſed to be the more *grave*, in proportion as the vibrations of the chord are leſs quick. See Gravity, in *Muſic*.

Grave, in the *Italian Muſic*, ſerves to denote the ſloweſt movement. See Time.

Grave is alſo an ingredient in the compoſition of divers terms in hiſtory and policy. Thus we ſay Land-*grave*, Burg-*grave*, Marg-*grave*, Pals-*grave*, &c.

The word, in this ſenſe, is formed of the German *graf*, ſignifying *comes*, *count*; called in the barbarous Latin *gravio* and *graphio*.

Grave is alſo uſed for a tomb, wherein a perſon defunct is interred.

GRAVEDO, a heavineſs or liſtleſſneſs which accompanies a leſſened tranſpiration or taking cold, as it is commonly called. Hence, alſo, the caſe being frequently accompanied with a running of the noſe and eyes, *gravedo* and coryza are ſometimes uſed promiſcuouſly. See Catarrh.

The ſigns of a *gravedo* are a dizzineſs and heavineſs of the head, attended with tenſive and preſſing pains, which ſometimes become violently pungent, and, as it were, burning, a remarkable turgeſcence of the veſſels, thirſt and a dryneſs of the mouth, and unſound ſleep; and finally, the breaſt is drawn into conſent, and is afflicted with a tenſive and oppreſſive pain.

The *gravedo* is a ſpecies, or rather ſymptom, of the head-ach, and conſequently is removed by the ſame means.

GRAVEL, in *Natural Hiſtory*, coarſer ſand, found at the bottom and the ſides of rivers.

The word is formed of the French *gravier*, which Du-Cange derives from the barbarous Latin *graveria*, ſignifying the ſame.

Monſ. Perrault and Dr. Woodward lay down the difference between ſand and *gravel*. The firſt is ſmall, and conſiſts of finer evener grains; the latter is bigger, and conſiſts of little pebbles and flints of various kinds, and mixed with the ſand and the finer fragments of other ſtones.

Gravel is chiefly uſed in laying yards, courts, and walks, in gardens.

The *gravel* of England as much excels that of France, Holland, Flanders, &c. as the graſs does. This and graſs are the natural ornaments of a country-ſeat. We have ſeveral ſorts of *gravel* in the different parts of England, but that which is common on Black-heath is the moſt valuable ſort for garden-walks, as it conſiſts of round, even, and beautiful pebbles, and when mixed with a ſtiff loam, binds well, and keeps in order the longeſt of all kinds of *gravel*.

Gravel-*bind*, in *Botany*. See Convolvulus.

Gravel-*walks*. Theſe are deſervedly eſteemed a great advantage, which our gardens have over thoſe of all other nations. The method of laying ſuch walks is this:

The bottom ſhould be laid with lime rubbiſh, or large flint ſtones, or any other hard matter, for eight or ten inches thick, to keep weeds from growing through, and over this the *gravel* is to be laid about ſix or eight inches thick: this ſhould be laid rounding up in the middle, by which means the larger ſtones will run off to the ſides, and may be raked away, for the *gravel* ſhould never be ſcreened before it is uſed. The moſt proper time for laying *gravel* is the month of March, and they ſhould alſo be turned at this time, and not laid up in ridges in December, which is a frequent but injurious practice. It is a common miſtake to lay theſe walks too round, which not only makes them the more uneaſy to walk on, but takes off from their apparent breadth. One inch in five feet is a ſufficient proportion for the riſe in the middle; ſo that a walk of twenty feet wide ſhould be four inches higher in the middle than at the edges, and ſo in proportion. As ſoon as the *gravel* is laid it ſhould be raked, and the large ſtones thrown back again; then the whole ſhould be rolled both lengthwiſe and croſſwiſe, and the perſon who draws the roller ſhould wear ſhoes with flat heels, that he may make no holes, becauſe holes made in a new walk are not eaſily remedied. The walks ſhould always be rolled three or four times in very hard ſhowers, after which they will bind more firmly than they could ever be made otherwiſe to do.

In making *gravel*-walks, regard ſhould be paid to the level of the ground, ſo that they may be laid with eaſy deſcents to the lower parts, in order to drain off the moiſture; and where there are no declivities, it will be proper to have ſink-ſtones laid, at convenient diſtances, by the ſides of the walks: in dry ground, the water may be conveyed from hence into ſeſs-pools, and thus ſoak away; but in wet land, there ſhould be under-ground drains, for conveying the water to the neareſt pond or ditch.

Gravel, with ſome loam among it, binds much more firmly than the rawer kinds, and when *gravel* is naturally very harſh and ſharp, it is very proper to add a mixture of loam to it. The beſt *gravel* for walks is ſuch as abounds with ſmooth round pebbles, which being mixed with a little loam, binds ſo firmly, as never to be injured after, either by wet or dry weather. Theſe are not ſo liable to be turned up by the feet in walking, as the more irregular-ſhaped pebbles, and remain much more firmly in their places after rolling. Miller.

Note, the ſides next the beds ſhould be laid a foot and a half thick, or two feet, with turf, from whence the heat of the ſun cannot be reflected as it is from *gravel*, to the prejudice of the neighbouring flowers.

Gravel, in *Medicine*, a diſeaſe of the bladder and kidneys, occaſioned by a ſandy or gritty matter gathered therein, which cohering into a ſtony maſs, prevents the due ſecretion and excretion of the urine.

The *gravel* is generally conſidered as the ſame diſeaſe with the calculus or ſtone.

The cauſes and ſymptoms of the *gravel* and ſtone are much the ſame, and they require a ſimilar treatment, both with regard to regimen and medicine. See Stone.

GRAVELLING, among *Farriers*, a diſorder incident to travelling horſes, occaſioned by little gravel-ſtones getting in between the hoof and the ſhoe, which, ſettling to the quick, fret and feſter the part.

It is cured by pulling off the ſhoe, drawing the place to the quick, picking out all the gravel, and ſtopping up the foot with horſe-greaſe and turpentine poured in hot.

GRAVELLY *ſoil*. See Soil.

GRAVER, a ſteel inſtrument, ſerving to engrave on metals. The *graver* conſiſts of four ſides or faces, and the point uſually terminates in a lozenge: in ſome it is round, and in others ſquare. The round point is beſt for ſcoring lines, the ſquare for cutting broad and deep, and the lozenge for more delicate and fine ſtrokes and ſcratches. Le Boſſe recommends thoſe of a form betwixt the ſquare and lozenge. See Engraving.

The *gravers* ſhould be made of the beſt ſteel, which muſt be drawn out into ſmall rods with a charcoal fire. Theſe rods, after having been cut into the proper lengths for *gravers*, ſhould be ſoftened, by heating them in a charcoal fire, and ſuffering them to cool very ſlowly: let them next be filed into the deſired form, and brought back to a hard temper by heating them red-hot, and in this ſtate dipping their ends into ſoft ſoap. This ſhould be done in a perpendicular direction; for, if they be turned in the leaſt degree obliquely, the *graver* will warp and be crooked. If the temper of the *graver* be too hard after this treatment, and prevent the whetting it properly to an edge, it may be ſoftened, by laying its end on a large burning piece of charcoal till it begins to grow yellow, and then thruſting it into a lump of tallow, or dipping it in water; but if water be uſed, the *graver* muſt not be too hot. It may be known whether the *graver* be tempered to a proper hardneſs by touching the edge of it with a file, which, if any effect attends it, proves the temper to be too ſoft. The beſt proof of too great hardneſs is the breaking of the point in engraving; after which, if a new edge be made by whetting the *graver*, it will be frequently found very good without any other alteration. Handmaid to the Arts, vol. ii. p. 56.

The other end is fitted into a wooden handle.

Beſides engravers, the ſeal-cutters, lockſmiths, gunſmiths, goldſmiths, armourers, ſpurriers, &c. likewiſe make uſe of *gravers*.

GRAVING, the act or art of cutting lines, figures, and other deſigns, on metals; more properly called Engraving.

Graving, in the *Sea-language*, is the bringing a ſhip aground, and then burning off with furze, reed, or broom, all the filth and foulneſs that ſticks to her bottom withoutboard, in order to pay her anew. See Brooming and Careening.

GRAVITAS, Βαρυτης; in the *Ancient Muſic*, was uſed to ſignify a ſound produced by the remiſſion or falling of the voice. *Gravitas* differs from remiſſion, as the effect from the cauſe.

Gravitas is alſo uſed to denote the ſtate of a woman going with child. See Pregnancy.

GRAVITATION, the exerciſe of gravity, or the preſſure a body exerts on another body underneath it by the power of gravity.

It is ſometimes diſtinguiſhed from gravity. Thus Monſieur Maupertuis takes gravity for that force whereby a body would fall to the earth ſuppoſed at reſt; and *gravitation* for the ſame, but diminiſhed by the centrifugal force. See Fig. of the Earth determ. p. 206 of Mr. Murdoch's tranſlation.

It is only *gravitation*, or gravity thus blended with the centrifugal force, that we can meaſure by our experiments. However, methods have been found to diſtinguiſh what remains of primitive gravity, and what has been deſtroyed by the Centrifugal *force*.

It is one of the laws of nature, diſcovered by Sir Iſaac Newton, and now received by moſt philoſophers, that every particle of matter in nature gravitates towards every other particle; which law is the hinge whereon the whole Newtonian *philoſophy* turns.

What we call *gravitation*, with reſpect to the gravitating body, is properly called *attraction* with reſpect to the body gravitated to.

The planets, both primary and ſecondary, as alſo the comets, do all gravitate towards the ſun, and toward each other; and the ſun toward them; and that in proportion to the quantity of matter in each.

The Peripatetics, &c. hold, that bodies only gravitate when out of their natural places, and that *gravitation* ceaſes when they are reſtored to the ſame, the intention of nature being then fulfilled. The final cauſe of this faculty, they hold, is only to bring elementary bodies to their proper place, where they may reſt. But the moderns ſhew, that bodies exerciſe gravity even when at reſt and in their proper places.

This is particularly ſhewn of fluids; and it is one of the laws of hydroſtatics, demonſtrated by Mr. Boyle and others, that fluids gravitate *in proprio loco*, the upper parts preſſing on the lower, &c.

For the laws of *gravitation* of bodies in fluids ſpecifically lighter or heavier than themſelves, see *Specific* Gravity, Fluid, &c.

Gravitation, *center of*. See Center.

Gravitation, *line of*. See Line.

Gravitation, *plane of*. See Plane.

GRAVITY, in *Phyſics*, the natural tendency or inclination of bodies towards the center.

In this ſenſe *gravity* coincides with Centripetal *force*.

Gravity is defined by others, more generally, to be the natural tendency of one body towards another; and by others more generally ſtill, the mutual tendency of each body, and each particle of a body, towards all others: in which ſenſe the word coincides with what we more uſually call Attraction.

The terms *gravity*, centripetal force, weight, and attraction, do, in effect, all denote the ſame thing, only in different views and relations; which different relations, however, authors are apt to confound, and, accordingly, the four are frequently uſed promiſcuouſly.

In propriety, when we conſider a body as tending towards the earth, the force wherewith it tends we call *gravity*, *force of gravity*, or *gravitating force*; the ſame force, when we conſider it as immediately tending to the center of the earth, we call *centripetal force*; the ſame, when we conſider the earth, or body to which it tends, we call *attraction* or *attractive force*; and when we conſider it, in reſpect of an obſtacle or a body in the way of its tendency, upon which it acts, we call it *weight*.

Philoſophers conceive very differently of *gravity*; its nature, uſe, phenomena, cauſes, effects, and extent, have afforded various ſpeculations in all ages.

Some conſider it as an inactive property or innate vis in bodies, whereby they endeavour to join their center. Others hold *gravity* in this ſenſe to be an occult quality, and, as ſuch, to be exploded out of all ſound philoſophy.

Sir Iſaac Newton, though he frequently calls it a vis, power, or property in bodies, yet explains himſelf, that all he intends by the word is the effect or the phenomenon. He does not conſider the principle, the cauſe whereby bodies tend downwards, but the tendency itſelf, which is no occult quality, but a ſenſible phenomenon, be its cauſes what they will, whether a property eſſential to body, as ſome make it, or ſuperadded to it, as others; or even an impulſe of ſome body from without, as others.

It is a law of nature long obſerved, that all bodies near the earth have a *gravity*, or a tendency towards the center of the earth; which law the moderns, and particularly the immortal Sir Iſaac Newton, have found, from certain obſervation, to be much more extenſive, and to hold univerſally with reſpect to all known bodies in nature.

It is now, therefore, acknowledged a principle or law of nature, that all bodies, and all the particles of all bodies, *gravitate* towards each other mutually; from which ſingle principle Sir Iſaac Newton has happily deduced all the great phenomena of nature. See Newtonian *philoſophy*.

Hence *gravity* may be diſtinguiſhed into *particular* and *general*.

Gravity, *particular*, is that whereby heavy bodies deſcend towards the center of the Earth.

Phenomena or properties of particular Gravity. 1. All circumterreſtrial bodies do hereby tend towards a point, which is either accurately or very nearly the center of magnitude of the terraqueous globe: not as if there was really any virtue or charm in the point called the center, by which it attracted bodies; but becauſe this is the reſult of the gravitation of bodies towards all the parts of which the earth conſiſts.

2. This point or center is fixed within the earth, or, at leaſt, hath been ſo ever ſince we have had any authentic hiſtory: for a conſequence of its ſhifting, though ever ſo little, would be the overflowing of the low lands, on that ſide of the globe towards which it approached. Dr. Halley ſuggeſts, it would well account for the univerſal deluge, to have the center of gravitation removed for a time towards the middle of the then inhabited world; for the change of place but the 2000th part of the radius of our earth, would be ſufficient to lay the tops of the higheſt hills under water. See DELUGE.

3. In all places which are equidiſtant from the center of the earth, the force of *gravity* is nearly equal. Indeed, all places of the earth's ſurface are not at equal diſtances from the center, becauſe the equatorial parts are ſomething higher than the polar parts; the difference between the earth's diameter and axis being about thirty-four Engliſh miles, which hath been proved by the neceſſity of making the pendulum ſhorter in thoſe places, before it will ſwing ſeconds. See *Figure of the* EARTH.

4. *Gravity* equally affects all bodies, without regard either to their bulk, figure, or matter: ſo that, abſtracting from the reſiſtance of the medium, the moſt compact and looſe, the greateſt and ſmalleſt bodies would deſcend equal ſpaces in equal times, as appears from the quick deſcent of very light bodies in an exhauſted receiver.

Hence, a very great difference may be obſerved between *gravity* and magnetiſm; the latter affecting only iron, and that towards its poles; the former all bodies alike, and that in every part.

Hence it follows, that *gravity*, in all bodies, is proportionable to their quantity of matter; ſo that all bodies conſiſt of matter equally heavy.

Hence alſo may be concluded, that there is no ſuch thing as poſitive levity: thoſe things which appear light being only comparatively ſo.

If ſeveral things aſcend and ſwim in fluids, it is only becauſe they are not, bulk for bulk, ſo heavy as thoſe fluids; nor is there any reaſon why cork, for inſtance, ſhould be ſaid to be light, becauſe it ſwims in water, any more than iron, becauſe it will ſwim on mercury.

5. This power increaſes as we deſcend to, and decreaſes as we aſcend from the ſurface of the earth, and that in the proportion of the ſquares of the diſtances from the center reciprocally; ſo as, for inſtance, at a double diſtance, to have but a quarter of the force, &c. Thus, a body, which, on the earth's ſurface, or at the diſtance of one ſemi-diameter from the center, weighs 3600, will, at the diſtance of two, three, four, &c. ſemi-diameters, weigh 900, 400, 225, &c. pounds reſpectively.

But this power decreaſes below the ſurface of the earth in the ſimple proportion of the diſtances from the center.

This propoſition may be expreſſed more generally thus: the weights of the ſame bodies, at different diſtances from the center of the earth, above the ſurface, are reciprocally as the ſquares of the diſtances; and below the ſurface, directly as the diſtances from the center: and therefore, at the ſurface, their *gravity* is the greateſt.

6. As all bodies gravitate towards the earth, ſo does the earth equally gravitate towards all bodies, i. e. the action of *gravity* is mutual on each ſide, and equal. See REACTION.

Hence alſo the attractive powers of bodies, at equal diſtances from the center, are as the quantities of matter in the bodies.

Hence alſo it appears, that the attractive force of the entire bodies conſiſts of the attractive force of the parts: for, by the adding or taking away any part of the matter of a body, its *gravity* is increaſed or diminiſhed in the proportion of the quantity of ſuch particle to the entire maſs.

GRAVITY, *general* or *univerſal*. The exiſtence of the ſame principle of *gravity* in the ſuperior regions of the heavens, as well as on earth, is eaſily proved.

That all motion is naturally rectilinear is allowed by all: thoſe bodies, therefore, which move in curves, muſt be retained therein by ſome power continually acting on them.

Hence, the planets being found to revolve in curvilinear orbits, we infer that there is ſome power, by whoſe conſtant influence they are prevented from flying off in tangents.

Again, it is proved by mathematicians, that all bodies moving in any curve line deſcribed in a plane, and which, by radii drawn to any certain point, deſcribe areas about the point proportionable to the times, are impelled, or acted on, by ſome power tending towards that point: now it is ſhewn by the aſtronomers, that the primary planets round the ſun, and the ſecondary planets round the primary ones, do deſcribe areas proportionable to the times. Conſequently the power whereby they are retained in their orbits, is directed towards the bodies placed in the centers thereof.

Laſtly, it is demonſtrated, that if ſeveral bodies revolve with an equable motion in ſeveral concentrical circles, and the ſquares of their periodical times be as the cubes of the diſtances from the common center, the centripetal forces of the revolving bodies will be reciprocally as the ſquares of the diſtances. Or, if bodies revolve in orbits approaching to circles, and the apſides of thoſe orbits be at reſt, the centripetal forces of the revolving bodies will be reciprocally as the ſquares of the diſtances.

Now, the aſtronomers all agree, that both theſe caſes obtain in all the PLANETS: whence it follows, that the centripetal powers of all the planets are reciprocally as the ſquares of the diſtances from the centers of the orbits.

Upon the whole, it appears, that the planets are retained in their orbits by ſome power which is continually acting on them: that this power is directed toward the centre of their orbits: that the intenſion or efficacy of this power increaſes upon an approach towards the centre, and diminiſhes at its receſs from the ſame; and that it increaſes in the ſame proportion as the diſtance diminiſhes; and diminiſhes in the ſame as the diſtance increaſes Now by comparing this centripetal force of the planets with the force of *gravity* on earth, they will be found perfectly alike.

This we ſhall illuſtrate in the caſe of the moon, the neareſt to us of all the planets. The rectilinear ſpaces deſcribed in any given time by a falling body, urged by any powers, reckoning from the beginning of its deſcent, are proportionable to thoſe powers. Conſequently the centripetal force of the moon revolving in its orbit, will be to the force of *gravity* on the ſurface of the earth, as the ſpace which the moon would deſcribe in falling, any little time, by her centripetal force towards the earth, if ſhe had no circular motion at all, to the ſpace a body near the earth would deſcribe in falling, by its *gravity* towards the ſame.

Now, by a natural calculus of thoſe two ſpaces, it appears, that the firſt of them is to the ſecond, i. e. the centripetal force of the moon revolving in her orbit, is to the force of *gravity* on the ſurface of the earth, as the ſquare of the earth's ſemidiameter to the ſquare of the ſemidiameter of her orbit: which is the ſame ratio as that of the moon's centripetal force in her orbit, to the ſame force near the ſurface of the earth.

The moon's centripetal force, therefore, is equal to the force of *gravity*. Theſe forces, conſequently, are not different, but they are one and the ſame: for, were they different, bodies acted on by the two powers conjointly, would fall towards the earth, with a velocity double to that ariſing from the ſole power of *gravity*.

It is evident, therefore, that the moon's centripetal force, whereby ſhe is retained in her orbit, and prevented from running off in tangents, is the very power of *gravity* of the earth, extended thither.

This reaſoning may be farther illuſtrated and confirmed in the following manner: let RAE, *Tab.* III. *Aſtronomy*, *fig.* 78, repreſent the earth, T its center, VL the orbit of the moon, and LC a part of it deſcribed by the moon in a minute, which is equal to $\frac{1}{39343}$ of the whole periphery, or 33 ſeconds of a degree; becauſe the moon completes her whole courſe in 27 days, 7 hours, 43 minutes, or in 39343 minutes. Moreover, the circumference of the earth, according to M. Picart's menſuration, is 123249600 Paris feet, and therefore its ſemidiameter TA = 19615800 feet; and TL, the ſemidiameter of the moon's orbit, will be 1176948000 feet, or = 60 times TA: and the verſed ſine LD of the arc LC = 33″, computed by means of tables, or BC, will be $15\frac{1}{12}$ feet, nearly; or, LD may be found without tables thus: the whole circumference of the moon's orbit, or 60 × 123249600, is equal to 7394976000, which, divided by 39343, will give the arc LC = 187961 feet: but by a well known theorem in geometry, ſuppoſing the arc LC, which is a very ſmall part of the moon's orbit, to be rectilinear, $LC^2 = LD \times 2LT$, i. e. $LD = \frac{LC^2}{2LT}$; or the ſquare of 187961, which is 35329337521, divided by 2353896000, will give 15,013, &c.

Note, a diſtance of the moon ſomewhat greater than 60 times the ſemidiameter of the earth would afford a more exact reſult; and the force whereby the moon is reſtrained in its orbit ſhould alſo be increaſed in the proportion of $177\frac{29}{40}$ to $178\frac{29}{40}$, in order to have the exact centripetal force of the moon, ſuch as it would be undiminiſhed by the action of the ſun, and with this correction the above number 15,013, &c. will become 15,097, &c. or

$15\frac{1}{12}$, very nearly. See Newton's Princip lib. i. Prop. 45. cor. 2. and lib. iii. prop. 3. In either way of calculation it appears, that the force, whereby the moon is drawn off from the tangent LB, or retained in its orbit, impels it towards the center of the earth about $15\frac{1}{12}$ Paris feet in one minute: but this force, being known from the elliptic figure of her orbit to be reciprocally proportional to the ſquare of the diſtance, would impel the moon, ſuppoſed to be at the ſurface of the earth, through a ſpace equal to $60 \times 60 \times 15\frac{1}{12}$ feet in one minute. But bodies, impelled by the force of *gravity*, fall near the ſurface of the earth through the ſpace of $15\frac{1}{12}$ Paris feet in one ſecond, and the ſpaces being as the ſquares of the times, through $60 \times 60 \times 15\frac{1}{12}$ in a minute. Wherefore as the force, by which the moon is retained in its orbit, and the force of *gravity* produce the ſame effects in the ſame circumſtances, and tend towards the ſame point, they are the ſame forces.

The moon, therefore, gravitates towards the earth; and the earth reciprocally towards the moon: which is farther confirmed by the phenomena of the TIDES.

The like reaſoning might be applied to the other planets. For, as the revolutions of the primary planets round the ſun, and thoſe of the ſatellites of Jupiter and Saturn round their primaries, are phænomena of the ſame kind as the revolution of the moon round the earth; as the centripetal powers of the primary are directed towards the center of the ſun, and thoſe of the ſatellites towards the centers of their primaries; and, laſtly, as all theſe powers are reciprocally as the ſquares of the diſtances from the centers; it may ſafely be concluded, that the power and cauſe are the ſame in all.

Therefore, as the moon gravitates towards the earth, and the earth towards the moon; ſo do all the ſecondaries to their primary ones; the primaries to their ſecondary ones; ſo, alſo, do the primary ones to the ſun, and the ſun to the primary ones. Newton's Princip. lib. iii. prop. 4, 5, 6. Greg. Aſt. lib. i. ſect. 7. prop. 46 and 47.

GRAVITY, *phænomena, or properties of univerſal.* 1. All the ſeveral particles of all bodies in nature *gravitate* to all the particles of all other bodies.

To what has been urged in proof hereof, from the analogy between the motions of the ſeveral bodies in our ſyſtem, it may be added, that Saturn is actually obſerved by aſtronomers to change its courſe when neareſt to Jupiter; and Jupiter, alſo, is found to diſturb the motion of the ſatellites of Saturn. So that the gravitation of thoſe bodies is matter of actual obſervation.

2. The quantity of this *gravity*, at equal diſtances, is always proportional to the quantity of matter in the gravitating bodies. For the powers of *gravity* are as the quantities of motion they generate; which quantities, in unequal bodies, equally ſwift, are to each other as the quantities of matter. Conſequently, ſince unequal bodies, which are equally ſwift, are to each other as the quantities of matter; therefore, ſince unequal bodies at the ſame diſtance from the attracting body are found to move equally ſwift, by *gravity*, it is evident, the forces of *gravity* are proportional to the quantities of matter.

3. The proportion of the increaſe, or decreaſe, of *gravity* in the approach, or removal of bodies from each other, is this; that the force is reciprocally in a duplicate ratio, i. e. it is as the ſquares of the diſtance. Thus, ſuppoſe a body of an hundred pounds, at the diſtance of ten diameters from the earth; the ſame body, if its diſtance were but half ſo great, would have quadruple the weight: if its diſtance were but one third of the former, its weight would be nine times as great, &c. Hence we deduce the following corollaries. 1. That at equal diſtances from the centers of homogeneal bodies, the *gravity* is directly as the quantity of matter, and inverſely as the ſquare of the diameter. 2. That on the ſurfaces of equal, ſpherical, and homogeneous bodies, the *gravities* are as the denſities. 3. That on the ſurfaces of ſpherical, homogeneous, equally denſe, but unequal bodies, the *gravities* are inverſely as the ſquares of the diameters. 4. That if both the denſities and diameters differ, the *gravities* on the ſurfaces will be in a ratio compounded of the denſities and the diameters. Laſtly, that a body placed any where, within a hollow ſphere, which is homogeneous, and every where of the ſame thickneſs, will have *gravity* whereſoever it be placed; the oppoſite *gravities* always preciſely deſtroying each other. For the particular laws of the deſcent of bodies, by the force of *gravity*, ſee DESCENT *of bodies*, and CENTRIPETAL *force*.

GRAVITY, *cauſe of.* We have various theories advanced by the philoſophers of various ages to account for this grand principle of gravitation. The ancients, who were only acquainted with particular *gravity*, or the tendency of ſublunar bodies towards the earth, aimed no farther than at a ſyſtem which might anſwer the more obvious phænomena of the ſame; but the moderns, as their principle is higher, and more extenſive, ſo ſhould their theory be.

However, we find ſome hints concerning the gravitation of celeſtial bodies in the account tranſmitted to us of the doctrines of Thales and his ſucceſſors; but Pythagoras ſeems to have been better acquainted with it, and is ſuppoſed to have had a view to it, in what he taught concerning the HARMONY *of the ſpheres.*

Ariſtotle, and the Peripatetics, content themſelves to refer *gravity* or weight to a native inclination in heavy bodies to be in their proper place or ſphere, the center of the earth.

Copernicus aſcribes it to an innate principle in all parts of matter, whereby, when ſeparated from their wholes, they endeavour to return to them again the neareſt way.

In anſwer to Ariſtotle and his followers, who conſidered the center of the earth as the center of the univerſe, he obſerved, that it was reaſonable to think there was nothing peculiar to the earth in this principle of *gravity*; that the parts of the ſun, moon, and ſtars tended likewiſe to each other, and that their ſpherical figure was preſerved in their various motions by this power. Copern. Revol. lib. i. cap. 9.

But neither of theſe ſyſtems aſſigns any phyſical cauſe of this great effect: they only amount to this, that bodies deſcend, becauſe they are inclined to deſcend.

Kepler, in his preface to the commentaries concerning the planet Mars, ſpeaks of *gravity* as of a power that was mutual betwixt bodies, and tells us, that the earth and moon tend towards each other, and would meet in a point ſo many times nearer to the earth than to the moon, as the earth is greater than the moon, if their motions did not hinder it. He adds, that the TIDES ariſe from the *gravity* of the waters towards the moon. To him we alſo owe the important diſcovery of the analogy between the diſtances of the ſeveral planets from the ſun, and the periods in which they complete their revolutions: viz. that the ſquares of their periodic times are always in the ſame proportion as the cubes of their mean diſtances from the ſun. Nevertheleſs, Kepler, Gaſſendus, Gilbert, and others, aſcribe *gravity* to a certain magnetic attraction of the earth. Theſe authors conceive the earth to be one great magnet continually emitting effluvia, which lay hold on all bodies, and draw them toward the earth. But this, we have obſerved, is inconſiſtent with the ſeveral phenomena.

Deſcartes, and his followers, Rohault, &c. attribute *gravity* to an external impulſe, or truſion of ſome ſubtle matter. By the rotation of the earth, ſay they, all the parts and appendages thereof neceſſarily endeavour to recede from the center of rotation: but they cannot, all, actually recede, as there is no vacuum or ſpace to receive them.

If now we ſuppoſe the earth ABCD, *Tab. Mechan. fig.* 8. and L a terreſtrial body placed in the pyramidal ſpace, AEB; it follows that the matter in this pyramid will have ſo much leſs endeavour to recede from the center, as the body L has a leſs endeavour than the fluid matter whoſe place it poſſeſſes. Hence it will follow, that the matter of adjacent pyramids receding with more force; that in the pyramid AEB, and particularly the body L, will be thereby driven toward the centre for the ſame reaſons as cork, though a heavy body, aſcends in water. This hypotheſis, though ingenious enough, yet, as it is founded on the ſuppoſition of a plenum, is overthrown by what has been ſince proved of the exiſtence of a vacuum. See CARTESIAN *philoſophy.*

Dr. Hook inclines to an opinion much like that of Deſcartes: *gravity* he thinks deducible from the action of a moſt ſubtle medium, which eaſily pervades and penetrates the moſt ſolid bodies; and which, by ſome motion it has, detrudes all earthly bodies from it, towards the center of the earth.

Voſſius, and many others, give partly into the Carteſian notion, and ſuppoſe *gravity* to ariſe from the diurnal rotation of the earth round its axis.

Dr. Halley, deſpairing of any ſatisfactory theory, chooſes to have immediate recourſe to the agency of the Almighty. So Dr. Clarke, from a view of ſeveral properties of *gravity*, concludes, that it is no adventitious effect of any motion, or ſubtil matter, but an original and general law impreſſed by the Almighty on all matter, and preſerved therein by ſome efficient power penetrating the very ſolid and intimate ſubſtance thereof; as being found always proportionable, not to the ſurfaces of bodies or corpuſcles, but to their ſolid quantity and contents. It ſhould, therefore, be no more inquired, why bodies gravitate, than how they came to be firſt put in motion. Annot. in Rohault. Phyſ. part i. cap. xi. § 16.

Dr. s'Graveſande, in his Introduct. ad Philoſoph. Newton. contends, that the cauſe of *gravity* is utterly unknown; and that we are to look on it no otherwiſe than as a law of nature, originally and immediately impreſſed by the Creator, without any dependence on any ſecond law or cauſe at all. Of this he thinks the three following conſiderations ſufficient proof.

1. That *gravity* requires the preſence of the gravitating or attracting body: ſo the ſatellites of Jupiter, e. gr. gravitate towards Jupiter, wherever he be.

2. That the diſtance being ſuppoſed the ſame, the velocity wherewith bodies are moved, by the force of *gravity*, depends on the quantity of matter in the attracting body: and the velocity is not changed, let the maſs of the gravitating body be where it will.

3. That if *gravity* do depend on any known law of motion, it muſt be ſome impulſe from an extraneous body; whence, as *gravity* is continual, a continual ſtroke muſt alſo be required.

Now, if there be any ſuch matter continually ſtriking on bodies, it muſt be fluid, and ſubtle enough to penetrate the ſubſtance of all bodies: but how ſhall a body ſubtle enough to penetrate the ſubſtance of the hardeſt bodies, and ſo rare as not ſenſibly to hinder the motion of bodies, be able to impel vaſt bodies towards each other with ſuch force? how does this force increaſe in the ratio of the maſs of the body, towards which the other body is moved? whence is it that all bodies, ſuppoſing the ſame diſtance, and the ſame body gravitated to, move with the ſame velocity? can a fluid, which only acts on the ſurface either of the bodies themſelves, or their internal particles, communicate ſuch a quantity of motion to bodies, which in all bodies ſhall exactly follow the proportion of the quantity of matter in them?

Mr. Cotes goes yet farther; giving a view of Sir Iſaac Newton's philoſophy, he aſſerts that *gravity* is to be ranked among the primary qualities of all bodies; and deemed as eſſential to matter, as extenſion, mobility, or impenetrability. Præfat. ad Newton. Princip.

But this author may ſeem to have overſhot the mark. His great maſter, Sir Iſaac Newton himſelf, diſclaims the notion; and to ſhew that he does not take *gravity* to be eſſential to bodies, he gives us his opinion about the cauſe; chooſing to propoſe it by way of query, as not being yet ſufficiently ſatisfied about its experiments.

This query we ſhall ſubjoin at large. After having ſhewn, that there is a medium in nature vaſtly more ſubtle than air, by whoſe vibrations light communicates heat to bodies, and is itſelf put into alternate fits of eaſy reflection, and eaſy tranſmiſſion, and ſound propagated; and by the different denſities whereof the refraction and reflection of light are performed;

He proceeds to inquire:

" Is not this medium much rarer within the denſe bodies of the ſun, ſtars, planets, and comets, than in the empty celeſtial ſpaces between them? and in paſſing from them to greater diſtances, doth it not grow denſer and denſer perpetually, and thereby cauſe the *gravity* of thoſe great bodies towards one another, and of their parts towards the bodies; every body endeavouring to recede from the denſer parts of the medium towards the rarer?

" For if this medium be ſuppoſed rarer within the ſun's body, than at its ſurface, and rarer there than at the hundredth part of an inch from his body, and rarer there than at the fiftieth part of an inch from his body, and rarer there than at the orb of Saturn; I ſee no reaſon why the increaſe of denſity ſhould ſtop any where, and not rather be continued through all diſtances from the ſun to Saturn, and beyond.

" And though this increaſe of denſity may at great diſtances be exceeding ſlow; yet if the elaſtic force of this medium be exceeding great, it may ſuffice to impel bodies from the denſer parts of the medium towards the rarer with all that power which we call *gravity*.

" And that the elaſtic force of this medium is exceeding great, may be gathered from the ſwiftneſs of its vibrations. Sounds move about 1140 Engliſh feet in a ſecond of time, and in ſeven or eight minutes of time, they move about one hundred Engliſh miles: light moves from the ſun to us in about ſeven or eight minutes of time, which diſtance is about 70000000 Engliſh miles, ſuppoſing the horizontal parallax of the ſun to be about twelve ſeconds; and the vibrations, or pulſes of this medium, that they may cauſe the alternate fits of eaſy tranſmiſſion, and eaſy reflection, muſt be ſwifter than light, and by conſequence, above 700000 ſwifter than ſounds; and therefore the elaſtic force of this medium, in proportion to its denſity, muſt be above 700000 × 700000 (that is, above 490000000000) times greater than the elaſtic force of the air is in proportion to its denſity: for the velocities of the pulſes of elaſtic mediums are in a ſubduplicate ratio of the elaſticities and the rarities of the mediums taken together.

" As magnetiſm is ſtronger in ſmall loadſtones than in great ones, in proportion to their bulk; and *gravity* is ſtronger on the ſurface of ſmall planets, than thoſe of great ones, in proportion to their bulk; and ſmall bodies are agitated much more by electric attraction than great ones: ſo the ſmallneſs of the rays of light may contribute very much to the power of the agent by which they are refracted; and if any one ſhould ſuppoſe, that æther (like our air) may contain particles which endeavour to recede from one another (for I do not know what this æther is), and that its particles are exceedingly ſmaller than thoſe of air, or even than thoſe of light; the exceeding ſmallneſs of ſuch particles may contribute to the greatneſs of the force by which they recede from one another, and thereby make that medium exceedingly more rare and elaſtic than air, and of conſequence, exceedingly leſs able to reſiſt the motions of projectiles, and exceedingly more able to preſs upon groſs bodies by endeavouring to expand itſelf." Optics, p. 325, &c.

Gravity, in *Mechanics*, denotes the conatus or tendency of bodies toward the center of the earth.

That part of mechanics which conſiders the motion of bodies ariſing from *gravity*, is peculiarly called STATICS.

Gravity, in this view, is diſtinguiſhed into *abſolute*, and *relative*.

Gravity, *abſolute*, is that wherewith a body deſcends freely through an unreſiſting medium.

The laws of abſolute *gravity* ſee under DESCENT *of bodies*, ACCELERATION, MOTION, *Inclined* PLANE, &c.

Gravity, *relative*, is that wherewith a body deſcends after having ſpent part of its weight in overcoming ſome reſiſtance.

Such is that wherewith a body deſcends along an inclined plane, where ſome part is employed in overcoming the reſiſtance, or friction of the plane.

The laws of relative *gravity*, ſee under *inclined* PLANE, DESCENT, FLUID, RESISTANCE, &c.

Gravity, *centre of*. See CENTRE *of gravity*.

Gravity, *diameter of*. See DIAMETER *of gravity*.

Gravity, *paracentric ſolicitation of*. See PARACENTRIC.

Gravity, *plane of*. See PLANE *of gravity*.

Gravity, *retardation from*. See RETARDATION.

Gravity, in *Hydroſtatics*. The laws of bodies *gravitating* in fluids, make the buſineſs of HYDROSTATICS.

Gravity is here divided into *abſolute* and *ſpecific*.

Gravity, *abſolute*, or *true*, is the whole force wherewith the body tends downward.

Gravity, *ſpecific*, called alſo *relative*, *comparative*, and *apparent* GRAVITY, is the exceſs of *gravity* in any body, above that of an equal quantity or bulk of another; and denotes that *gravity*, or weight, peculiar to each ſpecies, or kind of natural body; and whereby it is diſtinguiſhed from all other kinds.

In this ſenſe, a body is ſaid to be *ſpecifically heavier* than another, when under the ſame bulk it contains a greater weight than that other; and that other is ſaid to be *ſpecifically lighter* than the firſt. Thus, if there be two equal ſpheres, each a foot in diameter; the one wood, the other lead, ſince the leaden one is found heavier than the wooden one, it is ſaid to be *ſpecifically*, or in *ſpecie*, *heavier*; and the wooden one *ſpecifically lighter*.

This kind of *gravity*, ſome call *relative*; in oppoſition to *abſolute gravity*, which increaſes in proportion to the quantity or maſs of the body.

Gravity, *laws of the ſpecific, and levity of bodies.* I. If two bodies be equal in bulk, their *ſpecific gravities* are, to each other, as their abſolute gravities. Thus a body is ſaid to be twice as heavy, *ſpecifically*, as another, if it have twice its *gravity* under the ſame bulk.

Hence, the *ſpecific gravities* of equal bodies are as their denſities.

II. If two bodies, compared together, be of the ſame *ſpecific gravity*, their abſolute weights will be as their magnitudes or bulks.

III The *ſpecific gravities* of bodies of the ſame weight are in the reciprocal ratio of their bulks. Hence the maſſes of two bodies of the ſame weight are in a reciprocal ratio of their bulks.

IV. The *ſpecific gravities* of two bodies are in a ratio compounded of the direct ratio of the abſolute *gravities*, and the reciprocal one of their bulks. Hence, again, the *ſpecific gravities* are as the denſities.

V. The abſolute *gravities* of two bodies will be in a compound ratio of their *ſpecific gravities* and their bulks.

VI. The bulks of two bodies will be in a compound ratio of their abſolute *gravities* directly, and their *ſpecific gravities* inverſely.

VII. A body *ſpecifically* heavier than a fluid, loſes ſo much of its weight therein, as is equal to the weight of a quantity of the fluid of the ſame bulk.

For, ſuppoſe a cubic inch of lead immerged in water; a cubic inch of water will, thereby, be expelled from its place: but the weight of this water was ſuſtained by the reſiſtance of the ambient water. Therefore, ſuch a part of the weight of the leaden cube, muſt be ſuſtained by the reſiſtance of the ambient water, as is equal to the weight of the water expelled. The *gravity* of the body immerged, therefore, muſt be diminiſhed by ſo much.

Hence, 1. Since a fluid ſpecifically heavier, has a greater weight, in the ſame bulk, than a lighter; the ſame body will loſe a greater part of its weight in a fluid, ſpecifically heavier, than in a lighter: and therefore it weighs more in a lighter than a heavier.

2. Equal homogeneous bodies weighing equally in air, loſe their equilibrium if one of them be immerged in a heavier fluid; the other in a lighter.

3. Since the ſpecific *gravities* are as the abſolute *gravities* under the ſame bulk; the ſpecific *gravity* of the fluid, will be to the *gravity* of the body immerged, as part of the weight loſt by the ſolid, to the whole weight.

4. Two ſolids equal in bulk, loſe the ſame weight in the ſame fluid: but the weight of the ſpecifically heavier body, is greater than that of the ſpecifically lighter; therefore, the ſpecifically lighter loſes a greater part of its weight than the ſpecifically heavier.

5. Since the bulks of bodies equal in weight, are reciprocally as the ſpecific *gravities*; the ſpecifically lighter, loſes more weight in the ſame fluid than the heavier; wherefore, if they be in equilibrio in one fluid, they will not be ſo in another; but the ſpecifically heavier, will preponderate, and that the more, as the fluid is denſer.

6. The ſpecific *gravities* of fluids, are as the weights loſt by the ſame ſolid immerged in the ſame.

VIII. *To find the ſpecific gravity of a fluid.* On one arm of a balance ſuſpend a leaden globe; and to the other, faſten a weight, which is in equilibrium therewith in the air. Immerge the globe ſucceſſively in the ſeveral fluids, whoſe ſpecific *gravities* are to be determined, and obſerve the weight which balances it in each. Theſe ſeveral weights, ſubtracted, ſeverally, from the firſt weight, the remainders are the parts of the weight loſt in each fluid. Whence the ratio of the ſpecific *gravity* of the fluids is ſeen.

Hence, as the denſities are as the ſpecific *gravities*; we find the ratio of the denſities of the fluids at the ſame time.

This problem is of the utmoſt uſe; as by it the degree of purity or goodneſs of fluids is eaſily found; a thing not only of ſervice in natural philoſophy, but alſo in common life, and in the practice of phyſic. See HYDROMETER.

That the ſpecific *gravity* may be found the more accurately; the weight of the thread not immerged in the fluid is to be ſubtracted from the weight of the ſolid in air; and the force neceſſary to make the thread ſubſide (if it be ſpecifically lighter) is to be added to the weight loſt. But if the thread that ſuſtains the ſolid be heavier than the fluid; the weight of the thread in the air is to be ſubtracted from the weight of the ſolid in air; and the weight the thread loſes from the weight loſt in the fluid. Indeed, this precaution may be ſpared, if in examining the ſpecific *gravity* of ſeveral fluids, care be taken that the ſame thread be immerged to the ſame depth in each.

IX. To determine the ratio which the ſpecific *gravity* of a fluid has to the ſpecific *gravity* of a ſolid that is ſpecifically heavier than the fluid.

Weigh any maſs of the ſolid in a fluid, and note the juſt weight therein: the ſpecific *gravity* of the fluid will be to that of the ſolid, as the part of the weight loſt by the ſolid to its whole weight.

X. The ſpecific *gravities* of equally heavy bodies, are reciprocally as the quantities of weight loſt in the ſame fluid. Hence we find the ratio of the ſpecific *gravities* of ſolids, by weighing maſſes thereof, that are equal in air, in the ſame fluid; and noting the weights loſt by each.

The ſpecific *gravities* of various ſolids, have been determined by many authors. Marin Ghetaldus particularly, tried the ſpecific *gravities* various bodies had, eſpecially metallic ones; which were borrowed thence by Oughtred. In the Philoſophical Tranſactions, we have ample tables of ſpecific *gravities*, by various authors.

It will be ſufficient for us to give thoſe of ſome of the more uſual bodies, as determined with great care and accuracy by M. Petit; and publiſhed by F. Merſenne; and from him by ſeveral others.

TABLE of the ſpecific *gravities* of ſeveral ſolids.

An hundred pound weight of gold is equal in bulk to

71½	of mercury	38¼	of fine tin
60½	of lead	26	of loadſtone
54½	of ſilver	21	of marble
47½	of copper	14	of ſtone
45	of braſs	12½	of ſulphur
42	of iron	5	of wax
39	of tin	5½	of water.

A TABLE of the ſpecific *Gravities* of ſolid and fluid Bodies.

A cubic inch of	Troy weight.			Avoirdupoiſe weight.		Comparative weight.
	oz.	p.w.	gr.	oz.	drams.	
Very fine gold	10	7	3.83	11	5.80	19.637
Standard gold	9	19	6.44	10	14.90	18.888
Guinea gold	9	7	17.18	10	4.76	17.793
Moidore gold	9	0	19.84	9	14.71	17.140
Pure quickſilver	7	7	11.61	8	1.45	14.019
Lead	5	19	17.55	6	9.08	11.325
Fine ſilver	5	16	23.23	6	6.66	11.087
Standard ſilver	5	11	3.36	6	1.54	10.535
Copper	4	13	7.04	5	1.89	8.843
Plate braſs	4	4	9.60	4	10.09	8.000
Steel	4	2	20.12	4	8.70	7.852
Iron	4	0	15.20	4	6.77	7.645
Block tin	3	17	5.68	4	3.79	7.321
Speltar	3	14	12.86	4	1.42	7.065
Lead ore	3	11	17.76	3	14.96	6.800
Glaſs of antimony	2	15	16.89	3	0.89	5.280
German antimony	2	2	4.80	2	5.04	4.000
Copper ore	2	1	11.83	2	4.43	3.775
Diamond	1	15	20.88	1	15.48	3.400
Clear glaſs	1	13	5.58	1	13.16	3.150
Lapis lazuli	1	12	5.27	1	12.27	3.054
Welſh aſbeſtos	1	10	17.57	1	10.97	2.913
White marble	1	8	13.41	1	9.06	2.707
Black marble	1	8	12.65	1	9.02	2.704
Rock cryſtal	1	8	1.00	1	8.61	2.658
Green glaſs	1	7	15.38	1	8.26	2.620
Cornelian ſtone	1	7	1.21	1	7.73	2.568
Flint	1	6	19.63	1	7.53	2.542
Hard paving ſtone	1	5	22.87	1	6.77	2.460
Live ſulphur	1	1	2.40	1	2.52	2.000
Nitre	1	0	1.08	1	1.59	1.900
Alabaſter	0	19	18.74	1	1.35	1.875
Dry ivory	0	19	6.09	1	0.89	1.825
Brimſtone	0	18	23.76	1	0.66	1.800
Alum	0	17	21.92	0	15.72	1.714
Ebony	0	11	18.82	0	10.34	1.117
Human blood	0	11	2.89	0	9.76	1.054
Amber	0	10	20.79	0	9.54	1.030
Cow's milk	0	10	20.79	0	9.54	1.030
Sea water	0	10	20.79	0	9.54	1.030
Pump water	0	10	13.30	0	9.26	1.000
Spring water	0	10	12.94	0	9.25	0.999
Diſtilled water	0	10	11.42	0	9.20	0.993
Red wine	0	10	11.42	0	9.20	0.993
Oil of amber	0	10	7.63	0	9.06	0.978
Proof ſpirits	0	9	19.73	0	8.62	0.931
Dry oak	2	9	18.00	0	8.56	0.925
Olive oil	0	9	15.17	0	8.45	0.913
Pure ſpirits	0	9	3.27	0	8.02	0.866
Spiritsofturpentine	0	9	2.76	0	7.99	0.864
Oil of turpentine	0	8	8.53	0	7.33	0.772
Dry crab-tree	0	8	1.69	0	7.08	0.765
Æther	0	7	14.00	0	6.65	0.720
Saſſafras wood	0	5	2.04	0	4.46	0.482
Cork	0	2	12.77	0	2.21	0.240

If you take away the decimal point from the numbers in the right hand column, or, which is the ſame, multiply them by 1000, they will ſhew how many avoirdupoiſe ounces are contained in a cubic foot of each body. If the magnitude of any body be mutiplied by the ſpecific *gravity* in the table, the product will be the abſolute weight. e. gr. let it be required what weight of lead $\frac{1}{100}$ of a foot thick will cover a building whoſe area is 3000 feet. Anſ. $3000 \times \frac{1}{100}$ or(300) × 11325=3397500 ounces, or about 94⅘ tons, the weight required. Again, the ſpecific *gravity* of any body, whoſe weight and bulk are known, may be found by dividing the weight by its magnitude: e. g. let a piece of marble contain four cubic feet, and weigh ſix hundred and three pounds, or 10800 ounces, then $\frac{10800}{4}=2700$, its ſpecific *gravity* as in the table, nearly. Farther, the magnitude of a body, whoſe weight is known, may be found by dividing the weight by the ſpecific *gravity* in the table. See HIERO's *crown.*

To determine the ſpecific *gravity* of bodies accurately, requires ſo much care, and is liable to ſo many difficulties, that we need not be ſurpriſed when we find authors differing from one another. Dr. Richard Davies, in the Philoſ. Tranſact. N° 488. has with great pains and judgment collected all the experiments of this kind, that have been made by the moſt accurate authors, ſhewing how widely they diſagree, and pointing out the cauſes of their difference: and he has alſo given us the ſpecific *gravities* of ſeveral ſubſtances from his own obſervations; to which we refer the curious. See alſo tables of the ſpecific *gravities* of a great variety of metals, minerals, ores, ſtones, foſſils, &c. animal, vegetable, and miſcellaneous ſubſtances, and fluids, in Martin's Philoſoph. Britan. vol. i. p. 290, &c. and Muſchenbroeck. Introd. ad Phil. Nat. tom ii. p. 536, &c edit. 1762.

At different ſeaſons of the year, the ſpecific *gravities* of the ſame fluids, are found different. This was firſt diſcovered by M Homberg: and Joan. Caſp. Eiſenſchmidius, in his Diſquiſitio nova de Ponderibus, &c. gives us variety of experiments relating hereto: the principal whereof, to ſave the trouble of too frequent experiments, we ſhall here ſubjoin.

TABLE of the ſpecific *Gravities* of ſeveral Fluids.

A cubic inch Paris meaſure.	In ſummer			In winter.		
	oz.	dr.	gr.	oz.	dr.	gr.
Of mercury	7	1	66	7	2	14
Oil of vitriol		7	59		7	71
Spirit of vitriol		5	33		5	38
Spirit of nitre		6	24		6	44
Spirit of ſalt		5	49		5	55
Aquafortis		6	23		6	35
Vinegar		5	15		5	21
Diſtilled vinegar		5	11		5	15
Burgundy wine		4	67		4	75
Spirit of wine		4	32		4	42
Pale ale		5	1		5	9
Brown ale		5	2		5	7
Cow's milk		5	20		5	25
Goat's milk		5	24		5	28
Urine		5	14		5	19
Spirit of urine		5	45		5	53
Oil of tartar		7	27		7	43
Oil of olives		4	53	Is froze in winter		
Oil of turpentine		4	39		4	46
Sea water		6	12		6	18
River water		5	10		5	13
Spring water		5	11		5	14
Diſtilled water		5	8		5	11

XI. A body ſpecifically heavier, deſcends in a fluid ſpecifically lighter, with a force equal to the exceſs of its weight, above that of an equal quantity of the fluid.

Hence, 1. The force which ſuſtains a ſpecifically heavier body in a fluid, is equal to the exceſs of the abſolute *gravity* of the body, above that of the fluid, under the ſame bulk: e. gr. 47⅓ pound of copper loſes 5⅓ pounds of its weight in water; therefore a power of 42 pounds is able to ſuſtain it.

2. Since the exceſs of the weight of a ſolid over the weight of a fluid ſpecifically heavier, is leſs than that over the weight of a ſpecifically lighter fluid under the ſame bulk; it will deſcend with leſs force in a ſpecifically heavier fluid than in a lighter; and, conſequently, it will deſcend more ſlowly in the former than in the latter.

XII. A ſpecifically lighter body, ſinks in a heavier fluid, till the weight of a quantity of the fluid, equal in bulk to the part immerſed, be equal to the weight of the whole body.

Hence, 1. Since the ſpecific *gravities* of bodies of the ſame weight, are reciprocally as their bulks; and the bulks of fluids equal in weight, are as the parts of the ſame ſolid immerged therein; the ſpecific *gravities* of fluids are reciprocally as the parts of the ſame body immerged therein.

2. A ſolid, therefore, immerges deeper in a lighter fluid than in a heavier, and deeper, as the proportion of the ſpecific *gravity* of the ſolid to that of the fluid is greater.

3. If a body be of the ſame ſpecific *gravity* with a fluid; the whole body will be immerged; and it will remain in any given place of the fluid.

4. If a ſpecifically lighter body be wholly immerged in a fluid; it will be urged by the collateral columns of the fluid, to aſcend with a force equal to the exceſs of the weight of the fluid, bulk for bulk, over the weight of the ſolid.

5. A body, therefore, ſpecifically lighter, lying on the bottom of a veſſel, will not be raiſed up, unleſs the heavier fluid riſe above ſuch a part, as is equal in bulk to a quantity of the fluid of the ſame weight with the whole ſolid.

XIII. The ſpecific *gravity* of a ſolid is to the ſpecific *gravity* of a lighter fluid, wherein it is immerged, as the bulk of the part immerged, is to the whole bulk.

XIV. The ſpecific *gravities* of equal ſolids, are as their parts immerged in the ſame fluid.

XV. The weight and bulk of a ſpecifically lighter body, and the weight of the ſpecifically heavier fluid, being given, to find the force required, to keep the ſolid wholly immerged under the fluid.

As this force is equal to the exceſs of the weight of the fluid beyond that of an equal bulk of the ſolid; from the given bulk of the ſolid, and the weight of a cubic foot of water, find, by the rule of three, the weight of a bulk of water equal to that of the body. From this ſubtract the weight of the ſolid; the remainder is the force required.

E. gr. Suppoſe the force neceſſary to detain a ſolid eight feet in bulk, and 100 pounds in weight, under water, required: ſince a cubic foot of water is found to weigh 70 pound, the weight of water under the bulk of eight feet, is 560; whence, 100 pound, the weight of the ſolid, being ſubtracted; the remainder 460 pound, is the force neceſſary to detain the ſolid under water.

Hence, ſince a ſpecifically lighter body aſcends in a heavier fluid, with the ſame force that would prevent its aſcent: by the preſent problem, we can likewiſe find the force wherewith a ſpecifically lighter body aſcends in a heavier.

XVI. The weight of a veſſel, to be made of a ſpecifically heavier matter; and that of a ſpecifically lighter fluid, being given: to determine the cavity the veſſel muſt have, to ſwim on the fluid.

The weight of a cubic foot of the fluid being given; the bulk of the fluid equal to the weight of the veſſel, is found by the rule of three. If, then, the cavity be made a little bigger than this, the veſſel will have leſs weight under the ſame bulk, than the fluid, and will therefore be ſpecifically lighter than the ſame, and conſequently, it will ſwim.

XVII. The force employed to retain a ſpecifically lighter ſolid, under a heavier fluid; and the weight loſt by a heavier ſolid in a lighter fluid, are each added to the weight of the fluid, and weigh together with it.

The ſeveral theorems here delivered, are not only all demonſtrable from the principles of mechanics; but are conformable to experiment. In effect, experience is here found to anſwer exactly to calculation, as is abundantly evident from the courſes of philoſophical experiments, now frequently exhibited; where the laws of ſpecific *gravitation* are well illuſtrated. See HYDROSTATICAL *balance.*

GRAVITY *of the air.* See WEIGHT *of the air*, AIR, and ATMOSPHERE.

GRAVITY, in *Muſic*, is an affection of ſound, whereby it becomes denominated *grave*, *low*, or *flat*.

Gravity ſtands in oppoſition to *acuteneſs*, which is that affection of ſound, whereby it is denominated *acute*, *ſharp*, or *high*.

The relation of *gravity* and acuteneſs is the principal thing concerned in muſic; the diſtinctneſs, and determinateneſs of which relation give ſound the denomination of *harmonical*, or *muſical*.

The degrees of *gravity*, &c. depend on the nature of the ſonorous body itſelf, and the particular figure and quantity thereof: though, in ſome caſes, they likewiſe depend on the part of the body where it is ſtruck. Thus, e. gr. the ſounds of two bells of different metals, and the ſame ſhape and dimenſions, being ſtruck in the ſame place, will differ as to acuteneſs and *gravity*; and two bells of the ſame metal will differ in acuteneſs, if they differ in ſhape or magnitude, or be ſtruck in different parts.

So in chords, all other things being equal, if they differ either in matter, or dimenſions, or tenſion, they will alſo differ in *gravity*.

Thus again, the ſound of a piece of gold is much graver than that of a piece of ſilver of the ſame ſhape and dimenſions; and, in this caſe the tones are, *cæteris paribus*, proportional to the ſpecific *gravities:* ſo a ſolid ſphere of braſs, two feet in diameter, will ſound graver than another of one foot diameter; and here the tones are proportional to the quantities of matter, or the abſolute weights.

But it muſt be obſerved, that acuteneſs and *gravity*, as alſo loudneſs and lowneſs, are but relative things. We commonly call a ſound *acute* and loud, in reſpect to another which is *grave*, or low with reſpect to the former; ſo that the ſame ſound may be both *grave* and *acute*, and alſo loud and low, in different compariſons.

The degrees of acuteneſs and *gravity*, make the different tones, or tunes, of voice, or ſound; ſo we ſay one ſound is in tune with another, when they are in the ſame degree of *gravity*.

The immediate cauſe or means of this diverſity of tones lies very deep. The modern muſicians fix it on the different velocity of the vibrations of the ſonorous body: in which ſenſe *gravity* may be defined, a relative property of ſound, which, with reſpect to ſome other, is the effect of a leſſer number of vibrations accompliſhed in the ſame time, or of vibrations of a longer duration. In which ſenſe alſo, acuteneſs is the effect of a greater number of vibrations, or vibrations of a ſhorter duration.

If the vibrations be iſochronous, the ſound is called muſical, and is ſaid to continue at the ſame pitch. See Chord and String, in *Muſic*.

If two or more ſounds be compared in the relation of *gravity*, &c. they are either *equal*, or *unequal*, in the degree of tune. Such as are *equal*, or produced by iſochronous vibrations, are called unisons.

The *unequal* including, as it were, a diſtance between each other, conſtitute what we call an interval in muſic; which is properly the difference, in point of *gravity*, between two ſounds.

Upon this inequality, or difference, does the whole effect depend; and in reſpect hereof it is, that theſe intervals are divided into concords and discords.

GRAUPEN, a term uſed by the German miners to expreſs the reſiduum of any ore after the regulus, or metalline part, is run from it. Thus the ores of biſmuth leave behind them, after the regulus is melted off, an earthy ſubſtance called *biſmuth graupen*, with which, mixt with flints and an alkali, they make a kind of ſmalt, not diſtinguiſhable from the true ſmalt made from cobalt. Phil. Tranſ. N° 390.

GRAVY, in *Cookery*, &c. the juices of fleſh, or fiſh, obtained from them by coction, elixation, friction, or the like.

GRAY, or Grey, a mixed colour, partaking of the two extremes, black and white. See Dying.

In the *Manege* they make ſeveral ſorts of *grays*: as the *branded* or *blackened gray*, which has ſpots quite black, diſperſed here and there. The *dappled gray*, which has ſpots of a darker colour than the reſt of the body. The *light* or *ſilver gray*, wherein there is but a ſmall mixture of black hairs. The *ſad* or *iron gray*, which has but a ſmall mixture of white. And the *browniſh* or *ſandy-coloured gray*, where there are bay-coloured hairs mixed with the black.

Gray, in *Zoology*, a name given in ſome counties of England to the badger.

Gray is alſo uſed in ſome places for a ſpecies of wild-duck, more commonly known by the name of the *gadwall*. See Duck.

GRAYLING, or Umber, the Engliſh name for the fiſh called by authors *thymallus*, and *thymus*, and by Artedi made a ſpecies of coregonus, and the salmo *thymallus* of Linnæus.

It is of a long and flatted body, the belly is ſomewhat broad, and the back rigid and thin. It ſeldom exceeds a pound, or at the utmoſt a pound and half weight. The irides are ſilvery, tinged with yellow; the teeth very minute, ſeated in the jaws and roof of the mouth, but none on the tongue; the head is duſky; the covers of the gills of a gloſſy green; the back and ſides of a fine ſilvery grey, varied ſlightly, when the fiſh is juſt taken, with blue and gold; the ſide line is ſtrait; the ſcales are large, and the lower edges duſky, forming ſtrait rows from head to tail; the firſt dorſal fin has twenty-one rays; the three or four firſt are the ſhorteſt, the others almoſt of equal lengths; this fin is ſpotted, but all the others are plain; the tail is much forked.

It is caught in the freſh rivers and clear rapid ſtreams, chiefly in the mountainous counties of England, and in the like ſituations in Germany, and other kingdoms, and is one of the fineſt taſted of all the freſh-water fiſh. It is common in Lapland, where the guts of it are uſed inſtead of rennet to make the cheeſe, which they get from the milk of the rein-deer. It is a voracious fiſh, riſes freely to the fly, and will very eagerly take a bait. It feeds on worms, and ſpawns in May. See *Tab. of Fiſhes*, N° 7. Willughby and Pennant.

GRAYMILL, in *Botany*. See Gromwell.

GREASE, among *Farriers*, &c. a ſwelling and gourdineſs of the legs of a horſe, very frequently happening after a journey.

If the *greaſe* be an attendant of ſome other diſeaſe, it will be in vain to attempt the cure before the diſeaſe be removed that is the original cauſe of it; and therefore, if it be a hectic, the yellows, or the farcin, &c. the directions given for thoſe diſeaſes are to be followed, and in the mean time proper applications are to be uſed outwardly for the *greaſe*.

If the *greaſe* proceed from the common and ordinary accidents, and the horſe has no other diſtemper upon him, then applications that are peculiar to this diſtemper are to be followed. In general, keeping the heels clean, by waſhing them with ſoap-ſuds, chamber-lye, or vinegar and water, moderate exerciſe, a large and convenient ſtall, with good dreſſing, are the beſt remedies. When the heels are cracked, and diſcharge a nauſeous matter, or are full of hard ſcabs, after cutting off the hair, poultices, made of boiled turnips and lard, with a handful of powdered linſeed, or oatmeal and rye-flour, with a little common turpentine and hog's lard, boiled up with ſtrong beer grounds, or red wine lees, ſhould be applied to them, for two or three days, over the digeſtive ointment: theſe will promote a diſcharge, which may be dried up with the following waſh: take white vitriol and burnt alum, of each two ounces; Ægyptiacum one ounce; lime-water a quart or three pints; waſh the ſores with a ſponge dipped in this mixture three times a day, and apply the common white ointment, ſpread on tow; to which may be added ſugar of lead, in the proportion of two drams to an ounce of ointment. If the diſorder has advanced to a greater height, and the horſe has been well fed and pampered, it may be neceſſary to have recourſe, not only to bleeding, rowels, and repeated purging, but to the uſe of diuretic medicines. For this purpoſe the nitre balls may be given in the quantity of two ounces a day, for a month or ſix weeks; they may be either mixed with honey, or given in the horſe's feeds; one dram of camphor may be added to the nitre. The legs ſhould be alſo fomented twice a day with diſcutient fomentations, in which a handful or two of wood aſhes has been boiled: the above poultice applied, the ſores dreſſed with the green ointment, and when they are properly digeſted, dried up with the waſh already recommended. If the ſores are very foul, they ſhould be dreſſed with two parts of the wound ointment, and one of Ægyptiacum, over which the following preparation, ſpread on thick cloths, ſhould be rolled on: take of black ſoap one pound, honey half a pound, burnt alum four ounces, powdered verdegriſe two ounces, and a ſufficient quantity of wheat flour. If the diuretic balls ſhould not ſucceed with this treatment, they muſt be changed for the antimonial and mercurial alteratives. Bartlet's Farriery.

Grease, *molten*, is a diſtemper incident to horſes, in which the fat is melted by violent exerciſe in hot weather, and diſcharged with his dung. This diſeaſe is always attended with a fever, heat, reſtleſſneſs, ſtarting and trembling, inward ſickneſs, ſhortneſs of breath, and ſometimes with the ſymptoms of a pleuriſy. For the cure, bleed plentifully, and repeat it for two or three days ſucceſſively in ſmaller quantities; put in two or three rowels, and adminiſter cooling emollient glyſters. Let the horſe drink plenty of warm water or gruel, with cream of tartar or nitre. When he has recovered his appetite, and the fever is removed, gentle aloetic purgings, conſiſting of half an ounce or ſix drams of fine aloes, ſhould be given once a week for a month or ſix weeks. The purge may be prepared thus: take of Succotrine aloes ſix drams, of gum guaiacum half an ounce, of diaphoretic antimony and powder of myrrh, of each two drams, and make them into a ball with ſyrup of buckthorn: or it may be prepared with an ounce of aloes, ſix drams of diapente, and a ſpoonful of oil of amber. The diuretic nitre medicine recommended in the article Grease will be found of great uſe. Bartlet's Farriery.

Grease, among *Hunters*, denotes the fat of a boar or hare.

GREAT, a term of comparison, denoting a thing to have more extenſion than ſome other to which it is referred.

Thus we ſay, a *great* ſpace; a *great* diſtance; a *great* figure; a *great* body, &c.

Great is likewiſe uſed figuratively, in matters of morality, &c. to ſignify ample, noble, elevated, extraordinary, important, &c.

Thus we ſay, Shakſpeare was a *great* genius; queen Elizabeth had a *great* ſoul; Cromwell was a man of *great* deſigns; Da Vinci, a *great* painter; Galileo a *great* philoſopher; Boſſu a *great* critic, &c.

Great is alſo a title or quality appropriated to certain princes, and other illuſtrious perſonages.

Thus we ſay the *great* Turk; the *great* Mogul; the *great* cham of Tartary; the *great* duke of Florence, &c.

GREAT is alſo a ſurname beſtowed on ſeveral kings and emperors.

Thus we ſay, Alexander the *great*; Cyrus the *great*; Charles the *great*, or Charlemagne; Henry the *great* of France, &c. So the Engliſh frequently ſay Edward the *great*, or the *great* Edward; William the *great*, meaning king William III. or the *great* William. The French ſay, Louis the *great*, *le grand*, ſpeaking of the late Louis XIV. Giles of Paris ſays, Charlemagne firſt got the ſurname *great* from the tallneſs and eminence of his ſtature. Helgaud adds, that Hugh the *great* of France was thus denominated on account of his great piety, goodneſs, &c.

GREAT is alſo applied to ſeveral officers, who have preeminence over others.

Thus we ſay, the lord *great* chamberlain; the *great* marſhal of Poland, &c.

GREAT *circles of the ſphere*. See *Great* CIRCLE.

GREAT *circle ſailing*. See SAILING.

GREAT *apparatus*. See APPARATUS.

GREAT *artery*. See ARTERY.

GREAT *bairam*. See BAIRAM.

GREAT *bear*. See URSA *major*.

GREAT *diachylon*. See DIACHYLON.

GREAT *gun*. See CANNON and GUN.

GREAT *letters*. See CAPITALS.

GREAT *maſs*. See MASS.

GREAT *officers*. See OFFICER.

GREAT *repeat*. See REPEAT.

GREAT *ſeal*. See SEAL.

GREAT *tithes*. See TITHE.

GREAT *wardrobe*. See WARDROBE.

GREAT *wheel*, in *Clock* or *Watch-work*, is that wheel which the weight, ſpring, or fuſee, firſt moves.

GREAT *work*, in *Chemiſtry*, is the alchemical proceſs whereby gold is made, or pretended to be made.

GREAT *year*. See PLATONIC *year*.

GREATER *barons*. See BARON.

GREATER *enharmonical dieſis*. See DIESIS.

GREATER *excommunication*. See EXCOMMUNICATION.

GREATER *faſti*. See FASTI.

GREATER *hexachord*. See HEXACHORD.

GREBE, in *Ornithology*, is claſſed by Linnæus under the genus of COLYMBUS. See DIVER.

The diſtinguiſhing characters of this ſpecies of birds are, that the bill is ſtrong, ſtrait, and ſharp-pointed; that they have no tail, and that the legs are flat, thin, and ſerrated behind with a double row of notches. The *great creſted grebe*, or *colymbus criſtatus* of Linnæus, has between the bill and eyes a ſtripe of black naked ſkin, and on the head a large duſky creſt ſeparated in the middle; the cheeks and throat are ſurrounded with a long pendent ruff of a bright tawny colour, edged with black; the chin is white; from the bill to the eye is a black line, and above that a white one; the hind part of the neck and back are of a ſooty hue; the rump is covered with long ſoft down; the breaſt and belly are of a moſt beautiful ſilvery white, gloſſy as ſattin, and applied to the ſame uſes with thoſe of the *tippet grebe*. They breed in the meres of Shropſhire and Cheſhire, and in the eaſt fen in Lincolnſhire, where they are called *gaunts*. The bird ſits and hatches its eggs in a neſt floating on the water, among the reeds and flags. It preys on fiſh, and is almoſt perpetually diving, and is never ſeen on land; the fleſh is rank, but the fat is recommended in rheumatic pains, cramps, and paralytic contractions. Pennant. *Tab*. II. *Birds*, N° 15.

The *little* or *eared grebe*, or *colymbus auritus* of Linnæus, is the *didapper* or DOB-*chick* of other writers.

The *tippet grebe*, or *colymbus urinator* of Linnæus, called alſo *colymbus major*, *greater loon*, and *greater dob-chick* by other writers, differs from the great creſted *grebe* in being rather leſs, and wanting the creſt and ruff. This ſpecies is ſcarce in England, but is common in the winter-time on the lake of Geneva, where they appear in flocks of ten or twelve. They are killed for the ſake of their ſkins, the underſide of which being dreſt with the feathers on, are made into muffs and tippets. Pennant. *Tab*. II. *Birds*, N° 16.

GREE, in our *Law Books*, ſignifies agreement, contentment, or good liking. Thus, to make *gree* to the parties, is to ſatisfy them for offence done. "Judgment ſhall be "put in ſuſpence, till *gree* be made to the king of his "debt." Stat. 25 Edward III.

The word is formed from the French *gré*, *good will*, *good liking*, or *allowance*.

GREEK *language*, or *ancient* GREEK, is the language ſpoken by the ancient Grecians, and ſtill preſerved in the works of their authors, as Plato, Ariſtotle, Iſocrates, Demoſthenes, Thucydides, Xenophon, Homer, Heſiod, Sophocles, Euripides, &c.

The *Greek* has been preſerved entire longer than any other language known, notwithſtanding all the revolutions that have happened in the country where it was ſpoken. See ENGLISH.

Yet, from time to time of the removal of the ſeat of empire to Conſtantinople, in the fourth century, it has been gradually altering: the alterations at firſt did not affect the analogy of the tongue, the conſtruction, inflexions, &c. There were only new words, new riches acquired by taking in the names of new dignities and offices, and the terms of art it was before unacquainted with; but, at length, the incurſions of the Barbarians, and eſpecially the invaſion of the Turks, wrought much more conſiderable alterations.

The *Greek* has a great copia or ſtock of words: its inflexions are as remarkable for their variety, as thoſe of moſt of the other European tongues for their ſimplicity.

It has three numbers, ſingular, dual, and plural, and abundance of tenſes in its verbs, which makes a variety in diſcourſe, prevents a certain dryneſs which always accompanies a too great uniformity, and renders the language peculiarly fit for all kinds of verſe.

The uſe of the participles of the aoriſtus and preterit, together with the compound words, wherein it abounds, give it a peculiar force and brevity, without taking any thing from its perſpicuity.

The proper names in the *Greek* language are ſignificative, as in the oriental as well as in moſt of the modern languages, where the learned ſtill find ſome, though remote, character of their origin.

The *Greek* was the language of a polite people, who had a great taſte for arts and ſciences, which they cultivated with ſucceſs. In the living tongues are ſtill preſerved a vaſt number of *Greek* terms of art; ſome deſcended to us from the Grecians, and others formed anew. When a new invention, machine, right, order, inſtrument, &c. has been diſcovered, recourſe has been commonly had to the *Greek* for a name; the facility wherewith words are there compounded, readily affording us names expreſſive of the uſe, effect, &c. of ſuch inſtruments. Hence *areometer*, *thermometer*, *barometer*, *micrometer*, *logarithm*, *teleſcope*, *microſcope*, *loxodromy*, &c.

GREEK, *modern* or *vulgar*, is the language now ſpoken in Greece, and called Ρωμαικη γλωσσα, from Conſtantinople being called *Roma Nova*.

There have been few books written in this language, from the taking of Conſtantinople by the Turks; ſcarce any thing but ſome catechiſms, and the like pieces, compoſed or tranſlated into the vulgar *Greek*, by the Latin miſſionaries.

The native *Greeks* are contented to ſpeak the language without cultivating it; the Turkiſh politics not allowing any of the ſubjects of their eſtates to apply themſelves to the arts and ſciences.

It is not eaſy to aſſign the preciſe difference between the *vulgar* and the *ancient Greek*: it conſiſts of the terminations of nouns, pronouns, verbs, and other parts of ſpeech, which make a difference between thoſe two languages much like that obſerved between ſome of the dialects of the Italian or Spaniſh: we inſtance in thoſe languages, as being the moſt known; but we might have ſaid the ſame thing of the Hebrew, Sclavonic, &c. dialects.

The *modern Greek* alſo curtails words, runs them into one another, and adds a ſort of enclitic particles to the end of them: it confounds the vowels η, ι, υ, and the dipthongs ει and οι, which they pronounce and often write only *iota*. They likewiſe often confound caſes, moods, tenſes, and particles. See Brerewood's Inquiry concerning the Diverſity of Languages, &c. chap. 2.

Beſides, the modern *Greek* has divers new words not in the ancient; particularly ſeveral participles which appear as expletives, and which are introduced to characterize certain tenſes of verbs, and other expreſſions, which would have had the ſame meaning without ſuch particles, had cuſtom diſpenſed with them; divers names of dignities and offices, unknown to the ancient *Greeks*; and abundance of words borrowed from the vulgar tongues of the neighbouring nations.

Accordingly one may diſtinguiſh three ages of the *Greek* tongue: the firſt ends at the time when Conſtantinople became the capital of the Roman empire; not but there were ſeveral books, eſpecially of the fathers of the church, written with great purity after that time; but as religion, law, and policy, both civil and military, began then to introduce new words into the language, it ſeems neceſſary to begin the ſecond age of the *Greek* tongue from that epocha; which laſted to the taking of Conſtantinople by the Turks, where the laſt age commences.

GREEK *accents*. See ACCENT.

GREEK *Bible*. See BIBLE.

The New Teſtament was tranſlated into modern *Greek* by Maximus a monk, who flouriſhed about the year 1630. It was undertaken at the requeſt of Cornelius Haga, the Dutch ambaſſador at the Port of Conſtantinople, and is prefaced and recommended by the patriarch Cyrillus Lucaris. An edition of this verſion, with the ancient *Greek* in one column, and the modern *Greek* in another, was publiſhed at Geneva in 1638. There was another edition printed at London in duodecimo in the year 1703. The tranſlation appears to be very literal, and ſo cloſe as to be ſometimes obſcure.

GREEK *church* is that part of the Chriſtian church which is eſtabliſhed in Greece; extending likewiſe to ſome other parts of Turky.

It is thus called in Europe, Aſia, and Africa, in contradiſtinction from the *Latin* or *Romiſh* church; as alſo the *Eaſtern* church, in diſtinction from the *Weſtern*.

The Romaniſts call the *Greek* church the *Greek ſchiſm*, becauſe the Greeks do not allow the authority of the pope, but depend wholly, as to matters of religion, on their own patriarchs. They have treated them as ſchiſmatics ever ſince the revolt, as they call it, of the patriarch Photius. See CHURCH.

GREEK *croſs*. See CHURCH.

GREEK *grammar*. See GRAMMAR.

GREEK *lexicon*. See LEXICON.

GREEK *maſonry*. See MASONRY.

GREEK *maſs*. See MASS.

GREEK *monks*. See ANACHORET.

GREEK *orders*, in *Architecture*, are the Doric, Ionic, and Corinthian; in contradiſtinction to the two Latin orders, the Tuſcan and Compoſite. See ORDER.

GREEK *pitch*. See PITCH.

GREEK *rite*, or *ritual*, is diſtinguiſhed from the Latin. See RITE.

GREEK *ſtatue*. See STATUE.

GREEK *teſtament*. See BIBLE.

GREEK *valerian*. See VALERIAN.

GREEK *wine*. See WINE.

GREEK *year*. See YEAR.

GREEN, one of the original COLOURS of the rays of light. Graſs and herbs, and even all vegetables in places expoſed to the open air, are *green*; and thoſe in ſubterraneous places, or places inacceſſible to the air, white and yellow. Thus, when wheat, or the like, germinates under-ground, it is white or yellow; and when it is in the open air *green*; though this too is yellow before it be *green*.

GREENS, *artificial*, are very rarely ſimple colours, but produced by mixture of yellow and blue.

Two powders, the one blue, and the other yellow, well mixed, appear perfectly *green*; though, when viewed with a microſcope, we obſerve a chequer of blue and yellow.

The tincture of red roſes with oil of tartar per deliquium, or with ſpirit of ſal ammoniac, produces *green*. The tincture of many red flowers is changed into *green* by an alkali. The tincture of red roſes, and the yellow tincture of crocus, or the blue tincture of cyanus, and the white ſpirit of ſal ammoniac, produce *green*. The ſolution of verdegriſe becomes colourleſs by the affuſion of the ſpirit of nitre, and by the affuſion of the oil of tartar it becomes *green* again.

The dyers make divers ſhades, or caſts of *green*, as *light green*, *yellow green*, *graſs green*, *laurel green*, *ſea green*, *dark green*, *parrot green*, and *celadon green*.

All the *greens* are firſt dyed blue, then taken down with woad, verdegriſe, &c. and then *greened* with the weed, there being no one ingredient that will give *green* alone. See DYING.

GREEN, *mountain*, or *Hungary* GREEN, is a ſort of *greeniſh* powder found in little grains, like ſand, among the mountains of Kernauſent in Hungary, and thoſe of Moldavia. Though ſome hold, that this mountain *green* is factitious, and the ſame with that the ancients called *flos æris*, prepared by caſting water, or rather wine, on copper red-hot from the furnace, and catching the fumes thereof on copper plates laid over for that purpoſe; or by diſſolving copper plates in wine, much as in making verdegriſe. The painters make uſe of this colour for *graſs green*. It is ſometimes counterfeited by grinding verdegriſe with ceruſs.

GREEN, *calcined*, and *diſtilled* GREEN. See VERDEGRISE.

GREEN, *Pruſſian*. See the proceſs for making *Pruſſian* BLUE.

GREEN, *ſap*. See *Colours from* FRUITS, BUCKTHORN, and SAP-*green*.

GREEN, *Saxon*, an extremely beautiful *green* colour, the proceſs of dying which is this: the cloth or ſilk is firſt to be dyed a *Saxon* BLUE, in the following manner. Having ground nine parts of indigo with twenty of red arſenic into a fine powder, add forty-eight parts of ſtrong ſpirit of vitriol; which mixture ſwells, grows hot, and emits a ſulphureous ſmell. After ſtanding in a moderate warmth for twenty-four hours, pour off the liquid part, which will be of an extremely deep blue. A ſmall quantity of this liquor, dropt into hot water, inſtantly ſpreads, tinges it of a fine light blue, and fits it for dying the prepared wool, cloth, or ſilk; and, by increaſing or diminiſhing the proportion of the blue compoſition, the colour may be rendered deeper or lighter. This, Dr. Lewis ſays, is the method uſed for preparing the blue compoſition by the dyers of Norwich, who purchaſed this ſecret from Saxony.

The cloth or ſilk, thus dyed blue, is next to be dipt in the yellow decoction of weld or fuſtic, and the deſired colour will be obtained.

Or the ſubject may be dyed *green* at one operation, by boiling it for a little time in a mixture of the blue and yellow liquors.

By thus combining any blue and yellow dyes, in different proportions, all the ſhades of *green* may be produced, from the bluiſh *green* of the cabbage-leaf to the greeniſh yellow of the olive.

GREEN *cap*. See CAP.

GREEN *copperas*. See COPPERAS.

GREEN *earth*. See VERDITER, and TERRE *verte*.

GREEN *finch*, the Engliſh name of a ſpecies of LOXIA, being the *loxia chloris* of Linnæus, which has a ſtrong tinge of *green* diffuſed over all its body; the wings and tail are black, but both variegated with a beautiful yellow.

This bird may be eaſily tamed, by carrying it into the dark, and putting it on one finger, and gently touching its breaſt with a finger of the other hand. By a few ſtrokes and careſſes of this kind, and letting in the light by degrees, it will eat any bruiſed ſeed out of the hand, and afterwards continue tame. See CHLORIS.

GREEN *fiſh*. See *Cod*-FISHERY.

GREEN *glaſs*. See GLASS.

GREEN-*hew*, or *green-hue*, in our *Old Writers*, the ſame with *vert* in foreſts, &c.

GREEN *hides*, is that not yet tanned, or dreſſed, but ſuch as are taken off from the carcaſe. See HIDE, and CURRYING.

GREEN *muſtard*, an Engliſh name for the herb DITTANDER, or pepperwort.

GREEN *ſhank*, in *Ornithology*, the *ſcolopax glottis* of Linnæus. See LIMOSA.

GREEN *ſickneſs*. See CHLOROSIS.

GREEN *ſilver*, the name of an ancient cuſtom within the manor of Writtel in the county of Eſſex; which is, that every tenant, whoſe fore-door opens to Greenbury, ſhall pay an half-penny yearly to the lord, by the name of *green ſilver*. Blount.

GREEN *wax* is uſed where eſtreats are delivered to the ſheriffs out of the exchequer, under the ſeal of that court, made in *green wax* to be levied in the ſeveral counties.

GREEN *weed*. See BROOM.

GREEN, *winter*. See WINTER *green*.

GREENCLOTH, a board, or court of juſtice, held in the compting-houſe of the king's houſhold, for the taking cognizance of all matters of government and juſtice within the king's court royal; and for correcting all the ſervants therein, that ſhall any way offend.

To this court alſo belongs the authority of maintaining the peace for twelve miles round the king's court, wherever it ſhall be, excepting at London.

The judge of this court is the lord ſteward, aſſiſted by the treaſurer, comptroller, cofferer, clerks of the *greencloth*, &c. It takes its name, *greencloth*, from a green cloth ſpread over the board where they ſit, whereon are the arms of the compting-houſe.

GREENCLOTH, *clerks of the*, are three officers of the board of *greencloth*, who attend there, and have buſineſs aſſigned them by the board. All bills of comptrolments, relating to the office, are ſummed up, and allowed by the clerks comptrollers, and audited by the clerks of the *greencloth*.

They alſo appoint the king's, queen's, and houſhold's diet, and keep all records, ledgers, and papers, relating thereto; make up bills, parcels, and debentures for ſalaries, &c. and proviſions and neceſſaries for the officers of the pantry, buttery, cellar, &c.

GREENHOUSE, or *conſervatory*, a houſe of ſhelter in a garden; contrived for preſerving the more tender and curious exotic plants, which will not bear the winter's cold abroad in our climate.

Greenhouſes, as now built, ſerve not only as conſervatories, but likewiſe as ornaments of gardens; being uſually large and beautiful ſtructures, in form of galleries, wherein the plants are handſomely ranged in caſes for the purpoſe.

The length of *greenhouſes* muſt be proportioned to the number of plants intended to be preſerved in them, and cannot therefore be reduced to rule; but their depth ſhould never be greater than their height in the clear, which, in ſmall or middling houſes, may be ſixteen or eighteen feet, but in large ones from twenty to twenty-four feet; and the length of the windows ſhould reach from about one foot and a half above the pavement, and within the ſame diſtance of the cieling, which will admit of a corniche round the building over the heads of the windows. Their breadth cannot be in proportion to their length; for if in the largeſt buildings they are more than ſeven or ſeven feet and a half broad, they will be extremely heavy and inconvenient. The piers between the windows muſt be as narrow as may be to ſupport the building; for which reaſon they ſhould either be of ſtone, or of hard burnt bricks.

If the piers are made of ſtone, they ſhould be thirty inches wide in front, and ſloped off behind to about eighteen inches, by which means there will be no corners to take off the rays of the ſun. If they are of brick, they will require to be at leaſt three feet in front, but they ſhould be in the ſame manner ſloped off behind. Over the *greenhouſe* may be rooms for drying and preſerving ſeeds, roots, &c. and behind it a place for tools and other purpoſes; and both theſe behind, and the rooms above, will be of great uſe in keeping off the froſts, ſo that the wall between theſe need not be of more than two bricks and a half in thickneſs.

The floor of the *greenhouſe*, which ſhould be laid either with Bremen ſquares, Purbeck ſtone, or flat tiles, muſt be raiſed two feet above the ſurface of the adjoining ground, or if the ſituation be damp, at leaſt three feet; and if the whole is arched with low brick arches under the floor, they will be of great ſervice in preventing damps; and under the floor, about two feet from the front, it will be very adviſeable to make a flue of ten inches wide, and two feet deep; this ſhould be carried the whole length of the houſe, and then returned back along the hinder part, and there be carried up into funnels adjoining to the tool-houſe, by which the ſmoke may be carried off. The fire-place may be contrived at one end of the houſe, and the door at which the fuel is put in, as alſo the aſh-grate, may be contrived to open into the tool-houſe, and the fuel being laid in the ſame place, the whole will be out of ſight. Bradley recommends the new STOVE invented by M. Gauger, and publiſhed by Dr. Deſaguliers. Bradley alſo adviſes, that the front of *greenhouſes*, in the colder parts of England, be built in a ſweep or ſemicircle, ſo that one part or other of it may receive the ſun's rays all day. The uſe of fires muſt, however, be very ſparing in this place; and it is not one winter in three or four that will require them in any part, only when the weather is very ſevere, and the froſt cannot well be kept out any other way, this is an expedient that is good to have in readineſs, as it may ſave a whole houſe of plants. Withinſide of the windows, in front of the *greenhouſe*, there ſhould be good ſtrong ſhutters, made with hinges, to fold back cloſe to the piers, that they may not obſtruct the rays of the ſun. Theſe ſhutters need not be more than an inch and a half thick. The back part of the houſe ſhould be either laid over with ſtucco, or plaiſtered with mortar, and whitewaſhed, in order to prevent the froſty air from penetrating through the walls. When the *greenhouſe* is wainſcotted, the walls ſhould be plaiſtered with lime and hair behind the wainſcot, to keep out the cold; and the wainſcot, as well as the cieling, and every part within the houſe, ſhould be painted white, for the reflection of the ſun's rays. There muſt be a number of treſſels, with forms of wood upon them, to ſupport the pots of plants, the talleſt to be placed hindmoſt, the loweſt within four feet of the windows; and the rows of plants ſhould riſe gradually, ſo that the heads of the ſecond row ſhould be entirely above the firſt; and behind them there ſhould be a ſpace of at leaſt five feet, for the convenience of watering the plants, and for a free circulation of air. It has been obſerved that the placing of the euphorbiums, cereuſes, and other ſucculent plants among orange-trees, and other common *greenhouſe* plants, is always deſtructive of them, by making them receive an improper ſort of effluvia, which plants of that kind imbibe very freely. They ſhould therefore be placed in two wings built at each end of the *greenhouſe*, which, if well contrived, will be a great beauty, as well as uſe, to the building. Theſe wings may be made capable of a greater warmth alſo by more flues, and may be made to contain a hot-bed of tanners bark for the raiſing many of the tender plants, natives of warm climates.

Whilſt the front of the *greenhouſe* is exactly ſouth, one of the wings may be made to face the ſouth-eaſt, and the other the ſouth-weſt. By this diſpoſition the heat of the ſun is reflected from one part of the building to the other all day, and the front of the main *greenhouſe* is guarded from the cold winds. Theſe two wings may be ſo contrived as to maintain plants of different degrees of hardineſs, which may be eaſily effected by the ſituation and extent of the fire-place, and the manner of conducting the flues: the wing facing the ſouth-eaſt is evidently the moſt proper for the warmeſt ſtove; this may be divided in the middle by a partition of glaſs, with glaſs doors opening from one diviſion to the other. In each of theſe there ſhould be a fire-place, with flues carried up againſt the back wall, through which the ſmoke ſhould be made to paſs, as many times the length of the houſe as the height will admit of the number of flues; for the longer the ſmoke is in paſſing, the more heat will be given to the houſe, with a leſs quantity of fuel. The other wing, facing the ſouth-weſt, ſhould be divided and furniſhed with flues in the ſame manner; and thus different degrees of heat may be obtained, according to the ſeaſons, and the particular ſorts of plants that are to be preſerved. If there are no ſheds behind theſe wings, the walls ſhould not be leſs than three bricks thick, and the back part, having ſloping roofs, which are covered with tiles or ſlates, ſhould be lined with reeds, &c. under the covering. The ſloping glaſſes of theſe houſes ſhould be made to ſlide and take off, ſo that they may be drawn down more or leſs, in warm weather, to admit air to the plants; and the upright glaſſes in front may be ſo contrived, as that every other may open as doors upon hinges, and the alternate glaſſes may be divided into two; the upper part of each ſhould be ſo contrived as to be drawn down like ſaſhes, ſo that either of them may be uſed to admit air, in a greater or leſs quantity, as there may be occaſion. Miller.

As to the management of the plants herein, Mortimer recommends the opening of the mould about them, from time to time, and ſprinkling a little freſh mould in them, and a little warm dung on that; as, alſo, to water them when the leaves begin to wither and curl, and not oftener; which would make them fade, and be ſickly; and to take off ſuch leaves as wither, and grow dry.

It is a general rule among gardeners, to ſet exotic plants in the *greenhouſe* about the ſecond week in September, and to take them out again about the middle of May; though there ſhould be ſome diſtinction made herein; the tendereſt ſorts from places near the line, as the aloes, &c. being to be confined longer to the *greenhouſe* than oranges, myrtles, &c.

GREENLAND *fiſhery*. See *Whale* FISHERY.

GREENLAND *company*. A joint ſtock of 40,000*l.* was by ſtatute to be raiſed by ſubſcribers who were incorporated for fourteen years from the firſt of October, 1693, and the company to uſe the trade of catching whales, &c. into and from *Greenland*, and the *Greenland* ſeas; they may make bye-laws for government, and of the perſons employed in their ſhips, &c. Stat. 4 and 5 W. III. cap. 17. This company was farther encouraged by parliament in 1696; but partly by unſkilful management, and partly by real loſſes, it was under a neceſſity of entirely breaking up, before the expiration of the term aſſigned to it, ending in 1707. But any perſon who will adventure to *Greenland* for whale fiſhing, ſhall have all privileges granted to the *Greenland* company, by 1 Anne, cap. 16. and thus the trade was again laid open. Any ſubjects may import whale-fins, oil, &c. of fiſh caught in the *Greenland* ſeas, without paying any cuſtoms, &c. ſtat. 10 Geo. I. cap. 16. And ſhips employed in the *Greenland* fiſhery are to be of ſuch burden, provided with boats, ſo many men, fiſhing lines, harping irons, &c. and be licenſed to proceed; and on their return ſhall be paid 20*s.* per ton bounty, for whale-fins, &c. imported. 6 Geo. II. cap. 33. See *Whale*-FISHERY.

GREENWICH *hoſpital*. See HOSPITAL.

GREGARIOUS *birds*, are ſuch as do not live ſolitarily, but aſſociate in flights or coveys, a great many together in company.

GREGORIAN *calendar*. See CALENDAR.

GREGORIAN *chant*. See CHANT.

GREGORIAN *code*. See CODE.

GREGORIAN *epocha*, is the epocha, or time, whence the *Gregorian* calendar, or computation, took place.

The year 1780 is the 198th year of the *Gregorian* epocha.

GREGORIAN *year*. See YEAR.

GRENADA. See GRANADO.

GRENADIER. See GRANADIER.

GRENAILLE, a name given by the French writers to a preparation of copper, which the Chineſe uſe as a red colour in ſome of their fineſt china, particularly for that colour which is called *oil-red*, or *red in oil*. The china-ware coloured with this is very dear. The manner in which they procure the preparation is thus: they have in China no ſuch thing as ſilver-coined money, but they uſe in commerce bars, or maſſes of ſilver; theſe they pay and receive in large bargains; and among a nation ſo full of fraud as the Chineſe, it is no wonder that theſe are often adulterated with too great an alloy of copper. They paſs, however, in this ſtate in the common payments. There are ſome occaſions, however, ſuch as the paying the taxes and contributions, on which they muſt have their ſilver pure and fine: on this occaſion they have recourſe to certain people, whoſe ſole buſineſs it is to refine the ſilver, and ſeparate it from the copper and the lead it contains. This they do in furnaces made for the purpoſe, and with very convenient veſſels. While the copper is in fuſion, they take a ſmall bruſh, and dip the end of it into water; then ſtriking the handle of the bruſh, they ſprinkle the water by degrees upon the melted copper; a ſort of pellicle forms itſelf by this means on the ſurface of the matter, which they take off while hot with pincers of iron, and immediately throwing it into a large veſſel of cold water, it forms that red powder, which is called the *grenaille*; they repeat the operation every time they in this manner ſeparate the copper; and this furniſhes them with as much of the *grenaille* as they have occaſion for in their china works. Obſervations ſur les Coûtumes de l'Aſie, p. 309.

GRESHAM *college*. See COLLEGE.

GRESLING, in *Ichthyology*, a name given by the Germans to the *gobius fluviatilis*, or *common* GUDGEON, which is very frequent in their ſmaller rivers.

GRESSURA; a word uſed by ſome writers, to expreſs the part between the pudenda and the anus. See PERINÆUM.

GREVE, GEREFA, among our *Ancient Writers*, is a denomination of power and authority; ſignifying as much as *comes*, or *vicecomes*. See COUNT and VISCOUNT.

The word is formed from the Anglo-Saxon *grith*, *peace*. Thus Hoveden: Greve *dicitur, ideo quod jure debeat* grith, i. e. *pacem ex illis facere, qui patriæ inferunt væ*, i. e. *miſeriam vel malum.*

Lambard makes *greve* the ſame with *reve*.

Hence, alſo, the words *ſhrieve*, *portgreve*, &c. which were anciently written *ſciregerefa*, *portgerefa*, &c.

GREWIA, in *Botany*, a genus of the *gynandria polyandria* claſs. Its characters are theſe: the flower hath a five-leaved empalement; five petals, which are indented at their baſe, where is ſituated a ſcaly nectarium to each; and hath many briſtly ſtamina; in the centre is ſituated a roundiſh germen, which is lengthened in form of a column, and becomes a four-cornered berry with four cells, each incloſing one globular ſeed. Miller reckons two ſpecies, natives of Africa, and Linnæus four.

GREWT, in *Mineralogy*, a word uſed by our miners to expreſs earth, but particularly that earth found in the flat countries, and in the banks of rivers, in their ſearches after mineral veins, which is different in colour and nature from the reſt of the bank or bottom. This they always underſtand to have been waſhed off from the neighbouring hills, in the time when the ſhoad-ſtones, by which they train their new mines, were alſo waſhed down, that is at the univerſal deluge; and this wherever found, proves of great uſe to them in theſe reſearches, as it ſhews which way the waſh from the hill has run, and directs them how to trace the reſt, and where to look for the ſhoad-ſtones with any probability of ſucceſs. They generally examine the banks of rivers, where they have been worn away by land floods, in order to find theſe *grewts*, and then examine, in a ſtraight line with the next hill, though four or five miles off; and if there be any mine there, they generally meet with ſhoad-ſtones, as tokens of it in the way. Phil. Tranſ. N° 69.

GREY. See GRAY.

GREY, in *Ichthyology*, an Engliſh name for a truttaceous fix, the SALMO *eriox* of Linnæus, caught in many of the rivers of England. It is a very large fiſh, often growing to the full ſize of the larger ſalmon, but differing from that ſpecies, in the body being broader, and the head large in proportion; in the jaws are four rows of teeth, and on the tongue are eight teeth; the back and ſides, above the lateral line, are of a deep *grey* colour, ſpotted with a number of purpliſh ſpots, whence its name; the belly is ſilvery; its tail is not forked, and its fleſh is much finer taſted than the ſalmon; and in the places where both are to be had, the *grey* ſells at the larger price. It comes up into the freſh-waters in the month of Auguſt, and is a very ſcarce fiſh.

Mr Pennant believes this to be the *ſewin* or *ſhewin* of South Wales, which is very common in the neighbourhood of Carmarthen. This fiſh appears in the Eſk, in Cumberland, from July to September, and is then in ſpawn. The lower jaw grows hooked, when it is out of ſeaſon. The inhabitants of the north of England and of South Wales conſider this fiſh as a diſtinct ſpecies from the ſalmon.

GREY *fly*. See GAD-*fly*.

GREYHOUND. See HOUND and DOG.

GREYHOUNDS, in *Aſtronomy*. See CANES *venatici*.

GREYLAG *gooſe*. See GOOSE.

GRIAS, in *Botany*, a genus of the *polyandria monogynia* claſs; the characters of which are, that the flower hath four petals; the calyx is divided into four ſegments; and the fruit is a drupe, containing an eight furrowed nucleus.

GRICE, a term uſed by country perſons for a young wild boar.

GRIEF. The influence of this paſſion on the body is very great, ſo as often to deſtroy all appetite and deſire of meat, either by inſpiring men with a diſreliſh for life, or by a mechanical inſtinct; becauſe food taken at ſuch a time makes but bad nouriſhment, fitter to corrupt the blood than prolong life; on which account it is aſſigned as a phyſical cauſe for the FASTING practiſed among the heathens. The influence of this paſſion extends itſelf even to beaſts; which when indiſpoſed, not only take no pains to provide themſelves food, but alſo refuſe it when laid before them. Vid. Mem. Acad. Inſcript. tom. v. p. 50. ſeq. This paſſion has been found to leſſen PERSPIRATION and urine.

GRIELUM, in *Botany*, a genus of the *decandria pentagynia* claſs; the characters of which are, that the calyx is divided into five ſegments; the flower has five petals, and the fruit conſiſts of five monoſpermous pericarpia.

GRIFFON, GRYPHUS, γρυψ, in *Natural Hiſtory*, the name of an imaginary bird of prey, of the eagle kind.

The ancients ſpeak fabulouſly of the *griffon*: they repreſent it with four legs, wings, and a beak; the upper part repreſenting an eagle, and the lower a lion: they ſuppoſe it to watch over gold-mines, hidden treaſures, &c.

The animal was conſecrated to the ſun; and the ancient painters repreſented the chariot of the ſun as drawn by *griffons*. M. Spanheim obſerves the ſame of thoſe of Jupiter and Nemeſis.

The *griffon*, in Scripture, is that ſpecies of the eagle called, in Latin, *oſſifraga*, the *oſprey*; and פרס, of the verb פרס, *paras, to break*.

The *griffon* is frequently ſeen on ancient medals; and is ſtill borne in coat-armour.

Guillim blazons it *rampant*; alledging, that any very fierce animal may be ſo blazoned, as well as the lion. Sylveſter, Morgan, and others, uſe the term *ſegreiant* inſtead of rampant.

This is alſo an ornament of architecture in conſtant uſe among the Greeks, and was copied from them, with the other elegancies of architectural enrichments, by the Romans. See SPHYNX.

GRIG, in *Ichthyology*, a name frequently uſed for the ſand eel, or AMMODYTES.

Theſe are common in the Thames, and are diſtinguiſhed from the common ſort by having a larger head, a blunter noſe, thicker ſkin, and leſs fat; and they are not ſo much eſteemed, and ſeldom exceed three or four pounds in weight.

GRILLADE, in *Cookery*, meat broiled on the gridiron; thus called from the French *griller, to broil.*

The word is alſo uſed for the browning of any diſh, by rubbing a red-hot iron over it. To *grill* oyſters, is to put them into Scollop-ſhells, ſeaſon them with ſalt, pepper, and parſley ſhred, and pour their own liquor to them, covering them with grated bread, ſtewing them half an hour on the fire, and browning them with a red-hot iron. Shrimps are *grilled* after the ſame manner.

GRIND-*ſtone*, *cos gyratilis*, in *Natural Hiſtory*, is a very coarſe, rugged, rough, and harſh ſtone, of a yellowiſh brown colour, compoſed of an irregular grit, cemented together by a coarſe and debaſed terrene cryſtalline matter, and intermixed with a very few glittering ſpangles of white talc: it cuts freely, but bears no poliſh; it is pervaded by water, will not ſtrike fire with ſteel, is not acted upon by acids, and burns to a deep red colour, but acquires no hardneſs. It is chiefly dug in the northern counties of England, and uſed for *grind-ſtones*, whence its name.

GRINDING, *trituration*, the act of breaking or comminuting a ſolid body, and reducing it into powder, duſt, flour, farina, or the like.

Grinding is one of the ſpecies of diſſolution. The painters colours are ground on a marble or porphyry, either with oil or gum-water.

Some late phyſicians contend, that DIGESTION is performed by *grinding* the food in the ſtomach. It is alledged, that every part in the body is a veſſel or veſſels; and all the veſſels have a motion of ſyſtole and diaſtole; all the operations of the body conſiſt in the attrition or *grinding* of the humours or matters contained in ſuch veſſels.

GRINDING is alſo uſed for rubbing or wearing off the irregular or otherwiſe redundant parts of the ſurface of a body, and reducing it to the deſtined figure, whether that be flat, concave, or the like.

The *grinding of glaſſes* is a conſiderable art, and, as ſuch, neceſſarily requires to be here inſiſted on; eſpecially that of optic glaſſes.

Method of GRINDING *optic-glaſſes*. For convex glaſſes, the firſt object is to provide a diſh or baſon, within whoſe vity the glaſs is to be formed.

In order to this, they take a piece of braſs, copper, iron, or wood, and form it into a ſegment of a circle, having the radius of the baſon or the diſh intended: this done, a baſon is forged by a ſmith, either of iron or copper, having its cavity exactly fitting or correſponding to the ſegment above mentioned, though ſometimes they chuſe to have the baſon caſt; in this caſe, the rules elſewhere delivered for concave MIRRORS are to be here obſerved.

The figure of the baſon, thus roughly formed, is to be finiſhed in the pewterers lathe, or on a ſtone mould A, *Tab.* II. *Optics*, *fig.* 22. fixed to an iron axis with a pinion BC, moveable by a wheel DE, and that by a winch or handle F. The baſon being ground on the mould till it exactly fit in all parts, they take it off, and cementing it to a wooden block (loaden, if need be, with lead), ſtrew it over with fine-ſifted ſand, and thus grind it over again on the mould, till all the furrows or ſcratches be quite taken away.

Laſtly, they grind large pieces of glaſs in a baſon, with fine ſand between, till ſuch time as, its ſurface being well ſmoothed, there is no longer any oppoſition to the motion.

Note, the diſh is known to be perfectly finiſhed when, a hair being ſtretched over it, its ſhadow projected in the the cavity, eſpecially in a camera obſcura, does not appear any way diſtorted.

The baſon finiſhed, they proceed to chuſe glaſſes for the purpoſe: in order to this, lay them on clean paper, and obſerve what colours are projected thereon; for the ſame are the colours of the glaſſes. Always ſet aſide thoſe of the darker colours, and chuſe the brighter; but as the whiteſt and brighteſt have uſually veins, and beſides, in tract of time, by the humidity of the air, are apt to ruſt and loſe their poliſh; for this reaſon Huygens recommends thoſe a little yellowiſh, reddiſh, or greeniſh; Hevelius the blueiſh. A glaſs is found to be free from bubbles, ſands, veins, knots, and ſpires, by holding it to the ſun, and receiving the rays through it on a white paper; for the flaws above mentioned will each project a ſhadow thereon.

If, inſtead of lenticular, or at leaſt ſpherical glaſſes, you make uſe of plate-glaſs, it muſt be divided and cut with a diamond into ſquares; and if it be too thick to break otherwiſe, you may do it by laying it on a table covered with cloth, in ſuch manner as that the ſide or part to be ſevered hang over the edge: for, being ſtruck with an iron inſtrument, in this ſituation, it eaſily breaks in the direction of the line drawn by the diamond. Having thus got a ſquare piece, deſcribe two concentric circles thereon with a pair of compaſſes, one of whoſe legs carries a diamond; the diameter of the inner circle to be equal to the breadth of the intended lens, and that of the outer ſomewhat more; and break off the corners, as above directed, and the leſſer inequalities take off on a grind-ſtone, or the like. Examine now whether the piece of glaſs be every-where equally thick; if it be not, reduce it to ſuch equality by *grinding* it on an iron plate with ſand and water. Laſtly, glue or cement the glaſs thus prepared to a wooden handle NMO, *fig.* 23. with a cement made of pitch and a fourth part of reſin, or one part of wax and eleven of colophony: care to be taken that the baſe or bottom of the handle NO be equal to the glaſs, and that the center of the glaſs and handle meet together. Smaller lenſes, as thoſe uſed for microſcopes, are fixed on with ſealing-wax.

Now, to grind the glaſs, and bring it to the convexity required, ſmear over the diſh equally with fine ſifted ſand moiſtened with water; then taking the handle with the glaſs thereon, work it on the baſon, ſometimes this way, and ſometimes that, to prevent the form of the baſon from being diſturbed, never leaning too hard thereon. When the glaſs has got the figure of the baſon, clean it well of all the ſand and filth adhering, and ſprinkle the baſon over with emery moiſtened in water, *grinding* the glaſs thereon till all the roughneſſes and inequalities are taken away: after this, the fine ſand uſed in hour-glaſſes may be of ſervice, applied and uſed as before; remembering to take out the ſand, when too much worn, and ſubſtitute new in its ſtead. Some, in lieu hereof, chuſe ſeveral ſorts of emery, each finer than the other, or even the powder of flint calcined and pounded. Laſtly, grind the ſame glaſs in another baſon or diſh, which is a ſegment of a leſſer ſphere, making uſe of the like ſand as before, till it has got a pretty high rim or margin all around. Becauſe the preſſion is not here determined accurately enough upon the middle of the glaſs, by the mere guidance of the hand, ſome have choſe to make uſe of the following machine, eſpecially for *grinding* object-glaſſes.

Fix the diſh HI, *fig.* 24. on a horizontal table; exactly over its center let the aperture D be, through which paſs an iron arm five or ſix inches long, faſtened to the ſtaff AB: let the other extreme of the ſtaff be fitted into a hole cut in the diſh, and faſtened therein. Now to grind the glaſs, inſtead of the diſh, take hold of the ſaid ſtaff, and work with ſand, &c. as before.

Huygens tells us, that he always uſed firſt a coarſe emery, then a finer powder of the ſame, which would be fifty ſeconds in ſinking to the bottom of a veſſel of water, putting in freſh every half or quarter of an hour: ſometimes, too, he uſed emery of fifty ſeconds, for three quarters of an hour; then emery of four hundred ſeconds, for four fifths of an hour; and laſtly, emery of forty-five minutes, for a quarter of an hour. The ſame effect is had from powder of flints, broken in an iron mortar, mixed with water, and ſtirred ſometimes with a wooden ſpatula, taking the powder as it precipitates in ſome certain time to the bottom of the veſſel, by decanting the water. What remains is to poliſh the glaſs.

For a more particular account of the method of *grinding* and poliſhing glaſſes for teleſcopes, extracted from Mr. Huygens and other authors, by Mr. Molyneux, and comprehending the method of making and poliſhing the tools, of chuſing the glaſs, of preparing the glaſſes before they can be ground and poliſhed, of *grinding* the glaſſes, and of giving them the laſt and fineſt poliſh, we muſt refer to Smith's Optics, book iii. chap. i. paſſim.

The late ingenious Mr. James Short, in a paper left with the Royal Society, to be opened and printed after his death, gives the following directions for working object-glaſſes of refracting teleſcopes truly ſpherical.

Prepare two plates or tools of braſs, the one convex, and the other concave, being both portions of a ſphere of the ſame radius as the focal length of the object-glaſs you want to have, or rather of a radius ſomewhat longer than the focal length you want, for a dioptrical reaſon; let theſe plates or tools be between two and three times the breadth of the object-glaſs deſired; or, in long focal lengths, twice the breadth will be ſufficient: let theſe tools be of a ſufficient thickneſs in proportion to their breadth or diameter, and let them be ground with fine emery exactly true to one another, working them alternately, the one above the other, to preſerve the ſame focal length; or, if it is deſired longer, you muſt work the convex above the concave; or, if deſired ſhorter, you muſt grind the concave above the convex.

After this, you prepare another braſs plate or tool, of the ſame breadth and thickneſs as the two former, and of the ſame radius of concavity: its being truly turned on a lathe will be ſufficient for this purpoſe; which tool is to ſerve afterwards for the poliſhing of the two ſurfaces of your object-glaſs, and therefore called the poliſhing tool.

Prepare a piece of ſtraw-coloured glaſs, of the plate-glaſs kind, of the proper diameter for the object-glaſs you deſire, which ought always to be broader than the proper aperture for that length; let this piece of glaſs be ground flat, in another tool, on both ſides, and as nearly parallel as may be, and ſomewhat poliſhed, in order to diſcover whether there are any veins or flaws in the glaſs.

When you are ſatisfied of the goodneſs of the glaſs, you are then to prepare a handle to faſten your glaſs to. Great care muſt be taken in this, for fear of bending your glaſs by the handle; Mr. Short adviſes to take a flat piece of braſs, or rather of the concavity of the ſphere, to which the glaſs is to be ground; this piece of braſs ſhould not be thicker than two thirds of the thickneſs of the glaſs, of a circular form, leſs in breadth ſomewhat than the glaſs itſelf, and having ſides of the ſame form, at right angles to the flat piece of braſs, and theſe ſides ought to be of ſuch a ſhape as that the fingers may eaſily apply to it in working, and theſe ſides ſhould be as low as may conveniently be, and no thicker than about two thirds of the glaſs. This handle is to be faſtened to the glaſs, by warming the glaſs and handle gently before a fire, and laying ſome pitch upon the glaſs thus warmed, till it becomes ſoft like melted wax; and then laying your braſs handle, a little heated, on the pitch, you preſs it a little, till you are ſure there is nothing between the glaſs and the handle but pitch; you then lay down the glaſs and handle upon ſomething flat, taking care that the handle is in the middle of the glaſs, till it is entirely cold. It is very material to know, that the pitch, to be uſed for faſtening the handle to the glaſs, muſt be ſoft pitch, that has never been uſed nor melted; for any other pitch will infallibly bend the glaſs.

You then grind your glaſs in the concave tool with emery, and give it the proper figure and ſmoothing for the laſt poliſh, in the common manner.

In order to give your glaſs the laſt poliſh, which is the moſt difficult part of the whole work, you are to prepare ſome pitch for covering the before mentioned poliſhing concave tool, which is done in this manner: take ſome pitch, and melt it in an iron ladle, and let it boil for a quarter of an hour or thereabouts; by this boiling, the pitch, when cold, will become hard and brittle: or you may ſhorten this operation, by melting equal quantities of pitch and roſin, and then there is no occaſion to let it boil ſo long. Your pitch being thus prepared, you again melt it, and take it off the fire, and let it ſtand till the pitch becomes pretty cold, or of a thickiſh conſiſtence; and having warmed the poliſhing tool a little, to make the pitch ſtick to it, you pour out of the ladle upon the poliſhing tool as much pitch as you judge will cover the whole tool, when ſpread out, to about the thickneſs of one eighth of an inch; you then invert this tool with the pitch upon it, and preſs it upon the convex tool, which muſt be quite dry, clean, and cold, in order to give it the figure of the convex tool: in caſe it has not ſpread out ſo as to cover the whole ſurface of the poliſhing tool, you may warm the pitch by holding it before the fire, and preſſing it upon the convex tool, as before, till it has entirely covered the ſurface of the poliſhing tool; you then plunge it into cold water, till the braſs is quite cold.

N. B. In order to know if your pitch is hard enough, you preſs the edge of the nail of your thumb upon it, and if it receives an impreſſion, the pitch is not hard enough.

You then proceed to prepare this poliſhing tool, for the laſt poliſh of your glaſs, by grinding this poliſhing tool upon the convex tool with pretty coarſe emery, and a ſmall quantity of water, in the common way that tools are ground one upon another; but this muſt be done only for a ſmall ſpace of time, and the poliſhing tool muſt have no other preſſure than its own weight, for fear of ſome of the emery ſticking in the pitch, and you muſt never allow the emery to grow dry: when you have ground the pitch ſo as to be all over of the ſame colour, you then waſh the pitch from all the emery with a bruſh and clean water; after this you take a bottle of water, and holding the pitch tool in a ſloping poſition, you pour water out of the bottle ſo as to fall upon every part of its ſurface.

You then place the poliſhing tool in a horizontal poſition, and you put upon it ſome putty, waſhed from all its gritty particles, but it need not be the fineſt waſhed, and you put a good deal of water upon your poliſhing tool, mixing the putty and it together, and you poliſh your glaſs upon this pitch-poliſher in the common manner of poliſhing glaſſes.

After you have poliſhed your glaſs about ten minutes, you again grind your poliſher upon the convex tool with emery, as before, for fear the pitch has, by working, loſt any of its proper figure; and the oftener you do this, the truer will be the figure of your glaſs; and in this manner you proceed till the glaſs is quite poliſhed.

You then take your glaſs off its handle, by holding it before the fire, till it is ſo warm that you can ſlide the handle off the glaſs; and whilſt the glaſs is warm, you take off as much of the pitch as you can with the ſharp edge of a knife; you then lay the glaſs down to cool, and, when quite cold, you drop ſome ſpirits of wine upon it; and this, with a cloth, will wipe off the reſt of the pitch.

You then examine the center of the ſurfaces of your glaſs; and if it lies to one ſide of the center of your glaſs, mark that place with a ſpot of ink, and then put on your handle as before, upon the ſide that is now poliſhed, with its center over the ſpot of ink, and grind your glaſs as before, till the circular remaining part of the glaſs to be ground is as much diſtant from the center of the glaſs on the other ſide from the ſpot as the ſpot was from the center of your glaſs; you then by heat return your handle to the center of the glaſs, and proceed to grind and poliſh this ſide of the glaſs as before.

N. B. The concave and convex tools ſhould be ground with fine emery, after you have done one ſide of your glaſs; for the oftener theſe are ground together, you will be the more ſure of having your figure true. Phil. Tranſ. vol. lviii. p. 507, &c.

Method of GRINDING, *&c. the ſpecula of reflecting teleſcopes.* The method generally followed by workmen is that propoſed by Meſſrs. Molyneux and Hadley, and publiſhed in Dr. Smith's Optics: this has been lately improved in a very conſiderable degree by Mr. Mudge, whoſe directions, founded on accurate experiments, and practiſed with ſucceſs in the conſtruction of teleſcopes, we ſhall adopt wherever they differ from thoſe that occur in the book juſt cited. For making the gages, take a long pole of fir, deal, or any wood, of a little more than double the length of the inſtrument intended, and ſtrike through each end of it two ſmall ſteel points, and by one of them hang it up perpendicularly againſt a wall; then take two pieces of thin plate braſs well hammered, a little thicker than a ſixpence, which may be about an inch and a half broad, and let their length be in proportion to the diameter of the ſpeculum as three to two; ſo that if the ſpeculum be eight inches diameter, theſe may be about twelve. Fix each of theſe ſtrongly with rivets between two thin pieces of wainſcot, ſo that a little more than a quarter of an inch in the breadth may ſtand out from between the boards. Then fix up theſe pieces horizontally againſt the wall under your pole, and therewith, as with a beam-compaſs, ſtrike an arch upon each of them; then file each of them with a ſmooth file to the arch ſtruck, ſo as one may be a convex and the other a concave arch of the ſame circle. Theſe braſſes are the gages to keep the ſpeculum, and the tools on which it is ground, always to the ſame ſphere: and that they may be, therefore, perfectly true to each other, it is neceſſary to grind them with fine emery one againſt the other, laying them on a flat table for that purpoſe, and fixing one of them to the table. When the gages are perfectly true, let a piece of wood be turned about two tenths of an inch broader than the intended ſpeculum, which it is beſt to caſt in no caſe leſs than two tenths of an inch thick; and for ſpecula of ſix, eight, or ten inches broad, this ſhould be at leaſt three or four tenths thick when finiſhed. This board being turned, take ſome common pewter, and mix with it about one tenth of regulus of antimony, and with that wooden pattern, caſt one of this pewter, which will be conſiderably harder than common pewter. Let this pewter pattern be truly turned in a lathe, and examined by means of the gages before mentioned, as a pattern for caſting the ſpecula themſelves; and take care when it is turned, that it be at leaſt one twentieth of an inch thicker, and about one tenth of an inch broader than the ſpeculum intended to be caſt from it. The manner of makin the moulds for caſting is now to be explained, and will ſerve for a direction as well for caſting this pewter pattern, as afterwards for caſting thereby the ſpeculum itſelf. The flaſks ſhould be of iron, and at leaſt two inches wider every way than the ſpeculum intended. In each flaſk there ſhould be the thickneſs at leaſt of one inch of ſand. The caſting ſand which the common founders uſe will anſwer the purpoſe as well as any; and any ſand will do which is naturally mixed with a ſmall proportion of clay, to make it ſtick. The ſand ſhould be as little wet as may be, and well beaten, but not too hard. The ingates ſhould be cut ſo as to let the metal flow in, in four or five ſtreams, over the whole upper part of the mould; otherwiſe, whatever pores happen in the metal will not be ſo equally diſperſed as they ſhould be over the whole face of the metal, theſe pores generally falling near the ingate ſtreams. Let the flaſks dry in the ſun for ſome hours, or near a very gentle fire, otherwiſe they will warp, and give the ſpeculum, when caſt, a wrong figure: for, beſides ſaving the trouble in *grinding*, it is beſt, on many accounts, to have the ſpeculum caſt of a true figure; and for this reaſon it is beſt to caſt it from a hard pewter pattern, and not from a wooden one, as founders uſually caſt.

For the compoſition of the metal and manner of caſting it, ſee SPECULUM. When the metal is caſt, the next buſineſs is to grind and poliſh it, for which, ſays Mr. Mudge, four tools are all that are neceſſary, viz. 1. The rough grinder, for working off the rough face of the metal: this is beſt made of lead, ſtiffened with about a fifth or ſixth part of tin; it ſhould be at leaſt a third more in diameter than the metal which is to be ground, and for one of any ſize, not leſs than an inch thick. It may be cemented on a block of wood, in order to raiſe it higher from the bench.

This leaden tool being caſt, muſt be fixed in the lathe, and turned as true as poſſible by the gage to the figure of the intended ſpeculum, making a hole in the middle, as a lodgment for the emery, of about an inch diameter for a metal of four inches: when this is done, deep grooves muſt be cut acroſs its ſurface with a graver, in the manner repreſented in *Tab.* II. *Optics*, *fig.* 25. theſe grooves will ſerve to lodge the emery, and by their means the tool will cut much faſter. Any kind of low handle, fixed on the back of the metal with ſoft cement, will be ſufficient; but it ſhould cover two thirds of its back to prevent its bending.

2. The next tool is the convex braſs-grinder, on which the metal is to receive its ſpherical figure. In order to form this tool, procure a round ſtout piece of Hamburgh braſs, at moſt a ſixth part larger than the metal to be poliſhed; and let it be well hammered into a degree of convexity, by the aſſiſtance of the gage, ſuitable to the intended ſpeculum: then ſcrape and clean the concave ſide ſo thoroughly, that it may be well tinned all over; then caſt upon it, after it has been preſſed a proper depth into the ſand, the former compoſition of tin and lead in ſuch a quantity, that it may, for a ſpeculum of four

inches diameter, be at leaſt an inch and a half thick, and with a baſe conſiderably broader than the top, in order that it may ſtand firmly upon the bench in the manner hereafter to be deſcribed. This being done, it muſt be fixed and turned in the lathe with great care, and of ſuch a convexity as exactly to ſuit the concave gage. This tool muſt have a hole, ſomewhat leſs than that in the metal to be worked upon it, in the middle, quite through to the bottom. When it is finiſhed off in the lathe, its diameter ſhould be one eighth wider than the metal.

The 3d tool is the bed of hones, the uſe of which is to perfect the ſpherical figure, and to give the metal a fine ſmooth face. See *Bed of* HONES.

The 4th and laſt tool is the bruiſer, with which both the braſs grinder and the hones are to be formed: this tool ſhould be made of thick ſtout braſs, perfectly ſound, about a quarter of an inch thick, and hammered as near to the gage as poſſible; it ſhould be then ſcraped, cleaned, and tinned on the convex ſide, as the ſecond tool was on the concave, and the ſame thickneſs of lead and tin caſt upon it. This ſhould be as broad at bottom as at top; and when it is fixed in the lathe, and turned off concave to the convex gage with accuracy, the diameter ought to be of a middle ſize between the hones and the poliſher or braſs grinder, which is uſed for this purpoſe.

Having with the lathe roughly formed the convex braſs grinder, the bed of hones, and the concave bruiſer, the convex and concave braſs tools and the metal muſt be wrought alternately and reciprocally upon each other with fine emery and water, ſo as to keep them to the ſame figure as nearly as poſſible, in order to which ſome waſhed emery muſt be procured, by putting it into a bottle, half filling the bottle with water, and ſhaking the mixture; ſo that the coarſeſt of the emery will ſubſide to the bottom firſt, and the fineſt remain at the top: when freſh emery is laid on the tools, it is beſt done by gently ſhaking the bottle, and pouring out a ſmall quantity of the turbid mixture. The next operation is to grind the braſs convex tool with the bruiſer upon it, which is continued for about a quarter of an hour, and then the convex tool is wrought upon the bruiſer in the ſame manner. When theſe have been wrought on each other, occaſionally adding freſh emery, till the veſtiges of the turning tool are got out and both brought nearly to a figure, the ſame form muſt be given to the metal, by grinding it upon the braſs tool with the ſame kind of emery; taking care, however, by working the two former tools frequently together, to keep all three exactly in the ſame curve. The beſt kind of handle for the metal is made of lead, a little more than double its thickneſs, and ſomewhat leſs in diameter, of about three pounds weight, with a hole in the middle a little larger than that in the metal: the handle ſhould be cemented on with pitch. The upper edge of this weight muſt be rounded off, that the fingers may not be hurt, and a groove, about the ſize of the little finger, be turned round juſt below it, for the more conveniently holding and taking the metal off the tools. When the bruiſer, braſs tool, and metal, are all brought to the ſame figure, and have a good ſurface, the next part of the proceſs is to give a correct ſpherical figure and a fine face to the metal, upon the hones: theſe, however, ſhould be covered with water for at leaſt an hour before they are uſed, otherwiſe they will be liable to alter their figure; and they muſt be never ſuffered to grow dry whilſt they are in uſe, for the ſame reaſon.

In order to give a proper figure to the hones, correſponding to that of the braſs tool, bruiſer, and metal, when they are fixed down to the block, ſome common flour emery, unwaſhed, with a good deal of water, muſt be put upon them, and the bruiſer being placed upon the hones, and rubbed over them with a few ſtrokes and a light hand, the inequalities of the ſtone will be ſoon worn off, the mud that is generated being waſhed away, every quarter of a minute, with a great deal of water. As ſoon as the hones have received the general figure of the bruiſer, and all the turning ſtrokes are worn out from them, the emery muſt be carefully waſhed off, and cleared from the joints with a bruſh under a ſtream of water. The bruiſer and metal muſt be likewiſe cleared in the ſame manner. The hones being fixed down to the block, the bruiſer muſt be worked upon them with very cautious, regular, ſhort ſtrokes, forward and backward, to the right and left, turning the axis of the bruiſer in the hand while you move round the hones, by ſhifting your poſition, and walking round the block. The manner of conducting this operation is minutely deſcribed by Mr. Mudge. The metal may then be rubbed upon the hones in the ſame cautious manner, occaſionally rubbing the bruiſer upon the hones, in order to ſharpen them. When in this way the hone-pavement has given a fine face and true figure to the metal, you may proceed to try the metal and judge of its figure, by waſhing the hone-pavement quite clean; then putting the metal upon the center of it, and giving two or three light ſtrokes round and round only, without carrying the edges of the metal much over the hones; this will take out the order of ſtrait ſtrokes: then having again waſhed the hones, and placed the ſpeculum upon their center, with gentle preſſure, ſlide it towards you till its edge be brought a little over that of the hones; then carry it quite acroſs the diameter as far as the other ſide, and having given the metal a light ſtroke or two in this direction, take it off the tool. The metal being wiped quite dry, place it upon a table at a little diſtance from a window; ſtand as near the window, at ſome diſtance from the metal, and looking obliquely on its ſurface, turn it round its axis, and you will ſee at every half turn the grain given by the laſt croſs ſtrokes flaſh upon your eye at once over the whole face of the metal. This is a certain proof of a true ſpherical figure.

The laſt operation is that of poliſhing the ſpeculum, and this is the moſt difficult and eſſential part of the whole proceſs. Mr. Mudge, having made ſome ſtrictures on the method of Meſſrs. Hadley and Molyneux, generally followed, deſcribes at large that which he has diſcovered, after a number of trials, both of giving a correct parabolic figure and an exquiſite poliſh at the ſame time. Availing himſelf of the manner of poliſhing with pitch, practiſed by Sir Iſaac Newton, and mentioned in his Optics, he formed his poliſher by coating the braſs convex tool equally with pitch, which ſhould be neither very hard and reſinous nor too ſoft, about the thickneſs of a ſhilling, and by applying the bruiſer to it, gave the pitch upon the poliſher a fine ſurface and the true form of the bruiſer. He then divided the leaden weight upon the back of the metal into eight parts, by ſtrokes on the ſurface of the lead, which are marked with the numbers 1, 2, 3, 4, &c. in order to diſtinguiſh and regulate the turns of the metal. He alſo put half an ounce of putty into an ounce phial, and filled it two thirds with water; and having ſhaken the whole, let the putty ſubſide, and ſtopped the bottle with a cork: the other appendages of his apparatus are a ſmall-ſized camel's hair bruſh in a tea-cup with a little water, a piece of dry clean ſoap in a galley-pot, and a ſoft piece of ſponge. Theſe, as well as the metal, bruiſer, and poliſher, ſhould be conſtantly covered from duſt.

The poliſher being fixed down, is bruſhed over with the camel's hair bruſh, after it has been wetted and rubbed a little over the ſoap; then the bruiſer is worked lightly upon it, till it has acquired a good face and is fit for the metal. Then, having ſhaken up the putty in the phial, and touched the poliſher in five or ſix places with the cork wetted with that and the water, the bruiſer is placed upon the tool, and a few ſtrokes given to it upon the putty, in order to rub down any gritty particles: after which, having removed it, the metal is worked lightly upon the poliſher round and round, carrying the edges of the ſpeculum, however, not quite half an inch over the edge of the tool, and now and then with a croſs ſtroke. The putty is repeatedly applied in the ſame manner, and wrought into the pitch in the courſe of the operation; and if the bruiſer be apt to ſtick, and does not ſlide ſmoothly upon the pitch, the ſurface of either tool may be occaſionally bruſhed over with the ſoap and water. After ſome continuance of this proceſs, the pitch is well defended by the coating of the putty, and the metal, preſſed only by its own weight and that of the handle, and occaſionally moiſtened, moves over it with a more uniform and regular friction. When the poliſh of the metal nearly reaches the edge, the round ſtrokes muſt be gradually altered for the ſhort and ſtrait ones. When this has been done for ſome time, in the manner minutely deſcribed by Mr. Mudge, the metal will begin to move ſtiffly as the friction increaſes, and the ſpeculum poliſhes very beautifully and ſpeedily, and the whole ſurface of the poliſhing tool will be equally covered over with a fine metallic bronze. As the metal wears much, its ſurface muſt be now and then cleaned, with a piece of ſhammy leather, and the poliſher likewiſe with a ſoft piece of wet ſponge. You will now be able to judge of the perfect ſpherical figure of the metal and tool, when there is a perfect correſpondence between the ſurfaces, by the fine equable feel there is in working, which is totally free from all jerks and inequalities. Having proceeded thus far, you may put the laſt finiſhing to this figure of the metal by bold croſs ſtrokes, only three or four in the direction of each of the eight diameters, turning the metal at the ſame time: this muſt be done quickly; for, if the tool be ſuffered to grow quite dry, you will never be able, with all your force, to ſeparate that and the metal, without deſtroying the poliſher by heat. The metal will now have a beautiful poliſh and a true ſpherical figure, but will by no means make a ſharp diſtinct image in the teleſcope; for the ſpeculum will not be found to make parallel rays converge without great aberration; and, indeed, the deviation will be ſo great, as to be very ſenſibly perceived by a great indiſtinctneſs in the image.

Suppoſing then the metal to be now truly ſpherical, ſtop the hole in the poliſher, by forcing a cork into it underneath, about an inch, ſo that it do not reach quite to the ſurface; and having waſhed off any mud that may be on the ſurface of the tool with a wet ſoft piece of ſponge, whilſt the ſurface of it is a little moiſt, place the center of the metal upon the middle of the poliſher; then having, with the wet bruſh, lodged as much water round the edge of the metal as the projecting edge will hold, fill the hole of the metal and its handle with water, to prevent the evaporation of the moiſture, and the conſequent adheſion between the ſpeculum and poliſher, and let the whole reſt in this ſtate for two or three hours: this will produce an intimate contact between the two, and by parting with any degree of warmth they may have acquired by the nearneſs of the operator, they will become perfectly cold together. By this time you may puſh out the cork from the poliſher to diſcharge the water, and give the metal the parabolic figure, in the following manner: move the metal gently and ſlowly at firſt, a very little round the center of the poliſher, then increaſing by degrees the diameter of theſe ſtrokes, and turning the metal frequently round its axis, give it a larger circular motion, without any preſſure but its own weight: this manner of working may ſafely be continued about two minutes, moving yourſelf as uſual round the block, and carrying the round ſtrokes, in their increaſed and largeſt ſtate, not more than will move the edge of the metal half an inch or five eighths over the tool. The ſpeculum muſt not all this while be taken off from the poliſher, and conſequently no freſh putty can be added. It will not be ſafe to continue this motion longer than the time above mentioned; for if the parabolic tendency be carried in the leaſt too far, it will be impoſſible to recover a true figure of that kind, but by going through the whole proceſs for the ſpherical one in the manner before deſcribed, by the croſs ſtrokes upon the poliſher, which takes a great deal of time.

In order to try the true figure of the ſpeculum, place it in the teleſcope for which it is intended, and uſe the inſtrument as a kind of microſcope, moving the object to ſuch a diſtance that the rays may be nearly parallel. At about twenty yards a watch-paper, or ſome ſuch object, on which there are ſome very fine hair-ſtrokes of a graver, is fixed up. The lead muſt be taken off from the ſpeculum, the ſpeculum placed in the cell of the tube, and the inſtrument directed to the object; make an annular kind of diaphragm with card-paper, ſo as to cover a circular portion of the middle part of the metal between the hole and the circumference, equal in breadth to about an eighth part of the diameter of the ſpeculum: this paper ring ſhould be fixed in the mouth of the teleſcope, and remain ſo during the whole experiment, for the part of the metal covered by it is ſuppoſed to be perfect, and therefore unemployed.

There muſt likewiſe be two other circular pieces of card-paper cut out, of ſuch ſizes, that one may cover the center of the metal by completely filling the hole in the laſt deſcribed annular piece; and the other, ſuch a round piece as ſhall exactly fit into the tube, and ſo broad as that the inner edge may juſt touch the outward circumference of the middle annular piece. It would be convenient to have theſe two laſt pieces ſo fixed to an axis, that they may be put in their places, or removed from thence ſo eaſily as not to diſplace or ſhake the inſtrument. All theſe pieces therefore together will completely ſhut up the mouth of the teleſcope.

Let the round piece which covers the center of the metal, or that which has no hole in it, be removed; and, by a nice adjuſtment of the ſcrew, let the image (which is now formed by the center of the mirror) be made as ſharp and diſtinct as poſſible. This being done, every thing elſe remaining at reſt, replace the central piece, and remove the outſide annular one, by which means the circumference only of the ſpeculum will be expoſed, and the image now formed will be from the rays reflected from the outſide of the metal. If there be no occaſion to move the ſcrew and little metal, and the two images formed by theſe two portions of the metal be perfectly ſharp and equally diſtinct, the ſpeculum is perfect, and of the true parabolic curve; or at leaſt the errors of the great and little ſpeculum, if there be any, are corrected by each other.

If, on the contrary, under the laſt circumſtance, the image from the outſide of the metal ſhould not be diſtinct, and it ſhould become neceſſary, in order to make it ſo, that the little ſpeculum be brought nearer, it is plain that the metal is not yet brought to the parabolic figure; but if, on the other hand, in order to procure diſtinctneſs, you be obliged to move the little ſpeculum farther off, then the figure of the great ſpeculum has been carried beyond the parabolic, and hath aſſumed an hyperbolic form. When the latter is the caſe, the circular figure of the metal muſt be recovered (after having fixed on the handle with ſoft pitch) by bold croſs ſtrokes upon the poliſher, finiſhing it again in the manner above deſcribed. If the ſpeculum be not yet brought to the parabolic form, it muſt cautiouſly have a few more round ſtrokes upon the poliſher; indeed a very few of them, in the manner before deſcribed, make in effect a greater difference in the ſpeculum than would be at firſt imagined. If a metal of a true ſpherical figure were to be tried in the above mentioned manner in the teleſcope (which Mr. Mudge has frequently done) the difference of the foci of the two ſegments of the metal would be ſo conſiderable, as to require two or three turns of the ſcrew to adjuſt them; ſo very great is the aberration of a ſpherical figure of the ſpeculum, and ſo improper to procure that ſharpneſs and preciſion ſo neceſſary to a good reflecting teleſcope.

Suppoſing that the two foci of the different parts of the metal perfectly coincide, and that, by the union of them when the apertures are removed, the teleſcope ſhews the objects very ſharp and diſtinct, you are not however then to conclude that the inſtrument is not capable of farther improvement; for you will perceive a ſenſible difference in the ſharpneſs of the image, under different poſitions of the great ſpeculum with reſpect to the little one, by turning round the great metal in its cell, and oppoſing different parts of it to different parts of the little metal, correcting by this means the error of one by the other. This attempt ſhould be perſevered in for ſome time, turning round the great ſpeculum about one ſixteenth at a time, and carefully obſerving the moſt diſtinct ſituation each time the eye-piece is ſcrewed on: when, by trying and turning the great metal all round, the diſtinct poſition is diſcovered, the upper part of the metal ſhould be marked with a black ſtroke, in order that it may always be lodged in the cell in the ſame poſition. This is the method Mr. Short always uſed; and the caution is of ſo much conſequence, that he thought it neceſſary to mention it very particularly in his printed directions for the uſe of the inſtrument.

And farther, Mr. Short frequently corrected the errors of the great by the little metal in another way. If the great ſpeculum did not anſwer quite well in the teleſcope, he cured that defect ſometimes by trying the effect of ſeveral metals ſucceſſively, by this means correcting the errors of one by the other.

The apparatus above deſcribed for examining the parabolic figure of the ſpeculum, is repreſented in *Tab.* II. *Optics*, *fig.* 26. AA is the mouth of the teleſcope, or edge of the great tube: BB is a thin piece of wood faſtened into and fluſh with the end of the tube, to which is permanently fixed the annular piece of paſteboard *cc*, intended to cover and to prevent the action of the correſponding part of the ſpeculum. D is another piece of paſteboard, fixed by a pin to the piece of wood BB, on which it turns as on a center; ſo that the great annular opening HH may be ſhut up by the ring FF, or the aperture GG by the imperforate piece E, in ſuch manner that, in the firſt inſtance, the reflection may be from the center, and in the latter, from the circumference of the great ſpeculum.

Mr. Mudge has remarked, that the operation of poliſhing will not proceed well in the heat of ſummer or the cold of winter; and that neither this, nor the other of *grinding* upon the hones, will go on ſo well, unleſs they be continued uninterruptedly from beginning to end. In the above account it has been ſuppoſed, that the metal to be wrought was about four inches diameter; if it be either larger or ſmaller, the ſizes of the hones, bruiſer, and poliſher, muſt be proportionably different.

The proceſs for poliſhing the little ſpeculum of a teleſcope muſt be conducted in the manner already deſcribed for that of the large one; only obſerving, that as the little metal has an uninterrupted face, without a hole, ſo there is no occaſion for one in the poliſher: and likewiſe that, as a ſpherical figure is the only object in this caſe to be attempted, the difficulty of execution is much leſs than in the former. As it is always neceſſary to ſolder to the back of the little ſpeculum a piece of braſs, as a fixture for the ſcrew to adjuſt its axis, Mr. Mudge has communicated a neat and ſafe method of doing it, which he received from the late Mr. Jackſon, and which may be very uſeful to the optical or mathematical inſtrument-maker upon other occaſions. Having cleaned the parts to be ſoldered very well, cut out a piece of tin-foil the exact ſize of them; then dip a feather into a pretty ſtrong ſolution of ſal ammoniac in water, and rub it over the ſurfaces to be ſoldered; after which place the tin-foil between them as faſt as you can (for the air will quickly corrode their ſurfaces ſo as to prevent the ſolder taking), and give the whole a gradual and ſufficient heat to melt the tin. If the joints to be ſoldered have been made very flat, they will not be thicker than a hair: though the ſurfaces be ever ſo extenſive, the ſoldering may be conducted in the ſame manner, only that care muſt be taken, by general preſſure, to keep them cloſe together. In this manner, for inſtance, a ſilver graduated plate may be ſoldered on to the braſs limb of a quadrant, ſo as not to be diſcernible by any thing but the different colour of the metals.

We ſhall cloſe this article with obſerving, that a method of giving the parabolic figure to his great ſpeculum was a point of perfection which Gregory and Newton had wiſhed for, but deſpaired of attaining, and which Hadley does not appear to have attempted either in his Newtonian or Gregorian teleſcope. Mr. Short is ſaid to have poſſeſſed the ſecret; however it died with that ingenious artiſt. The method diſcovered by Mr. Mudge, above recited, is, as he has ſtrong reaſons to believe, the ſame with that of Mr. Short. See farther on this ſubject Smith's Optics, book iii. chap. ii. and Mr. Mudge's excellent paper in the Phil. Tranſ. vol. lxvii. part i. art. 16. p. 296—348. See Teleſcope.

Grinding is alſo uſed for a coarſer and leſs accurate method of ſmoothing or poliſhing the ſurface of a body, particularly glaſs for looking-glaſſes, &c.

In the new method of working large plates of glaſs for looking-glaſſes, coach-glaſſes, &c. by moulding, and, as it were, caſting them, ſomewhat after the manner of metals, deſcribed under the article Glass, the ſurface being left uneven, it remains to be ground and poliſhed. In order to this, the plate of glaſs is laid horizontally on a ſtone in manner of a table, and to ſecure it the better, plaiſtered down with mortar or ſtucco, that the effort of the workman, or of the machine uſed therein, may not ſhake or diſplace it: to ſuſtain it, there is a ſtrong wooden frame that ſurrounds it an inch or two higher than the glaſs: the bottom or baſe of the *grinding* engine is another rough glaſs, about half the dimenſions of the former; on this is a wooden plank, cemented thereto; and upon this are proper weights applied, to promote the triture, the plank or table being faſtened to a wheel, which gives it motion. This wheel, which is at leaſt five or ſix inches diameter, is made of a very hard but light wood, and is wrought by two workmen placed againſt each other, who puſh and pull it alternately; and ſometimes, when the work requires it, they turn it round. By ſuch means, a conſtant mutual attrition is produced between the two glaſſes, which is favoured by water and ſands of ſeveral kinds beſtowed between; ſand ſtill finer and finer being applied, as the *grinding* is more advanced: at laſt emery is uſed. We need not add, that as the upper or incumbent glaſs poliſhes and grows ſmoother, it muſt be ſhifted from time to time, and others put in its place.

It is to be noted, that only the largeſt ſize glaſſes are thus ground with a mill; for the middling and ſmaller ſorts are wrought by the hand; to which end there are four wooden handles at the four corners of the upper ſtone or carriage, for the workmen to take hold of, and give it motion. What remains to the perfection of glaſs, comes under the denomination of poliſhing.

GRINDERS, *molares dentes*. See Molares.

GRINETTA, in *Ornithology*, the name of a water fowl of the gallinula or moor-hen kind, having open feet, and no membranes annexed to them. This is the rallus *porzana* in the Linnæan ſyſtem. It is ſmaller than the moor-hen and the water-rail. Its legs are of a duſky greeniſh colour, and its toes very long; its beak very ſhort, compreſſed ſideways, and pointed at the end, and is covered at the origin with a deep yellow ſubſtance, looking like a plaſter put on it. The head is brown, ſpotted with black; the neck a deep olive, ſpotted with white; from the bill, beyond the eyes, is a broad grey bar; the feathers of the back are black next their ſhafts, then olive-coloured and edged with white; the ſcapulars are olive, finely marked with two ſmall white ſpots on each web. It is common in Italy and Germany, but not ſo frequent in England, where it is ſaid to be migratory. It inhabits the ſides of ſmall ſtreams, concealing itſelf among the buſhes. Its uſual weight is about four ounces five drams.

GRIP, or **Gripe**, in *Huſbandry*, is a ſmall ditch cut acroſs a meadow or ploughed land, in order to drain it. It alſo ſignifies a handful; as, a *gripe* of corn.

GRIPE, in *Mechanics*. See Crane.

Gripe *of a ſhip*, is the compaſs or ſharpneſs of her ſtem under water, chiefly towards the bottom of her ſtem.

The deſign of ſhaping her ſo is, to make her *gripe* the more, or keep a good wind; for which purpoſe, ſometimes a falſe ſtem is put on upon the true one.

Gripe is alſo a ſea-phraſe for a ſhip's being apt to run too much to windward of her courſe, particularly when ſhe ſails with the wind on her beam or quarter: this effect is partly occaſioned by the ſhock of the waves that ſtrike the ſhip perpetually on the weather-quarter, and force the ſtern to leeward; but principally by the arrangement of the ſails, which diſpoſes the ſhip continually to edge to windward, while in this ſituation of ſailing: in ſuch caſe they ſay ſhe *gripes*.

GRIPES, *tormina ventris*, in *Medicine*, a ſort of colic, or painful diſorder of the lower belly, occaſioned by ſome ſharp pungent matters vellicating the parts, or by wind pent up in the inteſtines. See Colic and Dysentery.

The *gripes* are a very common ſymptom in young children, and may be cauſed by the aliment they uſe, which is conſiderably different from what they had been accuſtomed to in the uterus.

The retention of a part of the meconium may alſo give occaſion hereto, as being ſomewhat acrimonious.

This diſorder ſometimes proves ſo violent, as to throw the child into univerſal convulſions, or to cauſe, what is vulgarly called *convulſions of the bowels*.

Gripes, or **Colic**, in *Farriery*, is an acute diſeaſe, to which horſes are very often ſubject. There are three different ſpecies of this diſorder, viz. the flatulent or windy, the bilious or inflammatory, and the dry *gripes*. The firſt is known by the horſe's alternately and ſuddenly lying down and riſing; by his ſtriking his belly with his fore feet, ſtamping with his fore feet, and refuſing his meat; and when the *gripes* are violent, by convulſive twitches, turning up his eyes, ſtretching out his limbs, and alternate ſweats and cold damps; ſtriving to ſtale, turning his head frequently to his flanks, rolling about, and often turning on his back. The confined wind may be diſcharged by emptying the ſtrait gut with a ſmall hand dipt in oil, and thus the neck of the bladder is eaſed of its load, and the horſe ſtales. It is always proper to bleed young and plethoric horſes in the neck-vein. The following ball and clyſter ſeldom fail of giving relief: take Straſburgh or Venice turpentine, and pounded juniper berries, of each half an ounce; ſal prunella, or ſaltpetre, an ounce; oil of juniper one dram; ſalt of tartar two drams; make theſe ingredients into a ball with any ſyrup; and give it whole, waſhing it down with a decoction of juniper-berries, or a horn or two of ale. If this ball does not ſucceed, and make the horſe break wind and ſtale plentifully, in an hour or two give him another ball, and add to it a dram of ſalt of amber; and this may be repeated a third time, if neceſſary: during the fit, let the horſe have gentle exerciſe. Let the following clyſter be given between the balls, or alone, and repeated occaſionally: take chamomile flowers two handfuls; aniſe, coriander, and fennel ſeeds, of each an ounce; long pepper half an ounce; boil them in three quarts of water to two; and add Daffy's elixir, or gin, half a pint; oil of amber, half an ounce, and oil of chamomile eight ounces. The horſe ſhould be well rubbed, cloathed, and littered with clean ſtraw up to his belly: and a pint of brandy, rum, or geneva, with as much ſweet oil, may be given for a drink; and if this ſhould not ſucceed, boil an ounce of pepper or ginger in a quart of milk, and add to it a handful of ſalt, and half a pint of oil, which, given warm, will purge in two or three hours.

The bilious inflammatory *gripes* are attended with a fever, beſides more of the preceding ſymptoms: the horſe alſo generally throws out a little looſe dung, with hot ſcalding water, the blackiſh or reddiſh colour and fœtid ſmell of which denote an approaching mortification. In this caſe three quarts of blood ſhould be immediately taken away, and the bleeding ſhould be repeated, unleſs the ſymptoms abate in a few hours. The emollient clyſter, with two ounces of nitre diſſolved in it, ſhould be thrown up twice a day, and gum Arabic water ſhould be plentifully drank, and a pint of the following mixture ſhould be given every two or three hours, till favourable looſe ſtools are procured, and then only night and morning, till the diſorder is removed. Take ſenna, three ounces, and ſalt of tartar half an ounce; infuſe them for an hour or two in a quart of boiling water, and add two ounces of lenitive electary, and four of Glauber ſalts. If the diſorder increaſes, recourſe muſt be had to the jeſuit's bark, which ſhould be given in the decoction to the quantity of a pint every three hours, with a gill of red port wine. In a caſe of leſs conſequence, take diapente, one ounce; diaſcordium, half an ounce; powdered myrrh two drams; make theſe into a ball with two drams of oil of amber, and give it twice or thrice a day.

The dry *gripes* ariſe often from coſtiveneſs, and are diſcovered by the horſe's frequent and fruitleſs motion to dung, the blackneſs and hardneſs of the dung, the frequent and quick motion of his tail, the high colour of his urine, and his great reſtleſſneſs. The ſtrait gut ſhould, in this caſe, be ſearched by an oiled hand: then throw up the following emollient clyſter twice a day: take marſhmallows and chamomile flowers, of each a large handful; bruiſed bay-berries and fennel ſeeds, of each an ounce; boil them in a gallon of water to three quarts; and having poured the liquor into a pan, diſſolve it in half a pound of treacle, and a pint of linſeed, or of dry common oil. The purging drink preſcribed for the inflammatory *gripes* ſhould be alſo given, till the ſymptoms are removed. The diet for a horſe with the *gripes* ſhould be ſcalded bran, warm water-gruel, or water prepared by diſſolving four ounces of gum Arabic in a quart of water and mixing it with other water. Farmer's Dict. art. *Gripes.*

GRIPES, in *Sea Language*, is the name of a machine formed by an aſſemblage of ropes, hooks, and dead-eyes, and uſed to ſecure the boats upon the deck of a ſhip at ſea, and prevent them from being ſhaken by the labouring of the veſſel. The hooks, which are faſtened at their ends, are fixed in ring-bolts in the deck on each ſide of the boat; whence, paſſing over her middle and extremities, they are extended, by means of the dead-eyes, ſo as to render the boats firm and ſecure.

GRISLAGINE, in *Ichthyology*, the name of a freſh-water fiſh, of the *cyprinus* kind, with whitiſh fins, and eleven rays in the anal fin, common in rivers of Germany. It ſomething approaches to the common roach in ſhape. Its back is of a duſky blue, and its belly and ſides, below the ſide-lines, are of a ſilvery whiteneſs. The ſide-lines are yellow and dotted, and over theſe there is an interrupted blackiſh line running into ſeveral oblong ſtreaks from the gills to the tail.

GRISLEA, in *Botany*, a genus of the *octandria monogynia* claſs; the characters of which are theſe: the perianthium conſiſts of one leaf, and is of a tubulated bell-faſhioned ſhape; it ſtands erect, and is divided into four ſegments at the end; the flower conſiſts of four oval petals, extremely ſmall, ſcarce indeed exceeding in ſize the ſegments of the cup from which they ariſe; the ſtamina are eight ſubulated, erect, and extremely long filaments; the antheræ are ſimple and erect; the germen of the piſtil is oval; the ſtyle is capillary, and of the length of the ſtamina; the ſtigma is ſimple; the fruit is a globoſe, ſingle-celled, polyſpermous capſule. It is an American tree, extremely well diſtinguiſhed from all others by the flower alone.

GRISLY *ſeed*, among *Herbaliſts*, denote thin, flat, ſkinny ſeeds.

GRISOLA, in *Ornithology*, the name of a bird of the lark kind, deſcribed by Aldrovandus, and ſuppoſed by Mr. Ray to be the ſame with the SPIPOLETTA, or *tordino*, of the Venetians.

GRIST, denotes CORN ground, or ready for grinding.

GRIZZLE, is ſometimes uſed for GRAY.

GRITHBRECHE, in our *Old Writers*, the ſame with breach of the peace. In this ſenſe we find it mentioned in leg. Hen. I. cap. 36. *In cauſis regiis* grithbreche 100 *ſol. emendabit.*

It comes from the Saxon, *grithbryce*, which ſignifies the ſame.

GRITHSTOLE, in our *Old Writers*, a place of ſanctuary. Blount. See FRIDSTOLE.

GRITS, in *Natural Hiſtory*. See SABURRÆ.

GRITT-*ſtone*, is a ſtone conſiſting of particles of ſand agglutinated together. Of this kind of ſtone there are many varieties, differing in the ſize of the particles of ſand that compoſe them, the different properties of theſe ſands, and their different degrees of compactneſs and agglutination. Some of theſe ſtones are uſed for building, others for grinding, others for whetting ſharp ſteel inſtruments, and others for filtrating water. See FILTRE, GRIND-*ſtone*, WHET-*ſtone*, and STONE.

GROANING, in *Hunting*, a term uſed for the cry or noiſe of a buck.

GROAT, an Engliſh money of account, equal to four pence.

Other nations, as the Dutch, Polanders, Saxons, Bohemians, French, &c. have likewiſe their *groats*, groots, groches, gros, &c.

We had no ſilver MONEY in the Saxon times bigger than a penny; nor after the Conqueſt, till Edward III. who about the year 1351. coined groſſes, i. e. *groats*, or great pieces which went for 4*d.* a-piece, and half *groats*; and ſo the matter ſtood till the reign of Henry VIII. who, in 1505 firſt coined ſhillings.

GROATS, a term uſed in many parts of the kingdom for culled oats, or oats only half-ground.

GROCERS, by the ſtat. 37 Edward II. cap. 5. is uſed for thoſe who engroſs merchandize. See ENGROSSING. But *grocers* are now thoſe who deal in ſugars, ſpices, &c. and form one of the incorporated companies of London. See COMPANY.

GROGRAM, in the *Manufactory*, a ſort of ſtuff, made of ſilk and mohair, being in reality no more than a taffety, coarſer and thicker than ordinary.

GROIN, in *Anatomy*. See INGUEN.

GROMA, among the *Romans*, a way-wiſer, or ſurveying inſtrument; whence thoſe who uſed it were called *gromatici*, and the place in the camp where it was kept, *groma*. Pitiſc.

GROMMETS, in a *Ship*, are ſmall wreaths, formed of a ſtrand of rope, and uſed to faſten the upper edge of a ſtay-ſail to its reſpective ſtay, in different places. By means of the *grommets* the ſail is accordingly hoiſted or lowered. Inſtead of theſe HANKS have been lately introduced.

GROMPHENA, in *Botany*, a name uſed by ſome authors, particularly by Pliny, for the common garden MARYGOLD.

GROMWELL, or GROMILL, in *Botany*, *lithoſpermum*, a a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower hath a permanent empalement, cut into five parts; and one petal, with a cylindrical tube, divided into five obtuſe points at the brim; the chaps are perforated; it has five ſhort ſtamina, which are ſhut up in the chaps of the petal; and hath four germina, which turn to ſo many oval, hard, ſmooth, acute-pointed ſeeds, ſitting in the ſpreading empalement. Miller reckons five ſpecies, and Linnæus ſeven. The ſeeds of the greater upright *gromwell* have been accounted powerfully diuretic, and cleanſers of the reins and ureters, being boiled in wine or water; and of great ſervice againſt the ſtone, gravel, or ſtoppage of urine, as alſo againſt the heat of it, and a gonorrhœa. Matthiolus commends two drams of the powder, to be given in women's milk, as a ſpeedy help in hard labour. But they have long been diſcarded from practice. The root of the hairy *gromwell*, or *alkanet*, with ſcarlet flowers, are externally of a deep purpliſh red colour, and the cortical part communicates a fine deep red to oils, wax, and all unctuous ſubſtances, and to rectified ſpirit of wine. Its chief uſe is for colouring oils, plaſters, lip-ſalves, &c. See ANCHUSA.

GRONDEUR, a name given by the French in America to a fiſh which is commonly eaten there; the jaws of which have been brought into Europe, and being examined by Mr. Juſſieu, were found beſet in a remarkable manner with teeth, which perfectly reſembled the bufonitæ, called *crapandines*, and by ſome *ſerpents-eyes*; and which, in their foſſile ſtate, had been for many ages accounted gems. The arrangement of theſe teeth is ſuch, that the whole flat ſurfaces of the upper and lower jaw are in a manner paved with them. They are of different ſhape and ſize in the different parts; thoſe placed towards the edges were of the ſmall and flat kind, commonly found in Malta, and called *ſerpents-eyes*; and the larger *toad-ſtones*, as they are called, were placed more toward the middle; the largeſt of all being placed in two ſtraight rows, or lines, along the center of each jaw. Each of theſe teeth is articulated by a gomphoſis in the jaw, and when taken out, they all have that natural cavity which is found in the hinder part of the foſſile ones. The ſockets of theſe teeth have much the appearance of thoſe from whence teeth have been frequently changed, and probable the fiſh ſheds them often in the courſe of its life. Mem. Acad. Par. 1723.

GRONNA, in our *Old Writers*, a deep pit, or bituminous place, where turfs are dug for burning.

GRONOVIA, in *Botany*, a genus of the *pentandria monogynia* claſs; the characters of which are: that the flower hath a ſingle-leaved coloured empalement, cut into five parts; five ſmall petals; and five hairy ſtamina, inſerted alternately in the empalement; the germen becomes a roundiſh coloured fruit, with one cell, incloſing one large roundiſh ſeed. There is only one ſpecies, firſt diſcovered by Dr. Houſtoun at La Vera Cruz.

GROOM, denotes a ſervant in ſome inferior poſt. In which ſenſe it amounts to the ſame with the old word, *garcio*, and the French *garçon*.

The word is formed from the Flemiſh, *grom*, *puer*, a boy.

GROOM is the denomination of ſeveral officers and ſervants in the king's houſhold.

There are *grooms* of the almonry, *grooms* of the compting-houſe, *grooms* of the great-chamber, the privy-chamber, and the bed-chamber, *grooms* of the robes, of the ward-robe, &c.

GROOM *of the ſtole*. See STOLE.

GROOM *porter* is an officer of the houſhold, whoſe buſineſs

neſs is to ſee the king's lodging furniſhed with tables, chairs, ſtools, and firing; as alſo to provide cards, dice, &c. and to decide diſputes ariſing at cards, dice, bowling, &c.

GROOM is more particularly uſed for a ſervant, appointed to attend on horſes in the ſtables. See EQUERY.

GROOVE, or GROVE, among *Joiners*, denotes the channel that is made by their plough in the edge of a moulding, ſtyle, or rail.

GROOVE alſo denotes a gardener's tool for tranſplanting flowers.

GROOVE, in *Mining*, is the ſhaft, or paſſage into the lead-mines, by which they draw up their ore. They are ſometimes ſunk in the vein, and ſometimes out.

GROOZDISHYS, in *Botany*, a name given by the Ruſſians to a ſpecies of muſhroom reſembling our pepper, or milky-muſhroom, deſcribed by Liſter, Ray, &c. but larger. The *groozdiſhys* is very broad and thick, and abounding with an acrid juice. The Ruſſians preſerve them in pickle, and eat them with their meats. When eaten freſh they inflame the mouth and throat, and endanger ſuffocation. Phil. Tranſ. N° 89.

GROS, a foreign money, in divers countries, anſwering to our *groat*.

A pound *gros*, livre de *gros*. See POUND and LIVRE.

GROSS, or GROSSUS, in our *Ancient Law Writers*, denotes a thing abſolute, and not depending on another. Thus, *villain in groſs*, *villanus in groſſo*, was a ſervant, who did not belong to the land, but immediately to the perſon of the lord; or a ſervile perſon not appendant, or annexed, to the land or manor, and to go along with the tenures as appurtenant to it; but like other perſonal goods and chattels of his lord, at his lord's pleaſure and diſpoſal.

GROSS, *advowſon in*. See ADVOWSON.

GROSS-BEAN, in *Zoology*, a name by which we commonly call the COCCOTHRAUSTES, called alſo at other times the *haw-finch*. This is the LOXIA *coccothrauſtes* in the Linnæan ſyſtem.

GROSS, *in common*. See COMMON.

GROSS *weight*, is the weight of merchandizes, and goods, with their duſt and droſs, as alſo of the bag, caſk, cheſt, &c. wherein they are contained; out of which *groſs* weight, allowance is to be made of tare and tret.

GROSS *average*. See AVERAGE.

GROSS is alſo uſed for the quantity of twelve dozen.

GROSSA, a groat. *Conceſſa eſt regi una* groſſa, *quæ continet quatuor denarios, de quolibet viro et muliere*, Knighton, an. 1378.

GROSSE-*bois*, in our *Ancient Law Books*, ſignifies ſuch wood, as has been, or is, either by the common-law, or cuſtom of the country, reputed timber.

GROSSULARIA, or RIBES. See GOOSEBERRY.

GROTESQUE, GROTESC, or GROTTESQUE, a wild, whimſical figure, or deſign of a painter, or engraver; having in it ſomething ridiculous, extravagant, and even monſtrous. The name ariſes hence, that figures of this kind were anciently much uſed to adorn the grottos wherein the tombs of eminent perſons, or families, were incloſed. Such was that of Ovid, whoſe grotto was diſcovered near Rome about one hundred years ago.

Calot, a celebrated engraver of Lorrain, had a wonderful genius for deſigning *groteſques*: the like is ſaid of Leonardo da Vinci.

We alſo extend the word *groteſque* to any thing whimſical, or wildly pleaſant, in a perſon's dreſs, diſcourſe, &c. Maſquerade habits are the more valued, the more *groteſque* they are. Our theatres preſent us with entertainments in *groteſque* characters, i. e. perſons quaintly dreſſed; as harlequins, ſcaramouches, &c. Planudes has given us a very *groteſque* picture of Æſop. Arioſto and the Italian poets are full of *groteſque* deſcriptions.

GROTESQUE-*work*, GROTESK-*work*, or GROTTESCO, denotes a work, or compoſition, in painting, and ſculpture, in the *groteſque* manner, or taſte; conſiſting either of things which are merely imaginary, and have no exiſtence in nature, or of things turned and diſtorted out of the way of nature, ſo as to raiſe ſurprize and ridicule. *Groteſque*-work is much the ſame with what we ſometimes alſo call *antique* and moriſco.

GROTESQUES, or GROTESKS, are particularly uſed for little fanciful ornaments, of animals, compounded with foliages, fruit, &c.

Such are thoſe painted by Raphael in the apartments of the Vatican, and thoſe carved by Michael Angelo in the cielings of the Portico in the Capitol. Vitruvius calls compartments of this kind *harpaginetuli*.

GROTTO, or GROTTA, in *Natural Hiſtory*, a large deep cavern, or den in a mountain or rock.

The word is Italian, *grotta*, formed, according to Menage, &c. from the Latin *crypta*: Du Cange obſerves, that *grotta* was uſed in the ſame ſenſe in the corrupt Latin.

The ancient anchorets retired into dens, and *grottos*, to apply themſelves the more attentively to meditation.

Okey-hole, Elden-hole, Pool's-hole, and the Devil's A—ſe in the Peake, are famous among the natural caverns or *grottos* of our country.

The entrance to Okey-hole, on the ſouth ſide of Mendip-hills, is in the fall of thoſe hills, which is beſet all about with rocks, and has near it a precipitate deſcent of near twelve fathoms deep, at the bottom of which there continually iſſues from the rocks a conſiderable current of water. The naked rocks above the entrance ſhew themſelves about thirty fathoms high, and the whole aſcent of the hill above is about a mile, and is very ſteep. As you paſs into this vault, you go at firſt upon a level, but advancing farther, the way is found to be rocky and uneven, ſometimes aſcending, and ſometimes deſcending. The roof of this cavern, in the higheſt part is about eight fathoms from the ground, but in many particular places it is ſo low, that a man muſt ſtoop to get along. The breadth is not leſs various than the height, for in ſome places it is five or ſix fathoms wide, and in others not more than one or two. It extends itſelf in length about two hundred yards. People talk much of certain ſtones in it, reſembling men and women, and other things, but there is little matter of curioſity in theſe, being only ſhapeleſs lumps of a common ſpar. At the fartheſt part of the cavern there is a good ſtream of water, large enough to drive a mill, which paſſes all along one ſide of the cavern, and at length ſlides down, about ſix or eight fathoms, among the rocks, and then preſſing through the clefts of them, diſcharges itſelf into the valley.

The river within the cavern is well ſtored with eels, and has ſome trouts in it; and theſe cannot have come from without, there being ſo great a fall near the entrance. In dry ſummers, a great number of frogs are ſeen all along this cavern, even to the fartheſt part of it; and on the roof of it, at certain places, hang vaſt numbers of bats, as they do in almoſt all caverns, the entrance of which is either level, or but ſlightly aſcending or deſcending; and even in the more perpendicular ones they are ſometimes found, provided they are not too narrow, and are ſufficiently high. The cattle that feed in the paſtures, through which this river runs, have been known to die ſuddenly ſometimes after a flood; this is probably owing to the waters having been impregnated, either naturally or accidentally, with lead-ore. Philoſoph. Obſerv. N° 2. p. 2.

In the Philoſophical Tranſactions, N° 480. p 223. we have an account of a ſubterranean *grotto*, or cavern, near Weredale, about twenty miles ſouth-weſt of Newcaſtle.

Elden-hole is a huge profound perpendicular chaſm, three miles from Buxton, ranked among the natural wonders of the Peak. Its depth is unknown, and is pretended to be unfathomable. Cotton tells us he ſounded 884 yards; yet the plumbet ſtill drew. But he might eaſily be deceived, unleſs his plumbet was very heavy; the weight of a rope of that length might well make the landing of the plumbet ſcarce perceivable. Phil. Tranſ. N° 407. p. 24.

Peak's-hole, and Pool's-hole, called alſo the Devil's A—ſe, are two remarkable horizontal ſprings under mountains; the one near Caſtleton, the other juſt by Buxton. They ſeem to have owed their origin to the ſprings which have their current through them: when the water had forced its way through the horizontal fiſſures of the ſtrata, and had carried the looſe earth away with it, the looſe ſtones muſt fall down of courſe: and where the ſtrata had few or no fiſſures, they remained entire; and ſo formed there very irregular arches, which are now ſo much wondered at. The water which paſſes through Pool's-hole is impregnated with particles of limeſtone, and has incruſted the whole cavern in ſuch a manner that it appears as one ſolid rock. Martyn, in Phil. Tranſ. N° 407. p. 27, & ſeq.

In *grottos* are frequently found cryſtals of the rock, ſtalactites, and other natural conglaciations, and thoſe often of an amazing beauty.

M. Homberg conjectures, from ſeveral circumſtances, that the marble pillars in the *grotto* of Antiparos vegetate, or grow. That author looks on this *grotto* as a garden, whereof the pieces of marble are the plants; and endeavours to ſhew, that they could only be produced by ſome vegetative principle. Mem. Acad. anno 1702.

At Foligno in Italy, is another *grotto*, conſiſting of pillars and orders of architecture of marble, with their ornaments, &c. ſcarcely inferior to thoſe of art; but they all grow downwards: ſo that if this too be a garden, the plants are turned upſide down. Mem. de l'Acad. anno 1711.

The Zirchinitzer-ſea, or lake, in Carniola, famous for being full of water, fiſh, &c. the beſt part of the year, and quite dry, and bearing graſs, corn, &c. the reſt, proceeds from ſome ſubterraneous *grotto*, or lake; as it is made highly probable by Mr. Vavaſor, Phil. Tranſ. N° 191.

We have ſeveral *grottos* famous in natural hiſtory; as,

Grotto *del Cani*, a little cavern near Pozzuoli, four leagues from Naples, the ſteams whereof are of a mephitical or noxious quality; whence alſo it is called *bocca venenoſa*, the poiſonous mouth. See **Mephitis.**

Two miles from Naples, ſays Dr. Mead, juſt by the Lago de Agnano, is a celebrated mofeta, commonly called *la Grotta del Cani*, and equally deſtructive to all within the reach of its vapours.

It is a ſmall *grotto* about eight feet high, twelve long, and ſix broad; from the ground ariſes a thin, ſubtile, warm fume, viſible enough to a diſcerning eye, which does not ſpring up in little parcels here and there, but in one continued ſtream, covering the whole ſurface of the bottom of the cave; having this remarkable difference from common vapours, that it does not, like ſmoke, diſperſe itſelf into the air, but quickly after its riſe, falls back again, and returns to the earth; the colour of the ſides of the *grotto* being the meaſure of its aſcent: for ſo far it is of a darkiſh-green, but higher only common earth. And as I myſelf found no inconveniency by ſtanding in it, ſo no animal, if its head be above this mark, is the leaſt injured. But when, as the manner is, a dog, or any other creature, is forcibly kept below it; or, by reaſon of its ſmallneſs, cannot hold its head above it; it preſently loſes all motion, falls down as dead, or in a ſwoon; the limbs convulſed and trembling, till at laſt no more ſigns of life appear than a very weak and almoſt inſenſible beating of the heart and arteries; which, if the animal be left a little longer, quickly ceaſes too, and then the caſe is irrecoverable; but if it be ſnatched out, and laid in the open air, it ſoon comes to life again, and ſooner, if thrown into the adjacent lake.

The fumes of the *grotto*, the ſame author argues, are no real poiſon, but act chiefly by their gravity; elſe the creatures could not recover ſo ſoon; or, if they did, ſome ſymptoms, as faintneſs, &c. would be the conſequence of it. He adds, that in creatures killed therewith, when diſſected, no marks of infection appear; and that the attack proceeds from a want of air, by which the circulation tends to an entire ſtoppage; and this ſo much the more, as the animal inſpires a fluid of a quite different nature from the air, and ſo in no reſpect fit to ſupply its place.

Taking the animal out, while yet alive, and throwing it into the neighbouring lake, it recovers: this is owing to the coldneſs of the water, which promotes the contraction of the fibres, and ſo aſſiſts the retarded circulation; the ſmall portion of air which remains in the veſiculæ, after every expiration, may be ſufficient to drive out the noxious fluid. After the ſame manner, cold water acts in a deliquium animi: the lake of Agnano has no greater virtue in it than others.

The true explication of the noxious effects of this vapour may be ſeen under the articles **Air**, and *Fixed* **Air, Damp**, &c.

Grotta *del Serpi* is a ſubterraneous cavern near the village of Saſſa, eight miles from the city of Braccano in Italy; deſcribed by Kircher thus:

The *Grotta del Serpi* is big enough to hold two perſons: it is perforated with ſeveral fiſtular apertures, ſomewhat in manner of a ſieve; out of which, at the beginning of the ſpring-ſeaſon, iſſues a numerous brood of young ſnakes of divers colours, but all free of any particular poiſonous quality.

In this cave they expoſed their lepers, paralytics, arthritics, and elephantiac patients, quite naked; where the warmth of the ſubterraneous ſtreams reſolving them into ſweat, and the ſerpents clinging variouſly all around, licking and ſucking them, they become ſo throughly freed of all their vicious humours, that upon repeating the operation for ſome time, they become perfectly reſtored. This cave Kircher viſited himſelf, and found it warm, and every way agreeable to the deſcription given of it. He ſaw the holes, and heard a murmuring hiſſing noiſe in them. Though he miſſed ſeeing the ſerpents, it not being the ſeaſon of their creeping out; yet he ſaw a great number of their exuviæ, or ſloughs, and an elm, growing hard by, laden with them.

The diſcovery of this cave was by the cure of a leper going from Rome to ſome baths near this place; who loſing his way, and being benighted, happened upon this cave; and finding it very warm, pulled off his cloaths; and being weary and ſleepy, had the good fortune not to feel the ſerpents about him till they had wrought his cure. Muſeum Wormian.

The ſalutary effects of this cavern were probably of the ſame nature, and to be aſcribed to the ſame cauſe with thoſe of the **Pyrmont** and **Spa** waters, abounding with a great quantity of the **gas**, or *fixed* **air**, which lies alſo to a certain height on the ſurface of the ground; and whither diſeaſed perſons reſort, and find relief in a variety of diſorders. The antiſeptic ſalutary quality of this air is now ſufficiently known.

Milky **Grotto**, *Crypta Lactea*, a mile diſtant from the antient village of Bethlehem, is ſaid to have been thus denominated on occaſion of the bleſſed Virgin, who let fall ſome drops of milk in giving ſuck to Jeſus in this *grotto*. And hence it has been commonly ſuppoſed, that the earth of this cavern has the virtue of reſtoring milk to women that are grown dry, and even of curing fevers.

Accordingly, they are always digging in it, and the earth is ſold at a good rate to ſuch as have faith enough to give credit to the fable. An altar has been built on the place, and a church juſt by it.

Grotto is alſo uſed for a little artificial edifice made in a garden, in imitation of a natural *grotto*.

The outſides of theſe *grottos* are uſually adorned with ruſtic architecture, and their inſide with ſhell work, foſſils, &c. finiſhed likewiſe with jets d'eaus or fountains, &c.

A cement for artificial *grottos* may be made thus: take two parts of white roſin, melt it clear, and add to it four parts of bees wax; when melted together add two or three parts of the powder of the ſtone you deſign to cement, or ſo much as will give the cement the colour of the ſtone; to this add one part of flower of ſulphur: incorporate all together over a gentle fire, and afterwards knead them with your hands in warm water. With this cement the ſtones, ſhells, &c. after being well dried before the fire may be cemented.

Artificial red coral branches, for the embelliſhment of *grottos*, may be made in the following manner: take clear roſin, diſſolve it in a braſs-pan; to every ounce of which add two drams of the fineſt vermillion: when you have ſtirred them well together, and have choſen your twigs and branches, peeled and dried, take a pencil and paint the branches all over whilſt the compoſition is warm; afterwards ſhape them in imitation of natural coral. This done, hold the branches over a gentle coal-fire, till all is ſmooth and even as if poliſhed.

In the ſame manner white coral may be prepared with white lead, and black coral with lamp-black.

A *grotto* may be built with little expence, of glaſs, cinders, pebbles, pieces of large flint, ſhells, moſs, ſtones, counterfeit coral, pieces of chalk, &c. all bound or cemented together with the above deſcribed cement.

The *grotto* at Verſailles is an excellent piece of building. Solomon de Caux has an expreſs treatiſe of *grottos* and fountains.

GROVE, in *Gardening*, &c. a ſmall thick wood, impervious to the rays of the ſun.

The ancient Romans had a ſort of *groves* near ſeveral of their temples, which were conſecrated to ſome god, and called *luci*, by antiphraſis, *à non lucendo*, as being ſhady and dark.

Groves are not only great ornaments to gardens, but alſo afford relief againſt the violent heats of the ſun; furniſhing ſhade to walk under in the hotteſt parts of the day, when the other parts of the garden are intolerable: ſo that every garden muſt be defective which has not ſhade.

Groves are of two ſorts, either open or cloſe. Open *groves* are ſuch as have large ſhady trees, which ſtand at ſuch diſtances, as that their branches approach near enough to each other, to prevent the rays of the ſun from penetrating through them.

Moſt of the *groves* that have been planted, either in England or in the celebrated gardens of France, are only a few regular lines of trees; many of which are avenues to the habitation, or lead to ſome building or other object: but thoſe do not appear ſo grand as others that have been made in woods, where the trees have grown at irregular diſtances, where they have large ſpreading heads, and are left ſo far aſunder as to permit the graſs to grow under them. For nothing is more noble than fine ſpreading trees, with large ſtems growing through the graſs; eſpecially if the graſs is well kept and has a good verdure. Beſides, moſt planted *groves* have a gravel walk made in a ſtraight line between them, which is offenſive to true taſte: therefore, whenever a gravel walk is to be carried through *groves*, it will be much better to twiſt it about, humouring the diſpoſition of the trees, than to attempt regularity. But under large trees, dry walks are not ſo uſeful as in open places; becauſe after rain the dropping of the trees will for ſome time render the walks uſeleſs.

In planting *groves*, the trees ſhould be diſpoſed irregularly, which will give them a more noble appearance, and alſo form a ſhade ſooner than when they are planted in lines. When in planting a garden, full grown trees are found upon the ſpot, they ſhould if poſſible remain inviolate; for it will be better to put up with many inconveniencies, than to deſtroy what will require an age to ſupply.

Cloſe *groves* have frequently large trees ſtanding in them, but the ground under them filled with ſhrubs or underwood; ſo that the walks within them are private, and ſcreened from winds, by which means they are rendered agreeable for walking, at ſuch times when the air is either too hot or too cold for walking in the more expoſed parts of the garden. They are often ſo contrived as to bound the open groves, and frequently to hide the walls or other incloſures of the garden: and when they are properly laid out, with dry walks winding through them, and ſweet ſmelling ſhrubs and flowers irregularly planted at the ſides, they have a charming effect. If they are continued round the whole incloſure of the garden, there will be a much greater extent of walks; and theſe ſhrubs will appear the beſt boundary, where there are not fine proſpects to be gained. Miller.

Groves have been in all ages held in great veneration. The PROSEUCHÆ, and high-places of the Jews, whither they reſorted for the purpoſes of devotion, were probably ſituated in *groves*. See Joſhuah xxiv. 26. The proſeuchæ in Alexandria, mentioned by Philo, had *groves* about them, becauſe he complains that the Alexandrians, in a tumult againſt the Jews, cut down the trees of their proſeuchæ: that at Rome, in Egeria's *grove*, was of the ſame ſort. The veneration which the ancient DRUIDS had for *groves* is well known.

GROUND, in *Agriculture*, is a piece of land, or ſoil; or a portion of earth, whether fit, or unfit, to be tilled, and cultivated.

All ſorts of *ground* may be reduced to boggy, or marſhy, chalky, gravelly, and ſtony. See MARSH, CHALK, SAND, GRAVEL, SOIL, &c.

GROUND-*angling*. See ANGLING.

GROUND, *battable*. See BATTABLE.

GROUND, among *Bowlers*. See BOWLING.

GROUND, *breaking*. See BREAKING.

GROUND, *commanding*. See COMMANDING.

GROUND, in *Etching*, denotes a varniſh, ſmeared over the ſurface of the metal to be etched, to prevent the aqua fortis from eating, or having effect, except in places where this *ground* is cut through, or pared off, with the points of needles. See ETCHING.

GROUND-*ivy*, *glechoma*, in *Botany*; called alſo *gill go by the ground*, *ale-hoof*, or *turn-hoof*, is a genus of the *didynamia gymnoſpermia* claſs; the antheræ of which unite in form of a croſs, and the calyx is divided into five ſegments; this is a plant that grows naturally under hedges and on the ſides of banks in moſt parts of England, and therefore it is rarely cultivated in gardens. The leaves, which are roundiſh, or kidney-ſhaped, are ſet in pairs at the joints; on the boſoms of theſe come forth cluſters of blue labiated flowers, whoſe upper lip is cloven and turned backwards: this plant flowers from April almoſt to the end of ſummer, and is generally found green all the winter.

Ground-ivy is an attenuant and diſſolvent, and famous, both externally and internally, as a vulnerary. It is much uſed by way of tea in diſorders of the breaſt and lungs, and is ſometimes an ingredient in the pectoral decoction. It is eſteemed a ſpecific in eroſions and ulcerations of the viſcera, and particularly of the kidneys and lungs; with which intention its juice has been given to people in conſumptions. Lindanus praiſes it in an *empyema* and *vomica pulmonum*, and recommends it to ſuch as void blood and purulent matter by urine. It is alſo ſaid to be good in bruiſes, and to cure the head-ach: but notwithſtanding all this, it is left in great meaſure to the common people.

It gives the denomination to a ſort of medicated ale, or drink, commonly called *gill*, or *gill-ale*, made by infuſing the dried leaves of the plant therein.

The leaves of the common *ground-ivy* are found ſometimes to produce on their under part certain galls, or round protuberances, of a fleſhy texture, and green colour, of the ſize of nutmegs, or ſometimes larger. Theſe are in ſome years ſo common in France, that the poor people eat them either raw or roaſted, and find them a wholeſome food.

GROUND *line*, in *Perſpective*. See *Terreſtrial* LINE.

GROUND, in the *Manege*. See TERRAIN.

GROUND, *manuring*. See MANURING.

GROUND *niche*. See NICHE.

GROUND-*nut*. See EARTH-*nut*.

GROUND, *oazy*. See OAZY.

GROUND *paſture*. See PASTURE.

GROUND-*pine*, in *Botany* and *Medicine*, &c. See GERMANDER.

GROUND, *ſhinking-pine*. See CAMPHORATA.

GROUND-*plates*, in *Architecture*, are the outermoſt pieces of timber lying on or near the *ground*, and framed into one another with mortiſes and tennons. In theſe alſo are mortiſes made to receive the tennons of joiſts, the ſummers, and girders; and ſometimes the trimmers for the ſtair-caſe and chimney-way, and the binding joiſts.

GROUND *of a ſhield*, or *eſcutcheon*, in *Heraldry*, is properly called the FIELD.

GROUND, in *Painting*, is the ſurface upon which the figures, and other objects are raiſed, or repreſented. See PAINTING.

Ground is properly underſtood of ſuch parts of the piece as have nothing painted on them, but retain the original colour, upon which the other colours are applied to make the repreſentations.

A drapery, piece of building, or the like, are ſaid to ſerve as a *ground* to a figure, when the figure is painted on the drapery, or building.

In the like ſenſe, we alſo ſay, the *ground* of a piece of tapeſtry, of an embroidery, of a medal, coin, &c.

GROUND *tackle*, a *Sea Term*, denoting a ſhip's anchor, cables, &c. with what is neceſſary to make her ride ſafe at anchor in a proper *ground*.

GROUND *timbers*, in a *Ship*, are thoſe whoſe timbers lie on her keel, and are faſtened to it with bolts through the keelſon. They are ſo called, becauſe the ſhip lies at reſt upon them when ſhe is aground.

GROUND-*work*, in *Building*. See FOUNDATION.

GROUND *worm*. See WORM, and EARTH-*worm*.

GROUNDAGE, a cuſtom, or tribute, paid for the ſtanding of a ſhip in a port. Blount.

GROUNDING *of a ſhip*, is the bringing her on *ground*, to be trimmed, made clean, or to have ſome leak ſtopped in her.

The term is alſo applied to a ſhip's running aground accidentally, when under ſail, or driving in a tempeſt.

GROUNDLING, an Engliſh name for that ſmall ſpecies of the cobitis, more commonly called the LOACH, and by Artedi the ſmooth-ſpotted COBITIS with the body cylindric.

GROUNDSEL, *ſenecio*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: the flower is compoſed of many hermaphrodite florets, which form the diſk, and female half florets, which make the border, or rays, included in one common cylindrical empalement, which is rough, ſcaly, and contracted above; the hermaphrodite florets are tubulous, funnel-ſhaped, cut into five parts at the brim, which are reflexed; they have five ſmall hair-like ſtamina, terminated by cylindrical ſummits; and an oval germen, crowned with down, ſituated under the petal, ſupporting a ſlender ſtyle, crowned by two oblong revolving ſtigmas; the germen afterwards turns to an oval ſeed, crowned with down, incloſed in the empalement; the female half florets, which form the rays, are ſtretched out like a tongue, and are indented in three parts at the top. There are many ſpecies of *groundſel*, which are common weeds; but Miller mentions ſome ſpecies of it which are cultivated as more valuable. Linnæus has annexed to this genus ſeveral ſpecies of Tournefort's RAGWORT.

The leaves of the common *groundſel*, taken in a ſtrong infuſion, is an emetic. Dr. Lewis conjectures that their emetic power may be merely owing to large doſes of the infuſion, by which the ſtomach was nauſeated. It is preſcribed in ſmaller doſes in dropſies, jaundices, and hæmorrhages. Externally they are uſed in ointments againſt cutaneous foulneſſes. Beat into a very coarſe pulp, and applied cold to the pit of the ſtomach, they have had very good ſucceſs in curing agues. They are to be uſed only on the days free from the fit. They vomit ſtrongly ſome hours after application. See Medic. Eſſ. Edinb. vol. ii. art. 5. or Abridg. vol. i. p. 203.

GROUNDSEL, *African*. See *Foreign* COLTSFOOT.

GROUP, or GROUPPE, in *Painting* and *Sculpture*, an aſſemblage, or knot, of two or more figures of men, beaſts, fruits, or the like, which have ſome apparent relation to each other.

The word is French; formed of the Italian *groppo*, a *knot*, or *cluſter*.

In a good painting, it is neceſſary that all the figures be divided into two or three *groups*, or ſeparate collections. Such and ſuch a thing make a *group*, with ſuch and ſuch others of different nature and kind. The antique Laomedon is a fine *group* of three beautiful figures.

A *group* has ſomewhat in it of the nature of a ſymphony, or concert of voices: as, in the one, the voices muſt ſuſtain each other, in order to fill the ear with an agreeable harmony from the whole; whence, if any part were to ceaſe, ſomething would neceſſarily be miſſed; ſo in the other, if the parts, or figures, be not well balanced, ſomething will be found diſagreeable.

There are two ſorts of *groups*, or two manners of conſidering *groups*; with regard to the deſign, and to the clair-obſcure. The firſt is common both to works of painting, and thoſe of ſculpture; the latter is peculiar to painting.

Groups, with regard to the deſign, are combinations of divers figures, which have relation to each other, either on account of the action, or of their proximity, or of the effect they have. Theſe we conceive, in ſome meaſure, as repreſenting ſo many different ſubjects, or at leaſt ſo many diſtinct parts, or members, of one greater ſubject.

Groups, with regard to the clair-obſcure, are bodies of figures wherein the lights and ſhadows are diffuſed in ſuch a manner, that they ſtrike the eye together, and naturally lead it to conſider them in one view.

In *Architecture* we ſometimes ſay, a GROUP *of columns*, ſpeaking of three or four columns joined together on the ſame pedeſtal. When there are but two together, we ſay, a *couple*, not a *group*, of columns.

Two or more figures, that are in any way connected, are called a *groupe:* and they are ſaid to be well or ill *grouped*, when they are or are not happily aſſigned. See *Tab. Archit. fig.* 40. H. Figures, though in the ſame ſituation, and joined to each other, if not connected in the deſign, are not ſaid to be grouped, but are ſingle FIGURES: ſuch are thoſe in the ſcreen of columns, and round the Attic ſtory, under the dome, in the wings of the building.

In *Muſic*, a GROUP is one of the kinds of diminutions of long notes, which in the writing forms a ſort of *group*, or cluſter.

The *group* uſually conſiſts of four crotchets, quavers, or ſemi-quavers, tied together, at the diſcretion of the compoſer.

GROUPADES is corruptly uſed, in the *Manege*, for CROUPADES.

GROUPED *column*. See COLUMN.

GROUSE, or GROUS, in *Ornithology*, is a general name comprehending ſeveral ſpecies of birds, which Linnæus has claſſed under the genus of TETRAO. Their general character is, that they have a ſhort arched bill, that the outmoſt and inner toes are connected to the firſt joint of the middle toe by a ſmall membrane; their legs are feathered to the feet; they have broad ſcarlet eye-brows. The *wood grous*, called alſo the *urogallus major*, and COCK of the mountain, or wood, is the *tetrao urogallus* of Linnæus. The male of this ſpecies ſometimes weighs fourteen pounds: its bill is of a pale yellow colour; the noſtrils are covered with duſky feathers; the head, neck, and back, are elegantly marked with ſlender lines of grey and black, running tranſverſely. The feathers on the hind part of the head are long, and beneath the throat is a large tuft of long feathers. The upper part of the breaſt is of a rich gloſſy green; the reſt of the breaſt and belly black, mixed with ſome white feathers; the ſides are marked like the neck; the coverts of the wings are croſſed with undulated lines of black and reddiſh brown; the exterior webs of the greater quill feathers are black, and at the ſetting on of the wings in both ſexes is a white ſpot: the tail conſiſts of eighteen black feathers, marked on each ſide with a few white ſpots; the legs are covered with brown feathers, and the edges of the toes pectinated. See *Tab.* III. *Birds*, N° 25. The bill of the female is duſky; its throad red; its head, neck, and back marked with tranſverſe bars of red and black; the breaſt has ſome white ſpots on it, and the lower part is of a plain orange colour; the belly is barred with pale orange and black; the tips of the feathers are white; the feathers of the back and ſcapulars are black, the edges being mottled with black and pale reddiſh brown; the ſcapulars are tipt with white; the tail is of a deep ruſt colour, barred with black, tipt with white, and conſiſts of ſixteen feathers. The female is conſiderably leſs than the male. See *Tab.* III. *Birds*, N° 26. Theſe differences between the male and female led ſome writers to make the male and female of this ſpecies two different ſpecies; and Geſner has diſtinguiſhed them in this manner, calling the female the *grygallus minor*, and the male the *grygallus major*. This ſpecies is found in no other part of Great Britain, except the Highlands of Scotland, where it is known by the name of *capercalze*, and in the old law books, *caperkally*, the horſe of the woods. It inhabits woods and mountainous countries, and feeds on the tops of pines and birch-trees, and the berries of juniper. Theſe birds are common to Scandinavia, Germany, France, and ſeveral parts of the Alps; and are generally reckoned well-taſted food. Another ſpecies of the *grous* is the black game, heath cock, or black cock, being the *tetrao tetrix* of Linnæus; the male, which is called the *urogallus minor*, has a duſky bill; the plumage of the whole body is black, gloſſed over the neck and rump with a ſhining blue: the coverts of the wings are of a duſky brown, the inner coverts white; the thighs and legs are covered with dark brown feathers, and on the former are ſome white ſpots; the tail conſiſts of ſixteen black feathers, and is much forked; the feathers under the tail are of a pure white. The weight of an old black cock is about four pounds.

The female weighs about two pounds; the head and neck are marked with alternate bars of dull red and black; the breaſt with duſky black and white; the back, coverts of the wings and tail, are of the ſame colours with the neck; the inner coverts of the wings are white; and in both ſexes form a white ſpot on the ſhoulder; the tail conſiſts of eighteen feathers, variegated with red and black, and ſlightly forked. This ſpecies of birds frequent the ſame ſituations with the former: they feed on bilberries and other mountain fruits, and in winter on the tops of the heath: in ſummer they often deſcend from the hills to feed on corn. They never pair, but in ſpring the male gets on an eminence, crows, and claps his wings; on which ſignal all the females within hearing reſort to him. The hen lays from ſix to eight eggs, which are hatched late in the ſummer. The young males, which quit their mother in the beginning of winter, keep together in flocks of ſeven or eight till ſpring, during which time they inhabit the woods. There is another variety of the black cock, which differ from the common ſort in being ſpotted on the neck, breaſt, wings, and thighs, with red: ſuch is alſo the *tetrao hybridus* of Linnæus. Pennant.

Another ſpecies of *grous* is the red game, moor-cock, or GOR-*cock*. A fourth ſpecies is the white game, *tetrao lagopus* of Linnæus, or PTARMIGAN.

GROUT, or GROWT, in *Building*, is a very thin coarſe mortar; when it is mixed with bullock's hair, it is called *hair-grout*. See *Extinguiſhing of* FIRE.

GROWAN, in *Natural Hiſtory*, a word uſed by the miners in Cornwall to expreſs a ſort of coarſe and gritty ſtone, which they are uſually obliged to dig through before they come at the veins of ore. This is uſually grey or whitiſh, but ſometimes it is of various colours, often yellowiſh, and ſometimes ſpotted with iron-colour, and an inky black; and often its texture is ſo looſe and ſpungy, that there are holes in it of the ſize proper to receive a pea or a horſe-bean; theſe are ſometimes empty, but more uſually they are filled up either with chalk or with ſpar. Beſide the ſtrata of this ſtone that lie over the ore, there is alſo a large quantity of it often placed by its ſide. They have this, and two other ſorts of ſtone, lying in the way to the tin ore in Cornwall. The firſt of the others they call *moor-ſtone*, a very uncertain name, as it is alſo given by ſome to the common white granite of that county; but the miners only mean by it a looſe ſort of free-ſtone, ſomewhat ſofter than that uſually employed in building. The other ſtone is called *killos:* this is a grey ſtone of the ſlate kind, eaſily ſplitting into thin plates, and is very full of talcy flakes: this *killos* is, however, a very indeterminate name, as well as the other, for the ſame people ſometimes uſe it alſo to ſignify a white earth common among them; this laſt, however, they ſometimes diſtinguiſhed by the epithet *white*. The word *growan* ſeems the only name they have kept to any determinate ſignification, for they never expreſs by this word any other ſubſtance than the ſtone above deſcribed.

GROWING, in *Sea-language*, denotes the direction of the cable from the ſhip towards the anchors: thus, the cable *grows* on the ſtarboard bow, when it ſtretches out forwards on the ſtarboard or right ſide.

GROWME, in our *Old Writers*, an engine to ſtretch woollen cloth after it is woven; it is mentioned in the ſtatute 43 Edw. III. cap. 10.

GROWTH *halfpenny*, a rate ſo called, and paid in ſome places for the tithe of every fat ox or other unfruitful cattle.

GRUARII, in our *Old Writers*, the principal officers of the foreſt in general. The word comes from the old French *gruyer*, which ſignifies the ſame.

GRUB, the Engliſh name of the hexapode worms or maggots hatched from the eggs of beetles. See SCARABÆUS. *Grubs* are an excellent bait for many kinds of fiſh. In angling for the grayling, the aſh-*grub* is to be preferred to all others. This is plump, milk-white, but round from head to tail, and has a red head. There is alſo another *grub*, which is very common, and is longer and ſlenderer than the aſh-*grub:* it is yellower and tougher, and is known by having a red head, and two rows of legs all along the belly. The trout and grayling uſually frequent the ſame places, and it is not uncommon to take the trout while fiſhing for the other. Theſe *grubs* are to be kept in bran, in which they will grow tougher than they were at firſt; but the aſh-*grub* is always ſo tender, that it is difficult to make a good bait of it. The beſt method is to wrap it in a piece of ſtiff hair with the arming, leaving it ſtanding out about a ſtraw's breadth at the head of the hook, ſo as to keep the *grub* from totally ſlipping off when baited: the horſe-hair that the hook is faſtened to ſhould be as white as poſſible, that it may reſemble the colour of the bait, and not be ſuſpected.

Grub *of the box*, or *box-puceron*, in *Natural Hiſtory*, a name given to a ſort of inſect approaching to the nature of the *puceron* of the elder and other trees, but differing from that animal in ſome eſſential characters, and being more properly of the ſame genus with the fig-inſect or falſe *puceron*. Reaumur's Hiſt. Inſ. vol. vi. p. 100. See Fig-*inſect*.

Theſe inſects change their ſkin ſeveral times, in the manner of the *pucerons*, and they change their colour at the ſame time. They are at firſt reddiſh, but they are then extremely ſmall; after this they throw off a ſkin and become yellowiſh; after this they are of a deeper yellow, ſpotted with black; and finally, when at their full growth, they are greeniſh, and have black antennæ. The exuviæ which theſe creatures leave behind them, have often a grain of the excrement remaining fixed to them.

Mr. Reaumur, who took great pains to know the hiſtory of theſe minute animals, found that they finally became flies of a peculiar kind, reſembling thoſe of the fig inſect; they hopped in the manner of graſshoppers, but only a little way at a time, and he was able to diſcover the parts peculiar to the male and female ſex, in the different individuals, but never could find any eggs or embryo-animals in the latter.

Grubs, *vine*, in the *Hiſtory of Inſects*. See Vine.

Grub-*axe*, or Grubbage, among *Gardeners*, a tool for grubbing up the roots of trees, weeds, &c.

GRUBBING, the term uſed by our farmers to expreſs the taking up the roots of trees out of the ground. Several occaſions offer for the doing this; as when trees are old and paſt growing to any uſe, the roots muſt be taken up, that young trees may be planted in their place. This is a chargeable operation in moſt places, but in ſome countries the farmers have deviſed a machine, which does a great part of the work in a much ſhorter time than in any other way can be done. It is a hook of iron, of about two feet and a half long, with a large iron ring faſtened to its ſtraight end or handle. The whole inſtrument may be made for about three or four ſhillings, and is to be uſed in this manner: the ground is firſt to be cleared away about the root, and any ſtraggling ſide-roots, found running horizontally, are to be cut off: they then faſten the point of the hook to ſome part of the ſtump or root, and putting a long and ſtrong lever through the ring, two men at the end of it go round forcing it every way, till they tear the root out, twiſting the tap-roots off at ſome diſtance under ground; the digging down to which, in the common way, is one great article of the expence. It is very effectual in ſtubbing up the roots of the underwood; but when large tree-roots are to be taken up by it, it is beſt to cleave them firſt with wedges into ſeveral pieces, and then pull them out ſeparately.

Grubbing *a cock*, a term uſed, by cock-fighters, for the cutting off the feathers under the wings. It is a thing not allowed by cockpit-law, nor to cut off his feathers in any handling-place.

GRUBBS, in *Medicine*, a white unctuous kind of pimples, or little tumors, ariſing upon the face, chiefly the alæ of the noſe.

They are uſually owing to hard drinking, and an obſtructed perſpiration; though natural in ſome conſtitutions. They begin with a ſmall black point, which gradually ſpreads; and ſometimes the matter tends to ſuppuration, upon which the heads of the eruptions grow white or yellow. They are uſually reputed ſalutary; whence, to check their growth ſuddenly, has proved of ill conſequence. They are cured by evacuation, and acrimonious lotions.

GRUINA, the *crane-fly*, a name given by ſome authors to the TIPULA, or father-long-legs, from its legs being like thoſe of a crane. See Crane-*fly*.

GRUME, Grumus, in *Medicine*, &c. a little maſs or lump of blood, milk, or other fluid, which is coagulated, thickened, hardened, &c.

Phthiſical people frequently ſpit up *grumes*, i. e. clots of blood.

Grumes of milk are what we popularly call *curds*.

GRUMOSE *roots*, are thoſe which are compoſed of ſeveral ſmall knobs; ſuch are thoſe of the anemones, and of the little celandine.

GRUMOUS *blood* denotes that ſtate, or conſiſtence, of the blood, wherein it is too viſcid and thick, for a due, briſk circulation; the effects whereof are, that it ſtagnates in the capillary veſſels, and produces divers diſeaſes.

GRUNDEL, or Grundling, in *Ichthyology*, a name uſed by ſome for the common loach, or loche, a ſmall freſh water fiſh, known among writers by the names of *cobitis* and *fundulus*.

Grundling, in *Ichthyology*, a name given alſo by the Germans to the *gobio fluviatilis*, or common gudgeon.

GRUNDULUS, in *Ichthyology*, a name given by Figulus, and others, to the fiſh called by us the *loach*, or *grundling*. It is a ſpecies of cobitis, called by authors in general *cobitis barbatula*, and *cobitis fluviatilis*. Artedi has diſtinguiſhed it by the name of the ſmooth ſpotted COBITIS, with the cylindric body.

GRUNNIENS *piſcis*, the *grunting fiſh*, the name of a fiſh caught in many parts of the Eaſt Indian ſeas, and called by the Dutch there *knorre-pot*. It ſeems of the gurnet or gurnard kind, and nearly related to the guabi-coara of the Braſilians. When it is firſt taken out of the water, it makes a remarkable *grunting* noiſe. It has two ſide lines on each ſide, running from the gills to the tail; the one of which is brown, and the other yellow; it is covered with very ſmall ſcales, and is a very fat and fleſhy fiſh; it grows to about ſix or ſeven inches long, and its head is large and ill-ſhaped; it is a very well taſted fiſh.

GRUPPO, or *ſhake*, in *Muſic*, was introduced into England by a gentleman who learned it of the famous Scipione del Palla in Italy. It conſiſts in the alternate prolation of two tones in juxta-poſition to each other, with a cloſe on the note immediately beneath the lower of them. This is the chief grace both in vocal and inſtrumental performances.

GRUS, in *Antiquity*, a dance performed yearly by the young Athenians, around the temple of Apollo, on the day of the Delia.

The motions and figures of this dance were very intricate, and variouſly interwoven; ſome of them being intended to expreſs the windings of the labyrinth wherein the minotaur was killed by Theſeus.

Grus, in *Aſtronomy*, a ſouthern conſtellation, not viſible in our latitude. The number of ſtars in this conſtellation, according to Mr. Sharp's Catalogue, is 13; the ſituation, longitude, latitude, and magnitude of which, are as follow:

Names and ſituations of the ſtars.	Signs.	Longit.			Latitude.			Magnitude
		°	′	″	°	′	″	
In the head	♒	13	35	38	22	58	52	3
In the middle of the neck		15	5	36	25	54	46	5
In the inſertion of the neck		16	8	4	28	17	4	5
		16	11	4	28	37	10	5
In the back		17	44	13	31	18	31	5
5.								
		17	41	17	31	33	50	5
In the right wing		24	58	33	34	23	54	5
		24	37	41	36	11	34	5
In the left wing		12	2	9	32	50	35	2
In the root of the tail		18	23	38	35	22	40	2
10.								
In the tail 2d		16	49	58	39	43	9	4
1ſt		14	54	31	41	24	6	5
3d		18	2	7	41	55	14	4

Grus. See Crane, and *Tab.* II. *of Birds*, N° 17.

Grus *balearica*. See Crane, and *Tab. of Birds*, N° 7.

GRY, a meaſure containing one tenth of a LINE.

A line is one tenth of a digit, and a digit one tenth of a foot, and a philoſophical foot one third of a pendulum, whoſe diadromes, or vibrations, in the latitude of forty-five degrees, are each equal to one ſecond of time, or one ſixtieth of a minute.

GRYGALLUS, in *Ornithology*. See Grouse.

GRYLLOTALPA. See *Mole* Cricket.

GRYLLUS. See Cricket.

Gryllus, in *Ichthyology*, a name given by ſome to the CONGER, or *ſea*-EEL. Ritterſhuſius, who has given commentaries on Oppian's Halieutics, has given this word as the tranſlation of the gongros of that author, which is the name of the ſame fiſh with the congrus of Ariſtotle, and the other ancient Greeks. Artedi has avoided the occaſion of any ſuch errors for the future, by not allowing it any generical name at all. He makes it a ſpecies of his genus of MURÆNA, and diſtinguiſhes it from all the others by the name of the *muræna*, with the rim of the back-fin black.

Gryllus *vulgaris*, in *Ichthyology*, a name given by Geſner, Bellonius, and others, to the OPHIDION of the generality of authors; diſtinguiſhed by Artedi by the name of the *ophidion* with four cirri, or beards, at the lower jaw. Pliny has mentioned this under the name of the *piſciculus congro ſimilis*.

GRYPHITES, in *Natural Hiſtory*, the name of a very common foſſil ſhell, the recent, or living fiſh, to which it belongs, not being known.

It is an oblong ſhell, very narrow at the head, or cardo, and gradually becoming wider to the extremity, where it ends in a circular limb. The head or beak is very crooked, or much bent inward. It has been called by ſome the *conchites anomius rugoſus*; by others they are called *conchæ rugoſæ*, and they are commonly known among us by the name of *crow-ſtones*. They are very frequent in many parts of the kingdom in our gravel-pits and clay-pits, and we ſeem to have three or four diſtinct ſpecies of them. Some are extremely rounded and convex on the back; others are leſs ſo; and the plates of which they are compoſed are in ſome ſmaller and thinner, in others much larger and thicker, in ſpecimens of the ſame bigneſs. Hill's Hiſt. of Foſſils, p. 650.

GRYPHIUS *pes*, the *griffons claw*, a name of a chirurgical inſtrument deſcribed by Ambroſe Paré, and uſed for extracting moles from the uterus.

GRYPHUS, one of the many names uſed by chemiſts for the philoſophers ſtone.

Gryphus, in *Surgery*, a ſort of crooked pincers uſed by ſurgeons.

Gryphus is alſo a kind of ÆNIGMA, or an artful obſcure deſcription of a thing.

GRYPOSIS, of γρυπος, *crooked*, in *Medicine*, the name of a diſtemperature of the toe-nails, in which they bend inwards, and make their way deep into the fleſh.

GUABANI, in *Botany*, the name of a delicious fruit in the Weſt Indies, cooling, and of a ſweet taſte.

GUACAGUACA, in *Ornithology*, the Braſilian name of a bird of the larus, or gull kind, the eggs of which are much valued in America, but the fleſh not at all. It is called by the Portugueſe there the GAVIOTA.

GUACARI, in *Ichthyology*, the name of an American fiſh of a roundiſh, or in ſome ſort a pyramidal figure, and of a foot or more than that in its common length. Its head is flat below, and roundiſh on the upper part; its mouth is ſmall and round, and is placed in the under part of the head, and is furniſhed with a ſort of beard, of ſlender, but ſtiff bodies, reſembling ſhort ſegments of hogs briſtles; its back-fin is ſomewhat prickly, as in the pearch, and its tail is ſupported by ſtrong nerves, and is very forked; its head is covered with a hard ſhelly cruſt, which feels rough to the touch; and its body with triangular ſcales, which are larger toward the tail than near the head; and all of them are rough, as if they had been cut and ridged, and have a ſort of tubercle in their middle; ſo that the whole fiſh ſeems covered with a coat of armour, and has a quadruple arrangement of tubercles on each ſide; it is all over of a pale ſaffron colour, but ſomewhat deeper on the belly than on any other part, and is all over variegated with brown ſpots, of the ſize of muſtard-ſeeds.

There is alſo another kind of this fiſh, which differs in colour, being all over of a duſky brown, ſpotted with ſmall ſpecks of a fine deep black. They are both eaten; but the firſt kind has very little fleſh; the latter has more, and it is alſo better taſted. Marcgrave's Hiſt. Braſil.

GUACUCUA, in *Zoology*, the Braſilian name of a kind of water-bat.

GUACUIA, the name of a very remarkable Braſilian fiſh, called alſo by ſome the *veſpertilio aquaticus*, or water-bat, and by others the *monoceros piſcis*. The anterior part of the body of this fiſh is like a plough; the head is eight fingers long, and five wide in the broadeſt part; the hinder part of its body is round, and pointed toward the tail; it is broad and flat, and the head ſcarce appears beyond the rim of the body; and has between the eyes a ſingle horn, which is very hard, of a conic ſhape, and near two fingers long; it has a tolerably wide mouth, but no teeth; and it has on each ſide, in the middle of the body, an arm, and under theſe, on the belly, has two fins, which ſeem to ſerve as feet; it has a tough ſkin, and no ſcales; it is brown on the back, and is full of tubercles, and is red on the belly; it, moſt of all fiſh, approaches to the *rana piſcatrix*. Marcgrave's Hiſt. Braſ. p. 39.

GUADUM, in *Natural Hiſtory*, an herb, by the ancient Romans called *glaſtum* and *vitrum*; by the Greeks *iſatis*; by the Britons *gundum*; and by us WOAD.

The ancient Britons, Cæſar informs us, painted their faces with this herb, to appear more terrible to their enemies; and Pliny relates, that the ſame was practiſed by the women in divers ſacrifices.

GUAIACANA. See *Indian Date* PLUM.

GUAIACUM, *lignum vitæ*, or *pockwood*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower has a concave empalement; it hath five oblong, oval, concave petals, and ten erect ſtamina, which are inſerted in the empalement; the germen, which is oval and pointed, afterward becomes a berry, which is roundiſh, with an oblique point, and deeply furrowed, incloſing one oval hard ſeed. There are three ſpecies. The common *lignum vitæ*, or *guaiacum*, which is uſed in medicine, grows naturally in moſt of the iſlands of the Weſt Indies, where it becomes a very large tree, having a browniſh, hard, brittle bark, not very thick; the wood is ſolid and ponderous, very reſinous, of a blackiſh yellow in the middle, and of a hot aromatic taſte; the ſmaller branches have an aſh coloured bark, and are garniſhed with leaves divided by pairs; each pair having two pair of ſmall oval blunt pinnæ, of a ſtiff conſiſtence, and a lucid green; the flowers are produced in cluſters at the ends of the branches, compoſed of five oval concave petals, of a fine blue colour; in the centre of theſe is fixed a ſtyle with an oval germen, crowned by a ſlender ſtigma; and round this is ſituated a great number of ſtamina, which are as long as the ſtyle, terminated by ſickle-ſhaped ſummits. Dr. Linnæus ſuppoſes the flowers to have but ten ſtamina, whereas they certainly have twenty, ſo it ſhould be ranged in his twelfth claſs of plants; nor is it the empalement, but the germen, which becomes the fruit.

The bark and wood of this tree are much of the ſame nature, only the wood is accounted hotter: they are uſed in diet drinks, to purify and cleanſe the blood, and to cauſe ſweating; they are eſteemed good for the gout and dropſy, the king's evil, and particularly for the French pox. The gum or reſin, which exudes from inciſions made in the trunk, is black, ſhining, and brittle, and when powdered, of a greeniſh white colour, of an aromatic ſmell, and poignant taſte; is ſomewhat cathartic, and a good purge in rheumatic caſes, to the quantity of two ſcruples mixed with the yolk of an egg, and given in a convenient vehicle.

The wood of this tree is ſo hard as to break the tools in felling them, ſo they are ſeldom cut down for fire wood, being difficult to burn; but it is of great uſe to the ſugar planters for making wheels and cogs for ſugar mills. It is alſo frequently brought to Europe, and wrought into bows and other utenſils. Miller.

But its principal uſe is in medicine; being found to warm, dry, rareſy, attenuate, attract, and promote ſweats and urine. Where the excretory glands are obſtructed, the veſſels lax and flaccid, and the habit replete with impure ſerous humours; in various cutaneous and catarrhous diſorders, ſome female weakneſſes, and chronical rheumatiſms, it frequently has good effects; but in thin emaciated habits, and an acrimonious ſtate of the fluids, it frequently does harm. The uſual way of applying it is in decoction; and a decoction of half an ounce of the wood or bark may be taken in a day at proper intervals, the patient keeping warm, to promote a diaphoreſis.

Decoctions of this wood taken internally, as alſo applied in fomentations externally, have been found of ſervice in cancerous diſorders. See Med. Eſſ. Edinb. vol. v. art. 9.

It is a very remarkable quality of *guaiac*, that the ſalt it yields has very little of the alkaline quality of other ſalts of that kind.

The beſt is that in large pieces, of a duſky colour, freſh, gummy, heavy, of an agreeable ſmell, and a briſk pungent taſte; the bark ſticking cloſe to the wood.

The bark of *guaiac* is held of nearly as much virtue as the wood itſelf; the rind is of no efficacy; ſo that, to make a ſudorific decoction, or ptiſan, of the wood, they firſt pare off all the white part, which, in reality, is the rind, and only chip or raſp off the hard, ſolid part, which is black, heavy, and reſinous. The ſurgeons frequently ſubſtitute box-wood inſtead of *guaiac*, and, it is ſaid, with equal ſucceſs.

The reſin drawn from *guaiac* is held much more effectual, in venereal caſes, than either the wood, or bark. It is brought us in large pieces, not unlike common reſin, but very different in reſpect of ſmell; the former, when caſt on the coals, yielding a very agreeable balſamic fume.

The reſin, which is the only active part, is obtained pure from the gummy ſubſtance, and from the woody and other indiſſoluble impurities, by digeſting the compound in rectified ſpirit, drawing off the ſpirit from the filtered ſolution, till the matter begins to grow thick, and then adding a quantity of water, which will precipitate the pure reſin, and keep diſſolved ſuch of the gummy parts as the ſpirit may have taken up. A quantity of the gum will yield about three-fourths of its weight of reſin. The reſinous matter of the wood is totally extracted by digeſtion in rectified ſpirit, and partially by boiling in water. During the inſpiſſation of the watery decoction, the reſinous part is apt to ſeparate and ſubſide, unleſs a little ſpirit be added towards the end of the proceſs, to keep it united with the gummy. This extract is kept in the ſhops in a ſoft and hard form; the firſt of a proper conſiſtence for making into pills, the latter for being reduced into powder. The quantity of ſolid extract obtained by rectified ſpirit, amounts to about one fourth of the weight of the wood; with water ſcarce one ſixth is obtained. The extract is recommended by Hoffman as an excellent ERRHINE. The gum, or extracts made from the wood, are given from a few grains to a ſcruple, or half a dram, and ſometimes two ſcruples, which laſt doſe commonly proves in a conſiderable degree purgative. Solutions and tinctures of the gum *guaiacum* are made in the ſhops, both with rectified ſpirit of wine and ſal volatile. The *balſamum guaiacum* of the London pharmacopœia is made by adding to ſix ounces of the gum two pints and a quarter of the volatile ſpirit; and for a more ſaturated ſolution, one pint and a half of rectified ſpirit of wine, with the addition of a dram and a half of balſam of Peru; and the *elixir guaiacum* of the Edinburgh college, by adding to the ſame quantity of the gum three pints of the volatile ſpirit, with ſix drams of balſam of Peru, and to the ſtrained liquor, after the ſolution of the gum and balſam, three drams of eſſential oil of ſaſſafras. Theſe may be given from twenty drops to a tea-ſpoonful or more in any convenient vehicle. The gum, or reſinous extracts, may alſo be diſſolved by means of thick mucilages in watery liquors; and it is obſerved, that the mucilaginous ſolution, which is at firſt greyiſh or browniſh, changes in a few hours to a fine blue or bluiſh green colour. Lewis.

The *guaiac* wood is diſtilled by putting thin ſhavings of it into a ſtone-ware retort, to which is to be fitted a large glaſs receiver, with a ſmall hole pierced in its ſide; and the diſtillation is to be promoted by a gradual fire. A liquor, like water, is obtained firſt, and then an acid, reddiſh, empyreumatic liquor, with a little reddiſh oil. In this proceſs a conſiderable quantity of air is diſcharged; which proves that this element is combined in certain bodies, and particularly in this. Dict. Chem. art. GUYAC.

GUAIAVA, *pſidium*, *bay plum*, in *Botany*, a genus of the *icoſandria monogynia* claſs. Its characters are theſe: the flower has a bell-ſhaped empalement, divided into five oval points at the top; it hath five oval, concave, ſpreading petals, indented in the empalement, with a great number of ſtamina, which are ſhorter than the petals, and are inſerted in the empalement, terminated by ſmall ſummits; it has a roundiſh germen ſituated under the flower, ſupporting a long awl-ſhaped ſtyle, crowned by a ſimple ſtigma; the germen becomes a large oval fruit, crowned by the empalement, incloſing a great number of ſmall ſeeds. There are two ſpecies, which grow naturally in the Eaſt and Weſt Indies. The common red *guaiava* hath a thick trunk, which riſes twenty feet high. After the flower is paſt, the germen becomes a large oval fruit, ſhaped like a pomgranate, having one cell crowned by the empalement of the flower, and filled with ſmall ſeeds; the fruit, when ripe, has an agreeable odour. They are much eaten in the Weſt Indies, both by men and beaſts; and the ſeed, which paſſes whole through the body, grows in great plenty every where. This fruit is very aſtringent, and nearly of the ſame quality with the pomgranate; ſo ſhould be avoided by thoſe perſons who are ſubject to be coſtive.

Theſe plants are propagated by ſeed, which when brought over in the fruit, gathered full ripe, will more certainly ſucceed: theſe ſhould be ſown in pots filled with kitchen-garden earth, and plunged into a hot-bed of tanner's bark. In about ſix weeks, if the ſeed be good, the plants will appear, when they muſt have freſh air admitted to them, in proportion to the warmth of the ſeaſon. When the plants are ſtrong enough to remove, they ſhould be each planted in a ſmall pot, and plunged into a freſh hot-bed, ſhading them from the ſun, until they have taken new root. In the ſummer they will require plenty of water, and in hot weather a great ſhare of air. With this management the plants will produce flowers and fruit the third year, and may be continued a long time. Miller.

GUAIBI *coara*, in *Ichthyology*, the name of an American fiſh, called by the Portugueſe *burace de velha*. It is flat bodied, with a riſing back, and is uſually caught between five and eight inches long, and of about a third part of its length in breadth. It is caught among the rocks and about the ſhores, and is eaten in conſiderable plenty in the Braſils, both by the natives and Portugueſe. Marcgrave's Hiſt. Braſil.

GUAIMINIBIQUE, in *Ornithology*, a name by which many authors have called the humming-bird, or GUAINUMBI.

GUAINUMBI, in *Ornithology*. See HUMMING-*bird*.

GUALACLING, in *Ornithology*, the name given by the people of the Philippine iſlands to a ſpecies of bird of the ſtarling kind. It is of the bigneſs of the turtle; it feeds on fruits, and is a very briſk and lively bird. It appears to be of a plain black colour, except when viewed in the ſun, and then is ſeen to be of a vaſt variety of bright colours.

GUAMAJACU *ape*, in *Ichthyology*, a name by which Marcgrave, and ſome others, have called the *piſcis* TRIANGULARIS.

GUAMAJACU *atinga*, in *Ichthyology*, the name of a fiſh of the orbis or globe-fiſh kind; which is thorny, and has the mouth of the ordinary frog-mouthed ſpecies. It is uſually about ſeven fingers breadth long, and in the place of teeth has a hard bone above and below in its mouth. The holes for its gills are large enough to admit one's finger, and near theſe there are two ſquare, broad, and ſhort fins; its head is covered with a hard bony ſhell, and all its body with prickles, except on the belly, where it is ſoft as the belly of a frog; the prickles are ſo many ſmall pointed bones. It can, at pleaſure, inflate its whole body into the reſemblance of a bladder; it is not eatable, but eſteemed poiſonous. Piſo, Hiſt. Nat. lib. v. cap. 16. See *Tab. Fiſh*, N° 2.

GUAMAJACU *guara*, in *Zoology*, a name by which ſome call that ſpecies of the *hiſtrix*, or ſea-porcupine, called by Marcgrave DIABE.

GUANA, in *Zoology*, a ſpecies of LIZARD.

GUANABANUS, a name by which Plumier, and other authors, have called ſeveral ſpecies of the annona. See ANNONA.

GUAPERVA, in *Ichthyology*, the name of an American fiſh, of the toad-fiſh or rana-piſcatrix kind, but different from that in many things, and remarkably ſmall. It is ſeldom found of more than four finger's breadth long, and its more uſual ſize is but two fingers; it has no gills; its mouth is large, projected like that of a dog, and furniſhed with extremely ſmall teeth; it has a bone, ſupplying the place of a tongue; its eyes are extremely ſmall, and of a fine pale blue, like that of the turquoiſe; between its eyes, or in the middle of its upper lip, it has a little horn, ſtanding upright, but bending a little backward, and before that horn is a ſlender filament, half a finger long, turned backward, and with a little button at its end; it has one large fin upon its back, and two ſmaller on its belly or breaſt, and in the middle of its body, but rather neareſt the head; it has on each ſide an arm, which toward the extremity degenerates into a fin, and is prickly at the end; it has no ſcales, but a tough ſkin, rough on the back, and ſmooth on the belly; it is of a reddiſh-brown colour, and ſpotted all over with large black ſpots. Marcgrave's Hiſtory of Braſil, p. 131.

GUARA, in *Ornithology*, the name of a Braſilian bird, called by Cluſius *numenius Indicus*, or the *Indian curlew*. It is a large bird, of the ſize of the platea, or ſpoonbill, and lives about waters; its beak is long, and of a whitiſh grey, figured like a Poliſh ſword; the tail is ſhort, and is hid by the wings when they are cloſed; it is all over of a fine gay red, only that the long wing-feathers are tipped with black at their extremities, and there is ſomething very remarkable in its growth, for it is black when firſt hatched from the egg, from this it becomes greyiſh, and from this at length changes to its fine red.

GUARACAPEMA, in *Ichthyology*, a name uſed by ſome for the fiſh more uſually called the DORADO, or *auratus piſcis*.

GUARANTEE, or WARRANTEE, in *Law*, a term relative to *warrant*, or *warranter*; properly ſignifying him whom the warranter undertakes to indemnify or ſecure from damage.

GUARANTEE is more frequently uſed for a warranter, or a perſon who undertakes and obliges himſelf to ſee a ſecond perſon perform what he has ſtipulated to the third. See WARRANTY.

GUARANTY, in *Politics*, an engagement of mediatorial or neutral ſtates, whereby they pledge their faith, that the articles of a particular treaty ſhall be inviolably obſerved on both ſides.

This engagement implies, that the guarantees are obliged to aſſiſt the party invaded contrary to the treaty, againſt the injurious aggreſſor; but not if the war is occaſioned by any other cauſes than the violation of the articles of peace. Puffendorf, Law of Nature and Nations, book viii. ch. 8. § 7.

The ancient lords were obliged to *guaranty* the lands of their vaſſals, i. e. to defend them againſt their enemies; otherwiſe they loſt their FEE, and their vaſſals were no longer bound to do them homage and ſervice. Kings alone did not forfeit their fiefs by not *guarantying* them; and yet we read, that Borel, count of Barcelona, threatened the king of France, Hugh Capet, to ſwear fealty to the Saracens, in caſe he did not *guaranty* him; and under Lewis the Young, the count of Champagne did homage to the emperor, on the like account.

To *guaranty* a fee, had likewiſe another meaning; being uſed to denote that where a fee was divided between the eldeſt ſon and the younger, the eldeſt did homage to the lord, both for himſelf and all the reſt; and by that homage *guarantied* the whole.

GUARA-TEREBA, in *Ichthyology*, the name of an American fiſh of the cuculus kind, approaching to the nature of the trachurus, and which Mr. Ray thinks may properly be called the *trachurus Braſilienſis*, or the *Braſilian ſcad*. It is uſually of about four or five inches in length; its head is obtuſe, and its mouth furniſhed with very ſmall teeth; the ſide-lines towards the tail are armed with prickly hooks, all pointed backwards; the tail is divided into two horns. It is eaten in Braſil, and other American countries.

GUARAUNA, in *Ornithology*, the name of a ſmall Braſilian bird common in watery places, and of the ſize of our ſnipe. Its bill is ſtraight, but a little hooked at the end, and is between four and five fingers breadth long; its body is about the ſame length, and its legs ſix fingers long; it is all over of a duſky brown, with an admixture of a caſt of greeniſh: it is a well-taſted bird.

GUARD, or **GARD**, in its general ſenſe, implies defence, cuſtody or conſervation, of any thing; the act of obſerving what paſſes, to prevent ſurprize; or the care and precaution taken to hinder any thing's being done contrary to the intention and deſire of another.

The word is formed of the French *garde*, and that of the corrupt Latin *warda*, and that of the German *wahren, to keep, to defend.*

GUARD is alſo uſed in a figurative ſenſe, for the act or ſervice of guarding, and the perſons appointed for that purpoſe.

Thus we ſay, to be upon *guard*, to ſet the *guard*, mount the *guard*, to diſmount the *guard*, to relieve the *guard*, to change the *guard*, the officer or ſerjeant of the *guard*; alſo, a ſtrong *guard*, an attempt on the *guard*, &c.

So, again, thoſe to whom the king commits the ſafety of his perſon, are called his *guard, life-guard, body-guard.*

And ſo thoſe who have had the education and guardianſhip of infants, or idiots, are called their *guards* or *wards*.

GUARD, or **GARD**, is alſo applied to a writ relating to the office of WARD; whereof there are three kinds: one called *droit de garde*; the ſecond, *ejectment de garde*; the third, *raviſhment de garde*. See GUARDIAN.

GUARD, in the *Military Senſe*, is properly the duty or ſervice done by the ſoldiers, to ſecure the army, or place, from the attempts and ſurprizes of an enemy. In garriſon the *guards* are relieved every day; ſo that every ſoldier mounts *guard* once every three or four days in times of peace, and much oftener in time of war. Of this there are divers kinds; as,

GUARD, *advanced*, a party of horſe or foot, which marches before a corps, to give notice of approaching danger. See ADVANCE *guard*.

GUARD, *artillery*. See ARTILLERY *guard*.

GUARD, *artillery quarter*, is frequently a non-commiſſioned officer's *guard* from the royal regiment of artillery, whoſe *corps de garde* is always in the front of their encampment.

GUARD, *artillery rear*, conſiſts of a corporal and ſix men, poſted in the rear of the PARK.

GUARD, *baggage*, is always an officer's *guard*, who has the care of the baggage on a march.

GUARD-*boat*, in *Sea Language*, a boat appointed to row the rounds among the ſhips of war which are laid up in any harbour, &c. to obſerve that their officers keep a good look-out, calling to the *guard-boat* as ſhe paſſes, and not ſuffering her crew to come aboard, without having previouſly communicated the watch-word of the night.

GUARDS, *camp*, are of two ſorts; the one ſerve to maintain good order within the CAMP, and the other, which are ſtationed without the camp, ſerve to cover and ſecure it againſt the enemy. They are formed both of infantry and cavalry; and ſhould conſiſt, as the occaſion requires, of the eighth part, or third part, or even of half the army, when an attack is apprehended. The cavalry *guards* are removed farther from the main army than the infantry; but not ſo far as to endanger their being cut off. Theſe *guards* have generally a day poſt and a night poſt; the latter of which is ſeldom more than four or five hundred paces from the camp: the *guards* of infantry are generally fixed, except thoſe that are to ſupport and protect the cavalry *guards*, and to cover the forage grounds.

Corps de **GARDE**, or **GUARD**. See CORPS.

GUARD, *counter*, in *Fortification*. See COUNTER-*guard*.

GUARD, *forrage*. See FORRAGE.

GUARD, *grand*, conſiſts of three or four ſquadrons of horſe commanded by a field officer, and poſted before the camp on the right and left wing towards the enemy, for the ſecurity of the camp.

GUARD-*irons*, in a *Ship*, are certain curved or arched bars of iron placed over the ornamental figures on a ſhip's head or quarter, to defend them from the impreſſion of ſome other ſhip, when they lie cloſe to or rub againſt each other.

GUARD, *main*, is that from whence all the other *guards* are detached. Thoſe who are to mount the main *guard*, meet at the reſpective captains quarters, and from thence they go to the parade; where, after the whole *guard* is drawn up, the ſmall *guards* are detached for the poſts and magazines; and then the ſubaltern officers draw lots for their *guards*, who are all commanded by the captain of the main *guard*.

GUARD, *picquet*, is a number of horſe and foot, who keep themſelves always in readineſs in caſe of an alarm; the horſes being generally ſaddled, and the riders booted. The foot draw up at the head of the battalion at the beating of the tattoo, but afterwards return to their tents, where they remain in readineſs to march on any ſudden alarm.

This *guard* is to make reſiſtance, in caſe of an attack, till the army can get ready.

GUARD, *provoſt*, is always an officer's *guard* that attends the provoſt in his rounds, to prevent deſertion, marauding, rioting, &c.

GUARD, *quarter*, is a ſmall *guard* commanded by a ſubaltern officer, poſted in the front of each battalion, about two hundred and twenty-two feet before the front of the regiment.

GUARD, *rear*, is that part of the army which brings up the rear on a march: the rear *guard* of a party is frequently eight or ten horſe, about five hundred paces behind the party. Hence the advance *guard* going out on a party, forms the rear *guard* in their retreat.

Rear guard is alſo a corporal's *guard* placed in the rear of a regiment, to keep good order in that part of the camp.

GUARD, *ſafe*. See SAFE *guard*.

GUARD-*ſhip*. See *Guard*-SHIP.

GUARD, *ſtandard*, is a ſmall *guard* under a corporal, out of each regiment of horſe, who mount on foot in the front of each regiment.

GUARD, *trench*, conſiſts of three, four, or ſix battalions, according to the occaſion, which mount in the time of a ſiege, in order to oppoſe the beſieged when they ſally out, protect the workmen, &c.

GUARD, *van*, is the ſame with the front of an army. See ADVANCE *guard*, and *advanced* GUARD, above.

GUARD is more particularly underſtood of a ſoldier, as a muſqueteer, archer, or the like, detached from a company, or corps, to protect, detain, or ſecure, any perſon, or to ſurvey his actions.

GUARDS is alſo underſtood of the troops, or companies, kept to guard the king; called alſo *royal guards, life guards, gardes du corps*, &c.

There are alſo uſually bodies of *guards* to wait on the princes of the blood, in the ſame capacity.

The *guards* are diſtinguiſhed into *horſe, foot, grenadiers*, and *yeomen*.

GUARDS, *the Engliſh horſe*, are divided into troops, called firſt, &c. troop of *horſe-guards*. See HORSE.

GUARDS, *the foot*, are diſtinguiſhed by regiments: of which there are three, called the firſt, &c. regiment of foot *guards*. They were raiſed in the year 1660: the firſt regiment is commanded by one colonel, one lieutenant-colonel, three majors, twenty-three captains, one captain-lieutenant, thirty-one lieutenants, and twenty-four enſigns; and contains three battalions. The ſecond regiment has one colonel, one lieutenant-colonel, two majors, fourteen captains, one captain-lieutenant, eighteen lieutenants, and ſixteen enſigns, and contains two battalions. The third regiment is the ſame as the ſecond.

Guards, no doubt, are as ancient as monarchy: the remoteſt antiquity affords inſtances hereof.

The Roman emperors had for their *guard* the prætorian cohorts, eſtabliſhed by Auguſtus, as Dion and Suetonius relate: thoſe of the emperors of Conſtantinople were called *buccellarii*.

Captain, colonel, brigadier, exempt of the *guards*, &c. See CAPTAIN, COLONEL, BRIGADIER, YEOMAN, &c.

The French *guards* are divided into thoſe *within*, and thoſe *without* the palace: the firſt conſiſts of the *gardes du corps*, or *body guard*; part whereof are *gardes de la manche*, q. d. *of the ſleeve*, of the hundred Swiſſes, and the *guards* of the gate.

The *guards without* are the GENS *d'armes*, light horſe, muſqueteers, and two regiments of *guards*, the one French, the other Swiſs.

The *gardes du corps*, or *life-guard*, conſiſts of four companies of horſe: the firſt was anciently Scotch, and ſtill retains the name, though it now conſiſts wholly of Frenchmen; and not only the name, but they alſo retain the ancient phraſe, or formula, of anſwering, when called upon, *I am here*.

The *Scotch guard* was firſt eſtabliſhed in France by Charles VII. who choſe himſelf a *guard* out of ſuch Scots as were ſent by the earls of Buchan, Douglas, and other Scotch lords, to drive out the Engliſh.

Guards, *prætorian.* See Prætorian.

Guards, *white.* See Scholares.

Guard, in *Fencing*, an action or poſture, proper to defend or ſcreen the body from the efforts or attacks of an enemy's ſword.

There are four general *guards* of the ſword; to conceive which, it will be neceſſary to imagine a circle drawn on an upright wall, and divided into four cardinal points; viz. top, bottom, right, and left.

Now when the point of the ſword is directed to the bottom point of the circle, and, conſequently, the head of the ſword tilted up to the top point, with the body inclining forwards, this is called *prime*, or the *firſt guard*. The *ſecond guard*, which ſome improperly call the *third*, is when the point of the ſword is directed to the right or ſecond part of the ſame circle, a quadrant diſtant from the firſt, with the fort of the ſword turned to the right, and the body raiſed proportionably. *Tierce*, or the *third guard*, is performed by directing the ſword's point to the uppermoſt point of the ſame circle diametrically oppoſite to that of prime; in which caſe the body, arm, and ſword, are in their natural diſpoſition, being the mean between the extremes of their motion. *Quart*, or the *fourth guard*, is when the point of the ſword is directed to the fourth point of the circle, deſcending to the right as far as one fourth of tierce, with the external ſide of the arm and the flat of the ſword turned towards the ground; and the body out of the line to the right, and the fort of the ſword towards the line to the left. There is alſo a *quint*, or a kind of *fifth guard*, being the return of the point of the ſword on the right, after traverſing the circle, to the point of the prime whence it had departed; and yet with a different diſpoſition of the body, arm, and ſword.

Theſe *guards* are alſo called, by the maſters, *figures* and *poſtures*; and the common centre of all their motions is to be in the ſhoulder.

In all theſe kinds of *guards*, there are high *advanced*, high *retired*, and high *intermediate guards*, when diſpoſed before the upper part of the body, either with the arm quite extended, quite withdrawn, or in a mean ſtate. *Mean advanced guard*, or, ſimply, *mean guard*, is when the ſword is diſpoſed before the middle part of the body. *Low advanced*, *retired*, or *intermediate guards*, are thoſe where the arm and ſword are advanced, withdrawn, or between the two extremes, before the lower part of the body.

Some will have prime the principal *guard*; others, quint; others, with better reaſon, tierce; becauſe it conſiſts of right lines, which are more eaſily defended than oblique ones, ſuch as thoſe of prime, ſecond, quart, and quint.

Guards, in *Aſtronomy*, is a name ſometimes applied to the two ſtars neareſt the pole; being in the hind-part of the chariot, at the tail of the little bear.

Their longitude, latitude, &c. ſee among thoſe of the other ſtars in the conſtellation Ursa *minor*. One of them is the pole ſtar.

GUARDANT, or **Gardant**, in *Heraldry*, a term applied to a beaſt when borne in a coat of arms full faced, or with his face turned towards the ſpectator, and thus appearing in a poſture of guard or defence.

Heralds ſay, a lion is never ſo repreſented; but a leopard always.

GUARDIAN, or **Gardian**, is he to whom the charge, or cuſtody, of any perſon, or thing, is committed.

The notion of *guardian* angels is very ancient in the Eaſt.

In the convents of Franciſcans, the officer is called *guardian*, who in the others is called *ſuperior*.

In the order of the Garter, the officer, who in other military orders is called *grand maſter*, is called the *ſovereign guardian* of the order.

Guardian, **Gardeyn**, in *Law*, is a perſon intruſted with the education, tuition, &c. of ſuch as are not of ſufficient diſcretion to guide themſelves, and their own affairs; as children and idiots.

The word *guardian*, with us, includes the offices both of the tutor and curator of the civilians: the tutor, for inſtance, had the government of a youth till he arrived at fourteen years of age; and the curator had the diſpoſition and ordering of his effects thenceforward till twenty-five years of age; or the charge of a lunatic, during his lunacy: all which purpoſes our *guardian* alone anſwers; though with regard to lunatics and idiots, theſe officers are commonly kept diſtinct.

There are ſeveral ſorts of *guardians*. The firſt are *guardians* by nature, viz. the father, and, in ſome caſes, the mother of the child: for if an eſtate be left to an infant, the father is, by common law, the *guardian*, and muſt account to his child for the profits; and, with regard to daughters, it ſeems by conſtruction of 4 and 5 Ph. & Mar. cap. 8. that the father might by deed or will aſſign a *guardian* to any woman-child, under the age of ſixteen; and if none be aſſigned, the mother ſhall in this caſe be *guardian*. The ſecond ſort are *guardians* for nurture, which are, of courſe, the father and mother, till the infant attains the age of fourteen years; and in default of father and mother, the ordinary uſually aſſigns ſome diſcreet perſon to take care of the infant's perſonal eſtate, and to provide for his maintenance and education. There are alſo *guardians* in ſocage, who are alſo called *guardians* by the common law: theſe take place only when the minor is entitled to ſome eſtate in lands, and then, by the common law, the *guardianſhip* devolves upon the next of kin, to whom the inheritance cannot poſſibly deſcend. Theſe *guardians* continue only till the minor is fourteen years of age.

But the ancient law relating to *guardians* is much altered by ſtat. 12 Car. II. cap. 24. which ordains, that "where "any perſon has a child under the age of twenty-one "years, and unmarried at the time of his death, it ſhall "be lawful for the father of the child, whether born at "the time of his deceaſe, or yet in ventre de ſa mere, "either by deed, or will, to diſpoſe of the cuſtody and "tuition of ſuch child while under age, or for any leſſer "time, to any perſon, popiſh recuſants excepted; which "diſpoſition ſhall be good againſt all perſons claiming "ſuch child as *guardian* in ſocage, or otherwiſe." Theſe are called *guardians* by ſtatute, or teſtamentary *guardians*. "And in caſe the father appoint no *guardian*, the ordinary may appoint one to look to his goods and chattels "till the age of fourteen; at which time the child may "chooſe a *guardian* himſelf; and for his lands, the next "of kin on that ſide by which the lands deſcend may "be *guardian*, as heretofore in caſe of a tenure in ſocage."

The *guardian*, when his ward comes of age, is bound to give him an account of all which he has tranſacted on his behalf, and muſt anſwer for all loſſes incurred by his wilful default or negligence. To prevent conteſts, the *guardians* of large eſtates apply to and act under the direction of the court of chancery, accounting annually before the officers of that court: for the lord chancellor, by right derived from the crown, is the general and ſupreme *guardian* of all infants, as well as idiots and lunatics. The court of chancery may, and ſometimes does, remove a *guardian* who abuſes his truſt, and appoint another in his room.

Guardian, in *Chivalry*, was an office which formerly belonged to the feodal lord, in virtue of his wardſhip of an heir-male, under the age of twenty-one, and of a female under fourteen. This wardſhip conſiſted in having the cuſtody of the body and lands of ſuch heir, without any account of the profits, till the age of twenty-one in males, and ſixteen in females. Theſe profits were claimed in lieu of knight-ſervice, which the male was ſuppoſed capable of rendering at twenty-one, and the female by her huſband at fourteen. However, if the female was under fourteen, when the lord's wardſhip commenced, he might keep her under ward till ſixteen, by ſtat. Weſt. 1. 3 Edw. I. cap. 22. This wardſhip was taken from the lord by the charter of Henry I. and transferred to the widow or next of kin. But this noble immunity did not continue long. When the male-heir arrived at the age of twenty-one, and the heir-female to that of ſixteen, they might ſue out their livery or *ouſterelemain*, i. e. the delivery of their lands out of their *guardian's* hands; but for this they were obliged to pay a fine, viz. half a year's profits of the land.

Theſe *guardians* had alſo another kind of power over their infant wards, which was that of diſpoſing of them in matrimony; and if the infants refuſed a ſuitable match, they forfeited the value of the marriage to their *guardian*; but if they married without his conſent, they forfeited double the value. This right of ſelling the ward in marriage was expreſly declared by the ſtatute of Merton, 20 Hen. III. cap. 6. Theſe grievances, and others of a ſimilar nature, were firſt aboliſhed by the lords and commons in parliament, in 1645; and this ordinance was confirmed by the Protector and his parliament in 1656; and they were finally aboliſhed by the ſtatute 12 Car. II. cap. 24. and by 20 Geo. II. cap. 43. and cap. 50. The ſame are alſo aboliſhed in Scotland. See Knight's *ſervice*.

Guardian *in ſocage*. See Guardian above, and Socage.

Guardian *of the ſpiritualities* is the perſon to whom the ſpiritual juriſdiction of a dioceſe is committed, during the time of the vacancy of the ſee.

This *guardian* may be either ſuch in law, i. e. *jure magiſtratus*, as the archbiſhop is of any dioceſe within his province; or by delegation, as he whom the archbiſhop, or vicar-general, does for the time depute.

The dean and chapter of Canterbury are *guardians* both for the dioceſe, and the whole province, during a vacancy of the archbiſhoprick.

Guardian *of the church.* See Church-*warden*.

Guardian, or *warden*, of the Cinqueports, is an officer who has the juriſdiction of the Cinqueports, with all the power that the admiral of England has in other places. Camden relates, that the Romans, after they had ſettled themſelves and their empire in our iſland, appointed a magiſtrate, or governor, over the eaſt parts, where the Cinqueports lie, with the title of *comes litoris Saxonici per Britanniam*; having another, who bore the like title, on the oppoſite ſide of the ſea. Their buſineſs was to ſtrengthen the ſea-coaſt with munition, againſt the outrages and robberies of the Barbarians. And that antiquary takes our warden of the Cinqueports to have been erected in imitation hereof. Britannia, p. 228.

Guardian *of the peace.* See Conservator *of the peace.*

GUARIBA, the simia *Beelzebub* of Linnæus, in *Natural Hiſtory*, the name of a ſpecies of monkey found in the Weſt Indies. It is of the ſize of a fox; its face is raiſed high, its eyes are black and ſhining, and its ears ſmall and round; its tail is very long, naked toward the end, and extremely moveable; the creature frequently twiſting it round things to faſten itſelf by it; it is covered all over with fine black ſhining hairs, except on the legs and part of the tail, where they are brown; the hairs are ſo nicely diſpoſed all over the body, that the creature appears perfectly ſmooth; and they are much longer under the chin and throat, ſo that they form a ſort of beard there. Ray's Syn. Quad. p. 152.

This ſpecies is found in prodigious numbers together in the woods, eſpecially of Braſil and Guiana, and makes a very loud and frightful noiſe; and it is very common for one only to make a noiſe, and all the reſt to form a mute aſſembly round him. Marcgrave relates a very ſingular thing of this creature, in this reſpect, which he ſays he has frequently been an eye-witneſs to. They meet in great numbers before and after mid-day, when they form a large circle; and one placing himſelf above the reſt, begins to make a loud noiſe; when he has ſung thus by himſelf for ſome time, the reſt all remaining in perfect ſilence, he lifts up his hand, and they inſtantly all join in a ſort of chorus; this intolerable yell they keep up inceſſantly, till the ſame monkey, who gave the ſignal for their beginning, lifts up his hand a ſecond time, on which they all ceaſe, and become ſilent again in a moment. He then exalts his pipe alone again, and ſo finiſhes the buſineſs of the aſſembly.

Theſe creatures carry their young upon their backs, and ſkip very nimbly with them from tree to tree, the young ones claſping faſt round their body with their arms. They are very fierce animals, and can never be tamed. There is a ſpecies of this kind alſo much larger than theſe, which have a very long, black, hairy beard. Theſe, as Marcgrave aſſures us, on his poſitive knowlege, will often attack the negro women as they go through the woods, and lie with them by force.

GUARUGUARU, in *Ichthyology*, the name of a ſmall American freſh-water fiſh, ſeldom exceeding an inch and half in length, and of a very ſlender body. It is eaten, though very ſmall, being very well taſted. It is caught in abundance in lakes and ponds.

GUASSEM, a word uſed by Avicenna, and ſome other authors, to expreſs certain black ſcorbutic ſpots and blotches appearing on the ſkin.

GUATUCUPA, in *Ichthyology*, the name of a ſea-fiſh caught about the Braſilian ſhores. It grows to about two feet long; its back is a little elevated, its mouth ſmall, and beſet with ſharp teeth; it has only one long fin upon the back, the rays of which are rigid and prickly. It is caught among the rocks, and is an extremely well taſted fiſh.

GUATUCUSA, in *Ichthyology*, the name of an American fiſh, approaching to the nature of the *coracinus* of the Mediterranean, and called by ſome *corvina*. It is of an oblong ſhape; its back is a little prominent, but its belly perfectly flat and even; its uſual length is from twelve to twenty inches. It is caught on the Braſilian ſhores, and is a very delicate fiſh.

GUAVA, in *Botany*. See Guaiava.

GUAZAMA, in *Botany*, the name of an American tree, deſcribed by Plumier as of the nature of the cacao. They are both ſpecies of the theobroma of Linnæus; but the *guazama* is peculiar in the ſtructure of its fruit, which is of a ſomewhat globular figure, full of tubercles and perforations on the ſurface, and yet divided into five lodgments for ſeeds within.

GUDGEON, in *Ichthyology*, the Engliſh name of the fiſh called by authors the *gobio*, and *gobius fluviatilis*. According to the new Artedian ſyſtem, the word *gobius* is made the name of another genus of fiſhes, and the *gudgeon* is reduced to the genus of the cyprini. See Fundulus.

There are two ſpecies of the *gudgeon*. The firſt is our common river *gudgeon*, the *cyprinus gobio* of Linnæus, with eleven rays in the anal fin, and two cirrhi, known by its thick and rounded body, the ſmallneſs of its ſcales, its brown colour, with the variegations of its black ſpots, and its forked tail. The ſecond is the leſſer river *gudgeon*, differing from the former not only in ſize but in being of a more tapering ſhape, growing very ſmall toward the tail, and being of a whiter colour and leſs ſpotted. The firſt is common in our rivers (ſee *Gudgeon* Fishing); the ſecond in thoſe of Germany, where it is commonly called a *wapper*.

Gudgeon, *ſea.* See Goget.

Gudgeons, in a *Ship*, is uſed for the eyes driven into the ſtern-poſt, into which the pintles of the rudder go, to hang it on.

GUEBUCU, in *Zoology*, the name by which ſome have called the fiſh more uſually known by the name of the bicauda, a kind of ſword-fiſh.

GUELPHS, or Guelfs, a celebrated faction in Italy, antagoniſts of the Gibelins.

The *Guelphs* and Gibelins filled Italy with blood and carnage for many years. The *Guelphs* ſtood for the pope, againſt the emperor. Their riſe is referred, by ſome, to the time of Conrad III. in the twelfth century; by others, to that of Frederic I. and by others, to that of his ſucceſſor, Frederic II. in the thirteenth century.

The name *Guelph* is commonly ſaid to have been formed from *Welfe*, *Welfo*, on the following occaſion: the emperor Conrad III. having taken the duchy of Bavaria from Welfe VI. brother to Henry duke of Bavaria; Welfe, aſſiſted by the forces of Roger king of Sicily, made war on Conrad, and thus gave birth to the faction of the *Guelphs*.

Others derive the name *Guelphs* from the German *Wolff*, on account of the grievous evils committed by that cruel faction. Others deduce the denomination from that of a German called *Guelfe*, who lived at Piſtoye; adding, that his brother, named *Gibel*, gave his name to the Gibelins; under which head the reader will find more ample account of the origin and hiſtory of thoſe celebrated factions.

GUERITE, in *Fortification*, a centry-box; being a ſmall tower of wood, or ſtone, placed uſually on the point of a baſtion, or on the angles of the ſhoulder, to hold a centinel, who is to take care of the ditch, and watch againſt a ſurprize.

GUERKIN, or Gherkin, a kind of cucumbers for pickling.

GUERNSEY *lily*. See Amaryllis.

GUESDA, in *Botany*, is properly the name of woad; but it is alſo uſed by ſome for the *lutum*, or *luta herbea* of the Romans, and *cymene* of the Greeks. This is an error in too many of the old authors, though ſo palpable that one would have thought no body could have run into it; the *lutum*, or *cymene*, having been always uſed to dye yellow, and the *glaſtum*, or *gueſda*, to dye blue; and the characters of the *lutum*, or *cymene*, plainly ſhewing it to be our *geniſtella tinctoria*, or dyers-weed, but not at all agreeing with the *glaſtum*, or woad.

GUEST-*rope*, on *Ship-board*, is that rope by which the boat is kept from *ſteeving*, or going too much in and out, as ſhe lies in the tow of a ſhip.

GUEST-TAKERS, or Gist-takers. See Agistor.

GUET. See Watch.

GUETTARDA, in *Botany*, a genus of the *monoecia heptandria* claſs, bearing male and female flowers in a cylindric cup; the corolla of each is divided into five ſegments, and that of the male funnel-ſhaped; the female has a ſingle piſtil, and the fruit is a dry drupe.

GUEULE, in *Architecture*. See Gula.

GUFFER, in *Ichthyology*. See Eel-*pout*.

GUIANA-*bark*, in the *Materia Medica*, the ſame with what is otherwiſe called sima-*rouba*.

GUIDA, in the *Italian Muſic*, the guide, or leading voice, or inſtrument, in fugues. The parts that are to imitate and follow, are ſaid to be *in conſequenza*. See Fugue.

GUIDAGE, Guidagium, in ancient *Law-Writers*, money paid for ſafe-conduct through unknown ways, or a ſtrange country.

GUIDES, in *Military Language*, are uſually the country people in the neighbourhood of an encampment; who give the army intelligence concerning the country, the roads by which they are to march, and the probable route of the enemy.

GUIDON, a ſort of flag, or ſtandard, borne by the king's life-guard; being broad at one extreme, and almoſt pointed at the other, and ſlit, or divided, into two.

The *guidon* is the enſign, or flag, of a troop of horſe-guards. See Guard.

Guidon alſo denotes the officer who bears the *guidon*. The *guidon* is that in the horſe-guards, which the enſign is in the foot. The *guidon* of a troop of horſe takes place next below the cornet.

GUIDONS, GUIDONES, or *ſchola guidonum*, was a company of prieſts eſtabliſhed by Charlemagne, at Rome, to conduct and guide pilgrims to Jeruſalem, to viſit the holy places: they were alſo to aſſiſt them in caſe they fell ſick, and to perform the laſt offices to them in caſe they died.

GUIDONIA, in *Botany*, the name given by Plumier to the plant called afterwards by Linnæus SAMYDA, and ſuppoſed to be allied to the melia.

GUIDONIS *glandula*. See GLANDULA.

GUILANDINA, in *Botany*, the *bonduc*, or *nickar tree*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the empalement of the flower is bell-ſhaped, cut at the rim into five equal parts; the flower has five concave ſpear-ſhaped petals, which are equal, inſerted into the empalement; in the center is ſituated an oblong germen, which becomes a rhomboid pod, with a convex ſuture on the upper ſide, having one cell, including oval hard ſeeds, ſeparated by partitions. There are five ſpecies, natives of different parts of the Eaſt and Weſt Indies.

The ſeeds, which are called Molucca nuts, are eſteemed good in colics and hernias; and are ſaid to diſcuſs flatulencies, comfort a weak ſtomach, provoke the menſes, and expel the ſtone.

GUILD, GILD, or GELD. See GILD, and GELD.

GUILD-HALL, or GILD-HALL, the great court of judicature for the city of London.

In it are kept the *mayor's* COURT, the ſheriff's court, the COURT *of huſtings*, COURT *of conſcience*, court of common council, chamberlain's court, &c.

Here alſo the judges ſit upon *niſi prius*, &c.

GUILLEM, in *Ornithology*, the name given in many parts of England to the bird called by authors LOMMIA, and in ſome places the *kiddaw* and *ſea-hen*.

GUILLEMOT, *black*. See *Sea turtle* DOVE.

GUILLEMITES, an order of monks in Flanders, whoſe habit reſembles that of the Ciſtercians: they follow the rule of St. Auguſtine, and are governed by a ſuperior, who does not take the title of provincial, and is elected every four years.

GUILT *rents*. See GILD.

GUINEA, a gold coin, ſtruck and current in England.

The value, or rate, of *guineas*, has varied: it was firſt ſtruck on the footing of twenty ſhillings; by the ſcarcity of gold was afterwards advanced to twenty-one ſhillings and ſix-pence; but it is now ſunk to twenty-one ſhillings. The pound weight troy of gold is cut into forty-four parts and a half; each part makes a *guinea*. See GOLD, STANDARD, and MONEY.

This coin took its denomination, *guinea*, becauſe the gold, whereof the firſt was ſtruck, was brought from that part of Africa called *Guinea*; for which reaſon it likewiſe bore the impreſſion of an elephant.

GUINEA *company*. See COMPANY.

GUINEA *hen*, the *meleagris* of ſome authors and the *numida* of Linnæus, in *Ornithology*, is the name of a ſpecies of gallinaceous fowl, of the ſize of the common hen, but with a longer neck. Its body is ſloped like that of a partridge, and its colour is all over a dark grey, very beautifully ſpotted with ſmall white ſpecks; there is a black ring round the neck; its head is reddiſh, and has on its top a hard horny protuberance of a brown colour; it is blue under the eyes, and has a red fleſhy appendage hanging down from thence. They naturally herd together in large numbers, and breed up their young in common; the females taking care of the broods of others, as well as of their own. They breed very well with us. Their fleſh is tender and ſweet; generally white, though ſometimes black.

They are not ſo tame and domeſtic as our own fowls, and particularly they will not lay in houſes, but get into the hedges and among buſhes, where they lay and hatch; but this is the occaſion of great loſs among them, the wild vermin deſtroying a great part of their young brood. The female alſo is leſs careful about the great buſineſs of hatching and taking care of them, than any other bird we are acquainted with: the beſt method, therefore, is to ſet other fowls upon the eggs of this kind. The young fowls of this kind are very beautiful; they look like ſo many partridges. Their beaks and legs are red, and their whole plumage is at that time of the colour of the partridge. See *Tab. of Birds*, N° 2.

The hen, if her neſt is found, and the eggs at times taken away, but ſo as always to have one there, will continue to lay till ſhe has depoſited a hundred, or ſometimes a hundred and fifty eggs, which are very well-taſted. This is a very active and ſprightly bird, and of an unquiet and troubleſome diſpoſition to the owner. It runs very ſwiftly, in the manner of the quail and partridge; but its wings are ſhort, and it is not made for flying; yet at night it will not rooſt among other fowl, but gets upon a houſe or tree, or any other high and ſafe place. The cry of the bird is ſharp and diſagreeable to many ears, and it is almoſt continually making it. It is of a quarrelſome diſpoſition, and will be miſtreſs of the yard: its agility, and the ſharpneſs of its beak, generally obtain it the victory with whatever bird it fights. The *pintado* is ſo common in America, that many have ſuppoſed it native there; but this is not the caſe: the origin of the bird is in Guinea, where they are found in flocks of two or three hundred, that perch on trees, and feed on worms and graſshoppers; and the firſt that were ever brought into America, were brought in the year 1508, with the cargoes of negro ſlaves. The Spaniards, neither at that time, nor ever ſince, have attempted to tame them, or render them domeſtic, uſeful birds, but let them go looſe and wild in the ſavannas, where they have increaſed to ſuch prodigious numbers, that they may well appear native, and are ſeen in vaſt flocks together, and are called *marroon pintades* by the Spaniards and French. Obſerv. ſur les Cout. de l'Aſie, p. 190.

GUINEA *henweed*. See *Guinea* HENWEED.

GUINEA *pepper*. See PEPPER.

GUINEA-*pig*, or *mus porcellus* of Linnæus, the name given by our common people to a ſort of animal, diſtinguiſhed by authors by the name of *mus porcelli pilis et voce, the rat with the hair and voice of a hog*.

It is a creature properly of the rat kind, and is not improperly called by Mr. Ray *mus Americanus et Guinienſis porcelli pilis et voce, the American or Guinea rat with the hair and voice of a pig*; though the ſame author ſeems to doubt whether it has not ſomething of the rabbit kind in it, by adding after the word *mus* that of *cuniculus*.

It is ſmaller than the rabbit, and has a ſhorter and thicker body; its ears are roundiſh, low, thin, pellucid, and very wide open, and are almoſt ſmooth; and are obſerved to be very nearly as large in the new-brought-forth creatures as in the full-grown.

Its noſe and beard are very much like thoſe of the hare, the long hairs which ſerve for whiſkers being diſpoſed in much the ſame manner; and its upper-lip is like that of the rabbit: two cutting teeth in each jaw are diſpoſed exactly as in the rat kind, and its hairs and grunting voice are wholly like thoſe of the pig.

It is ſometimes all over white, ſometimes all over of a reddiſh tawney; but moſt frequently it is mottled with large ſpots of both. Its fore-feet have four claws, its hinder ones only three, of which the middle one is much longer than the others. It ſits often upon its buttocks, in the manner of the rabbit, but it does not walk in the leaping manner of the rabbit kind, but as the hog, by ſetting one foot before the other; and in walking bears upon the heel, in the manner of the bear. It does not burrow in the earth; breeds at two months old; brings forth from four to twelve young ones at a time, which are not ſo blind at firſt as in the rabbit; and breeds every two months. It feeds on vegetables, and its fleſh is very well-taſted, and much reſembles that of the hog. This animal inhabits Braſil, but is domeſticated in Europe. Rats are ſaid to avoid their haunts. Ray's Syn. Quad. p. 223.

It is a very ſingular kind of animal, and there are three ſorts of it, all different from one another. 1. The *porcellus Indicus*, or common *Guinea-pig*. 2. The AGUTI. And, 3. The PACA of the Americans. See alſo APEREA and *Java* HARE.

GUINEA *wheat*. See MAIZE.

GUINEA *worm*. See CHAETIA and DRACUNCULI.

GUINIAD, or GWINIAD, i. e. *whiting*, ſo called on account of the whiteneſs of its ſcales, the *ſalmo lavaretus* of Linnæus, in *Ichthyology*, is a name given by ſome to the fiſh known among authors by the name of *ferra*, a fiſh of the truttaceous kind, common in the lakes of Wales, particularly in that called Llyntegid, near Bala, in Merionethſhire, and ſome of the northern counties of England; and in the laſt of theſe places called the *ſchelley*. It is alſo found in the lakes of Switzerland, Italy, Norway, Sweden, Lapland, Scotland, and Ireland. The head is ſmall, ſmooth, and of a duſky hue; the eyes large, the noſe blunt at the end, the jaws of equal length, the mouth ſmall and without teeth; the branchioſtegous rays nine; the covers of the gills ſilvery, powdered with black; the back is a little arched, the colour gloſſed with a deep purple and blue, but near the lateral lines aſſumes a ſilvery caſt tinged with gold; the ſide-line is ſtrait, and is formed of diſtinct ſpots of a duſky hue; the belly is a little prominent, and quite flat at the bottom; the firſt dorſal fin, near the middle, conſiſts of fourteen branched rays; the ſecond is near the tail, and is thin and tranſparent; the pectoral fins have eighteen rays, the ventral twelve, and the anal fifteen, which are all branched at their ends; the tail is much forked; the ſcales are large, and adhere to the body.

The *gwiniad* has an inſipid taſte, and will not keep long.

Their ſpawning ſeaſon in Llyntegid is in December. Camden obſerves, that this fiſh never wanders into the river Dee, and that the ſalmon never ventures into the lake: this is generally, but not univerſally the caſe. Pennant, and Phil. Tranſ. vol. lvii. for 1767, p. 211.

GUIRA-ACANGATARA, in *Ornithology*, the name of a Braſilian bird of the woodpecker kind, and of the ſize of our large ſpotted woodpecker. It is common in the woods in ſeveral parts of America, and, like our woodpeckers, makes a very loud yelling. Marcgrave.

GUIRACENOIA, in *Ornithology*, the name of a ſmall Braſilian bird of the parus or titmouſe kind. Its head, throat, breaſt, belly, and the lower half of its beak, are all of a fine blue; its neck, and the upper half of its back, black; its wings are black, variegated with blue; its tail is black, and its legs brown. Marcgrave.

GUIRACOEREBA, in *Ornithology*, the name of a Braſilian bird of the ſize of a greenfinch. Its head is ornamented with a large ſpot of ſea-green feathers; the reſt of its head, its throat, its breaſt and belly, and the lower half of its back, are of a fine ſhining blue, with white variegations. There runs a fine blue line acroſs the wings. The upper half of the back is of the deepeſt black imaginable, and is very gloſſy and ſhining; the tail is black, and the wings are large, and have a great deal of yellow in them, but that is not ſeen unleſs when the bird is flying. Marcgrave.

GUIRA-GUAINUMBI, in *Ornithology*, the name of a bird of the king-fiſher or merops kind, of the ſize of a pigeon in appearance, being very thick covered with feathers, but its body is really not larger than that of a thruſh; the bill is longiſh and black, a little crooked, and notched at the edges like the teeth of a ſaw; its legs are very ſhort; its tail very long, and very narrow. It is a very beautiful coloured bird. Marcgrave.

GUIRANHEEMGATU, in *Ornithology*, the name of a Braſilian ſparrow. Marcgrave.

GUIRAPANGA, in *Ornithology*, the name of a Braſilian bird of the thruſh kind, remarkable for the loudneſs of its voice. It is the largeſt of all the thruſh kind, approaching to the ſize of a ſmall pigeon. Its only ſounds are *cick cock kur kur kur*, which it repeats almoſt inceſſantly during the ſeaſon when it cries, which is only for ſix or ſeven weeks, about Midſummer. Marcgrave.

GUIRAPERA, in *Ornithology*, the name of a Braſilian bird. It is of the ſize of a lark, and has a ſhort, thick, black beak; its head, neck, back, and belly, are of a pale yellow, like that of wax; and the lower part of the head, the throat, and the breaſt, are black; the wings and tail are brown and black, with a ſlight variegation of ſea-green. Marcgrave.

GUIRAGUACUBERABA, in *Ornithology*, the name of a Braſilian bird of the ſize of a goldfinch. Its throat and the extremity of the belly are of a fine pale yellow, as is alſo the back; its head, the outſide of its neck, and the anterior half of its back are of a pale green, as are alſo its wings and tail; but the wings have ſome brown feathers intermixed; it has a large black ſpot under its throat, reaching almoſt to its eyes; its beak is ſtrait, ſlender, and pointed; its feet are brown. Marcgrave.

GUIRAQUEREA, in *Ornithology*, the name of a Braſilian bird of the caprimulgus or goat-ſucker kind, a ſort of ſmall owl, approaching to the figure of the cuckow. It is about the ſize of the lark, but its wings and tail are very long, which make it look much larger than it is; its legs are very ſhort, and its toes are connected by a membrane, but not webbed like the ducks. It is not ſaid whether this be a night-bird, or one that flies by day-light; but probably it is of the firſt kind, as its whole figure reſembles the caprimulgus. Ray's Ornithology, p. 71.

GUIRARA-NHAENGETA, in *Ornithology*, the name of a Braſilian bird of the œnanthe or wheat-ear kind. Marcgrave.

GUIRATANGEIMA, in *Ornithology*, the name of a Braſilian bird of the woodpecker kind. It is of the ſize of a lark. There is a great deal of beauty in the contrivance of the neſt of this bird; it is of a long cylindric figure, and is very nicely hung down from the firm twigs of trees. Marcgrave.

GUIRATINGA, in *Ornithology*, the name of a Braſilian bird of the heron kind, but ſmaller than the common heron. It walks very erect, its neck is long, and its feet and legs of a greeniſh yellow; it is all over of a pure ſnow white, and its neck-feathers are whiter and ſofter than thoſe of the oſtrich. It is always ſeen above water. Marcgrave.

GUIRATIRICA, in *Ornithology*, the name of a Braſilian bird of the bulfinch kind, called by Mr. Ray *rubicilla Americana*. It is of the ſize of a lark, and has a very ſtrong beak. Marcgrave.

GUIRAUPIAGARA, in *Zoology*, the name of a ſpecies of ſerpent found in America, and ſo called from its love of eggs, the word expreſſing a devourer of eggs. It is a long ſlender ſnake, black on the back, and yellow on the belly; it is a great climber of trees, and roils about among their upper branches, as ſwiftly as if ſwimming in water; it is a great enemy to birds, deſtroying vaſt quantities of their eggs. Ray's Syn. Animal. p. 329.

GUIRON. See GIRON.

GUITARRA, GUITAR, in the *Italian Muſic*, the name of a muſical inſtrument of the ſtring kind, with five double rows of ſtrings, of which thoſe that form the baſe are in the middle; unleſs it be one for the burden, an octave lower than the fourth.

This inſtrument was firſt uſed in Spain, and the Italians give it the particular denomination of *Spagnuola*. It is found in Italy and other countries, but more frequently in Spain. The old Engliſh name of this inſtrument was CITTERN; and as the practice of it is very eaſy, it was formerly the recreation of lewd women and their viſitors, and hence uſed as the ſymbol of a proſtitute.

GUITGUIT, in *Ornithology*, the name under which Nieremberg has deſcribed a bird, which he ſays is no larger than a wren, and of a beautiful green colour, and much eſteemed for the table. This bird, he ſays, has great courage, though ſo very ſmall, and often attacks whole flights of ravens, which it perſecutes till they ſeek ſhelter among reeds and in thickets, to hide themſelves from it. Mr. Ray eſteems the whole to be an entirely fabulous and falſe account, contrived as an imitation of the ancient tradition of the wren's fighting the eagle.

GULA, in *Anatomy*, the OESOPHAGUS or gullet; that conduit by which animals take down food into the ſtomach.

GULÆ *vaginalis*. See VAGINALIS.

GULA, GUEULE, or GOLA, in *Architecture*, a wavy member, whoſe contour reſembles the letter S; called by the Greeks CYMATIUM, q. d. a little wave, and by our workmen an OGEE. See *Tab. Archit. fig.* 25. N° 2.

This member is of two kinds; *recta* and *inverſa*. The firſt and principal has its cavity above, and convexity below. This always makes the top of the corona of the cornice, jetting over the drip of the cornice like a wave ready to fall. It is called *gula recta*, and by the French *doucine*. Sometimes it is abſolutely called the *entablature*, as being the firſt or uppermoſt member thereof.

The ſecond is juſt the reverſe of the former, its cavity being at the bottom; ſo that it appears inverted with regard to the former. This is uſed in the architrave, and ſometimes in the cornice, along with the former, only ſeparated by a reglet.

Some derive the word from the reſemblance theſe members bear to the *gula* or throat of a man; others, from the heralds term *gules*, as ſuppoſing the moulding formed from the ancient manner of wearing their garments, which conſiſted of ſlips or ſwaths, alternately furr and ſtuff, of various colours, the intervals between which were called *gules* or *guales*.

GULASISI, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to a very ſmall and very beautiful ſpecies of PARROT.

GULBE, in *Architecture*, the ſame as GORGE.

GULE *of Auguſt*, the day of St. Peter *ad vincula*, which is celebrated on the firſt of Auguſt.

It is called the *gule of Auguſt*, from the Latin *gula*, a *throat*, for this reaſon, that one Quirinus, a tribune, having a daughter that had a diſeaſe in her throat, went to pope Alexander, the ſixth from St. Peter, and deſired of him to ſee the chains that St. Peter was chained with under Nero, which requeſt being granted, and ſhe, kiſſing the chains, was cured of her diſeaſe: whereupon the pope inſtituted this feaſt in honour of St. Peter, and, as before, this day was termed only the calends of Auguſt; it was on this occaſion called indifferently either the day of St. Peter *ad vincula*, from what wrought the miracle; or the *gule of Auguſt*, from that part of the virgin whereon it was wrought.

GULES, in *Heraldry*, ſignifies the colour of red.

The word is French *gueules*, which Fa. Moned derives from the Hebrew *glud* or *guludid*, a reddiſh pellicle or ſkin appearing on a wound when it begins to heal; but F. Meneſtrier reproaches him, that there were no ſuch words in the Hebrew tongue. This, however, is not ſtrictly true: all the eaſtern languages, the Hebrew, Chaldee, Syriac, and Arabs, ſay, גלד, *gheld*, for *cutis*, *pellis*: whence the Arabic *gulud*: and in the general, the word *gules* ſignifies *red*, among moſt of the oriental nations: the Arabs and Perſians give the name to the roſe. Others, with Nicod, derive the name *gules* from *gula*, the throats of animals being generally red; or from the Latin *cuſculium*, which is the κοκκος of the Greeks, or ſcarlet grain.

The ſame colour, in the coats of noblemen, is by ſome called *ruby*, and in thoſe of ſovereign princes, *Mars*; but this is no ſtanding practice.

In engraving, *gules* is expreſſed by perpendicular ſtrokes drawn from the top of the eſcutcheon to the bottom; it is alſo marked with the letter G. *Tab.* II. *Heraldry, fig.* 56.

This colour is reputed a ſymbol of charity, valour, hardineſs, generoſity; and repreſents blood-colour, cinnabar, and true ſcarlet. It is the firſt of all colours uſed in armoury; and is of that account, that anciently it was prohibited any perſon to wear *gules* in his coat-armour, unleſs he were a prince, or had permiſſion from the prince.

Spelman, in his Aſpalogia, ſays, that this colour was particularly honoured by the Romans, as it had been before by the Trojans; and that they painted the bodies of their gods, and of their generals that triumphed, with vermilion. Under the conſuls, the Roman ſoldiers wore red, whence they were denominated *ruſſati.* Joan. de Bado Aureo adds, that the red dye, which the Greeks call *Phœnician*, and we *ſcarlet*, was firſt uſed by the Romans, to prevent ſeeing the blood iſſue from wounds in fight.

In effect, *gules* has always been eſteemed an imperial colour: the emperors were cloathed, ſhod, and had their apartments furniſhed with red; their edicts, diſpatches, ſignatures, and ſeals, were of red ink and red wax, whence the name *rubrics*.

GULL, in *Ornithology*, properly the common name of all the LARUS kind, but generally underſtood only as the name of the common black and white kind, or the *larus marinus* of Linnæus. This is the largeſt of all the *gull* kind; it uſually weighs between four and five pounds. Its beak is yellow, flatted ſideways, and three fingers breadth long, and a little hooked at the end, but the lower mandible is marked with a red ſpot, with a black one in the middle; its head is large and flatted at the top, and its back, breaſt, belly, and tail white, but with a little blackneſs juſt in the middle of the back, and in the long feathers of the wings; its legs and feet are white, and its hinder toe very ſhort; its mouth opens to a great width; it feeds on fiſh, and, like the raven, greedily devours carrion; it breeds in the higheſt cliffs, and is common on ſome of our coaſts.

There are properly two ſubordinate genera of theſe birds; the firſt is of thoſe which are large, and have an even, not forked tail, and have a tubercle in the lower chap of their bill; the other of the ſmaller ones, which have all forked tails, and have no tubercle in the lower chap. Of the firſt genus are the *great gull*, the HERRING-*gull*, the *ſea*-MALL, the *ſea*-MEB, the TARROCK, the FEWIT, the KITTIWAKE, the CATARACTA or SKUA, the MARTINAZZO; the CODDY MODDY, which Linnæus makes ſynonymous with the *tarrock*, but diſtinguiſhed by others; it frequents, during winter, the moiſt meadows in the inland parts of England, far from the ſea; the WINDER-*meb*, the CEPPHUS, the *brown* TERN, the *gaviota*, and the *arctic* bird or STRUNTJAGGER. And of the ſecond or ſmaller kind are the STERNA, the FISCHERLIN, the SCARECROW, and four ſpecies of the LARUS *fidipes*. Ray and Pennant.

GULLET. See OESOPHAGUS.

GULO. See GLUTTON.

GULOICK, in *Architecture*. See IMPOST.

GULPH, or GULF, in *Geography*, an arm or part of the ocean, running up with the land, and forming a capacious bay between two promontories.

The word comes from the French *golfe*, and that from the Italian *golfo*, which ſignify the ſame. Some deduce theſe farther, from the Greek κολπος; which Guichart again derives from the Hebrew גאב, *gob*: Du Cange derives them from the barbarous Latin *gulſum* or *gulſus*, which ſignify the ſame thing.

Such is the *gulph* of Venice, called alſo the Adriatic Sea; the *gulph* of Conſtantinople, called the Black Sea; the *gulph* of Perſia, called the Red Sea; the *gulph* of Lyons; the *gulph* of Sidra, near Barbary; the *gulph* of Mexico, of St. Lawrence, of California; the *gulph* of Bengal, and thoſe of Cochinchina and Kamtſchatka.

A *gulph* is ſtrictly diſtinguiſhed from a SEA, becauſe the latter is larger; from a *bay* or ſinus it is again diſtinguiſhed, by its being greater than the ſame.

Some will have it eſſential to a *gulph*, to run into the land through a ſtreight or narrow paſſage

The ſea is always moſt dangerous near *gulphs*, becauſe of the currents being penned up by the ſhores.

GULYAVAN, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to a very beautiful bird, common in that part of the world; it is of the ſize of a turtle-dove, and is very beautifully variegated with black and gold-coloured feathers. It feeds on fruits.

GUM, GUMMI, a mucilaginous juice, of no particular ſmell or taſte, exuding through the pores of certain plants or trees, and there hardening into a tenacious tranſparent maſs, by the evaporation of the greateſt part of their ſuperabundant water.

Gum is properly one of the juices of the bark: it is drawn thence by the ſun's warmth, in form of a glutinous humour; and by the ſame cauſe, is afterwards inſpiſſated, concocted, and rendered tenacious.

The chemical character of *gums*, whereby they are diſtinguiſhed from *reſins* and other vegetable juices, is, that they are diſſoluble in water, forming with it a viſcid tranſparent fluid; but not diſſoluble in vinous ſpirits or oils; that they burn in the fire to a black coal, without melting or catching flame; and that they ſuffer no diſſipation in the heat of boiling water. Of this kind of *gum* there are reckoned three kinds, viz. *gum Arabic*, *gum tragacanth*, and the *ordinary gums* gathered from moſt fruit-trees, as almond, apricot, plum, and cherry, &c. But this character, is to be obſerved, excludes a great part of thoſe commonly called *gums*.

In the general, *gums* are more viſcid and leſs friable, and are generally diſſoluble in any aqueous menſtruum; whereas reſins are more ſulphureous, and require a ſpirituous or oily diſſolvent. Boerhaave conſiders a *gum* as a ſort of ſaponaceous fat, which, beſide its oily principle in common with a reſin, has ſome other ingredient that renders it miſcible with water.

GUM *reſins* are juices, partly mucilaginous and partly oily, which flow from many kinds of trees, and which become concrete by the evaporation of their fineſt fluid parts. The mucilaginous and oily parts, though intimately mixed, are not abſolutely combined with each other; and, therefore *gum reſins* are not perfectly ſoluble either by water, by oils, or by ſpirit of wine ſingly: a kind of ſolution is effected by the aid of trituration, e. gr. in water; but the reſinous part remains ſuſpended, and forms a kind of EMULSION, being divided but not diſſolved, whilſt the *gummy* part is entirely ſoluble in water, and forms a mucilage with it. For the complete ſolution of a *gum* reſin, the reſinous part muſt be ſeparated from the *gummy* part, by applying alternately a ſpirituous and a watery menſtruum. All *gum* reſins are combined of ſubſtances not mutually ſoluble by each other, and therefore the compound bodies reſulting from their mixture muſt be opake: all thoſe concrete juices that are not evidently tranſparent, may, from hence, be reaſonably ſuſpected to be of a *gummy* reſinous nature; ſuch are *myrrh*, *bdellium*, *ſagapenum*, *opopanax*, *aſſa-fœtida*, &c. See RESINS. Chem. Dict. art. *Gum*.

Grew, in his Anatomy of Plants, makes the following remarks concerning the import of the word *gum*, and the diſtinction thereof both from a RESIN and a MUCILAGE.

A reſin, he obſerves, is originally a turpentine or acidulous liquor, having an exceeding ſmall quantity of watery parts mixed therewith; and which, for that reaſon, will not be diſſolved in water, but only in oil: of this kind are maſtic, benzion, tacamahaca, commonly called *gums*, though, ſtrictly ſpeaking, they are all true reſins. A *gum*, on the other hand, is originally a milky liquor, having a greater quantity of water mixed with its oily parts; and which, for that reaſon, diſſolves either in water or oil: of this kind are ſagapenum, opopanax, ammoniac, &c.

A third ſort of *gum* is that which is unoily, and which, therefore, diſſolves only in water; as *gum* Arabic, the *gum* of the cherry-tree, &c.

Theſe laſt ſubſtances, though commonly called *gums*, are only dried mucilages; being originally nothing elſe but the mucilaginous lymph iſſuing from the veſſels of the tree, in the ſame manner as it does from comfrey, mallows, &c. and even from the cucumber; the veſſels thereof, upon being cut acroſs, yielding a lymph which is plainly mucilaginous, and which being well dried, at length becomes a kind of *gum*, or rather a hardened mucilage.

In like manner, the *gums* of the plum-tree, cherry-tree, and the like, are nothing elſe but dried mucilages.

If we will take the word in its wideſt ſenſe, all *gums* are originally either a terebinth, or a milk, or a mucilage.

Gums, in medicine, ſhould always be ſtrained before they are uſed, as being ſeldom free from droſs and other admixtures, which hinder their operation.

Dr. Pringle, in his Obſervations on the Diſeaſes of the Army, tells us, that *gums* are all powerful ANTISEPTICS.

Theophraſtus ſpeaks of a way of multiplying plants, performed *per lachrymas*, by means of the *gum* or reſin; but Agricola takes this to be only practicable where there are ſeeds accidentally fallen into the *gum*.

GUM *aloes*. See ALOES.

GUM *ammoniac*. See AMMONIAC.

GUM *anime*. See ANIME.

GUM *apples*, in Languedoc, and ſome other parts of France. The juice of apples will ſometimes exſudate through their rind, and congeal all about them in form of a clear white *gum*, hard like ice, becauſe of its being ſoon dried in the ſun into a thin cake. The people call ſuch an apple *pomme gelée*, or *a frozen apple*. It is very common to ſee apples covered in part with this *gum* in ſeveral ſpecks; but it is more rare to meet with them wholly ſo. The *gum* is inſipid to the taſte.

We have one plant cultivated in ſome gardens, which yields in the heat of ſummer ſuch another white, icy, and taſteleſs *gum*. This is the common rhubarb, of the ſtalks of the leaves of which tarts are made. The ribs of the larger leaves of this plant, in June and July, are covered with large tranſparent drops of this *gum*, and an ounce of it may be ſometimes collected from a ſingle plant. Philoſ. Tranſ. N° 224.

The common plums and ſloes in our hedges alſo afford the ſame clear and taſteleſs white *gum*. If they are wounded on purpoſe for it, they uſually throw more or leſs of it out at the wound; but this is after ſome time, and is not in ſo large quantity as what they naturally throw out. The common laurel alſo affords a little tranſparent, white, and taſteleſs *gum* of no ill effect, though its leaves are poiſonous. And it ſeems, upon the whole, that this clear juice is not peculiar to apples, or to two or three plants only; but that a great number, even moſt of them, do contain it, if we knew by what means to get it from them.

Gum *Arabic*, called alſo *Thebaic*, *Saracenic*, *Babylonic*, and *Acanthine*, from the places or the tree which produce it, is the juice of a little tree growing in Egypt, and alſo in divers parts of America, of the acacia kind, called in Latin *acacia vera*: it is very tranſparent, glutinous upon the tongue, almoſt inſipid to the taſte, often twiſted ſometimes in the nature of a worm, and of a clear whitiſh or a pale yellow colour.

It is very common among us, but little is to be met with which is genuine; it is frequently adulterated with our common cherry and plum-tree *gums*, which are generally leſs white and leſs tranſparent. That is accounted beſt which is in ſmalleſt pieces, and almoſt of a white colour.

It diſſolves eaſily in any aqueous liquor, and is uſed in making an aqueous vehicle for colours in painting, and for a variety of mechanical purpoſes: in medicine, it is good in all kinds of fluxes; particularly in catarrhs, as it thickens and ſoftens the too acrimonious humours: it is eſteemed good to incraſſate, to ſtop the pores, blunt the points of too pungent medicines, and temper the acrimony of the trachea in coughs, &c.

It is chiefly given in the form of powder, from a ſcruple to a dram or two, and ſometimes diſſolved in water, in ſuch proportion as not to make the liquor diſagreeably ſlimy: an ounce renders a pint of water conſiderably glutinous, four ounces form the conſiſtence of ſyrup. Though *gum*, in its dry ſtate, is not affected by oily liquors, yet one part of *gum Arabic*, ſoftened with an equal weight of water, is ſufficient for rendering four parts or more of oil or balſam diſſoluble. The ſolid reſins may in like manner be reduced into emulſions, by grinding them thoroughly with powdered *gum*, and adding the water by degrees: by theſe means, all reſinous and oily bodies may be diſſolved in watery liquors. Theſe emulſions, as well as the ſimple ſolutions of *gum* in water, mingle uniformly with acids and neutral ſalts; but, on the mixture of any alkali, their parts are immediately ſeparated. Lewis, Mat. Med. Lond. Med. Obſ. &c. vol. i. art. 28.

Gum *aſſa-fœtida*. See Assa-*fœtida*.

Gum *bdellium*. See Bdellium.

Gum *copal*. See Copal.

Gum *elemi*. See Elemi.

Gum *euphorbium*. See Euphorbium.

Gum *guaiacum*. See Guaiacum.

Gum *gutta*, or *gutta gamba*, or *ghitta gemou*, popularly *gamboge*. See Gamboge.

Gum *lac*. See Lacca.

Gum *manna*. See Manna.

Gum *maſtic*. See Mastic.

Gum *myrrh*. See Myrrh.

Gum *opium*. See Opium.

Gum *opopanax*. See Opopanax.

Gum *ſagapenum*. See Sagapenum.

Gum *ſandarach*. See Sandarach.

Gum *ſanguis draconis*. See Dragon's *blood*.

Gum *ſcammony*. See Scammony.

Gum *ſeneca*, or *ſenega*, is the gum ordinarily ſold by the druggiſts for *gum* Arabic, which it reſembles very nearly both as to form and virtue. It is either white, bordering on yellow, or of a deep amber colour, tranſparent, &c. It ouſes out of a prickly ſhrub common enough in Africa, and of the ſame genus with that which affords the *gum* Arabic. The greater part of this *gum* is in larger and darker-coloured maſſes than the Arabic, and not ſmooth like it, but rough on the outſide. This is ſuppoſed to be the ſtrongeſt and moſt ſubſtantial, and the Arabic the pureſt and fineſt.

The *gum* Senegal is chiefly employed by the callico-printers, and in other buſineſſes where *gums* are made uſe of. A proper vehicle for water-colours in painting may be formed by mixing a third or fourth part of the *gum* Senegal with *gum* Arabic, for the former dries more ſlowly than the latter, which is ſubject to crack and ſeparate from the cartoon or grounds, on which the colour is laid with it, without ſome ſuch mixture.

The *gum* is brought to us from Senegal, whence its name.

Gum *tacamahaca*. See Tacamahaca.

Gum *tragacanth*. See Tragacanth.

Gum-*boils*, a morbid affection of the *gums*, called by the writers of ſurgery *parulides*. Theſe are of different degrees, and uſually ariſe from pains in the teeth. They are to be treated by diſcutients as other inflammatory tumors; but if theſe fail, or the diſorder is neglected, it uſually terminates in an abſceſs or fiſtula. Sage, camomile, and elder-flowers, boiled in milk and water, make a good gargariſm to be held in the mouth, and the remaining herbs may be ſowed up in a bag to be kept hot to the cheek. A half-roaſted fig is a very good internal application; and when the ſoftneſs of the tumor ſhews that the matter is ſuppurated, it ought immediately to be opened by the lancet, to prevent the matter's lodging there and eroding the bone, and producing a fiſtula or caries. After it is opened, the matter ſhould be gently preſſed out with the fingers, and the mouth frequently waſhed with red wine, mixed with a decoction of vulnerary herbs, till it is well. When the ulcer has penetrated deep, it will be neceſſary to inject the ſame liquors with a ſyringe, and compreſs the part by a proper external bandage, to make the bottom part heal firſt: and when it is already become fiſtulous, and has callous edges, it may then often be cured by injecting tincture of myrrh and elixir proprietatis, continuing this for ſome time. If all theſe prove ineffectual, the fiſtula muſt be laid open by inciſion, and the caries removed by medicines, cauſtics, or the actual cautery. If this proceeds, as ſometimes it does, from a carious tooth, this is firſt to be drawn before any thing elſe can be done; and it is a good rule in theſe caſes always to be rather too ſoon than too late in laying them open. Heiſter.

Gum *ſuccory*, *chondrilla*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the flower is compoſed of many hermaphrodite florets, which are uniform, and included in a cylindrical ſcaly empalement; theſe have one petal, which is ſtretched out on one ſide like a tongue, and they have each five ſhort hairy ſtamina: the germen is ſituated under the floret, and becomes a ſingle, oval, compreſſed ſeed, crowned with a ſingle down, and incloſed in the empalement. We have one ſpecies, which grows naturally in Germany, Helvetia, and France. Miller.

Gum, *ſweet*. See Liquid amber.

Gum, among *Gardeners*, is a diſeaſe incident to fruit-trees of the ſtone kind; as peaches, plums, apricots, cherries, &c.

The *gum* is a kind of gangrene, ariſing from a corruption of the ſap, which extravaſates and hardens. It uſually begins on ſome naked or broken part, and ſpreads itſelf to the reſt. To avoid its ſpreading, M. Quintinie directs to cut off the morbid branch two or three inches below the part affected.

This *gum* is no more than a thick, diſtempered, viſcid juice, which, not being able to make its way through the fibres of the body of the tree, to feed and ſupply them, is obliged, by the protruſion of other ſucceeding juice, to burſt its veſſels, which lie between the wood and bark, and to ouſe out upon the bark.

When the diſtemper ſurrounds the branch, it admits of no remedy; and when it is only on one ſide of a bough, the *gum* muſt be taken off to the quick of it, and then ſome cow-dung clapped on the wound, and the part covered over with a linen cloth and tied down.

Gum-*water*. See Water.

GUMMA, a ſort of venereal excreſcence on the perioſteum of the bones.

GUMMI *olivæ*, *olive gum*, in the *Materia Medica* of the ancients. We meet with this name given to a drug they ſometimes uſed in coughs and diſeaſes of the lungs. This was the concreted juice or exſudation of the olive-tree, called by the Greeks δακρυα Ελαιας, and by the Latins *gummi olivæ*.

GUMS, in *Anatomy*. See Gingiva and Mouth.

GUN, a fire-arm or weapon of offence, which forcibly diſcharges a ball, ſhot, or other offenſive matter, through a cylindrical barrel, by means of gunpowder.

Gun is a general name, under which are included divers, or even moſt ſpecies of fire-arms. They may be divided into *great* and *ſmall.*

GUNS, *great*, called by the general name *cannon*, make what we alſo call *ordnance* or *artillery*; under which come the ſeveral ſorts of cannon, as cannon-royal, demi-cannon, &c. culverins, demi-culverins, ſakers, minions, falcons, &c. See ORDNANCE; ſee alſo CANNON, CULVERIN, &c.

Inſtead of theſe names, which were formerly uſed, great *guns* are now denominated from the weight of the ball which they diſcharge: thus, a piece that diſcharges a ball of 24 pounds is called a 24 pounder; one that carries a ball of 12 pounds is called a 12 pounder, &c. and they are uſually diſtributed into SHIP-*guns*, which conſiſt of 42, 32, 24, 18, 12, 9, 6, and 3 pounders; GARRISON-*guns*, FIELD-*pieces*, and *battering guns*, comprehending 24, 18, and 12 pounders, whoſe ſeveral dimenſions are as follow:

Calibre	Length		Weight		
	f.	i.	c.	qr.	℔.
24	9	8	27	0	0
18	9	0	20	1	0
12	7	8	13	2	0

With reſpect to the metal of which they are made, they are divided into braſs *guns* and iron *guns*. See CANNON and FOUNDERY.

The ſeveral parts of a *gun*, ſee *Tab. Gunnery, fig.* 1. have peculiar names, which are as follow: AB repreſents the whole length of the *gun*, which is always reckoned from the hind part of the baſe ring, or beginning of the caſcable, to the extremity of the muzzle; AE is the firſt reinforce, which is that part of the *gun* next to the breech, and made ſtronger than the other parts for reſiſting the force of the powder; EF the ſecond reinforce, which is made ſomewhat ſmaller than the firſt; FB is the chaſe; HB the muzzle; A*b* the caſcable, including the button z; *b* the caſcable aſtragal; *c* the neck of the caſcable; AC the breech; A*i* the breech-mouldings; *rs* the baſe-ring and ogee; CD the vent-field; *t* the vent-aſtragal and fillets; *f* the firſt reinforce-aſtragal; *pq* the firſt reinforce-ring and ogee; FI the chaſe-girdle; T, T, the trunnions, by which the *gun* is fixed upon its carriage; G the dolphins or handles; *vw* the ſecond reinforce-ring and ogee; *u* the charging cylinder, which is the whole ſpace from the chaſe-aſtragal to the muzzle-aſtragal; *x* the chaſe-aſtragal and fillets; *z* the muzzle-aſtragal and fillets; *m* the ſwelling of the muzzle; *n* the muzzle-mouldings; *o* the bore, or vacant cylinder, in which the powder and ball are lodged, the diameter of which is called the calibre, and the difference between the diameter of the ſhot and bore is called the windage of the *gun*; *a* the mouth; *d* the vent or touch-hole; and *c* the chamber. For a farther explication of theſe parts of a *gun*, ſee the ſeveral articles. The proportional dimenſions of theſe parts have been differently aſſigned by different authors. General Armſtrong, formerly ſurveyor-general of the ordnance, ſtates them in the following manner: if the length of the *gun*, whether it be braſs or iron, be divided into ſeven equal parts, then the length of the firſt reinforce, AE, will be two of theſe parts; the ſecond, EF, one, and a diameter of the bore; and the chaſe, FB, four of the ſame parts, wanting a diameter of the bore: the breech AC, or diſtance from the hinder part of the baſe-ring to the beginning of the bore, is always equal to the thickneſs of the metal at the vent. The trunnions T, T, are always a calibre in length, and as much in diameter, clear of the ſecond reinforce-ring, and ſo placed, that a line drawn through their centers touches the lower part of the bore: the length of the caſcable, A*b*, is always 2¼ calibres. Farther, for braſs *guns*, if the calibre is divided into ſixteen equal parts, the thickneſs of metal at the baſe-ring from the bore is ſixteen of theſe parts; at the end of the firſt reinforce-ring 14.5; at the ſame place, for the beginning of the ſecond reinforce, 13.5; at the end of the ſecond reinforce 12.5; at the ſame place, for the beginning of the chaſe, 11.5; at the end of the chaſe or muzzle, the mouldings excluded, eight parts: as to the mouldings, the breadth of the baſe-ring is 1.5 inches; breadth of the next ogee two inches; from the ogee the fore-part of the aſtragal, a calibre: the fillets of the aſtragal are each .28, and the aſtragal .56, ſo that their ſum is 1.12 inches; the fillets of the firſt and ſecond reinforce-rings are .25, and the breadth of theſe rings 1.25; the ogees next to them 1.5, and the fillets at the muzzle .25. In a 12 pounder and upwards, the muzzle ogee is 1.25 inches, but in a 9 pounder and under only one inch; the chaſe-girdle and aſtragal is one calibre; from the mouth of the *gun* to the muzzle-aſtragal, the ſpace in an 18 pounder and upwards is equal to a diameter of the ſecond reinforce-ring, but in a 12 pounder and under equal to the diameter of the firſt reinforce-ring: the riſing of the mouldings at the firſt and ſecond reinforces is an eighth of an inch; and the riſing of the baſe-ring is determined by laying a ruler to the extremities of the firſt and ſecond reinforce-mouldings. The ſwelling of the metal at the muzzle is always equal to the diameter of the ſecond reinforce-ring: as to the dimenſions of the caſcable, the diſtance from the hinder part of the baſe-ring to the fore part of the fillet next to the button is one third of a calibre; from hence to the center of the button, one calibre; from the hinder part of the baſe-ring to the hinder part of the fillet, between the two ogees, one ſixth of a calibre; the diameter of the fillet next to the button 1.5 calibre; diameter of the neck ¾ of a calibre; that of the button ſomewhat more than a calibre; the ſhell at the vent is three inches broad, and the vent is the fifth part of an inch.

For iron *guns*, the calibre is divided into fourteen equal parts, and the thickneſs of metal at the vent from the bore is ſixteen parts; at the end of the firſt reinforce 14.5, at the beginning of the ſecond 13.5, at the end of it 12.5; at the beginning of the chaſe 11.5, and at the end of the chaſe or muzzle eight parts. The mouldings, &c. are as before, excepting the vent, which is one fourth of an inch. General Armſtrong makes the lengths of the ſeveral *guns* as follow, viz.

	Pounders	Length		Pounders	Length
		feet			feet
Braſs *guns.*	32	10	Iron *guns.*	32	9.5
	24	9.5		24	9
	18	9.5		18	9
	12	9		12	8
	6	8		9	7
	3	7		6	6.5
	1.5	6		3	4.5

See Muller's Artillery, p. 70, &c.

The two following tables exhibit the dimenſions of all ſorts of braſs and iron *guns*, as eſtabliſhed by the Board of Ordnance in 1764.

TABLE I.

Nature		Pnders.	Length		Weight			Calibre of the *gun*	Diameter of the ſhot
			f.	i.	c.	qr.	℔	inches	inches
Braſs *guns.*	Heavy	42	9	6	61	0	0	7. 3	6.68
		24	9	6	52	0	0	5.83	5.54
		12	9	0	29	0	0	4.63	4.4
		9	9	0	26	0	0	4.21	4.0
		6	8	0	19	0	0	3.66	3.48
		3	7	0	11	2	0	2.91	2.77
		1½	6	0	5	2	0	2.31	2.2
	Medium	24	8	0	40	1	21	5.83	5.54
		12	6	6	21	0	14	4.63	4.4
		6	5	0	10	1	0	3.66	3.48
	Light	24	5	6	16	1	12	5.83	5.54
		12	5	0	8	3	18	4.63	4.4
		6	4	6	4	3	14	3.66	3.48
		3	3	6	2	3	4	2.91	2.77

TABLE II.

Iron *guns.*	42	9	6	65	0	0	7. 3	6.68
	32	9	6	55	0	0	6.42	6. 1
	24	9	6	49	0	0	5.83	5.54
	24	9	6	47	2	0	5.83	5.54
	18	9	0	40	0	0	5.29	5.3
	12	9	0	32	2	0	4.63	4.4
	12	8	6	31	2	0	4.63	4.4
	12	7	6	29	1	0	4.63	4.4
	9	9	0	29	0	0	4.21	4
	9	8	6	27	2	0	4.21	4
	9	8	0	26	2	0	4.21	4
	9	7	6	24	2	0	4.21	4
	9	7	0	23	0	0	4.21	4
	6	9	0	24	0	0	3.66	3.48
	6	8	6	23	0	0	3.66	3.48
	6	8	0	22	0	0	3.66	3.48
	6	7	6	20	2	0	3.66	3.48
	6	7	0	19	0	0	3.66	3.48
	6	6	6	18	0	0	3.66	3.48
	6	6	0	16	2	0	3.66	3.48
	4	6	0	12	1	0	3.21	3.4
	4	5	6	11	1	0	3.21	3.4
	3	4	6	7	1	0	2.91	2.77
	½	3	0	1	1	25	1.58	1.52

The requiſite charges for all the different pieces, on all occaſions, both in garriſon and in the field, appear from the following table.

TABLE III.

Nat.	Proof		Service		Salut-ing	Rico-chet	Diameter of		Length of cart	
	Braſs	Iron	Braſs	Iron			Guns	Shot	Proof	Service
pds.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	in. pts.	in. pts.	in. pts.	in. pts.
42	31 8	25	14	12	10 4	4 7	7 018	6 684	26 94	17 79
32	26 12	21 8	10 10	9 4	8	2 12	6 410	6 100	26 3	16 25
24	21	18	8	8	6	2	5 824	5 547	25 58	14 78
18	18	15	6	8	4 8	1 12	5 292	5 040	24 92	13 46
12	12	12	4	4	3	1 6	4 623	4 403	23 24	11 72
9	9	9	3	3	2 8	1 4	4 200	4	21 26	10 63
6	6	6	2 8	2 8	2	1	3 668	3 498	18 7	9 35
4	4	4	1 6	1 8	1 4	12	3 204	3 003	16 43	8 12
3	3	3	1	1	12	8	2 913	2 775	14 84	7 42
1½	1 8	1 8	8	8	6	4	2 031	2 020	11 76	5 88
1	1	1	5	5	4	2¼	2 019	1 923	8 35	3 18

See CHARGE.

With regard to the length of *guns*, the modern practice is much improved; ſee CANNON: but experiments are ſtill wanting, in order to determine the beſt length for any given charge. The ancients imagined, that the greater velocity the ſhot had, the greater would be the effect; and therefore they made their *guns* long and heavy, that they might charge them with as much powder as is equal in weight to the ſhot. The moderns found, by experience, that theſe *guns* were unwieldy, and that a leſs force would anſwer the purpoſe; and therefore they reduced the charge of powder as well as the weight of the metal. From ſome experiments made by M. Du Metz, mentioned by St. Remy in his Memoirs of Artillery, vol. i. p. 9. with pieces of different calibres, but all of the ſame length, viz. 10 feet elevated to 45°, and equally charged with a quantity of powder weighing two thirds of their ſhot, it appears, that a 24 pounder of this length carried its ſhot farther with that charge than any leſſer calibre of the ſame length; but theſe experiments do not prove, that, if the pieces had been longer or ſhorter, or if they had been loaded with more or leſs powder, the length of the 24 pounder was the beſt. To this purpoſe St. Remy farther informs us, that pieces of the ſame calibre, but ſomewhat ſhorter, with half the former charge, at the ſame angle of elevation, ranged nearly to the ſame diſtance as the others. From ſome other experiments with ſix 24 pounders nearly of the ſame weight, whoſe lengths were 10.5, 10, 9.5, 9, 8.5, and 8 feet, charged alike, and elevated to 7¼°, made by general Armſtrong at Woolwich, in 1736, it has been inferred, that 9.5 was the beſt length for a 24 pounder: but it does not appear what the charge was; and beſides, if the charge, ſuppoſed to be half the weight of the bullet, had been more or leſs, the lengths which carried the ſhot fartheſt would likewiſe have been more or leſs: ſo that allowing this length to be the beſt for that charge, it does not follow that it will remain ſo when the charge is either increaſed or diminiſhed, or when the weight of the metal is changed. But ſince theſe experiments were made, it has been found that eight pounds of powder are ſufficient for a 24 pounder, when it is to make a breach; and therefore it remains to be determined, what is the beſt length for that charge.

Mr. Robins obſerves, that practitioners in artillery have generally ſuppoſed, that there is one certain charge for every piece, which will communicate to the bullet a greater velocity than any other, either greater or leſs; and this charge has lately been aſſigned for heavy cannon about one third of the weight of the bullet, and in ſmaller pieces about one half. But from the principles which he has eſtabliſhed, relating to the force of fired gunpowder, he infers, that every augmentation of powder will increaſe the velocity of the bullet, unleſs the charge be ſo great as to fill up about three eighths of the cylinder: in which caſe, a caſe that never occurs in practice, an addition to the charge may diminiſh its velocity. It has alſo been generally ſuppoſed, that in each ſpecies of cannon there was a certain length, which communicated to the bullet fired from it a greater velocity than could be communicated by either a longer or ſhorter piece; but he has ſhewn, that if two pieces of the ſame bore, but of different lengths, are fired with the ſame charge of powder, the longer will impel the bullet with a greater celerity than the ſhorter: thus, in an experiment with a ſmall piece, which was firſt ſixty diameters of the bore long, and afterwards cut to twenty diameters, and charged with half the weight of the bullet in powder, he found that an iron ball, diſcharged from the former, penetrated into a block of wood above half as deep again as when it was diſcharged from the latter; ſo that, within the limits of practice, there is no piece ſo long, but if its length be augmented, an addition will be thereby made to the impetuoſity of its ſhot. He farther ſhews, that if two pieces of artillery, differing in weight and in the metal of which they are formed, have their cylinders of equal bores and equal lengths, and be loaded with like charges of powder and like bullets, they will each of them diſcharge their ſhot with nearly the ſame degree of celerity. However, if two pieces of the ſame bore, and different lengths, are ſucceſſively fired at the ſame elevation, with the ſame charge of powder, it will often happen, that ſome of the ranges with the ſhorter piece will exceed ſome of thoſe with the longer: and this is owing to the reſiſtance of the air, which acts upon projectiles, both by oppoſing their motion and diminiſhing their celerity, with different degrees of violence, as the projectile moves with a greater or leſs velocity, and alſo by diverting or deflecting them from the regular courſe, which they would otherwiſe follow. Beſides, if the longer piece be allowed a greater charge of powder than the ſhorter, the ſame effect will follow, provided that the charge of the ſhorter be not leſs than one fourth of the weight of the bullet, nor the charge of the longer more than the whole weight of the bullet. It appears hence, that the ranges of pieces at a given elevation are no juſt meaſures of the velocity of the ſhot; and, therefore, a better method of determining the comparative velocities of bullets is to meaſure the depth of their penetration in any ſolid ſubſtance, placed at a ſmall diſtance from the muzzle of the piece. But though the velocity of a ball may be augmented by increaſing the charge or lengthening the piece, yet in many caſes that occur in practice, the advantages reſulting from hence are of little moment: in general, the leaſt charges, that are ſufficient to produce the deſired effect in cannonading, firing againſt ſhips, ruining of defences, or battering in breach, are always to be preferred; and the proper charge of any piece, whatever be its length, is not that quantity of powder which will communicate the greateſt velocity to the bullet, nor is it to be determined by any invariable proportion of its weight to the weight of the ball; but it is ſuch a quantity as will produce the leaſt velocity neceſſary for the purpoſe, and it ſhould be regulated by the uſe to which it is applied. Robins's Tracts, vol. i. p. 221, &c. p. 246, &c. See CHARGE, GUNNERY, PROJECTION, and RESISTANCE.

With a view to this ſubject, Mr. Muller has calculated the following table, in which the numbers at the top expreſs the lengths of the pieces in diameters of their ſhot; the firſt vertical column expreſſes the charges in reſpect to the weight of the ſhots; and the other numbers in the ſame horizontal lines, expreſs the diſtances in feet moved over, by the velocities of the ſhot uniformly continued in a ſecond of time.

TABLE of Velocities.

	12	15	18	21	24	27	30	36
¼	1043	1052	1058	1063	1066	1068	1071	1074
⅓	1186	1200	1210	1217	1222	1224	1229	1234
½	1406	1434	1452	1465	1475	1482	1488	1497
⅔	1568	1613	1641	1662	1677	1688	1698	1711

N. B. The diameter of a nine pound ſhot, which is four inches, and expreſſes the height of the charge when it is a quarter of the weight of the ſhot, &c. was uſed in the calculation of this table. From this table it is inferred, 1. That if the charge is but a quarter of the ſhot's weight, the difference between the velocities, when the length is 12 and 15 diameters, is only nine feet in a ſecond; and the differences between the other velocities decreaſe, as the length increaſes: and, therefore, as the difference between the velocities, when the piece is 15 and 36 diameters is only twenty-two feet in a ſecond, it follows, that when the pieces are charged with one quarter of the ſhot's weight, the length from 12 to 15 is the beſt in that caſe. 2. When the charge is one third of the ſhot's weight, it appears in the ſame manner, that the length from 15 to 18 diameters is the beſt. And, 3. When the charge is one half of the ſhot's weight, the length ought to be from 18 to 21 diameters; and when the charge is two thirds of the ſhot's weight, the length ſhould be from 21 to 24 diameters: and theſe lengths, ſays Mr. Muller, are conformable to practice; for the preſent light field-pieces are ſome 12, and others 15 diameters long, and their charge is one fourth of the ſhot's weight; and the heavy twenty-four pounders are commonly from 21 to 24 diameters long, and their proper charge is eſteemed to be two thirds of the ſhot's weight. On theſe principles Mr. Muller has given general inſtructions for braſs and iron *guns*, mortars and howitzes, as well as of their ſeveral carriages. Treat. of Artillery, p. 47, &c. 95, &c.

From a table of experiments, for finding the beſt length of *guns* and their fitteſt charges, deduced from actual trials in 1775, publiſhed in the Military Dictionary, 1779, it appears, that when the pieces were loaded with half the weight of the ſhot, the ranges were greater than when loaded with either more or leſs, except in the ſmaller calibres, where one third ſeemed to be the beſt charge: and the pieces of nine feet long carried farther than thoſe of ten feet ſix inches and eleven feet, &c.

The advantage of large *guns*, or cannon, over thoſe of a ſmaller bore, is generally acknowleged. This advantage, ſays Mr. Robins, ariſes from ſeveral circumſtances, particularly in diſtant cannonading. The diſtance to which larger bullets fly with the ſame proportion of powder, exceeds the flight of the ſmaller ones, almoſt in proportion to their diameters; ſo that a thirty-two pounds ſhot, for inſtance, being ſomewhat more than ſix inches in diameter, and a nine pounds ſhot but four inches, the thirty-two pounds ſhot will fly near half as far again as that of nine pounds, if both pieces are ſo elevated as to range to the fartheſt diſtance poſſible. The reaſon of this is, the extreme great reſiſtance of the air, which is ſuch, that the diſtances to which bullets fly is more regulated by this reſiſtance, than by the velocity they receive from the powder: and the larger bullets are leſs reſiſted, in proportion to their weight, than the ſmaller; ſo that their reſpective ranges are ſound to be nearly in the proportion of their diameters.

This advantage in the range of the heavier bullet, will not eaſily be counterbalanced by increaſing the charge of powder allotted for the ſmaller bullet. For though the ſwiftneſs of this laſt, at its iſſuing from the piece, may be thereby greatly increaſed, yet the diſtance to which the bullet will fly is thereby but little influenced; as all this increaſe of velocity is ſoon taken away by the reſiſtance of the air, which increaſes much faſter. This aſſertion might ſeem a paradox, but it is irrefragably eſtabliſhed by ſome experiments made by the French.

Another and more important advantage of heavy bullets is, that with the ſame velocity they break holes in all ſolid bodies, in a greater proportion than their weight. Thus, a twenty-four pounds ſhot will, with the ſame velocity, break out a hole in any wall, rampart, or ſolid beam, in which it lodges, above eight times larger than will be made by a three pounds ſhot: for the great ſhot will penetrate to above twice the depth that the ſmall one will, and leſs of the cavity it makes will be filled up again by the ſpring of the body pierced.

Large cannon alſo, by carrying the weight of their bullet, in grape or lead ſhot, may annoy the enemy more effectually than could be done by ten times the number of ſmall pieces.

The author here quoted, has propoſed to change the fabric of all the pieces employed in the Britiſh navy, from the twenty-four pounders downwards; ſo that they may have the ſame or leſs weight, but a larger bore. He thinks the thirty-two pounders, in preſent uſe, would be a proper model for this purpoſe. Theſe being of fifty-two or fifty-three hundred weight, have ſomewhat leſs than a hundred and two thirds for each pound of bullet. And that this proportion would anſwer in ſmaller pieces, in point of ſtrength, ſeems clear from theſe conſiderations: 1. That the ſtrength of iron or any other metal is in proportion to its ſubſtance. 2. That the leſſer quantity of powder, fired in a ſpace it fills, has proportionably leſs force than a larger quantity: ſo that if two pieces, a large and a ſmall one, be made in the ſame proportions to their reſpective bullets, and fired with a proportionable quantity of powder, the larger piece will be more ſtrained, will heat more, and recoil more than the ſmaller.

On this ſcheme our preſent twenty-four pounders will be eaſed of ſix or eight hundred weight of uſeleſs metal; and ſome pieces of a leſs çalibre, as nine and ſix pounders, would be ſometimes eaſed by fourteen hundreds. Hence, much larger *guns* of the ſame weight might be borne. Thus, inſtead of ſix, nine, twelve, and eighteen pounders, our ſhips might carry twelve, eighteeen, and twenty-four pounders.

Guns would be kept cooler and quieter, and would be of more ſervice in many reſpects, if their uſual CHARGE of powder were diminiſhed.

The author here quoted is of opinion, from his own trials, that a much greater reduction of the weight of ſhip guns might ſafely take place, and that one fourth, and even one fifth of the weight of the bullet in powder, if properly diſpoſed, would be ſufficient for naval purpoſes. See Mr. Robins's Propoſal for increaſing the Strength of the Britiſh Navy, in his Mathematical Tracts, vol. i. p. 283, &c. and his Letters, p. 295 and 306.

The author of the Military Dictionary, publiſhed in 1779, obſerves, with regard to the price of artillery, that the government pays 130*l*. per ton for braſs cannon, 12*l*. for each horſe, and a fixed price is allowed for carriages, wheels, iron-work, tumbrels, ammunition, and ball. For cannon ball government allows 16*l*. per ton, and 8*l*. 8*s*. per quintal for gunpowder. Hence, he ſays, a twenty-four pounder, with all its appurtenances, ready to act againſt an enemy, ſtands the government in 324*l*. 19*s*. 5½*d*. a twelve pounder in 208*l*. 10*s*. 6*d*. and a ſix pounder in 119*l*. 4*s*. 6¾*d*. Art. *Cannon.*

For the hiſtory and invention of *guns*, ſee CANNON and GUN-*powder*.

For the uſe and application of *guns*, ſee GUNNERY and PROJECTILES.

GUN, *bed of*. See BED.

GUN, *boring of*. See *Boring of* CANNON and FOUNDERY.

GUN, *carriage of*. See CARRIAGE.

GUN, *charging of*. See CHARGE and GUN.

GUN, *chaſe*. See CHASE *guns*.

GUN, *evening*, is generally a twelve pounder, that is fired every night about ſun-ſet, and every morning at ſun-riſe, to give notice to the drums and trumpets of the army to beat and ſound the retreat and the reveille.

GUNS, *exerciſe of*, denotes the method of laying, loading, and firing the *guns*, at various diſtances from the but or mark: Mr. Robins recommends a more extenſive exerciſe than that of firing with a conſtant charge at two or three marks, placed at known and invariable diſtances, in which the ranges, penetrations, and deflections of pieces, fired with all neceſſary diverſity of charge, elevation, and diſtance, ſhould be examined, and the reſult compared with the new principles explained under the article GUNNERY, &c. See EXERCISE.

GUN, *pointing of a*, ſo as to ſtrike diſtant objects, depends on two things, viz. 1. Tracing on the outſide of the piece a viſual line parallel to the axis, which is called *diſparting*, and is performed by taking half the difference of the diameters of the muzzle and baſe-ring, and ſetting it perpendicularly on the muzzle-ring directly over the center; for then a line, which paſſes from that point in the baſe-ring, which is directly over the center of the piece, to the extremity of the diſtance thus placed on the muzzle-ring, will, when the piece is truly bored, be parallel to its axis: ſee DISPART and *Line of* DIRECTION. 2. The other operation is the determining the allowance to be made in diſtant ſhot for the incurvation of the flight of the bullet: this is greater or leſs *(cæteris paribus)* according to the different charges of powder made uſe of. Mr. Robins has determined, that ſuch a charge as produces a velocity between 1100 and 1200 feet in a ſecond, is in many caſes the moſt eligible: ſuppoſing, therefore, that the piece is loaded with ſuch a charge; in this caſe, if the ſhot were not retarded by the reſiſtance of the air, the range correſponding to one degree of this piece might be reckoned 450 yards, to two degrees 900, to three degres 1350, &c. ſince, independently of the air's reſiſtance, the ranges at different elevations would be nearly in proportion to theſe angles, at leaſt as far as eight or ten degrees. But the reſiſtance of the air will occaſion a conſiderable alteration; becauſe, by diminiſhing the velocity of the bullet, it will render its track more incurvated than it would otherwiſe be, and diminiſh its range: and the ſmaller the ſhot, the greater would be the diminution. The following table will ſerve to ſhew the angles of elevation correſponding in different pieces to different diſtances, and will ſave the labour of computation.

Actual range in yards	Angle of elevation.				
	24 ℔	12 ℔	9 ℔	6 ℔	3 ℔
1400	4 12	4 30	4 45	5 0	5 57
1200	3 26	3 40	3 50	4 0	4 30
1000	2 45	2 54	3 0	3 7	3 30
800	2 6	2 10	2 13	2 20	2 30
600	1 30	1 32	1 34	1 36	1 44
500	1 13	1 15	1 17	1 19	1 22
400	58	58½	59	1 0¼	1 3
300	43	43	43	44	43
200	27¾	28¼	23½	28¾	29¼
100	14	14	14¼	14½	15

By this table, when the diſtance of the object is known, the angle, by which the axis of the piece ought to be elevated above the viſual line, will be readily determined; and when this angle is known, the piece may be directed or pointed, by meaſuring the length of it from the middle of the baſe-ring to the middle of the muzzle-ring, and computing the tangent of the given angle of elevation to that radius, which may be done either by a table of tangents, or by ſuppoſing that to a radius of one foot ,21 of an inch is the tangent of a degree. Let CHBD

(*Tab. Gunnery, fig.* 8.) be the given piece, AB its axis, DE half the difference between the diameter of the muzzle-ring and baſe-ring, and CE the line of DISPART; then make CG equal to the tangent of elevation juſt found, and the line GE will be the proper line for pointing of the piece. In practice it will be ſufficient to erect only one perpendicular; e. gr. if GC exceed DE, their difference erected on the baſe-ring will, with the muzzle-ring at D, give the line of direction; but if DE exceed GC, the ſame difference erected on the muzzle-ring will, with the baſe-ring at C, give the direction of the piece. In diſtances leſs than 500 yards, it will be ſufficient to allow one fourth of a degree for the inclination correſponding to every hundred yards, without having recourſe to the table. Mr. Robins obſerves, that the charge of powder producing the velocity above ſtated as the moſt eligible, is from one ſixth to one fourth of the weight of the bullet in powder; the different goodneſs of powder, and the difference in the length of pieces producing that diverſity. Robins's Tracts, vol. i. p. 312, &c.

The common mechanical method of directing cannon to a given object, is to find the center-line, or two points, one at the breech and the other at the muzzle, by a ſmall inſtrument called the perpendicular, and then applying the two fore-fingers to the baſe-center to look behind them, till the muzzle-center be made to cut the center of the object; then the piece is properly directed: and having found the neceſſary elevation, place the center of the quadrant in the bore, and raiſe or depreſs the piece till the plummet cuts the required elevation.

Gun, *proving of a.* See Proving.

Gun, *rifle.* See Rifle.

Guns, *ſmall*, include fire-locks, muſkets, muſketoons, carabines, blunderbuſſes, fowling-pieces, &c.

Piſtols and mortars are almoſt the only kinds of regular weapons, charged with gunpowder, that are excepted from the denomination of *guns*.

No one may ſhoot with, or keep in his houſe, any hand-*gun*, &c. who hath not lands to the value of 100*l.* a year, on pain of 10*l.* nor ſhall any perſon ſhoot with ſuch a *gun*, under the length of one yard, under the like penalty. If any one do ſo, any perſon who hath 100*l.* per annum land, may ſeize the *gun* unlawfully kept and uſed; but then he muſt break it within twenty days, or forfeit 40*s.* In foreſts, parks, and chaſes, thoſe who have power to take away *guns* may retain the ſame. Stat. 33 Hen. VIII. cap. 6. which act continues now in force. See Game.

Great Gun at Dover caſtle is a large braſs *gun* twenty-four feet long without, and twenty-two feet in the bore, beautifully adorned with flowers and emblematical figures in relievo, and ſeveral inſcriptions. This curious *gun*, vulgarly called queen Elizabeth's pocket-piſtol, was a preſent from the emperor Charles V. to Henry VIII. while they were engaged together in a war with France. The charge of this *gun* is fifteen pounds of powder, and it is ſaid to carry a ball ſeven or eight miles.

Gun is alſo a name given by the miners to an inſtrument uſed in cleaving rocks with gunpowder. It is an iron cylinder of an inch and quarter thick, and about ſix inches long, and having a flat ſide to receive the ſide of a wedge, and a hole drilled through it to communicate with the inſide of the hole in the rock. The hole is made of about eight inches deep, and in the bottom of it is put about two or three ounces of gunpowder; then this *gun* is driven forcibly in, ſo as to fill up the hole, and the wedge is driven in on its flat ſide to ſecure it. The priming at the hole is then fired by a train, and the orifice being ſo well ſtopped by this *gun*, the force of the powder is determined to the circumjacent parts of the rock which it ſplits. See Mine.

Gun-*room*, in *a ſhip*, is the apartment on the after end of the lower or *gun*-deck, where the maſter-gunner and his crew rendezvous, get ready their cartridges, &c. and do all things belonging to their buſineſs. In ſmall ſhips of war, it is uſed by the lieutenants as a dining-room, &c.

GUNDELIA, in *Botany*, a genus of the *ſyngeneſia polygamia ſegregata* claſs. Its characters are theſe: it has an uniform tubulous flower, compoſed of many hermaphrodite florets, which have but one petal, ſlightly cut into five parts; and they have five ſhort hairy ſtamina: an oval *germen* is ſituated at the bottom of the flower, which becomes a roundiſh ſingle ſeed, incloſed in the common receptacle which is conical; and the ſeeds are ſeparated by a chaffy down. There are two varieties of this plant, which were diſcovered by (and named from) Dr. Gundelſcheimer, in company with Mr. Tournefort, near Baibout, in Armenia. Miller.

GUNNEL *of a ſhip.* See Gun-*wale.*

GUNNELLUS, in *Ichthyology.* See Butter-*fiſh.*

GUNNERA, in *Botany*, a genus of the *gynandria diandria* claſs, without calyx or corolla, and having two ſtyles; the germen is double, dented, and contains a ſingle ſeed.

GUNNERS, officers of the Tower and other garriſons, whoſe buſineſs it is to manage and look after the ordnance mounted on the lines and batteries, which are all fixed and ready with cartouches and ball, for ſervice, on the ſhorteſt warning.

They carry a field-ſtaff, and a large powder-horn in a ſtring over the left ſhoulder; in which equipage they march by the guns.

Gunner, in the *Artillery*, is the ſecond rank of private men in the royal regiment of artillery.

Gunner *of a ſhip of war*, is an officer appointed to take charge of the artillery and ammunition aboard; to obſerve that the former are kept in order, and fitted with tackle and other furniture, and to teach the ſailors the exerciſe of the cannon: he is aſſiſted by a mate, &c.

Maſter Gunner *of England*, is an officer appointed to teach and inſtruct all ſuch as deſire to learn the art of gunnery, and to adminiſter to every ſcholar an oath; which, beſide the duty of allegiance, obliges him not to ſerve any foreign prince or ſtate without leave; nor to teach the art of gunnery to any but ſuch as have taken the ſaid oath; and to certify to the maſter of the ordnance, the ſufficiency of any perſon recommended to be one of his majeſty's *gunners*.

The *gunner*, Sir J. Moore obſerves, ſhould know his pieces and their names, which are taken from the height of the bore, the names of the ſeveral parts of a piece of ordnance, how to tertiate his gun, and how to diſpart it, &c.

Gunner's *level* See Level.

GUNNERY, the art of ſhooting with guns and mortars, i. e. of charging, directing, and exploding thoſe fire-arms to the beſt advantage. See *Tab. Gunnery, fig.* 9.

Gunnery is ſometimes conſidered as a part of the military art, and ſometimes as a part of pyrotechny.

To the art of *gunnery* belongs the knowlege of the force and effect of gunpowder, the dimenſions of pieces, and the proportions of the powder and ball they carry, with the methods of managing, charging, pointing, ſpunging, &c.

Some parts of *gunnery* are brought under mathematical conſideration, which, among mathematicians, are called abſolutely by the name *gunnery*; viz. the method of elevating or raiſing the piece to any given angle, and of computing its range; or of raiſing or directing it ſo, as it may hit a mark or object propoſed.

The inſtruments chiefly uſed in this part of *gunnery* are the CALLIPERS or gunners COMPASSES, QUADRANT, and LEVEL: the methods of applying which, ſee under thoſe articles; and for the particular principles and laws of *gunnery*, ſee Projectile.

With regard to the hiſtory of this part of mixed mathematical ſcience we may obſerve, that long before the invention of *gunnery*, properly ſo called, the art of artillery was in actual practice; for one of the kings of Judah, eight hundred years before the Chriſtian æra, erected, on the towers and bulwarks of Jeruſalem, engines of war, for ſhooting arrows and great ſtones for the defence of that city. 2 Chron. xxvi. 15.

Such machines were afterwards known to the Greeks and Romans under the names BALLISTA, CATAPULTA, &c. which produced effects, by means of the action of a ſpring of a ſtrongly twiſted cordage, formed of tough and elaſtic animal ſubſtances, no leſs terrible than the cannon and mortars of the moderns. Theſe warlike inſtruments continued in uſe, not only during the time of the Roman empire, but to the twelfth and thirteenth centuries; nor is it probable that they were totally laid aſide, till gunpowder and the modern ordnance ſuperſeded their uſe.

The firſt application of GUNPOWDER to military affairs ſeems to have been ſoon after the year 1300, for which the propoſal of friar Bacon, about the year 1280, for applying its enormous exploſion to the deſtruction of armies, might give the firſt hint; and Schwartz, to whom the invention of gunpowder has been erroneouſly aſcribed, might have been the firſt who actually applied it in this way: for, it is ſaid, that having pounded the materials of this mixture in a mortar, which he afterwards covered with a ſtone, a ſpark of fire accidentally flew into the mortar, and the exploſion blowed the ſtone to a conſiderable diſtance.

We ſhall here only mention the prohibition of fire-arms in the Code of Gentoo Laws, printed by the Eaſt India Company in 1776, which ſeems to confirm the ſuſpicion ſuggeſted by a paſſage in Quintus Curtius, that Alexander the Great found ſome weapons of that kind in India. Cannon, in the Shanscrit idiom, is called ſhet-aghnee, or the weapon that kills a hundred men at once. However, the firſt pieces of artillery, charged with gunpowder

powder and ſtone bullets of a prodigious weight, were of very clumſy and inconvenient ſize and ſtructure. See CANNON. Thus, when Mahomet the Second beſieged Conſtantinople in 1453, he battered the walls with ſtones of this kind, and with pieces, ſome of which were of the calibre of 1200 pounds, and which could not be fired more than four times a day. The matter and fabric of theſe unwieldy pieces were changed for others that were lighter and more manageable, and particularly for braſs cannon, about the cloſe of the fourteenth century. The formation of artillery, if we except the ingenious method of boring cannon, not long ſince invented, hath been little improved within the laſt two hundred years; the proportions of the beſt pieces being now much the ſame with thoſe that were made in the time of the emperor Charles V. but their uſe and application have undergone conſiderable changes, the ſame ends being now generally purſued by ſmaller pieces than thoſe which were formerly thought neceſſary: the manner of forming a breach, by firſt cutting off the whole wall as low as poſſible, before its upper part is attempted to be beat down, ſeems alſo to be a conſiderable improvement in the practical part of artillery; as is alſo that diſpoſition of artillery called the BATTERY à ricochet, firſt uſed in 1692. But the theory of *gunnery* has made ſlower advances than the mechanical part. The firſt people who directed their attention to this ſubject were the Italians, about the beginning of the ſixteenth century. N. Tartaglia, the famous mathematician of Breſcia, who invented the method of ſolving cubic equations, generally aſcribed to Cardan, profeſſedly diſcuſſed the theory of projectiles, in his Nova Scientia, printed at Venice in 1537; and in his Queſiti & Inventioni diverſi, in 1546; and in another work, tranſlated into Engliſh, under the title of Colloquies concerning the Art of Shooting in great and ſmall Pieces of Artillery, and publiſhed at London in 1588: he is ſuppoſed to be the firſt who aſſerted, that the greateſt range of projectiles was at an elevation of 45°; and he alſo determined, contrary to the opinion of his contemporaries, that no part of the track deſcribed by a cannon ball is a right line, though the curvature is in ſome caſes ſo ſmall as not to need attention. To him is likewiſe aſcribed the invention of the *gunner's* QUADRANT.

However, nothing deciſive was delivered as to the nature of the curve deſcribed by ſuch bodies till the time of Galileo, who diſcovered the law of ACCELERATION in falling bodies, and publiſhed his celebrated Dialogues on Motion in 1638. He deſcribed the action and effects of gravity on falling bodies, and on theſe principles determined, that the flight of any projectile would be in the curve of a parabola, unleſs ſo far as it were diverted from that track by the reſiſtance of the air: accordingly he has ſhewn, that a body, ſhot horizontally, would, in its flight, deſcribe half a parabola, and when the piece had an elevation above the horizon, a whole parabola, provided that it fell on the plane of the battery: he alſo proved, that, whatever the ranges of the projected body or the elevation of the piece were, the ball would ſtill trace that curve line, of a greater or leſs amplitude, by the time it deſcended to the level of the place from which it was projected. His diſciple, Torricelli, extended this theory, by ſhewing that, whether the ball fell above or below the plane of its projection, it deſcribed a parabola of a larger or a ſmaller amplitude, according to the angle of elevation of the piece and the ſtrength of the powder. Galileo was not unapprized of the effects of the air's reſiſtance, and he has propoſed the means of examining the inequalities which they would occaſion in the motion of a ball at ſome given diſtance from the piece; yet he expreſsly ſays, that "among theſe projectiles which we "make uſe of, if they are of a heavy matter and a round "form, nay, if they are of a lighter matter and have a "cylindrical form, ſuch as arrows ſhot from bows, their "track or path will not ſenſibly decline from the curve "of a parabola." See his fourth Dialogue of Motion. In this theory his ſucceſſors for a conſiderable time acquieſced, without trying how far the real motions of projectiles deviated from a parabolic track, or deciding, whether the reſiſtance of the air was, or was not, neceſſary to be attended to in the determinations of *gunnery*. Admitting that no great variation could ariſe from the reſiſtance of the air, in the flight of balls, chiefly on account of the extreme rarity of the air compared with the denſe and ponderous compoſition of thoſe projected bodies, they eſtabliſhed it as a kind of general axiom, that the flight of theſe bodies is nearly in the curve of a parabola. Accordingly, in 1674, our countryman, Mr. Anderſon, publiſhed his treatiſe of the Genuine Uſe and Effects of the Gun, in which he maintains the Galilean theory, and to anſwer all objections that could be urged againſt it: and though he was obliged to infer from ſubſequent experiments, that the whole track of projected bodies was not parabolical, as appears by his treatiſe, entitled To hit a Mark, publiſhed in 1690, yet, inſtead of aſcribing the deviation of their flight from the parabolic curve to the reſiſtance of the air, he framed an hypotheſis for reconciling his experiments with his doctrine: he ſuppoſed, that the bullet, at its firſt diſcharge, flew for a certain diſtance in a right line, from the end of which line it began to bend into a parabola: this right line, which he calls the *line of the impulſe of fire*, he ſuppoſes to be the ſame in all elevations; and, by aſſigning a proper magnitude to this line of impulſe, he was able to reconcile any two ſhot made at different angles, however oppoſite they might prove to the common principles. But this new modelled theory was not confirmed by his following experiments.

In the year 1683, Monſ. Blondel publiſhed, at Paris, a treatiſe, entitled L'Art de Jetter les Bombes, in which he labours to ſhew, that the retardation ariſing from the reſiſtance of the air is ſo very inconſiderable, as to be of no account in practice. This opinion was ſo generally received both in France and England, that there ſeem to have been none who ſuſpected its fallacy.

Dr. Halley, in a paper communicated to the Royal Society in 1686, expreſsly aſſerts, that "in large ſhot of "metal, whoſe weight many times ſurpaſſes that of the "air, and whoſe force is very great in proportion to the "ſurface wherewith they preſs thereon, this oppoſition "(occaſioned by the reſiſtance of the air to the motion "of cannon balls) is ſcarce diſcernible:" and from actual experiments he infers, that "although in ſmall "and light ſhot the oppoſition of the air ought and muſt "be accounted for, yet in ſhooting of great and weighty "bombs, there need be very little or no allowance "made. Phil. Tranſ. N° 179. p. 19. or Abr. vol. i. p. 484. The practitioners in *gunnery*, though an erroneous theory had obtained the ſanction of ſo great a name as that of Dr. Halley, might have been led to ſuſpect its truth by the authority of a ſtill greater name, viz. that of Sir Iſaac Newton, who, in 1687, publiſhed his Principia Mathematica Phil. Nat. in which he has demonſtrated, (ſee lib. ii. § 7.) that the curve deſcribed by a projectile, in a ſtrongly reſiſting medium, differed much from a parabola, and that the reſiſtance of the air was great enough to make the difference between the curve of projection of heavy bodies and a parabola far from being inſenſible, and, therefore, too conſiderable to be neglected. The truth of theſe concluſions was farther eſtabliſhed by M. Huygens, in his Diſcours de la Cauſe de la Peſanteur, Leide, 1690, in which he affirms, from experiments and mathematical inveſtigation, that the track of all projectiles was very different from the line of a parabola. However, the teſtimony of theſe writers produced little change in the general opinion; indeed M. Reſſons, a French officer of artillery, in a memoir preſented to the Royal Academy in 1716, declares, that theory was of very little ſervice in the uſe of mortars; that practice had convinced him there was no theory in the effects of gunpowder; for, having endeavoured, with the greateſt preciſion, to point a mortar agreeably to the calculations of M. Blondel, he had never been able to eſtabliſh any ſolid foundation upon them. One other inſtance occurs, in which D. Bernouilli applies the doctrine of Sir Iſaac Newton to the motions of projectiles. Com. Acad. Petrop. tom. ii. p. 338, &c.

In this ſtate of error and unaccountable contradiction between theory and practice did the ſcience of *gunnery* remain, till the ingenious Mr. Robins, in the year 1742, publiſhed a ſmall treatiſe, entitled New Principles of *Gunnery*, containing many curious diſcoveries relating to the force of gunpowder, the velocity of bullets impelled by its exploſion, the difference in the reſiſting power of the air to ſwift and ſlow motions, the deviation of the flight of projected bodies from the parabolic curve in a degree never diſcovered or ſuſpected by any, and the deflection of bullets and other projectiles from the vertical plane in which the ſhot is made, reſulting from a rotatory motion which they accidentally acquire about an axis. Theſe diſcoveries have been confirmed and improved by himſelf in ſubſequent publications, and by others, particularly M. Euler, of Berlin, who publiſhed it with a large Commentary in 1745; and by M. Le Roy, of Paris, in the Mem. Acad. Sc. for 1751; and by Dr. Hutton, of the Military Academy at Woolwich. The reader will find a more particular account of theſe diſcoveries in the ſequel of this article, and under the articles GUN, GUNPOWDER, PROJECTILE, RANGE, RESISTANCE, and RIFLE-*gun*.

Mr. Robins, from the experiments related in his New Principles of *Gunnery*, having concluded, that the force of fired GUNPOWDER, at the inſtant of its exploſion, is the ſame as that of an elaſtic fluid of a thouſand times the denſity of the common air, and that the elaſticity of this fluid, like that of air, is proportionable to its denſity, propoſes the following problem.

The dimenſions of any piece of artillery, the denſity of its ball, and the quantity of its charge being given, to determine the velocity which the ball will acquire from the exploſion, ſuppoſing the elaſticity or force of the powder at the firſt inſtant of its firing to be given.

In the ſolution of this problem he aſſumes the two following principles: 1. That the action of the powder on the bullet ceaſes as ſoon as the bullet is got out of the piece. 2. That all the powder of the charge is fired, and converted into an elaſtic fluid, before the bullet is ſenſibly moved from its place.

Theſe aſſumptions, and the concluſions before mentioned, make the action of fired gunpowder to be entirely ſimilar to that of air condenſed a thouſand times; and from thence it will not be difficult to determine the velocity of the ball ariſing from the exploſion: for the force of the fired powder diminiſhing in proportion to its expanſion, and ceaſing when the ball is out of the piece, the total action of the powder may be repreſented by the area of the curve, the baſe of which repreſents the ſpace through which the ball is accelerated; and the ordinates to which, repreſent the force of the powder at every point of that ſpace: and theſe ordinates being in reciprocal proportion to their diſtance from the breech of the gun, becauſe when the ſpaces occupied by the fired powder are as 1, 2, 3, 4, &c. the force of the powder, or the ordinates repreſenting it, will be as $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}$, &c. it appears that the curve will be a common hyperbola, and that the area intercepted between it, its aſymptote, and the two ordinates repreſenting the force of the powder at the firſt exploſion and at the muzzle of the piece, will repreſent the total action of the powder on the ball: but if the ball were urged through the ſame ſpace, by an uniform force equal to its gravity, the total action of this force would be repreſented by a rectangle, the baſe of which would be the baſe of the curve or intercepted portion of the aſymptote before mentioned, and the height of which would repreſent the uniform force of gravity. Hence the ſquare of the velocity of the ball, reſulting from the action of the gunpowder, will be to the ſquare of the velocity, reſulting from the action of gravity, as the area of the hyperbolic ſpace is to the area of the rectangle: but the velocity of the ball reſulting from gravity is given, being the velocity it would acquire from a height equal to the ſpace through which the powder accelerates it; and the proportion between the hyperbolic ſpace and the rectangle is alſo given, from the analogy of hyperbolic ſpaces and logarithms; therefore the velocity of the ball ariſing from the action of the fired gunpowder will be given. This reaſoning may be illuſtrated by a view of *fig.* 10. *Tab. Gunnery*, in which let AB repreſent the axis of any piece of artillery, A the breech, and B the muzzle; DC the diameter of its bore, and DEGC a part of its cavity filled with powder. Suppoſe the ball, that is to be impelled, to lie with its hinder ſurface at the line GE, then the preſſure exerted at the exploſion, on the circle of which GE is the diameter, or, which is the ſame thing, the preſſure exerted in the direction FB, on the ſurface of the ball, is eaſily known from the known dimenſions of that circle; draw any line FH perpendicular to FB, and AI parallel to FH, and through the point H, to the aſymptotes IA and AB, deſcribe the hyperbola KHNQ; then if FH repreſents the force impelling the ball at the point F, the force impelling the ball in any other place as M will be repreſented by the line MN, the ordinate to the hyperbola at that point; for when the fluid impelling the body along, has dilated itſelf to M, its denſity will be then to its original denſity in the ſpace DEGC reciprocally as the ſpaces, through which it is reſpectively extended; that is, as FA to MA, or as MN to FH; but it appears, that the elaſticity or impelling force of this fluid is directly as its denſity; therefore, if FH repreſents that force at the point F, MN will repreſent the like force at the point M.

Since the abſolute quantity of the force impelling the ball at the point F is known, and the weight of the ball is likewiſe known; the proportion between the force the ball is impelled with, and its own gravity, is known. In this proportion take FH to FL, and draw LP parallel to FB; then MN, the ordinate to the hyperbola in any point, will be to its part MR, cut off by the line LP, as the impelling force of the powder in that point M, to the gravity of the ball; and conſequently, the line LP will determine a line proportional to the uniform force of gravity in every point; whilſt the hyperbola HNQ determines in like manner ſuch ordinates, as are proportional to the impelling force of the powder in every point; whence, by the 39th propoſition of lib. i. of Sir Iſaac Newton's Phil. Nat. Prin. Math. the areas FLPB and FHQB are in the duplicate proportion of the velocities, which the ball would acquire, when acted on by its own gravity through the ſpace FB, and when impelled through the ſame ſpace by the force of the powder. But ſince the ratio of AF to AB, and the ratio of FH to FL are known, the ratio of the area FLPB to the area FHQB is known; and thence its ſubduplicate. And ſince the line FB is given in magnitude, the velocity, which a heavy body would acquire when impelled through this line by its own gravity, is known, being no other than the velocity it would acquire by falling through a ſpace equal to that line; find then another velocity, to which this laſt mentioned velocity bears the given ratio of the ſubduplicate of the area FLPB to the area FHQB, and this velocity, thus found, is the velocity the ball will acquire when impelled through the ſpace FB by the action of the inflamed powder.

To give an example of this, let us ſuppoſe the length of the barrel of a gun, or AB, to be 45 inches, its diameter DC, or rather the diameter of the ball to be $\frac{3}{4}$ of an inch, and the ſpace occupied by the powder, AF, to be $2\frac{5}{8}$ inches; to determine the velocity which will be communicated to a leaden bullet by the exploſion, ſuppoſing the bullet laid at firſt with its ſurface contiguous to the powder.

By the theory here laid down it appears, that at the firſt inſtant of the exploſion the flame will exert, on the ball lying cloſe to it, a force one thouſand times greater than the preſſure of the atmoſphere. But the mean preſſure of the atmoſphere is eſteemed equal to that of a column of water 33 feet high; whence lead being to water as 11.345 to 1, this preſſure will be equal to that of a column of lead 34.9 inches in height, whence multiplying this by 1000, a column of lead 34900 inches high would produce a preſſure equal to what is exerted on the ball by the powder in the firſt inſtant of the exploſion; and the leaden ball being $\frac{3}{4}$ of an inch in diameter, and conſequently equal to a cylinder of lead on the ſame baſe $\frac{1}{2}$ an inch in height, the preſſure at firſt acting on it will be equal to 34900×2, or 69800 times its weight; whence the force of gravity, FL, is to that of the powder at its firſt exploſion, FH, as 1 to 69800: and FB to FA is as $45-2\frac{5}{8}$ (or $42\frac{3}{8}$) to $2\frac{5}{8}$; that is, as 339 to 21; whence the rectangle FLPB is to the rectangle AFHS, as 339 to 21×69800; that is, as 1 to 4324–. And from the known application of the logarithms to the menſuration of the hyperbolic ſpaces it follows, that the rectangle AFHS is to the area FHQB as .43429, &c. is to the tabular logarithm of $\frac{AB}{AF}$; that is, of $\frac{360}{21}$, which is 1.2340579; whence the ratio of the rectangle FLPB to the hyperbolic area FHQB is compounded of the ratios of 1 to 4324–, and of .43429, &c. to 1.2340579; which together make up the ratio of 1 to 12263, the ſubduplicate of which is the ratio of 1 to 110.7; and in this ratio is the velocity, which the bullet would acquire by gravity, in falling through a ſpace equal to FB, to the velocity the bullet will acquire from the action of the powder, impelling it through FB; but the ſpace FB being $42\frac{3}{8}$ inches, the velocity a heavy body will acquire in falling through ſuch a ſpace is known to be, what would carry it nearly at the rate of 15.07 feet in $1''$ of time; whence the velocity, to which this has the ratio of 1 to 110.7, is a velocity, which would carry the ball at the rate of 15.07×110.7 feet in $1''$ of time; that is, at the rate of 1668 feet in $1''$ of time. And this is the velocity, which, according to the theory, the bullet in the preſent circumſtances would acquire from the action of the powder, during the time of its dilatation. And this being once computed for one caſe, is eaſily applied to any other; for if the cavity DEGC left behind the bullet be only in part filled with powder, then the line HF, and conſequently the area FHQB will be diminiſhed in the proportion of the whole cavity to the part filled; if the diameter of the bore be varied, the lengths AB and AF remaining the ſame, then the quantity of powder and the ſurface of the bullet, which it acts on, will be varied in the duplicate proportion of the diameter; but the weight of the bullet will vary in the triplicate proportion of the diameter; wherefore the line FH, which is directly as the abſolute impelling force of the powder, and reciprocally as the gravity of the bullet, will change in the reciprocal proportion of the diameter of the bullet. If AF, the height of the cavity left behind the bullet, be increaſed or diminiſhed, the rectangle of the hyperbola, and conſequently the area corresponding to ordinates in any given ratio, will be increaſed or diminiſhed in the ſame proportion. From all which it follows, that the area FHQB, which is in the duplicate proportion of the velocity of the impelled body, will be directly as the logarithm $\frac{AB}{AF}$, (where AB repreſents the length of the barrel, and AF the length of the cavity left behind the bullet,) alſo directly as the part of that cavity filled with powder, and inverſely as the diameter of the bore, or rather of the bullet, likewiſe directly as AF the height of the cavity left behind the bullet. Conſequently the velocity being computed above, for a bullet of a determined diameter, placed in a piece of a given length, and impelled by a given quantity of powder, occupying a given cavity behind that bullet; it follows, that by means of theſe ratios the velocity of any other bullet may be thence deduced, the neceſſary circumſtances of its poſition, quantity of powder, &c. being given. Where note, that in the inſtance of this propoſition we have ſuppoſed the diameter of the ball to be $\frac{3}{4}$ of an inch: whence the diameter of the bore will be ſomething more, and the quantity of powder contained in the ſpace DEGC will amount to exactly 12dwt. a ſmall wad of tow included.

As to the firſt of the principles here aſſumed, the author has obſerved, (ſee alſo his Mathematical Tracts, vol. i. p. 164, &c.) that it would be found erroneous, if examined with a geometrical rigour; ſince it cannot be queſtioned but the flame acts in ſome degree on the bullet after it is out of the piece: but, in experiments, no ſuch accuracy is attainable; minute irregularities are the neceſſary concomitants of all complicated experiments: in the colliſion of bodies, in the running or ſpouting of water, even in ſmall velocities, irregularities happen not reconcileable to theory or to each other; what may not then be ſuppoſed to happen from the action of ſo furious a power as gunpowder? From experiments it appears, that velocities of bullets fired from the ſame piece, charged with the ſame powder, and all other circumſtances, as nearly as poſſible the ſame, do yet differ from each other by ſometimes more than $\frac{1}{30}$ part of the whole; but this is a ſmall degree of inaccuracy in a caſe of this nature, and if the action of the flame on the bullet, after it is out of the piece, is ſo ſmall as to produce no greater effect than what may be deſtroyed by the inevitable variations of the experiments, the neglecting it entirely is both convenient and a reaſonable procedure. Now, what gives ground to think that this poſtulatum, though not rigorouſly true, may be ſafely aſſumed, is the conſideration of the ſpreading of the flame by its own elaſticity, as ſoon as it eſcapes from the mouth of the piece; for by this it may be conceived that the part of it which impinges on the bullet may be neglected, although the impulſe of the flame be a very remarkable force.

With regard to the ſecond aſſumed principle, that all the powder is fired before the bullet is ſenſibly moved from its place, it is to be obſerved, that this very poſition, having been examined by a committee of the Royal Society, was, after ſeveral experiments, determined in the negative, from whence many may be ready to conclude, that the whole theory muſt be overturned. But this requires a farther diſcuſſion; and it will appear, that though this principle be not rigorouſly true, no more than the former, yet it ſeems alſo that it may be ſafely admitted in inveſtigating the effects of powder, ſince, even in ſhort barrels, where the ſpace the bullet was impelled through was not five inches, and where of courſe the deficiency of velocity was greateſt, it cannot amount to one thirtieth of the whole. This will appear from the experiments made by the committee; for when the barrel was ſo ſhortened, that the bullet being placed cloſe to the wad, lay with its outer ſurface nearly level with the mouth of the piece, yet, even in this ſhort tranſit of the bullet, but $\frac{1}{6}$ of the whole charge, at a medium, was collected unfired, which $\frac{1}{6}$, properly reduced, amounts to but $\frac{1}{12}$ of the charge. This reduction is founded on theſe conſiderations, that the powder uſed by the committee being unequally grained, when the ſmaller grains, collected by ſifting, were uſed, the quantity remaining unfired was leſs at a medium, in the ratio of 5 to 3, than when it was uſed without ſifting. Alſo, by extracting the ſalt-petre from the powder collected unfired, there was leſs ſalt-petre contained in it than in real powder, nearly in the ratio of 9 to 7. Now theſe two proportions compounded, make the proportion of 15 to 7, in which proportion muſt the quantities of powder unfired be reduced, in order to determine the quantity of fine good powder that might be ſuppoſed to remain unfired in the experiments brought to confirm the aforeſaid theory.

Now, it appears, by experiments, that the velocities of bullets placed in the ſame ſituation, are in the ſubduplicate proportion of the charges; conſequently the deficiency of velocity ariſing from the loſs of $\frac{1}{12}$ of the charge will be about $\frac{1}{24}$ of the velocity only. And in the experiments made with a barrel $5\frac{1}{5}$ inches in length, where the ball had not three inches to move, the quantity of real powder collected unfired from a charge of 12dwt. would have been no more than 16 grains, at a medium, or $\frac{1}{18}$ of the whole charge, which would produce a deficiency of $\frac{1}{36}$ of the velocity only: a difference leſs than what frequently occurs in the exacteſt repetition of the ſame experiments.

This, it is thought, is fully ſufficient to juſtify the principle in queſtion; eſpecially, as in all caſes of real uſe the length of the barrel, in proportion to the quantity of the charge, will be much greater than in the inſtances here mentioned. See Phil. Tranſ. N° 469. p. 450, 452, &c. or Martyn's Abr. vol. viii. p. 260. or Robins's Math. Tracts, vol. i. p. 164, &c. and ſee the Experiments of the Committee, in the Tranſactions, N° 465. p. 172, 173, &c. or Martyn's Abr. vol. viii. p. 253, &c.

The greateſt number of thoſe who have written on the manner in which powder takes fire, have ſuppoſed it to be done by regular degrees; the firſt grains firing thoſe contiguous, and they the next ſucceſſively; and it has been generally thought, that a conſiderable time was employed in theſe various communications: for Mr. Daniel Bernoulli, in his Hydrodynamica, has concluded, from ſome experiments made at Peterſburgh, that the greateſt part of the charge eſcapes out of the piece unfired, and that the ſmall part which is fired, does not take fire till it is near the mouth. Many theories too have been compoſed on the time of the progreſs of the fire amongſt the grains, and the different modifications which the force of powder did thence receive; and it has been generally conceived, that the proper lengths of pieces were determinable from this principle; ſo that they ſhould be long enough to give time for all the powder to fire.

But no ſuch regular and progreſſive ſteps ſeem obſervable in the exploſion. For conſidering that by loading with a greater weight of bullet, and thereby almoſt doubling the time of the continuance of the powder in the barrel, its force receives but an inconſiderable augmentation; and that doubling and trebling the uſual charge, the powder thus added always produces a correſpondent effect in the velocity of the bullet; likewiſe, that in a piece near four feet in length, charged with an uſual charge of powder, the velocity communicated to the bullet, during the firſt three inches of its motion, is full half the velocity acquired in its whole paſſage through the barrel; and conſidering alſo that the elaſticity or force of the powder, in the three firſt inches of its expanſion, is at a medium near eight times greater than in the two laſt feet of the barrel: it may be concluded from all theſe circumſtances, that the time employed by the powder in taking fire was not neceſſary to be attended to in theſe computations; but that the whole maſs might be ſuppoſed to be kindled, before the bullet was ſenſibly moved from its place.

And the experiments reported by the committee of the Royal Society, before mentioned, are ſtrong proofs that the powder is not fired in the progreſſive manner uſually ſuppoſed; for when the ſhort barrel was charged with twelve penny-weight and ſix penny-weight reſpectively, the quantity of powder which was collected unfired from twelve penny-weight, did not exceed by three grains, at a medium, what was collected from ſix penny-weight, although the bullet was a leſs time in paſſing through the barrel with twelve penny-weight than with ſix, it having a leſs way to move; conſequently the quantity remaining unfired of the ſix penny-weight, did not continue unfired for want of time; ſince when the piece was charged with twelve penny-weight, the additional ſix penny-weight was conſumed in a ſhorter time. See Phil. Tranſ. N° 469. p. 450. or Robins, &c. ubi ſupra.

Mr. Robins has alſo given us an ingenious way of determining, by experiments, the velocity which any ball moves with, at any diſtance from the piece it is diſcharged from.

This may be effected by means of a pendulum made of iron, having a broad part at bottom, covered with a thick piece of wood, which is faſtened to the iron by ſcrews. Then having three poles joined together by their tops, and ſpreading at bottom, ſuch as are vulgarly uſed in weighing and lifting heavy bodies, and called by workmen triangles; on two of theſe poles, towards their tops, are ſcrewed on ſockets, on which the pendulum is hung by means of a croſs piece, which becomes its axis of ſuſpenſion, and on which it ought to vibrate with great freedom. Something lower than the bottom of the pendulum there ſhould be a brace, joining the two poles to which the pendulum is ſuſpended; and to this brace there is faſtened a contrivance made with two edges of ſteel, ſomething in the manner of a drawing pen; the ſtrength with which theſe edges preſs on each other being diminiſhed or increaſed at pleaſure, by means of a ſcrew. To the bottom of the pendulum ſhould be faſtened a narrow ribbon, which paſſing between the ſteel edges, may hang looſely down by means of an opening cut in the lower piece of ſteel.

The inſtrument being thus fitted, if the weight of the pendulum, the reſpective diſtances of its center of gravity, and of its center of oſcillation, from its axis of ſuſpenſion, be known, it may from thence be found what motion will be communicated to this pendulum by the percuſſion of a body of a known weight moving with a known degree of velocity, and ſtriking it in a given point; that is, if the pendulum be ſuppoſed at reſt before the percuſſion, it will be known what vibration it ought to make in conſequence of ſuch a blow; and if the pendulum being at reſt, is ſtruck by a body of a known weight, and the vibration which the pendulum makes after the blow is known, the velocity of the ſtriking body may from thence be determined.

Now the extent of the vibration, made by the pendulum, may be meaſured by the ribbon. For if the preſſure of the ſteel edges on the ribbon be regulated by the ſcrew, ſo as to be free and eaſy, though with ſome minute reſiſtance to hinder its ſlipping of itſelf; then ſetting the pendulum at reſt, let the part of the ribbon between the pendulum and the ſteel edges be drawn ſtraight, but not ſtrained; and fixing a pin in the part of the ribbon contiguous to the edges, the pendulum ſwinging back by the impulſe of the ball, will draw out the ribbon to the juſt extent of its vibration, which will be determined by the interval on the ribbon between the edges and the place of the pin.

The computation by which the velocity of the ball is determined, from the vibration of the pendulum after the ſtroke, is founded on this principle of mechanics: that if a body in motion ſtrikes on another at reſt, and they are not ſeparated after the ſtroke, but move on with one common motion, then that common motion is equal to the motion with which the firſt body moved before the ſtroke; whence, if that common motion and the maſſes of the two bodies are known, the motion of the firſt body before the ſtroke is thence determined. On this principle it follows, that the velocity of a bullet may be diminiſhed in any given ratio, by its being made to impinge on a body of a weight properly proportioned to it; and hereby the moſt violent motions, which would otherwiſe eſcape our examination, are eaſily determined by the retarded motions which have a given relation to them. See New Princip. of Gunnery, p. 28, 29, &c. See alſo the Phil. Tranſ. N° 469. p. 444. where a ſmall correction, relating to a number in Mr. Robins's 8th propoſition, is mentioned: or Math. Tracts, vol. i. p. 83, &c. and p. 163, &c.

It is to be obſerved, that the length to which the ribbon is drawn, is always nearly the chord of the arch deſcribed by the aſcent; it being ſo placed, as to differ inſenſibly from thoſe chords which moſt frequently occur; and theſe chords are known to be in the proportion of the velocities of the pendulum acquired from the ſtroke. Hence it follows, that the proportion between the lengths of ribbon drawn out at different times, will be the ſame with that of the velocities of the impinging bullets.

Now from the computations delivered by Mr. Robins, it appears, that the velocity of a bullet, whoſe weight was $\frac{1}{12}$ of a pound, was 1641 feet in one ſecond of time, when the chord of the arch deſcribed by the aſcent of the pendulum, in conſequence of the blow, was $17\frac{1}{4}$ inches. Therefore, by the proportion of any other lengths of ribbon drawn out, by any percuſſion, to $17\frac{1}{4}$, the proportion of the velocity with which the bullets impinge, to the known velocity of 1641 feet in 1″, will be determined.

As experiments of this kind are often attended with danger and difficulty, thoſe who may be diſpoſed to make any, will find ſeveral uſeful practical cautions, in p. 31, 32, and 33, of the ſaid treatiſe.

By the experiments recited at large, in propoſition IX. of the ſame treatiſe, it appears, that the computations from Mr. Robins's theory, compared with thoſe experiments which were made with barrels of various lengths, from ſeven inches to forty-five, and with different quantities of powder, from ſix penny-weight to thirty-ſix, have a remarkable coincidence, and ſuch as occurs but in a few philoſophical ſubjects of ſo complicated a nature.

Suppoſing, for inſtance, the length of a barrel to be 45 inches, the quantity of powder twelve penny-weight, the cavity containing it $2\frac{1}{4}$ inches, and the ball $\frac{3}{4}$ inch diameter, weighing $1\frac{1}{3}$ ounce, or $\frac{1}{12}$ of a pound avoirdupoiſe, and the windage or exceſs of the diameter of the barrel above that of the bullet about $\frac{1}{10}$ of an inch; the velocity of the bullet will, by theory, be about 1670 feet in one ſecond; and this velocity is found in theſe experiments, to be the mean velocity which the ball really receives in thoſe circumſtances. Hence we may determine the velocities with which muſket and cannon-ſhot are diſcharged from their reſpective pieces, by their uſual allotment of powder.

For as a leaden ball of $\frac{3}{4}$ inch diameter, and weighing nearly $1\frac{1}{3}$ ounce avoirdupoiſe, being fired from a barrel of 45 inches in length, with half its weight of powder, will have a velocity at its iſſuing from the piece, which, if uniformly continued, would carry it near 1700 feet in 1′; ſo if inſtead of a leaden ball an iron one of the ſame diameter was placed in the ſame ſituation in the ſame piece, and was impelled by the ſame quantity of powder, the velocity of ſuch an iron bullet would be greater than that of the leaden one, in the ſubduplicate ratio of the ſpecific gravities of lead and iron; and ſuppoſing that ratio to be as 3 to 2, and computing on the foregoing principles, it will appear, that an iron bullet of 24℔ weight, ſhot from a piece of ten feet in length, with 16℔ of powder, will acquire from the exploſion a velocity which, if uniformly continued, would carry it nearly 1650 feet in 1″. But if inſtead of this full charge, weighing two thirds of the ball, we ſuppoſe the charge to be only half that weight, then its velocity would be no more than at the rate of 1490 feet in 1″; and the ſame would be the velocities of every leſſer bullet, fired with the ſame proportions of powder, if the lengths of all pieces were conſtantly in the ſame ratio with the diameters of their bore; and though this proportion does not always hold, yet the difference is not conſiderable enough to occaſion a very great variation from the velocities here aſſigned. But in theſe determinations, the windage is ſuppoſed to be no more than is juſt neceſſary for the eaſy putting down the bullet; whereas, in real ſervice, either through negligence or unſkilfulneſs, it often happens, that the diameter of the bore ſo much exceeds the diameter of the bullet, that great part of the inflamed fluid eſcapes by its ſide; whence the velocity of the ſhot may, in this caſe, be conſiderably leſs than what is here aſſigned: however part of this may poſſibly be compenſated by the greater heat which in all probability attends the firing of theſe large quantities of powder.

The theory here eſtabliſhed ſuppoſes what is ſaid under the head GUNPOWDER, that the powder when fired is equally hot with iron at the beginning of its white heat; but in very ſmall quantities of powder the heat is probably leſs, and conſequently the elaſticity leſs than what ariſes from this ſuppoſition. Now this decreaſe of elaſticity in ſmall quantities of powder has been found in many trials actually to take place. For inſtance, according to the theory before laid down, the velocity given the ball by the action of the powder, is in round numbers 1670 feet in 1″; and this, as has been ſaid, is confirmed by the experiments taken at a medium. If now the barrel and poſition of the ball remaining the ſame, there be placed in the ſpace that contained twelve penny-weight of powder there mentioned, only one penny-weight; it follows, that if the elaſticity of the ſmaller charge be the ſame in proportion to its quantity with that of the larger, then the velocity of the bullet, when impelled by the exploſion of the ſmaller charge, will be to the velocity of a bullet impelled by a greater charge in the ſubduplicate ratio of the quantities of the reſpective charges, that is, in the ſubduplicate ratio of 1 to 12. Conſequently the velocity communicated by twelve penny-weight being known to be that of 1670 feet in 1″, the velocity communicated by one penny-weight would be that of 482 feet in 1″ nearly; but by repeated trials, differing little from each other, it has been found, that the real velocity acquired by the ball in this caſe, from the exploſion of one penny-weight, was rather leſs than that of 400 feet in 1″. Whence it is evident, that the elaſticity of one penny-weight of powder, when fired, is leſs in proportion to its quantity than that of twelve penny-weight, as it ought to be by the theory.

So if three penny-weight of powder be placed in the ſame manner with the one penny-weight laſt mentioned, the real velocity the ball will acquire from the exploſion, will be from 740 to 720 feet in 1″. Whereas, ſuppoſing the elaſticity of three penny-weight, when fired, to be in ſimilar circumſtances the ſame with that of twelve penny-weight, the velocity acquired by the ball ſhould be 825 feet in 1″.

It is farther to be obſerved, that the theory, eſtabliſhed under the head GUN-POWDER, ſuppoſes that in the firing of gun-powder about $\frac{3}{10}$ of its ſubſtance is converted by the ſudden inflammation into a permanent elaſtic fluid, the elaſticity of which, in proportion to its heat and denſity, is the ſame with that of the common air in the like circumſtances: it farther ſuppoſes, that all the force exerted by gun-powder in its moſt violent operations, is no more than the action of the elaſticity of the fluid thus generated; and theſe principles enable us to determine the velocities of bullets impelled from fire-arms of all kinds.

From this theory appears the inconcluſiveneſs of what ſome authors have advanced relating to the advantages of particular forms for the CHAMBERS *of mortars and cannon*; for all their laboured ſpeculations on this head are evidently founded on very erroneous opinions about the actions of fired powder. Lib. cit. p. 99.

But it muſt not be diſſembled, that however probable this theory may be from the experiments and reaſons on which it is founded, there ſtill remains a difficulty which ſeems not yet fully accounted for. The doubt ariſes from ſome experiments made before a committee of the Royal Society, who hereupon gave it as their opinion, that the change of the form in the chamber will produce a change of the diſtance to which the bullet is thrown. The experiments upon which this opinion was founded, were as follow:

Three braſs chambers were made, whoſe depths were reſpectively three inches, $1\frac{1}{2}$ inch and $\frac{3}{4}$ inch; ſo turned as to fit the chamber of a braſs mortar exactly; each of theſe chambers contained, when full, one ounce troy of powder. The ball was of braſs, weighing nearly 356 ounces troy: the ball touched the powder of the charge in all theſe experiments. With the firſt chamber of three inches deep, the elevation of the mortar being 45°, the range taken at a medium of three ſhot was 741 feet; and the mean diſtance to which the ball was thrown with the chamber of $\frac{3}{4}$ inch deep, was but 464 feet. As to the chamber of $1\frac{1}{2}$ inch, it not fitting the chamber of the mortar exactly, the ranges were very irregular; but the leaſt range, though fired late in the damp of the evening, exceeded the fartheſt range of the $\frac{3}{4}$ inch chamber, and the fartheſt range extended to 686 feet; ſo that the committee ſeem well warranted in their opinion. The difficulty is to reconcile this with the foregoing theory. Its ingenious author has in general obſerved, in the account of his book given in the Phil. Tranſ. N° 469. p. 455. or Tracts, &c. vol. i. p. 173, that when the charge is much ſmaller than the uſual allotment of powder, there are ſome irregularities, as thoſe ariſing from the different heat of ſmall and large quantities of powder, to which head too perhaps muſt be referred the experiments made by the committee on the effect of different ſmall chambers; but in cuſtomary charges, the velocities of bullets reſulting from all the experiments hitherto made, are really ſuch as the theory requires. And it appears, that theſe velocities are much greater than what they have been hitherto accounted; and there are reaſons from the theory to believe, that in cannon-ſhot the velocities may ſtill exceed the foregoing computation. See Phil. Tranſ. N° 465. or Martyn's Abr. vol. viii. p. 253, &c.

If a bullet be laid at a conſiderable diſtance from the charge, the principles before laid down cannot then be applied to determine the velocity of the ball; they being only applicable in caſes where the bullet is contiguous to the charge, or nearly ſo. For by what is ſhewn under the article GUNPOWDER, when the ſurface of fired powder is not confined by a heavy body, which it is obliged to impel before it, the flame dilates itſelf with a velocity much beyond what it can at any time communicate to a bullet by its continued preſſure; becauſe the powder having acquired a conſiderable degree of velocity of expanſion, the firſt motion of the ball will not be produced by the continual preſſure of the powder, but by the percuſſion of the flame. From whence it follows, that the velocity of a bullet, laid at a conſiderable diſtance before the charge, ought to be greater than what would be communicated to it by the preſſure of the powder acting as before mentioned in this article. And this deduction from theory is confirmed from experience, by which it was found that a ball laid in a barrel, at the diſtance of $11\frac{1}{4}$ inches from the breech, and impelled by twelve penny-weight of powder, acquired in its diſcharge a velocity of about 1400 feet in $1''$; whereas if it had been acted on by the preſſure of the flame only, it would not have acquired a velocity of 1200 feet in $1''$. The ſame was found to hold true in all other greater diſtances (and alſo in leſſer, though not in the ſame degree) and in all quantities of powder. And from hence ariſes a conſideration of conſequence in practice, which is, that no bullet ſhould at any time be placed at any conſiderable diſtance before the charge, unleſs the piece be extremely well fortified; for a moderate charge of powder, when it has expanded itſelf through the vacant ſpace, and reaches the ball, will, by the velocity each part has acquired, accumulate itſelf behind the ball, and be thereby prodigiouſly condenſed; whence if the barrel be not extraordinarily ſtrong, it muſt burſt. This is confirmed by the experience of an exceeding good Tower muſket of very tough iron, which being charged with twelve penny-weight of powder, and the ball being placed ſixteen inches from the breech, upon firing the piece, part of the barrel, juſt behind the bullet, was ſwelled out to double its diameter, and two large pieces burſt out of it. If the powder be not placed together at the breech, but ſcattered uniformly through the whole cavity left behind the bullet, the progreſſive motion of the flame may hence be ſuppoſed to be prevented by the expanſion of the neighbouring parts. And it was found that the ball being laid as before, $11\frac{1}{4}$ inches from the breech, its velocity, in this caſe, inſtead of 1400 feet in $1''$, was only 1100 feet. See New Principles of Gunnery, part i. prop. 12. or Tracts, &c. p. 113, &c.

It appears from experience, that bullets of the ſame diameter and denſity impinging on the ſame ſolid ſubſtance with different velocities, will penetrate that ſubſtance to different depths, which will be in the duplicate ratio of thoſe velocities nearly. Thus a leaden bullet of $\frac{3}{4}$ of an inch in diameter, being fired againſt a ſolid block of elm with different velocities, as of 1700 feet, 730, and 400 feet in $1''$, the cavities were found to be as 55, 10, and 3, reſpectively; which are nearly in the duplicate proportion of thoſe velocities: perfect regularity in caſes of this nature cannot be expected, when the unequal texture of the ſame piece of wood, and the change of the form, and the bullet by the ſtroke, are conſidered.

From the penetration being in the duplicate proportion of the velocity of the impinging body, it follows, that the reſiſtance of the wood, like that of gravity, is uniform. See New Princip. of Gunnery, p. 94, 95. or Tracts, &c. p. 152. See GUN.

It appears from the account already given of Mr. Robins's admirable experiments, that the balls he made uſe of, in aſcertaining their initial velocity, were very ſmall, being only muſket balls of about one ounce in weight; but other occupations, and his immature death, prevented his proſecuting his experiments with others of a larger ſize. This defect is now, in a very conſiderable degree, ſupplied by the experiments of Dr. Charles Hutton, in which he has made uſe of ſmall cannon balls, from one pound to near three pounds weight, and formed a variety of concluſions, which may be applied to cannon-ſhot of the largeſt ſize. The machinery uſed by Dr. Hutton is much of the ſame kind with that of Mr. Robins; and the intention of his experiments is to diſcover the initial velocity of military projectiles, or the velocity with which a ball iſſues from a piece.

The gun, with which the experiments were made, was of braſs; the diameter of the bore at the muzzle was 2.16 inches, and at the breech 2.08 inches; and the greateſt caſt iron ball, which it would admit, was $19\frac{1}{2}$ ounces avoirdupoiſe; but leaden balls weighing $1\frac{1}{4}$ pound, and long cylindrical ſhot weighing near three pounds, were ſometimes uſed; the length of the bore was 42.6 inches, ſo that it was nearly $20\frac{1}{2}$ calibres long. The powder was that commonly made for government, and the charge was 2, 4, or 8 ounces, put into a light flannel bag, and rammed without uſing any wad before it. The diſtance of the gun from the pendulum was 29 or 30 feet; and the depth of the penetration ſeemed to be near three inches in ſolid wood, when two ounces of powder were uſed. The firſt courſe of experiments was performed in May 1775, the day being clear and dry; and it appears from the reſult, that the mean velocity of five ſhot, with two ounces of powder, was 626 feet in $1''$, and of two ſhot, with four ounces of powder, 915 feet in $1''$, which velocities are in the ratio of 1 to 1.46. But the mean weight of the balls in the former caſe was $17\frac{1}{3}$ ounces, and in the latter $17\frac{1}{8}$ ounces, and the ratio of the quantities of powder was that of 1 to 2. In this inſtance it is evident, the velocities are very nearly as the ſquare roots of the quantities of powder directly, and the ſquare roots of the weights of the balls inverſely. The ſecond courſe of experiments was performed in June, in a clear and dry, but windy day. The mean velocity of the ſecond and third ſhot, in theſe experiments, was 973 feet in $1''$, and of the fourth and fifth, 749 feet in $1''$, which numbers are in the ratio of 1.3 to 1; the charges were two ounces, and the balls were $19\frac{1}{2}$ ounces and $46\frac{1}{2}$ ounces reſpectively. In this inſtance, the velocity of the heavier ſhot is a little leſs than what would ariſe from the inverſe ratio of the ſquare roots of the weight of the ſhot. Some of theſe experiments were rendered doubtful by the effect of the wind; but as the mean velocity is 973, and only 626 in the former courſe, with the ſame charge of powder, though the balls were heavier with the greater velocity, in the proportion of 19 to 17 nearly, Dr. Hutton aſcribes this remarkable difference chiefly to the windage in the firſt courſe, and takes occaſion from hence to recommend the uſe of balls approaching in proportion nearer to the diameter of the bore of the gun than what is preſcribed in the preſent eſtabliſhment. The next courſe of experiments was performed on a clear, dry, and calm day, in the ſame month. In ſix ſhot on this occaſion, the common mean weight of the ball was $18\frac{2}{3}$ ounces; the mean velocity with two ounces of powder was 738 feet in $1''$, and that with four ounces 1043 feet in 1″: the ratio of which velocities is that of 1 to 1.414; or accurately the ratio of the ſquare roots of the quantities of powder. The fourth courſe was performed with another machine on a fine clear day in July. The machinery for this and the following courſe, ſays Dr. Hutton, was ſo perfect, and every circumſtance attending the experiments ſo carefully obſerved, that the concluſions reſulting from them may be relied on with great ſafety. Thoſe of the firſt day were made with leaden balls, and thoſe of the other with iron ones, which differed greatly in weight; and as every other circumſtance was the ſame, they afford very good means for diſcovering the law of the different weights of ſhot, while the variations in the powder from 2 to 4 and 8 ounces, furniſh us with the rule for the different quantities of it. The mean velocities with 2, 4, and 8 ounces of powder, were 613, 873, and 1162 feet in 1″, which are in the ratio of 1, 1.424 and 1.9; and theſe numbers are nearly in the ratio of the ſquare roots of the quantities of powder, viz. 1, 1.414 and 2. The mean weight of the balls uſed with 8 ounces of powder was $28\frac{2}{3}$ ounces, and that with the 2 and 4 ounces $28\frac{1}{3}$; the reciprocal ſubduplicate ratio of theſe is that of 1 to 1.006, in which proportion, increaſing 1.9, the number for the greater velocity, and it becomes 1.91, which falls ſhort of 2 by .09, or about the $\frac{1}{22}$d part too ſmall for the ſubduplicate ratio of the powder. This defect is aſcribed to three cauſes, viz. the leſs length of cylinder through which the ball was impelled; the greater quantity of elaſtic fluid which eſcaped in this caſe than in the others by the windage, on account of the greater velocity; and the greater quantity of powder blown out unfired in this caſe than in that of the leſs velocities. Hence we may infer, how ſmall the quantity of powder which is blown out unfired in any of theſe caſes, and the amazing quickneſs with which it fires in all caſes; for although the time in which the ball paſſed through the barrel, when impelled by the eight ounces of powder, was not much different from the half only of the time in which it was impelled by the two ounces, it is evident that in half the time there was nearly four times the quantity of powder fired.

In the laſt courſe of experiments, conſiſting of fifteen ſhot, the mean velocities with 2, 4, and 8 ounces of powder, were 701, 993, and 1397 feet in 1″, which are as the numbers 1, 1.416 and 1.993, or nearly in the ſubduplicate ratio of the weights of powder, viz. 1, 1.414 and 2. The mean weight of the balls, which were iron, with the 2 and 4 ounces of powder, was $18\frac{3}{4}$ ounces, and with the 8 ounces of powder $18\frac{3}{5}$ ounces; and, therefore, if the number 1.993 be diminiſhed in the reciprocal ſubduplicate ratio of $18\frac{3}{5}$ to $18\frac{3}{4}$, it will become 1.985, which falls ſhort of the number 2 by .015, or the 133d part of itſelf; and this defect is to be aſcribed to the cauſes mentioned in the recital of the former courſe.

By comparing the correſponding velocities in theſe two laſt courſes, viz. 613 and 701, &c. it will be found that the ratio of the firſt, or of the velocities with two ounces of powder, is that of 1 to 1.1436; of the next two, viz. 873 and 993, that of 1 to 1.1375; and the ratio of the laſt, viz. 1162 and 1397, that of 1 to 1.2022. But the mean weight of the ſhot for the 2 and 4 ounces of powder, was $28\frac{1}{3}$ ounces, and $18\frac{3}{4}$ ounces; and for 8 ounces of powder, $28\frac{2}{3}$ ounces, and $18\frac{3}{5}$ ounces; the reciprocal ſubduplicate ratio of the former will be that of 1 to 1.224, and of the latter that of 1 to 1.241; which are little different from the real ratios above found. The concluſions that may be deduced from theſe experiments are the following; viz. that powder fires almoſt inſtantaneouſly, as Mr. Robins had before obſerved; that the velocities communicated to balls of the ſame weight, with different charges, are nearly in the ſubduplicate ratio of theſe charges; and to balls of different weights, with the ſame charge, nearly in the reciprocal ſubduplicate ratio of their weights; and, therefore, when the weights of balls and charges differ, the velocities are directly as the ſquare roots of the charges, and reciprocally as the ſquare roots of the weights, nearly; ſo that it would be a great improvement to make uſe of a ſhot of a long form, or of heavier matter; as it would alſo be to diminiſh the windage; for thus one third or more of the quantity of powder might be ſaved; and by combining theſe two laſt improvements, half the quantity of powder might be ſaved; and a ſmall gun might be made to produce the effect and execution of one two or three times its ſize, by diſcharging a ſhot of two or three times the weight of its natural ball or round ſhot. In this way a ſmall ſhip might diſcharge ſhot as heavy as thoſe of the greateſt now made uſe of. Experiments of this kind performed with guns of various lengths, would likewiſe ſerve to determine the juſt length of cannon for ſhooting fartheſt with the ſame charge of powder. By means of ſuch experiments, properly conducted and varied, we may be able to ſolve every queſtion relating to military projectiles, except ſuch as depend on the RESISTANCE of the air to bodies moving ſwiftly in it. See a farther account of the machinery uſed by Dr. Hutton, and of his experiments, in the Phil. Tranſ. vol. lxviii. for 1778. part i. art. 3. p. 50.

GUNPOWDER, a compoſition of ſalt-petre, ſulphur, and charcoal, mixed together, and uſually granulated, which eaſily takes fire, and, when fired, rarifies, or expands, with great vehemence, by means of its elaſtic force. It is to this power we owe all the action and effect of guns, ordnance, &c. ſo that the modern military art, fortification, &c. depend wholly thereon.

The invention of *gunpowder* is aſcribed, by Polydore Virgil, to a chemiſt; who, having accidentally put ſome of this compoſition in a mortar, and covered it with a ſtone, it happened to take fire, and blew up the ſtone.

Thevet ſays, the perſon here ſpoken of, was a monk of Fribourg, named Conſtantine Anelzen; but Belleforet, and other authors, with more probability, hold it to be Bartholdus Schwartz, or the Black, who diſcovered it, as ſome ſay, about the year 1320; and the firſt uſe of it is aſcribed to the Venetians, in the year 1380, during the war with the Genoeſe; and it is ſaid to have been firſt employed in a place anciently called Foſſa Clodia, now Chioggia, againſt Laurence de Medicis; and that all Italy made complaints againſt it, as a manifeſt contravention of fair warfare.

But what contradicts this account, and ſhews *gunpowder* to be of an older æra, is, that Peter Mexia, in his Various Readings, mentions that the Moors being beſieged in 1343, by Alphonſus XI. king of Caſtile, diſcharged a ſort of iron mortars upon them, which made a noiſe like thunder; which is ſeconded by what Don Pedro, biſhop of Leon, relates in his chronicle of king Alphonſus, who reduced Toledo, viz. that in a ſea-combat between the king of Tunis, and the Mooriſh king of Seville, above four hundred and fifty years ago, thoſe of Tunis had certain iron tubs or barrels, wherewith they threw thunder-bolts of fire.

Du-Cange adds, that there is mention made of *gunpowder* in the regiſters of the chambers of accounts in France as early as the year 1338.

Farther, it appears that our Roger Bacon knew of *gunpowder* near a hundred years before Schwartz was born. That excellent friar tells us, in his treatiſe De Secretis Operibus Artis & Naturæ, & de Nullitate Magiæ, cap. 6. which is ſuppoſed by ſome to have been publiſhed at Oxford in 1216, and which was undoubtedly written before his Opus Majus, in 1267, "that from ſalt-petre, "and other ingredients, we are able to make a fire that "ſhall burn at what diſtance we pleaſe." Dr. Plott, in his Hiſtory of Oxfordſhire, p. 236, &c. aſſures us, that theſe "other ingredients were explained, in a MS. copy of "the ſame treatiſe, in the hands of Dr. G. Langbain, "ſeen by Dr. Wallis, to be ſulphur and wood coal." The writer of the Life of Friar Bacon, in the Biographia Britannica, vol. i. ſays, that Bacon himſelf has divulged the ſecret of this compoſition in a cypher, by tranſpoſing the letters of the two words in chap. xi. of the above cited treatiſe; where it is thus expreſſed: *ſed tamen ſalis petræ* LURA MOPE CAN UBRE (i. e. *Carbonum pulvere*) *et ſulphuris*; *et ſic facies tonitrum & corruſcationem, ſi ſcias artificium*: and from hence Bacon's biographer apprehends the words *carbonum pulvere* were transferred to the fixth chapter of Dr. Langbain's MS. In this ſame chapter Bacon expreſly ſays, that ſounds like thunder, and corruſcations, may be formed in the air, much more horrible than thoſe that happen naturally. He adds, that there are many ways of doing this, by which a city or an army might be deſtroyed; and he ſuppoſes that, by an artifice of this kind, Gideon defeated the Midianites with only three hundred men. Judges, chap. vii. There is alſo another paſſage to the ſame purpoſe, in the treatiſe De Scientia Experimentali. See Dr. Jebb's edition of the Opus Majus, p. 474.

Mr. Robins apprehends (ſee the preface to his Tracts), that Bacon deſcribes *gunpowder* not as a new compoſition, firſt propoſed by himſelf, but as the application of an old one to military purpoſes, and that it was known long before his time. Marcus Græcus, an ancient author, who probably lived about the time of the Arabian phyſician Meſue, in the beginning of the ninth century, and mentioned by him, in a treatiſe intitled Liber Ignium, of which Dr. Mead had a MS. copy, and cited by Dr. Jebb in the preface to Bacon's Opus Majus, deſcribes two kinds of fire-works; one for flying, incloſed in a caſe or cartouche, made long and ſlender, and filled with the compoſition cloſely rammed, like our modern rocket; and the other thick and ſhort, ſtrongly tied at both ends, and half filled, reſembling our cracker; and the compoſition which he preſcribes for both is two pounds of charcoal, one pound of ſulphur, and ſix pounds of ſalt-petre, well powdered and mixed together in a ſtone mortar.

Mr. Dutens carries the antiquity of *gunpowder* much higher; and he refers to the accounts given by Virgil, Æn. lib. vi ver. 585; Hyginus, Fabul. 61 & 650; Euſtathius, ad Odyſſ. λ. 234, p. 1682. l. 1. Valerius Flaccus, lib. i. 662, and others, of Salmoneus' attempt to imitate thunder, preſuming from hence that he uſed a compoſition of the nature of *gunpowder*. He adds, that Dion Caſſius, in his Hiſt. Rom. in Caligul. p. 662, and Johannes Antiochenus, in Chronica, apud Peireſciana Valeſii, Pariſ. 1604. p. 804, report the ſame thing of Caligula. The Brachmans did the ſame, according to Themiſtius Orat. xxvii. p. 337. and alſo the Indians, whoſe practice is recorded by Philoſtratus, Vita Apoll. lib. ii. cap 33. See likewiſe lib. iii. cap. 13. Dutens's Inquiry into the Origin of the Diſcoveries attributed to the Moderns, p. 262, &c. Eng. ed. 1769.

See the preface to the Code of Gentoo Laws, 1776; where it is aſſerted, that *gunpowder* was known to the inhabitants of Hindoſtan far beyond all periods of inveſtigation.

GUNPOWDER, *preparation of*. There are divers compoſitions of *gunpowder*, with reſpect to the proportions of the three ingredients, to be met with in pyrotechnical treatiſes; but the proceſs of making it up is much the ſame in all.

For ſome time after the invention of artillery, *gunpowder* was of a much weaker compoſition than that now uſed by us, or that deſcribed by Marcus Græcus; which was chiefly owing to the weakneſs of their firſt pieces. See GUN and CANNON.

Of twenty-three different compoſitions, uſed at different times, and mentioned by Tartaglia in his Queſ. & Inv. lib. iii. queſ. 5. the firſt, which was the moſt ancient, contained equal parts of nitre, ſulphur, and charcoal. When guns of modern ſtructure were introduced, *gunpowder* of the ſame compoſition with the preſent came alſo into uſe. The cannon powder, in the time of Tartaglia, was made of four parts of ſalt-petre, one of ſulphur, and one of charcoal; and the muſket powder of forty-eight parts of ſalt-petre, ſeven parts of ſulphur, and eight parts of charcoal; or of eighteen parts of ſalt-petre, two parts of ſulphur, and three parts of charcoal. The cannon powder was in meal, and the muſket powder grained; and it is certain, that the invention of graining powder, which is a very conſiderable advantage, is a modern improvement. See the preface to Robins's Math. Tracts, p. 32, &c.

When the ſeveral ingredients of *gunpowder* are properly prepared, mixed, and grained, in the manner recited below, if the leaſt ſpark be ſtruck thereon from a ſteel and flint, the whole will be immediately inflamed, and burſt out with extreme violence.

The effect is not hard to account for: the charcoal part of the grain whereon the ſpark falls, catching fire like tinder, the ſulphur and nitre are readily melted, and the former alſo breaks into flame; and at the ſame time the contiguous grains undergo the ſame fate. Now it is known, that ſalt-petre, when ignited, rarefies to a prodigious degree.

Sir Iſaac Newton reaſons thus on the point: the charcoal and ſulphur in *gunpowder* eaſily take fire, and kindle the nitre; and the ſpirit of the nitre, being thereby rarefied into vapour, ruſhes out with an exploſion much after the manner that the vapour of water ruſhes out of an æolipile; the ſulphur alſo, being volatile, is converted into vapour, and augments the exploſion: add, that the acid vapour of the ſulphur, namely that which diſtils under a bell into oil of ſulphur, entering violently into the fixt body of the nitre, lets looſe the ſpirit of the nitre, and excites a greater fermentation, whereby the heat is farther augmented, and the fixt body of the nitre is alſo rarefied into fume; and the exploſion is thereby made more vehement and quick.

For if ſalt of tartar be mixed with *gunpowder*, and that mixture be warmed till it takes fire, the exploſion will be greatly more violent and quick than that of *gunpowder* alone, which cannot proceed from any other cauſe than the action of the vapour of the *gunpowder* upon the ſalt of tartar, whereby that ſalt is rarefied. See *Pulvis* FULMINANS.

The exploſion of *gunpowder* ariſes, therefore, from the violent action whereby all the mixture being quickly and vehemently heated, is rarefied and converted into fume and vapour; which vapour, by the violence of that action, becoming ſo hot as to ſhine, appears in the form of a flame. See DETONATION *of nitre*.

M. de la Hire, in the Hiſtory of the French Academy for 1702, aſcribes all the force and effect of *gunpowder* to the ſpring or elaſticity of the air incloſed in the ſeveral grains thereof, and in the intervals or ſpaces between the grains; the powder being kindled, ſets the ſprings of ſo many little parcels of air a-playing, and dilates them all at once, whence the effect; the powder itſelf only ſerving to light a fire which may put the air in action; after which the whole is done by the air alone.

But it will appear from the experiments and obſervations of Mr. Robins, recited in the ſequel of this article, that if this air be in its natural ſtate at the time when the powder is fired, the greateſt addition its elaſticity could acquire from the flame of the exploſion would not amount to five times its uſual quantity, and, therefore, could not ſuffice for the two hundredth part of the effort, which is exerted by fired powder.

In order to underſtand the force of *gunpowder*, it muſt be conſidered, that whether it be fired in a vacuum or in air, it produces by its exploſion a permanent elaſtic fluid. For if a red-hot iron be included in a receiver, and the receiver be exhauſted, and the *gunpowder* be then let fall on the iron, the powder will take fire, and the mercurial gage will ſuddenly deſcend upon the exploſion; and though it immediately aſcends again, yet it will never riſe to the height it firſt ſtood at, but will continue depreſſed by a ſpace proportioned to the quantity of *gunpowder* which was let fall on the iron. By this means (firing ſmall quantities at a time) the mercurial gage may be reduced from $29\frac{1}{2}$ inches to $12\frac{3}{4}$. Now this experiment, which has been often repeated, proves the propoſition with reſpect to the production of a permanent elaſtic fluid in a vacuum; for the deſcent of the gage could only be effected by the preſſure of ſome new generated fluid in the receiver, balancing in part the preſſure of the external air. That this fluid, or ſome part of it at leaſt was permanent, appears from hence, that though in theſe experiments the quickſilver aſcended after the operation, yet next day it had aſcended no higher than $22\frac{1}{2}$, at which place it ſeemed to continue fixed. And that this fluid is elaſtic, is proved from the deſcent of the mercurial gage; ſince the quantity of matter contained in this fluid could not by its gravity alone have ſunk the quickſilver by the leaſt ſenſible quantity; alſo from its extending itſelf through any ſpace, however great, the experiment ſucceeding in either a large or ſmall receiver, only the larger the receiver the leſs will be the deſcent of the mercurial gage to the ſame quantity of powder; the preſſure of the generated fluid diminiſhing as its denſity diminiſhes. See Phil. Tranſ. N° 295

The ſame production likewiſe takes place, when *gunpowder* is fired in the air; for if a ſmall quantity of *powder* be placed in the upper part of a glaſs tube, and the lower part of the tube be immerged in water, and the water be made to riſe ſo near the top, that only a ſmall portion of air is left in that part where the *gunpowder* is placed; if in this ſituation the communication of the upper part of the tube with the external air be cloſed, and the *gunpowder* be fired (which may eaſily be done by a burning-glaſs) the water will, in this experiment, deſcend on the exploſion, as the quickſilver did in the laſt, and will always continue depreſſed below the place at which it ſtood before the exploſion; and the quantity of this depreſſion will be greater, if the quantity of *powder* be increaſed, or the diameter of the tube be diminiſhed. From whence it is proved, that as well in air as in a vacuum, the exploſion of fired *powder* produces a permanent elaſtic fluid. Haukſbee, Phyſ. Mechan. Exp. p. 81. This releaſe of real and elaſtic air from various ſubſtances, in certain circumſtances, is now a well known and inconteſtible fact. See AIR.

It alſo appears from experiment, that the elaſticity or preſſure of the fluid produced by the firing of *gunpowder*, is, *cæteris paribus*, directly as its denſity. This follows from hence, that, if in the ſame receiver a double quantity of *powder* be let fall, the mercury will ſubſide twice as much as in the firing of a ſingle quantity. For the vapour produced from the double quantity, being contained in the ſame receiver, will be of double the denſity of that produced from the ſingle quantity; whence the elaſticity or preſſure, eſtimated by the deſcent of the mercury, being likewiſe double, the preſſure is directly as its denſity. Alſo the deſcents of the mercury, when equal quantities of *powder* are fired in different receivers, are reciprocally as the capacities of thoſe receivers; and conſequently as the denſity of the produced fluid in each.

To determine the elaſticity and quantity of this elaſtic fluid, produced from the exploſion of a given quantity of *gunpowder*, Mr. Robins premiſes, that the elaſticity of this fluid increaſes by heat, and diminiſhes by cold, in the ſame manner as that of the air; and that the denſity of this fluid, and conſequently its weight, is the ſame with the weight of an equal bulk of air, having the ſame elaſticity and the ſame temperature. From theſe principles, and from the experiments by which they are eſtabliſhed, for a detail of which we muſt refer to the book itſelf, ſo often cited in theſe articles, he concludes, that the fluid produced by the firing of *gunpowder* will be nearly $\frac{3}{10}$ of the weight of the generating *gunpowder*;

and the ratio of the reſpective bulks of the *powder*, and the fluid produced from it, will be, in round numbers, 1 to 244.

Count Saluce, in his Miſcell. Phil. Mathem. Soc. priv. Taurin. p. 125, makes the proportion as 1 to 222, which, he ſays, agrees with the computation of Meſſ. Hauksbee, Amontons, and Belidor.

Hence we are certain, that any quantity of *powder* fired in any confined ſpace, which it adequately fills, exerts at the inſtant of its exploſion againſt the ſides of the veſſel containing it, and the bodies it impels before it, a force at leaſt 244 times greater than the elaſticity of common air, or, which is the ſame thing, than the preſſure of the atmoſphere; and this without conſidering the great addition which this force will receive from the violent degree of heat with which it is endued at that time; the quantity of which augmentation is the next head of Mr. Robins's enquriy. He determines that the elaſticity of the air is augmented, when heated to the extremeſt heat of red-hot iron, in the proportion of 796 to $194\frac{1}{3}$ nearly; and ſuppoſing that the flame of fired *gunpowder* is not leſs hot than red-hot iron, and the elaſticity of the air, and conſequently of the fluid generated by the exploſion, being augmented by the extremity of this heat in the ratio of $194\frac{1}{3}$ to 796, it follows, that if 244 be augmented in this ratio, the reſulting number, which is $999\frac{1}{3}$, will determine how many times the elaſticity of the flame of fired *powder* exceeds the elaſticity of common air, ſuppoſing it to be confined in the ſame ſpace which the *powder* filled before it was fired.

Hence then the abſolute quantity of the preſſure exerted by *gunpowder* at the moment of its exploſion, may be aſſigned; for ſince the fluid then generated has an elaſticity $999\frac{1}{3}$, or in round numbers, 1000 times greater than common air; and ſince common air, by its elaſticity, exerts a preſſure on any given ſurface equal to the weight of the incumbent atmoſphere, with which it is in equilibrio, the preſſure exerted by fired *powder*, before it has dilated itſelf, is 1000 times greater than the preſſure of the atmoſphere, and conſequently the quantity of this force on a ſurface of an inch ſquare, amounts to above ſix tun weight; which force, however, diminiſhes, as the fluid dilates itſelf.

Dr. Ingenhouſz accounts for the effect of *gunpowder* by obſerving, that nitre yields by heat a ſurpriſing quantity of pure dephlogiſticated air, and charcoal a conſiderable quantity of inflammable air; the fire employed to inflame the powder extricates theſe two airs, and ſets fire to them at the inſtant of their extrication. See his theory largely explained in Phil. Tranſ. vol. lxix. part ii. art. 26.

Though it has here been ſuppoſed, that the heat of *gunpowder*, when fired in any conſiderable quantity, is the ſame with iron heated to the extremity of a red heat, or to the beginning of a white heat, yet it cannot be doubted but that the fire produced in the exploſion is ſomewhat varied (like all other fires) by a greater or leſs quantity of fuel; and it may be preſumed, that according to the quantity of *powder* fired together, the flame may have all the different degrees from that of a languid red heat to the heat ſufficient for the vitrification of metals; but as the quantity of *powder* requiſite for the production of this laſt mentioned heat is certainly greater than what is ever fired together for any military purpoſe, we ſhall not be far from our ſcope, if we ſuppoſe the heat of ſuch quantities as come more frequently in uſe to be, when fired, nearly the ſame with the ſtrongeſt heat of red-hot iron; allowing a gradual augmentation to this heat in larger quantities, and diminiſhing it when the quantities are very ſmall. Prin. of Gunnery, in Robins's Math. Tracts, vol. i. p. 59, &c.

We may obſerve, that the variations of the denſity of the atmoſphere do not any way alter the action of *powder*. By comparing ſeveral trials made at noon in the hotteſt ſummer ſun, with thoſe made in the freſhneſs of the morning and the evening, no certain difference could be perceived; and it was the ſame with thoſe made in the night and in winter. Indeed, conſidering that the ſame quantity of that elaſtic fluid in which the force of *powder* conſiſts, is generated in a vacuum and in common air, it is difficult to conceive how this force can be affected by the greater or leſs denſity of the atmoſphere.

But the moiſture of the air has a very great influence on the force of *powder*; for that quantity which in a dry ſeaſon would communicate to a bullet a velocity of 1700 feet in one ſecond, will not in damp weather communicate a velocity of more than 12 or 1300 feet in a ſecond, or even leſs, if the *powder* be bad and negligently kept. Robins's Math. Tracts, vol. i. p. 101, &c.

This agrees with an experiment made before a committee of the Royal Society, where *powder* having been dried by being put into a phial placed in boiling water, threw a ball out of a mortar twice as far as the ſame quantity of *powder* taken out of the ſame barrel before it was dried. Now the ranges under the ſame circumſtances of charge, elevation, &c. being as the ſquares of the velocities of the ball, theſe velocities, in this experiment, will be to each other nearly as 17 to 12, which give ranges as 289 to 144. Phil. Tranſ. N° 465. p. 182, 183.

If *powder* be damp, ſhot made with equal quantities of it out of the ſame parcel, will differ conſiderably from each other, perhaps ten times more than if the *powder* was in good order. A ſmall charge ſeems to loſe a greater part of its force than a larger, each being equally damp. Another circumſtance attending damp *powder* is, a remarkable foulneſs in the piece, after firing, much beyond what ariſes from an equal quantity of dry *powder*.

That *powder* will imbibe moiſture from the air, and thereby increaſe in weight, is certain. A parcel of very good *powder* being placed on a white paper, pierced with a great number of fine holes, and held over the ſteam of hot water, the *powder* in half a minute was increaſed about $\frac{1}{50}$ in weight. Another parcel continuing longer in the ſteam was increaſed by $\frac{1}{24}$ part. That the moiſture of the atmoſphere has a like effect, appears from this, that an ounce of *powder* kept for ſome time in a room having a fire in it every day, being dried before the fire, loſt above $\frac{1}{100}$ part of its weight; one third of which it regained in leſs than two hours, by being removed to a part of the room diſtant from the fire. And as the air is often much moiſter than when this experiment was tried, and the open air is more moiſt than a room with a fire, it cannot be doubted but that the twentieth or thirtieth part of the ſubſtance of the beſt *powder* is water. Now as a certain quantity of water mixed with *powder* will prevent its firing at all, it cannot be doubted but every degree of moiſture muſt abate the violence of the exploſion; and hence the effects of *damp* powder are not hard to account for.

It is to be obſerved, that the moiſture imbibed by *powder* does not render it leſs active when dried again. Indeed, if *powder* be expoſed to the greateſt damps without any caution, or if common ſalt abounds in it, as often happens through negligence in refining the nitre, the moiſture it imbibes may, in ſuch caſes, be perhaps ſufficient to diſſolve ſome part of the nitre, which is a laſting damage that no drying can retrieve. But when tolerable care is taken in preſerving *powder*, and the nitre it is compoſed of has been well purged from common ſalt, it will retain its force much longer than is uſually ſuppoſed; and it is ſaid that *powder* has been known to have been preſerved for fifty years, without any apparent damage from its age.

Some care is neceſſary in the drying of damp *gunpowder*; for there is a degree of heat, which though not ſufficient to fire the *powder*, will yet melt the brimſtone, and deſtroy the texture of the grains. Nay more, there is a heat with which the brimſtone will flame and burn away gradually, and yet the *powder* will not explode; of this any one may ſatisfy himſelf by heating a piece of iron red-hot, and then throwing a few grains of *powder* on it at different intervals, during the time of its cooling; for by this means he will find, that at a certain time the ſeparate grains that fall on the iron will not explode, but will burn with a ſmall blue flame for ſome ſpace of time, the grain ſtill remaining unconſumed. Indeed, when it has begun to burn in this manner, it ſometimes ends with exploding; but this more commonly happens when a number of grains lie near together; for then, though each ſeparate flame is not ſufficient to explode its reſpective grain, yet the whole fire made by them altogether, grows ſtrong enough at laſt to end in a general exploſion; however, by attending to the proper temperature of the iron, and ſpreading the grain, two or three inches ſquare may be covered with a blue lambent flame, which will laſt a conſiderable time without any exploſion, and the grains afterwards will not apparently have loſt either their colour or their ſhape. Now ſince theſe grains, when the brimſtone is thus burnt or even melted out of them, will no longer act as *powder*, it is evident that *powder* may be ſpoiled by being dried with too violent a heat. Robins, ubi ſupra, p. 104, &c.

The velocity of expanſion of the flame of *gunpowder*, when fired in a piece of artillery, without either bullet or other body before it, is prodigious. By the experiments of the author ſo often quoted, it ſeems this velocity cannot be much leſs than 7000 feet in a ſecond. This however muſt be underſtood of the moſt active part of the flame. For, as was obſerved before, the elaſtic fluid, in which the activity of *gunpowder* conſiſts, is only $\frac{3}{10}$ of the ſubſtance of the *powder*, the remaining $\frac{7}{10}$ will in the exploſion be mixed with the elaſtic part, and will by its weight retard the activity of the exploſion; and yet they will be ſo completely united as to move with one common motion; but the unelaſtic part will be leſs accelerated than the reſt, and ſome of it will not be carried out of the barrel, as appears by the conſiderable quantity of unctuous matter, which adheres to the inſide of all fire-arms after they have been uſed. Theſe inequalities in the expanſive motion of the flame, render it impracticable to determine its velocity otherwiſe than from experiments. The foundation of which determination is, that a barrel being fixed in a proper ſituation on a pendulum, ſuch as is deſcribed under the head GUNNERY, and being charged with twelve penny-weight of *powder*, without either ball or wad, the *powder* being only put together by the rammer; on the diſcharge the pendulum aſcended through an arch whoſe chord was 10 or 10$\frac{1}{10}$ inches.

Now if the piece be again loaded with the ſame quantity of powder, rammed down by a wad of tow weighing one penny-weight, it may be ſuppoſed that this wad, being very light, will preſently acquire that velocity, with which the elaſtic part of the fluid will expand itſelf when uncompreſſed; and it was accordingly found, that the chord of the aſcending arch was by this means augmented to twelve inches; ſo that by the additional weight of one penny-weight of matter moving with the velocity of the ſwifteſt part of the vapour, the pendulum aſcended through an arch whoſe chord was two inches longer than before. And by calculating upon theſe facts, and the principles laid down in his book, Mr. Robins determines that the velocity with which this one penny-weight of matter moved, muſt be about 7000 feet in one ſecond.

It is this prodigious celerity of expanſion of the flame of fired *gunpowder*, which is its peculiar excellence, and the circumſtance in which it ſo eminently ſurpaſſes all other inventions, either ancient or modern, for the purpoſe of military projections: for as to the quantity of motion of theſe projectiles only, many of the warlike machines of the ancients produced this in a degree far ſurpaſſing that of our heavieſt cannon-ſhot or ſhells; but the great celerity given to theſe bodies cannot be in the leaſt approached by any other means than by the flame of *powder*. The reaſon of this difference is, that the ancients could by weights, or the elaſticity of ſprings and ſtretched chords, augment their powers to any degree deſired; but then each addition of power brought with it a proportional addition of matter to be moved; ſo that as the power increaſed, thoſe parts of the machine which were to communicate motion to the projectile, and were conſequently to move with it, were likewiſe increaſed; and thence it neceſſarily happened, that the action of the power was not ſolely employed in giving motion to the impelled body, but much the greateſt part of it was ſpent in accelerating thoſe parts of the machine in which the power reſided, to enable them to purſue the body to be projected with perpetual impulſe, during its whole paſſage through the extent of their activity. Hence then it came to paſs, that, though theſe ancient machines could throw enormous weights, they could project them but with ſmall degrees of celerity, compared with what we can communicate to our cannon and muſket-ſhot; whence in all operations, where theſe great velocities are uſeful, our machines are infinitely ſuperior to thoſe of antiquity; although, in more confined and ſhorter projections, theſe laſt have ſome advantage which may yet render them worthy of the attention of thoſe military geniuſes, who have capacity enough to conſider each part of the profeſſion according to its true and genuine value, independent of the partial eſtimation of the times they live in. Ibid. p. 112.

Gunpowder is a commodity of ſuch conſequence, both in reſpect of ſpeculation, of war, and of commerce (the conſumption thereof being incredible), that it will deſerve a more particular detail. To make *gunpowder* duly, then, regard is to be had, that the ſalt-petre be pure, and in fine large cryſtals or ſhootings; otherwiſe, it is to be purified, by taking away its fixt or common ſalt, and earthy part, thus: diſſolve ten pounds of nitre in a ſufficient quantity of fair water; ſettle, filtrate, and evaporate it in a glazed veſſel, to the diminution of half, or till a pellicle appear on it; the veſſel may then be taken off from the fire, and ſet in a cellar: in twenty-four hours the cryſtals will ſhoot, which ſeparate from the liquor; and after the like manner may the liquor be cryſtallized ſeveral times, till all the ſalt be drawn forth: this done, put it into a kettle, and that on a furnace with a moderate fire, which gradually increaſe till it begins to ſmoke, evaporate, loſe its humidity, and grow very white: it muſt be kept continually ſtirring with a ladle, for fear it ſhould return to its former figure, whereby its greaſineſs will be taken away; after that, ſo much water is to be poured into the kettle as will cover the nitre; and when it is diſſolved, and reduced to the conſiſtency of a thick liquor, it muſt be ſtirred with a ladle, without intermiſſion, till all the moiſture is again evaporated, and it be reduced to a dry and white meal. See SALT-PETRE, and NITRUM *purificatum*.

The like regard is to be had to the ſulphur, chooſing that which is in large lumps, clear and perfectly yellow; not very hard, nor compact, but porous; nor yet too much ſhining; and if, when ſet on fire, it freely burns away all, leaving little or no reſident matter, it is a ſign of its goodneſs; ſo likewiſe, if it be preſſed between two iron plates that are hot enough to make it run, and in the running appear yellow, and that which remains of a reddiſh colour, it may be concluded to be fit for the purpoſe. But in caſe the ſame be foul and impure, it may be purified in this manner: melt the ſulphur in a large iron ladle, or pot, over a very gentle coal fire, well kindled, but not flaming; then ſcum off all that riſes on the top, and ſwims upon the ſulphur; take it preſently after from the fire, and ſtrain it through a double linen cloth, letting it paſs at leiſure; ſo will it be pure, the groſs filthy matter remaining behind in the cloth. See SULPHUR.

Some perſons, miſled by an experiment of Dr. Hales, which ſhews that burning ſulphur does not generate elaſtic air, but diminiſhes the quantity of common air, have imagined that the ſulphur was an unneceſſary and even injurious ingredient of *gunpowder*. But M. Beaumé has found by experiments, that the force of *gunpowder* was nearly doubled by addition of the ſulphur. The uſe of ſulphur, ſays the tranſlator of the Chemical Dictionary, ſeems to be not to increaſe the exploſion immediately by its own combuſtion, but to accelerate the combuſtion of the other ingredients, in conſequence of its being more eaſily inflammable than the charcoal.

For the charcoal, the third ingredient, ſuch ſhould be choſen as is large, clear, and free from knots, well burnt and cleaving. See CHARCOAL.

The charcoal of light woods has been generally employed; but M. Beaumé affirms from experience, that the charcoals of heavy and hard woods, if they have been well made, are as fit for the purpoſe. The charcoal not only concurs with the ſulphur in ſupplying the inflammable matter, which cauſes the DETONATION *of the nitre*, but alſo conſiderably adds to the exploſive power of the detonating nitre, by the quantity of elaſtic vapour expelled during its combuſtion.

Powder being a mixture of ſulphur and charcoal, which are very inflammable ſubſtances, with ſalt-petre, which in itſelf is not, if the ſalt-petre be too much in quantity, when compared with the other two, their burning may not be ſufficient to conſume the whole of the ſalt-petre; whence the fire may be leſs violent, and conſequently the *powder* leſs vigorous, than if ſome of the ſalt-petre was taken away, and a like quantity of the other materials were added in its ſtead. On the other hand, if the ſalt-petre in the compoſition be leſs than what the burning of the other two ſubſtances can eaſily conſume, the fire will be leſs active than it ought to be, becauſe it is not augmented ſo much as it would be if a larger quantity of ſalt-petre had been added to the compoſition.

Hence it appears that the goodneſs of *powder* is not to be eſtimated only from the quantity of ſalt-petre contained in it, although that ſubſtance ſeems to be the baſis of the elaſtic fluid, in which its force conſiſts: for ſince the converting of the ſalt-petre into that fluid, and the elaſticity of the fluid, afterwards, depend in ſome meaſure on the violence of the fire produced at the exploſion, it is plain that there is a certain proportion in the mixture of the materials, which will beſt contribute to this purpoſe, and conſequently to the perfection of the *powder*.

What this proportion is, has been aſcertained by experience; and it ſeems now to be generally agreed, that in any quantity of *powder* three-fourths of it ſhould be ſalt-petre, the remaining one-fourth conſiſting of equal quantities of ſulphur and charcoal. This is the proportion followed by the French, and by moſt nations in Europe: we, indeed, pretend to a greater degree of nicety in our proportions; though, it is ſaid, they do not greatly differ from what is here mentioned; nor is it certain that they are preferable: this, however, may be depended on, that no methods of proving *powder*, hitherto generally practiſed in England, could at all aſcertain the difference; and other *powders* made with the uſual proportions, are nothing inferior to our's.

But it is not the due proportion of the materials only, which is neceſſary to the making of good *powder*; another circumſtance, not leſs eſſential, is the mixing them well together; if this be not effectually done, ſome parts of the compoſition will have too much ſalt-petre in them, and others too little; and in either caſe there will be a loſs of ſtrength in the *powder*. Robins, ubi ſupra, p. 119, &c.

There have been commonly enumerated three kinds of *powder*, viz. *cannon-powder*, *muſket-powder*, and *piſtol-powder*; of each of theſe again there are two ſorts, a *ſtronger*, and a *weaker*; all which differences ariſe only from the various proportions.

The proportions are thus: in the ſtronger *cannon-powder*, to every hundred pounds of faltpetre, twenty-five pounds of ſulphur are generally allowed, with the ſame quantity of charcoal; and in the weaker *cannon-powder*, to every hundred pounds of ſalt-petre, twenty pounds of ſulphur, and twenty-four pounds of charcoal. As for the ſtronger *muſket-powder*, a hundred pounds of ſalt-petre require eighteen pounds of ſulphur, and twenty of charcoal; and in the weaker there go to a hundred pounds of ſalt-petre, fifteen of ſulphur, and eighteen of charcoal. In the ſtronger *piſtol-powder*, a hundred pounds of ſalt-petre require twelve of ſulphur, and fifteen of coal; whereas the weaker has to a hundred pounds of ſalt-petre, only ten of ſulphur, but eighteen of charcoal.

Other authors preſcribe different proportions: Semienowitz, for mortars, directs a hundred pounds of ſalt-petre, twenty-five of ſulphur, and as much of charcoal; for great guns, a hundred pounds of ſalt-petre, fifteen of ſulphur, and eighteen of charcoal; for muſkets and piſtols, a hundred pounds of ſalt-petre, eight of ſulphur, and ten of charcoal. The author of the Dictionary of Chemiſtry, recommends ſeventy-five parts of purified nitre, fifteen and a half parts of charcoal, and nine and a half parts of ſulphur.

Miethius extols the proportion of one pound of ſalt-petre to three ounces of charcoal; or two, or two and a quarter, of ſulphur: than which, he affirms, no *gunpowder* can poſſibly be ſtronger.

He adds, that the uſual practice of making the *gunpowder* weaker for mortars than guns, as in the example above, is without any foundation, and renders the expence needleſsly much greater: for whereas to load a large mortar twenty-four pounds of common is required, and conſequently to load it ten times, two hundred and forty pounds; he ſhews by calculation, that the ſame effect would be had by one hundred and eighty pounds of the ſtrong powder.

GUNPOWDER, *as to the proceſs of making the*; all the ingredients are firſt to be finely powdered, then moiſtened with fair water, or vinegar, or ſpirit of wine, or water and ſpirit of wine mixed together, or urine; afterwards all muſt be well beat for the ſpace of twenty-four hours at leaſt, and then granulated after the following manner: a ſieve is to be prepared with a bottom of thick parchment made full of round holes, and the former beaten maſs moiſtened before-hand with twenty ounces of ſpirit of wine, twelve of ſpirit of wine-vinegar, thirteen of ſpirit of nitre, two of ſpirit of ſal armoniac, and one ounce of camphor diſſolved in ſpirit of wine; and let all theſe be mingled together; Otherwiſe, take forty ounces of brandy, and one of camphire, and let them be mixed and diſſolved for the ſame purpoſe: when the whole compound is made up into balls as big as eggs, put them into the ſieve, and with them a wooden ball; which move up and down about the ſieve, ſo that it may break the balls of powder, and make it paſs through the little holes in corns.

For greater quantities, MILLS are uſually provided, by means of which, more work may be performed in one day, than a man can do in a hundred.

Gunpowder may alſo be made of ſeveral colours; but the *black* is the moſt ſerviceable of any.

To make white powder proceed thus:—Take ten pounds of ſalt-petre, one of ſulphur, and two of the ſaw-duſt of elder, or the like wood, powdered very fine; mix them together, and uſe the former method. Or thus: with ten pounds of nitre, and a pound and a half of ſulphur dried, and finely powdered, mix two pounds of ſaw-duſt, *&c.* or, inſtead of that, rotten wood dried and powdered, with two pounds and three ounces of ſalt of tartar; whereof make powder to be kept cloſe from the air.

It is alſo to be noted, that in making *piſtol-powder*, if you would have it ſtronger, it ſhould be ſtirred up ſeveral times while in the mortar, and moiſtened with water diſtilled from orange or lemon peels, or ſome other oily vegetable ſubſtance in an alembic, and then beaten for twenty hours, as aforeſaid.

Corn-powder is of ſo much greater force than when in duſt or meal, that it is generally concluded the larger grains are ſtronger than the ſmaller: for which reaſon, *cannon-powder* is granulated larger than other powders; and therefore *powder* in loading ſhould not be beat home into the piece, ſo as to bruiſe the grains. Powder is ſmoothed for ſmall arms by the following operation: a hollow cylinder or caſk is mounted on an axis, turned by a wheel; this caſk is half filled with powder and turned for ſix hours, and thus by the mutual friction of the grains of powder it is ſmoothed. The fine mealy part thus ſeparated or worn off from the reſt is again granulated. There are ſeveral ways to prove the goodneſs of *gunpowder*: 1. By ſight; for if it be too black, it is too moiſt, or has too much charcoal in it; ſo alſo if rubbed upon white paper, it blackens it more than good *powder* does: but if it be of a kind of azure colour, ſomewhat inclining to red, it is a ſign of good *powder*. 2. By touching; for if in cruſhing it with your fingers ends, the grains break eaſily, and turn into duſt, without feeling hard, it has too much coal in it; or if in preſſing under your fingers upon a ſmooth hard board, ſome grains feel harder than the reſt, or, as it were, dent your fingers ends, the ſulphur is not well mixed with the nitre, and the *powder* is naught. 3. By burning, wherein little heaps of powder are laid on white paper three inches or more aſunder, and one of them fired; which, if it only fires all away, and that ſuddenly, and almoſt imperceptibly, without firing the reſt, and makes a ſmall thundering noiſe, and a white ſmoke ariſes in the air almoſt like a circle, the *powder* is good; if it leaves black marks, it has too much coal, or is not well burnt: if it leaves a greaſineſs, the ſulphur or nitre are not well cleanſed or ordered. Again, if two or three corns be laid on paper an inch diſtant, and fire be put to one of them, and they all fire at once, leaving no ſign behind, but a white ſmoky colour in the place, and the paper not touched, the *powder* is good. So alſo if fired in a man's hand, and it burns not, but if black knots appear, which burn downwards in the place where proof was made, after firing, it is not ſtrong enough, but wants nitre. The method moſt commonly followed for this purpoſe, here with us, ſays Mr. Robins, is to fire a ſmall heap of it on a clean board, and to attend nicely to the flame and ſmoke it produces, as likewiſe to the marks it leaves behind on the table; from all which inſtructive particulars the merit of the *powder* is aſcertained with great accuracy, as is pretended: but beſides this uncertain method, which how much ſoever it may be practiſed, none will undertake ſeriouſly to defend, there are, on particular occaſions, other contrivances made uſe of, all which bear ſome analogy to the common powder-triers, ſold at the ſhops: only they are more artfully fabricated, and inſtead of a ſpring they move a weight, which is a more certain and equal power.

The method of proving *gunpowder*, as practiſed by our board of ordnance is to take out of ſeveral barrels a meaſure, of about the ſize of a thimble, which is ſpread upon a ſheet of fine writing-paper and then fired; if the inflammation is very rapid, the ſmoke riſes perpendicularly, and the paper is neither burnt nor ſpotted, the *powder* is judged to be good: then two drams of the ſame *powder*, being exactly weighed, are put into a machine, called *eprovette* or *gunpowder* prover, which if it raiſes a weight of 24lb. to the height of 3½ inches, it is received into the king's magazines: and is hence called *ordnance* or *government-powder*.

But theſe machines, ſays Mr. Robins, though more perfect then the common powder-triers, are yet liable to great irregularities; for as they are all moved by the inſtantaneous ſtroke of the flame, and not by its continued preſſure, they do not determine the force of the fired powder with that certainty and uniformity which were to be deſired in theſe kinds of trials: and therefore, the method followed by the French, in the receiving of powders from the makers, ſeems to be much better. Their practice is thus:

They have, in each magazine, a ſmall mortar caſt with its bed, according to a determined pattern, which is the ſame throughout the kingdom: this mortar is always pointed at 45°, and it contains juſt three ounces of powder; and it is a ſtanding maxim, that no powder can be received into their ſtores, unleſs three ounces of it, placed in the chamber of this mortar, throw a ſolid ball of 7½ inches diameter to the diſtance of at leaſt 55 French fathom. But if each barrel of powder was to be proved in this manner, the trouble of charging the mortar, &c. would be intolerable, and the delay ſo great, that no buſineſs of this kind could ever be finiſhed. The method by firing againſt a pendulum, in the manner mentioned under the head GUNNERY, ſeems a readier way; but ſtill it requires ſome nicety and time, which it were to be wiſhed could be obviated. Robins's Mathemat. Tracts, vol. i. p. 121.

To recover damaged *powder*, the method of the *powder* merchants is this; they put part of the *powder* on a ſail-cloth, to which they add an equal weight of what is really good; and with a ſhovel mingle it well together, dry it in the ſun, and barrel it up, keeping it in a dry and proper place.

Others again, if it be very bad, reſtore it by moiſtening it with vinegar, water, urine, or brandy; then they beat it fine, ſearce it, and to every pound of *powder* add an ounce, an ounce and an half, or two ounces (according as it is decayed), of melted ſalt-petre; and afterwards theſe ingredients are to be moiſtened and mixed well, ſo that nothing may be diſcerned in the compoſition; which may be known by cutting the maſs, and then they granulate it as aforeſaid.

In caſe the *powder* be in a manner quite ſpoiled, the only way is to extract the ſalt-petre with water, according to the uſual manner, by boiling, filtrating, evaporating, and cryſtallizing; and then, with freſh ſulphur and charcoal, to make it up anew again,

Perſons keeping more than 200 lb. weight of *gunpowder* at one time, within the cities of London and Weſtminſter, or their ſuburbs, &c. are liable to forfeitures if it be not removed; and juſtices of the peace may iſſue warrants to ſearch for, ſeize, and remove the ſame, 5 and 11 Geo I. and 5 Geo. II. cap. 20. All the acts relating to the making, keeping, and carrying of *gunpowder* are reduced into one, by 12 Geo. III. cap. 61.

GUN-SHOT *wounds*. See WOUND.

GUNTER'S LINE, called alſo *line of lines*, and *line of numbers*, is a graduated line uſually placed on ſcales, rules, ſectors, &c.

This line conſiſts of the logarithms transferred upon a ruler, from the tables, by means of a ſcale of equal parts, ſo as to anſwer much the ſame purpoſes, inſtrumentally, as the logarithms themſelves do arithmetically. What the logarithms do by addition and ſubtraction, is done in this line by turning a pair of compaſſes this way and that.

This line has been contrived various ways, for the advantage of having it as long as poſſible. As, firſt, on the two feet ruler, contrived by Edmund Gunter, and called *Gunter's ſcale*; whence alſo the line itſelf took its popular denomination *Gunter's line*.

After this, Wingate doubled the line, or laid it together, ſo as one might either work right on, or acroſs. Then it was projected in a circle, by Oughtred, and made to ſlide by the ſame author: and laſtly, it was projected in a kind of ſpiral, by Brown.

The method of uſing or applying, is much the ſame in all; except that in Gunter's and Wingate's way, common compaſſes are uſed; in Oughtred's and Brown's flat compaſſes, or an opening index; and in ſliding rules, no compaſſes at all.

Deſcription of GUNTER'*s line*. The whole length of this line is divided into two equal intervals, uſually called radiuſes; the firſt begins at the left-hand with the number 1; the middle point between the two radiuſes, where the firſt ends and the ſecond begins is alſo marked with number 1; and the end of the ſecond radius, which terminates the line at the right-hand end is marked with the number 10, againſt which are inſcribed the letters *num*. Each of theſe equal radiuſes or intervals is divided into 9 equal ſpaces, marked 2, 3, 4, 5, 6, 7, 8, 9; but the ſpace in one radius are exactly of the ſame lengths with the ſpaces alike marked in the other radius; each of theſe 9 unequal ſpaces are ſubdivided, firſt into ten unequal, and then each of theſe into 2 or more parts, ſuch as thoſe ſpaces can conveniently contain. If the left-hand 1 ſtands for the number one, the middle 1 repreſents the number 10, and the 10 at the right-hand end ſtands for the number 100, then the figures 2, 3, 4 &c. in the firſt radius ſtand for the numbers 2, 3, 4, 5, 6, 7 8, 9; and the like figures in the ſecond radius ſtand for the numbers 20, 30, 40, 50, 60, 70, 80, and 90; and the ten firſt ſubdiviſions in the ſpaces of the ſecond radius ſtand for the reſpective units between the marked ſpaces. If the left-hand 1 be called 10, the middle 1 ſtands for 100, and the 10 at the right-hand ſtands for 1000; the ſeveral ſpaces and ſubdiviſions in the firſt interval are then to be eſtimated as thoſe were eſtimated in the ſecond radius, when the right-hand end ſtood for 100; but now, in the ſecond interval, the firſt ſubdiviſions in the ſpaces ſtand for hundreds, and the leſſer diviſions of theſe ſtand for ſuch parts of 100, as there are parts introduced; thus, where only 2 of the laſt ſubdivſions can be introduced, each ſtands for 50; where 4 can be contained, each ſtands for 25; if 5 are put in, each ſtands for 20; and where 10 are introduced, each ſtands for 10; again, if the firſt 1 be called 100, the ſecond 1 ſtands for 1000, and the 10 at the end ſtands for 10000, &c. if the firſt 1 ſtands for $\frac{1}{10}$, the ſecond 1 ſtands for 1, and the 10 at the end ſtands for 10; and in this caſe, the numbered diviſions in the ſecond radius ſtand for the units between 1 and 10; the firſt ſubdiviſions ſtand for tenth-parts of unity, and the ſecond ſubdiviſions ſtand for the parts of tenths, according to the number of theſe ſecond ſubdiviſions, &c. ſo that whatever values are put upon any diviſion or ſubdiviſion in the ſecond radius, the value of the correſponding diviſion in the firſt radius will be only a tenth-part, and *vice verſâ*: thus, if the diviſion marked 5 in the ſecond radius ſtands for 5000, or 500, or 50, or $\frac{5}{10}$, &c. then the 5 in the firſt radius will ſtand for 500, or 50, or 5, or $\frac{5}{10}$, or $\frac{5}{100}$, &c.

Conſtrution of GUNTER'*s line*. From a ſcale of equal parts, accurately divided, and of ſuch a length, that 20 of the primary diviſions ſhall make the whole length of the intended ſcale of numbers, take the firſt 10 of theſe diviſions, and lay this diſtance down twice on the logarithmic ſcale, making 2 equal intervals; marking the firſt point 1, the ſecond 1, (or rather 10), and the third 10, (or rather 100). From the ſame ſcale take the diſtances expreſſed by the 3 firſt figures of the logarithms of the numbers 2, 3, 4, 5, 6, 7, 8, 9 reſpectively, rejecting the indices, viz. 301, 477, 672, 699, 778, 845, 903, 954; lay theſe diſtances on each interval of the logarithmic ſcale, between the marks 1 and 10, 10 and 100, reckoning each diſtance from the beginning of its interval, viz. from 1 and from 10, and mark theſe diſtances with the figures 2, 3, 4, 5, 6, 7, 8, 9, in order. The diſtances expreſſing the logarithms of the numbers between 10 and 20, 20 and 30, 30 and 40, 40 and 50, 50 and 60, 60 and 70, 70 and 80, 80 and 90, 90 and 100, rejecting the indices, are alſo to be taken from the ſcale of equal parts, and laid on the logarithmic ſcale, in each of the primary intervals between the marks 1 and 2, 2 and 3, 3 and 4, 4 and 5, 5 and 6, 6 and 7, 7 and 8, 8 and 9, 9 and 10, reſpectively, reckoning each diſtance from the beginning of its reſpective primary interval. The laſt ſubdiviſions of the ſecond primary interval are to be divided into others, as many as the ſcale will admit of, by laying down the logarithms of ſuch intermediate diviſions.

The accuracy of the diviſion of this line may be determined by taking with a pair of compaſſes the diſtance between the diviſions marked with the numbers 1 and 2, which will reach from 2 to 4, from 4 to 8, from 8 to 16, &c. and from $1\frac{1}{2}$ to 3, from 3 to 6, from 6 to 12, &c. and alſo from $1\frac{1}{4}$ to $2\frac{1}{2}$, from $2\frac{1}{2}$ to 5, from 5 to 10, &c. or the ſame diſtance applied to any one of the diviſions between 1 and 2, will reach from thence to diviſions found always by doubling the laſt number. The ſame work may be done without compaſſes, by moving the ſlider till the left-hand 1 on the line of numbers ſtands againſt the diviſion expreſſing any number counted on the fixed line of numbers, then will the diviſions 2, 4, 8, 16, 32, &c. on the ſlider ſtand againſt the reſpective diviſions on the fixed line, which will repreſent twice 4 times, 8 times, 16 times, &c the diviſion againſt which the 1 on the ſlider was ſet. Theſe diviſions on the fixed line which correſpond to the diviſions 2, 4, 8, 16, &c. on the ſlider will be cut by the edge of the braſs index by moving it along to the diviſions on the ſlider.

To find a diviſion or point in the line of numbers anſwering to any given number. Let the number be 654: ſeek in the ſecond radius between the figures 6 and 7 for the fifth of the firſt ſubdiviſions; between this fifth and ſixth are 4 ſecond ſubdiviſions, each of which anſwers to $2\frac{1}{2}$ units; then will a point taken a little nearer to the ſecond than the firſt of theſe ſmaller ſubdiviſions anſwer to the number 654 very nearly; the correſponding point in the firſt radius anſwers to the number 65.4, and if this point in the firſt radius anſwered to 654, the like point in the ſecond would anſwer to 6540. Let the number be 168: in the ſecond radius between 1 and 2, ſeek the ſixth of the larger ſubdiviſions, and the point will fall between this ſixth and the ſeventh of the ſubdiviſions, and the true point will be on the eighth of the ſmaller ones, which will repreſent the number 168; the like diviſion in the firſt radius repreſents 16.8, but if this ſtood for 168, then the like diviſion in the ſecond radius ſtands for 1680.

To find a fraction, conſider that the line properly only expreſſes decimal fractions, as thus, $\frac{1}{10}$, or $\frac{1}{100}$, or $\frac{1}{1000}$, and nearer the rule cannot well come than one inch, one tenth, one hundredth, or one thouſandth part of an inch: ſo that for other fractions, as quarters, half quarters, &c. you muſt either eſtimate them as near as you can reaſonbly, or elſe reduce them into decimals.

Uſe of GUNTER'*s* LINE. 1. *Two numbers being given, to find a third geometrically proportional to them; and to three a fourth number, to a fourth a fifth, &c.* Extend the compaſſes on the line from one number to another; then if that extent be applied upwards and downwards, as you would either increaſe or diminiſh the number from either of the numbers, the moveable point will fall on the third proportionable number required. Again, the ſame extent, applied the ſame way from the third, will give a fourth; and from the fourth a fifth, &c.

For example: let the two numbers 2 and 4 be propoſed to find a third proportional, &c. to them; extend the compaſſes on the firſt part on the line of numbers, from 2 to 4; which done, and the ſame extent being applied upwards from 4, the moveable point will fall on 8, the third proportional required; and from 8 it will reach to 16, the fourth proportional; and from 16 to 32, the fifth, &c. Contrariwiſe, if you would diminiſh, as from 4 to 2, the moveable point will fall on 1, and from 1 to $\frac{5}{10}$, or .5; and from .5 to .25, &c.

But generally in this, and in moſt other works, make uſe of the ſmall diviſions in the middle of the line; that you may the better eſtimate the fractions of the numbers you make uſe of; for how much you miſs in ſetting the compaſſes to the firſt and ſecond term, ſo much the more you will err in the fourth; therefore the middle part will be moſt uſeful. For example, as 8 to 11, ſo is 12 to 16.5, if you imagine one integer to be divided into ten parts, as they are on the line on a two-feet rule. See Sliding-*rule*.

2. *One number being given to be multiplied by another, to find the product.* Extend the compaſſes from 1 to the multicator; and the ſame extent, applied the ſame way from the multiplicand, will make the moveable point fall on the product: thus, if 6 be given to be multiplied by 5, extending the compaſſes from 1 to 5, the ſame extent will reach from 6 to 30, the product ſought.

3. *One number being given to be divided by another, to find the quotient.* Extend the compaſſes from the diviſor, e. gr. 25, to 1, and the ſame extent will reach from the dividend, *e. gr.* 750, to the quotient 30; or extend the compaſſes from the diviſor to the dividend, the ſame extent will reach the ſame way from 1 to the quotient.

4. *To reduce a vulgar fraction into a decimal.* In this caſe, the denominator of the given fraction is to the numerator as 1 is to the decimal required: let the fraction be $\frac{7}{8}$, extend the compaſſes from 8 to 7, and this extent laid the ſame way from 1 will reach to .875 the required decimal.

5. *Three numbers being given, to find a fourth in direct proportion.* Extend the compaſſes from the firſt number, ſuppoſe 7, to the ſecond, v. g. 22: that done, the ſame extent, applied the ſame way from the third, 28, will reach to the fourth proportional ſought, viz. 44, which is the circumference of a circle, whoſe diameter is 28, by Archimedes's proportion.

6. *Three numbers being given, to find a fourth in inverſe proportion.* Extend the compaſſes from the firſt of the given numbers, ſuppoſe 60, to the ſecond of the ſame denomination, viz. 30; if that diſtance be applied from the third number backwards, 5, it will reach to the fourth number ſought, 2.5.

7. *Three numbers being given, to find a fourth in duplicate proportion.* If the denominations of the firſt and ſecond terms be lines, extend the compaſſes from the firſt term to the ſecond, of the ſame denomination: this done, that extent being applied twice the ſame way from the third term, the moveable point will fall on the fourth term required. E. gr. the area of a circle, whoſe diameter is 1, being 0.78539, what will the content of a circle be, whoſe diameter is 28? Apply the extent from 1 to 28, the ſame way from .785 twice, the moveable point will fall on 616, the fourth proportional or area ſought.

8. *Having three numbers giving to find a fourth in triplicate proportion.* In this caſe the firſt and ſecond terms muſt be always in the ſame denomination: e. gr. If an iron bullet of 4 inches diameter, weigh 9 pounds, what is the weight of another of the ſame metal, whoſe diameter is 6 inches: the extent from 4 to 6, laid on three times from 9 will reach to 30, 3 pounds.

9. *To find a mean proportional between two given numbers.* Biſect the diſtance between the given numbers, the point of biſection will fall on the mean proportional ſought. Thus the quotient of the two extremes divided by one another, extremes being 8 and 32, the middle point between them will be found 16.

10. *To find two mean proportionals between two given lines.* Triſect the ſpace between the two given extremes; the two points of triſection will give the two means required; thus, if 8 and 27 be the two given extremes, the two means will be found 12 and 18.

11. *To find the ſquare root of any number under* 1000000. The ſquare root of a number is always a mean proportional between 1, and the number whoſe root is required; yet with this general caution, that if the figures of the number be even, that is 2, 4, 6, 8, 10, &c. then you muſt look for the unit at the beginning of the line, and the number in the ſecond part or radius, and the root in the firſt part; or rather, reckon 10 at the end to be unity; and then both root and ſquare will fall backwards towards the middle in the ſecond length or part of the line. If they be odd, the middle 1 will be moſt convenient to be counted unity, and both root and ſquare will be found from thence forward towards 10. On this principle the ſquare root of 9 will be found to be 3; the ſquare root of 64, to be 8, &c.

12. *To find the cube root of any number under* 1000000000. The cube root is always the firſt of two mean proportionals between 1 and the given number, and therefore to be found by triſecting the ſpace between them. Thus the cube root of 1728 will be found 12; the root of 17280, nearly 26; the root of 172800 almoſt 56.

Though the point on the line repreſenting all the ſquare numbers is in one place, yet, by altering the unit, it produces various points and numbers for their reſpective roots. The rule to find this is, to put dots, or to ſuppoſe them put, over the firſt figure to the left hand, the fourth figure, the ſeventh, and the tenth: if then the laſt dot on the left hand falls on the laſt figure, as it does in 1728, the unit muſt be placed at 1 in the middle of the line, and the root, the ſquare, and the cube, will all fall forward to the end of the line.

If it fall on the laſt but 1, as in 17280, the unit muſt be placed at 1 in the beginning of the line, and the cube in the ſecond length; or the unit may be placed at 10 at the end of the line, and then the root, the ſquare, and cube, will all fall backwards, and be found in the ſecond part between the middle and end of the line. Thus will the cube root of 8 be found 2; and that of 27, 3; that of 64, 4; that of 125, 5; that of 216, 6, &c.

We may obſerve in general, with regard to theſe two laſt problems, that the line of numbers is only a line of logarithms, and any logarithm divided by 2, quotes the logarithm of the ſquare root of its natural number; if divided by 3, it gives the logarithm of the cube root, and if by 6, it gives the logarithm of the ſixth power, &c. Hence the roots of all powers may eaſily be found on the line of numbers, by dividing the diſtance or extent on the ſcale, between unity and the number given to be extracted, into as many equal parts as are directed by the index of that power, i. e. the ſquare into 2 equal parts; the cube into 3; the biquadrate into 4, &c. which half, third, fourth, &c. part, taken in the compaſſes and laid off from unity (obſerving well the notation, or value of the figures) will give the reſpective root required.

For the particular uſes of *Gunter's line* in the meaſuring of timber, gauging of veſſels, &c. See Sliding-rule. For other uſes in geometry, trigonometry, &c. See Sector, and Gunter's *ſcale*.

Gunter's *quadrant* is a quadrant made of wood, braſs, or ſome other ſubſtance; being a kind of ſtereographic projection on the plane of the equinoctial, the eye ſuppoſed in one of the poles: ſo that the tropic, ecliptic, and horizon, form the arches of circles, but the hour-circles all curves, drawn by means of ſeveral altitudes of the ſun, for ſome particular latitude every day in the year.

The uſe of this inſtrument is to find the hour of the day, the ſun's azimuth, &c. and other common problems of the globe; as alſo to take the altitude of an object in degrees.

See its deſcription and uſe more at large under the article *Gunter's* QUADRANT.

Gunter's *ſcale*, alſo called by navigators abſolutely, *The Gunter*, is a large plain ſcale, with divers lines thereon, of great uſe in working queſtions in navigation, &c. See Scale and Sailing.

This inſtrument derives its name from its inventor, Mr. Edmund Gunter, who was profeſſor of aſtronomy in Greſham college, and firſt publiſhed the ſcales of logarithms, numbers, ſines, and tangents, in his deſcription of the croſs-ſtaff, in 1624. The errors which had crept into *Gunter's ſcale*, by length of time and negligence in the fabrication of it, have been corrected by the late Mr. John Robertſon, librarian to the Royal Society, and the inſtrument has been reconſtructed, under his inſpection and with his improvements, by Meſſrs. Nairne and Blunt, mathematical inſtrument makers in London. See a deſcription of this inſtrument in its improved ſtate by W. Mountain, F. R. S. publiſhed in 1778.

On one ſide of the ſcale, repreſented *Tab. Trigonom. fig.* 1, are the lines of numbers, marked *numbers*; the line of artificial ſines, marked *ſines*; the line of artificial tangents, marked *tangents*; the line of artificial verſed ſines, marked *V. S.* the artificial ſines of the rhumbs, marked *S. R.* the artificial tangents of the rhumbs, marked *T. R.* meridian line in Mercator's chart, marked *Merid.* and equal parts, marked *E. P.*

To which on the ſhorter ſcales of a foot long, are uſually added lines of latitudes, hours, and inclinations of meridians. On the backſide of the ſcale are the lines uſually found on a plain ſcale.

The lines of artificial ſines, tangents, and numbers, are ſo fitted on this ſcale, that by means of a pair of compaſſes, any problem, whether in right-lined or ſpherical trigonometry, may be ſolved very expeditiouſly, and with tolerable exactneſs; whence the inſtrument becomes extremely uſeful in all parts of mathematicks where TRIGONOMETRY is concerned, as navigation, dialling, aſtronomy, &c.

The ſame lines are alſo occaſionally laid down on rulers to ſlide by each other; hence called *ſliding Gunters*; ſ as to be uſed without compaſſes: but he that underſtands how to uſe them with, may, by what we have ſaid o Everard's and Coggeſhall's ſliding rules, uſe them without. See Sliding-*rule*.

The *Gunter's ſcale*, as it has been lately improved, i made 30 inches long, 2 inches broad, and about hal half an inch thick. One face contains the natural ſcales; half the length of this face is filled with ſcales of equal parts, which are denominated by the diviſions of an inch, viz. ſcales of 10, $12\frac{1}{2}$, 15, 20, 25, 30, 35, 40, 45, 50, and the left-hand primary diviſion of each ſcale is divided into 10 equal parts, and alſo into 12 equal parts: on the other half of this face are put the ſeveral lines which conſtitute the *plain* SCALE, ſuch as the ſcales of rumbs, chords, ſines, ſecants, tangents and half-tangents, fitted to a radius of 2 inches; alſo the dialling ſcales, viz. inclination of meridians, latitudes, chords, and hours, to a radius of 2 inches; and a ſcale of chords and miles of longitude to a radius of 3 inches, and other ſcales of chords and rhumbs to a radius of 1 inch. The breadth of the other face, which contains the logarithmic ſcales, is divided into 12 parts, or ſcales running nearly the whole length; nine of theſe ſcales may be called fixed, and the other three moveable, being on a ſliding piece of about $30\frac{1}{2}$ inches long, $\frac{1}{2}$ an inch broad, and of the thickneſs of the ſcale. The order of theſe ſcales, or lines is,

Fixed	1. A line of ſine rhumbs, marked	S. R.
	2. A line of tangent rhumbs, marked	T. R.
	3. A line of verſed ſines, marked	V. S.
	4. A line of ſines, marked	Sin.
Sliding	5. A line of ſines, marked	Sin.
	6. A line of numbers, marked	Num.
	7. A line of tangents, marked	Tan.
Fixed	8. A line of tangents, marked	Tan.
	9. A line of numbers, marked	Num.
	10. A line of meridian degrees to 50, marked	Mer.
	11. A line of meridian degrees from 50 to about 74, marked	Mer.
	12. A line of degrees of longitude, marked	Lon.

Along this face an index or thin piece of braſs, about an inch broad, is contrived to ſlide, which going acroſs the edge of the ſcale at right angles to it, will ſhew on the ſeveral lines the diviſions which are oppoſite to one another, although the lines are not contiguous. The apparatus at the right hand conſiſts of a braſs box and two ſcrews; the ſlider paſſes freely through the box, when the perpendicular ſcrew is eaſed and may be readily ſet by hand to the terms given; but for greater accuracy, and in order to keep the ſlider in its true poſition, move the perpendicular ſcrew, which by a ſub-ſpring will fix the ſlider in the box, and then by the motion of the horizontal ſcrew, the greateſt degree of accuracy poſſible may be obtained. Compaſſes may be uſed with this ſcale, as well as with the common *Gunter*, by firſt bringing the radius on the ſlider exactly in a line with the others on the right hand and fixing it there. In a convenient part of this inſtrument are marked 10 ſea-feet, each of which contains 13.8258 Engliſh inches; and each foot is divided into 12 equal parts, called ſea-inches. The method of forming and graduating the ſeveral lines on *Gunter*'s ſcale is as follows: the conſtruction of the line of numbers has been already explained: for the line of logarithmic ſines, it is to be obſerved, that this line terminates at 90 degrees, juſt againſt the 10 at the end of the line of numbers; and from this termination the degrees are laid backwards, or from thence towards the left: in order to obtain diviſions anſwering to theſe, ſeek in a table of logarithmic ſines, the numbers expreſſing the ARITHMETICAL *complements* of the ſeveral degrees, without the index, take theſe numbers from the ſcales of equal parts by which the line of numbers was formed, and apply them to the ſcale of lines from 90°. Then the arithmetical complements of the logarithmic ſines (or the coſecants) abating the index, of 10°, 20°, 30°, 40°, &c. are the numbers 76033, 46595, 30103, 19193, &c. and the equal parts anſwering to theſe numbers will give the diviſions for 10°, 20°, 30°, 40°, &c. and proceed in the ſame manner for the intermediate degrees. The arithmetical complement of the ſine of 50° 44′ 21″ will be equal to 10 of the primary diviſions of the ſcale of equal parts, or to one interval in the logarithmic ſcale; ſo that a decreaſe of the index by unity anſwers to one interval; then a decreaſe of the index by 2 anſwers to 2 intervals, or the whole length of the logarithmic ſcale, which happens at the ſine of 0° 34′ 23″; and the diviſions anſwering to the ſine of a little above 3′, viz. 3′ 27″, will be equal to 3 intervals, and the ſine of 21″ will be 4 intervals; and therefore, all the ſines between 90° and 0° 34′ are thoſe only, which can be put on this ſcale, the leſſer ſines extending beyond this length. It has been uſual to inſert the diviſions to every 5′, as far as 10°; from 10° to 30°, the ſmall diviſions are made 15′ each; from 30° to 50°, every half degree is marked; from 50° to 70° only the whole degrees. On the improved ſcale, the ſpace between 90° and 80° is too ſmall to admit of more than five diviſions; that neareſt to the 90° being the mark for 85°; between 80° and 60°, the diviſions are ſingle degrees; from 60° to 50° every degree and half-degree are introduced; from 50° to 30° are degrees and third-parts, or every 20′; from 30° to 20° are degrees and quarters, or every 15′; and from 20° downwards are put in the degrees and ſixth parts of degrees. This line of ſines is put the uppermoſt of the 3 on the ſlider, and alſo the loweſt on the upper part of the fixed ſcales, whereby the 2 ſcales of ſines are contiguous.

For the line of tangents, it is evident, ſince the tangent of 45° is equal to the radius, or ſine of 90°, that 45° on this ſcale will terminate directly oppoſite to 90° on the ſines; and the ſeveral diviſions of this ſcale of logarithmic tangents are conſtructed in the ſame manner as thoſe of the ſines, by applying their arithmetical complements backwards from 45°, or towards the left hand. The degrees above 45° are to be counted backwards on the ſcale: thus, the diviſion at 40, repreſents both 40° and 50°, &c. In the new ſcale, this line deſcends as low as 0° 34′ on the ſines; the ſpaces between 10° and 45°, and back again from 45° to 80° are large enough to admit of 4 ſpaces in each; and therefore, the ſubdiviſions between 10° and 80° extend to every 15 minutes; but the degrees under 10 and above 80 are each ſubdivided into 6 parts, of 10 minutes each. This line of tangents is, like that of ſines, laid down twice on the new *Gunter*, once on the ſlider and once on the loweſt fixed part. The conſtruction of theſe lines of ſines and tangents, above explained, depends on the following theorems in trigonometry: 1. The coſine is to the radius as the radius is to the ſecant. 2. The ſine is to the radius as the radius is to the coſecant. 3. The tangent is to the radius as the radius is to the cotangent. From theſe theorems it appears, that, if the radius of the tables be ſuppoſed equal to 1, in either of the above caſes, one of the quantities will be equal to the quotient of unit divided by the other; but diviſion is performed by ſubſtraction with logarithms, and the ſubtraction of a logarithm is the ſame as the addition of its arithmetical complement: conſequently, the logarithmic coſine and ſecant of the ſame degrees are the arithmetical complements of one another: and, as the arithmetical complement of any number is what that number wants of unity in the next ſuperior place, every natural ſine and its arithmetical complement are together equal to radius. Therefore, ſince the ſines begin at one end of the radius and terminate in 90° at the other end, in a ſcale of ſines, the arithmetical complement of any ſine or its coſecant, laid backwards from 90°, gives the diviſion for that ſine: and the caſe will be the ſame in a ſcale of logarithmic ſines. And as the logarithmic tangents and cotangents are the arithmetical complements of one another, the diviſions to the degrees both under and above 45, in a ſcale of logarithmic tangents, are equally diſtant from the diviſion of 45°; conſequently, the diviſions ſerving for the degrees under 45 will ſerve, by reckoning backwards, for thoſe above 45.

For the verſed ſines: from the ſcale of equal parts take the arithmetical complements of the logarithmic coſines, or the ſecants of the complements, of 5, 10, 15, 20, 25, 30, &c. degrees, rejecting the indices; and the double of theſe diſtances will give the diviſions, on the propoſed ſcale of verſed ſines, expreſſing 10, 20, 30, 40, 50, 60, &c. degrees, continued and divided according to the length of the ſcale: otherwiſe, having a table of logarithmic verſed ſines to 180°, ſubtract each logarithmic verſed ſine from that of 180 degrees, and lay the remainders ſucceſſively taken from the ſcale of equal parts on the ruler backwards from the common termination. This line of verſed lines begins at 0°, and runs thence towards the left hand to about 168°; one extremity of this line has the ſame termination with the lines of numbers, ſines and tangents, where the mark for 180° ſhould be placed; but as the ſcale begins at this place, and the diviſions may be ſuppoſed to go backwards, therefore 0 is put for the beginning, and the numbers thence proceeding through 10, 20, &c. towards the left are only the ſupplements of the verſed ſines themſelves.

On the new ſcale, the diviſions under 10° fall too cloſe to one another to be diſtinguiſhed; from 10° to 60° every ſingle degree is introduced; from 60° to 100°, every degree and half degree; from 100° to 130°, every degree and third of a degree; from 130° to 150° every degree and quarter of a degree; and above 150° every degree and ſixth part of a degree.

The conſtruction of the lines of ſine rhumbs and tangent rhumbs is eaſily underſtood; as theſe are formed by taking the ſines and tangents of the degrees and minutes anſwering to the rhumbs and parts of rhumbs from the lines of ſines and tangents reſpectively, and laying them down on their proper ſcales.

The ſcale of longitude is alſo a line of equal parts repreſenting the lengths of degrees of longitude, or of the degrees taken on the equator, in which the reckoning of a ſhip's longitude at ſea is kept; each degree, in the new ſcale, being about half an inch, and ſubdivided into ten parts of ſix minutes each.

The ſcale of meridional degrees is formed from the preceding, and ſhews the length of the degrees of latitude, relative to the correſpondent degrees of longitude; the degrees being gradually increaſed in the ſame proportion as the degrees of longitude on the globe diminiſh from the equator towards either pole: and each of them is ſubdivided into ten parts of ſix minutes each.

This ſcale comprehends, in the improved *Gunter*, two lengths of the ruler; the firſt length extends from the beginning at 0° on the right, and proceeds thence towards the left as far as 50°; and begins again on the right-hand at 50°, and goes on to the left as far as 75°, which is as far as moſt navigators extend, except thoſe of the Greenland fiſheries.

GUNTER'S *ſcale, uſe of.* 1. *The baſe of a right-lined right-angled triangle being given,* 30 *miles, and the oppoſite angle thereto* 26 *degrees, to find the length of the hypothenuſe.* The trigonometrical canon or proportion is thus: as the ſine of the angle, 26 degrees, is to the baſe, 30 miles, ſo is the radius to the length of the hypothenuſe. Set one foot of the compaſſes, therefore, on the 26th degree of the line of the ſines, and extend the other to 30 on the line of numbers; and the compaſſes remaining thus opened, ſet one foot on 90 degrees, or the end of the line of ſines, and extend the other on the line of numbers; this will give 68 miles and a half for the length of the hypothenuſe ſought.

2. *The baſe of a right-angled triangle being given,* 25 *miles, and the perpendicular* 15, *to find the angle oppoſite to the perpendicular.* As the baſe, 25 miles, is to the perpendicular, 15 miles, ſo is the radius to the tangent of the angle ſought. Extend the compaſſes, then, on the line of numbers, from 15, the perpendicular given, to 25, the baſe given; and the ſame extent will reach the contrary way, on the line of tangents, from 45 degrees to 31 degrees, the angle ſought.

3. *The baſe of a right-angled triangle being given, ſuppoſe* 20 *miles, and the angle oppoſite to the perpendicular* 50 *degrees, to find the perpendicular.* As radius is to the tangent of the given angle, 50 degrees, ſo is the baſe, 20 miles, to the perpendicular ſought. Extend the compaſſes then on the line of tangents, from the tangent of 45 degrees to the tangent of 50 degrees; and the ſame extent will reach on the line of numbers the contrary way, from the given baſe, 20 miles, to the required perpendicular, 23¼ miles.

Note, the extent on the line of numbers is here taken from 20 to 23¼ forwards; that the tangent of 50 degrees may be as far beyond the tangent of 45 degrees, as its complement 40 degrees wants of 45 degrees.

4. *The baſe of a right-angled triangle being given, ſuppoſe* 35 *miles, and the perpendicular* 48 *miles, to find the angle oppoſite to the perpendicular.* As the baſe, 35 miles, is to the perpendicular, 48 miles, ſo is radius to the tangent of the angle ſought. Extend the compaſſes from 35 on the line of numbers to 48, the ſame extent will reach the contrary way on the line of tangents, from the tangent of 45 deg. to the tangent of 36 deg. 5 min. or 53 deg. 55 min. To know which of thoſe angles the angle ſought is equal to, conſider that the perpendicular of the triangle being greater than the baſe, and both the angles oppoſite to the perpendicular and the baſe making 90 deg. the angle oppoſite the perpendicular will be greater than the angle oppoſite to the baſe; and conſequently the angle, 53 deg. 55 min. will be the angle ſought.

5. *The hypothenuſe of a right-angled ſpherical triangle being given, ſuppoſe* 60 *degrees, and one of the ſides* 20 *degrees, to find the angle oppoſite to that ſide.* As the ſine of the hypothenuſe 60 deg. is to radius, ſo is the ſine of the given ſide 20 deg. to the ſine of the angle ſought. Extend the compaſſes on the line of ſines from 60 deg. to the radius, or 90 deg. and the ſame extent will reach on the line of ſines the ſame way, from 20 deg. the given ſide, to 23 deg. 10 min. the quantity of the angle ſought.

6. *The courſe and diſtance of a ſhip being given, to find the difference of latitude and departure.* Suppoſe a ſhip ſails from the latitude of 50 deg. 10 min. north, S.S.W. 48.5 miles; as radius is to the diſtance ſailed 48.5 miles, ſo is the ſine of the courſe, which is two points, or the ſecond rhumb from the meridian, to the departure. Extend the compaſſes from 8 or 90 deg. on the artificial ſine rhumb-line to 48.5 on the line of numbers, the ſame extent will reach the ſame way from the ſecond rhumb, on the line of artificial ſines of the rhumbs, to the departure, weſting 18.6 miles.

Again, as radius is to the diſtance ſailed 48.5 miles, ſo is the coſine of the courſe 67 deg. 30 min. to the difference of latitude. Extend your compaſſes from the radius, on the line of ſines, to 48.5 miles on the line of numbers; the ſame extent will reach the ſame way, from 67 deg. 30 min. on the line of ſines, to 44.8 on the line of numbers; which converted into degrees by allowing 60 miles to a degree, and ſubtracted from the given north latitude 50 deg. 10 min. leaves the remainder 49 deg. 25 min. the preſent latitude.

This problem may be eaſily ſolved with the ſlider, by ſetting 48.5 on the ſlider againſt 90 on the line of ſines, or 8 on the line of ſine-rhumbs; then againſt two points, or 22 deg. 30 min. on the line of ſines, is 18.6, the departure; and againſt two points on the line of ſine-rhumbs, or 22 deg. 30 min. on the line of ſines, is 44.8 on the ſlider, for the difference of latitude.

7. *The difference of latitude and departure from the meridian being given, to find the courſe and diſtance.* A ſhip from the latitude 59 deg. north, ſails north-eaſtward till ſhe has altered her latitude 1 deg. 10 min. or 70 miles, and is departed from the meridian 57.5 miles, to find the courſe and diſtance. As the difference of latitude, 70 miles, is to radius, ſo is the departure, 57.5 miles, to the tangent of the courſe, 39 deg. 20 min. or three points and a half from the meridian. Extend the compaſſes from the fourth rhumb, on the line of artificial tangents of the rhumbs, to 70 miles on the line of numbers, the ſame extent will reach from 57.5, on the line of numbers, to the third rhumb and a half on the line of artificial tangents of the rhumbs.

Again, as the ſine of the courſe, 39 deg. 20 min. is to the departure 57.5 miles, ſo is the radius to the diſtance 90.6 miles. Extend the compaſſes from the third rhumb and a half, on the artificial lines of rhumbs, to 57.5 miles on the line of numbers; that extent will reach to the ſine of the eighth rhumb, on the lines of the rhumbs, to 90.6 miles on the line of numbers.

8. *Three ſides of an oblique ſpherical triangle being given, to find the angle oppoſite to the greateſt.* Suppoſe the ſide AB, *Tab. Trig. fig.* 2. be 40 deg. the ſide BC 60 deg. and the ſide AC 96 deg. to find the angle ABC. Add the three ſides together, and from half the ſum ſubtract the greater ſide AC, and note the remainder: thus, e. gr. the ſum will be 196 deg. half of which is 98 deg. from which ſubtracting 96 deg. the remainder is 2 deg.

Then extend the compaſſes from the ſine of 90 deg. to that of the ſide AB 40 deg. and applying this extent to the ſine of the other ſide BC 60 deg. you will find it reach to a fourth ſine 34 degrees.

Again, from this fourth ſine extend the compaſſes to the ſine of the half ſum, i. e. the ſine of 72 deg. the ſupplement of 98 deg. to 180; this ſecond extent will reach from the ſine of the difference 2 deg. to the ſine of 3 deg. 24 min. againſt which, on the verſed ſines, ſtand 151 deg. 50 min. the quantity of the angle ſought.

GUNWALE, or GUNNEL *of a ſhip*, is that piece of timber which reaches on either ſide of the ſhip, from the half-deck to the fore-caſtle, being the uppermoſt bend, which finiſhes the upper works of the hull in that part, and wherein they put the ſtanchions which ſupport the waſte-trees. This is called the *gunwale*, whether there be guns in the ſhip or not. The lower part of any port, where any ordnance are, is alſo termed the *gunwale*.

GUR, or GUHR, in *Mineralogy*, a word uſed to expreſs a fluid matter looking like milk, but reduced ſometimes, by evaporation, to the conſiſtence of honey, and appearing in form of a white ſediment. It is common in the mines of Sweden, and in ſome other places: it is ſometimes calcareous or chalky, and ſometimes metallic, and by dropping forms ſtalactitical concretions. Bromell. de Lapid.

GURGEATIO, a name by which ſome authors have called that peculiar diſeaſe, ſo fatal in England at one time, and commonly called SUDOR *Anglicus*, from the violent profuſions of ſweat which appeared immediately on being ſeized with it.

GURGIPTING, in *Falconry*, a term uſed when a hawk is ſtiff and choaked up. Dict. Ruſt.

GURGULIO, in *Natural Hiſtory*, a name given by the ancients to a peculiar claſs of *ſcarabæi* or beetles; the characters of which are, that they have not a ſhort head like the other beetles, but a long one, forming a trunk in the manner of the common flies; in this the horns or antennæ of the creature are lodged. Theſe are divided by Liſter into two kinds; the one having only one joint in this promuſcis or ſnout, and that placed in or near the middle; the other having ſeveral placed near the end. Of the firſt kind we have only two ſpecies. Of the other kind, in which the promuſcis has ſeveral joints at the end, we have five ſpecies; and in all theſe, as well as in the former, the antennæ are inſerted in the promuſcis.

GURNARD, a ſea fiſh, of which there are ſeveral ſpecies.

The characters are, that they have a ſloping noſe, a head covered with ſtrong bony plates, ſeven branchioſtegous rays, and three ſlender appendages at the baſe of the pectoral fins: and it is added, that they can make a ſort of noiſe; hence the Latins called them *cuculi*, from their imitating, in ſome ſort, the voice of the cuckow.

The Engliſh *gurnard*, which is their common name, ſeems alſo taken from their grunting; and one ſpecies of them is called the *piper*, LYRA, or the *muſician*, from its reſembling with its voice a ſmall pipe.

GURNARD, *the grey*, or TRIGLA *gurnardus* of Linnæus, is the moſt common kind; it is frequent in the Britiſh ſeas and elſewhere, and eſteemed a very well-taſted fiſh. This is of a long ſlender ſhape; its back is of a duſky green, marked with black ſpots, and with yellow and white ones; the ſide-lines are dotted and rough; under theſe the ſides are of a pale colour, and variegated with numerous white ſpots; the belly is white; the head is large, and is covered with a ſort of bony plates, the upper one of which runs out behind into two ſharp prickles; the ſnout has alſo two horns, each having three little horns or teeth, and there are alſo two others before each eye; the mouth is large, and the teeth very ſmall; its gill-fins are not ſo large as in many others of this kind; and its back has a cavity between two rows of pointed bones: the tail is bifurcated. This fiſh, which bites eagerly at a red rag, is uſually taken with the hook in deep water; but it is ſometimes found ſporting near the ſurface. They are often caught of the length of two feet and a half.

GURNARD, *the red*, is an Engliſh name given to the TRIGLA *cuculus* of Linnæus, called by authors in general the *cuculus*, and by ſome *coccyx*, *lyra*, and *capo*. It is properly a ſpecies of trigla, according the new Artedian ſyſtem, and is diſtinguiſhed from all the other ſpecies, by the name of the wholly red trigla with the ſnout lightly divided into two horns, and the opercula of the gills ſtriated. This is an inſtance of the value of the Artedian names; this conveying ſo good an idea of the fiſh, that it cannot be miſtaken, and the others conveying none at all. See *Tab. of Fiſhes*, N° 9. This red ſpecies is what we ſometimes ſimply call the *gurnard*, and ſometimes the *rotchet*.

GURNARD, *ſapphirine*, *trigla hirundo* of Linnæus, or *tub-fiſh*, is diſtinguiſhed from the other ſpecies of *gurnard* by the breadth and colours of the pectoral fins, which are very broad and long, of a pale green, moſt beautifully edged and ſpotted with rich deep blue. The dorſal fins are lodged between two rows of ſpines, of a ſerrated form; the back is of a greeniſh caſt; the ſide-line is rough; the ſides are tinged with red, and the belly white; the pupil of the eye is green, and on the inner corner of each are two ſmall ſpines. Theſe fiſh are found on the coaſt of Cornwall.

GURNARD, *yellow*. See DRACUNCULUS.

GUROUNDI, in *Zoology*, the name of a ſmall Braſilian bird, frequently kept in cages for its ſinging, and more commonly called TEITEI.

GUSSET, in *Heraldry*, denotes one of the ABATEMENTS of honour, appropriated to laſcivious, effeminate, or wanton perſons. It is formed of a line drawn from the dexter or ſiniſter angle of the chief, and deſcending diagonally to the chief point; from whence another line falls perpendicularly upon the baſe; as repreſented *Tab.* II. *Herald. fig.* 67.

GUST. See TASTE.

GUST is uſed by Bracton, and other ancient writers, for ſtranger or gueſt, who lodges with a perſon the ſecond night. See UNCUTH.

In the laws of St. Edward, publiſhed by Lambard, the word is written *geſt*.

GUST, denotes a ſudden and violent ſquall of wind, burſting from the hills upon the ſea, ſo as to endanger the ſhipping near the ſhore. Theſe are peculiar to ſome coaſts, as thoſe of South Barbary and Guinea.

GUSTATION. See TASTING.

GUSTO *grand*. See GRAND.

GUTS. It is obſerved, in the diſſections of many of the beaſts of prey, that the *guts* are very remarkably ſhort in compariſon of thoſe of other animals. The lion and the lynx are of this number; the *guts* being in theſe only of three times the length of the body. This argues ſpeedy digeſtion, and a great voracity in the creature. See INTESTINES.

GUTTA, a Latin term for what in Engliſh we call DROP.

GUTTÆ *Anglicanæ*, *Engliſh drops*, *volatile Engliſh drops*, or *Goddard's drops*, a name of a medicinal liquor prepared from divers ingredients, formerly ſuppoſed to be of ſovereign efficacy againſt coagulations of the blood, malignant fevers, and particularly the ſmall-pox, obſtructions, epilepſies, drowſy diſeaſes, vapours, &c.

The inventor of theſe celebrated drops was Dr. Goddard, a phyſician of London. The ſecret of their compoſition was purchaſed by king Charles II. at the price of 50,000*l.* ſterl. whence they were denominated *guttæ Anglicanæ*.

This coſtly receipt we ſhall here gratify the reader with *à mellieur marché*: "Take five pounds of human
" cranium of a perſon hanged, or dead of ſome violent
" death, two pounds of dried vipers, two pounds of
" hart's-horn, and two of ivory; mince the whole ſmall,
" put it in two or three retorts, and diſtil it in a rever-
" beratory furnace, with the ſame precautions as are
" ordinarily uſed in diſtilling hart's-horn and vipers, to
" extract their volatile ſalt. When the veſſels or re-
" ceivers are cold, unlute them, and ſhake them well,
" in order to looſen the volatile ſalt from the ſides of
" the veſſels. Pour the whole in a large glaſs cucurbite,
" and filtrate it through a brown paper, in order to ſe-
" parate the oil, which is here uſeleſs: put the filtrated
" liquor in a glaſs retort, and place it in a ſand heat,
" and fit another glaſs retort thereto, as a recipient; take
" care all things be well luted, and make a cohobation
" of the ſaid matters at three times. But, by the way,
" add all the ſalt before ſeparated from the receivers;
" and after the ſaid three cohobations, unlute the re-
" torts, and pour the whole into a matraſs with a long
" neck, to which fix a ſuitable capital, and a receiver;
" lute all the joinings on each ſide with a wet bladder,
" and ſet the veſſel in a ſand-heat: by this means, the
" volatile ſalt will be ſublimed, and ſtick to the capital
" and upper part of the matraſs. Continue the fire till
" ſpirit enough hath riſen to fuſe and diſſolve the ſalt
" which aroſe firſt: then take all the fire out of the fur-
" nace, that the diſtillation may proceed no farther;
" which is a circumſtance of the laſt importance, with-
" out which the medicine would be weakened by too
" much phlegm." Biet, in Mem. de Trev. 1713.

As to the doſe of this remedy, they begin with ſeven or eight drops, increaſing by degrees to forty or fifty, on preſſing occaſions, as in apoplexies, lethargies, weakneſſes, &c.

The real compoſition of the *guttæ*, however, is ſomewhat controverted. Dr. Liſter aſſures us, that he had the ſecret communicated to him by king Charles II. that it is no other than the volatile ſpirit of raw SILK, rectified with oil of cinnamon or ſome other eſſential oil.

The ſame author aſſures us, he had found by experience, that the *guttæ Anglicanæ* were not in any reſpect preferable to the common volatile ſpirits of hartſhorn and ſal ammoniac, except that the ſmell is more ſupportable. Mem. del l'Acad. des Scien. ann. 1700.

GUTTÆ, in *Architecture*, are ornaments in form of little cones, uſed in the plafond of the Doric cornice, on the architrave, underneath the triglyphs, repreſenting a ſort of drops or bells; they are uſually ſix in number. See *Tab. Archit. fig.* 25. N° 12.

They are ſometimes alſo called *lacrymæ*, *tears*; and *campanæ* or *campanulæ*, *bells*. Leon Baptiſta Alberti calls them *nails*.

GUTTA *roſacea*, in *Medicine*, denotes a red or pimpled face; a diſtemper, which, though not always owing its original to hard drinking, is nevertheleſs moſt incident to tiplers of ſtrong beer, wines, ſpirits, &c.

As to the cure, beſides making a revulſion by bleeding, bliſtering, cupping, iſſues, &c. the diet ought to be moiſtening and cooling, as lettuce, purſlain, ſorrel, and ſpinach: the drink may be an emulſion of the cold ſeeds, milk and water, clarified whey, &c.

In the uſe, however, of this cooling regimen, great caution is neceſſary; for if a perſon be taken off at once from his ſtrong liquors, and allowed nothing but whey or milk and water, it may coſt him his life, by haſtening a ſudden decay of heat, palling his appetite, and bringing on a leucophlegmatia or dropſy.

As for what concerns topics, much caution is likewiſe to be uſed. If there be only redneſs without pimples, and the diſeaſe recent, refrigerants and repellents take place: but if puſtules appear, diſcutients muſt be mixed; and if theſe puſtules ſeem hard, and the diſeaſe be of long ſtanding, there may be reaſon for emollients to ripen and digeſt the tough and viſcid matter, which is afterwards to be let out.

If the diſeaſe be ſtubborn, and the tubercles grow hard, we are to begin with emollients, both fotus and ointment: ſuch are the decoction of mallows, vervain, Solomon's ſeal, and linſeed; alſo a cerate of ſpermaceti, or Bate's white cerate. James.

GUTTA SERENA, ſo called from the tranſparency of the ſeveral humours of their membranes, is a diſeaſe of the eyes, being an entire privation of ſight, without any apparent fault or diſorder of the part, excepting that the pupil looks ſomewhat larger and blacker than before.

This diſorder is moſt commonly, but not univerſally, attended with a dilatation of the pupil; ſo that every dilated pupil is not a certain ſign of this diſeaſe. Scrophulous ſubjects have often very dilated pupils, with little or no defect of ſight; but in them the pupils preſerve their motion; the loſs of which motion, ſays Mr. Warner, is a more certain ſign of a *gutta ſerena* than a dilatation of the pupils. The Greeks call it *amauroſis*.

This diſorder is either *tranſient* or *permanent*.

The *tranſient gutta ſerena* is that found in apoplexies and lipothymias, from immoderate bleeding, and the like, which vaniſhes as the fit or paroxyſm goes off. To this kind alſo belong thoſe ſometimes produced by the ſuppreſſion of the hæmorrhoids, menſes, or other habitual evacuations, the healing up of iſſues, or the like.

The *permanent* is that whoſe cauſe is fixed in the retina, or in the optic nerves; chiefly in the want of the clear intercourſe and influx between the brain and thoſe parts. To this kind alſo belong thoſe occaſioned by hydrocephali, by ſtones found near the root of the optic nerves, or by ſteatomas compreſſing thoſe nerves, or by debilities and extenuations, by contortions or compreſſions of the ſame at their iſſue out of the cranium.

The proximate cauſe is, according to Hoffman and other eminent phyſicians, a palſy of the optic nerves.

The mediate cauſes of this diſorder may, as in other nervous caſes, be referred to two kinds, repletion and inanition.

To the firſt belong all ſuch cauſes as increaſe the blood too much, or force it with too much violence into the head. Thus, too great motion, immoderate hot bathing, violent fits of anger, deficiency of the menſes, and ſpaſms in the lower parts, forcing the humours upwards, as it ſometimes happens to women in labour, and by vomits. All theſe cauſes, as alſo the repulſion of humours appearing on the ſkin and drying up of ulcers, the tranſlation of morbid matter in malignant fevers, ſmall-pox, or phrenſy, and the improper uſe of mercurials, have been known to bring on a *gutta ſerena*; ſometimes, indeed, only tranſitory, and ſometimes curable by evacuations, as bleeding, &c.

To the ſecond kind belong all immoderate effuſions of the vital juices. Thus, great hæmorrhages, bloody vomits, profuſe bleeding, and, above all, early and immoderate venery, have been obſerved to produce BLINDNESS, extremely difficult, if not impoſſible, to cure. See Hoffm. Oper. tome iii. p. 228. ſeq.

The *gutta ſerena* is one of the moſt dangerous and untractable of all diſeaſes of the eyes. The ſymptoms of this diſeaſe, in its incipient ſtate, and of a cataract, much reſemble one another: they are alike indicated by a head-ach ſituated near the forehead; by a dimneſs of ſight, as if gauze were placed before the eyes; by the idea of moths flying before the eyes; and by the multiplication of objects.

The *gutta ſerena* admits of no operation on the eye itſelf; but when the caſe is recent and partial, evacuations of blood from the temporal arteries, by leeches or the lancet, from one of the external jugular veins, or from a vein of the arm, joined with briſk purgatives, are adviſable. Bliſters on the head are likewiſe to be recommended; or an iſſue made by cauſtics on the coronal ſuture, where it joins with the ſagittal, if bliſters do not ſucceed to our wiſhes. Strong decoctions in water of equal parts of Peruvian bark and Valerian root in powder, joined with volatile ſalts, adminiſtered in pretty large doſes at proper intervals, are often very beneficial. The oleum animale and muſk have often been of great ſervice in enervated and paralytic habits. Warner on the Eye, p. 34, &c.

The cure, according to Pitcairn, is to be attempted with mercurials, particularly calomel, and ſometimes even with ſalivation, and with decoctions of guaiacum.

Hoffman recommends the ſulphur of antimony. See AMAUROSIS and *Medical* ELECTRICITY.

The late Mr. Ferguſon contrived an inſtrument for applying the power of electricity to diſorders of the eyes: this inſtrument conſiſts of a pointed braſs wire, faſtened by means of a cork at the ſmaller end of a conical glaſs, open at both ends, and paſſing through the axis of this glaſs, ſo that its point comes within about half an inch of the larger aperture of the glaſs: the inſtrument is to be ſo fixed, that the larger aperture of the glaſs may ſurround the eye, and keep its lids open, and the point of the wire is directed to the pupil, and at the diſtance of about half an inch or an inch from it. In the uſe of this inſtrument a ſpark often proceeds from the point of the wire, which occaſions very acute pain; and, therefore, Mr. Partington fixed a wooden point upon the pointed wire: but the directors of this laſt gentleman are better adapted to the purpoſe.

GUTTE. See GUTTY.

GUTTERS, in *Building*, a kind of canals in the ROOFS of buildings, ſerving to drain, receive, and carry off the rain-waters.

Gutters are either parallel to the horizon, or vertical. The former ſhould be made with a proper deſcent, that there may be a good current, as the workmen term it; for if laid too level, the water will be apt to ſtand in plaſhes.

As to the vertical *gutters*, or thoſe formed by two roofs meeting at right angles to each other, or by the end of one roof joining to the ſide of another, they are either made of lead or tiles, which are either plain or concave; theſe laſt are called *gutter*-tiles, and may be eaſily laid. But in laying on the plain tiles the workman begins at one ſide of the *gutter*, and ſo works acroſs, as if it were plain work, and then brings the next row of tiles back again; ſo that he works forth and back, to and fro, from right to left. By this means, the *gutters* laid after this manner are not angular, but of a kind of diſtorted curvilinear form, which prevents the mortar from being waſhed away with the rain.

GUTTER-*ledge* is the name of a croſs-bar, laid along the middle of a hatch-way in ſome ſhips, for ſupporting the covers and any weighty body that may be laid or moved upon them.

GUTTER-*tyles*. See TYLE.

GUTTETÆ *pulvis* is the name of an epileptic powder in the Paris Pharmacopeia, compoſed of miſletoe of the oak, roots of white dittany, the root and ſeed of peony, of each half an ounce; the ſeeds of gooſe-foot, two drams; human ſkull, three drams; red coral prepared, two drams; the horns of elk's-foot, half an ounce; and a ſcruple of gold-leaf: all which ingredients are to be reduced to a fine powder. This powder has been deemed a very powerful antiſpaſmodic, and is ſaid to have been adminiſtered in the quantity of a ſcruple for a doſe, for a conſiderable time, with great ſucceſs in the epilepſy.

GUTTURAL *letters*, are thoſe pronounced or formed, as it were, in the throat.

Dr. Wallis diſtinguiſhes the VOWELS in our language into labial, palatine, and *guttural*; according to the ſeveral degrees of opening the mouth to pronounce them, larger, middle, and leſs. On this footing he makes three *guttural* vowels, and three labial, and as many palatines.

The four *guttural* letters in Hebrew are א, ה, ח, and ע, formed into the technical word אחהע.

GUTTUROSUS *piſcis*, a ſmall fiſh common in the Mediterranean, and brought to market at Rome, Venice, and elſewhere; and called, in different parts, *gotoroſala*, GOTTORUGINE, and *gotto di mare*.

GUTTUS, a term among antiquaries for a ſort of vaſe uſed in the Roman ſacrifices, to take the wine and ſprinkle it, *guttatim*, drop by drop, upon the victim.

Viginere on T. Livy gives the figure of the *guttus*, as repreſented on divers medals, and other ancient monuments.

GUTTY, or GUTTE, in *Heraldry*, is when a thing is repreſented as charged or ſprinkled with drops.

In blazon, the colour of the drops is to be named: thus, *gutty* of ſable, of gules, &c.

Some authors will have red drops called *gutty de ſang*, or *drops of bloods*; black ones, *gutty de poix*, *of pitch*; white, *gutty d'Eau, of water*, &c.

GUY, in *a Ship*, is any rope uſed to keep off weighty bodies from bearing or falling againſt the ſhip's ſide, when they are to be hoiſted or lowered. Thus, if any thing is to be haled in over the gunwale, it is gently eaſed in by a *guy*-rope, faſtened uſually to the ſtanchions of the waſte-trees.

GUY is likewiſe a large ſlack rope, extending from the head of the main-maſt to the head of the fore-maſt, and having two or three large blocks faſtened to the middle of it. This is chiefly employed to ſuſtain the tackle uſed for hoiſting in and out the cargo of a merchant-ſhip, and is removed from the maſt-heads as ſoon as the veſſel is laden or delivered. See GARNET.

GUY's *hoſpital*. See HOSPITAL.

GUZES, in *Heraldry*, roundles of a ſanguine or murry colour.

GWABR-MERCHED, in *our old Writers*, a Britiſh word ſignifying a payment or fine, made to the lords of ſome manors, upon the marriage of their tenants-daughters; or otherwiſe, on their committing incontinency. See MARCHET.

GWAIF, or WAIF. See WAIF.

GYBING, in *Sea language*, denotes the art of ſhifting any boom-ſail from one ſide of the maſt to the other.

GYLPUT, in *our old Writers*, the name of a court held every three weeks in the liberty or hundred of Pathbew, in the county of Warwick. *Inquiſit. ad quod damn.* 13 Edw. III. Blount.

GYLTWITE, in *our old Writers*, a compenſation or amends for treſpaſſes, &c. *Mulcta pro tranſgreſſione.* LL. Edg. regis, anno 964. Terms of Law.

GYMNARTHRIDIA, in the *Hiſtory of Inſects*, a ſeries or claſs of inſects, which have ſoft and naked bodies furniſhed with limbs.

Theſe have been generally called *zoophytes*, a term expreſſing creatures partly of an animal, and partly of a vegetable nature; but as it is now well known that there are none ſuch, it is proper that the term *zoophyte* ſhould no longer be retained.

Under this claſs are comprehended the LIMAX or the naked ſnail, the LERNEA, MEDUSA, APHRODITA, AMPHITRITE, &c.

GYMNASIARCH, GYMNASIARCHA, compounded of γυμνασιον, and αρχη, *government*, in *Antiquity*, the maſter or director of a gymnaſium.

The Greeks did not rank the *gymnaſiarcha* among the number of magiſtrates; though his office was of great conſideration, as having the care of all the youth, who were truſted to him to be formed to exerciſes of the body.

He had two principal officers under him, who were to aſſiſt him in the government of the gymnaſium; the firſt named XYSTARCHA, and the ſecond *gymnaſta*. The former was maſter of the ATHLETÆ, and preſided over the wreſtling. The latter had the direction of all the other exerciſes, taking care they were performed in due time and manner, that they were not too ſevere, that the youth attempted nothing beyond their ſtrength, and that nothing were done that might be injurious to their health.

Theſe had ſeveral ſubaltern officers or ſervants under them, for the ſervice and inſtruction of the youth committed to them.

GYMNASIUM, a place fitted for the performing exerciſes of the body.

This word is γυμνασιον, formed of γυμνος, *naked*; becauſe they anciently put off their cloaths, to practice with the more freedom.

Among the ancients, *gymnaſium* was a public edifice deſtined for exerciſe, and where people were taught, and regularly diſciplined, under proper maſters.

If we may credit Solon in Lucian's Anacharſis, and Cicero De Orat. lib. ii. the Greeks were the firſt who had *gymnaſia*; and among the Greeks, the Lacedæmonians: after them the Athenians, from whom the Romans borrowed them.

There were three principal *gymnaſiums* at Athens; the Academy, where Plato taught; the Lyceum, noted for Ariſtotle's lectures; and the Cynoſarges, allotted for the populace.

Vitruvius deſcribes the ſtructure and form of the ancient *gymnaſia*, lib. v. cap. 11. They were called *gymnaſia*, becauſe the champions performed *naked*; and *palæſtræ*, from *wreſtling*, which was one of the moſt uſual exerciſes there: the Romans ſometimes alſo called them *thermæ*, becauſe the baths and bagnios made a principal part of the building.

It appears, that they did not perform their exerciſes quite naked, ſo early as the time of Homer, but always in drawers; which they did not lay aſide before the thirty-ſecond Olympiad. One Orſippus is ſaid to have been the firſt who introduced the practice: for having been worſted, by means of his drawers undoing and entangling him, he threw them quite aſide, and the reſt afterwards imitated him.

The *gymnaſia* conſiſted of ſeven members or apartments. M. Burette, after Vitruvius, recites no leſs than twelve, viz. 1. The exterior *porticos*, where the philoſophers, rhetoricians, mathematicians, phyſicians, and other virtuoſi, read public lectures, and where they alſo diſputed and rehearſed their performances. 2. The *ephebeum*, where the youth aſſembled very early, to learn their exerciſes in private, without any ſpectators. 3. The *coryceum*, *apodyterion*, or *gymnaſterion*, a kind of wardrobe, where they ſtripped, either to bathe or exerciſe. 4. The *elæotheſium*, *alipterion*, or *unctuarium*, appointed for the unctions, which either preceded or followed the uſe of the bath, wreſtling, pancratia, &c. 5. The *coniſterium* or *coniſtra*, in which they covered themſelves with ſand or duſt, to dry up the oil or ſweat. 6. The *palæſtra*, properly ſo called, where they practiſed wreſtling, the pugillate, pancratia, and divers other exerciſes. 7. The *ſphæriſterium* or tennis-court, reſerved for exerciſes wherein they uſed balls. 8. Large unpaved alleys, which comprehended the ſpace between the porticos and the walls wherewith the edifice was ſurrounded. 9. The *xyſti*, which were porticos for the wreſtlers in winter or bad weather. 10. Other *xyſtis* or open alleys, allotted for ſummer and fine weather, ſome of which were quite open, and others planted with trees. 11. The BATHS, conſiſting of ſeveral different apartments. 12. The STADIUM, a large ſpace of a ſemicircular form, covered with ſand, and ſurrounded with ſeats for the ſpectators.

For the adminiſtration of the *gymnaſia*, there were divers officers: the principal were, 1. The *gymnaſiarcha*, who was the director and ſuperintendent of the whole. 2. The *xyſtarcha*, who preſided in the xyſtus or ſtadium. 3. The *gymnaſta*, or maſter of the exerciſes, who underſtood their different effects, and could accommodate them to the different complexions of the athletæ. 4. The *pædotriba*, whoſe buſineſs was mechanically to teach the exerciſes, without underſtanding their theory or uſe. Under theſe four officers were a number of ſubalterns, whoſe names diſtinguiſhed their different functions.

For the kinds of exerciſes practiſed in the *gymnaſia*, they may be reduced to two general claſſes, as they depend either on the action of the body alone, or as they require external agents or inſtruments. The former are chiefly of two kinds, *orcheſtice* and *palæſtrice*.

The *orcheſtice* comprehended, 1. *Dancing*. 2. *Cubiſtice*, or the art of tumbling. 3. *Sphæriſtice* or tennis, including all the exerciſes with pilæ or balls.

The *palæſtrice* compriſed all exerciſes under the denomination *palæſtra*; as *wreſtling*, *boxing*, *pancratia*, *hoplomachia*, *running*, *leaping*, *throwing the diſcus*, the *exerciſe of the javelin*, and that of the *hoop*, denominated by the Greeks τροχος, which conſiſted in rolling an iron hoop five or ſix feet in diameter, beſet with iron rings, the noiſe of which appriſing the people to give way, afforded them alſo an amuſement. Both ſtrength and ſkill were requiſite in directing this hoop, which was to be driven with an iron rod.

To theſe muſt alſo be added, the exerciſes belonging to the medicinal gymnaſtics; as, 1. *Walking*. 2. *Vociferation*, or ſhouting. 3. *Holding one's breath*.

The bodily exerciſes, which depend on external agents, may be reduced to *mounting* the horſe, *riding* in a chaiſe, or other wheeled vehicle; *rocking* in beds or cradles, and ſometimes *ſwinging*; to which may be added, the art of *ſwimming*. Hoffman enumerates no leſs than fifty-five ſorts of *gymnaſtic* exerciſes.

GYMNASTES, Γυμναςης, among the *Ancients*, an officer in the ancient *gymnaſium*, next in authority to the *gymnaſiarch* and *xyſtarch*.

GYMNASTERIUM, Γυμναςηριον. See GYMNASIUM.

GYMNASTICKS, GYMNASTICE, or the GYMNASTIC *art*, denotes the art of performing exerciſes of the body, whether for defence, health, or diverſion.

The *gymnaſtic* art is divided into three ſpecies or branches; *military*, *medicinal*, and *athletic* or *ſportive*.

Several modern writers have treated of this art; as Mercurialis, De Arte *Gymnaſtica*; Faber, in Agoniſtic. Joubert, De *Gymnaſiis*; Cagnatus, De Sanit. Tuend. Voſſius, De Quatuor Artib. Popular. Meurſius, De Orcheſtra; Fuller, in Medicina *Gymnaſtica*; and M. Burette, in ſeveral Diſſertations on the ancient Dancing, Spheriſtics, Athletics, Wreſtling, Pugillate, Diſcus, &c.

M. Burette has given the hiſtory of *gymnaſtics* in the Memoirs of the Royal Academy of Inſcriptions. According to him, this art is coeval with the world. In reality, we can hardly ſuppoſe mankind to have ever been without ſome ſort of exerciſes of the body, which the defence of their perſons, the preſervation of health, and even recreation and mirth, would neceſſarily lead them to. See EXERCISE.

On the firſt eſtabliſhment of ſociety, men, being appriſed of the neceſſity of military exerciſes, for repelling the inſults of their neighbours, inſtituted GAMES, and propoſed prizes, to animate their youth to combats of divers kinds. And as running, leaping, ſtrength and dexterity of arm in throwing the javelin, driving a ball, or toſſing a quoit, together with wreſtling, &c. were exerciſes ſuited to the manner of fighting in thoſe days, ſo the youth vied to excel in them, in the preſence of the aged, who ſat as their judges, and diſpenſed prizes to the conquerors; till what was originally only amuſement, became, at length, a matter of ſuch importance, as to intereſt famous cities, and entire nations, in its practice.

Hence aroſe an emulation and eagerneſs to excel, in hopes, one day, of being proclaimed and crowned conquerors in the public games, which was the higheſt honour a mortal could arrive at: nay, they went ſo far as to imagine, that even gods and demi-gods were not inſenſible of what men were ſo captivated with; and, in conſequence hereof, to introduce the greateſt part of theſe exerciſes into their religious ceremonies, the worſhip of their gods, and the funeral honours done to the manes of the dead.

Though it be hard to determine the preciſe epocha of the *gymnaſtic* art, yet it appears from ſeveral paſſages in Homer, and particularly the twenty-third book of the Iliad, where he deſcribes the games celebrated at the funeral of Patroclus, that it was not unknown at the time of the Trojan war. From that deſcription, which is the earlieſt monument now extant of the Grecian *gymnaſtics*, it appears, that they had chariot-races, boxing, wreſtling, foot-races, gladiators, throwing the diſcus, drawing the bow, and hurling the javelin; and it ſhould ſeem, from the particular account Homer gives of theſe exerciſes, that even then the *gymnaſtic* art wanted little of perfection: ſo that when Galen ſays there was no *gymnaſtic* art in Homer's days, and that it began to appear no earlier than Plato, he is to be underſtood of the medicinal *gymnaſtics* only. This laſt, indeed, had its riſe later; becauſe, while men continued ſober and laborious, they had no occaſion for it; but when luxury and idleneſs had reduced them to the ſad neceſſity of applying to phyſicians, theſe, who had found that nothing contributed ſo much to the preſervation and re-eſtabliſhment of health as exerciſes, proportioned to the different complexions, ages, and ſexes, did not fail to refer them to the practice of *gymnaſtics*.

According to Plato, one Herodicus, prior a little time to Hippocrates, was the firſt who introduced this art into phyſic; and his ſucceſſors, convinced by experience of its uſefulneſs, applied themſelves in earneſt to improve it.

Hippocrates, in his book of Regimen, has given inſtances of it, where he treats of exerciſe in general, and of the particular effects of walking, with regard to health; alſo of the different ſorts of races, either on foot or horſeback; leaping, wreſtling, the exerciſe of the ſuſpended ball, called *corycus*, chironomy, unctions, frictions, rolling in the ſand, &c.

But as phyſicians did not adopt all the exerciſes of the *gymnaſtic* art in their practice, it came divided between them and the maſters of martial and athletic exerciſes, who kept ſchools, the number of which was greatly increaſed in Greece.

At length the Romans alſo caught the ſame taſte; and, adopting the military and athletic exerciſes of the Greeks, they improved and advanced them to the utmoſt pitch of magnificence, not to ſay extravagance. But the declenſion of the empire involved the arts in its ruin, and, among others, *gymnaſtics* and medicine; which laſt unhappily then relinquiſhed the title it had to the former, and has neglected to reſume it ever ſince.

GYMNIA, in *Zoology*, a new eſtabliſhed claſs of animalcules, containing ſuch as have neither tail, nor any viſible limbs. See ANIMALCULE.

GYMNIC, GYMNICUS, ſomething belonging to the exerciſes of the body.

Gymnic games, *ludi gymnici*, are thoſe wherein the body is exerciſed: ſuch are wreſtling, running, dancing, the uſe of the lance, quoit-playing, &c.

Theſe made the chief diverſions of the OLYMPIC, NEMÆAN, PYTHIAN, and ISTHMIAN ſolemnities; being called by the Greeks Πενταθλον, and the Latins *Quinquertium*. See PENTATHLON.

GYMNOCRITHON, in *Botany*, a name given by ſome authors to the *zeopyrium*, or *hordeum nudum*, the naked barley.

GYMNOPÆDIA, a kind of dance, eſtabliſhed by Lycurgus, and in uſe among the ancient Lacedæmonians; performed, during their ſacrifices, by young perſons, who danced naked, ſinging at the ſame time a hymn in honour to Apollo.

The word is alſo written *gymnopædice*; it is compounded of γυμνος, *naked*, and παις, *child*.

One Terpander is recorded as the inventor of the *gymnopædia*. Athenæus deſcribes it as a Bacchic dance, performed by youths ſtripped quite naked, with certain interrupted though agreeable motions and geſtures of the body; the arms and legs being flouriſhed and directed after a peculiar manner, repreſenting a ſort of real wreſtling.

GYMNOPODIA, among the *Ancients*, a kind of ſhoes which diſcovered the naked feet. They were worn by the Grecian women, who were very fond of them.

GYMNOPYRIS, in *Natural Hiſtory*, the name of a genus of foſſils, the characters of which are theſe: they are of the claſs of the *pyritæ*, and are compound, inflammable, metallic bodies, found in detached maſſes, of no determinately angular figure; of a ſimple internal ſtructure, not ſtriated; and are naked, or not covered with any inveſtient coat or cruſt, in which they differ from the pyriplaces. See *Tab. of Foſſils*, *claſs* 5.

Of this genus there are only two known ſpecies.

GYMNOSOPHISTS, a ſet of Indian philoſophers, famous in antiquity; ſo denominated from their going bareſoot. The word is formed of the Greek γυμνοσοφιϛης, q. d. a ſophiſt or philoſopher who goes naked.

This name was given to the Indian philoſophers, whom the exceſſive heat of the country obliged to go naked; as that of *Peripatetics* was given to thoſe who philoſophiſed walking.

Laertius, Vives, &c. will not have *Gymnoſophiſt* to have been the name of any particular ſect, but a common name of all the philoſophers in the Indies; and hence they divide them into Brachmans and Germani.

Among the Germani, called alſo by Porphyry *Samanæi*, and by Clemens Alexand. *Sermanæ*, ſome were called *Hylobii*, by Clemens Alexand. *Allobii*, as inhabiting the woods; which laſt ſeem to come neareſt to the notion of *Gymnoſophiſts*. Clemens relates, that theſe Allobii neither inhabit cities nor towns, are clothed moſtly with the leaves of trees, eat acorns and berries, and drink water out of their hands, abſtaining from marriage and procreation.

The *Gymnoſophiſts* believed the immortality and tranſmigration of the ſoul: they placed the chief happineſs of man in a contempt of the goods of fortune and the pleaſures of ſenſe, and gloried in having given faithful and diſintereſted counſels to princes and magiſtrates. It is ſaid, that when they became old and infirm, they threw themſelves into a pile of burning wood, in order to prevent the miſeries of an advanced age. One of them, named Calamus, thus burnt himſelf in the preſence of Alexander the Great.

Apuleius, Florid. lib. i. deſcribes the *Gymnoſophiſts* thus: "They are all devoted to the ſtudy of wiſdom, both "the elder maſters and the younger pupils; and what "to me appears the moſt amiable thing in their cha"racter is, that they have an averſion to idleneſs and "indolence: accordingly, as ſoon as the table is ſpread, "before a bit of victuals be brought, the youths are all "called together from their ſeveral places and offices, "and the maſters examine them what good they have "done ſince the ſun-riſe: here one relates ſomething "he has diſcovered by meditation; another has learned "ſomething by demonſtration; and as for thoſe who "have nothing to allege why they ſhould dine, they are "turned out to work faſting."

The great leader of the *Gymnoſophiſts*, according to Jerome, was one Buddas, called by Clemens Butta, who is ranked by Suidas among the Brachmans. That laſt author makes Buddas, the preceptor of Manes the Perſian, the founder of the *Gymnoſophiſts*.

There were likewiſe African *Gymnoſophiſts*, who dwelt upon a mountain in Ethiopia, near the Nile, without the accommodation either of houſe or cell. Theſe did not form themſelves into ſocieties, like thoſe of India; but each had his private retirement, where he ſtudied and performed his devotions by himſelf. If any perſon had killed another by chance, he applied to theſe ſages for abſolution, and ſubmitted to whatever penances they enjoined. They pretended to an extraordinary frugality, and lived only upon the fruits of the earth. Lucian aſcribes to theſe philoſophers ſeveral new diſcoveries in aſtronomy.

GYMNOSPERMIA, in *Botany*, the name given by Linnæus to a certain ſeries of plants of the DIDYNAMIA claſs. *Tab.* II. *Botany*, N° 11. and *Tab.* V. *claſs* 14.

GYMNOTUS, in *Ichthyology*, the name of a genus of fiſhes, the characters of which are theſe: it is of the malacopterygious kind in the Artedian ſyſtem, but in the Linnæan it belongs to the order of apodes; the branchioſtege membrane contains five bones, and it has no fin upon the back; the head is furniſhed with lateral covers; the upper lip with two tentacula; the eyes are covered with a ſkin; the body is flatted and carinated under the lower fin. Linnæus enumerates five ſpecies of this genus, one of which is an American fiſh, deſcribed by Marcgrave under the name of *carapo*.

Another ſpecies is diſtinguiſhed, on account of its electrical powers, by the name of the *gymnotus electricus*, or *electrical eel*, and by the French *anguille tremblante*. This is a freſh-water fiſh found in the river of Surinam, in South America: the common ſize is from three to four feet in length, and from ten to fourteen inches in circumference about the thickeſt part of the body; however, it is ſaid, that ſome have been ſeen in the river of Surinam which are upwards of twenty feet long, and whoſe ſtroke or ſhock proved inſtant death to thoſe who received it. *Tab.* II. *Fiſhes*, N° 12.

This fiſh has been lately much the object of examination. It is deſcribed, in general, by Mr. Bancroft, in his Eſſay on the Natural Hiſtory of Guiana, and more minutely by Dr. Garden, in the Phil. Tranſ. The head is large and flat, and perforated with holes; the upper and lower jaws are of an equal length, and form a wide mouth without teeth; there are two noſtrils on each ſide of the head, one pair being large and raiſed above the ſurface, the other ſmall and level with the ſkin; the eyes are ſmall, flat, and of a bluiſh colour; the body is thick and roundiſh near the head and to ſome diſtance from it, but gradually diminiſhes in ſize and increaſes in depth to the point of the tail, which is rather blunt; the back and ſides are covered with many light-coloured ſpots;

the whole body, from about four inches below the head, ſeems to be divided into four different longitudinal parts, viz. the upper part or back, which is roundiſh, and ſeparated from the other parts by the lateral lines; theſe take their riſe juſt above the pectoral fins, and gradually converge, as they run down along the ſides towards the tail; the ſecond part is the body of the fiſh, or its ſtrong muſcular part, ſeparated from the former by the lateral lines; this is of a lighter blue colour than the back, and ſwells out a little on each ſide, but, toward the lower part, it is again contracted or ſharpened into the *carina*, or keel, which is the third diviſion; this part is thin and lax, and covered with a reticulated ſkin of a greyiſh colour; the *carina* begins about ſix or ſeven inches below the baſe of the head, and reaches down to the tail; it ſeems to be of a ſtrong muſcular nature, and terminates in a thin edge, on which is ſituated the fourth part or diviſion, which is a long, deep, ſoft, wavy fin, continued from about three or four inches below the head to the end of the tail. The anus of this fiſh is placed underneath, and about an inch more forward than the pectoral fins; theſe are ſmall, and orbicular in ſhape, and are placed, one on each ſide, juſt behind the head, over the *foramina ſpiratoria*, which are ſmall, and generally covered with a lax ſkin, ſituated in the axillæ of theſe fins: the chief uſe of theſe fins ſeems to be to raiſe the head of the fiſh when he wants to breathe, which he does every four or five minutes, by raiſing his mouth out of the water: this circumſtance ſhews that he is amphibious and has lungs; and Dr. Garden concludes, from his *foramina ſpiratoria*, that he has *branchiæ* likewiſe. The ſkin of the body is formed into a number of *rugæ* or annular bands, which reach acroſs the body to the baſe of the carina on each ſide; thus it has a worm-like appearance, and, like the worm tribe, it has alſo a power of lengthening or ſhortening its body, and of ſwimming backwards or forwards. But the moſt aſtoniſhing property of this fiſh is its power, exerted at its own pleaſure, of giving an electrical ſhock to any perſon, or number of perſons joining hands, provided the firſt touched the fiſh, and the laſt put his hand into the water in which it ſwam. The ſhock is conveyed either by the immediate touch of the fiſh with the hand, or through the ſame metallic or other conductors which convey the electric fluid; and it is intercepted by the common non-conductors of that fluid. This ſhock has been ſometimes ſtrong enough to paſs through a braſs chain, if the links were not too numerous, and the chain tenſe. But in all experiments of this kind, it ſeems to have been neceſſary to form a proper communication between the different parts of the fiſh; though ſome perſons have affirmed, that they were ſhocked by touching him only with one hand: in this caſe, however, ſome unobſerved communication may have produced the effect. The ſurpriſing power which this fiſh poſſeſſes, ſeems to have been deſigned for its defence and ſubſiſtence; the exerciſe of it in the latter view is obſervable, whenever ſmall fiſhes, which are a part of its food (as well as worms and animal food in general) are thrown into the water; for theſe are firſt ſtruck, till they are dead or ſtupified, and afterwards ſwallowed. If one of theſe ſmall fiſhes be taken out of the veſſel where the *gymnotus* is, after it has been apparently killed, and put into freſh water, it will ſoon revive again. In ſome caſes, the death, or apparent death of its prey, is not effected without ſeveral repeated ſhocks, which have been obſerved to increaſe in ſtrength according to the occaſion. Theſe electrical qualities depend on particular organs, which have been diſſected and accurately deſcribed by Mr. J. Hunter: of theſe organs there are two pair, a larger and a ſmaller, placed on each ſide the fiſh, and ſeparated from one another; and they conſtitute, perhaps, more than one third of the whole animal. The ſtructure of the organs conſiſts of flat partitions or ſepta, and croſs diviſions between them, by means of thin plates or membranes; of which tranſverſe plates there are, in an inch of length, about 240, which multiply the ſurface in the whole to a vaſt extent. The nerves in this fiſh, which are appropriated for the exerciſe of its electrical powers, and which ariſe particularly from the medulla ſpinalis, whence they iſſue in pairs between all the vertebræ of the ſpine, and ſupply the organs, are much larger than thoſe that are beſtowed on any other part for the purpoſes of ſenſation and action. Mr. Hunter's anatomical deſcription is illuſtrated by three plates. For a farther account of the electrical property of this fiſh, ſee TORPEDO. Phil. Tranſ. vol. lxv. part i. art. 10. p. 94. art. 11. p. 102. vol. lxv. part ii. art. 39. p. 395.

GYNÆCEUM, among the *Ancients*, the apartment of the women; or a ſeparate place, in the inner part of the houſe, where the women keep themſelves retired, employed in their ſpinning, out of the ſight of the men.

The word is compounded of the Greek *γυνη, a woman*, and οικος, *a houſe*.

Under the Roman emperors there was a particular eſtabliſhment of *gynæcea*, being a kind of manufactories managed chiefly by women, for the making of cloaths, furniture, &c. for the emperor's houſhold. Mention is made of theſe *gynæcea*, in the Theodoſian and Juſtinian code, and by divers other authors.

In imitation hereof, divers of the modern manufactories, particularly thoſe of ſilk, where a number of women and maids are aſſociated and formed into a body, are called *gynæcea*.

GYNÆCIARIUS, a workman employed in the gynæceum.

In the ancient gynæcea there were men to weave and ſhape; the reſt, as ſpinning, &c. being performed by women.

Criminals were ſometimes condemned to ſerve in the gynæcea, much as now in the galleys; frequently, alſo, this was a kind of ſervice which princes exacted of their ſubjects or vaſſals, both men and women, whom they made to work for them in their gynæcea.

GYNÆCOCOSMI, Γυναικοκοσμοι, in *Antiquity*, Athenian magiſtrates, whoſe buſineſs it was to regulate the women's apparel, according to the rules of modeſty and decency. See GYNÆCONOMUS.

GYNÆCOCRATUMENI, an ancient people of Sarmatia Europæa, inhabiting the eaſtern banks of the river Tanais, near its opening into the Palus Mæotis; thus called, as authors relate, becauſe they had no women among them; or, rather, becauſe they were under the dominion of women.

The word is formed of γυνη, *woman*, and κρατουμενος, *vanquiſhed*, of κρατεω, *I overcome*, q. d. overcome by women.

Fa. Hardouin, in his notes on Pliny, ſays, they were thus called, becauſe, after a battle which they loſt againſt the Amazons on the banks of the Thermodoon, they were obliged to have a venereal commerce with them, in order to get them children: *Et quod victricibus obſequantur ad procurandam eis ſobolem.*

Hardouin calls them the huſbands of the AMAZONS, *Amazonum connubia*; for, as the author obſerves, the word *unde* muſt be retrenched from Pliny, having been foiſted into the text by people who were not maſters of the author's meaning, *unde Amazonum connubia*.

They who take the Amazons for a fabulous people, will conclude the ſame of the *Gynæcocratumenians*.

GYNÆCOCRACY, GYNÆCOCRATIA, a petticoat government, or a ſtate where women have, or may have, the ſupreme command.

The word is formed of γυνη, γυναικος, *woman*, and κρατος, *authority*, *power*, *government*.

In this ſenſe, England and Spain are *gynæcocracies*: the French value themſelves, and think they are greatly happy, that their monarchy is not *gynæcocratic*.

GYNÆCOMASTOS, of γυνη, *woman*, and κομιζω, *I bear*, a term uſed by the ancients, to expreſs a man whoſe breaſts are large and turgid like thoſe of women, and afford milk.

It was an obſervation among the ancients, that ſuch men were naturally impotent. Paulus Ægineta obſerves, that the breaſts of men as well as women ſwell at the time of puberty, but that thoſe of women continue ſwelled, and thoſe of men ſubſide again, except in the caſe of the *gynæcomaſtoi*, where they remain turgid, and become in time more and more ſo, as the fat increaſes under them. As this ſwelling of the breaſts gave a ſuſpicion of impotency, thoſe who laboured under that deformity, uſually had recourſe to a very painful operation in ſurgery to get rid of it. An inciſion was made in the form of a creſcent in the lower part of the breaſt, then the ſkin being drawn back, the fat was taken out, and the lips of the wound healed by means of a ſuture. When the breaſts were very large and hung down, they made two inciſions, one within the other, meeting at the extremities, and then ſeparating all the ſkin between them, they took out the fat: and finally, if the diſeaſe returned, or they had performed the operation imperfectly, leaving ſome behind, they repeated the whole a ſecond time.

GYNÆCONOMUS, the name of a magiſtrate of Athens, who had the cenſure and inſpection of the women.

The word is compounded of the Greek γυνη, γυναικος, *woman*, and νομος, *law*.

There were ten *gynæconomi*; their buſineſs was to inform themſelves of the lives and manners of the ladies of that city, and to puniſh ſuch as miſbehaved themſelves, or tranſgreſſed the common bounds of modeſty and decency.

They had a liſt hanging out, of the names of all thoſe whom they had cenſured, or condemned to any mulct, forfeiture, penance, or other penalty.

GYNÆSIA, a word uſed by the writers in medicine, ſometimes

times for the MENSTRUA, and ſometimes for the LOCHIA.

GYNANDRIA, in *Botany*, the twentieth claſs of plants in the Linnæan ſyſtem, in which the male and female parts of the flower are joined at their origin, the ſtamina or male parts of which grow to the piſtil or female part, and not to the receptacle of the ſeed. See FRUCTIFICATION, and *Tab. of Botany*, *claſs* 20.

The word is formed of the Greek *γυνη*, *female*, and *ανηρ*, *male*.

The general character of this claſs of plants is very obvious: they are diſtinguiſhed at firſt ſight from all others, by the ſtamina being placed upon the ſtyle; or, in other words, the receptacle is elongated into the form of a ſtyle, and bears on it both the piſtil and ſtamina. This claſs contains eight orders. *Tab.* VI. *Botany*, *claſs* 20.

The order of the *diandria*, the firſt of this claſs, is a very natural diſtinction among plants, and its genera differ from one another in no other grand particular but the nectaria. Botaniſts, in general, have judged the roots of this order of plants, which are either teſticulated or palmated, to be a very certain mark of diſtinction; but this obſervation of the difference of the nectaria, which is owing to Linnæus, is much to be preferred, as being both more certain and more obvious. The ſtructure of the fructification in this order of plants is very ſingular: the germen of the piſtil is always contorted, and the petals are five in number; the two external ones often form themſelves into a galea, the lower lip of which forms the nectarium, which ſupplies the place of a ſixth petal and a piſtil: the ſtyle is affixed to the interior margin of the nectarium, ſo that it and its ſtigma are ſcarce to be diſtinguiſhed in the flower: the ſtamina are always two filaments, very ſhort, and ſupporting two antheræ, which are of a narrow ſhape below, and are naked, and divided into ſeveral lobes, in the manner of the pulp of an orange; theſe are covered each with a ſmall cell, which is open downwards, and growing on the inner margin of the nectarium: the fruit or ſeed-veſſel is a capſule, containing only one cell, and formed of three valves: the ſeeds are very numerous, and as ſmall as grains of duſt, and are affixed to a ſlender receptacle, which is placed within each valve. This order comprehends nine genera; the *orchis*, *ſatyrium*, &c. the other orders are, the *triandria*, including four genera; *tetrandria*, containing one genus; *pentandria*, containing three genera; *hexandria*, containing two; *decandria*, containing two; *dodecandria*, including one genus; and *polyandria*, containing three genera.

The flowers of all the plants of this claſs have a ſtrange, and, as it may be called, monſtrous appearance, very different from that of all other plants in their flowers; but this is only owing to the ſingular diſpoſition of the parts of fructification in theſe flowers, as deſcribed above. Linnæi, Gen. Plant. p. 451.

GYPSINE *ſtone*, a name given by ſome writers to the GYPSUM, or foſſil ſubſtance, of which the powder called *plaiſter of Paris* is made by calcination. There are in many parts of Arabia vaſt rocks of this ſtone; it reſembles alabaſter, but is ſofter, and of a more lax texture. It is found to be a very eaſy ſtone to form by tools, and therefore the Arabs build with it in ſome of the places in the neighbourhood of the quarries, but they are forced to make the walls very thick, as the ſtone is ſo ſoft and crumbly. The building called Arſoffa, or Arſoffa Emir, which ſeems the remains of a monaſtery, is built wholly of this ſtone; and when the ſun ſhines upon it, the walls give ſuch a luſtre, that they dazzle the eyes; but the ſoftneſs of the ſtone, and the redneſs of the mortar, have conſpired to make it a very ruinous pile at preſent, though of no great antiquity, the ſtones having ſplit and mouldered away in the walls, and the foundations failed in many places. Phil. Tranſ. Nº 218. p. 150.

GYPSINUM *metallum*, in the *Natural Hiſtory of the Ancients*, a name uſed for the common *lapis ſpecularis*, of which they often made windows as we do of glaſs. It was by ſome called *Cyprinum metallum*, becauſe frequently found in Cyprus.

GYPSOCHI, artiſts who work in plaiſter. See PARADIGRAMMATICE.

GYPSOPHYLA, in *Botany*, a genus of the *decandria digynia* claſs. Its characters are theſe: the flower hath a permanent bell-ſhaped empalement, cut into five parts at the top; it hath five oval blunt petals, and ten awl-ſhaped ſtamina; in the centre is ſituated a globular germen, which becomes a globular capſule with one cell, opening with five valves, filled with ſmall roundiſh ſeeds. There are ſeveral ſpecies, which are plants of no great beauty.

GYPSOPHYTON, in *Botany*, a name given by ſome authors to the *ſaxifraga antiquorum*, or ſaxifrage of the ancients.

GYPSUM, in *Natural Hiſtory*, the name of a claſs of foſſils, the characters of which are theſe: they are compoſed of ſmall flat particles, irregularly arranged, and giving the whole maſſes ſomething of the appearance of the ſofter marbles; they are bright, gloſſy, and in a ſmall degree tranſparent; not flexile nor elaſtic, not giving fire with ſteel, nor fermenting with or diſſoluble in acid menſtruums, and calcine very eaſily in the fire.

Gypſum is found in very large quantities in many parts of the globe, forming extenſive chains of mountains and hills, as in the neighbourhood of Paris. It is always cryſtallized or regularly diſpoſed; but in its cryſtallization aſſumes a variety of forms. In ſome caſes, it is compoſed of large, tranſparent, thin laminæ, which are ſo applied to each other as to conſtitute maſſes as tranſparent as cryſtal: in this form it is called *lapis ſpecularis*. In other caſes, it is cryſtallized in *ſtriæ*, like threads applied longitudinally to each other: this is called *ſtriated gypſum*. And ſometimes a large quantity of *gypſum* is found in ſmall irregular cryſtals, joined together and forming conſiderable maſſes of ſemi-tranſparent granulated ſtones, commonly called *gypſeous* ALABASTER. We alſo meet with a rhomboidal gypſeous ſtone, called alſo SELENITES; and other *gypſums* are found, conſiſting of differently formed cryſtals, as hexagonal parallelopipedons and pyramids.

Gypſum is diſtinguiſhed from calcareous earths by not diſſolving and effervefcing with acids; but M. Baumé obſerves, that it may in ſome meaſure be diſſolved by acids; however, in this ſtate, it is ſeparated by cryſtallization, without retaining any part of the acid: beſides, quick-lime does not harden, as *gypſum* does, without the addition of ſand or cement. It has been obſerved by Mr. Pott, in his Lithogeogneſia, that *gypſum* cannot be fuſed without addition by the moſt violent fire of furnaces; but Mr. D'Arcet has found that all gypſeous ſtones and earths are fuſible in this way by a violent and long-continued heat.

The author of the Chemical Dictionary infers, from the various properties of *gypſum*, that it is nothing elſe than calcareous earth ſaturated with vitriolic acid; or that it is a true SELENITES. Its want of hardneſs, its tranſparency, its cryſtallization, and its ſolubility in water, proceed from its ſaline character. It cannot be combined with any acid, becauſe it is naturally ſaturated with the vitriolic acid. It requires much water to diſſolve it, on account of its ſelenitic quality, or on account of the great quantity of earth which it contains, and the intimacy with which this earth is united with the vitriolic acid. Its calcination is nothing elſe than the ſubtraction of the water of its cryſtallization. The properties of quick-lime, which it acquires by calcination, are owing either to the ſuperabundant calcareous earth which it may contain, or rather to the ſubtraction of a part of the vitriolic acid, which is engaged during calcination, by touching ſome inflammable matter with which the acid unites and forms ſulphur. And, finally, the hardening of plaiſter, when calcined and mixed with water, may proceed from a mixture of thoſe parts, which, by calcination, have become quick-lime, with other parts which have not acquired that quality, and which ſerve as a cement to the former; or it proceeds from the *gypſum* reſuming the water of its cryſtallization, and again cryſtallizing precipitately and confuſedly. Art. *Gypſum*.

All the ſpecies burn with a very ſlight degree of fire, to that which is commonly called *plaiſter of Paris*; but the ſofter require the ſmaller degrees of fire, and, in general, the harder and more marbly make the better plaiſter. The common way of burning this ſtone into plaiſter, is too ſlight to give it all the hardneſs it is capable of. It is reported by many, that a greater degree of heat renders it much ſuperior in hardneſs; and, it is ſaid, that the artificial marble, with which the whole palace of Munich is adorned, and which the elector of Bavaria eſteems more than marble, for which it is miſtaken by all that ſee it, is made of the common *gypſum*, firſt burnt in the ordinary way, and afterwards put over the fire again in a copper veſſel, and ſuffered to boil as it will, like water, for a long time: when this boiling ceaſes of itſelf, the matter is taken out, and common colours, ſuch as are uſed in painting, are mixed with it in various proportions; which, on the wetting it with water, and working it in the common manner of plaiſter of Paris, diffuſe themſelves, and imitate the veins of natural marble. Phil. Tranſ. Nº 91.

The method of preparing it will be ſhewn under the article MOSAIC.

GYPSUM is uſed in the Canaries by way of remedy for their wine; and about Malaga a large quantity is tunned up with the juice of their grapes.

GYPSUM *ſtriatum*, *ſtriated plaiſter-ſtone*, in *Natural Hiſtory*, the name commonly uſed for the whitiſh leſs gloſſy TRICHERIA, with ſhort thick filaments.

It is of a rude, irregular, and unequal ſurface, and lax, friable texture, found in maſſes of various ſizes, from one to twelve or eighteen inches over, but always broad and flat, its thickneſs being uſually but an inch and a half, and in the broadeſt pieces ſeldom much more than two inches: it is compoſed of conſiderably large and coarſe longitudinal filaments, running uſually very evenly through the maſs: it is eaſily fiſſile in a perpendicular direction, that is parallel to the arrangement of theſe filaments: it is of a dull whitiſh colour, and its filaments, when examined ſingly, have a ſlight ſhare of tranſparency. It will not at all give fire with ſteel, or ferment with aqua fortis, but very readily calcines to a perfectly white ſubſtance. It is found in clay and marle-pits, among the ſtrata of gravel and in the fiſſures of ſtone, and is common in Yorkſhire and other parts of the kingdom.

The Germans uſe it in fluxing the ſulphureous ores of metals; and our druggiſts ſell it under the name of Engliſh talc, for cleanſing of ſilver lace.

GYPSUM *tymphaicum* is a name given by the ancients to the white chalk, which was eſteemed by them for the cleanſing of cloths, and which makes an excellent plaiſter or cement without previous burning. See CALX *nativa*

GYPSY, a name given to a ſet of vagrants. See EGYPTIANS.

GYRFALCON, in *Zoology*, the name of a large and fierce ſpecies of FALCON, called in Engliſh the *jerfalcon*.

Its name is a compound of the German *gyr*, which ſignifies a *vultur*, and *falco*, the *falcon*. It is the largeſt of all the falcon kind; its head is flatted, and of a greyiſh colour; the throat is of a pure white; its beak very thick and ſtrong, but ſhort, and of a bluiſh colour; the breaſt and belly are marked with narrow lines, thinly ſcattered and pointing down; the wings with large heart-ſhaped ſpots; the middle feathers of the tail with a few bars; the legs are thick and ſtrong, and feathered a little below the knees, and both they and the feet are of a pale blue.

It is a very bold and daring bird, attacking all other fowl without reſerve, and particularly the heron and ſtork kind: the other falcons are all afraid of this. It is ſometimes quite white, and was formerly in high eſteem when falconry was in vogue.

GYRINUS, in *Zoology*, a name uſed for a ſpecies of the MORDELLA.

GYRLE, among *Sportſmen*. See GIRLE.

GYROMANCY, GYROMANTIA, a kind of DIVINATION, performed by walking round, or in a circle.

The word is compounded of the Greek γυρος, *circle*, and μαντεια, *divination*.

GYROVAGI, in *Eccleſiaſtical Writers*, monks, who leaving their monaſteries, under pretence of piety, wandered about from one religious houſe to another.

The ſame appellation was alſo given to prieſts who left their pariſhes.

H.

H, Is the eighth letter of our alphabet, and the ſixth conſonant.

Varro, De Re Ruſtica, lib. iii. cap. 1. calls the *h*, *afflatus*; and Martianus Capella ſays it is pronounced by only a gentle contraction of the trachea. Hence it has been diſputed, whether or no the *h* be a real letter.

Some will only have it to be an aſpiration, or ſpirit, becauſe its ſound is ſo weak. And accordingly the Greeks, of later ages at leaſt, do not place it in the line with the other letters, but put it over the head of the letter which follows it; though it ſhould ſeem they anciently wrote it in the ſame line with the reſt.

The Latin grammarians, as they were religious imitators of the Greeks, have, on their authority, generally diſallowed the *h* as a letter; and the moderns have herein followed the Latins, urging, that it is ſounded only by a ſtrong emiſſion of the breath, without any conformation of the organs of ſpeech, and therefore that it is no letter. However, others maintain that the *h*, like all other aſpirates, from the time it is aſpirated, and for this very reaſon that it is aſpirated, is not only a letter, but a real conſonant; it being a motion, or effort of the larynx, to modify the ſound of the vowel that follows; as is evident in the words *heaven*, *health*, *hero*, &c. where the vowel *e* is differently modified from what it is in the words *endive*, *eating*, *elect*, &c. and ſuch modification is all that is eſſential to a conſonant. They add, that the *h* is either a letter, or *ſ* and *z* are none; thoſe being no more than hiſſing aſpirations; and that they who exclude the *h* from among the letters, as conceiving it only a mark of aſpiration, might as well exclude the labial conſonants *b* and *p*, and ſay they are only marks of certain motions of the lips, &c. Hence they conclude that the *h* is a letter, and a conſonant of the guttural kind, i. e. a conſonant, to the pronunciation whereof the throat concurs, in a particular manner, more than in any other of the organs of voice.

It is true, in many words beginning with *h*, the aſpiration is very weak, and almoſt inſenſible; the *h* in thoſe caſes not doing its office: but it does not ceaſe to be a conſonant on that ſcore, more than the various other conſonants, which we write but do not pronounce; as the *k* in *quick*, &c. and ſeveral other letters, particularly in the Hebrew, French, &c. Nor does it ceaſe to be a conſonant, becauſe it does not hinder the eliſion of the foregoing vowel, when another vowel follows in the ſubſequent word; for then *m* would undergo the ſame diſqualification.

M. Menage diſtinguiſhes two kinds of *h*; the one an aſpirate, which he allows a conſonant, the other a mute, which he conſiders as a vowel. Now, it is certain, the aſpirated *h* is a conſonant; but the mute *h* is no vowel, as having no peculiar or proper ſound diſtinct from that of the vowel, or diphthong, immediately following it.

When the *h* is preceded by a *c*, the two letters together have frequently the ſound of the Hebrew שׁ, with a point over the right horn: as in *charity*, &c.

In moſt words derived from the Greek, and beginning in that language with the letter χ, the *ch*, which begins them in Engliſh, has generally the ſound of a *k*, as in *echo*, *chorus*, &c. though it is ſometimes ſoftened a little, as in *Cherſoneſus*, &c.

After a *p*, the *h* is always pronounced together with the *p*, like an *f*; as in *phraſes*, *Philiſtines*, *phlegm*, *phlebotomy*, *philoſophy*, *Phoceans*, &c. Moſt words of this claſs are either proper names, or terms of art, borrowed from the Greek, or the Oriental languages; and written in Greek with a φ, and with a פ in the others.

The *h* in Engliſh is ſcarcely ever mute at the beginning of a word, or where it immediately precedes a vowel, as *houſe*, *behaviour*, &c. Where it is followed by a conſonant, it has no ſound, according to the preſent pronunciation.

In ancient authors we frequently meet with *h* put inſtead of *f*, as *haba* for *faba*; but this is principally obſervable in the Spaniſh tongue, where moſt of the words borrowed from the Latin beginning with an *f*, take the *h* in lieu of it: as *hablar*, for *fabulari*; *habo*, for *fabus*; *hado*, for *fatum*. For the relation which *h* has to the Æolic digamma, ſee the letter F.

The aſpirate or ſharp accent of the Greeks, which is the ſame with our *h*, is alſo frequently changed in the Latin for an *s*; ἁλς, *ſal*; ἑπτα, *ſeptem*; ἑξ, *ſex*; ἑρπω, *ſerpo*; ἡμισυ, *ſemis*; ὑς, *ſus*, &c. The *h* is alſo uſed for ſome other letters, enumerated at large by Paſſerat, De Literarum inter ſe Cognatione & Permutatione.

Anciently the *h* was put for *ch*; thus *Chlodovæus* was formed *Hludovicus*, as it is read on all the coins of the ninth and tenth centuries; and it was on this account, that they wrote *Hludovicus* with an *h*. In courſe of time, the ſound of the *h* being much weakened, or entirely ſuppreſſed, the *h* was dropt, and the word was written *Ludovicus*. In like manner we read *Hlotaire*, *Hlovis*, &c. F. Lobineau will have this difference to have riſen from the differences in the pronunciation. Such, ſays he, as could not pronounce the guttural, wherewith theſe two words begin, ſubſtituted a *c* for it; and they who pronounced it ſo, wrote it after the ſame manner: but ſuch as were accuſtomed to pronounce the guttural, wrote it likewiſe. He might have added, that ſuch as could not pronounce it, at length abſolutely rejected it, and both wrote and ſpoke *Louis*, *Lotaire*, &c. Some learned men have conjectured, that the *h* ſhould have been detached from the name; and that it ſignified lord, from the Latin *herus*, or the German *herr*. Much as the D, which the Spaniards prefix to their proper names, as *D. Phelipe*, for Don Philip. But as it is likewiſe found before the names of ſeveral cities, it is more probable the letter was there uſed to denote the rough, harſh pronunciation of the ancient Franks.

In reality, the moſt ancient way of writing the names of theſe French kings, was not by *h*, but by *ch*; where the *c* ſeems to have ſtood for *koning*, *king*, and the *h* was inſerted to give the *c* a guttural ſound.

The *h* is ſometimes alſo found prefixed to the *c*; as *Hcarolus*, *hcalendæ*, &c. for *Carolus*, *calendæ*, &c.

H, among the *Ancients*, was alſo a numeral letter, ſignifying 200, according to the verſe:

> H *coque ducentos per ſe deſignat habendos.*

When a daſh is drawn at the top of the $\overline{\text{H}}$, it ſignified two hundred thouſand. See what has been obſerved on this ſubject under the letter A.

HABAKKUK, one of the twelve leſſer prophets, whoſe prophecies are taken into the canon of the Old Teſtament.

The name is written in Hebrew with ח *hheth*; and ſignifies a *wreſtler*, or *grappler*. The Greek tranſlators call him *Abbakoum*.

The preciſe time is not known when *Habakkuk* propheſied; but from his predicting the ruin of the Jews by the Chaldeans, it may be concluded that he was contemporary with Jeremiah, and propheſied in the reign of Joſiah.

His prophecy only conſiſts of three chapters.

HABDALA, or HABHDALAH, a Jewiſh ceremony, practiſed among that people every ſabbath-day evening.

The word is Hebrew, and literally ſignifies *ſeparation*: it is formed of בדל, *badal*, *to ſeparate*; the ceremony being looked upon as the diviſion or parting of the ſabbath from the reſt of the week. It was eſtabliſhed to prevent their being too haſty in ending the ſabbath.

Towards the cloſe of the ſabbath, when the ſtars begin to appear, every maſter of a family lights a torch or flambeau, or at leaſt a lamp with two wicks. A little box of ſpices is then prepared, and a glaſs of wine taken; then ſinging, or rehearſing a prayer, and bleſſing the wine and the ſpices, they all ſmell at them; and, after a few ceremonies performed about the torch, or lamp, they caſt a little of the conſecrated wine into the flame; every body taſtes; and thus they break up, wiſhing each other, not a good night, but a good week.

HABEAS *corpora juratorum*, is a writ that lies for bringing in a JURY, or ſo many of them as refuſe to come upon the *venire facias*, for the trial of a cauſe brought to iſſue. This is of the ſame nature in the common pleas, as the DISTRINGAS *juratores* in the court of king's bench.

HABEAS *corpus*, in *Law*, a writ, which a man indicted and impriſoned for any crime, or treſpaſs, before the juſtices of peace, or in a court of franchiſe; having offered ſufficient bail, which is refuſed, though the caſe be bailable, may have out of the king's bench, thereby to remove himſelf thither, at his own coſts, to anſwer the cauſe at the bar thereof.

The order, in this caſe, is firſt to procure a *certiorari* out of the chancery, directed to the ſaid juſtices, for removing the indictment into the king's bench; and upon that to procure this writ to the ſheriff, for cauſing his body to be brought at a certain day.

This writ is alſo uſed to bring the body of a perſon into court, who is committed to any gaol, either in criminal or civil cauſes; and a *habeas corpus* will remove a perſon and cauſe from one court and priſon to another. Of this there are various kinds: ſuch is the *habeas corpus ad reſpondendum*, when a man hath a cauſe of action againſt one who is confined by the proceſs of ſome inferior court; in order to remove the priſoner, and charge him with this new action in the courts above: ſuch is that *ad ſatisfaciendum*, when a priſoner hath had judgment againſt him in an action, and the plaintiff is deſirous to bring him up to ſome ſuperior court to charge him with proceſs of execution. Such alſo are thoſe *ad proſequendum, teſtificandum, deliberandum*, &c. which iſſue when it is neceſſary to remove a priſoner, in order to proſecute or bear teſtimony in any court, or to be tried in the proper juriſdiction wherein the fact was committed. Such is, likewiſe, the common writ *ad faciendum et recipiendum*, which iſſues out of any of the courts of Weſtminſter-hall, when a perſon is ſued in ſome inferior juriſdiction, and is deſirous to remove the action into the ſuperior court; commanding the inferior judges to produce the body of the defendant, together with the day and cauſe of his caption and detainer, whence the writ is frequently denominated an *habeas corpus cum cauſa, to do* and *receive* whatſoever the king's court ſhall conſider in that behalf. This is a writ grantable of common right, without any motion in court; and it inſtantly ſuperſedes all proceedings in the court below. But the great and efficacious writ in all manner of illegal confinement is that of *habeas corpus ad ſubjiciendum*, directed to the perſon detaining another, and commanding him to produce the body of the priſoner, with the day and cauſe of his caption and detention, to do, ſubmit to, or receive the award of the judge or court. This is a high prerogative writ, iſſuing by the common law out of the court of king's bench, not only in term-time, but alſo during the vacation, by a *fiat* from the chief juſtice, or any other of the judges, and running into all parts of the king's dominions. In this court it is neceſſary to apply for this writ by motion to the court, as of certiorari, prohibition, mandamus, &c. ſhewing ſome probable cauſe, why the extraordinary power of the crown is called in to the party's aſſiſtance; and when a probable ground is ſhewn, that the party is impriſoned without juſt cauſe, the writ of *habeas corpus* is then a writ of right, which may not be denied, but ought to be granted to every man that is committed to priſon, or detained there, or otherwiſe reſtrained, though it be by the command of the king, the privy-council, or any other.

The writ of *habeas corpus* was originally ordained by the common law of the land, as a remedy for ſuch as were unjuſtly impriſoned, to procure their liberty; but many abuſes having been introduced into the mode of granting it, it became neceſſary to prevent them by modern ſtatutes. Accordingly, by the petition of right, 3 Car. I. it is enacted, that no freeman ſhall be impriſoned or detained, without cauſe ſhewn, to which he may make anſwer according to law. And by 16 Car. I. cap. 10. if any perſon be reſtrained of his liberty by order or decree of any illegal court, or by command of the king's majeſty in perſon, or by warrant of the council-board, or of any of the privy-council, he ſhall, upon demand of his counſel, have a writ of *habeas corpus*, to bring his body before the court of king's bench or common pleas; who ſhall determine whether the cauſe of his commitment be juſt, and thereupon do as to juſtice ſhall appertain. The methods of obtaining this are farther pointed out and enforced by 31 Car. II. cap. 2. See the next article.

HABEAS *corpus act* is the famous ſtatute 31 Car. II. cap. 2. which ſome have called the ſecond *Magna Charta*, and bulwark of Engliſh liberty. The ſubſtance of this important ſtatute is compriſed in the following particulars; viz. 1. That the writ of *habeas corpus* ſhall be returned, and the priſoners brought up within a limited time according to the diſtance, not exceeding in any caſe twenty days. 2. That ſuch writs ſhall be endorſed as granted in purſuance of this act, and ſigned by the perſon awarding them. 3. That on complaint and requeſt in writing by or on behalf of any perſon committed and charged with any crime (unleſs committed for treaſon or felony, expreſſed in the warrant, or for ſuſpicion of the ſame, or as acceſſary thereto before the fact, or convicted or charged in execution by legal proceſs) the lord chancellor, or any of the twelve judges, in vacation, upon viewing a copy of the warrant or affidavit, that a copy is denied, ſhall (unleſs the party has neglected for two terms to apply to any court for his enlargement) award a *habeas corpus* for ſuch priſoner, returnable immediately before himſelf, or any other of the judges; and upon the return made ſhall diſcharge the party, if bailable, upon giving ſecurity to appear and anſwer to the accuſation in the proper court of judicature. 4. That officers and keepers neglecting to make due returns, or not delivering to the priſoner or his agent within ſix hours after demand a copy of the warrant of commitment, or ſhifting the cuſtody of a priſoner from one to another, without ſufficient reaſon or authority (ſpecified in the act) ſhall for the firſt offence forfeit 100*l.* and for the ſecond offence 200*l.* to the party grieved, and be diſabled to hold his office. 5. That no perſon, once delivered by *habeas corpus*, ſhall be recommitted for the ſame offence, on penalty of 500*l.* 6. That every perſon committed for treaſon or felony ſhall, if he requires it, the firſt week of the next term, or the firſt day of the next ſeſſion of oyer and terminer, be indicted in that term or ſeſſion, or elſe admitted to bail; unleſs the king's witneſſes cannot be produced at that time; and if acquitted, or if not indicted and tried in the ſecond term or ſeſſion, he ſhall be diſcharged from his impriſonment for ſuch imputed offence; but that no perſon, after the aſſiſes ſhall be opened for the county in which he is detained, ſhall be removed by *habeas corpus*, till after the aſſiſes are ended; but ſhall be left to the juſtice of the judges of aſſiſe. 7. That any ſuch priſoner may move for and obtain his *habeas corpus*, as well out of the chancery or exchequer, as out of the king's bench or common pleas; and the lord chancellor or judges denying the ſame, on ſight of the warrant or oath that the ſame is refuſed, forfeit ſeverally to the party grieved the ſum of 500*l.* 8. That this writ of *habeas corpus* ſhall run into the counties palatine, cinque ports, and other privileged places, and the iſlands of Jerſey and Guernſey. 9. That no inhabitant of England (except perſons contracting, or convicts praying to be tranſported, or having committed ſome capital offence in the place to which they are ſent) ſhall be ſent priſoner to Scotland, Ireland, Jerſey, Guernſey, or any places beyond the ſeas, within or without the king's dominions; on pain that the party committing, his adviſers, aiders, and aſſiſtants, ſhall forfeit to the party grieved a ſum not leſs than 500*l.* to be recovered with treble coſts; ſhall be diſabled to bear any office of truſt or profit; ſhall incur the penalties of *præmunire*, and ſhall be incapable of the king's pardon. And, leſt this act ſhould be evaded, by demanding unreaſonable bail, or ſureties, for the priſoner's appearance, it is declared by 1 W. & M. ſtat. 2. cap. 2. that exceſſive bail ought not to be required.

In conſequence of this act, it is now expected by the court, that, upon writs of *habeas corpus* at the common law, the writ ſhould be immediately obeyed, without waiting for any *alias* or *pluries*; otherwiſe an attachment will iſſue. Blackſt. Comm. vol. iii. p. 136, &c.

HABENA, in *Surgery*, the name of a BANDAGE contrived to keep the lips of a wound together, and ſave the painful operation of a SUTURE.

HABENDUM, in *Law*, a word of courſe in a conveyance.

In every conveyance are two principal parts, the *premiſes*, and the *habendum*: the office of the firſt is to expreſs the name of the grantor, the grantee, and the thing granted.

The *habendum* is to limit the eſtate, ſo that the general implication, which, by conſtruction of law, paſſed in the premiſes, is by the *habendum* controuled and qualified.

Thus in a leaſe of two perſons, the *habendum* to one for life, alters the general implication of the joint tenancy in freehold, which ſhould paſs by the premiſes, if the *habendum* were not.

HABENTIA, in *Law*, ſignifies riches. In ſome ancient charters, *habentes homines* is taken for rich men; and we read, *nec rex ſuum paſtum requirat, vel* habentes homines, *quos nos dicimus* feaſting men.

HABERDASHER, in *Commerce*, a ſeller of hats, and other ſmall wares.

The maſter and wardens of the COMPANY of *haberdaſhers* in London, calling to their aſſiſtance one of the company of cappers, and another of the hat-makers, and mayors, &c. of towns, may ſearch the wares of all hatters who work hats with foreign wool, and who have not been apprentices to the trade, or who dye them with any thing but copperas and galls, or woad and madder; in which caſes they are liable to penalties by ſtat. 8 Eliz. cap. 7. and 5 Geo. II. cap. 22.

For the etymology of this denomination, ſee BERDASH.

HABERDASHERS *hoſpital.* See HOSPITAL.

HABERE *facias poſſeſſionem* is a writ that lies where one has recovered a term for years in an action of ejectment, in order to put him into poſſeſſion again.

HABERE *facias ſeiſinam*, a judicial writ, which lies where a man has recovered lands in the king's court; directed to the ſheriff, commanding him to give him the ſeiſin thereof.

This writ ſometimes alſo iſſues out of the records of a fine, directed to the ſheriff of the county where the lands lie; commanding him to give to the cognizee, or to his heirs, ſeiſin of the land whereof the fine is levied.

In the execution of theſe writs, the ſheriff may take with him the *poſſe comitatus*, and may juſtify breaking open doors, if the poſſeſſion be not quietly ſurrendered. But if it be peaceably yielded, the delivery of a twig, a turf, or the ring of the door, in the name of ſeiſin, is ſufficient execution of the writ.

There is alſo a writ called HABERE *facias ſeiſinam, ubi rex habuit annum, diem, & vaſtum*; which lies for the delivery of lands to the lord of the fee, after the king had taken his due of a perſon's lands, who was convict of felony.

HABERE *facias viſum* is a writ that lies in divers caſes, as in dower, formedon, &c. where a view is to be taken of the land or tenement in queſtion.

HABERGION, or HAUBERGEON, HABERGETUM, a coat of mail; an ancient piece of defenſive armour, in form of a coat, deſcending from the neck to the middle; and formed of little iron rings, or maſhes, linked into each other.

The word is alſo written *haberge, hauberge, haubere, haubert, hauther, hautbert*, and *hauberk*. Spelman takes it to have been formed from the ancient French *hault, high*, and *berg, armour, covering*; as ſerving to defend the upper part of the body. Du-Cange and Skinner chooſe to derive it from the Belgic *hals*, or Teutonic *haltz, neck*, and *bergen, to cover*; as if it were a peculiar defence for the neck. Others will have it formed of *al, alla*, q. d. *all*, and *bergen, to cover*; as importing it a cover for the whole body.

HABHAZZIS, in *Botany*, a name given by Leo Africanus, and ſome other of the writers of geography, to a plant growing in many parts of Africa, which they ſay produces its fruit under the earth in form of ſmall round globules, which are much eſteemed as food, and have the taſte of an almond. The fruit, as it is called, is no other than the disjunct tubera of the root, which are connected by fibres or ſtrings, and are in the propagation of the plant very uſeful to its ſpreading over a large ſpot of ground in a little time; all the fibres which ſhoot out horizontally from the root being terminated by theſe tubera, and each of theſe ſending out on the oppoſite ſide ſeveral other fibres, which at due diſtances produce other tubera. The Africans dig up the ground at random near to the place where they ſee any of theſe plants, and never fail of picking up a great number of them. The plant which produces them is the TARSI, and they are eaten in many other places beſides Africa. The Spaniards are very fond of them, and call them AVELLANDA, from their likeneſs to hazel-nuts in ſhape.

HABILIMENTS *of war*, in our *Ancient Statutes*, ſignify armour, harneſs, utenſils, or other proviſions for war; without which there is ſuppoſed no ability to maintain war.

HABIT, in *Philoſophy*, an aptitude, or diſpoſition, either of mind or body, acquired by a frequent repetition of the ſame act.

Some of the ſchoolmen call this a *qualitative habit*, and define it a quality adventitious to a thing, fitting and diſpoſing it either to act or ſuffer.

Others define *habit* an affection of mind or body, perſiſting by long uſe and continuance. In which ſenſe ἕξις, a conſtant *habit*, is diſtinguiſhed from διάθεσις, a preſent diſpoſition, liable ſoon to alter.

HABITS may be diſtinguiſhed into thoſe of the mind, and of the body. Thus virtue is called a *habit* of the mind; ſtrength, a *habit* of the body.

All natural *habits*, whether of body or mind, are no other than the body and mind themſelves, conſidered as either acting or ſuffering; or they are modes of the body or mind, wherein either perſeveres, till effaced by ſome contrary mode. Ariſtotle enumerates five *habits* of the mind; viz. underſtanding, knowlege, wiſdom, prudence, and art: which diviſion the later writers ſet aſide, and only admit of three intellectual *habits*; viz. ſcience, prudence, and art; agreeable to the three kinds of objects, about which the mind has occaſion to be facilitated; which are either theoretical, practical, or effective.

Virtues and vices are conſidered by philoſophers under the notion of good and bad *habits*.

The archbiſhop of Cambray defines *habits*, in general, to be certain impreſſions left in the mind; by means whereof, we find a greater eaſe, readineſs, and inclination, to do any thing formerly done, by having the idea ready at hand to direct us how it was done before. Thus, e. gr. we form a *habit* of ſobriety, by having always before us the inconveniences of exceſs; the reflections whereof, being often repeated, render the exerciſe of that virtue continually more and more eaſy.

F. Malebranche gives a more mechanical theory of the *habits*. His principle is, that they conſiſt in a facility which the ſpirits have acquired, of paſſing eaſily from one part of the body to another. He argues thus: if the mind act on, and move the body, it is, in all probability, by means of a ſtock of animal ſpirits lodged in the brain, ready to be ſent at the motion of the will, by means of the nerves which open or terminate in the brain, into the muſcles of the body.

Now, an influx of ſpirits into a muſcle, occaſions a ſwelling, and, of courſe, a ſhortening of the muſcle; and, conſequently, a motion of the part to which that muſcle is faſtened.

Farther, the ſpirits do not always find all the roads open and free, which they are to paſs through; whence that difficulty we perceive of moving the fingers with that quickneſs neceſſary to play on a muſical inſtrument; or of moving the muſcles neceſſary to pronounce the words of a foreign language. But, by degrees, the ſpirits, by their continual flux, ſmoothen the ways; ſo that at length they meet with no reſiſtance at all. In this facility the ſpirits find of paſſing, when directed into the members of the body, *habits* conſiſt.

On this hypotheſis, it is eaſy to account for an infinity of phenomena relating to the *habits*. Why, for inſtance, children acquire new *habits* with more eaſe than grown perſons? Why it is difficult to get rid of inveterate *habits?* Whence that incredible quickneſs in the pronunciation of words, even without thinking of them; as is particularly obſervable in thoſe long accuſtomed to formulas, &c.

On this footing, the faculty of memory appears to have very much the nature of a *habit*; inſomuch that in one ſenſe it may paſs for a *habit*.

Cuſtom, ſays Mr. Locke, ſettles *habits* of thinking in the underſtanding, as well as of determining in the will, and of motions in the body; all which ſeem to be but trains of motion in the animal ſpirits, which, once ſet a-going, continue in the ſame ſteps they have been uſed to, which by often treading are worn into a ſmooth path, and the motion in it becomes eaſy, and as it were natural. Eſſay on the Human Underſtanding, book ii. ch. 33. See ASSOCIATION *of ideas*.

HABIT, in *Medicine*, is what we otherwiſe call the temperament or conſtitution of the body; whether obtained by birth, or occaſioned by the manner of living.

An ill, diſtempered *habit*, without any particular apparent diſeaſe, the phyſicians uſually call a *cachexia*, or *cacochymia*.

A thing is ſaid to *enter the habit*, when it becomes intimately diffuſed throughout the body, and is conveyed to the remoteſt ſtages of circulation.

HABIT is alſo uſed for a dreſs, or garb; or the compoſition of garments wherewith a perſon is covered.

In this ſenſe we ſay, the *habit* of an eccleſiaſtic; of a religious, &c. the military *habit*, &c.

The eccleſiaſtical *habit* only commenced about the time of Gregory the Great, i. e. it only began at that time to be diſtinguiſhed from the lay *habit*; viz. in the ſixth century. The eſtabliſhment of the barbarous nations was the occaſion thereof; for the laymen took the *habit* of the nations they had ſubmitted to, but the prieſts kept to the Roman dreſs.

The abbot Boileau has an expreſs treatiſe on the eccleſiaſtical *habit*; wherein he maintains, contrary to the common opinion and cuſtom, that the eccleſiaſtical *habit* ſhould be a ſhort one, and that a ſhort *habit* is more decent than a long one.

The different *habits* and cloaths which the generality of the world wear, are through inadvertency and inattention very frequently the cauſe of very unhappy maladies. Mr. Winſlow, in the Memoirs of the Royal Academy of Sciences at Paris, has obſerved, that the greateſt attention and care are neceſſary on ſeveral occaſions in regard to this, as it is ſuppoſed, trifling article; and given many inſtances of the ill effects of it. The ancients have obſerved the inconveniences of many parts of dreſs, and daily obſervation confirms to us the many miſchiefs the ladies ſuffer from the ſtiff whale-bone ſtays they wear, and the diſorders of the viſcera of the lower belly, to which thoſe are ſubject who lace themſelves too tightly; and this is not only of dangerous conſequence to themſelves, but frequently is the death of children in breeding women.

The tight binding of the neck by the men's neckcloths, ſtocks, or the too tight collars of their ſhirts, &c. has been very frequently the only occaſion of ſeveral very terrible diſorders of the head, the eyes, and the breaſt; deafneſs, vertigoes, faintings, and bleedings at the noſe, are the frequent conſequences of this practice; and the phyſicians conſulted for relief in theſe caſes, have found all means ineffectual, merely from their not attending to the cauſe of the malady; when a cure might have been, and often has been, made without the help of medicines, only by leaving off thoſe unnatural bandages which had been the occaſion of them, from the not ſuffering the free return of the blood by the jugular veins, which had paſſed up into the head, without moleſtation, by the carotid arteries.

Mr. Cruger added to theſe relations, that a certain officer in the army of the king of Denmark, always ordered his ſoldiers to tie their cravats very tight, and garter their ſtockings below the knee, tying them alſo very hard; by which means they always looked red and florid in the face, and thick legged, ſo that his men always appeared ſtout, robuſt, well fed, and in good caſe. But the conſequence of this was, that after ſome time his men were all ſeized in a very particular manner with diſorders, for which the common methods of treatment gave no relief, and great numbers of them died, after all the internal as well as external methods which could be tried, were found ineffectual. Their diſeaſe ſeemed a putrid ſcorbutic infection; and this not only appeared externally, but was found to affect even the internal parts of ſuch of them as were opened after their death. It is unqueſtionable, that this wholly proceeded from the ligatures they continually wore about their necks and legs by order of their officer, and might have been cured merely by leaving them off; and it has even been proved on animals, as calves, ſheep, &c. that extremely tight ligatures on their legs, &c. will have ſo great an effect, as to alter the whole maſs of blood, render the animal morbid, and even make the fleſh unwholeſome and unfit for food. Memoirs Acad. Scien. Par. 1740.

Mr. Winſlow has obſerved, that the different motions of the bones of the foot, which are very free in their natural ſtate, as is very plainly ſeen in young children, are uſually wholly loſt to us as we grow up, by means of the improper preſſure of our ſhoes. The high-heeled ſhoes the women wear, entirely change the natural conformation of the bones of the whole foot. They render the foot elevated and arched, and incapable of being flatted, on account of the unnatural union and ancyloſis they bring on between the bones, which is not unlike that which happens to the vertebræ of people who are humpbacked; for theſe high ſhoes make the extremity of the os calcis, to which the tendo Achillis is affixed, to be alalways unnaturally elevated, and the anterior part of the foot on the contrary is much more depreſſed than it naturally would be. The conſequence of this is, that the muſcles which cover the hinder part of the leg, which ſerve by the attachment of the tendon to ſtretch out the foot, are continually in an unnatural ſtate of contraction; while the muſcles of the anterior part of the leg, whoſe office is to bend the foot forward, are on the contrary kept in a like unnatural ſtate of elongation and diſtention. To this cauſe it is owing, that we very frequently ſee women unable to go down a hill, or any declivity, without great pain; whereas, on the contrary, in walking up hill, their high-heeled ſhoes make them walk, as it were, on even ground; the end of the foot being only ſo far elevated as to bring it on a level with the unnatural poſition of the heel. The women who wear this ſort of ſhoes find it alſo very troubleſome to walk for a long time, though it be on the moſt even ground, and eſpecially if they are obliged to walk quick. They can by no means leap ſo freely and eaſily as thoſe who wear lower heeled ſhoes. The reaſon of which is, that in the human ſpecies, as well as in birds and beaſts, the action of leaping is executed by a ſudden lifting up the hinder part of the os calcis, by means of the action of thoſe muſcles to which the great tendon is faſtened. Low-heeled ſhoes by no means ſubject the wearer to any of theſe inconveniences, but, on the contrary, they greatly facilitate all the natural motions of the feet, as we have daily and innumerable inſtances in the labourers, chairmen, porters, and others of the lower claſs of mankind; and the wooden ſhoes worn by the lower claſs of people in France, notwithſtanding their weight and inflexibility, do not ſo much prevent the proper motions of the muſcles, whoſe office it is to move the feet. For beſide the lowneſs of their heel, they are rounded at the end downwards, which in ſome degree compenſates for their inflexibility, ſerving in the place of the alternate inflection of the foot on its toes on the one part, while the other is lifted up in walking.

But to return to the miſchiefs done by high-heeled ſhoes, there is yet a farther inconvenience from them than what has been mentioned, ſince not only the muſcles of the tendo Achillis, which ſerve to move the foot in the extenſion, but the anterior muſcles alſo, which ſerve to the extenſion of the toes, are by the height of theſe ſhoes always in an unnatural ſtate; and not only the anterior muſcles, which ſerve to the bending of the foot, but the poſterior muſcles alſo, which ſerve to the bending the toes, are, at the ſame time, by means of this height, kept forcibly in an elongated and extended ſtate. This continual unnatural ſhortening of ſome of the muſcles, and as unnatural lengthening of others, cannot but cauſe, ſooner or later, a greater or leſſer diſtemperature of their veſſels, as well the veins and arteries, as the lymphatics and nerves; nor may this be confined merely to the parts affected, but by the communication of theſe veſſels with thoſe of other more diſtant parts, nay, even with thoſe of the abdomen and its viſcera, may bring on diſorders which will be attributed to very different cauſes, and therefore will be treated with medicines which will not only prove uſeleſs, but in many caſes hurtful. It is certain, that long cuſtom makes theſe unnatural extenſions and contractions of the muſcles as it were natural to women; inſomuch that thoſe who are accuſtomed to theſe ſhoes would find it painful and diſagreeable to walk in others. But this is no proof that the unnatural ſtate in which the muſcles are continually kept, may not often be the occaſion of all the remote diſorders before hinted at, and which, many of them at leaſt, may appear to have no relation to their original cauſe. Memoirs de Acad. Scien. Par. 1740.

Habit is particularly uſed for the uniform garments of the religious, conformable to the rule and order whereof they make profeſſion: as the *habit* of St. Benedict, of St. Auguſtine, &c.

In this ſenſe we ſay abſolutely, ſuch a perſon has taken the *habit*; meaning, he has entered upon a NOVICIATE in a certain order. So he is ſaid to quit the *habit*, when he renounces the order. See Vow.

The *habits* of the ſeveral religious are not ſuppoſed to have been calculated for ſingularity or novelty: the founders of the orders, who were at firſt chiefly inhabitants of deſerts and ſolitudes, gave their monks the *habit* uſual among the country people. Accordingly, the primitive *habits* of St. Anthony, St. Hilarion, St. Benedict, &c. are deſcribed by the ancient writers as conſiſting chiefly of ſheep-ſkins, the common dreſs of the peaſants, ſhepherds, and mountaineers, of that time; and the ſame they gave to their diſciples.

The orders eſtabliſhed in and about cities and inhabited places, took the *habit* worn by other eccleſiaſtics at the time of their inſtitution. Thus, St. Dominic gave his diſciples the *habit* of regular canons, which he himſelf had always worn to that time. And the like may be ſaid of the Jeſuits, Barnabites, Theatins, Oratorians, &c. who took the common *habit* of the eccleſiaſtics at the time of their foundation. And what makes them differ ſo much from each other, as well as from the eccleſiaſtical *habit* of the preſent times, is, that they have always kept invariably to the ſame form; whereas the eccleſiaſtics and laics have been changing their mode on every occaſion.

HABITATION, a dwelling-place, or HOUSE.

Habitation is ſometimes alſo uſed for COHABITATION.

HABITUAL, ſome thing that is become a habit, or habitude.

Thus we ſay, an *habitual* or inveterate diſeaſe; *habitual* ſin, &c.

Habitual *grace*. See Grace.

The Romiſh divines hold *habitual grace* only neceſſary in order to be ſaved; and actual *grace* to the doing any thing meritorious.

HABITUDE, HABITUDO, in the *Schools*, ſignifies the reſpect or RELATION which one thing bears to another.

In this ſenſe, *habitude* is one of Ariſtotle's categories.

Some of the more preciſe and accurate ſchoolmen conſider *habitude* as a genus; and ſubdivide it into two ſpecies. Where it is conſidered as quieſcent, they call it *reſpect*; where as moved, *relation*; to which ſome add a third ſpecies, conſidered in reſpect of figure, which they call *mode*.

HABITUDE is alſo uſed, in *Philoſophy*, for what we popularly call habit; viz. a certain diſpoſition, or aptitude, for the performing or ſuffering of certain things; contracted by reiterated acts of the ſame kind.

HACHES, and HACHING. See HATCHING.

HACK, a tool uſed by miners, in ſhape like a mattock.

HACKNEY. See HAQUENY.

HACKNEY *coach*. See *Hackney* COACH.

HADBOTE, in our *Old Writers*, a recompence or amends for violence offered to perſons in holy orders.

HADDOCK, the *gadus æglefinus* of Linnæus, in *Ichthyology*, a name given by us to a ſpecies of fiſh of the ASELLUS kind, according to the generality of writers; and of the genus of the GADI, according to the new Artedian ſyſtem. It is called by Salvian the *aſellus major*, or *greater aſellus*, and by Turner and Willughby, the *oros* or *aſinus* of the ancients. Charlton tells us, that it was the *callaris*, *galeris*, or *galaxis*, of the old Romans, mentioned by Pliny; but Artedi has ſome doubt about that. It is called by Artedi by a name much more expreſſive than any of the old ones. This is the *gadus* with a bearded mouth, with three fins on the back, with a whitiſh body, with the upper jaw longeſt, and with the tail a little forked.

Large *haddocks* begin to be in roe in the middle of November, and continue ſo till the end of January; from that time till May they are very thin tailed, and much out of ſeaſon. The ſmall ones are extremely good from May to February; and thoſe which are not old enough to breed in February, March, and April. The fiſhermen aſſert, that in rough weather *haddocks* ſink down into the ſand and ooze, in the bottom of the ſea, where they ſhelter themſelves till the ſtorm is over, becauſe they take none in ſtormy weather. In ſummer they live on young herrings, and other ſmall fiſh; and in winter on a ſpecies of *ſerpula*, called the ſtone coated worm, and by fiſhermen *haddock-meat*. The grand ſhoal of *haddocks* comes periodically on the coaſts of Yorkſhire; the large ones quit the coaſt as ſoon as they get out of ſeaſon, leaving behind abundance of ſmall ones, and are ſaid to viſit the coaſts of Hamburgh and Jutland in the ſummer. On each ſide of the *haddock* there is a large black ſpot, aſcribed by ſuperſtition to the impreſſion made by St. Peter's finger and thumb, when he took the tribute money out of the mouth of a ſpecies of this fiſh. Pennant.

HADE, in *Mining*, ſignifies any ſhaſt or turn which deſcends like the ſide of a houſe, or like the deſcent of a ſteep hill. It is then ſaid to *hade*.

HADES. See ADES.

HADRIANEA, or HADRIANALIA, in *Antiquity*, games inſtituted by Antonine, at Puzzuoli, in honour of the emperor Hadrian, or Adrian.

There were two ſorts of *Hadrianalia*, the one held every year, and the other every five years.

HADRIANISTS, *Hadrianiſtæ*, in *Church Hiſtory*. See ADRIANISTS.

HÆMACHATES, the *blood coloured agate*, in the *Natural Hiſtory of the Ancients*, the name of an agate found at this time in the Eaſt Indies, and in ſome parts of Germany, and called by Dr. Hill *achates ſanguineus variegatus*; or the blood-coloured variegated AGATE.

It is one of the moſt beautiful of the agate kind, and was extremely well charactered by the name the ancients gave it, being always of a ſtrong and deep red like that of blood. Often it is only of this plain and ſingle colour throughout the maſs, but more frequently it is found beautifully variegated with a pale blue, and with brown; the blue in this caſe always ſurrounding the red, and appearing like the ſerum which ſeparates from and floats about the blood, when it has been ſome time out of the body. The brown or hair-colour is often the baſis or ground colour of the ſtone, and the red in ſpots only, and variegations, ſurrounded with this thin bluiſh colour; it is very hard, and takes a fine poliſh, and is cut into the tops of ſnuff-boxes, and other toys, and much valued by our lapidaries.

HÆMAGOGOS, of *αιμα*, *blood*, and *αγω*, *I draw away*, the name of a medicinal compoſition deſcribed in Myrepſus, and intended to bring away the lochia, or forward the menſtrual diſcharges. It conſiſts of black hellebore and the fœtid gums, with honey.

HÆMALOPS, of *αιμα*, *blood*, and *ωψ*, *eye*, a term uſed by many authors for that blackneſs which appears about the eyes from blows; but Hippocrates uſes it to expreſs a black, thick, and fæculent blood, overſpreading the chorion in the formation of the fœtus, and rejected afterwards as of no uſe, and diſcharged into the ſpace between the uterus and chorion. Some authors alſo uſe the word for ſpitting of blood.

HÆMANTHUS, in *Botany*. See BLOOD *flower*.

HÆMATITES, from *αιμα*, *blood*, in *Natural Hiſtory*, the *blood-ſtone*; a kind of ruddy mineral ſubſtance; thus called, either on account of its reſembling dry, curdled blood, or of its reputed faculty of ſtanching blood.

Pliny reckons five kinds of blood-ſtone; viz. the *Ethiopic*, *androdamas*, the *Arabic*, the ELATITES or *milittes*, and the SCHISTOS; beſides that commonly called in his time the *magnes hæmatites*, from the property it hath of attracting iron.

The five ſorts differ chiefly in point of hardneſs: the beſt, according to Dioſcorides, is that which is friable, hard, black, and ſmooth, without either gritty parts, or veins. That commonly uſed by the painters is factitious, being made of Armenian bole, and other drugs.

The common native, or the foſſil kind, comes from Egypt, Bohemia, &c. This is of various figures; ſpherical, ſemi-ſpherical, pyramidal, or cellular; compoſed of ſmall pyramids, the apices of which appear, in a tranſverſe ſection, in the center. It contains a large portion of iron; but the iron is obtained with ſuch difficulty, and is of ſo bad a quality, that this ore is not commonly ſmelted. This ſtone, when expoſed to a moderately ſtrong fire, falls by degrees into ſcales; and in this ſtate is attracted by the magnet, and gives out its iron to acids. It has divers uſes in medicine; being held cooling and aſtringent, and, in that quality, preſcribed in hæmorrhages and uterine obſtructions. It is given in ſubſtance, in form of a fine powder, from one ſcruple to three or four, for a doſe. It is alſo uſed in diſtemperatures of the eyes; but pure iron, or the preparations of iron, muſt be preferable to this ſtone in the ſame intention.

The gilders uſe it for burniſhers, to poliſh their metals. Bauſchius has an expreſs treatiſe on the *lapis hæmatites*.

HÆMATION, a word uſed, among the *Ancients*, for a ſort of reddiſh garon, made of the inteſtines and blood of fiſhes macerated in ſalt.

HÆMATOCELE, of *αιμα*, *blood*, and *κηλη*, *tumor*, is a tumor of the ſcrotum, or of the ſpermatic proceſs, occaſioned by extravaſated blood. This diſeaſe is diſtinguiſhed by Mr. Pott into four kinds; two of which have their ſeat in the *tunica vaginalis*; the third within the *albuginea*; and the fourth in the *tunica communis* of the ſpermatic veſſels. The two former happen in conſequence of the operation of tapping the hydrocele of the *tunica vaginalis*; ſo that either by the diviſion of a blood-veſſel in the original coat, or by the burſting of ſome of the veſſels after the operation, the cavity which had been filled with water, becomes in a very little time diſtended with blood; and muſt in both caſes, if not abſorbed or diſſipated, be diſcharged by opening the containing bag; but in neither of theſe, ſays Mr. Pott, is caſtration ever neceſſary: the mere diviſion of the ſacculus, and the application of dry lint to its inſide, will in general reſtrain this kind of hæmorrhage, and anſwer every purpoſe for which ſo ſevere as well as unneceſſary a remedy has been preſcribed.

The third kind happens, when the blood is extravaſated within the *tunica albuginea*, in conſequence of a great relaxation and, as it were, diſſolution of part of the vaſcular compages of that gland. In this caſe, the hæmorrhage proceeds from the ſubſtance of the teſticle, and from the convolutions of the ſpermatic artery within the *tunica albuginea*; the teſticle itſelf is injured and rendered uſeleſs, and caſtration is the only certain cure.

The laſt ſpecies of *hæmatocele* conſiſts of a rupture or breach of a branch of the ſpermatic vein, between the groin and ſcrotum, in the ſpermatic proceſs, which may be occaſioned by external violence and ſtraining, as well as by a wound in theſe parts. In this caſe, the extravaſation is made into the cellular membrane, inveſting the ſpermatic veſſels; the hazard is ſometimes conſiderable, and caſtration often the only remedy. Pott's Chirurgica Works, vol. ii. p. 382, &c. 1779. See HYDROCELE.

HÆMATOCHYSIS, of *αιμα*, *blood*, and *χυω*, *I pou forth*, a term uſed by Willis, and ſome others, for a hæmorrhage.

HÆMATOPUS, in *Ornithology*, a bird called by othe the PICA *marina*, or *ſea-pye*. This, in the Linnæan ſyſ tem of nature, makes a diſtinct genus of birds of th order of the *grallæ*; the diſtinguiſhing characters o which are, that the feet are formed for running, the to are three in number on each foot, and ſeparate, and th apex of the bill, which is compreſſed, in form of wedge.

Hæmatopus *ardea*, the red-legged heron, a very beautiful bird common in Italy, and called by the ancients cirris; it is one of the ſmalleſt of the heron kind, and is of a yellowiſh cheſnut colour.

HÆMATOSIS, formed of *αιμα*, *blood*, in *Medicine*, the action whereby the chyle is converted into blood; called alſo sanguification.

The chief of the vital actions are the chyloſis, and *hæmatoſis*.

HÆMATOXYLON, in *Botany*. See Logwood.

HÆMIONIUM, in *Botany*, a name by which Dioſcorides calls the *aſplenium*.

HÆMITYBION, in the *Writings of the Ancients*, a linen piece of apparel fringed on both ſides. Others call it a ſoft kind of handkerchief to wipe off ſweat; but Galen makes it ſignify a thick piece of linen cloth. In this he has an eye to ſome paſſages of Hippocrates, where the word ſeems plainly to be uſed in that ſenſe; others of the ancients have alſo uſed it exactly in the ſame meaning.

HÆMOCERCHNUS, of *αιμα*, *blood*, and *κερχνος*, *roughneſs of the throat*, in *Medicine*, a term uſed by ſome of the old writers for a ſpitting of blood, attended with a rattling noiſe in the noſe and fauces.

HÆMODIA, a ſtupor of the teeth, cauſed by auſtere and acid ſubſtances.

HÆMOPTOE, in *Medicine*. See Hæmoptysis.

HÆMOPTYSIS, formed of *αιμα*, *blood*, and *ϖτυειν*, *to ſpit*, corruptly alſo called Hæmoptosis, and Hæmoptoe, in *Medicine*, ſpitting of blood; occaſioned by the rupture or eroſion of ſome veſſel of the lungs; and accompanied uſually with a cough, and a ſenſe of preſſure on the breaſt.

The *hæmoptyſis* differs from a vomiting of blood, in that in the *hæmoptyſis* the blood comes from the lungs, and for that reaſon is florid and frothy; whereas in vomiting of blood, it comes from the ſtomach, and is blackiſh.

The *hæmoptyſis* is either *accidental* or *habitual*. The latter is a ſymptom of the phthiſis.

This diſorder is by ſome confounded with the ſputum cruentum, or bloody ſpit, but very improperly; ſince in this caſe the blood is thrown up pure and florid from the lungs, and without any violent efforts; whereas in the other the ſaliva is only thrown out tinged or ſtreaked with blood, and that with much trouble and laborious hauking; and ſometimes a ſlight eroſion of the gums or fauces tinging the ſaliva with blood, will occaſion the ſame appearance. The *hæmoptyſis* differs alſo from the vomiting *of blood*, in that the blood is arterial and unmixed, and voided without emotion, and with a little cough; whereas in the other caſe there is always a ſtraining to vomit, and the blood is venal, and uſually coagulated, and there is no cough.

Signs of it. The *hæmoptyſis* is generally preceded by a ſenſation of oppletion and narrowneſs of the breaſt; or more tacitly by a ſort of itching or titillation felt all along the aſpera arteria; and in moſt caſes there is a dry, and not very violent or troubleſome cough, for ſome time before. Sometimes it is preceded by ſhivering, coldneſs of the extremities, coſtiveneſs, great laſſitude, flatulence, pain of the back and loins, &c. Sometimes, however, the blood is voided without any of theſe antecedent ſymptoms, and only with a ſenſation of ſomething warm coming up out of the breaſt to the mouth.

Perſons ſubject to it. This is a caſe that more rarely happens than moſt other of the complaints of the lungs; and the perſons afflicted with it are principally young men between eighteen and twenty-five; it very rarely happens after thirty, and principally affects perſons of a plethoric habit, or ſuch as uſe high-ſeaſoned food. Perſons of a ſlender make and lax fibres, who have long necks and ſtrait breaſts, are moſt liable to this diſeaſe. Women are more ſubject to it than men, from the frequent diſturbances nature meets with in the menſtrual diſcharges; and people who are accuſtomed to loud ſpeaking or ſinging, are ſometimes afflicted with it, from the violent diſtentions they give to the veſſels of the breaſt. Sometimes alſo it ſeizes perſons who have changed an active life to a ſedentary one; and more than any others thoſe who have had ſome other hæmorrhage, or natural and habitual evacuation, ſtopped upon them, without having the caution to bleed or evacuate properly on the occaſion. Accordingly it has been a common obſervation, that thoſe who have been ſubject to bleeding at the noſe when young, are afterwards moſt liable to this diſorder.

Cauſes of it. Youth and a plethoric habit, with too great a derivation of the blood upon the lungs, are ſometimes the natural cauſes of this; but external accidents frequently concur, or of themſelves bring it on: ſuch are all violent ſtrainings of the breaſt; violent attempts to lift or carry burdens to which the body is not accuſtomed, blowing vehemently in the playing on trumpets and other wind inſtruments, exceſſive drinking, and violent paſſions, as anger, &c. and violent motions in wreſtling, running, jumping, or the like; violent coughing may alſo bring it on; but this is not the caſe ſo often as is ſuppoſed, the cough attending this diſorder, and ſuppoſed to be the cauſe of it, being uſually only a ſymptom of it.

This diſeaſe may alſo proceed from wounds of the lungs, and from a polypus, ſchirrous concretion, or any thing that obſtructs the circulation of the blood in the lungs. It is ſometimes occaſioned by breathing too rare an air, as in the caſe of thoſe who work in furnaces, glaſs-houſes, &c. or of thoſe who aſcend very high mountains.

Prognoſtics from it. This is a diſorder of the utmoſt conſequence, and is by far the moſt dangerous of all hæmorrhages; and though the quantity of blood voided is ſeldom ſo great as to bring on ſudden death, yet what remains extravaſated in the lungs eaſily corrupts there, and brings on a phthiſis, of which death is the conſequence. The uſe of violent aſtringents is often the cauſe of this alſo, where nature would have eſcaped it. However, if the patient is ſtrong, and of a ſound conſtitution, the danger is not very great; but the diſorder is with difficulty removed from perſons of a delicate frame and lax fibres. If it proceeds from a polypus, or ſchirrus of the lungs, it is alarming; and when the diſcharged blood is occaſioned by an ulcer of the lungs, it is generally fatal. In ſome caſes, as in pleuriſies, peripneumonies, and many other fevers, it is not an unfavourable ſymptom; but in a dropſy, ſcurvy, or conſumption, it indicates an ulceration of the lungs.

The method of cure. When the quantity of blood brought up is ſmall, and the ſymptoms not violent, ſuch things only are to be given as quiet the violent emotions of the blood; ſuch are nitre and cinnabar, made into powders with crabs-eyes, or any other abſorbent. If the caſe is more violent, a gentle anodyne or opiate may be added, ſuch as the pill *de ſtyrace*, or *de cynogloſſo*. In more violent caſes, where the attemperating medicines take no effect, the milder aſtringents are to be uſed; or if the urgency of the ſymptoms makes it neceſſary, even the ſtronger; ſuch as the acid elixir of vitriol, fifteen or twenty drops of which may be given in a glaſs of water, three or four times a day; but with theſe there ſhould always be given a gentle opiate. Thus, ten or twelve drops of laudanum may be given in a cup of barley water, twice a day, and continued for ſome time, provided they be found beneficial; the antimonial crocus of ſteel, and the vitriolic colcothars, may then be given with the ſtorax-pill. Revulſion muſt alſo be attempted by diaphoretics, bleeding in the foot, and clyſters, and gentle purges; and finally, the cure is to be completed by pectorals and detergents.

Dr. Dickſon very much recommends, from his own experience, the uſe of nitre in this diſorder: the mode in which he adminiſters it is in the form of an electary, prepared of four ounces of conſerve of red roſes, and half an ounce of nitre; and he directs the quantity of a large nutmeg to be taken four, ſix, or eight times a day, according to the urgency of the caſe. This electary, he ſays, is almoſt as much to be depended upon, when given early in an *hæmoptoe*, as the *cortex Peruvianus* in a genuine intermittent. In private practice, the nitre joined with ſpermaceti, or p. e trag. c. has produced equally good effects. Junker's Conſp. Med. p. 30. London Med. Obſ. vol. iv. p. 210. Buchan's Dom. Med. p. 367. ed. 5.

When the pulſe is hard and full, blood-letting ſhould be occaſionally repeated. Thoſe who are ſubject to frequent returns of this diſeaſe, ſhould avoid all exceſs; their diet ſhould be light and cool, conſiſting chiefly of milk and vegetables; and every liquor that is uſed, ſhould be drank cold. Above all, they ſhould beware of vigorous efforts of the body, and violent agitations of the mind.

If a ſuppreſſion of the menſes, or hæmorrhoidal diſcharges, have been the cauſe of the diſtemper, great care is to be taken to bring them on regularly again, by bleeding in the foot, applying leeches to the hæmorrhoidal veſſels, and the like means. Authors diſtinguiſh an *hæmoptoe* into a great many ſpecies, ſuch as *anaſtomoſis*, *diaireſis*, *diapedeſis*, *rixis*, and *diabroſis*; and write a great deal of the different cauſes of theſe *hæmoptoes*, and of the ſigns by which they are to be diſtinguiſhed. But a late author thinks this of little importance. He thinks it moſt advantageous to conſider a *hæmoptoe* ſimply as a preternatural efflux of blood, and as ſuch it agrees with the hæmorrhage of the noſe, vomiting of blood, dyſentery, bloody urine, too great flow of the menſes, &c. all which have the ſame immediate cauſes, the ſame effects and conſequences, and ſuggeſt the ſame indications of cure; which are, in the beginning, to diminiſh the quantity of blood, and to make a revulſion by opening a vein in the arm, foot, &c. then to moderate the velocity and rarefraction faction of the blood by cooling medicines; and laſtly, to contract and ſtrengthen the veſſels by aſtringents. The ſame method muſt take place in all; and therefore the general ſtyle of this claſs of diſeaſes ought to be hæmorrhage. See Medic. Eſſ. Edinb. vol. i. art. 25.

HÆMORRHAGE, compounded of αιμα, *blood*, and ῥεσνυμι, *I burſt forth*, in *Medicine*, a flux of blood at any part of the body; ariſing either from a rupture of the veſſels, as when they are too full, or too much preſſed; or from an eroſion of the ſame, as when the blood is too ſharp and corroſive.

The *hæmorrhage*, properly ſpeaking, as underſtood by the Greeks, was only a flux of blood at the noſe; but the moderns extend the name to any kind of flux of blood, whether by the noſe, mouth, lungs, ſtomach, inteſtines, fundament, matrix, or whatever part.

Hæmorrhages are divided, by the medical writers, into *natural* and *preternatural*.

HÆMORRHAGES, *natural*, comprehend bleeding at the noſe, ſpitting of blood, the fluxes of the hæmorrhoids and menſes, the lochia in lying-in women, vomiting of blood, and voiding blood by urine.

HÆMORRHAGES, *preternatural*, are ſuch as derive their origin from external accidents, as falls, blows, and wounds. Some alſo comprehend, under this term, the artificial evacuations, by bleeding, cupping, and the like.

HÆMORRHAGES differ much, according to the age and ſtate of the patient, and other accidents. Thoſe from the noſe are moſt frequent in young perſons; thoſe of the hæmorrhoids in people of a middle age, or later in life; the ſpitting of blood, to perſons in a middle age; and voiding blood by urine uſually to older people. Some *hæmorrhages* are periodical, which are the efforts of nature to relieve herſelf, and ſhould by no means be obſtructed, from whatever part of the body they proceed, unleſs they are very violent; and others vague or uncertain. The firſt obſerve ſome ſtated period of time for their return upon people; the laſt are wholly uncertain in that particular. Some are alſo termed critical; theſe are ſuch as happen at the *criſes* of fevers. There are uſually violent pains about the part whence natural *hæmorrhages* are to proceed; but theſe always go off as ſoon as the bleeding comes on in due quantity.

HÆMORRHAGES, *perſons moſt ſubject to*. Young perſons of a healthy and florid conſtitution are moſt ſubject to *hæmorrhages*; people of plethoric habits are alſo much ſubject to them, and eſpecially ſuch whoſe blood is ſound and fluxile, not ſubject to any dyſcracy. Thoſe who drink much wine, or eat high-ſeaſoned foods; and, more than all theſe, perſons who are ſubject to violent paſſions, eſpecially to anger. Hence it is, that brutes are very rarely afflicted with them.

HÆMORRHAGES, *cauſes of*. Among the principal of theſe are to be numbered a plethora, a laxity of the veſſels, an inflammatory diſpoſition of the blood, generally attended with ſome degree of fever, a diſſolved ſtate of the blood, as in putrid fevers, the dyſentery, the ſcurvy, the malignant ſmall-pox, &c. or occaſioned by the too liberal uſe of medicines which tend to diſſolve it, as cantharides, the volatile alkaline ſalts, &c. violent commotions of the body, and violent paſſions of the mind, hot foods and liquors, ſtrong purges and vomits, a heat of the ſeaſon, and a ſudden cooling of the body after violent heat and paſſion. Junker's Conſp. Med. p. 12.

Prognoſtics from them. *Hæmorrhages* from the lungs, and vomiting, and voiding blood by urine, are all very dangerous. The others, when regulated, and in due proportion, are ſalutary, and often prevent diſeaſes. And the common cuſtom of ſtopping them by aſtringents, or otherwiſe, is often productive of ſtagnations, inflammations, and violent fevers.

Method of cure. *Hæmorrhages* flowing moderately, and from natural paſſages, require no aſſiſtance of medicine; when they happen to plethoric perſons, they are to be ſuffered to continue a ſufficient time. When the quantity of the blood is leſſened by theſe diſcharges, its quality, if diſtempered, is next to be amended by internal remedies; if ſulphureous and acrid, by nitrous medicines and abſorbents, and by gentle acids; to this purpoſe ſal prunellæ, crabs-eyes, lemon-juice, and the like, are excellent; if the blood be too thick, a ſmaller quantity of food, and a larger of drink, is to be preſcribed; and to this the reſolvent and attenuating medicines are to be added, as the neutral ſalts and diuretic roots. Theſe are the neceſſary things out of the fit; and during the bleeding ſuch things are to be given as repreſs the violent emotion of the blood, ſuch as cinnabar, nitre, and crabs-eyes, ſated with a vegetable acid. Spirit of hartſhorn, and tincture of antimony, may next be given; and, after theſe, moderately ſtyptic and anodyne medicines; but the ſtronger ſtyptics and aſtringents are not to be uſed but with great caution; becauſe, by increaſing the force of the circulation, they muſt be prejudicial.

The STYPTIC *powder* of Helvetius has been found excellent in *hæmorrhages*.

The VITRUM *antimonii ceratum* has likewiſe proved very efficacious in uterine *hæmorrhages*.

The cure of a *hæmorrhage* muſt be adapted to its cauſe. When it proceeds from too much blood, or a tendency to inflammation, bleeding, with gentle purges, and other evacuations, will be neceſſary. It will likewiſe be proper for the patient in this caſe to live chiefly upon a vegetable diet, to avoid all ſtrong liquors, and food that is of an acrid, hot, or ſtimulating quality. The body ſhould be kept cool, and the mind eaſy.

When a *hæmorrhage* is owing to a putrid or diſſolved ſtate of the blood, the patient ought to live chiefly upon acid fruits with milk, and vegetables of a nouriſhing nature, as ſago, ſalep, &c. His drink may be wine, diluted with water, and ſharpened with the juice of lemon, vinegar, or ſpirits of vitriol. The beſt medicine in this caſe is the Peruvian bark, which may be taken according to the urgency of the ſymptoms.

When a flux of blood is the effect of acid food, or of ſtrong ſtimulating medicines, the cure is to be effected by ſoft and mucilaginous diet. The patient may likewiſe take frequently about the bulk of a nutmeg of Locatelli's balſam, or the ſame quantity of ſpermaceti.

When an obſtructed perſpiration, or a ſtricture upon any part of the ſyſtem, is the cauſe of a *hæmorrhage*, it may be remedied by drinking warm diluting liquors, lying in bed, bathing the extremities in warm water, &c. Buchan's Dom. Med. p. 359, ed. 5.

Dr. Hunter obſerves, that the faintneſs which comes on after *hæmorrhages*, inſtead of alarming the by-ſtanders, and making them ſupport the patient by ſtimulating medicines, as ſpirits of hartſhorn and cordials, ſhould be conſidered as ſalutary; as this ſeems to be the method which nature takes to give the blood time to coagulate. This obſervation has been confirmed by an experiment of the late ingenious Mr. Hewſon, who found, that the diſpoſition of the blood to coagulate is increaſed as the animal becomes weaker; and, therefore, the medicines likely to be of ſervice in ſtopping *hæmorrhages*, are ſuch as cool the body, leſſen the force of the circulation, and promote that languor or faintneſs. Phil. Tranſ. vol. lx. p. 404, &c.

His experiments alſo ſhew, that a vein may be opened with propriety, even where there is no plethora, in order ſuddenly to bring on weakneſs; by which the momentum of the blood may be ſo diminiſhed, and the diſpoſition of the lymph to coagulate may be ſo increaſed, as to ſtop the *hæmorrhage*.

Soft compreſſion is, by Garengort, thought more effectual to ſtop *hæmorrhages* than hard ſubſtances, and its uſe recommended even when ſtitches of arteries give way, in which caſe the uſe of vitriol buttons is condemned.

HÆMORRHAGES, *internal*. The omentum itſelf is not free from being the ſeat of fatal internal *hæmorrhages*, though this rarely happens. The Peterſburg Commentaries give us an account of a woman, who dying almoſt immediately of a blow ſhe received on the belly, was opened, and the cavity of the abdomen was found greatly diſtended with blood, which had plainly been diſcharged from the omentum, as a great number of grumes of blood were found lodged between its foliages. It was obſerved alſo, in this ſubject, that the omentum was firmly attached to the fundus of the uterus.

The ſame papers give an account alſo of another very remarkable internal *hæmorrhage*; this was of the ſtomach. In this caſe the patient died inſtantaneouſly; and the blood having been diſcharged into the ſtomach too faſt, either for its being ejected upwards or downwards, when the body was opened, the ſtomach was found greatly diſtended, and completely filled with one great grume or maſs of coagulated blood. It is remarkable, that, in this ſubject, the ſtomach was found in a perfectly ſound ſtate, but the ſpleen was found putrid and rotten. Act. Petropol. vol. i. p. 382.

HÆMORRHAGE, or *bleeding of the noſe*, is uſually preceded by ſome degree of quickneſs of the pulſe, fluſhing in the face, pulſation of the temporal arteries, heavineſs in the head, dimneſs of the ſight, heat and itching of the noſtrils, &c. This diſcharge is of conſiderable ſervice in many diſorders; it often cures a vertigo, the head-ach, a phrenſy, and even an epilepſy; it is very beneficial in fevers, inflammations of the liver and ſpleen, and often in the gout and rheumatiſm; in all caſes where bleeding is neceſſary, a ſpontaneous diſcharge of blood is much more ſerviceable than the ſame quantity drawn away with a lancet. Whenever bleeding at the noſe relieves any bad ſymptom, and does not proceed ſo far as to endanger the patient's life, it ought not to be ſtopped; but when it returns frequently, or continues till the pulſe becomes low, the extremities begin to grow cold, the lips pale, or the patient complains of being ſick or faint, it muſt immediately be ſtopped: for this purpoſe the patient ſhould be ſet nearly upright, with his head reclining a little, and his legs immerſed in water of the warmth of new milk; his hands ſhould likewiſe be put in lukewarm water; his garters may be tied a little tighter than uſual; and ligatures applied to the arms, which ſhould be gradually ſlackened as the blood begins to ſtop. If dry lint, put up the noſtrils, does not ſtop the bleeding, doſſils of lint, dipped in ſtrong ſpirits of wine or brandy, may be applied in the ſame manner: blue vitriol, diſſolved in water, may alſo be uſed for this purpoſe, or a tent dipped in the white of an egg beat up, and rolled in a powder made of equal parts of white ſugar, burnt alum, and white vitriol, may be put up the bleeding noſtril. If the genitals be immerſed for ſome time in cold water, the bleeding will almoſt always be ſtopped. The internal medicines proper in this caſe are Glauber's ſalt and manna, of each of which half an ounce, diſſolved in four or five ounces of barley water, may be taken for a doſe, and repeated till it produces the effect. Ten or twelve grains of nitre may alſo be taken in a glaſs of cold water and vinegar, every hour or oftener, if the ſtomach will bear it.

Mr. Le Dran propoſes to make a ſeton, like that mentioned in the article Polypus, ſerve for ſtopping *hæmorrhages* of the noſe; for which purpoſe he faſtens two doſſils to the cord, and, after drawing one out at the noſtril, to bring away the clotted blood, he continues to draw the cord, and ſo fills up the poſterior part of the noſtril with the other, which ought to be larger, and well wet in a ſtyptic liquor; by which not only the *hæmorrhage* will be ſtopped, but if it ſhould continue, the blood and medicines will be effectually prevented from running down the throat, which commonly occaſions a cough or vomiting that increaſes the bleeding.

Thoſe who are ſubject to bleeding at the noſe ſhould often bathe their feet in warm water, and keep them warm and dry; and their blood, if they have too much, may be leſſened by a vegetable diet and an occaſional cooling purge: but if the diſorder proceeds from a thin diſſolved ſtate of the blood, the diet ſhould be rich and nouriſhing. Infuſions of the bark in wine ought likewiſe to be taken and perſiſted in for a conſiderable time. Med. Eſſ. Edin. vol. ii. p. 318. Buchan's Dom. Med. p. 361. 5th edit.

Hæmorrhages, *unnatural*, a term uſed by ſome medical writers to expreſs ſuch diſcharges of blood as are made from parts not naturally, or, in the common courſe of things, admitting ſuch evacuations. Of theſe we have a very remarkable inſtance, recorded in the Philoſophical Tranſactions: it is of a young child, which bled firſt at the noſe and ears, and afterwards at the hinder part of the head, where there was no ſore, and afterwards at the ſhoulders, waiſt, and at the fingers and toes, and the bending of the arms.

Hæmorrhages *from wounds.* Profuſion of blood, from wounds, ariſes from injuries of the veins or arteries, received in the inflicting the wound; and the violence of the *hæmorrhage* is ever in proportion to the ſize of the wounded veſſel: it is no wonder, therefore, that great weakneſs, fainting fits, and ſometimes inſtant death, are the dreadful conſequences attending this ſymptom, according to the ſize of the wounded veſſel. The ſurgeon ought, for this reaſon, never to be without the proper remedies to ſtop blood about him; but there are ſome caſes in which it is by no means proper to ſtop the *hæmorrhage* inſtantly. In a young plethoric habit, or in a wound got in a drunken fit, or even in a fit of great paſſion, it is beſt to let the blood run as long as it continues to do ſo without inconvenience to the patient; for, by a moderate loſs of blood, the inflammation, tumour, pain, and fever, are either entirely prevented, or much leſſened; beſides, the divided arteries become more capable of contracting, and the blood more readily coagulates, two circumſtances that ſeem to concur in cloſing the bleeding orifices.

The ſtopping of *hæmorrhages* is to be done by various ways: if no large veſſel is wounded, dry lint alone is always ſufficient; the wound is to be filled with this, and a proper compreſs and bandage put over it. The wound muſt be filled pretty cloſely with the lint, and a proper degree of preſſure given over the compreſs with the hand, by which more is done ſometimes than by all the bandages or violent remedies in the world. But if the *hæmorrhage* is too large to be ſtopped by the application of dry lint alone, the uſe of aſtringent medicines is to be called in: the uſual application, in this caſe, is rectified ſpirit of wine applied cold to the wound, filling it up with doſſils dipped in the ſame ſpirit, and covering it with large compreſſes wrung out of the ſame liquor, and making a proper preſſure over all with a bandage: the other aſtringents, uſed on this occaſion, are vinegar, the lycoperdon, or puff-ball oil, and ſpirit of turpentine, alum, vitriol, or ſaccharum ſaturni, diſſolved in water and vinegar, or the dry powders of bole armeniac, bloodſtone, dragon's blood, &c.

When veſſels of a larger ſize are divided, we are to have recourſe to cauſtic medicines inſtead of aſtringents; the common medicine, in this intention, is the Roman vitriol, which being coarſely powdered and ſprinkled upon cotton, is to be applied to the wound, dreſſing up with doſſils, a compreſs, and bandage. It is uſually neceſſary to be very cautious in the application of this, that it only be laid to the bottom of the wound, or the part where the veſſel wounded lies, otherwiſe the other parts will ſuffer too great an eroſion from it.

If all theſe applications prove fruitleſs, it will be proper wholly to divide the artery, yet only divided in part; for, by this means alone, it will contract and hide its end under the muſcular fleſh, and its orifice will, by that means, either be entirely choaked up, or at leaſt it will be more ready to yield to the force of the medicines before adviſed to be uſed on ſuch occaſions. This method of treatment is moſt uſually neceſſary in wounds of the temporal arteries, and thoſe of the cubits and tibiæ.

If this method ſhould fail, you muſt then have recourſe to the hot iron or actual cautery; the orifices of veſſels being burned, a cruſt is formed over them, and this method is ſo very effectual, that it is ſcarce poſſible for an *hæmorrhage* to happen in wounds of the external parts, which may not certainly be ſtopped by it. In this caſe, two cauteries ſhould be always ready, that, if one ſhould be extinguiſhed before the operation is finiſhed, the other may be at hand without waiting for it. Cauteries are made of different ſhapes and ſizes, according to the parts they are intended to be applied to. The great inconvenience attending the uſe of the cautery is, that, after two or three days, the eſchar ſometimes falls off, and then a ſecond, and that commonly a fatal *hæmorrhage* ſucceeds; to prevent this fatal accident, the wounds muſt be handled very tenderly at the time of dreſſing, and every time the wound is dreſſed, to be provided with a cautery ready heated, to repeat the operation if it ſhould be neceſſary. This caution is to be obſerved, in regard to the larger arteries, for fourteen days; after this there is no great danger of a return of the complaint; but when the crural or axillary arteries are wounded, the cautery is of no uſe.

In very dangerous wounds of the large arteries, ſuch as the crural and axillary, and in amputations of the limbs, the ſafeſt method is that of making a ligature round the veſſels: if this is performed by paſſing a ſtrong waxed thread under the artery, by means of a crooked needle, the blood is preſently ſtopped, and the orifices of the artery coaleſce.

Inſtruments for the ſtopping of *hæmorrhages* have alſo been in uſe in all ages, which, by their forcible compreſſion on the part, ſtop the mouths of the veſſels, the moſt convenient of which is thus compoſed: a braſs plate, three fingers long and two fingers broad, is perforated in the middle to admit a ſtrong ſcrew, which is provided at the lower end with a ſmall round plate; a piece of leather is ſtrongly faſtened to one end of the braſs plate, of equal breadth with it. In violent *hæmorrhages* this inſtrument is fitted to the wounded part. The end of the leather is brought round the part, and, by means of holes made through it, is faſtened, at the proper part, to two ſmall hooks made on the braſs plate, at the end, oppoſite to that where the leather is faſtened; this is to be adjuſted in ſuch manner, that the ſmall plate at the bottom of the ſcrew is to be brought to preſs exactly upon the compreſſes and dreſſings that cover the wound; the handle of the ſcrew is then to be turned round with a gentle preſſure, till it is found turned far enough to make a preſſure of force, to ſtop the blood: it is then to be left in this condition for a day or two, or till it may ſafely be taken off. Heiſter's Surg. p. 45.

Mr. Petit, in examining all the different methods employed by ſurgeons for ſtopping *hæmorrhages*, aſſures us, that in each of them a piece of clotted blood is contained in the veſſel, which ſerves to keep the blood from eſcaping, after the effect of the medicine, firſt employed, ceaſes: where abſorbents or aſtringents are uſed, that there is not only a cylindrical piece of clotted blood in the veſſel, but there is a covering of it on and round the orifice of the cut veſſel, which cylindrical form makes it eaſily puſhed out. Cauſtics have much the ſame effects, only the covering on the extremity of the veſſel is firmer, by the ſolid parts being confounded with the clotted extravaſation. When a ligature is uſed, there is no clotted covering, and the internal plug is of a pyramidal figure, therefore it is with difficulty that ſuch a clotted piece can be puſhed out. Beſides this advantage, the ſides of the veſſel, which are brought to be contiguous by the ligature,

ture, will probably grow together; for which reaſon, and the ſaving both pain to the patient, and loſs of ſubſtance of the ſtump, he prefers compreſſion to all the other methods. In proof of the effects of coagulated blood ſtopping the efflux of blood from large arteries, he relates two hiſtories; in one the artery was oſſified, and in the other it lay in a bony groove: ſo that, in both, it muſt have been a plug which prevented the *hæmorrhage*. He endeavours to prove, that the plug is ſtronger and firmer, when formed of coagulated lymph, than when compoſed of red blood. For executing the compreſſion right, after amputation of the larger extremities, he has contrived a machine, compoſed of a large circular belt, to be put round the trunk of the body, or ſuperior part of the member, which are to ſuſtain the bandage by ſtraps going from it, which are faſtened at the other end to a leſſer circular belt, that is put round the part of the member where the tourniquet is commonly applied. This leſſer belt is to have two ſcrews, &c. in the form of his ſcrew-tourniquet. From this leſſer belt four ſtraps go out, to croſs over two plates with their ſcrews, as in the tourniquet, placed on the ſtump. When the operation is performed, he applies thick bolſters of lint on the ſide of each large artery fartheſt from the bone, and placing the interior convex plate of the ſmall tourniquet on them, he ſecures it in the right ſituation with the four ſtraps, and ſcrews down the plate on the bolſters and veſſel, which being preſſed between the inſtrument and the bone, can allow no blood to paſs. See Mem. de l'Acad. des Sciences, 1731 and 1732.

Mr. Morand imagines, that the change which happens to the artery on being wounded, aſſiſts greatly in ſtopping the flux of blood, and that this and the congelation are uſually joint agents in this caſe. When the artery is either empty, or at leaſt leſs diſtended than uſual with blood, it naturally will collapſe, in ſome degree, and become more or leſs flatted; and if this goes ſo far as that the ſides come to touch one another, they naturally unite, and the whole cure is performed by this alone: and this is very frequently the caſe in wounds of ſmall arteries, and in internal *hæmorrhages*. Nor is it more difficult for a large veſſel to become flatted and collapſe in the ſame manner, till its ſides touch, provided that the courſe of the blood through it be by any means reſtrained. Mr. Morand gave the Academy of Sciences of Paris a very remarkable account of a thing of this kind, which fell within his knowlege. A countryman having received a violent blow upon his arm, had afterwards no pulſation in the artery, in that part of the arm beneath the place where the blow had been given, though he had a plain one in that part of the artery which was above it. There was at firſt ſome fear that the arm muſt have been taken off, but Mr. Morand ſaved it, and, as the cure went on, the pulſe was obſerved gradually to be felt again in the hand and lower part of the arm. The occaſion of this was plainly, that the artery had become flatted by the blow, and the blood was unable to force the oppoſition, and circulated only through the ſmall veſſels, while the injury from the blow remained violent, but gradually made its way again as the parts reſtored themſelves to their natural ſtate.

A wounded artery, in caſe it be cut quite aſunder, is in the ſame ſtate with a cord which is cut in two while it is on the ſtretch. We well know, that when this is done, the two ends recede a great way from one another, and that in proportion to the tenſion they had before: the caſe is wholly the ſame with an artery, and that for the ſame reaſon. Its longitudinal fibres are drawn back and ſhortened, and its circular ones are, by this very action, compelled to run together more cloſe than they naturally ſhould, and form thicker rings about the extremities of the divided veſſel; the conſequence of which is, that they make the inner hollow narrower. This is a thing of great importance, as not only the ſides of the veſſel are brought nearer together, and therefore they more eaſily may come to touch; but the diameter of the bore of the artery being leſs, a ſmaller maſs of congealed blood may ſtop it, and this blood, adhering to the ſides of the veſſel on every hand, fills up the paſſage as it congeals, and, by degrees, brings them together.

Mr. Petit, in confirmation of his opinion, that *hæmorrhages* are ſtopped by plugs of clotted blood, ſhewed the Academy of Sciences at Paris ſuch a plug, in an artery which had been opened. See Hiſt. de l'Acad. des Scienc. 1735.

What is remarkable is, that this plug of clotted blood had loſt nothing of its conſiſtency, nor of its adheſion to the aperture of the artery, after lying two months in water and three years in brandy. This ſhews the plug to be analogous to a ſcar: nor is this ſtrange, ſince both are formed from the juices deſtined to the nouriſhment of the part. Hiſt. de l'Acad. Par. 1736.

A *hæmorrhage* at the anus is more uſually called a DYSENTERY.

HÆMORRHOIDAL, an epithet given to the veins and arteries of the inteſtinum rectum and the fundament, as being the ſeat of the *hæmorrhoids* or piles.

The *hæmorrhoidal* arteries are two; the one *internal*, the other *external*.

The *internal* is a branch of the lower meſenteric, which, running along the rectum, terminates at the fundament.

The *external* ſprings from the hypogaſtric artery.

The *hæmorrhoidal* veins are alſo *internal* and *external*.

The *internal* carries back the blood of the rectum and fundament, which it embraces regularly; and is inſerted ſometimes into the ſplenic branch of the porta, and ſometimes into the meſenteric. The *external* brings back the blood from the muſculous parts about the fundament, and terminates in the hypogaſtric vein.

HÆMORRHOIDS, in *Medicine*, a diſeaſe of the fundament, popularly called the *piles*.

The word is formed of αἱμοῤῥοις, *ſanguinis profluvium*, flux of blood; which is compounded of αἱμα, *blood*, and ῥεω, *I flow*.

The *hæmorrhoids* are a painful, periodical tumor, in the lower part of the inteſtinum rectum; uſually appearing external in the anus. They may be conſidered as a ſort of varicous tumors in the hæmorrhoidal veins; ariſing from the too great abundance of morbid blood therein.

The diſeaſe is either *ſimple*, as when the veins alone are tumefied; or *compound*, as when the neighbouring parts become alſo infected, or an excreſence ariſes therefrom, as a *ficus criſta galli*, *condyloma*, or the like.

Hæmorrhoids again are either open, *fluentes*, that is, when there is a diſcharge of blood from the hæmorrhoidal veſſels; or blind, *cæcæ*, where the parts are only tumid, and there is no diſcharge: the former are vulgarly called the bleeding, and the latter the blind piles. In the firſt, the veſſels of the *rectum* are open; in the latter, there is ſome obſtruction, which occaſions them to ſwell.

The *hæmorroids* ſometimes are internal, and cauſe great pain in going to ſtool, eſpecially if the fæces be indurated; after which they ſoon appear externally, and blood is ſeen upon the excrements.

Etmuller is careful in diſtinguiſhing the genuine hæmorrhoidal flux from a bloody diarrhœa, frequent in ſcorbutic caſes. The *hæmorrhoids* are uſually opened by the attrition of the excrements in a ſtool, ſo that the blood flows at the ſame time with the excrements: but if it flows promiſcuouſly before as well as after the excrements, and without pain, it is a ſcorbutic flux.

HÆMORRHOIDS are diſtinguiſhed from the manner and time of their return upon the patient, into regular or periodical, which are a ſalutary diſcharge, and ought by no means to be ſtopped, and vague or irregular.

HÆMORRHOIDS, *ſign of*. They are generally preceded by a ſenſation of pain and tenſion in the *hypochondria*, and vibrative or ſpaſtic motions about the ſtomach, meſentry, and ſpleen; and what is much more obvious than theſe, there is a ſenſation, as it were, of a hard *nucleus* ſticking in the extremity of the *rectum*; and the more high up in that inteſtine this is felt, the more difficult will be the eruption of the hæmorrhoidal diſcharge, and the longer before its appearance. With theſe ſyptoms there alſo very frequently comes on a *teneſmus*: theſe are the uſual antecedent ſigns, but there are ſome in whom they appear without any previous notice. When preſent, there is a diſcharge of blood, and that uſually very pure and florid in perſons who have them frequently and regularly; in others who have them ſeldom and imperfectly, the blood appears black and grumous, and in ſome caſes, eſpecially in perſons who never have had a genuine and proper flux of this kind, there is excreted a ſanious matter inſtead of pure blood. The evacuation of the blood from them is ſeldom voluntary, but uſually is forced out by the preſſure and hardneſs of the ſtools.

HÆMORRHOIDS, *perſons ſubject to them*. They equally affect both ſexes, but are oftner met with in men than in women, eſpecially thoſe who are of a ſanguine plethoric habit, or of a melancholy diſpoſition, or in thoſe who live high and lead a ſedentary inactive life. They are moſt frequent in the middle and advanced ages of life, and when they happen to young people, they are uſually hereditary.

HÆMORRHOIDS, *cauſes of them*. Among theſe are to be reckoned a *plethora*, and thickneſs of the blood, for an extreme thinneſs and acrimony of it are ſeldom the cauſe, though very often ſuppoſed to be ſo. Violent concuſſions of the abdomen, as by violent exerciſes of riding or walking, will alſo bring them on, as will a ſedentary life, in which, by the compreſſion of the abdomen, the circulation is impeded at the vena portæ; alſo an omiſſion of any cuſtomary evacuations of blood, great coſtiveneſs, cold in the parts affected by them, an abuſe of hot foods and ſpirituous liquors, and the taking of aloes, or other the like medicines. In Saxony the *hæmorrhoids* are very frequent, from their taking great quantities of elixir proprietatis; and in Hungary, from their eating large quantities of garlic: violent binding of the bowels, and paſſions of the mind, eſpecially anger and fear, and the venereal infection, will alſo frequently bring them on; but this laſt cauſe chiefly brings on the blind piles, or ſuch as do not bleed.

HÆMORRHOIDS, *prognoſtics from them.* The *hæmorrhoids,* when they flow naturally and moderately, are very beneficial to health, and often prevent violent diſeaſes. They are peculiarly the moſt certain of all remedies in the hypochondriacal affections; they eaſe deliriums, and very often are peculiarly beneficial in the gout, rheumatiſm, aſthma, colics, and inflammatory fevers. With all theſe advantages derived from them, when moderate, they are, however, attended when immoderate, or when too long continued, with bad ſymptoms, and are often dangerous: they bring on great weakneſs, and in length of time, induce cachectic diſpoſitions; but they very ſeldom are attended with ſo copious a hæmorrhage as to endanger life on the ſudden, though this has ſometimes happened. The ſudden ſtopping them is always dangerous, and often brings on immediate fatal ſymptons, ſchirruſes of the viſcera, inflammations, melancholy, madneſs, vomiting of blood, and dropſies; and jaundices often are the conſequence of ſuch practice. Thoſe perſons who have them while very young, generally are attended regularly with them through their lives, and ſeldom live to be very old; on the contrary, when they do not appear till perſons are advanced in years, and continue regular and moderate afterwards, they promiſe a long life. Finally, when the *hæmorrhoids* are continual, and flow without any intermiſſions, there is great cauſe to ſuſpect a ſchirrous or ulcerated ſtate of ſome of the abdominal viſcera.

HÆMORRHOIDS, *method of treatment.* When the *hæmorrhoids* have never yet appeared, but there are ſigns of their approaching, it is not always adviſeable to forward or promote their diſcharges, for they ſeldom anſwer exactly tc expectation; but when there is room to fear the ſucceſs, it is better to endeavour at a revulſion by bleeding in the arm or foot, and at the ſame time to ſtrenghen the tone of the parts by a decoction of yarrow, or the like medicines: and the bleeding is to be repeated afterwards at ſtated periods, and the uſe of the internal means continued, if neceſſary; but when the *hæmorrhoids* have already been uſed to flow, as ſoon as the patient feels the ſignals of their approach, their diſcharge is always to be gently promoted, by a moderate uſe of elixir proprietatis, or tincture of black hellebore, or its reſin made with ſpirit of wine; and externally by the application of leeches, or, if that is not ſufficient, by opening the veins with a lancet. Junker's Conſp. Medic. p. 47.

During the time of the flux, if that be moderate, there is no occaſion for any aſſiſtance from medicines, but a proper diet is to be obſerved; all windy foods are to be avoided, as alſo all aſtringent ones; the uſe of ſpirituous liquors is to be reſtrained, and the mind kept quiet and free from the commotions of any of the paſſions. When the diſcharge is too ſmall, it is to be promoted; and when it is really too great, and the ſtrength of the patient cannot bear it, then the nitrous, cinnabarine, and abſorbent medicines are to be given, as powders prepared of ſal prunellæ, cinnabar either native or antimonial; if there be urgent neceſſity ſome gentle opiate may be added to theſe, as the pill de ſtyrace, or de cynogloſſo. After this, gentle clyſters are to be injected, and then the uſe of ſpecifics is to be entered on; among theſe, a decoction of the common yarrow is of ſingular virtue: decoctions of maidenhair alſo, and other like herbs, are of great uſe. After the fit is over, bleeding muſt be repeated at the equinoxes, and gentle purges given at times, eſpecially ſmall doſes of rhubarb, which has an abſtergent virtue that renders it peculiarly proper; and this may be given even in the time of the fit, in ſmall doſes. Old conſerve of red roſes has been recommended as a very good medicine in this caſe; it may be mixed with new milk, and an ounce of it taken three or four times a day; a tea-cup full of the tincture of roſes may be taken about an hour after every doſe of the conſerve. Half a dram of the Peruvian bark taken in a glaſs of red wine, ſharpened with a few drops of the elixir of vitriol, three or four times a day, will be uſeful as a ſtrengthener and aſtringent.

HÆMORRHOIDS, *blind, hæmorrhoides cæcæ,* or *external,* are infarctions of the external *hæmorrhoidal* veſſels about the orifice of the inteſtinum rectum, which ſometimes form ſimply turgeſcent, ſometimes inflammatory tumors; and are meant by nature for the diſcharge of blood from this part to relieve *hæmorrhages.*

The *blind piles* are of two kinds, either ſimply turgeſcent, or tumid, the latter kind are painful, the former wholly indolent. The turgeſcent *blind piles* reſemble a ſoft tranſparent veſicle filled with a blackiſh blood, and are attended with no ſenſible uneaſineſs, except at the time of going to ſtool, when they occaſion a ſenſation reſembling that of a bean or plum ſtone, or the like, ſtopping in the paſſage; and at times there is an uncommon heat in the parts.

The tumid *blind piles* are ſituated a little deeper within the verge of the extremity of the inteſtine, and reſemble a hard and inflammatory tumor; theſe are properly indeed no other than *furunculi* of this part, and occaſion very violent and exquiſite pains from the ſenſibility of the nervous and muſcular coat which lines the inteſtines. Many authors reckon beſide theſe under the name of *blind piles* all the tumid excreſcences, and fungous and ulcerated protuberances, that happen about the anus: theſe are diſtinguiſhed indeed by the appellation of ſpurious *hæmorrhoids*; they uſually owe their origin to venereal taints, but ſometimes ariſe from the *turgeſcent piles,* which in bad habits, and bodies ſubject to ulceroſe ſeroſities, ſometimes degenerate into theſe dry and verrucoſe ſwellings, and are called *thymi, mariſci,* and *ficus ani.* Junker's Conſp. Med. p. 233.

The external or *blind piles* differ from the internal, in regard to the veſicles to which they owe their origin, the internal ariſing from the vena porta, the external from the vena cava: they differ alſo in their ſize, and in the quantity of blood they diſcharge; the internal ones uſually diſcharge a moderate quantity, and if they are any way diſturbed they will throw off a great deal; whereas the external rarely bleed at all, but only ſhew themſelves in theſe blind tumors. The internal alſo have their regular periods, and very frequently obſerve the monthly diſcharges of menſtrua in women, returning as regularly in men as theſe in that ſex: the others have no regular periods, but principally appear about ſpring and autumn; and they appear the larger, and have the more blood derived to them, the oftener they have already ariſen in a perſon. Their magnitude is very different in different perſons; in ſome they are of the ſize of a hazel-nut, in others of a walnut, and in ſome they often grow to the ſize of a pigeon's or even a hen's egg.

The *turgeſcent piles* either break naturally, or are to be opened by a ſurgeon; and when this is done, they not only diſcharge the blood they contained, but alſo ſupply a farther quantity afterwards. The tumid ones have all the ſigns of inflammatory tumors, attended with the moſt exquiſite pain.

HÆMORRHOIDS, *blind, perſons ſubject to them.* The turgeſcent external piles are principally incident to thoſe of a phlegmatic and pituitous habit; they often indeed appear in women during their going with child, without their being of this temperament, eſpecially toward the latter part of their time, if they ſit much; and ſometimes they happen even during the labour-pains, when the fœtus preſſes heavily upon the pelvis.

HÆMORRHOIDS, *blind, cauſes of them.* The general cauſe of them is a plethora attended with a thickneſs of blood; whence nature, attempting to relieve herſelf by an hæmorrhage of thoſe veſſels, derives a larger quantity of blood than ordinary to them, where it remains, and according to its different ſtate, forms either ſimple veſicles, or inflammatory tumors. The accidental cauſes which bring them on, are immoderate attritions in theſe parts, from riding long journeys by perſons unuſed to that exerciſe, from an itching or ſharp humour about the part, from the painful voiding of the excrements in perſons very coſtive, and from labour-pains in women. Junker ſays, that they are ſometimes got by ſitting down in the ſeat in which a perſon has been juſt ſitting, who has the ulcerated piles, while it is yet warm from him. To theſe it is to be added, that they frequently come on from an omiſſion of accuſtomed bleedings, from an improper uſe of aloetic, helleborine, and other hot medicines, and from too high-ſeaſoned foods, and the immoderate uſe of ſpirituous liquors.

HÆMORRHOIDS, *blind, prognoſtics in them.* The *blind piles* are always in a ſtate of tendency to a ſalutary end, that is the evacution of part of the abundant blood in plethoric habits; but from the ſmallneſs of the veſſels where they are formed, they very often miſs of their proper end. When they either burſt naturally, or are opened by art, they then afford for ſome time a diſcharge that may ſupply the place of that by the *internal hæmorrhoids.* When they burſt of themſelves, they eaſily become ulcerated afterwards, but this is not attended with any violent pain. As ſoon as opened, the veſſel which formed the tumor becomes flaccid and rugoſe in that part, and forms a ſort of papulæ or little tubercles, which, if not taken care of in the proper way, often continue to diſcharge a ſmall quantity of blood at every time the perſon has a hard ſtool; and even in ſome caſes theſe papulæ have continued without intermiſſion diſcharging a ſmall quantity of blood for many years; ſometimes alſo they degenerate into ſerpiginous and pruriginous little ulcers, which are called *ſerpegi ani*, or *pruritus ani*. This is a troubleſome complaint, and is not unfrequent in people ſubject to the external *hæmorrhoids*, though not much regarded by authors; it never ſpreads far, but often continues many months in the ſame ſpot; and if by unſkilful treatment it be repelled from thence, it ſometimes returns again more violently in the neighbouring parts, and ſometimes occaſions diſorders of a worſe nature in the more diſtant ones.

The tumid and *turgeſcent piles* are both without danger to the life of the patient, unleſs in ſuch caſes where they are violently ſuppreſſed, on perſons who have been long ſubject to them. The tumid are however attended with one danger, which the turgeſcent are free from; this is, that if unſkilfully managed, they will ſometimes come to a ſuppuration, which terminates often in a fiſtulous ulceration. This too often happens when they are cut too deeply into, during the time of their ripening, and are kept open too long afterwards without being well cleanſed. When *hæmorrhoidal* affections become ulcerous, they are more contagious than almoſt any other diſeaſe; and as this is not commonly known, many ſuffer by it.

Hæmorrhoids, *blind, method of cure*. The *turgeſcent piles*, if treated in the common way of tumors and little ulcers by a ſkilful ſurgeon, are very rarely attended with any bad conſequences. The tumid give much more trouble. The firſt attempt muſt be to diſcuſs them; and to this end bleeding in the foot is one of the firſt things to be done, in caſes where there is a plethoric habit, and very ſtrong decoctions of yarrow are to be given, ſeveral doſes in a day, and external remedies, ſuch as the unguentum linariæ, and the root of the ſcrophularia are to be applied; theſe are by ſome eſteemed ſpecifics, and botanical authors boaſt wonders of their effects. The patient may ſit over the ſteams of warm water; or apply a linen-cloth dipped in warm ſpirit of wine to the part, or poultices made of bread and milk, or of leeks fried with butter. The body may be kept gently open by ſmall doſes of equal quantities of the flowers of brimſtone and cream of tartar; a tea-ſpoon full of which may be taken two or three times a day: or, an ounce of the flowers of brimſtone and half an ounce of purified nitre may be mixed with three or four ounces of the lenitive electary, and a tea-ſpoonful of it taken three or four times a day: or, an electary may be prepared of one ounce of flowers of ſulphur, half an ounce of cream of tartar, a ſufficient quantity of treacle, and taken as the other: emollient clyſters are alſo beneficial, or if the aſtriction of the anus prevents the injection of theſe, a vomit will have good effect. Buchan's Dom. Med. p. 366. If by theſe means, after three or four days trial, there appears no hope of their being diſcuſſed, then they are to be maturated by all means and with all ſpeed that may be. To this purpoſe a cataplaſm of a roaſted onion with linſeed-oil and veal-fat, is by many greatly recommended; and when the pains are violent, internal medicines are to be given, ſuch as nitre with the cooling emulſions, and, when neceſſary, a gentle opiate. Oil of eggs is greatly recommended alſo for external uſe, to allay the pain, or, for this purpoſe, a liniment made of two ounces of emollient ointment and half an ounce of liquid laudanum, beat up with the yolk of an egg, may be applied. When they are brought to maturation, they are to be diſcharged by fixing leeches on or near them; or, if theſe will not fix, by carefully opening them with a lancet; and the cleanſing and healing them up are then to be forwarded by all poſſible means. Internally, gentle laxative medicines are to be given, ſuch as the lenitive electary, and the like, with manna, ſena, and other gentle purges; then medicines which purify the blood, and ſuch as quiet its too violent emotions. After the cure is completed, the beſt method to prevent a return is bleeding in ſpring and autumn, and applying leeches to the *hæmorrhoidal* veins, at any time when threatened with a relapſe. Junker's Conſp. Med. p. 240.

Hæmorrhoids, *ſuppreſſions of them*. Phyſicians conſider the ſuppreſſion of the *hæmorrhoids* in three reſpects: 1. When they have never yet flowed at all, but all the attempts of nature are obſerved toward their appearance, and all the preceding ſymptoms of them ſeen. 2. When they have been uſed to flow habitually, but their courſe has uſually been impeded by accidents; this is often the caſe in what are called the *blind piles*. And, 3. When they have been uſed to flow regularly and well, and at ſtated times, for a long courſe of time; the ſuppreſſions in theſe different ſtates are attended with different ſymptoms and different diſorders.

Hæmorrhoids, *ſigns of ſuppreſſions of them*. Theſe are frequently the common hypocondriacal affections, firſt appearing in pains and tenſion of the left hypocondrium, extending to the region of the loins. Theſe are ſucceeded by ſpaſtic pains, violent colics, inflations of the ſpleen, reachings to vomit, obſtinate coſtiveneſs, a hardneſs of the abdomen, and finally, infarctions and ſchirruſes of the viſcera, melancholy, madneſs, and a vomiting of blood; theſe are the ſucceſſion of ſymptoms, which naturally attend ſuppreſſions of the internal *hæmorrhoids*. The ſuppreſſions of the external are often violent fits of the gout, nephritic complaints, and the voiding of blood by urine; add to theſe, that the moſt frequent ſymptom attending the ſuppreſſion, either of the external or internal, is an aſthmatic difficulty of breathing, often attended with a cough. The perſons moſt ſubject to theſe ſuppreſſions from natural cauſes, are thoſe of a melancholic diſpoſition, ſuch as are eaſily terrified, or grieved at trifles, and ſuch as have ſuddenly changed a life of labour into a ſedentary one.

The internal and natural cauſes of theſe ſuppreſſions are principally a thickneſs of the blood, or a violent orgaſtic commotion of it; the external and accidental cauſes of it are the improper uſe of aſtringent medicines, the drinking of large draughts of cold liquors when very hot, a thick and heavy diet, and a too great coldneſs of the abdomen. The ſuppreſſion is uſually very difficult to be removed, but in general is found much more eaſily to give way to medicines when owing to natural cauſes than to accidental; and it is to be obſerved, that a ſuppreſſion of them in the firſt attack is leſs dangerous than when they have appeared.

Hæmorrhoids, *method of cure*. In caſes where *hæmorrhoids* have never yet appeared, but only the antecedent ſymptoms are perceived, great caution is neceſſary to determine, from the habit and conſtitution of the patient, whether it be proper to encourage and promote their appearance, and aſſiſt nature in the way ſhe is endeavouring to eaſe herſelf; or whether it may not be better to carry off the redundant blood ſome other way. If the body be in ſuch a ſtate as to promiſe a ſucceſsful flux from them, it is to be promoted by gentle aperients; but if otherwiſe, the blood is to be derived another way by bleeding in the arm, and the patient is to be ordered to uſe frequent exerciſe. In caſes of ſuppreſſions of uſual and habitual fluxes of the *hæmorrhoids*, the ſymptoms are to be firſt alleviated by bleeding in the arm, then emollient clyſters are to be adminiſtered, ſuch as chamomile-flowers boiled in milk, and after theſe the quality of the blood is to be amended by proper internal medicines, its violent emotions to be taken off by nitre, abſorbents, and the like, and its ſpiſſitude removed by attenuants. After this, its derivation to the proper parts is to be promoted by gently ſtimulating medicines; ſuch are aloes and all its preparations, particularly elixir proprietatis; and ſaffron and borax may alſo be given in ſmall doſes; to this may be added the uſe of ſtimulating clyſters and acrid ſuppoſitories, and the application of leeches to the parts. Junker's Conſp. Med. p. 87.

HÆMORRHOSCOPIA, formed of αιμα *blood*, ῥεω *I flow*, σκοπεω *I obſerve*, an old term uſed by the writers in *Medicine* to expreſs an examination of the blood drawn from a patient by phlebotomy, in order to judge of the nature of a diſeaſe by it.

HÆMORRHUS, in *Zoology*. See *Blood* SNAKE.

HÆMOSTASIA, formed of αιμα and ϛασις, *ſtation*, or *reſt*, occurs in ſome writers as the name of a diſeaſe occaſioning ſudden death; and it is ſaid to be a total ſtagnation of the whole maſs of blood from a plethora.

HÆMOSTATICA, formed of αιμα and ιϛημι, *I ſtop*, a name given by ſome authors, to medicines uſed to ſtop hæmorrhages, whether internally taken, or externally applied.

HÆPHESTITES *lapis*, in *Natural Hiſtory*, a name given by authors, to a ſtone of a reddiſh colour, and capable of a high poliſh. The ancients gave it this name, from its property of ſetting fire to dry ſubſtances by reflection, when formed into a concave ſpeculum. They hence called it the *Vulcanean-ſtone*, or *fire-ſtone*, not conſidering that the ſhape into which they formed it, and not the nature of the ſtone, was the cauſe of the effect; any ſtone being capable of the ſame, if hard enough to bear a proper poliſh. About Hilderſheim they have, at this time, a ſort of blackiſh-red coarſe jaſper, which they take to be the *hæpheſtites* of the ancients, and uſe it, at this day, for the ſame purpoſes, hollowing large pieces of it into ſpeculums, and ſetting them, when well poliſhed, in proper frames, and uſing them as burning-glaſſes.

HÆREDE *abducto*, is a writ which anciently lay for the lord, who, having by right the wardſhip of his tenant under age, could not obtain his body, as being conveyed away by another.

HÆREDE *deliberando alii qui habet cuſtodiam terræ*, a writ directed to the ſheriff, willing him to command one that had the body of him who was ward to another, to deliver him to the perſon whoſe WARD he was on account of his land.

HÆREDE *rapto*. See RAVISHMENT *de gard.*

HÆREDIPETA, in *our Antient Law-Books*, the next HEIR.

Et mellus hæredipeta *ſuo propinquo vel extraneo periculoſa ſane cuſtodia committatur.* Leg. Hen. I. cap. 70.

HÆREDITAS. See ABEYANCE.

HÆRESIARCH, HÆRESIARCHA, of the Greek αἱρεσιαρχης, an arch-heretic. See HERETIC.

HÆRESIS, *hereſy*. See HERESY.

HÆRETICO *comburendo*, a writ which anciently lay againſt an heretic, who, having once been convicted of hereſy by his biſhop, and having abjured it, afterwards falling into it again, or into ſome other, is thereupon committed to the ſecular power. This writ is thought by ſome to be as ancient as the common law itſelf; however the conviction of hereſy by the common law was not in any petty eccleſiaſtical court, but before the archbiſhop himſelf in a provincial ſynod, and the delinquent was delivered over to the king to do with him as he pleaſed: ſo that the crown had a control over the ſpiritual power. But by 2 Hen. IV. cap. 15, the dioceſan alone, without the intervention of a ſynod, might convict of heretical tenets; and unleſs the convict abjured his opinions, or if after abjuration he relapſed, the ſheriff was bound *ex officio*, if required by the biſhop, to commit the unhappy victim to the flames, without waiting for the conſent of the crown. This writ remained in force, and was actually excuted on two Anabaptiſts in the ſeventh of Elizabeth, and on two Arians in the ninth of James I.

Sir Edward Coke was of opinion, that this writ did not lie in his time; but it is now formally taken away by ſtatute 29 Car. II. cap. 9. But this ſtatute does not extend to take away or abridge the juriſdiction of Proteſtant archbiſhops or biſhops, or any other judges of any eccleſiaſtical courts, in caſes of atheiſm, blaſphemy, hereſy, or ſchiſm, and other damnable doctrines and opinions; but they may prove and puniſh the ſame according to his majeſty's eccleſiſtical laws, by excommunication, deprivation, degradation, and other eccleſiſtical cenſures, not extending to death, in ſuch ſort and no other, as they might have done before the making of this act. Sec. 2. See HERESY.

HÆRETICUS, *heretic*. See HERETIC.

HÆRETULA, in *Natural Hiſtory*, a name given by Mr. Lhuyd, to a ſpecies of FOSSILE oyſter-*ſhell*.

HÆRMIA, an Indian fruit, reſembling pepper, eſteemed good to ſtrengthen the ſtomach, diſperſe flatulencies, and reſtore the *uvula* when relaxed.

HAFFHERT, in *Zoology*, the name of a bird deſcribed by Hoier, which is ſeen uſually at ſea, and is ſuppoſed to be a foreteller of ſtorms. It is of the ſize of a common hen, and reſembles the falcon in ſhape. It is all over of a greyiſh colour, variegated with ſpots of white. Its beak is ſtrong and hooked like the falcon's, but it is ſhorter. The fiſhermen dread the appearance of this bird, and at ſight of it always make to ſhore as faſt as poſſible, expecting tempeſts and bad weather.

HAFIZI, or HAFIZLER, is a name given in Turky to thoſe who learn the whole Alcoran by heart; and who, on this account, are held in great veneration by the people.

HAGA, in our *Old Writers*, has different ſignifications. In Doomſday it is taken for a houſe in a city or borough. An ancient anonymous author ſays it is a houſe with a ſhop, *Domus cum ſhopa*.

HAGABLUM, in our *Old Writers*, the ſame with *gablum* or *gabel*.

HAGGAI, a canonical book of the Old Teſtament, ſo called from the prophet of that name, who in all probability was born at Babylon, from whence he returned with Zerubbabel.

This prophet, in the ſecond year of Darius or the five hundred and twentieth before Chriſt, exhorted the Jews, after their return from their captivity to finiſh rebuilding the temple, which they had intermitted for fourteen years. His remonſtrances had the deſired effect; and to encourage them to proceed in the work, he aſſured them from God that the glory of this latter houſe ſhould exceed the glory of the former; which was accordingly fulfilled when Chriſt honoured it with his preſence: for with reſpect to the building, this latter temple was not to be compared with the former.

HAGGARD, in *Falconry*, a HAWK, or FALCON, not taken in the neſt; but after ſhe had been enured to liberty, and preying for herſelf. The word is French, and ſignifies *fierce*; ſome derive it from the Latin *agreſte*, *wild*; others from the German *hag*, incloſure, fortified place. Whence Mr. Huet obſerves, the word *haggard* is ſometimes applied to a man who becomes hardy and proud, in confidence of the ſtrength of the place he is in.

Haggard hawks are hard to tame, and bring under diſcipline.

HAGGS, a kind of fiery meteor appearing on men's hair, or horſes mains; now known to be electrical phenomena.

HAGIAM, in the *Materia Medica*, a name given by ſome of the Arabian phyſicians, to a kind of *ſchœnanth*, or camel's hay. The Greeks made ſeveral kinds of this, according to the places from whence they received it; the *ſchœnanth* of different countries differing in virtue: but the Perſian was, in many ages, eſteemed the beſt kind; and this is probably what the Arabs called *hagiam*. The interpreters of Avicenna leave this word wholly unexplained. Garcias, according to what ſkill he had in the Arabic, ſuppoſes it the name of the city Damaſcus, and given to ſuch *ſchœnanth* as came from that part of the world; but this ſeems erroneous. The Arabs called all other nations barbarians; and this term gentiliſm or barbariſm, was, in their language, expreſſed by the word *hagiam*; they hated the Perſians beyond all other nations in the world, and called them *hagiam* by way of eminence, and therefore *hagiam* and Perſian were a ſort of ſynonymous words. It is probable they had their *ſchœnanth* principally from Perſia; and that this, whether better or worſe than the Nabatæan *ſchœnanth* of their own country, was diſtinguiſhed by the epithet of *foreign*, and that with the word by which they expreſſed Perſian.

HAGIOGRAPHA, a name given to part of the books of Scripture, called by the Jews *Cetubim*. See CANON.

The word is compounded of ἁγιος, *holy*; and γραφω, *I write*. The name is very ancient: St. Jerom makes frequent mention of it: before him, St. Epiphanius called theſe books ſimply Γραφεια.

The Jews divide the ſacred writings into three claſſes: the Law which comprehends the five books of Moſes; the Prophets, which they call *Neviim*; and the *Cetuvim*, כתובים called by the Greeks, &c. *Hagiographa*; comprehending the book of Pſalms, Proverbs, Job, Daniel, Ezra, including alſo the book of Nehemiah, Chronicles, Canticles, Ruth, the Lamentations, Eccleſiaſtes, and Eſther.

The Jews ſometimes call theſe books the Writings, by way of eminence, as being written by immediate inſpiration of the Holy Spirit. Thus ſays Kimchi, in his preface to the Pſalms, Maimonides in *More Nevoch*, and Elias Levita in his *Thiſbi*, under the word כתב.

They diſtinguiſh the *hagiographers*, however, from the prophets; in that the authors of the former did not receive the matters contained in them by the way called Prophecy, which conſiſts in dreams, viſions, whiſpers, exſtaſies, &c. but by mere inſpiration, and direction of the Spirit.

HAGIOSIDERON, or HAGIOSIDIRON, compounded of ἁγιος, *holy*; and σιδηρος, *iron*. The Greeks who are under the dominion of the Turks, being prohibited the uſe of bells, made uſe of an iron wherewith to call people to church, called *hagioſideron*.

Magius gives us the deſcription of a *hagioſideron* he had ſeen. It is a plate of iron, about three inches broad, and ſixteen long, faſtened by the middle to a chain or cord, whereby it is ſuſpended at the church-door. On this they ſtrike with an iron hammer, with ſome meaſure and cadence, ſo as to make no diſagreeable noiſe.

They alſo carry a *hagioſideron* before the prieſt, in a proceſſion of the ſacrament to any ſick perſon, beating on it from time to time, to advertiſe the people to adore it; much as in the Romiſh church they do with a bell.

HAIHALEM *moavi*, in *Botany*, a name by which the modern Ægyptians call the plant we name *ſtratiotes* and *ſempervivum aquaticum*, the water-ſoldier and water-houſeleek. The laſt of theſe names is a verbal tranſlation of the Ægyptian one. Some have ſuppoſed that the *nilufar* was called by this name by the ancient Ægyptians, but this is an error; the plants are ſo perfectly different from one another, that they have nothing but the growing in water in common between them.

HAII, a name uſed by the Braſilians, for an animal we call the ſloath, or *ignavus*. The word ſeems pronounced by the creature itſelf, as its common note, and thence became uſed as its name.

HAIL, *grando*, in *Phyſiology*, an aqueous concretion, in form of white or pellucid ſpherules, deſcending out of the atmoſphere.

Hail is conceived to be formed of drops of rain, frozen in their paſſage through the middle region. Others take it for the fragments of a frozen cloud, half-melted, and thus precipitated, and congealed again. Accordingly the Carteſians define *hail* to be a cloud, either wholly, or in part, liquefied; which tending downwards by its own gravity, is, in its paſſage, frozen again by the action of ſome very cold wind; and thus precipitated, for the moſt part, in round tranſparent globes. They add, that if the cloud have been totally liquefied, the *hailſtones* are pellucid; otherwiſe they are only partly ſo.

Hail aſſumes various figures, according to the degrees of heat or cold of the air which it paſſes through in its deſcent; ſometimes it is round, ſometimes angular, triangular, pyramidical, &c. ſometimes thin and flat, ſtar-like, with ſix equal points, &c.

Signior Beccaria ſuppoſes, that it is formed in the higher regions of the air where the cold is intenſe, and where the electric matter is very copious. In theſe circumſtances, a great number of particles of water are brought near together, where they are frozen, and in their deſcent collect other particles; ſo that the denſity of the ſubſtance of the *hail*-ſtone grows leſs and leſs from the center; this being formed firſt in the higher regions, and the ſurface being collected in the lower. Accordingly, in mountains, *hail*-ſtones as well as drops of rain, are very ſmall; and both agree in this circumſtance, that the more intenſe is the electricity that forms them, the larger they are.

Hail is obſerved frequently to attend thunder and lightning; with regard to which, Beccaria obſerves, that as motion is known to promote freezing, ſo the rapid motion of the electrified clouds may promote that effect in the air.

Natural hiſtories furniſh us with a great variety of inſtances of extraordinary ſhowers of *hail*. See Phil. Tranſ. N° 203. and Hiſt. de France, tom. ii. p. 339.

HAILE, a ſea-term, ſignifying either to call to a ſhip, to know from whence ſhe comes, and whither ſhe is bound, or elſe to ſalute her, and wiſh her well.

HAIR, ſmall filaments, iſſuing out of the pores of the ſkins of animals; and ſerving moſt of them as a tegument, or covering.

In lieu of *hair*, the nakedneſs of ſome animals is covered with feathers or wool.

Hair is found on all parts of the human body, except the ſoles of the feet, and the palms of the hands. But it grows longeſt on the head, chin, breaſt, and arm-pits, and about the privities.

Dr. Tyſon obſerves, that though the outward ſurface of the body be the uſual place where the *hair* grows; yet it has been ſometimes found on the tongue, in the heart, the breaſts, kidnies, &c. but that there is ſcarce any inward part more ſubject to it than the ovary, or teſticles, of females. Hooke, Philoſoph. Collect. N° 2.

Phyſicians diſtinguiſh the *hair* into ſeveral kinds, and give it divers denominations; but this only in Greek and Latin. The *hair* of the head they call *capillus*: that of women particularly, *coma*, from κομειν, to dreſs and adjuſt; and that of men *cæſaries*, from *cædendo*, becauſe often cut: that of the back of the head, *juba* and *crines*; that hanging behind the ears, *cincinni*; q. d. curled and buckled.

The ancients held the *hair* to be a ſort of excrement, fed only with excrementitious matters, and no proper part of a living body. They ſuppoſed it generated of the fuliginous parts of the blood, exhaled by the heat of the body to the ſurface, and there condenſed in paſſing through the pores. Their chief reaſons were, that the *hair*, being cut, will grow again apace, even in extreme old age, and when life is very low; that in hectic and conſumptive people, where the reſt of the body is continually emaciating and attenuating, the *hair* ſhall thrive very well: nay, and that it will grow even on dead carcaſes. They add, that *hair* does not feed and grow like the other parts, by introſuſception, i. e. by a juice circulating within it; but like the nails, by juxtapoſition, each part next the root thruſting forward that immediately before it.

But the moderns are agreed, that every *hair* does properly and truly live, and receive nutriment to fill and diſtend it like the other parts; this they argue hence, that the roots do not turn grey in aged perſons ſooner than the extremities, but the whole changes colour at once. And the like is obſerved in boys, &c. which ſhews, that there is a direct communication, and that all the parts are affected alike. We are told of inſtances of perſons, who by intenſe grief, fear, or ſtudy, have grown grey in a night's time.

It may be obſerved, however that in propriety, the life or growth of *hair* is of a different kind from that of the reſt of the body, and is not immediately derived therefrom, or reciprocated therewith; it is rather of the nature of vegetation. They grow as plants do out of the earth, or as ſome plants ſhoot from the parts of others; from which though they draw their nouriſhment, yet each has, as it were, its ſeveral life, and a diſtinct œconomy. They derive their food from ſome juices of the body, but not from the nutritious juices of it; whence they may live, though the body be ſtarved.

The *hairs* examined by the microſcope, appear to be fiſtulous bodies like horns. Their tubulous ſtructure is alſo confirmed from the diſeaſe called *plica Polonica*, wherein the blood ouſes out at their extremities.

Each *hair* is found to conſiſt of five or ſix other leſſer ones, all wrapped up in one common tegument: they are knotted like ſome ſorts of graſs, and ſend out branches at the joints. They have each an oval bulbous root, which lies pretty deep in the ſkin, being implanted in the pyramidal papillæ; and by this they imbibe, or ſecrete, their proper food from the adjacent humours. This oval root is covered by a whitiſh ſtrong membrane, in ſome meaſure elaſtic, and is connected either to the ſkin, to the *corpus adipoſum*, or to both, by a great number of very fine veſſels and nervous filaments. The ſtem having reached the ſurface of the ſkin, pierces the bottom of a ſmall foſſula between the papillæ, or ſometimes a particular papilla, and there it meets the epidermis, which ſeems to be turned round it and united with it. A ſort of unctuous matter tranſudes through the ſides of the foſſula, which is beſtowed on the ſtem, and accompanies it more or leſs, as it runs out from the ſkin, in form of a *hair*. Their extremities ſplit or divide into two or three branches, eſpecially when kept dry, and left to grow too long; ſo that what to the naked eye appears only a ſingle *hair*, to the microſcope ſeems a bruſh.

They turn grey on the fore part of the head, and particularly about the temples, ſooner than behind; the back part affording them the proper juice longer than the reſt. For the like reaſon they alſo fall ſooneſt from the crown of the head.

Their ſize, or thickneſs, depends on the magnitude of the pores they iſſue from: if thoſe be ſmall, theſe are fine; if the pores be ſtrait, the *hairs* are ſtrait; if thoſe be oblique or ſinuous, the *hair* is curled.

Thoſe who have by nature, ſoft, thin, and ſhort *hair*, which with great difficulty receives and retains a buckle, and thoſe who readily become bald, or ſhed their *hair* toward the ſpring, are certainly of a looſe, flabby, and relaxed ſtate of nerves. For the *hair* ſeems to be only ſome of the fleſhy fibres lengthened outward, and hardened: at leaſt they ſeem to be of the ſame kind and nature with the other fibres, conſiſting of many leſſer filaments, contained in a common membrane, and are ſolid, tranſparent, and elaſtic. And as the *hairs* are in ſtrength, bulk, and elaſticity, ſo generally are the fibres of the body. Therefore thoſe whoſe *hair* ſheds, turns thin, lank, or refuſes buckle, if it does not happen to them after recovering from an acute diſtemper, ought to be careful of falling into nervous diſorders.

Other things being equal, thoſe of the faireſt, cleareſt, and brighteſt coloured *hair*, are of the looſeſt and weakeſt ſtate of fibres and nerves; not only becauſe the faireſt and lighteſt is the moſt rare, tranſparent, and fungous, but becauſe bodies of the lighteſt parts conſiſt of parts of a weaker union, which adhere with leſs force, and conſequently are leſs elaſtic, firm, and ſpringy, than thoſe of darker and more opake colours. It is generally obſerved that perſons of very fine and white *hair*, eſpecially if ſo after they are come to maturity, are of tender and delicate conſtitutions: and thoſe who deal in making artificial coverings for men and women, find that ſuch *hair* will never ſerve thoſe purpoſes with any credit to them, and ſeldom honeſtly employ it to that end.

Hairs ordinarily appear in general round, or cylindrical; but the microſcope alſo diſcovers triangular, and ſquare ones; which diverſity of figures ariſes from that of the pores; to which the *hairs* always accommodate themſelves. Their length depends upon the quantity of the proper humour to feed them; and their colour on the quality of that humour: whence at different ſtages of life the colour uſually differs.

The *hairs* of different animals are very different in their appearance before the miſcroſcope. Malpighi diſcovered *hairs* to be tubular, or compoſed of a number of extremely minute tubes or pipes; this he diſcovered in examining the *hairs* of the mane and tail of a horſe, and the briſtles of a boar; and theſe tubes were much more diſtinguiſhable near the ends of the tubes than elſewhere, as they there appeared more open, and ſometimes above twenty of them might be reckoned in one *hair*. In the hedge-hog's prickles alſo, which are of the nature of *hairs*, theſe tubes are very elegantly diſcovered, and may ſeem to have a medullary part, and valves, and cells. There are alſo in the *hairs* of many animals, in ſome tranſverſe, and in others ſpiral lines, ſomewhat of a darker colour, and running from top to bottom in a very elegant manner; a mouſe's *hairs* are of this ſort, and appear in joints, as it were, like the back-bone; they are not ſmooth, but jagged on the ſides, and terminate in the ſharpeſt point imaginable. The *hairs* taken from the mouſe's belly are the leaſt opake, and fitteſt for the miſcroſcope.

microſcope. The darker medullary parts, or lines, Dr. Derham obſerves, are no other than fibres convolved round, and lying cloſer together, than in the other parts of the *hair*. They run from the bottom to the top of the *hair*; and, he imagines, may ſerve to make a gentle evacuation of ſome humour out of the body. Hence the *hair* of hairy animals, this author ſuggeſts, may not only ſerve as a fence againſt cold, &c. but as an organ of inſenſible perſpiration.

The *hairs* of men, and of horſes, ſheep, &c. are compoſed of ſmall, long, tubular fibres or ſmaller *hairs*, encompaſſed with a rind or bark; and from this ſtructure a ſplit *hair* appears like a ſtick ſhivered by beating. They have roots of different kinds in different animals, and are always thicker at the middle than at either end. *Hairs* of the Indian deer are perforated from ſide to ſide, and thoſe of our Engliſh ones ſeem covered with a kind of ſcaly bark or rind. The whiſkers of a cat, cut tranſverſely, have in the middle ſomething which reſembles the pith of elder; and the quills of the hedge-hog and porcupine have ſomewhat of a pith in a ſtar-like form. The *hairs* taken from the different parts of the human body, differ very much in their figures, appearing like different ſpecies of the ſame genus in plants. Hook's Microgr. p. 157. Baker's Microſc. p. 246.

Hair, *diſeaſes of.* Among the many remedies for diſeaſes of the *hair*, the following are recommended in the Philoſophical Tranſactions. To make *hair* grow, take a quantity of the largeſt and fineſt roots of the common burdock that can be collected; let them be taken out of the ground in the month of December; bruiſe them in a marble mortar, and boil them in a quantity of white-wine till there only remains as much as will cover them; let this be carefully ſtrained off, and every night, going to bed, let the head be waſhed with ſome of it warm. The other preſcription is this: burn the ſlender twigs of vines to aſhes, and boil theſe aſhes in ſuch a quantity of common water as will make a ſtrong lye; let this be ſtrained clear off, and the head waſhed every night with ſome of it warm. When the *hair* is good, but in danger of falling off by degrees, the aſhes of the vine branches are to be boiled in red-wine inſtead of water, and this lye is to be uſed inſtead of the other. When the perſon wears powder, let ſome hermodactyls be reduced to fine flour and mixed with it: let this be the only powder uſed, and the liquor conſtantly employed in waſhing the head every night, and the falling of the *hair* will be wholly prevented. Philoſ. Tranſ. N° 288. p. 90.

Wulrerus, in Philoſophical Collections, gives an account of a woman, buried at Norimberg, whoſe grave being opened forty-three years after her death, there was *hair* found iſſuing forth plentifully through the clefts of the coffin; inſomuch that there was reaſon to imagine, the coffin had ſome time been covered all over with *hair*. The cover being removed, the whole corpſe appeared in its perfect ſhape; but from the crown of the head to the ſoal of the foot covered over with a thick-ſet *hair*, long and curled. The ſexton going to handle the upper part of the head with his fingers, the whole ſtructure fell at once, leaving nothing in his hand but a handful of *hair*: there was neither ſkull, nor any other bone left; yet the *hair* was ſolid, and ſtrong enough.

Mr. Arnold in the ſame collection, gives a relation of a man hanged for theft, who, in a little time, while he yet hung upon the gibbet, had his body ſtrangely covered over with *hair*.

It was eſteemed a peculiar honour among the ancient Gauls, to have long *hair*; and hence came the appellation *Gallia comata*. For this reaſon Julius Cæſar, upon ſubduing the Gauls, made them cut off their *hair*, as a token of ſubmiſſion. It was with a view to this, that ſuch as afterwards quitted the world, to go and live in cloiſters, procured their *hair* to be ſhaven off; to ſhew that they bid adieu to all earthly ornaments, and made a vow of perpetual ſubjection to their ſuperiors.

Greg. de Tours aſſures us, that, in the royal family of France, it was a long time the peculiar mark and privilege of kings and princes of the blood, to wear long *hair*, artfully dreſſed and curled: every body elſe were obliged to be polled, or cut round, in ſign of inferiority, and obedience. Some writers aſſure us, that there were once different cuts of the *hair* for all the different qualities and conditions; from the prince, who wore it at full length, to the ſlave or villain, who was quite cropt. Hottoman treats at large of this privilege of the kings of France, Franco Gallia. cap. 11.

To cut off the *hair* of a ſon of France, under the firſt race of kings, was to declare him excluded from the right of ſucceeding to the crown, and reduced to the condition of a ſubject.

In the eighth century it was the cuſtom of people of quality, to have their children's *hair* cut the firſt time by perſons they had a particular honour and eſteem for; who, in virtue of this ceremony, were reputed a ſort of ſpiritual parents, or godfathers to them; though this practice appears to have been more ancient; inaſmuch as we read that Conſtantine ſent the pope the *hair* of his ſon Heraclius, as a token that he deſired him to be his adoptive father.

The parade of long *hair* became ſtill more and more obnoxious in the progreſs of Chriſtianity; as ſomething utterly inconſiſtent with the profeſſion of perſons who bore the croſs. Hence numerous injunctions and canons to the contrary. Pope Anicetus is commonly ſuppoſed to have been the firſt who forbad the clergy to wear long *hair*; but the prohibition is of older ſtanding in the churches of the Eaſt; and the letter wherein that decree is wrote, is of a much later date than that pope. The clerical tonſure is related, by Iſidore Hiſpalenſis, as of apoſtolical inſtitution.

Long *hair* was anciently held ſo odious, that there is a canon ſtill extant, of the year 1096, importing, that ſuch as wore long *hair* ſhould be excluded coming into church while living, and not be prayed for when dead.

We have a furious delamation of Luitprand againſt the emperor Phocas, for wearing long *hair*, after the manner of all the other emperors of the Eaſt, except Theophilus; who being bald, enjoined all his ſubjects to ſhave their heads.

The French hiſtorians and antiquaries have been very exact in recording the heads of *hair* of their ſeveral kings. Charlemagne wore it very ſhort, his ſon ſhorter; Charles the Bald had none at all. Under Hugh Capet it began to appear again: this the eccleſiaſtics were diſpleaſed with, and excommunicated all who let their *hair* grow. Peter Lombard expoſtulated the matter ſo warmly with Charles the Young, that he cut off his own *hair*; and his ſucceſſors, for ſome generations, wore it very ſhort. A profeſſor of Utrecht, in 1650, wrote expreſly on the queſtion, Whether it be lawful for men to wear long *hair*? And concluded for the negative. Another divine, named Reeves, who had wrote for the affirmative, replied to him.

The Greeks, and after their example the Romans, wore falſe *hair*.

Hair makes a very conſiderable article in commerce; eſpecially ſince the mode of perukes has obtained.

The *hair* of the growth of the northern countries, as England, &c. is valued much beyond that of the more ſouthern ones; as Italy, Spain, the ſouth parts of France, &c.

The merit of good *hair* conſiſts in its being well fed, and neither too coarſe nor too ſlender; the bigneſs rendering it leſs ſuſceptible of the artificial curl, and diſpoſing it rather to frizzle; and the ſmallneſs making its curl of too ſhort duration. Its length ſhould be about twenty-five inches; the more it falls ſhort of this, the leſs value it bears.

There is no certain price for *hair*; but it is ſold from five ſhillings to five pounds an ounce, according to its quality.

The ſcarceneſs of grey and white *hair* has put the dealers in that commodity upon the methods of reducing other colours to this. This is done by ſpreading the *hair* to bleach on the graſs like linen; after firſt waſhing it out in a lixivious water.

This lye, with the force of the ſun and air, brings the *hair* to ſo perfect a whiteneſs, that the moſt experienced perſon may be deceived therein; there being ſcarce any way of detecting the artifice, but by boiling and drying it, which leaves the *hair* of the colour of a dead walnut-tree leaf.

There is alſo a method of dying *hair* with biſmuth; which renders ſuch white *hair* as borders too much upon the yellow, of a bright ſilver colour: boiling is the proof of this too, the biſmuth not being able to ſtand it.

Hair, made perfectly clean, and moiſtened with the ſolution of ſilver in aqua fortis, expoſing it the ſun, in order to haſten the appearance and deepen the colour, will be changed from a red, grey, or other diſagreeable colours, to a brown or deep black. The ſolution for this purpoſe ſhould be fully ſaturated with the ſilver, diluted only with diſtilled water or pure rain water; and for the farther dulcification of the acid, it will be proper to add a little rectified ſpirits of wine. The liquids commonly ſold under the name of *hair*-waters, are in reality no more than ſolutions of ſilver, much diluted with water.

Hair which does not curl or buckle naturally, is brought to it by art; by firſt boiling, and then baking it in the following manner: after having picked and ſorted the *hair*, and diſpoſed it in parcels, according to lengths, they roll them up, and tye them tight down, upon little cylindrical inſtruments, either of wood or earthen ware, a quarter of an inch thick, and hollowed a little in the middle, called pipes; in which ſtate they are put in a pot over the fire, there to boil for about two hours. When taken out, they let them dry; and when dried, they ſpread them on a ſheet of brown paper, cover them with another, and thus ſend them to the paſtry-cook; who making a cruſt, or coffin, around them of common paſte, ſets them in an oven, till the cruſt is about three fourths baked.

The end by which a *hair* grew to the head, is called the *head of the hair*; and the other, with which they begin to give the buckle, the *point*. Formerly the peruke-makers made no difference between the ends, but curled and wove them by either indifferently; but this made them unable to give a fine buckle; *hair* woven by the point never taking a right curl. Foreigners own themſelves obliged to the Engliſh for this diſcovery, which was firſt carried abroad by a peruke-maker of our country.

HAIR is alſo uſed in divers arts and manufactures.

The *hair* of beavers, hares, conies, &c. is the principal matter whereof hats are made.

Spread on the ground, and left to putrefy on corn-lands, *hair*, as all other animal ſubſtances, viz. horns, hoofs, blood, garbage, &c. proves good manure.

Hair alſo makes an ingredient in the compoſition of plaiſter.

HAIR, in the *Manege*, and among *Farriers*, is popularly called the *coat*, and makes an object of principal conſideration in reſpect of horſes, &c.

If the *hair* of a horſe, eſpecially that about the neck, and parts uncovered, be ſleek and ſmooth, and cloſe, it is an indication of his being in health, and good caſe: if rough and ſtaring, or any way diſcoloured, it denotes a coldneſs, poverty, or ſome inward defect. To make the *hair* ſmooth, ſleek, and ſoft, he muſt be kept warm, ſweated often, and when ſweated, the coat muſt be well ſcraped, and rubbed down.

The *hair* growing on the fetlock ſerves as a defence to the prominent part thereof, in travelling on ſtony ways, or in froſty weather.

If a place be bare, or thin of *hair*, or the *hair* be too ſhort, the ancient farriers uſed to waſh it with the urine of a young boy; and after that with a lye of unſlaked lime, ceruſe, and litharge. The moderns have various other ways: ſome waſh the parts with the decoction of the roots althæa; others, with goats milk, wherein agrimony has been pounded; others rub the part with nettle-ſeed, bruiſed with honey-water and ſalt; others anoint it with the juice of an onion, or radiſh; others with a mixture of alum, honey, goats dung, and ſwines blood; others with the root of white lily, boiled in oil; others with tar, oil of olives, and honey; and others with green walnut-ſhells powdered, and mixed with honey, oil, and wine. To take off *hair* in any part, they apply a plaſter made of unſlacked lime, boiled in water, with orpiment added.

HAIR-*balls*, maſſes of *hair* of different ſhapes and ſizes found in the ſtomachs of cows, oxen, calves, deer, and other animals. Some of theſe are covered with a ſmooth, thin, hard, and ſhining coat or ſhell, and others have no covering at all, but ſhew the naked *hairs* on their ſurfaces. Some are of a cheſnut-brown, others of an aſh-colour, and others of yet different colours. They are often found to ten or eleven inches in circumference, ſometimes more, but very often much leſs; ſome of them are pretty exactly ſpherical, others of the figure of a prolate ſpheroid, others oblong and compreſſed, and others regularly oval.

Theſe balls are found in one or other of the four ventricles of the animal, and are ſometimes voided by ſtool. It is very evident they are formed of the *hair* of the animal, which it has licked off and ſwallowed, and which, by the motion of the ſtomach, which in theſe creatures is very ſtrong and frequent, is wrought and compacted together very firmly, and the thin, ſmooth, and ſhining coat which is found upon ſome of them, ſeems formed of the ſlimy matter of the ſtomach.

Among calves, that ſome have theſe *hair-balls*, and others not, ſeems in one reſpect owing to their being the firſt or latter offſpring of the creature, ſince thoſe that ſuck of a heifer which never had a calf before, take off a large quantity of *hair* from the paps. There is always found more or leſs *hair* in the fourth ventricle of thoſe calves that have ſucked young heifers, which has unqueſtionably been licked off from the paps, and waſhed down with the milk, and which at times form theſe balls. See BALLS.

HAIR-*bell*, in *Botany*. See HYACINTH.

HAIR, *capillus*, in *Botany*, is the firſt degree of the Linnæan ſcale for meaſuring plants, or the twelfth part of a line.

HAIR-*cloths*, in *Military Affairs*, are large pieces of cloth made with half *hair*; they are uſed for covering the powder in waggons, or upon batteries; as alſo for covering charged bombs, or hand-grenades, and many other uſes in magazines.

HAIR-*powder*. See STARCH.

HAIR, *Maiden*, in *Botany*. See ADIANTUM.

Horſe-**HAIR** *worms*. See AMPHISBÆNA.

HAIR-*weed*, *conferva*, in *Botany*, the name of a genus of algæ, or flags, the characters of which are theſe: it is a water-plant, deſtitute of flower and ſeed, ſo far as has hitherto been obſerved, and compoſed only of ſimple and uniform filaments, which uſually extend to a great length, and are often branched, and uſually of a cylindric figure. The generality of authors have ſuppoſed that theſe are not produced of ſeeds, but are formed of ſome viſcous or gelatinous matter floating in the water, by mere appoſition of parts; but this ſeems erroneous, and is actually confuted by the diſcovery of their ſeeds, and of the fructification of this claſs of plants, made by Mr. Ellis, as well as in the ſea-fucuſes, and in many other genera of plants ſuppoſed formerly to want them. Phil. Tranſ. vol. lvii. art. 40. p. 424, &c.

The *conferva* are uſually divided into ſeveral orders, according to the nature of the filaments they conſiſt of. Some conſiſt of equable and even threads, others are knotted or jointed in the manner of a worm, or other ſuch inſect. Theſe are called the geniculated *conferva*, to diſtinguiſh them from the other ſimple ones; and finally, others are compoſed, as it were, of ſeveral globules joined one to another; theſe laſt are called the knotty *conferva*.

Of the firſt kind, or ſimple *conferva*, there are twenty-four ſpecies.

Of the ſecond order, or the *geniculated conferva*, there are fourteen kinds.

Of the third order, or the knotted *conferva*, there are only eight known ſpecies. See CONFERVA.

HAIR-*worm*, in *Zoology*. See CHAETIA.

HAIRS *breadth*. This is accounted the forty-eighth part of an inch.

HAIRY *roots*. See FIBROSE *roots*.

HAKE, in *Icthyology*, the Engliſh name of a fiſh common in the Engliſh and ſome other ſeas, and called by authors the MERLUCIUS and *lucius marinus*.

This fiſh was uſed of old dried and ſalted. Hence the proverb obtains in Kent, *as dry as a* hake. Paroch. Antiq. 575.

HAKEL, or HATCHEL. See HATCHEL.

HAKETON, in our *Old Writers*, a military coat of defence.

HALBARD, or HALBERT, in the *Art of War*, an offenſive weapon, conſiſting of a ſhaft, or ſtaff, five feet long; with a ſteel head, partly in form of a creſcent.

The word is formed of the German *hal*, *hall*; and *bard*, an *hatchet*. Voſſius derives it from the German *halle-baert*: of *hel*, *clarus*, *ſpendens*, and *baert*, ax.

The *halbard* was anciently a common weapon in the army; where there were companies of *halbardeers*. I is ſtill carried by the ſerjeants of foot.

It is called the *Daniſh ax*, becauſe firſt bore by the Danes: they carried it on the left ſhoulder. From the Danes it was derived to the Scots, and from the Scots t the Engliſh, and from them to the French.

HALBERT, among *Farriers*, &c. is a piece of iron, a inch broad, and three or four inches long, ſoldered t the toe of an horſe's ſhoe, that jets out before; to hinde a lame horſe from reſting or treading upon his toe.

Halbert-ſhoes of neceſſity conſtrain a lame horſe to trea or reſt on his heel, when he goes a moderate pace which lengthens and draws out his back-ſinew, that wa ſomewhat ſhrunk before.

HALCRYPTIUM, a name given by Dr. Hill to a pecu liar ſalt diſcovered in the chalybeate waters, and men tioned by Hoffman and ſome other authors, though no before known by any peculiar name.

The word is derived from ἁλς, *ſalt*, and κρυπτω, *to hid* it being the moſt latent, and with the greateſt difficul diſcoverable or ſeparable, of the native ſalts. It is de fined to be a ſalt found naturally in a fluid form, ſu pended in ſmall quantities in certain waters, ſcarce di cernible in them by its taſte, and very difficultly ſep rable from them; but by a proper evaporation to be pr cured in a dry form in extremely ſmall particles, in for of powder; which, when carefully prepared by a prop ſolution and evaporation, affords extremely minute, long, and quadrangular cryſtals. Hill, Hiſt. of Foſſ. p. 3 It has been long ſuppoſed that alkaline ſalts could not cryſtalized; but this ſalt, the natrum of the ancien and the common borax, ſhew very evidently that have yet formed but very imperfect ideas of the nat of alkaline ſalts. The borax ſhewing us that the f poſed invariable properties of alkaline ſalts are no conſtant, certain, and incommunicable as they were poſed to be, as it has ſome, and has not others of th See the article BORAX. And this which is a true a in many reſpects; as alſo the natrum of the ancie being by proper care reducible into regular cryſtals.

The chalybeate waters all afford this ſalt in ſome degree, but none ſo plentifully as the Pyrmont.

This ſalt ſeems of the utmoſt impotance to the water, in which it is contained, ſince it can be ſuppoſed to contain no other alkali, and without an alkali it is not eaſy to account for its properties; to which it may be added, that, by means of the common alkali of tartar, and a ſolution of the pyrites, or even of iron, in an acid mixed with common water, a liquor may be made, very much reſembling the natural Pyrmont water.

HALCYON, in *Ornithology*. See KING-FISHER.

HALCYON-*days*, *dies alcyonii*, a phraſe that frequently occurs, among writers, to denote a time of peace and tranquility.

The expreſſion takes its riſe from a ſea-fowl, called, among naturaliſts, *halcyon*, or *alcyon*, which is ſaid to build its neſt about the winter ſolſtice, when the weather is uſually obſerved to be ſtill and calm.

To this circumſtance the ancient poets often refer: thus Theocritus,

> Χ' ἁλκυονες στορεσευντι τὰ κύματα, την οτε θαλασσαν,
> Τον τε νοτον, τον τ' ἔυρον, ὃς ἐσχατα φυκια κινει, &c.
> Idyll. vii. l. 57.

And alſo Ovid,

> *Perque dies placidos hiberno tempore ſeptem,*
> *Incubat* halcyone *pendentibus æquore nidis:*
> *Tum via tuta maris; ventos cuſtodit, et arcet*
> *Æolus egreſſu.* Met. lib. ii.

Halcyon-days, according to ancient tradition, are the ſeven days before, and as many after, the brumal ſolſtice; called alſo *St. Martin's Summer*: theſe are famous for the calmneſs of the weather, which emboldens the *halcyon* to build, and brood its eggs on the rocks, on the very brink of the ſea.

Columella gives the denomination, *halcyonii dies*, to a number of days commencing on the eighth of the calends of March; on account of the great ſtilneſs of the Atlantic ocean, then uſually obſerved.

HALE, in the *Sea Language*, ſignifies, *pull*: hence, to *hale* a ſhip, denotes, to pull her on ſhore.

HALECULA, in *Ichthyology*, a name given, by ſome authors, to the anchovy. The word is a diminutive of halec, a name for the herring. See ENCRASICHOLUS.

HALELÆUM, formed of ἁλς, *ſalt*, and ελαιον, *oil*; a medicine compoſed of oil and ſalt, and recommended by the ancients for external uſe in caſes of tumors of the joints.

HALESIA, in *Botany*, a genus of the *dodecandria monogynia* claſs: the characters of which are, that the calyx and corolla are divided into four ſegments; and that the fruit is a quadrangular nut, containing two ſeeds.

HALF-*blood*, in *Law*. See BLOOD, *whole* and *half*.

HALF-*bloom*. See *Half*-BLOOM.

HALF *files*. See FILE.

HALF-*mark*, *dimidia mercæ*, is a noble.

Fitzherbert ſays, that in caſe a writ be brought, and the ſeiſin of the demandant, or his anceſtor, alledged; the ſeiſin is not traverſable by the defendant, but he muſt tender the *half-mark* for the inquiry of the ſeiſin; which is, in plainer terms, that the defendant ſhall not be admitted to deny that the poſſeſſor, or his anceſtor, was ſeiſed of the land in queſtion, and to prove his denial; but that he ſhall be admitted to tender *half a mark* in money, to have an inquiry made, whether the demandant, &c. were ſeiſed or not.

HALF-MOON, in *Fortification*. See DEMI-LUNE and RAVELIN.

HALF-PENNY, a copper coin, whoſe value is expreſſed by its name, in reference to the penny.

HALF-*ſeal* is that uſed in chancery, for the ſealing of commiſſions to delegates appointed upon any appeal in eccleſiaſtical or marine cauſes.

HALF *tangents*, on a ſcale. See SCALE and GUNTER.

HALF *tongue*, *medietas linguæ*. See MEDIETAS *linguæ*.

HALGAZAR, in the *Materia Medica* of the earlier writers, is the name for parſnip. Averrhoes frequently uſed the word in this ſenſe.

HALIÆTUS, a ſpecies of eagle which frequents the ſea, and feeds on fiſhes, called alſo the *aquila marina*, *niſus*, *oſſifraga*, or oſprey, and the *falco oſſifragus* of Linnæus. Aldrovandus has deſcribed the Engliſh bald buzzard under the name of the *haliætus*, but erroneouſly, and his deſcription of the oſſifraga proves very plainly, that it is the *haliætus* of other authors. It is a very large bird, weighing often eleven pounds. Its head and neck are all covered with long and narrow feathers, and he has a ſort of beard of fine ſlender feathers, like hairs hanging from his chin, and has, for this reaſon, been called the bearded eagle, *aquila barbata*, by Pliny and Bellonius. It is of three colours, a whitiſh, a brown, and a ruſt colour, and it is remarkable, that every diſtinct feather of his body has all theſe colours; but his wing feathers are of a plain cheſnut-colour, and his tail-feathers have very little of the brown, and are principally black and white. The legs are yellow, ſtrong and thick, and feathered but little below the knees. The claws are of a deep ſhining black, very large and ſtrong, and hooked into a perfect ſemicircle. This ſpecies is ſound in Ireland and ſeveral parts of Great Britain. Its principal food is fiſh, which it takes as they are ſwimming near the ſurface, by darting down upon them: it alſo preys on water fowl. Willughby and Pennant.

HALICACCABUM, in *Botany*, the name given by the ancient Greeks to the winter cherry, or alkekengi.

HALIEUTICS, HALIEUTICA, 'ΑΛΙΕΥΤΙΚΑ, formed of ἁλιευς, *fiſherman*, which is derived from ἁλς, *ſea*; books treating of fiſhes, or the art of fiſhing.

We have ſtill extant the *Halieutics* of Oppian.

HALIGEMOTE. See HALYMOTE.

HALIMAR, a name given, by ſome of the old chemiſts, to COPPER.

HALIOTIS. See EAR-*ſhells*.

HALITUS *ignei*. See VAPOUR.

HALL, a word anciently uſed for a manſion-houſe, or habitation.

HALL, *ſalle*, in *Architecture*, is a large room, at the entrance of a fine houſe, palace, or the like.

Vitruvius mentions three ſorts of *halls*: the *tetraſtyle*, which has four columns ſupporting the plafond, or ceiling; the *Corinthian*, which has columns all round, let into the wall, and is vaulted over; and the *Egyptian*, which had a periſtyle of inſulated Corinthian columns, bearing a ſecond order with a cieling: theſe are called *oeci*.

The *hall* is properly the firſt and fineſt partition, or member of an apartment; and in houſes of miniſters of ſtate, public magiſtrates, &c. is that wherein they diſpatch buſineſs, and give audience.

In very magnificent buildings, where the *hall* is larger and loftier than ordinary, and placed in the middle of the houſe, it is called a *ſaloon*.

The length of a *hall* ſhould be at leaſt twice and a quarter its breadth, and in great buildings three times its breadth. As to the height of *halls* it may be two thirds of the breadth; and if made with an arched cieling, it will be rendered much handſomer, and leſs ſubject to fire. In this caſe its height is found by dividing its breadth into ſix parts, five of which will be the height from the floor to the under ſide of the key of the arch.

A royal apartment is ſaid to conſiſt of a *hall*, or chamber of guards, *aula prætoriana*; an ante-chamber, *procamera*; a chamber, *camera*; a cabinet, *conclave*; and a gallery, *porticus*.

HALL is alſo a public building erected for the adminiſtration of the policy and juſtice of a city or corporation.

In this ſenſe we ſay, the *town-hall*, a *company's hall*, &c.

A ſtately building in the city of London, and the great court of judicature for that city, is called GUILD-*hall*.

HALL is alſo particularly uſed for a court of juſtice; or an edifice wherein there is one, or more, tribunals.

In Weſtminſter-*hall* are held the great courts of this kingdom, viz. the King's-Bench, Chancery, Common-Pleas, and Exchequer.

In adjoining apartments is likewiſe held the high court of parliament. Weſtminſter-*hall* was the royal palace, or place of reſidence of our ancient kings; who ordinarily held their parliaments, and courts of judicature, in their dwelling-houſes (as is ſtill done by the kings of Spain), and frequently ſat in perſon in the courts of judicature, as they ſtill do in parliament.

A great part of this palace was burnt under Henry VIII. what remains is ſtill reſerved for the ſaid judicatories. The great *hall*, wherein the courts of King's-bench, &c. are kept, is ſaid to have been built by William Rufus; others ſay, by Richard I. or II. It is reckoned ſuperior, in point of dimenſions, to any *hall* in Europe; being 300 feet long, and 100 broad.

HALLAGE, a fee due for cloth brought for ſale to Blackwell-hall in London.

The word is alſo uſed for toll paid to the lord of a fair, or market, for commodities ſold in the common hall of the place.

HALLAMAS, in our *Old Writers*, the day of *All-Hallows*, or *All-Saints*, viz. Nov. 1. It is one of the croſs quarters of the year, which was computed, in ancient writings, from *Hallamas* to Candlemas.

HALLELUJAH, a term of rejoicing, ſometimes ſung, or rehearſed, at the end of verſes on ſuch occaſions.

The word is Hebrew; or rather, it is two Hebrew words joined together: one of them הללו, *hallelu*, and the other יה *jah*; an abridgment of the name of God, יהוה *Jehovah*. The firſt ſignifies *laudate*, *praiſe ye*; and the other *Dominum*, *the Lord*.

St. Jerome firſt introduced the word *hallelujah* into the church-ſervice: for a conſiderable time it was only uſed once a year in the Latin church, viz. at Eaſter; but in the Greek church it was much more frequent. St. Jerome mentions its being ſung at the interments of the dead, which ſtill continues to be in that church, as alſo on ſome occaſions, in the time of Lent.

In the time of Gregory the Great, it was appointed to be ſung all the year round, in the Latin church, which raiſed ſome complaints againſt that pope; as giving too much into the Greek way, and introducing the ceremonies of the church of Conſtantinople into that of Rome. But he excuſed himſelf, by alledging, that this had been the ancient uſage of Rome; and that it had been brought from Conſtantinople at the time when the word *hallelujah* was firſt introduced under pope Damaſcus.

HALLERIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. This plant which was named from Dr. Haller, profeſſor of botany at Gottingen, is called by ſome gardeners the African fly-honeyſuckle, from its reſemblance to the upright or fly-honeyſuckle. Its characters are theſe: the flower has a permanent empalement of one leaf, cut into three parts at the top; it has one petal of the grinning kind, whoſe chops are ſwollen and inflexed; it has four ſtamina, which are briſtly, two of them longer than the other; in the bottom of the tube is ſituated an oval germen, which becomes a roundiſh berry with two cells, each containing one hard ſeed. There is but one ſpecies. Miller.

HALLIARDS, or HALYARDS, in a *Ship*, are the ropes or tacks uſually employed to hoiſt or lower any ſail upon its reſpective maſt, or ſtay.

HALLIER. See BRAMBLE-*net*.

HALM. See HAUM.

HALMOTE, or HALIMOTE, from the Saxon *hrale*, *hall*; and *gemot*, *meeting*; is the ſame with what we now call a *court-baron*; the word implying, a meeting of the tenants of the ſame *hall* or manor.

Omnis cauſa terminetur, vel hundredo, vel comitatu, vel halimote, *ſocam habentium, vel dominorum curia.* LL. Hen. I. cap. 10. *Halmote* and *halimote* are often confounded with FOLKMOTE, though orignally they were diſtinct courts. The *halmote* being properly the lord's COURT, or a court-baron held in the MANOR, in which differences between the tenants were determined.

The name is ſtill retained at Luſton, and other places in Herefordſhire.

HALMOTE is ſometimes alſo taken for a convention of citizens in their public hall, more properly called FOLKMOTE.

HALMYRAX, a name given by Pliny to the NATRUM of the ancients, when found in a dry form on the ſurface of the earth.

HALMYRHAGA, in the *Materia Medica* of the *Ancients*, was a name given, by ſome authors, to the NATRUM, when in a purer ſtate. They diſtinguiſhed, according to Pliny, two kinds of this ſalt; one they called by this name *halmyrhaga*, which was the purer; the other, which was fouler, and mixed with earth, they called *agrium*. The firſt of theſe they had from Media, the other from Thrace.

HALMYRODES, of ἁλμυρος, *ſalt*; from ἁλς, *ſea*; a word uſed by Hippocrates, as the name of a peculiar ſpecies of fever, in which, as Galen explains it, the external parts, when touched, communicate ſuch an itching ſenſation, as is perceived on touching ſalt ſubſtances. The ſame word is ſometimes uſed to expreſs a roughneſs of the ſkin, and is applied to many of the excretions, when ſalt and acrimonious.

HALO, in *Phyſiology*, a meteor in form of a luminous ring or circle, of various colours, appearing round the bodies of the ſun, moon, planets, or fixed ſtars.

The word is formed of the Greek ἅλως, or ἅλων, *area*.

That round the moon is the moſt uſual, and is alſo called *corona*, *crown*.

Theſe *halos* are ſometimes white, and ſometimes coloured like the rainbow; but their colours are more dilute than thoſe of the rainbow, and they are in a different order, according to their ſize. Sometimes only one is viſible, and ſometimes ſeveral concentric *halos* or *coronas* appear at the ſame time. They are very various in their ſize; thoſe which have been ſeen about Sirius and Jupiter were never more than 3, 4, or 5 degrees in diameter; thoſe, alſo, which ſurround the moon, are ſometimes no more than 3 or 5 degrees; but theſe, as well as thoſe which ſurround the ſun, are of very different magnitudes, ſome of them being 90°, or even larger, and their diameters vary during the time of obſervation.

Theſe *halos* are very frequent. M. Muſchenbroeck ſays, that in Holland fifty may be ſeen in the day-time, almoſt every year: in North America there is generally one or two about the ſun every week, and as many about the moon every month. *Halos* round the ſun are very common in Ruſſia. There are ſeveral ways of exhibiting phenomena ſimilar to theſe: the flame of a candle, placed in the midſt of a ſteam in cold weather, or placed at the diſtance of ſome feet from a glaſs window that has been breathed upon, whilſt the ſpectator is alſo at the diſtance of ſome feet from another part of the window, or placed behind a glaſs receiver, when air is admitted into the vacuum within it to a certain denſity, will, in each of theſe circumſtances, appear to be encompaſſed, by a coloured *halo*. Mr. Muſchenbroeck obſerved, that when the glaſs windows of his room were covered with a thin plate of ice, on the inſide, the moon appearing through it, was ſurrounded with a large and variouſly coloured *halo*; and, opening the window, he found that it aroſe entirely from that thin plate of ice, becauſe none was ſeen except through this plate.

Naturaliſts conceive the *halo* to ariſe from a refraction ot the rays of light in their paſſing through the fine rare veſiculæ of a thin nubecula or vapour towards the top of our atmoſphere: which account they confirm from hence; that a quantity of water being thrown up againſt the ſun, as it breaks and diſperſes into drops, forms a kind of *halo* or iris, exhibiting the colours of the natural rainbow.

Deſcartes obſerves, that the *halo* never appears when it rains; whence he concludes, that this phenomenon is occaſioned by the refraction of light in the round particles of ice, which are then floating in the atmoſphere; and to the different protuberance of theſe particles he aſcribes the variation in the diameter of the *halo*. Gaſſendi ſuppoſes, that a *halo* is occaſioned in the ſame manner with the rainbow, the rays of light being, in both caſes, twice refracted and once reflected within each drop of rain or vapour, and that the difference between them is wholly owing to their different ſituation with reſpect to the obſerver. Dechales, alſo, endeavours to ſhew, that the generation of the *halo* is ſimilar to that of the rainbow; and the reaſon, he ſays, why the colours of the *halo* are more dilute than thoſe of the rainbow, is owing principally to their being formed, not in large drops of rain, but in very ſmall vapour. But the moſt conſiderable and generally received theory, relating to the generation of *halos*, is that of Mr. Huygens.

Mr. Huygens ſuppoſes *halos*, or circles round the ſun, to be formed by ſmall round grains of a kind of hail, made up of two different parts, one of which is opake, and incloſed in the other, which is tranſparent; which is the general ſtructure actually obſerved in hail.

He ſuppoſes, that the grains or globules that form theſe *halos* conſiſted at firſt of ſoft ſnow, and that they have been rounded by continual agitation in the air, and thawed on their outſide by the heat of the ſun. In order to illuſtrate this hypotheſis, let ABCD (*Tab.* II. *Optics*, *fig*. 27.) repreſent one of theſe globules, and EF the kernel of ſnow in the middle of it; if the rays of light, coming from GH, fall on the ſide AD, it is manifeſt they will be ſo refracted at A and D as to bend inwards, and many of them will ſtrike upon the kernel EF. Other rays, however, as GA and HD, will only touch the ſides of the kernel, and being again refracted at B and C, will emerge in the lines BK and CK, croſſing each other in the point K, whoſe neareſt diſtance from the globule is ſomewhat leſs than its apparent diameter. If, therefore, BK and CK be produced towards M and L, *fig*. 28. it is evident that no light can reach the eye placed within the angle LKM, but may fall upon it when placed out of that angle, or rather the cone repreſented by it. For the ſame reaſon, every one of theſe globules will have a ſhadow behind it, in which the light of the ſun will not be perceived. If the eye be at N, and that point be conceived to be the vertex of a cone, the ſides of which, NR, NQ, are parallel to the ſides of the former cone, KL, KM, it is evident that none of the globules within the cone QNR can ſend any rays of the ſun to the eye at N. But any other globule out of this cone, as X, may ſend thoſe rays, which are more refracted than XZ, to the eye; ſo that this will appear enlightened, while thoſe within the cone will appear obſcure. From hence it appears, that a certain area or ſpace, quite round the ſun, muſt appear dark, and that the ſpace next to this area will appear luminous, and more ſo in thoſe parts that are neareſt to the obſcure area; becauſe, Mr. Huygens ſays, it may eaſily be demonſtrated, that thoſe globules which are neareſt to the cone QNR exhibit the largeſt image of the ſun. A corona muſt be produced in the ſame manner, whatever be th ſun's altitude, becauſe of the ſpherical figure of th globules. In confirmation of this hypotheſis, he direc us to expoſe to the ſun a thin glaſs bubble, filled wit water, and having ſome opake ſubſtance in the center o it; and he ſays we ſhall find, that we ſhall not be abl to ſee the ſun through it, unleſs at a certain diſtance fro a place oppoſite to the center of it; but as ſoon as w perceive the light, the image of the ſun will immediately appear the brighteſt, and coloured red, for the ſame reaſon as in the rainbow. Theſe coronas, he ſays, often appear about the moon; but the colours are ſo weak as to appear only white. The livelineſs of the colours depends on the number of globules floating in the atmoſphere, and at the ſame time the area within the corona will be the darker. The apparent diameter of the corona, which is generally about 45 degrees, depends upon the ſize of the dark kernel; for the larger this is with reſpect to the whole globules, the larger will be the dark cone behind it. In order to have the diameter of this magnitude, he proves, that the ſemi-diameter of the globule muſt be to the ſemi-diameter of the kernel of ſnow very nearly as 1000 to 480; and for a corona of 100 degrees, it muſt be as 1000 to 680. Phil. Tranſ. Abr. vol. ii. p. 189. After the ſame manner he accounts for the parhelia; only that there he imagines the icy grains of an oblong figure, and rounding at the ends, like cylinders with round convex tops. Where ſome of theſe cylinders are in an erect poſition, the circle they form will be white, becauſe of the reflection of the rays of the ſun on the ſurface of theſe cylinders.

Mr. Weidler endeavours to refute Huygens's manner of accounting for *halos*, by a vaſt number of ſmall vapours, each with a ſnowy nucleus, coated round with a tranſparent covering. Mr. Weidler ſays, that when the ſun paints its image in the atmoſphere, and, by the force of its rays, puts the vapours in motion, and drives them towards the ſurface, till they are collected in ſuch a quantity, and at ſuch a diſtance from the ſun on each ſide, that its rays are twice refracted, and twice reflected, by the time they reach the eye, they exhibit the appearance of a *halo*, adorned with the colours of the rainbow; which may happen in globular pellucid vapours without ſnowy nuclei, as appears by the experiment of hollow glaſs ſpheres filled with water: therefore, whenever thoſe ſpherical vapours are ſituated as before mentioned, the refractions and reflections will happen every where alike, and the figure of a circular crown, with the uſual order of colours, will be the conſequence. Phil. Tranſ. N° 458. § 2.

The light which comes through drops of rain by two refractions, without any reflection, Sir Iſaac Newton obſerves, ought to appear ſtrongeſt at the diſtance of about 26 degrees from the ſun, and to decay gradually both ways, as the diſtance from him increaſes and decreaſes; and the ſame is to be underſtood of light, tranſmitted through ſpherical hail-ſtones. And if the hail be a little flatted, as is often the caſe, the light tranſmitted may grow ſo ſtrong at a little leſs diſtance than that of 26 degrees, as to form a *halo* about the ſun or moon; which *halo*, as often as the hail-ſtones are duly figured, may be coloured; and then it muſt be made red within by the leaſt refrangible rays, and blue without by the moſt refrangible ones, eſpecially if the hail-ſtones have opake globules of ſnow in their center, to intercept the light within the *halo*, as Huygens has obſerved, and make the inſide thereof more diſtinctly defined than it would otherwiſe be.

Such hail-ſtones, though ſpherical, by terminating the light by ſnow, may make a *halo* red within and colourleſs without, and darker in the red than without, as *halos* uſed to be; for of thoſe rays which paſs cloſe by the ſnow, the rubiform will be leaſt refracted, and ſo will come to the eye in the directeſt lines. Optics, p. 155. Thus Sir Iſaac Newton accounted for the larger and leſs variable appearances of *halos*; but he conſidered the leſs and more variable appearances as depending on the ſame cauſe with the colours of thin plates. If the diameter of a ſmall drop or globule of water be about the 500th part of an inch, ſo that a red making ray, in paſſing through the middle of this globule, has 250 fits of eaſy tranſmiſſion within the globule; and all the red making rays, which are at a certain diſtance from this middle ray round about it, have 249 fits within the globule; and all the like rays, at a certain farther diſtance round about it, have 248 fits; and all thoſe at a certain farther diſtance 247 fits, and ſo on; theſe concentric circles of rays, after their tranſmiſſion, falling on a white paper, will make concentric rings of red upon the paper, ſuppoſing the light which paſſes through one ſingle globule ſtrong enough to be ſenſible; and in like manner, the rays of other colours will make rings of other colours. Suppoſe, now, that in a fair day the ſun ſhould ſhine through a thin cloud of ſuch globules of water or hail, and that the globules are all of the ſame ſize, the ſun ſeen through this cloud ought to appear ſurrounded with the like concentric rings of colours, and the diameter of the firſt ring of red ſhould be $7\frac{1}{2}^{\circ}$, that of the ſecond $10\frac{1}{2}^{\circ}$, that of the third 12° 33′; and according as the globules of water are bigger or leſs, the ring ſhould be leſs or bigger.

This curious theory was confirmed by actual obſervation in June 1692, when the author ſaw by reflection, in a veſſel of ſtagnated water, three *halos*, crowns, or rings of colours about the ſun, like three little rainbows concentric to his body. Theſe crowns incloſed one another immediately, ſo that their colours proceeded in this continual order from the ſun outward: blue, white, red; purple, blue, green, pale yellow, and red; pale blue, pale red. The like crowns appear ſometimes about the moon. The more equal the globules of water or ice are to one another, the more crowns of colours will appear, and the colours will be the more lively. Optics, p. 288.

M. Muſchenbroeck concludes his account of coronas with obſerving, that ſome denſity of vapour, or ſome thickneſs of the plates of ice, divides the light in its tranſmiſſion, either through the ſmall globules of water or their interſtices, into its ſeparate colours; but what that denſity is, or what is the ſize of the particles which compoſe the vapour, he does not pretend to determine. Introd. ad Phil. Nat. p. 1037.

It has been often obſerved, that a *halo* about the ſun or moon does not appear circular and concentric to the ſun or moon, but oval and excentric, with its longeſt diameter perpendicular to the horizon, and extended from the moon farther downwards than upwards: Dr. Smith aſcribes this phenomenon to the apparent concave of the ſky being leſs than a hemiſphere; for by the theory of Huygens, above explained, it appears, that the rays, which cauſe the viſible appearance of *halos*, compoſe the ſurface of a cone, whoſe ſection made by a plane perpendicular to the ray that comes to the eye from the ſun or moon, is circular and concentric to the ſun or moon; and, therefore, an oblique ſection of it, made, as it were, by the apparent concavity of the ſky, which is the ſame as the perſpective projection of it upon that concave, muſt be an oval figure. When the angle which the diameter of a *halo* ſubtends at the eye is 45° or 46°, and the bottom of the *halo* is near the horizon, and conſequently its apparent figure is moſt oval, the apparent vertical diameter is divided by the moon in the proportion of about two to three or four, and is to the horizontal diameter drawn through the moon as four to three, nearly. See farther on the ſubject of this article, Prieſtley's Hiſt. and Preſent State of Diſcoveries relating to Viſion, &c. p. 596—613. and Smith's Optics, art. 167. 513, &c. 526, 527, &c.

Halo, in *Anatomy*, the name given by authors to that round red circle, or areola, about the nipple, from its ſimilitude to the circles formed round the ſun and moon at certain times, and called *halos*.

HALOSACHNE, formed of ἅλς, *ſea*, and αχνη, *froth*, in the *Materia Medica of the Ancients*, was a name given to a peculiar ſea-ſalt, made by the evaporation of ſmall quantities of ſea-water on rocks, by the ſun's heat. It no way differed from the common ſea-ſalt in its qualities or properties, except that it did not crackle ſo much in the fire; and this was merely owing to its being compoſed of finer particles, and in form of a ſort of powder, in which ſtate even common ſea-ſalt will no more crepitate in the fire than this. Hill's Hiſt. of Foſſ. p. 386.

Though this, however, was the common appearance of the *haloſachne*, it was not its univerſal one; for it was found ſometimes concreted on, or embodied in the alcyonia and other marine productions, and then appeared in a harder form.

HALOSANTHOS, of ἅλς, *ſea*, and ανθος, *flower*, *flower of ſalt*, in the *Materia Medica of the Ancients*, was a ſubſtance, though commonly ſuppoſed only an eſfloreſcence of common ſalt, yet really a bituminous matter mixed with ſome particles of ſalt.

It was a tough, viſcous, and fatty ſubſtance, found ſwimming on the waters of ſome ſprings and rivers, and was of a ſoft conſiſtence and of a yellow colour: and the ſame ſubſtance is ſtill found in the ſame places, and that not only yellow, but of various other colours, as blackiſh, green, or blue; theſe it takes up, according to the various earths it has waſhed againſt on the ſhores, or the ſubſtances mixed among it at its original concretion. The deſcription Dioſcorides gives of it is very expreſs; he ſays it was found ſwimming on the waters of the Nile, and ſome lakes, and was of a yellowiſh colour, very ſharp to the taſte, fattiſh, and of an unpleaſant ſmell. This, though that author did not diſtinguiſh to what claſs of foſſils it properly belonged, is enough, however, to teach us what it truly was; and it is ſomething wonderful, that thoſe who have accounted it a ſalt, ſhould not obſerve that the ſame author adds, that it was ſoluble in oil and not in water. Hill, Hiſt. Foſſ. p. 386.

HALSFANG. See Healfang and Pillory.

HALT, in *War*, a pauſe or ſtop in the march of a military body.

Some derive the word from the Latin *halitus*, *breath*, it being a frequent occaſion of *halting*, to take breath;

others from *alto*, becauſe in *halts* they raiſe their pikes, &c. on end.

HALTER, in the *Manege*, a head-ſtall for a horſe, of Hungary leather, mounted with one, and ſometimes two ſtraps, with a ſecond throat-band, if the horſe is apt to unhalter himſelf.

Halter-*caſt* is an excoriation of the paſtern, occaſioned by the halter's being entangled about the foot, upon the horſe's endeavour to rub his neck with his hinder feet. For the cure of this, anoint the place, morning and evening, with equal quantities of linſeed oil and brandy, well mixed.

Halter-*ſtrap* or *ſtring*, a cord or long ſtrap of leather, made faſt to the head-ſtall and to the manger, to tye the horſe.

HALTERISTÆ, in *Antiquity*, a ſort of players at diſcus, ſo denominated from a peculiar kind of diſcus, by the Greeks called ἁλτηρ, and by the Latins *halter*.

Budæus, and others, take the halter to have been a leaden weight or ball, which the vaulters bore in their hands, to ſecure and keep themſelves more ſteady in their leaping. Nor will theſe authors allow of any ſort of halter beſides this weight; nor other *halteriſts* but theſe vaulters. Others, as Cornarius, Conſtantine, and Portus, will have the halter to be a lump or maſs of lead or ſtone, with an hold or handle fixed to it, by which it might be carried; and that the *halteriſtæ* were thoſe who exerciſed themſelves in removing theſe weights from place to place. Theſe authors add, that the weight or ball mentioned by Budæus, was not called ἁλτηρ, *halter*, but ἁλκηρ, *alcter*, which ſignifies *helper*, *defender*.

Hier. Mercurialis, in his treatiſe De Arte Gymnaſtica, lib. ii. cap. 12. diſtinguiſhes two kinds of *halteriſtæ*; for though there was but one halter, there were two ways of applying it. The one was to throw or pitch it in a certain manner; the other only to hold it out at arm's end: and in this poſture to give themſelves divers motions, ſwinging the hands backwards and forwards, &c. according to the engraven figures thereof given us by Mercurialis.

The halter was of a cylindrical figure, ſmaller in the middle (where it was held) by one diameter, than at the two ends. It was about a foot long, and there was one for each hand: it was made either of iron, ſtone, or lead. Galen, De Tuend. Valetud. lib. i. lib. v. and lib. vi. ſpeaks of this exerciſe, and ſhews of what uſe it is in purging the body of peccant humours; making it equivalent both to purgation and phlebotomy.

HALTING, among *Farriers*, &c. an irregularity in the motion of a horſe, ariſing from a lameneſs or other injury in the ſhoulder, leg, or foot; which leads him to ſpare the part, or uſe it too timorouſly.

An acquaintance with this diſorder, in its ſeveral circumſtances, is a thing of great extent in the affairs of the manege; for which reaſon we ſhall add the principal points relating to it. If an horſe *halts*, it is either *before*, in which caſe his complaint lies either in the ſhoulder, the legs, or feet; or *behind*, where it muſt lie in the hip, ham, or the like.

1. The ſigns which indicate it in the *ſhoulder*, are his not lifting up his leg, but trailing it on the ground, or his caſting one leg more than the other, and with his knee, in a manner, unbent. Add, that in turning ſhort he will viſibly favour the leg on the lame ſide. Again, if the ailment be found on the ſhoulder, it muſt either be in the top of the ſhoulder-blade, called the *withers*, which is known by his *halting* moſt when a perſon is on his back, his ſhrinking much, and offering to bite when griped and handled about the top of the ſhoulder-blade, or in the bottom of the ſhoulder-blade, joining to the marrow-bone, which is the fore-pitch of the breaſt, which is known by his treading his ſteps thick, and ſhrinking, ready to fall down, when preſſed in that part; or in the elbow, which joins the marrow-bone to the leg, which is known by wincing and taking up his foot when pinched there.

2. If the grievance be in the *legs*, it either lies in the knee or paſtern joint, which he diſcovers by refuſing to bow the one or the other, and going ſtiffly on it; or in the *ſhank*, which is diſcovered by ſome ſplint, ſcrew, wind-gall, or other viſible malady thereon.

3. If it be in the *foot*, it is either in the coronet, and owing to ſome ſtrain, or to be diſtinguiſhed by ſome tumor or breaking thereon, or its appearing hot and burning to the touch; or in the *heel*, owing to an over-reach, or the like, and viſible to the eye; as alſo by his treading altogether on his toe; or in the *quarters*, between the middle of the hoof and the heel, which is known by his *halting* more when on the edge of a bank than when on plain ground. This is ſometimes occaſioned by being pricked with a nail in the ſhoeing; and the faulty nail is diſtinguiſhed by pinching the head of each nail, and the hoof together, with a pair of pincers.

If a horſe *halt behind*, from a diſorder in the hip or huckle-bone, he will go ſide-long, and not follow ſo well with that leg as the other; nor will he turn on that ſide without favouring the leg: add, that he ſhews it more in walking on the ſide of a bank with the worſt leg higheſt.

If a horſe has any hidden infirmity, that will bring him to *halt* when he comes to travel well, it may be diſcovered by running him in hand on a ſmooth way, at the length of the halter, and obſerving how he ſets down his legs: if he favour none of them, he is to be farther proved, by riding him roundly till heated; then letting him ſtand ſtill an hour, and after that running him in the hand at halter's length, as before.

HALYMOTE, properly ſignifies a holy or eccleſiaſtical court. See Halmote.

There is a court held in London by this name, before the lord mayor and ſheriffs, for regulating the bakers. It was anciently held on the Sunday next before St. Thomas's day, and for this reaſon called the *halymote*, or holy court. The title thereof runs thus: *Curia ſancti motus tenta in Guilhalda civitatis Londin. coram major & vicecom.* &c.

HALYWERCFOLK anciently ſignified ſuch perſons of the province of Durham as held lands on condition of defending the corpſe of S. Cuthbert; and who hereupon claimed the privilege, not to be forced to go out of the biſhoprick either by king or biſhop.

HAM, a Saxon word, properly ſignifying a *houſe* or *dwelling-place*.

Ham is alſo uſed to denote a ſtreet or village.

Hence it is that the names of many of our towns end with it; as Notting*ham*, Bucking*ham*, Walſing*ham*, &c.

Ham is alſo a part of the leg of an animal; being the inner or hind part of the knee, or the ply or angle in which the leg and thigh, when bent, incline to each other.

Ham, in *Commerce*, &c. is uſed for a leg or thigh of pork, dried, ſeaſoned, and prepared to make it keep, and to give it a briſk agreeable flavour.

Weſtphalia *hams*, ſo much in vogue, are prepared by ſalting them with ſalt-petre, preſſing them in a preſs eight or ten days, then ſteeping them in juniper-water, and drying them by the ſmoke of juniper-wood.

A *ham* may be ſalted in imitation of thoſe of Weſtphalia, by ſprinkling a *ham* of young pork with ſalt for one day, in order to fetch out the blood; then wiping it dry, and rubbing it with a mixture of a pound of brown ſugar, a quarter of a pound of ſalt-petre, half a pint of bay ſalt, and three pints of common ſalt, well ſtirred together in an iron pan over the fire till they are moderately hot: let it lie three weeks in this ſalting, and be frequently turned, and then dry it in a chimney.

HAMADRYADES, formed of ἅμα, *together*, and δρυας, *dryad*, of δρυς, *oak*, in *Antiquity*, certain fabulous deities revered among the ancient heathens, and believed to preſide over woods and foreſts, and to be incloſed under the bark of oaks.

The *Hamadryades*, ἁμαδρυαδες, were ſuppoſed to live and die with the trees they were attached to; as is obſerved by Servius on Virgil, Eclog. x. ver. 62. after Mneſimachus, the ſcholiaſt of Apollonius, &c. who mentions other traditions relating thereto.

The poets, however, frequently confound the *Hamadryades* with the Naiads, Napææ, and rural nymphs in general; witneſs Catullus, Carm. lxviii. ver. 23. Ovid, Faſt. iv. 229. Met. i. ver. 695. xiv. ver. 628. Propertius, Eleg. xx. 32. Virg. Ecl. x. ver. 64. Georg. iv. ver. 382, 383.

Feſtus calls them *Querquetulanæ*, as being iſſued or ſprung from oaks.

An ancient poet, Pherenicus, in Athenæus, lib. iii. calls the vine, fig-tree, and other fruit-trees, *hamadryades*, from the name of their mother the oak.

This common idea among the ancients, of nymphs or intellectual beings annexed to trees, will account for their worſhipping of trees; as we found they did, not only from their poets but their hiſtorians. Livy ſpeaks of an ambaſſador's addreſſing himſelf to an old oak, as to an intelligent perſon and a divinity. Lib. iii. § 25.

HAMAMELIS. See *Witch* Hazle.

HAMAXOBII, Hamaxobians, in the *Ancient Geography*, a people who had no houſes, but lived in carriages.

The word is formed from ἁμαξα, a *carriage* or *chariot*, and βιος, *life*.

The *Hamaxobii*, called alſo *Hamaxobitæ*, were an ancient people of Sarmatia Europæa, inhabiting the ſouthern part of Muſcovy, who, inſtead of houſes, had a ſort of tents made of leather, and fixed on carriages, to be ready for ſhifting and travel.

HAMBOROUGH *company*. See Company.

HAMELLIA, in *Botany*, a genus of the *pentandria monogynia* claſs; the characters of which are, that the corolla is divided into five ſegments, and the fruit is a five-celled berry containing ſeveral ſeeds.

HAMFARE, in *our Old Writers*, a breach of the peace in a houſe.

HAMELING, or Ham-*ſtringing*, the act of cutting the great tendon, vulgarly called the *ham-ſtring*.

Hameling or *hambling* of dogs, amounts to the ſame with expeditation or lawing.

HAMLET, a diminutive of *ham*, ſignifies a little village, or rather a part of a village.

Spelman, upon theſe words, ſhewing the difference between *villa integra* and *villa dimidia* & hamleta, ſays, Hamleta *vero, quæ mediatatem friborgi non obtinuit hoc eſt ubi quinque capitales plegii non deprehenſi ſint*. The ſtatute of Exon. 14 Edw. I. mentions this word thus, *Les noſmes de toutes les villes* & hamlets *que ſont en ſon wapentake*. In the ancient MS. *hamlet* is expounded, the ſeat of a freeholder.

HAMMA, ἅμμα, of ἅπτω, *I tie*, a word uſed, by ſome chirurgical writers, for a knot that faſtens a bandage.

HAMMER, an inſtrument of iron, with a handle of wood, uſed, in moſt mechanic arts, to beat, ſtretch, drive, &c.

Bodies capable of being ſtretched or extended under the *hammer*, are ſaid to be *malleable*.

The Latins call it *malleus*, anciently *martulus* or *marculus*; by which name Pliny calls it when he ſays, that Cynira, ſon of Agrippa, invented the *hammer* and pincers. Hiſt. Nat. lib. vii. cap. 56. Vide Hardouin, Not. ad loc.

The *hammers* of our great forges are moved or worked by a water-mill.

Hammer, in the *Manege*. See Shoeing-*hammer*.

Hammer *hardening*. See Hardening.

Hammer *of a clock*. See Clock.

Hammer, in *Anatomy*. See Malleus and Ear.

Hammer-*headed ſhark*. See Shark.

Hammer, *yellow*, in *Ornithology*. See Yellow *Hammer*.

HAMMERING, the act of beating or extending, and faſhioning a body under the hammer.

When it is performed on iron heated for the purpoſe, the ſmiths uſually call it *forging*.

Hammering, in *Coining*. A piece of money, or a medal, is ſaid to be *hammered* when ſtruck, and the impreſſion given with a hammer and not with a mill.

For the method of coining with the Hammer, ſee Coining.

HAMMOC, or Hamac, a kind of hanging bed, ſuſpended between two trees, poſts, hooks, or the like; much uſed throughout the Weſt Indies, as alſo on board of ſhips.

The Indians hang their *hammocs* to trees, and thus ſecure themſelves from wild beaſts and inſects, which render lying on the ground there very dangerous.

The people of the Caribbee iſlands are wonderfully ſuperſtitious with regard to their *hammocs*, and do not make them without many ceremonies.

According to F. Plumier, who has often made uſe of the *hammoc* in the Indies, it conſiſts of a large ſtrong coverlet or ſheet of coarſe cotton, about ſix feet ſquare: on two oppoſite ſides are loops of the ſame ſtuff, through which a ſtring is run, and thereof other loops are formed, all which are tied together with a cord; and thus is the whole faſtened to two neighbouring trees in the field, or two hooks in houſes.

This kind of couch ſerves, at the ſame time, for bed, quilts, ſheets, pillow, &c.

The *hammoc* uſed on board of ſhips is made of a piece of canvas, ſix feet long and three feet wide, gathered or drawn together at the two ends; there are uſually from fourteen to twenty inches in breadth allowed between decks for every *hammoc* in a ſhip of war; but this ſpace muſt in ſome meaſure depend on the number of the crew, &c. In time of battle the *hammocs* and bedding are firmly corded and fixed in the nettings on the quarter-deck, or wherever the men are too much expoſed to the view or fire of the enemy.

Mr. Le Cat has contrived a *hammoc* of Turkey leather, which may be eaſily raiſed or let down, with a ſick perſon in it, by ropes and pullies. See Phil. Tranſ. N° 468. § 3.

HAMMON, in the *Heathen Mythology*. See Ammon.

HAMMOSTEUS, the osteocolla of the ſhops.

HAMPER. See Hanaper.

HAMSOKEN, the liberty or privilege of a man's own houſe; alſo a franchiſe granted to lords of manors, whereby they hold pleas, and take cognizance of the breach and violation of that immunity: and it likewiſe ſignifies *quietantiam miſericordiæ intrationis in alienum domum vi* & *injuſte*. Fleta, lib. cap. 47. In Scotland, violations of this kind are equally puniſhable with raviſhing a woman. And our old records expreſs burglary under the word *hamſocne*.

HAMUS, or Hamulus, a hook.

Surgeons alſo make uſe of an inſtrument thus called, to extract the child in difficult labours.

HANAB ALTHALEB, in the *Materia Medica*, a name uſed, by the ancient Arabian writers, to expreſs the *lycoperſicum* or *pomum amoris*. The meaning of the name is the wolfs-grape; and the Greeks have called it by an exactly correſponding term, *lycoſtaphylon*. We generally call it lycoperſicon, or the wolfs-peach. Some have ſuppoſed this the name of a plant differing from the pomum amoris; but it appears, on a ſtrict enquiry, to be wholly the ſame. Some of the Greeks have uſed the word *ſtrychnus* in this ſenſe alone; and Alexander Trallian, in particular, always makes it the name of an eſculent plant; but Dioſcorides and Theophraſtus uſe it as the common name of the eſculent nightſhade, and of the poiſonous kinds.

HANAPER, or Hamper, an office in Chancery, under the direction of a maſter, his deputy and clerks, anſwering, in ſome meaſure, to the fiscus among the Romans.

Hanaper, *clerk of the*, ſometimes ſtiled *warden of the hanaper*, an officer who receives all money due to the king for ſeals of charters, patents, commiſſions, and writs, and attends the keeper of the ſeal daily in term time, and at all time of ſealing, and takes into his cuſtody all ſealed charters, patents, and the like, which he receives into bags, but anciently, it is ſuppoſed, into *hampers*, which gave denomination to the office.

There is alſo an officer who is comptroller of the *hanaper*.

HANCES, in a *Ship*, are falls or deſcents of the fiſe-rails, which are placed as baniſters in the poop, &c. and down to the gang-way.

Hances, or Hanses, in *Architecture*, are the ends of elliptical arches, which are arcs of ſmaller circles than the ſcheme or middle part of the arch.

HAND, *manus*, a part or member of the body of man, making the extremity of the arm.

The mechaniſm of the hand is very curious; excellently contrived to fit it for the various uſes and occaſions we have for it, and the great number of arts and manufactures it is to be employed in. It conſiſts of a compages of nerves, and little bones joined into each other, which give it a great degree of ſtrength, and at the ſame time an unuſual flexibility, to enable it to handle adjacent bodies, lay hold of them, and graſp them, in order either to draw them toward us or thruſt them off. Anaxagoras is repreſented, by ancient authors, as maintaining, that man owes all his wiſdom, knowlege, and ſuperiority over other animals, to the uſe of his *hands*. Galen repreſents the matter otherwiſe: man, according to him, is not the wiſeſt creature, becauſe he has *hands*; but he had *hands* given him becauſe he was the wiſeſt creature; for it was not our *hands* that taught us arts, but our reaſon. The *hands* are the organs of reaſon, &c. De Uſu Part. lib. i. cap. 3.

The *hand*, among anatomiſts, extends from the ſhoulder to the fingers ends: this is called alſo the *greater hand*.

It is divided into three parts. The firſt reaching from the ſhoulder to the elbow, properly called the *arm*, *brachium*. The ſecond reaches from the elbow to the wriſt. The third is the *hand*, *manus*, properly ſo called; called alſo the leſſer *hand*, or *extreme manus*. This is ſubdivided into three other parts: the *carpus*, which is the wriſt; the *metacarpus*, which is the body of the *hand*, including the *dorſum* and *vola*; and the fingers, *digiti*. See Carpus, Metacarpus, and Fingers.

The muſcles whereby the *hand* is moved and directed, are the *palmares*; the *flexor* and *extenſor*, *carpi*, *ulnaris*, and *radialis*; *perforatus*; *perforans*; *lumbricalis*; *interoſſei*; *extenſors*, *abductors*, and *flexors* of the fingers. See each in its place; Palmaris, Flexor, Extensor, &c.

Hand, *cartilages of the*. All the bones of the carpus, metacarpus, and fingers, are cruſted over with cartilages, at thoſe places called cartilaginous ſurfaces, in the deſcriptions of thoſe bones; but in the freſh bones they are much thicker, ſofter, and whiter, than in the ſkeleton. In adult ſubjects, their figure indeed remains the ſame in both ſtates, but it changes in the dried bones of younger ſubjects, particularly thoſe of children. Winſlow's Anatomy, p. 143.

Hand, *ligaments of the*. The ligaments of the carpus are very numerous. Some of them ſerve to tie each bone of it to the neighbouring bones in the ſame rank; and theſe are ſo very ſhort as to allow theſe bones only a very ſmall degree of motion; ſome of them tie the bones of one row to thoſe of another; theſe are likewiſe made up of numbers of filaments, but are not ſo ſhort as the former, and allow thoſe bones a more manifeſt motion; and laſtly, there are other ligaments of the wriſt, by which the three firſt bones of the firſt row are connected with thoſe of the arm, and to theſe may be added thoſe of the ſecond row, by which its bones are connected to thoſe of the metacarpus, and to the firſt phalanx of the thumb. Beſide all theſe ſhort ligaments belonging to each bone, in both rows, the rough ſurfaces of all the bones, eſpecially of thoſe which form the convexity of the carpus, give inſertion to a great many ligamentary faſciculi, which are ſtretched over, and cloſely united to the former ſmall ligaments, and probably ſerve to ſtrengthen them: there is likewiſe a conſiderable ligament, called the inner tranſverſe ligament of the carpus. It has formerly been called an annular ligament, and may ſtill juſtly enough retain that name.

The bones of the metacarpus, beſide thoſe ligaments by which they are tied to the ſecond row of the bones of the carpus, have ſeveral others by which both their baſes and heads are connected together. The baſes of the third and fourth bones are not ſo cloſely connected as the reſt, and therefore have a very ſenſible motion. The heads of theſe bones are firmly tied to each other by a ſtrong ligament, ſituated tranſverſely in the palm of the hand, and fixed, by diſtinct productions, in the neighbouring parts of the heads. The firſt phalanx of the thumb is fixed to the os trapezium by ſhort ligaments, which paſs obliquely over the articulation. The firſt phalanges of the four fingers are joined to the heads of the metacarpal bones by ligaments like the former, and almoſt in the ſame manner. The third phalanx of the thumb is joined to the ſecond, and the ſecond phalanges of the other fingers to the firſt, and the third to the ſecond, by lateral ligaments, almoſt in the ſame manner as the bones of the fore-arm to the os humeri; that is, theſe ligaments ſpread from a point fixed in the lateral tubercles of the heads of the phalanges, and are inſerted in their other extremity like radii in the baſes of the neighbouring phalanges. The two firſt phalanges of each finger have a ſtrong ligamentary vagina, inſerted in the rough lines or ridges, on their flat ſides; theſe vaginæ are lined with a mucilaginous membrane, which runs like a tube from one phalanx to the other, over the articulation. They ſerve for fræna to the flexor muſcles of the fingers, the tendons of which paſs through them. Winſlow's Anatomy, p. 143.

HAND, *luxation of the.* Notwithſtanding that the *hand* is very accurately connected to the ulna and radius, by means of the carpus, and ſtrong ligaments, yet it is liable to luxations, and ſometimes ſuffers them in all directions either outward or inward, or on either ſide; but is generally not ſo eaſy to be luxated ſideways, as in the other directions, becauſe of the two proceſſes of the radius and ulna which guard it on each ſide. The *hand* is ſaid to be luxated forwards or inwards, when it recedes from the muſcles which bend the fingers; and to be luxated backward, when it departs from the muſcles which extend the fingers. Much in the ſame manner alſo the *hand* is ſaid to be luxated outwards, when the carpus makes a tumor near the thumb, and a cavity near the little finger; and to be luxated inward, when the contrary of this happens.

To reduce luxations of the *hand*, it muſt be ſufficiently extended by two aſſiſtants, one of which is to lay hold of the *hand*, and the other of the humerus, pulling in oppoſite directions; and that part of the extended *hand* where the ſinus is, muſt be placed on a flat and even table, that whatever ſticks up may be depreſſed into its place; by which method the *hand*, in whatever part luxated, may be very readily reduced into its natural ſeat. It alſo ſometimes happens, that one or two of the eight little bones of the carpus are luxated and diſtorted from their natural ſeat by ſome external violence. When this happens, there will be perceived a tumor in one part, and a cavity in another, which may be perceived by the feeling, as well as by the ſight, and the patient will feel very violent pains. This is a luxation very readily and eaſily cured, by extending the *hand* as before directed, and replacing the bone. Heiſter's Surg. p. 165.

The *hand* makes the ſubject of the art of palmiſtry, which is employed in conſidering the ſeveral lines and eminences of the palm of the *hand*, their ſignifications, &c. Among the Egyptians, the *hand* was uſed as a ſymbol of ſtrength; among the Romans, it was held a ſymbol of fidelity; and, accordingly, was conſecrated to that goddeſs, by Numa, with great ſolemnity.

HAND, in *Falconry*, is uſed for the foot of the hawk. To have a clean, ſtrong, ſlender, glutinous *hand*, well clawed, are ſome of the good qualities of a hawk, or falcon.

HAND, in the *Manege*, is a term variouſly uſed. Sometimes it ſtands for the fore-feet of a horſe.

Hand is alſo uſed for a diviſion of the horſe into two parts, with reſpect to the riders *hand*. The *fore-hand* includes the head, neck, and fore-quarters; the *hind-hand* is all the reſt of the horſe.

Spear-hand, or *ſword-hand*, is uſed for a horſeman's right *hand*.

Bridle-hand is the horſeman's left *hand*.

Your regular cavalier holds his *bridle-hand* two or three inches above the pommel of the ſaddle.

A horſeman is ſaid to have *no hand*, when he only makes uſe of the bridle unſeaſonably; not knowing how to give the aids, or helps, of the *hand* with diſcretion.

To keep a horſe *upon the hand*, ſignifies to feel him in the ſtay upon the *hand*, and to be always prepared to avoid any ſurprize from him. When the horſe obeys and anſwers the effects of the *hand*, he is ſaid to *reſt well upon the hand*.

A horſeman ought to have a *light hand*, i. e. he ought only to feel the horſe upon his *hand*, ſo as to reſiſt him whenever he attempts to ſlip from it; and as ſoon as he has made his reſiſtance, he ought to lower the bridle, inſtead of cleaving to it.

If a horſe, by a too great eagerneſs to go forward, *preſſes* too much *upon the hand*, it ought to be ſlackened at certain times, and at other times to be kept hard, in order to diſappoint him from continually preſſing upon the bit. This facility, or liberty, of the horſemen, of ſlackening or ſtiffening the *hand*, makes what they call a *good hand*.

A horſe is ſaid to *force the hand*, when he does not fear the bridle, but runs away in ſpite of the rider.

To *work a horſe upon the hand*, is to manage him by the effects of the bridle, without any other helps, except the calves of the legs.

To be *heavy upon the hand*, is underſtood of a horſe, which, on account of the ſoftneſs of his neck, the weakneſs of his back, the largeneſs of his head, and the weight of his fore-quarters, or his wearineſs, throws himſelf upon the bridle, without making any reſiſtance, or effort, to force the horſeman's *hand*.

To make a horſe right upon the *hand*, and free in the *ſtay* or *reſt*, he muſt he taught to know the *hand* by degrees, and gentle methods; the horſeman muſt turn him, or change *hands*; ſtop him, and manage with dexterity the *appui*, or preſſure of his mouth, ſo as to make him ſuffer chearfully and freely the effect of the bit-mouth, without reſiſting or reſting heavy upon the *hand*. The ſhort, or *hand*-gallop, teaches horſes to be right upon the *hand*.

HAND is alſo found, in many other terms, or phraſes of art, belonging to the manege, as,

HAND, *to ſlack or yield the*, is to ſlacken the bridle.

HAND, *to hold up, or ſuſtain the*, is to pull the bridle in.

HAND, *to guide a horſe by the*, is to turn or change *hands* upon one tread.

HAND, *appui, or ſtay of the*. See APPUI.

HAND, *beat upon the*. See BEAT and CHACK.

HAND, *to preſs upon the*. See PRESS.

HAND, *to change the*. See CHANGE.

HAND, *effects of the*. See EFFECTS.

HAND, *haſten the*. See HASTE.

HAND, *to feel a horſe upon the*. See FEEL.

HAND, *full, or full reſt upon the* HAND. See APPUI and MOUTH.

HAND, *to have mares covered in the*. See HORSE and MARE.

HAND, *to make a horſe part from the*, or ſuffer him *to ſlip from the* hand, is to put on at full ſpeed.

HAND, *to make a horſe part right from the*, he ſhould not put himſelf upon his back or reins, but bring down his hips.

HANDS, *all*. A horſe is ſaid to turn upon *all hands*, that is not reſty for one *hand*. This is called in French ENTIER.

HAND, *harmonical*, in *Muſic*, is uſed, by ſome writers, for the ancient diagramma, or ſcale of muſic, upon which they learned to ſing.

The reaſon of the appellation was, that Guido Aretin, upon inventing the notes, *ut*, *re*, *mi*, *fa*, *ſol*, *la*, diſpoſed them on the fingers of the figure of a *hand* ſtretched out. He changed the letters of the alphabet, uſed till that time to expreſs the notes, for theſe ſix ſyllables, which he took out of the firſt ſtrophe of the hymn of St. John Baptiſt, compoſed by Paulus Diaconus.

> Ut *queam laxis* re-*ſonare fibris*
> Mi-*ra geſtorum* fa-*muli tuorum*,
> Sol-*ve polluti* la-*bii reatum*.
> *Sancte Joannes.*

HAND *of juſtice*, is a ſceptre, or batoon, a cubit long, having an ivory *hand* at the extremity thereof; uſed as an attribute of certain kings, wherewith they are painted in their royal robes; as on the coronation day.

Authors uſually call it *virga*. Louis X. of France firſt took the *hand* of juſtice for his device.

HANDS, *impoſition of*, or *laying on of* HANDS, ſignifies the conferring of holy orders; a ceremony wherein the *hands* are laid on the head of another, as a ſign of a miſſion, or of a power given him to exercise the functions of the miniſtry belonging to the order.

The apoſtles began to appoint miſſionaries by the impoſition of *hands*. See IMPOSITION.

Waſhing one's **HANDS** of a thing, ſignifies the witneſſing that a perſon has no part or concern in an affair; and that he will not be anſwerable for it: this Pilate did in reſpect of our Saviour's death. In this ſenſe, a man is ſaid to have *clean hands*; becauſe the *hands* are the chief inſtruments of action; and particularly a judge does this, to denote that he has not been corrupted by bribes or preſents.

Hand, *left.* To marry with the *left-hand*, is to eſpouſe a woman of inferior degree, whoſe children, in virtue of ſuch marriage, are not to ſucceed to the father, nor ſhare with the other children, but are to be contented with what fortune the huſband ſhall appoint them the next day after marriage.

This method of taking *left-handed wives* obtains at this time in Germany.

Hand is alſo uſed for the INDEX of a clock, watch, or the like, ſerving to point the hour, &c.

Hand, *long, longimanus*, a kind of title, or ſurname, aſſumed by certain princes. Artaxerxes, the ſon of Xerxes, and his ſucceſſor in the Perſian empire, was thus denominated; as having *hands* ſo long, that he could touch his knees with them when he ſtood upright.

Hand, *ſhort.* See TACHYGRAPHY.

Hand, *bloody.* See BLOODY *hand.*

Hand is alſo figuratively uſed in painting, ſculpture, &c. for the manner, or ſtyle, of this or that maſter.

Hands are borne in coat-armour, *dexter* and *ſiniſter*; that is, right and left; expanded or open; and after other manners.

Azure, a *dexter hand* couped to the wriſt, and extended in pale argent, is borne by the name of Brome. Argent, three *ſiniſter hands*, couped to the wriſt, gules, by the name of Maynard.

Knights BARONETS are to bear in a canton, or in an eſcutcheon, as they pleaſe, the arms of Ulſter; viz. in a field argent, a *ſiniſter hand* couped to the wriſt, gules.

Hand, or **Handing**, in the *Sea-Language.* When a thing is to be delivered away, or paſſed from one to another, or to be brought to any one, then the word is, *hand* it this way, or that way. Alſo, when more men are wanted to do any labour, as hoiſing, &c. they call for more *hands*, not more men.

Handing the ſails is the ſame operation as FURLING them.

Hand *in and out*, in our *Old Writers*, the name of an unlawful game, now diſuſed and prohibited by the ſtatute 17 Edw. IV. cap. 2.

Hand-*barrow*, in the *Military Art*, is commonly made of hard light wood. It is of great uſe in fortification, for carrying earth from one place to another, and in a ſiege, for carrying bombs, or cannon-ball, along the trenches, and for ſeveral other uſes.

Hand-*borow*, a pledge, or ſurety, of the lower rank.

Eſt quaſi vas, aut fidejuſſor manuenſis, hoc eſt, minor, ſeu inferior; nam head-borow, vas eſt capitalis, vel ſuperior. Spelman. See HEADBOROUGH.

Hand-*breadth*, is ſometimes uſed for a meaſure of three inches.

Hand-*cuffs*, an inſtrument formed of two circular pieces of iron, each fixed by a hinge on the ends of a ſhort iron bar, which being locked over the wriſts of a malefactor, prevents his uſing his hands.

Hand-*grenades.* See GRANADO.

Hand-*over-hand*, in *Sea Language*, is an order to the men, who pull upon any rope, to paſs their hands alternately one before, or above the other, if they are hoiſing, in order to haſten the ſervice. A ſailor is ſaid to go aloft, *hand-over-hand*, when he aſcends into the tops by a ſingle rope, as a ſhroud or back-ſtay, without the help of the rattlings, by the dexterity of throwing one *hand* above the other, and lifting his weight along with it.

Hand-*ſcrew.* See JACK.

Hand-*ſpike*, or *hand-ſpec*, a lever, or piece of aſh, elm, or other ſtrong wood, five or ſix feet long, cut thin like a wedge at one end, that it may get the eaſier betwixt things which are to be ſeparated, or under any thing that is to be raiſed; it is better than a crow of iron, becauſe its length allows a better poiſe.

Hand-ſpikes are uſed in ſhips, to traverſe the ordnance, to heave with in a windlaſs, to weigh up the anchor, &c. The gunners *hand-ſpike* is ſhorter and flatter than the other, and armed with two claws, for the purpoſe of managing the artillery in battle, &c.

Hand, or **Handful**, is a meaſure of four inches, by the ſtandard; according to the ſtatute 33 Hen. VIII. cap. 5.

The *hand*, among *Jockeys*, is four fingers breadth, and is the meaſure of a fiſt clenched; by this the height of horſes is meaſured.

A horſe for war ſhould be ſixteen or eighteen *hands* high.

A *handful* of corn or bran is alſo underſtood to be as much grain or bran as two *hands* will hold, when joined together; a quantity frequently ordered to be given horſes.

HAND-HABEND, in our *Ancient Cuſtoms*, denotes a thief taken in the very fact.

Hand, or *bond-habend*, from the Saxon *hond*, *hand*, and *habend*, *having*, is a circumſtance of manifeſt theft, when the party is taken with the mainor, or mainover, i. e. the thing ſtolen, in his *hand.*

Bracton alſo uſes *hand-berend* in the ſame ſenſe. *Sc. Latro manifeſtus.*

So in Fleta, *Furtum manifeſtum eſt ubi aliquis latro deprehenſus ſeiſitus de aliquo latricinio* hand-habbinde, & back-berinde, & *inſecutus fuerit per aliquem cujus res illa fuerit, quæ dicitur Sacborgh, & tunc licet inſecutori rem ſuam petere criminaliter ut furatam.* Lib. i. cap. 38. § 1.

Hand-habend alſo ſignifies the right which the lord has to judge and determine of this offence in his court.

HANDACOCHA, in *Botany*, a name by which Pliny, and ſome other authors, have called the *trifolium bituminoſum*, or ſtinking trefoil.

HANDGRITH, in our *Old Writers*, peace or protection given by the king with his own hand. *Hæc mittunt hominem in miſericordia regis, infractio ſeu violatio pacis quam per* manum *ſuam dabit alicui.* Leg. Hen. I.

The word is Saxon, from *hant*, or *hond*, *manus*, and *grith*, *pax.*

HANDLING, a term uſed in reſpect of fighting cocks; ſignifying the meaſuring the girth of them, by griping one's hands and fingers round the cock's body.

HANDY-*warp*, in our *Old Writers*, a kind of cloth mentioned in ſtat. 4 & 5 Phil. & Mar. cap. 5.

HANG-*benches*, in *Mining.* See STOWS.

HANGING *in chains.* See CHAINS.

HANGINGS, linings for rooms, made of arras, tapeſtry, or the like.

HANIG, in our *Old Writers*, a term for cuſtomary labour to be performed.

HANK *for hank*, in *Sea Language*, is a phraſe uſed for two ſhips which tack and make a progreſs to windward together.

HANKS, in a *Ship*, are certain wooden rings fixed upon the ſtays of a ſhip, whereby to confine the ſtay-ſails to them at different heights. They are a later invention, and much more convenient than the GROMMETS, and uſed inſtead of them.

HANTELODE, in our *Old Writers*, ſignifies an arreſt.

The word is Saxon, from *hant*, *hand*, and *load*, i. e. *laid*; *manus immiſſio*, becauſe arreſts are made by laying hold on the debtor, &c.

HANGWITE, **Hangwita**, a mulct impoſed for the hanging a thief, or felon, without courſe of law; or even for ſuffering him to eſcape out of legal cuſtody.

The word is alſo written, corruptly, *hangwith*, or *hankwite.* It is formed from the Saxon *hangian*, *to hang*, and *wite*, *mulct*, *compenſation.*

Hangwite, *to be quit of*, *quietus eſſe de hangwita*, in *Royal Charters*, denotes an immunity or freedom from the mulct or penalty above mentioned. *Quit de larron pendu ſans ſerjeants le roy.*

HANSE, or **Hans**, an ancient name for a ſociety or company of merchants; particularly that of certain cities in Germany, &c. hence called *hanſe towns.*

The word *hanſe* is obſolete High Dutch, or Teutonic; and ſignifies, as Lambecius obſerves in his Origines Hamburgenſes, *alliance*, *confederacy*, *aſſociation*, &c. In this ſenſe it is uſed in two of king John's charters, in 1199, to Dunwich in Norfolk, and the city of York. Some, as Werdenhagen, who has been followed by many later authors, derive it from the three German words, *an-der-ſee*, that is, *on the ſea*; becauſe the firſt *hanſe towns* were all ſituate on the ſea-coaſt; whence the ſociety is ſaid to have been firſt called *an-der-ſee ſteten*, that is, *cities on the ſea*; and afterwards, by abbreviation, *hanſee*, and *hanſe.*

Hanse *towns* are certain free towns of Germany, and the North, united in ſtrict league, under laws and magiſtrates of their own appointing, for the better carrying on of commerce, and for their mutual ſafety and aſſiſtance.

This celebrated aſſociation, which makes ſo great a figure in the hiſtory of commerce, is ſuppoſed by Werdenhagen to have commenced in the year 1169, immediately after the incurſions and piracies of the Danes, &c. The learned Lambecius is of opinion, that it did not properly commence till after the league between Lubeck and Hamburgh, in the year 1241; Thuanus, in lib. li. Hiſt. Sui Temp. traces the origin of it to the year 1200; others trace its firſt riſe to the year 1140; but be its origin when it will, it was confirmed and re-eſtabliſhed in 1226 and 1284; and an extraordinary general aſſembly was held every ten years, at which they ſolemnly renewed their league, admitted new members, and excluded old ones, if they were refractory, &c.

At firſt it only conſiſted of twelve towns, ſituate on the coaſts of the Baltic ſea, or not far from it. But its ſtrength and reputation increaſing, ſcarce any trading city in Europe but deſired to be admitted into it. However, it ſeems to have been a ſtanding rule of this confederacy, that no city ſhould be admitted into the *hanſe* league, but ſuch as were either ſituated on the ſea, or on ſome navigable river, commodious for maritime commerce.

Under our king Henry III. who, in the year 1266, made a conſiderable grant of immunities to the *hanſe* towns, the *hanſe* conſiſted of no leſs than ſeventy-two cities; to which were afterwards added ſeveral more. France furniſhed to the confederacy Calais, Rouen, St. Malo, Bourdeaux, Bayonne, and Marſeilles; Spain, Barcelona, Seville, and Cadiz; England, London; Portugal, Liſbon; the Low Countries, Antwerp, Bruges, Rotterdam, Oſtend, and Dunkirk; and Italy and Sicily, Meſſina, Leghorn, and Naples. However, the number of the *hanſe* towns, which were properly members of the *hanſeatic* league, and contributed to its ſupport, was ſixty-four, in the year 1370, which was the period when this mercantile confederacy was in its zenith of power and glory; moſt of which have long ſince deſerted the league; ſome about the year 1512, and ſome afterward. Beſides theſe there were forty-four towns that were properly allies of the confederacy, and were exempted from annual contributions; and to theſe ſeveral others, ſuch as thoſe above mentioned, were added.

The *hanſe* was divided into four claſſes, or members, which were thoſe of Lubeck, Cologn, Brunſwick, and Pruſſia or Dantzick. Theſe four cities were the heads of the four members; and Lubeck was the head of the whole *hanſe*.

Beſides this, the *hanſe* had four principal factories, or ſtaples, called the *comptoirs* of the confederacy: theſe were at London, Bruges, Novogrod, and Bergen; that of Bruges was afterwards removed to Antwerp. But the firſt and principal was that of Lubeck, which ſtill remains the head of the aſſociation. That of London was called *Guildhalla Teutonicorum*, or the *Steel-yard*.

The government of the *hanſe* was at firſt ariſtocratical: then it came under the ſole direction of the grand maſter of the Teutonic order; and, at length, divers princes and lords made intereſt for it.

The end of the fourteenth century, and the beginning of the fifteenth, were the moſt flouriſhing times of this alliance. Theſe towns were then in a condition to proclaim war againſt kings: hiſtory is not ſilent as to that they waged againſt Waldemar king of Denmark, about the year 1348, and againſt Eric, in 1428; particularly this laſt, when the *hanſeatic* fleet conſiſted of two hundred and ſixty ſhips, containing about twelve thouſand regular troops, beſide the ſeamen.

But the ſeveral princes, whoſe principal cities were entered into the aſſociation, began to think it policy to put ſome bounds to a power, which, in time, might have proved formidable to themſelves. The means were eaſy, and ſhort: each withdrew the merchants of his country from the aſſociation; by which, in a little time, from the great number of cities it had comprehended, the aſſociation found itſelf ſunk to thoſe few which had begun the confederacy; which henceforth was called the *Teutonic hanſe*: though theſe are ſtill ſo conſiderable in point of commerce, that they are admitted to make treaties with the greateſt kings.

The diviſions that were got among them, contributed greatly to their fall: nor muſt it be forgot, that the eſtabliſhment of the republic, and commerce of Holland, had its ſhare therein.

The four cities which formed the league, were Lubeck, Cologn, Brunſwick, and Dantzick, which were called *mother towns*; as thoſe afterwards added thereto, were called *daughters* thereof.

A great number of towns in Germany ſtill retain the title of *hanſe towns*; but this is rather an empty title which they affect, than any argument of their continuing to trade under the laws and protection of the ancient alliance; there being ſcarce any but Lubeck, Hamburgh, Bremen, Roſtock, Brunſwick, and Cologn, that are truly *hanſeatic*, and that have deputies at the aſſemblies held on the common occaſions thereof.

The great trade the Dutch maintain with the *hanſe towns*, contributes not a little towards maintaining ſome part of them in their ancient reputation; and it is principally to their alliance with that flouriſhing republic, that they owe the preſervation of their liberties; the ſuccours ſome of them have received from the Dutch, having ſaved them more than once from the enterprizes of the neighbouring princes.

HANSEATIC, ſomething belonging to the alliance, or company of the HANSE.

Thus we ſay, the *hanſeatic* body; the *hanſeatic* towns, &c.

HANSGRAVE, the title of an officer in Germany. The *hanſgrave* is the chief of a company, or ſociety.

The word is compounded of the German *hanſe* and *graf*, *count*. See GRAVE.

HAP, or HAPP, in *Law*, ſignifies, to catch or ſnatch a thing. Thus we meet with, to *hap* the poſſeſſion of a deed-poll. Littleton, fol. 8. alſo, to *hap* the rent. If partition be made between two parceners, and more land be allowed the one than the other, ſhe that hath moſt of the land charges it to the other, and *happeth* the rent whereon aſſize is brought.

HAPPINESS, in *Ethics*. See GOOD.

HAQUE, in our *Old Writers*, a little hand-gun, prohibited to be uſed for deſtruction of game, &c. by ſtatute 33 Hen. VIII. cap. 6. and 2 & 3 Ed. VI. cap. 14. There is alſo the *half-haque*, or *demi-haque*, within the ſaid acts.

HAQUENY, HACKNEY, an old French word for an ambling horſe.

HAQUEBUT, a kind of fire-arm, otherwiſe called an *hagbut*, or HARQUEBUSS.

HARACH, in the *Eaſtern Revenues*, is a poll-tax laid on the Chriſtians and Jews in Egypt. This had long been in the hands of the janizaries, but of late has got into the power of an officer, called thence the *harach aga*, ſent from Conſtantinople. Before this the Chriſtians paid but a trifle, by capitulation with ſultan Selim; and this capitulation the Coptis ſay they have in their own hands, it was only two dollars and three quarters a head. The great men conſented to this; and now they pay either two or three quarters, or five and a half, or eleven, according to their ſubſtance, each dollar being about half a crown. The perſons who pay this are thoſe only who have arrived at the age of ſixteen. Pococke's Egypt, p. 173.

HARAHA, in *Botany*, a name uſed, by ſome authors, for the GOURD.

HARAM. See SERAGLIO.

HARANGUE, a modern French name for a ſpeech, or oration, i. e. a diſcourſe made by an orator in public.

Menage derives the word from the Italian *arenga*, which ſignifies the ſame; formed, according to Ferrari, from *arringo*, a *juſt*, or *place of juſting*. Others derive it from the Latin *ara*, *altar*; becauſe the firſt *harangues* were made before altars: whence the verſe of Juvenal,

Aut Lugdunenſis rhetor dicturus ad aram.

The word is alſo frequently uſed in an ill ſenſe; viz. for a too pompous, prolix, or unſeaſonable ſpeech or declamation. In Homer the heroes generally *harangue* before they come to fight; as, in England, criminals *harangue* on the ſcaffold before they die.

HARANKAHA, in the *Materia Medica*, a name by which ſome authors have called ZEDOARY.

HARBINGER, an officer of the king's houſhold, having four yeomen under him, who ride a day's journey before the court when it travels, to provide lodgings, &c.

HARBOUR, a ſea-port, or a ſtation where ſhips may ride ſafe at anchor.

The word is chiefly applied to thoſe cloſed and ſecured with a boom, or chain; and that are furniſhed with a mole, &c. See PORT.

To HARBOUR, *verb*; popularly ſignifies to lodge, receive, or entertain; or to find a retiring place.

Among hunters, a hart is ſaid to *harbour*, when he goes to reſt; whence to *unharbour* a deer, is to diſlodge him.

HARD *beam*, in *Botany*. See HORNBEAM.

HARD *bodies*, in *Natural Hiſtory*. By *hard bodies* are underſtood ſuch bodies as are abſolutely inflexible by any ſhock or colliſion whatſoever.

This is the common meaning of the term; but Huygens, by *hard bodies (corpora dura)* meant what others call perfectly elaſtic bodies; for he thus expreſſes himſelf: *Quæcunque ſit cauſa*, corporibus duris, *a mutuo contactu reſiliendi cum ſe invicem impinguntur*; *ponimus*, *cum corpora duo inter ſe æqualia*, *æquali celeritate*, *ex adverſo ac directe ſibi mutuo occurrunt*, *reſilire utrumque eadem qua advenit celeritate*. Huyg. De Motu Corp. ex Percuſſ. Hypoth. 2. But this hypotheſis is conſiſtent only with perfect elaſticity, and not with the common ſuppoſition of *hardneſs* or inflexibility, which produces no reſilition.

The laws of motion for *hard bodies* are the ſame as for ſoft bodies; and theſe two ſorts of bodies might be comprized under the common name of *unelaſtic*.

Some who follow Leibnitz's doctrine, concerning the meaſure of the moving FORCE of bodies, deny the exiſtence of *hard* or inflexible bodies. And it is ſo far true, that no experience ever taught us, that there are any ſuch. The *hardeſt* bodies, to appearance, do not preſerve their figures in colliſion, ſuch bodies being only elaſtic, yielding to the ſhock, and then reſtoring themſelves.

Mr. Bernouilli goes ſo far as to ſay, that *hardneſs*, in the vulgar ſenſe, is abſolutely impoſſible, being contrary to the law of CONTINUITY. For ſuppoſing two ſuch *hard bodies* of equal maſſes, and with equal velocities, to meet directly, they muſt either ſtop or return after the colliſion. The firſt ſuppoſition is commonly admitted; but then it follows, that theſe bodies muſt inſtantaneouſly paſs from motion to reſt, without going through ſucceſſive diminutions of their velocities till they ſtop: but this is thought to be contrary to the fundamental laws of nature. See Bernouilli Oper. tom. iii. p. 10.

Hence this author rejects perfectly ſolid and inflexible atoms, which others think a conſequence of the impenetrability of matter. See Maupert. Mem. de l'Acad. Berlin. tom. ii. p. 284.

Hard *horſe*, in the *Manege*, is one that is inſenſible of whip or ſpur.

Hard-a-lee, in *Sea Language*, denotes the ſituation of the helm, when it is puſhed cloſe to the lee-ſide of the ſhip, either to tack or keep her head to the wind, when lying-by, or trying. It expreſſes alſo the order to put the helm in this poſition.

Hard-a-weather, is the order to put the helm cloſe to the weather or windward-ſide of the ſhip, and it ſignifies this poſition of the helm.

HARDENING, the act of communicating a greater degree of *hardneſs* to a body than it had before.

The *hardening* and tempering of iron and ſteel make a conſiderable article in the mechanical arts.

There are divers ways of effecting it: as by the hammer, quenching it when hot, in cold water; caſe hardening, &c. See Tempering and Steel.

Hardening, *hammer*, is moſtly uſed on iron and ſteel plates, for ſaws, ſprings, rules, &c.

Hardening, *caſe*, which is a ſuperficial converſion of iron into ſteel (ſee Case-*hardening*) is thus performed: take cow-horn or hoof, dry it well in an oven, and beat it to powder; put as much bay-ſalt as of this powder into ſtale urine, or white-wine vinegar, and mix them well together; cover the iron, or ſteel, all over with this mixture, and wrap it up in loam, or plate-iron, ſo as the mixture touch every part of the work; then put it in the fire, and blow the coals to it, till the whole lump have a blood-red heat, but no higher; laſtly, take it out, and quench it. See Steel, under which article other proceſſes for this purpoſe are deſcribed.

Hardening *of timber*. The Venetians are famous for the ſoundneſs of their ſhips, which do not rot as thoſe of other nations, but will endure much longer than the others. Tachenius tells us, that the whole ſecret of this conſiſts in the manner of their *hardening* their timber intended for this ſervice; and that this is done by ſinking it in water while green, and leaving it there many years. This prevents the alkali, or that ſalt which furniſhes the alkali in burning, from exhaling afterwards; and by this means the timber becomes almoſt as incorruptible as ſtone. It is evident that the exhaling of this ſalt, and the rotting of wood, have ſome very great connexion with one another, ſince the more ſound any piece of timber is, the more ſalt it proportionably yields; and the wood which is rotten is found on trial to contain no ſalt at all. Tachen. Hippocr. Chym.

HARDER, in *Zoology*, a name given by ſome to a fiſh of the mullet kind, called by Marcgrave pastor *piſcis*.

HARDNESS, *Durities*, in *Philoſophy*, that quality in bodies whereby their parts cohere firmly together, ſo as to reſiſt the touch.

In this ſenſe, *hardneſs* coincides with what, on other occaſions, we call *firmneſs*, and ſometimes *ſolidity*; in oppoſition to *fluidity*.

More ſtrictly ſpeaking, a body is ſaid to be *hard*, when its parts mutually cohere, ſo as not to yield inwards, or give way to an external impulſe; and therefore are not ſubject to any motion in reſpect of each other, without breaking the body. In which ſenſe *hardneſs* ſtands oppoſed to *ſoftneſs*, where the parts do readily give way.

The Peripatetics make *hardneſs* a ſecondary quality; as ſuppoſing it to ariſe from *dryneſs*, which is a primary one, and to be in proportion thereto.

Its remote cauſes, according to them, are either heat or cold, according to the diverſity of the ſubject: heat producing dryneſs, and by that means *hardneſs* in clay; and cold doing the like in wax.

The Epicurean and corpuſcular philoſophers account for *hardneſs*, from the figure of the component parts, and their union together. Accordingly, ſome aſcribe it to the atoms, or particles of the body being hooked, and thus mutually catching and hanging upon one another: but this is directly bringing that for an anſwer, which was the queſtion. For how do thoſe hooked parts cohere?

Again, the Carteſians will have the coheſion of hard bodies effected by reſt; that is, by nothing at all.

Sir Iſaac Newton ſhews, that the primary particles of all bodies, whether ſolid or fluid, are *hard*, perfectly *hard*; and are not capable of being broken or divided by any power in nature.

Theſe particles he maintains to be connected together by an attractive power; and according to the circumſtances of this attraction, the body is either hard, or ſoft, or even fluid.

If the particles be ſo diſpoſed or fitted for each other, as to touch in large ſurfaces, ſuch body will be hard; and the more ſo, as thoſe ſurfaces are the larger. If, on the contrary, they only touch in ſmall ſurfaces, the body, by the weakneſs of the attraction, will remain ſoft.

HARDS, or **Hurds**, of flax, or hemp, denote the coarſer parts ſeparated in the dreſſing of it, from the tear, or fine ſtuff.

HARDWIC. See Herdewic.

HARDY-*ſhrew*, a name given by the people in ſome parts of England to the mus araneus, called more uſually the *ſhrew*, or the shrew-*mouſe*.

HARE, *Lepus*, in the Linnæan ſyſtem of *Zoology*, makes a diſtinct genus of animals, of the order of *glires*; the characters of which are, that the animals of it have feet made for running, with five toes on the fore ones, and four on the hinder, have very long ears, a ſhort tail, and two cutting teeth in each jaw. Under this genus the author takes in all the creatures of the *hare* and rabbit kind.

What is moſt particular in the *hare* is, that the hinder legs are much longer than the fore ones, and are furniſhed with extremely ſtrong muſcles; by which means the creature, naturally defenceleſs, is furniſhed with a power of running very ſwiftly from its purſuers, and of aſcending ſteep places; and on this account the *hare* always makes towards the riſing ground when ſtarted. The head is roundiſh, the eyes prominent, and the upper lip ſplit; its ears are very long; and it is ſaid to ſleep with its eyes open, for fear of danger; it lies hid all day, but in the night goes out in ſearch of food, and returns to its form by the ſame way, by which it had left it.

The colour of the *hare* approaches near to that of the ground; and in northern countries this, as well as other animals, changes colour, and becomes white at the beginning of winter, ſo that they are leſs conſpicuous in the ſnow: we have accidental inſtances of white *hares*.

The food of this animal is entirely vegetable; and it is particularly fond of pinks, parſley, and birch. The *hare* never pairs; but in the rutting ſeaſon, which begins in February, the male purſues and diſcovers the female, by the ſagacity of its noſe. The female breeds often in the year; goes with young a month, and brings uſually two, and ſometimes three or four, at a time. *Hares* are very ſubject to fleas; and Linnæus tells us, that the Dalecarlians make a ſort of cloth of the fur, called filt, which preſerves the wearer from their attacks. The fur of *hares* is a very conſiderable article in the hat manufacture, and many thouſand of the ſkins are annually imported for that uſe from Ruſſia and Siberia.

The ſportſmen diſtinguiſh four ſorts of this animal: the one lives in the mountains; the ſecond kind in open fields; a third kind in marſhy grounds; and the fourth is a rambler, having no particular fixed ſpot of reſidence. It is eaſy to ſee that theſe are no diſtinction in the eye of the naturaliſt; but they have their ſeveral properties, according to theſe differences of place, which are of conſequence to the ſportſmen. Thus the mountain *hares* are the ſwifteſt of all, and the marſh *hares* the ſloweſt; the field *hares* have a middle degree of ſwiftneſs between theſe; and the rambling *hares* are the moſt difficult of all others to hunt, for they are not only conſiderably ſwift, but they generally know all the coverts and thickets, and have the art to make a thouſand doublings and eſcapes that the others would not think of. See *Hare*-Hunting.

Hares and rabbits are very miſchievous to new planted orchards, by peeling off the barks of the tender and young trees for their food. They do alſo the ſame ſort of miſchief to nurſeries; for the prevention of which, ſome bind ropes about the trees up to ſuch a height as they are able to reach; ſome daub them with tar; but though this keeps off the *hares*, it is itſelf miſchievous to the trees; but this hurtful property of it is in ſome degree taken off by mixing any kind of fat or greaſe with it, and incorporating them well over the fire. This mixture is to be rubbed over the lower part of the trees in November, and will preſerve them till that time the next year, without any danger from theſe animals. It is only in the hard weather in the winter ſeaſon, when other food is ſcarce, that theſe creatures feed on the barks of trees.

People who have the care of warrens, pretend to an odd way of making *hares* fat when they get them there. This is the ſtopping up their ears with wax, and rendering them deaf. The *hare* is ſo timorous a creature, that ſhe is continually liſtening after every noiſe, and will run a long way on the leaſt ſuſpicion of danger; ſo that ſhe always eats in terror, and runs herſelf out of fleſh continually. Theſe are both prevented by her feeding in a ſafe place, and that without apprehenſion; and they ſay ſhe will always readily be fattened in this way.

However delicious the *hare* may be eſteemed now, our anceſtors thought it a crime to taſte it, as we learn from

Cæſar, Com. lib. v. in which they agreed with the Jews. Among the Romans it was reckoned a great delicacy. Thus Martial, xiii. 92.

Inter quadrupedes gloria prima lepus.

And Horace, in the ſecond ſatire of his fourth book, extols the wing of the fruitful *hare:*

Fœcundi leporis *ſapiens ſectabitur armos.*

Though the *hare* lives on vegetables and water only, yet the habitual exerciſe of this animal exalts its ſalts, and renders it ſomewhat alcaleſcent; and this tendency is much increaſed, if it is killed immediately after being heated by ſtrong exerciſe.

Hare, *Alpine*, which inhabits the ſummits of the highland mountains of Scotland, Norway, Lapland, Ruſſia, Siberia, and the banks of the Wolga, has ſhorter ears, and more ſlender legs, and is leſs in ſize than the common *hare.* Its hair is ſoft, and in ſummer of a grey colour, mixed with a little black and tawny; but in winter the whole animal changes to a ſnowy whiteneſs, except the tips and edges of the ears. The alteration of colour begins in September; and in April it reſumes its grey coat; but in Greenland it is always white. This ſpecies never deſcends into the vales, nor mixes with the common ſpecies; it does not run faſt, and is eaſily tamed; when purſued, it ſhelters beneath ſtones, or in the clefts of rocks; it is full of frolick; fond of honey and carraway comfits, and is obſerved to eat its own dung before a ſtorm. Pennant.

The *hare* of North America differs little in form or colour from that of Europe, but it is a third leſs; its legs are ſhorter in proportion to the body; and the fur has a tinge of cinereous; when purſued, it takes refuge in a hollow tree; frequents marſhes and meadows, and is very deſtructive to the turnip and cabbage fields.

Hare, *Java*, or *Sumatra*, or *mus leporinus* of Linnæus, has the ſame general characters with the GUINEA-*pig* kind; its head is ſmall and ſlender; its ears prominent, naked, and round; the colour of the upper part of the body is reddiſh; the breaſt and belly are white; the legs long, with four toes on the fore-feet, and three on the hind; the tail is ſhort, and the animal is of the ſize of a *hare.*

Hare, in *Aſtronomy.* See Lepus.

Hare, *ſea.* See Lernia.

Hare's *ear, Bupleurum*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it is a plant with an umbellated flower; the rays of the principal umbel are thin; the involucrum of the great umbel is compoſed of many leaves; thoſe of the ſmall have five: the flower hath five ſmall heart-ſhaped petals, which are inflexed, and hath five ſlender ſtamina; the germen is ſituated below the flower, and becomes a roundiſh compreſſed fruit, which is channelled, dividing in two parts, containing two oblong channelled ſeeds. There are ſeveral ſpecies.

The common *hare's ear* grows naturally in chalky land among wheat in ſeveral parts of England; ſo is ſeldom admitted into gardens. The leaves and ſeed of this plant are uſed in medicine; the herb is eſteemed good for diſſolving ſcrophulous tumours, and is by ſome uſed for internal ailments, ruptures, and bruiſes from a fall. Miller.

Hare's *ear, baſtard.* See Phyllis.

Hare's *foot trefoil.* See Trefoil.

Hare's *lettuce.* See Sow-*thiſtle.*

Hare's *ſtrong.* See *Hog's* Fennel.

HARENARIA, in *Botany*, a name uſed by ſome authors for the buckſhorn plantain.

HARENGIFORMES, in *Ichthyography*, a genus of fiſhes approaching to the herring in ſhape; the principal character of which is, a ſerrated line made up of ſcales running along the bottom of the belly; to which may be added, that the ſides and belly are of a bright ſilver colour, and that the ſcales are large and looſe.

HARENGUS, in *Ichthyology.* See Herring.

HARIOT, or Heriot, a due, or ſervice, belonging to the lord at the death of his tenant; conſiſting of the beſt beaſt the tenant had at the time of his deceaſe.

Coke, on Littleton, obſerves, that *heriot* in Saxon is called *hereger*, q. d. the *lord's beaſt*; *here* ſignifying *lord*, and *gear*, *beaſt*; which others reject, urging that *here*, in Saxon, ſignifies an *army*; and *gear*, a *march*, or *expedition*; and that the Saxon *hereger*, whence we derive our *hariot*, ſignified *proviſion for war*, or a *tribute*, or *relief*, given to the lord of a manor, for his better preparation towards war. Spelman.

By the laws of Canutus, tit. De *Heriotis*, it appears, that at the death of the great men of this nation, ſo many horſes and arms were to be paid, as they were in their reſpective life obliged to keep for the king's ſervice. The firſt eſtabliſhment, if not introduction, of compulſory *heriots* into England, was by the Danes.

But *hariot* is now wholly taken for a beaſt, which the lord by cuſtom chooſes out of all the ſtore of his deceaſed tenant, be it horſe, ox, &c. and in ſome manors, the beſt piece of plate, jewel, or even the beſt moveable.

Hariot is of two ſorts; viz. Hariot *cuſtom*, where *hariots* have been paid time out of mind by cuſtom, after the death of a tenant for life.

In ſome places, there is a cuſtomary compoſition in money, as ten or twenty ſhillings in lieu of a *hariot*, by which the lord and tenant are both bound, if it be an indiſputably ancient cuſtom; but a new compoſition of this ſort will not bind the repreſentatives of either party.

Hariot *ſervice*, when a tenant holds by ſuch ſervice to pay *hariot* at the time of his death; which ſervice is expreſſed in the deed of feoffment.

For this latter the lord ſhall diſtrain; and for the other he ſhall ſeize, and not diſtrain.

If the lord purchaſe part of the tenancy, *hariot-ſervice* is extinguiſhed; but it is not ſo of *hariot-cuſtom.*

HARLE. See Goosander, and Merganser.

HARLEIAN *Collection of Manuſcripts*, is a valuable collection begun near the end of the laſt century, by Robert Harley, Eſq. afterwards earl of Oxford, and increaſed in the year 1721 to near ſix thouſand books, fourteen thouſand original charters, and five hundred rolls. This collection was farther enlarged by his ſon, and amounted at his death, in 1741, to eight thouſand volumes, and above forty thouſand original rolls, charters, letters patent, grants, and other deeds and inſtruments of great antiquity. By ſtat. 26 Geo. II. it was enacted, that this collection ſhould be purchaſed for the ſum of ten thouſand pounds, and placed and continued in the ſame repoſitory with the Cottonian library. See *Britiſh* Museum.

HARLEQUIN, in the *Italian Comedy*, a buffoon, dreſſed in party-coloured cloaths; anſwering much the ſame purpoſe as a merry-andrew, or jack-pudding, in our drolls, on mountebanks ſtages, &c. We have alſo introduced the *harlequin* upon our theatres; and this is one of the ſtanding characters in the modern groteſque, or PANTOMIME *entertainments.*

The term took its riſe from a famous Italian comedian, who came to Paris under Henry III. and who frequenting the houſe of M. de *Harlay*, his companions uſed to call him *Harlequino*, q. d. *little Harlay*; a name which has deſcended to all thoſe of the ſame rank and profeſſion.

HARLOT, a woman given to incontinency; or that makes a habit, or trade, of proſtituting her body. See Courtisan.

The word is ſuppoſed to be uſed for the diminutive *whorelet*, a *little whore.* Others derive it from *Arlotta*, miſtreſs to Robert duke of Normandy, and mother to William the Conqueror. Camden derives it from one *Arlotha*, concubine to William the Conqueror: others from the Italian *arlotta*, a *proud whore.*

HARMONIA, in *Muſic*, &c. See Harmony.

Harmonia, Αρμονια, in *Anatomy*, a ſort of juncture, or articulation of the bones.

Harmonia is a ſpecies of the *ſynarthroſis*, or juncture intended for abſolute reſt.

Two bones are ſaid to be joined *per harmoniam*, by *harmonia*, when the juncture is in one uniform, right, or circular line; or when the bones meet with even margins; in contradiſtinction from *ſutura*, where they are indented.

The bones of the upper jaw, and moſt of the epiphyſes, are joined *per harmoniam.*

HARMONICA, Harmonics, a branch, or diviſion, of the ancient muſic.

The *harmonica* is that part which conſiders the differences and proportions of ſounds, with reſpect to acute and grave: in contradiſtinction from RHYTHMICA, and METRICA.

The only part of their muſic, the ancients have left us any tolerable account of, is the *harmonica*; which itſelf is but very general and theoretical. It is defined by Ptolemy, a perceptive power of the differences of ſounds, according to acute and grave. Vide Ptolem. p. 1. edit. Wallis.

Mr. Malcolm has made a very induſtrious and learned enquiry into the *harmonica*, or harmonic principles, of the ancients. They reduced their doctrine into ſeven parts; viz. of *ſounds*; of *intervals*; of *ſyſtems*; of the *genera*; of the *tones*, or *modes*; of *mutations*; and of the *melopœia.* See each conſidered under its proper article.

HARMONICAL *arithmetic*, is ſo much of the theory and doctrine of numbers as relates to making the compariſons, reductions, &c. of muſical intervals, which are expreſſed by numbers, in order to our finding their mutual relations, compoſitions, and reſolutions.

Harmonical *compoſition*, in its general ſenſe, includes the compoſition both of harmony and melody; i. e. of muſic, or ſongs, both in a ſingle part, and in ſeveral parts.

In its more proper and limited ſenſe, *harmonical compoſition* is reſtrained to that of harmony. In which ſenſe it may be defined, the art of diſpoſing and concerting ſeveral ſingle parts together, in ſuch manner as to make one agreeable whole.

The art of harmony has been long known under the name of *counterpoint.*

At the time when parts were firſt introduced, muſic being then very ſimple, there were no different notes of time; and the parts were in every note made concord.

This they afterwards called *ſimple*, or *plain counterpoint*, to diſtinguiſh it from another kind, then introduced, wherein notes of different value were introduced, and diſcords brought in between the parts.

This they called *figurative* COUNTERPOINT.

HARMONICAL *interval.* See INTERVAL.

HARMONICAL *proportion.* See *Harmonical* PROPORTION.

HARMONICAL *ſeries*, is a ſeries of many numbers in continual *harmonical* proportion.

If there be four or more numbers, whereof every three immediate terms are *harmonical*, the whole makes an *harmonical ſeries*, of continual *harmonical* proportionals; as, 30 : 20 : 15 : 12 : 10.

Or if every four immediately next each other are *harmonical*, it is alſo a continual *harmonical ſeries*, but of another ſpecies; as, 3, 4, 6, 9, 18, 36, &c.

HARMONICAL *ſound*, is an appellation given by Mr. Sauveur to ſuch ſounds as always make a certain determinate number of vibrations, in the time that ſome other fundamental ſound, to which they are referred, makes one vibration.

Harmonical ſounds are produced by the parts of chords, &c. which vibrate a certain number of times while the whole chord vibrates once.

By this they are diſtinguiſhed from the third, fifth, &c. where the relations of the vibrations are four to five, or five to ſix, or two to three.

The relations of ſounds had only been conſidered in the ſeries of numbers, 1 : 2, 2 : 3, 3 : 4, 4 : 5, &c. which produced the intervals called *octave*, *fifth*, *fourth*, *third*, &c. M. Sauveur firſt conſidered them in the natural ſeries, 1, 2, 3, 4, &c. and examined the relations of the ſounds ariſing therefrom. The reſult is, that the firſt interval, 1 : 2, is an octave; the ſecond, 1 : 3, a twelfth; the third, 1 : 4, a fifteenth, or double octave; the fourth, 1 : 5, a ſeventeenth; the fifth, 1 : 6, a nineteenth, &c.

This new conſideration of the relations of ſounds is more natural than the old one: it expreſſes and repreſents the whole of muſic, and is, in effect, all the muſic that nature gives without the aſſiſtance of art. The ſtring of a harpſichord, or a bell, beſides their general ſound, which is proportionate to their length, tenſion, &c. do alſo, at the ſame time, yield other ſubordinate and acuter ſounds, which a nice ear, with a good attention, clearly diſtinguiſhes.

Theſe ſubordinate ſounds ariſe from the particular vibrations of ſome of the parts of the ſtring, or bell, which are, as it were, detached from the reſt, and make ſeparate vibrations: in effect, every half, every third, every fourth, &c. of the chord, performs its vibrations apart, while a general vibration is made of the whole chord.

Now all theſe ſubordinate ſounds are *harmonical* with regard to the whole ſound: the leaſt acute which we hear is octave with the whole ſound; the leaſt acute that follows, makes a twelfth with the whole ſound; the next a ſeventeenth, &c. till they grow too acute for the ear to perceive them. Now throughout the whole, we hear no ſuch thing as a ſound that makes a fifth, or a third, &c. with regard to the whole ſound; none, in ſhort, but what are comprized in the ſeries of *harmonical* ſounds.

Add, that if the breath, or bellows, that blow a wind-inſtrument, be played ſtronger and ſtronger, the tone will be continually raiſed, but this only in the ratio of the *harmonical ſounds.* So that it appears, that nature, when ſhe makes, as it were, a ſyſtem of muſic herſelf, uſes no other but this kind of ſounds; and yet they had, till of late, remained unknown to the muſicians: not but that they frequently fell into them, but it was only inadvertently, and without knowing what they did. M. Sauveur ſhews, that the ſtructure of the organ depends entirely on this ſo long unknown principle.

HARMONY, in *Muſic*, the agreeable reſult of an union of ſeveral muſical ſounds, heard at one and the ſame time; or, the mixture of divers ſounds, which together have an agreeable effect to the ear.

The word is ἁρμονια, formed of the verb ἁρμοζειν, *convenire, congruere, to agree, quadrate, match,* &c.

As a continued ſucceſſion of muſical ſounds produces melody; ſo does a continued combination of them produce *harmony.*

Among the ancients, however, as ſometimes alſo among the moderns, *harmony* is uſed in the ſtrict ſenſe of *conſonance*; and ſo is equivalent to the *ſymphony.*

The words *concord* and *harmony* do really ſignify the ſame thing; though cuſtom has made a little difference between them. Concord is the agreeable effect of two ſounds in conſonance; and *harmony* the effect of any greater number of agreeable ſounds in conſonance.

Again, *harmony* always implies conſonance; but concord is alſo applied to ſounds in ſucceſſion; though never but where the terms can ſtand agreeably in conſonance. The effect of an agreeable ſucceſſion of ſeveral ſounds, is called *melody*; as that of an agreeable conſonance is called *harmony.*

The ancients ſeem to have been entirely unacquainted with *harmony*, the ſoul of the modern muſic. In all their explications of the melopœia, they ſay not one word of the concert or *harmony* of parts. We have inſtances, indeed, of their joining ſeveral voices, or inſtruments, in conſonance; but then theſe voices, &c. were not ſo joined, as that each had a diſtinct and proper melody, ſo making a ſucceſſion of various concords; but they were either uniſons, or octaves, in every note; and ſo all performed the ſame individual melody, and conſtituted one ſong.

When the parts differ, not in the tenſion of the whole, but in the different relations of the ſucceſſive notes, it is this that conſtitutes the modern art of *harmony.*

Harmony is well defined, the ſum or reſult of the combination of two or more concords; i. e. of three or more ſimple ſounds ſtriking the ear altogether; and different compoſitions of concords make different *harmony.*

To underſtand the nature, and determine the number and preference, of *harmonies*; it is to be conſidered, that in every compound ſound, where there are no more than three ſimple ones, there are three kinds of relations; viz. the primary relation of every ſimple ſound to the fundamental, or graveſt, whereby they make different degrees of concord with it: the mutual relations of the acute ſounds each with other, whereby they mix either concord or diſcord into the compound; and the ſecondary relation of the whole, whereby all the terms unite their vibrations, or coincide more or leſs frequently.

Suppoſe, e. gr. four ſounds, A, B, C, and D, whereof A is the graveſt; B next; then C; and D the acuteſt. Here, A is the fundamental; and the relations of B, C, and D, to A, are primary relations: ſo, if B be a third *g* above A, that primary relation is 4 to 5; and if C be fifth to A, that primary relation is 2 to 3; and if D be octave to A, that is 1 to 2. For the mutual relations of the acute terms B, C, D, they are had by taking their primary relations to the fundamental, and ſubtracting each leſſer from each greater: thus, B to C is 5 to 6, a third *l*; B to D is 5 to 8, a fixth *l*, &c. Laſtly, to find the ſecondary relation of the whole, ſeek the leaſt common dividend to all the leſſer terms or numbers of the primary relations; i. e. the leaſt number that will be divided by each of them exactly: this is the thing ſought; and ſhews, that all the ſimple ſounds coincide, after ſo many vibrations of the fundamental as the number expreſſes.

So, in the preceding example, the leſſer terms of the three primary relations are 4, 2, 1, whoſe leaſt common dividend is 4; conſequently, at every fourth vibration of the fundamental, the whole will coincide.

Now *harmony*, we have obſerved, is a compound ſound, conſiſting of three or more ſimple ſounds. Its proper ingredients are concords; and all diſcords, at leaſt in the primary and mutual relations, are abſolutely forbidden. It is true, diſcords are uſed in muſic; but not for themſelves ſimply, but to ſet off the concords by their contraſt and oppoſition.

Hence, any number of concords being propoſed to ſtand in primary relation with a common fundamental, we diſcover whether or no they conſtitute a perfect *harmony*, by finding their mutual relations. Thus, ſuppoſe the following concords, or primary relations, viz. the greater third, fifth, and octave, given, their mutual relations are all concord, and therefore may ſtand in *harmony*: for the greater third and fifth are to one another as 5 : 6, a leſſer third; the greater third and octave are as 5 : 8, a leſſer ſixth; and the fifth and octave are as 3 : 4, a leſſer fourth. But if fourth, fifth, and octave, be propoſed, it is evident they cannot ſtand in *harmony*; becauſe, betwixt the fourth and fifth there is a diſcord, viz. the ratio 8 : 9. Again, ſuppoſing any number of ſounds, which are concord each to the next, from the loweſt to the higheſt, to know if they can ſtand in *harmony*, we muſt find the primary, and all the mutual relations, which muſt be all concord: ſo let any number of ſounds be as 4 : 5 : 6 : 8, they may ſtand in *harmony*, becauſe each to each is concord; but the following ones cannot, viz. 4, 6, 9, becauſe 4 : 9 is diſcord.

The neceſſary conditions of all *harmony*, then, are concords in the primary and mutual relations; on which footing, a table is eaſily formed of all the poſſible varieties:

but to determine the preference of *harmonies*, the ſecondary relations are likewiſe to be conſidered. The perfection of *harmonies* depends on all the three relations; it is not the beſt primary relations that make the beſt *harmony*, for then a fourth and fifth muſt be better than a fourth and ſixth; whereas the firſt two cannot ſtand together, becauſe of the diſcord in the mutual relation. Nor does the beſt ſecondary relation carry it; for then would a fourth and fifth, whoſe ſecondary relation with a common fundamental is 6, be better than a leſſer third and fifth, whoſe ſecondary relation is 10: but here, alſo, the preference is due to the better mutual relation. Indeed, the mutual relations depend on the primary, though not ſo as that the beſt primary ſhall always produce the beſt mutual relation: however, the primary relations are of the moſt importance, and, together with the ſecondary, they afford us the following rule for determining the preference of *harmonies*; viz. comparing two *harmonies*, which have an equal number of terms, that which has the beſt primary and ſecondary relations is ſure to be moſt perfect: but in caſes where the advantage is in the primary relation of the one, and the ſecondary of the other, we have no certain rule. The primary are certainly the moſt conſiderable; but how the advantage in theſe ought to be proportioned to the diſadvantage in the other, or *vice verſâ*, we know not: ſo that a well tuned ear muſt be the laſt reſort in theſe caſes.

Harmony is divided into *ſimple* and *compound*.

HARMONY, *ſimple*, is that where there is no concord to the fundamental above an octave.

The ingredients of *ſimple harmony* are the ſeven ſimple original concords, of which there can be but eighteen different combinations that are *harmony*, which we give in the following table from Mr. Malcolm.

Table of ſimple HARMONIES.

	2dary rel.		2dary rel.	
fifth octave	2	third *g* fifth	4	third *g* fifth octave
fourth octave	3	third *l* fifth	10	third *l* fifth octave
ſixth *g* octave	3	fourth, ſixth *g*	3	fourth ſixth *g* octave
third *g* octave	4	third *g* ſixth *g*	12	third *g* ſixth *g* octave
third *l* octave	5	third *l* ſixth *l*	5	third *l* ſixth *l* octave
ſixth *l* octave	5	fourth, ſixth *l*	15	fourth ſixth *l* octave

Theſe are all the poſſible combinations of the concords that make *harmony*; for the octave is compounded of a fifth and fourth, or a ſixth and third, which have a variety of greater and leſſer; out of theſe are the firſt ſix *harmonies* compoſed: then, the fifth being compoſed of the greater third and leſſer third, and the ſixth of fourth and third, from theſe proceed the next ſix of the table; then an octave joined to each of theſe ſix, makes the laſt ſix.

The perfection of the firſt twelve is according to the order of the table: of the firſt ſix each has an octave; and their preference is according to the perfection of the other leſſer concord joined to the octave. For the next ſix, the preference is given to the two combinations with the fifth, whereof that which has the third *g* is beſt; then to theſe two combinations with the ſixth of *g*, of which that which has the fourth is beſt. For the laſt ſix, they are not placed laſt as being the leaſt perfect, but becauſe they are the moſt complex, and are the mixtures of the other twelve with each other. In point of perfection they are plainly preferable to the preceding ſix, as having the very ſame ingredients, and an octave more.

HARMONY, *compound*, is that which to the ſimple *harmony* of one octave, adds that of another octave.

For the *compound harmonies*, their variety is eaſily found out of the combinations of the ſimple *harmonies* of ſeveral octaves.

HARMONY, again, may be divided into that of *concords*, and that of *diſcords*.

The *firſt* is that we have hitherto conſidered, and wherein nothing but concords are admitted.

The *ſecond* is that wherein diſcords are uſed, intermixed with the concords.

For compoſition of HARMONY, ſee HARMONICAL *compoſition*.

HARMONY is ſometimes alſo uſed, in a laxer ſenſe, to denote an agreement, ſuitableneſs, union, conformity, &c.

In muſic we ſometimes apply it to a ſingle voice, when ſonorous, clear, and ſoft; or to a ſingle inſtrument, when it yields a very agreeable ſound. Thus, we ſay, the *harmony* of her voice, of his lute, &c.

In *Matters of Learning*, we uſe *harmony* for a certain agreement between the ſeveral parts of the diſcourſe, which renders the reading thereof agreeable. In this ſenſe we ſay, *harmonious* periods, &c.

In *Architecture*, *harmony* denotes an agreeable relation between the parts of a building. See SYMMETRY.

In *Painting*, they ſpeak of a *harmony*, both in the ordonnance and compoſition, and in the colours of a picture. In the ordonnance it ſignifies the union or connexion between the figures, with reſpect to the ſubject of the piece. In the colouring it denotes the union or agreeable mixture of different colours. See COLOURING. M. De la Chambre derives the *harmony* of colours from the ſame proportions as the *harmony* of ſounds. This he inſiſts on at large, in his treatiſe Of the Colours of the Rainbow. On this principle, he lays down green as the moſt agreeable of colours, correſponding to the octave in muſic; red, to a fifth; yellow, to a fourth, &c.

HARMONY, or *Evangelical* **HARMONY**, is alſo a title of divers books, compoſed to ſhew the uniformity and agreement of the accounts given by the four Evangeliſts, by reducing them to the order of time in which the events recorded really happened.

The firſt attempt of this kind is attributed to Tatian or Theophilus of Antioch, under the title of Diateſſaron, or *of the four*, in the ſecond century. After his example, divers other *Harmonies* have been compoſed by Ammonius of Alexandria, Euſebius of Cæſarea, Janſenius, biſhop of Ghent, Mr. Toinard, Mr. Whiſton, Lamy, Le Clerc, Doddridge, Macknight, Prieſtley, Newcome, &c. Theſe ſeveral *harmonizers* have entertained very different opinions with regard to the period of our Lord's public miniſtry, which have neceſſarily occaſioned a correſponding diverſity in the diſpoſition of their reſpective *Harmonies*. Dr. Prieſtley, in an excellent work of this kind, publiſhed in 1777, has adopted the opinion propoſed by Mr. Mann, in his Diſſertations on the Times of the Birth and Death of Chriſt, and ſtrenuouſly maintained, that he preached no longer than one year, or one year and a few months. This opinion is, undoubtedly, very ancient: it was the opinion of Origen, and alſo of Clemens Alexandrinus; Irenæus and Tertullian aſcribe the ſame opinion to the Valentinians. See Origen. De Princip. lib iv. § 5. apud Oper. tom. i. p. 160. ed. Benedict. Clem. Alex. Strom. lib. i. p. 340. ed. Sylb. vel apud Oper. tom. i. p. 407. ed. Oxon. Iren. lib. i. cap. 3. num. 3. Tertull. lib. Adverſus Judæos, cap. 18.

However, it has been objected by others, and particularly by biſhop Newcome, in his *Harmony* of the Goſpels, publiſhed in 1778, that this period of one year is much too ſhort for the ſeveral journies of our Saviour in Galilee, and the tranſactions connected with them; and he has offered ſeveral arguments to prove the more common opinion, firſt advanced by Euſebius, viz. that our Lord's miniſtry continued three years and a half, and included in that ſpace of time four Paſſovers. Sir Iſaac Newton is of opinion, that our Lord's miniſtry included five Paſſovers; the firſt of which happened A. D. 30. the ſecond A. D. 31. the third A. D. 32. the fourth A. D. 33. and the fifth on Friday, April 23, A. D. 34. anſwering to the 4747th year of the Julian period. See his Obſervations on Prophecy, book i. chap. xi. p. 144–168.

HARMONY *of the ſpheres*, or *celeſtial* **HARMONY**, is a ſort of muſic much ſpoken of by many of the philoſophers and fathers; ſuppoſed to be produced by the regular ſweetly-tuned motions of the ſtars and planets.

Plato, Philo Judæus, St. Auguſtine, St. Ambroſe, St. Iſidore, Boethius, and many others, are ſtrongly poſſeſſed with the opinion of this *harmony*, which they attribute to the various proportionate impreſſions of the heavenly globes upon one another, which, acting under proper intervals, form a *harmony*. It is impoſſible, according to them, that ſuch ſpacious bodies, moving with ſo much rapidity, ſhould be ſilent; on the contrary, the atmoſphere, continually impelled by them, muſt yield a ſet of ſounds proportionate to the impulſions it receives: conſequently, as they do not all run the ſame circuit, nor with one and the ſame velocity, the different tones ariſing from the diverſity of motions, directed by the hand of the Almighty, muſt form an admirable ſymphony or concert. St. Irenæus, St. Baſil, and St. Epiphanius, &c. have appeared againſt the notion.

Pythagoras is ſuppoſed to have had a view to the gravitation of celeſtial bodies, in what he taught concerning the *harmony* of the ſpheres.

A muſical chord gives the ſame notes as one double in length, when the tenſion or force with which the latter is ſtretched is quadruple; and the gravity of a planet is quadruple of the gravity of a planet at a double diſtance. In general, that any muſical chord may become uniſon to a leſſer chord of the ſame kind, its tenſion muſt be increaſed in the ſame proportion as the ſquare of its length is greater; and that the gravity of a planet may become equal to the gravity of another planet nearer the ſun, it muſt be increaſed in proportion as the ſquare of its diſtance from the ſun is greater. If, therefore, we ſhould ſuppoſe muſical chords extended from the ſun to each planet, that all theſe chords might become uniſon, it would be requiſite to increaſe or diminiſh their tenſions in the ſame proportions as would be ſufficient to render the gravities of the planets equal; and from the ſimilitude of thoſe proportions, the celebrated doctrine of the *harmony of the ſpheres* is ſuppoſed to have been derived. Plin. lib. ii. cap. 22. Macrob. in Somn. Scip. lib. ii. cap. 1. Plutarch de Animal. Procreatione, è Timæo. See Maclaurin's View of Newton's Diſcov. book i. chap. ii. p. 32. ed. 4to. See GRAVITY.

HARMONY, *pre-eſtabliſhed*, a celebrated ſyſtem of M. Leibnitz, by means whereof he accounts for the union or communication between the ſoul and body.

The philoſophers had univerſally held, that the ſoul and body act really and phyſically on each other. Des Cartes firſt appeared, and ſhewed that the heterogeneity of their nature did not allow of ſuch real union; and that they could only have an apparent one, whereof God is the mediator.

M. Leibnitz, unſatisfied with either of theſe hypotheſes, eſtabliſhes a third. A ſoul or ſpirit, he obſerves, is to have a certain ſeries of thoughts, deſires, and wills: a body, which is only a machine, is to have a certain ſeries of motions, to be determined by the combination of its mechanical diſpoſition with the impreſſions of external objects.

If, now, there be found a ſoul and a body ſo framed, that the whole ſeries of wills of the ſoul, and the whole ſeries of motions of the body, exactly correſpond; and at the ſame time, for inſtance, when the ſoul deſires to go to any place, the two feet move mechanically that way; this ſoul and body will have a relation to one another, not by any actual union between them, but by the conſtant and perpetual correſpondence of the ſeveral actions of both. Now, God puts together this ſoul and body, which had ſuch a correſpondence antecedent to their union; ſuch a *pre-eſtabliſhed harmony*. And the ſame is to be underſtood of all the other ſouls and bodies that have been, or ever will be joined.

In effect, the laws of motion in the body, ſucceeding in the order of efficient cauſes, do alſo agree and correſpond with the ideas of the ſoul; ſo that the body is determined to act at the time when the ſoul wills. So that upon this hypotheſis, the volitions of the mind are followed inſtantly by the deſired motions of the body, not in conſequence of thoſe volitions in the leaſt, but of the nice and well-adjuſted machinery of the body; and the impreſſions produced in the ſenſory have no effect on the mind, but the correſponding idea ariſes, at that preciſe time, in conſequence of a chain of cauſes of a different kind; and, therefore, all that men do or ſay, is no more than the effect of exquiſite machinery.

The ſame principle he extends farther, and makes a *pre-eſtabliſhed harmony* between the kingdoms of nature and grace; to account for the apparent communication between them, and make phyſical and moral evil correſpond.

Such is the ſyſtem of *pre-eſtabliſhed harmony*. The author's way of ſtating and enforcing it, may be ſeen in his Eſſais de Theodicée.

This hypotheſis was firſt publiſhed in the Journal des Sçavans of Paris, in 1695, and ſtrenuouſly defended by Wolſius, who, on this account, was baniſhed by Frederick, king of Pruſſia; it was oppoſed by Bayle, in the article Borarius of his Dictionary, and ſince his time by Newton, Clark, Stahl, &c. See LEIBNITZIAN *philoſophy*.

HARMONY, in *Anatomy*. See HARMONIA.

HARMOS, from ἁρω, *apto*, *I fit*, a word uſed by the old medicinal writers, for the fleſh growing between the teeth.

HARMOSTES, or HARMOSTA, in *Antiquity*, a ſort of magiſtrate among the Spartans, whereof there were ſeveral, whoſe buſineſs was to look to the building of citadels, and repairing the forts and fortifications of the cities.

The word is ἁρμοστης, formed of ἁρμοω, *apto*, *concinio*, *I adapt*, *concert*, &c.

HARMOSYNIANS, ἁρμοσυνοι, in *Antiquity*, were magiſtrates among the Spartans, who, after the death of Lycurgus, were appointed to enforce the obſervance of that law of the Spartan legiſlator, which required married women to wear a veil when they appeared in the ſtreets, whereby they were diſtinguiſhed from ſingle females, who were allowed to appear abroad with their faces uncovered.

HARNESS, a complete armour, or the whole equipage and accoutrements of a cavalier heavily armed; as caſque, cuiraſs, &c.

The word is formed of the French *harnois*, which ſome derive from the Greek *ἀρνακις*, *a lamb's ſkin*, becauſe they anciently covered themſelves therewith. Du Cange obſerves, that the word *harneſium* is uſed in the corrupt Latin in the ſame ſenſe, and that it comes from the High Dutch *harnas* or *harniſch*. Others derive it from the Italian *arneſe*; others from the Celtic *harnes*, *a cuiraſs*.

Under king Richard II. it was expreſsly forbidden all men to ride in *harneſs* with launcegays. Vide ſtat 7 Ric. II. cap. 13. In the ſtatute 2 Hen. VI. cap. 14. *harneſs* ſeems to include all kinds of furniture for offence as well as defence, both of men and horſe; as ſwords, buckles for belts, girdles, &c.

HARNESS is alſo uſed for the furniture put on a horſe, to draw in a coach or waggon, or other carriage; ſuch as collars, leathers, traces, &c.

HARNESS-*galls*, in *Farriery*, are ſwellings or ſoreneſs on the breaſts of coach-horſes, occaſioned by the galling of the *harneſs*. For the cure of this, firſt cut off the hair about the ſore very cloſe, and rub the whole breaſt with a lather of water and black ſoap; then waſh that part of the breaſt which is uſually covered by the petrel with ſalt water, ſuffering it to dry of itſelf. Bolſters may be applied to the *harneſs* by way of prevention.

HARO, HAROU, or HAROL, in the *Norman Cuſtoms*.

Clamour de HARO is a cry or formula of invoking the aſſiſtance of juſtice againſt the violence of ſome offender, who upon hearing of the word *haro* is obliged to deſiſt, on pain of being ſeverely puniſhed for his outrage, and to go with the party before the judge.

The word is commonly derived of *ha* and *roul*, as being ſuppoſed an invocation of the ſovereign power, to aſſiſt the weak againſt the ſtrong, on occaſion of Raoul firſt duke of Normandy, about the year 912, who rendered himſelf venerable to his ſubjects by the ſeverity of his juſtice; ſo that they called on him, even after his death, when they ſuffered any oppreſſion. Some derive it from Harola, king of Denmark, who, in the year 826, was made grand conſervator of juſtice at Mentz; others from the Daniſh *aa rau*, q. d. help me, a cry raiſed by the Normans in flying from a king of Denmark, named Roux, who made himſelf duke of Normandy.

The letters of the French chancery have uſually this clauſe, *Nonobſtant clameur de* haro, &c.

The *haro* had anciently ſuch vaſt power, that a poor man of the city of Caen, named Aſſelin, in virtue hereof, arreſted the corpſe of William the Conqueror, in the middle of the funeral proceſſion, till ſuch time as his ſon Henry had paid the value of the land in queſtion, which was that whereon the chapel was built where he was interred.

HARP, a muſical inſtrument of the ſtring kind, being of a triangular figure, and placed upright between the legs of the perſon who plays upon it.

Papias, and Du-Cange after him, will have the *harp* to have taken its name from the *Arpi*, a people of Italy, who were ſuppoſed the firſt that invented it; and from whom they ſay it was borrowed by other nations. Menage, &c. derives the word from the Latin *harpa*, and that from the German *herp* or *harp*. Others bring it from the Latin *carpo*, becauſe touched or thrummed with the fingers. Dr. Hickes derives it from *harpa* or *hearpa*, which ſignify the ſame thing; the firſt in the language of the Cimbri, the ſecond in that of the Anglo-Saxons. The Engliſh prieſt who wrote the Life of St. Dunſtan, and who lived with him in the tenth century, ſays, cap. ii. n. 12. *Sumpſit ſecum ex more citharam ſuam, quam paterna lingua* hearpam *vocamus*; which intimates the word to be Anglo-Saxon.

There is ſome diverſity in the ſtructure of *harps*. That called the *triple harp* has ninety-ſeven ſtrings or chords, in three rows, extending from C in the tenor cliff, to double G in alt, which make five octaves: the middle row is for the ſemitones, and the two outſide rows are perfect uniſons. On the baſs ſide, which is played with the right hand, there are thirty-ſix ſtrings; on the treble ſide, twenty-ſix; and in the middle row, thirty-five ſtrings. There are two rows of pins or ſcrews on the right ſide, ſerving to keep the ſtrings tight in their holes, which are faſtened at the other end to three rows of pins on the upper ſide.

The *harp*, within the laſt forty years, has been in ſome degree improved, by the addition of eight ſtrings to the uniſon, viz. from E to double F in alt.

This inſtrument is ſtruck with the finger and thumb of both hands. Its muſic is much like that of the ſpinet, all its ſtrings going from ſemitone to ſemitone; whence ſome call it an *inverted ſpinet*.

It is capable of a much greater degree of perfection than the lute. The editor is indebted to Mr. Evans, a very celebrated performer on this inſtrument, for the above account of the ſtructure and compaſs of the Welch *harp*.

King David is uſually painted with a *harp* in his hands; but we have no teſtimony in all antiquity, that the Hebrew *harp*, which they call *chinnor*, was any thing like ours. On a Hebrew medal of Simon Maccabæus we ſee two ſorts of muſical inſtruments; but they are both of them very different from our *harp*, and only conſiſt of three or four ſtrings. All authors agree, that our *harp* is very different from the lyra, cithara, or barbiton, uſed among the Romans.

Fortunatus, lib. vii. Carm. 8. witneſſes, that it was an inſtrument of the barbarians.

> *Romanuſque lyra, plaudat tibi barbarus* harpa,
> *Græcus Achilliacha, crotta Britanna canat.*

HARP, *bell*, a muſical inſtrument of the ſtring kind, thus called from its being ſwung about by thoſe who play upon it like a bell. It is about three feet long; its ſtrings are of braſs or ſteel wire, fixed at one end, and ſtretched acroſs the ſound-board, by ſcrews fixed at the other end. It comprehends four octaves, and the ſtrings are ſtruck with the thumbs, the right-hand playing the treble, and the left the baſs; and, in order to draw the ſounds the clearer, the thumbs are armed with a little wire pin.

HARP, *Æolus's.* See ÆOLUS's *harp*.

HARP, in *Mythology*, is the ſymbol of Apollo.

HARP, in the *Manege.* See GRAPPLE.

HARP-*ſhell.* See DOLIUM.

HARPAGIUS, in *Antiquity.* See ARPAGIUS.

HARPAX, a name given by ſome naturaliſts to amber, and by ſome of the chemiſts to quick-lime, and by others to ſulphur.

HARPE, in *Natural Hiſtory*, the name of a kind of ſhell-fiſh of very great beauty. It is of the genus of the dolium or concha globoſa. See LYRA.

HARPEGGIATO, or HARPEGGIO, in the *Italian Muſic*, ſignifies the cauſing the ſeveral ſounds of one accord to be heard, not together, but diſtinctly one after the other, beginning with either at pleaſure, but commonly with the loweſt.

HARPIES, ʽΑΡΠΥΙΑΙ, HARPYIÆ, in *Antiquity*, a rapacious impure ſort of monſters, of the bird kind, mentioned among the poets.

They are repreſented with wings, ears like bears, bodies like vulturs, faces like women, and feet and hands hooked like the talons of birds of prey. See Virgil, Æneid, lib. iii. who gives a deſcription of them.

The ancients looked on the *Harpies* as a ſort of genii or demons. Some make them the daughters of Tellus and Oceanus, the *earth* and *ocean*; whence, ſays Servius, it is, that they inhabit an iſland, half on land and half in water. Valerius Flaccus makes them the daughters of Typhon.

There were three *Harpies*, Aello, Ocypete, and Celœno, which laſt Homer calls *Podarge*. Heſiod, in his Theogony, ver. 267. only reckons two, Aello and Ocypete, and makes them the daughters of Thaumas and Electra, affirming that they had wings, and went with the rapidity of the wind. Zephyrus begat of them Balius and Xanthus, Achilles's horſes. Pherecydes relates, that the Boreades expelled them from the Ægean and Sicilian ſeas, and purſued them as far as the iſlands, which he calls Plotæ, and Homer Calynæ; and which have ſince been called the Strophades.

Voſſius, De Idolol. lib. iii. cap. 99. p. 63. thinks, that what the ancients have related of the *Harpies*, agrees to no other birds ſo well as the bats found in the territories of Darien in South America. Theſe animals kill not only birds, but dogs and cats, and prove very troubleſome to men by their peckings. But the ancients, as the ſame Voſſius obſerves, knew nothing of theſe birds. By the *Harpies*, therefore, he thinks they could mean nothing elſe but the winds; and that it was on this account they were made daughters of Electra, the daughter of Oceanus. Such is the opinion of the ſcholiaſts of Apollonius, Heſiod, and Euſtathius. Their names, Aello, Ocypete, Celœno, are ſuppoſed to ſuggeſt a farther argument of this.

Mr. Bryant ſuppoſes that the *Harpies* were a college of prieſts in Bithynia, who, on account of their repeated acts of violence and cruelty, were driven out of the country: their temple was called Arpi, and the environs Arpiai, whence the Grecians formed ʽΑρπυιαι; and he obſerves farther, that *Harpyia*, ʽΑρπυια, was certainly of old the name of a place. Anal. of Anc. Mythol. vol. ii. p. 42.

HARPINEER, or HARPONEER, an engineer or fiſherman, who manages and throws the harping-iron in the whale-fiſhing. See *Whale* FISHERY.

HARPING-*iron*, HARPAGO, HARPOON, a ſort of dart or ſpear, faſtened to a line, wherewith they catch whales and other large fiſh, as ſturgeons, &c.

The *harping-iron* is a large javelin of forged iron, generally about twenty ounces in weight, and about two feet long, with a ſharp, cutting, triangular point, barbed like that of an arrow. At the upper end is engraven the harpineer's name, near a ring to which the line is faſtened, which they let down as ſoon as the fiſh is ſtruck, to give him room to dive, &c. See *Whale* FISHERY.

The *harpoon* cannot be ſtruck with certainty at any conſiderable diſtance; ſo that unleſs the harpooner is within a yard of a whale, or directly above, this inſtrument cannot be uſed with any great ſucceſs. In the year 1731, a new ſort of gun was invented for ſhooting the *harpoons* into the bodies of whales at a greater diſtance than they could be thrown by hand, and this was uſed for two or three ſeaſons with ſome ſucceſs; but farther experience has proved the inutility of this contrivance. It was afterwards propoſed to ſubſtitute the ancient BALISTA in the room of the gun; but the ſcheme, we believe, terminated in mere ſpeculation. Phil. Tranſ. vol. xlvii. p. 429.

HARPINGS, in a *Ship*, properly denote her breadth at the bow. Some alſo call the fore-part of the wales, which go round the bow, and are faſtened into the ſtem, the *harpings*.

HARPINGS, *cat.* See CAT-*harpings.*

HARPOCRATES, in *Mythology*, the ſon of Iſis and Oſiris. This is an Egyptian deity, whoſe diſtinguiſhing attribute is, that he is repreſented with his fingers applied to his mouth, denoting that he is the God of Silence. The ſtatue of this idol was fixed in the entrance of moſt of the Egyptian temples, and he was commonly exhibited under the figure of a young man naked, crowned with an Egyptian mitre, holding in one hand a cornucopia, and in the other the flower of lotus, and ſometimes bearing a quiver.

HARPOCRATIANS, a ſect of heretics mentioned by Celſus, and the ſame with CARPOCRATIANS.

HARPSICHORD, or HARPSICHOL, a muſical inſtrument of the ſtring kind, played after the manner of an organ. The Italians call it *clave cimbala*, and the French *clavecin*. In Latin it is uſually called *grave cymbalum*, q. d. large or deep cymbal.

The *harpſichord* is furniſhed with a ſet of keys; ſometimes two ſets. The touching or ſtriking of theſe keys moves a kind of little jacks, which move a double row of chords or ſtrings of braſs or iron, ſtretched on the table of the inſtrument over four bridges.

HARQUEBUSS, in our *Ancient Statutes*, called alſo ARQUEBUSE, HAQUEBUT, or HAGBUT, is a hand-gun, or a fire-arm of a proper length, &c. to be borne in the arm.

The word is formed of the French *arquebuſe*; and that from the Italian, *arcobuſio*, or *arco abuſo*, of *arco*, *a bow*, and *buſio*, *a hole*; on account of the touch-hole, at which the powder is put to prime it, and that it ſucceeded to the bows of the ancients.

The *harquebuſs* is properly a fire-arm, of the ordinary length of a muſquet or fowling-piece, cocked uſually with a wheel. Hanzelet preſcribes its legitimate length to be forty calibres; and the weight of its ball one ounce ſeven eighths; its charge of powder as much.

There is alſo a larger kind, called *harquebuſs a croc*, much of the nature of our blunderbuſſes, uſed in war for the defence of places, being uſually reſted on ſomething when diſcharged. The firſt time theſe inſtruments were ſeen was in the imperial army of Bourbon, who drove Bonnivet out of the ſtate of Milan: they were ſo big and heavy, that there were two men to carry them. They are now little uſed except in ſome old caſtles, and by the French in ſome of their garriſons.

HARRIER, or *Leverarius*, a kind of hound, called in Latin *ſagax*, from his tracing or chaſing by foot; being endowed with an admirable gift of ſmelling, and alſo very bold in the purſuit of his game.

There are ſeveral kinds, all differing in their ſervices; being for the hare, fox, wolf, hart, buck, badger, otter, polecat, weaſel, or coney; ſome, in fine, for one game, ſome for another, &c. See DOG and HUNTING.

HARRIGATE *well-water*, a ſtrong ſulphureous water, containing beſides ſulphur, marine ſalt and nitre, or nitre only and earth.

HARRIOT. See HARIOT.

HARROW, in *Fortification*, is a GATE made of timber, whoſe dimenſions are commonly ſix by four inches, and ſix inches diſtant from each other, well faſtened to three or four croſs bars, and ſecured with iron.

HARROW, in *Huſbandry*, a drag made in a ſquare form, ſet with long iron teeth, to break the clods of earth after ploughing.

It conſiſts of three parts. 1. The *harrow*-bulls, which are the holes where the nails go in. 2. The ſlots, which are the croſs pins. 3. The *harrow*-tines, pins, or tuſhes, which are great iron nails.

Beſides theſe there are, 4. The hook, being that which faſtens the horſe to them. 5. The couples, when two *harrows* are tied together.

Harrows have been commonly made to drag, and thoſe of this ſort have been conſtructed of different figures, according to the purpoſes to which they have been applied; however, there have been ſome contrived with rollers.

HARROW, *reſt*, in *Botany*. See REST *harrow*.

HARSCHEF, in *Botany*, the name by which Avicenna, Serapion, and the reſt of the Arabian writers, call the *cinara*, or ARTICHOKE. Some who have been puzzled for an etymology for the word hartichoke or artichoak, as we differently ſpell it, have ſuppoſed that it was derived by corruption from this Arabian word, *harſchef*, which the Engliſh phyſicians, who practiſed according to the rules of Serapion and Avicenna, might bring into uſe, and adopt in their own language, as the name of the ſame plant.

The word *harſchef* ſeems, however, like the word *cinara*, and all the other names of the artichoak, to take in alſo another plant of the ſame kind, called by us the chardoon, a ſort of garden thiſtle, the tender ſtalks of which are earthed up and blanched, and are eaten by us, and were ſo by the Greeks. The moſt modern accounts of the Perſians tell us alſo, that they eat the young ſhoots and tender ſtalks of the *harſchef*, which, as the artichoak plant is not uſed for blanching in this manner, probably ſignifies in this ſenſe the chardoon.

HART, in the *Foreſt Law*, a ſtag or male deer of five years old complete. See DEER and STAG.

If the king or queen hunt him, and he eſcape, he is called a *royal hart*.

And if by ſuch hunting he be chaſed out of the foreſt, proclamation is commonly made in the places adjacent, that in regard of the paſtime the beaſt has afforded the king or queen, none ſhall hurt or hinder him from returning to the foreſt; upon which he is called an *hart-royal proclaimed*.

Harts at one year old have no horns, but only bunches; and at two years they are very imperfect, being ſtraight and ſingle; at three years old they grow out into two ſpears; at four, into three; and ſo increaſe every year in number of branches, till they are ſix years old; but after that their age is not to be known by their heads. February and March are the months in which they caſt their horns; and, in general, the older ones caſt them ſooner than the young ones. Thoſe that have been injured at rut, or which have been gelded, never caſt them at all; if they are gelded while young, they never have any horns; if after their horns are grown, they keep thoſe which they had on at the time as long as they live. The horns of ſome are reddiſh, thoſe of ſome black, and thoſe of others finally are white. The red horns are generally the largeſt and ſtrongeſt, the black are uſually ſhorter, and the white are worſt of all, being the leaſt ſolid or ſtrong.

This animal is the moſt cunning in its care of itſelf of all the deer kind. It is the moſt timorous of any, and by its windings and turnings, and other ſubtilties, as the running among herds of cattle, often deceives the huntſman, and puts a foil upon the dogs. In the chaſe, which generally is a long one, he takes over hedge, ditch, river, or whatever comes in his way, nothing ſtopping him.

This creature loſes its horns in the ſpring-time, as the other deer do; but, during the time that it is without them, does not appear, but abides in the thick woods, and only comes out in the night-time for food.

HART-*hunting*. See HUNTING.

HART'*s-horn*, *cornu cervi*. See *Hart's* HORN.

HART'*s-horn*, in *Botany*. See PLANTAIN.

HART'*s-tongue*, *lingua cervina*, in *Botany*, the name of a genus of plants, the characters of which are theſe: the leaves reſemble the tongue of an animal in ſhape, or are, at leaſt, vulgarly ſuppoſed to do ſo; they are uſually plain and ſimple, but ſometimes they are jagged, and in ſome ſpecies they are compoſed of many ſegments affixed to a middle rib; the flowers are not diſcovered, but the ſeeds grow on the under part of the leaf, in ſeveral long, ſulcated, and ſeemingly bivalve furrows; theſe are filled with oblong capſules, each of which is furniſhed with an elaſtic ring, by the contraction of which they are burſt when the ſeeds are ripened.

The ſpecies of *hart's-tongue*, enumerated by Mr. Tournefort are fifty-nine. In the Linnæan ſyſtem this is a ſpecies of *ſplenium*. See MILT-*waſte*.

Theſe plants commonly grow from the joints of old walls, where they are moiſt and ſhady, and alſo upon ſhady moiſt banks, but are ſeldom cultivated in gardens.

Hart's-tongue is principally uſed in diſorders of the liver and ſpleen, being good to diſſolve hard ſchirrous tumours in either; it is alſo ſerviceable for the rickets in children, for ſpitting of blood, and the bloody flux. Dioſcorides commends it againſt the biting of ſerpents, and Mr. Ray praiſes it either given in powder, or a conſerve of the green leaves, as particularly uſeful for hyſteric and convulſive fits, and the palpitation of the heart. Miller. Externally applied it cleanſes wounds and ulcers.

Sea-HART'*s-tongue*, *phyllitis marina*, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of ſea plant, the leaves of which, in ſome degree, reſemble thoſe of the common *hart's-tongue*. It grows on the rocks at great depths, and is ſeldom ſeen, unleſs when taken up by the coral fiſhers; its leaves are ſometimes ſingle, ſometimes they divide into two; they are of a duſky green colour, and are about two inches in length; they have each a nerve or rib running along their middle; they are very thin and tranſparent, and are of a ſort of cartilaginous ſtructure, and each has ſeveral rows of ſmall points on each ſide of the middle rib, which not unaptly reſemble the ſeed ſpots on the leaves of ſome of the capillary plants; but not on thoſe of the *phyllitis*, or *hart's-tongue*, in particular, becauſe they are in that plant not round but oblong, and ſtand only in a ſingle row on each ſide of the rib. When this plant is viewed by the microſcope, it appears in all parts of the leaf full of little holes, and thoſe which are ſo plain to the naked eye, are no other way different from the imperceptible ones, but in that they are larger. See CORALLINE.

HART-*wort*, *ſeſeli*, in *Botany*. See *Wild* SPIGNEL.

HART-*wort of Crete*, *tordylium*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it hath an umbellated flower, the principal umbel compoſed of many ſmall ones, compounded of ſeveral rays; the involucrum of the greater umbel is compoſed of narrow leaves, as long as the rays of the umbel; thoſe of the rays are half the length, the umbels are deformed; the flowers have five heart-ſhaped inflexed petals, which are equal, and have each five hair-like ſtamina, terminated by ſingle ſummits; it has a roundiſh germen ſituated under the flower, ſupporting two ſmall ſtyles crowned by obtuſe ſtigmas: the germen turns to a roundiſh compreſſed fruit longitudinally indented, dividing in two parts, each containing one roundiſh compreſſed fruit, with an indented border. There are eight ſpecies, which are annual plants, are propagated by ſeed, and will grow in any ſoil or ſituation. Miller.

HART-*wort*, *ſhrubby Ethiopian*, is a ſpecies of the *bupleurum*, or HARE'*s-ear*.

HART, or STAG-*evil*, in the *Manege*, a ſort of rheum or defluxion that falls upon the jaws, and the other parts of the forehand of a horſe, which hinders him from eating; ſometimes alſo this diſtemper affects the parts of the hinder quarters.

HARTANITHE, in the *Materia Medica* of the ancient Arabs, was one of the names of the ſtruthium, or lanaria herba of the Greeks and Romans, a kind of thiſtle the root of which was uſed in the cleaning of wool. Avicenna, following the Arabic tranſlation of Dioſcorides, extant in his time, gives, under this name, a deſcription of the leontopetalon, and the virtues of the CYCLAMEN, or ſow-bread; but he finds out the error himſelf, and charges it upon the interpreter, acknowledging that in his time *harthanitha*, or artanita, was not a name either of ſow-bread or of the leontopetalon, but of the ſtruthium.

HARVEST, probably derived from a Saxon word ſignifying *herb-feaſt*, is that ſeaſon of the year, when the corn is ripe and fit to be reaped and gathered into barns.

HARVEST-*fly*, *cicada*, in *Natural Hiſtory*, the name of a large fly, remarkable for the noiſe which it makes in the ſummer-months, and particularly about the time of harveſt. The generality of authors have very improperly tranſlated *cicada* by the Engliſh word graſshopper, but this is extremely erroneous, the *cicada* having not the leaſt reſemblance to the graſshopper. It is called the *cigale* in France, in the provinces of Languedoc, &c it is very common in that country: Italy and all the hot countries abound with it; and it is in moſt of theſe places called by the common people by a name expreſſing the *harveſt-fly*, but in England we have not the inſect, and few of us have any notion of what it is. It is probable, that people who found the cicada, according to the deſcription of ancients very noiſy, fancied the graſshopper muſt be the ſame creature, this being of all our inſects the moſt noiſy in the ſummer-months.

The cicada is a large four-winged fly; its body is ſhort and thick, and its wings long and large: the great or common cicada is by far the largeſt of the known ſpecies of ſhort-bodied flies, and the ſmaller kinds are larger than the hornet.

Ariſtole, and the other ancient writers who have treated of the cicada, have mentioned two ſpecies, which they have diſtinguiſhed by the names of achetæ and tettigoniæ; theſe have been generally underſtood to mean the two general kinds now known: the achetæ being our large cicada, and the tettigoniæ our ſmall ones; but Mr. Reaumur has added to theſe two kinds a third, which is of a middle ſize between the other two; this he ſuppoſes to have been the tettigonia of the ancients, and ſeems very confident that our ſmall kind was wholly unknown to them.

Theſe three kinds do not only differ in ſize, but alſo in colour: the large kind is of a deep and blackiſh brown, with a little yellow on the breaſt, and on ſome of the rings of the body; the middle-ſized kind is of a paler brown, and has much more of the yellow in it, particularly it has on the body two croſs lines of yellow, which repreſent in ſome ſort the letter X: the third kind, or ſmalleſt of all, are called cigalons by the French; they are very different from both the others, having a reddiſh caſt on the body, and more yellow than the largeſt, and leſs than the middle kind. Theſe diſtinctions we owe to Mr. Reaumur, who very candidly acknowledges, that he had not ſo great opportunities of examining the cicadæ of different countries as he could have wiſhed; and is of opinion, that farther obſervations will give us ſeveral more kinds of them.

It has been the common opinion, that the noiſe which the cicada makes was occaſioned by a ſwift motion of the wings and their rubbing againſt the breaſt, and the grating of the under pair of wings in their paſſage againſt the upper ones; were this the caſe, there is no reaſon why the female cicada ſhould not make a noiſe as well as the male, ſince ſhe has wings and all the other requiſites to ſinging, according to this ſyſtem; but in reality the matter is far otherwiſe, and the bare inſpection of the body of the male cicada will ſhew that the noiſe is owing to other cauſes. If we are determined to call nothing a voice but the articulation of air thrown from the lungs in its paſſage through the larynx and other parts, then the cicada has properly indeed no voice; but if we extend the meaning of the term farther, and take in the ſeveral ſounds made by inſects in other manners yet intelligible to other inſects, we muſt allow the cicada has a voice, and a very ſtrong one, the organs of which are not in the lungs and throat, but in the belly. See a particular deſciption of theſe organs, in Reaumur's Hiſt. of Inſects, vol. ix. p. 218.

Though the female cicada wants the organs of ſinging of the male, ſhe has however a part in her body which the male has not, and which deſerves a peculiar attention. The eggs of the cicada muſt be lodged in the ſubſtance of wood, in order to their happily ſucceeding in the hatching, and the inſtrument of the female is intended for the purpoſe of lodging them properly. A very exact account of this inſtrument is given at large in Reaumur, to whom we refer the reader.

Moſt other inſects which lodge their eggs in wood, do it in the young ſhoots and tender branches of ſhrubs and trees while yet living, where the eggs receive juices and nouriſhment from the ſap. See ROSE-*fly*.

The cicada, on the contrary, knowing that her eggs only want a proper lodgement, not a nouriſhing juice, always lays them in dry or dead ſticks. The creature never regards what kind of wood ſhe meets with, but ſeizes the dead twigs of any tree, and bores a row of holes in it, putting an egg into each. Theſe creatures depoſit their firſt exuvia in the neſt, and after this they come out at the ſame hole at which the egg was let in, and they are no ſooner out than they fall to the ground, and immediately make their way into it and bury themſelves; they live ſome time under ground in the form of a hexapode worm. After living ſome time under ground they become transformed into a ſort of nymphs, which have alſo a motive power, and have yet a part of their growth to attain to: theſe nymphs were well known to the ancients. The creature remains in this nymph ſtate two years, and when the time of its final transformation into the fly ſtate approaches, it leaves the earth, and crawls up the body of the tree, and there faſtening itſelf to ſome of the branches, it changes into the fly, in the manner that all the other creatures paſs into that ſtate, that is, by breaking through its ſeveral coverings, by means of the repeated inflations of its body; when the fly firſt comes out of this caſe, it is green, but it becomes brown by degrees, and in a few hours loſes all its firſt agreeable colour.

Theſe inſects are extremely troubleſome, by their noiſe, in moſt of the hot countries; they are now made no uſe of any where, but we find that the ancients revenged themſelves by eating them: they accounted them an excellent diſh in all their ſtates, but the nymph, or tettygometra, was what they were moſt fond of; they alſo eat them in the fly ſtate, and were ſo nice as to diſtinguiſh their ſexes and ſeaſons: they preferred the females when they were full of eggs, and the males before that time, while they were full of ſemen. Reaumur ubi ſupra, p. 236.

HARVEST-*home*, denotes the feaſt often obſerved at the cloſe of *harveſt*, and alſo the ſong uſed on that occaſion. See DECEMBER.

HARESPEX, or ARUSPEX, in *Antiquity*, a ſort of prieſt, or diviner, who inſpected and conſidered the entrails of beaſts, particularly thoſe of victims, to find ſigns or indications of ſomething he wanted to know. See ARUSPICES.

Cicero, De Divinat. lib. ii. explains the difference between auſpex and *haruſpex*.

HASCHE, in *Botany*, a name by which ſome authors have called thyme.

HASEL, in *Botany*. See HAZLE.

HASELA, in *Zoology*, the name of a freſh water fiſh, of the malacoſtomous, or leather-mouthed kind, called by ſome a ſpecies of the mullet, by others, of the chubb, and in many places the haſler; it is a ſmooth, ſoft, and ſmall fiſh, of an oblong and ſlender body, and ſeldom exceeding ſix or ſeven inches in length. They are caught in lakes and rivers, but thoſe from running waters are eſteemed the beſt, and April and May are accounted the months in which they are in higheſt ſeaſon; they are eaten alſo in June and July, but ſeldom after theſe months.

HASINELLAS, in the *Glaſs-making Trade*, are a number of hooks faſtened to the ſides of the working furnace, by means of which the workmen are able to reſt and turn their veſſels as they heat them. Neri's Art of Glaſs, p. 242.

HASSA *alrhai*, in the *Materia Medica of the Arabian Phyſicians*, a name given to a plant, the virtues of which they commend on many occaſions.

The meaning of the words *haſſa alrhai* is *virga paſtoris*, ſhepherd's rod; and hence they have been led to ſuppoſe, that the plant we call *virga paſtoris*, or DIPSACUS-*minor*, the ſmaller teazel, or ſhepherd's rod, has the virtues given to the *haſſa alrhai*, and was the ſame plant. But though it happens that the names of theſe two plants agree in ſignification, there is nothing elſe in which they agree, the *haſſa alrhai* being the ſame plant with the *polygonum* of the early writers, which, with the epithet of *maſculum*, ſtood for the common knotgraſs; and when the word *fæmininum* was added, ſignified the common *equiſetum*, or horſetail, which was called *polygonum*, for the ſame reaſon the knotgraſs was, that is, becauſe its ſtalks were compoſed of a great number of joints. Theſe two plants agree in the virtues of agglutinants and aſtringents, neither of which virtues our *virga paſtoris* has any title to.

HASSELQUISTIA, in *Botany*, a genus of the *pentandria digynia* claſs: the characters of which are, that the diſc is hemiſpheric and urceolated, and that the rays are oval, plane, marginated, and convex in the middle; and that the fruit is a ſmooth ſeed.

HASSOCK, denotes a baſs, or cuſhion made of ruſhes, to kneel or reſt the feet on in churches.

HASTA, or HASTA *pura*, among *Medaliſts*, ſignifies a kind of ſpear or javelin, not ſhod, or headed with iron; or rather an ancient ſceptre, ſomewhat longer than ordinary, occaſionally given to all the gods.

The *haſta* is ſuppoſed a ſymbol of the goodneſs of the gods, and of the conduct of providence, which is equally mild and forcible.

HASTA, in ſome countries, is a meaſure, or quantity of ground amounting to thirty paces: thus called, according to M. Du-Cange, from the *haſta*, or rod, wherewith it was meaſured.

HASTATED *leaf*, among *Botaniſts*. See LEAF.

HASTATI, or HASTARII, among the *Romans*, ſoldiers armed with ſpears, who were always drawn up in the firſt line of BATTLE.

HASTE, or QUICKEN *your hand*, in the *Manege*, called in French, *hatez le main* or *hatez, hatez*, is an expreſſion frequently uſed by riding-maſters, when a ſcholar works a horſe upon volts, and the maſter has a mind he ſhould turn his hand quicker to the ſide on which the horſe works; ſo that if the horſe works to the right, he turns quicker with his ſhoulders to the right: and the contrary is obſerved, if the horſe works to the left.

HASTING-*pear*, a name given, by the gardeners, to a ſpecies of *pear*, called alſo by ſome, the green chiſſel *pear*; this is a moderately large PEAR, and is longiſh towards the pedicle; its ſkin is thin, and of a whitiſh green; the pulp is melting, and of a ſugary flavour. It ripens in July.

HASTIVE, a French term, ſometimes uſed in Engliſh for *early*, *forward*, or ſomething that comes before the ordinary time, or ſeaſon.

The *haſtive* fruits are ſtrawberries and cherries. We have *haſtive* peas, &c.

HAT, a covering for the head, worn by the men throughout the weſtern part of Europe.

Hats are chiefly made of hair, wool, &c. worked, fulled, and faſhioned to the figure of the head.

Hats are ſaid to have been firſt ſeen about the year 1400, at which time they became of uſe for country wear, riding, &c. F. Daniel relates, that when Charles II.

made his public entry into Rouen, in 1449, he had on a *hat* lined with red velvet, and ſurmounted with a plume, or tuft of feathers: he adds, that it is from this entry, or at leaſt under this reign, that the uſe of *hats* and caps is to be dated, which henceforward began to take place of the chaperoons and hoods, that had been worn before. In the proceſs of time, from the laity, the clergy alſo took this part of the habit, but it was looked on as a great abuſe, and ſeveral regulations were publiſhed, forbidding any prieſt, or religious perſon, to appear abroad in a *hat* without coronets, and enjoining them to keep to the uſe of chaperoons, made of black cloth, with decent coronets; if they were poor, they were at leaſt to have coronets faſtened to their *hats*, and this upon penalty of ſuſpenſion and excommunication. Indeed the uſe of *hats* is ſaid to have been of a longer ſtanding among the eccleſiaſtics of Brittany, by two hundred years, and eſpecially among the canons; but theſe were no other than a kind of caps, and from hence aroſe the ſquare caps worn in colleges, &c.

Lobineau obſerves, that a biſhop of Dol, in the twelfth century, zealous for good order, allowed the canons alone to wear ſuch *hats*; enjoining that if any other perſon come with them to church, divine ſervice ſhould immediately be ſuſpended. Tom. i. p. 845.

Hats make a very conſiderable article in commerce: the fineſt, and thoſe moſt valued, are made of pure hair of an amphibious animal, called the caſtor or beaver, frequent in Canada, and other provinces of North America. See BEAVER.

HATS, *method of making*. *Hats*, we have obſerved, are made either of wool, or hair of divers animals, particularly of the caſtor, hare, rabbet, camel, &c. The proceſs is much the ſame in all; for which reaſon we ſhall content ourſelves to inſtance in that of caſtors.

The ſkin of this animal is covered with two kinds of hair; the one long, ſtiff, gloſſy, and pretty thin ſet; this is what renders the ſkin, or fur, of ſo much value: the other is ſhort, thick, and ſoft, which alone is uſed in *hats*.

To tear off one of theſe kinds of hair, and cut the other, the hatters, or rather the women employed for that purpoſe, make uſe of two knives, a large one like a ſhoemaker's knife, for the long hair; and a ſmaller, not unlike a vine knife, wherewith they ſhave, or ſcrape off, the ſhorter hair.

When the hair is off, they mix the ſtuff; to one third of dry caſtor putting two-thirds of *old coat*, i. e. of hair which has been worn ſome time by the ſavages, and card the whole with cards, like thoſe uſed in the woollen manufactory, only finer; this done, they weigh it, and take more or leſs, according to the ſize or thickneſs of the *hat* intended. The ſtuff is now laid on the *hurdle*, which is a ſquare table, parallel to the horizon, having longitudinal chinks cut through it; on this hurdle, with an inſtrument called a *bow*, much like that of a violin, but larger, whoſe ſtring is worked with a little bow ſtick, and thus made to play on the furs, they fly and mix together, the duſt and filth at the ſame time paſſing through the chinks; this they reckon one of the moſt difficult operations in the whole, on account of the juſtneſs required in the hand to make the ſtuff fall preciſely together, and that it may be every where of the ſame thickneſs. In lieu of a bow, ſome hatters make uſe of a ſieve, or ſearce of hair, through which they paſs the ſtuff.

After this manner they form gores, or two capades, of an oval form, ending in an acute angle at top; and with what ſtuff remains, they ſupply and ſtrengthen them in places where they happen to be ſlenderer than ordinary; though it is to be remembered, that they deſignedly make them thicker in the brim, near the crown, than toward the circumference, or in the crown itſelf.

The capades thus finiſhed, they go on to harden them into cloſer and more conſiſtent flakes by preſſing down a *hardening ſkin*, or leather, thereon; this done, they are carried to the *baſon*, which is a ſort of bench with an iron plate fitted therein, and a little fire underneath it; upon which laying one of the hardened capades, ſprinkled over with water, and a ſort of mould being applied thereon, the heat of the fire, with the water and preſſing, imbody the matter into a ſlight hairy ſort of ſtuff, or felt; after which, turning up the edges all round the mould, they lay it by, and thus proceed to the other; this finiſhed, the two next are joined together, ſo as to meet in an angle at the top, and only form one conical cap, after the manner of a manica Hippocratis, or flannel bag.

The *hat* thus baſoned, they remove it to a large kind of receiver or trough, reſembling a mill-hopper, going ſloping or narrowing down from the edge or rim, to the bottom, which is a copper kettle, filled with water and grounds, kept hot for that purpoſe. On the deſcent or ſloping ſide, called the *plank*, the baſoned *hat*, being firſt dipped in the kettle, is laid, and here they proceed to work it, by rolling and unrolling it again and again, one part after another, firſt with the hand, and then with a little wooden roller, taking care to dip it from time to time, till at length by thus fulling and thickening it four or five hours, it is reduced to the extent or dimenſions of the *hat* intended. To ſecure the hands from being injured by this frequent rolling, &c. they uſually guard them with a ſort of thick gloves.

The *hat* thus wrought, they proceed to give it the proper form, which is done by laying the conical cap on a wooden *block*, of the intended ſize of the crown of the *hat*, and thus tying it round with a packthread, called a *commander:* after which, with a piece of iron, or copper bent for that purpoſe, and called a *ſtamper*, they gradually beat or drive down the commander all round, till it has reached the bottom of the block, and thus is the crown formed; what remains at bottom below the ſtring, being the brim.

The *hat* being now ſet to dry, they proceed to *ſinge* it, by holding it over a flare of ſtraw, or the like; then it is *pounced*, or rubbed over with pumice, to take off the coarſer knap; then rubbed over afreſh with ſeal-ſkin to lay the knap a little finer; and laſtly, carded with a fine card to raiſe the fine cotton, with which the *hat* is afterwards to appear.

Things thus far advanced, the *hat* is thus ſent, upon its block, and tied about with a packthread as before, to be dyed. The dyer's copper is uſually very large, holding ten or twelve dozen of *hats*. The dye, or tincture, is made of logwood, verdegris, copperas, and alder-bark; to which ſome add galls and ſumac.

Here the *hat* is kept boiling for about three quarters of an hour; then taken out and ſet to cool, and then returned to the dye, and this for ten or twelve times ſucceſſively. For the method of dying *hats*, ſee DYING *of hats*.

The dye being complete, the *hat* is returned to the hatter, who proceeds to dry it, by hanging it in the top, or roof, of a ſtove or oven, at the bottom of which is a charcoal fire; when dry, it is to be ſtiffened, which is done with melted glue or gum ſenegal, applied thereon by firſt ſmearing it, and beating it over with a bruſh, and then rubbing it with the hand. The next thing is to *ſteam* it on the *ſteaming baſon*, which is a little hearth, or fire-place, raiſed three feet high with an iron plate laid over it, exactly covering the hearth; on this plate they firſt ſpread cloths, which being ſprinkled over with water to ſecure the *hat* from burning, the *hat* is placed brim downwards thereon; when moderately hot, the workman ſtrikes gently on the brim, with the flat of his hand, to make the joinings incorporate and bind ſo as not to appear; turning it from time to time, this way and that way, and at laſt overturning and ſetting it in the crown.

When ſteamed ſufficiently, and dried, they put it again on the block, and bruſh and *iron* it on a table or bench for the purpoſe, called the *ſtall-board*; this they perform with a ſort of irons like thoſe commonly uſed in ironing linen, and heated like them, which being rubbed over and over each part of the *hat*, with the aſſiſtance of the bruſh, ſmoothens and gives it a gloſs, which is the laſt operation; nothing now remaining but to clip the edges even with ſciſſars, and ſew a lining to the crown.

Hats for women have been made in various forms, of ſilk, ſtraw, ſhavings of wood, ivory, feathers, gold, and ſilver.

HAT is alſo figuratively uſed for the dignity of a cardinal, or a promotion to that dignity.

In this ſenſe they ſay, to expect a *hat*; to claim, or have pretenſion to the *hat*, &c.

Pope Innocent IV. firſt made the *hat* the ſymbol or cognizance of the cardinals; enjoining them to wear a *red hat*, at all ceremonies and proceſſions, as a token of being ready to ſpill their blood for Jeſus Chriſt. See CARDINAL.

HAT, in *Heraldry*. See CHAPEAU.

HATCHEL, or HITCHEL, in the *Manufactory of Flax, Hemp, &c.* a tool, not unlike a CARD, for dreſſing and combing them into fine hairs.

They conſiſt of ſharp-pointed iron pins, or teeth, ſet orderly in a board.

Of theſe there are ſeveral ſorts, ſome with finer and ſhorter teeth, others with them coarſer and longer.

HATCHES, in *a Ship*, a ſort of trap-doors in the midſhip, or between the main-maſt and fore-maſt, through which goods of bulk are let down into the hold. There are ſeveral of theſe ſquare or oblong paſſages in the deck of a ſhip, leading from one deck to another, and into the hold or lower apartments. Hence the

HATCH-*way* is that place where the *hatches* are. See *Tab. Ship. fig.* 2. *n.* 40.

To lay any thing in the *hatch-way*, is to put it ſo that the *hatches* cannot be come at, or opened.

Hatches, *coamings of the.* See Coamings.

Hatches are alſo flood-gates, ſet in a river, &c. to ſtop the current of water.

The word is particularly uſed for certain dams, or mounds, made of rubbiſh, clay, or earth, to prevent the water that iſſues from the ſtream-works, and tin-waſhes in Cornwal, from running into the freſh rivers.

The tenants of Bulyſtoke, and other manors, are bound to do certain days work to the *hatches*.

Hatches, in *Mining*, a term uſed in Cornwal, to expreſs any of the openings of the earth, either into mines, or in ſearch of them; the fruitleſs openings are called eſſay *hatches*; the real mouths of the veins, tin-*hatches*; and the places where they wind up the buckets of the ore, wind-*hatches*.

HATCHET, an inſtrument wherewith to hew wood. The *hatchet* is a ſmaller, lighter ſort of ax, with a baſil edge on its left ſide; having a ſhort handle, as being to be uſed with one hand.

Hatchet, a ſmall ax, uſed by the pioneers, who go before to prepare the ways for an army, by cutting down hedges, buſhes, ſtyles, or gates. The grenadiers carry ſometimes each a *hatchet* by his ſide; and the French dragoons, who have but one piſtol, have a *hatchet* hanging at their ſaddle-bows, on the right-ſide.

Hatchet *vetch*, in *Botany*. See Vetch.

HATCHING, the act whereby fecundated eggs, after ſeaſonable incubation, exclude their young.

Hatching, with reſpect to the oviparous tribe, amounts to the ſame as parturition, or delivery, in the viviparous.

In Egypt they *hatch* all their chickens by the heat of an oven: the method whereof is given us by Mr. Greaves in the Philoſophical Tranſactions, N° 117, or Abridgment, vol. ii. p. 851, &c.

They have houſes built for the purpoſe, having a long entrance, on each ſide whereof are twelve or fourteen ovens, whoſe bottoms and ſides are formed of ſundried bricks, lined with mats for the eggs to lie on; and the tops covered with ſticks, except two ſpaces, which are brick, and ſerve as hearths to build the fires on wherewith the eggs are to be heated; over theſe is another ſtory of ovens, having holes, which are either ſtopped with tow, or left open at pleaſure, to govern the heat of the ovens below.

They begin to heat the ovens in the middle of January, ſpending on them every morning about a hundred pound weight of camels or buffaloes dung, and the like quantity at night, till the middle of February; by which time the ovens are too hot for the hand to be held to the walls. After this they put in the eggs to *hatch*, which they continue ſucceſſively to the end of May.

The eggs are firſt put upon the mats in the lower ovens, upon the ground, 7 or 8000 eggs in number, and laid only double one upon another: in the ovens over theſe, the fire is made in the little channels, from whence the heat is conveyed into the lower; the eggs directly under theſe hearths lie threefold.

At night when they new-make their fires in their hearth, they remove the eggs that were directly undermoſt, laying three upon one another, in the place of thoſe which lay on the ſides only double; and theſe being now removed, they lie treble under the hearth, becauſe the heat is greater there than on the ſides.

Theſe eggs continue in the lower ovens fourteen days and nights; after which they remove them into the upper; and in theſe, there being no more fire uſed, they turn the eggs four times every twenty-four hours.

The 21ſt, or 22d day the chickens are *hatched*, which the firſt day do not eat; the ſecond day they are fetched away by women who give them corn, &c. The maſter of the ovens hath a third part of the eggs for his coſt and pains, out of which he is to make good to the owners (who have two thirds in chickens for their eggs) if any happen to be ſpoiled or miſcarry.

The fire in the upper ovens, when the eggs are placed in the lower, is thus proportioned: the firſt day there is the greateſt fire, the ſecond leſs than the firſt; the fourth more than the third, the fifth leſs; the ſixth more than the fifth, the ſeventh leſs; the eighth more, the ninth without fire; the tenth a little fire in the morning; the eleventh they ſhut all the holes with flax, &c. making no more fire; for if they ſhould the eggs would break. They take care that the eggs be no hotter than the eye of a man, when they are laid upon it, can well endure. When the chickens are *hatched*, they put them into the lower ovens.

The number of theſe ovens in different parts of the country, which are attended by the inhabitants of a village called Bermi, is about 386, and they uſually keep them at work for ſix months; as, therefore, each brood is perfected in twenty-one days, it is eaſy in every one of them to *hatch* eight different broods of chickens. If we ſuppoſe that only two thirds of the eggs are *hatched*, and each brood conſiſts of at leaſt 30000 chickens, the ovens of Egypt are capable of producing yearly, at leaſt 92640000 chickens.

Mr. Reaumur has diſcovered, that the heat neceſſary for this purpoſe, is nearly the ſame with that marked 32, upon his thermometer, or that marked 96 on Fahrenheit's. If, therefore, theſe eggs be kept in this degree of heat, they will as certainly *hatch*, as if the parent-hen had ſat upon them; and indeed it is impoſſible it ſhould be otherwiſe, ſince this heat anſwers nearly to that of the ſkin of the hen, or even of mankind; ſo that the empreſs Livia, as Pliny relates, might truly *hatch* a chicken in her boſom, if ſhe had but the patience to keep an egg there for the ſame number of days that it ought to have continued under a hen.

After many experiments, Mr. Reaumur found, that ſtoves heated by means of a baker's oven, ſucceeded equally well with thoſe made hot by layers of dung. The furnaces of glaſs-houſes, and thoſe of the melters of metals, might no doubt be made to anſwer the ſame purpoſe: if therefore, an eaſy method could be found to regulate the heat of the ſtove, it would be extremely convenient for bakers or paſtry-cooks to *hatch*, with little or no expence, a very great number of chickens, which they might diſpoſe of to the country people, to be reared till marketable. Should a thermometer be judged neceſſary for this purpoſe, it will be ſufficient to mark on it only ſuch degrees as are abſolutely neceſſary; by which means the inſtrument will not only come cheaper, but be more readily underſtood by the ignorant people, for whoſe uſe it is deſigned.

Such an inſtrument however may be wholly diſpenſed with; a lump of butter, of the ſize of a walnut, melted with half as much tallow, ſerving to indicate the heat of the ſtove with ſufficient exactneſs; when the heat is too great, this mixture, which is kept in a phial, will become as liquid as oil; and when the heat is too ſmall, it will remain fixed in a lump; but it will flow like thick ſyrup, upon inclining the bottle, if the ſtove be of a right temper: great attention therefore ſhould be given to keep the heat always at this degree, by letting in freſh air, if it be too great, or ſhutting the ſtove more cloſe, if it be too ſmall.

But this is not all. That all the eggs in the ſtove may equally ſhare the irregularities of the heat, it will be neceſſary to ſhift them from the ſides to the center, and *vice versâ*; thereby imitating what the hens themſelves do by thoſe upon which they ſit; for hens are frequently ſeen to make uſe of their bills to puſh to the outer parts thoſe eggs which were neareſt to the middle part of their neſt, and to bring into that middle part ſuch as before lay neareſt to the ſides of the ſame.

As to the form of the ſtoves, no great nicety is neceſſary; a chamber over an oven will do very well, only in order to aſcertain the due degree of heat, it will be neceſſary to have phials of butter, as directed above, in ſeveral parts of the rooms; and when the heat wants to be either increaſed or diminiſhed, it is ſufficient to diminiſh or increaſe the communication between the air in the room and that abroad, by opening or ſhutting ſome of the openings made in the wall for that purpoſe.

In order to cheriſh the new-*hatched* chickens, capons may be taught to tend them in the ſame manner as hens do. Mr. Reaumur tells us, that he has ſeen above two hundred chickens at once, all led about and defended by only three or four ſuch capons, which clucked like hens, to call in the chickens that had ſtrayed too far off; and even redoubled their call, when they found any nice bits, to invite the young brood to come and pick them up: nay cocks may be taught to do the ſame office, which they as well as capons will continue to do all their lives afterwards.

But Mr. Reaumur, not ſatisfied with the aſſiſtance he could procure from cocks and capons, has invented a ſort of low boxes without bottoms, and lined with furs; theſe, which he calls artificial parents, not only ſhelte the chickens from the injuries of the air, but afford a kindly warmth, ſo that they preſently grow fond of them, and take the benefit of their ſhelter as readily as they would have done under the wings of a hen.

For a few weeks after *hatching*, it will be neceſſary t keep the chickens in a room artificially heated, and furniſhed with theſe boxes; but afterwards they may be ſafel expoſed to the air in the court-yard, in which it may no be amiſs to place one of theſe artificial parents to ſhelte them, ſhould there be any occaſion.

As to the manner of feeding the young brood, they ar generally a whole day after being *hatched*, before the take any food at all; and then a few crumbs of brea may be given them for a day or two, or millet ſee mixe mixed with the crumbs; after which they will begin to pick up inſects and graſs for themſelves.

People in the country, who have plenty of conveniences for the raiſing of poultry, will hardly give themſelves the trouble to *hatch* chickens in this artificial manner. It is in villages near great towns, and principally in the neighbourhood of the capital city, that it would be of the greateſt importance to promote the eſtabliſhment of this kind of ſtoves. Vide Mr. Trembley's Abſtract of the Art of Hatching domeſtic Fowls, tranſlated from the original Treatiſe of Mr. Reaumur, where he explains every difficulty.

HATCHING *of bees*. See *Generation of* BEES.

HATCHING, or **HACHING**, in *Deſigning and Engraving*, ſignifies the making of lines with a pen, pencil, graver, or the like; and interſecting, or going acroſs thoſe lines, with others drawn over them another way.

The depths and ſhadows of draughts are uſually formed by *hatching* or *hatch-work*. See ENGRAVING and ETCHING.

HATCHING, among *Miners*. See DIGGING.

HATCHINGS are of great uſe in heraldry, to diſtinguiſh the ſeveral COLOURS of an eſcutcheon, without its being illumined.

The firſt kind of *hatching* in pale, or from top to bottom, ſignifies *gules*, or *red:* the ſecond in ſeſs, acroſs the coat, *azure*, or *blue*.

Hatching in pale, counter-*hatched* in feſs, ſignifies *ſable*, or *black*. *Hatching* in bend, proceeding from right to left, ſignifies *green*; and that in bars, from left to right, *purple*.

When the coat is only dotted, it is ſuppoſed to be *or*, or *gold*; and when quite bare or void, *argent*, or *white*.

This invention is commonly aſcribed to F. Pietra Sancta; though the Sieur de la Columbiere has diſputed his title to it.

HATCHMENT, in *Heraldry*, the marſhalling of ſeveral coats of arms in an eſcutcheon.

HATCHMENT is alſo a popular name for an ATCHIEVEMENT.

By theſe *hatchments* or funeral eſcutcheons, it may be known after any perſon's deceaſe, what rank either he or ſhe held when living; and if it be a gentleman's *hatchment*, whether he was a bachelor, married man, or widower, with the like diſtinctions for gentlewomen. In the *hatchment*, (*Tab. IV. Heraldry*, *fig*. 123.) are repreſented the arms of a private gentleman and his wife parted per pale, the dexter ſide, which is *gules*, *three bars or*, for the huſband; having the ground without the eſcutcheon black, which denotes the man to be dead; and the ground on the ſiniſter ſide being white ſignifies that the wife is living. When a married gentlewoman dies firſt, the *hatchment* is diſtinguiſhed by a contrary colour from the former; that is, the arms on the ſiniſter ſide have the ground without the eſcutcheon black, whereas thoſe on the dexter ſide, for her ſurviving huſband, are upon a white ground: beſides, the *hatchment* of a gentlewoman is differenced by a cherub over the arms inſtead of a creſt. See *fig*. 124. When a bachelor dies, his arms may be depicted ſingle or quartered, with a creſt over them, but never impaled as the others are; and the whole ground without the eſcutcheon is black. See *fig*. 125. When a maid dies, her arms, which are placed in a lozenge, may be ſingle or quartered, have the whole ground black, and inſtead of a creſt have a cherub over them. See *fig*. 126. When a widower dies, his arms are repreſented impaled with thoſe of his deceaſed wife, having a helmet, mantling and creſt over them, and the whole ground without the eſcutcheon black. See *fig*. 127. When a widow dies, her arms are impaled with thoſe of her deceaſed huſband, but incloſed in a lozenge, over them is placed a cherub inſtead of a creſt, and the whole ground without the eſcutcheon is black. See *fig*. 128. If a widower or bachelor ſhould be the laſt of his family, the *hatchment* is depicted as in *fig*. 129, and that of a maid or widow, whoſe family is extinct by her death, is depicted as in *fig*. 130. with this difference, that a death-head is generally annexed to each *hatchment*, denoting, that death has conquered all. The ſame rules are obſerved with reſpect to the eſcutcheons placed on the hearſe and horſes uſed in pompous funerals, except that they are not ſurmounted with creſts but always plain; however, herald-painters commonly enſign thoſe of peers with coronets, and that of a maiden lady with a knot of ribbands. Porny's El. of Her. p. 240, &c.

HATTEMISTS, in *Eccleſiaſtical Hiſtory*, the name of a modern Dutch ſect, ſo called from Pontian Van Hattem, a miniſter in the province of Zealand, towards the cloſe of the laſt century, who being addicted to the ſentiments of Spinoza, was on that account, degraded from his paſtoral office. The VERSCHORISTS and *Hattemiſts* reſemble each other in their religious ſyſtems, though they never ſo entirely agreed as to form one communion. The founders of theſe ſects deduced from the doctrine of abſolute decrees, a ſyſtem of fatal and uncontrolable neceſſity; they denied the difference between moral good and evil, and the corruption of human nature: from hence they farther concluded, that mankind were under no ſort of obligation to correct their manners, to improve their minds, or to obey the divine laws; that the whole of religion conſiſted not in acting but in ſuffering; and that all the precepts of Jeſus Chriſt are reducible to this one, that we bear with chearfulneſs and patience the events that happen to us through the divine will, and make it our conſtant and only ſtudy to maintain a permanent tranquility of mind. Thus far they agreed; but the *hattemiſts* farther affirmed, that Chriſt made no expiation for the ſins of men by his death, but had only ſuggeſted to us by his mediation, that there was nothing in us that could offend the deity; this, they ſay, was Chriſt's manner of juſtifying his ſervants, and preſenting them blameleſs before the tribunal of God. It was one of their diſtinguiſhed tenets, that God does not puniſh men for their ſins, but by their ſins. Theſe two ſects, ſays Moſheim, ſtill ſubſiſt, though they no longer bear the names of their founders. Moſh. Eccl. Hiſt. vol. iv. p. 553, &c. 8vo. edit. 1768.

HATTOCK, a ſhock of corn, containing twelve ſheaves. Others make it only three ſheaves laid together.

HATUMURUNGHA, in *Botany*, a name by which ſome authors have called the tree whoſe fruit is the ben-nut, the balanus myrepſica, or glans unguentaria, and whoſe wood is the lignum nephriticum of the ſhops.

HAVELDA, in *Zoology*, the name of a bird of the duck kind, common in Iceland, and known, among the natives, by this name, called by authors *anas caudata Iſlandica*, the *long-tailed Iceland*-DUCK.

HAUBERGETTUM, in our *Old Writers*, the ſame with *halſberga* and habergeon, which all ſignify a coat of mail.

HAVEN, a ſeaport, or HARBOUR for ſhips. See PORT.

The word is derived from the Saxon *havene*, or the German *hafen*, or the French *havre*; which all ſignify the ſame thing.

HAVER, a name given in ſome parts of the kingdom, to OATS.

HAVERSACK, in *Military Language*, is a kind of bag, made of coarſe grey linen, in which the ſoldiers carry bread and proviſions on a march. They are only uſed in the field and in cantonments, each ſoldier having one.

To **HAUL**, in *Sea Language*, to pull a ſingle rope without the aſſiſtance of blocks, or other mechanical powers. See BOWSE.

To **HAUL** *the wind*, is to direct the ſhip's courſe nearer to that point of the compaſs from which the wind ariſes.

HAUM, **HALM**, or **HAWM**, among *Farmers*, denotes the ſtem or ſtalk of corn, peaſe, beans, &c. from the root to the ear.

HAUNCH, or **HANCH**, the hip, or that part of the body between the laſt ribs and the thigh.

The *haunches* conſiſt of three bones, joined together by cartilages, which in courſe of time grow dry, hard, and bony; ſo that in adults, the three only ſeem to conſtitute one continued bone.

HAUNCHES, or hips of a horſe, are thoſe parts of the hind-quarters which extend from the reins or back, to the hough or ham.

The *haunches* of a horſe are too long, if, when ſtanding in the ſtable, he limps with his hind legs farther than he ought to do; and when the top or onſet of his tail is not in a perpendicular line to the top of his hocks, as it always is in horſes whoſe *haunches* are of a juſt length.

One of the moſt neceſſary leſſons in managing the great horſe, is that of *putting him upon his haunches*; which, in other terms, is called to *couple* him well, or to put him well together, or make him compact.

A horſe that does not bend or lower his *haunches*, throws himſelf too much upon his ſhoulders, and is heavy upon the bridle. To *drag the haunches*, is to change the leading foot in galloping.

To make a horſe bend, or lower his *hips*, you muſt frequently make him go backwards, and make uſe of the aids of the hands, and of the calves of your legs, in giving good ſteps; and if that does not ſucceed, he muſt be tried upon a *calcade*, or ſloping ground, after the Italian faſhion.

Head in, and *hips in*. See HEAD.

To gallop with the *haunch in*. See GALLOP.

HAUNT, among *Sportſmen*, denotes the place to which game are accuſtomed to reſort; and among *Hunters*, it ſignifies the walk of a deer, or the place of his ordinary paſſages. See HUNTING.

HAVRE, in *Geography*, &c. a French term, ſignifying the ſame with *haven* or *harbour*.

HAUGH, the ſame with HAW.

HAURIANT, in *Heraldry*, denotes the poſture of a fiſh when borne directly upright. See *Tab.* II. *Heraldry*, *fig.* 53.

HAUSTELLUM, in *Natural Hiſtory*, a name given by ſome authors to a peculiar kind of ſhell-fiſh, of the purpura kind, which the French have named the BECASSE, and we the woodcock ſhell. It is remarkable for its extremely long and ſlender beak. There are a very elegant echinated or ſpinoſe kind, and two or three ſmooth ones.

HAUSTILIA *ſuccina*, in *Natural Hiſtory*, a term uſed to expreſs that kind of amber, or, more properly ſpeaking, thoſe maſſes of amber which are obtained by dragging the bottoms of the ſea near Pruſſia, or found on the ſhores, in diſtinction from thoſe pieces which are found foſſile in the ſame or other kingdoms.

The foſſile amber itſelf very much differs, not only in degree of beauty and purity, but alſo in hardneſs; ſome of it being ſo poor, ſo coarſe, and ſo brittle, as not to be worthy the name of amber; and ſome, that is yet ſomewhat better than this, breaking in the taking up.

This difference in purity, hardneſs, and goodneſs, ſeems wholly owing to the different proportion in which the ſalts are mixed with the bitumen, in the compoſition of the amber; and it is no wonder that the ſea or *hauſtile* amber is never of the ſame coarſe kind with ſome of the worſt that is dug, becauſe ſuch is daſhed in pieces by the waves, and deſtroyed, and only the good preſerved. The *hauſtile* amber is uſually found in irregular maſſes, for the moſt part wholly diveſted of its rough coat, and often broken, ſo that its original ſhape cannot well be aſcertained; but the foſſile amber generally carries the marks of its origin with it, and is either found in form of large drops of a roundiſh or oval figure, or elſe in flatted cakes, formed by the narrow ſpaces it is found in, between the layers of the matrix, which is always a kind of foliated or flakey ſubſtance, by ſome miſtaken for foſſile wood, or the barks of trees preſſed together, though, in reality, it is no other than a bituminous earth coagulated by ſalts, and hardened by the gradual evaporation of its ſuperfluous moiſture by the ſun's heat. Phil. Tranſ. N° 258, p. 18. See AMBER and MATRIX.

HAUTBOY, or HOBOY, a ſort of muſical inſtrument, of the wind kind, with a reed, by means of which it is blown or ſounded.

The word is French, *haut-bois*; q. d. *high wood*; and is given to this inſtrument, becauſe its tone is higher than that of the violin.

The *hautboy* is ſhaped much like the flute, only that it ſpreads or widens more towards the bottom. The treble is two feet long, and has ten holes, nine only of which are harmonical: the tenor goes a fifth lower, when blown, or ſounded open; it has eight holes, ſeven of which are only harmonical. The baſs is five feet long, and has eleven holes.

HAUTIN, in *Zoology*, the name by which ſome call the fiſh, more uſually called *outin*, and known, among the writers on fiſhes, by the name of OXYRYNCHUS.

HAW. A ſmall parcel of land is ſo called in Kent; as a *hemp-haw*, or *bean-haw*, lying near the houſe, and incloſed for thoſe uſes. But Sir Edward Coke, in an ancient plea concerning Feverſham in Kent, ſays *haws* are houſes. See HAGA.

HAW, HAWGH, or **HOWGH**, is uſed, in the north of England, for a green plot in a valley.

HAW, among *Farriers*, &c. an excreſcence reſembling a griſtle growing between the nether eye-lid and the eye of a horſe, or other beaſt, and which will put the eye quite out, if not timely taken away.

It comes by groſs, tough, and phlegmatic humours, falling from the head, and knitting together, which in the end grow to this infirmity; the ſigns whereof are the watering of the eye, and involuntary opening of the nether ſide.

Every common farrier can cut it out: the affected beaſt is to be held faſt by the head, and with a ſtrong double thread, a needle is to be put in the midſt of the upper eye-lid, and tied, if it be a bullock, to his horn; then taking the needle again, with a long thread, and putting it through the griſtle of the *haw*, with a ſharp knife cut the ſkin finely round, and ſo pluck out the *haw*. That done, they dreſs the eye, take out the blood, waſh it with beer or ale, and caſt in a good deal of ſalt; then waſh it again, afterwards ſtroaking it down with their hands, and ſo let him go. To cure a ſheep of this malady, they drop into the eye the juice of chamomile, or crows-foot.

HAWFINCH, in *Zoology*, an Engliſh name for the COCCOTHRAUSTES, called alſo the groſsbeak, and by the Italians the *frizone*. This bird is the LOXIA *coccothrauſtes* of Linnæus.

HAWK, *accipiter*, a bird of prey, of a bold and generous nature; whereof there are ſeveral ſpecies.

In the Linnæan ſyſtem, the *hawk* gives denomination to a whole order of birds, diſtinguiſhed by a hooked beak projecting on both ſides from the upper mandible, and comprehending four genera, viz the VULTURE, the FALCON, the OWL, and LANIUS.

The *hawk* makes the ſubject of a particular art, called *hawking*, or *falconry*.

Naturaliſts diſagree about the number and diviſion of the *hawk* kind. The moſt commodious diſtribution is that into *long-winged* and *ſhort-winged hawks*.

To the *long-winged*, which may be alſo called the *falcon* tribe, belong the falcon, haggard-falcon, ger-falcon, lanner, hobby, ſaker, merlin, and bawler; all which are reclaimed, manned, fed, and mewed, much after the ſame manner. Of the *ſhort-winged* ſpecies, or *hawks* properly ſo called, are the *gos-hawk* and *ſparrow-hawk*. The former are generally brought to the lure, and ſeize their prey with the foot; breaking the neck-bone with their beak, before they proceed to plume or tire it: the latter are brought to the fiſt, and kill their game by ſtrength and force of wing, at random, and proceed immediately to plume them.

It is to be noted, that the female of all birds of prey is much larger, ſtronger, and more courageous, than the male; which is diſtinguiſhed from it by ſome diminutive name. Thoſe of the *falcon* and *gos-hawk*, are called *tiercels*, or *tiercelets*; that of the ger-falcon, *jerkin*; that of the merlin, *jack*; that of the hobby, *robbin*; that of the *ſparrow-hawk*, *muſket*; and that of the lanner, *lanneret*.

The *hawk* has different names, according to their different ages. The firſt year ſhe is called a *ſoarage*; the ſecond, an *enterview*; the third, a *white hawk*; the fourth, a *hawk of the firſt coat*.

Add, that they have different denominations, according to the different ſeaſons when they are taken. Thoſe taken in the ayrie, are called *eyeſſes*, or *nyeſſes*; thoſe which had forſaken it, and were fed in ſome place not far off, by the old ones, *branchers*; thoſe which had begun to prey for themſelves, *ſoar hawks*; thoſe which have changed their feathers once or more, *mewed hawks*; and thoſe which lived at large, and preyed for themſelves about the woods, *haggards*.

We ſhall here, according to our method in other caſes, give the reader what relates to the ſeveral ſpecies of *hawks*, referring for what is common to them all, to the article HAWKING.

1. Of the *falcon*, or *falcon-gentle*, her nature and qualities, with the manner of luring and reclaiming, and bringing her up to the ſport, we have elſewhere ſpoken under the article FALCON. See *Tab. of Birds*, N° 3.

2. The *haggard falcon*, called alſo *peregrine falcon*, *paſſenger*, and *traveller*, becauſe it is no native of our iſland; or rather, on account of its roving, and wandering more than any other ſort, is not inferior to the beſt of the tribe, for ſtrength, courage, hardineſs, and perſeverance. She is diſtinguiſhed from the common falcon, as being larger, longer, armed with a longer beak and talons, a higher neck, &c. See FALCON. She will lie longer on the wing, and is more deliberate and adviſed in her ſtooping, than the others.

The haggard falcon, when wild and unreclaimed, takes the greateſt liberty of all birds, living either by land or ſea; and is of ſuch abſolute power, that wherever ſhe comes, all flying fowl ſtoop under her ſubjection; even the tiercelet, though her natural companion, dares not ſit by her, or approach her reſidence, except in cawking time; when for procreation-ſake, ſhe admits him in a ſubmiſſive manner to come near and woo her.

When very young, ſhe is apt to attack birds too ſtrong for her; which ſhe perſiſts in, till a ſound beating has brought her to a better underſtanding. She is an inceſſant pains-taker; no weather diſcouraging her from her game. When, unreclaimed, as ſoon as ſhe has ſeized her prey, and broken the ink or neck, ſhe falls on the crop, and feeds firſt on what is contained there; then on the other parts. When ſhe has filled her gorge, ſhe flies to ſome ſolitary place, near the water, where ſhe ſits all day, and at night takes wing to ſome convenient place, where ſhe has before purpoſed, to perch till morning.

For the method of reclaiming, manning, entering, &c. a haggard falcon, or other ſort of hawk, *with the terms of art uſed in reſpect thereof*, ſee HAWKING.

3. The *ger-falcon*, or *gyr-falcon*, is the largeſt bird of the falcon kind, coming next to the ſize of a vulture, and is of the greateſt ſtrength next an eagle; ſhe is ſtoutly armed, and in all reſpects a lovely bird to the eye. Her head and eyes are like thoſe of the haggard; her beak great and bending, her nares large; her ſails long and ſharp pointed, and her train and mail much like the lanner's, having a large marble-ſeared foot; and plumed black, brown, and ruſſet. She may alſo be called a *paſſenger*, her ayrie or breeding-place being in Pruſſia, Muſcovy,

covy, and the mountains of Norway. See Gyrfalcon.

The ger-falcon is of a fierce and fiery nature, and is very hardly managed and reclaimed; but being once overcome, ſhe proves an excellent *hawk*, ſcarce refuſing to ſtrike at any thing. She does not naturally fly the river; but always purſues the herons, ſhovelers, &c. In going up to their gate, they do not hold the courſe, or way, which others uſe to do, but climb up upon the train, when they find any fowl; and, as ſoon as they have reached her, pluck her down, if not at the firſt, yet at the ſecond or third encounter.

4. The *ſaker*, or *ſacre*, is the third in eſteem, next the falcon and ger-falcon, but difficult to be managed, being a *paſſenger*, or *peregrine hawk*, whoſe ayrie has not yet been diſcovered; but the young are chiefly found in the iſlands of the Levant.

She is ſomewhat longer than the haggard falcon; her plume ruſty and ragged; the ſear of her foot and beak like the lanner; her pounces ſhort; her train the longeſt of all birds of prey. See Sacre.

She is very ſtrong and hardy againſt all kinds of fowl, being a great deal more diſpoſed to the field than the brook, and delighting to prey on great fowl, as the heron, gooſe, &c. but for the crane ſhe is not ſo free as the haggard falcon. She alſo excels for the leſſer fowl, as pheaſants, partridges, &c. and is much leſs dainty in her diet, as long-winged *hawks* uſually are.

The ſaker makes excellent ſport with the kite; which as ſoon as he ſees the ſaker caſt off, immediately betakes himſelf to, and truſts in the goodneſs of his wings, and gets to his pitch, as high as poſſibly he can, by making many tours and wrenches in the air; which, together with the variety of conteſts and bickerings between them, affords a curious ſpectacle.

5. The *lanner* or *lanar*, is a *hawk* common in moſt countries, eſpecially in France; making her ayrie on lofty trees in foreſts, or on high cliffs near the ſea-ſide. See Lannarius.

She is leſs than the falcon-gentle, fair plumed, and of ſhorter talons than any other falcon. Such as have the largeſt and beſt faſhioned heads, are eſteemed the beſt. Mewed *lanners* are not eaſily known from *gos-hawks*, or ſakers: the chief marks and characteriſtics are, that they are blacker, have leſs beaks, and are leſs armed and pounced than any other *hawks*.

Of the whole *hawk* tribe, there is none ſo fit for a young falconer as this, becauſe ſhe is not inclined to ſurfeits, and ſeldom melts greaſe by being over-flown.

There is another ſort of *lanners*, whoſe ayrie is in the Alps, having their heads white, and flat aloft, large and black eyes, ſlender nares, ſhort and thick beaks, being leſs than the haggard, and falcon-gentle, though there are different ſizes of them; their tail is marble, or ruſſet; their breaſt feathers white and full of ruſſet ſpots, and the points and extremities of their feathers full of white drops; their ſails and trains long; they are ſhort-legged, with a foot leſs than that of a falcon, and marble ſeared. This *hawk* never lies upon the wing, after ſhe has flown to a mark; but after once ſtooping, makes a point, and like the *gos-hawk*, waits the fowl. She is more valued abroad than in England; here ſhe is conſidered as ſlothful, and hard-mettled. The truth is, a very ſtrict hand muſt be kept over her, as being of an ungrateful diſpoſition. She is flown at field or brook, and will maintain long flights; by which means much fowl is killed. To fly them, they muſt be kept very ſharp; and becauſe they have their caſtings long, they muſt have hard caſtings, made of tow, and knots of hemp.

6. The *merlin* is the ſmalleſt of all birds of prey, and bears a reſemblance to a haggard falcon in plume, as alſo in the ſear of the foot, beak, and talons; and is not unlike her in conditions. See Merlin.

When well manned, lured, and carefully looked after, ſhe proves an excellent *hawk*, eſpecially at partridge, thruſh, and lark: but ſhe is very buſy and unruly, and ſpecial care muſt be had, leſt ſhe unnaturally eat off her own feet and talons, as ſhe has been often known to do. She is very bold; and will fly at birds bigger than herſelf with ſuch eagerneſs, as to purſue them even into a town or village. Though the merlin be accounted a *hawk* of the fiſt, ſhe may be brought to take delight in the lure: when you have made her come to the lure, ſo that ſhe will patiently endure the hood, you ſhould make her a train with a partridge; if ſhe foot and kill it, reward her well: then fly her at the wild partridge; and if ſhe take or make it at firſt or ſecond flight, being retrieved by the ſpaniels, feed her upon it with a reaſonable gorge, chearing her in ſuch a manner with the voice, that ſhe may know it another time: if ſhe do not prove hardy at the firſt or ſecond time, ſhe will always be good for nothing.

7. The *hobby* is a ſort of *hawk* that naturally preys on doves, larks, and other ſmall game. See Hobby, and *Tab.* II. *Birds*, N° 21.

She has a blue beak, but the ſear thereof and legs are yellow; the crinels, or little feathers under the eye, very black; the top of the head between black and yellow. She has alſo two white ſeams on her neck; the plumes under the gorge, and about the brows, are reddiſh, without ſpot or drop; the breaſt-feathers, for the moſt part, are brown, yet interſperſed with white ſpots; her back, train, and wings, are black aloft, having no great ſcales upon the legs, unleſs a few behind: the three ſtretchers and pouncers are very large, with reſpect to her ſhort legs; her brail-feathers are tinctured between red and black; the pendant ones, or thoſe behind the thigh, of a ruſty ſmoky hue.

She is a *hawk* of the lure, and not of the fiſt; and is a high flyer, being in every reſpect like the ſaker, but that ſhe is of a much leſs ſize; for ſhe is not only nimble and light of wing, but dares encounter kites, buzzards, or crows, and will give ſouſe for ſouſe, and blow for blow, till ſometimes they ſiege, and come tumbling down to the ground together. But ſhe is chiefly for the lark, which poor little creature does ſo dread the ſight of her, ſoaring in the air over her, that ſhe will rather chooſe to commit herſelf to the mercy of men or dogs, or to be trampled on by horſes, than venture into the element, when ſhe ſees her mortal enemy there.

The hobby alſo makes excellent ſport with nets and ſpaniels; for when the dogs range the field, to ſpring the fowl, and the hobby ſoars aloft over them, the poor birds, apprehenſive of a conſpiracy between the *hawks* and dogs to their utter ruin, dare not commit themſelves to their wings, but think it ſafer to lie cloſe on the ground, and ſo are taken in the nets. This ſport is called *daring*.

8. The *gos-hawk*, or *goſs-hawk*, q. d. *groſs hawk*, is a large ſhort-winged *hawk*, of which there are ſeveral ſorts, differing in goodneſs, force, and hardineſs, according to the diverſity of their choice in cawking; at which time the ſeveral ſorts of birds of prey aſſemble themſelves with the *gos-hawk*, and gallant it together. See Goshawk.

There are *gos-hawks* from moſt countries, but none better than thoſe bred in the north of Ireland. This *hawk* ought to have a ſmall head, a long and ſtrait face, a large throat, great eyes deep ſet; the apple of the eye black; nares, ears, back, and feet, large and black; a black long beak, long neck, big breaſt, hard fleſh, long fleſhy thighs, the bone of the leg and knee ſhort, long large pounces and talons; and to grow round from the ſtern, or train, to the breaſt forward. The feathers of the thighs, towards the train, ſhould be large, and the train feathers ſhort and ſoft, ſomewhat tending to an iron mail.

The brail-feathers ought to be like thoſe of the breaſt; and the covert-feathers of the train ſpotted, and full of black rundles; but the extremity of every train feather black ſtreaked.

To diſtinguiſh the ſtrength of this bird, tie divers of them in ſeveral places of one chamber, or mew; and that *hawk* that ſlices and mutes higheſt and fartheſt off, may be concluded to be the ſtrongeſt.

The *gos-hawk* flies at the pheaſant, mallard, wild gooſe, hare, and coney; nay, ſhe will venture to ſeize a kid, or goat. She is to be kept with care, as being very choice and dainty in eating, &c.

9. *Sparrow-hawk*, *fringillarius accipiter*, or *falco niſus* of Linnæus, is alſo a kind of ſhort-winged *hawk*, whereof there are ſeveral ſorts, different in plumes; ſome ſmall plumed and black; others of a larger feather; ſome plumed like a quail; ſome brown, or of a canvas-mail, &c. In ſome, the back, head, coverts of the wing and tail, are of a deep bluiſh grey; in others of a deep brown, edged with a ruſty red; the quill feathers are duſky, barred with black on their exterior webs, and ſpotted with white on the lower part of their inner webs; the tail is of a deep aſh-colour, marked with fine broad black bars, the tip being white; the breaſt and belly are of a whitiſh yellow, adorned with tranſverſe waved bars; in ſome of a deep brown colour, in others orange; the cere, irides, and legs, yellow. The colours of the female differ from thoſe of the male: the head is of a deep brown; the back and coverts of the wings are duſky, mixed with dove-colour; the coverts of the tail are of a brighter dove-colour; the waved lines that croſs the breaſt are more numerous than thoſe on that of the male; and the breaſt itſelf is of a pure white. This is the moſt pernicious *hawk* which we have; and makes great havock among pigeons as well as partridges. It builds in hollow trees, in old neſts of crows, large ruins, and high rocks; lays four white eggs, encircled near the blunter end with red ſpecks. Pennant.

The *ſparrow-hawk*, ſo far as her ſtrength will give her leave, is a good *hawk*; and he that knows how to man, reclaim, and fly with a *ſparrow-hawk*, may eaſily attain to the keeping and managing of all others. In this reſpect ſhe really excels, that ſhe ſerves both for winter or for ſummer, with great pleaſure, and will fly at all kinds of game, more than the falcon.

The Engliſh legiſlature has thought theſe birds worthy of its protection: taking their eggs out of any man's ground, is puniſhable by impriſonment for a year and day, and by a fine at the king's will, one half to him, and half to the owner of the ground. Stat. 11 Hen. VII. cap. 17. Stealing *hawks*, in diſobedience to the rules preſcribed by the ſtat. 37 Edw. III. cap. 19. is felony. See FALCONRY.

HAWK, *make*, in *Falconry*, a name given to an old ſtaunch *hawk*, which being uſed to fly, will teach a young one to fly.

HAWK-*weed*, *hieracium*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: it has a flower compoſed of many hermaphrodite florets, included in one common ſcaly empalement; the florets are equal and uniform; they have one petal, ſhaped like a tongue, indented in five parts at the point; and have each five ſhort, hairy ſtamina; at the bottom of the petal is ſituated a germen, which becomes a ſhort four-cornered ſeed, crowned with down, ſitting in the empalement. There is a great number of the ſpecies of this plant, which grow naturally as weeds in England. Miller therefore only ſelects ſeven, which he eſteems worth cultivating.

HAWK-*weed*, *baſtard*, *crepis*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: it has a flower compoſed of many hermaphrodite florets, which are included in a double empalement; theſe florets are of one leaf, uniform, tongue-ſhaped, and are indented at the top in five parts, having each five ſhort, hairy ſtamina: the germen is ſituated in the center of the florets, which afterward becomes an oblong ſeed, crowned with a long feathery down, which ſits upon little footſtalks. There are four ſpecies, which Miller ſelects out of numbers which he ſays grow as weeds in divers parts of Europe.

HAWKERS, anciently were fraudulent perſons, who went from place to place, buying and ſelling braſs, pewter, and other merchandize, which ought to be uttered in open market. In this ſenſe the word is mentioned, anno 25 Hen. VIII. cap. 6. and 33 ejuſdem, cap. 4.

The appellation *hawkers* ſeems to have ariſen from their uncertain wandering, like thoſe who, with *hawks*, ſeek their game where they can find it.

The term is now uſed as ſynonymous with pedlar; a perſon who travels about the country ſelling wares.

Every *hawker* muſt take out an annual licence, for which he muſt pay 4*l.* and if he travels with a horſe, aſs, or mule, for every one of them 8*l.* If he travels without a licence, or contrary to it, he forfeits for every offence to the informer, and the poor of the pariſh where diſcovered, 12*l.* If he travels with a forged licence, he forfeits 50*l.*

The acts relating to *hawkers* do not extend to makers of goods, or their agents; or to thoſe who ſell goods in fairs or markets; to the ſellers of fiſh, fruit, or other victuals; nor to the venders of books and news-papers. 9 and 10 W. cap. 27. 3 and 4 Anne, cap. 4. But *hawkers* ſhall not, by virtue of ſuch licence, ſell or offer to ſale any tea, or ſpirituous liquors, though with a permit, under the penalty of having the ſame ſeized, and impriſonment and proſecution of the offender. 9 Geo. II. cap. 35. And if any foreign cambrick or French lawn ſhall be found in the poſſeſſion of any *hawker*, &c. the ſame ſhall be forfeited, together with all the goods in his pack; and he ſhall be adjudged to have forfeited his licence. 7 Geo. III. cap. 43.

HAWKERS is a term alſo applied to thoſe who go up and down London ſtreets, and country towns, ſelling news-papers, pamphlets, &c.

HAWKING, the art or exerciſe of chaſing and taking wild fowl, by means of *hawks*, or birds of prey.

Hawking is the ſame thing with what we otherwiſe call FALCONRY.

The word *hawking*, in its latitude, alſo includes the taming and diſciplining of hawks, and fitting them for the ſport.

Hawking, though an exerciſe now much diſuſed among us, in compariſon of what it anciently was, does yet furniſh a great variety of ſignificant terms, which ſtill obtain in our language. Thus, the parts of a hawk have their proper names. The legs, from the thigh to the foot, are called *arms*; the toes, the *petty-ſingles*; the claws, the *pounces*. The wings are called the *ſails*; the long feathers thereof, the *beams*; the two longeſt, the *principal feathers*; the next thereto, the *flags*. The tail is called the *train*; the breaſt-feathers, the *mails*; thoſe behind the thigh, the *pendant feathers*. When the feathers are not yet full grown, ſhe is ſaid to be *unſummed*; when they are complete, ſhe is *ſummed*. The craw, or crop, is called the *gorge*. The pipe next the fundament, where the fæces are drawn down, is called the *panel*; the ſlimy ſubſtance lying in the panel, is called the *glut*. The upper and crooked part of the bill is called the *beak*; the nether part, the *clap*; the yellow part between the beak and the eyes, the *ſcar*, or *ſere*; the two ſmall holes therein, the *nares*.

As to her furniture: the leathers, with bells buttoned on her legs, are called *bewits*. The leathern thong, whereby the falconer holds the hawk, is called the *leaſe* or *leaſh*; the little ſtraps, by which the leaſe is faſtened to the legs, *jeſſes*; and a line or packthread faſtened to the leaſe, in diſciplining her, a *creanſe*. A cover for her head, to keep her in the dark, is called a *hood*; a large wide hood, open behind, to be worn at firſt, is called a *rufter hood*; to draw the ſtrings, that the hood may be in readineſs to be pulled off, is called *unſtriking the hood*. The blinding a hawk juſt taken, by running a thread through her eye-lids, and thus drawing them over the eyes, to prepare her for being hooded, is called *ſeeling*. A figure, or reſemblance of a fowl, made of leather and feathers, is called a *lure*. Her reſting place, when off the falconer's fiſt, is called the *pearch*. The place where her meat is laid, is called the *hack*; and that wherein ſhe is ſet, while her feathers fall and come again, the *mew*.

Something given to a hawk, to cleanſe and purge her gorge, is called *caſting*. Small feathers given her to make her caſt, are called *plumage*. Gravel given her to help to bring down her ſtomach, is called a *rangle*. Her throwing up filth from the gorge after caſting, is called *gleaming*. The purging of her greaſe, &c. *enſeaming*. A being ſtuffed is called *gurgiting*. The inſerting a feather in her wing, in lieu of a broken one, is called *imping*. The giving her a leg, wing, or pinion of a fowl to pull at, is called *tiring*. The neck of a bird the hawk preys on, is called the *inké*. What the hawk leaves of her prey, is called the *pill*, or *pelf*.

There are alſo proper terms for her ſeveral actions. When ſhe flutters with her wings, as if ſtriving to get away, either from pearch or fiſt, ſhe is ſaid to *bate*. When, ſtanding too near, the fighting with each other, is called *crabbing*. When the young ones quiver, and ſhake their wings in obedience to the elder, it is called *cowring*. When ſhe wipes her beak after feeding, ſhe is ſaid to *feak*. When ſhe ſleeps, ſhe is ſaid to *jouk*. From the time of exchanging her coat, till ſhe turn white again, is called her *intermewing*. Treading is called *cawking*. When ſhe ſtretches one of her wings after her legs, and then the other, it is called *mantling*. Her dung is called *muting*; when ſhe mutes a good way from her, ſhe is ſaid to *ſlice*; and when ſhe does it directly down, inſtead of yerking backwards, ſhe is ſaid to *ſlime*; and if it be in drops, it is called *dropping*. When ſhe, as it were, ſneezes, it is called *ſniting*. When ſhe raiſes and ſhakes herſelf, ſhe is ſaid to *rouſe*. When, after mantling, ſhe croſſes her wings together over her back, ſhe is ſaid to *warble*.

When a hawk ſeizes, ſhe is ſaid to *bind*. When, after ſeizing, ſhe pulls off the feathers, ſhe is ſaid to *plume*. When ſhe raiſes a fowl aloft, and at length deſcends with it to the ground, it is called *truſſing*. When, being aloft, ſhe deſcends to ſtrike her prey, it is called *ſtooping*. When ſhe flies out too far from the game, ſhe is ſaid to *rake*. When, forſaking her proper game, ſhe flies at pyes, crows, &c. that chance to croſs her, it is called a *check*. When, miſſing the fowl, ſhe betakes herſelf to the next check, ſhe is ſaid to *fly on head*. The fowl or game ſhe flies at is called the *quarry*. The dead body of a fowl, killed by the hawk, is called a *pelt*. When ſhe flies away with the quarry, ſhe is ſaid to *carry*. When, in ſtooping, ſhe turns two or three times on the wing, to recover herſelf before ſhe ſeizes, it is called *canceliering*. When ſhe hits the prey, yet does not truſs it, it is called *ruff*. The making a hawk tame and gentle, is called *reclaiming*. The bringing her to endure company, *manning* her. An old ſtaunch hawk, uſed to fly and ſet example to a young one, is called a *make hawk*.

The reclaiming, manning, and bringing up a hawk to the ſport, are not eaſily brought to any preciſe ſet of rules. They conſiſt in a number of little practices and obſervances, calculated to familiarize the falconer to his bird, to procure the love thereof, &c. The principal hold and foundation which the falconer has to work upon, is the bird's ſtomach. This great principle of appetite he is to make uſe of a hundred ways, to lead the bird obliquely to what he would have from her: all he can do is, to divert nature, and make her ſubſervient to his purpoſes, to make it the intereſt of the bird, either real or apparent, to do what the falconer requires of her. The courſe, it is evident, will be different, according to the ſtate and condition of the bird to be managed. An *eyeſs*, e. g. needs no reclaiming; ſhe is to be carefully nurſed and brought up in her natural tameneſs.

A *brancher*, *ſoar-hawk*, or *ramage-hawk*, needs no nurſing; ſhe is to be brought down from her wildneſs, and habituated to another courſe of life; and in purſuance of her own views and intereſts, ſhe is to be made ſubject to thoſe of her maſter.

To reclaim, e. g. a *haggard falcon*, they begin with ſhutting her up from the light, by pulling a hood over her eyes, and fixing her by a *creance*, which makes her more acceſſible.

The next thing is, to handle her frequently; taking her up, often ſtroking her, ſetting her on the hand, and carrying her about; unhooding, and preſently hooding her again; and this for eight or nine days, without ever ſuffering her to ſleep.

All the while ſhe is to be kept ſharp ſet, but to be frequently fed with a little at a time, unhooding her for the purpoſe; and, when unhooded, the voice is to be continually uſed to her, that ſhe may learn it; and that the hearing of the voice may naturally put her in hopes of being fed. This done, ſhe is to be invited to come from the pearch to the fiſt, by unſtriking her hood, ſhewing her ſome meat, uſing the voice, and calling her till ſhe come to it, and feed thereon. If ſhe ſtill refuſe, keep her ſharp ſet till ſhe will do it. Proceed then to bring her to the lure, by giving her to ſome perſon to hold, and calling her with a lure, well garniſhed with meat on both ſides, and give her a bit: uſe her to this for ſix or ſeven days; after which, tempt her to come gradually farther and farther off to the lure, waving it, and caſting it round your head, &c. and if ſhe come to it roundly, reward her: in three or four days more call her to your lure, well garniſhed as above, as far as it is poſſible for her to ſee or hear you; and ſet her looſe from all her furniture.

The hawk thus manned, reclaimed, and lured, you may go with her into the fields, and whiſtle her off your fiſt, to ſee whether ſhe will rake out, or no: if ſhe mount and fly round you in circles, as a good hawk ought to do, after two or three turns call to her with your voice, and fling out the lure about your head, and upon her ſtooping or coming to it, give her a chicken, or pigeon, and let her kill and feed thereon. Being thus far initiated, give her firſt ſtones every evening, to prepare her body for caſtings; and then caſtings, to cleanſe and ſcour her body, and make her eager. This courſe continue, till ſhe have endewed and muted enough to enter upon buſineſs.

If the hawk be intended for ſome particular ſort of game, let her lure be a reſemblance of that ſort of game; and make a practice of frequently feeding and rewarding her thereon, or on a train of the ſame kind; calling her, when feeding, as if ſhe were called to the lure. Add, that it may be proper to feed her in ſuch ſort of places as thoſe her game is chiefly to be found in.

To *enter a hawk*, it may be convenient to take a well-quarried hawk, and let her ſtoop a fowl, on brook or plaſh; this done, reward, hood, and ſet her; and taking the young hawk, go half a bow-ſhot up the wind, looſe her hood, and ſoftly whiſtle her off the fiſt, till ſhe have rouſed, or muted; then let her fly with her head into the wind, and when ſhe is at a proper height, let go a fowl for her to ſtoop and truſs. See Falcon.

HAWM. See Haum.

HAWSE, or Hause, denotes the ſituation of the cable before the ſhip's ſtem, when ſhe is moored with two anchors out from forward; viz. one on the ſtarboard, and the other on the larboard bow. *Hawſe* denotes alſo any ſmall diſtance a-head of a ſhip, or between her head and the anchors employed to ride her.

HAWSER, or Halser, belonging to a ſhip, is a rope conſiſting of three ſtrands; being a kind of little cable, ſerving for many uſes on board; as to faſten the main and fore-ſhrouds, to warp a ſhip over a bar, &c.

HAWSES, or Hawse-*holes*, in a *Ship*, are two round holes under her head, through which the CABLES paſs when ſhe lies at ANCHOR. See *Tab. Ship. fig.* 2. *n.* 10.

Hawse, *burning in the*, is when the cable endures an extraordinary ſtreſs.

Hawse, *bold*, is when the holes are high above the water.

Hawse, *clearing the*, is the untwiſting of two cables, which being let out at different *hawſes*, are entangled or twiſted about one another. Or, directing the cables to their anchors, without lying athwart the ſtern.

Hawse, *foul*, implies that the cables lie acroſs the ſtern, or bear upon each other, ſo as to be rubbed or chafed by the motion of the veſſel.

Hawse-*full*, or *to ride* Hawse-*full*, at ſea. See Ride.

Hawse, *freſh the*. When there is reaſon to ſuſpect the cable may be fretted in thoſe holes, they veer out a little, to let another part endure the ſtreſs. This they call to *freſh the hawſe*.

Freſhing the hawſe is alſo uſed when new pieces are laid upon the cable in the *hawſe*.

Hawse, *riding upon the*, is when any weighty ſubſtance lies acroſs, or falls directly before the *hawſe*.

Hawse-*pieces*, denote the foremoſt timbers of a ſhip, whoſe lower ends reſt upon the knuckle-timber, or the foremoſt of the cant-timbers. They are generally parallel to the ſtem, having their upper ends ſometimes terminated by the lower part of the beak-head; and otherwiſe, by the top of the bow, particularly in ſmall ſhips and merchantmen.

HAWTHORN, in *Botany*. See Medlar.

HAY, in *Agriculture*, is a general name for any kind of graſs, cut and dried for the food of cattle.

Whatever uplands are deſigned to be mowed for *hay*, are to be ſhut up in the beginning of February, and no cattle ſuffered to come upon them afterwards; but the meadows and marſh-lands, where the graſs grows quicker, need not be ſhut up till April, except the ſpring be bad; and many farmers feed thoſe meadows which are in danger of overflowing, till the firſt of May, and then ſhut them up for mowing.

In ſpring, the ſtones, ſticks, and all other kinds of foulneſs that lie upon the land, are to be picked up, and the mole-hills all levelled and ſpread, becauſe they hinder the mowers. If the meadows lie uneven, or if they have been trodden down in winter, they ſhould be rolled all over with a large wooden roller; the mowers will then be able to cut much cloſer; for this, and the quantity of the *hay*, will very well anſwer the trouble.

The time of mowing the graſs muſt be proportioned to its ripeneſs; nothing can be more prejudicial to the crop, than the cutting it too ſoon, becauſe the ſap is not then fully come out of the root; and ſuch graſs when dried into *hay*, ſhrinks up almoſt into nothing. It is very wrong alſo to let it ſtand too long; for when the ſeed has been ripened, and is ſhed, the moiſture of the ſap all dries away out of the ſtalks, and they become no better than ſo much ſtubble, as is plainly ſeen by thoſe graſſes which grow in hedges, and not being mowed, die away after they have perfected their ſeed, and become taſteleſs, and very different from *hay*. The middle or latter end of June is the general ſeaſon for mowing; and the red flowers of the honey-ſuckle beginning to wither, generally give the farmer notice that the time is coming on. But he may be more aſſured of this, by the tops or heads of the graſs looking full, bending downwards, and looking brown: it is then in the proper ſtate to be cut down. If there is great plenty of the *hay*, and it lie thick in the ſwarth, the hay-makers ſhould follow the mowers, and turn the ſwarths as they cut them, unleſs there ſeems danger of wet weather; but in that caſe it is better to let them lie in the ſwarth. At night it muſt be made up into little cocks, and theſe in the morning muſt be ſpread again and turned, ſo that the other ſide may wither. After this it is to be made into ſmall cocks again, and the next day it is to be ſpread again, and drawn into long rows, which they call wind-rows. From theſe it is to be made up into large cocks after a little drying; and theſe large ones, if any wet comes, are to be ſpread open once again before they are carried in.

Mowing of land too often, and continuing it too long, are a very great prejudice to it, unleſs it have the advantage of being fed and renewed by land floods at times. The farmer who has not this advantage to his lands, ſhould feed them once in two or three years, inſtead of making *hay* from them, unleſs he chooſes to lay on manure conſtantly to keep them in heart. Feeding the *hay*-lands is the ſame ſort of reſpite that fallowing is to corn-lands, both very neceſſary and advantageous. See Lucerne, Saintfoin, and Trefoil.

Mr. Boyle tells us, that by ſurrounding glaſſes with refuſe *hay*, well preſſed and uniformly wetted, it would for ſeveral days afford ſuch a heat, as rendered that of horſe-dung uſeleſs. Works abr. vol. i. p. 72.

It is well known that *hay* laid up in wet ſtacks, often takes fire. Hence the cuſtom of the ancients to place their *hay-ſtacks*, or *fœnilia*, out of their villages.

Infuſions of *hay*, or any other vegetable production in water, will, after ſome days, yield a ſort of whitiſh ſcum or motherineſs, which will appear on the ſurface, and, when examined by the microſcope, will be found to contain an inexpreſſible number of minute living creatures, or ANIMALCULES, of various ſizes, forms, and kinds. Many of theſe are the ſame with ſome of the animals in pepper-water; for there are ſome which are found indifferently in all watery fluids expoſed to the air. The moſt common ſort are oval, ſomewhat reſembling an ant's egg in ſhape. Theſe run to and fro with great velocity; and they will occaſionally ſtop, and turn ſeveral times with ſurpriſing ſwiftneſs round their own axis. This kind of motion is owing to a number of legs or fins with which they are furniſhed, placed in a circular order; and the ſame motion is obſerved in many other animalcules. There is another kind very like the former, except that they have one end conſiderably ſharper than the other; and they always move with the ſharp end foremoſt; they are moſtly tranſparent, but ribbed longitudinally like a melon; others are only tranſparent at their ſmaller end; theſe have no legs nor fins. Another ſort are alſo found in theſe infuſions, which are nearly as long as thoſe of the largeſt ſize in pepper-water; they are very nimble, and have a power of contracting and extending themſelves as they ſwim along. Theſe have ſeveral feet, viſible at the end, which ſeems to be the fore-part, which are moſt diſtinguiſhable as the water dries up, and the body of the animal ſhrinks into a globular form. There is another ſpecies of theſe animals, whoſe bodies are ſpherical, but pointed like a pear, and reſembling bladders filled with water, in which a great number of dark particles are obſerved in continual agitation. The motion of theſe animals is chiefly a revolving one, which they perform a hundred times in a minute, firſt one way, and then the contrary, without moving a hair's breadth out of their place; but they are able alſo, when they pleaſe, to move backwards and forwards very nimbly. Animalcules in the ſhape of eels are often met with in theſe infuſions, and in many other liquors; their ſize is extremely different, ſome of them being an hundred times larger than others. Baker's Micr. 1743. p. 77, &c.

Hay-*market*. Carts of *hay* which ſtand to be ſold in the *hay-market*, are to pay 3*d*. per load towards paving and repairing the ſtreet; and ſhall not ſtand loaden with *hay* after three o'clock in the afternoon, &c. on pain of forfeiting 5*s*. *Hay* ſold in London, &c. between the firſt of June and the laſt of Auguſt, being new *hay*, is to weigh ſixty pounds a truſs; and old *hay*, during the remainder of the year, fifty-ſix pounds, under the penalty of 2*s*. 6*d*. for every truſs offered to ſale. 2 W. & M. cap. 6. 8 & 9 W. cap. 4. 31 Geo. II. cap. 40.

Hay-*worms*. Beſide the ſmall worms or animalcules bred in water, in which *hay* has been infuſed, which are only the objects of microſcopical obſervations, we find that it is a proper nidus of itſelf, ſometimes, for a much larger ſpecies of inſect called the *hay-worm*, whoſe origin and changes have not, as yet however, been properly obſerved. An animal which can be produced from the egg, and grow to its full ſize during the ſhort time that *hay* is left in the field in making, muſt be very quick in its growth; but yet it is found that multitudes of ſuch are produced, though probably few come to perfection, the removing of the *hay* naturally deſtroying many. In the Philoſophical Tranſactions we have an account of the ſame ſort of inſect breeding among cocks of barley while left in the field, many millions of them being diſcovered together on ſtirring or lifting up the cocks with a cane. They are alſo found in the barns where barley is laid up, and are ſo numerous that they ſtrow the way the carts go that carry the barley home, by the multitudes that are ſhook off. They are about half an inch long, as thick as a pigeon's feather, and of a whitiſh colour ſhaded with faint ſtripes of a yellowiſh brown. They have fourteen feet, and ſeem evidently by all their marks to be true caterpillars. They are of an offenſive ſmell; and their excrements are hard white pellets of pure flour, like that of barley; whence it is plain that they eat the grain.

Hay, *Burgundian*, in *Botany*. See *Snail* Trefoil.

Hay, **Haya**, or **Haye**, a fence or incloſure, formed of rails; wherewith ſome foreſts, parks, &c. were anciently ſurrounded.

Hay is ſometimes alſo uſed for the park itſelf; and ſometimes for a hedge, or a place hedged round.

Hays alſo denote a particular kind of nets, for the taking of rabbets, hares, &c.

HAYBOTE, **Hedgbote**, in our *Ancient Cuſtoms*, a mulct, or recompence, for hedge breaking; or rather, a right to take wood neceſſary for making hedges either by a tenant for life, or for years, though not expreſſed in the grant or leaſe.

It is mentioned in the Monaſt. tom. ii. pag. 134. *Et concedo ei, ut de boſco meo* heybot, &c. In the ſame place, *huſbote* ſignifies a right to take timber to repair the houſe. See Bote.

HAYWARD, or **Haward**, a keeper of the common herd of cattle of a town; who is to to look that they neither break nor crop the hedges of incloſed grounds; and is ſworn in the lord's court for the due performance of his office. See Agillarius.

HAZARD, a game on dice, without tables, is very properly ſo called, ſince it ſpeedily makes a man, or undoes him.

It is played with only two dice; and as many may play at it as can ſtand round the largeſt round table.

Two things are chiefly to be obſerved, viz. main and chance; the latter belonging to the caſter, and the former, or main, to the other gameſters. There can be no main thrown above nine, nor under five; ſo that five, ſix, ſeven, eight, and nine, are the only mains flung at *hazard*. Chances and nicks are from four to ten: thus four is a chance to nine, five to eight, ſix to ſeven, ſeven to ſix, eight to five; and nine and ten a chance to five, ſix, ſeven, and eight: in ſhort, four, five, ſix, ſeven, eight, nine, and ten, are chances to any main, if any of theſe nick it not. Now nicks are either when the chance is the ſame with the main, as five and five, or the like; or ſix and twelve, ſeven and eleven, eight and twelve. Here obſerve, that twelve is out to nine, ſeven, and five; eleven is out to nine, eight, ſix, and five; and ames-ace and duce-ace, are out to all mains whatever.

But to illuſtrate this game by a few examples: ſuppoſe the main to be ſeven, and the caſter throws five, which is his chance; he then throws again, and if five turn up, he wins all the money ſet him; but if ſeven is thrown, he muſt pay as much money as there is on the board: again, if ſeven be the main, and the caſter throws eleven, or a nick, he ſweeps away all the money on the table; but if he throws a chance, as in the firſt caſe, he muſt throw again: laſtly, if ſeven be the main, and the caſter throws ames-ace, duce-ace, or twelve, he is out; but if he throws from four to ten, he hath a chance; though they are accounted the worſt chances on the dice, as ſeven is reputed the beſt and eaſieſt main to be flung. Four and five are bad throws (the former of which being called by the tribe of nickers, little dick-fiſher) as having only two chances, viz. trey-ace and two duces, or trey duce and quater-ace; whereas ſeven hath three chances, viz. cinque-duce, ſice-ace, and quater-trey. Nine and ten are in the like condition with four and five; having only two chances. Six and eight have indeed the ſame number of chances with ſeven, viz. three; but experienced gameſters nevertheleſs prefer the ſeven, on account of the difficulty to throw the doublets, two quaters, or two treys. It is alſo the opinion of moſt, that at the firſt throw the caſter hath the worſt of it. On the whole, *hazard* is certainly one of the moſt bewitching and ruinous games played on the dice. Happy, therefore, the man who either never heard of it, or who has reſolution enough to leave it off in time. See De Moivre's Doct. of Chances, p. 160, &c. See Chance, and Gaming.

HAZLE, or **Nut**-*tree*, *Corylus*, in *Botany*, a genus of the *monoecia polyandria* claſs. Its characters are theſe: it hath male and female flowers growing at remote diſtances on the ſame tree; the male flowers are produced in long ſcaly catkins, having no petals, but eight ſhort ſtamina faſtened to the ſide of the ſcale; the female flowers are included in the future bud, ſitting cloſe to the branches, having a thick two-leaved perianthium; theſe have no petals, but a ſmall round germen occupies the center, which afterward becomes an oval nut, ſhaved at the baſe, and compreſſed at the top, ending in a point. Miller enumerates three ſpecies; the wild *hazle* nut, the Filbert, and the Byzantine nut.

All theſe ſorts may be propagated by layers, or by ſowing their nuts in February; which, in order to preſerve them good, ſhould be kept in ſand in a moiſt cellar, where the vermin cannot come to deſtroy them; nor ſhould the external air be excluded from them, which would occaſion their growing mouldy. Miller.

No great uſe is made of the nut tree in medicine; ſome account the juli and nut ſhells to be reſtringent or binding; the kernels are hard of digeſtion, and ſtuffing, cauſing ſhortneſs of breath and wheezing; yet an emulſion made of them with mead, is commended for an old dry cough.

Filberts are more nouriſhing than nuts; and are by ſome eſteemed pectoral. The moderate uſe of them agrees at all times with every age and conſtitution, provided there be a good ſtomach. James.

Nuts and filberts will purge when taken in conſiderable quantities. The cream of theſe nuts is good for the ſtone, and heat of urine; emulſions may be made of them. Quercetan gave a dram of the powder of nut-ſhells, mixed with an equal quantity of prepared coral, in a glaſs of the water of carduus benedictus, or corn poppy, in the pleuriſy.

Hazle *earth*, in *Agriculture*, a moderately compact earth, much approaching to the nature of the chiſely ſoil, and indeed properly a ſpecies of it, but always containing a large quantity of a reſin-coloured ſand.

Hazle-*hen*, in *Zoology*, the name of a bird of the gallinaceous kind, common in the woods of Germany, and ſuppoſed by many to be the Attagen of the ancients.

It is of the ſize of a very ſmall pullet; its belly is all over perfectly white; its breaſt white variegated with black; its throat is reddiſh, and under the beak black, in the male, but in the female, of the ſame colour with the reſt; it has on each ſide of the head a white line; its head is of a greyiſh brown, and its back and rump much of the ſame colour with the partridge; its ſides are of a yellowiſh or reddiſh brown, variegated with white; its wings are variegated with black, brown, and white, as is alſo the tail, but that has an admixture of red. It is caught in thick woods, and feeds on vegetables. Ray's Ornithology, p. 126.

Hazle, *witch*, in *Botany*, *hamamelis*, a genus of the *tetrandria digynia* claſs. Its characters are theſe: it is male and female in different plants; the male flowers have a four-leaved empalement, four narrow petals which are reflexed, and four narrow ſtamina which are ſhorter than the petals; the female flowers have a four-leaved involucrum, in which are four flowers, with a four-leaved coloured empalement; they have four narrow petals, and four nectariums adhering to the petals; in the center is ſituated an oval hairy germen, which afterward becomes an oval capſule ſitting in the involucrum, having two cells, each containing one hard, oblong, ſmooth ſeed. We have but one ſpecies of this plant, a native of North America, which is rather preſerved in gardens for variety than for beauty.

HEAD, *caput*, the uppermoſt or foremoſt part of the body of an animal.

Pliny, and other of the ancient naturaliſts, ſpeak of a nation of people without *heads*, called **Blemmyes**.

We have accounts, in modern geographers and travellers, of people whoſe *heads* are as flat as the hand; it being the cuſtom among them to flatten the childrens *heads*, when new-born, by paſſing them through a preſs, or laying them between two planks with a conſiderable weight thereon. Theſe are ſaid to be the inhabitants of the province of Coſaquas, on the river Amazons, in South America.

Anatomiſts account the *head* of man the firſt or uppermoſt venter; being that which comes laſt in order of diſſection, becauſe its contents are not ſo ſubject to corruption as thoſe of the others.

The *head* is divided into two parts: the firſt, the *calvaria* or ſcalp, being that part covered with hair.

The ſecond ſmooth, or without hair, called the *face* or viſage; by the Latins, *vultus*; and by the Greeks, *proſopon*, q. d. looking forward.

The former is ſubdivided into four, viz. the *front* or forehead, which is reputed the moſt humid, called by phyſicians the *ſinciput*, q. d. *ſummum caput*.

The hind or back-part, called *occiput*; by the Greeks, ἰνίον; becauſe all the nerves, which among them are called ἶνες, ariſe from this part.

The middle or top-part, called the *crown* of the *head*, and by anatomiſts *vertex*, *à vertendo*, becauſe the hair turns round there.

Laſtly, The ſides are called the *temples*, *tempora*, as being the places where the hair firſt begins to turn grey and diſcover the age.

The bone or baſis of the *head* is called by one general name, *ſkull* or *cranium*, conſiſting of ſeveral parts or leſſer bones.

The bone of the forehead is called *os frontis*, or *puppis*, or *coronale*, or *verecundum*; whence impudent perſons are ſaid to be *frontleſs*.

The bone of the ſcalp is called *os ſincipitis* or *bregma*.

The bone of the back of the *head*, *os occipitis* or *proræ*.

And thoſe of the temples, *temporalia*, or *oſſa temporis*.

Thoſe bones are connected or joined together by *ſutures*.

In the *head* are ſeated the principal organs of ſenſe, viz. the *eye*, *ear*, &c. and in it is likewiſe the *brain*, inveſted with its *meninges*, the ſuppoſed ſeat of the ſoul.

The *head* is moved by ten pair of muſcles, viz. the *par ſplenium*, *complexum*, *rectum majus externum*, *rectum minus externum*, *obliquum ſuperius*, *obliquum inferius*, *maſtoideum*, *rectum internum majus*, *rectum internum minus*, and *rectum laterale*.

See each deſcribed under its reſpective article.

Head, *cartilages of the*. The condyloide apophyſes of the os occipitis, the glenoide cavities, or articular foſſulæ of the oſſa temporum, the eminences next theſe cavities, and the condyloide apophyſes of the lower jaw, are all cruſted over with very white and ſmooth cartilages, and there is likewiſe an interarticular or moveable cartilage in each articulation of the lower jaw with the temporal bones. The remaining cartilages of the *head* are the cartilaginous ſeptum, and other cartilages of the noſe; the ſmall cartilaginous ring in each orbit, the cartilages of the outer ear, and thoſe which are joined to the os hyoides; which ſee in their proper places.

Head, *ligaments of the*. The ligaments of the bones of the *head* are theſe: thoſe between the occipital condyles and the ſuperior apophyſis of the firſt vertebra of the neck; thoſe between the os occipitis and the apophyſis dentiformis of the ſecond vertebra; thoſe of the articulation of the lower jaw with the temporal bones; and thoſe by which the os hyoides is connected to the ſtyloide apophyſes. To theſe muſt be added the ligaments which connect the cartilages of the ear, thoſe of the noſe, the ſmall cartilaginous pulleys of the orbits, and the ciliary cartilages.

The ligaments of the occipital condyles reſemble thoſe of the vertebræ, and conſiſt of a ſtrong texture of ligamentary filaments, placed cloſe by each other, round the whole articulation, and fixed by one end in the occipital bone, by the other in the ſuperior apophyſis of the firſt vertebra, and ſurrounding the capſular ligaments.

The ligaments which go from the os occipitis to the apophyſis dentiformis are very thick, and diſpoſed in ſeparate faſciculi, which afterwards unite, and the ligaments of the articulation of the lower jaw are very ſtrong, and diſpoſed and inſerted in ſuch a manner as thoſe by which the clavicle is inſerted into the ſternum. They are fixed, by one extremity, round the glenoide cavity, or articular foſſula and eminence of each temporal bone, by their middle, round the interarticular cartilage, and by the other extremity round each condyle of the lower jaw. Winſlow's Anatomy, vol. i. p. 151.

Head, *the diſeaſes of the*, are often miſtaken, even by phyſicians, for thoſe of other parts. Mr. Lieutand, of the French academy, gives an extraordinary caſe of this kind. A man had a fever, with a violent diſorder of the *head*; he afterwards was ſeized with a violent cough, and brought up a large quantity of matter: it was not doubted but that this was from the lungs, and no one queſtioned but that the man had an abſceſs there. On opening the body, however, the lungs were found perfectly ſound, and all his diſorder was found to be in his *head*, where the ſphenoidal, frontal, and maxillary ſinuſes were found ſo full of matter, that they could contain no more.

Some phyſicians tell us, that perſons who are ſubject to diſorders of the *head*, ought not to take any food at night. Dr. Bryan Robinſon of the Food and Diſcharges of Human Bodies, p. 95.

M. Le Dran, in his Obſervations on Wounds of the *Head*, ſhews how much more dangerous the caſe is, when the cranium does not break by violent blows, &c. than when it is fractured, becauſe of the greater commotion of the brain, &c. and therefore concludes it neceſſary to perform the operation of the trepan oftener than is commonly practiſed. Med. Eſſ. Edinb.

M. Winſlow has given us ſome very particular and curious remarks on the motions of the *head* and neck, in the Memoires de l'Acad. Royale des Sciences, an. 1730.

Head, *ulcers of the*. There are ſeveral ulcers which the hairy part of the *head* is ſubject to, and which the writers in medicine have diſtinguiſhed by the ſeveral names of *tineæ*, *favi*, and *achores*; though they do not all agree about the determinate ſignification of each of thoſe words. By the term *favus*, however, we now generally underſtand ſuch ulcers of the *head* as are full of cavities like a honeycomb; by *achores*, thoſe which are full of ſmall holes, and contain a moderately viſcid humour. Many call theſe diſorders by the common name of tinea, becauſe, from the abundance of ſmall holes in them, they make the head look like a moth-eaten garment; but this is a vague ſignification of the word, and we uſually now underſtand it, in a more determinate ſenſe, to mean a large and dry ſcab, to which the heads of children are ſubject, and which is full of thick foul ſcales, and very offenſive to the ſmell. This ſometimes alſo extends itſelf to the face, in which caſe it is called *cruſta lactea*. It is often of a mild and benign nature, but is ſometimes very ill-conditioned and dangerous. There is alſo a yet worſe kind of tinea than this, which covers the whole hairy ſcalp with an aſh-coloured thick cruſt, attended with a violent itching and grievous ſtench: this is generally very difficult of cure, and the perſons afflicted with it have generally a pale unhealthy countenance; it much more frequently affects young perſons than adults, and is generally occaſioned either by the nurſe's irregular courſe of life, or the child's being uſed to foul feeding. Sometimes alſo ulcers of this kind, from the ſame cauſes, break out in adults, and are very difficult to cure; theſe much reſemble the leproſy: and in the pox, it is common to find the head and face, particularly the forehead, ſpread with dry ſcabs and ſcabby ulcers.

When ulcers of theſe kinds are ſlight, gentle purges, with the addition of calomel, ſhould be given at proper intervals, adminiſtering between whiles, to adults, the decoctions of the woods, with the ſweetening powders. Infants at the breaſt may take diaphoretic powders, and their nurſes ought to proſecute the other methods. Externally it is proper to uſe cream, with a ſmall quantity of ceruſs mixed in it, or the oil of eggs or of wax, with the elecampane ointment, or that of ceruſs or the diapompholygos. And if the ulcers are of a worſe kind, doſes of calomel are to be given more frequently, and a little crude quickſilver may be added ro the external applications with great ſucceſs. But in worſe caſes, and where mercurials may not be employed, it will be neceſſary to take off all the hair; this may be done either by degrees or at once, by means of a pitch plaſter ſpread upon ſtrong cloth, and applied all over the ſcalp after the hair has been cut pretty ſhort. When a plaſter of this kind has lain on twelve, or four and twenty hours, the method is to pull it off at once, and it brings away with it both all the hair and the ſcabs. This, though a good method, is however a very harſh one, and cannot be done without great pain and effuſion of blood. When the plaſter is taken off, the blood is to be wiped away with dry lint, and then the *head* anointed with oil of bricks, and a ſmall admixture of oil of wax among it, and afterwards the whole ſcalp ſhould be covered with a plaſter of frogs ſpawn, with a ſmall admixture of camphor. This dreſſing ſhould be repeated every day, till the injured parts are clean, and then they may be healed with the oil of eggs and eſſence of amber. Internal medicines, to ſweeten the blood, and a regularity of diet, ſhould alſo be obſerved at the ſame time; a mixture of crude antimony and flour of brimſtone ſerve well for this purpoſe, and ſhould be given for ſome time before the external remedies, here directed, are employed. Heiſter's Surgery, p. 268.

HEAD, *water in the*. See HYDROCEPHALUS.

HEAD *of fiſh, caput piſcium*. The *head*, in the fiſh kind, is ſo very various in its ſhape and figure, that it makes one of the great articles of their diſtinction and characters. The *head* is always ſingle, and placed at the anterior extremity of the body; but its proportion or ſize, as well as figure, is very various in the ſeveral kinds. Its differences in figure are five.

1. It is, in ſome fiſhes, cathetoplateous; that is, its ſides ſeem ſqueezed together, and its perpendicular meaſure, for this reaſon, is greater than its tranſverſe meaſure. We have inſtances of this in the pearch, the cyprini, and in ſeveral others.

2. In others it is plagioplateous; that is, depreſſed ſo that its top and bottom ſeem to have been ſqueezed downwards upon one another. Hence its horizontal breadth is greater than its perpendicular, and it is, in all reſpects, the contrary to the other *head*. The conger, the ſturgeon, and the ray-fiſh, give us evident inſtances of this ſort of *head*.

3. In ſome fiſhes the *head* is evidently rounded and cylindric, as in the petromyzæ.

4. The *head* is, in ſome, ſmooth, as is the caſe of moſt fiſhes; but in others it is rough and aculeated, as in the ſcorpænæ, the cotti, and the legyri.

The differences with reſpect to proportion are alſo very great. The *head*, in reſpect of the reſt of the body, is, in ſome, 1. Narrower than the middle of the body, as in the cyprini, ſalmons, mackrel, pearch, &c. 2. In ſome it is broader than the middle of the body, as in the cotti, ſiluri, &c. And, 3. In others it is about equal to the middle of the body in breadth, as in the clarias.

For the differences of the mouths of fiſhes, ſee MOUTH.

The bones of the *head*, in all animals, deſerve great attention; and in fiſh particularly, as they are more numerous in theſe than in other creatures. They differ much alſo in the various kinds of fiſh, in number, figure, and ſituation. As to number, 1. They are fewer than uſual in the cetaceous and cartilaginous kinds. 2. In the ſpinoſe fiſhes, in general, they are very numerous; the bones in the *head* of the perca fluviatilis of Bellonius will ſerve as an inſtance of this. The number is not the ſame in the ſeveral kinds that ſeem neareſt allied. In the fiſh laſt mentioned there are no leſs than eighty: there are five in the tongue, one oblong one in the anterior part, and four ſhorter in the hinder part; there are four in the lower jaw, two on each ſide; the oſſa hypophthalmica are ten on each ſide, four are ſmall, and of different figures from the reſt; the membrana branchioſtega contains on each ſide ſeven of them; the oſſeous laminæ, behind the eyes, are four on each ſide; the upper jaw conſiſts of four bones, two on each ſide; the noſtrils have each one bone placed below them; the bones of the palate are four, three of theſe are ſmall and ſtand forwards, the other is long and ſhaped like a pickax-head, and extended all over the palate; the middle of the anterior bone is nicely articulated with this; there is, beſide this, a cartilaginous bone, of a very ſingular figure, extended under the bones of the palate, almoſt to the end of the ſnout; this has on each ſide an angular bone faſtened to it, and under that end which is neareſt the ſnout there is yet another placed, which is of a very ſingular figure.

The bones that cover the *head* above are four; the two anterior ones are ſmall; the two poſterior ones are long, and ſo broad, that they cover the greater part of the *head* and cranium. The bones of the cranium are eleven in number; that which is neareſt the vertebræ is large, and has ſeveral apophyſes and cavities: in the lower part of this there are contained two oblong and flat little bones, of almoſt a ſtony hardneſs; all the reſt are ſmaller, and all of very ſingular and remarkable figures. Artedi, Ichthyolog.

HEAD is alſo applied in a general ſenſe, by analogy, to the uppermoſt or principal extremity of any thing; or figuratively, when ſpeaking of communities, to the ſuperior; and, when referred to place or priority, is that ſtation or poſition which is moſt honourable.

HEAD, in *Architecture*. *Heads* are uſed as an ornament of ſculpture or carved work, frequently ſerving as the key of an arch or plat-band, and other occaſions.

Theſe *heads* uſually repreſent ſome of the heathen divinities, virtues, ſeaſons, ages, &c. with their attributes.

The *heads* of beaſts are alſo uſed in places ſuitable thereto: as a bullock's or ſheep's *head*, for a ſhambles or a market-houſe; a dog's, for a kennel; a deer's or boar's, for a park or foreſt; or a horſe's, for a ſtable, &c.

In the metopes of the friezes, and other parts of certain antique Doric temples, we meet with repreſentations of bullocks or rams *heads* flayed, as a ſymbol of the ſacrifices offered there.

In *Heraldry*, the *heads* of men, beaſts, birds, &c. are borne in armoury, either full-faced and in front, or ſide-faced and in profile, which muſt be diſtinguiſhed in blazoning.

Among *Medalliſts*, the different *heads* on ancient coins are diſtinguiſhed by the different dreſſes thereof. See MEDAL.

In the imperial medals, where the *head* is quite bare, it is uſually a ſign the perſon was not an emperor, but one of the children of one, or the preſumptive heir of the empire.

Though we have inſtances of thoſe who were only Cæſars, and never reigned, being crowned with laurel or adorned with a diadem; as, on the contrary, we have ſome emperors *heads* entirely bare.

The *heads* which are covered, are either covered with a diadem or a crown, or a ſimple caſk or a veil, or with ſome other foreign covering; whereof the diadem is the moſt ancient. The ſenate firſt granted it to Julius Cæſar to wear the laurel crown, which his ſucceſſors took after him.

The *heads* of deities are frequently diſtinguiſhed by ſome ſpecial ſymbol thereof.

HEAD is alſo uſed for the horns of a deer, as a hart, buck, &c.

Harts *mew*, or caſt their *heads*, every year, and get new ones.

The old hart or buck caſts his head ſooner than the young; and the time is about the month of February or March. Having caſt their *heads*, they inſtantly withdraw into the thickets, hiding themſelves in convenient places near good water, &c. and far from the annoyance of flies.

After they have mewed, they begin to *button* again in March or April, i. e. to ſhoot out new horns, which at firſt appear like little branches.

Note, if a hart be gelt before he have a *head*, he will never bear any; and if he be gelt when he has a *head*, he will never after mew or caſt it. If only one of his teſticles be taken out, it is ſaid he will want a horn on that ſide; and that if one of the teſticles be only tied up, he will want the horn of the oppoſite ſide.

The age of a hart or deer is uſually reckoned by the number of *heads*. A deer of the firſt *head*, of the ſecond *head*, &c.

At one year they have nothing but bunches, called *ſignificators*, of horns to come. The ſecond year they appear more perfectly, but ſtraight and ſimple: this makes the firſt *head*, properly called *broches*, and, in a fallow deer, *pricks*. The third year they grow into two *ſpears*, or four, ſix, or eight ſmall branches. At the fourth, they bear eight or ten. At the fifth, ten or twelve. At the ſixth, fourteen or ſixteen. At the ſeventh year they bear their *heads* beamed, branched, and ſummed, as much as they will bear; never multiplying farther, but only growing in magnitude.

The names and diverſities of *heads*, in the hunting language, are as follow:

The part that bears the antlers, royals, and tops, is called the *beam*, and the little ſtreaks therein are *glitters*: that which is about the cruſt of the beam is termed *pearls*; and that which is about the bur itſelf, formed like little pearls, is called *pearls bigger than the reſt*: the *bur* is next the head, and that which is about the bur is called *pearls*: the firſt branch is called *antler*, the ſecond *ſur-antler*; all the reſt which grow afterwards, till you come to the crown, palm, or croche, are called *royals*, or *ſur-royals*; the little buds or broches, about the tops, are called *croches*.

The *heads* alſo go by ſeveral names. The firſt *head* is called a *crown top*, becauſe the croches are ranged in form of a crown; the ſecond is called a *palmed top*, becauſe the croches are formed like a man's hand. In all *heads*, which bear not above three or four, the croches being placed aloft, all of one height, in form of a cluſter of nuts, are called *heads of ſo many croches*. All *heads* which bear two on the top, or have their croches doubling, are called *forked heads*. All *heads* which have double burs, or the antlers, royals, and croches, turned downwards contrary to the other *heads*, are called *ſimple heads*. See HUNTING.

HEAD is ſometimes alſo uſed for the whole man.

In this ſenſe we ſay, to offer a reward for a man's *head*. In proſcriptions, there is a price ſet on a man's *head*.

Capitation denotes a tax laid upon each *head*, called alſo *poll* and *head*-money.

HEAD, in the *Military Art*. *Head of the camp* is the front or foremoſt part of the ground an army is encamped on, or that which advances moſt towards the field or enemy. The *head* of the camp is always to be the beſt fortified.

In the like ſenſe we ſay, the *head of the trenches*, the *head of the ſap*, *of the works*, &c. meaning the *fronts*, or thoſe parts next the enemy, and fartheſt from the body of the place. See TRENCH and ATTACK.

The *head of a horn work* is that part contained between the flanked angles of the two demi-baſtions

HEAD *of a ſhip* or other veſſel, is the *prow*, or that part that goes foremoſt, including the bows on each ſide.

HEAD alſo denotes an ornamental figure erected on the continuation of a ſhip's ſtem, as being expreſſive of her name, and emblematical of war, navigation, commerce, &c. See *Tab. Ship*, *fig.* 2. *lit.* A. *fig.* 1. *lit.* L.

HEAD, in the *Manege*. The perfections required to the *head* of a horſe are, that it be ſmall, narrow, lean, and dry. Horſes with a big, groſs *head*, are apt, by their weight, to reſt and loll upon the bridle, and ſo to incommode the rider's hand. A horſe with a large *head* can never look ſtately, unleſs he have a long and very well-turned neck, and place his *head* well. Horſes with groſs, fat *heads*, much charged with fleſh, are too often ſubject to infirmities of the eyes.

But the chief thing in a horſe's *head* is a good *onſet*, ſo as he may be able to bring his *head* into its natural ſituation; which is, that all the fore-part, from the brow to the noſe, be perpendicular to the ground; ſo that if a plummet were applied thereto, it would but juſt raze or ſhave it. See HORSE.

The *head* of a horſe is alſo uſed to import the action of his neck, and the effect of the bridle and wriſt.

To give a horſe the *head*, ſee ECHAPPER.

HEAD *in, and likewiſe the hips*, is a phraſe importing that you muſt paſſage your horſe with his *head and croupe in*, i. e. work him ſide-ways upon two parallel lines, at ſtep or trot, ſo that when the horſe makes a ſtep or volt, his ſhoulders mark a *piſte* or tread, at the ſame time that his haunches give the tract of another; and the horſe plying or bending his neck, turns his head a little within the volt, and ſo looks upon the ground he is to go over.

Moors HEAD is underſtood of a horſe with a black *head* and feet, the body being uſually of a roan colour. It is alſo uſed by engineers, for a kind of boom or grenade ſhot out of a cannon: in *Heraldry*, for a repreſentation, uſually in profile, of a *blackmoor's head*, ſwathed or rolled about with a bandage; frequently borne as a creſt: in *Chemiſtry*, as a cover or capital of an alembic, having a long neck, to convey the vapours raiſed by the fire into a veſſel, which ſerves as a refrigeratory. In *Muſic*, the *head* of a lute, theorbo, or the like, is the place where the pins or pegs are ſcrewed, to ſtretch or ſlacken the ſtrings.

Dragon's HEAD, in *Aſtronomy*, &c. is the aſcending NODE of the moon or other planet.

HEAD-*ach*, in *Medicine*. Phyſicians commonly diſtinguiſh the *head-ach* into two kinds, according to its degree and continuance. The gentleſt kind, and which commonly affects a particular part of the *head* only, they call *cephalalgia*, and the more violent and obſtinate *cephalæa*; when the pain is on one ſide only, it is called HEMICRANIA, and when it is a fixed pain in the forehead, which may be covered with the end of the thumb, it is called the CLAVUS *hyſtericus*.

Cephalalgia is defined to be a pain in the *head*, proceeding from a copious congeſtion of the blood and humours in that part, which do not find any exit or paſſage from thence.

They generally diſtinguiſh it alſo into two kinds, the idiopathic and the ſymptomatic.

The idiopathic is that which ariſes from a plethora, and an immediate congeſtion of blood or humours in the *head*. The ſymptomatic is that which ariſes from a fault in the primæ viæ, communicating with the *head* by means of the par vagum of nerves, or from a tranſlation of the humours to the *head*, in fevers or other diſorders.

The diſtinction of the *cephalalgia* from the *cephalæa* is, that in the latter all the ſymptoms are more violent; the *cephalæa* alſo is uſually chronical and habitual; the *cephalalgia* only returns at times, and has but ſhort periods.

The ſimple *cephalalgia* is alſo diſtinguiſhed from the venereal *head-ach* by the burning heat and ſenſation of eroſion which attends the latter, which alſo is continual, or, at leaſt, never wholly ceaſes, and is always moſt violent in the night, when the body is at reſt, and is hotter than in the day.

The *cephalalgia* ſometimes ſeizes on the whole *head*, but more uſually the forehead is the ſeat of it; very frequently alſo it is felt about the origin of the noſe, and a weight or preſſure and burning heat are felt in the os cribroſum, and often at the ſame time there is felt a violent weight and preſſure in the bulbs of the eyes; not unfrequently a tooth-ach attends upon the *cephalalgia*, and when this is violent, the other abates in proportion. A noiſe and ringing in the ears are often alſo an attendant on it, and the eyes are often red and inflamed; the face alſo looks red, and often turgid, but ſometimes it looks as remarkably pale, or has a redneſs irregularly ſpread over it; both theſe caſes are from ſtrictures upon the veſſels. The veſſels of the neck and temples are often turgid. Women are very ſubject to this pain about the time of their menſtrual diſcharges, either before their eruption, or at any time on their diminution; ſometimes the *head-ach* is attended with a vertigo, which gives proof of a very violent congeſtion, and ſometimes a binding of the bowels, and a ſlight ſuppreſſion of urine attends it.

People of a plethoric habit of body are more ſubject than others to this pain, and, in general, young people more than ſuch as are older, and women more than men; and perſons who live high, and drink much wine, and uſe little exerciſe, ſuffer much more by it than thoſe who live lower, and uſe much labour and exerciſe.

When the *head-ach* proceeds from a hot bilious habit, the pain is very acute and throbbing, with a conſiderable heat of the part affected. When it proceeds from a cold phlegmatic habit, the patient complains of a dull heavy pain, and has a ſenſe of coldneſs in the part: this kind is ſometimes attended with a degree of ſtupidity and folly.

HEAD-*ach*, *cauſes of the*. Among the natural and internal cauſes, the principal are too great a quantity of blood, and a derivation of great quantities of it toward the head, with an intention of nature to relieve herſelf there by a hæmorrhage from the noſe. The external or accidental means that may bring on this pain are very numerous: the natural and habitual evacuations of blood being ſuppreſſed, and of theſe particularly a bleeding at the noſe, the neglect of accuſtomed bleedings, ſweats prevented or repelled, and the omiſſion of purging, cuſtomary before at certain periods of the year; great commotions of the body, or paſſions of the mind, eſpecially anger, drunkenneſs with ſpirituous liquors of any kind, the attracting acrid fumes through the noſe, a ſudden cooling of the legs or feet, hanging down the *head*, looking long obliquely at any object, wearing any thing tight about the neck, a tranſlation of the peccant matter toward the head in fevers, and a peculiar ſenſibility in the organs of ſmelling, whence perfumes give ſome perſons the *head-ach*; and to all theſe are to be added an hereditary diſpoſition, or injuries from blows or concuſſions of the head long before.

Sometimes the *head-ach* proceeds from the repulſion or retroceſſion of the gout, the eryſipelas, the ſmall-pox, meaſles, itch, or other eruptive diſeaſes.

Prognoſtics from it. The *head-ach* is a pain rather troubleſome than dangerous in itſelf, but it too eaſily degenerates into worſe complaints, and not unfrequently preſages defects of the ſight or hearing, or the gout; and in old age, lethargies, apoplexies, and paralytic diſorders. The *head-ach* often is cured by nature, by plentiful hæmorrhages from the noſe, and ſometimes by inflammatory diſorders of the adjacent parts: it more eaſily leaves young people than old; and, indeed, where long ſettled upon a perſon, and become habitual, rarely gives way to any remedies. The *head-ach* often is ſymptomatic in continual and intermitting fevers, eſpecially quartans: it is likewiſe a very common ſymptom in hyſteric and hypochondriac complaints. When the *head-ach* attends an acute fever, with pale urine, it is an unfavourable ſymptom.

Method of cure. The congeſtions of humours are to be derived from the ſuperior to the inferior parts, and, above all things, the bowels are to be looſened by clyſters and purges, for they are uſually bound up in this diſorder. After this, medicines are to be given which will quiet the violent emotions of the blood; ſuch are powders of nitre, crabs-eyes, and ſome diaphoretics, with a little cinnabar, according to Stahl. When the blood is thick, a ſcruple of tartarum vitriolatum may be given every day with great ſucceſs. After theſe, the gentle diaphoretics are to be given in ſmall doſes, with the diluent decoctions of the common tea-herbs, ſuch as baum, ſage, and the like. And if the pains are exceſſive, a gentle opiate, ſuch as a ſmall doſe of the ſtorax-pill, may be added to theſe.

When the *head-ach* is owing to exceſs of blood, or a hot bilious conſtitution, bleeding is neceſſary; which may be performed in the jugular vein, or by cupping, or the application of leeches to the temples and behind the ears. A bliſtering plaſter may alſo be afterwards applied to the neck, behind the ears, or to any part of the *head* that is moſt affected. In ſome caſes it will be proper to bliſter the whole *head*. In perſons of groſs habit, iſſues or perpetual bliſters will be of ſervice; and the belly ſhould likewiſe be kept open by gentle laxation. But when the *head-ach* proceeds from a copious vitiated ſerum ſtagnating in the membranes, and will not yield to bleeding or gentle laxatives, more powerful purgatives are neceſſary, as pills made of aloes, reſin of jalap, &c. the whole *head* ſhould alſo be bliſtered, and the back part of the neck kept open for a conſiderable time by a perpetual bliſter.

External applications ſometimes alſo aſſiſt the uſe of internal medicines; of this kind are ſpirit of wine camphorated, with a ſmall admixture of ſaffron; this ſometimes almoſt inſtantaneouſly removes the pain. The affected part may be rubbed with Bate's anodyne balſam, or a cloth dipped in it may be applied to the part; and, in caſe of extreme pain, the patient may, at the ſame time, take twenty drops of laudanum, in a cup of valerian or penny-royal tea, twice or thrice a day: but the uſe of opiates ſhould be always accompanied with proper evacuations. A violent *head-ach* may ſometimes be removed by a little of Ward's eſſence dropped into the palm of the hand, and applied to the forehead; or by æther, applied in the ſame manner. Dr. Percival found, by repeated experience, that the uſe of eighteen drops of laudanum and ſtrong coffee removed the *head-ach*, without occaſioning any diſpoſition to ſleep; the narcotic effects of the opium being counteracted by the coffee. Coarſe bread, with juniper-berries, caraway-ſeeds, and ſalt, laid on as an epithem, is alſo ſometimes a preſent help; and bags of aromatic ingredients, reduced to a groſs powder, are, though a ſlower, yet often a very valuable relief. All theſe are only to be uſed in the idiopathic *head-ach*; for in the ſymptomatic, regard is to be had only to the principal diſorder; and when the cauſe is removed, the effect always ceaſes. After the fits of the *head-ach* are over, it is proper, by way of prevention for the future, to bleed in the ſpring and autumn, and frequently to bathe the feet in warm water. The uſe of gentle exerciſe is to be greatly recommended. The fatty or oleaginous remedies, preſcribed by ſome for rubbing on the head, are to be carefully avoided, as they ſtop up the pores and prevent perſpiration. The ſmelling to pungent liquids is not of ſo much benefit as uſually ſuppoſed. The urinous volatiles, ſuch as ſpirit of hartſhorn, ſal volatile, and the like, are ſometimes of a little preſent relief; and theſe, or any thing that will irritate the noſe, may be freely uſed when the *head-ach* is occaſioned by a ſtoppage of a running at the noſe; but the common uſe of ſpirit of lavender and Hungary-water, on theſe occaſions, is often the cauſe of more violent pain, by cauſing a freſh derivation of humours on the parts. Cinnabar has, by many authors, been ſuppoſed a dangerous medicine in all caſes of this kind; but Stahl affirms, on repeated experience, that it has great good effects; and that in theſe, and many other caſes, it ſupplies the place of opiates and anodynes. When the patient cannot bear the loſs of blood, his feet ſhould be frequently bathed in lukewarm water, and rubbed with a coarſe cloth; cataplaſms with muſtard or horſe-radiſh ſhould be alſo applied to them, eſpecially when the pain proceeds from a gouty humour affecting the head.

The diet of perſons afflicted with the *head-ach* ſhould conſiſt of ſuch emollient ſubſtances as will correct the acrimony of the humours and keep the body open, as apples boiled in milk, ſpinach, turnips, &c. The drink ſhould be diluting, as barley-water, infuſions of mild mucilaginous vegetables, decoctions of the ſudorific woods, &c. The feet and legs ſhould be kept warm, and often bathed in warm water, and the *head* ſhaved and bathed with water and vinegar, and kept, as much as poſſible, in an erect poſture.

Cephalæa is a violent and continual pain in the *head*, occaſioned by a rheumatic congeſtion of humours in the *head*.

Notwithſtanding the *cephalæa* is a continual and unintermitting pain of the head, yet it is ſubject to ſome remiſſions, and is thence diſtinguiſhed by authors into the periodic, the continual, and the vague *cephalæa*. The continual kind is that which is always in the ſame degree, and admits not of the leaſt remiſſions. The periodical is that which has its regular periods of being leſs intenſe; theſe are called its remiſſions. And finally, the vague *cephalæa* is that which has times of being leſs violent; but theſe return at no regular nor ſtated periods.

Signs of it. The *cephalæa* ſometimes ſo much reſembles the *cephalalgia*, or common *head-ach*, that it only differs from it by its obſtinate continuance and the violence of the pain; and in women it has all the ſame ſymptoms with the clavus hyſtericus, except that it affects indifferently all parts of the head. When this complaint ariſes from a venereal taint in the blood, it is always violent; but moſt ſo, when the perſon is warm in bed. When it ariſes from a ſcorbutic coagulation of the blood, or an inflammation of the meninges of the brain, the pain is remarkably ſharp and piercing, and is attended with a febrile heat and an intolerable thirſt. There generally comes on a vertiginous diſorder of the head after this complaint has held the patient ſome time, and the patient can never bear any motion; and on the leaſt ſhaking or diſturbing the head, the pain becomes violently intenſe, and reſembles the beating of an artery in pulſation. The pain is in general leſs violent while the patient lies down, but as ſoon as the *head* is raiſed up ever ſo little, it increaſes to a great degree. The leaſt noiſe or motion is terrible to perſons in this ſtate, and the light is frequently offenſive and painful; ſo that the patient loves retirement in darkened and quiet rooms, and avoids company. Liquors of any ſtrength give violence to the pain as ſoon as drank; and in caſes of this kind, where a ſcorbutic habit is the cauſe, frequent and violent bleedings at the noſe happen, which give no laſting relief, but only an abatement of the pain for the time.

Women are generally more ſubject to this terrible pain than men, theſe being rarely afflicted with it, unleſs when there is ſome violent diſorder in regard to the hæmorrhoids, or when there is a venereal taint in the blood. Among women, thoſe are moſt ſubject to it who live high and lead ſedentary lives, and who are of a melancholy diſpoſition, or ſubject to obſtructions of the menſes.

Cauſes of it. The general cauſe of this, as well as of all other *head-achs*, is a violent congeſtion of blood directed to the *head*; and the peculiar cauſes which determine the *head-ach* to this terrible kind, are ulceroſe or exulcerated diſpoſitions of the body; theſe principally are owing to the ſcurvy, the venereal diſeaſe, or any violent cutaneous eruptions driven in, or to external injuries, as blows and wounds of the head ill-treated. The ancients ſuppoſed this owing to impoſtumes or collections of a viſcid matter in the head, and therefore always preſcribed bliſters, ſetons, and the like, and ſometimes the piercing the ſkull in the part where the pain was moſt violent.

In the moſt favourable caſes this is a diſtemper that with difficulty admits of a cure. Where there is a ſimple ulceration in the caſe, the cure becomes yet more difficult, but not quite to be deſpaired of; but where a venereal taint is the cauſe, a cure is ſcarce to be expected. For though the cauſe be removed, yet in this or any other kind of *cephalæa*, attended with a caries of the bones, the pain will afterwards often return, and that with little leſs violence than before.

Thoſe *cephalæas* which ſometimes are relieved by nature, by copious diſcharges of ſerous humours, are more difficult of cure than others; and thoſe which happen to perſons of remarkably plethoric habits, threaten an approaching apoplexy.

Method of cure. The ſame general method is to be obſerved as in the common *head-ach*, which ſee above; but in this there are to be added to the medicines there preſcribed, ſuch as powerfully diſſolve mucous humours; ſuch are the roots of pimpernel, arum, and maſterwort, with the bitter herbs, ſaſſafras, gum ammoniacum, tartarum vitriolatum, and the like. After theſe, purging is proper; and in caſes where the ſcurvy or any venereal taint is joined, there muſt be always regard had to thoſe complaints in the whole method of cure: and, indeed, the ſcorbutic *cephalæa* ſhould always be treated as the ſcurvy itſelf, and the venereal *cephalæa* as the pox; and the patient, after proper evacuations, ſhould drink freely of the decoction of the woods, or the decoction of ſarſaparilla with raiſins and liquorice; theſe promote perſpiration, and ſweeten the humours. When a collection of matter is felt under the ſkin, it muſt be diſcharged by an inciſion, otherwiſe it will render the bone carious;

and where any old ulcers have been dried up, or any other habitual diſcharge ſtopped, and the complaint is owing to that, the making iſſues or ſetons muſt be premiſed to any other attempt of a cure. Some inveterate complaints of this kind have been happily cured by mercury, whether they had or had not any thing venereal in their foundation; and in general, a ſalivation is a ſort of laſt reſource, be the origin what it will. Junker's Conſp. Med. p. 96. 100. 104. 116. and Buchan's Dom. Med. p. 283. edit. 1776.

Head-*borow*, or Head-*borough*, ſignifies the perſon who is the chief of the frank-*pledge*, and had anciently the principal direction of thoſe within his own pledge.

He was alſo called *burrow-head*, *burſhoulder*, now *boſholder*, *third-borow*, *tything-man*, *chief-pledge*, and *borowelder*, according to the diverſity of ſpeech in divers places. This office is now uſually called a *high-conſtable*.

The *head-borow* was the chief of ten pledges; the other nine were called *hand-borows*, or *plegii manuales*, &c.

By the Head, in *Sea-language*, denotes the ſtate of a ſhip which is laden deeper at the fore-end than the after-end.

Head-*farcin*. See Farcin.

Head-*faſt*, in *Sea-language*, ſignifies a rope employed to faſten a ſhip to a wharf, chain, or buoy, or to ſome other veſſel along-ſide.

Head-*land*, in *Huſbandry*, is the upper part of a ground left for turning the plough, or that part which is ploughed acroſs at the ends of other lands.

Head-*land*, in *Sea-language*. See Land.

Head-*lines*, in a *Ship*, thoſe ropes of all ſails which are next to the yards, and by which the ſails are made faſt to the yards.

Head-*moſt*, in *Sea-language*, denotes the ſituation of any ſhip or ſhips, which are the moſt advanced in a fleet or line of battle.

Head-*mould ſhot*, a diſeaſe in children, wherein the ſutures of the ſkull, generally the coronal, *ride*; that is, have their edges ſhot over one another; and are ſo cloſe locked together, as to compreſs the internal parts, the meninges, or even the brain itſelf.

The diſeaſe uſually occaſions convulſions, and is ſuppoſed to admit of no cure from medicine, unleſs room could be given by manual operation or a divulſion of the ſutures.

The *head-mould-ſhot* is the diſorder oppoſite to the horse-*ſhoe-head*.

Head-*pence*, an exaction of a certain ſum formerly collected by the ſheriff of Northumberland from the inhabitants of that county, without any account to be made to the king. This was aboliſhed by the ſtatute 23 Hen. VI. cap. 7. Blount.

Heads, a term uſed by builders for that kind of tile which they uſed to lay at the eaves of a houſe, being the full breadth of a common tile, and but half a tile in length.

Head-*rope*, in a *Ship*, is that part of the bolt-*rope* which terminates any of the principal ſails on the upper edge, which is accordingly ſewed to it.

Head-*ſails*, in a *Ship*, thoſe which belong to the fore-maſt and bowſprit; for it is by theſe that the *head* of the ſhip is governed, and by which it is made to fall off and keep out of the wind; ſuch are the fore-ſail, fore-top-ſail, fore-top-gallant-ſail, jib, fore-ſtay-ſail, and the ſprit-ſail with its top-ſail: and theſe in quarter-winds are the chief drawing-ſails.

Head-*ſea* is when a great wave or billow of the ſea comes right ahead of the ſhip as ſhe is in her courſe.

Head-*ſtall*, in the *Manege*. See Caveson.

Head-*ſtall*, among *Ancient Muſicians*. See Phorbæa.

Head-*tin*, in *Metallurgy*, is a preparation of tin-ore toward the fitting it for working into metal. When the ore has been pounded and twice waſhed, that part of it which lies uppermoſt, or makes the ſurface of the maſs in the tub, is called the *head-tin*; this is ſeparated from the reſt, and, after a little more waſhing, becomes fit for the blowing-houſe.

Head-*to-wind*, in *Sea-language*, denotes the ſituation of a ſhip or boat when her head is turned to windward.

Head-*way* ſignifies the motion of advancing at ſea, and is generally uſed when a ſhip firſt begins to advance, or, in calm weather, when it is doubtful whether ſhe be in a ſtate of reſt or motion.

HEALFANG, Healsfang, or Halsfang, in our *Ancient Cuſtoms*, ſignifies *colliſtrigium*, or the puniſhment of the pillory.

The word is compounded of two Saxon words; *halp*, *neck*, and *pangen*, *to contain*: *Pœna ſcilicet qua alicui collum ſtringatur*. The *healfang*, however, cannot ſignify a pillory in the charter of Canutus, De Foreſtis, cap. xiv. *Et pro culpa ſolvat regi duos ſolidos, quos Dani vocant* halfehang.

Healfang is alſo taken for a pecuniary puniſhment or mulct, to commute for ſtanding in the pillory; and is to be paid either to the king or to the chief lord.

Qui falſum teſtimonium dedit, reddat regi, vel terræ domino healfang. Leg. Hen. I.

HEALING, in its general ſenſe, includes the whole proceſs of curing or removing a diſorder, and recovering health.

In this ſenſe, medicine is defined the art of *healing*.

In its more reſtrained ſenſe, as uſed in ſurgery, &c. *healing* denotes the uniting or conſolidating the lips of a wound or ulcer.

The medicines proper for this intention, are called *incarnatives*, *agglutinatives*, *vulneraries*, &c.

Dr. Beal has a diſcourſe of ſanative or *healing* ſprings and waters, in the Philoſophical Tranſactions, N° 20.

Healing, in *Architecture*, denotes the covering the roof of a building.

The *healing* is various; as of lead, tiles, ſlate, Horſhamſtone, ſhingles, or reed and ſtraw.

HEALTH, a due temperament or conſtitution of the ſeveral parts whereof an animal is compoſed, both in reſpect of quantity and quality. Or it is that ſtate of the body wherein it is fitted to diſcharge the natural functions perfectly, eaſily, and durably.

Health is the ſtate or condition oppoſite to *diſeaſe*.

The preſervation and reſtoration of *health* make the objects of the art of medicine.

The continuance of *health* depends, principally, on the ſix non-naturals, viz. air, food, exerciſe, the paſſions, evacuation and retention, and ſleep and waking. See each in its place.

Injuries, affecting a man's *health*, are thoſe in which, by any unwholeſome practices of another, he ſuſtains any apparent damage in his vigour or conſtitution; as by ſelling him bad proviſions or wine, by the exerciſe of a noiſome trade, or by the neglect or unſkilful management of his phyſician, ſurgeon, or apothecary. For theſe injuries there is a remedy in damages by a ſpecial action of treſpaſs upon the caſe. The ſtat. 51 Hen. III. ſtat. 6. prohibits the ſale of corrupted wine and unwholeſome fleſh, or fleſh bought of a Jew, under pain of amercement for the firſt offence, pillory for the ſecond, fine and impriſonment for the third, and abjuration of the town for the fourth: and by ſtat. 12 Car. II. cap. 25. any brewing or adulteration of wine is puniſhable with the forfeiture of 100*l.* if done by the wholeſale merchant, and 40*l.* if done by the vintner or retailer. See Plague and Quarantain.

The ancients perſonified, and even deified, *health*; or, rather, they erected a goddeſs, to whom they ſuppoſed the care of *health* to belong. The Greeks worſhipped her under the name Ὑγιεια, and the Latins under that of *Salus*. The place of her worſhip, at Rome, was on the Mons Quirinalis, where ſhe had a temple, and a ſtatue crowned with medicinal herbs.

We frequently find the goddeſs *Health* on the reverſe of medals. She is repreſented crowned with laurel, with a ſerpent ſtretched on her left arm, and holding a patera to it with the right. Sometimes ſhe has an altar before her, with a ſerpent twiſted round the ſame, and raiſing its head to take ſomething off from it.

The inſcription is sal. aug.

Health, *houſe of*, a kind of hoſpital or public building, for the reception and entertainment of perſons infected with the plague, or coming from places infected therewith. See Pest-*houſe*, Quarantain, &c.

In the like ſenſe we ſay, officers of *health*, certificate of *health*, &c.

HEAM, in beaſts, denotes the ſame with *after-birth* in women.

Thyme, penny-royal, winter-ſavory, and common horehound, boiled in white-wine, and given to a mare, are eſteemed good to expel the *heam*. Dittany, applied in a peſſary, expels the *heam*, as well as the dead foal; ſo alſo do fennel, hops, ſavin, angelica, &c.

HEARING, *auditus*, the act or faculty of perceiving ſounds.

Hearing is reckoned among our external ſenſes. Its organ is the *ear*, and particularly the auditory nerve diffuſed through the ſame; and its object, certain motions or vibrations of the air.

Hence *hearing* may be more ſcientifically defined, a ſenſation, whereby, from a due motion impreſſed on the fibrillæ of the auditory nerve, and communicated thence to the ſenſory, the mind perceives and gets the idea of ſounds.

Philoſophers have differed as to the immediate organ of *hearing*. Ariſtotle will have it to be the cochlea and tympanum, and takes the ſenſe of *hearing* to be ſeated therein. Hiſt. Animal. cap. 10. in which he is followed by Galen, lib. viii. De Uſu Part. See Tympanum.

The moderns ſpeak of the point on much better ground. The ear, and the ſeveral parts thereof, membranes, canals,

nals, labyrinths, nerves, &c. they ſay, are the only means and vehicles for the reception, modification, and tranſmiſſion of the ſonorous matter to the brain, which is the ſeat of the ſenſe.

A ſound, in effect, is nothing but a certain rarefaction or modulation of the external air, which, being gathered by the external ear, paſſes through the meatus auditorius, and beats upon the membrana tympani, which moves the four little bones in the tympanum.

In like manner, as this is beat by the external air, theſe little bones move the internal air which is in the tympanum and veſtibulum; which internal air makes an impreſſion upon the auditory nerve in the labyrinth and cochlea, according as it is moved by the little bones in the tympanum: ſo that, according to the various refractions of the external air, the internal air makes various impreſſions upon the auditory nerve, the immediate organ of *hearing*; which different impreſſions repreſent different ſounds. See **Ear**.

Sir Iſaac Newton carries the thing ſomewhat farther, and ſuppoſes *hearing*, like ſeeing, to be performed not immediately by the vibrations of the air, but by thoſe of ſome other more ſubtil medium, excited in the auditory nerves by the tremors of the air, and propagated through the ſolid capillaments of the nerve to the place of ſenſation.

The curious ſtructure of the labyrinth and cochlea tend to make the weakeſt ſounds audible; for the whole organ of *hearing* being included in a ſmall ſpace, had the auditory nerve run in a ſtrait line, the impreſſion would only have been made on a very ſmall part of it; and the ſtrength of the impreſſion being, *cæteris paribus*, always as the number of parts upon which the impreſſion is made, ſounds which are now low could not have been heard at all. If the auditory nerve had, like the retina, been expanded into a large web, which had covered or lined ſome wide cavity, the impreſſion of ſounds, even in this caſe, had been much weaker than they are now; for this large cavity had given room for the ſounds to dilate, and all ſounds grow weaker as they dilate.

Both theſe inconveniences are prevented by the preſent ſtructure of the labyrinth and cochlea, whoſe canals, by their winding, contain large portions of the auditory nerve, upon every point of which the ſmalleſt ſound being at once impreſſed becomes audible, and by their narrowneſs the ſounds are hindered from dilating; and the impreſſions made upon the nerves by the firſt dilatations are always the ſtrongeſt.

The ſtrength of the impreſſion in narrow channels is likewiſe increaſed on account of the elaſticity of the ſides of the bony canal, which, receiving the firſt and ſtrongeſt impulſes of the air, do reverberate them more ſtrongly upon the auditory nerve.

It may be obſerved, that though the air be the uſual matter of ſounds, ſo that a bell rung in vacuo is not heard at all, yet will moſt other bodies, properly diſpoſed, do the like office, only ſome more faintly than others.

Thus may a ſound be heard through water, or even through earth; of which we have various inſtances.

Add, that though the ear be the ordinary organ of *hearing*, yet Hagerup, a Daniſh phyſician, maintains, that one may hear with the teeth. Thus, if one end of a knife, or the like, be applied to a harpſichord, and the other held between the teeth, the muſic thereof will be plainly heard, though the ears be ever ſo cloſely ſtopped. But this perhaps may more properly be referred to the ſenſe of feeling.

Such as want the ſenſe of *hearing* are ſaid to be *mute* or *deaf*. See **Deafness**.

Hearing, *difficulty of*. In common caſes of difficult *hearing* ſuddenly coming on, the following is an excellent remedy: take eſſence of amber a dram, of caſtor a ſcruple, oil of chamomile half a ſcruple, oil of amber one drop; mix theſe together, and three or four times a day put into the ear a piece of cotton wetted in them. This is a complaint frequently happening to young women, from a ſuppreſſion of the menſes; and, in that caſe, there is no more required for a cure, than barely to reſtore that diſcharge to its natural and proper courſe. It ſometimes alſo happens to men, from a ſtoppage of the hæmorrhoidal diſcharges, and is then to be cured by recalling them, and applying leeches to the part; or, if the patient is averſe to that, bleeding or cupping often prove an immediate cure. When this difficulty of *hearing* ariſes from any obſtruction in the auditory paſſage, the matter that cauſes the obſtruction is to be carefully removed by a ſurgeon.

Old men often have a difficulty of *hearing* from mere debility and loſs of the due ſtrength and tone of the parts. In this caſe medicines can give no aſſiſtance, but all applications uſually render the caſe worſe: and the ſame is to be obſerved in all caſes where the diſorder is very inveterate, or is hereditary; or owing to external injuries, by which the tympanum has been broke, or any other of the principal parts are deſtroyed. The total loſs of *hearing*, after having held a perſon for many years, and not been at all relieved by the common methods of cure, has been ſometimes known to go off of itſelf, and the patient to hear as perfectly as ever; ſo that we are not to deſpair of relief even in the worſt caſes of this kind, and ſuch as have reſiſted all remedies. Perſons who are ſubject to returns of this complaint, ſhould uſe frequent bleeding or cupping, be moderate in diet, and ſhun all exceſſes of ſtrong liquors, and uſe moderate exerciſe. Heiſter alſo affirms, on his own experience, that the drinking the mineral waters every ſpring, in a proper and regular manner, is of the utmoſt ſervice in preſerving the patient from returns of this diſorder during the year. Heiſter's Compend. Med. p. 180.

Mr. Le Cat, in his treatiſe on the organ of ſound, propoſes an inſtrument, as of his own invention, to aſſiſt dull *hearing*: it conſiſts of a ſhell or cornet of copper, into which a ſmall funnel-like tube is fixed, ſo that its narrow end is at the center of the cornet. See Phil. Tranſ. Nº 466. § 9. See **Deafness**.

Hearing is particularly uſed, in civil and judicial concerns, for a cauſe being brought before the judge and jury, and the parties being *heard* as to the merits thereof.

The method of *hearing* cauſes in the court of Chancery is this: the parties on both ſides appearing by their counſel, the plaintiff's bill is firſt opened or briefly abridged, and the defendant's anſwer alſo, by the junior counſel on each ſide; after which the plaintiff's leading counſel ſtates the caſe and the matters in iſſue, and the points of equity ariſing from them; and then ſuch depoſitions as are called for by the plaintiff are read by one of the ſix clerks; and the plaintiff may alſo read ſuch part of the defendant's anſwer as he thinks material or convenient: and, after this, the reſt of the counſel for the plaintiff make their obſervations and arguments. Then the defendant's counſel go through the ſame proceſs for him, except that they may not read any part of his anſwer; and the counſel for the plaintiff are heard in reply. When all are heard, the court pronounces the decree, adjuſting every point in debate according to equity and good conſcience; which decree, being uſually very long, the minutes of it are taken down, and read openly in court by the regiſtrar. Blackſt. Com. vol. iii. p. 451. 4to.

The *hearing* of ambaſſadors, at the courts of princes, is uſually called audience.

HEARSE, among *Hunters*, a hind in the ſecond year of her age. See **Hunting**.

Hearse is the name of a well-known carriage, uſed for conveying the dead to the grave.

The word is alſo uſed by Shakeſpear in his Henry VI. for a monument erected over a grave.

HEART, *cor*, in *Anatomy*, a muſculous part of the animal body, ſituated in the thorax, on the anterior part of the diaphragm, between the two laminæ of the mediaſtinum, wherein the veins all terminate, and from which all the arteries ariſe, and which, by its alternate contraction and dilatation, is the chief inſtrument of the circulation of the blood, and the principle of life. See *Tab. Anat. (Splanch.) fig.* 12. *lit.* cc.

This noble part is included in a capſula or pouch, called the pericardium, whoſe ſtructure and office will be explained under that article.

The figure of the *heart* is a cone or pyramid reverſed, flatted on the ſides; the upper and broader point whereof is called the *baſis*, and the lower the *cone*, *apex*, or *point*; this is turned a little towards the left ſide.

The magnitude of the *heart* is indeterminate, and different in ſeveral ſubjects, according to their reſpective dimenſions. Its ordinary length is about ſix inches, its breadth at the baſis four or five, and the whole circumference fourteen. Its place is in the middle of the thorax, between the two lobes of the lungs; and it is faſtened to the pericardium, and ſupported by the great blood-veſſels, to which alone it is immediately connected, being, for the conveniency of its motion, diſengaged from any other impediments. It is covered with a thin membrane, which, about the baſis, is guarded with fat, and which is no other than the common membrane of the muſcles.

It has two great cavities called *ventricles*, ſomewhat unequal, one of which is thick and ſolid, the other thin and ſoft; this latter, called the right ventricle, being larger, and capable of containing between two and three ounces of blood. They are divided by a fleſhy partition, conſiſting of the ſame muſcular fibres with the parietes themſelves, and called the *ſeptum*; the figure whereof is concave towards the left ventricle, and convex towards the right. There is no immediate communication between

tween the ventricles; but for the blood to paſs out of one into the other, it muſt fetch a round through the lungs.

The parietes or ſides of theſe ventricles are of a thickneſs and ſtrength very unequal; the left much exceeding the right becauſe of its office, which is to force the blood through all the parts of the body; whereas the right derives it through the lungs only, and is therein greatly aſſiſted by other parts. The right ventricle, in effect, ſeems only intended with a view to the lungs; whence, in ſuch animals as have no lungs, we only find one ventricle, which is the left.

In the ventricles are little muſcles, called *columnæ carneæ*, or *lacertuli*; theſe are derived from the parietes, and connected, by tendinous extremities, to the valves of the *heart* hereafter mentioned.

The ventricles are capped each with an auricle or little muſcle, conſiſting, like the ventricles themſelves, of a double order of fleſhy fibres.

The veſſels, either ariſing from, or terminating in the *heart* and its auricles, are two arteries, viz. the aorta and the pulmonary artery, which have their origin from the two ventricles; viz. the aorta from the left, and the pulmonary from the right: and two veins, which terminate in the auricles; viz. the cava vein in the right, and the pulmonary vein in the left.

At the reſpective orifices of theſe veſſels are placed valves; particularly, at the orifice of the arteries, within each of them, are three ſemilunar valves, or membranes of a ſemilunar figure, which cloſe the orifice of the artery, and hinder the relapſe of the blood into the *heart* at the time of its dilatation. At the mouth of the right ventricle, juſt at its juncture with the auricle, are three others called *tricuſpides*, from their three points being faſtened by tendinous fibres to the columnæ carneæ; ſo that, upon the contraction or ſyſtole of the *heart*, they cloſe the orifice, and hinder the blood from recurring into the great vein. The ſame office is performed by the two mitral valves, at the exit of the left ventricle, ſtopping the return of the blood into the pulmonary vein.

The ſubſtance of the *heart* is entirely fleſhy or muſculous. The ancients, indeed, generally took it for what they call a parenchyma; but Hippocrates had a juſter ſentiment, and after him Steno and the moderns have evidently found it to conſiſt of a continued ſeries of proper muſculous fibres, variouſly contorted or wound up, and ending at the orifices of the reſpective ventricles, where they form the tendons.

In diſſecting the *heart*, after taking off the proper membrane, there appear, on the outer ſurface of the right ventricle, ſome ſlender ſtrait fibres, tending to and ending in the baſis. Immediately under theſe there is a double order of ſpiral fibres, the exterior whereof aſcend obliquely from the ſeptum to the baſis, and form a ſort of helix or cochlea; the interior take a contrary courſe, winding obliquely from the right ſide towards the left, ſo as to compaſs both ventricles, and ending in the baſis on the left ſide, form likewiſe a helix of an inverſe order. Under theſe appear the fibres of the left ventricle; and firſt, a ſpiral ſeries running to the left, under which, as in the other ventricle, lie another order running the contrary way, which not only extend to the outward paries, but encompaſſing the whole ventricle, make the ſeptum more immediately appertain to, and be a part of, the left ventricle. Some of them, inſtead of terminating, as the reſt do, in the tendons of the *heart*, run inwards, and form the columnæ carneæ; while others, reaching down to the cone, are wound about it, and form the circle called the *center of the heart*.

The fibres of the *heart* appear to be the ſame with thoſe of the other muſcles, whence the part now generally paſſes for a real muſcle; though ſome think that inference not very juſt, inaſmuch as the aorta has the ſame claim to be reputed a muſcle.

Some late authors, upon conſidering the ſtructure and diſpoſition of the ſpiral fibres, chuſe rather to make the *heart* a double muſcle, or two muſcles tied together. In effect, the two ventricles, with their reſpective auricles, are found two diſtinct bodies, two veſſels or cavities, which may be ſeparated, and yet remain veſſels; the ſeptum, which was ſuppoſed to belong only to the left, being now found to conſiſt of fibres derived from them both. To ſay no more, the two ventricles, according to Mr. Winſlow, are two ſeveral muſcles united together, not only by the ſeptum, but by ſeveral plans of fibres ariſing from the exterior baſe of the *heart*, and meeting at the apex, which, entering the left ventricle, lines the parietes, &c.

The *heart* has alſo its proper blood-veſſels, viz. two arteries ſpringing from the entrance of the aorta, and one larger vein, with one or two leſſer; all which, from their encompaſſing the *heart*, are called *coronariæ*.

The nerves of the *heart*, and its auricles, come from a plexus of the par vagum, called by Willis, *plexus cardiacus*. It has alſo lympheducts, which carry the lymph from the *heart* to the thoracic duct.

The uſe of the ventricles of the *heart*, and its appendant auricles, is to circulate the blood through the whole body; in order to which, they have an alternate motion of contraction and dilatation. The two ventricles may be conſidered as two ſyringes, ſo cloſely joined together as to make but one body, and furniſhed with ſuckers placed in contrary directions to each other, ſo that by drawing one of them a fluid is let in, and forced out again by the other. By the dilatation, called the *diaſtole*, the cavity of the ventricles is opened, and their internal dimenſions enlarged to receive the refluent blood from the veins, which is forced into them through the tricuſpidal valves, by the contraction of the auricles, where it is lodged; and by the contraction of the ventricles, called the *ſyſtole*, their cavity is ſhrunk, and their dimenſions leſſened, ſo that the blood is forced toward the baſis of the *heart*, and made to preſs the tricuſpidal valves againſt each other, to open the ſemilunares, and to ruſh with impetuoſity through the arteries and their ramifications; and from thence it is forced to return by the veins to the auricles, which receive and lodge it during the time of a new contraction.

Hence it appears, that theſe alternate motions of the heart and auricles are oppoſite, in time, to each other; the auricles being dilated whilſt the *heart* is contracted again, and contracted whilſt it is dilated, to drive the blood into it.

By means of the right ventricle, the blood is driven through the pulmonary artery; from which, being received into the pulmonary vein, it is returned to the left ventricle; from which, by the aorta, it is diſtributed all over the reſt of the body, and thence returned to the right ventricle by the vena cava; ſo making an entire circulation through the whole body. See *Circulation of the* Blood.

Schenchius gives an account of a man who had no *heart*; but Molinetti denies it; as alſo, that there ever were two *hearts* found in any man, though the caſe be common in divers inſects, which have often naturally ſeveral *hearts*: witneſs ſilk-worms, which have a chain of *hearts* running the whole length of their bodies. But we have, in other authors, inſtances of two *hearts*, even in the ſame man. There have been *hearts* found all gnawed and devoured with worms. Muretus opened the *hearts* of ſome banditti, which were all hairy, or at leaſt inveſted with a tomentum or down. And, what is ſtill more extraordinary, we have accounts of perſons in whom the *heart* has been found inverted, or turned upſide-down; particularly in a woman hanged ſome time ago in Saxony, and a man hanged at Paris.

Timorous animals have always larger *hearts* than courageous ones, as we ſee in deer, hares, aſſes, &c.

Dr. Hales conjectures, that one reaſon of this may be, that the fibres of the timorous are generally more lax than thoſe of courageous animals; on which account the blood paſſing with leſs reſiſtance through the lax-fibred capillary veſſels, it is requiſite that the heart ſhould at each pulſe throw out a greater quantity of blood, in order to ſupply its more eaſy and plentiful flow through the lax capillary arteries into the veins: and this may alſo be the reaſon why the pulſes of young animals, as of children, are found to beat faſter than thoſe of grown perſons; becauſe the tender fibres of the coats of their blood-veſſels being very lax, give leſs reſiſtance to the flowing blood, whoſe globules are obſerved by M. Lewenhoeck to be all of a ſize, both in great and ſmall animals; whence it was needful to make proviſion for a proportionably greater ſupply of it from the *heart*, by increaſing the velocity of its dilatations and contractions. Hæmaſtatics in Statical Eſſ. vol. ii. p. 29.

There is a bone ſometimes found in the baſis of the *hearts* of certain animals, particularly deer, which ſeems to be no other than the tendons of the fibres of the *heart* indurated and oſſified.

Hiſtorians relate, that pope Urban VIII. being opened after his death, was found to have ſuch a bone in his *heart*. The caſe is very uſual in the trunk of the aorta, which ſprings from the *heart*.

Many amphibious creatures, as frogs, &c. have but one ventricle in the *heart*. The tortoiſe is ſaid, by the French academiſts, to have three ventricles: M. Buſſiere charges this on them as a miſtake, and maintains it has but one. The point is ſcarce yet aſcertained. Mem. de l'Acad. an. 1703. and Philoſ. Tranſ. N° 328.

Heart, *theory of the motion of the*. The principle of motion in the *heart*, or the power from which its alternate contraction and dilatation ariſes has been greatly controverted among the late phyſicians and anatomiſts. See Diastole and Systole.

The proportion of the weight of the *heart* to that of the body is greater in the males than in the females of birds, both wild and tame. But this proportion differs leſs in the males and females of wild birds than of tame birds; which may probably be owing to the exerciſe of the former being more nearly equal than that of the latter.

The proportion of the *heart* to the body is much greater in birds than in fiſh, at a medium about 8 to 1; Dr. Robinſon thinks this great difference is owing to the vaſtly ſuperior heat of birds.

Dr. Bryan Robinſon has given us a table of the mean weights of the bodies, *hearts*, and livers of ſeveral ſpecies of birds and fiſhes, as alſo of the proportions of the *hearts* and livers to the weight of the body, and of the liver to the weight of the *heart*. It appears from theſe tables, that the proportion of the weight of the *heart* to the weight of the body is greater in wild birds than in tame birds: the former uſe more exerciſe, or move their muſcles more than the latter, and it is known that the motions of the *heart* and blood are much increaſed by the motion of the muſcles: on the contrary, when the quantity of motion in the muſcular ſyſtem is greatly diminiſhed by the inactivity of bodies, the force of the *heart* and motion of the blood will likewiſe be diminiſhed in the ſame proportion. But muſcles which are much moved always increaſe in magnitude, weight, and ſtrength; and yet bodies that uſe much muſcular motion are ſeldom obſerved to grow fat, or increaſe in weight; and therefore the weight of the *heart* in proportion to the weight of the body will be greater in wild animals than in tame, and in bodies which uſe much exerciſe than in bodies which are inactive.

The weight of the *heart* in proportion to the weight of the body is greater in ſmall birds than in large ones. It is likewiſe greater in a mouſe than in an ox, in a child than in a man, and probably greater in little men than in large men. Now ſince ſmall animals are generally more active than great animals, we may allow the activity of the body to depend much on the proportion of the weight of the *heart* to the weight of the body. Diſſ. on the Food and Diſch. of Hum. Bod. p. 103, 104.

The proportion of the weight of the *heart* to the weight of the body is leſs in fat bodies than in lean. As animals grow fat the weight of their bodies increaſes, and their quantity of blood and weight of *heart* leſſens; for the fat in the membranes compreſſes the blood-veſſels, and leſſens the quantity of blood, and as this leſſens the weight of the *heart* leſſens; the weight of the *heart* and quantity of blood always increaſing and decreaſing together. Diſſ. on the Food, &c. of Hum. Bod. p. 103, 108.

Various unnatural accidents happen to the *heart*, and are the cauſes of diſorders, which are never underſtood till too late, on the diſſection of the body. Of this kind Mr. Hunauld ſhewed the Paris academy a remarkable inſtance in the *heart* of a woman of thirty years old; in this the valves of the left auricle were joined and cemented together, and left only a very ſmall aperture formed in the middle of the plane made by their re-union; the blood coming from the lungs into this auricle, could not without a very great and unnatural difficulty, paſs thence into the ventricle; and the auricle compelled by this to extend itſelf to contain a large quantity of blood, was become much larger than it ought to have been in its natural ſtate. In different parts of the united valves there appeared ſeveral little points where an oſſification was begun; the woman died phthiſical, nor could it be otherwiſe, ſince the lungs could not but be affected by the difficulty with which the blood entered into the left ventricle of the *heart*: and the gentleman who gave the account obſerved, that this was no ſingle inſtance of a caſe of this kind, but that he had met with ſeveral ſuch, particularly one in the right auricle of the *heart* of a girl of fourteen. Another inſtance of a remarkable diſtemperature of the *heart* is given by Mr. Du-Fay of the ſame academy: a man who had lived to thirty-four in very good health, became at this age very ſubject to the vapours, but the complaint increaſed to no particularly violent degree for the ſpace of eighteen years, but at this time he perceived a palpitation of the *heart* to join with the other ſymptoms, and this held him to the time of his death, which was two years afterwards. Mem. Acad. Scien. Paris, 1735.

Theſe palpitations, which were ſlight at firſt, became afterwards ſo ſtrong, that they communicated their motion to the ſides, and might be ſeen through the patient's cloaths even when he was dreſſed; if the hand were applied to the region of the *heart*, it was perceived to move very forcibly, and the arteries all partook of the diſorder, while the veins were all conſiderably ſwelled in the upper parts; in the latter part of his life he became dropſical, his legs ſwelling violently. On opening his body, the cavities of the breaſt and belly were found to be full of water, the lungs were ſound, but conſiderably waſted; the liver and ſpleen ſomewhat larger than ordinary, and the pancreas very large, and very hard and ſchirrous; the *heart* weighed above two pounds, and was ſo large that it threw the left lobe of the lungs towards the upper part of the breaſt; it meaſured fifteen inches round at the baſe, and the two ventricles were full of blood, the right was nearly of its natural ſize, but the left, which ought to be ſmaller than that, was ſo dilated as to be vaſtly larger, though its ſides had not at all loſt their thickneſs; the pericardium was ſomewhat thicker than ordinary, and was nicely applied to the *heart*, but had on one ſide a tumor of the ſize of an egg, full of blood; the aorta was oſſified at the place where it goes out of the left ventricle. Mr. Du-Fay eſteems this caſe to have been an extraordinary aneuriſm of the left ventricle of the *heart*, a caſe ſeldom heard of. Another ſcarce leſs memorable inſtance there is in the Memoirs of the ſame academy, which proves that wounds of the *heart* are not always ſo immediately mortal as is generally ſuppoſed: the caſe is this, a ſoldier was brought into one of the hoſpitals with a wound made by a ſword in the upper part of the left breaſt; he ſeemed very well for three days, but on the fourth he was taken with a fever and difficulty of reſpiration, and in fine died on the tenth day. On opening the body it was found that the ſword had pierced the pericardium, traverſed the right ventricle of the *heart* in its lower part, and near the point, and pierced the pericardium on the oppoſite ſide, and gone through the diaphragm, and an inch deep into the liver; there was much blood found in the pericardium, a little clot of congealed blood in the wound in the *heart*, and a quantity of purulent water on each ſide of the breaſt.

We have an account of a child which lived ſeveral days, yet upon diſſection its *heart* was found without a pericardium, and turned upſide down, ſo that its baſis, with all the veſſels, had fallen down as low as the navel, and its apex ſtill on the left ſide lay hid between the two lungs. See Phil. Tranſ. N° 461. ſect. 7.

Mr. Boyle tells us of a kind of fiſh on the coaſt of Ireland, about the ſize of mackrel, the *heart* of which was inverted, the baſis lying towards the tail, with the mucro pointing to the head, and adhering to the aorta.

Some creatures are known to live a conſiderable time after their *hearts* are taken out: Mr. Boyle mentions frogs ſwimming in this condition, and living above an hour; and the *heart* of an animal often gives ſigns of life after exſection. The ſame author mentions the *heart* of a chicken unhatched, but perfectly formed, which continued to beat above an hour after the head and breaſtbone were clipt of to diſcloſe it; and when the *heart* was dead to appearance, it might be excited to freſh motion by puncture; the motion was alſo again excited by placing the part in the ſteam of warm water, and thus the *heart* was kept beating for two hours and a half. See Boyle's Works abridg. vol. i. p. 28.

The *heart* is a ſolitary muſcle of very great ſtrength, and the intercoſtal muſcles and diaphragm, which likewiſe have no antagoniſts, are a vaſt additional force, which muſt be balanced by the contrary action of ſome equivalent power or other; for though the action of the intercoſtal muſcles be voluntary, it does not exempt them from the condition of all other muſcles ſerving for voluntary motion, which would be in a ſtate of perpetual contraction, notwithſtanding any influence of the will, if it were not for the libration of antagoniſt muſcles. This libration, between other muſcles, is anſwered by the weight of the incumbent atmoſphere, which preſſes upon the thorax and other parts of the body; as in all other voluntary motions, the influence of the will only gives a prevalence to one of two powers before equiliberated; ſo here it ſerves to enable thoſe muſcles to lift a weight too ponderous for their ſtrength not ſo aſſiſted: ſo that as ſoon as that aſſiſtance is withdrawn, the ribs are again depreſſed by the mere gravitation of the atmoſphere, which would otherwiſe remain elevated through the natural tendency of thoſe muſcles to contraction: this is evidently proved from the Torricellian experiment, and thoſe made upon animals *in vacuo*, where, as ſoon as the air is withdrawn, and the preſſure thereby taken off, the intercoſtal muſcles and diaphragm are contracted, and the ribs elevated in an inſtant, and connot by any power of the will be made to ſubſide, till the air is again let in to bear them forcibly down. As in the elevation of the ribs, the blood, by the paſſage opened for it, is in a manner ſolicited into the lungs, ſo in their depreſſion, by the ſubſidence of the lungs, and contraction of the blood-veſſels conſequently thereto, the blood is forcibly driven through the plumonary vein into the left ventricle of the *heart*; and this, together with the general compreſſion of the body by the weight of the atmoſphere which ſurrounds and preſſes on its whole ſurface, is that power which cauſes the blood to mount in the veins, after the force impreſſed upon it by the *heart* is broken and ſpent, and which ſuffices to force the *heart* from its natural ſtate to dilatation.

Upon computing the weight of a column of air equal to the ſurface of the body, it appears a power ſufficient for the effects here aſcribed to it, and conſidering that the bodies of animals are compreſſible machines, it appears that it muſt of neceſſity affect them in the manner here laid down; and yet though our bodies be entirely compoſed of tubuli, or veſſels filled with fluids, this preſſure how great ſoever, being equal every way, could not affect them, were it not that the ſuperficial dimenſions are equally variable: becauſe, being compreſſed on all parts with the ſame degree of force, the contained fluids could not any-where begin to recede, and make way for the reſt to follow, but would remain as fixed and immoveable as if they were actually ſolid.

But, by the dilatation of the thorax, room is made for the fluids to move, and by the coarctation of it, freſh motion is impreſſed; which is the great ſpring whereby the circulation is ſet and kept going.

This reciprocal dilatation and contraction of the ſuperficial dimenſions of the body ſeem ſo neceſſary to animal life, that there is not any animal ſo imperfect as to want them, at leaſt none to which our anatomical inquiries have yet reached; for though moſt kinds of fiſh, and inſects, want both moveable ribs and lungs, and conſequently have no dilatable thorax, yet that defect is ſupplied by an analogous mechaniſm, anſwering ſufficiently the neceſſities of their life. Thus fiſhes, which have no lungs, have gills to do the office of lungs, receiving and expelling alternately the water, whereby the blood-veſſels ſuffer the ſame alteration of dimenſions as in the lungs of more perfect animals.

Add that the lungs, or air-veſſels, of inſects are much more different from thoſe of perfect animals, than thoſe of fiſhes are, and yet in their action and uſe, they agree perfectly with both; that is, removing and expelling the air, and varying the dimenſions and capacities of the blood-veſſels; having no thorax, or ſeparate cavity for the *heart* and air-veſſels, the latter are diſtributed through the whole trunk, by which they communicate with the external air through ſeveral ſpiracles or vent-holes, to which are fitted ſo many little tracheæ or wind-pipes, which thence ſend their branches to all the muſcles and viſcera, and ſeem to accompany the blood-veſſels all over the body, as they do in the lungs of perfect animals; by this diſpoſition, in every inſpiration the whole body is inflated, and in every exſpiration compreſſed, and conſequently the blood-veſſels muſt ſuffer a viciſſitude of extenſion and contraction, and a greater motion be thereby impreſſed on the contained fluids than the *heart*, which in theſe creatures does not appear to be muſcular, would be capable of giving. The only animal exempted from this neceſſary condition of receiving and expelling alternately ſome fluid in and out of the body is a FOETUS; but this, while included in the womb, ſeems to have little more than a vegetative life, and ought ſcarce to be reckoned among the number of animals; and were it not for that ſmall ſhare of muſcular motion which it exerciſes in the womb, it might without abſurdity, be accounted a graft upon, or branch of, the mother.

One difficulty we muſt not here conceal, which will lie againſt the whole doctrine, viz. that the *hearts* of ſeveral animals have been found to beat regularly, and ſtrongly, even *in vacuo*, not leſs ſo than in the air. Witneſs the *hearts* of frogs, tried by Mr. Boyle. Phil. Tranſ. Nº 62.

Dr. Keill objects to this hypotheſis; alledging, that the preſſure of the atmoſphere on the ſurface of our bodies cannot ſupply the place of antagoniſt muſcles, becauſe the air within us is always in equilibrio with the external air, and conſequently the preſſure of the atmoſphere can neither promote nor retard the contraction of the thorax, or the dilatation of the *heart*; and he aſcribes their alternate contraction and dilatation to the influx of the blood or animal ſpirits. Anat. p. 133. edit. 1759.

Albert Haller, M. D. aſcribes the motion of the *heart* to a ſtimulus impreſſed upon it by the blood; in proof of this he urges, that the right auricle and ventricle do perſevere longer in a ſtate of conſtriction than the left, becauſe they are longer ſtimulated by the venous blood: the fact is known, and inferred by Boerhaave from the experiments of Galen and Harvey. Dr. Haller made ſeveral experiments to prove that this was owing to the afflux of the venous blood: he contrived to exclude the blood from the right ventricle and auricle, and to hinder it from quitting the left ventricle; and thus by retaining the ſtimulus, he cauſed the motion of the left ventricle to ſubſiſt, and thence inferred that the motion of the *heart* depends upon the ſtimulus of the blood: for this purpoſe, after cutting the veins of cats and kids, which were the animals he uſed, he opened the pulmonary artery, in order perfectly to empty the right ventricle of its blood, keeping the left ventricle full by a ſtrong ligature on the aorta; he then found that the right ventricle was at reſt, and that the left and its auricle were in motion; according to this proceſs the part which kept longeſt alive, which is commonly the right auricle, was now the left ventricle, that being the longeſt kept ſtimulated by the blood. Mem. Acad. Sc. Gottingen, vol. i.

HEART, *eſtimate of the force of the*. The quantity of the force of the *heart* has been variouſly eſtimated, and on various principles, by various authors, particularly Borelli, Morland, Keill, Jurin, &c.

The force of the *heart* may be defined by the motion wherewith the *heart* contracts, or by the motion of a weight which being oppoſed to the blood at its exit out of the *heart*, will juſt balance and ſtop the ſame; this we have no way of coming at *à priori*; the internal ſtructure of the part, and the nature and power of the contracting cauſe, being but imperfectly known; ſo that the only means remaining is, to eſtimate it by the effects.

All the action of the *heart* conſiſts in the contraction of its ventricles; the ventricles contracting, ſtrike or preſs upon the blood, and communicating part of their motion thereto, drive it out with vehemence where the paſſage is open: the blood thus protruded into the aorta and pulmonary artery, preſſes every way, partly againſt the coats of the arteries, which by the laſt diaſtole had been left in a collapſed, flaccid ſtate; and partly againſt the anterior blood moving on too ſlowly before it: by ſuch means the coats of the arteries are gradually diſtended, and the antecedent blood has its motions accelerated.

By the way it may be obſerved, that the more flaccid the arteries are, the leſs reſiſtance they will make to a dilatation; and the more they are dilated the more ſtrongly will they reſiſt a farther diſtraction: ſo that the force of the blood, at its egreſs out of the *heart*, is at firſt ſpent in diſtending the arteries more than in protruding the antecedent blood, but afterwards more in protruding the blood than in diſtending the arteries.

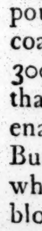
Borelli, in his Oecon. Animal. makes the obſtacle to the motion of the blood through the arteries, equivalent to 180,000 pounds; and the force of the *heart* itſelf only equal to 3000 pounds, which is only one ſixtieth of the oppoſition it has to overcome: then deducting 45,000 pounds for the adventitious help of the muſcular elaſtic coat of the arteries, he leaves the *heart* with a force of 3000 pounds to overcome a reſiſtance of 135,000 pounds, that is, with 1 to remove 45; which he ſuppoſes it enabled to do by virtue of percuſſion. See DIASTOLE.

But if he had proceeded in his calculation to the veins, which he allows to contain quadruple the quantity of blood found in the arteries, and to which this energy of percuſſion either does not reach at all, or but very languidly, he would readily have ſeen the ſyſtem of percuſſion to be inſufficient.

But his calculus itſelf is alſo found to be faulty; the force aſcribed by him to the *heart* being immenſely too great. Dr. Jurin ſhews, that if he had not made a miſtake in the computation, the reſiſtance which the *heart* has to overcome, muſt have come out, on his own principles, much greater; and, inſtead of 135,000 pounds, would have been 1,076,000 pounds, which tranſcends all probability.

The great faults in his ſolution conſiſt, according to Dr. Jurin, in his eſtimating the motive force of the *heart* by a pondus at reſt, in ſuppoſing the whole weight ſuſtained by a muſcle, in one of his experiments, to be ſuſtained wholly by the contracting force thereof; in aſſuming muſcles equally heavy to be of equal force, and in ſuppoſing the utmoſt force of the *heart* exerted at every ſyſtole.

Dr. Keill, in his Eſſays on the Anim. Oecon. firſt ventured to ſet aſide Borelli's calculus, and ſubſtituted another, almoſt infinitely ſmaller in its ſtead: his method of eſtimating the force of the *heart* is as follows: having the velocity wherewith a fluid flows out at an orifice, without meeting any reſiſtance from an anterior fluid; the force which produces that motion is thus dedetermined: Let the line AB be the height from which a falling body will acquire a velocity equal to that wherewith the fluid flows out at the orifice; then is the force, which produces the motion of this fluid, equal to the weight of a cylinder of the ſame fluid, whoſe baſe is equal to the orifice, and weight equal 2 AB. Corol. 2 Prop. 36. lib. ii. Newton. Princip.



Now the blood flowing out of the *heart* is reſiſted, in its motion, by the anterior blood in the arteries and veins, and therefore cannot flow with all the velocity which the force of the *heart* will give it, part of that force being ſpent in overcoming the reſiſtance of the maſs of blood; if, therefore, we knew how much the velocity of the blood is diminiſhed by this reſiſtance, or what proportion the velocity of the blood reſiſted has to the blood driven out, and not reſiſted; having already determined the velocity of the blood as it is reſiſted, we might eaſily collect the velocity by which the blood would flow were it not reſiſted; and from thence find the abſolute force of the *heart*. To find this, the author made the following experiment: having uncovered the iliac artery and vein in the thigh of a dog, near his body, and paſſed convenient ligatures under them, he opened the whole diameter of the vein, and receiving the blood which run from it in the ſpace of ten ſeconds; the ſame was afterwards done by the artery for the ſame ſpace of time, and both the quantities of the blood were exactly weighed: the experiment was repeated for the greater ſecurity, till the quantity of blood from the artery was found, at a medium to that of the vein, in the ſame ſpace of time, nearly as $7\frac{1}{2}$ to 3.

Now the velocity of the blood in the iliac artery, ſo near the aorta, muſt be nearly the ſame with that in the aorta itſelf; and conſequently the velocity with which it flows out of the iliac artery cut aſunder, is the ſame with which it would flow out of the *heart* unreſiſted, or the blood runs through a wound in the iliac artery with all the velocity it received from the *heart*: now all the blood which runs along the iliac artery returns again by the iliac vein; and conſequently the quantities of blood which paſs through both in the ſame ſpace of time are equal; the quantity of blood, therefore, which runs out of the iliac vein cut aſunder, is the ſame which ran through the iliac artery before it was cut, in that ſpace of time: having therefore the quantity which runs through the iliac artery when it is cut and when it is not cut, we have their velocities; for the velocity of a fluid running through the ſame canal in equal ſpaces of time, is directly as their quantities; but the velocity of the blood when the artery is cut, is equal to that it receives by the full force of the *heart*, and the velocity when it is not cut, is that velocity with which the blood moves through the aorta, reſiſted by the anterior blood, and therefore theſe two velocities are to one another as $7\frac{1}{2}$ to 3.

If now the *heart* throws out two ounces of blood every ſyſtole, which is a probable aſſumption, then the blood moves through the aorta at the rate of 156 feet in a minute; and therefore the abſolute velocity wherewith the blood would be forced into the aorta, if it found no reſiſtance, is ſuch as would make it move 390 feet in a minute, or $6\frac{1}{2}$ feet in a ſecond.

We now proceed to inquire, what is the height from which a falling body will acquire this given velocity? for this height doubled, gives the length of the cylinder whoſe baſe is equal to the orifice of the aorta, and weight equal to the abſolute force of the *heart*.

It is known by experiment, that the force of gravity will make a body move 30 feet in a ſecond, which is the velocity it acquires in falling through 15 feet; and therefore this velocity is to the velocity of the blood flowing without reſiſtance into the aorta as 30 to 6.5: but becauſe the heights from which bodies acquire given velocities, are as the ſquares of the velocities, that is, as 900 to 42.25; therefore as 900 to 42.25, ſo is 15 to 0.74. This height doubled, gives 1.48, or in inches 17.76, which is the height of a cylinder of blood, whoſe baſe is equal to the aorta, which we have ſuppoſed to be equal to 0.4187, and therefore the ſolid content is 7.436112, the weight of which is equal to the abſolute force of the *heart*.

This weight is five ounces, whence the force of the *heart* is found equal only to the weight of five ounces.

Dr. Keill, in his Anatomy Abridged, p. 137, &c. ſuppoſes that the ventricles of the *heart* throw out at leaſt one ounce of blood in each ſyſtole; and, if the *heart* contracts 4000 times in an hour, there will paſs through the *heart* every hour 4000 ounces, or 250 ℔ weight of blood: and, ſtating the whole maſs of blood to be 25 ℔, a quantity equal to this paſſes through the *heart* 10 times in an hour, or about once in ſix minutes. If the *heart* contracts 80 times in a minute, then 25 ℔ weight of blood paſſes through its ventricles once in five minutes. According to this eſtimate, the left ventricle of the *heart* throws out in each ſyſtole one ounce, or 1.638 cubic inches of blood, and the area of the orifice of the aorta being = 0.4187; then, dividing the former by this, the quotient 3.9 will be the length of the cylinder of blood, which is formed in paſſing through the aorta in each ſyſtole; and, allowing the number of pulſes in a minute to be 75, in 75 pulſes a cylinder of 292.5 inches will paſs, or the blood will move at the rate of 1462 feet in an hour: but the ſyſtole of the *heart* being performed in one third of the time of a pulſation, the velocity of the blood in that inſtant will be thrice as much; viz. at the rate of 4386 feet in an hour, or 73 feet in a minute. The quantity of blood thrown out in 75 pulſes will be equal to 4.4 ℔ 11 oz. and in 34 minutes a quantity equal to a middle-ſized man, viz. 158 ℔ will paſs through the *heart*. But if, with Dr. Harvey and Dr. Lower, we ſuppoſe two ounces of blood, i. e. 3.276 cubic inches, to be thrown out at each ſyſtole, then the velocity of the blood in entering the orifice of the aorta will be double the former, viz. at the rate of 146 feet in a minute, and a quantity of blood equal to the weight of a man's body will paſs in half the time, viz. 17 minutes. Hale's Stat. Eſſ. vol. ii. p. 39.

Dr. Keill has farther demonſtrated, that the greateſt velocity of the blood is to the leaſt as 5233 to 1, or that it moves 5233 times ſlower in ſome capillary arteries than it does in the aorta, ſuppoſing that it has a free and unembarraſſed courſe through theſe arteries; which is very far from being the caſe, becauſe the principal obſtruction to the progreſs of the arterial blood is in the capillary arteries, as Dr. Hales has ſhewn, vol. ii. p. 48, &c. and ſince the velocity of the blood at its paſſing from the *heart* to the aorta is at the rate of 146 feet in a minute, taking one third of that for its continued equable velocity, according to Dr. Keill's eſtimate, it would move but 0.1128 inch in a minute, in the evaneſcent arteries, in that time.

The number of extreme capillary arteries eſtimated by Dr. Hales, on the ſuppoſition that one ounce of blood be thrown out at each ſyſtole, is 4109723; and, on the ſuppoſition that two ounces of blood are thrown out at each ſyſtole, their number will be 8219446. From the arteries the blood is received into the veins; and, if the number of arteries be to that of the veins as 324 to 441, Dr. Keill concludes, that the blood moves in the veins above 7116 times ſlower than it does in the aorta.

The ſame author, by another method of calculating from the laws of projectiles, finds the force of the *heart* almoſt equal to eight ounces; which, though ſomewhat more than was before determined, yet the difference is of ſmall moment in reſpect of Borelli's account, the great failing of whoſe calculation Dr. Keill takes to ariſe from his not diſtinguiſhing between the blood at reſt and the blood already in motion. The force of the *heart*, it is certain, is not employed in giving motion to any quantity of blood at reſt, but only to continue it in motion: how that motion firſt aroſe, ſeems out of the human capacity to determine. It is demonſtrable, that if the reſiſtance of the blood always bore the ſame proportion to the force of the *heart* it now does, the blood never could be firſt put in motion by the heart. if the blood conſtantly moved forwards, with the motion firſt communicated to it, and did the coats of the veſſels make no reſiſtance, the poſterior blood would not be retarded by the anterior, and the force of the blood would equal the entire force of the mover; but becauſe of the reſiſtance made by the coats of the blood-veſſels, and the force which is ſpent in diſtending them, the blood is continually retarded in its motion as it circulates, and would in a ſhort time ſtop, were not the motion loſt made up again by a freſh impulſe from the *heart*; and, therefore, the force of the *heart* muſt be equal to the reſiſtance the blood meets with in its motion: if it were more, the velocity of the blood would be continually increaſing; if leſs, it would continually decreaſe, and at laſt ſtop. And hence it is evident, that if the circulation of the blood was once ſtopped, all the force of the *heart* could never ſet it moving again.

Thus much for Dr. Keill's ſyſtem. Dr. Jurin charge even this with its defects; and, particularly, in that i ſuppoſes the weight, whereby the motion of water running out of a veſſel may be generated, to be what generates that motion, which this laſt author takes for a mi apprehenſion of Sir Iſaac Newton's corollary, urging that the water falling by the power of gravity, acquire its motion of itſelf, and that the weight falling the ſam time, only receives a motion equal to that of the wate out of the veſſel. There are ſome other points which h objects againſt, and of which the learned author has a expreſs vindication in the Philoſophical Tranſactions; t which his antagoniſt has ſince replied; but the autho dying in the mean time, the diſpute ceaſed.

Dr. Jurin, however, proceeds to give another computation, on more unexceptionable principles; though hi adverſary has found occaſion therein for recrimination. He conſiders one of the ventricles of the *heart* impelli the blood, as a given body impelling another at reſt, wit a given velocity, and, after communicating part of i motion thereto, proceeding with the ſame common v locity; on which principle, the force of the *heart* wi eithe either be equal to the factum of the weight of the ventricle and its initial velocity before it impels the blood, or to the ſum of the motions of the ventricle, and the blood flowing out of the ſame, and the motion communicated to the coats of the arteries and the antecedent blood. Now it is demonſtrable, 1. That the motion whereby a hollow machine, unequally contractile, does act in contraction, is equal to the ſum of the factums of the ſeveral particles of the machine multiplied into their ſeveral velocities. Whence it follows, that the motion of the machine is equal to the factum of its weight into ſome mean velocity between the particles moved ſwifteſt, and thoſe moved ſloweſt. 2. That if the water be expreſſed out of the orifice of ſuch a machine, the motion of the water burſting out of the ſame will be equal to the ſum of the facta of any tranſverſe ſections of all the threads of water, ſeverally multiplied into their reſpective lengths and velocities: whence it follows, that the motion of the water is equal to the factum of the water iſſuing out at the orifice into ſome mean length between that of the longeſt thread and the ſhorteſt. Hence, alſo, if there be ſeveral ſuch machines full of water, and contracted alike, whether equally, or unequally, the motion of the water, burſting out at the orifice of one of them, will be in a ratio compounded of the quadruple ratio of any homologous diameter of the machine, and the reciprocal ratio of the time wherein the contraction is effected.

From theſe data is drawn a ſolution of the problem, *To find the force of the* heart. For, calling the weight of the left ventricle, or the quantity of blood equal to the ſame, p; the inner ſurface of the ventricle, S; the mean length of the filaments, or threads, of blood expelled from the ſame, l; a ſection of the aorta, s; the quantity of blood contained in the left ventricle, q; the time wherein the blood would be thrown out of the *heart,* were the reſiſtance of the arteries and antecedent blood removed, t; the variable velocity wherewith the blood would flow through the aorta, if the reſiſtance were taken away, v; the variable length of the aorta, paſſed over by the blood, x; and the time wherein the length x is run, z. The mean variable velocity of the blood contiguous to the ventricle, or the mean velocity of the ventricle itſelf, will be $= \frac{sv}{S}$; the motion of the ventricle, $= p \times \frac{sv}{S}$; the motion of the blood iſſuing out, $= sv \times \overline{l + x}$; and their ſum, or force of the ventricle, $= sv \times \overline{\frac{p}{S} + l + x}$. But, $v = \frac{\dot{x}}{\dot{z}}$; whence, by the inverſe method of fluxions, the force of the ventricle is found $= \frac{sx}{z} \times \overline{\frac{p}{S} + \frac{x}{2} + l}$. But ſince $z = t$, $\underline{sx = q}$. And hence, the force of the ventricle $= \frac{q}{t} \times \frac{p}{S} + \frac{q}{2s} + l$. After the like manner, the force of the right ventricle (noting the ſame things by Greek letters, which in the left are denoted by Italic ones) is found $= \frac{q}{t} \times \overline{\frac{\pi}{\Sigma} + \frac{q}{2\sigma} + \lambda}$. So that the whole force of the *heart* is $= \frac{q}{t} \times \overline{\frac{p}{S} + \frac{\pi}{\Sigma} + \frac{q}{2S} + \frac{q}{2\sigma} + l + \lambda}$. *Q. E. J.*

If now we ſuppoſe $p = 8$ ounces, and $\pi = 4$ ounces avoird. $S = 10$ ſquare inches, and $\Sigma =$ to as much; $l = 2$; and $\lambda = 1\frac{1}{2}$ inches; $q = 2$ ounces avoird. $s = 0.4185$ ſquare inches, $\sigma = 0.583$; and $t = 0.\ 1''$; the forces of the ventricles will be equal to the weights under-written; viz.

			℔	oz.
Of the left ventricle	-	-	9	1
Of the right ventricle	-	-	6	3
Force of the whole *heart*		-	15	4

Which weights have a velocity, wherewith they would move an inch each ſecond of a minute.

Corol. Hence it is inferred, that when the pulſe is quicker than ordinary, either the reſiſtance is leſs than ordinary, or the force of the *heart* is increaſed, or a leſs quantity of blood than uſual is expelled at each contraction of the *heart*; and *vice verſâ.* As alſo, that if the reſiſtance be either increaſed or diminiſhed, either the pulſe or the quantity of blood expelled at each contraction, will be either increaſed or diminiſhed reſpectively. And that if the force of the *heart* be increaſed, or diminiſhed, either the pulſe muſt be accelerated, or the reſiſtance diminiſhed.

On theſe principles Dr. Jurin proceeds to demonſtrate the three following theorems:

1. That the whole motion of reſiſtance made to the blood iſſuing out of the *heart* in the ſyſtole, or the whole motion communicated to the antecedent blood, and the coats of the arteries, is equal to the whole force of the *heart*, *quam proximè.*

2. That the motion communicated to the antecedent blood in a ſyſtole, is to the motion communicated to the coats of the arteries, as the time of the ſyſtole is to the time of the diaſtole.

Whence, if, with Dr. Keill, we ſuppoſe the ſyſtole performed in one third of the interval between two pulſes, the motion communicated to the antecedent blood will be one third of the whole motion of the *heart*; and that communicated to the arteries, two thirds.

3 In different animals, the force of the *heart* is in a ratio compounded of the quadruple ratio of the diameter of any homologous veſſel, and the inverſe ratio of the time wherein the *heart* is contracted; or a ratio compounded of the ratio of the weight either of the *heart*, or the whole animal, the ſubtriplicate ratio of the ſame weight, and the reciprocal ratio of the time. Phil. Tranſ. abr. vol. v. p. 231. 249, &c.

We ſhall cloſe this article with a table exhibiting the reſult of many experiments made by Dr. Hales, with a view of determining the velocity of the blood in different animals, &c. The apparatus for theſe experiments is very ſimple: it conſiſts of a braſs pipe, about one ſixth of an inch in diameter, to which, by means of another braſs pipe fitly adapted to it, is fixed a glaſs tube of the ſame diameter, and about nine feet in length; theſe pipes are properly graduated, and the braſs pipe is inſerted into the arteries, &c. of the animals that are the ſubjects of the author's experiments.

The ſeveral animals.	Weight of each.		Height of the blood in the tube from jugul.		Height of the blood in tubes fixed to arteries.		Capacity of the left ventricle of the heart.	Area of the orifi of the aorta.	Velocity of the blood in the aorta.	Quantities of blood = to the weight of the animal in what time	How much in a minute.	Weight of the blood ſuſtained by the left ventricle contracting.	Number of pulſes in a minute	Area of the tranſverſe ſection of deſcending aorta.	Area of the tranſverſe ſection of aſcending aorta.	
	Pd.	Ou.	Inches.		Feet	Inch	Cubick inches.	Square inches.	Feet Inch in a minute.	Minutes.	Pounds.	Pounds.		Square inches.	Square inches.	
Man		160	On ſtraining		7	6	1.659	0.4187	56.55	34.18	4.38	51.5	75			
Horſe 1ſt					8	3	3.318		113. 3	17.6	9.36					
2d					9	8										
3d		825	12	52	9	6	10	1.036	86.85	60	13.75	113.22	36	0.677	0.369	
Ox		1600					12.5	1.539	76.95	88	18.14		38	0.912	0.85	
															Ri.	Left.
Sheep		91	5½	9	6	5½	1.85	0.1[illegible]2	174. 5	20	4.593	36.56	65	0.094	0 07	0.012
Doe					4	2	9	0.476						0.385	0.246	
															Ri.	Left.
Dogs 1ſt		52	0	6	6	8	1.172	0.196	144.77	11.9	434	33.61	97	0.106	0.041	0.034
2d		24	5	7	2	8	1	0.185	130. 9	6.48	3.7			0.102	0.031	0.009
3d		18	5		4	8	0.633	0.118	130	7.8	2.3	19.8		0.07	0.022	0.009
4	12	8	4		3	3	0.5	0.101	120	6.7	1.85	11.1		0.061	0.015	0.007
5			4	6	at crural arter.		1.25	0.210	144.28					0.119	0.7	0.031
6		31						0.196						0.125	0.062	0.031
7		43			6	8	1.172	0.179	156.59	9.9	4.34			0,109	0.053	0.032
8					6	6	Tube fixed to the crural artery.									
9			7	14	3	1										
10		15	5	24	1	6	was very old, and died ſoon.									
11		37	8½		4	9										
12		36			6	7										
13		24	6	9½	4	11	Tube fixed laterally to the left carotide artery.									
14	37	8			5	8										
15			5	19	on ſucking at the tube.											
16			5½	8	on ſucking.											
17		19	5	14	5	2										
18		35	5		4	7										
19		32	6	9½	3	11										
20		23	5	7	4	10										

It does not appear, that, by comparing the weights of theſe animals, and the ſeveral quantities of blood which paſs through their *hearts* in a given time, that any fixed rule can be thence formed for proportioning the quantities of flowing blood to their different ſizes. Theſe quantities in larger animals are very diſproportionate to the bulk of their bodies, in compariſon with thoſe in leſſer animals. But as the blood has a longer courſe, and conſequently a greater reſiſtance in the former, it appears by the table, by comparing the perpendicular heights of the blood in the tubes affixed to the arteries, that the force of it in the arteries, is, in the main, greateſt in the largeſt animals. And if the blood-veſſels in the man and horſe are equally diſtributed in all their homologous parts, or if they are proportionable to their reſpective weights, then the blood muſt move in them reciprocally as the times, in which quantities of blood equal to their reſpective weights paſs through their *hearts*, viz. as 60 to 17 minutes; and, therefore, though the arterial blood of a horſe is propelled with a greater force than that of a man, yet it moves ſlower in the horſe, on account of a greater number of ramifications, and a greater length of veſſels in the larger animal. See a variety of curious experiments and obſervations on this ſubject, in Hales's Statical Eſſays, vol. ii.

HEART *of fiſh*. The *heart* in fiſhes is ſituated a little below the gills. It is uſually contained in an extremely thin membrane by way of pericardium, and placed in a large cavity. The *heart* in the ſeveral kinds of fiſhes is of many different figures. 1. In ſome it is quadrilateral; of this we ſee inſtances in moſt of the common fiſh. 2. In ſome it is of a ſemicircular figure, but a little flatted, as in the cyprini. 3. Its ſituation is generally tranſverſe with reſpect to the head, but not always ſo. In the cetaceous fiſhes the *heart* has two ventricles, as in land animals: but in all other fiſhes, that is, in all that have gills and not lungs, it has but one cavity. The *heart* in all fiſh has only one auricle; this is very large, and is always placed on the left ſide of the *heart*: at the place of the inſertion of this auricle, there are two valves, the one an upper, the other a lower one. The auricle in its lower part contains the receptacle of the veins, and this has alſo, at its inſertion into the auricle, two valves.

The aorta, or great artery in fiſhes, adheres to the upper part or baſe of the *heart* by a ginglymus. Its firſt part, or that next the *heart*, is ſmall, and contains two ſigmoide valves. Soon after this it is dilated into a large cavity, which is whitiſh on the outſide, and within is ſupported by ſeveral carneous fibres, forming a ſort of columns. From this part the artery is formed into a ſort of cave, and thence is carried to the gills; it gives one great branch to the hollow of each gill, that is, four to each ſide; and each of theſe large branches is again, a little beyond its inſertion into the hollow part of the bow of each gill, divided into four other branches, which running along the baſe of the lamellæ, are divided finally into as many branches as there are lamellæ, each receiving one; theſe are carried to the extremity of the lamellæ, and there loſt; but the blood returns by as many veins, and is thence diſtributed throughout the whole body. In the margin of every lamina in the leaves of the branchiæ, or gills, there is a vein which diſcharges the blood it receives from the arteries of theſe parts into a trunk, which runs over the ſurface of every arch or bow of the gills; and in fine, every vein coming from all the bony circles of the gills, is by degrees, ſome higher and ſome lower, inſerted into one common trunk. This grand trunk of the vein runs along the ſpine, and performs the office of the deſcending trunk of the aorta in land animals, and diſtributes the blood to every part of the body of the fiſh. The trunks of the lower part of each bony circle take this courſe; but thoſe of the upper part are carried up to the brain and organs of ſenſation, and are returned thence by other branches, which join theſe lower trunks. Theſe veins when thus joined, are carried to the origin of the gills, and there are diſcharged into another trunk lying upon the aorta, which is opened into the receptacle of Du Verney. This receptacle is no other than a venoſe trunk formed by the meeting of ſeveral veins coming from the ſpine, from the liver, and other parts, and terminating in the auricle. Thus is the circulation in fiſh carried on in a very different manner from that in land animals; and the gills ſerve to offices little thought of by many authors. Artedi's Ichthyolog.

HEART *of inſects*. It is eaſy to diſcover that many inſects have a true and regular *heart*; nor is this any where more beautifully diſtinguiſhable than in the claſs of flies; the ſmall ones, and thoſe of tranſparent bodies, are to be choſen indeed for this examination, the larger and more opake being wholly improper for it. None is more eligible on this occaſion than the little fly produced of the puceron eater; this is a very pale yellowiſh fly of a flat body, and ſo perfectly tranſparent, that examined in a proper manner, its internal parts are ſeen as clearly as if they were in a white glaſs veſſel.

One of theſe little flies is to be taken ſoftly by the head between the fingers; the wings are to be bent backward, and held with the head, the body inverted and held up againſt a ſtrong light, and the belly then examined with the help of a magnifying glaſs. This examination will convince any one that flies have a real *heart*; they have not a long veſſel only, in the place of one running lengthway down the back, as Malpighi thinks is the caſe in caterpillars and butterflies, but towards the middle of the ſecond ring, and ſometimes in the third, counting from the corcelet, one plainly diſcovers a part which can be taken for no other than a real *heart*. The figure of the *heart* in theſe animals varies, however, much more than in any others that we are acquainted with. Sometimes this *heart* is of the figure of a kidney placed tranſverſely, and with its hollowed part toward the corcelet, with a long veſſel running ſtraight from this hollowed part up the corcelet. At other times the hollow of the *heart* diſappears, it lengthens itſelf, and acquires the figure of a bottle, with the veſſel before deſcribed placed as its neck. Sometimes it is more, and ſometimes leſs inflated and diſtended; ſometimes the tranſverſe diameter ſurpaſſes the longitudinal, and at others the longitudinal diameter exceeds the other. At all times, however, one may ſee a regular alternative contraction and dilatation of the *heart*; and to the contraction there conſtantly ſucceeds a jet of liquor thrown into the long veſſel as if by a ſyringe; but what is very ſingular is, that after four or five of theſe jets, one always ſees the liquor before thrown up, deſcending into the *heart* again out of the corcelet, by the ſame veſſel by which it was received from the *heart*. Reaumur's Hiſt. Inſ. vol. iv. p. 261.

HEART-*burn*, a diſeaſe, among *Phyſicians*, uſually called CARDIALGIA.

In ſurfeits, or upon ſwallowing without due maſtication; when meats are eat tough and fat, or with farinaceous ſubſtances unfermented; or when by any accident the ſaliva is vitiated, too ſcanty, or not intimately mixed with the food, the fermentation becomes tumultuous, the ſtomach ſwells with air, and this extraordinary commotion being attended with an unuſual heat, brings on the uneaſineſs called the *heart-burn*; which is remedied by whatever promotes a greater ſecretion of ſaliva, or helps to mix it with our aliment. Pringle's Obſerv. on the Diſeaſes of the Army, p. 168. See DIGESTION.

The teſtaceous powders, as oyſter-ſhells, crabs-eyes, chalk, &c. are the uſual remedies for the *heart-burn*.

HEART *of a tree*, the middle part thereof, taken longitudinally, is called ſo

HEART, in the *Manege*. A horſe that works in the manege with conſtraint and reſolution, and cannot be brought to conſent to it, is ſaid to be a horſe of *two hearts*.

HEART, in *Sea Language*, is a peculiar ſort of DEAD-*eye*, ſomewhat reſembling the ſhape of a *heart*, but differing from the common dead-eyes, inaſmuch as it is only furniſhed with one large hole in the middle, whereas the common dead-eyes have always three holes. They are principally uſed to contain the laniards, by which the ſtays are extended.

HEART'*s eaſe*, in *Botany*, the name of a ſpecies of VIOLET.

It is ſaid to be good for ruptures, and the falling ſickneſs. Dict. Ruſt.

HEART-*ſhell*, *conchæ cordiformes*, in *Natural Hiſtory*, the name of a genus of ſhells, by ſome authors referred to the pectunculus or cockle kind, but by later writers juſtly diſtinguiſhed into a ſeparate genus. The characters are theſe: it is a bivalve ſhell-fiſh of a globoſe elated form, furrowed in deep lines, and in ſome ſpecies imbricated, in others prickly, never auriculated, and always expreſſing what we call the figure of a *heart*.

There are ſeveral very remarkable ſpecies of this genus. The imbricated *heart ſhell*, called by the French authors *faitage*, or roof-ſhell, from its reſembling the rafters on the top of a houſe, is a very elegant one. Another ſpecies is called the cabbage-ſhell, from the undulations in it reſembling ſome of the garden curled cabbages. To this genus alſo belong the Noah's ark ſhell. Some of theſe ſpecies of *heart-ſhells* are of a globular figure; others of a triangular ſhape; others more nearly of the ſhape of a human heart; and others again of an imbricated kind. Hiſt. Nat. Eclairc. p. 330.

HEARTH, *focus*. See FIRE, CHIMNEY, &c.

HEARTH-*money*. See CHIMNEY-*money*.

HEARTH-*ſtone*. See FIRE-*ſtone*.

HEAT, *calor*, one of the primary qualities of bodies; oppoſed to *cold*.

Heat may be defined a phyſical being, whoſe preſence is known, and its degree meaſured by the expanſion of the air, or ſpirit, or mercury, in the thermometer.

Heat in us is properly a ſenſation, excited by the action of fire: or it is the effect of fire on our organs of feeling. Hence it follows, that what we call *heat* is a particular idea, or modification of our own mind; and not any thing exiſting in that form in the body that occaſions it.

Heat is no more in the fire that burns the finger, than pain in the needle that pricks it. In effect, *heat*, in the body that gives it, is only motion; and in the mind only a particular idea or diſpoſition of the ſoul.

Heat, with reſpect to our ſenſation, or the effect produced on us by a hot body, is eſtimated by its relation to the organ of feeling; no object appearing to be hot, unleſs its *heat* exceeds that of our body: whence the ſame thing to different perſons, or at different times to the ſame perſon, ſhall appear both hot and cold.

Heat, as it exiſts in the hot body, or that which conſtitutes and denominates a body hot, and enables it to produce ſuch effects on our organ, is variouſly conſidered by the philoſophers. Some will have it a quality, others a ſubſtance, and others only a mechanical affection, viz. motion.

Ariſtotle and the Peripatetics, define *heat* a quality or accident whereby homogeneous things, i. e. things of the ſame nature and kind, are collected and gathered together; and heterogeneous ones, or things of different natures, are ſevered or diſunited. Thus, ſays he, the ſame heat which aſſociates and brings into a maſs ſeveral particles of gold before ſeparate, ſeparates the particles of two metals before mixed together. But not only the doctrine, but the very inſtance he produces, is faulty; for *heat* though continued to eternity, will never ſeparate a maſs, e. g. of gold, ſilver, and copper: and, on the contrary, if bodies of different qualities, as gold, ſilver, and copper, be put ſeparately in a veſſel over a fire; notwithſtanding all their heterogeneity, they will be mixed and congregated into a maſs thereby.

In effect, *heat* cannot be ſaid to do either this thing or that univerſally; but all its effects depend on the circumſtances of its application. Thus, to do the ſame thing in different bodies, different degrees of *heat* are required; as, to mix gold and ſilver, the heat muſt be in one degree, and to mix mercury and ſulphur, in another.

Add, that the ſame degree of *heat* ſhall have oppoſite effects. Thus a vehement fire ſhall render water, oils, ſalts, &c. volatile; and yet the ſame fire ſhall embody ſand, and fixed alkaline ſalt, into glaſs.

The Epicureans, and other corpuſcularians, define *heat* not as an accident of fire, but as an eſſential power or property thereof, the ſame in reality with it, and only diſtinguiſhed from it in the manner of our conception.

Heat, then, on their principles, is no other than the volatile ſubſtance of fire itſelf, reduced into atoms, and emitted in a continual ſtream from ignited bodies; ſo as not only to *warm* the objects within its reach, but alſo, if they be inflammable, to *kindle* them, turn them into fire, and conſpire with them to make flame.

In effect, theſe corpuſcles, ſay they, flying off from the ignited body, while yet contained within the ſphere of its flame, by their motion conſtitute fire; but when fled, or got beyond the ſame, and diſperſed every way, ſo as to eſcape the apprehenſion of the eye, and only to be perceivable by the feeling, they take the denomination of *heat*, inaſmuch as they ſtill excite in us that ſenſation.

The Carteſians, improving on this doctrine, aſſert *heat* to conſiſt in a certain motion of the inſenſible particles of a body, reſembling the motion whereby the ſeveral parts of our body are agitated by the motion of the heart and blood.

Our lateſt and beſt writers of mechanical, experimental, and chemical philoſophy, differ very conſiderably about *heat*. The fundamental difference is, whether it be a peculiar property of one certain immutable body, called *fire*; or whether it may be produced mechanically in other bodies, by inducing an alteration in the particles thereof. The former tenet, which is as ancient as Democritus, and the ſyſtem of atoms, had given way to that of the Carteſians, and other mechaniſts; but is now with great addreſs retrieved, and improved on, by ſome of the lateſt writers, particularly Homberg, the younger Lemery, s'Graveſande, and, above all, by the learned and induſtrious Boerhaave, in a courſe of lectures expreſly on *fire*; the reſult whereof we have already laid down under the article Fire.

The thing we call *fire*, according to this author, is a body ſui generis, created ſuch ab origine, unalterable in its nature and properties, and not either producible de novo, from any other body, nor capable of being reduced into any other body, or of ceaſing to be fire.

This fire, he contends, is diffuſed equally every where, and exiſts alike, or in equal quantity, in all the parts of ſpace, whether void, or poſſeſſed by bodies; but that naturally, and in itſelf, it is perfectly latent and imperceptible; and is only diſcovered by certain effects which it produces, and which are cognizable by our ſenſes.

Theſe effects are *heat*, light, colour, rarefaction, and burning, which are all indications of fire, as being none of them producible by any other cauſe: ſo that whereever we obſerve any of theſe, we may ſafely infer the action and preſence of fire. But, though the effect cannot be without the cauſe, yet the fire may remain without any of theſe effects; any, we mean, groſs enough to affect our ſenſes, or become objects thereof: and this, he adds, is the ordinary caſe; there being a concurrence of other circumſtances, which are often wanting, neceſſary to the production of ſuch ſenſible effects.

Hence, particularly, it is, that we ſometimes find ſeveral, and ſometimes all, of theſe effects of fire together, and ſometimes one unaccompanied with any others; according as the circumſtances favour or diſpoſe things for the ſame. Thus we find light without *heat*; as in rotten wood, putrid fiſhes, or the mercurial phoſphorus: nay, and one of them may be in the higheſt degree, and the other not ſenſible; as in the focus of a large burning-glaſs expoſed to the moon; where, though the light, as Dr. Hooke found, was ſufficient to have inſtantly blinded the beſt eye, yet no *heat* was perceivable, nor was there the leaſt rarefaction occaſioned in an exquiſite thermometer. See Moon and Light.

On the other hand, there may be *heat* without light, as we find in fluids, which emit no light even when they boil, and not only *heat* and rarefy, but alſo burn or conſume the parts; and in metals, ſtones, &c. which contract a vehement *heat* before they ſhine, or become ignited. Nay, and there may be the moſt intenſe *heat* in nature without any light: thus in the focus of a large burning concave, where metals melt, and the hardeſt gems vitrify, the eyes perceive no light; ſo that ſhould the hand happen to be put there, it would inſtantly be turned into a coal, or even a calx. So alſo rarefactions are frequently obſerved by the thermometer, in the night-time, without either *heat* or light, &c.

But as *heat*, when accumulated in a ſufficient quantity, is conſtantly accompanied with light, or, in other words, as fire is always produced by the increaſe of *heat*, philoſophers have generally conſidered theſe phenomena as proceeding from the ſame cauſe; and have, therefore, uſed the word fire to expreſs that unknown principle, which, when it is preſent to a certain degree, excites the ſenſation of *heat* alone, but when accumulated to a greater degree, renders itſelf obvious, both to the ſight and touch, or produces *heat*, accompanied with light; and in this ſenſe, the element of fire ſignifies the ſame thing with abſolute *heat*. See the ſequel of this article.

Thus it appears, that the effects of fire have a dependence on other concurring circumſtances; ſome more, and others leſs. One thing ſeems to be required in common to them all, viz. that the fire be collected or brought into leſs compaſs; without this, as fire is every where equably diffuſed, it could have no more effect in one place than another, but muſt either be diſpoſed to warm, burn, and ſhine, every where, or no where. Indeed, ſuch every where does amount to no where; for to have the ſame *heat*, &c. in every place, would be to have no *heat* at all; it is only the changes that we perceive; thoſe alone make the mind diſtinguiſh in its ſtate, and become conſcious of the things that diverſify it. So our bodies being equally preſſed on all ſides by the ambient air, we feel no preſſure at all; but if the preſſure be only taken off in any one part, as by laying the hand over an exhauſted receiver, we ſoon become ſenſible of the load.

This collection is performed two ways: the firſt, by directing and determining the fluctuating corpuſcles of fire into lines, or trains, called *rays*; and thus driving infinite ſucceſſions of the fiery atoms upon the ſame place or body, each to produce its ſeveral effort, and ſecond that of the preceding ones, till by a ſeries of augmentations, the effect is ſenſible. This is the office of thoſe bodies which we call *luminaries*; ſuch as the ſun, and other heavenly bodies; and alſo of our culinary fires, lamps, &c. on earth, which do not emit the fire from their own ſubſtance, as is commonly conceived, but only by their rotatory mutation direct the undermined corpuſcles into parallel rays. And the effect may ſtill be farther increaſed by a ſecond collection of theſe parallel, into converging rays, by means of a concave ſpeculum, or a convex glaſs, which at length brings them all into a point: whence thoſe aſtoniſhing effects of our large burning-glaſſes.

The ſecond way wherein the collection is made, is not by determining the vague fire, or giving it any new direction, but merely by aſſembling it; which is done by the attrition or rubbing of two bodies ſwiftly againſt each other; ſo ſwiftly, in effect, as that nothing in the air, except the floating fire, has activity enough to move an equal pace, or ſucceed faſt enough into the places continually relinquiſhed by it: by which means fire, the moſt agile body in nature, ſlipping in, becomes collected in the path of the moving body; ſo that the moveable has, as it were, a fiery atmoſphere around it. Thus it is, that the axes of chariot-wheels, mill-ſtones, the ropes of ſhips, cannon-balls, &c. conceive *heat*, and ſome of them kindle into flame.

Thus much for the circumſtance in *heat*, common to all the effects of fire, viz. collection. The particular circumſtances are various: thus, for it to warm, or to *heat*, i. e. to give the ſenſation of it, it is neceſſary that there be more fire in the *hot* body or thing, than in the organ whereby it is to be felt; otherwiſe the mind will not be put into any new ſtate upon its approach, nor have any new idea. Whence, alſo, if the contrary to this obtains, v. g. if there be leſs fire in the external object than in the organ, it will raiſe an idea of cold, or chillineſs.

Thus it is, that a man coming out of a hot bath into a moderately warm air, ſeems as if he were got into an exceſſive cold place; and another entering a room ſcarcely warm, in a very pinching day, will at firſt fancy himſelf in a ſtove. Whence it appears, that the ſenſe of *heat* does by no means determine the degree of fire; the *heat* being only the ratio or difference between the internal and external fire. As to the circumſtances neceſſary to the fire's producing LIGHT, BURNING, RAREFACTION, &c. ſee LIGHT, &c.

The mechanical philoſophers, particularly lord Bacon, Mr. Boyle, and Sir Iſaac Newton, look on *heat* in another light. They do not conceive it as an original inherent property of any particular ſort of body; but as mechanically producible in any body.

Lord Bacon, in an expreſs treatiſe De Forma Calidi, deduces, from a particular enumeration of the ſeveral phenomena and effects of *heat*,

1. That *heat* is motion: not that motion generates *heat*, or *heat* motion; though, in many caſes, this be true: but that the very thing *heat* is motion, and nothing elſe. But this motion, he ſhews, has ſeveral peculiar circumſtances, which conſtitute it *heat*.

As, 2. That it is an expanſive motion, whereby a body endeavours to dilate or ſtretch into a larger dimenſion than it had before.

3. That this expanſive motion is directed towards the circumference, and at the ſame time upwards; which appears hence, that an iron rod, being erected in the fire, will burn the hand that holds it, much ſooner than if put in laterally.

4. That this expanſive motion is not equable, and of the whole, but only of the ſmaller particles of the body; as appears from the alternate trepidation of the particles of *hot* liquors, ignited iron, &c. And laſtly, that this motion is very rapid.

Hence he defines *heat* an expanſive undulatory motion in the minute particles of the body; whereby they tend, with ſome rapidity, towards the circumference, and at the ſame time incline a little upwards.

Hence, again, he adds, that if, in any natural body you can excite a motion whereby it ſhall expand or dilate itſelf, and can ſo repreſs and direct this motion upon itſelf, as that the dilatation ſhall not proceed uniformly, but obtain in ſome parts, and be checked in others, you will generate *heat*. This doctrine, Deſcartes and his ſect adhere to with ſome little variation. According to them, *heat* conſiſts in a certain motion or agitation of the parts of a body, like to that wherewith the ſeveral parts of our body are agitated by the motion of the heart and blood.

Mr. Boyle, in a treatiſe of the Mechanical Origin of Heat and Cold, ſtrenuouſly ſupports the doctrine of the producibility of *heat*, with new obſervations and experiments: as a ſpecimen, we ſhall here give one or two.

In the production, ſays he, of *heat*, there appears nothing, on the part either of the agent or patient, but motion, and its natural effects. When a ſmith briſkly hammers a ſmall piece of iron, the metal thereby becomes exceedingly *hot*; yet there is nothing to make it ſo, except the forcible motion of the hammer impreſſing a vehement and variouſly determined agitation on the ſmall parts of the iron, which, being a cold body before, grows, by that ſuperinduced commotion of its ſmall parts, *hot*: firſt in a more looſe acceptation of the word, with regard to ſome other bodies, compared with which it was cold before; and then ſenſibly *hot*, becauſe this agitation ſurpaſſes that of the parts of our fingers; and in this inſtance oftentimes, the hammer and the anvil continue cold after the operation; which ſhews, that the *heat* acquired by the iron, was not communicated by either of thoſe implements as *heat*, but produced in it by motion great enough ſtrongly to agitate the parts of ſo ſmall a body as the piece of iron, without being able to have the like effect upon ſo much greater maſſes of metal, as the hammer and the anvil; though, if the percuſſions were often and briſkly renewed, and the hammer were ſmall, this alſo might be *heated*. Whence it is not neceſſary, that a body itſelf ſhould be *hot* to give *heat*.

If a large nail be driven by a hammer into a plank of wood, it will receive ſeveral ſtrokes on its head, before it grow *hot*; but when it is once driven to the head, a few ſtrokes ſuffice to give it a conſiderable *heat*: for while, at every blow of the hammer, the nail enters farther into the wood, the motion produced is chiefly progreſſive, and is of the whole nail tending one way; but when the motion ceaſes, the impulſe given by the ſtroke being unable to drive the nail farther on, or to break it, muſt be ſpent in making various, vehement, and inteſtine commotions of the parts among themſelves, wherein the nature of *heat* conſiſts.

That *heat*, ſay the ſame authors, is mechanically producible, appears probable from a conſideration of its nature, which ſeems principally to conſiſt in that mechanical property of matter, called *motion*; but which is here ſubject to three conditions, or modifications.

Firſt, the agitation of the parts of the body muſt be vehement: for this diſtinguiſhes the bodies ſaid to be *hot*, from thoſe which are barely fluid. Thus, the particles of water, in its natural ſtate, move ſo calmly, that we do not feel it at all warm, though it could not be a liquor, unleſs they were in a reſtleſs motion; but when water becomes actually *hot*, the motion manifeſtly and proportionably appears vehement, ſince it does not only ſtrike our organs of feeling briſkly, but ordinarily produces numerous very ſmall bubbles, melts coagulated oil caſt upon it, and affords vapours, which by their agitation aſcend into the air. And if the degree of *heat* be ſuch as to make the water boil, the agitation becomes more manifeſt by the confuſed motions, waves, noiſe, bubbles, and other obvious effects, excited therein. Thus, in a *heated* iron, the vehement agitation of its parts may be eaſily inferred from the motion, and the hiſſing noiſe it makes with the drops of water that fall from it. But though the agitation be various, as well as vehement, yet there is a third condition required to make a body *hot*; which is, that the agitated particles, or at leaſt the greateſt number of them, be ſo minute, as to be ſingly inſenſible. Were a heap of ſand to be vehemently agitated by a whirlwind, the bulk of the corpuſcles would keep their agitation from being properly *heated*, though by their numerous ſtrokes upon any man's face, and the briſk commotion of the ſpirits, which would thence enſue, they might perhaps produce that quality.

The ſecond condition is, that the determination be very various, and tend all manner of ways. This variety of determinations appears to be in hot bodies, both by ſome of the inſtances already mentioned, and eſpecially that of flame, which is a body; by the dilatation of metals when melted; and by the operations of *heat*, exerciſed by hot bodies upon others, in what poſture or ſituation ſoever the body, to be heated thereby, be applied to them: thus a coal, thoroughly kindled, will appear on all ſides red, and melt wax and kindle brimſtone, whether the body be applied to the upper, the lower, or any other part of it. Hence, if we duly attend to this notion of the nature of *heat*, it is eaſy to diſcern how it may be mechanically produced ſeveral ways; for, except in ſome few anomalous caſes, by whatever means the inſenſible parts of a body can be put into a very confuſed and vehement agitation, *heat* will be introduced into that body; and as there are ſeveral agents and operations, by which the heating motion may be excited, ſo there muſt be ſeveral mechanical ways of producing *heat*: various experiments may be reduced to almoſt each of theſe heads; chance itſelf having, in the laboratories of chemiſts, afforded ſeveral phenomena referable thereto.

This ſyſtem is farther ſupported alſo by Sir Iſaac Newton, who does not conceive fire as any particular ſpecies of body, originally endued with ſuch and ſuch properties. Fire, according to him, is only a body much ignited, i. e. heated hot, ſo as to emit light copiouſly: what elſe, ſays he, is red-hot iron than fire? and what elſe is a burning coal than red-hot wood? or flame itſelf than red-hot ſmoke? It is certain, that flame is only the volatile part of the fuel heated red-hot, i. e. ſo hot as to ſhine; and hence only ſuch bodies as are volatile, i. e. ſuch as emit a copious fume, will flame; nor will they flame longer than they have fume to burn. In diſtilling hot ſpirits, if the head of the ſtill be taken off, the aſcending vapours will catch fire from a candle, and turn into a flame. And in the ſame manner ſeveral bodies, much heated by motion, attrition, fermentation, or the like, will emit lucid fumes, which, if they be copious enough, and the *heat* ſufficiently great, will be flame: and the reaſon why fuſed metals do not flame, is the ſmallneſs of their fume; this is evident, becauſe ſpelter, which fumes moſt copiouſly, does likewiſe flame. Add, that all flaming bodies, as oil, tallow, wax, wood, pitch, ſulphur, &c. by flaming, waſte, and vaniſh into burning ſmoke.

And do not all fixed bodies, when heated beyond a certain degree, emit light, and ſhine? and is not this emiſſion performed by the vibrating motion of their parts? and do not all bodies, which abound with terreſtrial and ſulphureous parts, emit light as often as thoſe parts are ſufficiently agitated, whether that agitation be made by external fire, or by friction, or percuſſion, or putrefaction, or by any other cauſe? Thus ſea-water, in a ſtorm; quickſilver agitated in vacuo; the back of a cat, or the neck of a horſe, obliquely rubbed in a dark place; wood, fleſh, and fiſh, while they putrefy; vapours from putreſying waters, uſually called *ignes fatui*; ſtacks of moiſt hay or corn; glow-worms; amber and diamonds by rubbing; fragments of ſteel ſtruck off with a flint, &c. all emit light. Are not groſs bodies and light convertible into one another? and may not bodies receive much of their activity from the particles of light which enter their compoſition? I know no body leſs apt to ſhine than water; and yet water, by frequent diſtillations, changes into fixed earth, which, by a ſufficient *heat*, may be brought to ſhine like other bodies.

Add, that the ſun and ſtars, according to Sir Iſaac Newton's conjecture, are no other than great earths vehemently heated: for large bodies, he obſerves, preſerve their *heat* the longeſt, their parts heating one another; and why may not great, denſe, and fixed bodies, when heated beyond a certain degree, emit light ſo copiouſly, as by the emiſſion and reaction thereof, and the reflections and refractions of the rays within the pores, to grow ſtill hotter, till they arrive at ſuch a period of *heat* as is that of the ſun? Their parts alſo may be farther preſerved from fuming away, not only by their fixity, but by the vaſt weight and denſity of their atmoſpheres incumbent on them, and ſtrongly compreſſing them, and condenſing the vapours and exhalations ariſing from them. Thus we ſee, warm water, in an exhauſted receiver, ſhall boil as vehemently as the hotteſt water open to the air; the weight of the incumbent atmoſphere, in this latter caſe, keeping down the vapours, and hindering the ebullition, till it has conceived its utmoſt degree of *heat*. So, alſo, a mixture of tin and lead, put on a red-hot iron in vacuo, emits a fume and flame; but the ſame mixture in the open air, by reaſon of the incumbent atmoſphere, does not emit the leaſt ſenſible flame. Thus much for the *ſyſtem of the producibility of heat.*

On the other hand, Mr. Homberg, in his Eſſai du Souffre Principe, holds, that the chemical principle or element, SULPHUR, which is ſuppoſed one of the ſimple, primary, pre-exiſtent ingredients of all natural bodies, is real fire; and conſequently, that fire is coeval with body. Mem. de l'Acad. an. 1705.

Dr. s'Graveſande goes on much on the ſame principle: fire, according to him, enters the compoſition of all bodies, is contained in all bodies, and may be ſeparated or procured from all bodies, by rubbing them againſt each other, and thus putting their fire in motion. But fire, he adds, is by no means generated by ſuch motion. Elem. Phyſ. tom. ii. cap. 1.

A body is then only ſenſibly hot, when the degree of its *heat* exceeds that of our organs of ſenſe; ſo that there may be a lucid body, without any ſenſible *heat*; and conſequently, as *heat* is only a ſenſible quality, without any *heat* at all.

Heat, in the hot body, ſays the ſame author, is an agitation of the parts of the body, made by means of the fire contained in it; by ſuch agitation a motion is produced in our bodies, which excites the idea of *heat* in our minds: ſo that *heat*, in reſpect of us, is nothing but that idea, and in the hot body nothing but motion. If ſuch motion expel the fire in right lines, it may give us the idea of light; if in a various and irregular motion, only of *heat*.

Mr. Lemery, the younger, agrees with theſe two authors in aſſerting this abſolute and ingenerable nature of fire; but he extends it farther. Not contented to confine it as an element to bodies, he endeavours to ſhew, that it is equably diffuſed through all ſpace; that it is preſent in all places, even in the void ſpaces between the bodies, as well as in the inſenſible interſtices between their parts. Mem. de l'Acad. an. 1713. See ÆTHER.

This laſt ſentiment falls in with that of Boerhaave above delivered. It ſeems extravagant to talk of heating cold liquors with ice; yet Mr. Boyle aſſures us he has eaſily done it, by taking out of a baſon of cold water, wherein ſeveral fragments of ice were ſmimming, one piece or two which he perceived very well drenched with the liquor, and ſuddenly immerging them into a wide-mouthed glaſs of ſtrong oil of vitriol; for the menſtruum preſently mixing with the water which adhered to the ice, produced in it a briſk *heat*, ſometimes with a manifeſt ſmoke, and that ſuddenly diſſolving the contiguous parts of the ice, and thoſe the next, the whole ice was ſoon reduced to water; and the corroſive menſtruum being, by two or three ſhakes, well diſperſed through it, the whole mixture would immediately grow ſo hot, that ſometimes the containing phial could not be endured in one's hand.

Philoſophers have lately diſtinguiſhed *heat* into *abſolute* and *ſenſible*. By *abſolute heat*, which is ſynonymous with what other writers have called FIRE, they mean that power or element, which, when it is preſent to a certain degree, excites in animals the ſenſation of *heat*; and by *ſenſible heat*, the ſame power conſidered in its relation to the effects which it produces: e. gr. two bodies are ſaid to have equal quantities of ſenſible *heat*, when they produce equal effects upon the mercury in the thermometer; but as bodies of different kinds have different capacities for containing *heat*, the abſolute *heat* in ſuch bodies will be different, though the ſenſible *heat* be the ſame. Thus, a pound of water and a pound of antimony of the ſame temperature have equal ſenſible *heat*; but the former contains a much greater quantity of abſolute *heat* than the latter. It is a well-known fact, that *heat* is contained in great quantities in all bodies, when at the common temperature of the atmoſphere; and it is no leſs certain, that *heat* has a conſtant tendency to diffuſe itſelf over all bodies, till they are brought to the ſame degree of abſolute *heat*: it is alſo generally acknowleged, that, when the parts of the ſame homogeneous body have the ſame degree of ſenſible *heat*, the quantities of abſolute *heat* will be proportionable to the bulk or quantity of matter: it alſo appears, that in the ſame homogeneous bodies, if the temperatures be different, but the quantities of matter the ſame, the quantities of abſolute *heat* will be in proportion to the temperatures; and, therefore, the mercurial thermometer is an accurate meaſure of the comparative quantities of abſolute *heat*, which are communicated to the ſame homogeneous bodies, or ſeparated from them, as long as ſuch bodies continue in the ſame form.

M. De Luc has evinced, by a variety of experiments, that the expanſions of mercury between the freezing and boiling points of water correſpond preciſely to the quantities of abſolute *heat* applied, and that its contractions are proportionable to the diminution of this element within theſe limits: from hence it may alſo be inferred, that, if the mercury were to retain its fluid form, its contractions would be proportionable to the decrements of the abſolute *heat*, though the diminution were continued to the point of total privation. But the comparative quantities of abſolute *heat*, which are communicated to different bodies, or ſeparated from them, cannot be determined in a direct manner by the thermometer.

Some philoſophers have apprehended, that the quantities of abſolute *heat* in bodies are in proportion to their denſities. The celebrated Boerhaave imagined, that *heat* is equally diffuſed through all bodies, the denſeſt as well as the rareſt, and, therefore, that the quantities of *heat* in bodies are in proportion to their bulk: and, at his deſire, Fahrenheit attempted to determine the fact by experiment. For this purpoſe he took equal quantities of the ſame fluid, and gave them different degrees of *heat*, and, having mixed them intimately together, found, that the temperature of the mixture was half the exceſs of the hotter above the colder. But if this experiment be made with water and mercury, in the ſame circumſtances, the reſult will be different. Thus, if you take equal bulks of mercury and water, and give the water a greater degree of *heat* than the mercury, the heat of the mixture will always be greater than half the exceſs of the *heat* of the water above that of the mercury. If, on the other hand, the mercury be hotter than the water, the temperature of the mixture will always be leſs than half the exceſs of the *heat* of the mercury above that of the water. And, in general, if equal bulks of water and mercury, at different temperatures, be mixed together, the change, produced in the heat of the mercury, will be to that produced in the *heat* of the water as three to two; from whence it has been inferred, that the comparative quantities of the abſolute *heats* of theſe fluids are reciprocally proportionable to the changes which are produced in their ſenſible *heats*, when they are mixed together at different temperatures: this is a fact, which has been publicly taught, for ſeveral years, by Dr. Black and Dr. Irvine, in the univerſities of Edinburgh and Glaſgow. This rule, however, does not apply to thoſe ſubſtances which, in mixture, excite ſenſible *heat* by chemical action.

From the experiments and reaſoning employed by Dr. Crawford, a late ingenious and much-approved writer on this ſubject, it follows, that equal weights of heterogeneous ſubſtances, as air and water, having the ſame temperature, may contain unequal quantities of abſolute *heat*; and, therefore, there muſt be certain eſſential differences in the nature of bodies, in conſequence of which ſome have greater powers or capacities of collecting and containing *heat* than others. On theſe principles Dr. Crawford proceeds, with great caution, guarding, as he apprehends, againſt every poſſible cauſe of error, to eſtimate the abſolute *heat* of a variety of ſubſtances: the general concluſions deduced from his experiments, the reader will find in this and ſome of the following articles.

We ſhall now obſerve, that he has ſhewn, by ſeveral well-conducted experiments, that the capacities of bodies for containing *heat* are diminiſhed by the addition of phlogiſton, and increaſed by the ſeparation of this principle.

It has been an opinion generally received among philoſophers, that phlogiſton is either fire itſelf, or intimately connected with the production of fire. But if this were true, ſays Dr. Crawford, bodies, when united with phlogiſton, would contain a greater quantity of fire, or of abſolute *heat*, than when ſeparated from it: thus, metals would contain more abſolute *heat* than their calces, and ſulphur more than the vitriolic acid. But the contrary is evinced to be the fact: e. gr. the abſolute *heat* of the calx of tin is to that of tin as 14.7 to 10.4; the abſolute *heat* of the calx of iron is to that of the metal as 8 to 3.1; the abſolute *heat* of the calx of lead is to that of lead as 19.9 to 14.7; and the abſolute *heat* of the calx of antimony is to that of the regulus as 11.6 to 4.5. Hence it follows, that if phlogiſton be added to a body, a quantity of the abſolute *heat* of that body will be extricated; and if the phlogiſton be ſeparated again, an equal quantity of *heat* will be abſorbed: in the former caſe, the capacity of the body for containing *heat* is diminiſhed, and, in the latter, increaſed. *Heat*, therefore, and phlogiſton appear to be two oppoſite principles in nature: by the action of *heat* on bodies, the force of their attraction to phlogiſton is diminiſhed; and by the action of phlogiſton, a part of the abſolute *heat*, which exiſts in all bodies as an elementary principle, is expelled. It appears, however, from the facts above recited, that, though all bodies have their capacities for containing *heat* changed in conſequence of the addition or ſeparation of phlogiſton, yet the degree of this change is very different in different bodies. It is alſo evident, from this ingenious author's experiments, that different quantities of phlogiſton are required to ſaturate different bodies; and that when phlogiſton paſſes from one body to another, the changes in the capacities of the bodies for containing *heat* will be different, and unequal quantities of matter will be changed in a given time: and if two contiguous bodies, at the ſame moment, have their capacities for containing *heat* reſpectively increaſed and diminiſhed, and the changes be ſuch, that the whole *heat* ſeparated from the one is abſorbed by the other, no ſenſible *heat* or cold will be produced. Dr. Crawford has demonſtrated, by an analytical proceſs, that in the caſe when this happens, the differences of the capacities are reciprocally as the quantities of matter changed in a given time: but if the diminution in the capacity of one body be to the increaſe in another, in a greater proportion than the quantity of matter in this body to that in the former, the whole of the *heat* which is ſeparated from the former will not be abſorbed by the latter; a part of it becoming redundant, or being converted into moving and ſenſible *heat*. He obſerves, that the capacity for containing *heat* may continue unchanged, while the abſolute *heat* is varied without end; that the alterations which are produced in the ſenſible *heats* of different bodies, by given quantities of abſolute *heat*, are greater or leſs, as the body to which the *heat* is applied has a leſs or greater capacity for containing *heat*; and, therefore, the ſenſible *heat* of a body depends partly upon the quantity of its abſolute *heat*, and partly upon the nature of the body in which this *heat* is contained; and, therefore, in the ſame body, the ſenſible *heat* may vary, though the abſolute *heat* continues the ſame. The curious reader will find a variety of other proportions, that obtain with reſpect to the capacities, the ſenſible *heats*, and the quantities of abſolute *heat*, deduced from experiment and analyſis, in the work cited at the cloſe of this article.

This ingenious writer has not preſumed abſolutely to decide the queſtion that has been long agitated, whether *heat* be a ſubſtance or a quality. He obſerves, however, that if we adopt the opinion, that *heat* is a diſtinct ſubſtance, or an element *ſui generis*, the phenomena will be found to admit of a ſimple and obvious interpretation, and to be perfectly agreeable to the analogy of nature. Fire, he ſays, on this hypotheſis, will be conſidered as an elementary principle, which enters into the compoſition of all known bodies: in conſequence of the addition of phlogiſton, a portion of the fire will be detached, in the ſame manner as the nitrous acid is detached, by the vitriolic, from an earth or alkali; and therefore reſpiration and combuſtion will be truly chemical proceſſes, in which, by the exchange of fire and phlogiſton, a double decompoſition will take place, and two new compounds will be formed; the blood, or the inflammable body, parting with phlogiſton and receiving fire, and the atmoſpherical air parting with fire and receiving phlogiſton. See *Animal* HEAT, and HEAT *of inflammable bodies*.

He adds, that a table may be formed, on this ſuppoſition, exhibiting the reſpective attractions of phlogiſton and fire. As phlogiſton ſeparates from bodies a part of their abſolute *heat*, this ſhould be placed at the head of the firſt column; the earths of the perfect metals, which attract this principle with the greateſt force, ſhould ſtand immediately under phlogiſton; and next to theſe ſhould be claſſed in order, dephlogiſticated and atmoſpherical air, the baſes of all the inflammable bodies, according to the degrees of *heat* which are neceſſary to their inflammation, when combined with phlogiſton, and laſt of all nitrous air. Fire ſhould be placed at the head of the ſecond column; and if the attractions of bodies to this principle be proportionable to the quantities of it contained in them, when the quantities of matter are equal, under fire ſhould ſtand dephlogiſticated and atmoſpherical air, the vapour of the nitrous acid, and probably of ſome other fluid, arterial blood, water, &c. But many experiments are wanting for forming an accurate table of this kind. See Crawford's Experiments and Obſervations on Animal *Heat* and the Inflammation of combuſtible Bodies, &c. 8vo. 1779. See alſo Elliot's Philoſophical Obſervations, &c. 8vo. 1780.

There is a great variety in the *heat* of different places and ſeaſons. Naturaliſts commonly lay it down, that the nearer any place is to the center of the earth, the hotter it is found; but this does not hold ſtrictly true. In digging mines, wells, &c. they find, that at a little depth below the ſurface it feels cool; a little lower, and it is yet colder, as being now beyond any reach or influence of the ſun's rays, inſomuch that water will freeze almoſt inſtantaneouſly; and hence the uſe of ice-houſes, &c. but when a little lower, viz. about forty or fifty feet deep, it begins to grow warmer, ſo that no ice can bear it; thus, in the cave of the obſervatory at Paris, about ninety feet under ground, the *heat* keeps the thermometer at 53°; and then the deeper they go, ſtill the greater is the *heat*, till, at length, reſpiration grows difficult, and the candles go out. Hence ſome have recourſe to the notion of a fund of fire lodged in the center of the earth, which they conſider as a central ſun, and the great principle o the generation, vegetation, nutrition, &c. of foſſil an vegetable bodies.

But Mr. Boyle, who had been at the bottom of ſom mines himſelf, ſuſpects that this degree of *heat*, at lea in ſome of them, may ariſe from the peculiar nature o the minerals generated therein. To confirm this, he inſtances a mineral of the vitriolic kind, dug up in larg quantities, in ſeveral parts of England, which, by the ba effuſion of common water, will grow ſo hot as almo to take fire.

On the other hand, as you aſcend high mountains, th air grows more and more piercing and cold: thus th tops of the Pico de Theide in Bohemia, the pike o Teneriff, and ſeveral others, even in the moſt ſultr countries, are found always inveſted with ſnow and ic the *heat* never being ſufficient to thaw the ſame.

In ſome of the mountains of Peru there is no ſuch thin as running water, but all ice: plants make a ſhift to gro about the feet of the mountains, but near the top no vegetable can live; and this is not for want of food, b through the intenſeneſs of the cold. This effect is a tributed to the thinneſs of the air, and the little ſu face of earth there is to reflect the rays. The rays he are only determined into a paralleliſm; but the effect o direct parallel rays is found, by computation, to be ve inconſiderable, this effect being really greater in wint than ſummer.

HEAT, in *Geography*. The diverſity of the *heat* of clim and ſeaſons ariſes from the different angles under whic the ſun's rays ſtrike upon the earth's ſurface.

It is ſhewn in mechanics, that a moving body, ſtrikin perpendicularly on another, acts on it with all its forc and that a body ſtriking obliquely, acts with the leſs forc the more it deviates from the perpendicular. Now ſin moving in right lines, muſt obſerve the ſame mechanic

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law as other bodies; and conſequently its action muſt be meaſured by the ſine of the angle of incidence: and hence fire, ſtriking on any obſtacle in a direction parallel thereto, has no ſenſible effect, becauſe the ratio is almoſt infinite, i. e. it is nothing. Accordingly, the ſun, radiating on the earth in the morning, ſcarce produces any warmth at all.

Hence Dr. Halley gives a mathematical computation of the effect of the ſun under different ſeaſons and climates; proceeding on this principle, that the ſimple action of the ſun, as all other impulſes or ſtrokes, is more or leſs forcible, according to the ſines of the angles of incidence, or to the perpendiculars let fall on the plane: whence, the vertical ray (which is of the greateſt *heat)* being put for radius, the force of the ſun on the horizontal ſurface of the earth will be to that, as the ſines of the ſun's altitude at any other time.

Hence it follows, that the time of the continuance of the ſun's ſhining being taken for a baſis, and the ſines of the ſun's altitudes erected thereon as perpendiculars, and a curve drawn through the extremities of thoſe perpendiculars, the area comprehended will be proportionate to the collection of the *heat* of all the ſun's beams in that ſpace of time.

Hence it will follow likewiſe, that under the pole the collection of all the *heat* of a tropical day is proportionate to a rectangle of the ſine of 23 degrees and a half into 24 hours, or the circumference of a circle; that is, the ſine of 23 degrees and a half being nearly $\frac{4}{10}$ of radius, as $\frac{8}{10}$ into 12 hours. Or, the polar *heat* is equal to that of the ſun continuing 12 hours above the horizon at 53 degrees height; than which the ſun is not five hours more elevated under the equinoctial.

But whereas the nature of *heat* is to remain in the ſubject, after the luminary that occaſioned its being heated is removed, and particularly in the air, under the equinoctial the twelve hours abſence of the ſun does but little diminiſh the motion impreſſed by the paſt action of his ray, wherein *heat* conſiſts, before he riſes again; but under the pole, the long abſence of the ſun for ſix months, wherein the extremity of cold does obtain, hath ſo chilled the air, that it is, as it were, frozen, and cannot, before the ſun has got far towards it, be any ways ſenſible of his preſence, his beams being obſtructed by thick clouds, and perpetual fogs and miſts.

That *heat* and cold very much depend on the clearneſs or opacity of the ſky is atteſted by fact; for the winter cold in South America is very ſharp, becauſe the atmoſphere is loaded with clouds and icy particles, which intercept the ſolar rays. At Lima, in lat. 12° ſouth, where the ſky is never free from vapours, the *heat* is moderate, but at the diſtance of a few miles the ſky is more ſerene, and there the *heat* is greater; and at Carthagena, in lat. 11° north, the *heat* is, principally on this account, intolerable.

Add, that the different degrees of *heat* and cold, in different places, depend, in a very great meaſure, upon the accidents of ſituation, with regard to mountains or valleys, rivers, ſeas, and woods, and the nature and colour of the ſoil, &c. The firſt, eſpecially when they are lofty and covered with ſnow, greatly help to chill the air by the winds which come over them, and which blow in eddies through the levels beyond.

Mountains, ſometimes, turning a concave ſide towards the ſun, have the effect of a burning mirror on the ſubject plain; and the like effect is ſometimes had from the concave or convex parts of clouds, either by refraction or reflection. And ſome even take theſe to be ſufficient to kindle the exhalations lodged in the air, and to produce thunder and lightning, &c.

As to ſoils; a ſtony, ſandy, or chalky earth, it is known, reflects moſt of the rays into the air again, and retains but few; by which means a conſiderable acceſſion of *heat* is derived to the air; as, on the contrary, black looſe ſoils abſorb moſt of the rays, and return few into the air, ſo that the ground is much the hotter.

This the peaſants, who inhabit the moraſs de Veenen, where turf is dug, are very ſenſible of: walking there but a little while, the feet grow extremely hot, but the face not at all; on the contrary, in a ſandy place, the feet are ſcarce warm, when the face is ſcorched by the great reflection.

It is certain, that *heat* communicated by the ſun to bodies on this earth, depends much upon other circumſtances beſide the direct force of its rays. Theſe muſt be modified by our atmoſphere, and variouſly reflected and combined by the action of the ſurface of the earth itſelf, to produce any remarkable effects of *heat*; ſo that if it were not for theſe additional circumſtances, it is much to be queſtioned whether the naked *heat* of the ſun would be very ſenſible.

To this purpoſe, it is obſerved by Ulloa, in his Voyage to Peru, that on the weſtern ſhore of that kingdom, from Santa Maria de la Parilla to Lima, it is winter on the mountains from January or February to June, whilſt it is ſummer in the vallies; but from June to November or December, it is winter in the vallies, and ſummer in the mountains.

The following table gives the *heat* to every tenth degree of latitude to the equinoctial and tropical ſun, by which an eſtimate may be made of the intermediate degrees.

Lat.	Sun in ♈ ♎	Sun in ♋	Sun in ♑
0	20000	18341	18341
10	19696	20290	15834
20	18794	21737	13166
30	17321	22651	10124
40	15321	23048	6944
50	12855	22991	3798
60	10000	22773	1075
70	6840	23543	000
80	3473	24673	000
90	0000	25055	000

For an account of the general principles and problems, by which this table is calculated, ſee Phil. Tranſ. abr. vol. ii. p. 167, &c.

From this table are deducible the following corollaries:

1. That the equinoctial *heat*, when the ſun becomes vertical, is as twice the ſquare of the radius; which may be propoſed as a ſtandard to be compared with in all other caſes.

2. That under the equinoctial the *heat* is as the ſine of the ſun's declination.

3. That in the frigid zones, when the ſun ſets not, the *heat* is as the circumference of a circle into the ſine of the altitude at 6. And, conſequently, that, in the ſame latitude, theſe aggregates of warmth are as the ſines of the ſun's declination; and at the ſame declination of the ſun, they are as the ſines of the latitudes, and generally they are as the ſines of the latitudes into the ſines of declination.

4. That the equinoctial day's *heat* is every-where as the coſine of the latitude.

5. In all places where the ſun ſets, the difference between the ſummer and winter *heats*, when the declinations are contrary, is equal to a circle into the ſine of the altitude at 6, in the ſummer parallel; and, conſequently, thoſe differences are as the ſines of the latitude into, or multiplied by, the ſines of declination.

6. From the foregoing table it appears, that the tropical ſun, under the equinoctial, has of all others the leaſt force; under the pole it is greater than any day's *heat* whatever, being to that of the equinoctial as 5 to 4.

From the table, and theſe corollaries, a general idea may be conceived of the ſum of all the actions of the ſun in the whole year; and thus that part of *heat* which ariſeth ſimply from the preſence of the ſun, may be brought to a geometrical certainty. The *heat* of the ſun, for any ſmall portion of time, is always as a rectangle, contained under the ſine of the angle of incidence of the ray producing *heat* at that time.

Many objections have been urged againſt the preceding theory of Dr. Halley: ſome have urged, that the effect of the ſun's *heat* is not in the ſimple ratio of the ſines of the angles of incidence, but in the duplicate ratio of theſe ſines; alledging, that this is the law of the impulſe of fluids. See FORCE. Dr. Halley himſelf was well appriſed, that many other circumſtances, beſides the direct force of the ſun's rays, contributed to augment or diminiſh the effect of this and the *heat* reſulting from it in different climates; and, therefore, no calculation, formed on the preceding theory, can be ſuppoſed to correſpond exactly with obſervation and experiment.

It has alſo been objected, that, according to the preceding theory, the greateſt *heat* in the ſame place ſhould be at the ſummer ſolſtice, and the moſt extreme cold at the winter ſolſtice; which is contrary to experience. To this objection it may be replied, that *heat* is not produced in bodies by the ſun inſtantaneouſly, nor do the effects of his *heat* ceaſe immediately when his rays are withdrawn; and, therefore, thoſe parts which are once heated, retain the heat for ſome time, which, with the additional heat daily imparted, makes it continue to increaſe, though the ſun declines towards the ſouth: and this is the reaſon why July is hotter than June, although the ſun has withdrawn from the ſummer tropic; as we find it is generally hotter at three in the afternoon, when the ſun has declined towards the weſt, than at noon, when he is on the meridian. As long as the heating particles, which are conſtantly received, are more numerous than thoſe which fly away or loſe their force, the *heat* of bodies muſt continually increaſe. After the ſun has left the tropic, the number of particles, which *heat* our atmoſphere and earth, conſtantly increaſes, becauſe we receive more in the day than we loſe at night, and therefore our *heat* muſt alſo increaſe. E. gr. Let us ſuppoſe that there are 100 heating particles received in the day, whilſt the ſun is above our horizon, and that, as the night is much ſhorter, 50 of them fly off; the other 50 ſtill remaining to excite *heat*: the next day, the ſun acting with almoſt the ſame force, will impart 100 particles more, of which one half will eſcape in the night; ſo that, on the beginning of the third day, the number of particles exciting *heat* will be increaſed by 100: and thus, while there are more particles that excite *heat* received in the day-time than thoſe that fly off in the night, the *heat* muſt increaſe. But as the days decreaſe, and the action of the ſun becomes weaker, more particles will fly off in the night-time than thoſe we receive in the day, by which means the earth and air will gradually cool. Farther, thoſe places which are well cooled require time to be heated again; and, therefore, we find January for the moſt part colder than December, although the ſun has withdrawn from the winter tropic, and begins to emit his rays more perpendicularly upon us.

It is well known, that the ſun is farther from the earth in ſummer than in winter, becauſe his apparent motion is ſlower, and his apparent DIAMETER leſs in June than in December: but, as the EXCENTRICITY of the earth's orbit bears no greater proportion to the earth's mean diſtance from the ſun than 17 does to 1000, this ſmall difference of diſtance cannot occaſion any great difference of *heat* or cold. But the principal cauſe of the difference between the *heat* of ſummer and that of winter is, that in ſummer the rays fall more perpendicularly, and paſs through a leſs denſe part of the atmoſphere; and, therefore, with greater force, and in greater number on the ſame place: and, beſides, by their long continuance, a much greater degree of *heat* is imparted by day than can fly off by night. The effect of rays, according to their various degrees of obliquity, has been already ſtated; and it will appear (by *Tab.* III. *Aſtronomy*, *fig.* 79.) that a greater number of rays fall on the ſame place, when they come perpendicularly, than when they come obliquely upon it: for, let AB repreſent a certain number of the ſun's rays falling on CD, e. gr. London, on the 21ſt of June; but on the 22d of December, the line CD or London has the oblique poſition C*d* to the ſame rays; and, therefore, ſcarce a third part of them falls upon it, or only thoſe between A and *e*; all the reſt being expended on the ſpace *d*P, which is more than double the length of CD or C*d*.

Dr. Long, eſtimating the degree of *heat* by the ſines of the angles of incidence of the ſun's rays, computes the ſun's *heat* at noon at the ſummer ſolſtice to be in proportion to his *heat* at noon at the winter ſolſtice, in Cambridge, nearly as 100 to 28; for, the meridian height of the ſun at the ſummer ſolſtice being there 61° 19′, and his height at the winter ſolſtice 14° 21′, the ſines of theſe angles are 8772358 and 2478445 reſpectively.

Monſ. De Mairan, allowing for the principal cauſes of the ſummer *heat*, ſtates the proportion of ſummer *heat* to that of winter as 66 to 1. The method he purſues in forming his calculation is briefly as follows: he aſſigns the proportion of the ſines of the meridional heights of the ſun at the ſummer and winter ſolſtices to be as 3 to 1, and the ratio of the *heat*, which he ſuppoſes to be as the ſquares of the ſines, that of 9 to 1; and as the rays of the ſun proceed through a leſs ſpace of air in ſummer than in winter, he ſtates the increaſe of ſummer *heat* on this account to be in the proportion of 2 to 1, and that ariſing from the greater length of days as 4 to 1; and, therefore, the heat of ſummer is to that of winter as 72 to 1. But there are ſome other circumſtances, particularly the greater diſtance of the ſun in ſummer than in winter, which induce him to reduce this proportion of 72 to 1 to that of 66 to 1.

However, M. Amontons has, from obſervation, made the proportion of ſummer *heat* to that of winter as 60 to 51½; and M. De Mairan, in order to reduce his calculation to fact, ſuppoſes that in the earth and air there is a conſtant fund of *heat*, equal to 393 degrees, to which 66 degrees muſt be added in ſummer, and 1 in winter, and thus he adjuſts his own proportion of 66 to 1 to that of M. Amontons, or 60 to 51½. Keil's Aſt. Lect. viii. Ferguſon's Aſt. chap. x. Long's Aſt. § 777. Mem. Acad. Scienc. 1719.

With regard to the temperature or *heat* of our atmoſphere, we may obſerve that the mercury ſeldom falls under 16° in Fahrenheit's thermometer; but we are apt to reckon it very cold at 24°, and it continues coldiſh to 40° and a little above. However, ſuch colds have been often known as to bring it down to 0°, the beginning of the ſcale, or nearly the cold produced by a mixture of ſnow and ſalt. This, as Dr. Boerhaave ſeems to think, is the greateſt degree of cold which nature has ever been obſerved to produce on our earth; but the fallacy of this opinion has been evinced by a variety of obſervations in climates that may be reckoned ordinarily temperate. In Penſylvania, in lat 40°, the cold brought the mercury to 5° in 1732; at Paris, in 1709 and 1710, the mercury ſunk to 8°; at Leyden, in 1729, to 5°, and at Utrecht to 4°; at London, in 1709 and 1710, the cold ſunk the ſpirits almoſt down to the artificial cold of an ice and ſalt mixture; and, in 1709, the mercury ſunk to 0° at Copenhagen, lat. 55° 43′. At Upſal, in 1732, the cold was ſo great, as to be ſufficient to make the mercury fall one degree below 0°; and at Peterſburgh, lat. 59° 56′, much the ſame with that of Upſal, the cold was ſevere enough to depreſs the mercury to 28° below 0.

We learn from Dr. King's Obſervations on the Climate of Ruſſia, that the cold at St. Peterſburgh, during the months of December, January, and February, is uſually from 8 to 15 or 20 degrees below 0; and that commonly, in the courſe of the winter, it is for a week or ten days ſome degrees lower. In this ſeaſon, the water iſſuing from the eyes hangs in little icicles on the eye-laſhes, and icicles appear ſuſpended to the beards of the peaſants in form of ſolid lumps of ice. But in ſtill more northern latitudes the cold is much more extreme. Maupertuis, who wintered at the north polar circle in 1736-7, found the degree of cold at Torneo, lat. 65° 51′, ſufficient to have made the mercury ſink to 33 diviſions below 0. By Mr. Hutchins's obſervations at Albany Fort, lat. 52° 24′, the thermometer was at eight o'clock in the morning of the 19th of January, 1775, at 37° below 0. And yet this degree of cold is inconſiderable, compared with that which may be produced by art. See FREEZING.

The middle temperature of our atmoſphere is about 48°, which is, as it were, the medium of all the ſeaſons, coinciding nearly with the middle vernal and autumnal heat, as obſerved in England by Sir Iſaac Newton and Dr. Hales, and by Mr. Crucqius in Holland. The French make it ſomewhat higher, reckoning it equal to the *heat* of the cave of their royal obſervatory, or 53°. In cold countries the air will be found agreeable enough to the inhabitants while it is betwixt 40° and 50°. In our climate we are beſt pleaſed with the *heat* of the air from about 50 to 60°; while in the hot countries, the air is generally a little above or below 70°. With us the air is not reckoned warm till it arrives at about 64°, and it is very warm and ſultry at 80°; and Dr. Boerhaave thought, that in its natural ſtate it ſcarce ever exceeded 80 or 90°, apprehending that ſuch hot air would ſoon be deſtructive of the life of animals: but in theſe temperate climates it has been found much hotter; and at Utrecht, Paris, Padua, &c. the mercury would have riſen in our thermometer to above 90°. In Penſylvania, the ſummer *heat* in 1732 was once 96° or 97°; and at Aſtracan, in July 1746, the *heat* was ſo great as to raiſe the mercury in M. De L'Iſle's thermometer in the ſhade to 89°, which correſponds to 103½ of Fahrenheit's; and during the whole month of July, and for ſeveral days in Auguſt, it was higher than 96°, which in Fahrenheit's denotes the natural *heat* of the blood. Mem. de l'Acad. de Berlin, 1746. See *Animal* HEAT.

The preceding obſervations are applicable to the ſtate of the air, influenced by the ſun, but ſhaded from its immediate burning operation; for, in the open air, expoſed to its direct beams ſhining with greateſt advantage, the *heat* is found much higher. Many have had occaſion to obſerve how much metals are heated in the ſun: Dr. Martine found dry earth heated to above 120°; and Dr. Hales found a very hot ſun-ſhine *heat* in 1727 to be about 140°; but Dr. Muſchenbroek once obſerved it ſo high as 150°; and, if we reckon from the freezing point at 32°, theſe ſtrong ſun-ſhine *heats* were much greater than ⅓, or even the half of the *heat* of boiling water. At Montpelier the ſun was ſo very hot, on one day in the year 1705, as to raiſe the quickſilver in M. Amontons' thermometer to the mark of boiling water itſelf, which is our 212°. But the moſt common noon-tide *heat* of the ſun in our climate has been found to raiſe the mercury in the thermometer to about 60 or 70 diviſions above the freezing point at 32°; and the afternoon *heat* in the ſhade about the half of that; and, therefore, the ordinary ſummer ſun *heat* with us does nearly coincide with the *heat* of our body, and boiling water is between two and three times hotter than our common ſhaded warm air at Midſummer.

Sir Iſaac Newton informs us, that he found the *heat* of boiling water only about three times greater than the *heat* communicated to dry earth by the ſummer ſun, or about 92°, with which the obſervations of Muſchenbroek agree; and in Italy, Borelli and Malpighi found this *heat* at Midſummer equal to the *heat* of the viſcera of hot animals, or about 102°. In another place (viz. Princip. lib. iii. prop. 8. cor. 4.) Sir Iſaac Newton eſtimates the *heat* of boiling water to be ſeven times greater than the *heat* of the ſummer ſun, which in this reckoning ſhould be only at $(32+\frac{180}{7}=)$ 58°: by which, as Dr. Martine remarks, he muſt have meant ſolely the number of degrees above freezing water; and by ſummer ſun, the ordinary ſhaded air in ſummer, or the ſummer *heat* of the air. Martine's Eſſ. Med and Phil. 1740. Eſſ. vi.

It appears, from a regiſter of the thermometer kept at London by Dr. Heberden for nine years, viz. from the end of 1763 to the end of 1772, that the mean *heat* at eight in the morning was 47° 4; and by another regiſter kept at Hawkhill, near Edinburgh, that the mean *heat* in that place, during the ſame period of time, was 46°. By regiſters kept in London and at Hawkhill, for the years 1772, 1773, 1774, it appears, that the mean *heat* of theſe three years in London, at eight in the morning, was 48°.5, and at two in the afternoon 56°, and the mean *heat* of three years, both morning and afternoon, 52°.2; and the mean *heat* at Hawkhill for the ſame time, at eight in the morning, was 45°.4, and at two in the afternoon 50°.1, and the mean *heat* of morning and afternoon for the whole time 47°.7. The mean *heat* of ſprings near Edinburgh ſeems to be 47°, and at London 51°. Phil. Tranſ. vol. lxv. part ii. art. 44.

From the Meteorological Journals of the Royal Society, publiſhed in the Philoſophical Tranſactions, it appears, that the mean heights of the thermometer, kept without and within the houſe, are as below:

	Therm. without.	Therm. within.
For 1775	- - 51.5	52.7
1776	- - 51.1	52.9
1777	- - 51.0	53.0
1778	- - 52.0	53.1

And, therefore, according to theſe obſervations, the mean *heat* of four years, eſtimated by the external thermometer, is 51°.4. The leaſt height during this period was on 31ſt January, 1776, at eight in the morning, when it was 13°.5; and the greateſt height, which was on the 13th and 14th of July, 1778, at two in the afternoon, was 86°.

HEAT, *animal.* The *heat* of animals is very various, both according to the variety of their kinds and the difference of the ſeaſons: accordingly, zoologiſts have divided them into hot and cold, reckoning thoſe to be hot which are near our own temperature, and all others cold whoſe *heat* is much below our's, and, conſequently, affects us with the ſenſe of cold; though, by their *vis vitæ*, they are kept ſomewhat warmer than the medium in which they live. To this latter claſs writers have commonly referred the whole inſect tribe; though Dr. Martine obſerves with reſpect to bees, that the *heat* of a ſwarm raiſed a thermometer buried among them above 97°, indicating a degree of *heat* ſcarce, if at all, inferior to our own. To this claſs alſo belong muſcles and oyſters, the branchial fiſhes, ſnails, frogs, land and ſea tortoiſes, toads, vipers, and all the ſerpent kind.

The human kind forms the loweſt gradation in the claſs of hot animals: the *heat* of the human body, in its natural ſtate, according to Dr. Boerhaave is, ſuch as to raiſe the mercury in the thermometer to 92°, agreeing with Dr. Pitcairn's obſervation of the *heat* of the human ſkin, or at moſt to 94°. M. Amontons, by ſeveral trials, found the *heat* communicated by the human body to be 91°, 92°, and 93°. Sir Iſaac Newton makes the external *heat* of the human body, of the ſame temperature with that of a bird hatching eggs, to be 95°.5. Fahrenheit ſtates the *heat* of the human body and blood at 96°, which Muſchenbroek aſſigns to be the degree of *heat* communicated to the thermometer when immerged in the blood flowing from an animal. Dr. Martine infers, from a great number of trials, that the mean *heat* of the human ſkin is about 97° or 98°; being a little higher in ſome ſubjects, and a little lower in others: and the *heat* of the human urine, by which we may judge of that of the neighbouring viſcera, he ſays, is ſcarcely a degree hotter than the ſkin. Dr. Hales found the *heat* of his ſkin to be about 97°, and the *heat* of urine, newly made, about 103°. Mr. Hunter found, by ſinking the ball of the thermometer under his tongue, and keeping it there for ſome minutes, that the mercury roſe to 97°: in another experiment, he introduced the ball of the thermometer into the urethra about an inch, and when it had remained there a minute, the quickſilver roſe only to 92°; at two inches it roſe to 93°; at four inches to 94°; and when the ball had got as far as the bulb of the urethra, the quickſilver roſe to 97°. The *heat* of the rectum was 98°½ exactly.

With reſpect to ordinary quadrupeds, ſuch as dogs, cats, ſheep, oxen, ſwine, &c. the *heat* of their ſkin raiſes the thermometer four or five diviſions higher than that of the human kind, viz. to 100°, 101°, 102°, and ſome to 103° and a little more. The cetaceous fiſhes are as hot as theſe; and the bird kind, as lord Bacon has long ſince obſerved, are warmer by three or four degrees than quadrupeds: for Dr. Martine has found, by lodging the bulb of the thermometer in the groin of ducks, geeſe, hens, &c. that the mercury was raiſed to 103°, 104°, 105°, 106°, and 107°, and in a hen hatching eggs he once found the height to be 108°. Dr. Crawford has collected the following obſervations relating to this ſubject: that thoſe animals which are furniſhed with lungs, and which continually reſpire the freſh air in great quantities, have the power of keeping themſelves at a temperature conſiderably higher than the ſurrounding atmoſphere: but animals that are not furniſhed with reſpiratory organs, are very nearly of the ſame temperature with the medium in which they live; the former, according to his theory, which we ſhall explain in the ſequel of this article, continually abſorbing *heat* from the air, for which purpoſe they are provided with a pulmonary ſyſtem and double circulation. Farther, among the hot animals, thoſe are the warmeſt which have the largeſt reſpiratory organs, and which, conſequently, breathe the greateſt quantity of air in proportion to their bulk: thus, the reſpiratory organs of birds, compared with their ſize, are more extenſive than thoſe of any other animal; and birds are known to have the greateſt degree of animal *heat*. This fact is likewiſe explained by the ſame theory, and affords a confirmation of it; for, if animal *heat* depends upon a change which the air undergoes in the lungs, it is evident that, all other circumſtances being equal, the greater the quantity of air which is changed in a given time, the greater muſt be the *heat* produced. Moreover, in the ſame animal, the degree of *heat* is in ſome meaſure proportionable to the quantity of air inſpired in a given time: thus, we find, that animal *heat* is increaſed by exerciſe and by whatever accelerates reſpiration.

But it is obſerved, that the *heat* of animals varies in different individuals, and likewiſe in the ſame animal at different times; for, though in a healthful ſtate, the variations are not great, yet by accidents and diſeaſes they may be much altered, and brought conſiderably above and below the natural ſtandard. Dr. Hales ſuppoſes the *heat* of the human blood in high fevers to be about 136°½; and Dr. Boerhaave relates certain experiments of Fahrenheit and others, from which it appears, that animals were very ſoon deſtroyed in a *heat* of 146°; a ſparrow having died in leſs than ſeven minutes, a cat in about fifteen, and a dog in twenty-eight: and he concludes in general, that the ſerum of the blood may be coagulated by a degree of *heat* not much above 100°; whence Dr. Hales and Dr. Arbuthnot have been led to affirm, that the natural *heat* of the blood of a human creature approaches very near the degree of coagulation. But Dr. Martine obſerves, that he has found the blood to be heated five or ſix degrees above 100°, without any ſuch pernicious effects; and that the ſerum of blood and the white of an egg have continued thin and liquid, till the thermometer has indicated a degree of *heat* equal to 156°, which he ſuppoſes to extend beyond any thing that can ever be experienced by a living animal. The late ingenious Mr. Hewſon infers, from ſeveral experiments, that the lymph of the human blood coagulates at a degree of *heat* between 114° and 120°½; and that the ſerum does not coagulate without 160° of *heat*: there is, therefore, no ground for the apprehenſion of Boerhaave and others, that the blood ſhould be coagulated by the animal *heat*, even whilſt it is circulating in the blood-veſſels; ſince the animal *heat* is naturally only 98° or 100°, and in the moſt ardent fever it is not raiſed above 112°. Phil. Tranſ. vol. lx. art. 33.

From ſome experiments made by Dr. Dobſon in a heated room it appears, that the white of an egg, incloſed in its own film, remained fluid in a *heat* of 224°, but coagulated in the ſame *heat* when contained in a tin veſſel or its own ſhell: he offers ſeveral conjectures for the explication of this phenomenon, the moſt probable of which ſeems to be, that tin is a more powerful conductor of fire from air, and robs this medium of its *heat* more readily than the film can do.

Philoſophers, miſled by the opinion of Boerhaave and the experiments above recited, had very generally imagined, that animals were incapable of enduring, without danger, any very conſiderable degree of *heat*: however, governor Ellis had obſerved, as long ago as the year 1758, that a man can live in air of a greater *heat* than that of his own body, and that the body in this ſituation continues its own cold. Phil. Tranſ. vol. l. p. 755.

Nevertheleſs, it was ſcarce conceivable, by reaſoning *à priori*

priori and in oppoſition to a ſuppoſed fact, that the human body could be ſafely expoſed to a *heat* only of the degree which proved fatal to the animals in the experiments related by Boerhaave. Accident, we may ſay, firſt led to the diſcovery of the fallacy of the general opinion on this ſubject. Meſſrs. Du Hamel and Tillet being employed, in the years 1760 and 1761, in deſtroying an inſect which conſumed the grain of the province of Angoumois, contrived, for this purpoſe, to expoſe the affected corn, with the inſects included in it, in an oven, the *heat* of which was ſufficient to kill them without injuring the grain. With a view of aſcertaining the *heat* of this oven, they conveyed into it a thermometer; and being deſirous of knowing the preciſe heat of the mercury whilſt the thermometer remained in the oven, a girl, one of the attendants on the oven, entered it, and marked the thermometer with a pencil, after ſtaying two or three minutes, and the *heat* was found to be near 260° of Fahrenheit's ſcale: ſhe afterwards remained there ten minutes longer, the mercury in the thermometer ſtanding at 288°, or 76° above that of boiling water; and when ſhe came out of the oven her complexion was conſiderably heightened, but her reſpiration was by no means quick and laborious. Theſe experiments were afterwards repeated, when another girl remained in the oven without much inconvenience, and under the ſame degree of *heat*, as long as the former, and even breathed in air heated to about 325° for the ſpace of five minutes. Theſe girls, ſays M. Tillet, were protected from the external action of the *heat* by their cloaths, which are bad conductors of *heat*, and enabled to breathe the air, thus violently heated, for a long time, without great inconvenience: to which we may add, ſays an ingenious anonymous remarker on this experiment, that the bulk of their bodies might alſo contribute to their ſecurity; and, as in common reſpiration, the blood in its paſſage through the lungs is cooled by being brought into contact with the external inſpired air: in the preſent caſe, on the contrary, the veſicles and veſſels of the lungs, receiving at each inſpiration an air heated to 300°, muſt have been continually cooled and refreſhed, as well as the ſubcutaneous veſſels, by the ſucceſſive arrival of the whole maſs of blood contained in the interior parts of the body, whoſe *heat* might be ſuppoſed, at the beginning of the experiment, not to exceed 100°. Hiſt. Acad. Scienc. 1764. mem. ii. Month. Rev. vol. xxxviii. p. 580.

Theſe extraordinary facts might poſſibly lead philoſophers into a new train of reaſoning and experiment on the ſubject of *heat*: accordingly we find, that Dr. Cullen has long ago ſuggeſted many arguments to ſhew, that living animals have a power of generating *heat*, independently of any common chemical or mechanical means either of friction or fermentation, and alſo of generating cold or deſtroying *heat*, when the *heat* of the atmoſphere exceeded the proper temperature of their bodies. In order to examine and aſcertain this theory, Dr. George Fordyce prepared a ſuite of three rooms heated by flues in the floor; in one of which the air was in a dry ſtate, and in another loaded with moiſture, by pouring boiling water on the floor. In the firſt room the higheſt thermometer ſtood at 120°, and the loweſt at 110°; in the ſecond the *heat* was from 90° to 85°; and the third room felt moderately warm, whilſt the external air was below the freezing point. Dr. Fordyce, having undreſſed himſelf to his ſhirt in the third room, entered the ſecond room, and ſtaid five minutes in a *heat* of 90°; he then entered the firſt room, and, having remained in the part heated to 110° for ten minutes, the water running down in ſtreams over his whole body, he removed to the part of the room heated to 120°, and after ſtaying there twenty minutes, he found that the thermometer, placed under his tongue and held in his hand, ſtood juſt at 100°, and that his urine was of the ſame temperature: his pulſe had gradually riſen till it made 145 pulſations in a minute; the external circulation was greatly increaſed, but his reſpiration little affected. The moiſture of his ſkin, he apprehended, was chiefly owing to the condenſation of the vapour in the room upon his body. In the ſecond experiment, the higheſt thermometer in the firſt room varied from 132° to 130°, and the loweſt ſtood at 119°. Having undreſſed in an adjoining chamber, he went firſt into the *heat* of 119°, and in half a minute the water flowed down over his whole body in ſtreams; having remained here fifteen minutes, he went into the *heat* of 130°; at this time the *heat* of his body was 100°, and his pulſe beat 126 times in a minute: in this ſituation a Florence flaſk, filled with water heated to 100°, and wiped dry, became wet, and ſtreams of water continued to run down its ſides, till the *heat* of the water within had riſen to 122°. In this *heat* he remained fifteen minutes, and juſt before he left the room his pulſe made 139 beats in a minute, but the *heat* under his tongue, in his hand, and of his urine, did not exceed 100°.

Dr. Fordyce obſerves, on this experiment, that there was no evaporation, but conſtantly a condenſion of vapour on his body, and no cold was generated but by the animal powers. Having continued much longer in a much greater dry *heat* without being ſo much affected, he takes occaſion to infer, from this circumſtance, that dry air does not communicate its *heat* like air ſaturated with moiſture; and that the evaporation from the body, which takes place when the air is dry, aſſiſts its living powers in producing cold.

In another experiment, Dr. Fordyce, accompanied with four other gentlemen, went into the heated chamber where the air was dry, without taking off their clothes. When they firſt entered the room, the quickſilver ſtood above 150°, and they continued in it more than twenty minutes, in which time the *heat* had riſen about 12°. In another period of this experiment, the quickſilver ſtood at 198°, and they continued in this *heat* about ten minutes; but finding that the thermometer ſunk very faſt when they went together, they agreed to go in ſeparately. Dr. Solander ſtood in the room heated to 210° for three minutes, during which time the quickſilver ſunk to 196°; and Mr. Banks remained ſeven minutes in the *heat* of 211°, in which time the quickſilver had ſunk to 198°. The *heat* of their bodies in theſe ſeveral experiments roſe very little above its uſual ſtate; and many ſtriking effects proceeded from their power of preſerving their natural temperature. Whenever they breathed on the thermometer, the mercury ſunk ſeveral degrees; every expiration afforded a pleaſant cooling impreſſion to the noſtrils, and their cold breath cooled their fingers. Dr. Blagden, on touching his ſide, found that it felt like a corpſe, though the actual *heat* of his body was 98°. When the *heat* of the air began to approach the higheſt degree which the apparatus made uſe of was capable of producing, their bodies in the room prevented it from riſing any higher; and when it had been previouſly raiſed above that point, immediately ſunk it. Theſe, and other circumſtances attending the experiments, clearly prove, that the body has a power of deſtroying *heat*; but, in eſtimating the *heat* which we are capable of reſiſting, it is neceſſary to conſider not only what degree of *heat* would be communicated to our bodies, if they poſſeſſed no reſiſting power, by the heated body, before the equilibrium of *heat* was effected, but alſo what time that *heat* would take in paſſing from the heated body into our bodies. On this principle, we bear very different degrees of *heat* in different mediums; and it appears, by other experiments, that the ſame perſon, who felt no inconvenience from air heated to 211°, could not bear quickſilver at 120°, and could juſt bear rectified ſpirit of wine at 130°; i.e. quickſilver heated to 120° furniſhed, in a given time, more *heat* for the living powers to deſtroy than ſpirits heated to 130°, or air to 211°. Accordingly, when they were in the heated rooms, their watch-chains and other pieces of metal felt ſo hot, that they could ſcarce touch them; whilſt the air, from which the metal derived all its *heat*, was only unpleaſant. From theſe experiments, it is concluded that no attrition, fermentation, or whatever elſe the mechanical and chemical phyſicians have deviſed, can explain a power capable of producing or deſtroying *heat*, juſt as the circumſtances of the ſituation require: this power muſt be referred to the principle of life itſelf; and yet this is only giving a name to a ſtill unknown cauſe. This power, however it acts, ſeems to attend life very univerſally: Mr. Hunter found a carp preſerve a coat of fluid water round him long after all the other water in the veſſel had been congealed by a freezing mixture; and he has alſo ſhewn, that vegetables poſſeſs ſome degree of this property of generating *heat*. The ſudden melting of ſnow on graſs, whilſt that on the gravel walks continues unthawed, and many other ſimilar phenomena, can be adequately explained only on this principle.

In ſubſequent experiments, the *heat* of the room was raiſed to 240°, and ſometimes to 260°: theſe exceſſive *heats* were borne for a conſiderable time with little inconvenience by the gentlemen, who expoſed themſelves to them, both naked and with their cloaths on; nor was the *heat* of Dr. Blagden's body at all increaſed, though the velocity of his pulſe was, in one inſtance, more than doubled. A blaſt of the heated air from a pair of bellows was ſcarcely to be endured for the following obvious reaſon: when the ſame air remained for any time in contact with the body, part of its *heat* was deſtroyed, and, conſequently, the body was ſurrounded with a colder medium than the air of the room; whereas, when freſh portions of the air were applied to the body in ſuch a quick ſucceſſion, that no part of it could remain in contact a ſufficient time to be cooled, the *heat* muſt be ſenſibly greater. On this occaſion the gentlemen evinced the fallacy of the experiment related by Boerhaave, and which has been already mentioned: they ſhut up a bitch in the heated room, when the thermometer had riſen to 220°; in this ſituation ſhe was ſuffered to remain, without being immoderately affected, for 32′, and when ſhe was releaſed, and brought again into the cold air, ſhe appeared not to have received the leaſt injury. In the ſame heated air, which they breathed, eggs were roaſted quite hard in 20′, and beef-ſteaks were dreſſed in 33′; and by blowing the air upon ſome of them, in 13′.

The effect of EVAPORATION, in preventing certain bodies, and particularly fluids, from receiving a degree of heat equal to that of the air, is ſhewn by ſome of theſe experiments to be very conſiderable. In the great *heat* juſt mentioned, pure water expoſed in an earthen veſſel, during an hour and a half, acquired only a *heat* of 140°, and afterwards continued ſtationary above an hour, at a degree much below the boiling point; but when its power of evaporating was checked, by dropping a ſmall quantity of oil on its ſurface, it boiled very briſkly. A ſaturated ſolution of ſea-ſalt acquired a *heat* of 230°, and was, conſequently, brought into a briſk ebullition, on covering its ſurface with a layer of oil.

Dr. Dobſon has alſo publiſhed an account of ſimilar experiments made by him in the ſweating-room of the hoſpital at Liverpool; the reſults of which are conformable to thoſe that have been already recited. It appears from theſe, as well as from the former experiments, that the pulſe is conſiderably accelerated by heated air, whilſt the animal *heat* varies little from its natural ſtandard; a fact, which, as Dr. Dobſon obſerves, contradicts the opinion that has been generally received with regard to the cauſe of animal *heat*, viz. that it is produced by the attrition of the globules of the circulating fluids againſt the ſides of the containing veſſels; whereas it is ſeen, that the circulation may be amazingly quickened, whilſt there is little increaſe of the animal *heat*.

We may conclude in general, from the experiments and obſervations already recited, that man is ſo framed as to poſſeſs a power of keeping nearly the ſame tenor of *heat* in all the variations of the temperature of the air in ſummer and winter, in hot and cold climates; and, conſequently, changes his ſituation on the ſurface of the globe with much leſs inconvenience or injury than he could otherwiſe have done. The ſame power likewiſe happily adapts different animals to their reſpective deſtinations: the lizard and the cameleon remain cool under the equator, whilſt the whale and porpoiſe retain a degree of *heat* above that of the human body, though ſurrounded with the waters of the coldeſt northern ſeas, and amidſt mountains of ice, in the neighbourhood of the pole.

Dr. Crawford obſerves, with regard to the power above illuſtrated, which animals poſſeſs, of producing cold, that, by the heat of the ſurrounding medium, the evaporation from the lungs is increaſed; and that if this increaſe to ſuch a degree as to carry off the whole of the *heat* which is detached from the air, the arterial blood, when it returns by the pulmonary vein, will have its ſenſible *heat* greatly diminiſhed, and will, conſequently, abſorb *heat* from the veſſels which are in contact with it, and from the parts adjacent. And thus the ſame proceſs, which in one caſe ſupplies the animal with *heat*, according to Dr. Crawford's theory, explained in the ſequel of this article, will now become the inſtrument of producing cold; and the quantity of cold produced will be in proportion to the velocity of the blood through the lungs, and the fulneſs and frequency of the reſpiration. Thus, in winter ſeaſons, and cold climates, the veſſels on the ſurface of the body are conſtricted, the blood is determined to the lungs, and the pulſe and reſpiration are rendered full and frequent; ſo that the quantity of *heat* abſorbed from the air is proportionably increaſed. But in ſummer, the blood is determined to the ſurface, the velocity of the circulation through the lungs is diminiſhed, and the quantity of *heat* abſorbed is diminiſhed: beſides, if the quantity of *heat* abſorbed by the vapour exhaled in reſpiration be ſo great, as that the remaining portion of the *heat* depoſited by the air is not ſufficient to ſupport the temperature of the arterial blood, ſome degree of cold will be produced in conſequence of the change which the blood undergoes in the lungs. Martine's Eſſays, Eſſ. vi. Phil. Tranſ. vol. lxv. part i. art. 12. Id. ibid. part ii. art. 43. art. 45. art. 47. Id. vol. lxviii. part i. art. 2. Crawford on *Heat*, &c. p. 31. 80, &c.

There is hardly any ſubject of philoſophical inveſtigation that has afforded a greater variety of hypotheſes and conjectures, and experiments, than the origin of animal *heat*. The reader will find the principal of them enumerated, and briefly illuſtrated, in this article. The firſt opinion which has very generally obtained is, that the *heat* of animal bodies is owing to the attrition betwixt the arteries and the blood.

The arguments in favour of this opinion are, that if an artery is tied or cut, the part to which it goes turns cold; on the ceaſing of the pulſation of the arteries, cold and death follow. An increaſe of *heat* attends a briſk circulation, and a languid circulation is accompanied with a ſmall *heat*; but it has been already ſhewn, that this is not univerſally the caſe. One who burns in a fever, or is hot with exerciſe, has a full and frequent pulſe; in cold faintings, chloroſis, &c. the pulſe is ſmall and ſlow; and laſtly, that the thermometer ſhews the arterial blood to be a little hotter than that of the veins. This is accounted for from the conical figure of the arteries, from their flexures and branchings into exquiſitely ſmall capillaries; whence the reſiſtance and conſequent attrition muſt be great; from the number, ſtrength, and elaſticity of their coats; from the propelling power of the heart, and their ſtrong reſiſtance. From all theſe the particles of the blood perpetually getting new motions, directions, and rotations, are attenuated, condenſed, have their angles ground off, and are made homogeneous: hence the fluidity, red colour, and *heat* of the maſs, which is here perfected. But this theory is doubtful; for what is ſaid of arteries, may be ſaid of any other parts, whoſe functions are neceſſary to life. The *heat* and pulſation of the arteries do not keep together in any regular proportion; in ſome morbid caſes there is a great ſenſible *heat*, and a ſmall pulſe; and in others a full pulſe, and great coldneſs. Beſides, all the length this demonſtration goes, is to ſhew, that the motion of the arteries and *heat* are generally in proportion, which however does not ſhew which is the cauſe, and which the effect; nor indeed that either is the cauſe or effect of the other, ſince both may be the effects of ſome other cauſe. As to the proof by the thermometer, it ſeems doubtful; and what adds to the doubt is, that the venal blood does not coagulate ſo ſoon as the arterial. In ſhort, this theory is not eſtabliſhed by any ſatisfactory and convincing proof.

Dr. Douglas, in his Eſſay on the Generation of *Heat* in Animals, aſcribes it ſolely to the friction of the globules of blood in their circulation through the capillary veſſels.

The ſecond opinion is, that the lungs are the fountain of *heat* in the human body. All that has been ſaid for the blood's being heated in the arteries, is advanced to prove this hypotheſis, with conſiderable addition, viz. that in the lungs the blood-veſſels every where attend, divide, and ſubdivide, along with the ramifications of the windpipe; and as theſe are perpetually changing their ſituation and form, becoming longer or ſhorter, making more acute or more obtuſe angles, ſo muſt the concomitant blood-veſſels every moment make new angles, and give the blood new directions; that at laſt the blood enters into an exquiſitely fine net-work, ſpread every where on the vaſtly thin air veſicles, where theſe air-bladders are perpetually changing their angles, points of contact, their form, volume, interſtices, and ſo forth. From theſe, and the elaſticity of the air, and weight of the atmoſphere, the blood is ſaid to be churned, preſſed backward and forward, broken and kneaded together, diſſolved and condenſed, made red and hot in reſpiration. This theory, however plauſible, is not ſatisfactory. For, 1. What was ſaid before of the improbability of *heat* being generated by the ſole attrition of fluids, takes place here. 2. Though the lungs be regularly ſupplied with plenty of air, which has weight and elaſticity enough to carry on the alternate ſwelling and ſubſiding of the veſicles; yet life and *heat* ſoon fail, if that air has, by paſſing through the fire, or any other way, been robbed of, or if it has acquired ſome particles or quality, different from its weight and elaſticity. 3. The argument from the additional action of the ſolids of the lungs on the blood, more than what is found in the arteries, from their greater and conſtantly varying motion, ſeems to be fully taken off by one part of Hook's experiment, exhibited before the Royal Society, in which the lungs of a dog being kept conſtantly diſtended by a freſh blaſt of air, the dog lived, and his heart beat regularly; ſo that there is no need for that frequent and great variation of angles, and points of contact, upon which the additional attrition is built. 4. That the cold air ruſhing into the ſpongy lungs, on the numberleſs air-bladders, on which the blood is almoſt ſuperficially ſpread, ſhould make the blood hot, is an improbable opinion, and ſupported by no proof. And as the cauſe appears not at all promiſing *à priori*, ſo the effect ſeems to demonſtrate this not to be the cauſe. For, 5. That the blood is rather cooled than *heated* in the lungs, may be inferred from the benefit received by the inſpiration of cool air in many inflammatory diſeaſes, eſpecially thoſe of the lungs. In burning fevers, with a full quick pulſe, red ſkin, and a large and quick reſpiration, relief has often been given by opening a window, and admitting a ſtream of cool air to breathe in; the effects of which have been obſerved to be, that though the body was cloſe covered, yet in one minute the reſpiration became ſlower, and very ſoon after the pulſe abated of its fullneſs; and not only the face, but the whole body, of its fiery *heat* and colour. 6. If the blood were *heated* in the lungs, we ſhould need leſs of their functions, when we are warm, or in a warm place, the *heat* of our bodies, or of the atmoſphere, doing ſo much of the office of the lungs; and we ſhould want more of it, when cool, or in cool air. But when we are hot, and want to be cooled, we breathe full and quick; and when we are cold, and want to be warmed, our reſpiration is ſlow and ſmall; contrary to what one would expect, if the action of the air on the blood in the lungs were to *heat* it. 7. The blood which comes from the ſmall veſſels of the lungs, is not more expanded than before, as has been aſſerted, but not proved by any experiment, which it would certainly be, if it was hotter; for liquors rarify by *heat*, and few more than blood. 8. If the blood owes its *heat* to the action of the lungs, we muſt look out for another ſource of *heat* in the eggs and fœtus. To the objection, that the *heat* of the mother is ſufficient for the purpoſe, till this new function comes into action, two obſervations may be oppoſed: the firſt is, that toward the end of incubation, an egg may be left by the dam, in a cold ſeaſon, for a little longer time than would be ſafe for the chick, if all its *heat* depended upon her; yea long enough for an egg, that contains no warm principle to become of the temperature of the ambient air; yet upon opening it, the chick has been found neither quite ſo cold, nor dead. The ſecond is, that a ripe fœtus taken away from the mother, but continuing within the membranes, can live ſeveral hours by its own *heat*, without any aſſiſtance from the lungs. What is the cauſe of this *heat* before the lungs act? How comes it to fail as ſoon as the lungs play? Med. Eſſ. Edinb. abr. vol. i. p. 228.

The third opinion is, that the cauſe of animal *heat* is owing to the action of the ſolid parts upon one another. The heart and arteries move moſt; and it is natural to expect, that the *heat* ſhould be owing to this motion. But even this does not ſeem very plauſible, from the following conſiderations. 1. The moving parts, however we term them ſolid, are neither hard nor dry; which two conditions are abſolutely requiſite to make them fit to generate *heat* by attrition. 2. None of their motions are ſwift enough to promiſe *heat* in this way. 3. They have no great change of ſurface in their attritions. 4. The moveable fibres have fat, mucilage, or liquors every way ſurrounding them, to prevent their being deſtroyed, or *heated* by attrition.

A fourth cauſe aſſigned for the *heat* of our bodies, is that proceſs by which our aliment and fluids are perpetually undergoing ſome alteration.

This proceſs, according to Dr. Stevenſon, may be one *ſui generis*, ſomewhat of a middle nature, betwixt fermentation and putrefaction; and he thinks it to come ſo near to the latter, that he chooſes to call it by that name. In putrefaction, which is a moſt powerful diſſolvent of bodies, the inteſtine action of their minute particles creates, collects, or ſome way or other is the cauſe or means of *heat*. The doctor thinks it probable, that this proceſs is conſtantly carried on in all our juices, eſpecially where there is blood, and this chiefly in the veins; ſo that the blood is both the fountain of *heat*, and the firſt ſpring of motion. He obſerves, that it is agreeable to the laws of natural philoſophy to reaſon on the chemiſtry of the animal body, as well as on its mechanics; the minute component parts of ſolids having a ſet of laws peculiar to them; and their intimate changes and actions on one another are not to be accounted for by the coarſe mechanical laws. He obſerves laſtly, that ſince it has never been demonſtrated, that any fluid acquired *heat* in the coarſe mechanic way, by friction with a ſolid body; or that ſo conſiderable a change was made on the ſtructure of the minute parts of bodies, as is made in this proceſs, without producing *heat* at the ſame time; and ſince in fermentation, putrefaction, &c. the *heat* is not pretended to be owing to the veſſels containing the changed ſubject, but to what happens to its minute parts, in undergoing the change, it ſeems, on the whole, an unphiloſophic partiality for mechanics to maintain, that our juices have all their *heat* communicated to them from the ſolids, and that they acquire it by rubbing with the veſſels. See Medic. Eſſ. Edinb. vol. v. art. 77. Abrid. vol. i. p. 222, ſeq.

The ingenious Dr. Franklin inclines to this hypotheſis, when he ſays, that the fluid fire, as well as the fluid air, is attracted by plants in their growth, and becomes conſolidated with the other materials of which they are formed, and makes a great part of their ſubſtance; that, when they come to be digeſted, and to ſuffer in the veſſels a kind of fermentation, part of the fire, as well as part of the air, recovers its fluid active ſtate again, and diffuſes itſelf on the body digeſting and ſeparating it; that the fire ſo reproduced, by digeſtion and ſeparation, continually leaving the body, its place is ſupplied by freſh quantities, ariſing from the continual ſeparation; that whatever quickens the motion of the fluids in an animal, quickens the ſeparation, and reproduces more of the fire, as exerciſe, &c. Hence he conceives, that *animal heat* ariſes by or from a kind of fermentation in the juices of the body, juſt as *heat* ariſes in the liquors preparing for diſtillation; and he adds, it is remarkable that the liquor in a diſtiller's vat, when in its higheſt and beſt ſtate of fermentation, has the ſame degree of *heat* with the human body, i. e. about 94 or 96°.

But to this hypotheſis it may be objected, that the putrefactive fermentation, which is the only ſpecies that can, with probability, be ſuppoſed to take place in the body, has been found by accurate experiments to produce no *heat* at all; as is apparent in a dead body, which continues cold, though tending ever ſo faſt towards putridity. Beſides, it may be aſked, what fermentative or putrefactive proceſs can poſſibly be carried on in the bodies of men or animals in ſuch a climate as that of Siberia, where the thermometer frequently ſtanding at 90° or 100° below 0, a *heat* is nevertheleſs generated, in the body of a man uſing a proper degree of exerciſe, equal at leaſt to 90° above that mark? And whether there be any ſuch proceſs, that generates greater quantities of *heat* in proportion to the increaſing degrees of cold in the medium in which the proceſs is carried on? Thus, let the *heat* of the body at a medium be 95°; and, conſequently, when the thermometer ſtands at temperate, or 50°, a *heat* is generated within the body equal to 45°, which may be conſidered as additional to the 50°, which the body would poſſeſs in a ſtate of death. When the thermometer ſtands at 32°, the body, with proper exerciſe, is ſtill 95°, and produces no leſs than 63 additional degrees of *heat*; and in the cold above ſtated of 90° below 0, the body of a living man muſt produce 185 degrees of *heat* above that of a dead man expoſed in the ſame ſituation. Franklin's Exp. and Obſ. &c. on Electricity, p. 346, &c. Month. Rev. vol. xlii. p. 302.

A late author thinks the *heat* of animals explicable from the phoſphorus and air they contain. Phoſphorus exiſts, at leaſt in a dormant ſtate, in animal fluids; and it is alſo known that they all contain air; it is therefore only neceſſary to bring the phoſphoreal and aereal particles into contact, and *heat* muſt of conſequence be generated; and were it not for the quantity of aqueous humours in animals, fatal accenſions would frequently happen. Dr. Mortimer, ap. Phil. Tranſ. N° 476. § 20. See PHOSPHORUS.

Dr. Cullen, as we have already obſerved, maintains that the vital principle may have ſuch a peculiar power, that, where it is different, different degrees of *heat* may be generated, though the velocity of the blood be the ſame. But this appears to be only an occult principle in the animal œconomy, producing effects in a manner not yet ſatisfactorily explained. And it ſeems contrary to experience, and abſurd, to aſſert, that the principle of life can generate *heat* or cold, independently of chemical or mechanical means.

Dr. Black ſuppoſes, that animal *heat* is generated altogether in the lungs, by the action of the air on the principle of inflammability, and is thence diffuſed over the reſt of the body by means of the circulation; but a late ingenious writer, Dr. Leſlie, hath urged ſeveral arguments againſt this hypotheſis, tending to ſhew that it is repugnant to the known laws of the animal machine.

Dr. Leſlie advances another hypotheſis of his own, viz. that the ſubtle principle by chemiſts termed phlogiſton, which enters into the compoſition of natural bodies, is in conſequence of the action of the vaſcular ſyſtem gradually evolved through every part of the animal machine, and that, during this evolution, *heat* is generated. This opinion, he candidly acknowleges, was firſt delivered by Dr. Duncan of Edinburgh, and ſomewhat ſimilar to it is to be found in Dr. Franklin's Works, and in a paper of Dr. Mortimer's, in the Philoſophical Tranſactions. He endeavours to eſtabliſh this hypotheſis by the following arguments: 1. That the blood contains phlogiſton. 2. That the action of the blood-veſſels evolves phlogiſton. 3. That the evolution of phlogiſton is attended with *heat*. 4. That the *heat* thus generated is ſufficient to accoun for the *heat* of living animals. 5. That the moſt ſtrikin phenomena of animal *heat* evince the truth of theſe propoſitions. Philoſ. Inquiry into the Cauſe of Anim *Heat*, &c. 8vo. 1778.

With reſpect to this hypotheſis, it may be obſerved, th it is altogether inconſiſtent with thoſe experiments of D Prieſtley, from which it appears, that arterial blood h ſo ſtrong an attraction to phlogiſton, as to be capable of ſeparating it from fixed and phlogiſticated air. See BLOOD. The laſt hypotheſis we ſhall mention, is the very plauſible one of the ingenious Dr. Crawford, lately publiſhed in his Experiments and Obſervations on Animal *Heat*. It has been already obſerved, that Dr. Crawford has inferred from a variety of experiments, that *heat* and phlogiſton, ſo far from being connected, as moſt philoſophers have imagined, act in ſome meaſure in oppoſition to each other. By the action of *heat* on bodies, the force of their attraction of phlogiſton is diminiſhed, and by the action of phlogiſton, a part of their abſolute *heat* is expelled. He has alſo demonſtrated, that atmoſpherical air contains a greater quantity of abſolute *heat* than the air which is expired from the lungs of animals: he makes the proportion of the abſolute *heat* of atmoſpherical air to that of fixed air as 67 to 1; and the *heat* of dephlogiſticated air to that of atmoſpherical air as 4.6 to 1; and obſerving, that Dr. Prieſtley has proved, that the power of this dephlogiſticated air in ſupporting animal life is five times as great as that of atmoſpherical air, he concludes, that the quantity of abſolute *heat* contained in any kind of air fit for reſpiration, is very nearly in proportion to its purity, or to its power of ſupporting animal life; and ſince the air exhaled by reſpiration is found to contain only the $\frac{1}{67}$th part of the *heat* which was contained in the atmoſpherical air, previous to inſpiration, it is very reaſonably inferred, that the latter muſt neceſſarily depoſit a very great proportion of its abſolute *heat* in the lungs. It is natural to wiſh, that Dr. Crawford had made a greater variety of deciſive experiments on phlogiſticated air, which is not the ſame with fixed air, and experiments conducted on a larger ſcale than thoſe from which ſome of theſe latter concluſions are deduced, in order to confirm his general theory. An ingenious friend of the editor informs him, that, in repeating Dr. Crawford's experiments with the utmoſt attention and exactneſs, he has obtained very different reſults; and expreſſes an apprehenſion, that his ſyſtem is not ſufficiently eſtabliſhed by the experiments already publiſhed. Dr. Crawford has alſo demonſtrated, that the blood which paſſes from the lungs to the heart, by the pulmonary vein, contains more abſolute *heat* than that which paſſes from the heart to the lungs, by the pulmonary artery; the abſolute *heat* of florid arterial blood being to that of venous blood as $11\frac{1}{2}$ to 10: therefore, ſince the blood which is returned by the pulmonary vein to the heart has the quantity of its abſolute *heat* increaſed, it muſt have acquired this *heat* in its paſſage through the lungs; ſo that in the proceſs of reſpiration, a quantity of abſolute *heat* is ſeparated from the air, and abſorbed by the blood. Dr. Prieſtley has alſo proved, that in reſpiration phlogiſton is ſeparated from the blood, and combined with air. From theſe general principles, the ingenious author infers, that animal *heat* is diſengaged from the atmoſpherical air, during the proceſs of reſpiration, by the action of the phlogiſton contained in the blood; the blood at the ſame moment being left at liberty to unite with that portion of *heat* which the air had depoſited; ſo that a proceſs is carried on ſimilar to a chemical elective attraction. Thus, the air is received into the lungs, containing a great quantity of abſolute *heat*, the blood is returned from the extremities, highly impregnated with phlogiſton; the attraction of the air to the phlogiſton is greater than that of the blood: this principle, therefore, will leave the blood to combine with the air. By the addition of phlogiſton, the air is obliged to depoſit a part of its abſolute *heat*; and as the capacity of the blood for retaining *heat* is increaſed by the ſeparation of the phlogiſton, it will inſtantly unite with that portion of *heat* which had been detached from the air. Since arterial blood, as Dr. Prieſtley has proved, has a ſtrong attraction to phlogiſton, it will, conſequently, during the circulation, imbibe this principle from thoſe parts which retain it with leaſt force; and hence the venous blood, when it returns to the lungs, is found to be highly impregnated with phlogiſton. By this impregnation, its capacity for containing *heat* is diminiſhed. In proportion, therefore, as the blood, which had been dephlogiſticated by the proceſs of reſpiration, becomes again combined with phlogiſton in the courſe of the circulation, it will gradually give out that *heat* which it had received in the lungs, and diffuſe it over the whole ſyſtem. Conſequently, in reſpiration the blood is continually diſcharging phlogiſton, and abſorbing heat; and in the courſe of the circulation, it is continually imbibing phlogiſton, and emitting *heat*. But this *heat* being more than can be abſorbed by thoſe parts of the animal ſyſtem, which communicate the phlogiſton to the blood, the ſurplus becomes redundant, or is converted into moving or ſenſible *heat*, or that *heat* which is the object of our ſenſes.

The author applies theſe principles to the explication of a variety of phenomena accompanying *animal heat*. He ſhews, that the cauſes, which prevent the accumulation of *heat* in the animal body, in conſequence of its continually abſorbing it from the air, are the evaporation from the ſurface, and the cooling power of the air. Theſe, he obſerves, are alternately increaſed and diminiſhed in ſuch a manner, as to produce an equal effect. When the cooling power of the air is diminiſhed by the ſummer *heats*, the evaporation from the ſurface is increaſed; and when, on the contrary, the cooling power of the air is increaſed by the winter colds, the evaporation from the ſurface is proportionably diminiſhed. Exerciſe contributes to accelerate the reſpiration, and to increaſe the velocity of the circulation, and, therefore, to increaſe the quantity of phlogiſton diſcharged, and the quantity of *heat* abſorbed. In the cold ſtage of fevers, preceded by languor, a ſenſe of debility, and a diminution in the action of the heart and arteries, the reſpiration is ſmall, the pulſe is weaker than its natural ſtate, and the quantity of blood which paſſes through the *heart* in a given time, is diminiſhed; and hence leſs phlogiſton will be diſcharged from the body, and, conſequently, leſs *heat* ſeparated from the air. But in the progreſs of this cold ſtage, the veſſels on the ſurface of the body will be conſtricted, and the blood determined to the heart; and, therefore, its velocity through the lungs will be increaſed, and a greater quantity of *heat* will be abſorbed. In the hot ſtage of fevers, there is a very great evaporation from the ſurface, which is one of the means employed by nature for moderating the *heat*, and reſtraining the violence of the diſeaſe.

In putrid fevers, as the ſolid and fluid parts of the ſyſtem are in a putreſcent ſtate, and, conſequently, retain their phlogiſton with leſs force, a greater quantity of this principle will be diſcharged from the lungs, and the air more copiouſly ſupplied with it, will impart to the blood a greater proportion of its abſolute *heat*; and to theſe cauſes it is probably owing, that the *heat* of the human body never riſes ſo high as in putrid fevers. In topical inflammations, the *heat* is accumulated by the increaſed velocity of the blood through the part inflamed, in the ſame manner as it is accumulated upon fuel, in combuſtion, by directing a ſtream of freſh air into the fire.

HEAT *of inflammable and combuſtible bodies*. Dr. Crawford's theory with reſpect to the inflammation of combuſtible bodies, is founded on the ſame principles as his doctrine concerning the *heat* of animals. According to him, the *heat* which is produced by combuſtion is derived from the air, and not from the inflammable body. Inflammable bodies, he ſays, abound with phlogiſton, and contain little abſolute *heat*: the atmoſphere, on the contrary, abounds with abſolute *heat*, and contains little phlogiſton. In the proceſs of inflammation, the phlogiſton is ſeparated from the inflammable body, and combined with the air; the air is phlogiſticated, and gives off a great proportion of its abſolute *heat*, which, when extricated ſuddenly, burſts forth into flame, and produces an intenſe degree of ſenſible *heat*. And ſince it appears by calculation, that the *heat* produced by converting atmoſpherical into fixed air, is ſuch, if it were not diſſipated, as would be ſufficient to raiſe the air ſo changed, to more than twelve times the *heat* of red-hot iron, it follows, that in the proceſs of inflammation a very great quantity of *heat* is derived from the air. But, on the contrary, no part of the *heat* can be derived from the combuſtible body; becauſe the combuſtible body, during the inflammation, being deprived of its phlogiſton, undergoes a change ſimilar to that of the blood by the proceſs of reſpiration, in conſequence of which its capacity of containing heat is increaſed; and, therefore, it will not give off any part of its abſolute *heat*, but, like the blood in its paſſage through the lungs, it will abſorb heat. E. gr. the calx of iron contains more than twice as much abſolute *heat* as the iron in its metallic form; ſo that, in the proceſs of inflammation, the former muſt neceſſarily abſorb a quantity of *heat* equal to the exceſs of its heat above that of the latter. This *heat* cannot be conveyed from the iron; becauſe the heat of the calx is more than double of that which was contained in the iron, previous to the calcination. But in the burning of iron, the phlogiſton is ſeparated from the metal, and combined with the air; and by the combination of phlogiſton with air, a very intenſe *heat* is produced; and therefore, in the inflammation of iron, the atmoſpherical air is decompoſed, a very great proportion of its abſolute heat is ſeparated, part of which is abſorbed by the calx, and the reſt appears in the form of flame, or becomes moving and ſenſible *heat*. This ſenſible heat excited in combuſtion, muſt conſequently depend upon the ſeparation of abſolute *heat* from the air, by the action of phlogiſton. From this reaſoning it appears, that, when the air, in which an inflamed body is confined, is ſaturated with phlogiſton, and deprived of the greater part of its abſolute *heat*, the ſource of inflammation will be exhauſted, and the flame will be neceſſarily extinguiſhed. Hence we ſee the reaſon, why a conſtant ſucceſſion of freſh air is neceſſary to inflammation, as well as to the ſupport of animal life. Moreover, it is manifeſt, that the leſs phlogiſton, and conſequently the more abſolute *heat* any ſpecies of air contains, the longer it muſt contribute to the ſupport of flame as well as to the preſervation of life; and this agrees both with the author's experiments, and with thoſe of Dr. Prieſtley: for Dr. Crawford has found, that *dephlogiſticated* AIR contains nearly five times as much abſolute *heat* as common air; and Dr. Prieſtley has ſhewn, that five times as much ſenſible *heat* is produced by the converſion of it into fixed and phlogiſticated air, as by that of common air; for a candle will continue to burn five times as long in the former as in the latter ſpecies of air. It is evident, likewiſe, that the intenſity of the *heat*, all other circumſtances being alike, muſt be in proportion to the quantity of air which is changed in a given time; and, therefore, the *heat* may be increaſed to a very great degree, if a ſtream of freſh air be directed upon the fuel, by the bellows, or the blow-pipe.

It is obſerved by Dr. Prieſtley, that the air which was tainted by combuſtion and reſpiration, is again purified by the growth of vegetables (ſee AIR, *phlogiſticated*); and if this effect be produced by the ſeparation of phlogiſton, it follows, that vegetation will reſtore to the air that heat which had been detached from it in the proceſſes of reſpiration and combuſtion; and thus the principles of phlogiſton and fire, by the medium of atmoſpherical air, will be continually circulating through the animal and vegetable kingdoms.

A ſimilar theory of *heat* has lately been publiſhed by Mr. Elliot. See his Philoſophical Obſervations on the Senſes of Viſion and Hearing; to which are added an Eſſay on Combuſtion and *Animal Heat*, &c. 8vo. 1780.

HEAT is uſually divided, by the ſchool philoſophers, into *actual* and *potential*.

HEAT, *actual*, is that which we have been hitherto ſpeaking of, and which is an effect of real, elementary fire.

HEAT, *potential*, is that which we find in pepper, wine, and certain chemical preparations, as oil of turpentine, brandy, quick-lime, &c.

The Peripatetics account for the *heat* of quick-lime from an antiperiſtaſis.

The Epicureans, and other corpuſcularians, attribute even *potential heat* to atoms of particles of fire detained and locked up in the pores of thoſe bodies, and remaining at reſt therein; which being excited to action again by the *heat* and moiſture of the mouth, or by the effuſion of cold water, or the like cauſe, then break their incloſures, and diſcover what they are.

This doctrine is illuſtrated by Mr. Lemery the younger, in the inſtances of quick-lime, regulus of antimony, tin, &c. in the calcination whereof he obſerves, 1. That the fire, which they imbibe in the operation, makes a ſenſible addition to the weight of the body, amounting ſometimes to one tenth of the whole; and that, during this impriſonment, it ſtill retains all the particular properties or characters of fire, as appears hence, that when once ſet at liberty again, it has all the effects of other fire.

Thus a ſtony or ſaline body being calcined, and water poured thereon, that fluid is found ſufficient, by its external impreſſion, to break up the cells, and let the fire out; and upon this the water is rendered more or leſs warm, according to the quantity of fire lodged therein. Hence alſo it is, that ſome of theſe bodies viſibly contain a great deal of actual fire; and the ſlighteſt occaſion is capable of diſengaging it; and upon applying them to the ſkin, they burn, and raiſe an eſchar, not unlike the top of a live coal.

To this it is objected, that the particles of fire are only ſuch in virtue of the rapid motion wherewith they are agitated; ſo that to ſuppoſe them fixed in the pores of a body, is to diveſt them at once of that which conſtituted them fire, and, conſequently, to diſqualify them from producing the effects aſcribed to them. To which M. Lemery anſwers, that though the rapid motion of fire doth contribute very greatly to its effects, yet the particular figure of its particles is alſo to be conſidered. And though fire ſhould be detained, and fixed in the ſubſtance of bodies, yet why ſhould it fare worſe than other fluids under the ſame circumſtances? Water, for inſtance, is a fluid, whoſe fluidity depends, as already obſerved, on fire; and conſequently, it is leſs fluid than fire; and yet, every day, water is incloſed in bodies of all ſorts, without loſing its fluidity, or any of the properties that characterize it as water.

Add, that when water is frozen, the motion of its parts is, doubtleſs, diſcontinued; and yet, the figure of the particles remaining the ſame, it is ready to commence a fluid, as before, upon the leaſt warmth.

Laſtly, though ſalt be allowed to be the matter of taſtes, and that it has certain properties, ariſing chiefly from the figure of its parts; yet it only acts when diſſolved; or, which amounts to the ſame, when it ſwims in a fluid proper to keep its parts in motion: yet it is not leſs ſalt, or leſs the matter of taſte, when not in a ſtate of diſſolution: to deſpoil it of that quality, the figure of its parts muſt be altered.

As to what may be farther objected, of the impoſſibility of fixing ſo fine, ſubtil, penetrative, and active a matter, as fire, within the ſpongeous ſubſtance of a groſs, porous body, it will be of no great weight, unleſs it can be proved, that the pores of the cells are bigger than the ſame. If it be inſiſted, again, that a body which could find its way into a ſolid body, might get out again the ſame way; and that as it only penetrated the body, becauſe its own corpuſcles were ſmaller than the pores, the ſame conſideration muſt let it out again; it is anſwered, that the pores are not now in the ſame condition as before; the fire, in calcining, opened and dilated the pores; which, upon the fire's ceaſing, muſt naturally cloſe and contract again. Mem. de l'Acad. an. 1713.

Mr. Boyle endeavours to ſet aſide this account, and ſubſtitute a mechanical property; viz. a peculiar texture of parts in theſe caſes, in lieu of fire. Though a great likeneſs might be expected between the particles of fire adhering to the quick-lime, and thoſe of highly rectified ſpirit of wine; yet he has not found, that the effuſion of the ſpirit upon quick-lime produced any ſenſible *heat*, or viſible diſſolution of the lime, though it ſeemed to be as greedily ſucked in, as common water would have been. And farther, he found, that if cold water were poured upon the ſame lime, ſo drenched, there would enſue no manifeſt *heat*; nor did the lump appear ſwelled or broken till ſome hours after; which ſeems to argue, that the texture of the lime admitted ſome particles of the ſpirit of wine into ſome of its pores, which were either larger or more fit for it, without admitting it into the moſt numerous, whereinto the liquor muſt be received, to be able ſuddenly to diſſipate the corpuſcles of lime into their minuter particles.

Theſe phenomena, according to Mr. Boyle, ſeem to ſhew, that the diſpoſition which lime has to grow hot with water, greatly depends on ſome peculiar texture; ſince the aqueous parts, which one would think capable of quenching moſt of the fiery atoms ſuppoſed to adhere to quick-lime, did not near ſo much weaken the diſpoſition of it to *heat*, as that exceſs of the ſpirituous corpuſcles, and their contexture with thoſe of the lime, increaſed it.

Yet, in other places, this author appears rather to give into the corpuſcular ſcheme; urging, that if, inſtead of cold water, you quench the lime with hot water, the ebullition will be, oftentimes, far greater than if the liquor were cold; which, indeed, might well be expected, hot water being much fitter than cold ſuddenly to pervade the body of the lime, and haſtily to diſſolve, and ſet at liberty, the fiery and ſaline parts wherewith it abounds. And what a greater intereſt ſalts may have in producing ſuch *heats*, than cold water, he has alſo tried, by pouring acid ſpirits, and particularly ſpirit of ſalt, upon good quick-lime; for, by this means, there was always a far greater degree of *heat* excited, than if he had uſed common water; and this, whether he employed the ſpirit cold or hot.

It is not eaſy, ſays the ſame author, to apprehend how ſuch light and minute bodies ſhould be ſo long detained, as muſt by this hypotheſis be allowed, in quick-lime eſpecially; ſince no great *heat* enſues the pouring of water upon minium, or *crocus martis per ſe*, though they have been calcined by a violent fire, the effluvia whereof ſeem to adhere to them, by the increaſe of the weight the lead and iron manifeſtly receive from the operation of it.

The true cauſe of the phenomenon, which is the ſubject of this article, or of the increaſe of weight which certain ſubſtances acquire in calcination, was not generally known, previous to the modern diſcoveries relating to air. From theſe it appears, that the additional weight of calcined ſubſtances is not owing, as Mr. Boyle and others imagined, to the particles of fire that fix themſelves in the metal, but to the air abſorbed by theſe ſubſtances, and adhering to their conſtituent parts, in the proceſs of CALCINATION. See alſo *Fixed* AIR.

This curious diſcovery was ſuggeſted by Jean Rey, a phyſician at Perigord, in a very ſcarce book written at the beginning of the laſt century. Eſſais de J. Rey, &c. à Baza, 1630.

Mr. Brun, apothecary at Bergerac, had informed him, that having put two pounds ſix ounces of fine tin into an iron veſſel, expoſed to a violent heat, during ſix hours, he found that it was converted into a calx, which weighed ſeven ounces more than the tin originally employed. This increaſe of weight, ſays Jean Rey, proceeds from the air, which has been thickened, rendered heavy, and in ſome degree adheſive, by the vehement and long continued *heat* of the furnace; which air mixes with the calx, and attaches itſelf to its minuteſt particles, in the ſame manner as water adheres and adds weight to thoſe of ſand. This air, he adds, is no otherwiſe changed than in being deprived of its fluidity, which rendered it incapable of adhering to any ſubſtance; and in the preſent caſe is made more groſs, heavy, and adheſive. Abbé Rozier's Obſerv. ſur la Phyſique, vol. v. or Monthly Rev. vol. liv. p. 124. See Fire.

Heat, *method of eſtimating its effects on ſolids and fluids.* See Pyrometer and Thermometer.

Heat, in *Chemiſtry*. See Fire.

Heat, in *Medicine*. Great *heats* are not ſo much the immediate, as the remote cauſe of a general ſickneſs, by relaxing the fibres, and diſpoſing the humours to putrefaction; eſpecially among ſoldiers, and perſons expoſed the whole day to the ſun; for the greateſt *heats* are ſeldom found to produce epidemic diſeaſes, till the perſpiration is ſtopped by wet cloaths, fogs, dews, damps, &c. and then ſome bilious or putrid diſtemper is the certain conſequence, as fluxes, and ardent intermitting fevers. Neverthelesſs, it muſt be allowed, that *heats* have ſometimes been ſo great, as to prove the more immediate cauſe of particular diſorders. As when céntinels have been placed without cover, or frequent reliefs, in ſcorching *heats*; or when troops march, or are exerciſed in the *heat* of the day; or when people imprudently lie down and ſleep in the ſun; all theſe circumſtances are apt to bring on diſtempers, varying according to the ſeaſon of the year. In the beginning of ſummer, theſe errors produce inflammatory fevers; and, in the end of it, or in the beginning of autumn, a remitting fever, or dyſentery.

To prevent, therefore, the effects of intemperate *heat*, commanders have found it expedient ſo to order the marches, that the men come to the ground before the heat of the day; and to give ſtrict orders, that none of them ſleep out of their tents; which in fixed encampments may be covered with boughs, to ſhade them from the ſun. It is likewiſe a rule of great importance to have the ſoldiers exerciſed before the cool of the morning is over; for, by that means, not only the ſultry *heats* are avoided, but the blood being cooled, and the fibres braced, the body will be better prepared to bear the heat of the day. Laſtly, in very hot weather, it has been found proper to ſhorten the centinels duty, when obliged to ſtand in the ſun. Pringle's Obſ. on the Diſeaſes of the Army, p. 79—95.

Heat, in *Smithery*, &c. See Iron.

Heat is alſo uſed, in reſpect of race-horſes, for the exerciſes to be given them by the way of preparation, &c. Two *heats* in a week are reckoned a juſt meaſure for any horſe, of what ſtate or conſtitution ſoever. The jockeys lay it down as a rule, that one of the *heats* be given on the ſame day of the week whereon the horſe is to run his match; and this is to be the ſharpeſt *heat*.

HEATH, *Erica*, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe: the flower hath a coloured empalement of four leaves, and one ſwollen petal, which is quadrifid, with eight ſtamina fixed to the receptacle; in the bottom is ſituated a germen, which afterward becomes a round capſule, having four cells, which are filled with ſmall ſeeds. Miller enumerates four ſpecies, which grow wild upon barren uncultivated places in divers parts of England; but notwithſtanding their being ſo common, they deſerve a place in ſmall quarters of humble flowering ſhrubs, where the beauty and long continuance of the flowers, and diverſity of the leaves, make an agreeable variety. Linnæus attributes forty-two different ſpecies to this genus.

The decoction of *heath* is diuretic; Cluſius affirms that Rondeletius, the famous profeſſor of phyſic at Montpelier, uſed the oil of its flowers for tetters with ſucceſs. Tabernæmontanus ſays, that it is a ſpecific for theſe ſorts of diſeaſes; and that a fomentation with the flowers of *heath*, eaſes the pain of the gout. For the ſame diſeaſe they prepare a vapour bath with its leaves and flowers. Martyn's Tournefort.

The juice, or the diſtilled water of the flowers, cures redneſs of the eyes, and mitigates pain in them. A decoction of the leaves taken warm, to the weight of five ounces, morning and evening, three hours before meat, for thirty days ſucceſſively, is effectual for breaking and expelling the ſtone in the bladder, as Matthiolus experienced. He adds, that he knew ſome, who, by obſerving an accurate regimen of diet, by only drinking this liquor, voided the ſtones from the bladder, crumbled into ſmall particles.

Hence is derived its name *erica*, from ερεικω, *I break.*

Heath, *berry-bearing*, or *Blackberry* Heath, *Empetrum*, in *Botany*, a genus of the *dioecia triandria* claſs. Its characters are theſe: it hath male and female flowers on different plants; the male flowers have a three-pointed empalement, and three petals, which are narrow at their baſe, and three long hanging ſtamina: the female flowers have the ſame empalement and petals as the male; and in the center is ſituated a depreſſed germen, with nine reflexed ſpreading ſtigmas; the germen becomes a depreſſed round berry of one cell, incloſing nine ſeeds, placed circularly. We have but one ſpecies in England, which grows wild on the mountains in Staffordſhire, Derbyſhire, and Yorkſhire, where the ſoil is boggy; the heathcocks feed much upon the berries, which are called heath berries, or crack berries; and where theſe ſhrubs are, there is generally plenty of theſe fowls. Miller.

Heath, *low pine*. See Coris.

Heath, *ſea*. See Erica *marina*.

Heath *peaſe*. See *Bitter* Vetch.

Heath-*cock*. See Grouse.

Heath, *mountain*. See Saxifrage.

HEATHEN. See Pagan.

HEATOTOTL, in *Zoology*, the name of an American bird, deſcribed by Nieremberg, and called alſo *avis venti*. It is remarkable for a very large and round creſt of whitiſh feathers on its head. Its breaſt is of a browniſh grey; its belly white, and its feet yellow; its tail is round when expanded, and is variegated with black and white; its back and wings are black.

HEAVE, at *Sea*, ſignifies to throw away, or fling any thing over-board.

When a ſhip, being at anchor, riſes and falls by the force of the waves, ſhe is alſo ſaid to *heave and ſet*.

To **Heave** *a peek*. See Peek.

To **Heave** *at the capſtan*, ſignifies to turn it about. See Capstan.

To **Heave** *down*. See Careening.

To **Heave** *a flag abroad*, is to hang it out. See Flag, and Signal.

To **Heave** *a-head*, is to make the ſhip advance by heaving in the cable, or other rope, which is faſtened to an anchor at ſome diſtance before her. *To heave a-ſtern*, is to draw the ſhip backwards by the ſame operation.

To **Heave** *the lead*. See Sounding.

To **Heave** *out*, is to unfurl and throw looſe a ſail from the place where it had been rolled and faſtened. The phraſe is more particularly applied to the ſtay-ſails: as, *looſe the top-ſails*, and *heave out the ſtay-ſails*, which is done, in order to ſet or dry them.

To **Heave** *ſhort*, is to draw ſo much of the cable into the ſhip, by means of the capſtan or windlaſs, as that by advancing ſhe will be almoſt perpendicularly above the anchor, and in a proper ſituation to ſet ſail: and to *heave taught*, is to turn about the capſtan, till the rope applied to it becomes ſtrait, and ready for action.

Heave-*offerings*, under the *Jewiſh Law*, were things offered up to God, by lifting them up on high.

HEAVEN, *Cœlum*, an azure, tranſparent orb, inveſting our earth; wherein the celeſtial bodies perform their motions.

The popular notion of *heaven*, it muſt be obſerved, has various ideas, in the language of philoſophers, divines, and aſtronomers: agreeable to which, we may lay down divers *heavens*; as the *higheſt*, or *empyrean heaven*; the *ætherial*, or *ſtarry heaven*; the *planetary heaven*, &c.

Heaven, among *Divines*, called alſo the *empyrean heaven*, is the abode of God, and bleſſed ſpirits; as angels, and the ſouls of the righteous deceaſed.

In this ſenſe, *heaven* ſtands oppoſite to *hell*.

This is alſo frequently called, in Scripture, the *kingdom of heaven*, the *heaven of heavens*, and by St. Paul the *third heaven*; ſometimes *Paradiſe*, the *New Jeruſalem*, &c.

This *heaven* is conceived as a place in ſome remote part of infinite ſpace, wherein the Deity is pleaſed to afford a nearer and more immediate view of himſelf, and a more ſenſible manifeſtation of his glory; and a more adequate perception of his attributes, than in the other parts of the univerſe, where he is likewiſe preſent.

This makes what the divines alſo call the *beatific viſion*. Authors are much divided as to the reality of ſuch *local heaven*.

The inſpired writers give us very magnificent deſcriptions of *heaven*, the ſtructure, apparatus, and attendance thereof; particularly Iſaiah, and St. John the divine. Plato, in his Dial. de Anim. ſpeaks of *heaven* in terms that bear ſo near a reſemblance to thoſe of Scripture, that Euſebius charges him with borrowing his account thence. De Præpar. Evangel. lib. xi. cap. 37.

The ancient Romans had a kind of *heaven* in their ſyſtem of theology, which they called Elysium, or the *elyſian fields*.

The Mahometan *heaven*, or *paradiſe*, is very groſs, agreeable to the genius of their religion.

Heaven, among *Aſtronomers*, called alſo the *ætherial* and *ſtarry heaven*, is that immenſe region wherein the ſtars, planets, and comets, are diſpoſed.

This is what Moſes calls the *firmament*, ſpeaking of it as the work of the ſecond day's creation; at leaſt it is thus the word רקיע is uſually rendered by his interpreters; though ſomewhat abuſively, to countenance their own notion of the *heavens* being firm, or ſolid. The word, it is certain, properly ſignifies no more than *expanſe*, or *extenſion*; a term very well adapted by the prophet to the impreſſion which the *heavens* make on our ſenſes; whence, in other parts of Scripture, the *heaven* is compared to a curtain, or a tent ſtretched out to dwell in. The LXX firſt added to this idea of expanſion, that of *firm* or *ſolid*; rendering it by στερεωμα, according to the philoſophy of thoſe times; in which they have been followed by the modern tranſlators.

The later philoſophers, as Des Cartes, Kircher, &c. have eaſily demonſtrated this *heaven* not to be ſolid, but fluid; but they ſtill ſuppoſe it full, or perfectly denſe, without any vacuity, and cantoned out into many vortices.

But others carry the thing much farther, and overturn not only the ſolidity, but the ſuppoſed plenitude, of the *heavens*. Sir Iſaac Newton has abundantly ſhewn the *heavens* void of almoſt all reſiſtance, and, conſequently, of almoſt all matter: this he proves from the phenomena of the celeſtial bodies; from the planets perſiſting in their motions without any ſenſible diminution of their velocity; and the comets freely paſſing in all directions towards all parts of the *heavens*.

Heaven, taken in this general ſenſe, for the whole expanſe between our earth and the remoteſt regions of the fixed ſtars, may be divided into two very unequal parts, according to the matter found therein; viz. the atmoſphere, or *aereal heaven*, poſſeſſed by air; and the *æthereal heaven*, poſſeſſed by a thin, unreſiſting medium, called *æther*.

Heaven is more particularly uſed, in *Aſtronomy*, for an orb, or circular region, of the æthereal *heaven*.

The ancient aſtronomers aſſumed as many different *heavens* as they obſerved different motions therein. Theſe they ſuppoſed all to be ſolid, as thinking they could not otherwiſe ſuſtain the bodies fixed in them; and ſpherical, that being the moſt proper form for motion.

Thus we had ſeven *heavens* for the ſeven planets; viz. the *heavens* of the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn.

The eighth was for the fixed ſtars, which they particularly called the *firmament*.

Ptolemy adds a ninth *heaven*, which he called the *primum mobile*.

After him two CRYSTALLINE *heavens* were added, by king Alphonſus, &c. to account for ſome irregularities in the motions of the other *heavens*: and laſtly, an *empyrean heaven* was drawn over the whole, for the reſidence of the Deity; which made the number twelve.

But others admitted many more *heavens*, according as their different views and hypotheſes required. Eudoxus ſuppoſed twenty-three, Calippus thirty, Regiomontanus thirty-three, Ariſtotle forty-ſeven, and Fracaſtor no leſs than ſeventy.

We may add, that the aſtronomers did not much concern themſelves whether the *heavens*, they thus allow of, were real or not; provided they ſerved a purpoſe in accounting for any of the celeſtial motions, and agreed with the phenomena.

Among the other reveries of the rabbins, contained in the Talmud, we find it aſſerted, that there is a place where the *heavens* and the earth join together; that rabbi Barchana, going thither, laid his hat on the window of *heaven*; and that, going to take it again immediately after, it was gone, the *heavens* having carried it off; ſo that he muſt wait for a revolution of the orbs to bring it to its place again.

HEAVER, in *Sea Language*, is a name given by ſeamen to a wooden ſtaff, which they employ as a lever on many occaſions; particularly in ſetting up the top-maſt ſhrouds, frapping the top-maſts, ſtropping the larger blocks, ſeizing the ſtanding rigging, &c.

HEAVINESS. See Gravity.

For the laws of the deſcent of *heavy* bodies, ſee Descent.

Heavy bodies do not tend preciſely to the very center of the earth, except at the poles, and the equator, on account of the ſpheroidal figure of the earth. Their direction is every where perpendicular to the ſurface of the ſpheroid.

HEAULME, or Heaume, in *Heraldry*, a HELMET, or head-piece.

HEAVY, in the *Manege*. A horſe is ſaid to reſt *heavy* upon the hand, who, through the ſoftneſs of his neck, the weakneſs of his back, the weight of his fore-quarters, or through wearineſs, throws himſelf upon the bridle; but without making any reſiſtance, or any effort, to force the horſeman's hand. This fault is remedied, and the horſe made light upon the hand, by ſtopping, and making him go back frequently, if it proceeds only from lazineſs and ſtiffneſs; but if cauſed by any defect in the back, there is no remedy for it.

HEBBING-*wears*, in our *Statutes*, is uſed for wears or engines made or laid at ebbing water, 23 Hen. VIII. cap. 5.

HEBDOME, Ἑβδόμη, among the Athenians, a feſtival or holy day kept always on the ſeventh day of the moon in honour of Apollo; that being ſuppoſed to have been his birth-day.

HEBE, in *Ancient Mythology*, a goddeſs, the idea of whom, among the Romans, ſeems to have been much the ſame with that of eternal youth, or an immortality of bliſs; agreeably to which, ſhe is repreſented on a gem, in the great duke's collection at Florence, with a young airy look, and drinking out of a little bowl; or, according to Milton's expreſſion, "Quaffing immortality and joy." Spence's Polymetis, p. 189.

HEBENSTRETIA, in *Botany*, the name of a genus of plants, of the *didynamia angioſpermia* claſs; the characters of which are theſe: the perianthium is of a tubular form; it conſiſts of one leaf, lightly divided at the verge into two lips; the upper lip is ſhort, ſtraight, and narrow; the under is lanceolated, long, and bent downwards; the flower conſiſts of one irregular petal; the tube is cylindric, and ſhorter than the cup; the lip is only one, not two, as in other labiated flowers; it is broad, and divided into four ſegments at the end, and is of the length of the under lip of the cup; the ſtamina are four filaments, two ariſing from each ſide of the lower part of the lip of the flower; the germen of the piſtil is oblong, the ſtyle is ſlender, and of the length of the flower, and the ſtigma is very thin; the fruit is an oblong capſule opening into two parts; the ſeeds are two in number, and are oblong, convex, and triſulcated on one ſide, and flat on the other.

HEBERMAN, in *Ancient Law Books*, a poacher, or a fiſherman below London bridge: thus called, becauſe he commonly fiſhes at ebb-water.

HEBERTHEFT, in *Ancient Cuſtoms*, a privilege of having the goods of a thief, and the trial of him, within a particular diſtrict.

HEBDOMADARY, Hebdomadarius, or Hebdomadius, a member of a chapter, or convent, whoſe week it is to officiate in the choir, to rehearſe the anthems and prayers, and to perform the uſual functions which the ſuperiors perform at ſolemn feaſts, and other extraordinary occaſions.

The word is formed of the Greek ἑβδομας, which ſignifies the number *ſeven*; of ἑπτα, *ſeven*.

The *hebdomadary* generally collates to the benefices which become vacant during his week; though it is uſually looked on as an abuſe.

In cathedrals, the *hebdomadary* was a canon or prebendary, who had the peculiar care of the choir, and the inſpection of the officers for his week.

In monaſteries, the *hebdomadary* is he who waits at table for a week, or other ſtated period; directs and aſſiſts the cook, &c.

In church antiquity, we meet with accounts of nine different ſorts of *hebdomadaries*; viz. the *hebdomadarius cantor*, or *hebdomadary chanter*; *hebdomadarius chori*, *hebdomadary of the choir*; which two were really the ſame; viz. he who led or conducted the public ſervice; *hebdomadary* of the kitchen, *hebdomadarius coquinæ*; *hebdomadary* of the defunct, or the dead; *hebdomadarius defunctorum*, he who took care of the office and ſervice of the dead; *hebdomadarius invitatorii*, he who ſung the invitatory; *hebdomadarius lector ad menſam*, he who read at meal time; *hebdomadarius majoris miſſæ*, he who read the maſs; *hebdomadarius pſalterii*, who probably was the ſame with the *hebdomadarius chori*; and *hebdomadarius ſacri altaris*, who might be the ſame with the *hebdomadary* of the high maſs.

HEBRAICA *concha*, in *Natural Hiſtory*, a name given by authors to a very beautiful ſea-ſhell of the VOLUTA kind, from a number of black marks which ſeem to reſemble the Hebrew characters.

HEBRAISM, an idiotiſm, or manner of ſpeaking, peculiar to the Hebrew tongue.

There is no underſtanding even the verſions of the Old Teſtament, without ſome acquaintance with the Hebrew; they are ſo full of *Hebraiſms*.

We have abundance of *Hebraiſms* borrowed from Scripture, and naturalized in our own language: as, *Son of perdition*; *to ſleep in the Lord*, &c.

HEBREW, ſomething relating to the people of the Jews, i. e. the twelve tribes, deſcended from the twelve patriarchs, ſons of Jacob. See Jews. Thus we ſay,

Hebrew *Bible*. See Bible.

Hebrew *character.* There are two kinds of *Hebrew* characters: the *ancient*, called alſo the *ſquare*; and the *modern*, or *rabbinical* characters. The *ſquare Hebrew* takes its denomination from the figure of its characters, which ſtand more ſquare, and have their angles more exact and preciſe than the other.

This character is uſed in the text of holy Scripture, and their other principal and moſt important writings. When both this and the rabbinical character are uſed in the ſame work, the former is for the text, or the fundamental part; and the latter for the acceſſory part; as the gloſs, notes, commentaries, &c.

The beſt and moſt beautiful characters of this kind, are thoſe copied from the characters in the Spaniſh manuſcripts; next, thoſe from the Italian manuſcripts; then thoſe from the French; and laſtly, thoſe of the Germans, whoſe characters are much the ſame, with reſpect to the other genuine *ſquare Hebrew* characters, that the Gothic, or Dutch characters, are with reſpect to the Roman.

Several authors contend, that the *ſquare* character is not the real ancient *Hebrew* character, written from the beginning of the language to the time of the Babyloniſh captivity; but that it is the Aſſyrian, or Chaldee character, which the Jews aſſumed, and accuſtomed themſelves to, during the captivity, and retained afterwards. They ſay, that the Jews, during their captivity, had quite diſuſed their ancient character; ſo that Ezra found it neceſſary to have the ſacred books tranſcribed into the Chaldean ſquare character. Theſe authors add, that what we call the *Samaritan* character, is the genuine ancient *Hebrew.*

Of this opinion are Scaliger, Bochart, Caſaubon, Voſſius, Grotius, Walton, Capellus, &c. and among the ancients Jerome and Euſebius. On this ſide it is urged, that the preſent characters are called Aſſyrian by the ancient Jewiſh writers of the Talmud, and, therefore, muſt have been brought from Aſſyria; but to this argument it is replied, that there were two ſorts of characters anciently in uſe, viz. the ſacred, or preſent ſquare character, and the profane or civil, which we call Samaritan; and that the ſacred is called Aſſyrian, becauſe it firſt began in Aſſyria to come into common uſe. It is farther alledged, that the Chaldee letters, which the Jews now uſe, were unknown to the ancient Jews before the captivity, from Dan. i. 4. Moreover, it is inferred from 2 Kings, xvii. 28. whence we learn that a Jewiſh prieſt was ſent to teach the Samaritans the worſhip of Jehovah; on which occaſion he muſt have taught them the law; and yet no mention occurs of his teaching them the language or character, that the law was then written in the character which the Samaritans uſed. But the chief argument is taken from ſome ancient Jewiſh ſhekels, with a legend on one ſide, "The ſhekel of Iſrael;" and on the other "Jeruſalem the holy," both in Samaritan characters. Theſe ſhekels, it is ſaid, muſt have been coined before the diviſion of the two kingdoms of Judah and Iſrael, or, at leaſt, before the Aſſyrian captivity, becauſe the Samaritans never afterwards reckoned Jeruſalem holy. On the other ſide, or for the primitive antiquity of the ſquare character, are the two Buxtorfs, Leuſden, Calovius, Hottinger, Spanheim, Lightfoot, &c. They urge, from Matthew v. 18. that *jod* is really the leaſt of the conſonants in the preſent *Hebrew*, whereas it is one of the largeſt characters in the Samaritan alphabet: but Walton replies, that if our Saviour here ſpeaks of the leaſt letter of the alphabet, we can only infer, that the Chaldee character was uſed in our Saviour's time, which is not denied by thoſe who maintain the Samaritan to be the original. They alſo allege, that the Jews were too obſtinate and ſuperſtitious to allow their ſacred character to be altered; but if this was done under the direction and authority of Ezra, the argument will be much invalidated. Farther they ſay, that Ezra could not alter the ancient character, becauſe it was impoſſible to make the alterations in all their copies. This argument, however, is contradicted by fact; ſince the old Engliſh black letter is actually changed for the Roman. They ſay, likewiſe, that Ezra was not diſpoſed to prophane the ſacred writings with a heathen character: but this ſuppoſes that Ezra was ſo ſuperſtitious as to imagine, that there was ſome peculiar ſanctity in the ſhape of the letters. Moreover, the advocates for this opinion appeal to ancient coins found in Judæa, with a legend in the Chaldee or Aſſyrian character. But the genuineneſs of theſe coins is much ſuſpected.

The learned Jeſuit Souciet maintains, with great addreſs, that the ancient *Hebrew* character, is that found on the medals of Simon, and others, commonly called *Samaritan medals*; but which, he aſſerts, were really *Hebrew* medals, ſtruck by the Jews, and not the Samaritans.

Buxtorf endeavours to reconcile theſe two opinions, by producing a variety of paſſages from the rabbies to prove, that both theſe characters were anciently uſed; the preſent ſquare character being that in which the tables of the law, and the copy depoſited in the ark, were written; and the other character being uſed in the copies of the law, which were written for private and common uſe, and in civil affairs in general; and that after the captivity, Ezra enjoined the former to be uſed by the Jews on all occaſions, leaving the latter to the Samaritans and apoſtates. But it can hardly be allowed by any who conſider the difference between the Chaldee and Samaritan characters, with reſpect to convenience and beauty, that they were ever uſed at the ſame time. After all, it is of no great moment which of theſe, or whether either of them, were the original characters; ſince it appears, that no change of the words has ariſen from the manner of writing them, becauſe the Samaritan and Jewiſh Pentateuch almoſt always agree after ſo many ages. It is moſt probable that the form of theſe characters has varied in different periods; this appears from the teſtimony of Montfaucon, in his Hexapla Origenis, vol. i. p. 22, &c. and is implied in Dr. Kennicot's making the characters in which manuſcripts are written, one teſt of their age. See Jenning's Ant. vol. ii. p. 336, and the authors there cited. Kennicott's Diſſ. on the *Hebrew* Text, vol. i. and ii.

Hebrew *character, modern*, or *rabbinical*, is a good neat character, formed of the *ſquare Hebrew*, by rounding it, and retrenching moſt of the angles, or corners of the letters, to make it the more eaſy and flowing. The letters uſed by the Germans are very different from the *rabbinical* character uſed every where elſe, though all formed alike from the ſquare character; but the German in a more ſlovenly manner than the reſt.

The rabbins frequently make uſe either of their own, or the *ſquare Hebrew* character, to write the modern languages in. There are even books in the vulgar tongues, printed in *Hebrew* characters; inſtances whereof are ſeen in the French king's library.

Hebrew *language*, called alſo abſolutely HEBREW, is the language ſpoke by the *Hebrews*, who were ſo called, as is moſt probable, from Heber the ſon of Shem, wherein all the books of the Old Teſtament are written; whence it is alſo called the *holy* or *ſacred language.*

There is no piece, in all antiquity, written in pure *Hebrew*, beſide the books of the Old Teſtament; and even ſome parts of thoſe are in CHALDEE.

The *Hebrew*, then, appears to be the moſt ancient of all the languages in the world; at leaſt it is ſo with regard to us, who know of no older. Some learned men will have it the language ſpoken by Adam in paradiſe; and that the ſaints will ſpeak it in heaven; alleging, that it is ſo conciſe and yet ſo ſignificant, ſo pathetic and yet ſo free from levity, or bombaſt, as of all languages to approach neareſt to that of ſpirits, who need no words for conveying their ideas to each other. Dr. Sharpe adopts the opinion, that the *Hebrew* was the original language; not indeed that the *Hebrew* is the unvaried language of our firſt parents, but that it was the general language of men at the diſperſion; and however it might have been improved and altered from the firſt ſpeech of our firſt parents, it was the original of all the languages, or almoſt all the languages, or rather dialects, that have ſince ariſen in the world. Origin, &c. of Languages, p. 22, &c. See LANGUAGE.

The *Hebrew*, ſuch as we have it in the holy Scripture, is a very regular, analogical language, and is particularly ſo in its conjugations. Properly ſpeaking, there is but one ſimple conjugation; but this is varied in each verb ſeven or eight different ways, which has the effect of ſo many different conjugations, and affords a great number of expreſſions, whereby to repreſent, under one ſingle word, all the different modifications of a verb, and ſeveral ideas at once; which in the modern, and moſt of the ancient and learned languages, are expreſſible only by phraſes.

The original or primitive words in their language, which they call *radices, roots*, rarely conſiſt of more than three letters, or of two ſyllables, which are expreſſed by two ſounds, or by the ſame ſound redoubled, which is indicated by a point.

There are twenty-two letters in the *Hebrew* language, which grammarians divide into *guttural*, *palatal*, *dental*, *labial*, and *lingual*. This diviſion is taken from the ſeveral organs of ſpeech; ſome whereof contribute more than others to the pronunciation of certain letters.

Uſually, they only reckon five vowels in the *Hebrew*, which are the ſame with ours, viz. *a*, *e*, *i*, *o*, *u*; but then each vowel is divided into two, a long, and a breve, or ſhort: the ſound of the former is ſomewhat graver, and longer; and that of the latter ſhorter, and more acute. It muſt be added, that the two laſt vowels have quite different ſounds; different, we mean, in other reſpects beſides quantity and degree of elevation.

To theſe ten or twelve vowels muſt be added ſome others, called *ſemi-vowels*, which are only ſlight motions ſerving to connect the conſonants, and make the eaſier tranſitions from one to another.

The number of accents is prodigious in the *Hebrew*. Some reckon near forty different ones; and others reduce their number to thirty, and even lower; and of theſe there are ſeveral whoſe uſe is not well aſcertained, notwithſtanding all the inquiries of the learned into that matter.

In the general, we know theſe three things: 1. That they ſerve to diſtinguiſh the ſentences, and the members thereof, like the points and commas, &c. in Engliſh. 2. To determine the quantity of the ſyllables; and, 3. To mark the tone wherewith they are to be ſpoke or ſung.

It is no wonder, then, that there ſhould be more accents in the *Hebrew* than in other languages; as they do the office of three different things, which, in other languages, are called by different names. See Accents.

As we have no *Hebrew*, but what is contained in the Scripture, that language to us wants a great many words; not only becauſe in thoſe primitive times the languages were not ſo copious as at preſent; but alſo on this account, that the inſpired writers had no occaſion to mention many of the terms that might be in the language.

The Chaldee, Syriac, Ethiopic, &c. languages, are by ſome held to be only dialects of the *Hebrew*; as the French, Italian, Spaniſh, &c. are dialects of the Latin.

It has been ſuppoſed by many very learned men, that the *Hebrew* characters or letters were often uſed hieroglyphically, and that each had its ſeveral diſtinct ſenſe underſtood as a hieroglyphic. Neuman, who ſeems to have taken infinite pains to find out this ſecret meaning of theſe letters, gives the following explication: א *aleph*, he ſays, is a character denoting motion, readineſs, and activity; ב *beth*, ſignifies, 1. matter, body, ſubſtance, thing. 2. Place, ſpace, or capacity. And, 3. In, within, or contained; ג *gimel*, ſtands for flexion, bending, or obliquity of any kind; ד *daleth*, ſignifies any protruſion made from without, or any promotion of any kind; ה *he*, ſtands for preſence, or demonſtrative eſſence of any thing; ו *vau*, ſtands for copulation or growing together of things; ז *dſain*, expreſſes vehement protruſion and violent compreſſion, ſuch as is occaſioned by at once violently diſcharging and conſtringing a thing together; it alſo ſignifies, ſometimes, the ſtraitening of any figure into a narrow point at the end; ח *cheth*, expreſſes aſſociation, ſociety, or any kind of compoſition, or combination of things together; ט *teth*, ſtands for the withdrawing, drawing back, or receſs of any thing; י *jod*, ſignifies extenſion and length, whether in matter or in time; כ *caph*, expreſſes a turning, curvedneſs, or concavity; ל *lamech*, ſtands for an addition, acceſs, impulſe, or adverſation, and ſometimes for preſſure; מ *mem*, expreſſes amplitude, or the amplifying any thing in whatever ſenſe; in regard to continuous qualities, it ſignifies the adding length, breadth, and circumference; and in disjunct qualities it ſignifies multitude; נ *nun*, ſignifies the propagation of one thing from another, or of the ſame thing from one perſon to another; ס *ſamech*, expreſſes cincture and coarctation; ע *ain*, ſtands for obſervation, objection, or obviation; פ *pe*, ſtands for a crookedneſs or an angle of any figure; צ *tſade*, expreſſes contiguity and cloſe ſucceſſion; ק *koph*, expreſſes a circuit or ambit; ר *reſh*, expreſſes the egreſs of any thing, as alſo the exterior part of a thing, and the extremity or end of any thing; ש *ſhin*, ſignifies the number three, or the third degree, or the utmoſt perfection of any thing; ת *tau*, expreſſes a ſequel, continuation, or ſucceſſion of any thing.

According to this explication, as the ſeveral particular letters of the *Hebrew* alphabet ſeparately ſignify the ideas of motion, matter, ſpace, and the ſeveral modifications of matter, ſpace, and motion, it follows, that a language, the words of which are compoſed of ſuch expreſſive characters, muſt neceſſarily be of all languages the moſt perfect and expreſſive, as the words formed of ſuch letters, according to their determinate ſeparate ſignifications, muſt convey the idea of all the matters contained in the ſenſe of the ſeveral characters, and be at once a name and a definition, or ſuccinct deſcription of the ſubject, and all things material as well as ſpiritual, all objects in the natural and moral world, muſt be known as ſoon as their names are known, and their ſeparate letters conſidered.

The words urim and thummim are thus eaſily explained and found, perhaps the moſt appoſite and expreſſive words that were ever formed.

Hebrew, *rabbinical*, or *modern* **Hebrew**, is the language uſed by the rabbins, in the writings they have compoſed. The baſis, or body hereof, is the *Hebrew* and Chaldee, with divers alterations in the words of theſe two languages, the meanings whereof they have conſiderably enlarged and extended. Abundance of things they have borrowed from the Arabic: the reſt is chiefly compoſed of words and expreſſions, chiefly from the Greek; ſome from the Latin; and others from the other modern tongues; particularly that ſpoken in the place where each rabbin lived or wrote.

The *rabbinical Hebrew* muſt be allowed a very copious language. M. Simon, in his Hiſt. Crit. du Vieux Teſtam. liv. iii. chap. 27. obſerves, that there is ſcarce any art, or ſcience, but the rabbins have treated thereof in it. They have tranſlated moſt of the ancient philoſophers, mathematicians, aſtronomers, and phyſicians; and have wrote themſelves on moſt ſubjects: they do not want even orators and poets. Add, that this language, notwithſtanding it is ſo crowded with foreign words, has its beauties viſible enough in the works of thoſe who have written well in it.

M. Simon ſays, it is impoſſible to reduce it into an art, or ſyſtem of rules; but ſeveral learned men are of another ſentiment; and it not only appears poſſible, but has actually been performed. Genebrard firſt attempted it in his Iſagoge Rabbinica, which yet goes no farther than the learning to read it. Buxtorf ſeconded him, at the end of his *Hebrew* Grammar; where we have an additional piece, under the title Lectionis Hebreæo-Germanicæ Uſus & Exercitatio. Others have gone yet farther: Maius has lately given us a rabbinical grammar, at Gieſſen, under the title of Johannis Maii Grammatica Rabbinica; and before him Sennert had done the ſame; Rabbiniſmus: h. e. Præcepta Targumico-Talmudico-Rabbinica. Wirtemb an. 1666.

Hebrew *points* or *vowels*. See Points.

HEBREWS, *Epiſtle to the*, a canonical book of the New Teſtament, bearing no writer's name, but generally aſcribed to the apoſtle Paul. Concerning the date of this epiſtle, and occaſion of writing it, ſee Epistle.

HECATE, in *Mythology*, a name of the infernal Diana, repreſented with all the characteriſtics of a fury, holding inſtruments of terror in her hands, and graſping either cords, or ſwords, or ſerpents, or flaming torches. Under this character ſhe was exhibited with three bodies, and invoked in enchantments.

HECATOMB, **Hecatombe**, in *Antiquity*, a ſacrifice of a hundred beaſts of the ſame kind, at a hundred altars, and performed by a hundred prieſts, or ſacrificers.

The word is formed of the Greek ἑκατομϐη, which properly ſignifies a *ſumptuous*, or *magnificent ſacrifice*. Others derive it from the Greek ἑκατον, *centum*, a *hundred*, and βȣς, *bos*, *bullock*, &c. On which footing the *hecatomb* ſhould be a ſacrifice of a hundred bullocks. Others derive the word from ἑκατον, and πȣς, *pes*, *foot*; and on that principle hold, that the *hecatomb* might conſiſt of only twenty-five four-footed beaſts. They add, that it was of no importance what kind of beaſts were choſe for victims, provided the quota of feet were but had.

Pythagoras is ſaid to have ſacrificed a *hecatomb* to the Muſes, of a hundred oxen, in joy and gratitude for his diſcovering the demonſtration of the 47th propoſition of the firſt book of Euclid, viz. that in a rectangled triangle, the ſquare of the hypothenuſe is equal to the ſquares of the two other ſides.

For the origin of *hecatombs*. Strabo relates, that there were a hundred cities in Laconia; and that each city uſed to ſacrifice a bullock every year, for the common ſafety of the country; whence the inſtitution of the celebrated ſacrifice of a hundred victims, called *hecatombs*. Others refer the origin of *hecatombs* to a plague; wherewith the hundred cities of Peloponneſus were afflicted; for the removal whereof, they jointly contributed to ſo ſplendid a ſacrifice.

Julius Capitolinus relates, that for a *hecatomb* they erected a hundred altars of turf, and on theſe ſacrificed a hundred ſheep, and a hundred hogs. He adds, that when the emperors offered ſacrifices of this kind, they ſacrificed a hundred lions, a hundred eagles, and a hundred other beaſts of the like kind.

HECATOMBÆON, in *Chronology*. See Ecatombæon.

HECATOMPHONIA, Ἑκατομφονια, an ancient ſacrifice among the Meſſenians; offered by ſuch as had ſlain a hundred enemies in battle.

The word comes from ἑκατον, a *hundred*, and φονευω, *to kill*.

HECATONSTYLON, Ἑκατονϛυλον, in the *Ancient Architecture*, a porch with a hundred columns. This deſignation was peculiar to the great porch of Pompey's theatre at Rome.

HECK, among *Huſbandmen*, a rack, at which horſes are fed with hay.

It is alſo uſed as the name of an engine, wherewithal to take fiſh in the river Ouſe. A ſalmon *heck* is a grate for the catching that ſort of fiſh. See *Salmon*-FISHING. Hence alſo HECKAGIUM, or HECCAGIUM, which occurs in ancient records, for a rent paid the lord for the liberty to uſe ſuch engines.

HECKLE, among *Hemp Dreſſers*. See HATCHEL.

HECKLING *of hemp*. See HEMP.

HECTIC, or HECTIC FEVER, in *Medicine*, a ſort of ſlow habitual fever, ſeated in the ſolids, and gradually preying on and conſuming the ſubſtance thereof.

The word is ἑκτικὸς, formed of ἕξος, *habitus*, a quality hard to ſeparate from its ſubject.

A *hectic* is an uſual attendant of a CONSUMPTION, and is reputed one of the diagnoſtic ſigns thereof.

The *hectic*, according to Dr. Quincy, is the reverſe of thoſe fevers which ariſe from the plethora, or too great a fulneſs: this being attended with too lax a ſtate of the excretory paſſages, and particularly thoſe of the ſkin, whereby ſo much runs off, as leaves not reſiſtance enough in the contractile veſſels to keep them ſufficiently diſtended; ſo that they vibrate oftener, agitate the fluids more, and keep them thin and hot.

The ſymptoms of this diſeaſe diſtinctively from the *febris lenta*, or *ſlow* FEVER, which is often confounded with it, are theſe: a perpetual dry burning in the fleſh, which is moſt ſenſible in the hands after eating; a weak, low, and quick pulſe; the return of a chilneſs in the middle of the fever; a thick orange-coloured urine, with a pale red ſediment, with a thin fattiſh cuticle upon it, and a ſtrong ſmell, though the urine is ſo various, that nothing can be aſcertained from its appearances; a languid habit of body, and a particular love of all cold meats; a drineſs of the mouth, with continual thirſt, and a frothy or glutinous ſpittle; unſettled ſleep, not at all refreſhing to the patient; a ſucceſſive and continual waſting and emaciation of the body, a loſs of ſtrength, a languor of the mind, a ſenſe of a weight and pain in one of the hypochondria, a ſenſibility of the lighteſt changes in the weather, and a continual growing worſe at the greater changes which happen at the equinoxes; a vertiginous and dozing ſwimming in the head when the patient gets up, and in the latter ſtages of the diſeaſe colliquative ſweats; and finally, the ſcene is cloſed by a diarrhœa, and the facies Hippocratica, which is ſeen in no other diſeaſe ſo remarkably as in this and a conſumption. A cough is no neceſſary conſequence of a *hectic*, but it uſually attends it, and ariſes from ſome conjunct cauſe.

Perſons ſubject to it. Men are much more liable to fall into *hectics* than women; and of thoſe principally ſuch as are of a tender conſtitution and dry habit, and are violently addicted to the paſſions, and live high, eating ſeaſoned food, and drinking large quantities of wine or other ſtrong liquors; and ſuch as have exhauſted their ſtrength and ſpirits by violent exerciſes, long watching, great ſtudy or thoughtfulneſs, want of nouriſhment, exceſſive venery, or by taking repeated doſes of ſtrong purgative medicines. Perſons often fall into this diſeaſe alſo by omitting habitual bleedings and other evacuations, and by ſtopping cuſtomary diſcharges of blood by the hæmorrhoidal veins, or other ways, by the taking aſtringent medicines; but more perſons are thrown into *hectics* by injudicious treatment in fevers, than fall into them by all theſe other ways together, and eſpecially by the bad treatment of intermittents. Lying-in women, and thoſe in whom the menſes ceaſe, are liable to this diſorder; as well as all perſons, of either ſex, whoſe glands are diſordered, or who are afflicted with abſceſſes or ulcers in the internal parts. The matter of theſe ulcers, abſorbed into the blood, occaſions a fever more or leſs violent.

Prognoſtics in it. When a *hectic* is confirmed and of ſome ſtanding, it is in vain to attempt the cure of it; for when one of the viſcera is ulcerated, nature will always bring on this fever to endeavour to abſterge it; and as the cauſe never can be removed, the ſymptoms never will ceaſe.

All that can be expected from medicine in theſe caſes, is the mitigating the ſymptoms, and putting off the fatal period longer than it would naturally have happened. Younger people are much more ſuddenly deſtroyed by *hectics*, and are much more ſubject to them, than thoſe more advanced in years; hence, from eighteen to five-and-thirty may be accounted the period of life moſt ſubject to danger from this diſeaſe; it is uſually ſudden in its deſtruction between theſe periods, afterwards if people fall into it, it becomes chronical, and they bear it a long time. The changes of the ſeaſons are dangerous times for *hectic* people, but moſt of all the autumnal equinox, and ſo alſo the climacteric years. Young perſons, firſt ſeized with *hectics* in ſpring, uſually die in the autumn following; and thoſe who are firſt ſeized with it in the ſummer ſolſtice, uſually live till the ſame ſeaſon of the following year. A diſcharge of blood by the hæmorrhoidal veins in the laſt ſtages of a *hectic* uſually haſtens the death of the perſon, but in the beginning of the diſeaſe the ſame evacuation often proves a cure.

Method of treatment. The viſcous humours collected in the primæ viæ are to be attenuated by tartarum vitriolatum and the neutral ſalts, and the bowels to be kept gently open by clyſters and ſmall doſes of manna and the other gentler cathartics; next the acrimony of the ulcerous matter is to be obtunded by the abſorbents ſated with vegetable acids, as by the crabs-eyes ſated with lemon juice; by coral, oyſter-ſhells, and the like teſtaceous ſubſtances, ſated in the ſame manner; decoctions of pimpernel and of hartſhorn with daiſy-flowers are alſo very ſerviceable; a mixture of ſpirit of hartſhorn and tincture of antimony, and powders of coral and diaphoretic antimony, are to be given twice or oftener in a day. Small doſes of ſtorax pill will mitigate the cough, and emulſions of almonds, with a ſmall mixture of lemon-juice, will greatly abate the febrile heat. During the whole time the diet muſt be nouriſhing; and jellies, ſtrengthening ptiſans, and milk food, are to be taken. Junker's Conſp. Med. p. 387 and 390.

But theſe medicines are not to be continued in an uninterrupted courſe; nature is to be ſometimes eaſed of ſuch a burden; and, in fine, the more the diſeaſe increaſes, the fewer medicines are to be given, as there grows leſs and leſs hope of benefit from them.

If a cough attends a *hectic*, great relief is uſually found from a linctus of oil of ſweet almonds and ſyrup of poppies; or liquid laudanum may be occaſionally given in ſmall doſes. The cough may be ſometimes appeaſed by bleeding, and the expectoration promoted by pills formed by freſh ſquills, gum ammoniac, and powdered cardamom ſeeds, of each a quarter of an ounce; four or five of theſe, made of a moderate ſize, may be taken twice or thrice a day. The milk of gum ammoniac and vegetable acids, as apples, oranges, lemons, &c. are proper medicines. The colliquative ſweats which attend this diſeaſe are not to be cured by ſuppreſſing them violently, but the patient is to keep himſelf moderately cool, and to take powders of coral, terra lemnia, and the other abſorbents, and a grain of opium may be added to the quantity of three or four doſes. Whey and the cooling emulſions alſo have their good effects. Gum Arabic, added in moderate quantities to theſe emulſions, alſo is of great uſe in checking the diarrhœa which often attends *hectics*; and conſerve of red roſes with chalybeated milk are to be taken conſtantly to mitigate this ſymptom; and when it is more violent, a doſe of diaſcordium diſſolved in cinnamon water often proves a very efficacious medicine; and when the violence of the purging is once ſtopped by this, it will be kept from returning by the other methods. Heiſter's Comp. Med. p. 115.

The loſs of appetite which uſually attends theſe caſes is to be remedied by bitters, ſuch as tinctures of orange-peel and cortex eleutherii, to which may be added a ſmall quantity of the Jeſuits bark; and to theſe a ſmall quantity of ſpirit of ſulphur or of vitriol may be added, the more immediately to excite the appetite.

When there is reaſon to apprehend that an impoſthume is formed in the breaſt, recourſe muſt be had to the Peruvian bark. Sir John Pringle obſerves, that he found nothing diminiſh the *hectic* fits ſo much as ſmall but repeated bleedings, accompanied with ſaline draughts and cooling diet. Dr. Hulme recommends fixed air in *hectic* fevers, attended with pulmonary complaints. For the manner of adminiſtering it, ſee *Putrid* FEVER. But more depends on exerciſe, particularly riding, air, and diet, than on medicine. The diet ſhould be chiefly vegetables and milk.

A milk diet is much recommended in *hectics*, and particularly aſſes milk, as being the leaſt viſcid and heavy of any kind; but it ſhould be uſed ſoon, and in ſufficient quantities, to the amount of half a pint three or four times a day, and duly perſiſted in. When it happens to purge, it may be mixed with old conſerve of roſes, or powder of crabs-claws.

Dr. Barnard propoſes butter-milk as a ſuccedaneum to aſſes milk. According to him, it anſwers moſt of the indications in this caſe, as it cools, moiſtens, nouriſhes, &c. He adds, that he has known many perſons cured of obſtinate *hectics* only by a continued uſe thereof. This ſhould be uſed ſparingly at firſt, and the quantity gradually increaſed, till it becomes almoſt the only food. Though much may be expected from a milk and vegetable diet, regular exerciſe, and wholeſome air, in the firſt ſtages of a conſumption, yet thoſe who have been accuſtomed to animal food and ſtrong liquors muſt make the change by degrees; and if they have ſtrength and ſufficient reſolution to perſiſt in this courſe, they will ſeldom be diſappointed of a cure. Buchan's Dom. Med. p. 185. ed. 1776.

HEDAGIUM anciently ſignified a toll or cuſtom, paid at the hythe or wharf, &c. for landing merchandize, goods, &c.

The word is formed from *heda*, *a hythe*, *port*, or *wharf*.

From ſuch toll, or cuſtomary duty, exemptions were ſometimes granted by the ſovereign to particular perſons and ſocieties.

HEDERA, *ivy*. See Ivy.

Hedera *terreſtris*. See Ground-*ivy*.

Lacryma Hederæ. See Ivy.

HEDERALIS, in *Botany*, a name uſed by Ruellius, and ſome other authors, for the plant called by others *aſclepias* or swallow-*wort*.

HEDERARIUS *plexus*, a ſort of reticular plexus formed by the ſpermatic vein and artery in their progreſs to the teſticles.

HEDGE, in *Agriculture*, &c. a fence incloſing a field, garden, or the like, made of branches of trees interwoven.

The word is formed of the German *hag* or *haeg*, or the Anglo-Saxon *hegge* or *hege*, which ſignifies ſimply *incloſure*, *circumference*.

Hedge, *quickſet*, is that made of quick or live trees, which have taken root, in contradiſtinction to that made of faggots, hurdles, or dry boughs, &c.

The hawthorn is allowed the beſt of all the Engliſh ſhrubs for quickſet *hedges*. The beſt method of raiſing this for uſe, is to put the haws into the ground as ſoon as ripe, and cover them with earth, and by the ſpring twelvemonth the young ſhoots will be of a due ſize to tranſplant from the ſeed-pot into *hedge*-rows. The crab-tree is a common mixture with the hawthorn in *hedges*; but it grows faſter than the hawthorn, and requires cutting to keep the *hedge* even. The young hawthorns raiſed from ſeed always thrive better than thoſe picked up wild in the fields.

The great conſideration in making quickſet *hedges* is to bring the plants from a worſe ſoil than that in which it is intended to ſet them. They muſt be about the thickneſs of a gooſe-quill, well-rooted and ſtrong, and muſt be planted about four or five inches out of the ground. If there be a ditch to the *hedge*, it ſhould be ſix feet wide at the top, one and a half at the bottom, and three feet deep.

If the bank be without a ditch, the plants ſhould be ſet in two rows, at a foot diſtance below one another. The turf is to be laid, with the graſs-ſide downward, on that ſide of the ditch on which the bank is deſigned to be made, and ſome of the beſt mould muſt be laid upon it to bed the quick; then the quick is to be laid upon it a foot aſunder, ſo that the end of it may be inclining upwards; and, at equal diſtances of thirty foot, plant an aſh, oak, crab, or elm, to grow with the quick. When the firſt row of quick is laid, it muſt be covered with mould, and the turf laid upon it as before, and ſome more mould upon that; ſo that, when the bank is a foot high, another row of ſets may be laid againſt the ſpaces of the lower quick. Theſe muſt be then covered as the former, and the bank is to be then topped with the bottom of the ditch, and a dry or dead *hedge* laid to ſhade the under plantation. There ſhould then be ſtakes driven into the looſe earth quite down to the firm ground, at about two foot and a half diſtance from each other; oak ſtakes are accounted the beſt of all for this uſe, and the next to this thoſe of black-thorn or ſallow. Small buſhes are to be laid below, but not too thick, only to cover the quick from being injured as it ſhoots.

The young plants muſt be conſtantly weeded, and great care muſt be taken to preſerve them from the bitings of cattle, eſpecially of ſheep. If they have been cropped, or are not found to grow well, it is a good cuſtom among the farmers to cut them down in February to the ground, or within an inch of it, for after this they uſually ſend out new roots, and ſhoot very vigorouſly.

When the *hedge* is of eight or nine years growth, it may be plaſhed or laid down, by giving the ſhoots or branches a cut with a knife or bill half through, and then weaving them about the ſtakes, and trimming off the ſmall ſuperfluous branches. See Plashing.

The crab, black-thorn or ſloe, and holly, are ſometimes planted for *hedges*. See Fence.

Inſtead of building a garden wall facing the north-eaſt, Mr. Lawrence adviſes, that to ſave charge, &c. a crab-tree *hedge* of three rows be planted; which will be a good mound, and quickly grow up to be a better fence than a wall againſt the weſt and ſouth-weſt winds, which make the greateſt deſtruction in a garden, and which blow two parts in three of the whole year; beſides the ſtock of fruit ſuch a *hedge*, grafted with red-ſtreak or gennet moyl, will yield.

Hedges, for ornament in gardens, are ſometimes planted with evergreens, in which caſe the holly is preferable to any other. Next to this, moſt people prefer the yew, on account of its growing very cloſe; but the dead colour of its leaves renders theſe *hedges* leſs agreeable. The laurel is one of the moſt beautiful evergreens, but the ſhoots are ſo luxuriant, that it is difficult to keep it in any tolerable ſhape; but *hedges* that are formed of laurel, which has large leaves, ſhould be pruned with a knife, cutting the ſhoots juſt down to a leaf; and this method is much better than that of cutting them with ſheers. The *lauruſtinus* is alſo a very fine plant for the purpoſe of ornamental *hedges*; but this is liable to the ſame objection as the laurel: it ought, therefore, to be pruned with a knife, in April, when the flowers are going off; but the new ſhoots of the ſame ſpring muſt by no means be ſhortened. The ſmall-leaved and rough lauruſtines are the beſt plants for this purpoſe. The true phillyrea is the next beſt plant for *hedges*, which may be led up to the height of ten or twelve feet; and if they are kept narrow at the top, that the ſnow may not have room to lodge upon them, they will become cloſe and thick, and make a fine appearance. The *ilex*, or evergreen oak, is alſo planted for *hedges*, and is a fit plant for thoſe that are deſigned to be very tall. The deciduous trees, which are uſualy planted to form *hedges* in gardens, are the hornbeam, which may be kept neat with leſs trouble than moſt other plants; the beech; and the ſmall-leaved Engliſh elm, which ſhould not be planted cloſer than ſeven or eight, or even ten feet: the lime-tree has alſo been recommended for this purpoſe; but, as *hedges* thus formed become thin at bottom, and the leaves turn of a black diſagreeable colour, it is now diſuſed. The alder is frequently uſed for *hedges*; and, where the ſoil is moiſt, it is preferable to any of the deciduous trees, becauſe its leaves are of a lively green till late in autumn, and when they decay their litter is ſoon over. Many of the flowering ſhrubs have been planted for *hedges*, ſuch as roſes, honey-ſuckles, ſweet-briar, &c. but theſe are difficult to train; and if they are cut to keep them within compaſs, their flowers, which are their greateſt beauty, will be entirely deſtroyed. However, theſe *hedges* are by no means to be recommended for pleaſure-gardens, either as ornamental or uſeful. Miller.

By 43 Eliz. cap. 7. *hedge*-breakers are bound to pay ſuch damages as a juſtice of the peace ſhall think fit; and if not able to pay, they ſhall be committed to the conſtable to be whipped. And *hedge*-ſtealers may be apprehended, and the juſtice ſhall adjudge a penalty, not exceeding 10*s*. to the poor; or, in want of payment, they ſhall be ſent to the houſe of correction for a month. 15 Car. II. cap. 2. And perſons convicted of buying ſtolen wood ſhall forfeit treble the value.

Hedges, *eſpalier*. See Espalier.

To line a Hedge, in *Military Affairs*, is to plant muſketteers along it, under cover; either to fire upon an enemy that is advancing, or to ſave themſelves from the horſe, or to defend a paſs or defile.

Hedge-*hog*. See *Hedge*-Hog.

Sea Hedge-*hog*. See Centronia and Echinoderma.

Hedge-*hog*, in *Botany*. See *Snail* Trefoil.

Hedge-*hog*, *medica*, in *Botany*. See Lucerne.

Hedge-*hog-thiſtle*, a name ſometimes given to a diſtinct genus of plants, called by authors cactus. See *Melon* Thistle.

Spaniſh Hedge-*hog-thorn* or *anthyllis*. See Lady's *finger*.

Hedge-*hyſſop*. See *Hedge*-Hyssop.

Hedge-*hyſſop*, is alſo a name ſometimes given to a diſtinct genus of plants, called by botaniſts digitalis. See Fox-*glove*.

Hedge-*muſtard*, the name of a genus of plants, known among botaniſts by that of erysimum. See *Hedge*-Mustard.

Hedge-*nettle*, a name ſometimes given to a genus of plants, called by botaniſts galeopsis. See *Stinking Dead*-Nettle.

Hedge-*nettle-ſhrub*, a name by which ſome call the *praſium*, a diſtinct genus of plants. See *Shrubby Hedge*-Nettle.

Hedge-*ſparrow*, the Engliſh name of a ſpecies of *motacilla*. See *Hedge*-Sparrow.

HEDIUNDA, in *Botany*. See *Baſtard* Jasmine.

HEDYOSMOS, of ἡδυς, *ſweet*, and οσμη, *ſmell*, in *Botany*, a name given by ſome writers to mint, becauſe of its ſweet ſmell.

HEDYOTIS, in *Botany*, a genus of the *tetrandria monogynia* claſs. The corolla has a ſingle petal and is funnel-ſhaped; and the fruit is a two-celled capſule, containing many ſeeds.

HEDYPNOIS, in *Botany*. See Hyoseris.

HEDYSARUM, in *Botany*. See *French* Honey-*ſuckle*.

HEEL, in *Anatomy*, the hind part of the Foot.

In winter, the *heels* are liable to a kind of chilblains, called *kibes*, which ſometimes tend to a mortification.

The bone of the *heel* is called CALCANEUM.

Heel *of a horſe*, is the loweſt hind part of the foot, comprehended between the quarters and oppoſite to the toe.

The *heel* ſhould be high and large, and one ſide not riſe higher on the paſtern than the other. The diſtempers incident to this part are ſcabbineſs and SCRATCHES.

Some narrow-*heeled* horſes have high *heels*, but ſo weak and tender, that by preſſing the two ſides of the *heel* one againſt another they will ſenſibly yield. See HOOF.

To open the **Heels**, is to pare the foot and cut the *heel* low, almoſt cloſe to the fruſh; taking it down within a finger's breadth of the coronet or top of the hoof, ſo as to ſeparate the quarters, and by that means weaken and take away the ſubſtance of the foot, and make it cloſe and become narrow at the *heels*.

Heel *of a horſeman*. This being the part which is armed with a ſpur, the word is uſed for the ſpur itſelf; as, this horſe underſtands the *heels* well.

To ride a horſe from one **Heel** *to another*, is to make him go ſideways, ſometimes towards one *heel*, and ſometimes another.

Heel, among *Carpenters*, denotes an inverted OGEE.

Heel, in *Sea-language*, is a name often given to the afterend of a ſhip's keel; and alſo to the lower-end of the ſtern-poſt, to which it is firmly joined.

If a ſhip lean on one ſide, whether aground or afloat, they ſay ſhe *heels* a-ſtarboard or a-port, or ſhe *heels* offward or to the ſhore; that is, ſhe inclines more to one ſide than to the other.

Heel *of a maſt*, is that part of the foot thereof which is pared away ſlanting, that the MAST may be ſtayed aftward on it.

Heel *of a top-maſt* is the lower end, ſuſtained on the treſſel-trees by means of an iron bar, called the FIDD.

HEELER, or *Bloody*-**Heel** *Cock*, is a fighting cock which ſtrikes or wounds much with his ſpurs.

The maſters know ſuch a cock, even while a chicken, by the ſtriking his two *heels* together in his going.

HEGEMONE, in *Mythology*, one of the GRACES. See AUXO.

HEGIRA, in *Chronology*, a celebrated epocha, uſed by the Arabs and Mahometans for the computation of time.

The word is Arabic, formed of הגירה, *hagirah*, *flight*; of הגר, *to fly*, *quit one's country*, *family*, *friends*, &c.

The event which gave occaſion to this epocha, was Mahomet's flight from Mecca. The magiſtrates of that city fearing his impoſtures might raiſe a ſedition, reſolved to expel him: this, accordingly, they effected in the year of our Lord 622, on the evening of the 15th or 16th of July.

To render this epocha more creditable, the Mahometans affect to uſe the word *hegira* in a peculiar ſenſe, for an act of religion, whereby a man forſakes his country, and gives way to the violence of perſecutors and enemies of the faith: they add, that the Coraſhites being then the ſtrongeſt party in the city, obliged their prophet to fly, as not being able to endure his aboliſhing of idolatry. This flight was not the firſt of Mahomet's, but it was the moſt famous. It happened in the fourteenth year from his aſſuming the character of prophet and apoſtle, and promulgating his new religion.

The Orientals do not agree with us as to the time of the *hegira*. Among the Mahometans, Amaſi fixes it to the year of Chriſt 630, and from the death of Moſes 2347; and Ben Caſſem, to the year of the world 5800: according to the Greek computation, among the Chriſtians, Said Ebn Batrik refers the *hegira* to the year of Chriſt 614, and of the creation 6114.

Khondemir relates, that it was Omar, the ſecond caliph, that firſt eſtabliſhed the *hegira* as an epocha, and appointed the years to be numbered from it: at the time he made this decree, there were already ſeven years elapſed. This eſtabliſhment was made in imitation of the Chriſtians, who, in thoſe times, reckoned their years from the perſecution of Diocleſian.

But there is another *hegira*, and the earlier too, though of leſs eminence. Mahomet, in the fourteenth year of his miſſion, was obliged to relinquiſh Medina: the Coraſhites had all along oppoſed him very vigorouſly, as an innovator and diſturber of the public peace; and many of his diſciples, not enduring to be reputed followers of an impoſtor, deſired leave of him to abandon the city, for fear of being obliged to renounce their religion. This retreat makes the firſt *hegira*. Theſe two *hegiras* the Mahometans, in their language, call *hegiratan*.

The years of the *hegira* conſiſt only of 354 days. To reduce theſe years to the Julian calendar, i. e. to find what Julian year a given year of the *hegira* anſwers to, reduce the year of the *hegira* given into days, by multiplying by 354, divide the product by 365, and from the quotient ſubtract the intercalations, i. e. as many days as there are four years in the quotient; and laſtly, to the remainder add 622. See YEAR.

HEIGHT, the third DIMENSION of a body, conſidered with regard to its elevation above the ground.

To find the *height* of a hill, ſee the article of LEVELLING, toward the end.

Height, In *Aſtronomy*, *Geography*, &c. See ALTITUDE and ELEVATION.

Height, in the *Manege*, &c. the ſtature of a horſe, &c.

It is reputed imperfection in a horſe, when ſet too *high* on his legs, i. e. when the legs are too long in proportion to the body.

Some jockeys have determined a meaſure for them thus: take a ſtring, and meaſure from the horſe's withers to his elbow; and what length that is, the ſame ſhould he have betwixt the elbow and the lower part of the heels. Some meaſure their colts after this manner at a year old, being of opinion that the legs of a colt at this age are as long as they ever will be.

The duke of Newcaſtle, and Sir W. Hope, allow this to hold generally, but not univerſally.

Heights, in the *Military Art*, are the eminences round a fortified place, whereon the armies uſually poſt themſelves. The enemy had ſeized all the *heights*, appeared on the *heights*, &c.

HEINASE, among *Sportſmen*, a roe-buck of the fourth year.

HEIR, Hæres, in the *Civil Law*, denotes the perſon who ſucceeds to the whole eſtate and effects of another, whether by right of blood or of teſtament.

The word is formed of the Latin *hæres*, of the verb *hærere*, *to ſtick*, *remain faſt*, *be near*, *follow immediately*, &c.

The inſtitution of an *heir* is a circumſtance neceſſary to the validity of a teſtament.

There are two principal kinds of *heirs*, the *apparent* and *preſumptive*.

Heir *apparent*, is he on whom the ſucceſſion is ſo ſettled, that he cannot be ſet aſide without altering the laws of ſucceſſion; or, whoſe right of inheritance is indefeaſible, provided he outlives the anceſtor; as the eldeſt ſon or his iſſue, who muſt by the courſe of the common law be *heir* to the father, whenever he happens to die.

Heir *preſumptive*, is one who, if the anceſtor ſhould die immediately, would, in the preſent circumſtances of things, be his *heir*; but whoſe right of inheritance may be defeated by the contingency of ſome nearer *heir* being born; as a brother or nephew, whoſe preſumptive ſucceſſion may be deſtroyed by the birth of a child; or a daughter, whoſe preſent hopes may be cut off by the birth of a ſon. Nay, even if the eſtate hath deſcended, by the death of the owner, to ſuch brother or nephew, or daughter; in the former caſe the eſtate ſhall be taken away by the birth of a poſthumous child, and in the latter, by the birth of a poſthumous ſon.

Heir, in *Common Law*, is he who ſucceeds, by right of blood, to any man's lands, or tenements in fee.

For nothing paſſes in common law, *jure hæreditatis*, by right of inheritance, but fee.

By common law, therefore, a man cannot be *heir* to goods or chattels; for *hæres dicitur ab hæreditate*, it is the inheritance denominates the *heir*.

Every *heir* having lands by deſcent, is bound by the acts of his anceſtors, if he be named; it being a maxim, that *qui ſentit commodum*, *ſentire debet & onus*. But, though ever ſo much land come to him from ſuch anceſtors by gift in tail, or conveyance of the father, and not by deſcent, he is no way chargeable; and the caſe is the ſame in all other eſtates, except fee-ſimple.

Eſtates are tranſmitted from the anceſtor to the *heir*, according to certain rules or canons of inheritance, for which ſee DESCENT *collateral*.

Thoſe that are incapable of being *heirs* are BASTARDS, ALIENS, and perſons attainted for treaſon or felony, (ſee ATTAINDER;) but idiots and lunatics, perſons excommunicated, or that are attainted in a *premunire*, outlaws in debt, &c. are capable of being *heirs*.

The *heir* is favoured by common law; for not only land, but rent not due and in arrear at the death of the anceſtor, ſhall go to the *heir*; ſo corn ſown by a tenant for years, where his term expires before his corn is ripe, and every thing faſtened to the freehold, timber-trees, deeds belonging to the inheritance, deer, conies, pigeons, fiſh, &c. go to the *heir*. If an *heir* hath made over lands fallen to him by deſcent, execution ſhall be had againſt him to the value of the land, &c. if it be not ſold *bonâ fide* before the action brought, in which caſe there is a ſaving by the ſtat. 3 and 4 Will. and Mary, cap. 14. and it ſhall be tried by a jury, whether the *heir* hath ſuch lands, and what is their value, in order to make the *heir* anſwerable. A creditor may ſue either the *heir*, executor, or adminiſtrator, each of whom is chargeable; but, when an *heir*, on being ſued, pays his anceſtor's debts, he ſhall be reimburſed by the executor of ſuch anceſtor, if he has aſſets in his hands. The *heir* can force the adminiſtrator to pay debts out of the perſonal eſtate, in order to preſerve the inheritance free; and where an executor has aſſets, he is compellable in equity to redeem a mortgage and diſcharge debts.

Moveables, or chattels immoveable, are given by teſtament, to whom the teſtator thinketh fit; otherwiſe they lie at the diſpoſition of the ordinary, to be diſtributed as he in conſcience likes beſt.

Heir, *laſt*. See Last *heir*.

Heir-*loom*, formed of *heir* and the Saxon *loom*, denoting *limb* or *members*, in our *Law-books*, ſignifies ſuch goods and perſonal chattels as are not inventoried after the owner's deceaſe, but neceſſarily come to the *heir* along with the houſe.

Conſuetudo hundredi de Stretford, in com. Oxon. eſt quod hæredes tenementorum infra hundredum prædict. exiſten. poſt mortem anteceſſorum ſuorum habebunt, &c. principalium, Anglice an heir-loome, *viz. de quodam genere catallorum, utenſilium, &c. optimum plauſtrum, optimam carucam, optimam ciphum, &c.* Coke on Littleton.

Heir-loom comprehends divers implements; as tables, preſſes, cupboards, bedſteads, furnaces, wainſcot, and ſuch-like; which in ſome countries have belonged to a houſe for certain deſcents, and are never inventoried after the deceaſe of the owner as chattels are, but accrue by cuſtom, not by common law, to the *heir*, with the houſe itſelf. The ancient jewels of the crown are held to be *heir-looms*, and are not deviſable by will, but deſcend to the next ſucceſſor.

HEISTERIA, in *Botany*, the name given by Linnæus to a genus of plants of the *decandria monogynia* claſs; the characters of which are theſe: the perianthium conſiſts of five leaves, which are lanceolated, erect, and pointed at the ends; theſe are a little ſhorter than the petals of the flower, and do not fall with it: the flower is of the gaping kind, and conſiſts of one petal divided almoſt to its baſe into two ſegments; the upper lip, which is the vexillum, is erect and ſlightly divided into two oval ſegments which gape aſunder; the carina, which is properly the nectarium of the flower, is hollow, almoſt ſhut, and of a cordated form, and forms the lower part of the under lip: the lower lip, which makes the alæ, is placed on the ſummit of the nectarium; it is divided into two ſegments, and hangs down: the ſtamina are eight filaments, which grow at the bottom into an oval membrane, and are of the diadelphous kind; the antheræ are eight in number, and are placed within the nectarium; the germen of the piſtil is oval, and is terminated by four oval points, which cloſe together; among theſe ſtands the ſtyle, which is of the length of the ſtamina, and the ſtigma which terminates this is obtuſe, compreſſed, and obliquely bifid; the fruit is a roundiſh compreſſed capſule, terminated by four briſtles, which ſtand at a diſtance from one another, and is compoſed of two cells, each containing a ſeed of an oval figure.

HELCESAITES. See Elcesaites.

HELCOMA, of ἑλκω, *I draw*, a word uſed by the old writers in ſurgery, to ſignify an ulcer.

HELCYDRION, of ἑλκος, *ulcer*, a word uſed by the old writers in medicine and ſurgery, to expreſs a ſmall exulceration or ulcerous puſtule in any part of the body.

HELCYSMA, of ἑλκος, a word uſed by ſome of the old writers to ſignify the ſcoriæ of ſilver, called alſo by ſome encauma. Dioſcorides ſays, this has the ſame virtues with the molybdæna, and that it was in his time uſed like that in plaſters.

HELCYSTER, of ἑλκω, *I draw*, in *Surgery*, a hook uſed to extract the fœtus in difficult parturition.

HELEGUG, in *Zoology*, a name by which the people in ſome parts of England call the *anas arctica Cluſii*, a web-footed fowl common on our ſhores. See Duck.

HELENA. See Castor and *Pollux*.

HELENIUM, in *Botany*. See *Baſtard* Sun-*flower*.

Helenium is alſo ſometimes uſed for *inula* or elecampane, and alſo for star-*wort*.

HELEPOLIS, in *Antiquity*, a military machine for battering down the walls of a place beſieged.

The word is Greek, ἑλεπολις; compounded of the words ἑλειν, *to take*, and πολις, *a city*.

The *helepolis*, as deſcribed by Diodorus Siculus, &c. appears to have been no more than the aries or battering-ram, with a roof or covering over it, to prevent its being ſet on fire, as alſo to ſcreen the men who worked it. Some will have it a combination of two or three battering-rams, moving on large ſtrong wheels, roofed over, and covered with raw or wet ſkins. It had ſeveral iron points or heads, wherewith the execution was done, formed much like the thunderbolts which painters repreſent. Within was a great number of ſoldiers, who drove it with force of arm, and by means of ropes, violently againſt the wall where the breach was intended. Others will have *helepolis* a generical name, comprehending all the machines uſed by the ancients in beſieging towns; as, among us, the name *artillery* includes all the ſorts of large fire-arms. But this opinion is chiefly founded on the origin of the name, and does by no means ſuit with thoſe minute deſcriptions given of the *helepolis* in the ancient writers.

The invention of the *helepolis*, and divers other military machines, is aſcribed to Demetrius; which, with the great number of cities he took thereby, gave him the denomination of *Poliorcetes*, or city-taker.

HELFING, in our *Old Writers*, a braſs coin among the Saxons, equivalent to our halfpenny.

HELIACA, formed from ἥλιος, *ſun*, in *Antiquity*, ſacrifices and other ſolemnities performed in honour of the ſun.

HELIACAL, of ἥλιος, *ſun*, in *Aſtronomy*. Heliacal *riſing of a ſtar, planet*, &c. is its iſſuing or emerging out of the rays and luſtre of the ſun, wherein it was before hid; whether this be owing to the receſs of the ſun from the ſtar, or that of the ſtar from the ſun.

Heliacal *ſetting*, is a ſtar's entering or immerging into the ſun's rays, and ſo becoming inconſpicuous by the ſuperior light of that luminary.

A ſtar riſes *heliacally*, when after it has been in conjunction with the ſun, and on that account inviſible, it gets at ſuch a diſtance from him, as to be ſeen in the morning before the ſun's riſing.

The ſame is ſaid to ſet *heliacally*, when it approaches ſo near the ſun as to be hid therein. So that, in ſtrictneſs, the *heliacal* riſing and ſetting are only an apparition and occultation.

The *heliacal* riſing of the moon happens when ſhe arrives at the diſtance of 17 degrees from the ſun; for the other planets, 20 degrees diſtance is required; and for the ſtars more or leſs, as they are greater or ſmaller. See Arch *of Viſion*.

The ancients computed that a ſtar, between the tropics, would be forty days before it got clear of the ſun's rays, and became conſpicuous again. Heſiod firſt made this computation, and the reſt followed him. The period comes very near to the computation of the moderns; for the ſun advancing nearly a degree every day, it will be twenty days approaching thereto, from the *heliacal* ſetting of the ſtar, and thirty days more withdrawing, till the *heliacal* riſing.

Some nations of America, and particularly the inhabitants of Cayenne, regulate their civil year by the courſe of Sirius, beginning it with the *heliacal* riſing of that ſtar.

To find the Heliacal *riſing and ſetting by the globe*, ſee Globe.

Heliacal *year*. See Canicular and *Egyptian* Year.

HELIADES, in *Mythology*, the daughters of the Sun and Clymenes, according to the poets: they were ſo afflicted, as they ſay, with the death of their brother Phaeton, that the gods, moved with compaſſion, transformed them into poplars on the banks of the river Eridanus.

HELIANTHEMUM. See *Dwarf* Sun-*flower*.

HELIANTHUS. See Sun-*flower*.

HELIASTES, in *Antiquity*, officers or magiſtrates of Athens, who conſtituted a court of five hundred perſons, called *Heliæa*, and were judges for taking cognizance of civil matters.

Ulpian gives us two etymologies of the word: ſome, ſays he, derive it from ἥλιος, *helios*, *ſun*; and hold it thus called, becauſe they ſat in the open air, in ſight of the ſun. Ulpian himſelf chuſes rather to derive *heliaſtes*, from Ἡλιαια, *Heliæa*, the place where this court or council was held; and that from ἁλιζω, *I aſſemble*, of ἁλις, *ſatis*, *enough*.

The court of *heliaſtes* was one of the ſix civil juriſdictions of Athens, and that before which matters of the greateſt moment were uſually brought; ſo that it was held the firſt and moſt conſiderable of all the civil tribunals. The delinquencies of the military men were alſo brought before the *heliaſtes*.

This court conſiſted ſometimes of a thouſand, and ſometimes of fifteen hundred or more judges; in the former caſe the members of two other courts, and in the latter thoſe of three courts, were ſummoned by the Thesmothetæ, and before whom they took a ſolemn oath, which is preſerved by Demoſthenes in his oration againſt Timocrates: this court ſat from ſun-riſe to ſun-ſet.

HELICE, or Elice, the name given by the ancient Greeks to the willow.

Helice, Ἑλικη, in *Aſtronomy*, the ſame with URSA *major*.

HELICOID *parabola*, or the *parabolic ſpiral*, a curve ariſing upon a ſuppoſition of the axis of the common Apollonian PARABOLA's being bent round into the periphery of a circle.

The *helicoid parabola*, then, is a line paſſing through the extremities of the ordinates, which converge towards the center of the ſaid circle.

Suppoſe, e. gr. the axis of the common parabola to be bent into the periphery of the circle BDM, (ſee *Tab. Conics, fig.* 11.) then the curve BFGNA, which paſſes through the extremities of the ordinates CF and DG, which converge towards the centre of the circle A, conſtitutes what we call the *helicoid*, or ſpiral PARABOLA.

If the arch BC, as an abſciſs, be called x, and the part CF of the radius, as an ordinate to it, be called y, and the parameter of the parabola be called l, the nature of this CURVE will be expreſſed by the equation $lx = yy$. See EQUATION.

HELICON, in *Ancient Geography*, the name of a mountain in the neighbourhood of Parnaſſus and Cytheron, ſacred to Apollo and the Muſes, who are thence called *Heliconides*. The fountain *Hippocrene* flowed at the foot of this mountain, and here was alſo ſhewn the ſepulchre of Orpheus. It is ſituated in Livadia, and now called Zagura or Zaguya.

HELICTERES, in *Botany*, the *Screw-tree*, a genus of the *gynandria decandria* claſs. Its characters are theſe: the flower has a coriaceous empalement of one leaf; it hath five oblong equal petals, which are fixed to the empalement, and ten ſhort ſtamina at the baſe of the germen, with five nectariums ſurrounding the germen, which have the appearance of petals; the ſtyle ſupports the germen at the top, which afterward turns to a twiſted ſpiral fruit with one cell, encloſing many kidney-ſhaped ſeeds. There are three ſpecies, natives of the Weſt Indies. Miller.

HELIOCARPUS, in *Botany*, a genus of the *dodecandria digynia* claſs. Its characters are theſe: the flower hath one petal, which is cut into five ſegments, and hath an empalement of one leaf, which is cut into five parts; in the center is ſituated a roundiſh germen, attended by ſeveral ſtamina, which becomes an oval compreſſed capſule, about three lines long and two lines broad, with a tranſverſe partition dividing it into two cells, each contaning a ſingle roundiſh ſeed ending in a point; the borders of the capſule are ſet with hairs reſembling rays. We know but one ſpecies of this plant, which was diſcovered by Dr. Houſton growing at Old La Vera Cruz, in New Spain. Miller.

HELIOCENTRIC *place of a planet*, is the place wherein the planet would appear to be if viewed from the center of the ſun; or the point of the ecliptic, wherein a planet viewed from the ſun would appear to be.

The word is compounded of ἡλιος, *ſun*, and κεντρον, *center*.

The *heliocentric* place, therefore, coincides with the longitude of a planet viewed from the ſun. See PLACE.

Heliocentric *latitude of a planet*, is the inclination of the line drawn between the center of the ſun and the center of a planet to the plane of the ecliptic.

The *heliocentric* latitude of a planet is thus determined: if the circle KDM (ſee *Tab. Aſtron. fig.* 62.) repreſent the orbit of the earth round the ſun, and the inner one ANBn, be placed ſo as to be inclined to the plane of the other (for which reaſon it appears in the form of an ellipſis), when the planet is in N or n (which points are called its *nodes)*, it will appear in the ecliptic, and ſo have no latitude; if it move to P, then, being ſeen from the ſun, it will appear to decline from the ecliptic, or to have a latitude; and the inclination of the line RP to the plane of the ecliptic, is called the planet's *heliocentric latitude*; and the meaſure of it is the angle PRq, ſuppoſing the line Pq to be perpendicular to the plane of the ecliptic.

This *heliocentric* latitude will be continually increaſing, till it come to the point A, which they call the *limit* or utmoſt extent of it; and then it will decreaſe again, till it come to nothing in N; after which it will increaſe again, till it come to B; and laſtly, it will be decreaſing again, till the planet comes to be in n, &c.

HELIOCENTROS, in *Natural Hiſtory*, a name given to an inſect of the poiſonous kind, called by Ariſtotle PHALANGIUM *decticum*, and by the Latins SOLIPUGA.

HELIOCOMETES, *comet of the ſun*, a phenomenon ſometimes obſerved at the ſetting of the ſun; thus denominated by Sturmius and Pylen, who had ſeen it, becauſe it ſeems to make a comet of the ſun, being a large tail, or column of light, fixed or hung to that luminary, and dragging after it at its ſetting, much in the manner of a tail of a comet.

In that obſerved by M. Pylen, at Grypſwald, March 15, 1702, at five o'clock in the afternoon, the end which touched the ſun was only half the ſun's diameter broad, but the other end, oppoſite to the ſun, was much broader; its length was above ten diameters of the ſun, and it moved in the ſame tract as the ſun; its colour was yellow next the ſun, and darker farther off; it was only ſeen painted on the thinner higher clouds; a little teleſcope eaſily diſcovered, that there was nothing of it on the thicker and lower clouds, though the naked eye could not diſcover ſo much. It laſted, in its full vigour, the ſpace of an hour, and then gradually diminiſhed.

HELIOMETER, formed of ἡλιος, *ſun*, and μετρω, *I meaſure*, the name of an inſtrument called alſo *aſtrometer*, invented by M. Bouguer in 1747, for meaſuring with particular exactneſs the diameters of the ſtars, and eſpecially thoſe of the ſun and moon.

This inſtrument is a kind of teleſcope, conſiſting of two object glaſſes of equal focal diſtance, placed one of them by the ſide of the other, ſo that the ſame eye-glaſs ſerves for both. The tube of this inſtrument is of a conic form, larger at the upper end which receives the two object-glaſſes than at the lower, which is furniſhed with an eye-glaſs and micrometer. By the conſtruction of this inſtrument two diſtinct images of an object are formed in the focus of the eye-glaſs, whoſe diſtance, depending on that of the two object-glaſſes from one another, may be meaſured with great accuracy: nor is it neceſſary that the whole diſc of the ſun or moon come within the field of view; ſince, if the images of only a ſmall part of the diſc be formed by each object-glaſs, the whole diameter may be eaſily computed, by their poſition with reſpect to one another: for, if the object be large, the images will approach, or perhaps lie even over one another; and the object-glaſſes being moveable, the two images may always be brought exactly to touch one another, and the diameter may be computed from the known diſtance of the centers of the two glaſſes: beſides, as this inſtrument has a common micrometer in the focus of the eye-glaſs, when the two images of the ſun or moon are made in part to cover one another, that part which is common to both the images may be meaſured with great exactneſs, as being viewed upon a ground that is only one half leſs luminous than itſelf; whereas, in general, the heavenly bodies are viewed upon a dark ground, and, on that account, are imagined to be larger than they really are. By a ſmall addition to this inſtrument, provided it be of a moderate length, M. Bouguer thought it very poſſible to meaſure angles of three or four degrees, which is of particular conſequence in taking the diſtance of ſtars from the moon. With this inſtrument M. Bouguer, by repeated obſervation, found, that the ſun's vertical diameter, though ſomewhat diminiſhed by the aſtronomical refraction, is longer than the horizontal diameter; and, in aſcertaining this phenomenon, he alſo found, that the upper and lower edges of the ſun's diſc are not ſo equally defined as the other parts; on this account his image appears ſomewhat extended in the vertical direction. This is owing to the decompoſition of light, which is known to conſiſt of rays differently refrangible in its paſſage through our atmoſphere. Thus, the blue and violet rays, which proceed from the upper part of the diſc at the ſame time with thoſe of other colours, are ſomewhat more refracted than the others, and, therefore, ſeem to us to have proceeded from a higher point; whereas, on the contrary, the red rays proceeding from the lower edge of the diſc, being leſs refracted than the others, ſeem to proceed from a lower point; ſo that the vertical diameter is extended or appears longer than the horizontal diameter. Mem. Acad. Sc. Par. 1748.

Mr. Servington Savery diſcovered a ſimilar method of improving the micrometer, which was communicated to the Royal Society in 1743. See MICROMETER.

HELIOPHILA, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. The corolla conſiſts of two nectaria, that are recurved towards the veſicular baſe of the calyx.

HELIOSCOPE, in *Optics*, a ſort of teleſcope, peculiarly fitted for viewing and obſerving the ſun, without doing prejudice to the eye.

The word is compounded of ἡλιος, *the ſun*, and σκεπτομαι, *video, ſpecto, I ſee, view, conſider*.

Helioſcopes are neceſſary in viewing the phenomena of the ſun, as his ſpots, eclipſes, &c.

There are various apparatuſes of this kind. As coloured glaſſes are found to diminiſh the force of the ſun's rays, to make a *helioſcope*, it is enough that both the object-glaſs and the eye-glaſs of the teleſcope be of coloured glaſs; the firſt, e. gr. of red, and the latter green.

But as there is a neceſſity for the glaſſes to be very tranſparent and equally coloured, which rarely happens, Hevelius chuſes rather to uſe two plain-coloured glaſſes, with a piece of paper between, either tied or cemented together, and applied before the eye-glaſs.

Dr. Hooke, in an expreſs treatiſe on *helioſcopes*, recommends four reflecting glaſſes placed in the tube: by theſe, he obſerves, the force of the rays will be ſo weakened, as only to ſtrike the eye with a 256th part of their force; and this *helioſcope* he prefers to all others.

M. Huygens's method is much eaſier: he only blackens the inſide of the eye-glaſs of the teleſcope, by holding it over the flame or ſmoke of a lamp or candle; or, which is yet more commodious, blackens a piece of plain glaſs, and holds it between the eye and the object-glaſs; or, which is the beſt of all, joins the ſmoked glaſs to another, with a rim of thick paper between, to keep the black from rubbing off, and fits the two into a cell or frame, to be applied between the eye and the eye-glaſs.

HELIOSTATA, from ἥλιος, *ſun*. and ἵστημι, *I fix*, in *Optics*, the name of an inſtrument invented by Dr. s'Graveſande, and thus called from its property of fixing the ſun-beam in one poſition, viz. in a horizontal direction acroſs the dark chamber whilſt it is uſed.

This is an automaton, or piece of clock-work, conſiſting of the following parts: AA (*Tab.* II. *Optics*, *fig.* 29.) is a frame in which a metalline ſpeculum S is ſuſpended, moveable about its axis by means of two ſmall ſcrews at *a a*. This frame is fixed to the piece C, which being hollow, is moveable upon the cylindric ſhaft P about the iron pin *e*. (See the part by itſelf.) This pillar P is fixed to a triangular baſe or foot ſet perpendicularly by the three ſcrews B, B, B.

On the back-part of the ſpeculum is fixed a long cylindric wire or tail DE, in a perpendicular poſition. By this it is connected to the ſecond part of the *helioſtata*, which is a common twenty-four hour clock, repreſented at H; the plane of which clock is parallel to that of the equator in any given place. This clock is ſuſtained on the column FG, in which it is moveable up and down by a thin lamina or plate that enters it as a caſe, and fixed to a proper height by the ſcrews *d*, *d*, at the ſide. The whole is truly adjuſted to a perpendicular ſituation by means of the three ſcrews I, I, I, in the tripod LLM, and the plummet Q, whoſe cuſpis muſt anſwer to the point *o* beneath.

The axis of the wheel, which moves the index NO over the hour-circle, is ſomewhat large, and perforated with a cylindric cavity verging a little to a conical figure; and receives the ſhank *p q* of the ſaid index NO very cloſe and tight, that by its motion the index may be carried round. In the extremity O of the index is a ſmall cylindric piece *n*, with a cylindric perforation to receive the tail *t* of the fork T, yet ſo as to admit a free motion therein. In each ſide of the fork are ſeveral holes exactly oppoſite to each other, in which go the ſcrews *r*, *r*, upon whoſe ſmooth cylindric ends moves the tubular piece R on its auricles *m*, *m*.

When the machine is to be fixed for uſe, another part is made uſe of to adjuſt it; which is called the *poſitor*, and is denoted by the letters VXYZ. The cylinder C is removed with the ſpeculum from the foot P, and the braſs column VX put on in its ſtead, and adheres more ſtrictly to the pin *e*, that it may keep its poſition while the machine is conſtituted.

On the top of the column, about X as a centre, moves the lever YZ, ſo that it may be any-how inclined to the horizon, and keep its poſition. The arm YX may be of any length at pleaſure, but the arm YZ is of a peculiar conſtruction, and of a determinate length. To this arm, which extends no farther than *y*, is adapted a ſliding-piece Z*x* ſharp-pointed at Z. By this the arm XZ is determined to a given length, the piece Z*x* being fixed by the ſcrews *z z*.

Upon this arm is drawn the ſhort line *v x*, by which it may be lengthened in the whole, and is $\frac{9}{100}$ of the whole length XZ when ſhorteſt. The reaſon is, this arm is always to increaſe and decreaſe in proportion to the ſecant of the ſun's declination to the radius XZ when ſhorteſt; but the radius is to the ſecant of 23° 30′ (the ſun's greateſt declination) as 10000000 to 10904411, or as 100 to 109.

Now the reaſon of this conſtruction of the arm XZ is to find for any given day the diſtance of the center of the ſpeculum S from the top *l* of the ſtyle *l*N, which muſt ever be equal to the ſecant of the ſun's declination; for it muſt always be equal to the diſtance of the top of the ſaid ſtyle *l* from the center of the cylinder R in the fork T, and that is ever equal to the ſaid ſecant of declination.

For ſince the ſtyle *l*N and the fork T are in a poſition parallel to each other, therefore the middle hole in the ſides of the fork being (as they muſt be) of the ſame height above the end of the index O as is the height of the ſtyle NT, it is evident that on an equinoctial day the ſun's rays will paſs directly through the perforation of the piece R, if it be put in a poſition parallel to the plane of the ecliptic, or that of the clock; and alſo that the top of the ſhadow of the ſaid ſtyle will fall exactly on the ſaid hole.

In this caſe the top of the ſtyle is at the leaſt diſtance from the central point of R, and therefore may be repreſented by radius, while in any other poſition above or below, the diſtance will increaſe in proportion to the ſecant of the angle which the rays make with this firſt or middle ray, that paſs by the top of the ſtyle, and through the hole R.

Now it may be demonſtrated, that on any day of the year, if the clock and its pedeſtal be ſo fixed that the line of XII be exactly in the meridian, and that the poſition of R in the fork be ſuch that the ſun's rays go directly through it, and the ſhadow of the ſtyle's top fall juſt upon the hole; moreover, if the diſtance of the center of the ſpeculum S from the top of the ſtyle *l* be made equal (by the poſitor) to the diſtance of the central point R therefrom; and laſtly, the tail of the ſpeculum DE paſſing through R; if then the clock be put into motion, the index NO ſhall carry about the tail of the ſpeculum in ſuch a manner, that at all times of that day when the ſun can come upon the ſpeculum it will reflect the rays conſtantly in one and the ſame poſition and direction all the time without variation.

The machine thus conſtituted is placed in a box or caſe, and ſet in a window with one ſide open, expoſed to the ſun, and all the other parts cloſe; ſo that when the room is made dark, and the ſolar microſcope fixed to the fore-part of the box in which the *helioſtata* is placed, juſt againſt the center of the ſpeculum to receive the reflected horizontal beam, all the experiments of the darkened room are then performed as uſual. This is a very ingenious conſtruction of a ſolar microſcope apparatus, and full of art, but, it is to be feared, too expenſive and troubleſome for common uſe. However, it is eaſy to ſee that this machine is capable of being greatly reduced; for it may be made to anſwer the end very well without a clock; alſo the ſpeculum may be glaſs inſtead of metal, and all fixed on one foot or pedeſtal.

For a farther account of this inſtrument, the principles of its conſtruction, and its uſe, ſee s'Graveſande's Phyſices Element. Mathematica, &c. tom. ii. p. 715, &c. ed. 3tia. 1742.

HELIOSTROPHUS, in the *Materia Medica*, a name given by ſome of the Greek writers of the later ages to the gum ammoniacum of the ancients, which ſeems to have been a very different thing from what is called gum ammoniacum at this time; it being yellow and friable, our's whitiſh and tough.

HELIOTROPE, *heliotropium*, among the *Ancients*, an inſtrument or machine for ſhewing when the ſun arrived at the tropics and the equinoctial line. This name was alſo uſed for a ſun-dial in general.

HELIOTROPE is alſo a precious ſtone, of a green colour, ſtreaked with red veins.

Pliny ſays, it is thus called, becauſe, when caſt into a veſſel of water, the ſun's rays, falling thereon, ſeem to be of a blood colour; and that, when out of the water, it gives a faint reflection of the figure of the ſun; and is proper to obſerve eclipſes of the ſun, as a helioſcope.

The *heliotrope* is alſo called *oriental jaſper*, on account of its ruddy ſpots.

It is found in the Eaſt Indies; as alſo in Ethiopia, Germany, Bohemia, &c. Some have aſcribed to it the faculty of rendering people inviſible, like Gyges's ring. See HÆMATITES.

HELIOTROPE, *heliotropium*, from ἥλιος, *ſun*, and τρέπω, *I turn*, in *Botany*. See TURNSOLE.

HELISPHERICAL *line*, in *Navigation*, denotes the RHUMB *line*.

It is thus called, becauſe, on the globe, it winds round the pole helically, *i. e.* ſpirally, and ſtill comes nearer and nearer to it.

HELIX, in *Geometry*, a ſpiral line. See SPIRAL.

The word is Greek, ἕλιξ, and literally ſignifies a *wreath* or *winding*; of ελισσω, *involvo*, *I environ*.

In *Architecture*, ſome authors make a difference between the *helix* and the ſpiral.

A ſtair-caſe, according to Daviler, is in a *helix*, or is *helical*, when the ſtairs or ſteps wind round a cylindrical newel; whereas the ſpiral winds round a cone, and is continually approaching nearer and nearer its axis.

HELIX is alſo applied, in *Architecture*, to the caulicoles, or little volutes, under the flowers of the Corinthian capital; called alſo *urillæ*. See *Tab. Archit. fig.* 27. See alſo CAULICOLES.

HELIX, in *Anatomy*, is the whole circuit or extent of the auricle, or border of the EAR outwards.

In oppoſition to which, the inner protuberance ſurrounded thereby, and anſwering thereto, is called *anthelix*.

Helix *janthina* and *violacea*, a kind of ſhell-fiſh or teſtaceous animal always found floating on the water. It is about the ſize of a ſnail, and ſupported on the ſurface of the ſea by a ſmall cluſter of bubbles, which are filled with air, and a tenacious ſlimy ſubſtance, that will not eaſily part with its contents. This animal is oviparous, and theſe bubbles ſerve only as a nidus for its eggs. It is probable it never goes down to the bottom, nor willingly approaches any ſhore; for the ſhell is exceedingly brittle, few freſh-water ſnails having ſhells ſo thin. Every ſhell contains about a tea-ſpoonful of liquor, which it eaſily diſcharges on being touched, and which is of the moſt beautiful red purple that can be conceived. It dyes linen cloth, and it may be worth enquiry, as the ſhell is certainly found in the Mediterranean, whether it be not the *purpura* of the ancients. The *larus crepidatus* probably feeds upon it, as its dung is of the ſame colour with that of the beautiful liquor contained in its ſhell.

HELL, a place of puniſhment, wherein the wicked are to receive the reward of their evil deeds after this life.

In this ſenſe *hell* ſtands oppoſed to HEAVEN.

Among the ancients, *hell* was called Ταρταρος, Ταρταρα, *Tartarus*, *Tartara*; ʽΑδης, *Hades*, *Infernus*, *Inferna*, *Inferi*, &c.

The Jews, wanting a proper name for it, called it *Gehenna*, or *Gehinnon*, from a valley near Jeruſalem, wherein was a Tophet, or place where a fire was perpetually kept.

Divines reduce the torments of *hell* to two kinds; *pœna damni*, the loſs and privation of the beatific viſion; and *pœna ſenſus*, the horrors of darkneſs, with the continual pains of fire inextinguiſhable.

Moſt nations and religions have their notions of a *hell*. The *hell* of the poets is terrible enough: witneſs the puniſhment of Tityus, Prometheus, the Danaids, Lapithæ, Phlegyas, &c. deſcribed by Ovid in his Metamorphoſis. Virgil, after a ſurvey of *hell*, Æneid, lib vi. declares, that if he had a hundred mouths and tongues, they would not ſuffice to recount all the plagues of the tortured. The New Teſtament repreſents *hell* as *a lake of fire and brimſtone*, and *a worm which dies not*, &c. Rev. xx. 10, 14, &c. Mark ix. 43, &c. Luke xvi. 23, &c.

The Caffres are ſaid to admit thirteen *hells*, and twenty-ſeven paradiſes; where every perſon finds a place of recompence ſuited to the degree of good or evil he has done.

There are two great points of controverſy among writers concerning *hell*: the firſt, whether there really be any local *hell*, any proper and ſpecific place of torment by fire? the ſecond, whether the torments of *hell* are to be eternal?

I. The locality of *hell*, and the reality of the fire thereof, have been controverted from the time of Origen. That father, in his treatiſe Περι Αρχων, interpreting the ſcripture account metaphorically, makes *hell* to conſiſt not in external puniſhments, but in the conſcience of ſinners, the ſenſe of their guilt, and the remembrance of their paſt pleaſures. St. Auguſtine mentions ſeveral of the ſame opinion in his time; and Calvin, and many of his followers, have embraced it in our's.

The retainers to the contrary opinion, who are much the greateſt part of mankind, are divided as to the ſituation and other circumſtances of this horrible ſcene. The Greeks, after Homer, Heſiod, &c. conceived *hell*, τοπον τινα ὑπο την γην μεγαν, &c. *a large and dark place under the earth*. Lucian, De Luctu; and Euſtathius, on Homer.

Some of the Romans lodged it in the ſubterranean regions directly under the lake Avernus, in Campania; which they were led to from the conſideration of the poiſonous vapours emitted by that lake. Through a dark cave near this lake, Virgil makes Æneas deſcend to *hell*. See AVERNI.

Others placed *hell* under Tenarus, a promontory of Laconia; as being a dark frightful place, beſet with thick woods, out of which there was no finding a paſſage. This way, Ovid ſays, Orpheus deſcended to *hell*. Others fancied the river or fountain of Styx, in Arcadia, the ſpring-head of *hell*, becauſe the waters thereof were deadly.

But theſe are all to be conſidered as only fables of poets, who, according to the genius of their art, allegorizing and perſonifying every thing, from the certain death met with in thoſe places, took occaſion to repreſent them as ſo many gates or entering places into the other world.

The primitive Chriſtians, conceiving the earth a large extended plain, and the heavens an arch drawn over the ſame, took *hell* to be a place of the earth, the fartheſt diſtant from the heavens; ſo that their *hell* was our antipodes.

Tertullian, De Anima, repreſents the Chriſtians of his time as believing *hell* to be an abyſs in the center of the earth; which opinion was chiefly founded on the belief of Chriſt's deſcent into *Hades*, *hell*, Matt. xii. 40. See the following article HELL.

Mr. Whiſton has advanced a new opinion. According to him, the comets are to be conceived as ſo many *hells*, appointed in the courſe of their trajectories or orbits, alternately to carry the damned into the confines of the ſun, there to be ſcorched by his flames; and then to return them to ſtarve in the cold, dreary, dark regions, beyond the orb of Saturn.

Mr. T. Swinden, in an expreſs Inquiry into the Nature and Place of *hell*, not contented with any of the places hitherto aſſigned, contends for a new one. According to him, the ſun itſelf is the *local hell*.

This does not ſeem to be his own diſcovery: it is probable he was led into the opinion by that paſſage in Rev. xvi. 8, 9. Though it muſt be added, that Pythagoras ſeems to have had the like view, becauſe he places *hell* in the ſphere of fire, and that ſphere in the middle of the univerſe. Add, that Ariſtotle mentions ſome of the Italic or Pythagoric ſchool, who placed the ſphere of fire in the ſun, and even called it Jupiter's Priſon. De Cœlo, lib. ii.

His arguments for the ſun's being the *local hell* are,

1. Its capacity. Nobody will deny the ſun ſpacious enough to receive all the damned conveniently; ſo that there will be no want of room. Nor will fire be wanting, if we admit of Mr. Swinden's argument againſt Ariſtotle, whereby he demonſtrates that the ſun is hot, p. 208, & ſeq. The good man is "filled with amazement to think what Pyrenean mountains of ſulphur, how many Atlantic oceans of ſcalding bitumen, muſt go to maintain ſuch mighty flames as thoſe of the ſun; to which our Ætna and Veſuvius are mere glow-worms." P. 137.

2. Its diſtance and oppoſition to the empyreum, which has uſually been looked upon as the local heaven: ſuch oppoſition is perfectly anſwerable to that oppoſition in the nature and office of a place of angels and devils, of elect and reprobate, of glory and horror, of hallelujahs and curſings; and the diſtance quadrates well with Dives ſeeing Abraham *afar off*, *and the great gulph between them*, which this author takes to be the ſolar vortex.

3. That the empyreum is the higheſt, and the ſun the loweſt place of the creation, conſidering it as the center of our ſyſtem; and that the ſun was the firſt part of the viſible world created, which agrees with the notion of its being primarily intended or prepared to receive the angels, whoſe fall he ſuppoſes to have immediately preceded the creation.

4. The early and almoſt univerſal idolatry paid to the ſun; which ſuits well with the great ſubtilty of that ſpirit to entice mankind to worſhip his throne.

II. As to the eternity of *hell*-torments, we have Origen, again, at the head of thoſe who deny it; it being the doctrine of that writer, that not only men, but devils themſelves, after a ſuitable courſe of puniſhment, anſwerable to their reſpective crimes, ſhall be pardoned and reſtored to heaven. Aug. De Civit. Dei, lib. xxi. cap. 17. The chief principle Origen went upon was this, that all puniſhments are emendatory; applied only as painful medicines, for the recovery of the patients health. And other objections inſiſted on by modern authors are the diſproportion between temporary crimes and eternal puniſhments, &c.

The ſcripture phraſes for eternity, as is obſerved by archbiſhop Tillotſon, do not always import an infinite duration: thus, in the Old Teſtament, *for ever* often ſignifies only a long time, particularly to the end of the Jewiſh diſpenſation: thus, in the Epiſtle of Jude, ver. 7. the cities of Sodom and Gomorrah are ſaid to be ſet forth for an example, ſuffering the vengeance of *eternal fire*; that is, of a fire that was not extinguiſhed till thoſe cities were utterly conſumed. So one generation is ſaid to come, &c. but the earth endureth *for ever*.

In effect, M. Le Clerc notes, that there is no Hebrew word which properly expreſſes eternity: הולם, *holam*, only imports a time whoſe beginning or end is not known; and is accordingly uſed in a more or leſs extenſive ſenſe, according to the thing treated of.

Archbiſhop Tillotſon, however, argues very ſtrenuouſly, that where *hell-torments* are ſpoken of, the words are to be underſtood in the ſtrict ſenſe of infinite duration; and what he eſteems a peremptory deciſion of the point is, that the duration of the puniſhment of the wicked is in the very ſame ſentence expreſſed by the very ſame word which is uſed for the duration of the happineſs of the righteous, which all agree to be eternal. "Theſe, ſpeaking of the wicked, ſhall go away, εις κολασιν αιωνιον, *into eternal puniſhment*; but the righteous, εις ζωην αιωνιον, *into life eternal*."

The ſame great author attempts to reconcile this eternity with the divine juſtice, which had not been ſatisfactorily done before. Some had urged, that all ſin is infinite, in reſpect of the object it is committed againſt, viz. God; and therefore deſerves infinite puniſhment: but, that crime ſhould be heightened by the quality of the object, to ſuch a degree, is abſurd; ſince the evil and demerit of all ſin muſt be equal, inaſmuch as none can be more than infinite; and conſequently there can be no foundation for degrees of puniſhment in the next life. Add, that for the ſame reaſon as the leaſt ſin againſt God is infinite, in reſpect of its object, the leaſt puniſhment inflicted by God may be ſaid to be infinite, becauſe of its author; and thus all puniſhments from, as well as ſins againſt God, would be equal.

Others have urged, that if the wicked were to live for ever they would ſin for ever: but this, ſays the author, is mere preſumption. Who can ſay, that if a man lived ever ſo long, he would never repent? beſides, the juſtice of God only puniſhes ſins which men have committed, not thoſe they might poſſibly have committed.

Others therefore urge, that God gives men the choice of everlaſting happineſs and miſery; and that the reward promiſed to obedience is equal to the puniſhment threatened to diſobedience. To which it was anſwered, that though it be not contrary to juſtice to exceed in rewards, that being matter of mere favour, it may be ſo to exceed in puniſhments.

It may be added, that a man in this caſe has nothing to complain of, ſince he has only his election. But though this may ſuffice to ſilence the ſinner, and make him acknowlege his deſtruction to be of himſelf, it does not ſatisfy the objection from the diſproportion between the crime and the puniſhment. All the conſiderations, therefore, hitherto alledged, proving ineffectual, our great author is left to ſolve the difficulty himſelf.

In order to this he obſerves, that the meaſure of penalties with reſpect to crimes, is not only, nor always, taken from the quality and degree of the offence, much leſs from the duration and continuance of it; but from the reaſons of government, which properly require ſuch penalties as may ſecure the obſervation of the law, and deter men from the breach of it. Among men it is not reckoned injuſtice to puniſh murder, and many other crimes, which perhaps are committed in a moment, with perpetual loſs of eſtate, or liberty, or life: ſo that the objection of temporary crimes being puniſhed with ſuch long ſufferings is of no force.

In effect, what proportion crimes and penalties are to bear to each other, is not ſo properly a conſideration of juſtice as of wiſdom and prudence in the lawgiver, who may enforce his laws with what penalties he pleaſes, without any impeachment of his juſtice, which is out of the queſtion.

The primary end of all threatening is not puniſhment, but the prevention of it: God does not threaten, that men may ſin, and be puniſhed; but that they may not ſin, and ſo eſcape: and therefore the higher the threatening runs, the more goodneſs there is in it.

After all, it is to be conſidered, ſays the good archbiſhop, that he who threatens has ſtill the power of execution in his own hands. There is this difference between promiſes and threatenings; that he who promiſes, paſſes over a right to another, and thereby ſtands obliged to him, in juſtice and faithfulneſs, to make good his word: but it is otherwiſe in threatenings; he that threatens, keeps the right of puniſhing ſtill with him, and is not obliged to execute what he has threatened, any farther than the reaſons and ends of government require. Thus, God abſolutely threatened the deſtruction of Nineveh, and his peeviſh prophet underſtood the threatening to be abſolute, and was angry for being employed in a meſſage that was not made good; but God underſtood his own right, and did what he pleaſed, notwithſtanding the threatening he had denounced, and notwithſtanding Jonah was ſo touched in point of honour, that he had rather have periſhed than Nineveh ſhould have eſcaped. Tillotſon's Sermons, vol. i. p. 411. ed. fol. 1710.

Hell, *hades*, is ſometimes alſo uſed, in the ſcripture ſtyle, for *death* and *burial*; becauſe the Hebrew and Greek names ſignify ſometimes the place of the damned, and ſometimes ſimply the grave. See Ades.

The word *hell* is of Saxon extraction, and ſignifies *a covered place*; and thence, by an eaſy tranſition, the place of the dead, or the inviſible ſtate into which death removes mankind. From the ſame original we ſtill retain in our language the word *heal*, or *hele*, which ſignifies *to cover over*: and in this ſenſe lord King maintains that the word *hell* is uſed, and ought to be underſtood in the Apoſtle's Creed; the meaning of the article relating to our Saviour's deſcent into *hell* being no other than this, that his ſoul, being ſeparated from his body by a real tranſition and local motion, went into the unſeen region of ſpirits, where, according to the laws of death, it remained among other pious departed ſouls till the reſurrection of his body. Others contend, that he deſcended into the place of torment, where he triumphed over the devils, &c. Crit. Hiſt. of the Apoſtle's Creed, p. 181, &c. Pearſon on the Creed, p. 225.

The Romaniſts add, that he there comforted the ſouls in purgatory, and brought away the ſpirits of the patriarchs, and other juſt perſons, departed till that time, carrying them with him into paradiſe.

In the Romiſh church, that part of *hell*, wherein thoſe were retained who died in the mercy and favour of God before our Saviour's ſufferings, is called Limbus.

HELLEBORE, ΕΛΛΕΒΟΡΟΣ, or Elleborus, a medicinal plant, reputed, among the ancients, a ſpecific for the cure of melancholy and madneſs.

There are two kinds of *hellebore*, the *black* and the *white*.

The characters of the *black hellebore*, alſo called the Chriſtmas-flower, which is a genus of the *polyandria polygynia* claſs, are theſe: the flower has no empalement, but has five large, roundiſh, permanent petals, and many ſmall nectaria placed circularly; it has a great number of ſtamina, and ſeveral compreſſed germina, which afterward turn to compreſſed capſules with two keels, the lower ſhort, and the upper convex, filled with round ſeeds adhering to the ſeam. Miller enumerates ſix ſpecies, Linnæus five.

The *white hellebore*, *veratrum*, which is a genus of the *polygamia monoecia* claſs, has theſe characters: it has hermaphrodite and male flowers intermixed in the ſame ſpike; the flowers have no empalement, but have ſix oblong ſpear-ſhaped petals which are permanent, and ſix awl-ſhaped ſtamina ſitting on the point of the germen, ſpreading aſunder, and terminated by quadrangular ſummits; they have three oblong erect germina ſitting upon the ſtyle, which are ſcarcely viſible, crowned by a ſingle ſpreading ſtigma; the germina afterward become three oblong, erect, compreſſed capſules, with one cell opening on the inſide, including many oblong, compreſſed, membranaceous ſeeds: the male flowers have the ſame characters with the hermaphrodite, but are barren. There are four ſpecies according to Miller, and three in the Linnæan ſyſtem.

It is only the roots that are uſed in each kind, which are to be choſen large and fair, furniſhed with thick filaments: thoſe of the *white*, tan-coloured without, and white within; and thoſe of the *black*, blackiſh without, and browniſh within; dry, clean, and of a ſharp, diſagreeable taſte.

The ancients, as already obſerved, had a great opinion of their efficacy in diſeaſes of the mind; whence various phraſes and forms of ſpeaking among writers; as *caput* helleboro *dignum:* Juvenal ſays, Miſers need a double doſe of *hellebore*; *danda eſt* ellebori *multo pars maxima avaris.* The iſland of Anticyra, ſituate againſt mount Œta, was famous for the growth and uſe of this plant; it being here in its greateſt perfection, and uſed with the beſt effect: whence the proverb, *Navigat Anticyras, ſend him a voyage to Anticyra*, ſpoken of a madman.

The white, which is common on mountainous places, in Germany, Switzerland, and other parts of Europe, acts, in doſes of ten or fifteen grains, as a purgative, but ſo very violently, both upwards and downwards, as frequently to cauſe convulſions; whence the uſe of it internally is now diſcontinued: but it is ſtill retained with ſucceſs for the farcy in horſes and the ſcab in ſheep, and for ſome kinds of maniacal caſes, as a laſt reſource.

The chief uſe wherein the preſent practice acknowleges it, is in form of a ſternutatory powder, to clear and open the head, in lethargic and other diſorders: the powder has likewiſe been uſed, with other external applications, for deſtroying cutaneous inſects. Infuſions of the root in water, and the extracts obtained by inſpiſſating them, operate with leſs violence.

There is a preparation in the ſhops, which is uſed ſometimes in glyſters, called *mel helleboratum*, which is obtained by macerating a pound of the root for three days in four pints of water, and boiling it a little; the decoction, ſtrained, is mixed with three pounds of clarified honey, and the mixture boiled down till the water has exhaled. There is alſo a tincture, drawn with a quart of proof ſpirit from eight ounces of the root, which is ſometimes given in doſes of a few drops as an alterative, and one or two drams and upwards as a cathartic and emetic.

The black *hellebore*, called alſo *melampodium*, and uſed among us, Dr. Quincy ſuggeſts to be much inferior in virtue to that of the ancients; becauſe it will not operate much by ſtool, but is only a powerful alterative, getting far into the habit, and ſo promoting ſweat: however, in doſes of ten grains to half a dram, it will prove a ſtrong, a ſtrong, though not very violent cathartic: the root and its preparations are chiefly uſed, in ſmall doſes, as attenuants and deobſtruents.

He adds, that he has known it do wonders in the gout and rheumatiſm, and that it rarely fails in obſtructions of the menſes. It is alſo ſerviceable in plethoric and ſanguine conſtitutions, where chalybeats are ineffectual or injurious.

The extract made with water, given in doſes from eight or ten grains to a ſcruple or more, is the beſt and ſafeſt preparation of this root, when deſigned for a cathartic; and a tincture made in proof ſpirits appears to be the moſt eligible preparation for the purpoſes of an alterative and deobſtruent: four ounces of the root may be digeſted in a quart of the ſpirit, with the addition of thirty or forty grains of cochineal; and the filtered tincture may be given in the quantity of a tea-ſpoonful twice a day, in warm water or any other convenient vehicle. Lewis, Mat. Med.

Hellebore, *baſtard*, or *Helleborine*, *ſerapias*, in *Botany*, a genus of the *gynandria diandria* claſs. Its characters are theſe: it has a ſingle ſtalk, and the ſheath of the flower is at a diſtance; the germen ſuſtains the flower, which has no empalement, but has five oblong oval petals; the nectarium is the length of the petal, hollowed at the baſe, oval and gibbous below, cut into three points; the flower has two ſhort ſtamina, ſitting upon the pointal, terminated by erect ſummits, placed under the upper lip of the nectarium, and an oblong contorted germen, ſituated under the flower, the ſtyle growing to the upper lip of the nectarium, crowned by an obſolete ſtigma; the germen becomes an oval, obtuſe, three-cornered capſule, armed with three keels, opening with a valve under each, having one cell, filled with ſmall ſeeds There are four ſpecies. Miller. Linnæus reckons ſix.

Hellebore *with a globoſe flower*, or *globe ranunculus*, *trollius*, in *Botany*, a genus of the *polyandria polygynia* claſs. Its characters are: the flower has no empalement; it has about fourteen almoſt oval petals, whoſe points meet together; it has nine narrow, plain, incurved, umbilicated nectariums, which are perforated at their baſe; and a great number of briſtly ſtamina, terminated by erect ſummits, with numerous germina forming a column, without ſtyles, which afterward become as many capſules, collected into an oval head, each containing one ſeed. There are two ſpecies. Miller.

HELLENISM, a ſort of Greciſm; or a phraſe peculiarly accommodated to the genius and conſtruction of the Greek tongue.

Helleniſm is diſtinguiſhed from Greciſm, in that the former is not applied to authors who have written in Greek; their language, it is evident, ſhould be a continual *helleniſm*; but it is applied to authors, who, writing in ſome other language, uſe terms and expreſſions peculiar to the Greek.

There are abundance of *helleniſms* in the vulgate verſion of the ſcriptures.

HELLENISTIC, or Hellenistic *language*, that uſed among the Hellenists.

The critics are divided as to this language. Several of them, and among the reſt Druſius and Scaliger, take it to be the language uſed among the Grecian Jews. They add, that it is in this language the Greek tranſlation of the Septuagint was written, and even the books of the New Teſtament compoſed. M. Simon calls it *the language of the ſynagogue*.

It muſt not be imagined, that this was any peculiar language diſtinct from all others, or even any peculiar dialect of the Greek; it was thus denominated, to ſhew that it was Greek, mixed with Hebraiſms and Syriaciſms. Salmaſius rejects the common opinion of the learned touching the *Helleniſtic* language, and has written two volumes on the ſubject, in which there is not a little logomachia.

HELLENISTS, Hellenistæ, a term occurring in the Greek text of the New Teſtament, and which in the Engliſh verſion is rendered *Grecians*.

The critics are divided as to the ſignification of the word. Œcumenius, in his Scholia on Acts vi. 1. obſerves, that it is not to be underſtood as ſignifying thoſe of the religion of the Greeks, but thoſe who ſpoke Greek, τȣς ἑλληνιςι φθεγξαμενȣς. The authors of the Vulgate verſion, indeed, render it, like ours, *Græci*; but Meſſieurs Du Port Royal, more accurately, *Juifs Grecs*, *Greek* or *Grecian Jews*; it being the Jews who ſpoke Greek that are here treated of, and who are hereby diſtinguiſhed from the Jews called *Hebrews*, that is, who ſpoke the Hebrew tongue of that time.

The *Helleniſts*, or Grecian Jews, were thoſe who lived in Egypt, and other parts, where the Greek tongue prevailed. It is to them we owe the Greek verſion of the Old Teſtament, commonly called the Septuagint, or that of the Seventy.

Salmaſius and Voſſius are of a different ſentiment with regard to the *Helleniſts*. The latter will only have them to be thoſe who adhered to the Grecian intereſts.

Scaliger is repreſented, in the Scaligerana, as aſſerting the *Helleniſts* to be the Jews who lived in Greece and other places, and who read the Greek Bible in their ſynagogue, and uſed the Greek language *in ſacris*; and thus they were oppoſed to the Hebrew Jews, who performed their public worſhip in the Hebrew tongue; and in this ſenſe St. Paul ſpeaks of himſelf as a Hebrew of the Hebrews, Phil. iii 5. i. e. a Hebrew both by nation and language. The *Helleniſts* are thus properly diſtinguiſhed from the *Hellenes* or Greeks, mentioned John xii. 20. who were Greeks by birth and nation, and yet proſelytes to the Jewiſh religion

HELLENODICÆ, 'Ελληνοδικαι, in *Antiquity*, the directors of the Olympian games. At firſt there was only one, afterwards the number increaſed to two and to three, and at length to nine. They aſſembled in a place called 'Ελληνοδικαιον, in the Elean forum, where they were obliged to reſide ten months before the celebration of the games, to take care that ſuch as offered themſelves to contend, performed their προγυμνασματα, or preparatory exerciſes, and to be inſtructed in all the laws of games by certain men called νομοφυλακες, i. e. keepers of the laws. And the better to prevent all unjuſt practices, they were farther obliged to take an oath, that they would act impartially, would take no bribes, nor diſcover the reaſon for which they diſliked or approved of any of the contenders. At the ſolemnity they ſat naked, having before them the victorial crown till the exerciſes were finiſhed, and then it was preſented to whomſoever they adjudged it. Nevertheleſs, there lay an appeal from the *hellenodicæ* to the Olympian ſenate. Pott. Archæol. Græc. lib. ii. cap. 22. tom. i. p. 448.

HELLENODICÆUM, "Ελληνοδικαιον, in *Antiquity*, the place where the hellenodicæ were uſed to aſſemble.

HELLENOTAMIÆ, "Ελληνοταμιαι, in *Antiquity*, Athenian officers appointed to receive the money due from the tributary cities.

They were alſo called *hellenotamiæi*.

HELLOTIA, 'Ελλωτια, in *Antiquity*, two feſtivals, one of which was celebrated in Crete, in honour of Europa, called *Hellotia*; the other was celebrated by the Corinthians, with ſolemn games and races, wherein young men contended, running with lighted torches in their hands. See a farther account of theſe feſtivals in Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 393.

HELLOTIS, 'Ελλωτις, in *Antiquity*, a myrtle garland, carried in proceſſion with Europa's bones at the feſtival called Hellotia.

This garland was no leſs than twenty cubits in circumference.

HELM, in *Sea-language*, is a long and flat piece of timber, or an aſſemblage of ſeveral pieces, ſuſpended along the hind-part of a ſhip's ſtern-poſt, where it turns upon hinges to the right or left, serving to direct the courſe of the veſſel. The *helm* is uſually compoſed of three parts, viz. the rudder, the tiller, and the wheel, except in ſmall veſſels, where the wheel is unneceſſary.

Helm, *a-lee the*. See A-lee.

Helm, *bear up the*. See Bearing.

Helm, *eaſe the*. See Ease.

Helm, *port the*. See Port.

Helm, *right the*, or *helm the midſhip*. See Right.

Helm, *ſtarboard the*. See Starboard.

Helm, in *Chemiſtry*, is the head of a ſtill or alembic; thus called, becauſe in figure it ſometimes reſembles a *helm* or helmet.

Hence, to bring the thing *over* the *helm* is the ſame as to force it by fire up to the top of the veſſel, that it may diſtil down into the receiver by the beak of the head.

And when they ſay, ſuch a thing cannot be brought over the *helm*, they mean that it is of too fixed a nature to be raiſed into vapour by the force of fire.

Helm, a term uſed by country people for ſtraw, bruiſed by threſhing or otherwiſe, and bound up in bundles for thatching. See Thatch.

HELMET, or Helm, an ancient armour of defence, worn by the cavaliers, both in war and in tournaments, as a cover and defence of the head; and ſtill uſed by way of a creſt or ornament over the ſhield or coat of arms.

The *helmet* is known by divers other names, as the *caſk*, *head-piece*, *ſteel cap*, &c.

The *helmet* covered the head and face, only leaving an aperture about the eyes, ſecured by bars, which ſerved as a viſor.

The *helmet* is borne in armoury as a mark of nobility; and by the different circumſtances of the bearing of the *helmet*, are the different degrees of nobility indicated. In France, whence all our heraldry originally came, the following rules obtain.

A perſon newly ennobled, or made a gentleman, bears over his eſcutcheon a *helmet* of bright iron or ſteel, in profile, or ſtanding ſideways; the viſor quite cloſe.

A gentleman of three deſcents bears it a little open, but ſtill in profile, ſhewing three bars of the viſor.

Ancient knights, &c. have it in profile, but ſhewing five bars; the edges of ſilver.

A baron's *helmet* is of ſilver; the edges gold, with ſeven bars neither quite in profile, nor yet in front, with a coronet over it adorned with pearls.

Viſcounts and earls formerly bore a ſilver *helmet*, with gold edges, its poſition like the former; but now they bear it quite fronting, with a coronet over it.

Marquiſes bear a ſilver *helmet*, damaſked, fronting; with eleven bars, and their coronet.

Dukes and princes have their *helmet*, damaſked, fronting, the viſor almoſt open, and without bars, with their coronets over them.

Laſtly, the *helmets* of kings and princes are all of gold, damaſked full fronting, and the viſor quite open, and without bars.

The *helmets* of baſtards are to be turned to the left, to denote their baſtardy.

Among the Engliſh heralds, theſe laws are of late ſomewhat varied. Leigh will have the *helmet* profile and cloſe to belong to knights; but all other authors give it to eſquires and gentlemen. *Tab.* III. *Heraldry*, *fig.* 92.

To a knight's and baronet's, they aſſign the *helmet* ſtanding right forward, with the beaver a little open, and without bars. *Fig.* 93.

The *helmet* in profile, or poſited ſideways, and open, with four bars, belongs to a nobleman under the condition of a duke. *Fig.* 94.

The *helmet* right forward and open, with many bars, is aſſigned to dukes, princes, and kings: that appropriated to dukes and marquiſes has five bars, one exactly in the middle, and two on each ſide, (*fig.* 95.) whereas the king's *helmet* has ſix bars, three on each ſide. *Fig.* 95. N° 2.

Thoſe turned ſideways are ſuppoſed to be giving ear to the command of their ſuperiors; and thoſe right forwards, to be giving orders with abſolute authority.

Commonly there is but one *helmet* in a ſhield; but ſometimes there are two or three: if there be two, they muſt be placed facing each other; if three, the two extremes muſt be looking towards that in the middle.

Helmet-*flower*, in *Botany*. See Aconite and Wolf's-*bane*.

Helmet *pigeon*, the name given to a particular ſpecies of pigeon, called by Moore the *columba galeata*. It has its name from its having its head covered with a plumage of a diſtinct colour from that of the reſt of the body, and appearing ſomewhat like a *helmet* covering the head. It is a moderate-ſized pigeon, a little bigger than the ſpecies called the nun. The head, tail, and flight-feathers of the wings, are always of the ſame colour, which is either black, red, or yellow, and ſometimes, though rarely, blue; the reſt of the body is all white. They are red-eyed, and have no hood like that of the nun, otherwiſe they approach much to that ſpecies. Moore's Columbarium, p. 48.

Helmet *ſtone*, in *Natural Hiſtory*. See Galea.

HELMINTHAGOGA, of ελμινς, *worm*, and αγω, *I expel*, medicines contrived to deſtroy and expel worms.

HELMINTHES, in the *Medicinal Writers*, a word uſed to ſignify the worms in human bodies.

HELMINTHOLITHUS, of ελμινς, *worm*, and λιθος, *ſtone*, in *Natural Hiſtory*, a name given by Linnæus to petrified bodies reſembling worms. Of theſe he enumerates twenty-four different genera.

HELMINTHOTHECA, in *Botany*, a name given by Vaillant to a genus of plants, ſince deſcribed by Linnæus under the name picris.

HELMONTII *ludus*. See Ludus *helmontii*.

HELODES, formed of ελος, *marſh*, in *Natural Hiſtory*, a term applied to certain plants, to ſignify their place of growth to be in fens, bogs, or marſhy places; thus a kind of St. Peter's wort, which is diſtinguiſhed from the others by being hairy, and growing always in boggy places, is called by Ray and others, *aſcyrum villoſum helodes*.

In *Medicine*, the ſame word, or *elodes*, is uſed as a characteriſtic epithet in certain fevers. Theſe are ſuch as are attended, in their beginning, with profuſe ſweats, which afford no relief; and all the time the tongue is dry, and the ſkin hard, and as if it were parched. Theſe are uſually of dangerous conſequence.

HELONIAS, in *Botany*, a genus of the *hexandria trigynia* claſs. The characters are, that the corolla has ſix petals, that it has no calyx, and the fruit is a three-celled capſule. There are two ſpecies.

HELOPS, in *Ichthyology*, the name of a fiſh which often occurs in the old Greek and Latin writers. Ariſtotle, Ælian, Ovid, and others, mention it. It ſeems to have been the ſame with their oniſcus and acciPeſius, which was our sturgeon. Pliny's account of the *helops* countenances this opinion.

HELOSIS, of ελυω, *I fold up*, in *Medicine*, the name of a diſorder of the eyes, attended with an everſion, or turning up of the eye-lids.

HELOTIS, a name given by ſome authors to a diſeaſe called plica *Polonica*.

HELOTS, in *Antiquity*, a kind of ſlaves, among the Lacedæmonians, ſo named from Helos, a Laconian town, conquered by the Spartans, who made all the inhabitants priſoners of war, and reduced them and their poſterity to the condition of ſlavery.

On theſe ſlaves lay the whole care of ſupplying the city with proviſions; the ground was tilled, and all manner of trades managed by them; whilſt their maſters ſpent all their time in dancing and feaſting, in their exerciſes, hunting-matches, and the λεσχαι, or places where good company uſed to meet. Notwithſtanding the great uſefulneſs of the *Helots*, they were treated in a moſt barbarous manner, and often murdered without committing any fault, and without any ſhew of juſtice. Pott. Archæol. Græc. lib. i. cap. 10.

HELPS, in the *Manege*. To teach a horſe his leſſons, there are ſeven *helps* or aids to be known: theſe are the *voice*, *rod*, *bit* or *ſnaffle*; the *calves* of the legs, the *ſtirrups*, the *ſpur*, and the *ground*. See Aids.

The *helps* are occaſionally turned into corrections.

HELPESED, in *Natural Hiſtory*, a name uſed by ſome writers for coral.

HELSEBON, an affected word, uſed by ſome of the chemical writers to expreſs common ſea-ſalt, well purified by ſolution and recryſtallization.

HELSINGIC *character*, a character inſcribed on ſome ſtones found in Helſingland, in the north parts of Sweden. It differs from the Runic; though one of theſe characters may eaſily be transformed into the other. See Runic.

HELVE, the handle of a hatchet, pick-ax, mattock, &c. and to *helve* theſe is to put handles to them.

HELVELLA, in the *Linnæan Syſtem of Botany*, a genus of the *cryptogamia fungi*.

HELVETIC, ſomething that has a relation to the Switzers or inhabitants of the Swiſs cantons, who were anciently called *Helvetii*.

The *Helvetic* body comprehends the republic of Switzerland, conſiſting of thirteen cantons, which make ſo many particular commonwealths.

By the laws and cuſtoms of the *Helvetic* body, all differences between the ſeveral ſtates and republics are to be decided within themſelves, without the intervention of any foreign power.

The government of this body is chiefly democratic, with ſome mixture of the ariſtocratic.

HELVIDIANS, a ſect of ancient heretics, denominated from their leader Helvidius, a diſciple of Auxentius the Arian, whoſe diſtinguiſhing principle was, that Mary, the mother of Jeſus, did not continue a virgin, but had other children by Joſeph.

The *Helvidians* are called, by the Greeks, antidicomarianites.

HELXINE, in *Botany*, a name uſed, by ſome authors, for the parietaria, or pellitory *of the wall*.

Helxine *ciſſampelos*, in *Botany*, a name given by ſome authors to a ſpecies of bindweed, called by Mr. Tournefort *convolvulus major albus craſſiori & auriculato folio maritimus*; the great white-flowered ſea bindweed, with thick auriculated leaves. See Convolvulus.

HEM, a partition in the ovens, wherein the *lapis calaminaris*, or *calamine*, is baked. Theſe ovens have a hearth made on one ſide, divided from the oven itſelf by a partition, or *hem*, open at the top, by which the flame paſſes over, and ſo heats and bakes the *calamine*.

HEMATOPUS, in *Ornithology*, a name uſed by Bellonius and ſome others, for the bird commonly known in England by the name of the ſea-pie, and called by Mr. Ray and ſome authors pica *marina*.

HEMEROBAPTISTS, a ſect among the ancient Jews, thus called from their waſhing and bathing every day, in all ſeaſons; and performing this cuſtom with the greateſt ſolemnity, as a religious rite neceſſary to ſalvation.

Epiphanius, who mentions this as the fourth hereſy among the Jews, obſerves, that in other points theſe heretics had much the ſame opinions as the Scribes and Phariſees; only that they denied the reſurrection of the dead, in common with the Sadducees, and retained a few other of the improprieties of theſe laſt.

The ſects who paſs in the Eaſt under the denomination of Sabians, calling themſelves *Mendai Iiahi*, or the diſciples of John, and whom the Europeans entitle the Chriſtians of St. John, becauſe they yet retain ſome knowlege of the Goſpel, is probably of Jewiſh origin, and ſeems to have been derived from the ancient *Hemerobaptiſts*; at leaſt it is certain, that that John, whom they conſider as the founder of their ſect, bears no ſort of ſimilitude to John the Baptiſt, but rather reſembles the perſon of that name, whom the ancient writers repreſent as the chief of the Jewiſh *Hemerobaptiſts.* Theſe ambiguous Chriſtians dwell in Perſia and Arabia, and principally at Baſſora; and their religion conſiſts in bodily waſhings, performed frequently, and with great ſolemnity, and attended with certain ceremonies, which the prieſts mingle with this ſuperſtitious ſervice. Moſheim's Eccl. Hiſt. vol. iii. p. 498, 8vo. 1758.

HEMEROBIUS, in *Zoology*, a genus of inſects of the *neuroptera* order; the characters of which are, that the mouth has two tentacula, the wings are deflex, without folds, and the antennæ are longer than the convex thorax, ſetaceous, and extended. There are fifteen ſpecies. See CHRYSOPIS.

HEMEROCALLIS. See LILY.

HEMERODROMI, compounded of ἡμερα, *day*, and δρομος, *courſe*, &c. among the *Ancients*, were centinels, or guards, appointed for the ſecurity and preſervation of cities, and other places.

They went out of the city every morning, as ſoon as the gates were opened, and kept all day patrolling round the place; ſometimes, alſo, making excurſions farther into the country, to ſee that there were no enemies lying in wait to ſurpriſe them.

HEMERODROMI were alſo a ſort of couriers, among the *Ancients*, who only travelled one day, and then delivered their packets, or diſpatches, to a freſh man, who run his day, and ſo on, to the end of the journey.

The Greeks had of theſe ſort of couriers, which they derived from the Perſians, who were the inventors thereof, as appears from Herodotus. Auguſtus had the ſame; at leaſt, he eſtabliſhed couriers, who, if they did not relieve each other from day to day, yet did it from ſpace to ſpace, and that ſpace was not very great.

HEMEROTROPHIS, in *Antiquity*, a meaſure of capacity, the ſame with the CHOENIX.

It was ſo called from its holding one day's food.

The word is compounded of ἡμερα, a *day*, and τροφη, *food.*

HEMEROLOPIA, of ἡμερα, *day*, and ωψ, *eye*, a diſtemperature of the eyes, by means of which perſons can only ſee in broad day-light, and not diſtinguiſh objects at all in the duſk of the evening. It is owing to a great contraction of the pupil.

HEMI, a word uſed in the compoſition of divers terms. It ſignifies the ſame with *ſemi* or *demi*, viz. *half*; being an abbreviature of ἡμισυς, *hemiſys*, which ſignifies the ſame. The Greeks retrenched the laſt ſyllable of the word ἡμισυς, in the compoſition of words; and, after their example, we have done ſo too, in moſt of the compounds borrowed from them.

HEMICRANIA, Ἡμικρανια, in *Medicine*, a ſpecies of cephalalgia, or head-ach; wherein only one hemiſphere, or half, or one ſide of the head, is affected; and owing to a congeſtion of blood in the veſſels of that half.

Phyſicians divide the *hemicrania* into four kinds. 1. The idiopathic, when it is properly a diſeaſe of itſelf. 2. The ſymptomatic, where it is properly only the ſymptom of ſome other diſeaſe. 3. The continual or fixed, where it admits of no abſolute intermiſſions. And, 4. The periodic, where the patient is regularly free from it at certain ſtated periods.

Signs of it. Among theſe are vibrative and very acute pains: the pain occupies only one part of the head, while the other part is wholly free and at eaſe. The left ſide of the head is uſually the part in pain. In that ſide of the head where the pain is, it is not fixed to any one ſpot, but wanders up and down from one part to another; and ſometimes the eye on that ſide, ſometimes the jaw and teeth are affected by it. When the lower part of the head is in pain, the upper part is ſomewhat eaſy; and in ſome caſes the pain has been known to deſcend to the arm of that ſide. To this it is to be added, that the patient is uſually coſtive, and makes very little urine. Women are much more ſubject to this diſtemper than men, and among them principally ſuch as live high, and uſe little exerciſe; ſuch as are ſubject to violent paſſions of the mind; ſuch as have had frequent ſuppreſſions of the menſes; and ſuch as live in a married ſtate without having children.

The principal cauſe of the diſeaſe is a plethora, occaſioned uſually by a ſuppreſſion of the menſes, or hæmorrhoids, or ſome other natural evacuation, or the omiſſion of habitual bleedings at ſpring and fall. To theſe cauſes are to be added a diſtemperature of the primæ viæ, and conſequent acidities or indigeſtion, a change of the courſe of life from one full of exerciſe to a ſedentary one; exceſſive watchings or ſtudies; too great heat of the body, or too ſudden cooling of it; violent paſſions, as of anger, or the like, ſuppreſſed; and, finally, too high living, and the free uſe of ſtrong liquors.

Prognoſtics. This ſpecies of head-ach not unfrequently brings on ſuffuſions, and other diſorders of the eyes, and often is a fore-runner of the gout, eſpecially if it be imprudently treated during the fit; if the congeſtion of blood be driven by repellents at this time to the feet, it conſtitutes that painful diſtemper; but if it fall upon the viſcera, it uſually brings on an inflammatory fever. When it extends to the arm and ſide of the affected half of the head, there is danger of a palſy coming on. In itſelf it is not difficult to cure in young people; but in women advanced in years, after the ceſſation of the menſes, it is ſcarce ever perfectly cured ſo as not to return.

Method of cure. As the primæ viæ are almoſt always obſtructed in this complaint, the regular beginning of a cure is by emptying them; and a gentle vomit, and purging medieines. are to be given. Stahl adviſes, to anſwer both theſe purpoſes at once, by rhubarb and emetic tartar mixed together. After this emollient clyſters are to be given; then the violent motion of the blood is to be quieted, by giving powders compoſed of nitre, crabs-eyes, and cinnabar; and in caſes where the pain is violent and unſufferable, a gentle opiate may be given; ſuch as a ſmall doſe of the ſtorax pill, and at other times the quantity of the cinnabar may be increaſed from five grains to ten or twenty in a doſe; and this will ſupply the place of the opiate, and produce the ſame effect in giving eaſe. After the bowels have been ſufficiently cleanſed, chalybeate waters, and ſuch bitters as ſtrengthen the ſtomach, will be neceſſary. Spirit of wine camphorated may alſo be uſed externally; and frequently bathing the feet in the decoctions of the warm and emollient herbs, has a great effect. In the abſence of the fit, the methods to be uſed, by way of prevention, are bleeding in the ancle, to remove the plethora; and where the ſuppreſſion of the menſtrual, or any other diſcharge, has been the cauſe, this is to be reſtored, if poſſible, to its wonted periods; and in all caſes a ſedentary life is to be avoided. Bleeding is never proper in the time of the fit, unleſs the plethora be very great, or the congeſtion in the head ſo great, that worſe conſequences are to be feared. Junker, Conſp. Med. p. 118.

HEMICYCLE, HEMICYCLIUM, compounded of ἡμισυς, *half*, and κυκλος, *circle*, a SEMICIRCLE.

HEMICYCLE is particularly applied, in *Architecture*, to vaults in the cradle form; and arches, or ſweeps, of vaults, conſtituting a perfect ſemicircle.

To conſtruct an arch of hewn ſtone, they divide the *hemicycle* into ſo many vouſſoirs; taking care to make them an uneven number, that there be no joint in the middle, where the key-ſtone ſhould be. See KEY and BRIDGE.

HEMICYCLIUM was alſo a part of the orcheſtra in the ancient theatre. Scaliger, however, obſerves, it was no ſtanding part of the orcheſtra; being only uſed in dramatic pieces, where ſome perſon was ſuppoſed to be arrived from ſea, as in Plautus's Rudens.

The ancients had alſo a ſort of ſun-dial, called *hemicyclium.* It was a concave ſemicircle, the upper end, or cuſp, whereof looked to the north.

There was a ſtyle, or gnomon, iſſuing from the middle of the *hemicycle*, whereof that point, correſponding to the center of the *hemicycle*, repreſented the center of the earth; and its ſhadow projected on the concavity of the *hemicycle*, which repreſented the ſpace between one tropic and another, the ſun's declination, the day of the month, hour of the day, &c.

HEMINA, formed of ἡμισυς, *half*, a veſſel uſed as a meaſure among the ancient Romans, containing half the ſextary. The *hemina*, called alſo *cotyla*, and *acetabulum*, contained eight ounces of liquor; and was the twelfth part of the congius.

Several authors have wrote expreſs treatiſes on the Roman *hemina*; particularly Meſſ. Arnaud, and Pelletier.

St. Benedict preſcribes the *hemina* as the portion or quantity of wine to be allowed the religious of his order at each meal. F. Mabillon, who has wrote on the ſubject, ſhews, that this *hemina* was a meaſure peculiar to the Benedictines, as well as the pound of bread allowed the ſame religious, which only conſiſted of fifteen ounces. F. Lancelot has a diſſertation to prove, that the *hemina* of wine, preſcribed by St. Benedict, only amounts to a demi-ſeptier of Paris meaſure; but others make it two ſeptiers; and others three.

HEMIOBOLON, a weight often mentioned by the ancient writers in medicine, and expreſſing the half of their obolus, or the twelfth part of a dram, that is, five grains.

HEMIOLIUS, or HEMIOLIA, compounded of ἡμισυς, *half*, and ὁλος, *whole*, an ancient mathematical term, occurring chiefly in muſical writers. It ſignifies the ratio of two things, whereof the one contains the other once and a half; as 3 : 2, or 15 : 10, otherwiſe called *ſeſquialterate.* See RATIO, and SESQUIALTERATE.

Macrobius, on the Somnium Scipionis, lib. ii. cap. 1. obſerves, that the concord, called in the ancient muſic *diapente*, and in the modern a *fifth*, ariſes from this proportion.

HEMIONITIS, of ἡμιονος, *a mule*, *moon*, or *mule-fern*, in the Linnæan ſyſtem of *Botany*, the name of a genus of *ferns*; the character of which is, that the fructifications are diſpoſed in branched lines, or ſuch as intermix with and interſect one another.

The characters of *hemionitis*, according to Tournefort, are theſe: the flowers are not diſcovered, but the ſeeds ſtand in cluſters on the back part of the leaves; the leaves are all furniſhed with broad auricles at their baſe, and are in ſome ſpecies ſimple, and in others branched or compound. Tourn. Inſt. p. 546.

The ſpecies of *hemionitis*, enumerated by Mr. Tournefort, are thirteen; and by Linnæus three.

HEMIOPE, or Hemiopus, compounded of ἡμισυς, *half*, and οπη, *hole*, a muſical inſtrument in uſe among the ancients.

The *hemiopus* was a FLUTE with only three ſmall holes.

HEMIPAGIA, a pain that affects only one half of the head; the ſame as HEMICRANIA.

HEMIPLEGIA, or Hemiplexia, compounded of ἡμισυς, *half*; and ϖλεσσω, *I ſtrike*, or *ſeize*, in *Medicine*, a palſy of one whole ſide of the body. See Palsy, and *Medical* Electricity.

HEMIPTERA, derived from ἡμίσυς, *half*, and πτερον, *wing*, in the *Linnæan Syſtem*, the ſecond order of inſects, comprehending twelve genera, viz. the *blatta*, *mantis*, *gryllus*, *fulgora*, *cicada*, *notonecta*, *nepa*, *cimex*, *aphis*, *chermes*, *coccus*, and *thrips*, and a great number of ſpecies. The characters of this order are, that the mouth is either ſituated in the breaſt, or inclined towards it; and that the upper wings are ſemi-cruſtaceous, ſemi-membranaceous, and incumbent, and not connected by a ſtrait longitudinal ſuture, as in the order of COLEOPTERA.

HEMISPHERE, Hemisphærium, compounded of ἡμισυς, *half*; and σφαιρα, *ſphere*, in *Geometry*, is one half of a globe, or ſphere, when divided into two by a plane paſſing through its center.

If the diameter of a ſphere be equal to the diſtance of the two eyes; and a right line drawn from the center of the ſphere to the middle of that diſtance be perpendicular to the line which joins the eyes; the eyes making a rotation on the axis, or middle point between them, will ſee the whole *hemiſphere*. If the diſtance of the eyes be either greater or leſſer than the diameter of the ſphere, in making ſuch rotation they will view reſpectively more or leſs than a *hemiſphere*. See Vision.

The center of gravity of a *hemiſphere* is five eighths of the radius diſtant from the vertex.

Hemisphere, in *Aſtronomy*, is particularly uſed for one half of the mundane ſphere.

The equator divides the ſphere into two equal parts, called the *northern* and *ſouthern hemiſpheres*.

The *northern hemiſphere* is that half in whoſe vertex is the north pole. Such is that repreſented by DPA (*Tab. Aſtronomy*, *fig.* 52.) terminated by the equator DA, and having the pole P in its zenith.

The *ſouthern hemiſphere* is that other half DQA, terminated by the equator DA; and having the ſouth pole Q in its zenith.

The horizon alſo divides the ſphere into two *hemiſpheres*; the *upper*, and the *lower*.

The *upper hemiſphere* is that alſo of the mundane ſphere HZR, terminated by the horizon HR, and having the zenith Z in its vertex.

The *lower hemiſphere* is that other half HNR, terminated by the horizon HR, and having the nadir N in its vertex.

Hemisphere is alſo uſed for a map, or projection, of half the terreſtrial globe, or half the celeſtial ſphere, on a plane. *Hemiſpheres* are frequently called *planiſpheres*.

HEMISPHÆRIA, a name by which Dr. Hill calls the genus of flies, known in Engliſh by that of *lady-cow*, or *lady-bird*.

Ray, and other writers, have deſcribed theſe among the beetles. See Scarabæus.

HEMISPHEROIDAL, in *Geometry*, ſomething that approaches to the figure of a *hemiſphere*, but is not juſtly ſo.

HEMISTICH, compounded of ἡμισυς, *half*, and στιχος, *verſe*, in *Poetry*, a half VERSE.

Such, e. gr. are, *Cernit Deus omnia vindex*—
or *Medio tutiſſimus ibis*, &c.

It is diſputed, whether or no the *hemiſtichs* in the Æneid were left with deſign; or whether they are owing to the work's being unfiniſhed?

In Engliſh, &c. the common and Alexandrine verſes require a reſt at the end of each *hemiſtich*; common verſes require it at the end of four ſyllables; and Alexandrine at the end of ſix.

Leonine verſes rhythm both at the end, and at the *hemiſtich*. See Leonine.

HEMITONE, in the *Ancient Muſic*, was what we now call a half-note, or ſemi-tone.

HEMITRITÆUS, Ἡμιτριταιος, compounded of ἡμισυς, *half*, and τριταιος, *third*: or, as modern Latin authors expreſs it, *ſemitertiana*, in *Medicine*, an irregular intermitting fever, which returns twice every day; by which it is diſtinguiſhed from the quotidian, which only returns once in the day.

HEMIXESTON, a meaſure among the ancients, containing half a xeſtes. The xeſtes contained two cotyles, and therefore the *hemixeſton* was a cotyle.

HEMLOCK, *Conium*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it is an umbelliferous plant; the petals of the greater umbels are uniform; each flower is compoſed of five unequal heart-ſhaped petals, which turn inward, and have five ſtamina; the germen, which is ſituated under the flower, ſupports two reflexed ſtyles, and becomes a roundiſh channelled fruit, divided into two parts, containing two ſeeds. There are three ſpecies, the greater *hemlock*, with ſtriated ſeeds, and ſmaller leaves, the greater *hemlock* with narrower leaves, and the *hemlock* with prickly ſeeds.

The firſt and common ſort grows naturally on the ſides of banks and roads in many parts of England; and is a biennial plant, periſhing after it has ripened its ſeeds; it hath a long taper root like a parſnip, but much ſmaller; the ſtalk is ſmooth, ſpotted with purple, and riſes from four to ſix feet high; branching out toward the top into ſeveral ſtalks, which are garniſhed with decompounded leaves, whoſe ſmall leaves are cut at the top into three parts: theſe are of a lucid green, and have a diſagreeable ſmell; the ſtalks are terminated by umbels of white flowers, each being compoſed of about ten rays, or ſmall umbels, which have a great number of flowers ſpread open, each ſitting upon ſlender foot-ſtalks; the ſeed is ſmall, and channelled like thoſe of aniſe.

Hemlock is ſeldom allowed room in gardens, being ſuppoſed to have a poiſonous quality: ſome phyſicians have affirmed that it is ſo to all animals, while others have aſſured us that it is eaten by the inhabitants of ſome parts of Italy when it is young, and is by them eſteemed a great dainty. Mr. Ray tells us, that he found the gizzard of a thruſh full of *hemlock* ſeeds, with four or five grains of corn intermixed, which in the time of harveſt that bird had neglected for what we reckon ſo very pernicious. However, it is very certain that ſcarce any animal will eat the green herb.

This plant is eſteemed by many phyſicians as an excellent remedy to diſſolve ſchirrous tumours; and ſome have greatly recommended it for cancers: moſt of them agree that it may be preſcribed as a good narcotic.

We are chiefly indebted for the knowlege of the beneficial effects of *hemlock* to the experiments of Dr. Storck, phyſician at Vienna, an account of which was publiſhed in the year 1760. This ingenious writer relates, that bags of the dry leaves, quilted together, boiled for a few minutes in water, or milk, then ſqueezed from the ſuperfluous liquid, and applied warm, checked the progreſs of very bad gangrenes, and procured a ſuppuration of the corrupted parts; that the ſame application abated the pains of an obſtinate gout, and diſcuſſed the tophaceous concretions; and that its effects were likewiſe conſiderable in œdematous tumors, ſchirrous ſtrumæ, indurations of the glands of the breaſt, and in very bad cancers; and that plaſters, containing the juice of *hemlock*, often reſolve and diſcuſs what reſiſts all other applications. With us this herb has been chiefly uſed in the form of plaſter, prepared by mixing the recent juice with a ſolution of twice its quantity of gum ammoniac, made in vinegar of ſquills, and boiling down the mixture to a due conſiſtence.

For internal purpoſes, Dr. Storck directs the freſh juice to be inſpiſſated in an earthen veſſel over a very gentle fire, till it acquires the conſiſtence of a thick extract; which is to be mixed with as much of the powdered leaves as will reduce it into a maſs fit for pills. This preparation produced very powerful and ſalutary effects in ſome diſeaſes that were reputed incurable, acting, though ſlowly and inſenſibly, as a high reſolvent. He relates hiſtories of inveterate ſchirruſes, cancers, and the worſt kinds of ulcers and fiſtulæ, being completely cured by it; and ſays, that it alſo reſolves recent cataracts, or at leaſt reſtrains their progreſs. He begins always with ſmall doſes; giving one pill of two grains, firſt twice a day, then thrice a day, and gradually increaſing the number to ſix or more for a doſe. The good effects of the medicine were ſometimes viſible in a few days, though the cure generally required ſeveral months.

It appears from ſeveral late trials of this medicine, both in England and Ireland, particularly by Dr. Fothergill and Dr. Rutty, that, though it is far from anſwering the high expectations which Dr. Storck had formed of it, it may nevertheleſs be a very uſeful acquiſition, and may aſſiſt in curing or alleviating diſorders, in which the common medicines are inſufficient. In real cancers, whether ulcerated or occult, there is no inſtance of its effecting a complete cure; but it has been found to retard the progreſs of this diſeaſe, to mitigate the pain, and to change the thin, ichorous, fetid diſcharge, to a ſtate more approaching that of laudable pus. In different kinds of ulcers it likewiſe mended the diſcharge, and diſpoſed the ulcers to heal. Some ſcrophulous tumors have been completely reſolved by it, and the cure has ſtood for ſeveral ſeaſons; in other caſes of this kind, the patient has frequently relapſed, eſpecially in the ſpring. Dr. Fothergill obſerves, that the ſucceſs of this medicine depends on its being given in as large a doſe as the patient can bear; that the *hemlock* is in greateſt perfection when the flowers begin to fade, and the habit of the plant inclines to yellow; and that in making the extract, the leſs heat it undergoes, the better; that he has found twenty grains of one ſort of extract equal in efficacy to near forty of another; that the doſe is to be increaſed by degrees, till it produces certain effects, which ſeldom fail to attend a full doſe, and which are generally a giddineſs of the head, and motions of the eyes, as if they were puſhed outwards, or a ſlight ſickneſs and trembling agitation of the body, or a laxative ſtool or two; that here we muſt ſtop till theſe effects ſubſide, and in three or four days advance a few grains more; that a greater quantity can commonly be borne at night than at noon, and at noon than in the morning; that the method he uſually purſues is to order two drams of the extract to be made into thirty pills, of which two are to be taken in a morning, two at noon, and three or four at night, and one pill added to each doſe, as the patient can bear it; that the extract, given in this manner, is apparently anodyne, promotes reſt, and eaſes pain; ſeldom creates thirſt, or that kind of morning head-ach which ſucceeds an opiate; rarely occaſions coſtiveneſs, but in moſt caſes procures a laxative ſtool the next day; that in ſome habits very ſmall drops offend the ſtomach, excite ſpaſmodic twitchings, heat, and thirſt; and that in ſuch caſes its uſe is immediately forbid. Lond. Med. Obſ. and Inq. vol. iii. p. 229, and p. 400, &c.' vol. iv. p. 358, &c. vol. v. p. 113, &c.

The root of *hemlock* is generally ſuppoſed to have greater activity than the leaves, both when applied externally, and when taken internally. The juice applied in a drop or two to the tongue, will occaſion rigidity, pain, and ſwelling, ſo as to prevent ſpeech, which Dr. Storck ſays may be remedied by waſhing and rubbing the tongue with citron juice. In drying it loſes its virulence; and there are inſtances, in which twenty and thirty grains have been given, with advantage, in ſchirruſes of the liver, in quartan agues on the approach of a fit, and even in acute fevers. The ſeeds have been recommended by ſome as demulcent, paregoric, and antiphrodiſiac. Lewis's Mat. Med.

HEMLOCK, *baſtard.* See LOVAGE.

HEMLOCK, *leſſer*, *Æthuſa*, a genus of the *pentandria digynia* claſs. This is alſo called fool's parſley, and is a kind of poiſonous weed frequently found in gardens and rich ground. It may be diſtinguiſhed from parſley by the narrowneſs of the ſmall leaves, which are alſo more pointed, and of a darker green.

HEMLOCK, *water*, *Cicuta*, a genus of the *pentandria digynia* claſs: the characters are, that it has an umbellated flower; the principal umbel is compoſed of ſeveral ſmaller, called rays, and has no involucrum, as the ſmaller have; the flowers have each five petals, nearly equal, turning inward, and five hairy ſtamina; the germen is ſituated below the flower, and ſupports two ſlender ſtyles, which are permanent, and longer than the petals, and afterward becomes a roundiſh channelled fruit, dividing in two parts, containing two oval ſeeds, plain on one ſide, and convex on the other. There are two ſpecies, one of which grows naturally to the height of near four feet, in ſtagnant waters, in many parts of England. It has a branching hollow ſtalk, garniſhed with winged leaves; the ſtalks are terminated by umbels of yellowiſh flowers, which are ſucceeded by ſmall channelled ſeeds, like thoſe of parſley. It flowers in June and July, and the ſeeds ripen in autumn.

The leaves are commended by Blancard in virulent inflammations of the penis; internally, it is an emetic. It is ſuppoſed to be much like the common *hemlock* in its nature and quality, but more poiſonous; it is therefore very ſeldom uſed in the ſhops. Webſer has wrote a treatiſe entirely on this plant. Miller.

The CICUTA ſo much celebrated among the ancients, was the juice of a ſpecies of this plant, called *oenanthe aquatica cicutæ facie.*

The ſecond ſpecies grows naturally in North America.

HEMLOCK *drop-wort.* See *Water* DROP-WORT.

HEMP, *Cannabis*, in *Botany*, a genus of the *dioecia pentandria* claſs. Its characters are theſe: it is male and female in different plants; the male flowers have a five-leaved concave empalement, without petals, but have five ſhort hairy ſtamina, terminated by oblong, ſquare ſummits; the female flowers have permanent empalements, of one leaf, without petals, but a ſmall germen, which afterward becomes a globular depreſſed ſeed, incloſed in the empalement. We have but one ſpecies of this plant, which is propagated in the rich fenny parts of Lincolnſhire in great quantities for its bark, which is uſeful for cordage, cloth, &c.

Hemp bears a near analogy to flax, *linum*; in reſpect of form, culture, and uſe. It riſes quick into a tall, ſlender ſort of ſhrub, whoſe ſtem, however, is hollow, and big enough to be charred; and is often thus uſed in the compoſition of gunpowder. Its leaves ariſe by fives or ſixes from the ſame pedicle, and are a little jagged; yielding a ſtrong ſmell, which affects the head. Its flowers grow in cluſters, oppoſite to each other, in manner of a St. Andrew's croſs; each conſiſting of five yellowiſh ſtamina, encompaſſed with a like number of petals, purple without, and white within; its fruit, or ſeed, is ſmall and round, filled with a white ſolid pulp, and grows on the top of the ſtem, having its ſtalks diſtinct from thoſe of the flowers. Laſtly, its bark is a tiſſue of fibres, joined together by a ſoft matter, which eaſily rots away.

Hemp is always ſowed on a deep, moiſt, rich ſoil, ſuch as that of Holland, Lincolnſhire, and the fens in the iſle of Ely, where it is cultivated to great advantage, as it might in many other parts of England, where there is the like ſoil; but it will not thrive on cold clay, or ſtiff cold land. It is eſteemed very good to deſtroy weeds, which is no other way effected but by robbing them of their nouriſhment; for *hemp* greatly impoveriſhes the ground; ſo that this crop muſt not be repeated on the ſame land. Miller.

The beſt *hemp-ſeed* for ſowing, is that which looks brighteſt, and which will retain its brightneſs, and not break when rubbed. It ſhould be always of the growth of the preceding year, and every ſecond or third year taken from a different ſoil. Three buſhels of ſeed are the general allowance for an acre; but the richer the land is, the thicker it ſhould be ſown; and the poorer, on the contrary, the thinner ſown. Some people only give the land one ploughing for *hemp*, which is juſt before they ſow it; but others prepare it as finely as the gardeners do their mould. For this purpoſe it ſhould be ploughed once in the preceding autumn, and two or three times in the ſpring; and after the firſt ſpring ploughing in February, it ſhould be well manured; though M. Du-Hamel recommends the laying on of the manure before the winter ploughing, that the dung may rot on the ground, and be afterwards thoroughly mixed with the earth by the ſpring ploughings. The time for ſowing *hemp* is from the beginning of April till the end; and the beſt ſeaſon is juſt after a gentle fall of rain. The ſeed muſt not be buried, but only juſt covered in the ground. When *hemp* is chiefly cultivated for the ſeed, it is much the beſt way to ſow it thin; and if the plants are raiſed on ridges, and horſe-hoed, the ſeed will be ſuperior to what is obtained from broad-caſt *hemp*; and with reſpect both to ſeed and *hemp*, it will be beſt to drill it in equidiſtant rows, and to hand-hoe it, which will improve both the land and crop; and leſs manure will ſuffice, than when it is ſown by hand. If it be ſown in a dry time, it muſt be at firſt carefully preſerved from the birds, which are great devourers of the ſeed before it ſhoots. When the plants are come up, they ſhould be hoed out like turnips, leaving the plants twelve or ſixteen inches apart, and cutting down all the weeds. This crop will require a ſecond hoeing about a month or ſix weeks after the firſt, in order to deſtroy the weeds; after which the *hemp* will ſoon cover the ground, and prevent the growth of weeds.

An acre of *hemp* in the beſt land yields from two to three quarters of ſeed; and this ſeed, with the *hemp* unwrought, is worth from ſix to eight pounds; and if the *hemp* be wrought, from ten to twelve pounds, or more; but the male, or *fimble-hemp*, is not worth more than half as much as the other. The growing of *hemp* on proper lands would not only be a great advantage to the farmers, but alſo to the poor, as it would give them a ſecond harveſt-work after the corn harveſt was over, and which would employ them even in wet ſeaſons; yet it is a piece of huſbandry too much neglected among us.

It does not appear, that the ancients were acquainted with the uſe of *hemp*, in reſpect of the thread it affords. Pliny, who ſpeaks of the plant in his Natural Hiſtory, lib. xx. cap. 23. ſays not a word of this; contenting himſelf with extolling the virtues of its ſtem, leaves, and root. In effect, what ſome writers of the Roman antiquities remark, viz. that the *hemp* neceſſary for the uſe of war was all ſtored up in two cities of the weſtern empire; viz. at Ravenna and Vienne, under the direction of two procurators, called *procuratores linificii*, muſt be underſtood of linum, or flax.

The culture and management of *hemp* makes a conſiderable article in agriculture; there being divers operations required therein: as *pulling*, *watering*, *beating*, *ſwingling*, &c.

The firſt ſeaſon for pulling the *hemp* is about the middle of Auguſt, when they begin to pull the male plants, which the farmers call the *fimble-hemp*; but Mr. Miller ſays it would be better to defer this for a fortnight or three weeks longer, till theſe male plants, which contain the *farina fœcundans*, have ſhed their duſt; without which the ſeeds will prove abortive, produce nothing if ſown the next year, and fetch no price at the oil-mills, becauſe they are only empty huſks, without any kernel for yielding the oil; but they begin to decay after having ſhed their farina. The ſigns of its maturity are the yellowneſs of its leaves, and the whiteneſs of its ſtalks. The remaining plants, which are the female *hemp*, called by the farmers *karle-hemp*, are to be pulled a little after Michaelmas, when the ſeeds are ripe. The ripeneſs of the female *hemp* is known, not only by the ſame ſigns as that of the male, but alſo by the ſeeds beginning to turn brown, and by the capſules which contain them beginning to open.

The way of gathering is, to pull it up by the roots; after which, they bind it up in handfuls, or bundles. The female they let ſtand eight or ten days in the air, that the ſeed may dry and ripen; after which they cut off the heads, and beat or threſh them, to get out the ſeed. The ſeed which falls out eaſieſt is always the ripeſt and beſt, and ſhould therefore be reſerved for ſowing the next ſpring; and as to that which remains in the heads after this operation, it is got out by combing the heads on the teeth of a ripple, which pulls off the leaves, the huſks of the ſeeds, and the ſeeds themſelves, all together. Theſe are gathered in a heap, and left in that condition for a few days, in order to their heating a little, after which they are ſpread out to dry; then they are threſhed, and the ſeeds are ſeparated by winnowing and ſifting. This ſecond ſeed is much inferior to the firſt, and accordingly it is uſed only for extracting oil from it, or feeding of poultry. They alſo beat the male, to get out a hurtful, thick, fetid ſort of duſt contained therein.

This done, they proceed to *water* or *rate* it, by laying it five or ſix days in a pool, or other ſtagnant water, to rot the bark; ſo that it may be the more eaſily ſeparated from the reed. A ſtream, or running water, would do the buſineſs much better, but that it infects the water, and gives it a quality very pernicious to the health; for which reaſon it is forbid to rate it in any waters uſed for domeſtic purpoſes.

When it is ſufficiently rotted, and taken out again, they dry it; for which there have been various contrivances. In many parts of France they dry their *hemp* in a kind of cavern, deſcribed by M. Du-Hamel and Marcandier, which is generally ſix or ſeven feet high, five or ſix feet wide, and nine or ten feet long. At about four feet above the floor of this drying place, and two feet from its entrance, three bars of wood, about an inch thick, are placed acroſs the cavern, from ſide to ſide, and there fixed. On theſe bars the *hemp* is laid about ſix inches thick, and under it is kept a ſmall fire made of the fragments of the reeds of *hemp* that has already been broken or peeled. When a ſmall quantity of *hemp* is to be dried, an oven, of a moderate heat, is the ſafeſt method; and when the quantity is greater, it is uſual to dry it on a kiln; and the beſt fuel that can be uſed for this purpoſe, is coke.

When the *hemp* is ſufficiently dried, they proceed either to peel it, by taking one ſtalk after another, breaking the reed, and ſlipping off the bark, or to break or *brake* it. The operation of breaking *hemp*, or beating out the dry bun or hex, which is the woolly part of the ſtem, from the rind or bark which covers it, is performed three ways, viz. by beating the *hemp* with beetles, which is laborious and tedious; or by a toothed inſtrument called a *brake*, beginning with the root end; or, which is the beſt method, by fluted rollers, that are wrought by horſes, wind, or water. The Moravian *hemp-mill* uſed in America is a good inſtrument for this operation: it conſiſts of a large, heavy ſtone, ſhaped like a ſugar-loaf, with the ſmall end cut off; this is moved by a water-mill, and the *hemp*, being laid on the floor, is bruiſed by the weight of the ſtone paſſing over it. Mr. Robert Macpherſon, aſſiſtant ſecretary to the commiſſioners and truſtees for improvements in Scotland, has lately invented a new water-mill, and foot machines, for breaking, ſcutching, and beating flax and *hemp*.

When the bun is ſufficiently broke, and hangs by ſmall ſhivers, they *ſwingle*, *ſcutch*, or beat it out with a piece of wood, edged for the purpoſe, called a *ſwingle-hand*, or *ſcutcher*. But this operation is now performed more expeditiouſly, by means of water-mills, in which ſeveral ſcutches, fixed in the ſame axle-tree, are moved with great velocity. The intention of this proceſs is to ſeparate the reed from the *hemp*. Note, the *karle hemp* they ſometimes break with the fingers, and ſtrip off the rind, without the help of the brake or ſwingle.

The next thing is to *beat*, or *beetle*, the *hemp*; which is done either on a block, or in a trough, with a hammer, or with beetles, till it feels ſufficiently ſoft and pliable. The beetles uſed for this purpoſe are moved either by hand or by water. M. Marcandier, in his Treatiſe on *Hemp*, tranſlated into Engliſh in 1764, propoſes, inſtead of ſcutching and beetling the *hemp*, to give it a ſecond ſteeping after it has been peeled or broken, in order to ſoften the bark, and the more eaſily to bring it to a proper degree of fineneſs. The *hemp* is, for this purpoſe, to be divided into ſmall parcels, and tied looſely with packthread, and thus laid in a veſſel of water, where it is to remain for a longer or ſhorter time, according to the hardneſs of its fibres, and the quantity of glutinous matter adhering to it. Afterwards it ſhould be waſhed clean in a running ſtream; and if many of the fibres of the *hemp* are found to cling together, he adviſes to beat it in the manner that linen is beaten in bleaching. After this watering, the parcels are opened, ſpread on a board, and laid in the ſun to dry. The *hemp* may be again ſteeped and waſhed in a lye of pot-aſh, or wood-aſhes, which will ſhorten the time required for bleaching. M. Marcandier alſo uſed for this purpoſe a lye, prepared of horſe-cheſnuts peeled, and raſped into ſoft water, in the proportion of two or three nuts to every quart of water. This lye is to be uſed rather hotter than the hand can bear; and the *hemp*, after having been ſteeped and waſhed in it, is carefully dried, and then tied up in bundles. *Hemp* thus prepared, ſays the ſame author, may be dyed like ſilk, wool, or cotton, and made into various cloths and garments, which will be in no danger of being deſtroyed by thoſe worms that eat woollen cloth. The *hemp* remains now to be *heckled*, or paſſed through divers toothed inſtruments, not unlike the wool-dreſſers combs, of different fineneſs: this ſeparating the ſhorter tow from it, the reſt is fit to be ſpun, wove, &c. for thread, cordage, or the like.

HEMP-*ſeeds* are uſed in medicine on many occaſions; but they are ſuſpected of being bad for the head. An emulſion made from them, by trituration in water, and decoctions of them in milk, are of great uſe in old coughs, and the jaundice. They have been formerly believed to occaſion impotency; but that is not at all likely; for they not only cauſe hens to lay eggs in plenty, if given moderately, but the famous baugue, ſo much uſed by the Perſians and Indians to invigorate them, is a ſpecies of *hemp*. Miller.

HEMP, *baſtard*, *Datiſca*, in *Botany*, a genus of the *dioecia dodecandria* claſs. Its characters are theſe: there are male and female flowers in different plants; the male flowers have a five-leaved empalement, but no petals, with ten ſummits; the female flowers have no petals, but empalements like the male, with an oblong pervious germen, ſupporting three ſtyles, and an oblong triangular capſule with three valves, filled with ſmall ſeeds, adhering to the three ſides of the capſule. There are two ſpecies. Miller.

HEMP, *water*. See *Water-Hemp* AGRIMONY.

Baſtard HEMP *agrimony*. See AGERATUM.

HEMP *agrimony*, *naked headed*. See VERBESINA.

HEMP *agrimony*. See *Hemp* AGRIMONY.

HEN, in *Ornithology*. See *Tame* FOWL, and GALLINACEOUS.

HEN, *Guinea*. See GUINEA-*hen*.

HENBANE, *Hyoſcyamus*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a cylindrical empalement of one leaf, which is permanent; it has one funnel-ſhaped petal, cut into five obtuſe parts, with five inclined ſtamina; in the center is ſituated a roundiſh germen, which becomes an obtuſe capſule, divided into two cells by an intermediate partition, opening with a lid at the top, to let out many ſeeds which adhere to the partition. There are ſix ſpecies. The roots of the common *henbane* are uſed for anodyne necklaces, to hang about children's necks, to prevent fits, and cauſe them to breed their teeth eaſily; but they are very dangerous to uſe inwardly. Miller.

There are two kinds of *henbane* ſeed uſed in medicine, which poſſeſs the ſame narcotic virtues, but in a different degree; the white is the milder of the two, and therefore generally preſcribed. They are recommended in many caſes, particularly in ſpitting of blood, ſharp defluxions on the lungs, and likewiſe in ſome convulſive diſorders. The medicine, however, is of ſuſpicious qualities, and appears at beſt to be only a precarious ſuccedaneum to the products of the poppy.

Henbane has been always eſteemed poiſonous; and we have a late account of the manner of its affecting thoſe who have taken it, from Touey in France, which appears very ſingular. See Phil. Tranſ. N° 450, p. 449.

Henbane-ſeed, is uſed by many people in the tooth-ach, and in ſeveral other maladies, and is an ingredient in ſome of the officinal compoſitions, particularly in the philonium Romanum; but it has been found, when taken alone, to be poiſonous. Sir Hans Sloane gives an account in the Philoſophical Tranſactions, of ſome children who, eating the ſeeds of the common *henbane*, were affected with intenſe thirſt, ravings, dimneſs of ſight, and a profound ſleep, which in one of them laſted two days. Theſe were all recovered by bleeding, bliſtering, purging, and vomiting. What Sir Hans obſerves particularly of the caſe is, that the delirium which was occaſioned by theſe ſeeds was not of the common kind, but was of the nature of that produced by the dutroa, a ſpecies of ſtramonium, and by the baugue of the Eaſt Indies, which is a plant with leaves like hemp. Phil. Tranſ. N° 430.

The virtues of this ſeed may compenſate for the miſchief it may do when taken in an improper manner; in the tooth-ach nothing is perhaps equal to it. Sir Hans Sloane mentions an account of a quack who cured this pain immediately by burning theſe ſeeds, and cauſing the vapour to be received into the tooth through a funnel. The empiric ſlily contrived to have ſome ſmall maggots conveyed at the ſame time into a pail of water placed under the perſon's head, which he pretended to have fallen out of the tooth, by the virtues of the medicine; but theſe being bred up to their change, became ſmall beetles, and were doubtleſs of the common kind.

Henbane, *yellow*. See Tobacco.

Henbane-*louſe*, in *Natural Hiſtory*, a name given by ſome to a peculiar inſect found very frequently on that plant in the ſummer months. It is one of the cimices of authors, and is very well deſcribed by Liſter in the Philoſophical Tranſactions. It is a very large cimex, of a fine red, ſpotted with black. It feeds on the juices of the *henbane*, whoſe leaves and ſtalks it pierces with its trunk. It is very remarkable that the juices of this ſtinking plant become of a very agreeable and aromatic flavour in the body of this inſect; and on trial it may perhaps be found, that the miſchievous narcotic quality of the plant may be rendered wholeſome, and a good medicine, in the body of this inſect. Phil. Tranſ. N° 71.

In June and July it is common to ſee ſeveral ſeries of oblong orange-coloured bodies adhering to the upper ſides of the leaves of this plant; theſe are the eggs of this cimex. Theſe eggs are white in the belly of the inſect, and whitiſh when laid firſt; but they grow more deep coloured when the young ones come near the time of hatching. They are hatched into perfect cimices, not into worms. Theſe eggs yield a colour, which is ſo fine, that it may be worth introducing into uſe in ſome manner; it is a fine lively carnation. There needs no more to obtain it, but the rubbing or cruſhing the eggs, while freſh, upon white paper. The inſects themſelves are ſo common, that from May to the end of June it is ſcarce poſſible to find a plant without them; and the eggs are not leſs frequent in their ſeaſon, in hot weather. They are ſometimes laid in May, but never later than June; their colour is apt to fade of itſelf; but this might probably be much aſſiſted as to holding, by alum, or other additions.

HENDECAGON, compounded of ἑνδεκα, *eleven*, and γωνια, *angle*, in *Geometry*, a figure which has eleven ſides, and as many angles.

Hendecagon, in *Fortification*, is uſed for a place defended by eleven baſtions.

HENDECASYLLABUM, Ἑνδεκασυλλαβον, compounded of ἑνδεκα, *eleven*, and συλλαβη, *ſyllable*; of συλλαμβανω, *I comprehend*, in Greek and Latin *Poetry*, a verse of eleven ſyllables.

Sapphic and Phaleucic verſes are, *hendecaſyllaba*, or *hendecaſyllabic*. E. gr.

Sap. *Jam ſatis terris nivis atque diræ.*
Phal. *Paſſer mortuus eſt meæ puellæ.*

HENED-*penny*, in our *Old Writers*, a cuſtomary payment of money inſtead of *hens*, at Chriſtmas. It is mentioned in a charter of king Edward III. Mon. Angl. tom. ii. p. 327. Du-Cange is of opinion it may be *hen-penny*, *gallinagium*, or a compoſition for eggs; but Cowel thinks it is miſprinted *hened-penny* for *heved-penny*, or *head-penny*.

HEN-HARRIER, in *Ornithology*, the Engliſh name for the *falco cyaneus* of Linnæus, which has been ſuppoſed to be the male ſubbuteo, the female of which is ſo very different, that it has been called by another name, the ring-tail. But males have been lately diſcovered of this ſpecies.

The *hen-harrier* is ſmaller than the ring-tail; its head, neck, and back, are of a dove-colour; its ſhoulder-feathers, however, are ſomewhat browniſh; its rump is ſomewhat whitiſh, and its breaſt of a fine clean white, variegated with tranſverſe brown ſpots; its wings and tail are grey or dove-coloured, variegated with black, and its legs ſmaller and ſlenderer than is uſual in the hawk-kind, and of a yellow colour. Theſe birds, which fly near the ſurface of the ground in ſearch of prey, and breed on the ground, without ever ſettling on trees, are extremely deſtructive to young poultry, and the feathered game. Ray and Pennant.

HEN-HOUSE, a place or building for confining or ſheltering poultry.

HENIECOE, in *Botany*, a name given by the people of Guinea to a ſpecies of plant which we are unacquainted with, but which they give with very great ſucceſs in all kinds of the colic, boiled in water. Phil. Tranſ. N° 232.

HENIOCHAS, Ἡνιοχος, *Auriga*, in *Aſtronomy*, a northern conſtellation. See Auriga.

HEN-MOULD-*ſoil*, in *Agriculture*, a term uſed by the huſbandmen in Northamptonſhire, and other counties, to expreſs a black, hollow, ſpungy, and mouldering earth, uſually found at the bottoms of hills.

It is an earth much fitter for grazing than for corn, becauſe it will never ſettle cloſe enough to the grain to keep it ſufficiently ſteady while it is growing up, without which, the farmers obſerve, it either does not grow well; or, if it ſeem to thrive, as it will in ſome years, the growth is rank, and yields much ſtraw, but little ear.

It is too moiſt, and to that is principally to be attributed this rankneſs of the crop in ſome years; and the occaſion of its retaining ſo much moiſture is, that it uſually has a bed of a ſtiff clay, which will not let the water run off into the under ſtrata.

In ſome places they alſo give this name to a black, rich, and denſe earth, with ſtreaks of a whitiſh mould in many parts. This ſort of *hen-mould* is uſually found very rich and fertile. Moreton's Northamp. p. 37.

HENNA, in *Botany*, a name given by Ludwig to a genus of plants, called *alhen* by Dr. Shaw and others, and ſince named by Linnæus lawsonia.

HENOTHRIX, in *Natural Hiſtory*, the name of a fly of the ſeticauda or hair-tailed kind. This is diſtinguiſhed from the others by having only one hair, and is called alſo by ſome uniſeta. The whole body of this ſpecies is black, except the middle of the back and belly, which are red; the wings are ſilvery, and the antennæ very ſmall and black. It is very common in the warm climates, and is uſually found ſitting on the ammi, or biſhop's weed; whence it is called by ſome the ammi fly.

HENOTICUM, Ἡνωτικον, q. d. *reconciliative*; of ἑνοω, *I unite*, in *Church Hiſtory*, a famous edict of the emperor Zeno, publiſhed A. D. 482, and intended to reconcile and re-unite the Eutychians with the Catholics.

It was procured of the emperor by means of Acacius, patriarch of Conſtantinople, with the aſſiſtance of the friends of Peter Mongus and Peter Trullo.

The ſting of this edict lies here; that it repeats and confirms all that had been enacted in the councils of Nice, Conſtantinople, Epheſus, and Chalcedon, againſt the Arians, Neſtorians, and Eutychians, without making any particular mention of the council of Chalcedon. It is in form of a letter, addreſſed by Zeno to the biſhops, prieſts, monks, and people of Egypt and Libya. It was oppoſed by the catholics, and condemned in form by pope Felix II.

HENRICIANS, in *Eccleſiaſtical Hiſtory*, a ſect ſo called from *Henry* its founder, who, though a monk and hermit, undertook to reform the ſuperſtition and vices of the clergy. For this purpoſe he left Lauſanne in Switzerland, and removing from different places, at length ſettled at Tholouſe in the year 1147, and there exerciſed his miniſterial function, till being overcome by the oppoſition of Bernard abbot of Clairval, and condemned by pope Eugenius III. at a council aſſembled at Rheims, he was committed to a cloſe priſon in 1148, where he ſoon ended his days. This reformer rejected the baptiſm of infants; ſeverely cenſured the corrupt manners of the clergy; treated the feſtivals and ceremonies of the church with the utmoſt contempt, and held clandeſtine aſſemblies for inculcating his peculiar doctrines. Moſheim's Eccl. Hiſt. vol. ii. p. 448. ed. 8vo. 1768.

HENRICUS *rubens*, in the affected language of ſome chemiſts, a name given to vitriol when calcined to a redneſs.

HENTINGS, in *Agriculture*, a term uſed by the farmers for a particular method of ſowing before the plough; the corn being caſt in a ſtraight line juſt where the plough is to come, is by this means preſently ploughed in. By this way of ſowing they think they ſave a great deal of ſeed and other charge, a dexterous boy being as capable of ſowing this way out of his hat, as the moſt ſkilful ſeeds-man. Plott's Hiſt. Oxfordſhire, p. 251.

Henting is alſo a term uſed by the plowmen, and others, to ſignify the two furrows that are turned from one another at the bottom, in the ploughing of a ridge. The word ſeems to be a corruption of *ending*, becauſe thoſe furrows make an end of ploughing the ridges. The tops of the ridges they call veerings.

HENWEED, *Guinea*, *Petiveria*, in *Botany*, a genus of the *hexandria tetragynia* claſs. Its characters are theſe: the flower hath a permanent empalement; it hath four ſmall white petals, placed in form of a croſs, which ſoon fall off; and ſix awl-ſhaped erect ſtamina, terminated by ſingle ſummits; in the center is ſituated an oblong compreſſed germen, with four awl-ſhaped ſtyles; the germen afterward becomes one oblong ſeed, narrow at the bottom, and taper, but broad, and indented at the top, reſembling an inverted ſhield, armed with the acute ſtyle, which is reflexed.

We know but one ſpecies of this plant, which is a very common plant in Jamaica, Barbadoes, and moſt of the other iſlands in the Weſt Indies, where it grows in ſuch plenty as to become a very troubleſome weed. In Europe this plant is preſerved in the gardens of thoſe perſons who are curious in botany; but there is little beauty in it; and having a ſtrong rank ſcent upon being handled, it is leſs valuable. Miller.

HEORDPENNY, in our *Old Writers*, the ſame with what at firſt was called *Romeſcot*, and afterwards Peter-*pence*.

The word is Saxon, from *heorth*, *focus*, a *hearth*, and *penning*, *denarius*, a *penny*.

HEPAR, in *Anatomy*. See Liver.

Hepar, in *Chemiſtry*. See Liver.

Hepar *uterinum*, the ſame with placenta.

HEPATIC, in *Medicine* and *Anatomy*, ſomething that relates to the liver; by the Greeks called ἧπαρ, *hepar*.

Hepatic *aloes*. See Aloes.

Hepatic *duct*, is a veſſel more uſually called *porus* bilarius.

Hepatic *flux*, *fluxus hepaticus*, a flux of the belly of a very ſingular kind, and ſo rarely met with, that many authors have confounded the accounts of it with thoſe of dyſenteries and hæmorrhoidal fluxes. The ſigns by which it is known, are theſe: the patient voids by the anus a liquid matter, reſembling water in which raw fleſh had been waſhed; this is attended with pains and a ſenſe of weight and tenſion in the abdomen, and ſpaſtic motions about the loins, which ſometimes extend themſelves to the right-ſide toward the region of the liver. In ſome patients there is no ſenſation of any pain, or any particular ſymptom, and in ſome a teneſmus is joined continually with this voiding of a bloody fluid.

The perſons principally ſubject to this diſeaſe are men, and thoſe between the age of eighteen and forty for the moſt part, as alſo ſuch as are of a ſanguineo-phlegmatic habit, and of a ſedentary life. This diſeaſe is obviouſly diſtinguiſhed from a dyſentery, in that there is always in that diſeaſe blood mixed with a mucous matter voided, which is not at all the caſe in this; and in that there is always more or leſs of a fever attending, whereas in this there is none.

Cauſes of it. The ancients ſuppoſed this to be owing to a debility of the liver, which was not able in this caſe properly to attract or retain the blood. But it ſeems rather to belong to the hæmorrhoidal diſcharges; and as in the menſes, when the pure and proper blood is not diſcharged, a bloody water is; ſo in theſe caſes when true blood is not voided, this fluid comes in its place. This flux is never dangerous at the time; but when it is long continued it will at length wear down the ſtrength, and bring on bad habits.

Method of cure. This is to be treated in the ſame manner as a hæmorrhoidal diſcharge when obſtructed, and attemperating and abſtergent medicines are to be given, with gentle purges. Rhubarb, in doſes from a ſcruple to two or more, is to be given every day for a lohg time; after this nitre, tartarum vitriolatum, the alkaline ſalts of plants, as of wormwood, with the abſorbent powders, ſuch as crabs eyes; and to theſe may be added decoctions of ſmall centaury, and the like herbs. Junker's Conſp. Med. p. 50.

Hepatic *plexus*. See Plexus *hepaticus*.

Hepatic *vein*, is that otherwiſe called basilica.

Hepati-Cystic *ducts*. See Cyst-Hepatic *duct*.

HEPATICA, in *Botany*. See Liver *wort*.

HEPATIS *infarctus*, in *Medicine*, the name of a diſeaſe, conſiſting in a ſtagnatory congeſtion of the blood in the liver. This is of two kinds, the one owing to an inordinate contraction of the liver, which is uſually the caſe when this happens to adults; the other is owing to a too great expanſion of this viſcus, which is the caſe more frequently in youths. Either of theſe diſtemperatures of this organ prevents the free paſſage of the blood through it, and by that means lays the baſis of this infarction.

Signs of it. Theſe are a ſtraitneſs of the pericordia, eſpecially about the right hypochondrium, and a difficulty of breathing, a heavy and obtuſe pain in the ſame part, which ſometimes becomes pulſatile, an uncertain and irregular heat of the whole body, and frequent fluſhings of the face; a violent thirſt at times, but not continual, a drineſs of the mouth, and often a bitter taſte in it; a glutinous texture of the ſpittle; a dry cough, a loſs of appetite, and laſſitude of the limbs; uneaſy, and not ſound ſleep; frequent toſſing about while in bed; a flaccid habit of body; and to all theſe it is to be added, that the urine is thin and limpid at firſt; but as the hectic that always attends, increaſes, it becomes of a deep orange colour, and finally depoſits a deep red ſediment; and in caſe of an expanſion of the liver being the cauſe, the right hypochondrium is ſenſibly ſwelled.

Perſons ſubject to this diſorder, are principally ſuch as are of a ſtudious and ſedentary, or idle life; ſuch as have omitted uſual bleedings, or have had ſuppreſſions of the natural diſcharges by the hæmorrhoids or menſes, and ſuch as uſe too thick a diet.

Cauſes of it. Theſe are a plethora, joined with a too great thickneſs of the blood, and this occaſionally increaſed by improper treatment in different diſeaſes, as in intermittents, with too powerful aſtringents; and in acute fevers with too cooling a regimen, or the abuſe of the volatile ſalts in large doſes. To theſe may be added violent paſſions of the mind; and the ſudden chilling the body when very hot.

Prognoſtics. This is a diſeaſe that when recent admits of a cure under the proper methods of treatment; but when neglected, it very eaſily degenerates into a ſchirrus, and finally into a hectic and a dropſy.

Method of cure. This differs greatly in regard to the different cauſes of the diſeaſe, which, as before obſerved, are exact contraries; it ſometimes ariſing from an over contraction, ſometimes from an over expanſion of the liver. In caſes ariſing from the expanſion, the ſame method is to be uſed as in infarctions of the spleen. But on the contrary, when it ariſes from a contraction of this viſcus, the method muſt be this: the primæ viæ muſt be firſt cleanſed and evacuated by gentle purges; after this bleeding in the foot is to be ordered, and then the matter impacted in the liver is to be incided and attenuated by decoctions of dandelion and pimpernel roots, with maiden-hair, ſorrel, dodder, and daiſy-flowers; after this the gums, as ammoniacum, and the reſt, are to be taken; and after theſe the digeſtive ſalts, as tartarum vitriolatum, nitre, and the like; and during the uſe of theſe, all the external medicines of the emollient kind are to be applied to the right hypochondrium; but this not continually, but at different intervals, leſt they ſhould bring on a ſuppuration in the liver. Junker's Conſp. Med. p. 204, &c.

HEPATITIS, in *Medicine*, the name of an acute, continuous, and inflammatory fever, in which nature frequently and forcibly propels the humours through the liver, ſeemingly with intent to reſolve and abſterge congeſtions and ſtaſes of the blood in that viſcus.

The *hepatitis* is diſtinguiſhed from all other fevers by the ſeat of it in the liver, and by its being of all fevers the moſt fatal. It differs however in degree, ſome caſes depending on a more ſuperficial, ſome on a deeper and more internal inflammation of the liver.

Signs of it. This dangerous fever uſually ſeizes the patient with a chillneſs, which laſts a conſiderable time; this is at length ſucceeded by a violent heat, which is much more intenſe at ſome time than at others, and is attended with an inſupportable thirſt. The patient perceives a ſevere and heavy pain on the right ſide about the ſeventh or eighth rib, and is afflicted with a violent ſtraitneſs of the breaſt, and difficulty of breathing, and the extremities are very apt to become cold. After drinking any thing they uſually belch, and the narrowneſs of the breaſt and difficulty of breathing always increaſe upon this, though not the pain. Often alſo there are nauſeas and reachings to vomit, and a bilious matter is thrown up, and ſometimes ſpaſtic motions of the throat are very frequent and painful. The one or the other of theſe ſymptoms occur, as the gibbous ſide or the other part of the liver are affected. The cough attending this diſeaſe is dry, and not violent, and the ſweats are continual, but moderate, and eaſily ſtruck back, or often cold and clammy. The urine for the firſt days is reddiſh and thick, and about the fourth day it uſually begins to depoſit a ſediment,

diment, the remaining part of it being however ſtill turbid; the ſediment is mucous, and of a pale fleſh-colour; it has ſo much the appearance of putrid matter, that many have ſuppoſed it to be ſuch; but theſe ſediments and true pus are eaſily diſtinguiſhed, as the pus always ſubſides immediately on making the water; but the other ſediment not till it has ſtood to be cold, and this ſediment becomes diſſolved and mixed again with the urine, if the veſſel containing it be ſet in hot water. This is one great proof of inflammation. Another very peculiar ſymptom in this diſeaſe is, that the patient very frequently changes colour, being at times pale, and at times browniſh or yellowiſh; the yellowneſs principally affecting the eyes and face. The ſymptoms vary according to the degree of inflammation, and the particular part of the liver where it happens. The pain is ſometimes inconſiderable; but when the inflammation happens in the upper or convex part of the liver, it is more acute, the pulſe quicker, and the patient is often troubled with a dry cough, a hiccup, and a pain extending to the ſhoulder, with difficulty of lying on the left ſide, &c. In caſes where the matter in the liver comes to a ſuppuration, all the ſymptoms become more ſevere, the heat is greater, the reſpiration more difficult, and the anxieties and ſenſe of pain in the part, and the coldneſs of the extremities, all become greater. Finally, the breaking of the tumor is known by a ſudden remiſſion of the pain, with a terrible faintneſs and lowneſs of ſpirits, and a hectic; and when the matter is diſcharged into the cavity of the abdomen, it is known by the ſwelling of that part.

Cauſes of it. The general cauſes of the *hepatitis* are a plethora, and a derivation of blood into the liver, which there forms congeſtions and ſtaſes; a ſchirrus of the liver; violent ſhocks from ſtrong vomits, when the liver was before unſound; ſtones obſtructing the courſe of the bile; drinking ſtrong wines and ſpirituous liquors; uſing hot, ſpicy aliment; obſtinate hypochondriac affections, &c. This is brought on by violent motions of the body; ſuch as running, dancing, leaping, and the like, and by endeavouring to lift great weights; by ſuddenly cooling the body at times, when the blood is in a great heat; by taking aſtringent medicines in inflammatory fevers, and by driving back the matter of cutaneous eruptions, ſuch as the St. Anthony's fire, and the like, into the blood; and finally, by applying cold external medicines to the region of the liver, or by cupping upon the part.

Prognoſtics. The *hepatitis* is one of the moſt dangerous kinds of inflammation; and the deeper it lies the more obſtinate it is, and the more difficult to be diſcuſſed, and the more liable to corruption, which muſt occaſion immediate death, or elſe to maturating and breaking, which would be attended with no leſs danger, though not ſo ſudden. A vehement and unaccuſtomed commotion of the humours immediately at the beginning of this diſeaſe, is a bad omen. The more violently inflammatory fevers attack perſons in the morning, and that without any particular cauſe, the greater always is the danger. A conſtant hiccupping, violent fever, and exceſſive thirſt, are bad ſymptoms. This diſeaſe, if properly treated, is ſeldom mortal; though the cure of it is very difficult, and its manner of going off very variable and uncertain. In ſome caſes it goes off by regular diſcuſſion in a longer time, ſometimes by copious hæmorrhages of the noſe, or by profuſe ſweats which come on, on the regular critical days. Black matter, reſembling the rob of elder, whether diſcharged by vomit or ſtool, is a very bad omen, in this and all other inflammatory diſeaſes of this kind; but when voided by vomit, the danger is greater than when by ſtool.

Method of treatment. Bleeding is very proper in the beginning of the diſeaſe, and it will be often neceſſary to repeat it; and after this the bowels are to be kept gently open, not by ſtimulating purges, but by emollient glyſters, and the mildeſt and gentleſt cathartics. A decoction of tamarinds, with a little honey or manna, will anſwer this purpoſe very well. The mixtura ſimplex is a very valuable medicine given ſeveral times a day; and in the intermediate hours the following powder is to be given: take purified nitre, and tartarum vitriolatum, each two drams; crabs eyes, and the jaw of a pike reduced to powder, and ſated with lemon-juice, of each four ſcruples; diaphoretic antimony, a dram. The doſe of this mixed powder is a ſcruple. When there is an inclination to ſweat, it ought to be promoted by plenty of warm diluting liquors, of the temperature of the human blood. While theſe things are given internally, the region of the liver ſhould be bathed externally with ſpirit of wine camphorated, impregnated with ſaffron. If the diſeaſe is very violent, a gentle anodyne may be mixed with one of the powders, to be taken at night; but this muſt only be done while the diſeaſe is in its increaſe; and above all things, reſt, moderate warmth, and a placid regimen, are to be obſerved. Junker's Conſp. Med. p. 287. and Buchan's Dom. Med. p. 332, &c. See LIVER.

HEPATITIS *lapis*, in *Natural Hiſtory*, a name given by ſome of the ancients to a ferrugineous ſtone of a yellowiſh red colour; others called a coarſe jaſper, and ſome a dirty kind of hyacinth, by this name: in ſhort, they ſeem to have called any thing *hepatitis* that was of a liver-colour. The ſtone moſt generally ſo called, however, ſeems to have been of the nature of ſome of our poor iron ores.

HEPATOSCOPIA, Ἡπατοσκοπια, formed of ἡπαρ, *liver*, and σκοπεω, *I conſider*, in *Antiquity*, a ſpecies of divination, wherein predictions were made by inſpecting the livers of animals.

HEPATOSCOPIA is alſo uſed as a general name for divination by intrails. See an account of the ſymptoms of the liver, whence good or evil were foretold, in Potter's Archæol. Græc. lib. ii. cap. 14. tom. i. p. 316. See EXTISPEX.

HEPATUS, in *Ichthyology*, the name of a ſea-fiſh caught in the Mediterranean, and remarkable for its colour, which is that of the liver, from whence it has its name. It is of a broad flat ſhape, and has very prominent eyes, and a remarkably broad tail, in which near the baſis there is a large black ſpot; its teeth are round and large, and ſomewhat pointed; and it has only one back-fin, the anterior rays of which are prickly, the hinder ones ſoft to the touch. Rondelet. De Piſc. lib. v. cap. 21.

This name is given by Bellonius, Geſner, and others, to the fiſh more uſually called *ſachettas*, and by ſome *channadella*.

All theſe however are arbitrary and unexpreſſive names. Artedi has referred the fiſh to its proper genus, which is the LABRUS, and calls it the labrus with the lower jaw longer than the upper, with a forked tail, and with black tranſverſe lines on the ſides.

HEPHÆSTIA, Ἡφαιϛεια, in *Antiquity*, an Athenian feſtival in honour of Ἡφαιϛος, i. e. Vulcan; the chief ceremony of which was a race with torches. For an account of the ceremonies and games, on this occaſion, ſee Potter's Archæol. Græc. lib. ii. cap. 20. tom. i. p. 399.

HEPHÆSTIAS, in the *Writings of the Ancients*, the name of a plaſter uſed among the ſurgeons to excite a cicatrix. It was principally compoſed of burnt earth, or of the tiles that had been long burnt in the kilns, reduced to powder.

HEP, in the *Materia Medica*. See HIP.

HEPHTHEMIMERIS, compoſed of ἑπτα, *ſeven*, ἡμισυς, *half*, and μερος, *part*, in the Greek and Latin *Poetry*, a ſort of verſe conſiſting of three feet and a ſyllable; that is, of ſeven half feet.

Such are moſt of the verſes in Anacreon.

Θελω | λεγειν | Ατρει | δας
Θελω | δε Καδ | μον α | δειν, &c.

And that of Ariſtophanes, in his Plutus:

Επεσθε μητρι χοιροι.

They are alſo called *trimetri catalectici*.

HEPHTHEMIMERIS, or HEPHTHEMIMERES, is alſo a cæſura after the third foot; that is, on the ſeventh half-foot. It is a rule, that this ſyllable, though it be ſhort in itſelf, muſt be made long, on account of the cæſura, or to make it an *hephthemimeris*. As in that verſe of Virgil:

Et furiis agitatus amor, & conſcia virtus.

It may be added, that the cæſura is not to be on the fifth foot, as it is in the verſe which Dr. Harris gives us for an example:

Ille latus niveum molli fultus Hyacintho.

This is not a *hepththemimeris* cæſura, but a henneamimeris, i. e. of nine half feet.

HEPSETUS, in *Ichthyology*, the name of a ſmall ſea-fiſh, called alſo ANGUELLA, and by ſome ATHERINA. It is long, ſlender, and almoſt pellucid; its tail is forked, and its back variegated with black ſpots. It is caught on the ſhores of the Mediterranean, and ſome other ſeas, and is of a delicate taſte, but very full of bones; whence it is not much valued.

HEPTACHORD, of ἑπτα, *ſeven*, and χορδη, *chord*, in the *Ancient Poetry*. *Heptachord* verſes were thoſe ſung, or played, on ſeven chords; that is, in ſeven different notes, or tones; and, probably, on an inſtrument with ſeven ſtrings.

HEPTAGON, of ἑπτα, *ſeptem*, *ſeven*, and γωνια, *angle*, in *Geometry*, a figure conſiſting of ſeven ſides, and ſeven angles.

If the ſides be all equal, it is called a *regular heptagon.*

HEPTAGON, in *Fortification*, a place ſtrengthened with ſeven BASTIONS, for its defence.

HEPTAGONAL *numbers*, are a ſort of polygonal numbers, wherein the difference of the terms of the correſponding arithmetical progreſſion is five.

One property, among others, of theſe numbers, is, that if they be multiplied by 40, and 9 be added to the product, the ſum is always a ſquare NUMBER.

HEPTAMERIS literally ſignifies a *ſeventh part*; being formed of the Greek ἑπτα, *ſeven*, and μερις, *part*, or *portion*.

The word is uſed by M. Sauveur, in his Principles of Acouſtics, for the ſeventh part of a MERIS; and, in his ſyſtem, for the forty-third part of the octave.

HEPTAMERON, a term literally implying *ſeven days*; being compounded of ἑπτα, *ſeven*, and ἡμερα, *day*.

It is chiefly uſed as a title of certain books, containing the tranſactions of ſeven days.

The *Heptameron* of Margaret de Valois, ſiſter to Francis I. of France, and queen of Navarre, is a very ingenious piece, in the manner of Boccace's Decameron.

HEPTANDRIA, in *Botany*, the ſeventh claſs of plants with hermaphrodite flowers, and ſeven male parts or ſtamina in each.

The word is formed of the Greek ἑπτα, *ſeven*, and ἀνὴρ, *male*.

This claſs comprehends four orders; viz. *monogynia*, which includes three genera, viz. horſe-cheſnut, trientalis, and diſandra; *digynia*, having one genus, viz. limeum; *tetragynia*, including one genus, viz. ſaururus; and *heptagynia*, of which there is alſo one genus, viz. ſeptas. See *Tab.* I. *Botany*, *Heptandria*, and *Tab.* IV. *Botany*, *Claſs* VII. See FRUCTIFICATION.

HEPTANGULAR *figure*, in *Geometry*, a figure with ſeven angles, or ſeven ſides.

HEPTAPHARMACUM, a relaxing, ſuppurating, and incarnating medicine, compoſed of ſeven ingredients. This is much talked of among the ancient writers in medicine. The ingredients were, ceruſs, wax, pitch, litharge, colophony, bull's fat, and frankincenſe. It is deſcribed by Aetius in his Tetrab. Serm. 3. cap. 27.

HEPTAPLEURON, *Septinervia*, having ſeven ribs; a word uſed in botany to expreſs a ſort of common plantain, every leaf of which has ſeven ribs belonging to it.

HEPTARCHY, compounded of the Greek ἑπτα, *ſeven*, and αρχη, *imperium*, *government*, a government compoſed of ſeven perſons; or a country governed by ſeven perſons, or divided into ſeven kingdoms.

The Saxon *heptarchy* included all England, which was cantoned out into ſeven petty independent kingdoms, peopled and governed by different clans and colonies; viz. thoſe of Kent, the South Saxons, Weſt Saxons, Eaſt Saxons, Northumberland, the Eaſt Angles, and Mercia. The *heptarchy* was formed, by degrees, from the year 455, when firſt the kingdom of Kent was erected, and Hengiſt aſſumed the title of king of Kent immediately after the battle of Eglesford; and it terminated in 827, or 828, when king Egbert reunited them into one, made the *heptarchy* into a MONARCHY, and aſſumed the title of king of England. It muſt be obſerved, however, that though Egbert became monarch of England, he was not perfectly abſolute. The kingdom which he actually poſſeſſed conſiſted of the ancient kingdoms of Weſſex, Suſſex, Kent, and Eſſex, that had been peopled by Saxons and Jutes. As for the other three kingdoms, whoſe inhabitants were Angles, he contented himſelf with preſerving the ſovereignty over them, permitting them to be governed by kings, who were his vaſſals and tributaries.

The government of the *heptarchy*, reckoning from the founding of the kingdom of Mercia, the laſt of the ſeven Anglo-Saxon kingdoms, laſted two hundred and forty-three years; but if the time ſpent by the Saxons in their conqueſts from the arrival of Hengiſt in 449 be added, the *heptarchy* will be found to have laſted three hundred and ſeventy-eight years, from its commencement to its diſſolution. The cauſes of the diſſolution of the *heptarchy* were the great inequality among the ſeven kingdoms, three of which greatly ſurpaſſed the others in extent and power; the default of male heirs in the royal families of all the kingdoms, that of Weſſex excepted; and the concurrence of various circumſtances which combined in the time of Egbert.

HEPTATEUCH, in *Matters of Literature*, a volume, or work, conſiſting of ſeven books.

The word is compounded of ἑπτα, *ſeven*, and τευχω, *I do*, *I work*; whence τευχος, a *work*, *book*; and ἑπτατευχος, *heptateuch*, a work of ſeven parts, or ſeven different works joined in one volume.

Heptateuch is chiefly applied to the firſt ſeven books of the Old Teſtament; viz. Geneſis, Exodus, Leviticus, Numbers, Deuteronomy, Joſhua, and Judges; that is, the five books of Moſes called the *Pentateuch*, and the two following ones, which are uſually joined therewith.

HERACANTHA, in *Botany*, a term uſed by ſome authors to expreſs the common wild carline-thiſtle. See CARLINA.

HERACLEON, in *Botany*, a name given by ſome of the Greek writers to the lithoſpermum, or GROMWELL. It was originally called the *heracleon ſporon*, ἡρακλεον σπορον, the *herculean-ſeed*, from the remarkable hardneſs of the ſeed; but the latter word was dropped, and the *heracleon* only preſerved. There is great reaſon againſt uſing the word dioſpyros as a ſynonym for the gromwell, becauſe it is a name given by ſome of the Greeks to a very different kind of vegetable, a ſort of cherry. Pliny, lib. xxvi. cap. 11.

HERACLEONITES, ancient heretics of the ſect of the Gnoſtics; thus called from their leader, Heracleon.

St. Epiphanius, Hær. 36 is very ample on this hereſy. He repreſents Heracleon as one who had reformed the theology of the Gnoſtics in many points; though, at bottom, he had retained the principal articles thereof. He refined on the ordinary interpretations of abundance of texts of Scripture; and even altered the words of ſome, to make them conſiſt with his own notions.

He diſtinguiſhed two kinds of worlds; the one divine, the other corruptible; and reſtrained the word παντα, *all things*, to this laſt. He held, that the Word did not create the world immediately, and of himſelf; but only that he gave occaſion to the demiurgos to do it.

The *Heracleonites*, after the example of their maſter, annulled all the ancient prophecies; holding that St John was really the voice that proclaimed and pointed out the Meſſiah; but that the prophecies were only empty ſounds, and ſignified nothing. They held themſelves ſuperior, in point of knowlege, to the apoſtles; and, on that footing, dared to advance the moſt extravagant paradoxes, on pretence of explaining Scripture in a ſublime, elevated manner. They were ſo fond of theſe myſtic interpretations, that Origen, though a ſtickler that way himſelf, was obliged to reproach Heracleon with his abuſing Scripture by that means.

HERACLEUM, in *Botany*. See *Cow* PARSNEP.

HERACLEUS *lapis*, in the *Natural Hiſtory of the Ancients*, a name by which many have called the loadſtone. This was the name given to it by the ancient Greeks from Heraclea, a city of Lydia, near which it uſed to be found; but ſubſequent writers ſo far erred from the origin and orthography of the word, as to call it *herculeus lapis*, as if it had been named from Hercules.

The after-ages of the Greeks called it alſo *magnetis lapis*, but this was a name by no means applied to it in the earlier times, but then was uſed to expreſs a very different ſubſtance, a white ſilvery-looking ſtone, which had no power of attraction, but was turned into beautiful veſſels for the uſe of the table; and the not attending to the ages in which the authors lived who uſe the word *magnetis*, has been the occaſion of great errors in their commentators, who did not conſider that in the ſucceſſion of a few ages, the ſame word became the name of two very different things. Hill's Theoph. p. 79. See BASALTES.

HERACLIA, Ἡρακλεια, in *Antiquity*, an Athenian feſtival celebrated every fifth year in honour of Hercules.

The Thiſbians and Thebans in Bœotia obſerved a ſolemn feſtival in honour of Hercules, ſurnamed Μηλων, becauſe apples were offered to him. Beſides theſe there were other feſtivals kept in honour of Hercules; for a deſcription of all which, ſee Potter's Archæol. Græc. lib. ii. cap. 20. tom. i. p. 398, ſeq.

HERACLIDÆ, in *Antiquity*, the deſcendants of Hercules, whom the Greeks called Ἡρακλης, *Heracles*, from Ἡρα, *Juno*, and κλεος, *glory*, on account of the glory he acquired by executing what Juno induced him to undertake.

The *Heraclidæ* were expelled from Peloponneſus by Euriſtheus, king of Mycenæ, after the death of Hercules.

HERACLIDÆ, *return of the*, into Peloponneſus, is a celebrated epocha in the ancient chronology.

The time of this return is differently aſſigned; becauſe authors miſtake the divers attempts which they made to return, for the return itſelf. The firſt attempt was twenty years before the taking of Troy; the ſecond was a hundred years later, or eighty years after the taking of Troy. This laſt is ſuppoſed to have ſucceeded; at leaſt, according to Petavius, who mentions only theſe two. Rat. Temp. p. 1. lib. i. cap. 12. and Doct. lib ix. cap. 30. Scaliger diſtinguiſhes three attempts; and fixes the firſt fifty years later than Petavius; viz. thirty years after the taking of Troy. He ſays nothing of the ſecond, which was unfortunate, like the firſt; but he places the third in the ſame year with Petavius.

As it occaſioned many changes and revolutions in the affairs of Greece, inſomuch that ſcarce a ſtate, or people, but were turned upſide down thereby, the return of the *Heraclidæ* is the epocha of the beginning of profane hiſtory:

tory; all the time that preceded it is reputed fabulous. Accordingly, Ephorus, Cumanus, Calliſthenes, and Theopompus, only begin their hiſtories from hence. See *Newtonian Principles of* CHRONOLOGY.

HERACLITISM, in *Antiquity*, denotes the philoſophy of *Heraclitus*, who was born at Epheſus, and flouriſhed about the ſixty-ninth Olympiad. This philoſopher differing from the vulgar concerning the nature of the gods and of the univerſe, was ſlighted and perſecuted by his countrymen, and betook himſelf to a private life, and living in the mountains, ſubſiſted on graſs and herbs. His writings were compriſed in a treatiſe, which, according to Laertius, contained a continued diſcourſe on nature, and was divided into three books; one, concerning the univerſe; the ſecond, concerning politics; and the third, of theology. This book he depoſited in the temple of Diana; and it is ſaid, that he affected to write obſcurely, leſt it ſhould be read by the vulgar, and become contemptible. The fundamental doctrine of his philoſophy was, that fire is the principle of all things; and the ancient philoſophers have collected and preſerved admirable apophthegms of this philoſopher.

HERÆA, Ἡραια, in *Antiquity*, a feſtival celebrated at Argos in honour of Juno, called in Greek ἥρη. See a deſcription of the ceremonies attending this ſolemnity, in Potter's Archæol. Græc. lib. ii. cap. 20. tom. i. p. 397.

There was another feſtival of this name, celebrated every fifth year in Elis, where ſixteen matrons were appointed to weave a garment for the goddeſs.

There were other ſolemnities of this nature. See Potter, loc. cit. ſeq.

HERALD, an officer of arms, anciently in great repute, and poſſeſſed of ſeveral conſiderable functions, rights, and privileges.

The word *herald*, according to Du-Cange, comes from the Saxon *here*, or German *heer*, *army*, and *ald*, *ſervant*; becauſe chiefly ſerving in the army. Others will have the two words ſignify *champion of the army*; in alluſion to their office of denouncing war, proclaiming peace, &c. Du-Cange adds, that they were called *clarigarii*, as well as *heralds*. Borel derives the word from the Latin *herus*, *maſter*; q. d. one coming from his maſter; others from *herhaut*; q. d. *high lord*; others from *herold*, which is the ſame with *dominus veteranus*; and others, laſtly, from *heer*, *maſter*, or *army*; and *hold*, q. d. *bound to his lord*, or the *army*.

The origin of *heralds* is very ancient. Stentor is repreſented, by Homer, as *herald* of the Greeks, who had a voice louder than fifty men together. The Greeks called them κηρυκες, and ειρηνοφυλακες; and the Romans, *feciales*.

The Romans had a college of *heralds*, appointed to decide whether a war were juſt or unjuſt; and to prevent its coming to open hoſtilities, till all means had been attempted for deciding the difference in a pacific way.

Heralds, or *heralds at arms*, have formerly been denominated *dukes at arms*, becauſe properly belonging to dukes; as kings at arms, to kings.

In England we have ſix *heralds*; viz. 1. Richmond; 2. Lancaſter; 3. Cheſter; 4. Windſor; 5. Somerſet; 6. York. To which may be added three *heralds* extraordinary; viz. Arundel, Norfolk, and Mowbray. Their office is, to wait at court, to order and attend public ſolemnities, as coronations, inſtallations, &c. to proclaim war and peace, to look to the regulation of the bearings of arms, and to ſearch pedigrees, &c. under the authority of the earl marſhal and his deputy.

They were formerly created and chriſtened by the king; who, ſlowly pouring a gold cup of wine on their head, gave them their *herald's* name: now it is done by the earl marſhal. They could not arrive at the dignity of *herald*, without having been ſeven years POURSUIVANT; nor could they quit the function of *herald*, but to be made KING *at arms*.

Their principal employment was, to compoſe, or make out, coats of arms, genealogies, and titles, of the nobility. They were the ſuperintendents of military exploits, and the conſervators of the honours of war. They had a right to take away the arms of ſuch as, for cowardice, treaſon, &c. deſerved to be degraded. They had a commiſſion to examine and correct the vices and diſorders of the nobles, and, on ſuch occaſions, to exclude them from juſts, tournaments, &c. to them belonged alſo, the correcting of all uſurpations and abuſes relating to crowns, coronets, caſks, creſts, ſupporters, &c. They took cognizance of all differences among the nobles, with reſpect to their bearings, the antiquity of their families, precedencies, &c. They went into the ſeveral countries to ſearch into the grounds and pretenſions of nobility; and had a right to open all libraries, and to command all the ancient charters and inſtruments in the archives to be ſhewn them; they had admiſſion into all foreign courts, where they were commiſſioned to proclaim war and peace; and their perſons were held ſacred as thoſe of ambaſſadors. To them it belonged to make publication of juſts and tournaments; to call the people to them; to ſignify the cartels; to mark the ground, liſt, or place of duel; to ſee fair play obſerved; and to divide the ſun between the two parties. In the army, they advertiſed the cavaliers and captains of the day of battle, and aſſiſted therein before the ſtandard; retiring, after the firſt onſet, to ſome place of eminence, there to obſerve who behaved beſt, and to give a faithful report thereof to the king. They alſo numbered the dead, relieved the enſigns, re-demanded priſoners, ſummoned places to ſurrender, and in capitulations walked before the governor of the place, to ſecure and warrant his perſon. They were the principal arbitrators of the diſtribution of the ſpoils of the vanquiſhed, and of military rewards. They publiſhed victories, and gave notifications thereof to foreign courts. They convened the eſtates of the kingdom, aſſiſted at royal marriages, and frequently made the firſt demand; they alſo officiated at ſolemn feaſts, &c.

The modern *heralds*, i. e. thoſe we properly call *heralds*, have loſt a good deal of the diſtinction and office of the ancient ones. What relates to the making out arms, the rectifying of abuſes therein, &c. is chiefly committed to the kings at arms. And in the army, drums and trumpets have ſucceeded to the functions of *heralds*, being ſent by the generals on the ſame errands; and on that account enjoying the ſame rights and privileges. Their perſons are under the protection of the law of nations, when they bear the marks of their offices publicly, i. e. the trumpeter his trumpet, and the drummer his drum; in the ſame manner as the *herald* his coat.

The *heralds*, with the kings at arms, and the four pourſuivants, are a COLLEGE, or corporation; erected into ſuch by charter of Richard III. who granted them divers privileges, as to be free from ſubſidies, tolls, and all troubleſome offices. Clarencieux and Norroy king at arms are alſo called *provincial heralds*.

HERALDRY, the art of armoury and blazoning, or the knowlege of what relates to the bearing of arms, and the laws and regulations thereof. See ARMS, BLAZONING, &c.

It is an eſtabliſhed rule among the heralds, that in blazoning, *animals* are always to be interpreted in the beſt ſenſe; that is, according to their moſt noble and generous qualities, and ſo as may redound moſt to the honour of the bearers.

Thus the fox, being repeated witty, and withal given to filching for his prey; if this be the charge of an eſcutcheon, we are to conceive the quality repreſented to be his wit and cunning, not his theft.

Guillim adds, that all ſavage beaſts are to be figured in their fierceſt action; as, a lion erected, his mouth wide open, his claws extended, &c. thus formed, he is ſaid to be *rampant*. A leopard or wolf is to be pourtrayed going, as it were, pedetentim; which form of action, ſaith Chaſſanæus, fits their natural diſpoſition, and is termed *paſſant*. The gentler kinds are to be ſet forth in their nobleſt and moſt advantageous action; as, a horſe running or vaulting, a grey-hound courſing, a deer tripping, a lamb going with ſmooth and eaſy pace, &c.

Every *animal* is to be moving or looking to the right ſide of the ſhield; and it is a general rule, that the right foot be placed foremoſt, becauſe the right ſide is reckoned the beginning of motion: add, that the upper part is nobler than the lower; ſo that things conſtrained either to look up or down, ought rather to be deſigned looking upwards. It muſt be noted, that notwithſtanding theſe ſolemn precepts of Guillim, and the other maſters of armoury, we find by experience, that there are lions paſſant, couchant, and dormant, as well as rampant, and that moſt *animals* in arms look down, and not up.

Birds are eſteemed a more honourable bearing than fiſh; and wild and ravenous birds than tame ones.

Birds, according to Leigh, are to be numbered as far as ten; according to Chaſſanæus, to ſixteen; after which they are to be blazoned without number. When their bills and feet are of a different colour from the reſt, they are ſaid to be *membered*.

Birds of prey are more properly ſaid to be *armed*.

Birds borne of their natural colour are to be blazoned by *proper*, without mention of the colour. In the blazoning of fowls much exerciſed in flight, if the wings be not diſplayed, they are ſaid to be borne *cloſe*; e. gr. he beareth an eagle, a hawk, or a ſwallow, *cloſe*. In the general, wherever a *bird* is found in any action or poſture, to which nature does not ordinarily incline it, ſuch action or poſture is to be named, otherwiſe not. Coats, Her. Dict. p. 53.

Fiſh are of themſelves of leſs eſteem in a coat armour than beaſts and fowls, as being poſterior thereto in the order of creation; but they ſometimes become ſo digniſied by the perſons or families who bear them, as to be preferable to many birds and beaſts.

Fiſh are borne different ways; upright, embowed, extended, endorſed, ſurmounted of each other, fretted, triangled, &c.

All *Fiſh* borne feeding ſhould be termed *devouring*.

Thoſe borne directly upright ſhould be termed HAURIANT.

And thoſe borne traverſe the eſcutcheon, *naiant*.

Heraldry likewiſe comprehends what relates to the marſhalling of ſolemn cavalcades, proceſſions, and other ceremonies at coronations, inſtalments, creations of peers, funerals, nuptials, &c.

HERB, a name common to all plants whoſe ſtalks or ſtems die away every year, after their ſeed is become ripe.

The word is formed of the Latin *herba*, which ſome derive from *arvum, field*; others from the Greek φερϐειν, *paſcere, to feed*, of φερϐη, *pabulum*. Of the Greek *pherbe*, the Latins formed *pherba*; and of *ferba*, *herba*, after the manner of the Spaniards, who always change the *f* at the beginning of a word into *h*.

There are ſome *herbs* whoſe root periſhes with the ſtem; and others, where the root ſurvives the ſtem by ſeveral years.

Of the former, thoſe which come to maturity the firſt year, and after they have caſt their ſeed die away, are called *annuals:* ſuch are wheat, rye, &c.

Thoſe which only bear flowers and fruit the ſecond year, or even the third year, and then periſh, are called *biennials* and *triennials:* ſuch are the garden angelica, and ſome others.

Herbs whoſe root does not periſh after they have ſhed their ſeed, are called *perennials:* ſuch are mint, &c.

Of theſe, ſome keep their leaves all the year round, and are called *ever-greens*; as the aſarabacca, &c. See EVERGREENS.

The reſt loſe their leaves, and continue bare part of the year; as colts-foot, &c.

Herbs are alſo diſtinguiſhed into *kitchen* or *ſallet-herbs*, and *medicinal herbs*.

HERBS, *ſallet*. See SALLET.

HERBS, *medicinal*. See SIMPLE.

HERB-*bane*, in *Botany*. See *Broom* RAPE.

HERB-*bane, great purple*. See LATHRÆA.

HERB, *St. Bartholomew's*. See HOLLY.

HERB *bennet*, *herb bleſſed*, or *avens*, *geum*, in *Botany*, a genus of the *icoſandria polygynia* claſs. Its characters are theſe: the flower has five roundiſh petals, which are narrow at their baſe, where they are inſerted in the empalement, and a great number of awl-ſhaped ſtamina, which are of the length of the empalement, into which they are inſerted; in the center of the flower is ſituated a great number of germina collected into a head, which become ſo many flat hairy ſeeds, with the ſtyle, which is bent like a knee, adhering to them. Miller enumerates ſix ſpecies.

The common ſort grows plentifully by the ſides of hedges and in woods, in moſt parts of England, ſo is rarely admitted into gardens. This ſtands in the liſt of medicinal plants; the root is the part uſed, and is eſteemed cephalic and alexipharmic. It is manifeſtly of a binding nature, and ſo is uſeful in all fluxes, &c.

HERB *Chriſtopher*, *actæa*, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of four roundiſh concave leaves, which fall off; the flower has four petals which drop off, a great number of ſtamina, and an oval germen with one ſtigma, which becomes a ſmooth oval berry, including ſeveral roundiſh ſeeds. There are three ſpecies. Miller.

In the opinion of all botaniſts this is a very poiſonous plant; but Pliny ſays, it may be given in the quantity of an acetabulum, that is, half a quarter of a pint, in internal diſorders of women; which ſeems to argue ſome miſtake. James.

HERB *Gerard*, in *Botany*, a name ſometimes given to a diſtinct genus of plants, otherwiſe called ANGELICA; but more commonly to the wild angelica, called alſo ÆGOPODIUM.

HERB *of grace*, a name by which ſome call RUE.

HERB *maſtick*. See SAVORY.

HERB *Paris*. See PARIS.

HERB *Robert*, a name ſometimes uſed for the GERANIUM, or crane's bill.

HERB *trefoil*, in *Botany*. See TREFOIL.

HERB *trinity*, in *Botany*, a name ſometimes given to the VIOLET.

HERB *true-love*, the name by which the *herb* PARIS is ſometimes called.

HERB *two-pence*, the name of a diſtinct genus of plants, called otherwiſe *lyſimachia* or *nummularia*. See LOOSE-STRIFE.

HERB *willow*, or *willow-herb*, a name ſometimes given to two or three diſtinct genuſes of plants. See LOOSE-*ſtrife*, *Purple* LOOSE-*ſtrife*, and *Herb* WILLOW.

HERBA *lucis*, in *Botany*, a name by which ſome authors have called the chelidonium majus or great CELANDINE.

HERBA *roſſa*, in *Botany*, a name given by Latin writers to a plant uſed by the dyers in making their yellow colours, and by the women in tinging their hair yellow, which was the favourite colour of ancient times. It is alſo by ſome called *robia herba*. It was from this ſimilitude with the word *rubia*, which ſignifies madder, a vegetable uſed alſo in the dying trade, ſuppoſed to be the ſame plant: but all the accounts we have of the robia, or *roſſa herba*, ſhew it to be different in all reſpects from the madder. Paulus Ægineta, who calls it *robia herba*, takes pains to diſtinguiſh it from the rubia, and ſhews that it was the plant called œcomenium and cymene by the Greeks, and lutum, lutea *herba*, and corniola by the Latins. It is the geniſta tinctoria, or DYER'*s-weed*, at this time common both in England and Greece, and uſed in both places in dying yellow. Pliny tells us, that the lutum had the leaves of flax, and the flowers of broom: this ſufficiently ſhews, that it was the plant we have mentioned.

HERBA *Scythica*, in *Botany*, a name by which ſome authors have called the common LIQUORICE, the root and inſpiſſated juice of which are uſed in the ſhops.

HERBA *Vulcani*, in *Botany*, a name uſed by ſome writers for the RANUNCULUS.

HERBAGE, a collective name, comprehending all kinds of herbs.

What makes the principal difference in the goodneſs of butters and cheeſes, is the difference of *herbage*.

HERBAGE, in *Law*, ſignifies the green paſture or fruits of the earth, provided by nature for the food of cattle.

HERBAGE is alſo uſed for a liberty which a man hath to feed his cattle in another man's ground; as, in the foreſt.

HERBAL, a book which treats of plants, or deſcribes the figure, genus, ſpecies, properties, virtues, &c. of herbs, trees, ſeeds, plants, &c.

Such are Gerard's *Herbal*, Parkinſon's *Herbal*, &c.

HERBAL is alſo uſed for a ſet or collection of ſpecimens of the ſeveral kinds of plants, dried and preſerved in the leaves of a book, called alſo a HORTUS SICCUS.

In the Philoſophical Tranſactions, we have a method deſcribed for preſerving ſpecimens for ſuch a *herbal*. The flowers, leaves, &c. gathered perfectly ripe, and in their true colours, are to be ſpread on whity-brown paper, with the parts all diſplayed as diſtinctly as may be. If the ſtem, or body of the flower, &c. be thick, one half is to be pared away to make it lie flat. Over theſe is to be ſpread another paper; and the whole is to be put between two iron plates, ſcrewed tight together, and thus baked in an oven for two hours. When taken out, waſh the plants over with a mixture of brandy and aqua fortis, and lay them on freſh paper to dry. Laſtly, lick over the back ſides with a bruſh dipped in a diſſolution of gum tragacanth, to make them ſtick; and lay them in the paper book, where they will lie faſt, and always look freſh.

HERBALIST, or HERBORIST, a perſon ſkilful in plants; the ſame with *botaniſt*.

To *herbalize* or *herbarize*, is to go into the fields in ſearch of different or new herbs or plants.

HERBE, in the *French Academies*, a reward, or ſome good ſtuff given to a horſe that has worked well in the manege.

HERBENGER, or HARBINGER. See HARBINGER.

HERBER, in the *Manege*, is uſed by farriers to denote an application for ſome diſeaſes in horſes, particularly of the head and the anticor. It conſiſts only of a piece of hellebore-root, which, being put into the middle of the horſe's counter, makes it ſwell and ſuppurate.

HERBIDÆ *veſtes*, green habits. See EARINÆ *veſtes*.

HERBIVOROUS, an epithet given to thoſe creatures which feed only on vegetables, to diſtinguiſh them from the carnivorous, or ſuch as feed on fleſh.

HERBOSUM *marmor*, the name of a ſpecies of marble, much eſteemed and uſed by the ancient architects and ſtatuaries. It was of a beautiful green colour, but had always with it ſome caſt of yellow. It was dug in the quarries of Taigetum, but was eſteemed by the workmen the ſame in all reſpects, except colour, with the black marble dug at Tænarus in Lacedæmonia, and thence called the Tænarian marble.

HERCINIAN *foreſt*, in *Geography*, a foreſt which formerly extended over the face of Germany; Cæſar reported it to be nine days journey in length, and ſix in breadth. It is now cut down in many places, and parcelled out into woods which go by particular names; as the Black foreſt, which ſeparates Alſace from Swabia; the Steyger, in Franconia; the Spiſſard, on the Main; the Thuringer, in Thuringia; Heſerwald, in the duchy of Cleves; the Bohemerwald, which encompaſſes Bohemia, and was in the middle ages called Hercinia ſylva; and the Hartz, in Lunenburgh.

HERCULANEUM is the name of an ancient city of Campania, in Italy, which was deſtroyed by an eruption of Veſuvius in the firſt year of the empire of Titus, or the 79th of the Chriſtian æra, and lately rendered famous on account of the curious monuments of antiquity diſcovered in its ruins; an account of which has been publiſhed by order of the king of Naples, in a work of ſix volumes folio.

The epocha of the foundation of *Herculaneum* is unknown; Dionyſius Halicarnaſſenſis conjectures, that it may be referred to ſixty years before the war of Troy, or about 1342 years before Chriſt, and therefore that it laſted about 1400 years.

HERCULANIA, in *Botany*, a name by which ſome authors have called the verbena or VERVAIN.

HERCULES, Ενγονασιν, in *Aſtronomy*, one of the conſtellations of the northern hemiſphere.

The ſtars in the conſtellation *Hercules*, in Ptolemy's catalogue, are 29; in Tycho's, 28; in the Britannic catalogue, 113. The longitudes, latitudes, magnitudes, &c. whereof are as follow:

Names and ſituations of the ſtars.	Bayer's Cha.	Signs.	Longit.			Latitude.			Magnitude.
			°	′	′	°	′	″	
In the right leg	χ	♏	3	49	7	60	15	50	6
			3	52	38	61	5	21	6
			22	32	54	24	32	30	5
			4	45	22	60	39	50	6
5.	r		19	10	30	37	36	4	3
South. of the 2 under right knee	υ		4	2	40	64	22	30	5
In the bend of the right arm	κ		21	21	26	37	14	57	5
	q		21	31	0	37	26	46	5.6
			25	53	0	25	47	24	6
10.			20	23	23	43	43	47	5
North. of the 2 under right knee	φ		7	18	26	63	49	36	6
			25	38	13	28	37	50	6
			24	51	30	32	12	5	5.6
			8	51	35	62	56	30	7
15.			25	9	50	32	10	29	6
			23	1	34	39	22	42	6
			21	55	12	43	38	47	6
			22	15	23	44	9	6	7
In the right arm			21	38	13	46	25	22	6
20.	γ		24	51	33	40	2	6	3
In the right knee	ο		28	26	42	28	11	37	6
	τ		10	4	11	65	53	0	4
			20	34	16	52	54	8	5
	ω		27	15	2	35	12	43	6
25.			18	51	52	57	53	10	5
			22	7	8	53	32	6	7.6
In the armpit of the right ſhould.	β		26	44	46	42	42	41	3
		♐	1	2	30	27	9	17	6
	b	♏	29	51	37	33	1	46	4
30.	g		17	12	53	62	20	58	5
			22	58	10	54	30	32	7
			24	53	27	51	41	37	6
		♐	1	53	55	28	53	5	6
Northern in the right thigh		♏	11	22	46	69	1	28	6
35.	σ		18	55	50	63	11	48	4
	m	♐	3	28	50	26	9	17	6
			3	29	16	26	10	57	6
			3	27	46	26	51	56	6
In the right ſide		♏	28	46	42	48	35	12	5
40.	ζ		27	8	49	53	7	15	3
		♐	4	24	22	28	12	57	6
		♏	15	2	49	69	34	5	5
In the top of right thigh	i	♐	4	12	4	30	41	20	5.6
	η	♏	24	22	8	60	19	47	3
45.	e	♐	5	17	58	27	27	43	5
		♏	29	28	15	50	8	42	7
	k	♐	5	41	8	29	31	45	5
			0	24	25	31	54	0	6
			4	56	36	37	14	25	6
50.			0	56	3	51	48	6	5
			2	46	51	46	47	23	5
		♏	22	22	43	67	26	19	5.6
		♐	1	8	22	53	46	0	5
			5	15	14	40	46	35	} 5
55.			5	30	6	40	45	2	}
			3	30	59	47	58	30	6
In the left ſide			4	26	19	47	40	50	6
North of the laſt in the left thigh	ι		3	56	56	53	19	12	3
	d		3	37	33	55	56	8	6
60.			9	15	50	35	26	50	6
In the top of the left thigh	c		4	27	5	57	54	35	6
			8	16	40	47	11	37	6
In the head			8	5	6	49	56	30	6
In the left ſhoulder	α		11	50	3	37	19	15	3
65.	δ		10	23	30	47	43	45	4
	ω		13	25	0	33	55	6	6
	π		7	41	12	59	35	30	3.4
	u		9	34	22	55	59	24	5
	e		8	35	30	60	8	35	4.5
70.			12	24	6	47	31	47	4
			12	32	8	47	32	30	5
	ω		10	51	41	55	31	57	6
			13	44	20	46	4	29	6
			6	17	48	69	2	50	6
75. In the left arm	δ		11	2	2	60	10	40	4
In the left foot	λ		15	31	28	49	20	16	4.5
	κ		8	21	53	71	14	30	6
			15	36	47	51	38	40	6.7
			17	57	36	47	38	[illegible]	6
80.			12	39	6	70	33	13	4
			12	41	46	70	33	0	4
	y		13	19	16	71	48	46	6
			19	45	6	47	58	13	7
In the anter. part of the left tibia			19	57	29	47	42	59	7
85.	ι		15	31	1	69	18	49	4
In the bend of the left arm	μ		20	54	26	51	12	38	4
In the left foot			21	46	10	49	4	10	6
	z		20	29	30	71	49	53	6
			24	0	45	49	31	40	6
90.	f		22	45	51	63	28	20	6
In the left knee	θ		24	5	50	60	43	40	4
In the left wriſt	ξ		24	48	49	52	43	56	4
2d of Hevelius's Cerberus			25	36	37	40	12	58	5
1ſt of ditto	ν		25	6	0	53	40	15	5
95. 4th of ditto			26	5	36	45	4	30	4
			26	21	50	44	18	54	5
			26	32	16	46	24	48	5.6
			27	35	24	45	41	24	5
	b		28	13	40	54	1	32	5
100.	i		28	20	28	49	33	40	6
			28	27	9	43	30	23	5
			28	28	36	44	17	6	4.5
	o		28	21	13	52	13	35	4
	A	♑	0	2	58	54	50	30	4.5
105.			1	47	25	47	49	30	5
			2	22	36	45	20	6	5.6
	t		3	8	36	52	13	20	6
3d of Cerberus			3	12	54	53	13	10	6
			3	27	49	45	6	55	4
110.			10	27	37	43	27	54	4.5
			10	30	48	41	3	23	4
			12	43	44	44	8	8	5
			13	45	17	45	16	20	5

HERCULES, in *Mythology*, a celebrated hero of antiquity, who, on account of his ſingular exploits, was deified by the Pagans. He is ſaid to have been the ſon of Jupiter and Alcmene, the wife of Amphitrion, king of Thebes. Herodotus fixes his birth a hundred years before the taking of Troy by the Greeks, or about the year 1382 before the commencement of the Chriſtian æra. The adventures for which he was celebrated may be diſtributed into three claſſes: to the firſt claſs we may refer his ſtrangling the two ſerpents which were ſent to deſtroy him in his cradle, and his killing a large lion near his native city Thebes. The ſecond claſs comprehends thoſe exploits which have been commonly called his twelve labours: theſe he undertook by order of Euryſtheus, in conſequence of the fatality of his birth, and of a decree of the Delphian oracle, as ſome ſay, for expiating his crime of killing the three children which he had by his wife Megara, the daughter of Creon, and in order to acquire immortality: the firſt of theſe was his engagement with the Cleonæan lion; the ſecond, his conqueſt of the hydra; the third, his deſtruction of the Erymanthian boar; the fourth, his killing of the wild ſtag; the fifth, his ſhooting the flying birds called ſtymphalides;

the ſixth, his cleanſing Augæas's ſtables; the ſeventh and eighth, his deſtroying the bull, and Diomed, the barbarous tyrant of Thrace, with his horſes; the ninth labour is his combat with Geryon, who is generally repreſented with three bodies; the tenth, his conqueſt of the Amazon; the eleventh, his dragging Cerberus up from the infernal regions; and the laſt is his killing the ſerpent, and gaining the golden fruit in the gardens of the Heſperides. The third claſs of *Hercules*'s exploits were thoſe which he voluntarily undertook; the chief of which are his combat with the giant Antæus, whereby he freed Africa from this deſtroyer, and his killing Cacus, the notorious robber of Italy. Theſe ſeveral adventures are repreſented and deſcribed both by the ancient ſtatuaries and poets.

It is obſerved, that there are none, even of the twelve great gods of antiquity, that have ſo many ancient monuments relating to them as *Hercules*. The famous ſtatue of *Hercules*, in the Farneſe palace at Rome, is well known to the connoiſſeurs: this repreſents him, reſting after the laſt of his twelve labours above recited, leaning on his club, and holding the apples of the Heſperides in his hand. In this ſtatue, as in all the other figures of him, he is formed, by the breadth of his ſhoulders, the ſpacioufneſs of his cheſt, the largeneſs of his ſize, and the firmneſs of his muſcles, to expreſs ſtrength and a capacity of enduring great fatigue, which conſtituted the chief idea of virtue among the ancient heathens. His other attributes are his lion's ſkin, his club, and his bow.

Hercules is repreſented by the ancients as an exemplar of virtue; however, the *Hercules bibax*, or *drunken Hercules* is no uncommon figure, and his amours are deſcribed both by the poets and artiſts. Thus, the Cupids are made to take away his club, and he is exhibited in the poſture of bending under a little boy; by which actions we perceive, that he, who conquered all difficulties, was a ſlave to love. The chief ſcene of his effeminacies was in Aſia, whilſt he lived with Omphale, queen of Lydia; and at length, viz. in the forty-ninth year of his life, he fell a ſacrifice to the jealouſy of his wife Dejanire, who, dreading the influence of his paſſion for Iole, the daughter of Eurytus, king of Oechalia, poiſoned his robe, ſo that he died in great agonies on mount Oeta. Ovid repreſents him as preparing his own funeral pile, and laying himſelf upon it with great compoſure. Met. ix. ver. 238.

The apotheoſis of *Hercules*, or the eſtabliſhment of his altars in the principal cities of Greece, is fixed by Thraſybulus, twenty-nine years before the taking of Troy.

Hercules has been particularly honoured by the Greeks under the name of *Muſagetes*, *the conductor of the Muſes*, and at Rome under that of *Hercules Muſarum*. He is repreſented on medals with a lyre in his hand; and the reverſe is marked with the figure of the nine Muſes, with their proper ſymbols. Encyclopedie, and Spence's Polymetis, p. 113, &c.

HERCULES's *allheal*. See GINSENG, *Cow* PARSNEP, and WOUND-*wort*.

HERCULES's *club*. See TOOTH-*ach-tree*.

HERCULEUS *morbus*, in *Medicine*, the EPILEPSY; thus called from the terror of its attacks, and the difficulty of cure.

HERD, among *Hunters*, a company or aſſemblage of black or fallow beaſts, in contradiſtinction to *flock*.

In the hunting language, there are various terms uſed for companies of divers kinds of game. We ſay a *herd* of harts and bucks, a *bevy* of roes, a *rout* of wolves, a *richeſs* of martens, &c. See HUNTING.

HERDEWICH, HERDEWIC, or HERDEWYCH, in our *Ancient Law-books*, a grange or place for cattle and huſbandry.

Et unam herdewycham *apud Hethcotum in peco*, &c. Mon. Angl.

HERDING, among *Sportſmen*, is the reverſe of BREAKING *herd*.

HEREBODE, the king's edict, anciently iſſued to command his ſubjects into the field.

The word is formed of the Saxon, *here*, *army*, and *bode*, *meſſenger*.

HEREDITAMENTS, in *Law*, are ſuch immoveable things as a man may have to himſelf and his heirs by way of inheritance; or which, not being otherwiſe bequeathed, do naturally and of courſe deſcend to him who is next heir of blood, and fall not to the executor or adminiſtrator as chattels do.

Hereditaments is a word of large extent, and is much uſed in conveyances; for by the grant of *hereditaments*, iſles, ſeigniories, manors, houſes, and lands of all ſorts, charters, rents, ſervices, advowſons, conveyances, and whatever may be inherited, will paſs.

HEREDITARY, ſomething appropriated to a family, or belonging thereto by right of ſucceſſion, from heir to heir.

Of monarchies, ſome are *hereditary*, others elective: of *hereditary* monarchies, ſome deſcend only to the heirs-male, as in France; others to the next of blood, whether male or female, as in England, Spain, &c.

The dominions of the emperor are diſtinguiſhed into *hereditary*, which are thoſe he derives from his anceſtors by right of blood and inheritance; and thoſe he enjoys in quality of emperor, by virtue of his election.

HEREDITARY is alſo applied to offices and honours annexed to certain families. Thus the office of earl marſhal and lord great chamberlain of England are *hereditary* in the families of the duke of Norfolk and the duke of Ancaſter.

It is of no very long date, that the dignities of duke, count, &c. are *hereditary*.

The canon law has taken all poſſible precautions to prevent benefices from becoming *hereditary*.

HEREDITARY is alſo applied figuratively to good or evil qualities, habitudes, &c. capable of being tranſmitted by blood from father to ſon.

The gout, king's evil, madneſs, &c. are *hereditary* diſeaſes; i. e. they are ſometimes tranſmitted from the parents in the ſtamen or firſt rudiments of the fœtus: and ſuch, probably, is the origin of numerous other chronic diſeaſes.

HEREDITARY *right* denotes a right or privilege, in virtue whereof a perſon ſucceeds to the effects of his anceſtors.

The nonjurors, &c. hold *hereditary* right to be *divine* right, i. e. of God's own appointment; and conſequently indiſpenſible, or, as they call it, *indefeaſible*. On this account they contend for the obligation of *hereditary* right in favour of the deſcendents of king James II.

HEREGELD, in our *Old Writers*, a tribute or tax levied for the maintenance of an army. See SUBSIDY.

HERESIARCH, *arch-heretic*, the founder or inventor of a hereſy, or a chief and ring-leader of a ſect of heretics.

The word is Greek, ἁιρεσιαρχης, compounded of ἁιρεσις, *hæreſis*, *hereſy*, and αρχος, *princeps*, *prince*, *chief*.

Thus Arius and Socinus are called *hereſiarchs*, as being the founders and patriarchs of the Arians and Socinians.

Simon Magus is recorded as the firſt *hereſiarch* under the new law.

HERESY, an error in ſome eſſential point of Chriſtian faith, maintained with obſtinacy and diſingenuity.

It is properly the obſtinacy that conſtitutes the character of *hereſy*, not the error. When a man is humble and ingenuous, ready and deſirous to receive farther light and inſtruction, and when he gives every thing urged againſt him its due weight, he is not guilty of *hereſy*. *Errare poſſum*, hæreticus *eſſe nolo*, is a celebrated maxim of St. Auguſtine.

Tertullian, in his treatiſe Of Preſcriptions, defines *hereſy* by *choice*, agreeably to the etymology of the word. A heretic, in this ſenſe, is one who, knowingly and of his own choice, propoſes, or even embraces, any new dogma or article of faith.

The word is formed of the Greek ἁιρεσις, from ἁιρεω, *I chuſe*, which, among the ancients, had nothing of that odious ſignification attached to it by eccleſiaſtical writers of later times. It only ſignified a peculiar opinion, dogma, or ſect.

In this ſenſe they ſaid, the *hereſy* of the Stoics, of the Peripatetics, &c. meaning their ſect, their ſyſtem, &c. Thus alſo, in the New Teſtament, we read of the ſect or *hereſy* of the Sadduces, of the Phariſees, of the Nazarenes, &c. See Acts v. 17. ch. xv. 5. ch. xxiv. 5. ch. xxvi. 5. ch. xxviii. 22.

It ſeems difficult, in the law of England, preciſely to determine what errors amount to *hereſy*, and what not. The ſtatute 2 Hen. IV. cap. 15. declares thoſe to be *heretics* who were teachers of erroneous opinions, contrary to the faith and bleſſed determinations of the holy church. And though the ſtatute 25 Hen. VIII. cap. 14. declared, that offences againſt the ſee of Rome are not *hereſy*, and the ordinary is reſtrained from proceeding upon mere ſuſpicion, i. e. unleſs the party be accuſed by two credible witneſſes, or an indictment of *hereſy* be firſt previouſly found in the king's courts of common law; yet the ſtatute 31 Hen. VIII. cap. 14. eſtabliſhed the ſix moſt conteſted points of popery, viz. tranſubſtantiation, communion in one kind, the celibacy of the clergy, monaſtic vows, the ſacrifice of the maſs, and auricular confeſſion; and farther enacted and declared all oppugners of the firſt to be heretics, and to be burnt with fire; and of the five laſt to be felons, and to ſuffer death. By ſtat. 1 Eliz. cap. 1. all former ſtatutes relating to *hereſy* are repealed, which leaves the juriſdiction of *hereſy* as it ſtood at common law, viz. as to the infliction of common cenſures, in the eccleſiaſtical courts; and, in caſe of burning the heretic, in the provincial ſynod only, or, according to Sir Matthew Hale, in the dioceſan alſo; but in either caſe the writ was not demandable of common right, but grantable or otherwiſe, merely at the king's diſcretion. See *De* HÆRETICO *Comburendo*. By this ſtatute the term *hereſy* is reſtrained to ſuch tenets as are either determinable by the words of the canonical ſcripture, or by one of the four firſt general councils, or by ſome other council which has only uſed the expreſs words of ſcripture, or by parliament, with the aſſent of the convocation.

It is agreed that the convocation may and always might declare what opinions are heretical, and that a conviction before them was anciently a good foundation for the writ *De Hæretico Comburendo*; but it is doubted whether they can, at this day, convene and convict a heretic. A biſhop, but no other ſpiritual judge, may puniſh a heretic by church cenſures; and a conviction before him was, as ſome ſay, anciently a good foundation for the writ *De Hæretico Comburendo*. But the temporal courts cannot puniſh a a heretic, as ſuch, but only as a diſturber of the public peace; yet ſuch courts may incidentally take knowlege whether a tenet be heretical or not; as anciently, where biſhops grounded their commitment of a man as an heretic on 2 Hen. IV. which impowered them to impriſon for *hereſy*; or even at this day, where a biſhop pleads to a *quare impedit*, that he refuſed the clerk for *hereſy*; in both which caſes the temporal courts will relieve the party, unleſs the particular point charged againſt him be ſet forth, and ſuch point appear to be heretical. But regularly, the temporal courts cannot determine what is *hereſy*; and therefore if a man thinks himſelf aggrieved by a ſuit in the ſpiritual court *pro ſalute animæ*, for *hereſy*, his moſt proper remedy is by appeal, not prohibition. Anciently an heretic convict, refuſing to abjure, or relapſing after abjuration, might be burnt by force of the writ *De Hæretico Comburendo*; but he forfeited neither lands nor goods: but though this writ is now aboliſhed, and all the old ſtatutes which gave a power to arreſt or impriſon perſons for *hereſy*, or introduced any forfeiture on that account, are repealed; yet by the common law, ſtill in force, an obſtinate heretic may be impriſoned by force of the writ *De* EXCOMMUNICATO *Capiendo*, till he make ſatisfaction to the church. The civil magiſtrate has ſtill a power of interpoſing with regard to one ſpecies of *hereſy*; for, by ſtat. 9 and 10 Will III. cap. 32. if any perſon, educated in the Chriſtian religion, and having made profeſſion of the ſame, ſhall by writing, printing, teaching, or adviſed ſpeaking, deny the Chriſtian religion to be true, or the holy ſcriptures to be of divine authority, or deny any one of the perſons in the holy Trinity to be God, or maintain that there are more Gods than one, he ſhall for the firſt offence be rendered incapable of holding any office or place of truſt; and for the ſecond, be rendered incapable of bringing any action, being guardian, executor, legatee, or purchaſer of lands, and ſhall ſuffer three years impriſonment without bail. But if, within four months after the firſt conviction, the delinquent will, in open court, publicly renounce his error, he is diſcharged at once from all diſabilities

HERESY is ſometimes alſo uſed, by extenſion, for a propoſition that is notoriouſly falſe in ſome other ſcience.

Thus, it is a *hereſy* in morals to ſay, that a man muſt be ungrateful. It is a *hereſy* in geometry to ſay, that two triangles, whoſe angles are equal, are not ſimilar.

HERETIC, in a general ſenſe, is one that ſets up to be the head, or chuſes to join himſelf to a particular religious ſect.

Heretic, in a bad ſenſe, according to the opinion of Whitby, Foſter, and many others, is one who knowingly eſpouſes a falſe doctrine, is inſincere in his profeſſion, and aſſerts and defends what he is convinced is contrary to Chriſtianity, and conſequently ſupports the intereſt of a faction, in order to ſerve ſome bad deſigns. According to this opinion, a *heretic* not only entertains wrong ſentiments of Chriſtianity, but doth this wilfully, and with an ill intention: ſo that no mere error of the judgment can be hereſy, and no honeſt man, who is not condemned of himſelf, can poſſibly be a *heretic*.

The *heretics*, whom, in the New Teſtament, we are directed to avoid, were not the humble, modeſt, and peaceable, though erroneous Chriſtians, who adhered to the authority of Chriſt, and deſired to know and do his will; but the proud, pragmatical, turbulent party-men, who diſturbed and divided the church by their impoſitions and innovations, on the terms of brotherly affection and Chriſtian communion, and by aſſuming an authority over their fellow-Chriſtians. Hereſy, in the ſenſe of ſcripture, doth not conſiſt in ſimple error; nor were thoſe *heretics* who were anathematized and perſecuted; but only thoſe who anathematized and perſecuted others, refuſing to acknowlege them for true Chriſtians, on account of their ſuppoſed or real miſtakes: agreeably to this ſenſe of the appellation, it is juſtly obſerved by Mr. Hallet, that the pope is the greateſt *heretic* in the world. See Hallet's Notes, &c. vol. iii. diſc. ix. p. 390. and Furneaux's Letters to Judge Blackſtone, p. 30.

A real *heretic* is properly he who maintains a falſe opinion, out of a ſpirit of obſtinacy, faction, or hypocriſy.

A *heretic* makes profeſſion of Chriſtianity, by which he is diſtinguiſhed from an infidel, Jew, and idolater.

A man does not become an *heretic* by doing a thing condemned or forbidden by the goſpel, and of conſequence repugnant to the Chriſtian faith; but by a ſtiff, diſingenuous, wilful, turbulent adherence to an opinion oppoſite to ſome article of the Chriſtian faith, whether it regard ſpeculation or practice.

Others, however, both in the early ages of the church and in modern times, have extended the odious appellation of *heretics* to thoſe that have been miſtaken in judgment, who have erred in fundamentals, or doctrines reckoned of the greateſt importance.

The ſects of *heretics*, who have, at different times, diſturbed the church, are innumerable.

The emperor Maximus, who uſurped the throne from Gratian, was the firſt that decreed the pains of death to *heretics*.

By our own law, *heretics* were anciently to be burnt; and there was a writ, *De* HÆRETICO *Comburendo*, which lay for that purpoſe.

HERETOCHS, among our *Saxon Anceſtors*, ſignified the ſame with DUKES or *duces*, denoting the commanders or leaders of their armies.

It appears, from Edward the Confeſſor's laws, that the military force of this kingdom was in the hands of the dukes or *heretochs*, who were conſtituted through every province and county in the kingdom, being ſelected out of the principal nobility, and ſuch as were moſt remarkable for being *ſapientes*, *fideles*, & *animoſi*. Their duty was to lead and regulate the Engliſh armies, with a very unlimited power; and becauſe of their great power, they were elected by the people in their full aſſembly, or folkmote, in the ſame manner as ſheriffs were elected.

HERIOT. See HARIOT.

HERISSON, in *Fortification*, a beam armed with iron ſpikes, the points whereof are turned outward, ſupported in the middle by a ſtake, wherein is a pivot on which it turns: it ſerves as a barrier to block up a paſſage.

Heriſſons are frequently placed before gates, eſpecially the poſterns of a town or fortreſs, to ſecure thoſe paſſages which muſt of neceſſity be frequently opened and ſhut.

HERITAGE. See INHERITANCE.

HERMÆA, Ἑρμαια, in *Antiquity*, a feſtival obſerved in honour of Mercury: yet there were ſeveral ſolemnities of this kind, ſome celebrated in Peloponneſus, others in Bœotia, Crete, &c. See Pott, Archæol. Græc. lib. ii. cap. 20. tom. i. p. 896.

In Crete, during the celebration of the *hermæa*, the maſters ſerved their ſlaves at table. This cuſtom obtained likewiſe among the Athenians and Babylonians, as alſo among the Romans; witneſs the SATURNALIA.

HERMANNIA, in *Botany*, a genus of the *monadelphia pentandria* claſs. Its characters are theſe: the flower has a pitcher-ſhaped permanent empalement; it has five petals, which twiſt againſt the ſun within the tubulous empalement, but ſpread open above; it has five broad ſtamina joined in one body; in the center is ſituated a roundiſh five-cornered germen, which becomes a five-cornered roundiſh capſule, with five cells opening at the top, incloſing many ſeeds. Miller enumerates nine ſpecies, all natives of the Cape of Good Hope.

HERMAPHRODITE, Ἑρμαφροδιτος, a perſon who has both the ſexes, or the genital parts both of male and female.

The word is formed of the Greek Ἑρμαφροδιτος, a compound of Ἑρμης, *Mercury*, and Αφροδιτη, *Venus*; q. d. a mixture of Mercury and Venus, i. e. of male and female. For it is to be obſerved, *Hermaphroditus* was originally a proper name, applied by the heathen mythologiſts to a fabulous deity, whom ſome repreſent as a ſon of *Hermes*, *Mercury*, and *Aphrodite*, *Venus*; and who, being deſperately in love with the nymph Salmacis, obtained of the gods to have his body and her's united into one. Others think this junction intended to ſhew, that *Venus*, *Pleaſure*, was of both ſexes; as, in effect, the poet Calvus calls Venus a god.

M. Spon obſerves, Heſychius calls Venus *Aphroditos*; and Theophraſtus affirms, that Aphroditos, or Venus, is *Hermaphroditus*; and that, in the iſland of Cyprus, ſhe has a ſtatue, which repreſents her with a beard like a man. The Greeks alſo call *hermaphrodites* ανδρογυνοι, *androgyni*, q. d. *men-women*.

Naturaliſts diſtinguiſh four kinds of *hermaphrodites*;

whereof one kind only are the perfect *hermaphrodites*, or thoſe who have the pudenda of both kinds; but theſe are rarely, if ever, found. It is affirmed, however, that there were once two ſuch *hermaphrodites* married to each other, and that each beget children on the other. See various inſtances of *hermaphrodites*, in a diſſertation of M. Loffhagen, in the Nov. Lit. Mar. Balth. 1704. p. 105. Bauhine, De *Hermaphrod.* Ludov. Bonaciol. Tract. de Part. Form. cap. 9. Aldrovand. De Monſtr. cap. 1. Paul. Zacch. Quæſt. Med. Legal. tom. i. lib. vii. § 8.

Others diſpute all that has been ſaid on the ſubject; maintaining, that the ill conformation of the parts of generation, the teſticles being detained or concealed in men, and the clitoris longer than ordinary in women, have been the ſole occaſion of ſo erroneous a notion. To which may be added, ſteatomatous tumours of the labia pudendi, which have ſometimes paſſed for teſticles. Dr. Quincy thinks that the frequent uſe of laſcivious frictions and titillations may contribute greatly to the extenſion of the clitoris, and make it paſs with the ignorant for a penis. This, he adds, was the caſe in the celebrated inſtance of the two nuns at Rome, who, after they had lived women for many years, were ſaid to have become men. But, on what grounds he aſſerts this we do not know.

“ The extraordinary ſize of the clitoris, ſays Dr. Drake,
“ and its propendence, ſometimes, out of the body in
“ infants, makes the women miſtake ſuch children for
“ that ſort of monſters called *hermaphrodites*. Of this
“ kind I had one brought to me, the clitoris whereof
“ hung out of the body ſo far, at about three years old,
“ that it reſembled very much a penis, but it wanted a
“ perforation; and inſtead of that, juſt behind it, the
“ urine iſſued at a hole, which was nothing elſe but the
“ corner of the rima, the clitoris filling all the reſt of
“ the orifice; ſo that the parents miſtook it for a boy,
“ and as ſuch chriſtened it: but the neighbours called it
“ an *hermaphrodite*.” Anthropol. p. 148.

Dr. Parſons has given us a treatiſe on this ſubject, where he endeavours to ſhew the notion of *hermaphrodites* to be a vulgar error; and, in particular, that the Anglo-Negro, ſhewn about this town ſome years ago, was a woman whoſe clitoris was overgrown. See his Mechanical and Critical Enquiry into the Nature of *Hermaphrodites*, Lond. 1741, 8vo. Phil. Tranſ. vol. xlvii. p. 142.

The interpreters and commentators of the civil law hold, that an *hermaphrodite* who has choſen the male ſex, as that which prevails moſt in him, may no longer do the office of a woman. And the French lawyers produce an arret of the parliament of Paris, whereby a young *hermaphrodite* was condemned to be burnt on that very account.

At Athens and Rome, they looked on *hermaphrodites* as ominous monſters, and precipitated them into the ſea, as we are informed by Alexander ab Alexandro.

Divers of the inſect and reptile kind are truly *hermaphrodites*; particularly worms, ſnails, &c.

In the Memoirs of the French Academy, we have an account of this very extraordinary kind of *hermaphrodites*, which not only have both ſexes, but do the office of both at the ſame time. Such are earth-worms, round-tailed worms found in the inteſtines of men and horſes, land-ſnails and thoſe of freſh waters, and all the ſorts of leeches. And, as all theſe are reptiles, and without bones, M. Poupart concludes it probable, that all other inſects, which have theſe two characters, are alſo *hermaphrodites*.

The method of coupling, practiſed in this claſs of *hermaphrodites*, may be illuſtrated in the inſtance of earth-worms. Ray's Hiſt. Inſect. p. 2. Theſe little creatures creep, two by two, out of holes proper to receive them, where they diſpoſe their bodies in ſuch a manner, as that the head of the one is turned to the tail of the other. Being thus ſtretched lengthwiſe, a little conical button or papilla is thruſt forth by each, and received into an aperture of the other.

Theſe animals, being male in one part of the body and female in another, and the body flexible withal, M. Homberg does not think it impoſſible but that an earth-worm may couple with itſelf, and be both father and mother of its young; an obſervation which, to ſome, appears highly extravagant!

Among the inſects of the ſoft or boneleſs kind, there are great numbers, indeed, which are ſo far from being *hermaphrodites*, that they are of no ſex at all. Of this kind are all the caterpillars, maggots, and worms, produced of the eggs of flies of all kinds; but the reaſon of this is plain; theſe are not animals in a perfect ſtate, but diſguiſes under which animals lurk. They have no buſineſs with the propagating of their ſpecies, but are to be transformed into animals of another kind, by the putting off their ſeveral coverings, and then only they are in their perfect ſtate, and therefore then only ſhew the differences of ſex, which are always in the diſtinct animals, each being only male or female. Theſe copulate, and their eggs produce theſe creatures, which ſhew no ſex till they arrive at that perfect ſtate again. Mem. Acad. Par. 1707.

Mr. Hunter, in his account of the free martin, has lately obſerved, that, in many of the inferior tribes of animals, the male and female parts of generation are found to be united in the ſame animal, which, from poſſeſſing both parts, are called *hermaphrodite*. Theſe *hermaphrodites* he divides into the natural, and unnatural or monſtrous. The natural kind belongs to the inferior and more ſimple order of animals; but as animals become more complicated, and each part is more confined to its particular uſe, a ſeparation of the two neceſſary powers for generation takes place in them: and he apprehends that the unnatural kind may be occaſionally found among every tribe of animals having diſtinct ſexes, but that it is more common in ſome than in others. The human ſpecies has the feweſt; but in the horſe, aſs, ſheep, and cattle, they are very frequent. Phil. Tranſ. vol. lxix. part i. p. 279, &c. See *Free* MARTIN.

HERMAPHRODITE is alſo applied in a botanical ſenſe.

The lateſt botaniſts make a diviſion of plants, which they call *hermaphrodites*, as having both the male and female parts of generation, viz. the ſtamina and piſtil in the ſame flower.

Theſe *hermaphrodite* flowers are ſometimes diſtinguiſhed into male *hermaphrodites* and female *hermaphrodites*: the caſe, in which this diſtinction, which is ſeldom neceſſary, occurs, is, when the flower contains the parts belonging to each ſex, but one of them proves abortive or ineffectual: if the defect be in the ſtamina, it is a female *hermaphrodite*; if in the piſtil, a male one.

HERMAPOLLON, in *Antiquity*, a ſtatue or figure compoſed of Mercury and Apollo, repreſenting a young man with the ſymbols of both divinities, viz. the petaſus and caduceus, with the bow and lyre.

HERMATHENA, Ἑρμαθηνη, in *Antiquity*, a ſtatue repreſenting Mercury and Minerva both in one.

The word is a compound of *Hermes*, *Mercury*, and *Athena*, a Greek name for *Minerva*.

M. Spon gives divers figures of *Hermathenæ*, in his Rech. Cur. de l'Antiqué, p. 98. They are a ſort of ſtatues raiſed on ſquare pedeſtals, after the manner of Hermæ, only that the attributes of Minerva are added thereto. See HERMES below.

HERMERACLES, in *Antiquity*, a ſtatue compounded of the figures of Mercury and Hercules.

M. Spon gives us a type of an *Hermeracles*, Rech. Cur. de l'Antiq. p. 96. fig. 13. The name, he obſerves, was given to a divinity repreſented after the manner of Hermes, with the additional attributes of Hercules, viz. a lion's ſkin and a club. This he aſcribes to the cuſtom among the Greeks of placing the ſtatues of Mercury and Hercules in the academy and gymnaſia, as both one and the other preſided over the exerciſes of the youth.

HERMEROS, compoſed of Ἑρμης, *Mercury*, and Ἔρως, *Cupid*, a ſtatue formed of Mercury and Cupid.

HERMES, or HERMA, among *Antiquaries*, a ſort of ſquare or cubical figure of the god Mercury, uſually made of marble, though ſometimes of braſs or other materials, without arms or legs, and planted by the Greeks and Romans in their croſs-ways.

Servius gives us the origin thereof, in his Comment on the eighth book of the Æneid. Some ſhepherds, ſays he, having one day caught Mercury, called by the Greeks *Hermes*, aſleep on a mountain, cut off his hands; from which he, as well as the mountain where the action was done, became denominated Cyllenius, from κυλλος, *maimed*: and thence, adds Servius, it is, that certain ſtatues without arms are denominated *Hermeſes* or *Hermæ*. But this etymology of the epithet of Cyllenius contradicts moſt of the other ancient authors; who derive it hence, that Mercury was born at Cyllene, a city of Elis, or even on the mountain Cyllene itſelf, which had been thus called before him.

Suidas gives a moral explication of this cuſtom of making ſtatues of Mercury without arms. The *Hermeſes*, ſays he, were ſtatues of ſtone placed at the veſtibules or porches of the doors and temples at Athens; for this reaſon, that, as Mercury was held the god of ſpeech and of truth, ſquare and cubical ſtatues were peculiarly proper; having this in common with truth, that, on what ſide ſoever they are viewed, they always appear the ſame.

It muſt be obſerved, that Athens abounded more than any other place in *Hermeſes*: there were abundance of very ſignal ones in divers parts of the city, and they were indeed one of the principal ornaments of the place. They were alſo placed in the high-roads and croſs-ways, becauſe Mercury, who was the courier of the gods, preſided over the highways; whence he had his ſurname of Trivius, from *trivium*; and that of Viacus, from *via*.

From Suidas's account, above cited, it appears, that the terms, *termini*, uſed among us in the door-caſes, balconies, &c. of our buildings, take their origin from theſe Athenian *Hermeſes*; and that it was more proper to call them *hermetes* than *termini*, becauſe, though the Roman termini were ſquare ſtones, whereon a head was frequently placed, yet they were rather uſed as land-marks and mere-ſtones than as ornaments of building.

HERMESIA, a name given by ſome authors to hermetic CHYMISTRY.

HERMETIC, or **HERMETICAL** *art*, a name given to chemiſtry, on a ſuppoſition that Hermes Triſmegiſtus was the inventor thereof, or that he excelled therein. See ALCHYMY and CHYMISTRY.

We know but little of this Hermes; only that he was an ancient king of Egypt, a thouſand years prior to Æſculapius. Zozimus Panopolity mentions him, as having wrote of natural things; and there are ſeveral pieces ſtill extant under his name, but they are all ſuppoſititious.

HERMETICAL *philoſophy* is that which undertakes to ſolve and explain all the phenomena of nature, from the three chemical principles, ſalt, ſulphur, and mercury.

A conſiderable augmentation was made to the ancient *Hermetical philoſophy*, by the modern doctrine of alcali and acid.

HERMETICAL *phyſic* or *medicine*, is that ſyſtem or hypotheſis in the art of healing, which explains the cauſes of diſeaſes, and the operations of medicine, on the principles of the *Hermetical* philoſophy, and, particularly, on the ſyſtem of alcali and acid.

HERMETICAL *ſeal*, a manner of ſtopping or cloſing glaſs veſſels, for chemical operations, ſo very accurately, that nothing can exhale or eſcape, not even the moſt ſubtile ſpirits.

It is performed by heating the neck of the veſſel in the flame of a lamp till it be ready to melt, and then with a pair of pincers twiſting it cloſe together. This they call putting on *Hermes's ſeal*.

There are alſo other ways of ſealing veſſels *Hermetically*; viz. by ſtopping them with a plug or ſtopple of glaſs, well luted into the neck of the veſſel; or, by turning another ovum philoſophicum upon that wherein the matter is contained.

HERMHARPOCRATES, or **HERMARPOCRATES**, in *Antiquity*, a deity, or figure of a deity, compoſed of Mercury, and Harpocrates the god of ſilence.

M. Spon gives us a *Hermharpocrates* in his Rech. Cur. de l'Antiquité, p. 98. fig. 15. having wings on his feet like Mercury, and laying his finger on his mouth like Harpocrates. It is probable they might mean, by this combination, that ſilence is ſometimes eloquent.

HERMIANI, or **HERMIATITÆ**, a ſect of heretics in the ſecond century, thus called from their leader Hermias. They were alſo denominated Seleuciani.

One of their diſtinguiſhing tenets was, that God is corporeal. Another, that Jeſus Chriſt did not aſcend into heaven with his body, but left it in the ſun.

HERMIT, **EREMIT**, **EREMITA**, a devout perſon retired into ſolitude, to be more at leiſure for prayer and contemplation, and to diſencumber himſelf from the affairs of the world.

The word is formed from the Greek ερημος, *eremus*, *wilderneſs*; and, according to the etymology, ſhould rather be written *eremit*, the ſpirit being ſoft.

An *hermit* is not reputed a religious, unleſs he have made the vows.

Paul, ſurnamed the *Hermit*, *Paulus Eremitanus*, towards the cloſe of the ſecond century, is uſually reckoned the firſt *hermit*; though St. Jerom, at the beginning of the life of that ſaint, ſays, it is not known who was the firſt. Some go back to St. John the Baptiſt, and others to Elias.

Others make St. Antony the founder of the *hermetical* life; but others take him to have only rekindled and heightened the fervour thereof, and hold, that the diſciples of that ſaint owned St. Paul for the firſt perſon that practiſed it, who fled into the moſt ſolitary deſerts of Thebais, where he led, during the ſpace of ninety years, a life more worthy of a ſavage animal than of a rational being. Nevertheleſs this unſociable manner of life was very common in Egypt, Syria, India, and Meſopotamia, not only long before his time, but even before the coming of Chriſt; and it is ſtill practiſed among the Mahometans, as well as the Chriſtians, in thoſe dry and burning climates: for the glowing atmoſphere that ſurrounds theſe countries is a natural cauſe of that love of ſolitude and repoſe, of that indolent and melancholy diſpoſition, that are very common among their languid inhabitants. The perſecutions of Decius and Valerian are ſuppoſed to have been the occaſion; though the fanatical ſyſtem of theology, derived from the Platonic ſchool, and adopted by Origen and his diſciples, that prevailed at this period, contributed to form the taſte and temper of the firſt *hermits*.

Several of the ancient *hermits*, as St. Antony, &c. though they lived in deſerts, had yet numbers of religious accompanying them.

There are alſo divers orders and congregations of religious, diſtinguiſhed by the title of *hermits*; as, *hermits* of St. Auguſtine, of St. John Baptiſt, of St. Jerom, of St. Paul, &c.

HERMITS *of St. Auguſtine*, is a religious order, more frequently called Auguſtines or Auſtin-friers.

It is commonly pretended to have been inſtituted by that father, but without much ground. This is pretty certain, he laid the foundations of a monaſtic order about the year 388, and retired to his father's eſtate near Tagaſta, to lead a religious life with ſome companions: but it does not at all appear, that this order has ſubſiſted ever ſince; nor that the *hermits* of St. Auguſtine are deſcended, without interruption, from them.

This order, in reality, only commenced under pope Alexander IV. in the middle of the thirteenth century, and was formed gradually by the union of divers congregations, as appears from his bull, publiſhed in the Mare Magnum of the Auguſtines.

That pontiff undertook this union from the firſt year of his pontificate, viz. the year 1254. It was the year 1256 before the ſuperiors of all the congregations could be got together. In the general chapter the union was effected; Lanfranc Septala, a Milaneſe, was choſen general, and the order divided into four provinces, viz. thoſe of France, Germany, Spain, and Italy. See AUGUSTINS.

Since that, other orders have been united to the *hermits* of St. Auguſtine; as the Poor Catholics, &c. and the order now conſiſts of forty-two provinces.

After ſo many unions, the order began to divide again into ſeparate congregations, according to the relaxations and reformations that afterwards got footing. Such are the Bare-footed *Hermits* of St. Auguſtine; the congregation of Centorbi, or the Sicilian Reform; the congregation of the Colorites, in Calabria, &c.

There are alſo ſeveral congregations of nuns, under the appellation of *Hermits of St. Auguſtine*.

There is alſo a THIRD *order* of *hermits of St. Auguſtine*.

HERMITS *of Brittini*, was a congregation formed under pope Gregory IX. who gave them the rule of St. Auguſtine.

Their firſt hermitage or abode was in a ſolitary place, called Brittini, in the marquiſate of Ancona; whence the name. They led a very auſtere liſe; they never eat any meat, and faſted much.

HERMITS *of Camaldui*. See CAMALDULIANS.

HERMITS *of St. Jerom* See JERONYMITES.

HERMITS *of St. John Baptiſt*, was a religious order in Navarre, whoſe principal convent or hermitage was ſeven leagues from Pampelona.

Till the time of Gregory XIII. they lived under the obedience of the biſhop of that city; but the pope confirmed them a religious order, approved their conſtitutions, and admitted them to make the vows. Their way of living was exceeding auſtere; they went bare-footed, wore no linen, lay on boards, with a large ſtone for their pillow, and bore a large wooden croſs on their breaſts.

Their houſe was a kind of laura, rather than a convent, cantoned out into cells, in which they lived ſolitary in the middle of a wood.

HERMITS *of St. Paul*, the firſt *hermit*, is an order formed in the thirteenth century, by the union of two bodies of *hermits* in Hungary, viz. thoſe of St. James de Patach, and thoſe of Piſilia near Zante.

Upon being incorporated, they choſe St. Paul, the firſt *hermit*, for the common patron and protector of their order, and aſſumed his name. They multiplied very conſiderably in Hungary, Germany, Poland, and other provinces; and, at length, came to have ſeventy monaſteries in Hungary alone; but the revolutions and wars in that kingdom reduced them again.

HERMIT-*fiſh*, the name by which ſome call the long-tailed SQUILLA, with a ſoft tail, and the right claw the larger.

HERMITAGE properly ſignifies a little hut or habitation, in ſome deſert place, where a hermit dwells.

HERMITAGE is alſo popularly attributed to any religious cell, built and endowed in a private and recluſe place, and thus annexed to ſome large abbey, of which the ſuperior was called *hermita*.

HERMODACTYL, or *Snake-headed Iris*, in *Botany*. This genus is by Dr. Linnæus joined to the IRIS; the characters of the flower agreeing pretty well with thoſe of that genus, from which, however, Tournefort has ſeparated

rated it by the difference of the root. Its characters are theſe: it has a lily-ſhaped flower, conſiſting of one leaf, ſhaped exactly like the iris; but has a tuberous root divided like two or three dugs, like oblong bulbs. There is one ſpecies.

This plant is eaſily propagated by its tubers, which ſhould be taken off and planted ſoon after the green leaves decay; for if they are kept long out of the ground, they ſhrink and rot when planted. The roots are apt to run deep in the ground, when they ſeldom produce flowers; in light ſoils, therefore, it may be proper to lay a thickneſs of rubbiſh under the border where they are planted. Miller.

HERMODACTYLS, in *Medicine*, a drug uſed as a gentle purgative, &c.

The *hermodactyl* is a root about the ſize of a little cheſtnut, in figure reſembling a heart; ruddy without, very white within; of a light fungous ſubſtance, without fibres; eaſily broken, and reducible into a powder like flour; of a ſweetiſh taſte, but ſomewhat viſcid. It is brought to us dried, from Egypt, Syria, and Turky.

Theſe have been too generally ſuppoſed a fruit, but they are unqueſtionably a root, and ſeem to be the roots of that ſpecies of meadow-ſaffron, called by authors *colchicum Chinenſe floribus fritillariæ inſtar variegatis, foliis undulatis*, or the Chineſe meadow-ſaffron, with undulated leaves, and with flowers chequered like thoſe of the fritillary. They were in great uſe among the ancients as a purge; but their operation is very ſlow, tedious, and fatiguing, and therefore they have been commonly quickened with aloes and other cathartics. They are beſt corrected by being joined with aromatics, and are now ſometimes uſed, mixed with jalap, in rheumatiſms. The women of Egypt eat the freſh roots roaſted, to make them grow fat.

Hermodactyls were chiefly uſed to purge pituitous humours of the brain and joints. They were deemed ſo efficacious in ſcouring the mucilaginous glands, and preſerving them from the lodgments of gritty matters, which occaſion the gout and arthritic complaints, that they were denominated, by ſome writers, *anima articulorum*. They alſo promote ſweat. They are now expunged by the colleges both of London and Edinburgh from their catalogues of officinals.

HERMODE, in *Mythology*, the name of a divinity worſhipped by the ancient inhabitants of the North, or Goths: he was reputed to be the ſon of Odin, the firſt of their gods.

HERMOGENEAN *code*, in *Law*. See CODE.

HERMOGENIANS, a ſect of ancient heretics, denominated from their leader Hermogenes, who lived towards the cloſe of the ſecond century.

Hermogenes eſtabliſhed matter as his firſt principle, and regarding matter as the fountain of all evil, he maintained that the world, and every thing contained in it, as alſo the ſouls of men and other ſpirits, were formed by the deity from an uncreated and eternal maſs of corrupt matter.

The opinions of Hermogenes, with regard to the origin of the world and the nature of the ſoul, were warmly oppoſed by Tertullian.

The *Hermogenians* were divided into ſeveral branches under their reſpective chieftains, viz. Hermiani, Seleucians, Materiari, &c.

Some will have the Manichees alſo to have ſprung from the *Hermogenians*.

HERMOPAN, in *Antient Mythology*, a figure compoſed of Mercury and Pan.

HERMOSIRIS is a ſtatue of Mercury and Oſiris, with the diſtinct attributes of theſe divinities united; viz. the caduceus for Mercury, and the head of a hawk with an eagle for Oſiris.

HERMULES were two ſmall ſtatues of Mercury placed in the Circus at Rome.

HERN. See HERON.

HERNANDIA, in *Botany*. See JACK *in a box*.

HERNIA, in *Medicine*, a deſcent of the inteſtines or omentum out of their natural place; or rather, the tumor formed by that deſcent, popularly called a rupture.

The word is Latin, *hernia*, and originally ſignifies the ſame with *tumor ſcroti*, called alſo *ramex*. Priſcian obſerves, that the ancient Marſi gave the appellation *hernia* to rocks; whence ſome will have *hernias* thus called, *propter duritiem*, on account of their hardneſs. Scaliger chuſes rather to derive the word from the Greek ερνος, *ramus*, *branch*.

When the peritonæum happens to be extraordinarily dilated, (for it is hardly ever burſt or broken,) a portion of the omentum, a part of the inteſtinal canal, and ſometimes (though very rarely) the ſtomach, fall out of their place, and form theſe ſorts of tumors called *hernias*.

The liver, ſpleen, uterus, bladder, &c. have at different times been found in different *herniæ*, but theſe are caſes that very ſeldom occur.

They happen moſt uſually in the inguen or groin, in the labia pudendi, or in the ſcrotum and navel; though, ſometimes, in other places, as above and below the navel; in the ſide, far above the inguen; in the upper part of the thigh, near the ſpine, &c. and as they make their appearance in the groin, ſcrotum, thigh, navel, or belly, they are hence called inguinal, ſcrotal, femoral, umbilical, and ventral.

Hernias are often occaſioned by blows, violent concuſſions, over-ſtretching in vomiting, and hard labour, or wind; from which laſt cauſe it is, that they are ſo frequent in children, and ſo eaſily helped by timely care: in adults they are generally incurable. From *hernias* frequently ariſe the iliac paſſion, and ſometimes inflammations, and even gangrenes of the inteſtines.

Hernias are variouſly denominated, both according to the parts diſplaced, and thoſe whereon they fall.

If a *hernia* be formed by the deſcent of a portion of the inteſtines, which is the moſt uſual kind of rupture, it is called ENTEROCELE, or *hernia inteſtinalis*.

If, inſtead of the inteſtines, the omentum be fallen, it is called EPIPLOCELE, or *hernia omentalis*.

A deſcent of both is called ENTERO-EPIPLOCELE, or compound rupture.

If the inteſtines fall on the navel, it is called OMPHALOCELE.

If a piece of the gut or caul falls through the perforation of the obliquus deſcendens into the groin, it is called BUBONOCELE, or *inguinalis*; but if the ſcrotum be occupied by either of them, the rupture is ſaid to be complete, and is called OSCHEOCELE: the latter was formerly attributed to the laceration of the peritonæum, and the former merely to its dilatation. But it has been more lately diſcovered, that both the ſcrotal and femoral *herniæ* deſcend from the abdomen by openings which are natural to every human body. See the ſequel of theſe articles.

Herniæ have been alſo diſtinguiſhed by different circumſtances that attend them, into congenial, incarcerated, &c. There is another diſtinction of *Herniæ* into true, and falſe or ſpurious: the former are occaſioned by the removal of certain parts from their natural ſituation, whilſt the parts themſelves remain, in general, ſound, and free from diſeaſe; ſuch are thoſe which have been already enumerated: the latter are originally diſorders of the parts in which they are ſeated, occaſioned by a varicous diſtenſion of the ſpermatic veſſels, extravaſated blood or water within the membranes either of the teſticle or of the ſpermatic veſſels, an inflammatory enlargement, and a ſchirrous or cancerous ſtate of the teſtis itſelf.

The ſpurious *herniæ* derive their names either from their ſuppoſed contents, as the PNEUMATOCELE, HÆMATOCELE, and HYDROCELE; or from the alteration made by the diſeaſe in the natural ſtructure of the parts concerned, as the VARIOCELE, CIRSOCELE, and SARCOCELE; to which ſome have added the HERNIA *humoralis*.

A kind of prominent tumor in the throat is frequently alſo called BRONCHOCELE, or *hernia gutturalis*.

To this general account of the ſeveral ſpecies of *hernia*, we ſhall ſubjoin a more particular deſcription of each, referring to thoſe that are elſewhere deſcribed in the courſe of this work.

HERNIA *aquoſa*. See HYDROCELE.

HERNIA *carnoſa*. See SARCOCELE.

HERNIA *congenita*, or *congenial hernia*, denotes a tumor, occaſioned by a portion of inteſtine or omentum, which is found in contact with the naked teſticle, and contained in a ſac or bag formed by the *tunica vaginalis teſtis*. The teſtes are originally ſituated in the abdomen, and gradually deſcend, near the time of birth, through the orifice adapted for their paſſage, firſt into the groin, and then into the ſcrotum, each carrying along with it a peritoneal coat, by which it was covered in the cavity of the belly, and being received into a ſacculus or ſmall membranous bag, which, when cloſed, conſtitute the tunicæ vaginales, and are true and original proceſſes of the peritonæum. The upper part or neck of theſe bags paſſes through the apertures in the tendons of the external oblique muſcles, and the lower part lies enveloped in the common cellular membrane on the outſide of thoſe muſcles, in the groins. Theſe ſacculi have free communication with the abdomen by means of their orifices until birth, and often for ſome time longer. However, when theſe orifices are cloſed, a bag or cavity is formed, which contains within it the teſticle, covered only by its tunica albuginea, and which has never afterwards any communication with the orifice into the cavity of the belly. Neverthele ſs, it ſometimes happens, that, while theſe paſſages are open, a piece of the inteſtine or omentum intrudes into the orifice of the tunica vaginalis, prevents its cloſing, and thus a hernial ſac is formed of the vaginal coat of the teſtis, containing the inteſtine or omentum, and the teſticle in immediate contact with each other. This is the congenial *hernia*; a diſeaſe unknown till within theſe few years, but by no means an uncommon one.

This diſcovery was made by Dr. Hunter, in 1755; aſſiſted by his brother Mr. John Hunter; and it is ingeniouſly accounted for and explained in Dr. Hunter's Medical Comment. Nº 1. and by Mr. Pott, in his Account of the Congenial *Hernia*, publiſhed in 1757, and in his Remarks on the Hydrocele, publiſhed in 1762.

The *hernia*, now deſcribed, appears in very early infancy, and, like all other kinds of ruptures, ſhould be reduced, and conſtantly kept up by a proper bandage, whenever this method is practicable; and when attended with ſymptoms of ſtricture, it requires the ſame aſſiſtance as the common *hernia*. But if it ſhould happen, that a piece of the inteſtine or omentum has deſcended low into the ſac, while the teſticle is in the groin, or even within the abdomen, the application of a truſs would be highly improper; for it might either prevent the deſcent of the teſticle from the belly into the ſcrotum, or injure it, and occaſion much pain without any benefit. No ſuch bandage ſhould, therefore, be applied to the rupture of an infant, unleſs the teſticle can be fairly felt in the ſcrotum, after the gut or caul is replaced; and, when it can be ſo felt, a truſs cannot be put on too ſoon. There are other circumſtances, which require the attention of a ſurgeon, in the management of this diſeaſe, for which we refer the reader to Mr. Pott's Chirurgical Works, vol. ii. p. 161, &c. 1779.

Hernia *cruralis*. See Hernia *femoralis*.

Hernia *cyſtica* or *veſicalis*, is the *hernia* of the urinary bladder. This is liable to be thruſt forth, either through the opening in the oblique muſcle, like the inguinal *hernia*, or under Poupart's ligament, like the femoral *hernia*. The portion of the bladder which is liable to protruſion is not covered by the peritonæum, and therefore this *hernia* differs from every other in having no hernial ſac.

This kind of *hernia*, in a recent ſtate, is eaſily reduced, and kept from returning, by a proper bandage; but if the outer ſurface of the bladder adheres to the cellular membrane, which is the caſe in the advanced ſtate of this diſorder, the urine cannot be diſcharged without lifting up and compreſſing the ſcrotum, and the patient muſt be contented with a ſuſpenſory bag. If this *hernia* be complicated with a bubonocele, and the operation becomes neceſſary, great care is required leſt the bladder ſhould be opened inſtead of the ſac.

M. Mery concludes, that *herniæ* of this kind never ariſe from mere accident, but, when they do happen, they muſt be the effect of an original ill conformation: the bladder of urine, he ſays, is too big to paſs through the annuli or rings which the inteſtines paſs through; and, beſides, it is faſtened too ſtrongly on all ſides to admit of a deſcent. M. Petit, however, is of a different opinion, and maintains, that *herniæ* of the bladder may be produced after the ordinary manner of others. Mem. de l'Acad. 1717.

Hernia *femoralis* is formed by the depreſſion of the omentum or inteſtine into the upper and fore-part of the thigh through the arch made by the ligamentum Poupartii, or, as others call it, the ligamentum Fallopii, between the points of its attachment to the os ilion and the os pubis. The hernial ſac, in this caſe, if it be not greatly extended, lies between the crural veſſels and the os pubis on which it reſts. The method of attempting reduction, and the treatment of the patient in caſe of difficulty, are the ſame as in an *inguinal hernia*; except that in this *hernia* the preſſure ought to be made directly upward, or a little towards the pubes.

There is another kind of *hernia femoralis*, called *hernia foraminis magni iſchii*, which happens when the inteſtines or omentum fall through the great hole of the iſchium into the internal part of the thigh, between and under the two anterior heads of the triceps muſcle. In this caſe, no preſſure nor operation can be attended with ſucceſs.

Hernia *flatulenta*. See Pneumatocele.

Hernia *gutturalis*. See Bronchocele.

Hernia *humoralis* has been generally ſuppoſed to be a diſeaſe of the teſticle itſelf; but it appears, from ſome late obſervations, that its proper ſeat is the *tunica vaginalis*, which is very conſiderably enlarged as well as the ſpermatic chord, whilſt there is no appearance of diſeaſe in the teſtis. Mr. Pott aſcribes it to the defluxion of the inflammatory kind, occaſioned moſt commonly by an irritation in that part of the urethra where the vaſa deferentia or veſiculæ ſeminales terminate. It generally proceeds from venereal complaints, though ſometimes from external bruiſes. This diſorder is attended with pain and heat, and moſt frequently fever. When it proceeds from the ſtoppage of a venereal gonorrhœa, briſk purgatives are uſeful in order to produce a diſcharge: vomits alſo and bleeding are ſerviceable for removing the inflammation and tumor. The topical applications ſhould be of the aſtringent and ſtimulating kind, ſuch as Goulard's ſaturnine water, or a mixture of vinegar and brandy. When the inflammatory ſymptoms abate, mercury may be preſcribed internally, and the unguentum cœruleum forte may be rubbed on the ſcrotum every night, either to prevent or remove any degree of induration. When a ſuppuration cannot be prevented, an emollient cataplaſm muſt be applied warm, and continued till it produces a diſcharge of matter. If the knife be uſed, care muſt be taken that the teſticle is not wounded. Med. Obſ. vol. iii. art. 17. Motherby's Dict.

Hernia *incarcerata*, *confined* or *ſtrangulated rupture*, derives its name from this circumſtance, that the protruded parts of the omentum or inteſtine, on account of their ſize, inflammation, or diſtenſion of the gut by fæces or wind, the adherence of either of them to the hernial ſac, &c. the ſmallneſs of the aperture of the tendon through which the *hernia* paſſes, or any other cauſe, cannot be replaced without difficulty, pain, and hazard.

The ſymptoms of this diſeaſe are a ſwelling of the groin or ſcrotum, reſiſting the impreſſions of the fingers; and when the *hernia* is of the inteſtinal kind, it is painful to the touch; an increaſe of pain by coughing, ſneezing, or ſtanding upright; a ſickneſs of the ſtomach, and frequent inclination to vomit; and a ſtoppage of all diſcharge by the anus, attended with a frequent hard pulſe and ſome degree of fever. The immediate cauſe of theſe ſymptoms is a ſtricture made on the prolapſed part of the gut, by the borders of the natural aperture in the tendon of the oblique muſcle, which interrupts the paſſage of the aliment and fæces, diſturbs the periſtaltic motion of the whole canal, obſtructs the circulation of the blood through its veſſels, and, without ſpeedy relief, brings on a mortification.

Writers are not agreed, whether this ſtricture be owing to a diſeaſe originally in the inteſtine, or to its diſlodgment and diſtenſion. The latter opinion has been generally received; but there are many circumſtances, which deſerve the ſurgeon's attention, that favour the former ſuppoſition; and when this is the caſe, the diſorder becomes more alarming and dangerous. In thoſe caſes, where all the miſchief ariſes from the mere prolapſus and ſtricture, the returned inteſtine becomes immediately pervious, and recovering its periſtaltic motion, keeps its place and performs its office; but if, by previous diſtemper, it is rendered impervious and deprived of its motion, it cannot execute its function, it remains violently diſtended, and is, with great difficulty, kept within the belly, after it has been replaced.

Whatever be the immediate cauſe of this kind of *hernia*, the ſurgeon ſhould firſt endeavour, by gentle means, to reſtore the protruded parts to their proper ſituation in the belly: for this purpoſe, the patient ſhould be laid in a ſupine poſture, with his trunk ſomewhat lower than his thighs, and with the thigh on the diſeaſed ſide ſo elevated, as to contribute as much as poſſible to the relaxation of the abdominal aperture; and thus, by keeping the teſticle from aſcending and the inteſtine from deſcending, and continued gentle preſſing of the tumour, the inteſtine may be made to return. When the difficulty is conſiderable, the poſture of the body ſhould approach nearly to that which is commonly called ſtanding on the head. If this attempt fails, recourſe muſt be had to frequent and copious bleeding, the warm bath, cathartics, the application of cataplaſms, fomentations, embrocations, &c. acrid ſtimulating glyſters and ſuppoſitories frequently repeated, particularly thoſe of the ſmoke of tobacco, and a compoſition of ſalt, honey, and aloes, boiled to a proper conſiſtence. Omental ruptures are generally more capable of reduction than the inteſtinal; but when, by adheſion to the ſides of the hernial ſac, or any alteration in their form, they cannot be reduced, their weight muſt be ſuſpended in a bag or truſs, and thus rendered as little troubleſome as poſſible.

When the parts are properly reduced, they ſhould be kept from falling down by a bandage or truſs, the pad of which is made to conſtantly preſs againſt the opening in the abdominal tendon, and ſo keep the gut or caul from protruding, and bring the ſides of the hernial ſac as near as poſſible to each other. After the operation is completed, the body ſhould be kept open, and the diet and regimen be low and ſparing, while the leaſt degree of tenſion or pain remain.

If the means above recited fail of effect, and the ſymptoms of the diſorder increaſe, the next remedy, which ſhould be applied to without delay, is chirurgical operation, in order to diſengage the parts where the ſtricture lies, before they become gangrenous. The manner of performing the operation, as deſcribed by Mr. Pott, is as follows: the patient muſt be laid on his back, on a table of convenient height, with his legs hanging eaſily over the end of it; and then the operator, with a ſtrait diſſecting knife, muſt make an inciſion through the ſkin and membrana adipoſa, beginning juſt above the place where the inteſtine paſſes out from the belly, and continuing it to the lower part of the ſcrotum. When the adipoſe membrane is divided, there will appear a few ſmall, diſtinct, tendinous bands, lying cloſe on the hernial ſac, which muſt likewiſe be divided, as well as the ſac itſelf. The inciſion in the ſac, which requires caution and ſteadineſs, becauſe of its different degrees of thickneſs in different kinds and ſtages of the *hernia*, ſhould be made about an inch and a half below the ſtricture, and the opening be ſufficient to admit the end of the operator's fore-finger, which, introduced into the aperture, will ſerve as a director; and upon this a narrow-bladed, curved knife, with a bold probe-point; the point of the knife being always ſhort of the extremity of the finger, will ſerve to divide the ſac quite up to the opening in the tendon, and down to the bottom of the ſcrotum. When the ſac is firſt divided, there iſſues from it a fluid, which varies in quantity, colour, and conſiſtence, according to the date, ſize, and ſome other circumſtances attending the rupture. The ſac being laid open, the inteſtine immediately protrudes, unleſs it happens to be enveloped in the omentum: the operator is now to try, whether by gently drawing out a little more of the gut, and reducing its bulk, he can return it back to the belly without dividing the tendon; but if this cannot be eaſily accompliſhed, it is better to decline attempting it. In order to divide the ſtricture with the leaſt hazard, the ſurgeon ſhould firſt attend to the ſtructure and direction of the parts; and, as the natural opening in the tendon of the obliquus deſcendens muſcle, through which the *hernia* paſſes, is formed by a kind of ſeparation of the fibres from each other, and its direction is the ſame with that of the tendon, or obliquely downward from the os ilion to the os pubis, the knife ſhould be ſo managed as to continue this ſeparation, by applying its edge to the ſuperior and poſterior part of the oval, and carrying it upward and obliquely backward till a ſufficient opening is obtained: this opening ſhould afford room for paſſing the end of the finger on the inſide in caſe of any adheſion. When the ſac and ſtricture are divided, the contained parts will come into view, and their ſtate may be judged of by the ſurgeon. If they appear to be ſound and unconnected, they ſhould be immediately reduced. In returning the inteſtine, the part which came out laſt ſhould be put in firſt, that the gut may not be doubled on itſelf; and the fingers, in this operation, ſhould be applied to that part of the inteſtine which is connected with the meſentery, rather than with its convex part: during the reduction, the leg and thigh of the patient on the ruptured ſide ſhould be elevated. If the inteſtine be accompanied with a portion of the omentum, the latter ſhould be returned firſt. Slight adheſions of the parts of the inteſtines to one another, to the omentum, or to the hernial ſac, may be ſeparated without danger. When the prolapſed part is replaced, a conſiderable part of the hernial ſac may be ſafely removed, no part of it being of any conſequence, except that with which the ſpermatic veſſels are connected. If the protruded parts, by neglect, delay, or inflammation, are ſo diſeaſed, by gangrene or mortification, as not to be fit for immediate reduction, ſome previous attention will be neceſſary: the diſeaſed part of the omentum may be cut off from the ſound; and this has been the general practice. The common way of doing this has been by making a ligature juſt above the altered part, cutting off what is below the ligature, and leaving the ligature to hang out of the wound, that it may be more eaſily taken away when it is caſt off. But Mr. Pott condemns the uſe of the ligature as needleſs and pernicious, and obſerves, that any portion of the caul may be cut off without any previous tying. If the gangrene or ſphacelus has ſeized the inteſtine, and conſiſts of a black ſpot only, which, by caſting off, might endanger the ſhedding its contents into the belly, this inconvenience may be prevented by connecting the upper part to the wound by means of a needle and ſtrong ligature; ſo that, when the mortified part ſeparates, the fæces may be for ſome time diſcharged by the wound; after which it has been known to contract gradually and heal: but whatever be the event, this method of ſecuring the gut ſhould never be omitted. If the altered portion of the gut be large, and requires exciſion, the divided parts muſt be united by ſuture, and both faſtened to the inſide of the belly, at the upper part of the wound, ſo that if the union does not ſucceed, the fæces may be diſcharged, if poſſible, through the groin: but if the two ends cannot be brought together, they muſt both be connected with a proper needle and a ſtrong ligature to the upper edge of the wound. The dreſſing ſhould be ſoft and light, and the patient muſt obſerve the moſt rigid ſeverity of diet, and the moſt perfect ſerenity of body and mind. Old age is an advantage in performing the operation for *herniæ*, becauſe old people's guts are not ſo liable to inflame or gangrene as thoſe of young perſons. After all, the hazard of ſucceſs is ſo great, and the utmoſt power of art ſo little, ſays Mr. Pott, that what Iapis ſaid to Æneas, with relation to his cure, may be applied here:

> *Non hæc humanis opibus, non arte magiſtra*
> *Proveniunt; neque te Ænea mea dextera ſervat:*
> *Major agit deus.*

Pott's Works, vol. ii. p. 100, &c. 1779. Heiſter's Surgery, part ii. § 5. cap. 117.

See an account of a ſtrangulated *hernia*, by Mr. Elſe, Med. Obſ. vol. iv. art. 30.

HERNIA *inguinalis*, or *rupture in the groin*, called alſo BUBONOCELE, is occaſioned by the deſcent of a portion of the inteſtine, moſt commonly of the ilium, and often of the cœcum, or colon, or omentum, through the rings of the abdominal muſcles into the groin. This is called an incomplete rupture, in contradiſtinction to the ſcrotal or OSCHOCELE. The ſign of an inguinal and ſcrotal rupture is a ſwelling in the groin, or in the upper part of the ſcrotum, beginning at the opening in the abdominal muſcles, the appearance of which will depend on the nature and quantity, and ſtate of its contents. If the tumor be formed by a ſmall portion of the inteſtine, it will be proportionably ſmall; and when it is diſtended with wind, or inflamed, or has any degree of ſtricture upon it, it will be tenſe, and reſiſt the impreſſion of the finger, and handling of it will occaſion pain. But if there be no ſtricture or inflammation, the tenſion of the tumor, whatever be its ſize, will be inconſiderable, unleſs the patient coughs; and no pain will attend the handling of it. The reduction of this *hernia*, in the ſtate laſt deſcribed, is very eaſy, and requires only the moſt gentle means; the inteſtine generally ſlips up at once, and in its return makes a kind of guggling noiſe.

If a portion of the omentum hath deſcended, the tumor will be more flabby and compreſſible, and its ſurface will be more uneven; the ſcrotum will aſſume a more oblong appearance than it bears in an inteſtinal *hernia*; and when the quantity of its contents is large, and the patient adult, it may in ſome meaſure be diſtinguiſhed by its weight. In this caſe the return is not ſo ſpeedy as in the former, nor attended with the ſame noiſe, and requires to be followed with the finger to the laſt. See EPIPLOCELE.

If both the inteſtine and omentum have deſcended, the characteriſtic marks will be leſs diſtinct, and ſome degree of experience will be neceſſary, in order to diſtinguiſh it from other complaints. When this *hernia* is reduced, the inteſtine returns firſt, and the omentum feels flabby, but, being farther compreſſed, ſoon follows it. See ENTERO-EPIPLOCELE.

Herniæ, where the omentum falls down with the inteſtines, are more dangerous than where the gut is alone, becauſe the omentum hinders the reduction of the gut, grows to the rings of the muſcles, ſwells, and forms a thick ring, which ſtrangulates the gut. See Phil. Tranſ. N° 450. ſect. 2. See HERNIA *incarcerata*.

In every kind of rupture, as ſoon as the parts are returned, their deſcent ſhould be prevented by the application and conſtant uſe of a ſteel truſs, which ſhould be well made and properly fitted: the uſe of a truſs by infants and young perſons, and in recent caſes, will ſerve to compreſs the neck of the HERNIAL *ſac*, while it is in its ſoft and thin ſtate, ſo as to unite the ſides with each other, or at leaſt to diminiſh the paſſage, and prevent the deſcent of any thing into it from the belly; and thus frequently effect a radical and perfect cure. In thoſe of mature age, or whoſe ruptures are of longer ſtanding, the entrance into the ſac is large, and the ſac is thicker and firmer; therefore the compreſſion and union of the ſides of the neck are more difficult, though they are ſometimes ſufficiently contracted to hinder the falling down of any thing from the abdomen. But in very ancient people, and very old ruptures, this union is ſtill more improbable, and therefore a truſs, the pad of which ſerves to keep the parts in their proper place, can hardly ever be laid aſide.

Inteſtinal ruptures are in themſelves more hazardous than the omental; and this hazard ariſes from the ſtructure and the functions of the parts concerned; which are incapable of bearing any conſiderable degree of inflammation, and which perform offices, ſuch as digeſtion, propulſion of the chyle into and through the lacteals, and expulſion of the fæces, neceſſary to the exiſtence of the animal.

The female *hernia*, when recent, has much the ſame appearance as the *hernia inguinalis* in men; and when more of the gut or caul is thruſt down than the groin can conveniently contain, it puſhes down into one of the labia pudendi, and ſometimes forms a tumor of conſiderable ſize. When the *herniæ* of women are eaſily reducible, they give little pain, and generally return into the belly, when they lie in a ſupine poſture. The ſame kind of truſs is neceſſary for women as for men.

For the method of treatment in the more dangerous ſtages of this diſorder, ſee the preceding article.

Hernia *inteſtinalis*. See Enterocele, and the preceding articles.

Hernia *lachrymalis*. See Ægilops, Anchilops, and Fistula *lachrymalis*.

Hernia *omentalis*. See Epiplocele and Hernia *inguinalis*.

Hernia *ovaria*, is occaſioned by the deſcent of the ovaria through the tendinous opening of the oblique muſcles into the groin. Mr. Pott mentions a remarkable caſe of this kind, in which the ovaria were taken away, by making a ligature on the membranous bag containing them, juſt below the tendon, and cutting them off. The woman on whom this operation was performed, became thinner and more muſcular; her breaſts, which before were large, diminiſhed, and in great meaſure diſappeared, and her menſtruation ceaſed; but ſhe enjoyed good health after the operation.

Hernia *ſcrotalis*. See Oscheocele and Hernia *inguinalis*.

Hernia *vaginalis*, is a tumor of the vagina, formed by the deſcent of the inteſtines, and their preſſure on the peritonæum, between the rectum, and the poſterior part of the uterus.

Hernia *varicoſa*, called alſo Cirsocele, is a varicous diſtention of the ſpermatic vein, attended with pain, and occaſionally with a waſting of the teſticle. Frequent bleeding, exerciſe, and attenuating medicines, may be recommended for the prevention of this diſeaſe; and the pain of the back that attends it may be relieved by ſuſpenſion of the ſcrotum.

Hernia *ventoſa*. See Pneumatocele.

Hernia *ventralis*, is a tumor which appears almoſt in any part of the belly; but is moſt frequently found in or between the recti muſcles, either above or below the navel. The protruded parts ſhould be reduced, and kept in their place by a proper bandage.

Hernia *veſicæ urinariæ*. See Hernia *cyſtica*.

Hernia *umbilicalis*. See Omphalocele and Exomphalus.

HERNIAL *ſac*, is formed by a portion of the peritonæum, thruſt before the deſcending part in a rupture, though ſome have erroneouſly imagined, that it is produced by mere preſſure of the common cellular membrane; and is larger or ſmaller, according to the quantity of its contents. This ſac is at firſt ſmall and thin, and ſeldom deſcends lower than the groin at firſt, except in congenial *herniæ*, but by degrees it extends itſelf into the ſcrotum, and as it enlarges in length, its texture becomes firmer and ſtronger, till in old age, or old ruptures, it is found of very conſiderable thickneſs. Mr. Pott apprehends, that this ſac is incapable of returning back into the abdomen, after it has been fairly puſhed out through the aperture in the tendon. It is now generally acknowleged, that to whatever ſize the *hernial* ſac may be extended, and however large its contents may be, it is merely dilated, and hardly ever burſt or broken. See Hernia *incarcerata*, and Hernia *inguinalis*.

See on the ſubject of the preceding articles, Pott's Chirurgical Works, vol. ii. and vol. iii. Heiſter's Surgery, part ii. Sharp's Operations, &c.

HERNIARIA, in *Botany*. See Rupture-*wort*.

HERNSHAW, or Hernary, a place where herons breed.

HERO, in the *Ancient Theology*, and *Mythology*, a great and illuſtrious perſon, of mortal nature, though by the populace ſuppoſed to partake of immortality, and after his death, placed by them among the number of the gods. The word is formed of the Latin *heros*; and that of the Greek ἥρως, *ſemideus*, *demi-god*. St. Auguſtine, De Civit. Dei, lib. x. obſerves, that it is highly probable, that ſome one of Juno's ſons was originally called by this name; that goddeſs being called in Greek Ἥρη: or it may be, that great men were diſtinguiſhed by this appellation; in alluſion to the opinion of the ancients, that virtuous perſons, after their deaths, inhabit the wide expanſe of the air, which is Juno's province. Iſidore inclines to think, that *heroes* were thus called *quaſi aeroes*, *aerei*, perſons of ſuperior merit, and worthy of heaven. Plato derives the word from the Greek ερος, *love*; as intimating the *heroes* to have riſen from the copulation of a god with a mortal woman; or of a goddeſs with a man. Others derive the name from the Greek ειρειν, *dicere*, *to ſpeak*; the *heroes* being perſons who, by their eloquence, led the people at their pleaſure. Others, laſtly, derive it from the Greek ἔρα, *terra*, *earth*; the *heroes*, on their principle, being the *dii terreſtres*, or *gods of the earth*.

Heroes were, properly, perſons partly of divine, and partly of human extraction; being produced between a deity and a mortal: as Achilles, who was the ſon of the goddeſs Thetis, by Peleus; and Hercules, who was the ſon of Jupiter, by Alcmena.

A *hero*, then, coincides with what we otherwiſe call a *demi-god*: accordingly, Lucian defines a *hero* to be a medium between a god and a man; or rather, a compoſition of both.

The Greeks erected columns and other monuments over the tombs of their *heroes*, and eſtabliſhed a kind of worſhip in honour of the manes both of their *heroes* and heroines. The Romans alſo raiſed ſtatues in honour of their *heroes*; but there were ſix of their *heroes* of a ſuperior order, and who were ſuppoſed to be admitted into the community of the twelve great gods: theſe were Hercules, Bacchus, Eſculapius, Romulus, Caſtor, and Pollux. Writers have diſtinguiſhed between the worſhip which the ancients paid to their *heroes*, and that offered to their gods. The latter, it is ſaid, conſiſted of ſacrifices and libations; the former was only a kind of funeral honour, in which they celebrated their exploits, concluding the rehearſal with feaſts.

Hero is alſo uſed in a more extenſive ſenſe, for a great, illuſtrious, and extraordinary perſonage; particularly in reſpect of valour, courage, intrepidity, and other military virtues.

F. Bouhours makes this diſtinction between a great man and a *hero*, that the latter is more daring, fierce, and enterpriſing; and the former more prudent, thoughtful, and reſerved. In this ſenſe we properly ſay, Alexander was a *hero*, Julius Cæſar a great man.

Hero *of a poem* or *romance*, is the principal perſonage, or he who has the chief part in it.

Thus the *hero* of the Iliad is Achilles; of the Odyſſey, Ulyſſes; of the Æneid, Æneas; of Taſſo's Jeruſalem, Godfrey of Bulloign; of Milton's Paradiſe Loſt, Adam; though Mr. Dryden will have the devil to be Milton's *hero*, becauſe he gets the better of Adam, and drives him out of Paradiſe.

The character of Achilles is the inexorable wrath of a haughty, valiant, unjuſt, and revengeful prince; that of Ulyſſes, is the wiſe and prudent diſſimulation of a courageous king, whoſe conſtancy nothing could ſhake; that of Æneas, is piety, goodneſs, gentleneſs, good-nature, and humanity, ſuſtained, like the others, with an invincible courage.

Many of the critics find fault with the *hero* of the Æneid; they ſay he is too ſenſible and delicate; and wants the fire, firmneſs, and uncontrolable ſpirit, remarkable in the *hero* of the Iliad. Piety, tenderneſs, and ſubmiſſion to the gods, are the virtues of the middle claſs of mankind; they do not ſtrike and command enough for a *hero*, who is to be the inſtrument of ſuch notable exploits. St. Evremond looks on Æneas as fitter to have been the founder of a religious order than of an empire.

F. Boſſu defends Virgil's *hero*, or at leaſt Virgil, with admirable addreſs. Æneas's character, he obſerves, was not to be formed on the model, either of Achilles, or Ulyſſes, nor to be of the ſame kind with them; as the fable and the deſign of the Æneid was very different from thoſe of the Iliad and Odyſſey.

What Virgil had in view was, to make the Romans receive a new kind of government, and a new maſter; this maſter, then, muſt have all the qualities requiſite for the founder of a ſtate, and all the virtues which make a prince beloved. The violence of Achilles was, of conſequence, precluded; and ſo was the diſſimulation of Ulyſſes; that being a quality which renders a man ſuſpected, not beloved.

Virgil was reſtrained in his choice; his *hero* was to be of the genius of Auguſtus; and the poet was in the condition of a painter, who is obliged to accommodate a piece of hiſtory to the model of a face that is given him. The character of Homer's two *heroes*, as being directly oppoſite to his deſign, he has thrown upon Turnus and Mezentius, who are the counterparts to his *hero*.

It is diſputed among the critics, whether it be neceſſarily required, that the *hero* of an epic poem be a good and virtuous man? F. Boſſu maintains the negative; between a *hero* in morality, and a *hero* in poetry, the ſame diſtinction is to be made, as between moral and poetical goodneſs. Hence, as the manners of Achilles, and Mezentius, are poetically as good as thoſe of Ulyſſes, and Æneas, ſo thoſe two cruel and unjuſt men are as regular poetical *heroes*, as theſe two juſt, wiſe, and good men.

Ariſtotle, indeed, repreſents the *heroic* virtue, as a virtue more than human; and of conſequence, *heroes*, as divine perſons, whom the excellency of their nature raiſes above our claſs; but this he ſays only in his books of morality: in his Poetics he ſpeaks another language. The prime perſon of a poem, whom he calls the *hero*, he there obſerves, muſt neither be good nor bad, but between both: he muſt not either be ſuperior to the generality of mankind, by his virtue and juſtice; nor inferior to them, by his crimes and wickedneſs: the moral and epic *heroes*, therefore, even on Ariſtotle's principles, have nothing in common with each other; the one muſt be raiſed above mankind, and the other muſt not be on a level with the moſt perfect of men.

In effect, reaſon, the nature of the poem, which is to be a fable, the practice of Homer, and the rules of Ariſtotle and Horace, all agree, that ſo far is it from being neceſſary, that the *hero* of an epopea be a perfect, faultleſs man, that it is not neceſſary he be an honeſt man; and that it is no ways irregular to make him as perfidious as Ixion, as unnatural as Medea, or as brutal as Achilles.

It is another ſubject of controverſy among the critics, whether the cataſtrophe, or concluſion of the action, is neceſſarily to leave the *hero* happy, and at eaſe; or whether it be allowable to leave him unhappy?

The general practice of the *heroic* poets ſtands for the firſt. We have ſcarce one example of a *hero* who is overcome, and remains unhappy; excepting Adam in Milton. In tragedy, the caſe is different: unhappy cataſtrophes, according to Ariſtotle, are preferable to happy ones, and were always much better received among the ancients. The tragic ſcene is the throne of the paſſions; and terror and pity are there to rule in a peculiar manner: now thoſe paſſions ariſe the moſt naturally from unhappy events; and the audience, quitting the theatre full of the misfortunes wherewith the piece was cloſed, preſerve their concern much longer, and feel more forcible effects from it, than if their tears had been wiped away, and their ſighs ſmothered, in the ſatisfaction of a more happy peripetia.

But theſe reaſons have no place in the epopea; which is not intended ſo much to affect the paſſions, as to remove ill habitudes. But it is true, withal, that the epopea does not exclude all unhappy concluſions; the nature of epic fable is ſuch as admits equally of good and bad perſons for the prime parts; the unhappy adventure of a lamb unjuſtly devoured by a wolf, is a ſubject every way as inſtructive, and as regular, as the generoſity of a lion, who lets himſelf be diſarmed of his rage by the innocence of the ſame lamb.

It is true, if the poet propoſed his *hero* as a pattern of perfection for imitation, the misfortunes falling on him would ſuit very ill with the deſign: but this was, doubtleſs, the fartheſt thing from the intentions of the great maſters of the epopea above mentioned. The only reaſon, perhaps, that can be given for the uniform practice of the poets in this reſpect is, that an epic poem containing an action of much more extent than that of a tragic poem, the reader would not be ſo well ſatisfied, if, after ſo many labours and difficulties as the *hero* is brought to ſtruggle with, he ſhould not at laſt be brought off, but periſh miſerably. There is ſomething, no doubt, great and good in the *hero*, which, in the courſe of the poem, makes us concerned for him; ſo that, after ſo long an acquaintance, we cannot leave him miſerable without ſome anxiety; which it is not the final buſineſs of the poet to raiſe.

HERODIANS, a ſect among the Jews, at the time of Jeſus Chriſt, mentioned by St. Matthew, xxii. 16. and St. Mark, iii. 6. and xii. 13.

The critics and commentators on the New Teſtament, are very much divided with regard to the *Herodians*; ſome making them to be a political party, and others a religious ſect. The former opinion is favoured by the author of the Syriac verſion, who calls them the domeſtics of Herod, and alſo by Joſephus' having paſſed them over in ſilence, though he profeſſes to give an account of the ſeveral religious ſects of the Jews. The latter opinion is countenanced by our Lord's caution againſt the leaven of Herod, which implies, that the *Herodians* were diſtinguiſhed from the other Jews by ſome doctrinal tenets.

St. Jerom, in his Dialogue againſt the Luciferians, takes the name to have been given to ſuch as owned Herod for the Meſſiah; and Tertullian, Epiphanius, Chryſoſtom, and Theophylact, among the ancients; and Grotius, and other moderns, are of the ſame ſentiment. But the ſame St. Jerome, in his comment on St. Matthew, treats the ſame opinion as ridiculous; and maintains, that the Phariſees gave this appellation, by way of deriſion, to Herod's ſoldiers, who paid tribute to the Romans; agreeably to which, the Syriac interpreters render the word by the *domeſtics of Herod*; i. e. his courtiers.

M. Simon, in his notes on the twenty-ſecond chapter of Matthew, advances a more probable opinion. The name *Herodian* he imagines to have been given to ſuch as adhered to Herod's party and intereſt, and were for preſerving the government in his family; about which there were, at that time, great diviſions among the Jews. F. Hardouin will have the *Herodians* and Sadducees to have been the ſame.

Dr. Prideaux is of opinion that they derived their name from Herod the Great, and that they were diſtinguiſhed from the other Jews by their concurrence with Herod's ſcheme of ſubjecting himſelf and his dominions to the Romans, and likewiſe by complying with many of their heathen uſages and cuſtoms. This ſymbolizing with idolatry upon views of intereſt and worldly policy, was probably that leaven of Herod, againſt which our Saviour cautioned his diſciples It is farther probable that they were chiefly of the ſect of Sadducees; becauſe the leaven of Herod is alſo denominated the leaven of the Sadducees. Prid. Conn. part ii. book v. ſub. fin.

HERODIUS *avis*, in *Natural Hiſtory*, a name given by Aldrovand, and ſome others, to the chryſaëtos, or *golden* EAGLE.

HEROIC, ſomething belonging to a hero, or heroine.

Thus we ſay, *heroic* actions, *heroic* virtue, *heroic* ſtyle, *heroic* verſe, *heroic* poet, *heroic* age, &c.

Heroic *age*, is that age or period of the world, wherein the *heroes*, or thoſe called by the poets the *children of the gods*, are ſuppoſed to have lived.

The *heroic age* coincides with the fabulous AGE.

Heroic *poem* is that which undertakes to deſcribe ſome extraordinary action, or enterprize.

Homer, Virgil, Statius, Lucan, Taſſo, Camoens, Milton, and Voltaire. have compoſed *heroic poems*.

In this ſenſe, *heroic poem* coincides with EPIC *poem*.

Heroic *verſe*, is that wherein *heroic* poems are uſually compoſed; or, it is that proper for ſuch poems.

In the Greek and Latin, hexameter verſes are peculiarly denominated *heroic verſes*, as being alone uſed by Homer, Virgil, &c.

Alexandrine verſes, of twelve ſyllables, were formerly called *heroic verſes*, as being ſuppoſed the only verſe proper for *heroic* poetry; but later writers uſe verſes of ten ſyllables.

HEROINE, Heroina, or Herois, a woman that has the qualities and virtues of a HERO; or, that has done ſome heroic action.

HERON, *Ardea*, in *Ornithology*, the name of a large genus of birds, the diſtinguiſhing character of which is, by Mr. Ray, fixed in their inteſtines, they having only one inteſtinum cœcum, or blind gut, as is the cuſtom of nature in quadrupeds, moſt other birds having two.

In the Linnæan ſyſtem this is a genus of the grallæ, diſtinguiſhed by a long, ſtrait, pointed bill, with furrows from the noſtrils to the end, linear noſtril, and feet with four toes. To this genus belong the ARDEOLA, BITTERN, COCOI, CRANE, the GAZA *giovani*, or ſmall white *heron*, the GAZZA, or greater white *heron*, the SOCO, the STORK, *night*-RAVEN, &c.

The common *heron*, or *ardea major* of Linnæus, has a ſmall body, always lean, and covered with a very thin ſkin. It builds in trees, and ſometimes in high cliffs over the ſea; forms its neſt of ſticks lined with wool, and in the month of February lays five or ſix large eggs of a pale green colour. This bird was formerly much eſteemed as a food; it is remarkably long-lived, ſometimes exceeding even ſixty years. The male is a very elegant bird; its forehead and crown, and upper part of the neck, are white; the head is adorned with a pendent creſt of long black feathers; the coverts of the wings are of a light grey colour; the fore part of the neck is white, ſpotted with a double row of black; the feathers are white, long, narrow, and unwebbed, and the ſcapulars are of the ſame texture, of a grey colour, ſtreaked with white; beneath the wings there is a bed of black feathers, which are very long and ſoft, and were formerly uſed as ornaments to the caps of the knights of the Garter; the breaſt, belly, and thighs, are white, the laſt being daſhed with yellow; the tail is compoſed of twelve ſhort cinereous feathers; the legs are of a dirty green, the claws ſhort, and the inner edge of the middle claw finely ſerrated. The head of the female, which was formerly ſuppoſed to be a diſtinct ſpecies, is grey; inſtead of a creſt, it has only a ſhort plume; the ſcapulars are grey and webbed, and the ſides grey. Pennant. This bird is a very great devourer of fiſh, and does more miſchief to a pond than even an otter. People who have kept *herons*, have had the curioſity to number out the fiſh they fed them with into a tub of water, and counting them again afterwards, it has been found that they will eat fifty moderate ſized dace and roaches in a day. It has been found that in carp ponds, viſited by this bird, one *heron* will eat up a thouſand ſtore carp in a year, and will hunt them ſo cloſe as to let very few eſcape. The readieſt method of deſtroying this miſchievous bird, is by fiſhing for him in the manner of pike, with a baited hook. When the haunt of the *heron* is found out, three or four ſmall roach or dace are to be procured, and each of them is to be baited on a wire, with a ſtrong hook at the end, entering the wire juſt under the gills, and letting it run juſt under the ſkin to the tail, the fiſh will live in this manner five or ſix days, which is a very eſſential thing; for if it be dead, the *heron* will not touch it. A ſtrong line is then to be prepared of ſilk and wire twiſted together, and is to be about two yards long; tie this to the wire that holds the hook, and to the other end of it there is to be tied a ſtone of about a pound weight; let three or four of theſe baits be ſunk in different ſhallow parts of the pond, and in a night or two's time, the *heron* will not fail of being taken by one or other of them.

When hawking was more in uſe, and laws were enacted for the preſervation of the ſpecies, the *heron* afforded a great deal of ſport to the people who loved that diverſion. There is but very little art in this flight of the hawk; but as both the birds are large and courageous, the fight is finer than in the flight of ſmaller birds that make no reſiſtance. At the beginning of March the *herons* begin to make their paſſage: if, therefore, you will adapt your hawks to the *heron*, they muſt at this time be uſed to fly at the rivers, and about waters, and they muſt be fed with light meats; then the hawk is to be entered at the game by getting a living *heron*, and cutting its wings, or diſabling it in ſuch a manner that it cannot fly; then it is to be ſet on the ground, and the hawk unhooded and let go at her. If the hawk ſeize the *heron*, the falconer muſt run in to her aſſiſtance, and kill the *heron*, giving the hawk her reward, the heart, and letting her ſtand over the opened breaſt, and feed on other parts of the entrails; then let her be hooded; and afterwards the bird is to be ſwung about the head, and the hawk taught to come and feed on it out of the falconer's hand.

When the hawk is thus fairly entered, another live *heron* is to be procured, and let off in an open field undiſabled. As ſoon as ſhe is riſen to a conſiderable height in the air, the hawk is to be let out after her; if the hawk cloſe with her, and bring her down, the falconer is to run up to her aſſiſtance, and ſticking the *heron's* bill in the ground, and breaking her wings and legs, the hawk is to be left to feed and plume upon her. When ſhe is thus well managed, ſhe may be taken to the waters, and let at a wild *heron*, in the following manner,

When a *heron* is found, the falconer is to get as nigh her as he can, going under the wind with his hawk, which muſt be a gerfalcon, or jerkin, with a haggard falcon for the driver. Thus having the hoods looſe, as ſoon as ever the *heron* is up, let off the driver, which makes up to her, and cauſes her to work in the wind; then let go the hawks that are to fly at her; but when they have worked above the *heron* that they come through her, they will make her come to ſiege. When they have got her down, the falconer muſt make up to them as quick as poſſible, and aſſiſt them by breaking her legs and wings, and thruſting her bill into the ground. For this flight of the hawk there ſhould always be a dog trained up to the ſport, whoſe buſineſs it is to come up and kill the *heron* the moment that he ſees her fall.

If the hawk cannot bring her down, or gives over the flight, then give her a train *heron* or two, in a proper place, before ſhe is truſted at a wild *heron* again, otherwiſe ſhe will be diſheartened and ſpoiled.

A *heron* at ſiege is one ſtanding at the water-ſide watching for prey.

HEROS *coagulationis*, the *hero of coagulations*, an affected name given by Paracelſus to the ſpirit of ſea-ſalt; a menſtruum he was particularly fond of, and which ſeems to have been one great ingredient in his alcaheſt.

HERPES, Ἕρπης, in *Medicine*, a cutaneous heat, or inflammation, attended with a roughneſs of the ſkin, and the eruption of a number of little puſtules ſpreading every way.

The word is formed of the Greek ἕρπω, *paulatim gradior, repo*; becauſe the eruptions *creep* from place to place.

There are divers kinds of this diſeaſe: as,

HERPES, *miliary*. This is an aſſemblage of innumerable little puſtules, under the cuticle, of the ſize of millet-ſeeds; popularly called the SHINGLES.

HERPES, *ſimple*, is a ſingle puſtule, or two, riſing chiefly on the face, of a whitiſh or yellowiſh colour, pointed, and with an inflamed baſe. Theſe dry away, of their own accord, upon letting out the drop of pus contained in them.

A third ſpecies of *herpes* is what we otherwiſe call SERPIGO; and, in Engliſh, a *tetter*, or RING-*worm*.

HERPES *exedens* is of a more corroſive kind: the puſtules are ruddy, and attended with an itching; and ulcerate the parts on which they riſe.

HERPES *ferus*. See ERYSIPELAS.

HERRING, *Harengus*, in *Ichthyology*, a ſpecies of the CLUPEA. The characters by which this fiſh is diſtinguiſhed from the reſt which approach to it in ſhape, and which are thence called *harengiformes*, are theſe: its uſual length is ſeven or eight inches, though it ſometimes grows to a foot; its head is flatted, and its mouth placed upwards; the colour of the back and ſides is green, varied with blue, and that of the belly ſilvery; the ſcales are large and round; it is not at all ſpotted; and its belly is ſharply carinated, but the ridge is quite ſmooth, and not in the leaſt ſerrated; its ſide-lines are ſmall, and ſcarce diſtinguiſhable; the lower jaw is longer and more prominent than the upper; its gills are four in number, as in other fiſhes, but their fibres are remarkably long, and open very wide; ſo that the *herring* almoſt inſtantly dies when taken out of the water; it has one fin on its back, which conſiſts of about ſeventeen rays, and is in the midway between the head and tail; the two ventral fins have nine rays, the pectoral ſeventeen, the anal fourteen, and the tail is forked.

The name *herring* is derived from the German *heer*, an *army*, which expreſſes their number, when they migrate into our ſeas. *Herrings* are found in great plenty from the higheſt northern latitudes as low as the northern coaſts of France. They are alſo met with in vaſt ſhoals on the coaſt of America, as low as Carolina: they are found alſo in the ſea of Kamtzchatka, and poſſibly reach Japan: but their winter rendezvous is within the arctic circle, whither they retire after ſpawning, and where they are provided with plenty of inſect food. For an account of the remarkable migration of *herrings*, and the hiſtory of the fiſhery, &c. ſee *Herring* FISHERY.

They are in full roe at the end of June, and continue in perfection till the beginning of winter, when they begin to depoſit their ſpawn.

There are divers names given to preſerved *herrings*, according to the different manners wherein they are ordered: as,

1. *Sea-ſticks*. Theſe are ſuch as are caught all the fiſhing ſeaſon, and are but once packed. A barrel of theſe holds ſix or eight hundred; eight barrels go to the tun, by law; a hundred of *herrings* is to be a hundred and twenty; a laſt is ten thouſand; and they commonly reckon fourteen barrels to the laſt.

There are others, repacked on ſhore, called *repacked herrings*; ſeventeen barrels of ſea-ſticks commonly make from twelve to fourteen of repacked *herrings*.

The manner of repacking them is, to take out the *herrings*, waſh them out in their own pickle, and lay them orderly in a freſh barrel: theſe have no ſalt put to them, but are cloſe packed, and headed up by a ſworn cooper, with pickle, when the barrel is half full. The pickle is brine; ſo ſtrong, as that the *herring* will ſwim in it.

2. *Summers*. Theſe are ſuch as the Dutch chaſers, or divers, catch from June to the fifteenth of July. Theſe are ſold away in ſea-ſticks, to be ſpent preſently, in regard of their fatneſs; becauſe they will not endure repacking. They go one with another, full and ſhotten; but the repacked *herrings* are ſorted, the full *herrings* by themſelves.

3. The *ſhotten* and *ſick herrings* by themſelves; the barrel whereof is to be marked diſtinctly.

4. *Crux herrings*; which are ſuch as are caught after the fourteenth of September. Theſe are cured with that kind of ſalt called ſalt upon ſalt, and are carefully ſorted out, all full *herrings*, and uſed in the repacking.

5. *Corved herrings*. Theſe ſerve to make red *herrings*, being ſuch as are taken in the Yarmouth ſeas, from the end of Auguſt to the middle of October; provided they can be carried aſhore within a week, more or leſs, after they are taken. Theſe are never gipped, but rowed in ſalt, for the better preſerving of them, till they can be brought on ſhore; and ſuch as are kept to make *red herrings*, are waſhed in great vats in freſh water before they are hung up in the *herring-hangs*, or *red-herring* houſes.

As for the *manner of ſalting herrings*. The nets being haled on board, the fiſhes are taken out, and put into the warbacks, which ſtand on one ſide of the veſſels. When all the nets are thus unloaded, one fills the gippers baſkets. The gippers cut their throats, take out their guts, and fling out the full *herrings* into one baſket, and the ſhotten into another. One man takes the full baſket when they are gipped, and carries them to the rowerback, wherein there is ſalt. One boy rows and ſtirs them about in the ſalt, and another takes them, thus rowed, and carries them in baſkets to the packers. Four men pack the *herrings* into one barrel, and lay them, one by one, ſtrait and even; and another man, when the barrel is full, takes it from the packers. It is left to ſtand a day, or more, open to ſettle, that the ſalt may melt and diſſolve to pickle; after which it is filled up, and the barrel headed. The pickle is to be ſtrong enough to ſuſtain a *herring*; otherwiſe the fiſh decay in it. See *Herring* FISHERY.

It is unlawful to buy or ſell *herrings* at ſea, before the fiſhermen come into the haven, and the cable of the ſhip be drawn to the land. 31 Edw. III. ſtat. 2. No *herring* ſhall be ſold in any veſſel, but where the barrel contains thirty-two gallons, and half barrel and firkin accordingly; and they muſt be well packed, of one time's packing and ſalting, and be as good at the middle as the ends, on the pain of forfeiting 3*s.* 4*d.* a barrel, &c. by ſtat. 22 Edw. IV. cap. 2. The veſſels for *herrings* are to be marked with the quantity, and place where packed, and packers to be appointed and ſworn in all fiſhing-ports, &c. under the penalty of 100*l.* ſtat. 15 Car. II. cap. 16.

Freſh *herrings* conſidered as a food, are ſaid to be very good aliment, if uſed moderately; but if taken in quantities diſproportioned to the powers of digeſtion, they produce a putrefaction in the ſtomach of the alkaline kind, and are attended with all the bad conſequences of highly alcaleſcent aliment: but pickled *herrings* are very bad aliment, the fleſh being rendered hard, and ſcarcely digeſtible by the vital powers: theſe, however, are leſs injurious than thoſe which are ſalted and dried.

The parts of the *herring* uſed in medicine, are the veſicles called *animæ*, and the entire fiſh. The *animæ* are ſaid to excite urine taken internally. Salted *herrings* are ſometimes applied to the ſoles of the feet in fevers, with an intent to derive the humours from the head, and mitigate the febrile heat. The pickle of *herrings* is uſed in clyſters, for pains in the hips, and a dropſy; externally applied, it mundifies fetid ulcers, ſtops the progreſs of a gangrene, and diſſipates ſtrumous ſwellings. It is alſo of ſervice in a quinſy, if the parts affected are anointed with this and honey mixed together.

HERRING *buſs*, a veſſel uſed in the *herring* fiſhery. See BUSS and FISHERY.

HERRING *cob* is a young *herring*. See *Herring* FISHERY.

HERRING *fiſhery*. See *Herring* FISHERY.

HERRING-*gull*, in *Ornithology*, the name of a bird of the larus kind, called by authors *larus cinereus maximus*, or the great grey gull, and by Linnæus the *larus fuſcus*. It is of the ſize of our common duck; its beak is yellow, and is narrow, and two fingers breadth long, a little hooked at the end, and has on the lower chap an orange coloured ſpot; the edges of the eye-lids are red; the head, neck, and tail, white; the back and coverts of the wings aſh-coloured; the upper part of the five firſt quill-feathers are black, marked with a white ſpot near their end; the legs are of a pale fleſh colour; it feeds on herrings and other fiſh, and is a very voracious bird. It breeds on the ledges of rocks that hang over the ſea. Ray and Pennant.

HERRING *ſilver*, a compoſition in money, formerly paid in lieu of a certain quantity of *herrings* for the proviſion of a religious houſe.

HERRIOT. See HARIOT.

HERRISON, in *Fortification*, is a beam or barrier made of one ſtrong piece of wood, full of iron ſpikes. It is commonly ſupported in the middle, and turns upon a pivot, or axis. It is uſed for ſecuring any paſſages, which are to be often opened and ſhut.

HERRNHUTERS, in *Eccleſiaſtical Hiſtory*, the name of a fanatical ſect, called alſo Moravians, which ſprung up in Upper Luſatia towards the beginning of this century. This ſect was founded by Nicholas Lewis count of Zinzendorf; and to his activity and zeal the progreſs of it is to be aſcribed. According to the account which he gives of himſelf, he had formed a deſign, when only ten years old, of collecting a ſmall ſociety of *believers*, who ſhould altogether employ themſelves in exerciſes of devotion, under his direction. Accordingly, when he became of age, in the year 1721, he ſettled at Bertholſdorf, a village in Upper Luſatia, where he was ſoon joined by a number of proſelytes from Moravia; ſo that in a few years Bertholſdorf became a conſiderable village, having an orphan houſe, and other public buildings. In 1728, thirty-four new houſes were erected; and in 1732 the number of inhabitants amounted to ſix hundred. From the name of a hill in the neighbourhood of this village, called the *Huth-berg*, theſe coloniſts gave their dwelling place the appellation of *Huth des Herrn*, and afterwards *Herrnhuth*, ſignifying the guard or protection of the Lord; whence aroſe the denomination of their ſect. As their number increaſed, Zinzendorf eſtabliſhed a peculiar diſcipline; dividing his adherents into different claſſes of married men, married women, widowers, widows, maids, bachelors, and children; each claſs being under the inſpection of a director, choſen by its members; and the claſſes are alſo ſubject to the ſuperintendence of an elder, co-elder, and vice-elder. Particular attention was paid by theſe ſeveral claſſes to the inſtruction of youth; and as a great part of their worſhip conſiſted in ſinging, they pretended that children were inſtructed in their religion by hymns. There are ſome perſons of both ſexes appointed by rotation to pray for the ſociety, who are admoniſhed of their duty by an inward feeling; and they pretend to determine the divine will in particular caſes by caſting lots. All matrimonial contracts are ſubject to the direction and approbation of the elders. This ſect profeſſed in their firſt eſtabliſhment to belong to the Lutheran church; but count Zinzendorf, for the greater credit of this new ſociety, afterwards pretended that it was a revival of the ancient Moravian church, or Bohemian brethren, who were converted from popery by John Huſs. But this ſeems to have been a mere pretence. Such was the origin of a ſect, which in proceſs of time became very conſiderable and extenſive, and which adopted tenets and practices as infamous as they are ſingular. Zinzendorf was denominated the truſtee and guardian of the brethren; in 1737 he was conſecrated biſhop of this ſect, a dignity which he reſigned in 1740. Towards the cloſe of the year 1744, he was denominated miniſter plenipotentiary and œconomiſt; and it was enacted that nothing of importance ſhould be done without his conſent; and he afterwards ſtyled himſelf the lord advocate of the *unitas fratrum.* Zinzendorf has travelled in perſon all over Europe, and been twice in America; and he has alſo ſent miſſionaries almoſt throughout the known world. It would be endleſs to recount the numberleſs artifices which this ſectary has made uſe of to eſtabliſh his own authority, and to extend the intereſt of his party. According to his own account, publiſhed in 1749, the ſociety had almoſt a thouſand labourers diſperſed all over the world, who preached in fourteen languages, and ninety-eight different eſtabliſhments, among which are caſtles, that have twenty, fifty, or ninety apartments. How far theſe boaſts are juſtified by fact, we cannot pretend to determine; but it is certain, that the decline of this ſect has been no leſs ſignal and rapid than its progreſs. With regard to the tenets of the *Herrnhuters*, it may be obſerved, that at their firſt riſe they profeſſed to admit the confeſſion of Augſburgh, and count Zinzendorf has always referred to this confeſſion, as the ſtandard of his doctrine. However it is well known, that he has advanced the moſt pernicious notions, and recommended the moſt abominable practiſes; ſuch notions and practices as disfigure the ſacred truths of the Goſpel, and ſap the foundations of morality. The count himſelf ſpeaks in very derogating terms of the Scripture; and expreſly aſſerts, that the reading of the Scripture appears to him to be more dangerous than uſeful to the ſociety. To avoid idolatry, he ſays, people ought to be taken from the Father and Holy Ghoſt, and conducted to Chriſt, with whom alone we have to do. The Holy Ghoſt is called by the *Hernnhuters* the eternal wife of God, the mother of Chriſt, the mother of the faithful, and of the church. The language of their devotion is obſcene and abominable; and the ideas excited by it are ſuch as no chaſte mind can entertain. In ſome of their hymns of devotion, they make their direct addreſſes to what was formerly adored at Lampſacus. The conjugal act is a piece of ſcenery, in which the male repreſents Chriſt the huſband of ſouls, and the female the church; and they have actually appointed ſuch ceremonies, in the celebration of marriage, as ſuppoſe them to have entirely given up all ſenſe of ſhame. Count Zinzendorf expreſly declares, that the law is not a rule of life to a believer; that the moral law belongs only to the Jews, and that a converted perſon cannot ſin againſt light. We ſhall only add, that no examples can be found of a fanaticiſm more extravagant, and a myſticiſm more groſs and ſcandalous than thoſe of the *Herrnhuters*; and it would be impoſſible to multiply ſpecimens of their creed or devotion, extracted from the ſermons and writings of their founder, without offending the chaſte reader. Thoſe whoſe curioſity leads them to wiſh for farther information, may conſult Moſheim's Eccl. Hiſt. vol. v. p. 85, note *(s)*. Warburton's Doctrine of Grace, vol. ii. p. 153. and Rimius's Candid Narrative of the Riſe and Progreſs of the *Herrnhuters*, commonly called Moravians, or Unitas Fratrum, &c. 1753. and Supplement, &c. publiſhed in 1755.

HERSE, in *Fortification*, a lattice, or PORTCULLICE, in form of a harrow, beſet with iron ſpikes.

The word *herſe* is French, and literally ſignifies *harrow*; being formed of the Latin *herpex*, or *irpex*; which denote the ſame.

It is uſually hung by a rope faſtened to a moulinet; to be cut, in caſe of ſurprize, or when the firſt gate is broken with a petard; that the *herſe* may fall, and ſtop up the paſſage of the gate, or entrance of the fortreſs.

The *herſe* is otherwiſe called a *ſarraſin*, or *cataract*; and when it conſiſts of ſtrait ſtakes, without any croſs pieces, it is called ORGUES.

HERSE is alſo a harrow, which the beſieged, for want of chevaux de friſe, lay either in the way, or in breaches, with the points up, to incommode the march as well of the horſe as the infantry.

HERSILLON, in the *Military Art*, a ſort of plank, or beam, ten or twelve feet long, whoſe two ſides are driven full of ſpikes, or nails, to incommode the march of the infantry or cavalry.

The word is a diminutive of herſe; the *herſillon* doing the office of a little herſe.

HERSIPHORIA. See ARRHEPHORIA.

HERTHA, or HERTHUS, in *Mythology*, a deity worſhipped by the ancient Germans. This is mentioned by Tacitus, in his book De Moribus Germanorum, cap. 40. Voſſius conjectures that this goddeſs was Cybele; but ſhe was more probably Terra, or the Earth; becauſe the Germans ſtill uſe the word *hert* for the earth, whence alſo the Engliſh *earth*. Some have ſuppoſed that STONE*henge* was a temple conſecrated to the goddeſs *Herta*.

HERTHAMAN, in the *Materia Medica*, a name given by Avicenna and Serapion to the grain called ZEA, uſed much in medicine in their time, and ſuppoſed to be of a middle nature between wheat and barley.

HESPER, HESPERUS, in *Aſtronomy*, the *evening ſtar*; an appellation given to Venus when ſhe follows, or ſets after the ſun.

The word is formed of the Greek Ἑσπερος, and is ſuppoſed to have been originally the proper name of a man, brother of Atlas, and father of the HESPERIDES.

Diodorus, lib. iii. relates, that *Heſperus* having aſcended to the top of mount Atlas, the better to obſerve and contemplate the ſtars, never returned more; and that hence he was fabled to have been changed into this ſtar.

HESPERIDES, Ἑσπεριδες, in the *Ancient Mythology*, were the daughters of Heſper, or Heſperus, the brother of Atlas. According to Diodorus, Heſperus and Atlas were two brothers, who poſſeſſed great riches in the weſtern parts of Africa. Heſperus had a daughter called Heſperia, who married her uncle Atlas, and from this marriage proceeded ſeven daughters, called *Heſperides*, from the name of their mother, and Atlantides, from that of their father. According to the poets, the *Heſperides* were three in number, Ægle, Arethuſa, and Heſperthuſa. Heſiod, in his Theogony, makes them the daughters of *Nox*, *Night*, and ſeats them in the ſame place with the Gorgons; viz. at the extremities of the weſt, near mount Atlas: it is on that account he makes them the daughters of Night, becauſe the ſun ſets there.

The *Heſperides* are repreſented by the ancients as having the keeping of certain golden apples, on the other ſide the ocean. And the poets give them a dragon to watch the garden where the fruit grows: this dragon they tell us Hercules ſlew, and carried off the apples.

Pliny and Solinus will have the dragon to be no other than an arm of the ſea, wherewith the garden was encompaſſed, and which defended the entrance thereof. And Varro ſuppoſes, that the golden apples were nothing but ſheep. Others, with more probability, ſay they were oranges.

The gardens of the HESPERIDES, *Heſperidum horti*, or *horti Heſperidum*, are placed by ſome authors at Larach, a city of Fez; by others, at Bernich, a city of Barca, which tallies better with the fable. Others take the province of Suſa, in Morocco, for the iſland wherein the garden was ſeated. And laſtly, Rudbecks places the Fortunate Iſlands, and the gardens of the *Heſperides*, in Sweden.

HESPERIS, in *Botany*. See *Dame's* VIOLET.

HESSIAN *bellows*. See BELLOWS.

HESYCHASTES, HESYCHASTA, a perſon who keeps himſelf vacant, and at leiſure, to attend the better, and with the leſs interruption, to the contemplation of divine things.

The word is Greek ἡσυχαστης, formed of ἡσυχαζω, *quieſco*, *quieti indulgeo*, a derivative of ἡσυχος, *quietus*, *quiet*; ſo that *heſychaſtes*, in Greek, anſwers to the literal ſenſe of *quietiſt* in Engliſh.

The name was chiefly uſed by the ancients for ſuch among the monks as did not employ themſelves in any labour of the hands, but renounced all bodily action, to reſign themſelves wholly to prayer and meditation.

HESYCIUS, in *Natural Hiſtory*, the name of a fly of the carnivorous kind, often found preying on the bodies of other flies, beetles, &c. and of ſerpents; whence it has been called alſo ophioboros. Its wings are of a ſhining pale yellow, or the colour of poliſhed braſs; whence it has alſo been called by ſome CHALCOMUIA.

HETERIARCH, HETÆRIARCHA, in *Antiquity*, an officer in the Greek empire, whereof there were two ſpecies; the one called ſimply *heteriarch*; and the other, *great heteriarch*, who had the direction of the former.

The word is Greek εταιριαρχα, formed of the Greek εταιρος, *ſocius*, *companion*, *ally*, and αρχη, *imperium*, *command*. Their principal function was to command the troops of the allies; beſides which, they had ſome other duties in the emperor's court, deſcribed by Codin, De Officiis, cap. 5. n. 30, 31, 32, 37.

HETEROCLITE, HETEROCLITON, in *Grammar*, an irregular, or anomalous word, which either in declenſion, conjugation, or regimen, deviates from the ordinary rules of grammar. See ANOMALOUS.

The word is Greek ετεροκλιτον, formed of ετερος, *alter*, *another*, *different*, and κλινω, *I decline*.

Heteroclite is more peculiarly applied to nouns, which vary, or are irregular, in point of declenſion; having fewer caſes, numbers, &c. than ordinary; or that are of one declenſion in one number, and another in another.

We have various ſorts of *heteroclites*, as defective, and redundant *heteroclites*, &c. Under the claſs of *heteroclites*, come APTOTES, DIPTOTES, MONOPTOTES, TRIPTOTES, TETRAPTOTES, PENTAPTOTES, &c.

HETERODOX, in *Polemical Theology*, ſomething that is contrary to the faith or doctrine eſtabliſhed in the true church.

The word is formed of the Greek ετεροδοξος, a compound of ετερος, *alter*, and δοξα, *opinion*.

Thus, we ſay, a *heterodox* opinion, a *heterodox* divine, &c.

The word ſtands in oppoſition to *orthodox*.

HETERODOX, *Heterodoxi*, in *Botany*, that ſet of ſyſtematical writers on this ſcience, who formed their diſtributions and claſſes of the plants on wrong foundations, not on the diviſions made by nature in the different ſtructure of the parts of fructification in the different claſſes, but on the ſhape of their leaves, or roots; or who ranged them by their common names, according to the letters of the alphabet. Linnæi Fund. Bot. p. 2. See BOTANY.

HETERODROMUS *vectis*, in *Mechanics*, a lever wherein the fulcrum, or point of ſuſpenſion, is between the weight and the power.

This is what we otherwiſe call a *lever of the firſt kind*. Such is that repreſented *Tab. Mechanics*, *fig.* 1.

This term is uſed by way of contradiſtinction to the HOMODROMUS *vectis*

HETEROGENEITY, in *Phyſics*, the quality, or diſpoſition, which denominates a thing *heterogeneous*.

The word is alſo uſed for the *heterogeneous* parts themſelves. In which ſenſe, the *heterogeneities* of a body are the ſame thing with the *impurities* thereof.

Heterogeneity is a term of a very lax ſignification, and is brought by the chemiſts to ſerve almoſt for every thing they do not underſtand; ſo that all diſagreement, or inaptitude to mixture between any bodies, is imputed to the *heterogeneity* of their parts.

But ſo far as the term may be made uſe of, to convey any diſtinct ſignification, it muſt be by conſidering natural bodies under different ſortments, according as they are diverſified by figure, bulk, motion, and their more ſenſible properties; ſo that thoſe of different ſortments are *heterogeneous* to one another, and the parts of the ſame ſortment are homogeneous. Thus the diviſion chemiſtry makes of bodies into oils, ſalts, ſpirits, &c. may be reckoned, with reſpect to one another, *heterogeneous*; though the parts of each diviſion are among themſelves homogeneous.

In effect, they are two terms, which ſerve frequently as a refuge for ignorance; otherwiſe the common terms of *like* and *unlike* may ſerve every whit as well. Quincy.

HETEROGENEOUS, or HETEROGENEAL, literally imports ſomething of a different nature, or that conſiſts of parts of different, or diſſimilar kinds: in oppoſition to HOMOGENEOUS.

The word is Greek, formed of ετερος, *alter*, *different*, and γενος, *genus*, *kind*; q. d. compoſed of different kinds of parts.

HETEROGENEOUS is particularly applied, in *Mechanics*, to thoſe bodies, whoſe denſity is unequal in different parts of their bulk.

Or, *heterogeneous* bodies are ſuch, whoſe gravities in different parts are not proportionable to the bulks thereof.

Bodies equally denſe, or ſolid in every part, or whoſe gravity is proportionable to their bulk, are ſaid to be homogeneous.

HETEROGENEOUS *light*, is that which conſiſts of parts or rays of different refrangibility, reflexibility, and colour.

HETEROGENEOUS *nouns*, in *Grammar*. See NOUN, GENDER, &c.

HETEROGENEOUS *numbers*. See NUMBERS.

Heterogeneous *quantities*, are thoſe which are of ſuch different kind and conſideration, as that one of them, taken any number of times, never equals or exceeds the other.

Heterogeneous *ſurds*, are ſuch as have different radical ſigns; as $\sqrt{aa}$, and $\sqrt[3]{bb}$; $\sqrt[5]{9}$, and $\sqrt[7]{19}$.

How to reduce the *heterogeneous ſurds* to homogeneous ones, ſee under the article SURDS.

HETEROPHAGI, formed of ἑτερος, *different*, and φαγω, *I eat*, in *Natural Hiſtory*, a term uſed by ſome authors to expreſs a peculiar claſs of inſects diſtinguiſhed by their eating many different things, but not feeding on one another, as thoſe do which are of the claſs of the ALLELOPHAGI, of which there are a great number of ſpecies.

HETEROPYRÆ, in *Natural Hiſtory*, the name of a genus of ferrugineous foſſils, compoſed of ſeveral coats, incloſing a nucleus of a different ſubſtance from themſelves, and often looſe, and rattling in them. See SIDEROCHITA.

Of this genus there are ſeven ſpecies. Hill's Foſſils, p. 536.

HETERORHYTHMUS, compounded of ἑτερος, and ρυθμος, *meaſure*, a term uſed by ſome fanciful writers, for a courſe of life unſuitable to the age of thoſe who live in it.

The ſame is alſo applied to pulſes, when they beat variouſly or irregularly in diſeaſes; or rather when a pulſe belonging to one age is found in a patient of another.

HETEROSCII, formed of ἑτερος, *different*, and σκια, *ſhadow*, in *Geography*, a term vulgarly applied to thoſe inhabitants of the earth, whoſe ſhadow at noon-tide is always projected the ſame way, either northward, or ſouthward.

In this ſenſe, the inhabitants of the temperate zones are denominated *heteroſcii*. See ZONE.

Heteroscii, however, in ſtrictneſs, and according to the origin and reaſon of the word, is a term of relation, and denotes thoſe inhabitants, which, during the whole year, have their noon-tide ſhadows projected different ways from each other. Thus, we who inhabit the northern temperate zone, are *heteroſcii* with regard to thoſe who inhabit the ſouthern temperate zone; and they are *heteroſcii* with reſpect to us.

From this definition it follows, that only the inhabitants of the two temperate zones are *heteroſcii*; nor is the word ordinarily applied to any other: though, in reality, there is always one part of the torrid zone, whoſe inhabitants are *heteroſcii* with regard to thoſe of the reſt, and with regard to thoſe of one of the temperate zones, except at the time of the ſolſtices. And even at that time, all of the torrid zone are *heteroſcii* with regard to thoſe of one of the temperate zones. But as this is variable, and the people of the torrid zone have their ſhadow now on this, and then on that ſide, the cuſtom is to call them AMPHISCII, and not *heteroſcii*.

HETEROSTROPHE, formed of ἑτερος and ϛρεφω, *I turn*, an epithet applied to certain ſhells, the wreathes of which turn a contrary way from thoſe of other ſhells of the ſame genera. We have in the Philoſophical Tranſactions, N° 56, an account of two very remarkable ſnail-ſhells of this kind.

HETEROUSII, HETEROUSIANS, compoſed of ἑτερος, and ȣσια, *ſubſtance*, a ſect or branch of Arians, the followers of Aetius, and from him alſo denominated AETIANS.

They were called *Heterouſii*, becauſe they held, not that the Son of God was of a ſubſtance like, or ſimilar to, that of the Father; which was the doctrine of another branch of ARIANS, thence called HOMOOUSIANS, *homoouſii*; but that he was of another ſubſtance different from that of the Father.

HEUCHERA, in *Botany*, a genus of the *pentandria digynia* claſs; the corolla of which conſiſts of five petals, and the fruit is a capſule, containing two cells. Of this genus there is only one ſpecies.

HEWHOLE, or, as it is pronounced in ſome places, the *high-hoo*, a name given by many to the common green WOOD-*pecker*, from its making holes in trees.

HEXACHORD, compounded of ἑξ, *ſix*, and χορδη, *chord*, or *ſtring*, in the *Ancient Muſic*, a concord commonly called by the moderns a *ſixth*.

The *hexachord* is twofold, the *greater* and *leſſer*. The *greater hexachord* is compoſed of two greater tones, two leſſer tones, and one greater ſemitone; which make five intervals.

The *leſſer hexachord* conſiſts only of two greater tones, one leſſer tone, and two greater ſemitones.

The proportion of the former, in numbers, is as 3 to 5; and that of the other, as 5 to 8.

In the table inſerted under the head INTERVAL, we have reſtrained the term *hexachord* to ſignify the ſixth of the Greek ſcale, which is not a true ſixth major, but a comma more, being a tone major above the fifth.

HEXACONTALITHUS, in *Natural Hiſtory*, the name of a ſtone deſcribed by Pliny, and other of the ancient writers, as being very ſmall, yet ſhewing an almoſt infinite variety of colours. It ſeems only another name for the OPAL.

HEXAEDRON, or HEXAHEDRON, formed of ἑξ, *ſix*, and ἑδρα, *ſeat*, in *Geometry*, one of the five regular bodies, popularly called a CUBE.

The ſquare of the ſide of a *hexaedron* is in a ſubtriple ratio to the ſquare of the diameter of the circumſcribed ſphere. Hence, the ſide of the *hexaedron* is to the ſide of the ſphere it is inſcribed in, as one to the $\sqrt{3}$; and, conſequently, it is incommenſurable to it.

HEXAGON, formed of ἑξ, *ſix*, and γωνια, *angle*, in *Geometry*, a figure of ſix ſides and as many angles.

If theſe ſides and angles be equal, it is called a *regular hexagon*.

The ſide of a *hexagon* is demonſtrated to be equal to the radius of a circle circumſcribed about the ſame.

Hence, a regular *hexagon* is inſcribed in a circle, by ſetting the radius off ſix times upon the periphery.

To deſcribe a *hexagon* on a given line AB (*Tab*. II. *Geometry, fig*. 48.) draw an equilateral triangle ACB; the vertex C will be the center of a circle, which will circumſcribe the *hexagon* required.

Hexagon, in *Fortification*, is a fortreſs with ſix baſtions.

HEXAHEDROSTYLA, in *Natural Hiſtory*, the name of a genus of SPARS.

The word is derived of the Greek ἑξ, *ſix*, ἑδρα, *ſide*, and ϛυλος, a *column*.

The bodies of this genus are ſpars of a columnar form, adhering to ſome ſolid body at the baſe, and terminated at the point by a pyramid. The pyramid and column are both hexahedral, or compoſed each of ſix ſides.

Of this genus there are three known ſpecies. 1. A ſlender one with a long pyramid, compoſed of ſo pure and clear a ſpar, that it reſembles cryſtal, and is found in Ockley Hole, on Mendip hills, and in ſome other parts of England. 2. A ſomewhat thick one, with a long irregular pyramid, found in the mines of Cornwall and Devonſhire, and common alſo in thoſe of Germany. 3. One with a very ſhort pyramid, found in the Derbyſhire lead-mines, and in thoſe of the Hartz-foreſt in Germany. Hill's Hiſt. of Foſſils, p. 218.

HEXAMERON, or HEXÆMERON, a name given to divers writings, both of ancient and modern authors, containing commentaries, or diſcourſes, on the firſt chapter of Geneſis; wherein is delivered the hiſtory of the creation, or the firſt ſix days of the world.

The word is Greek, formed of ἑξαμερον, or ἑξαημερον; compoſed of ἑξ, *ſex*, *ſix*; and ἡμερα, which in the Doric dialect is wrote ἁμερα, *day*.

St. Baſil, St. Ambroſe, &c. have wrote *Hexamerons*.

HEXAMETER, compoſed of ἑξ, *ſix*, and μετρον, *meaſure*, *foot*, in the *Ancient Poetry*, a verſe uſed by Greek and Latin writers, conſiſting of ſix feet.

The firſt four feet of an *hexameter* may be indifferently either dactyls, or ſpondees; but the laſt foot, in ſtrictneſs, is always to be a ſpondee, and the laſt but one a dactyl. Such is that of Homer,

> Εις ὑδωρ μ' ερριψας, εχει Θεος ενδικον ειμα.

And that of Virgil,

> *Diſcite juſtitiam moniti, & non temnere divos.*

Hexameter verſes are divided into *heroic*; which are to be grave and majeſtical, ſuitable to the dignity of heroic poetry; and *ſatirical*, which may be more looſe and negligent, as thoſe of the epiſtles of Horace.

Epic poems, as the Iliad, Odyſſey, Æneid, &c. conſiſt of *hexameter* verſes alone; elegies and epiſtles ordinarily conſiſt, alternately, of *hexameters* and pentameters.

Some of the French and Engliſh poets have attempted to compoſe in *hexameter* verſes, but without ſucceſs. Jodelle made the firſt eſſay in 1553, with a diſtich in praiſe of Olivier de Magny, which Paſquier repreſents as a maſterpiece. It is this:

> *Phœbus, Amour, Cypris, veut ſauver, nourrir & orner*
> *Ton vers, & ton chef, d'umbre, de flamme, de fleurs.*

But this kind of poetry pleaſes nobody. The modern languages are not at all fit for a kind of verſe whoſe cadence depends altogether on long and ſhort ſyllables.

HEXAMILION, HEXAMILI, or HEXAMILIUM, in *Antiquity*, a celebrated wall, built by the emperor Emanuel, in 1413, over the iſthmus of Corinth.

It took its name from ἑξ, *ſix*, and μιλιον, which in the vulgar Greek ſignifies a *mile*; as being ſix miles long.

The deſign of the *hexamilion* was, to defend Peloponneſus from the incurſions of the Barbarians. Amurath II. having raiſed the ſiege of Conſtantinople, in the year 1424, demoliſhed the *hexamilion*; though he had before concluded a peace with the Greek emperor.

The Venetians reſtored it in the year 1463, by thirty thouſand workmen, employed for fifteen days, and covered by an army commanded by Bertoldo d'Eſte, general of the land-forces; and Louis Loredano, commander of the ſea.

The infidels made ſeveral attempts upon it, but were repulſed, and obliged to retire from the neighbourhood thereof; but Bertoldo being killed at the ſiege of Corinth, which was attempted ſoon after, Bertino Calcinato, who took on him the command of the army, abandoned, upon the approach of the beglerbeg, both the ſiege, and the defence of the wall, which had coſt them ſo dear; upon which, it was finally demoliſhed.

HEXANDRIA, in *Botany*, the ſixth claſs of plants with hermaphrodite flowers, and ſix ſtamina or male parts in each, which are in ſome plants all of the ſame length, and in others are alternately one ſhorter and another longer.

The word is derived from the Greek ἑξ, *ſix*, and ἀνηρ, *male*.

This claſs contains five orders, viz. the *monogynia*, comprehending fifty-ſix genera; the *digynia*, two; the *trigynia*, nine; the *tetragynia*, one; and the *polygynia*, one. See *Tab. Botany*, Nº 6. and *Tab.* III. *Botany*, *Claſs* 6. See FRUCTIFICATION.

HEXAPLA, formed of ἑξ, *ſix*, and απλοω, *I open*, *I unfold*, in *Church Hiſtory*, a Bible diſpoſed in ſix columns; containing the text, and divers verſions thereof, compiled and publiſhed by Origen, with a view of ſecuring the ſacred text from future corruptions, and to correct thoſe that had been already introduced.

Euſebius, Hiſt. Eccl. lib. vi. cap. 16. relates, that Origen, after his return from Rome under Caracalla, applied himſelf to learn Hebrew, and began to collect the ſeveral verſions that had been made of the ſacred writings, and of theſe to compoſe his Tetrapla and *Hexapla*: others, however, will not allow him to have begun till the time of Alexander, after he had retired into Paleſtine, about the year 231.

To conceive what this *Hexapla* was, it muſt be obſerved, that, beſides the tranſlation of the ſacred writings, called the Septuagint, made under Ptolemy Philadelphus, above 280 years before Chriſt, the Scripture had been ſince tranſlated into Greek by other interpreters. The firſt of thoſe verſions, or (reckoning the Septuagint) the ſecond, was that of Aquila, a proſelyte Jew, the firſt edition of which he publiſhed in the twelfth year of the emperor Adrian, or about the year of Chriſt 128; the third was that of Symmachus, publiſhed, as is commonly ſuppoſed, under Marcus Aurelius, but, as ſome ſay, under Septimus Severus, about the year 200; the fourth was that of Theodotion, prior to that of Symmachus, under Commodus, or about the year 175: theſe Greek verſions, ſays Dr. Kennicott, were made by the Jews from their corrupted copies of the Hebrew, and were deſigned to ſtand in the place of the Seventy, againſt which they were prejudiced, becauſe it ſeemed to favour the Chriſtians. The fifth was found at Jericho, in the reign of Caracalla, about the year 217; and the ſixth was diſcovered at Nicopolis, in the reign of Alexander Severus, about the year 228: laſtly, Origen himſelf recovered part of a ſeventh, containing only the Pſalms.

Now Origen, who had held frequent diſputations with the Jews in Egypt and Paleſtine, obſerving, that they always objected againſt thoſe paſſages of Scripture quoted againſt them, and appealed to the Hebrew text; the better to vindicate thoſe paſſages, and confound the Jews, by ſhewing that the Seventy had given the ſenſe of the Hebrew, or, rather, to ſhew, by a number of different verſions, what the real ſenſe of the Hebrew was, undertook to reduce all theſe ſeveral verſions into a body, along with the Hebrew text, ſo as they might be eaſily confronted, and afford a mutual light to each other.

He made the Hebrew text his ſtandard; and allowing that corruptions might have happened, and that the old Hebrew copies might and did read differently, he contented himſelf with marking ſuch words or ſentences as were not in his Hebrew text, nor the later Greek verſions, and to add ſuch words or ſentences as were omitted in the Seventy, prefixing an aſteriſk to the additions, and an obeliſk to the others.

In order to this, he made choice of eight columns: in the firſt he gave the Hebrew text in Hebrew characters; in the ſecond, the ſame text in Greek characters; the reſt were filled with the ſeveral verſions above mentioned; all the columns anſwering verſe for verſe, and phraſe for phraſe; and in the Pſalms there was a ninth column for the ſeventh verſion.

This work Origen called Ἑξαπλα, *Hexapla*, q. d. *ſextuple*, or a work of ſix columns, as only regarding the firſt ſix Greek verſions. See TETRAPLA.

Indeed, St. Epiphanius, taking in likewiſe the two columns of the text, calls the work Octapla, as conſiſting of eight columns.

This celebrated work, which Montfaucon imagines conſiſted of fifty large volumes, periſhed long ago, probably with the library at Cæſarea, where it was preſerved, in the year 653; though ſeveral of the ancient writers have preſerved us pieces thereof: particularly St. Chryſoſtom on the Pſalms, Philoponus in his Hexameron, &c. Some modern writers have earneſtly endeavoured to collect fragments of the *Hexapla*, particularly Flaminius Nobilius, Druſius, and F. Montfaucon, in two folio volumes, printed at Paris in 1713.

HEXAPOD, ἑξ and ποδες, in *Zoology*, an animal with ſix feet.

HEXAPYRAMIDES, in *Natural Hiſtory*, the name of a genus of ſpars.

The word is derived from the Greek ἑξ, *ſix*, and πυραμις, *a pyramid*.

The bodies of this genus are ſpars formed into pyramids, compoſed of ſix ſides or planes, and affixed to no column, but adhering to ſome ſolid body by their baſes. Of this genus there are only two known ſpecies: 1. A ſhort one with a broad baſe, which is very rare, and found only in the great mine at Goſſelar in Saxony. And, 2. A long-pointed one, with a narrow baſe: this is found in the fiſſures of the alabaſter quarries of the Hartz-foreſt. Hill's Hiſt. of Foſſ. p. 225.

HEXASTYLE, compoſed of ἑξ, *ſix*, and ϛυλος, *column*, in the *Ancient Architecture*, a building with ſix columns in front.

The temple of Honour and Virtue at Rome, built by Mutius, was a *hexaſtyle*.

HEXIS, in the *Writings of the Greek Phyſicians*, a word uſed to expreſs a firm and permanent habitude, in oppoſition to ſcheſis and diatheſis, importing a tranſient or eaſily removed diſpoſition.

HEYRS, in *Huſbandry*, young timber-trees, uſually left for ſtandards in felling of wood or copſes.

HHAHB, in *Modern Hiſtory*, is a name which the Mahometans give to one of the officers of their moſques, anſwering to our curates.

HIÆNA, in *Zoology*. See HYÆNA.

HIASTAOTOMTEHOM, a Chineſe name, expreſſing a plant, the root of which is ſaid to change, at a certain time, into a worm. Mr. Reaumur has given it the name of *plante-ver* in the French, but he has diſcovered the error of ſuppoſing ſuch a transformation; the whole truth of the caſe being, that a certain caterpillar, when about to change into the chryſalis ſtate, ſo nicely joins itſelf to the root of this plant, as to appear a part of it.

HIATICULA, in *Ornithology*. See *Sea* LARK.

HIATULA, in *Ichthyology*, a name given by ſome to the fiſh more uſually called the CHANNA. It has this name from its opening its mouth to a great width, eſpecially when dying, which is owing to its under jaw being much longer than the upper.

HIATULA is alſo a name by which Gaza, and ſome other authors, have called the ſhell-fiſh more uſually named CHAMA; a genus diſtinguiſhed from other kinds by its always keeping its ſhells in ſome degree open, and in many ſpecies having no power to ſhut them entirely; for this reaſon they defend their naked bodies by burying themſelves in the mud, or in other ſubſtances.

HIATUS, a Latin term, properly ſignifying the aperture of the mouth, from the verb *hiare*, *to gape*.

It is variouſly uſed, in works of literature, &c. to denote a *chaſm* or *gap*; particularly in verſes, where there is a claſhing of vowels, by one word ending with a vowel, and the following one beginning with another:

> As in—*Tho' oft the ear the open vowels tire.*

This claſhing of vowels, ſo diſagreeable to the ear, is called a *hiatus* in proſe as well as verſe. The Romans were ſo very careful to avoid it, that they always ſuppreſſed the preceding vowel even in proſe; as it is obſerved by Cicero in his Orator. In writing, to avoid it, they uſed to inſert the letter *d*: as in *redeo*, *redamo*, *medergа*, &c. Hence, on the baſe of the Duilian column, we meet with *prædad. altod. marid.* &c. Voſſ.

HIATUS is alſo uſed for a defect in a manuſcript copy, where ſomething is loſt or effaced by the injuries of time or otherwiſe.

In a theatrical piece, there is ſaid to be a *hiatus*, when a ſcene is not well connected to the next, but leaves the action interrupted, and the ſtage empty.

In matters of genealogy, *hiatus* is an interruption in a line or ſeries of deſcendants.

HIBISCUS, in *Botany*. See *Syrian* MALLOW.

HICKUP, HICKOCK, HICCOUGH, HICKET, or HICCUP, *ſingultus*, in *Medicine*, a ſudden irregular inſpiration, wherein the ſtomach, and the parts contained in the lower venter, are impelled downwards.

The word ſeems formed of the Flemiſh *hick*, which ſignifies the ſame thing: others derive it *ab hiſcendo*; others *a difficile anhelitu*; but others think the moſt natural derivation to be from the ſound yielded in this action.

The *hickup* is not immediately a diſorder of the ſtomach, as is uſually imagined, but a convulſive motion of the diaphragm; whereby the muſcle, retiring impetuouſly downwards, impels the parts beneath it.

It is occaſioned by ſharp humours; a too great plenitude of the ſtomach; a bit of any thing ſtopped at its upper orifice; or, in general, by any thing capable of irritating the nerves of the diaphragm.

The remedy for the *hickup*, according to Hippocrates, is to fetch the breath very long, or even to ſtop the breath for ſome time. A ſneezing, happening upon a *hickup*, generally cures it; the diaphragm, ſhook by the violent expiration, being apt to throw off what before irritated it.

This motion, when it happens in acute diſeaſes, is to be diſtinguiſhed from that which happens at other times; and there is yet another kind of it different from either of theſe, which is familiar to children in dying.

The chronic *hickup* is of two kinds; in its common ſtate it remains on a perſon but a very ſhort time, and in the other it remains long, and is attended with a febrile heat and a difficulty of breathing, with a remarkable noiſe in expiration.

Signs of it. It is uſually preceded by a ſenſe of a heavy pain in the breaſt and abdomen, and this is followed by a more or leſs difficult breathing, with a ſound or noiſe in the expiration; and the *hickup* itſelf, which in chronic caſes is attended with a ſenſation of internal ulceration.

Perſons ſubject to it. Theſe are principally men who eat large meals, and load the ſtomach by drinking largely after them, and who eat large quantities of the ſummer fruits, eſpecially when unripe. In acute fevers, a *hickup* is very familiar to thoſe perſons who any have internal inflammation; and it is very common in the fevers that attend women in their lying-in. The cauſes of the common *hickup* are an overloading the ſtomach with food, chiefly with ſuch as is hard of digeſtion; eſpecially if ſwallowed voraciouſly, and large draughts taken after it: large draughts of cold liquors, or cooling internal medicines, alſo ſometimes bring it on; and it frequently happens when the periſtaltic motion of the bowels is diſturbed by violent purges or vomits. In acute diſeaſes, it is principally owing to an inflammation either in the pylorus, the meſentery, or the ſinuous part of the liver; and in dyſenteries it ſometimes comes on from an inflammation of the ileum. Slow poiſons alſo ſometimes ſhew their effects in a violent and unmitigable *hickup*.

Prognoſtics. The common *hickup* is uſually a diſtemper of little trouble, and attended with no danger; yet there have been inſtances of perſons dying of it without any other diſorder: but theſe fatal *hickups* will be found, when all circumſtances are conſidered, to have been very different in their nature and origin from the common kind, and uſually to have ariſen from ſome violent motion of the body. When the *hickup* comes on in acute fevers, about the day of the criſis, it is always dangerous; for this, though in itſelf but a ſemi-convulſive motion, yet very eaſily degenerates into an univerſal convulſion of the whole body, under which the patient uſually ſoon expires. In malignant fevers alſo, and gangrenes, they are often the forerunners of death. *Hickups* attending cholics, in perſons who have not before been ſubject to them, are always a bad omen.

Method of cure. The common *hickup* ſeldom requires any thing of medicine for its cure; it uſually goes off in a little time of itſelf, or if not, is eaſily thrown off by warm liquors, as tea, coffee, or the like. But when it remains on the perſon a long time, as it ſometimes will for ſeveral weeks, then the following method is proper for its cure: the crudities of the primæ viæ are to be carried off by gentle purges, as ſmall doſes of rhubarb, and the like; and by the aſſiſtance of the abſtergent and emollient clyſters. After this the ſtomach is to be ſtrengthened by bitters and mild chalybeats, and by wearing externally bags with camphor, and the aromatic roots and carminative ſeeds. Sometimes alſo it will be neceſſary to give abſorbents mixed with the calx of antimony, to correct the acrimony of the humours. When the fit has by theſe means been carried off, the return of it is to be prevented by taking now and then a doſe of ſome gentle purge, and after every meal ſwallowing two or three corns of pepper in a glaſs of hot wine. When the *hickup* comes on as a ſymptom in acute diſeaſes, reſpect is always to be had to the primary diſeaſe, and then the common alexipharmics are to be given, with ſpirit of nitre dulcified, and a gentle doſe of the nitrous and abſorbent medicines, ſuch as a powder prepared of purified nitre and crabs-eyes, or the like; and bags with aromatics may be worn externally. Caſtor, and the other nervous medicines, externally, have their uſe in this caſe, but internally taken they have no effect, either in this or any the like complaints in the lower belly. Caſſia fiſtula, ſena, and the other purges, which are apt to create flatulencies, are not to be given in theſe caſes. When the *hickup* proceeds from an inflammation of the ſtomach, &c. cooling regimen muſt be uſed; the patient muſt be bled, and frequently take a few drops of the ſweet ſpirits of nitre in a cup of wine-whey, and his ſtomach ſhould be fomented with cloths dipped in warm water, or bladders filled with warm milk and water may be applied to it. When it is occaſioned by a gangrene or mortification, the Peruvian bark and other antiſeptics ſhould be freely uſed. When it proceeds from a foul ſtomach, a gentle vomit and purge will be of ſervice. When it proves obſtinate, recourſe muſt be had to the moſt powerful aromatic and antiſpaſmodic medicines. In this intention, fifteen or twenty grains of muſk may be made into a bolus, and repeated occaſionally: opiates, uſed cautiouſly, are alſo of ſervice; a lump of ſugar, dipped in compound ſpirits of lavender, or the volatile aromatic tincture, may be taken often. External applications, ſuch as the *ſtomach* PLASTER, or a cataplaſm of Venice treacle, to the region of the ſtomach, are ſometimes beneficial. People who are ſubject to habitual *hickups*, will find relief by uſually wearing a belt round the abdomen; and ſuch ſhould always uſe moderate exerciſe, and avoid large draughts of cold liquors. Junker's Conſp. Med. p. 639. Buchan's Dom. Med. p. 475.

Dr. Hoyer informs us, that a moſt violent *hickup*, which had reſiſted a great number of medicines, was at laſt cured by ſucking women's milk. Act. Acad. Nat. Curioſ. vol. iv. obſ. 3.

HICKWALL, in *Zoology*, the name of a ſmall ſpecies of wood-pecker, called by authors picus varius minor; a ſmall bird of not above an ounce weight, very beautifully variegated with black, white, and brown. The head in the female of this ſpecies has a white ſpot on the crown, and in the males a red one. It climbs trees like the common large wood-pecker, and like it feeds on worms and other inſects which it finds there.

HIDAGE, or HYDAGE, an extraordinary tax, anciently payable to the king for every hide of land. See HIDE. *Sunt etiam quædam communes præſtationes, quæ ſervitia non dicuntur, nec de conſuetudine veniunt, niſi cum neceſſitas intervenerit, vel cum rex venerit*; *ſicut ſunt* hidagia, coragia, *&* carvagia, *& alia plura de neceſſitate, & ex conſenſu communi totius regni introducta, & quæ ad dominum non pertinent*, &c. Bracton, lib. ii. cap. 6.

King Ethelred, in the year of Chriſt 994, upon the landing of the Danes at Sandwich, taxed all his lands by hides. Every three hundred and ten hides of land, on this occaſion, found one ſhip furniſhed; and every eight hides found one jack and one ſaddle, for the defence of the realm. William the Conqueror took ſix ſhillings for every hide of land in England.

HIDAGE is alſo uſed for being quit of that tax; otherwiſe called HIDE-*gild*.

HIDALGO, q. d. *a ſon of birth*, in *Modern Hiſtory*, a title given in Spain to all who are of noble family.

HIDE, the ſkin of a beaſt; particularly that of a bullock or cow. See SKIN and TANNING.

We have *hides* of divers denominations, according to their ſtate, quality, &c.

HIDE, *curried*, is that which, after tanning, has paſſed through the currier's hands, and has thus received its laſt preparation, and is fitted for uſe. See CURRYING.

HIDE, *raw*, or *Green* HIDE, is that which has not undergone any preparation; being in the ſame condition as when taken off the carcaſe.

HIDE, *ſalted*, is a green *hide*, ſeaſoned with ſea-ſalt and alum, or ſaltpetre, to prevent its ſpoiling and corrupting, either by keeping it too long in cellars, or in tranſporting it too far in a hot ſeaſon.

There are alſo *hides dried in the air*, ſent from America; particularly thoſe of buffalos.

HIDE, *tanned*, is a *hide* either green, ſalted, or dried, farther dreſſed and prepared by the tanner, by paring off the hair, and ſteeping it in pits of lime and tan. See TANNING.

Tanned *hides* are commonly carried along with the artillery of an army. They are uſed in the fire-workers ſtores, for covering powder or charged bombs from the rain or from ſparks of fire. They are alſo uſed on batteries, or in a laboratory.

HIDE, or HYDE, HYDA, in our *Ancient Cuſtoms*, denoted a meaſure or quantity of land, containing ſo much as could be yearly tilled with a ſingle plough.

Beda calls the *hide* of land *familia*, and defines it to be ſo much as was ſufficient for the ordinary maintenance of one family. In other authors it is called *manſum, manſio, carucata*, &c.

Crompton, in his Juriſdict. fol. 322, ſays, a *hide* of land contains one hundred acres: he adds, that eight *hides* make a knight's fee. In ancient manuſcripts, the *hide* is fixed at one hundred and twenty acres. But Sir Edward Coke notes, that a knight's fee, a *hide* or plough land, a yard-land, and an oxgang of land, do not contain any certain determinate number of acres. See CARRUCATE.

The diſtribution of England into *hides* of land is very ancient, there being mention made of it in the laws of king John, cap. 14. *Henricus* I. *maritand. filiæ ſuæ gratia imperatori, cepit ab unaquaque* hida *Anglia tres ſol.* Spelman.

HIDE *and* GAIN, in our *Old Writers*, ſignified arable land; to gain the land being as much as to till it.

HIDE-*bound*, a diſorder of a horſe or other beaſt, wherein his ſkin ſticks ſo tight to his ribs and back, as not to be looſened from it with the hand.

The diſorder is ſometimes owing to poverty and bad keeping; at other times to over-riding or a ſurfeit, the horſe being ſuffered when he is hot to ſtand long in the wet; or to a morbid dryneſs of the blood, which, not having its natural courſe, cauſes the ſkin to ſhrink up and cleave to the bones.

Among *Huſbandmen*, trees alſo are ſaid to be *hide-bound* when the bark ſticks too cloſe.

HIDEL, in our *Ancient Statutes*, ſignifies a place of protection or ſanctuary.

HIDGILD, or HIDEGILD, in the laws of king Canute, is explained by *pretium redemptionis ſervi*; the price by which a ſervant wàs to redeem his ſkin from being whipped.

The word is formed from the Saxon *hide*, *ſkin*, and *gild*, *payment*. *Si liber feſtis diebus operetur perdat libertatem*; *ſi ſervus*, *corium perdat*, *vel* hidgildum; i. e. let him be whipped (which was the puniſhment for ſervants), or let him pay for his ſkin; by which payment he is to be excuſed from whipping.

HIDROA, from ἰδρως, *ſudor*, in the *Medicinal Writings of the Ancients*, a kind of puſtules ariſing from bilious, viſcid, and irritating humours, very troubleſome to the ſkin, and moſt ſo in ſummer time, when they make their eruption with the ſweat. They are reckoned by Hippocrates among the diſeaſes peculiar to the ſummer.

HIDROCRITICA, a term uſed to expreſs the judgments paſſed by phyſicians on their patients, on obſerving the ſweats that have attended the diſeaſe.

HIDRONOSOS, a name given, by ſome authors, to that terrible diſeaſe the *ſudor Anglicanus*, or SWEATING *ſickneſs*.

HIDROPYRETOS, of ἰδρως, *ſweat*, and πυρέτος, *fever*, *the ſweating fever*, a name given by ſome to the *ſudor Anglicus*, or SWEATING *ſickneſs*.

HIDROTICS, or HYDROTICS, in *Medicine*, the ſame with SUDORIFICS.

The word is compoſed of the Greek ἰδρως, *ſweat*.

Contrayerva, zedoary, guaiacum, angelica, &c. are of the number of *hidrotics*, or *hidrotic* medicines.

HIEMALIA, in *Antiquity*, the ſame with BRUMALIA.

HIERACHIOIDES, in *Botany*, a name given by Vaillant to a genus of plants, ſince called by Linnæus *crepis*. See *Baſtard* HAWKWEED.

HIERACITES, HIERACITÆ, a ſect of ancient heretics, at the cloſe of the ſecond century, denominated from their leader Hierax, a bookſeller of Leontium, and eminently diſtinguiſhed by his extenſive learning and a venerable air of ſanctity and virtue.

He abſolutely denied the reſurrection of the body, maintaining, that the ſoul alone roſe again, and that the reſurrection was altogether ſpiritual. Epiphanius ſurmiſes, that he might have imbibed this error from Origen.

The ſame Hierax, and his followers, likewiſe condemned the uſe of fleſh, wine, and marriage; being of opinion, that they were only allowed under the Old Teſtament, and till the coming of Jeſus Chriſt; but that, under the new law, they were prohibited, as incompatible with the kingdom of God.

St. Epiphanius produces the paſſages of Scripture whereon he founded this doctrine: he adds, that Hierax did not give into Origen's error with regard to the myſtery of the Trinity, but allowed the Son to be really and truly begotten of the Father. He was alſo orthodox with reſpect to the Holy Ghoſt, excepting for ſome peculiarities received from the Melchiſedecians, on which he had refined, maintaining that Melchiſedec was the Holy Ghoſt. He alſo excluded from the kingdom of heaven children, who died before they had arrived to the uſe of reaſon. He lived a very auſtere life, and promoted the ſame among his followers; but, after his death, they degenerated very faſt.

HIERACIUM, in *Botany*. See HAWKWEED.

HIERA PICRA, in *Pharmacy*, originally a kind of electary, firſt deſcribed by Galen, compoſed of aloes, cinnamon, aſarabacca, ſpica-nardi, ſaffron, and maſtic, made up with honey, or ſyrup of violets and honey.

It is denominated from the Greek ἱερος, *ſacer*, *holy*, becauſe of its rare virtues; and πικρος, *amarus*, *bitter*; aloes, which is the baſe thereof, rendering it extremely bitter.

It was uſed to purge and cleanſe the ſtomach, remove obſtructions, promote the menſes and hæmorrhoids, and ſweeten the blood; but its chief uſe among us is in powder, for making the tinctura ſacra.

Beſides this *ſimple hiera picra*, there is a *compound* ſort, called *diacolocynthidos Pachii*, becauſe colocynthis is the baſe thereof; and it was firſt uſed, with good ſucceſs, by Pachius of Antioch, in divers obſtinate diſeaſes. It is compoſed of colocynth, opopanax, ariſtolochia rotunda, agaric, and other ingredients. It is uſed in epilepſies, apoplexies, palſies, and lethargies; and to excite the menſes, and promote the expulſion of the after-birth.

There is alſo a third ſort of *hiera*, called *liberans*; but rarely uſed. Dr. Quincy ſays, it is one of the moſt ridiculous medleys ever contrived. It paſſes for a cordial, &c.

HIERA PICRA, *tincture of*. See TINCTURA *ſacra*.

HIERARCHY, HIERARCHIA, in *Theology*, the order or ſubordination among the ſeveral choirs or ranks of angels. The word is Greek, ἱεραρχια, formed of ἱερος, *ſacer*, *holy*, and αρχη, *principatus*, *rule*; q. d. ἱερα αρχη, *holy command*, or *rule in holy things*.

St. Dionyſius, and other of the ancient writers, eſtabliſh nine choirs or orders of celeſtial ſpirits; viz. *ſeraphim*, *cherubim*, *thrones*, *dominions*, *principalities*, *powers*, *virtues*, *angels*, and *archangels*: and theſe they divide into three *hierarchies*.

HIERARCHY is alſo uſed for the ſubordination between prelates and other eccleſiaſtics. See PRIEST, &c.

Archbiſhops, biſhops, prieſts, and deacons, compoſe the *hierarchy* of the church of England. In that of Rome, the pope has likewiſe a place at the head of the *hierarchy*.

F. Cellot, a Jeſuit of Paris, has publiſhed a volume expreſs (De *Hierarchia* & *Hierarchis*) on the *hierarchy*, and thoſe who compoſe it. He there diſtinguiſhes a created and an uncreated *hierarchy*; a divine and a human, or eccleſiaſtical *hierarchy*; and in this, a *hierarchy* of juriſdiction, a *hierarchy* of an order, and a *hierarchy* of graces, the moſt ſublime of all.

He defines *hierarchy*, in the general, a command or ſovereignty in holy things; *principatus*, *ſive imperium*, *in rebus ſacris*; on which footing he holds, that *hierarchy* excludes all below biſhops; and that neither prieſts nor deacons can be reckoned among the number of hierarchiſts. Bellarmin, Hallier, Aurelius, &c. he holds, were all miſtaken, and did not diſtinguiſh between being *of* the *hierarchy*, and being *under* it.

HIERATIC *paper*, among the *Ancients*, was the fineſt ſort of paper, which was ſet apart only for ſacred or religious uſes. See PAPER.

HIERO'*s crown*, in *Hydroſtatics*. The hiſtory of this crown, and of the important hydroſtatical propoſition, to the diſcovery of which it gave occaſion, is as follows: Hiero, king of Syracuſe, having furniſhed a workman with a quantity of gold for making a crown, ſuſpected that he had been cheated, and that the workman had uſed a greater alloy of ſilver than was neceſſary in the manufacture of it; he, therefore, applied to Archimedes for a diſcovery of the fraud. This celebrated mathematician was led by chance to a method of detecting the impoſture, and of determining preciſely the quantities of gold and ſilver of which the crown was compoſed: for he obſerved, whilſt he was bathing in a tub of cold water, that as he immerged his body in it, the water ran out; and he immediately concluded, that the water which ran out, when his whole body was immerged, was equal in bulk to his body. It is ſaid, that he was ſo pleaſed with the diſcovery, as to run about naked crying out, ἕυρηκα, ἕυρηκα, *I have found it*; and others affirm, that he offered a hecatomb to Jupiter for having inſpired him with the thought.

On this principle, he procured a ball of gold and another of ſilver, exactly of the weight of the crown, conſidering, that if the crown were altogether of gold, the ball of gold would be of the ſame bulk as the crown, and when immerſed in water, would raiſe the water juſt as high as the crown immerſed; but if it were wholly of ſilver, the ball of ſilver being immerſed, would raiſe the water no higher than the crown immerſed; and if the crown was of gold and ſilver mixed in a certain proportion, this proportion would be diſcovered by the height to which the crown would raiſe the water higher than the gold, and lower than the ſilver. Accordingly, let AMLB (*Tab.* IV. *Hydroſtatics*, *fig.* 39.) be a veſſel filled with water to the height DC, and let the maſs of gold, equal in weight to the crown, on being immerſed into the water, raiſe the ſurface of it to E, and the maſs of ſilver raiſe it to G; then if the height of the veſſel above DC be divided into equal parts, and DF=11, and DG =19, it is plain the bulks of gold and ſilver will be as DF to DG, and the ſpecific gravities in the inverſe proportion of theſe quantities, or as DG to DF. If the crown be immerſed, it will raiſe the ſurface of water to E; whence the proportion of the bulks of the gold and ſilver in the crown may be determined. For ſince the difference of the ſpecific gravities of the gold and ſilver is DG−DF=FG=8, if the bulk of the crown is divided into eight equal parts, it is evident, that ſince the ſpecific gravities of the debaſed and pure gold crowns will be as the bulks inverſely, that is, as DF to DE, we can eaſily find the point H, which will expreſs the ſpecific gravity of the former; for DE : DF : : DG : DH. This point H always divides the difference FG into two parts GH, HE, which have the ſame proportion as the parts of ſilver in the crown to the parts of gold; for as the point E aſcends, the point H deſcends, and when E coincides with G, H falls upon E, and the crown becomes wholly ſilver; on the contrary, when E deſcends to F, and H aſcends to G, the crown becomes wholly gold; therefore FH will be every where to HG as the parts of gold to the parts of ſilver in the crown. Conſequently, in the preſent caſe, becauſe the crown, when immerſed, raiſes the water to the height DE, and H is three diviſions below G, it ſhews that three of the eight parts of the crown are ſilver, and the other five parts gold, as H is five of the diviſions above F. Hence the bulk of the gold in the crown is to that of the ſilver as 5 to 3. In ſome ſuch method as this Archimedes deduced his propoſition, viz. that the difference of the ſpecific gravities of the compound and lighter ingredient, i. e. 5, (ſuppoſing the ſpecific gravity of gold to ſilver as 19 to 11, and the ſpecific gravity of the king's crown to be 16,) is to the difference of the ſpecific gravities of the heavier ingredient and the compound, i. e. 3, as the bulk of gold to that of ſilver made up of: ſo that if the whole crown were divided into eight parts, the gold would conſiſt of five, and the ſilver of three; and the magnitudes 5 and 3, multiplied by the ſpecific gravities 19 and 11 reſpectively, will give the numbers 95 and 33, expreſſing the proportion of the weight of the gold to that of the ſilver.

This propoſition of Archimedes may be demonſtrated analytically in the following manner: let the magnitudes of the gold and ſilver in the crown be A and B, and their ſpecific gravities as a and b; then, ſince the abſolute gravity of any body is compounded of its magnitude and ſpecific gravity, the weight of the gold is aA, of the ſilver bB, and of the crown $aA+bB=c\times\overline{A+B}$, ſuppoſing c to be the ſpecific gravity of the mixture. Hence $aA-cA=cB-bB$; and conſequently $c-b : a-c :: A : B$, as before. Cotes's Hydroſtatical, &c. Lectures, p. 81. Martin's Phil. Brit. vol. i. p. 305, &c. See *Specific* GRAVITY.

HIEROBOTANE, in *Botany*. See VERVAIN.

HIEROBULBUM, in *Botany*, a name given by the ancients to the COLCHICUM.

Some have wondered that the medical writers of thoſe times ſhould give this name, which ſignifies the *ſacred root*, to a thing that was generally allowed to be a poiſon; but Wedelius has proved that it may be given, under proper regulations, with ſafety and great ſucceſs, in malignant and petechial fevers, and in the worſt kinds of the ſmall-pox and meaſles. The manner he gave it was in a mixture with bezoar and plantane-root, and this he called his ARCANUM *duplicatum catholicum*, or peſtilential alexipharmic. The ancients had a cuſtom of wearing this root about their necks, by way of an amulet, to prevent infection; and it was probable from this that it obtained the name of the ſacred bulb.

HIEROCERYCE, in *Mythology*, the chief of the ſacred heralds in the myſteries of Ceres, whoſe office was to exclude all improper perſons, to preſerve order in the celebration of theſe myſteries, and to recite the formulæ of initiation.

The *hieroceryce* repreſented Mercury, and was diſtinguiſhed by the ſame attributes: the office was perpetual, and belonged to the family of the Ceryces, the deſcendants of Ceryx, the laſt ſon of Eumolpus.

HIEROCORACES, q. d. *ſacred crows*, in *Mythology*, were miniſters of Mythras, or of the Sun, which the Perſians worſhipped under this title.

HIEROGLYPHIC, Ἱερογλυφικα, a ſymbol or myſtic figure, uſed among the ancient Egyptians to cover or conceal the ſecrets of their theology.

The word is compoſed of the Greek ιερος, *ſacer*, *holy*, and γλυφειν, *ſculpere*, *to engrave*; it being the cuſtom to have the walls, doors, &c. of their temples, obeliſks, &c. engraven with ſuch figures.

Hieroglyphics are properly emblems or ſigns of divine, ſacred, or ſupernatural things; by which they are diſtinguiſhed from common ſymbols, which are ſigns of ſenſible and natural things.

Hermes Triſmegiſtus is commonly eſteemed the inventor of *hieroglyphics*: he firſt introduced them into the Heathen theology; from whence they have been tranſplanted into the Jewiſh and Chriſtian.

Sacred things, ſays Hippocrates, ſhould only be communicated to ſacred perſons. Hence it was, that the ancient Egyptians communicated to none but their kings and prieſts, and thoſe who were to ſucceed to the prieſthood and the crown, the ſecrets of nature, and the ſecrets of their morality and hiſtory; and this they did by a kind of cabbala, which, at the ſame time that it inſtructed them, only amuſed the reſt of the people. Hence the uſe of *hieroglyphics*, or myſtic figures, to veil their morality, politics, &c. from profane eyes. Spon. This author, it may be obſerved, and many others, do not keep to the preciſe character of a *hieroglyphic*, but apply it to profane as well as divine things.

Hieroglyphics are a kind of real characters, which do not only denote, but in ſome meaſure expreſs the things. Thus, according to Clemens Alexandrinus, Strom. v. a lion is the *hieroglyphic* of ſtrength and fortitude; a bullock, of agriculture; a horſe, of liberty; a ſphinx, of ſubtilty, &c.

Such is the opinion that has generally been embraced, both by ancient and modern writers, of the origin and uſe of *hieroglyphics*; it has been almoſt uniformly maintained, that they were invented by the Egyptian prieſts, in order to conceal their wiſdom from the knowlege of the vulgar. But the late biſhop Warburton hath, with much ingenuity and learning, endeavoured to ſhew, that this account is erroneous.

According to this writer, the firſt kind of *hieroglyphics* were mere pictures; becauſe the moſt natural way of communicating our conceptions by marks or figures was by tracing out the images of things: and this is actually verified in the caſe of the Mexicans, whoſe only method of writing their laws and hiſtory was by this picture-writing. But the *hieroglyphics* invented by the Egyptians, were an improvement on this rude and inconvenient eſſay towards writing; for they contrived to make them both pictures and characters: in order to effect this improvement, they were obliged to proceed gradually, by firſt making the principal circumſtance of the ſubject ſtand for the whole, as in the *hieroglyphics* of Horapollo, which repreſent a battle of two armies in array by two hands, one holding a ſhield, and the other a bow; then putting the inſtrument of the thing, whether real or metaphorical, for the thing itſelf, as an eye and ſcepter to repreſent a monarch, a ſhip and pilot the governor of the univerſe, &c. and finally, by making one thing ſtand for or repreſent another, where their obſervations of nature or traditional ſuperſtitions led them to diſcover or imagine any reſemblance: thus, the univerſe was deſigned by a ſerpent in a circle, whoſe variegated ſpots denoted the ſtars; and a man who had nobly ſurmounted his miſfortune was repreſented by the ſkin of the hyæna, becauſe this was ſuppoſed to furniſh an invulnerable defence in battle.

The Chineſe writing, he obſerves, was the next kind of improvement in the uſe of *hieroglyphics*; the Egyptians joined characteriſtic marks to images; the Chineſe threw out the images, and retained only the contracted marks, and from theſe marks proceeded LETTERS. The general concurrence of different people in this method of recording their thoughts, can never be ſuppoſed to be the effect of imitation, ſiniſter views, or chance; but muſt be conſidered as the uniform voice of nature, ſpeaking to the rude conceptions of mankind: for not only the Chineſe of the Eaſt, the Mexicans of the Weſt, and the Egyptians of the South, but the Scythians, likewiſe, of the North, and the intermediate inhabitants of the earth, viz. the Indians, Phœnicians, Ethiopians, &c. uſed the ſame way of writing by picture and *hieroglyphic*.

The biſhop farther ſhews, that the ſeveral ſpecies of *hieroglyphic* writing took their riſe from nature and neceſſity, and not from choice and artifice, by tracing at large the origin and progreſs of the art of ſpeech. He proceeds to ſhew how, in proceſs of time, the Egyptian *hieroglyphics* came to be employed for the vehicle of myſtery. They uſed their *hieroglyphics* two ways; the one more ſimple, by putting the part for the whole, which was the *curiologic hieroglyphic*; and the other more artificial, by putting one thing, of reſembling qualities, for another, called the *tropical hieroglyphic*: thus the moon was ſometimes repreſented by a half circle, and ſometimes by a cynocephalus. They employed their proper *hieroglyphics* to record openly and plainly their laws, policies, public morals, and hiſtory, and all kinds of civil matters: this is evident from their obeliſks, which were full of *hieroglyphic*

hieroglyphic characters, deſigned to record ſingular events, memorable actions, and new inventions; and alſo from the celebrated inſcription on the temple of Minerva at Sais, where an infant, an old man, a hawk, a fiſh, and a river-horſe, expreſſed this moral ſentence: All you who come into the world and go out of it know this, that the gods hate impudence. However, the tropical *hieroglyphics*, which were employed to divulge, gradually produced ſymbols which were deſigned to ſecrete or conceal: thus Egypt was ſometimes expreſſed by the crocodile, ſometimes by a burning cenſer with a heart upon it; where the ſimplicity of the firſt repreſentation and the abſtruſeneſs of the latter ſhew, that the one was a tropical *hieroglyphic* for communication, and the other a tropical ſymbol invented for ſecrecy.

Enigmatic ſymbols were afterwards formed by the aſſemblage of different things, or of their properties that were leſs known; and though they might have been intelligible at firſt, yet, when the art of writing was invented, *hieroglyphics* were more generally diſuſed, the people forgot the ſignification of them, and the prieſts, retaining and cultivating the knowlege of them, becauſe they were the repoſitories of their learning and hiſtory, at length applied them to the purpoſe of preſerving the ſecrets of their religion.

Symbols were the true original of animal worſhip in Egypt, as Sir John Marſham conjectured, Can. Chron. p. 58 becauſe in theſe *hieroglyphics* was recorded the hiſtory of their greater deities, their kings, and lawgivers, repreſented by animals and other creatures: the ſymbol of each god was well known and familiar to his worſhippers, by means of the popular paintings and engravings on their temples and other ſacred monuments; ſo that the ſymbol preſenting the idea of the god, and that idea exciting ſentiments of religion, it was natural for them, in their addreſſes to any particular god, to turn to his repreſentative mark or ſymbol; eſpecially when we conſider farther, that the Egyptian prieſts feigned a divine original for *hieroglyphic* characters, in order to increaſe the veneration of the people for them. Theſe would of courſe bring on a relative devotion to theſe ſymbolic figures, which, when it came to be paid to the living animal, would ſoon terminate in an ultimate worſhip.

Another conſequence of the ſacredneſs of the *hieroglyphic* characters was, that it diſpoſed the more ſuperſtitious to engrave them on gems, and wear them as amulets or charms. This magical abuſe ſeems not to have been much earlier than the eſtabliſhed worſhip of the god Serapis, which happened under the Ptolemys, and was firſt brought to the general knowlege of the world by certain Chriſtian heretics and natives of Egypt, who had mixed a number of Pagan ſuperſtitions with their Chriſtianity. Theſe gems, called ABRAXAS, are frequently to be met with in the cabinets of the curious, and are engraven with all kinds of *hieroglyphic* characters. To theſe abraxas ſucceed the TALISMANS. Warburton's Divine Legation of Moſes demonſtrated, vol. ii. paſſim.

HIEROGRAMMATEI, 'Ιερογραμματεις, among the *Ancient Egyptians*, were the prieſts appointed to explain myſteries of religion, and to direct the performance of the ceremonies thereof; and for this purpoſe they had a kind of ſacred alphabetical character, different from the political one, and which the writer, cited in the laſt article, conſiders as one of the four kinds of Egyptian writing. This, as well as the epiſtolic, uſed in civil matters, was formed by the letters of an alphabet; and, from its being uſed only in religious matters, was called *hierogrammatic*. The other two ſpecies of writing were the HIEROGLYPHIC and *ſymbolic*.

The *hierogrammatei* invented and wrote hieroglyphics and hieroglyphical books, and occaſionally explained them, together with other matters relating to the doctrines of religion. If we may believe Suidas, they were all prophets; at leaſt, he relates, that a *hierogrammateus* foretold to an ancient king of Egypt, that there would be an Iſraelite of great wiſdom, virtue, and renown, who ſhould humble Egypt.

The *hierogrammatei* were always near the king, to aſſiſt him with their informations and counſels: the better to fit them for this, they made uſe of the ſkill and knowledge they had acquired in the ſtars and the motions of the heavenly lights, and even of the writings of their predeceſſors, wherein their functions and duties were delivered. They were exempted from all civil employments, were reputed the firſt perſons in dignity next the king, and bore a kind of ſcepter in form of a ploughſhare.

After Egypt became a province of the Roman empire, the *hierogrammatei* ſunk into neglect.

HIEROLOGY denotes a diſcourſe on ſacred things. Among the Jews and Greeks, this term was uſed for the nuptial benediction.

HIEROMANTIA, 'Ιερομαντεια, in *Antiquity*, a general name for all kinds of divination, made from the various things offered in ſacrifice to gods. They firſt made conjectures from the external parts and motions of the victim; then from its entrails, from the flame in which it was conſumed, from the cakes and flour, from the wine and water, &c. Vide Pott. Archæol. Græc. lib. ii. cap. 14. tom. i. p. 314.

HIEROMENIA, 'Ιερομηνια, in *Ancient Chronology*, a name given to the month in which the Nemean games were celebrated. It was the ſame with the Athenian month Bœdromion, and anſwered to the latter end of our Auguſt and beginning of September.

HIEROMNEMON, 'Ιερομνημων, among the *Ancient Greeks*, ſignified a delegate choſen by lot, and ſent to the great council of the AMPHICTYONS, where he was to take care of what concerned religion. The *hieromnemones* were reckoned more honourable than the other members of that aſſembly, the general meetings of which were always ſummoned by them, and their names were prefixed to the decrees made by that council.

HIEROMNEMON, compoſed of ιερος, *ſacred*, and μνημων, *one who advertiſes* or *puts in mind of*, an officer in the ancient Greek church, whoſe principal function was to ſtand behind the patriarch at the ſacraments, ceremonies, &c. and ſhew him the prayers, pſalms, &c. which he was to rehearſe.

He alſo clothed the patriarch in his pontifical robes, and aſſigned the places of all thoſe who had a right to be around him when ſeated on his throne, as the maſter of the ceremonies now does to the pope.

The *hieromnemon* was commonly a deacon: when he was in prieſt's orders, as it ſometimes happened, he was excuſed from dreſſing the patriarch in his pontifical habits. Whether he were deacon or prieſt, he had always under him an officer named *caſtriſius*. He had alſo the keeping of the book entitled Contacion, or book of ordination; and that called the Enthronianiſmus, which was a ſort of ritual.

HIEROMNEMON, in the *Writings of the Ancients*, was alſo the name of a ſtone ſaid to have been uſed in divination, and called by others erotylos and amphicome. There is no deſcription left us of it by the ancients, from which we may gueſs what ſtone it was, or from whence it was brought.

HIERONYMITES, compounded of ιερος, *holy*, and ονομα, *name*, or *Hermits of St. Jerom*. See JERONYMITES.

HIEROPHANTES, or HIEROPHANTA, from ιερος, *holy*, and φαινω, *I appear*, in *Antiquity*, a prieſt among the Athenians.

The *hierophantes* was properly the chief perſon that officiated in the ELEUSINIA, that great ſolemnity ſacred to Ceres.

This office was firſt executed by Eumolpus, and continued in his family for twelve hundred years, though when any perſon was appointed to this dignity, he was required always to live in celibacy.

St Jerom ſays, that the *hierophantes* extinguiſhed the fire of luſt, by drinking cicuta or the juice of hemlock, or even by making themſelves eunuchs. Apollodorus obſerves, that it was the *hierophantes* who inſtructed perſons initiated into their religion in the myſteries and duties thereof, and that it was hence he derived his name: for the ſame reaſon he was called *prophetes*, *the prophet*. He had officers under him to do the ſame thing, or to aſſiſt him therein, who were alſo called *prophetes* and *exeges*, i. e. *explainers of divine things*.

To the *hierophantes* it belonged to dreſs and adorn the ſtatues of the gods, and to bear them in proceſſions and ſolemn ceremonies.

There were alſo women employed in the ceremonies of the Eleuſinia.

HIEROPHYLAX, of ιερος, *ſacred*, and φυλαξ, *keeper*, of φυλαττω, *I keep*, an officer in the Greek church. His function is that of guardian or keeper of the holy things, utenſils, veſtments, &c. anſwering to our *ſacriſta* or *ſexton*.

HIEROSCOPY, HIEROSCOPIA, formed of ιερος, *ſacred*, and σκοπε, *I view* or *conſider*, a kind of divination, performed by conſidering the victim, and obſerving every thing that occurs during the courſe of the ſacrifice.

HIGH, *altus*, a term of relation, applied to a body, conſidered according to its third dimenſion, or its elevation above the horizon, or even above the ground.

HIGH is alſo uſed to denote a perſon in power, dignity, &c.

So in England we ſay *high* court of parliament.

HIGH *chancellor, lord*. See CHANCELLOR.

HIGH *church*. See CHURCH.

HIGH-*bearing cock*. See COCK.

HIGH *commiſſion court*. See COMMISSION.

HIGH *conſtable of England*. See CONSTABLE.

HIGH *court of parliament*. See PARLIAMENT.

High *and* **Dry** is a phraſe, among *Seamen*, denoting the ſituation of a ſhip when ſhe has run aground, ſo as to be ſeen dry upon the ſtrand.

High *Dutch* is the German tongue in its greateſt purity, as ſpoken in Miſnia, &c. See Teutonic, &c.

High, in *Muſic*, is ſometimes uſed in the ſame ſenſe with *loud*, in oppoſition to *low*; and ſometimes in the ſame ſenſe with *acute*, in oppoſition to *grave*.

High *operation*, in *Surgery*, is a method of extracting the ſtone; thus called, becauſe the ſtone is taken out at the upper part of the bladder.

For the method of performing the *high* operation, ſee Lithotomy.

The *high* operation is ſaid to have been firſt practiſed by Roſſetus; others ſay by Franco, a ſurgeon of Lauſanne. It was retrieved by Mr. Douglas, and practiſed with good ſucceſs by Mr. Cheſelden and others.

High *prieſt*. See Pontifex.

High *relievo*. See Relievo.

High *ſea*, or ocean, is that far from land. See Sea.

High *ſteward, lord*. See Steward.

High *taper*, in *Botany*. See Mullein.

High *treaſon*. See Treason.

High *treaſurer, lord*. See Treasurer.

High *water*, is that ſtate of the tides when they ceaſe to flow up, or the greateſt height of the flood-tide.

High-*way*, *via regia*, a free paſſage for the king's ſubjects; on which account it is called the king's *high-way*, though the freehold of the ſoil belongs to the lord of the manor, or the owner of the land. Thoſe *ways* that lead from one town to another, and ſuch as are drift or cart-ways, and are for all travellers in great roads, or that communicate with them, are *high-ways* only; and their reparation is under the care of ſurveyors.

A river alſo that is common to all men, is alſo called a *high-way*.

Where a *high-way* lies within a pariſh, the pariſh is bound to repair it, unleſs it appears that the ſame ought to be repaired by ſome particular perſon, either by reaſon of tenure or preſcription. At common law it is ſaid, that all the country ought to make good the reparations of a *high-way*, where no particular perſons are bound to do it, becauſe the whole country have their eaſe and paſſage by that way.

If a *high-woy* leading through a field is out of repair, travellers may juſtify going out of the track, though there be corn ſowed; and in caſe a *high-way* is not ſufficient, any paſſenger may break down the incloſure, and go over the land adjoining, until a ſufficient way be made.

All kinds of injuries to *high-ways*, that render them leſs commodious to travellers, are deemed nuiſances; ſuch as laying logs of timber in them, erecting gates, or making hedges acroſs them, permitting boughs of trees to hang over them, &c. By ſtat. 13 Geo. III. cap. 78. no tree or buſh is to be allowed to grow or ſtand within fifteen feet of the center of the *high-way*, on forfeiture of 10*s*. by the owner. The poſſeſſors of land next adjoining ſhall cut, prune, or plaſh their hedges, and lop trees growing in or near ſuch hedges, or be liable to a complaint of the ſurveyor, after ten days notice; and the juſtices at a ſpecial ſeſſions ſhall order ſuch hedges to be cut or plaſhed, and ſuch trees to be lopped; and the poſſeſſor, who refuſes to comply within ten days after notice of ſuch order, ſhall forfeit 2*s*. for every twenty-four feet in length of ſuch hedge, and 2*s*. for every tree; the ſurveyor ſhall order the ſame to be done, and the poſſeſſor, beſide the penalties, ſhall pay the charges of doing the ſame, to be levied by diſtreſs, by warrant of one juſtice. The occupiers of ſuch lands ſhall keep their ditches, drains, and water-courſes, in proper order, on forfeiture of 10*s*. after ten days notice given by the ſurveyor. No ſtone, timber, ſoil, or other matter, ſhall be laid in the *high-way*, ſo as to obſtruct or prejudice it, and remain there five days after notice by the ſurveyor, on forfeiture of 10*s*. and if ſuch ſtone, &c. ſhall be laid within fifteen feet of the center of the *high-way*, the owner of the adjacent lands, after five days notice, may remove and diſpoſe of the ſame to his own uſe. Perſons making incroachments on the *high-way* by any fence, or breaking up the ſoil, within fifteen feet from its center, ſhall forfeit 40*s*. to the informer, and the ſurveyor ſhall cauſe the damage to be repaired by the offender; and one juſtice may levy the penalty and expence by diſtreſs. The ſurveyor is required to give written notice to thoſe who offend in theſe reſpects; and if they do not comply within twenty days after ſuch notice, he ſhall proceed to remove nuiſances, &c. to cleanſe ditches, &c. and to cut hedges, &c. at the expence of the offender, who ſhall beſides forfeit for his neglect one penny for every foot in length. If the *high-way* is wilfully obſtructed by carriages, or implements of huſbandry, the perſon offending ſhall forfeit 10*s*.

It is farther enacted by the ſame ſtatute, 13 Geo. III. cap. 78. that no driver of any cart, dray, or waggon, ſhall ride upon ſuch carriages, without having ſome perſon on foot to guide the ſame, excepting ſuch carriages as are conducted by perſons holding the reins of the horſe or horſes drawing them; or damage or obſtruct the paſſage of any perſon or carriage in the ſtreet or *high-way*, or quit the *high-way*, or wilfully be at ſuch a diſtance from his carriage, ſo that he cannot have the government of the horſes, &c. drawing the ſame; or refuſe or neglect to make way for loaded carriages; or drive a carriage not having the owner's name, and refuſe to diſcover it, under the penalty of forfeiting any ſum not exceeding 10*s*. if the driver be not the owner of the carriage; and if he be the owner, any ſum not exceeding 20*s*. on conviction by confeſſion, view of the juſtice, or oath of one witneſs, before one juſtice. Owners of carriages are alſo required to have their names and places of abode painted in large legible letters on ſome conſpicuous part; and the owner of every ſtage, waggon, or cart, ſhall, moreover, have the following words, *common-ſtage waggon* or *cart*, as the caſe may be, under the penalty of a forfeiture not exceeding 5*l*. nor leſs than 20*s*. And no ale-houſes ſhall be kept by toll-collectors at any public bridge, under a penalty of 5*l*.

It is alſo enacted by the ſame ſtatute, that the juſtices ſhall iſſue their precept to the ſurveyor, requiring him to erect poſts or ſtones in places where ſeveral *high-ways* meet, with inſcriptions on them in large legible letters, containing the names of the towns or chief villages to which the ſeveral ways lead; and alſo in places ſubject to floods, inſcribed with marks denoting the greateſt depth of the water; and if he ſhall neglect or refuſe for three months, he ſhall forfeit 20*s*. And if any perſons remove or deſtroy poſts, blocks, banks, &c. ſet up for the ſecurity of horſe and foot cauſeways, or the battlements of bridges, or deſtroy or even deface any mileſtone or direction poſt, they ſhall forfeit, on conviction before the oath of one juſtice, on the oath of one witneſs, or upon view of the juſtice, a ſum not exceeding 5*l*. nor leſs than 10*s*. and on default of payment be committed to the houſe of correction for any time not exceeding one month, nor leſs than ſeven days.

The ſame ſtatute farther enjoins, that no waggon, the fellies of whoſe wheels are nine inches broad, ſhall be drawn with more than eight horſes, nor carts of the ſame dimenſions with more than five horſes; and no waggon, the fellies of whoſe wheels are ſix inches broad, and rolling on each ſide a ſurface of nine inches, ſhall be drawn with more than ſeven horſes; and no waggon rolling a ſurface of ſix inches only, with more than ſix horſes; nor cart, the breadth of whoſe wheels is ſix inches, with more than four horſes; and no waggon, the fellies of whoſe wheels are of leſs breadth than ſix inches, ſhall be drawn with more than five horſes, nor cart of the ſame breadth with more than three horſes; the owner that offends againſt theſe regulations ſhall forfeit 5*l*. and the driver, not being the owner, 10*s*. for every horſe above the proper number, to the ſole uſe of the informer. But carriages moving upon wheels or rollers, of the breadth of ſixteen inches on each ſide, with flat ſurfaces, ſhall be allowed to be drawn with any number of horſes. No regulations affecting the number of horſes, and wheels of carriages, ſhall extend to carriages uſed in carrying one ſtone or block of marble, cable rope, piece of metal, or piece of timber, or to ſuch ammunition and artillery as may be required for his majeſty's ſervice. For all the purpoſes of this act, two oxen, or horned cattle, ſhall be conſidered as one horſe.

By the common law, no *high-way* can be changed without the king's licence firſt obtained, upon a writ of *ad quod damnum*. In aid of the common law, and to render the changing of *high ways* leſs troubleſome and expenſive, power is given by 13 Geo. III. cap. 78. to the juſtices of the peace to widen, divert, and change *high-ways*, as they ſhall judge moſt convenient. And it is enacted, that the ſurveyor ſhall make every public cart-way leading to any market-town twenty feet wide at the leaſt, and every public horſe way or drift way eight feet wide at the leaſt, wherever the ground between the fences ſhall admit of it; or on the view of two juſtices, it ſhall be widened or diverted at their pleaſure, provided that its breadth exceeds not thirty feet, and that no houſes or buildings are pulled down, or any garden, park, court, or yard, taken away; and the owners of the ground, which ſhall be laid into the *high-way*, or through which it ſhall paſs, ſhall be recompenſed for it, and every injury redreſſed. The expences of making, repairing, &c. *high-ways*, are defrayed by equal aſſeſſments, made by a warrant of the juſtices, at a ſpecial ſeſſions, on all occupiers of lands, tenements, woods, tithes, and hereditaments; provided that no ſuch aſſeſſment in one year ſhall exceed ſix pence in the pound. In extraordinary caſes another aſſeſſment may be made, provided this and the preceding ſhall not in any one year exceed the rate of nine pence in the pound.

By the ſame ſtatute the juſtices are enjoined to hold a ſpecial ſeſſions for the *high-ways* in the week next after the Michaelmas general quarter-ſeſſions yearly; and notice ſhall be given to the conſtables of the reſpective pariſhes at leaſt ten days before it ſhall be held. Surveyors of the *high-ways* are to be choſen yearly out of a liſt of proper perſons, nominated by the houſholders, aſſeſſed to any parochial or public rate, by the juſtices at their ſeſſions; and their number ſhall depend on the extent of the pariſh, &c. But no perſon is liable to be appointed to ſerve this office within three years from the time of his having ſerved it, without his own conſent. Thoſe who refuſe to ſerve, after having been nominated by the pariſh and juſtices, ſhall forfeit 5*l.* and if they were only nominated by the juſtices, they ſhall forfeit 50*s.* In this caſe, the juſtices may appoint a proper perſon to this office, with a ſalary not exceeding one eighth part of what ſhall have been raiſed by aſſeſſment of ſix pence in the pound for the uſe of the *high-ways* in the diſtrict, where the aſſeſſment hath been raiſed: and they ſhall alſo appoint one ſubſtantial inhabitant of ſuch pariſh, &c. for aſſiſtant to ſuch ſurveyor, till the next annual appointment, whoſe refuſal incurs a forfeiture of 50*s.* And if a ſecond perſon refuſe, he ſhall alſo forfeit 50*s.* and a third ſhall be appointed, with a ſalary. Special ſurveyors returned to the juſtices by two parts out of three of thoſe who have the choice, with a ſettled ſalary, may be appointed by them with the ſaid ſalary. In caſe of the death of a ſurveyor, two juſtices at a ſpecial ſeſſions may appoint another in his room.

It is the buſineſs of the ſurveyor to preſerve *high-ways* in proper repair, &c. For this purpoſe it is enacted by the ſtatute already cited, that every perſon keeping a team, draught, or plough, i. e. who keeps a waggon, cart, wain, plough, or tumbrel, and three or more horſes or beaſts of draught, ſhall ſix days in the year furniſh one wain, cart, or carriage, and other neceſſaries, and two able men, on the day and place appointed by the ſurveyor. Thoſe who occupy lands of 50*l.* a year ſhall do the ſame; and in like manner for every 50*l.* a year reſpectively. Thoſe who occupy lands under 50*l.* ſhall pay to the ſurveyor, in lieu of the duty, for every 20*s.* annual value of their land, &c. one penny for every day's ſtatute duty, &c. and the ſame for every 20*s.* above the annual value of 50*l.* and leſs than 100*l.* Perſons keeping a team, but occupying land of the yearly value of 30*l.* ſhall be obliged to ſend only one labourer with ſuch team. Perſons not keeping a team, but keeping one or more cart or carts, and one or two horſes, ſhall ſend one labourer with each cart; and perſons keeping a wheel-carriage, but no team, nor occupying 50*l.* a year, ſhall pay to the ſurveyor 1*s.* in reſpect of every day's ſtatute duty, for every horſe which he ſhall uſe in ſuch carriage. Every inhabitant eighteen years of age, and upwards, but under ſixty, not chargeable in any other way for 4*l.* a year, or upwards, and not being an apprentice or menial ſervant, or not having ſerved or compounded in any other place for that year, ſhall go in perſon, or find a labourer, on each of the foreſaid days. Carriages ſhall be changed, at the diſcretion of the ſurveyor, for men, three being allowed for each team, or 4*s.* 6*d.* ſhall be paid in lieu of them. Perſons liable to perform ſtatute duty may compound at ſuch rates as the juſtices ſhall think fit, not exceeding 6*s.* nor leſs than 3*s.* for each team, for each day, or, in default of their adjudging the ſame, the ſum of 4*s.* 6*d.*; for every cart and one horſe 2*s.* for every cart with two horſes 3*s.* in lieu of each day's duty. And every inhabitant liable to perform ſuch duty, and not chargeable in any other reſpect, may compound for 4*d.* each day. The ſurveyor ſhall give four days notice to thoſe whoſe attendance is required, and they ſhall bring with them their own tools, continue at work for eight hours in each of the appointed days; and defaulters in finding a team, &c. ſhall forfeit 10*s.* thoſe in ſending a cart with one horſe and man, 3*s.* for not ſending a cart with two horſes and one man, 5*s.* and for each labourer 1*s.* 6*d.* Surveyors for neglect of duty, where no particular penalty is impoſed, ſhall forfeit a ſum not exceeding 5*l.* nor leſs than 10*s.* at the diſcretion of the juſtices. All defects of repairs of *high-ways* ſhall be preſented in the county where they lie; and the indictment muſt ſhew, that they are *high-ways*; alſo the places from and to which they lead; where the nuiſance was done, and how far it extends; it muſt likewiſe ſtate the fact clearly. Juſtices may preſent on their own view. For the farther regulations relating to *high-ways*, the principal of which have been already recounted, the reader is referred to 13 Geo. III. cap. 78.

HIGH-*ways, turnpike.* See TURNPIKE.

HIGH-*way men*, are robbers on the *high-way*; for the apprehending and taking of whom, a reward of 40*l.* is given by the ſtatute of 4 and 5 W. & M. to be paid within a month after conviction by the ſheriff of the county; to which the ſtatute 8 Geo. II. cap. 16. ſuperadds 10*l.* to be paid by the hundred indemnified by ſuch taking.

HIGHNESS, a quality, or title of honour, given to princes.

The kings of England and Spain had formerly no other title but that of *highneſs*; the firſt, till the time of Henry VIII. and the ſecond, till that of Charles V. See KING.

The petty princes of Italy began firſt to be complimented with the title of *highneſs* in the year 1630. And the duke of Orleans aſſumed the title of *royal highneſs* in the year 1631, to diſtinguiſh himſelf from the other princes of France.

The duke of Savoy, afterward king of Sardinia, bore the title of *royal highneſs*, on account of his pretenſions to the kingdom of Cyprus. It is ſaid that the duke only took the title of *royal highneſs*, to put himſelf above the duke of Florence, who was called *great duke*; but the great duke has ſince aſſumed the title of *royal highneſs*, to put himſelf on a level with the duke of Savoy.

The prince of Conde firſt took the title of *moſt ſerene highneſs*, leaving that of ſimple *highneſs* to the natural princes.

At preſent all the ſons of crowned heads are ſtyled *royal highneſs*, as the electors of Germany are called *electoral highneſs*.

HIGLER is a name frequently mentioned in our ſtatutes for a perſon who carries from door to door, and ſells by retail ſmall articles of proviſions, &c. They are laid under various reſtraints by the ſtatute laws.

HIJABILA, in *Botany*, a name given by ſome authors to the tamarind tree.

HIIS *teſtibus*, q. d. *theſe witneſſes*; a phraſe anciently added in the end of a deed, written in the ſame hand with the deed; upon which the witneſſes were called, the deed read, and then their names entered. See WITNESS.

This clauſe of *hiis teſtibus*, in ſubjects deeds, continued till, and in, the reign of Henry VIII. but it is now omitted. Coke on Littleton.

HILARIA, in *Antiquity*, feaſts celebrated every year, by the Romans, on the eighth of the calends of April, or the twenty-fifth of March, in honour of Cybele, the mother of the gods. As is obſerved by Macrobius, lib. i. cap. 10. and Lampridius, in his Life of Alexander Severus.

The *hilaria* were ſolemnized with great pomp and rejoicing. Every perſon dreſſed himſelf as he pleaſed, and took the marks or badges, of whatever dignity or quality, he had a fancy for. The ſtatue of the goddeſs was carried in proceſſion through the ſtreets of the city, accompanied by multitudes in the moſt ſplendid attire. The day before the feſtival was ſpent in tears and mourning. Cybele repreſented the earth, which at this time of the year begins to feel the kindly warmth of the ſpring; ſo that this ſudden tranſition from ſorrow to joy was an emblem of the viciſſitude of the ſeaſons, which ſucceeded one another.

The Romans took this feaſt originally from the Greeks, who called it αναϐασις, q. d. *aſcenſus*; the eve of that day they ſpent in tears and lamentations, and thence denominated it καταϐασις, *deſcenſus*.

Afterwards, the Greeks took the name ἱλαρια, from the Romans; as appears from Photius, in his extract of the life of the philoſopher Iſidore.

Caſaubon maintains, that beſide this particular ſignification, the word *hilaria* was alſo a general name for any joyful or feſtival day, whether public, or private and domeſtic. But Salmaſius does not allow of this.

Triſtan, tom. i. p. 482, diſtinguiſhes between *hilaria* and *hilariæ*. The former, according to him, were public rejoicings; and the latter, prayers made in conſequence thereof; or even of any private feaſt or rejoicing, as a marriage, &c. The public laſted ſeveral days; during which, all mourning and funeral ceremonies were ſuſpended.

HILARODI, Ἱλαρῳδοι, compounded of ἱλαρος, *joyful*, and ᾠδη, *ſong*, in the *Ancient Muſic* and *Poetry*, a ſort of poets among the Greeks, who went about ſinging little merry diverting poems or ſongs; though ſomewhat graver than the Ionic pieces.

The *hilarodi* appeared dreſſed in white, and were crowned with gold. At firſt they wore ſhoes; but afterwards they aſſumed the crepida, which was only a ſoal, tied over the foot with ſtraps.

They did not ſing alone, but had always a little boy, or girl, to attend them, playing on ſome inſtrument.

From the ſtreets they were at length introduced into the tragedy, as the magodi were into comedy.

The *hilarodi* were afterwards called Simodi, from a poet named Simus, who excelled in this kind of poetry.

HILARODIA, a poem, or compoſition in verſe, made or ſung by a kind of rhapſodiſts, called HILARODI.

HILARO-TRAGŒDIA, a dramatic performance, partly tragic or ſerious; and partly comic, or merry.

Scaliger holds, the *hilaro-tragœdia* and *hilarodia* to be one and the ſame thing. Others rather take the *hilaro-tragœdia* to have been pretty nearly what we call a *tragi-comedy*. Others, again, will have it to have been a pure tragedy, only terminating with a happy cataſtrophe, which brings the hero out of a wretched into a fortunate ſtate. But the firſt opinion ſeems the moſt probable, and the beſt warranted.

Suidas mentions one Rhinthon, a comic poet of Tarentum, as the inventor of this kind of poem: whence it was alſo called *Rhinthonica fabula*.

HILARY *term*. See TERM.

HILL. See MOUNTAIN.

To find the height of a hill, ſee the latter part of the article LEVELLING.

HILLIA, in *Botany*, a genus of the *hexandria monogynia* claſs: the calyx is ſix-leaved; the corolla is very long, and divided into ſix ſegments; the fruit is a berry, with two cells, containing many ſeeds.

HILLOCK. See MOUNT.

HILUM, a word uſed by botaniſts to expreſs the blackiſh ſpot in beans, commonly called by us the eye of the bean.

HIMANTOPUS, *long-legged plover*, in *Ornithology*, the name of a water-bird, a ſpecies of the CHARADRIUS in the Linnæan ſyſtem, very remarkable for the length and ſlenderneſs of its legs; it is all over white on the breaſt, belly, and throat, and blackiſh on the back and wings; its beak is black, about a hand's breadth long, and very weak and ſlender, fit for nothing but to deſtroy the ſofter ſmall inſects; its tail is of a whitiſh grey; its neck has ſeveral oblong black ſpots drawn downwards, and its wings are very long; its legs and feet are red, and have no hinder toe. Aldrovand. de Avib. lib. xx. cap. 30. Theſe birds are extremely rare in the Britiſh iſlands. See *Tab*. II. *of Birds*, N° 19.

HIMAS. The proper ſignification of the word *ιμας* is a *thong of leather*; but in medicine it is uſed to ſignify a laxneſs of the uvula, when it becomes long and ſlender, and hangs pendulous. It differs from the cionis, becauſe in this latter diſorder the uvula is not extenuated, but ſeems to acquire a greater thickneſs, as well as length, than what it naturally has.

HIN, a Hebrew meaſure, containing the ſixth part of an epha; or one wine gallon and two pints.

HIND, a female ſtag of the third year. See HUNTING.

HIND-*berry*, in *Botany*. See RASPBERRY.

HIND-*calf*, a female hart of the firſt year. She fawns in April and May. Her fleſh is ſofter than that of a hart, but not ſo ſavoury, and is dreſt after the ſame manner. If it be roaſted it ought to be larded, dipt in a marinade or pickle, and moiſtened while it is roaſting. See HUNTING.

HIND *hand*, in the *Manege*. See HAND.

HINDENI *homines*, formed from the Saxon *hindene*, a *ſociety* or *company*, anciently ſignified a ſociety, or claſs of men.

In the time of our Saxon anceſtors, all men were ranked into three claſſes, or *hindenes*; the *loweſt*, the *middle*, and the *higheſt*; and they were valued according to the claſs they were in; that in caſe an injury were done by any one, ſatisfaction might be made according to the value or worth of the man it was done to.

The *loweſt* were thoſe who were worth ten pounds, or two hundred ſhillings; called *viri ducentini*, or *twyhyndemen*, and their wives, *twyhyndas*.

The *middle* were valued at ſix hundred ſhillings; and were called *ſixhyndemen*, and their wives *ſixhyndas*.

The *higheſt* were valued at twelve hundred ſhillings; and were called *twelvehyndemen*, and their wives the *twelvehyndas*.

HINDOOS. See GENTOOS.

HINE, or HIND, in the *Saxon Language*, ſignifies a ſervant, or one of the family; but it is now taken in a more reſtrictive ſenſe, for a ſervant at huſbandry; and the maſter *hine* is he that overſees the reſt.

HINGES, in *Building*, thoſe neceſſary iron ligaments, by means whereof doors, lids, folds of tables, &c. make their motion, whether of opening, ſhutting, or folding.

The ſpecies of *hinges* are many, viz. bed, box, butts, caſement; caſting, cheſt, coach, deſk, dove-tails, eſſes, folding, garnets, weighty, ſide, ſide with riſing joints, ſide with ſquares, ſcrew, ſcuttle, ſhutter; trunk of ſundry ſorts, and hook and eye *hinges*.

HINGWANG, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a ſpecies of red arſenic, which they uſe in painting and in medicine. They find it in and about the copper mines. It is calcined ſeveral times, in order to fit it for internal uſe. In painting, it makes a very fine orange-colour; but when mixed with ceruſs, it makes a lemon-colour, and any other ſhade of yellow. It ſeems to contain ſome portion of ſilver, and ſome cinnabar.

HINNULARIA, a name given by authors to a ſpecies of eagle. See PYGARGUS, and *White-tailed* EAGLE.

HINNULUS, a hind; the young of the deer or goat kind. The rennet of a young hind or deer, taken within nine days after it is brought forth, is a preſcription given by Scribonius Largus for the epilepſy. James's Med. Dict.

HIP, in the *Manege*. See HAUNCH.

HIP, in the *Materia Medica*, the fruit of the cynoſbatus ſhrub, wild briar, *hip-tree*, or DOG-ROSE.

Hips are agreeably dulco-acid, and ſtand recommended as cooling reſtringents, in bilious fluxes, ſharpneſs of urine, and hot indiſpoſitions of the ſtomach; but they are but little uſed in the ſhops, except in the conſerve, which is a very pleaſant one, and made of the freſh pulp, by mixing three ounces of it with five of fine ſugar. The pulp ſhould be carefully ſeparated from the rough prickly matter which incloſes the ſeeds; for a ſmall quantity of this retained in the conſerve, is apt to occaſion an uneaſineſs at the ſtomach, pruritus about the anus, and ſometimes vomiting. Lewis.

HIP-*gout*, *ſciatica*. See GOUT and SCIATICA.

HIP-*ſhot*, a diſorder of a horſe, when he has wrung or ſprained his haunches, or *hips*, ſo as to relax the ligaments that are to keep the bone in its due place.

The ſigns are, that the horſe will halt much, and go aſide-long, trailing his leg after him; and the *hip* which is hurt will be lower than the other; the fleſh falling away on the ſide of his buttock.

HIPS, in *Building*, are thoſe pieces of timber, placed at the corners of a roof.

The *hips* are much longer than the rafters, on account of their oblique poſition, and are placed not with a right or ſquare angle, but a very oblique one; and by conſequence are not, at leaſt ought not to be, ſquare at any angle (as rafters are at all) but level at every one of them; and, which is yet more, as rafters have but four planes, theſe commonly have five.

They are commonly, by country workmen, called *corners*: ſome call them *principal rafters*, and others *ſleepers*. Indeed, *hips* and ſleepers are much the ſame; only the ſleepers lie in the valleys, and join at the top with the *hips*; but thoſe ſurfaces or planes, which make the back of the *hip*, are the underſides of the ſleeper.

The *backs of a hip* are thoſe two ſuperficies, or planes, on the outſide of the *hip*, which lie parallel, both in reſpect of their length and breadth, with the ſuperficies of the adjoining ſide, and end of the roof.

HIP-*mould*, is by ſome uſed for the back of the *hip*. Others underſtand it is a prototype, or pattern, commonly made of a piece of thin wainſcot; by which the back and the ſides of the *hip* are ſet out.

HIP-*roof*, among *Builders*, called alſo *Italian roof*, is a roof which has neither gable-head, nor ſhread-head, nor jirken head; which laſt are both gable and *hip* at the ſame end. A *hip-roof* has rafters as long, and with the angles at the foot, &c. at the ends of buildings, as it has at the ſides; and the feet of the rafters on the ends of ſuch buildings as have *hip-roofs*, ſtand on the ſame plane, viz. parallel with the horizon, and at the ſame height from the foundation, with rafters on the ſides of the roof.

HIP-*tyles*. See TYLE.

HIPPAGOGA, in *Antiquity*, a veſſel uſed in tranſporting horſes. It was otherwiſe called *hippago*.

HIPPARCHUS'*s period*. See PERIOD.

HIPPELAPHUS, among the *Ancient Zoologiſts*, was only the name of a large race of ſtags, with longer hair on the neck, giving it the appearance of a mane.

HIPPEUS, or EQUINUS, in *Phyſiology*, a ſort of comet which ſome writers ſuppoſe to bear a reſemblance in its tail to a horſe. But the ſhape of this kind of comet is not always alike; being ſometimes oval, and ſometimes imitating a rhomboides. Its train alſo is ſometimes ſpread from the front or fore-part, and ſometimes from the hind-part.

Hence this claſs of comets is diſtinguiſhed into *equinus barbatus*, *equinus quadrangularis*, and *equinus ellipticus*. See COMET.

HIPPIATRICE, of *ιππος*, *horſe*, and *ιατρος*, *phyſician*, the art of curing the diſeaſes of brutes, and particularly horſes.

This makes what we rather call the *farrier's art*. See FARRIER.

HIPPION, or HIPPIUM, in *Botany*, a name by which John Bauhine, and ſome other authors, have called the larger ſpecies of the autumnal dwarf GENTIAN.

HIPPIUM, in *Antiquity*, that part or tract of the *hippodrome*, which was beaten with the horſes feet. See HIPPODROME.

HIPPO, in *Zoology*, the name of a ſpecies of COLUBER, the ſcuta of whoſe abdomen are one hundred and ſixty, and the ſquamæ of the tail one hundred.

HIPPOBOSCOS, in *Natural Hiſtory*, the name given by authors to the horſe-fly. This is of the bigneſs of the common fly, and has a broad flat body, which is hard and ſmooth, and of ſo firm a ſtructure, that it can ſcarce be cruſhed or broken by the fingers. It is remarkable for its flying ſideways. See HORSE-*worm*.

This is a genus of the *diptera* claſs of inſects in the Linnæan ſyſtem.

HIPPOCAMPUS, the *ſea-horſe*, in *Zoology*, the name of a ſmall ſea-animal caught in the Mediterranean, and eſteemed uſeful in medicine among the ancients, but at preſent not uſed. This is a ſpecies of the SYNGNATHUS in the Linnæan ſyſtem.

It has its name from the Greek ἱππος, a *horſe*, and καμπη, a *caterpillar*, from its reſembling a horſe in its head, and a caterpillar in the reſt of its body. It ſeldom exceeds the length of three inches, and is about as thick as a finger, or a little more; its ſnout is long and hollow like a pipe, and is not ſplit, as in other animals, in general; but it has an operculum from below, which opens or ſhuts up its aperture at the creature's pleaſure; its whole ſnout is perfectly like that of the acus or needle-fiſh; its eyes are round and prominent, and between the eyes there are two more prominent tubercles. The body, down to the anus, is heptahedral, or ſeven-ſided, and terminated at the angles with a ſort of thorny protuberances; from the anus to the tail the ſhape is only three or four-ſided, and ends in a point. and is twiſted into a ſort of ſpiral line. In the place where the gills of other fiſhes are ſituated, this has two fins in the ſhape of ears, and above theſe there are two apertures opening upwards, but no gills are any way diſcoverable. It has two apertures on the belly, out of one of which the excrements are voided, and by the other the female depoſits her eggs; its whole body is compoſed of a ſort of annular cartilages, from diſtinct parts of which are propagated a ſort of prickles; it is while freſh of a duſky green colour, and blackiſh toward the tail, and is ſpotted principally on the belly with bluiſh-white ſpecks; it has a ſingle fin in the middle of its back of an equal height all the way. Into whatever poſture you turn the tail, while the creature is yet living, it will retain it when dead. Some of this ſpecies have a mane like that of a horſe, but moſt want this character; and naturaliſts are not yet determined whether it be the character of a diſtinct ſpecies of the animal, or be owing to the different age or ſex. It is hairy in many parts of the body, but principally about the head; but the hairs often fall off in drying the creature. Willugh. Hiſt. Piſc. p. 157.

HIPPOCASTANUM. See *Horſe* CHESTNUT.

HIPPOCENTAUR, formed of ἱππος, *horſe*, κεντεω, *pungo*, *I ſpur*, and ταυρος, *bull*, in *Antiquity*, a fabulous monſter, ſuppoſed to be half horſe and half man.

What gave occaſion to the fable was, that a people of Theſſaly, inhabiting near mount Pelion, became thus denominated, becauſe they were the firſt that taught the art of mounting on horſeback; which occaſioned ſome of their neighbours to imagine, that the horſe and man made but one animal.

The *hippocentaurs* ſhould ſeem to have differed from the CENTAURS, in this, that the latter only rode on bullocks, and the former on horſes, as the names themſelves intimate.

On the medals of Gallienus is repreſented a centaur drawing a bow, or holding a globe in the right hand, and the helm of a ſhip in the left; with this inſcription, APOLLINI CONS. AUG. *To Apollo the conſervator of Auguſtus.* Triſtan conſiders both the one and the other as a ſymbol of the protection Gallienus received from Apollo in his wars againſt the Perſians.

HIPPOCEPHALOIDES, the *horſe-head ſtone.*

The word is derived from the Greek ἱππος, a *horſe*, and κεφαλη, the *head*; and is a name given by Dr. Plot to a ſtone found in Oxfordſhire, and many other places, and ſuppoſed to reſemble the head of a horſe in figure, though the truth is, it requires a very warm imagination to make out the reſemblance.

The ſtone is compoſed of the matter of the common coarſer quarry-ſtone, and owes its figure to a ſhell of the cockle-kind, into which having been received at a time when it was ſoft and moiſt, it has taken the exact figure and lineaments of its inner parts. It is about the ſize of the larger bucarditæ, from an inch and a half to two inches and a half in length, and indeed very much reſembles that ſtone, having been formed wholly in the ſame manner, and in a ſhell of the ſame genus. Hill's Hiſt. of Foſſ. p. 646.

HIPPOCRAS, *Vinum* HIPPOCRATICUM, a kind of medicated WINE.

Menage approves the conjecture of thoſe who derive *hippocras* from *Hippocrates*, as ſuppoſing him the inventor hereof; but we may better deduce it from the *manica Hippocratis*, or *Hippocrates's ſleeve*, uſed in the filtration of it.

Hippocras is a drink compoſed of wine, with ſpices and other ingredients infuſed therein; much uſed among the French by way of a cordial dram after meals.

There are various kinds of *hippocras*, according to the kind of wine, and the other additional ingredients made uſe of; as white *hippocras*, red *hippocras*, claret *hippocras*, ſtrawberry *hippocras*, *hippocras* without wine, cyder *hippocras*, &c.

That directed in our late college diſpenſary, is to be made of cloves, ginger, cinnamon, and nutmegs, beat, infuſed in canary, with ſugar; to the infuſion, milk, a lemon, and ſome ſlips of roſemary, are to be put, and the whole ſtrained through a flannel. It is recommended as a cordial, and as good in paralytic, and all nervous caſes.

HIPPOCRATEA, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are theſe: it has a large ſpreading empalement of one leaf, cut into five ſegments; and the flower hath one oval petal, which is entire; it has ſix ſlender, ſhort ſtamina, and an oval germen, ſituated below the petal, which becomes an oblong capſule, winged at the top, incloſing a ſingle ſeed. We have but one ſpecies of this genus, which is a native of Campeachy. Miller.

HIPPOCRATES's *ſleeve*, *manica* HIPPOCRATIS, a kind of filtre, or ſtraining-bag, formed by joining the oppoſite angles of a ſquare piece of flannel, in form of a pyramid, and uſed to percolate or ſtrain ſyrups, decoctions, &c. for clarification.

HIPPOCRATIA, in *Antiquity*, feaſts celebrated by the Arcadians in honour of the equeſtrian Neptune, from a notion that this deity conferred horſes on men. During the celebration of them, horſes were exempt from all labour, and were led in proceſſion through the ſtreets, ſuperbly harneſſed, and adorned with garlands of flowers. The Romans celebrated theſe feaſts under the title of CONSUALIA.

HIPPOCRATICA *facies*. See FACIES *Hippocratica.*

HIPPOCRATISM, in *Medicine*, denotes the philoſophy of Hippocrates, applied to the ſcience of medicine; or the doctrine of Hippocrates conſidered with regard to the means of prolonging life, of preventing and counteracting the effects of accidents that tend to abridge it, and of maintaining that ſtate of the animal body, which will preſerve it from immature diſſolution. Hippocrates, who has been juſtly venerated for more than twenty centuries, as the inſtitutor, and, in a degree, the inventor of the art of healing, was born in the iſle of Coos, one of the Cyclades, about four hundred and ſixty years before Chriſt, in the firſt year of the eightieth Olympiad, according to Soranus, or thirty years before the Peloponneſian war. However, ſome authors have made him more and others leſs ancient. He is ſaid to be deſcended from Eſculapius, by Heraclides his father, and from Hercules, by Praxithea his mother. Hippocrates firſt joined reaſoning to experience in treating of the medicinal art; and on this account he has been always held in veneration as the father of rational medicine. To him we owe the diſcovery of that principle of the animal œconomy, which he calls nature, the knowlege of which is ſo eſſential to the right conduct of a phyſician in every branch of his office. Nature is that power, obſervable in all animals, which directs all the motions both of the ſolids and fluids for their preſervation: to nature, as the governing principle, he aſcribes certain faculties, by the mediation of which it ſelects, retains, and properly prepares what is good and uſeful in any part of the animal oeconomy, and rejects what is ſuperfluous or hurtful. Nature, according to him, is the true phyſician that heals all diſeaſes, and that preſerves health. This ſhould be invariably conſulted in the adminiſtration of all remedies; its operations ſhould be aided, and all obſtacles removed. Without particular attention to nature, and without recovering its active powers, all remedies are not only uſeleſs, but commonly injurious. On theſe principles Hippocrates applied himſelf principally to examine the progreſs of nature in the courſe of different diſeaſes, as appears from his books De Morbis, & De Affectionibus; and to deſcribe their ſymptoms and their prognoſtics and diagnoſtics, in ſuch a manner, that they might be known to others as well as to himſelf. See § 7. Aphoriſmorum, Lib. Prognoſt. Prædict. Præn. Coac. Lib. de Judication. De Dieb. Judicator.

Hippocrates was no leſs diſtinguiſhed as the inventor of that part of medicine, which is called DIETETIC. Vide lib. vi. De Diæta, lib. De Alimento, De Hermidorum Uſu, De Salubri Diæta, De Victu Acutorum. In theſe works he has evinced the great importance of a proper regimen, both for preſerving health, and healing diſeaſes. He has alſo left ſeveral treatiſes on the ſubject of anatomy. Vide lib. vi. De Corde, De Oſſium Natura, De Venis, De Humoribus, De Genitura, De Principiis & Carnibus, De Glandulis, De Natura Humana. It appears alſo from his ſix books De Articulis, De Fracturis, De Fiſtulis, De Vulneribus Capitis, De Chirurgiæ Officina, that he excelled in ſurgery; with regard to the materia medica, as far as we can judge from his writings, he made uſe only of a few remedies, and ſuch as were the moſt ſimple. Hippocrates applied his extenſive acquaintance with phyſics for determining the effects produced by the NON-NATURALS on the human body. Vide lib. vi. De Aere Locis & Aquis; and he was the firſt who made uſe of mathematics in explaining the phenomena of the animal oeconomy; and with this view he recommended the ſtudy of them to his ſon Theſſalus. He was no ſtranger to the doctrine of attraction, and conſidered the philoſophy of Democritus, which he adopted, as of peculiar importance in its reference to the animal oeconomy. The probity of Hippocrates was no leſs remarkable than his extenſive knowlege; an inſtance of which occurs in his hiſtory to this purpoſe. An infectious diſeaſe had infeſted Perſia, and Alexander made the moſt unlimited offers to Hippocrates to induce him to come and reſtrain the ravages of this plague; to which he replied, that he could by no means think of giving ſuccour to the enemies of the Greeks. Hippocrates died at a hundred and four years of age, in the three hundred and fifty-ſixth year before Chriſt. He has always occupied in medicine the ſame kind of diſtinguiſhed rank as Homer does among the poets, and Cicero among the orators. Galen cites his authority with theſe words: *Magiſter dixit.* Encyclopedie. See MEDICINE.

The works of Hippocrates are collected in one volume, and publiſhed in Greek and Latin by Fœſius. Geneva. 1657.

HIPPOCRENE, derived from *ἱππος*, *horſe*, and *κρηνη*, *fountain*, q. d. the fountain of the horſe Pegaſus, was a ſpring at the foot of mount HELICON.

HIPPOCREPIS, in *Botany*, the name given by Linnæus to the plant uſually called by authors *ferrum equinum*, or the *horſe-ſhoe* VETCH.

HIPPODROME, HIPPODROMUS, compoſed of *ἱππος*, *horſe*, and *δρομος*, *courſe*, of the verb *δρεμω*, *curro*, *I run*, in *Antiquity*, a liſt, or courſe, wherein chariot and horſe-races were performed, and horſes exerciſed.

The Olympian *hippodrome* or horſe-courſe was a ſpace of ground of ſix hundred paces long, ſurrounded with a wall, near the city Elis, and on the banks of the river Alpheus. It was uneven, and in ſome degree irregular, on account of the ſituation; in one part was a hill of a moderate height, and the circuit was adorned with temples, altars, and other embelliſhments. See STADIUM. There is a very famous *hippodrome* at Conſtantinople, which was begun by Alexander Severus, and finiſhed by Conſtantine. This circus, called by the Turks *atmeican*, is four hundred paces long, and above one hundred paces wide. At the entrance of the *hippodrome* there is a pyramidal obeliſk of GRANITE, in one piece, about fifty feet high, terminating in a point, and charged with hieroplyphics. The Greek and Latin inſcriptions on its baſe ſhew, that it was erected by Theodoſius; the machines that were employed to raiſe it are repreſented upon it in baſſo-relievo. We have ſome veſtiges in England of the *hippodromus*, in which the ancient inhabitants of this country performed their races; the moſt remarkable is that near STONE-HENGE, which is a long tract of ground, about three hundred and fifty feet, or two hundred druid cubits wide, and more than a mile and three quarters, or ſix thouſand druid cubits, in length, incloſed quite round with a bank of earth, extending directly eaſt and weſt. The goal and career are at the eaſt end. The goal is a high bank of earth, raiſed with a ſlope inwards, on which the judges are ſuppoſed to have ſat. The metæ are two tumuli, or ſmall barrows, at the weſt end of the courſe. Theſe *hippodromes* were called in the language of the country *rhedagua*, the racer *rhedagwr*, and the carriage *rheda*, from the Britiſh word *rhedeg*, *to run*. One of theſe *hippodromes*, about half a mile to the ſouthward of Leiceſter, retains evident tracts of the old name *rhedagua*, in the corrupted one of *rawdikes*. There is another of theſe, ſays Dr. Stukeley, near Dorcheſter; another on the banks of the river Lowther, near Penrith in Cumberland; and another in the valley, juſt without the town of Royſton.

HIPPODROMUS, in *Chronology*, the Bœotian name for the Athenian month Hecatombæon, or ECATOMBÆON.

HIPPOGLOSSUS, a ſpecies of the PLEURONECTES in the Linnæan ſyſtem of *Ichthyology*, the name of the holibut; a large flat fiſh caught in the Britiſh ſeas and elſewhere. It is the biggeſt and the moſt voracious of all the fiſh of this kind, and is ſomewhat of the ſhape of a turbot, but larger and longer bodied, and conſequently leſs ſquare; its back is of a duſky browniſh green, and beneath it is of a pure white; its ſcales are extremely ſmall, and the whole ſurface of the fiſh very ſmooth, having no crooked prickles on the ſides. The eyes are on the right ſide, and the belly has ſix ſmall fins, beſide the large ſtraight ones. It is caught in the German and Britiſh ſeas, and its fleſh is very coarſe, excepting the part which adheres to the ſide fins, which is extremely fat and delicious, but ſurfeiting. They have been taken in our ſeas weighing from one to three hundred pounds; but thoſe of a much larger ſize are found in Newfoundland, Greenland, and Iceland, where they are taken with a hook and line in very deep water. The Greenlanders cut them in large ſlips, and dry them in the ſun.

HIPPOGLOSSUM, *horſe-tongue*, in *Botany*, the name of a plant of the *ruſcus*, or butcher's broom kind, called by others the Alexandrian bay, or *laurus Alexandrina*. See BUTCHER'*s broom*.

HIPPOLAPATHUM, in *Natural Hiſtory*, a ſpecies of lapathum, called alſo *monk's* RHUBARB.

HIPPOLITHOS, a name given by ſome authors to the ſtones found in the ſtomachs and inteſtines of horſes: there are often a great number of theſe in one horſe; and they are frequently found in the colon, of a very large ſize. See BEZOAR.

HIPPOMANE, in *Botany*. See MANCHINEEL.

HIPPOMANES, compounded of *ἱππος*, *horſe*, and *μανια*, *madneſs*, a ſort of poiſon, famous among the ancients as an ingredient in amorous philtres, or charms.

Naturaliſts are not agreed about the nature of the *hippomanes*. Pliny deſcribes it as a blackiſh caruncle, found on the head of a new-foaled colt; which the dam bites off and eats, as ſoon as ſhe is delivered. He adds, that if ſhe be prevented herein by any other's cutting it off before, ſhe will not take to, nor bring up her young.

Virgil, and after him Servius and Columella, deſcribe it as a poiſonous matter, trickling from the pudendum of a mare, when proud, or longing for the horſe. Æn. lib. iv. ver. 515.

At the end of Mr. Bayle's Dictionary is a very learned diſſertation on the *hippomanes*; and all its virtues, both real and pretended.

HIPPOMYRMEX, the *horſe-ant*, the name of a ſpecies of ant much larger and nimbler than the common kind. This builds in woods, and makes its neſts of ſticks and ſtraws, and fragments of various parts of trees. The common ANT builds only with earth.

HIPPONE, in *Mythology*, the goddeſs of horſes and chariots.

HIPPOPHAE, in *Botany*, the name given by Linnæus to a genus of plants, called *rhamnoides* by Tournefort and others. See SEA-*buckthorn*.

HIPPOPHEOS. This was a name given not only to the larger ſpecies of the pheos or ſtebe, but to a very different plant, a kind of dodder, more vulgarly called epipheos, from its growing upon the pheos, as the dodder of thyme is called epithymum, from its growing upon that plant. It is poſſible indeed that it might be called originally *hippopheos*, from its riding, as it were, on the pheos. But however this be, there is great reaſon to ſuſpect that Dioſcorides confounds this dodder with the plant itſelf, and gives its virtues as thoſe of the proper *hippopheos*; which, according to Theophraſtus, and all the other writers of credit in antiquity, is only a larger ſpecies of the pheos, a prickly ſhrub, not a plant, growing on it. See EPIPHEOS.

HIPPOPHTHALMIC *muſcles*, a name given by the ichthyologiſts to a pair of large muſcles found in the head of fiſh, one placed immediately under the eye; theſe ſerve to move the eyes; and, with the two maxillary muſcles placed under the jaws, are the principal muſcular parts of the head of fiſh.

HIPPOPODES, or HIPPOPEDES, compoſed of *ἱππος*, *horſe*, and *ϖȣς*, *foot*, in the *Ancient Geography*, an appellation given to a certain people, ſituated on the banks of the Scythian ſea; as being ſuppoſed to have horſes feet. The *hippopodes* are mentioned by Dionyſius, Geogr. v. 310. Mela, lib. iii. cap. 6. Pliny, lib. iv. cap. 13. and St. Auguſtine, De Civit. lib. xvi. cap. 8. But the truth is, that they had this appellation given them on account of their ſwiftneſs, or lightneſs of foot.

HIPPOPOTAMUS, in the Linnæan ſyſtem of *Zoology*, a diſtinct genus of animals of the order of *belluæ*, in the claſs of *mammalia*, the characters of which are, that it has two paps ſituated in the groin; its dentes inciſores, or cutting teeth, are ſix above, and four below; others reckon only four in each jaw, and four tuſks; the upper ones placed at diſtances by pairs, the lower ones prominent,

minent, with the middle two the largeſt; the dog-teeth are ſingle, and ſeem as if cut off obliquely; the feet are hooffed at their margin. There is only one ſpecies of this genus, which is called the amphibious *hippopotamus*. This is called in Engliſh the river-horſe, and by ſome, though leſs properly, the ſea-horſe. It approaches in figure partly to the buffalo, and partly to the bear. It is larger than the buffalo, and ſecond in ſize only to the elephant, and its legs are very like the bear's. The full-grown male animal is ſeventeen feet long from its head to its tail, and near five feet in the diameter of its body, and its belly is rather flat than ridged; the circumference of its body is uſually nearly equal to its whole length, or about fifteen feet; its height near ſeven feet; the legs near three; the head above three and a half in its girth, and near nine feet; ſo that its head is very large in proportion to its body, and its mouth is capable of opening a foot wide; its eyes are ſmall, its ears alſo ſmall and thin; its teeth are as hard as flint, and will readily give fire with ſteel; it has four tuſks; the hair on the body is thin and whitiſh; its hoofs are black, much like thoſe of the common cloven-footed beaſts, but divided into four claws, unconnected with membranes, inſtead of two; its upper jaw is moveable in the manner of the crocodiles, and it is uſually very fat. See *Tab. II. Quadrupeds*, N° 20.

It is found in the Nile and Niger, and many other great rivers; but in none of the rivers which run into the Mediterranean, except the Nile, and only in Upper Egypt, and in the fens and lakes of Æthiopia, through which that river runs. It is a mild and gentle animal, unleſs provoked, and is capable of being tamed. In the night it leaves the rivers to graze, and does great damage to the ſugar-canes and plantations of rice and millet; it alſo feeds on the roots of trees, and ſmall fiſh. It walks ſlowly, but, when purſued, plunges into the water, and walks at the bottom at full eaſe. When it riſes to the ſurface, with its head out of water, it makes a loud bellowing; and when wounded, will attack canoes and boats with great fury. In the water theſe animals are bold, but timid on the land; they are ſeldom found in the mouths of rivers; they ſleep on ſhoals of ſand in the midſt of the ſtream. There are various ways of taking and deſtroying theſe animals. In ſome places the natives lay boards, full of ſharp irons, in the corn grounds, which ſtrike into their feet. Others ſtrike them in the water with harpoons, and employ ten or twelve canoes in the chace of them. Sometimes a quantity of peas is laid in their way, which they greedily devour; and thus the animals become immoderately thirſty, and drinking large quantities of water, are blown up and deſtroyed. The teeth are uſed by dentiſts for making falſe teeth, being leſs liable to become yellow than ivory. The dried ſkin is extremely hard, and uſed for bucklers.

A herd of females has only a ſingle male; they bring one young at a time, on the land, and ſuckle it in the water. Some have ſaid that the increaſe of the crocodile in Egypt is prevented by the *hippopotamus*, to which he is an inveterate enemy; but others affirm, that they have ſeen them ſwimming together, without any diſagreement.

There is no mane on the neck, the hairs being only thicker on that part; the ſkin is thick and ſtrong, and of a duſky colour; the tail is about a foot long, taper, compreſſed, and naked. It is very plainly proved by Bochart, that this is the creature mentioned under the name of the behemoth in the book of Job. Ray's Syn. Quad. p. 124, and Pennant.

HIPPOSIS, in the *Writings of the Ancient Phyſicians*, ſignifies a reducing any part of the body into its natural ſituation, by means of compreſſion.

HIPPOSORCHIS, in ſome diſpenſatories, a name given to a powder of the teſticles of horſes.

HIPPOTAURUS, in *Natural Hiſtory*, the name given by authors to a creature generated between a bull and a mare. It ſeems a very unnatural copulation; but Wagner, in his Hiſtory of Switzerland, aſſures us, that the creature produced by it is ſometimes found wild in the mountainous parts of that country.

HIPPURIS, in the Linnæan ſyſtem of *Botany*, a genus of plants of the *monandria digynia* claſs, called by others *limnopeuce*. The characters of this genus are, that it has neither calyx nor petal; the ſtigma is ſimple, and the ſeed is ſingle, roundiſh, and naked, or ſurrounded with no ſort of pericarpium.

Pliny has made a great confuſion of plants under this name. The ancients called the *hippuris*, or horſe-tail, *polygonum*, on account of its having ſo many joints in its ſtalks and branches; this name confounded it with the knot-graſs; and Pliny has made a deſcription from the accounts of different authors, which has the characters and qualities of both, and therefore ſuits neither.

It is eaſy however to trace his errors; where he ſpeaks of the ſtalks being naked, ruſh-like, and brittle, it is plain that he is ſpeaking of the *horſe-tail*; and where he gives it ſmall, oval and pointed leaves, it is equally certain that he means this of the knot-graſs; but he adds in one place, that it has a large ſpreading root, that it grows in woods and ſhady places, and that it bears a round fruit like a coriander-ſeed. Theſe are characters belonging neither to the horſe-tail nor knot-graſs; and might ſeem to beſpeak this *hippuris* a plant different from both; but it rather appears, that Pliny has brought in by an error of his own a third plant, to perplex the caſe, and is here tranſcribing ſome author's account of the Solomon's ſeal, or polygonatum, a name ſounding like the word polygonum, and eaſily miſtaken for the ſame word by ſo haſty a writer as this author appears to have been. He had before erred in his opinon, that the polygonum and horſe-tail were the ſame plant; and here taking the polygonatum to be the ſame plant with the polygonum, he has not ſcrupled to attribute to the horſe-tail whatever he found recorded of the polygonatum.

Hippuris is alſo a name given by Dillenius to the CHARA of Linnæus, a diſtinct genus of plants.

Hippuris, in *Ichthyography*, the name of a large ſea-fiſh, the CORYPHÆNA *hippuris* of Linnæus, with a bifid tail, and ſixty dorſal rays, very much reſembling the dorado, or gold-fiſh, and by many ſuſpected to be the ſame ſpecies. It is a very remarkable fiſh, having a ſort of creſt riſing immediately behind its head, which is continued in a long fin to the tail; and there is another in ſome meaſure anſwering this, and reaching from the anus to the tail. It is the quickeſt of all fiſh in its growth, which is an obſervation as old as the time of Ariſtotle, but is found true to this day. It is caught upon the coaſts of Spain, but that only at one time of the year in the month of Auguſt. It is a very delicate and well-taſted fiſh, and is much eſteemed at table. Willughby's Hiſt. Piſc. p. 273. Geſn. de Piſc. p. 501.

Hippuris, in the claſs of *zoophytes*, is a ſpecies of ISIS.

HIPPURITES, in *Natural Hiſtory*, a name given by ſome writers to a ſtone which they fancy to repreſent a ſaddle. It is deſcribed to be a ſoft argillaceous ſtone, owing its figure of a ſaddle to certain depreſſions. This is only a luſus naturæ, and is of the nature of the hand-ſtones, and foot-ſtones, with ſeveral others, which fancy has aſſiſted in their reſemblances, but which have been very improperly called by particular names.

HIPPUS, in *Medicine*, a diſorder of the eyes, wherein they continually ſhake and tremble, and thus repreſent objects as if continually fluctuating.

It is thus called from the Greek ἵππος, *horſe*; becauſe, according to Blancard, objects appear to ſhift in it, as much as when we are riding.

HIRA, a word uſed by the writers in medicine either for the inteſtinum jejunum, or for all the inteſtines, or in a yet larger ſenſe for all the contents of the abdomen. Caſtel. Lex. in voc.

HIRÆA, in *Botany*, a genus of the *decandria trigynia* claſs; the characters are, that it has a five-leaved calyx, and roundiſh unguiculated petals, and three ſeeds. There is only one ſpecies found in Carthagena.

HIRARA, in *Zoology*, the name of an animal in the Braſils much reſembling the HYÆNA.

HIRCUS, *tragus*, or *goat*, in *Anatomy*, a part of the auricle, or outer EAR; being that eminence next the temples.

Hircus, in *Aſtronomy*, a fixed ſtar of the firſt magnitude, the ſame with CAPELLA.

Hircus is alſo a denomination given to the rank ſmell exhaling from the arm-pits; and which has its ſource in the axillary glands.

Hircus is alſo uſed by ſome writers for a COMET, encompaſſed as it were with a main, ſeemingly rough and hairy.

HIRNGRILL, a name given by ſome authors to the *ſerinus*.

HIRQUUS, a name given by ſome authors to the great canthus of the eye.

HIRTELLA, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are, that it has five petals, and very long, permanent, ſpiral filaments; the fruit is a ſingle-ſeeded berry, and the ſtyle is lateral. There is only one ſpecies, which is American.

HIRUDELLA *marina*, in *Natural Hiſtory*, the name of a very remarkable little animal of the leech kind. The body of this creature is roundiſh and oblong, and adorned with many longitudinal lines or furrows; it is about an inch in length, and is of a greyiſh colour, and ſomewhat tranſparent; the bowels are ſeen through the ſkin, and appear at firſt ſight like ſtreaks on its ſurface; in the middle of the belly there is a remarkable protuberance, which, when cloſely examined, is found to be a muſcular body in form of a ſpherical bladder; this, when moſt diſtended, has the appearance of a ſpherical air-pump, and has all the properties of that machine, to be employed for the ſervice of the animal, and at its pleaſure. It reſembles, in its common figure, the cup of an acorn, with the mouth a little contracted. The head of the animal is of the ſame figure with that of the common leech, and ſerves to ſuck the juices of other animals, in the ſame manner as in that inſect. That part of the body which reaches from the head to the middle protuberance is of a very irregular form, frequently in motion, and continually changing its figure; but the other part moves more ſlowly, and leſs frequently, and preſerves its ſhape unaltered. The protuberance has two motions, expanſion, and undulation.

When the creature has a mind to fix itſelf any where, it does it by means of this protuberance, which it applies cloſely down to the ſubſtance, and void of air. Hence the external air ſo firmly preſſes its ſides againſt the ſubſtance, that it is not eaſy to remove it. When the creature changes its place, it draws the head round to the protuberance, and looſens it ſo as to be able to change its place as it has occaſion.

When this creature is kept out of water, it dies in a few hours; and when after being thus kept out a few minutes, it is put into ſea-water, it immediately darts out a fine green thread from its mouth; this it uſually makes of the length of its body, or thereabout, though it varies it occaſionally; and by means of this it ſuſpends its body any length that it pleaſes in the water. It ſeems to be calculated only for living in the bodies of fiſh, for the ſea-water ſoon kills it; and it is obſerved to diminiſh its bulk very ſenſibly all the time that it is kept in it. Phil. Tranſ. Nº 410.

HIRUDO, in *Zoology*. See Leech.

HIRUNDO, in *Ichthyology* and *Ornithology*. See Swallow.

HISPANICUM *viride*, *Spaniſh green*, a name given by ſome to verdigris.

HISPID *leaf*, among *Botaniſts*. See Leaf.

Hispid-*ſtalk*. See Stalk.

HISSING, an appellation given by grammarians to the three conſonants, s, x, and z.

HISTIODROMIA, the art of ſailing, or of conducting veſſels on the ſea.

The word is compoſed of ιϛιον, *ſail*, of ιϛος, the *maſt of a ſhip*, which comes from ιϛημι, *ſto*, *I ſtand*, and δρομος, *courſe*, of δρεμω, *I run*.

Hiſtiodromia is the ſame with what we otherwiſe call *navigation*.

Hiſtiodromia turns on four points, any two whereof being given, the other two are eaſily found from them, by the loxodromic tables, ſines, tangents, ſecants, Mercator's chart, &c. Theſe four things are, the difference of latitude, difference of longitude, the courſe, and the diſtance run.

HISTORICAL, ſomething that relates to history.

Historical *column*. See Column, *hiſtorical*.

Historical *muſic*, *muſica hiſtorica*, is that branch of muſic which treats of the origin and invention of muſic, of modes, of notes, inſtruments, &c. as alſo the lives and writings of celebrated authors on that ſubject.

Historical *ſtyle*. See Style.

HISTORIOGRAPHER, compoſed of ιϛορια, *hiſtory*, and γραφω, *I write*, a profeſſed hiſtorian, or writer of hiſtory; or a perſon who applies himſelf peculiarly to it.

The province of the hiſtorian is important and extenſive; and he, therefore, ought to be endowed with great and uncommon qualifications. Cicero has given us the whole art of compoſing hiſtory in a very compendious and comprehenſive manner. No one is ignorant, ſays he, that the firſt law in writing hiſtory is, not to dare to ſay any thing that is falſe, and the next, not to be afraid to ſpeak the truth; that on the one hand there be no ſuſpicion of affection, nor of prejudice on the other. Theſe fundamental principles are generally known: but the ſuperſtructure conſiſts partly in things, and partly in the ſtyle or language. The former require an order of time, and deſcription of places. And becauſe in great and memorable events, we are deſirous to know firſt their cauſes, then the actions themſelves, and laſtly their conſequences; the hiſtorian ſhould take notice of the ſprings or motives that occaſioned them; and in mentioning the facts themſelves ſhould not only relate what was done or ſaid, but likewiſe in what manner; and in treating of their conſequences, ſhew whether they were the effects of chance, wiſdom, or imprudence. Nor ſhould he only recite the actions of great and eminent perſons, but likewiſe deſcribe their characters. The ſtyle ought to be fluent, ſmooth, and even, free from that harſhneſs and poignancy which are uſual at the bar. De Orat. lib. ii. cap. 15.

According to this plan, in the obſervance of which few are ſuperior to Tacitus, an hiſtorian ſhould be not only a man of probity, but free from all paſſion and bias: he ought to unite the ſteadineſs of a philoſopher with the vivacity of a poet or orator. He ſhould alſo poſſeſs a good judgment, to direct him what is proper to be ſaid, and what to be omitted, and to treat every thing in a manner ſuited to its importance. Induſtry is likewiſe an eſſential quality of an accurate hiſtorian. Thucydides in his Hiſtory of the Peloponneſian War, and Polybius in his Hiſtory of the Roman Affairs, took great pains in procuring neceſſary information. An hiſtorian ſhould be always actuated by a love of truth; to this purpoſe Polybius obſerves, that a good man ought to love his friends and his country, and manifeſt a ſimilar diſpoſition with their's, towards both their friends and enemies. But when he takes upon him the character of a hiſtorian, they muſt all be ſorgot. In hiſtory, all perſonal conſiderations ſhould be laid aſide, and regard be paid only to their actions. Lib. i. p. 13. See alſo Lucian, De Hiſt. Scrib. p. 366.

Suetonius, Thucydides, and Polybius, are much commended for the integrity and ingenuity of their temper. Cicero obſerves, ubi ſupra, that hiſtory is converſant in great and memorable actions; and, therefore, a hiſtorian ſhould always keep poſterity in view, and relate nothing which may not on ſome account or other be worth the notice of future ages. Thoſe who deſcend to trivial and minute matters, which are below the dignity of hiſtory, ſhould be deemed journaliſts rather than hiſtorians. Whenever a prudent hiſtorian thinks it neceſſary or convenient to take notice of things that are in themſelves leſs conſiderable, he either does it with brevity, or for ſome apparent reaſon, or accounts for it by ſome juſt apology. As it is the province of a hiſtorian to acquaint us with facts, he ſhould give a narration or deſcription not only of the facts or actions themſelves, but likewiſe of ſuch things as are neceſſarily connected with them, viz. the characters of perſons, the circumſtances of time and place, in reference to which chronology and geography have been called the two eyes of hiſtory; the views and deſign of the principal actors, and the iſſue and event of the actions which he deſcribes. The proper diſpoſition of theſe various particulars depends on the ſkill and prudence of the writer. The hiſtorian ſhould alſo introduce pertinent and uſeful reflections in the courſe of his narrations. The beſt hiſtorians, ſuch as Salluſt and Livy, &c. have allowed themſelves this liberty. But the remarks or reflections of the hiſtorian ſhould be brief, and differ in this reſpect from the encomiums or declamations of the orator. Hiſtorians have likewiſe enlivened their narration by introducing, on various occaſions, ſpeeches, which are either oblique or direct; the former recited by the hiſtorian in his own perſon. Of this kind is that of Hannibal in Juſtin, by which he endeavours to perſuade king Antiochus to carry the heat of war againſt the Romans into Italy. Lib. xxxi. cap. 5. And in the latter, the perſon himſelf is introduced as addreſſing his audience; and therefore the words, as well as the ſenſe, are to be accommodated to his character. Such is the ſpeech of Eumenes, one of Alexander's captains and ſucceſſors, addreſſed to his ſoldiers, when they had traiterouſly bound him in chains, in order to deliver him up to his enemy Antigonus. Juſtin. lib. xiv. cap. 4.

With regard to direct ſpeeches, there are few ancient hiſtorians who have not adopted them, though ſome of our critics will only admit thoſe which were really ſpoken by the perſons to whom they are aſcribed. The firſt hiſtorian who introduced complete and finiſhed ſpeeches into hiſtory, is ſaid to be Thucydides, thoſe of Herodotus being but ſhort and imperfect. Letters are ſometimes met with in hiſtories, as well as ſpeeches: ſuch are thoſe of Alexander to Darius in Q. Curtius, lib. iv. cap. i. and thoſe of Tiberius and Druſus in Tacitus Ann. lib. i. 73. iii. 53. 59. Digreſſions alſo, when they are neither too long nor too frequent, may be ſo managed by the hiſtorian, as to afford the reader both delight and profit. With regard to the order of hiſtory, the hiſtorian ſhould ſo form his introduction, as to give ſome general view of the ſubject, to engage the reader's attention, and to poſſeſs him with a candid opinion of himſelf and of his performance: theſe ſhould be natural, and proportioned to the extent of the work. Such are thoſe of Livy, Herodotus, Thucydides, Tacitus, and others. But order is to be principally regarded in the body of the work: for this purpoſe the *hiſtoriographer* ſhould either attend to the time in a chronological ſeries, which is beſt in biography, after the manner of Plutarch and Cornelius Nepos; in the hiſtory of particular ſtates, after Thucydides, Livy, and Tacitus, and ſometimes alſo in a general hiſtory; though in this latter caſe the order of time cannot always be preſerved, and therefore the actions of each nation, when ſeveral ſtates are independent of each other, muſt neceſſarily be ſeparated, in order to prevent confuſion. This is the method adopted by Herodotus, Diodorus Siculus, and Juſtin. For the ſtyle of the hiſtorian, ſee STYLE.

So numerous and conſiderable are the qualifications neceſſary for a hiſtorian, that this province was formerly aſſigned by the eaſtern nations to a particular order of men; and both among the Greeks and Romans it was generally undertaken by perſons of figure, and ſuch as were eminent for learning, knowlege of the world, and other great abilities: and as it is of ſuch ſingular ſervice to mankind to have the records of paſt ages well and faithfully tranſmitted to poſterity, it is to be wiſhed that perſons of ſimilar character would, in all countries, undertake it. See farther on this ſubject Ward's Oratory, vol. ii. lect. 42, 43, 44, and 45.

The term is chiefly uſed for a perſon who has a peculiar charge and commiſſion to write the hiſtory of his time. The *hiſtoriographer* to his majeſty is an officer under the lord chamberlain; his ſalary 200*l.* per ann. There is an office of the ſame kind in Scotland, with the ſame ſalary.

HISTORY, a recital or deſcription of things as they are, or have been, in a continued orderly narration of the principal facts and circumſtances thereof. See ANNALS. The word is Greek, *ιϛορια*, *hiſtoria*; and literally denotes a ſearch of curious things, or a deſire of knowing, or even a rehearſal of things we have ſeen; being formed of the verb *ιϛορειν*, which properly ſignifies to know a thing by having ſeen it: though the idea appropriated to the term *hiſtory* is now much more extenſive, and we apply it to a narration of divers memorable things, even though the relater only takes them from the report of others. The origin of the word is from the verb *ισημι*, *I know*; and hence it is, that among the ancients ſeveral of their great men were called *polyhiſtores*, q. d. perſons of various and general knowlege.

Hiſtory is divided, with regard to its ſubject, into the *hiſtory of nature* and the *hiſtory of actions*.

HISTORY *of nature*, or *Natural* HISTORY, is a deſcription of natural bodies; whether terreſtrial, as animals, vegetables, foſſils, fire, water, air, meteors, &c. or celeſtial, as the ſtars, planets, comets, &c. See *Natural* HISTORY.

Natural hiſtory is much the ſame with what we otherwiſe call PHYSIOLOGY.

HISTORY, with regard to actions, is a continued relation of a ſeries of memorable events in the affairs either of a ſingle perſon, a nation, or ſeveral perſons and nations, and whether included in a great or little ſpace of time; or, it is a narrative of ſuch facts as are fit to be tranſmitted to poſterity for the uſe of mankind and the better conduct of human life. Cicero calls *hiſtory* the miſtreſs of life, (De Orat. lib. ii. cap. 9) as it teaches us both what we ought to purſue and what we ought to avoid.

Thus Thucydides has written the *Hiſtory* of Greece; Livy, that of Rome; Mezeray and F. Daniel, of France; Tyrrel, Echard, Rapin, &c. the *Hiſtory* of England; Buchanan, of Scotland; Clarendon, the *Hiſtory* of the Rebellion; and Thuanus, biſhop Burnet, &c. the *Hiſtory* of their own Lives and Times.

Euſebius, Baronius, &c. have written the *Hiſtory* of the Church; biſhop Burnet that of the Reformation, &c.

Several authors have written on the Method of reading and ſtudying *Hiſtory*; among the reſt Lucian, Bodin, Voſſius the elder, Whear, Patrici, Beni, Maſcardi, De Silhon, F. le Moine, F. Rapin, the abbot de St. Real, F. Thomaſſin, Freſnoy, &c.

Hiſtory, with reſpect to time, is divided into *ancient* and *modern*, diſtinguiſhed into ſeveral epochs, periods, and intervals.

The three periods of time into which *hiſtory* has been derived are the following: viz. the *firſt*, from the creation to the deluge, which age is reckoned uncertain, becauſe we know no more than the ſhort account given of it in the holy ſcriptures; the *ſecond*, from the deluge to the firſt Olympiad, which, from the many feigned ſtories related in it, is called the fabulous age; the *third*, from the firſt Olympiad to our own times, is called hiſtorical, becauſe the actions done in that period are recorded by writers of true *hiſtory*. See AGE.

The moſt ancient of the Greek hiſtorians now left is Herodotus, who lived, according to Sir Iſaac Newton's Chronology, a hundred and fifty-ſeven years after the building of Rome. And as to the Romans, Livy himſelf confeſſes, that there were ſcarce any certain memoirs of their affairs till the city was taken by the Gauls, which was above a hundred years later than Herodotus; the accounts before this time having been preſerved chiefly by tradition.

Hiſtory, with reſpect to its ſubject, is divided into *univerſal* and *particular*, *ſacred* and *profane*.

F. Meneſtrier gives us the proper characters of the divers kinds of *hiſtory* with great accuracy. He diſtinguiſhes *hiſtory* with regard to both its matter and its form, and gives curious inſtances of each particular.

Hiſtory, with regard to its matter, is either *ſacred*, or *natural*, or *civil*, or *perſonal*, or *ſingular*; to which ſome have added *artificial hiſtory*, giving an account of the origin and progreſs of arts; and *miſcellaneous hiſtory*, which recites many various things as they promiſcuouſly occur in human life.

HISTORY, *ſacred*, is that which lays before us the myſteries and ceremonies of religion, viſions or appearances of the Deity, &c. miracles, and other ſupernatural things, whereof God alone is the author. Such are the book of Geneſis, the Goſpels, Apocalypſe, &c. See MIRACLES, PROPHECY, REVELATION, &c.

To this head we may refer *eccleſiaſtical hiſtory*, which gives an account of the riſe and eſtabliſhment of the ſeveral religions and churches, of the riſe and progreſs of various opinions, ſects, &c. In ancient *ſacred hiſtory*, otherwiſe called the *hiſtory* of the Old Teſtament, there are ſeven remarkable periods. The firſt comprehends 1656 years, from the creation of the world to the deluge; ſee *Sacred* CHRONOLOGY. The ſecond period includes 857 years, from the DELUGE to the going forth of the Iſraelites out of Egypt. The third period begins with the exodus of the Iſraelites in 2513, extends to the times of the kings, and includes 396 years. The fourth period begins in the year of the world 2909, or from the beginning of the government by kings, and extends to the end of the Babyloniſh CAPTIVITY, or 3468th year of the world, including 559 years. The fifth period amounts to 372 years, from the year of the world 3468 to the year 3840, or to the times of the MACCABEES. The ſixth period begins with Judas Maccabæus, A. M. 3840, and is continued to the year 3964, or to Herod the Great, comprehending 124 years. The ſeventh or laſt period reaches from Herod the Great to the deſtruction of Jeruſalem, or the 70th year after the birth of Chriſt, containing 106 years.

In more *modern ſacred hiſtory*, more properly called *eccleſiaſtical hiſtory*, which denotes a clear and faithful narration of the tranſactions, revolutions, and events, that relate to the external and internal ſtate of the Chriſtian church, Dr. Moſheim has diſtinguiſhed four remarkable periods. The firſt comprehends the ſtate and viciſſitudes of the Chriſtian church, from its commencement to the time of Conſtantine the Great. The ſecond period extends from the reign of Conſtantine to that of Charlemagne, which produced ſuch a remarkable change in the face of Europe. The third period contains the *hiſtory* of the church from the time of Charlemagne to the memorable period when Luther roſe in Germany to oppoſe the tyranny of Rome, and to deliver divine truth from the darkneſs that covered it. The fourth period reaches from the time of Luther to the preſent times. On this plan Dr. Moſheim's Eccleſiaſtical *Hiſtory*, a work deſervedly held in great eſteem, is divided into four books, containing the *hiſtory* of the centuries comprehended by the above periods according to the order of time. See Holberg's Introduction to Univerſal *Hiſtory*, tranſlated by Dr. Sharpe, with notes, &c. p. 55, &c. ed. 1758; and Moſheim's Eccleſiaſtial *Hiſtory*, tranſlated by Dr. Macleane, with notes, &c. ed. 1758, vol. i. p. 12.

HISTORY, *natural*, is a deſcription of the ſingularities of nature, its irregularities and prodigies, and the alterations it undergoes in the birth, progreſs, end, and uſe of things. Such is Ariſtotle's *Hiſtory* of Animals, Theophraſtus's *Hiſtory* of Plants, and the entire body of Natural *Hiſtory* by Pliny; ſuch alſo are Acoſta's Natural *Hiſtory* of the Indies, Plott's *Hiſtory* of Staffordſhire, &c.

HISTORY, *civil*, is that of people, ſtates, republics, communities, cities, &c. Such are thoſe of Thucydides, Halicarnaſſeus, Livy, Polybius, Mezeray, F. Daniel, Milton, Buchanan, &c.

Civil hiſtory may be again ſubdivided into *particular* and *general*: the former conſiſts of a number of facts relating to the ſame ſtate, ſuitably connected and laid together in a proper ſeries; ſuch are Thucydides's *Hiſtory* of the Peloponneſian War, compriſing the events of the firſt twenty years of that war; Salluſt's *Hiſtory* of the War between the Romans and King Jugurtha in Africa; and Cæſar's *Hiſtory* of his own Gallic and Civil Wars: the latter, or *general hiſtory*, is made up of ſeveral particular *hiſtories*, whoſe ſeparate tranſactions within the ſame period of time, or part of it, ſhould be ſo diſtinctly related as to cauſe no confuſion; ſuch are thoſe of Diodorus Siculus, of Herodotus, of Juſtin, of Xenophon, and of Polybius, among the ancients; and Thuanus's *Hiſtory*, Lord Lyttelton's *Hiſtory* of Henry II. Dr. Robertſon's *Hiſtory* of Charles V. &c. among the moderns.

Civil hiſtory, in its more unlimited extent, is denominated *univerſal hiſtory*.

History, *perſonal*, is that which gives the portrait or life of ſome ſingle perſon. Such are the Lives of Plutarch, Cornelius Nepos, Suetonius, &c. and the Lives of the painters, philoſophers, ſaints, &c.

Perſonal hiſtory is the ſame with what we otherwiſe call BIOGRAPHY, and may be denominated *literary hiſtory*, as it records the lives and productions of learned men, the controverſies that ſubſiſted amongſt them, and the riſe and advancement of ſciences.

History, *ſingular*, is that which deſcribes a ſingle action, ſiege, battle, or even a war or expedition, &c. Such was the Conſpiracy of Catiline to ſubvert the Roman State, written by Salluſt.

Hiſtory, with regard to its form, is either *ſimple*, or *figurative*, or *mixed*.

History, *ſimple*, is that delivered without any art or foreign ornament; being only a naked and faithful recital of things, juſt in the manner and order wherein they paſſed. Such are the Chronicles of the Eaſtern Empire, the Faſti, Chronological Tables, Journals, &c.

History, *figurative*, is that which is farther enriched with ornaments, by the wit, ingenuity, and addreſs of the hiſtorian. Such are the political and moral *Hiſtories* of the Greeks, Romans, and moſt of the moderns.

This latter is a kind of rational *hiſtory*, which, without ſtopping at the ſhell or outſide, the appearances of things, diſcovers the ſecret ſprings and movements of the ſeveral events; it enters into the thoughts, the breaſts of the perſons concerned therein; diſcovers their intentions and views; and, by the reſult of enterprizes and undertakings, diſcovers the prudence or weakneſs wherewith they were laid, conducted, &c. Theſe are much the moſt uſeful and entertaining *hiſtories*. To this claſs may be particularly referred the *Hiſtories* and Annals of Tacitus, among the ancients; and thoſe of Guicciardin, Thuanus, and biſhop Burnet, among the moderns.

History, *mixed*, is that which, beſide the ornaments of figured *hiſtory*, calls in the proofs and authorities of ſimple *hiſtory*, furniſhing authentic memoirs, or original letters, maniſeſtoes, declarations, &c. to vouch the truth of what is ſaid. Such are *Hiſtories* or Collections of Ruſhworth, M. Rapin Thoras's *Hiſtory* of England, the Geneological *Hiſtories* of Ducheſne, M. De Marca's *Hiſtory* of Berne, &c.

History is alſo uſed for a ROMANCE, or a fabulous but probable relation of a ſeries of actions or adventures feigned or invented by the writer.

Such is the *Hiſtory* of the Civil Wars of Grenada, the *Hiſtory* of Don Quixote, the Ethiopic *Hiſtory* of Heliodorus, &c.

History, in *Painting*, denotes a picture compoſed of divers figures or perſons, repreſenting ſome tranſaction or piece of *hiſtory*, either real or feigned.

Painters are diſtinguiſhed into portrait painters, flower and fruit painters, painters of beaſts and landſcapes, and *hiſtory* painters. The firſt place is univerſally allowed to *hiſtory* painters, as the moſt difficult, maſterly, and ſublime province.

HISTRIO, in the *Ancient Drama*, ſignified an actor or comedian; but more eſpecially a pantomime, who exhibited his part by geſtures and dancing.

Livy informs us, that the *hiſtriones* were brought to Rome from Etruria, in the year of the city 391, Dec. i. lib. 7.

HISTRIX. See PORCUPINE.

HITCH, on *Ship-board*, a word denoting a ſort of knot or nooſe, by which one rope is faſtened to another, or to ſome other object, and hence uſed for catching hold of any thing with a hook or a rope, and to hold it faſt. Thus, when the boat is to be hoiſed in, they ſay, *hitch* the tackles into the rings of the boat; and, when about to weigh anchor, *hitch* the fiſh-hook to the fluke of the anchor.

HITCHEL, the ſame with HATCHEL.

HITCHING, in *Horſemanſhip*, is to wriggle or move forwards by degrees, or to knock the legs together in walking.

HIVE. *Bee-hives*, in different places and on different occaſions, are of very different materials. In ſome places the hollow trunk of a tree ſerves the purpoſe; in others they are made of four boards nailed together in the ſhape of a long box, and placed with one end upon the ground, or upon a frame of wood-work erected for that purpoſe. The moſt uſual form of them, however, is conic and bell-faſhioned; and the common materials of which they are made are twiſted oſier or ſtraw, nicely matted together, and made into a ſort of thick cords, bound round with oſier-bark. The laſt is the moſt common kind, and ſerves perfectly well for all the purpoſes of the bees, and of the perſons who make their profits of the honey. The lodgment is ſufficiently warm and cloſe for the bees, and a thin frame of boards defends it from being injured by the wet. But perſons of ſpeculative diſpoſitions have at all times been deſirous of ſeeing what paſſed in the *hive*, and of obſerving theſe induſtrious inſects at their work: for this purpoſe the ancients contrived a method of placing certain ſquares or panes of a tranſparent matter, ſuch as horn, or the lapis ſpecularis, or iſinglaſs, in ſome parts of the ſides of the *hive*, through which they might ſee all that paſſed within. This is mentioned by Ariſtotle, Pliny, and others; but it ſoon ſunk into diſuſe, and in later ages it has been ſuppoſed to be an idle attempt. Mouffet, in particular, ridicules it, and ſays, that the bees within would immediately ſpoil the tranſparence of any materials thus employed.

This practice of the ancients ſeems to have been firſt revived in our country by Mr. Jeddie, who, in the year 1665, publiſhed his invention of boxes for preſerving the lives of bees, and obtained a patent from king Charles. Theſe were improved by Joſeph Warder, phyſician at Croydon, who enriched his account of the ſtructure and uſe of theſe boxes, with ſeveral other curious circumſtances concerning bees, in his work entitled The true Amazons, or the Monarchy of Bees. But this method was far from being generally known in the year 1680, ſince Swammerdam ſeems to have been altogether unacquainted with it; and to this we are to impute the imperfections of that author's account of bees, becauſe, though a moſt accurate and faithful writer, he had no opportunities of ſeeing what has been ſince diſcovered with this advantage.

Of late, however, this invention has been commonly practiſed. A tranſparent ſort of *bee-hive* may eaſily be made, by leaving certain ſquares in a wooden hive open, and afterwards faſtening clear glaſs in theſe vacant ſpaces: a frame of wood may cover the whole, ſo that the light is not always let in upon the bees, and the covering may be removed when the obſerver is to examine their operations. By this means it is found, that the ſquares of glaſs, when properly placed, will keep clean and tranſparent for many years; and when they are ſullied, there are eaſy methods of cleaning them, by taking them out and replacing them when they have been wiped. When the obſerver places himſelf behind the *hive*, and has one of theſe ſquares of glaſs before his eye, he ſees exactly all that paſſes within, without incommoding or interrupting the creatures at their work. Theſe glaſs *hives*, however, are chiefly objects of curioſity, though, in ſome inſtances, they have led to diſcoveries that muſt gradually contribute to the improvement of the œconomy of theſe uſeful inſects.

The principal advantage derived from *hives* of modern conſtruction, is that of obtaining the honey and wax without recurring to the barbarous expedient of deſtroying the bees. In the common method, a hole is dug near the *hive*, (generally in the month of September,) and a ſtick, at the end of which is a rag that has been dipped in melted brimſtone, is fixed in the hole; and, when the rag is ſet on fire, the *hive* is immediately put over it, and the earth thrown up round it, ſo that none of the ſmoke can eſcape; and thus the bees are inhumanly and needleſsly deſtroyed. The heavieſt and lighteſt *hives* are treated in this manner; the former, becauſe they yield the greateſt profit, with an immediate return; and the latter, becauſe the bees in them would not be able to ſurvive the winter. Thoſe *hives* which weigh from fifteen to twenty pounds are thought to be the fitteſt for keeping.

The method of preſerving the lives of bees has been brought to a conſiderable degree of perfection by the late Mr. Thorley of Oxfordſhire, and Mr. White of Suffolk. Mr. Thorley, who takes the lead in this improvement, prefers colonies to *hives* for the following reaſons: 1. The more certain preſervation of many thouſands of theſe uſeful inſects. 2. Their greater ſtrength, conſiſting in their number, and their correſponding ſecurity from robbers. 3. Their greater wealth, ariſing from their united labours. To this purpoſe he tells us, that he has, in ſome ſummers, taken two boxes filled with honey (moſt of it being pure virgin honey of the beſt kind) from one colony, and left ſufficient ſtore for their maintenance: add to theſe advantages, the pleaſure of viewing them, with the greateſt ſafety, at all ſeaſons, even in their buſieſt time of gathering, and their requiring a much leſs attendance in ſwarming time. The bees thus managed are alſo more effectually ſecured from wet and cold, from mice, and other injuries.

Mr. Thorley's boxes are made of deal, which, being ſpongy, ſucks up the breath of the bees ſooner than a more ſolid wood would do; and yellow dram-deal, thoroughly ſeaſoned, he ſays, is the beſt.

The beſt form of theſe boxes is an octagon, which, being nearer to a ſphere, allows the bees in winter to lie in a round body near the center of the *hive*; and thus a due heat is conveyed to all the exterior parts, and the honey is kept from candying. The dimenſions, which be he recommends, after long trial, are ten inches deep in the inſide, the top-board a full inch, and the breadth within twelve or fourteen inches. He has tried boxes containing a buſhel or more, but found them not to anſwer the deſign like thoſe of a leſs ſize. The top of the box ſhould be made of an entire board, or of two boards well glued together, which ſhould be a full inch thick after it has been planed, and project on all ſides at leaſt an inch beyond the dimenſions of the box. In the midde of this top there muſt be a hole five inches ſquare, for a communication between the boxes; and this hole ſhould be covered with a ſliding ſhutter of deal or elm, running eaſily in a groove, over the back-window. The eight pannels, nine inches deep, and three quarters of an inch thick when planed, are to be let into the top, ſo as to keep them in their proper places; to be ſecured at the corners with plates of braſs, and to be cramped with wires at the bottom, in order to keep them firm. There ſhould be a glaſs window behind, fixed in a frame, with a thin deal cover, two ſmall braſs hinges, and a button to faſten it: this window will ſerve for inſpecting the ſtate and operations of the bees. Two braſs handles, one on each ſide, are neceſſary to lift up the box; theſe ſhould be fixed in with two thin plates of iron, near three inches long, ſo as to turn up and down within the box, and put in three inches below the top-board, which is nailed down cloſe with ſprigs to the other parts of the box. Thoſe who chuſe a frame within, to which the bees may faſten their combs, need only uſe a couple of deal ſticks of an inch ſquare, placed acroſs in the box, and ſupported by two pins of braſs; one an inch and a half below the top, the other two inches below it; by which means the combs will quickly find a ſtay. There muſt alſo be a paſſage, four or five inches long, and leſs than half an inch deep, for the bees to go in and out at the bottom of the box.

The boxes, thus prepared, ſhould be kept in a houſe or under a ſhed, the diſpoſition and ſtructure of which Mr. Thorley has particularly deſcribed. He alſo recommends to paint the apertures of the boxes, which are the habitations of the ſeveral colonies, with different colours, as red, white, blue, yellow, &c. in form of a half moon or ſquare, that the bees may the better know their own home. For the method of furniſhing theſe colonies with inhabitants, ſee HIVING.

Mr. Thorley, ſon to the above mentioned gentleman, has, by long experience, improved his father's method of managing bees. The *bee-hive* of his conſtruction, preſented to the Society of Arts, &c. is exhibited in *Tab. Huſbandry, fig.* 3.

The bottom part, marked *a*, is an octangular bee-box, made of deal boards, about an inch in thickneſs, the cover of which is externally ſeventeen inches in diameter, but internally only fifteen and a half, and its height ten inches. In the middle of the cover of this octangular box is a hole, which may be opened or ſhut at pleaſure, by means of a ſlider *d*. In one of the pannels is a pane of glaſs, covered with a wooden door *e*. The entrance *f*, at the bottom of the box, is about three and a half inches broad, and half an inch high. Two ſlips of deal, about half an inch ſquare, croſs each other in the center of the box, and are faſtened to the pannel by means of ſmall ſcrews: to theſe ſlips the bees faſten their combs. In this octangular box the bees are hived, after ſwarming, in the uſual manner, and there ſuffered to continue till they have built their combs and filled them with honey; which may be known by opening the door, and viewing their works through the glaſs pane, or by the weight of the *hive*.

When the bee-maſter finds his laborious inſects have filled their habitation, he is to place a common *bee-hive* of ſtraw, repreſented at *b*, made either flat at the top, or in the common form, on the octangular box, and drawing out the ſlider, a communication will be opened between the box and the ſtraw *hive*; in conſequence of which the bees will fill this *hive* alſo with the product of their labours.

When the ſtraw *hive* is well filled, the ſlider may be puſhed in, and the *hive* taken away, and another placed in its room, with the ſlider drawn out. This new *hive* will alſo be filled in the ſame manner.

By proceeding in this method, Mr. Thorley aſſured the ſociety, that he had taken three ſucceſſive *hives* filled with honey and wax, from a ſingle *hive*, during the ſame ſummer, and that the food ſtill remaining in the octangular box was ſufficient for the ſupport of the bees during the winter. He adds, that, if this method was purſued in every part of the kingdom, inſtead of the cruel method of deſtroying theſe uſeful inſects, he is perſuaded, from long experience, that wax would be collected in ſuch plenty, that candles made with it might be ſold as cheap as thoſe of tallow are ſold at preſent.

Mr. Thorley has alſo added another part to his *bee-hive*, which cannot fail of affording the higheſt entertainment to a curious and inquiſitive mind. This part conſiſts of a glaſs receiver eighteen inches high, eight inches in diameter at the bottom, and in the greateſt part thirteen: this receiver has a hole at the top, about an inch in diameter, through which a ſquare piece of deal is extended nearly to the bottom of the veſſel, having two croſs-bars, to which the bees faſten their combs. Into the other end of this ſquare piece is ſcrewed a piece of braſs, which ſerves for a handle to the receiver or glaſs *hive*. When the bees have filled their ſtraw *hive*, which muſt have a hole in the center covered with a piece of tin, Mr. Thorley places the glaſs receiver upon the top of the ſtraw *hive*, and draws out the piece of tin. The bees now finding their habitation enlarged, purſue their labours with ſuch alacrity, that they fill this glaſs *hive* likewiſe with their ſtores: and as this receptacle is wholly tranſparent, the curious obſerver may amuſe himſelf with viewing the whole progreſs of their works. It will, however, be neceſſary to cover the glaſs with an empty *hive* of ſtraw, or at leaſt with a cloth, which may be eaſily removed when the bees are inſpected, leſt too much light prevent their working. In this way Mr. Thorley, in a good ſeaſon, has had a glaſs filled in thirty days, containing thirty-eight pounds of fine honey.

When the glaſs is completely filled, ſlide a tin plate between the glaſs and the *hive* or box, ſo as to cover the paſſage, and in half an hour the glaſs may be taken away with ſafety. The few bees that remain will readily go to their companions.

Mr. Thorley has added a glaſs window to his ſtraw *hives*, in order to obſerve the progreſs of the bees; and this contrivance is uſeful, eſpecially if one *hive* is to be removed whilſt the ſeaſon continues favourable for their collecting of honey; for when the combs are filled with honey, the cells are ſealed up, and the bees forſake them, and reſide moſtly in the *hives* in which their works are chiefly carried on. Obſerving alſo, that the bees were apt to extend their combs through the paſſage of communication into the upper *hive*, which rendered it neceſſary to divide the comb when the upper *hive* was taken away, he puts in that paſſage a wire ſcreen or netting, the meſhes of which are large enough for a loaded bee to paſs eaſily through them; and thus he prevents the junction of the combs from one box to the other, and conſequently obviates the neceſſity of cutting them, and of ſpilling ſome honey, which running down among a crowd of bees, incommoded them much.

Mr. White, in his directions for making the bee-boxes of his invention, tells us, ſpeaking of the conſtruction of a ſingle box, that it may be made of deal or any other well-ſeaſoned boards, which are not apt to warp or ſplit. The boards ſhould be near an inch thick; the figure of the box ſquare, and its height and breadth nine inches and five eighths every way, meaſuring within. A box of theſe dimenſions will contain near a peck and a half. The front part muſt have a door cut in the middle of the bottom edge, three inches wide, and near half an inch high. In the back part a hole muſt be cut with a rabbit in it, in which is to be fixed with putty a pane of the cleareſt and beſt crown-glaſs, about five inches long and three broad; and let the top of the glaſs be placed as high as the roof within-ſide, that the upper part of the combs may be ſeen: and thus the ſtate and ſtrength of the bees may be judged better of than if the glaſs were fixed in the middle. The glaſs muſt be covered with a thin piece of board, as a ſhutter, which may be made to hang by a ſtring, or turn upon a nail, or ſlide ſideways between two mouldings. The glaſs may be made large, or another pane of glaſs may be fixed on the top and covered with a ſhutter, for the convenience of obſerving the bees at their work. The ſide of the box, which is to be joined to another box of the ſame form and dimenſions, as it will not be expoſed to the external air, may be made of a piece of ſlit deal not half an inch thick. This Mr. White calls the ſide of communication, becauſe it is not to be wholly incloſed: a ſpace is to be left or cut at the bottom through the whole breadth of the box, and a little more than an inch in height, and a hole or paſſage is to be made at the top, three inches long, and more than half an inch wide. Through theſe the bees are to have a communication from one box to another. In the next place a looſe board is to be provided, which board is to be half an inch thick, and large enough to cover the ſide of communication; and likewiſe ſeveral little iron ſtaples, an inch and a half long, with the two points or ends bending down more than half an inch: the uſe of this part of the apparatus will appear under the article HIVING. Moreover, let two ſticks be fixed in the box tranſverſely and croſſing each other, in order to be a ſtay to the combs; one about three

three inches from the bottom, and the other at the ſame diſtance from the top; and when the whole is painted, in order to render it more durable, the box is finiſhed. This box, ſays the inventor, is as plain as poſſible: it is little more than five ſquare pieces of board nailed together; ſo that any poor cottager may make his own boxes, without the help or expence of a carpenter.

The other box muſt be exactly of the ſame form and dimenſions; and the two boxes differ only in this, that the ſide of communication of the one muſt be on the right hand, and of the other on the left. The two boxes with their openings of communication, ready to be joined to each other, are repreſented in *Tab. Huſbandry*, *fig*. 4.

In *fig*. 5. is exhibited the front of a frame for twelve colonies; *a*, *a*, are two cells of oak, lying flat on the ground, more than four feet long: in theſe cells are fixed four oaken poſts, about the thickneſs of ſuch as are uſed for drying linen. The two poſts *b*, *b*, in the front, are about ſix feet two inches above the cells; the other two, ſtanding backward, five feet eight inches. You are next to nail ſome boards of ſlit deal horizontally from one of the fore-poſts to the other, in order to ſcreen the bees from the ſun: let theſe boards be ſeven feet ſeven inches in length, and nailed to the inſide of the poſts, and be well ſeaſoned, that they may not ſhrink or gape in the joints: *c*, *c*, are two ſplints of deal, to keep the boards even and to ſtrengthen them.

Fig. 6. repreſents the back of the frame: *d*, *d*, *d*, *d*, are four ſtrong boards of the ſame length with the frame, on which the boxes are to be placed; let the upper ſide of them be very ſmooth and even, that the boxes may ſtand true upon them, or it may be more adviſeable to place under every pair of boxes a ſmooth thin board, as long as the boxes, and about a quarter of an inch wider. The bees will ſoon faſten the boxes to this board in ſuch a manner, that you may move or weigh the boxes and board together, without breaking the wax or reſin, which, for many reaſons, ought to be avoided.

Theſe floors muſt be ſupported by pieces of wood or bearers *e*, *e*, &c. which are nailed from poſt to poſt at each end: they are likewiſe to be well railed to the frame, to keep them from ſinking with the weight of the boxes. *f* repreſents the roof, which projects backwards about ſeven or eight inches beyond the boxes, to ſhelter them from the rain.

You have now only to cut niches or holes in the frame over againſt every entrance into the boxes, as *h*, *h*, *h*, *fig*. 5. let theſe niches be near four inches long, and under each nail a ſmall piece of wood for the bees to light upon. The morning or evening ſun will ſhine upon one or both ends of the frame, let its aſpect be what it will; but you may prevent its over-heating the boxes, by a looſe board ſet up between the poſts, and kept in by two or three pegs.

In order to take away part of the honey, without deſtroying or much diſturbing the bees, Mr. White adviſes to examine the ſtate of the colonies about the latter end of Auguſt through the glaſſes; and he obſerves, that ſuch as have filled a box and a half with their works may ſpare the half box; but the honey-comb ſhould be particularly examined, and about eight or nine pounds left for their winter ſtore. When this is done, open the mouth of the box you intend to take; then, with a thin knife, cut through the reſin with which the bees have joined the boxes to each other, till they are ſeparated; and, after this, thruſt a ſheet of tin gently between the boxes. The communication being thus ſtopped, the bees in the fulleſt box, where moſt probably the queen is, will be a little diſturbed; but thoſe in the other box, where there is no queen, will be in the utmoſt confuſion, running to and fro with a kind of mournful cry, and iſſuing out at the newly opened door in great diſorder: however, when they have got abroad, and diſcover their companions, they eagerly join them at the mouth of the other box. By this means, in an hour or two, you will have a box of pure honey, without a living bee to moleſt you, or any dead bees to waſte and damage the honey.

Mr. White's boxes are convenient for feeding poor ſtocks in order to preſerve them, and alſo for removing moths and inſects from any colony that is in danger of being injured by them.

Mr. Wildman recommends the following method of taking the wax and honey, without deſtroying the bees: remove the *hive*, from which you would take the wax and honey, into a room, into which little light is admitted; invert the *hive* gently, placing it on any ſupport, and cover it with an empty *hive*, keeping the ſide next the window of the empty *hive* raiſed a little, to give the bees ſufficient light to find their way into it: while you hold the empty *hive* ſteadily ſupported on the edge of the full *hive*, between your ſide and your left arm, keep ſtriking with your hand all round the full *hive* from top to bottom, in the manner of beating a drum, ſo that the bees may be frightened by the noiſe, and mount out of the full *hive* into the empty one. As ſoon as all the bees are out of the full *hive*, which will generally be in about five minutes, the other *hive*, in which they are collected, muſt then be placed on the ſtand from which the full *hive* was taken, in order to receive the abſent bees as they return from the fields.

If this be done early in the ſeaſon, the operator ſhould examine the royal cells; for if any of them contain young bees, they, as well as all the combs that have young bees in them, muſt be preſerved in the *hive*. Take out the other combs with a long, broad, and pliable knife, cutting them from the ſides and crown as clear as poſſible, to prevent the future labour of the bees, who muſt lick up all the honey ſpilt, and remove every grain of wax. The ſides of the *hive* ſhould then be ſcraped with a table ſpoon, to clear away what was left by the knife.

Having thus taken the wax and honey, let a table, covered with a clean cloth, be placed near the ſtand, and giving the *hive*, in which the bees are, a ſudden ſhake, ſtriking at the ſame time with a conſiderable degree of force, the bees will be ſhaken on the cloth. Put their own *hive* upon them immediately, raiſed a little on one ſide, that the bees may the more eaſily enter; and when all are entered, place it on the ſtand as before. If the *hive*, in which the bees are, be turned uppermoſt, and their own *hive* placed over it, the bees will immediately aſcend into it, eſpecially if the lower ſides be ſtruck to alarm them; for the effects of fear, impreſſed on the bees by the continual noiſe, renders them for a conſiderable time ſo mild and tractable, that they will bear any handling, which does not hurt them, without any ſigns of reſentment.

Mr. Thorley objects to the method of driving bees, in order to obtain their honey, becauſe the honey will be foul and corrupted, and great numbers of the young brood will thus be utterly deſtroyed, and the ſtocks much reduced and endangered. See on the ſubject of this article, Thorley's Inquiry into the Nature, Order, and Government of Bees, 1774; White's Collateral Bee-Boxes; Wildman, &c. on Bees.

HIVE *droſs*, a name ſometimes given to crude or rough wax. See WAX.

HIVING, the placing a ſwarm of bees in a hive, in order to have the profit of their labours. When the ſwarm of bees has left an old hive, and is placed in form of a cluſter hanging down from the branch of ſome ſhrub or low buſh, the *hiving* is extremely eaſy, and may be done in half an hour after the time of their being ſtill and calm in the cluſter; or it may be let alone till an hour or two before ſunſet, provided that the ſun do not ſhine too vehemently upon the place where they are, for that would diſquiet them, and force them to riſe; and, in that caſe, they uſually take a long flight before they ſettle again, and are very often loſt: this, however, may at any time be prevented, by placing an artificial ſcreen before them, compoſed either of coarſe cloth, or of a few branches of trees well covered with leaves.

It is commonly the branch of ſome ſhrub or tree that they ſettle upon, and we always find that they mean this as their ſettled habitation; for, however ſoon they are hived, the rudiments and beginnings of combs are found on it. It is true, they always leave theſe places, if left to themſelves, in five or ſix days; but this is not till they find them ſo inconvenient that they cannot keep them, either from their being too much ſcorched by the ſun, or expoſed to winds and rain. The quantity of wax and honey left in theſe places, when they have quitted them, abundantly proves, however, that they had meant them for their fixed abode.

When they are placed in a hive, they very ſoon find themſelves much better lodged than in the place they had provided for themſelves; and they uſually ſtay in it, and begin to work the next morning.

It might appear a very difficult taſk to get ſo large a number of bees into a hive, but it is much leſs ſo than it appears to be. They will often take poſſeſſion of the hive of their own accord when it is hung over them; but the ſhorteſt way is to hold the hive under the branch where they are, and then ſweep them down into it. This may be done with a branch of a tree with its leaves on it, or with the hand armed with a ſtrong glove, and the face covered. But there are country fellows who will go without any ſort of defence, and with their naked hand ſweep them carefully off the bough into the hive, which they hold in the other hand underneath.

It is not to be expected that the whole ſwarm will be thus ſwept peaceably into the hive; many will fly away, and many cluſters will fall beſide the hive to the ground. All this, however, creates no difficulty; for the hive being turned bottom upwards, and ſet on the ground near the tree, with its edges a little raiſed above the ſurface, thoſe bees which fell in cluſters to the ground will ſoon crawl to their companions in the hive, and ſoon after, thoſe which flew off will deſcend and follow their example. If it happen, however, that ſome bees will obſtinately keep to the place where they at firſt fixed themſelves, the branch is to be rubbed over with the juice of ſuch plants as theſe creatures hate the ſmell of; ſuch are elder, rue, and ſome others. And if this does not ſucceed, there muſt be linen rags burnt under them, the ſmoke of which will ſoon drive them off, and make them join their companions, who find themſelves more at eaſe in the hive.

As it is neceſſary to render the places diſagreeable to the bees from which they are to be taken into the hive, ſo many people think it very proper to prepare the hive for their reception, by ſcenting it with ſuch things as they love the ſmell of. To this purpoſe they rub the inſide of it with baum and bean-flowers, and daub a little honey in ſome parts of it. This, however, does not ſeem neceſſary, thoſe hives having been found to ſucceed full as well where it was not done, as thoſe where it was. Reaumur's Hiſt. Inſ. vol. x. p. 305.

If it be about noon that the ſwarm is taken into the hive, it muſt not be removed from the place before evening; and in the mean time it muſt be ſheltered from the too violent heat of the ſun by the ſhade of the trees; or, if that be not ſufficient, a ſort of ſcreen muſt be made for it, either of a coarſe cloth properly ſupported, or of branches of trees with their leaves on. In this manner it muſt remain till ſunſet, and then the hive muſt be gently liſted up, and carried to the place where it is to remain, and the next morning the bees will be ſeen as buſy in their work in it, as the old ſwarm in their hive. See HIVE.

It ſometimes happens that the ſwarm is not placed ſo favourably as in the inſtance before mentioned; they often hang themſelves in a long cluſter from the young ſhoots or ſmall branches of high trees; and in this caſe many different expedients are to be uſed to hive them, according to the circumſtances of their poſition. The common method is for one man to climb the tree with a long ſtaff in his hand, and another to mount a ladder placed againſt the tree, and hold the hive under the ſwarm, while the other ſweeps them into it with the ſtaff; and when the bough on which they hang is ſo far from the body of the tree that this is impracticable by the ladder, the hive is to be fixed to the end of a long pole, and by that means ſuſpended under the ſwarm while they are ſwept into it. When all this is impracticable, becauſe of the great height of the branch on which the ſwarm hangs, a large cloth is to be ſpread on ſome of the lower branches, and the whole ſwarm ſwept down in a cluſter upon it; this is then to be thrown carefully to the ground, and another perſon is to be ready there to place the hive over the greater part of the cluſter, and the reſt will uſually ſoon creep into it and join them. If they are ſlow in doing this, they are to be driven in by burning linen rags about the places where they fly, the diſagreeable ſmell of which will ſend them towards the hive, where, finding their companions not incommoded with it, they will naturally remain.

Another method of getting a ſwarm from a branch of a high tree, is to cut off the branch with a ſaw, as gently and with as little diſturbance to the bees as poſſible. In this caſe, when the branch is off, a man may carefully deſcend with it, and the bees will not quit their hold, but will be all carried where he pleaſes with it, and may by that means be very eaſily put into a hive.

Sometimes the bees, which go out in a ſwarm, fix upon a hole in a wall, or a hollow in the trunk of a tree, for the aſſembling themſelves. This is a much better choice for them than the branch of a tree, but it is much worſe for the perſon who is to hive them, for they are very difficult to be got out of theſe places. The common way of the country people is to attack theſe ſwarms in the middle of a cold night, and they then enlarge the opening from without, and placing the hive under it, ſcoop the bees out of their neſt with a ladle, and put them into the hive.

Mr. Thorley tells us, that the beſt time to plant colonies of bees is either in March or April with new ſtocks, or in May or June with ſwarms. If ſwarms are uſed, procure, if poſſible, two the ſame day, and put them together in two boxes, or in a hive and a box; at night place them in your houſe, and with a knife and a little lime and hair, ſtop cloſe the mouth of the hive or upper box, ſo that not a bee may be able to go in or out, except at the front door. If boxes are employed, you will, in a week or ten days, ſee the combs appear in them; but in a hive nothing can be obſerved till the bees have wrought down into the box. Never plant a colony with a ſingle ſwarm, as Mr. Thorley ſays he has ſometimes done, but with little ſucceſs.

When the ſecond box, or the box under the hive, appears full of bees and combs, it is a proper time to raiſe the colony in the duſk of the evening, which ſhould be done in the following manner: place your empty box, with the ſliding ſhutter drawn back, behind the houſe near the colony that is to be raiſed, and at nearly the height of the floor, by the help of another empty box upon the ground; then lifting up the colony with as much expedition as poſſible, ſet it down upon the empty box, with the aperture of the colony cloſe to the piece of wood nailed upon it, ſo that no ſingle bee may get out: when this is done, lift the *hive* and two boxes, or the three boxes, into the houſe again, putting them in their proper place.

Mr. Thorley farther adds, that the moſt effectual method of preſerving bees in common hives is incorporation, or uniting two ſtocks into one, by the help of a peculiar fume or opiate, which will put them entirely in your power for a time, ſo that you may diſpoſe of and diſtribute them at pleaſure. The queen, in this operation, is immediately to be ſearched for and detained. Hives or ſtocks, which have ſwarmed once or twice, and are conſequently reduced in their number, are the fitteſt to be joined together, as they will be thus greatly ſtrengthened and improved. However, if you have a ſtock both rich in honey and full of bees, you may take it, by dividing the bees into two parts, and putting them into two other hives inſtead of one. But be careful to examine, whether the ſtock to which you deſign to join the bees of another has honey enough to maintain the bees of both; for which purpoſe it ſhould be full twenty pounds in weight.

The ſtupifying fume uſed in this proceſs is the fungus maximus or pulverulentus, or larger muſhroom, commonly known by the name of bunt, puckfiſt, or frogcheeſe: it is as big as a man's head or bigger; when ripe, it is of a brown colour, turns to powder, and is exceedingly light. Put one of theſe pucks into a large paper, preſſing it to two thirds or nearly half its bulk, and tying it very cloſe; then place it in an oven ſome time after the houſhold bread is drawn, and let it remain there all night; when it is dry enough to retain fire, it is fit for uſe in the following manner: cut off a piece of the puck as large as a hen's egg, and fix it in the end of a ſmall ſtick ſlit for the purpoſe, and ſharpened at the other end, and place this ſo that it may hang near the middle of an empty hive; this hive muſt be ſet with the mouth upward, in a pail or bucket, near the ſtock you intend to take: then ſet fire to the puck, and immediately place the ſtock of bees over it, tying a cloth round the hives, that no ſmoke may eſcape. In a little while you will hear the bees fall like drops of hail into the empty hive. You may then beat the top of the hive gently with your hand, to get as many out of them as you can: after this, looſening the cloth, lift off the hive to a table, knock it ſeveral times againſt the table, and ſeveral more bees will tumble out, and perhaps the queen among them; ſhe is often one of the laſt that falls: if ſhe is not there, ſearch for her among the main body in the empty hive, ſpreading them for this purpoſe upon a table. You muſt proceed in the ſame manner with the other hive, with the bees of which theſe are to be united.

One of the queens being found, you muſt put the bees of both hives together; mingle them thoroughly, ſprinkling them at the ſame time with a little ale and ſugar, and put them among the combs of the latter hive, ſhaking them down in it. When they are all depoſited, cover the hive with a cloth, bound cloſe about it, and let them remain ſhut up all that night and the next day. Some time after this you will be ſenſible that they are awakened out of ſleep. The ſecond night after their union, in the duſk of the evening, gently remove the cloth from the mouth of the hive (taking care of yourſelf), and the bees will immediately ſally forth with a great noiſe; but it being too late for them to take wing, they will ſoon return again: then inſerting two pieces of tobacco-pipes to let in air, ſtop them cloſe as before, and keep them thus confined for three or four days longer, after which the door may be left open.

The beſt time of the year for uniting them is when the young brood are all out, and before they begin to lodge in the empty cells, which they do in great numbers in cold weather and in winter. The operation ſhould be performed early in the afternoon, that having the greater light, the queen may be more eaſily found. The few bees that are left in the hive ſhould be ſuffocated with ſulphur.

Mr. Thorley obſerves, that he never knew ſuch combined ſtocks conquered by robbers, and that they will either ſwarm the next ſummer, or yield a hive full of honey.

Mr. White's method of *hiving* a ſwarm into one or more of his boxes is as follows: take the looſe board, mentioned under the article Hive, and faſten it to one of the boxes, ſo as to ſtop the communication; this may be done by three of the ſtaples there mentioned, one on the top of the box near the front, the two others on the back near the top and near the bottom: let one end of the ſtaple be thruſt into a gimblet-hole made in the box, ſo that the other end may go as tight as poſſible over the looſe board, to keep it from ſlipping when it is handled. Be careful to faſten the ſhutter ſo cloſe to the glaſs, that no light may enter through it; and cover the box as ſoon as the bees are hived, with a linen cloth thrown looſely over it, or with green boughs, to protect it from the heat of the ſun. If the ſwarm be larger than uſual, inſtead of faſtening the looſe board to one box, you may join two boxes together with three ſtaples, leaving the communication open from one to the other, and then hive your bees in both. In all other reſpects, they are to be hived in boxes after the ſame manner as in common hives. The door of the ſecond box ſhould be carefully ſtopped up and kept conſtantly cloſed, in order that the bees may have no entrance but through the firſt box. Thorley and White, ubi ſupra.

HOACHE, in *Natural Hiſtory*, a name given by the Chineſe to a peculiar kind of earth, which they have found lately very uſeful in the manufacture of their China-ware. It is called *hoache* from the word *hoa*, which ſignifies *ſoft* and *glutinous*, and is deſcribed to us as being an earth approaching to the nature of chalk, but harder, and feeling like ſoap to the touch. There is great reaſon to believe, that this is either the ſame earth with our SOAP-*rock* of Cornwall, or ſomething very like it. But we are to learn, in regard to the Chineſe way of uſing it, that it is only one of the ingredients of their fine ware, not the whole matter of which it is made.

The Chineſe phyſicians had long uſed this earth as a medicine, giving it in diſorders of the lungs; but it is only of late times that the workmen in porcelain attempted to uſe it inſtead of KAOLIN. It ſucceeds, however, ſo well, that the porcelain made of it ſells dearer in the Indies than any other kind. The grain of this porcelain is remarkably fine and even, ſo that it is fitter for receiving the fineſt pencilling than any other, and it may be made ſurpriſingly light. But there is this diſadvantage, that the whole is more brittle than ordinary china, and the juſt degree of baking it is very difficult to hit; without which it is never ſtrong. The Chineſe ſometimes make the body of their veſſels of the common China-ware, and dip them when dry into a thick liquor like cream, in which the *hoache* is diſſolved: this gives a new and beautiful coat to the veſſel. They give the common varniſhing over this, and it ſucceeds to a very great perfection.

The manner in which the Chineſe uſe it for this purpoſe is this: they firſt waſh it clean with river water, to ſeparate a yellow ſort of earth, which lies near it in the mine where they dig it, and is often brought up with it. When it is thus cleaned, they beat it to powder, and mix it in large quantities of water; they ſtir the mixture well, and then letting the coarſer part ſettle, they pour off the thick liquor, and let it ſtand till a ſubſtance like cream ſubſides, which they keep moiſt, and uſe, as before mentioned, to dip the veſſels in, or elſe they dry it, and uſe it with the PETUNSE inſtead of the kaolin in the common manufactures.

It is ſaid that a good porcelain-ware may be made with this earth alone, without any other mixture; but the workmen themſelves are unwilling to do this, and always chuſe, if they do not work in the common way, to add at leaſt two parts of the petunſe to eight of the *hoache*, and with this mixture they make a very good ware, working it in the ſame manner as they do the petunſe and kaolin.

The *hoache*, though ever ſo proper to ſupply the place of the kaolin, could not be uſed in the common works, becauſe it coſts three times the price, it being much ſcarcer, and brought much farther.

There is another very elegant ſort of China-ware, which depends entirely on the *hoache* for its beauty: it is all white; but though the ſurface is perfectly ſmooth and poliſhed, there are ſeen flowers and other ornaments on it in a very delicate manner. The method of making this is as follows: they make the veſſels of the common matter of the porcelain-ware; they then diſſolve, in a ſufficient quantity of clear water, as much of the refined *hoache* as will give it the conſiſtence of a ſyrup. With this they pencil out the figures they intend on the ſurface of the veſſel while yet not quite dry: this penetrates the ſurface, and the lines and ſtrokes all appear very determinate. They let this dry thoroughly, and then cover the whole veſſel with the common varniſh of the porcelain.

When it has been baked, the whole appears white, but the figures are very diſtinctly ſeen, and appear extremely beautiful. They are of a brighter white than any of the reſt, and ſeem formed of a thin white vapour, running with regularity juſt under the ſurface of the veſſel. They have a way of doing this with another ſort of earth, which they call *chekao*; but this requires more trouble, as it muſt be roaſted and powdered before it is fit for uſe. The white of this alſo is not ſo fine when done as the other. Obſerv. ſur les Coutumes de l'Aſie, p. 300, &c. See Porcelain.

HOACTLI, in *Ornithology*, the name of an American bird deſcribed by Nieremberg, of the ſize of a common hen: the legs and neck are long; its head is black, and ornamented with a beautiful creſt of the ſame colour; its whole body is of a fine white, but its tail, as well as the upper ſides of its wings, are grey; the wings have a greeniſh caſt, and the back has occaſionally many black feathers; its feet are not webbed, its legs are of a pale white colour, and it has a circle of white beginning at the eyes and encompaſſing the head. It is common on the lakes of Mexico, and builds among reeds and ſedge. It bites very deſperately. Ray's Ornith. p. 300.

HOACTON, in *Ornithology*, the name of a Mexican bird deſcribed by Nieremberg, and ſeeming of the heron or bittern kind. Its neck and belly are white, ſlightly variegated with brown; the reſt of the body is brown variegated with white; its eyes are large, and have a pale iris. Ray's Ornithol. p. 303.

HOACTZIN, in *Ornithology*, a name under which Nieremberg has deſcribed a ſpecies of American bird which is of the ſize of a hen, and has a crooked beak: the breaſt is of a yellowiſh white; its wings and tail are variegated with large ſpots of a pale grey and white colour; its neck and back are of a browniſh yellow, and it has on its head a creſt made of white feathers, which are black on their inſide. Its voice is very loud, and it feeds on ſnakes. It is ſeen in the autumn about Mexico, and generally frequents high trees near waters. Its bones, feathers, and ſome other parts, are eſteemed by the natives ſpecific in the jaundice and other diſeaſes. Ray's Appen. p. 300.

HOANGICOYA, in *Natural Hiſtory*, an amphibious animal, which in ſummer is a bird, and in winter a fiſh. See Croceus.

HOAR-*froſt*, *pruina*. See Frost and Evaporation.

HOARSENESS, *raucedo*, in *Medicine*, a diminution of the voice, ſometimes attended with a preternatural aſperity or roughneſs thereof.

The part here affected is the ASPERA *arteria*, and particularly its head or the LARYNX.

This diſtemper differs in degree, being milder when from external cauſes, and much more obſtinate and troubleſome when from internal.

Signs of it. The hoarſeneſs of the voice in ſpeaking ſufficiently manifeſts this complaint, but it is uſually alſo attended with a ſlight cough in the milder kind; and when of the ſeverer ſort, is not unfrequently accompanied with catarrhal and ſcorbutic effects; and not uncommonly, in its worſt ſtates, with a complication of venereal taints. The perſons more ſubject to *hoarſeneſſes* are young and middle-aged men, and ſometimes women, who have for ſome time been afflicted with obſtructions of the menſes.

Cauſes of it. *Hoarſeneſs* is a ſort of catarrhous indiſpoſition, ariſing from a too great acrimony or ſaltneſs of the lymph; and the general cauſe of it is a too copious effuſion of thin lymph on the larynx and adjacent parts, or an interception of the lymph deſtined to lubricate the wind-pipe; and the occaſional cauſe of this is uſually an obſtruction of the glandular parts, towards the top of that organ, in the ſimple raucedo; but in the complicated kind, in which there is a ſcorbutic or venereal taint, an eroſion of the epiglottis is very often the cauſe. Beſide theſe, there are many accidental and external cauſes which will bring on a *hoarſeneſs*; ſuch as the falling of any ſmall particle of extraneous matter, if it be only a grain of duſt, into the windpipe; a vehement cough will alſo bring it on, as will a frequent loud ſpeaking, and too fat foods, and acrid or bilious humours ſtagnating about theſe parts, and ſometimes worms in the inteſtines. It is eaſy to conceive, that the more complicated this diſeaſe is, the more difficult will be the cure; and accordingly *hoarſeneſſes*, which have ſcorbutic or venereal taints for their baſis are with great difficulty removed.

Method of cure. Lubricating medicines are firſt to be given, to obtund the acrimony of the humours, and relax the ſtrictures of the glandular parts. To this purpoſe are properly taken oil of almonds and the pectoral ſyrups, with barley-water, mucilaginous broths, and decoctions of the pectoral herbs, or infuſions of them drank in the manner of TEA. When the *hoarſeneſs* is occaſioned by too great acrimony and viſcidity of the lymph, a ſmall quantity of horſe-radiſh juice, mixed with honey, may be ſwallowed every morning with a draught of new-milk whey. When there is a CORYZA or COUGH attending it, theſe are to be treated in the uſual way, and the *hoarſeneſs* will uſually go off with them. When the *hoarſeneſs* ariſes from acrid and bilious humours, the abſorbents and nitrous medicines are to be given, with gentle diaphoretics; powders compoſed of crabs-eyes, nitre, and diaphoretic antimony, are of great uſe in this caſe. The bowels, in all theſe caſes, are to be kept gently relaxed; and where there is a ſcorbutic or venereal taint for the baſis, thoſe diſeaſes muſt be attacked in the common way, and then the *hoarſeneſs* will be regularly taken off. A relaxation of the wind-pipe is uſually accuſed as being the cauſe of a *hoarſeneſs*, and that not without ſome foundation, ſince, where the humours are collected, there will be ſuch a relaxation; but when we conſider all the circumſtances of the diſeaſe, and obſerve, that relaxing medicines are the only cure for it, we muſt acknowlege, that though a relaxation of ſome part of the aſpera arteria may be in the caſe, yet that the origin of the complaint is from a conſtriction of ſome part of it; and it appears, that the longer this complaint remains with people, the greater the conſtriction becomes; ſo that after a courſe of years, the voice is not only hoarſe, but is in a manner ſuppreſſed, ſo that it can ſcarce be heard. Junker's Conſp. Med. p. 505. Sperma ceti, decoct. rapar. & rob. paſſular. are approved remedies herein. Where the diſorder is inveterate, attenuants and expectorants are frequently of ſervice.

In many inſtances, the moſt ſpeedy relief is obtained from continuing the feet in warm water, for the ſpace of half an hour, about bed-time.

HOASE, in *Sea-language*, is a long flexible tube, formed of leather or tarred canvas, but chiefly of the latter, and employed to conduct the freſh water, which is hoiſted aboard a ſhip, into the caſks that are ranged in the hold; and to paſs the water, or other liquors, out of one caſk into the other.

HOBAL, in *Mythology*, an idol of the ancient Arabs, the worſhip of which at Mecca was deſtroyed by Mahomet.

HOBBISM, or *philoſophy of Hobbes*, in the *Hiſtory of Literature*, denotes the metaphyſical, moral, religious, and political opinions of Thomas Hobbes, a celebrated Engliſh writer, who was born at Malmeſbury, in Wiltſhire, in the year 1588.

Having diſtinguiſhed himſelf in early life by his genius, application, and improvement, he was taken into the ſervice and protection of the Devonſhire family, which continued, with little interruption, as long as he lived, and which gave him an opportunity of purſuing his ſtudies, and of forming connections with perſons of the firſt reputation for learning and ſcience both at home and abroad.

His firſt work was an Engliſh tranſlation of the Hiſtory of Thucydides, which he publiſhed with a view to the ſtate of his country, in order to ſhew the fatal conſequences of inteſtine broils.

Having acquired a thorough acquaintance with the Latin and Greek languages, he applied himſelf to the ſtudy of mathematics; and particularly to the works of Euclid, which he read and admired, principally on account of the clearneſs of his reaſoning, the connection of his arguments, and the wonderful perſpicuity of his method. He alſo devoted his leiſure hours to natural philoſophy, and eſpecially to mechanics and the cauſes of animal motion.

In 1640 he retired to Paris, where he became acquainted with the famous Des Cartes, with whom he afterwards correſponded, and whoſe doctrine concerning innate ideas he ſtrenuouſly oppoſed.

In 1642 he printed a few copies of his book De Cive, a more complete edition of which was printed in Holland in 1647, by the care of Dr. Sorbiere: to this edition two recommendatory letters are prefixed; one written by Gaſſendi and the other by Merſenne, with whom Mr. Hobbes was on terms of intimate friendſhip.

In 1650, two other treatiſes were publiſhed at London; one entitled Human Nature, and another entitled De Corpore Politico, or the Elements of Law. During this time he had been digeſting his religious, political, and moral principles, into a complete ſyſtem, which he entitled Leviathan, and which was printed in Engliſh, at London, in that and the following year. Soon after this publication he returned to England, and joined in communion with a congregation where the ſervice of the church of England was uſed, and continued to reſort thither.

In 1654 he publiſhed his letter upon Liberty and Neceſſity, which occaſioned a long controverſy between him and Dr. Bramhall, afterward lord primate of Ireland. About this time he likewiſe began a controverſy with Dr. Wallis of Oxford, which laſted as long as he lived, and in which he had the misfortune to have all the mathematicians againſt him: this controverſy did him no credit; for though he was once and again refuted, and his miſtakes were clearly pointed out, yet, ſuch was the obſtinacy of his temper, he adhered as pertinaciouſly as ever to his old opinions, and rendered that a perſonal quarrel, which ought to have continued a literary diſpute. He was no leſs poſitive and imperious in maintaining his moral, religious, and political ſentiments; and he ſeems to have diſcovered, on a variety of occaſions, a very unbecoming opinion of his own abilities, and a ſupercilious contempt for thoſe of other men.

After the Reſtoration, in 1660, the king ſettled upon him a penſion of a hundred pounds a year; but notwithſtanding this favour, his Leviathan and his treatiſe De Cive were cenſured by parliament in 1666, a circumſtance which much alarmed him.: at the ſame time a bill was brought into the houſe of commons to puniſh atheiſm and profaneneſs, which, it is ſaid, induced Mr. Hobbes to write or to enlarge his book concerning Hereſy.

In 1675 he publiſhed his Engliſh edition of the Iliad and Odyſſey; in 1676 his diſpute with Dr. Laney, biſhop of Ely, concerning Liberty and Neceſſity was printed; in 1678 appeared his Decameron Phyſiologicum, or ten Dialogues of Natural Philoſophy; and about the ſame time a new edition of the Art of Rhetoric, to which he added a Dialogue between a Philoſopher and a Student of the Common Law of England: in the ſame year he alſo publiſhed his Behemoth, or Hiſtory of the Civil Wars from 1640 to 1660.

Mr. Hobbes retained his underſtanding to his laſt ſickneſs; inſomuch that he was not only capable of ſtudying mathematics when above eighty-ſix years old, but alſo of writing very long poems. It has been ſaid, that he was afraid of apparitions and ſpirits; but his friends call this a fable, though they acknowlege that he was afraid of being alone, and aſcribe it to a fear of being aſſaſſinated. Mr. Bayle obſerves, that he meditated much more than he had read, and that he never cared to collect a large library: and Mr. Hobbes ſays of himſelf, that if he had beſtowed as much time on reading as other men of letters, he ſhould have been as ignorant as they. He was a great admirer of Homer, Virgil, Thucydides, and Euclid; but he made no account of large libraries, obſerving that men, for the moſt part, following one another's ſteps like ſheep, have ſeldom the courage to go out of the trodden paths and roads which are preſcribed to them by their guides. Mr. Hobbes died at the houſe of his patron, the earl of Devonſhire, in the year 1679. For a fuller account of his life and writings, the reader may conſult Bayle, or the Biographia Britannica, article *Hobbes*.

Mr. Hobbes's religious and political ſentiments are chiefly contained in his book De Cive and his Leviathan; and it is certain, that there have been few perſons whoſe writings, by the extraordinary abilities of their author and the ſingularity of his notions, for the dogmatical manner in which they are delivered and the agreeableneſs of their ſtyle, that have had a more pernicious influence in ſpreading infidelity and irreligion, though none of them are directly levelled againſt revealed religion.

Mr. Hobbes has been unjuſtly charged with atheiſm; for he expreſsly acknowleges the exiſtence of God, and that we muſt neceſſarily ariſe from the effects which we behold, to the eternal power of all powers, and cauſe of all cauſes; and he blames the abſurdity of thoſe, who call the world, or the ſoul of the world, God: nevertheleſs, he denies that we know any more of him than that he exiſts, and ſeems plainly to make him corporeal; for he affirms, that that which is not body is nothing at all: *Dantur nomina inſignificantia; hujus generis eſt ſubſtantia incorporea.* Religion, he ſays, ariſes from the fear of power inviſible, feigned by the mind, or imagined from tales publicly allowed, as ſuperſtition ariſes from thoſe that are not allowed: and he elſewhere reſolves religion into opinions of ghoſts, ignorance of ſecond cauſes, devotion to what men fear, and taking things caſual for prognoſtics. He takes pains in many of his works to prove man to be a neceſſary agent (if theſe contradictory terms can be properly joined), and expreſsly aſſerts the materiality and mortality of the human ſoul; alledging, againſt the well-known maxim of Des Cartes, "I think, "therefore, I am," another maxim of his own, "I "think, therefore, matter can think." And he repreſents the doctrine concerning the diſtinction between ſoul and body in man to be an error, contracted by the contagion of the demonology of the Greeks. The belief of a future ſtate, he ſays, is grounded upon other men's ſaying that they knew it ſupernaturally, or that they knew thoſe that knew them, that knew others, that knew it ſupernaturally.

With regard to revealed religion, he treats the pretence to inſpiration as a ſign of madneſs: he alleges, that the books of Moſes, and the hiſtorical writings of the Old Teſtament, were not written by thoſe whoſe names they bear; and that they are derived to us from no higher authority than that of Ezra. As to the books of the New Teſtament, he acknowleges, that they are the true regiſters of thoſe things which were done and ſaid by the prophets and apoſtles; but he pretends, that they were not received as of divine authority in the Chriſtian church, till they were eſtabliſhed by the council of Laodicea, in the year of Chriſt 364. Though he ſometimes ſeems to ſpeak with veneration of the ſacred writings, and to make the laws of Scripture the laws of God, yet he expreſsly aſſerts, that we have no aſſurance of the certainty of Scripture but the authority of the church, or the authority of the commonwealth; that the precepts of Scripture derive all their obligation from the will of the magiſtrate; and that the magiſtrate is the authoritative interpreter of all Scripture doctrines, to whom we are bound to ſubmit. On the ſame principle he maintains, that the private reaſon muſt ſubmit to the public, viz. to God's lieutenant; that a ſubject may be allowed to deny Chriſt in words, provided he retains the faith of Chriſt in his heart, when commanded by his ſovereign; and that idolatry, to which a man is compelled by the terror of death, is no idolatry.

Mr. Hobbes's opinions with regard to natural religion and civil government are equally erroneous and extravagant: he aſſerts, that by the law of nature every man hath a right to all things, and over all perſons, and that the natural condition of man is a ſtate of war, a war of all men againſt all men; that every man acts reaſonably, who endeavours, as far as poſſible, to maſter all the perſons of others, till he ſees no other power great enough to endanger him; that the civil laws are the only rules of good and evil, juſt and unjuſt, honeſt and diſhoneſt, and that antecedently to ſuch laws every action is in its own nature indifferent; that there is nothing good or evil in itſelf, nor any common laws conſtituting what is naturally juſt and unjuſt; that all things are eſtimated by what every man judgeth to be fit, where there is no civil government, and by the laws of ſociety, where ſociety is eſtabliſhed; that the power of the ſovereign is abſolute, and that he is not bound by any compact with his ſubjects; that nothing the ſovereign can do to the ſubject can properly be called injurious or wrong; and that the king's word is ſufficient to take any thing from any ſubject, if there be need, and the king is judge of that need. *Non veritas, ſed auctoritas facit legem.* And yet he elſewhere ſays, *Obligatio civium erga eum qui ſummam habet poteſtatem tandem nec diutius permanere intelligitur, quam manet potentia cives protegendi.*

Wood, in his Athenæ Oxon. vol. ii. p. 646, has aſſerted, that Mr. Hobbes, in advanced life, retracted many of his opinions publiſhed in his Leviathan, &c. and compoſed an apology for himſelf and his writings; but the authenticity of this apology has been diſputed. Leland's View of the Deiſtical Writers, vol. i. letter iii. Moſheim's Eccl. Hiſt. by Dr. Macleane, vol. iv. p. 244. note *b*, 8vo. ed. 1768.

HOBBY, in *Ornithology*, the Engliſh name of a hawk of the long-winged kind, the FALCO *ſubbuteo* of Linnæus, called, by many authors, by the name *ſubbuteo*, the name by which others expreſs the ringtail and hen-harrier. The *hobby* has a prominent and crooked beak, covered at the baſe with a yellow ſkin; the beak is white near this membrane, elſewhere it is blue; above each eye there is a white line; the crown of the head and back, and coverts of the wings, are of a deep bluiſh black; the hind part of the head is marked with two pale yellow ſpots, and each cheek with a large black ſpot pointing downwards; the interior webs of the ſecondary and quill-feathers are variegated with oval, tranſverſe, reddiſh ſpots; the breaſt is white, marked with oblong ſpots of black; the thighs and vent-feathers are pale orange; the middle feathers of the tail are entirely of a deep dove-colour; the others are barred on their interior ſides with ruſt-colour, and tipt with a dirty white. The female is much larger than the male. The legs and feet are yellow. It builds with us in high trees, and breeds in England, but migrates in October; it feeds principally upon larks. It was formerly uſed in that ſpecies of FALCONRY called daring of larks: the *hobby* was caſt off, and the larks were fixed to the ground through fear, and became an eaſy prey to the net of the fowler. Pennant. See *Tab.* II. *of Birds*, N° 21. See DORING and HAWK.

HOBBY is alſo a name formerly given to ſtrong active horſes of a middling ſize: they are reported to have been originally natives of Ireland, and were much liked and uſed. Nags anſwer the ſame deſcription as to ſize, qualities, and employments.

HOBGOBLIN is a name vulgarly applied to fairies or apparitions. Skinner calls the word *robgoblins*, and derives it from *Robin Goodfellow*, Hob being the nick-name of Robin: but Wallis and Junius, with greater probability, derive it from *hopgoblins*, *empuſæ*, becauſe they are ſuppoſed to *hop* without moving both their feet. Johnſon.

HOBITS, in *Gunnery*. See HOWITZ.

HOBLERS, or HOBILERS, HOBELARII, in our *Ancient Cuſtoms*, were men who, by their tenure, were obliged to maintain a light horſe or hobby, for the certifying any invaſion towards the ſea-ſide.

The name was alſo uſed for certain Iriſh knights, who uſed to ſerve as light-horſemen upon hobbies.

HOB-NAIL, a nail with a thick ſtrong head, uſed in ſhoeing a hobby or little horſe. Johnſon.

HOB NOB, or HAB NAB, a cant word formed from *hap ne hap*, and denoting an event which happens at random or by mere chance. Johnſon.

HOBOO, a name given by the people of Otaheite, and in the neighbouring iſlands of the South Sea, to their ſuperfine cloth. It is the thinneſt and moſt finiſhed preparation of the AOUTA.

HOBSON'*s-choice*, a vulgar proverbial expreſſion, applied to that kind of choice in which there is no alternative. It is ſaid to be derived from the name of a carrier at Cambridge, who let out hackney horſes, and obliged each cuſtomer to take, in his turn, that horſe which ſtood next the ſtable door. Scott.

HOCK. See HAM.

HOCK-*Tueſday money*. See HOKE-*day*.

HOCUB, in *Botany*, a name given by Vaillant to a genus of plants, called by Tournefort and other authors GUNDELIA.

HOCUS POCUS, a cant term applied to a juggle or cheat. Dr. Tillotſon derives it from the form of conſecrating the ſacramental bread in the Romiſh church, *hoc eſt corpus*. Junius derives it from the Welch *hocced, a cheat*, and *poke* or *pocus, a bag*; the jugglers uſing a bag for conveyance. The etymology, however, is uncertain. Johnſon.

HOD, a ſort of tray for carrying mortar, in uſe among bricklayers.

HODEGOS, a term purely Greek, ὁδηγος, ſignifying *guide*. The word is chiefly uſed as the title of a book compoſed by Anaſtaſius the Sinate, towards the cloſe of the fifth century; being a method of diſputing againſt the heretics, particularly the Acephali.

Mr. Toland has alſo publiſhed a diſſertation under the ſame title. Its ſubject is the pillar of fire, &c. which went before the Iſraelites as a guide in the deſert.

HODENSTEIN, in *Natural Hiſtory*. See ENORCHIS.

HODGE-PODGE. See HOTCH-POT.

HODMAN, a cant term formerly uſed for a young ſcholar admitted from Weſtminſter-ſchool to be ſtudent in Chriſt-church in Oxford.

HODOMETRICAL (of ὁδος, *way*, and μετρω, *I meaſure*,) *method of finding the longitude at ſea* is that of the computation of the meaſure of the way of a ſhip between place and place, i. e. of obſerving the ſeveral rhumbs or lines in which the ſhip ſails, and what way ſhe has made, or how many leagues and parts of a league ſhe has run. This method is liable to great errors.

HOE, or HOW, a huſbandman's tool, made like a cooper's adz, to cut up weeds in gardens, fields, &c.

This inſtrument is of great uſe, and ought to be much more employed than it is, in hacking and clearing the ſeveral corners and patches of land, in ſpare times of the year, which would be no ſmall advantage to it.

Horſe-HOE is a large kind of *hoe* drawn by horſes, and uſed to ſtir the intervals in the *new* HUSBANDRY, and clear the corn from weeds.

The Rev. Mr. Hewitt, of Hadleigh, in Suffolk, preſented to the Society for the Encouragement of Arts, &c. in 1766, the model of a new *horſe-hoe*, repreſented in *Tab. Agriculture, fig.* 2. A repreſents a ſmall round curved iron bar, fixed upon each end of the axle of the wheel, by which the *hoe* is drawn; the wheel B is three feet in diameter; C, C, are two flat iron bars, three feet long, fixed upon the axle of the wheel, and to the ſides of the *hoe* at E, E, by bolts and ſcrews, and moveable both upon the axle and bolts; F is a ſmall round iron bar, faſtened at each end into the bars C, C, at I and I; the bars to theſe points may be ſtrait, and from I, I, to E, E, let them be curved; H is the *hoe* itſelf, the breadth of which is to be regulated by the different diſtances of the rows of plants whoſe intervals are to be hoed; K, K, are two flat curved iron bars, fixed by bolts, upon which they are moveable, to the bars C, C; each of theſe paſſes through a ſtaple, fixed into the ſides of the *hoe* at L, L;

in both theſe ſmall bars there is a row of holes, and in each ſtaple one hole, anſwering to a hole in each of the ſides of the *hoe*, which is fixed to any poſition by means of bolts paſſing through theſe holes, and ſome of the holes in the bars K, K, and thus the ground may be hoed as near the ſurface, or as far below it, as is neceſſary; M, M, are two wooden handles, fixed to the two ſides of the *hoe*, and to each other, by the croſs-bar O; theſe handles are as long and as high from the ground as thoſe of a common plough.

This machine may eaſily be adapted to hoeing the furrows between the wheat ridges, by ſubſtituting in the room of the flat hoe one that is curved, and ſuiting its breadth and curvature to the breadth and curvature of the furrows that are to be hoed.

With this inſtrument the ground may be hoed ſo deep, as to cut aſunder the roots of every weed it meets with below the crown or head; and thus they will either be deſtroyed or prevented from growing again during the ſeaſon. There has been a farther improvement of this inſtrument by annexing a harrow to the *hoe*. See *Hoe* PLOUGH.

HOEING, in the *New Huſbandry*, is the breaking or dividing the ſoil by tillage, while the corn or other plants are growing thereon. It differs from common tillage, which is always performed before the corn or plants are ſown or planted in the time of performing it; and it is much more beneficial to the crops than any other tillage. This ſort of tillage is performed various ways, and by means of different inſtruments.

Land which, before the tilling, would have yielded little, though the more it is tilled before ſowing the greater crop it yields, yet, if tilled only before the ſowing, will always have ſome weeds, and they will partake of the advantage of the tillage as well as the corn. This is one reaſon for an after-tillage, ſuch as that by *hoeing*. But there is another conſideration that yet more evinces the neceſſity of it; this is, that as ſoon as the ploughman has done his buſineſs, by ploughing and harrowing the land after ſowing, the ſoil, of its own accord, begins to undo it all again, by tending towards its original texture and ſpecific gravity again; the altering of which was the only buſineſs of all the former tillage. The breaking the particles of the earth, and making in it new pores, and new particles or new ſuperficies, is the great buſineſs of the plough and harrow; but as ſoon as their uſe is over, the earth begins to coaleſce again into its own form, the particles unite together, and the artificial pores in a great meaſure cloſe up. The ſeed is nouriſhed in a worſe ground than it was firſt put into, and the more the plant grows up and requires a larger ſupply of food, the worſe the paſture becomes. While nouriſhment is thus denied the growing plants, they are at the ſame time choaked with weeds, which being of a hardier nature than they, will grow with leſs ſupplies, and therefore thrive more vigorouſly, and rob them of a great part of the little food the land before allowed them.

Farmers in all ages have been acquainted, in ſome degree, with the uſe of tillage and dung to crops of uſeful plants; but they have ſo ill managed the time of giving theſe aſſiſtances to nature, that there is no doubt but one third part of the nouriſhment raiſed by dung and tillage, if it were given to plants and corn at many proper ſeaſons, and proportioned to the different times of their exigencies, would be of more benefit to the crop than the whole is, when applied all together at the time of ſowing.

Nature, by what ſhe does to the animal œconomy, ſeems to point out to us ſomething like a remedy for this by *hoeing*; for when the teeth, as the plough, have tilled that ſoil or maſs which is earth altered, and when the ſaliva and the juices of the ſtomach have ſerved to divide and attenuate it, as the ſalts of dung and other manure do land; after all this, the bile and pancreatic juices are ordained to farther attenuate it, at the very time when it is ready to be exhauſted by the numerous mouths of the lacteals ſituate in the inteſtines. This laſt operation of theſe juices ſeems analogous to meliorating the ſoil by *hoeing*, after the plants are grown and are become fit for uſe.

Tranſplanting is nearly allied in its nature to *hoeing*, but it is much inferior. The nature of this will not admit of its being a general thing; and even if it would, *hoeing* is better: for, by tranſplanting, the plants can only be kept up to a certain period, after which they will not bear it; but *hoeing* may be uſed to them with advantage, to their utmoſt ſtanding, and makes them vigorous all the while.

The roots of a plant are all neceſſarily broken off in tranſplanting, and it requires ſome time for it to ſtrike a whole ſet of new ones; and if the earth about it is not kept thoroughly moiſtened all this time, the new formed roots will not be able to ſhoot, and the plant will ſtarve in the midſt of plenty. But, on the contrary, in *hoeing*, the ſame advantage of a new paſture for the plant is obtained, by breaking the particles of the earth, and at the ſame time no more of the roots are broken off than can eaſily be ſupplied, and the reſt remaining in their places, the plant continues growing without that ſtop and decay which muſt happen on tranſplanting, and which it recovers only by degrees. It is obſerved, that ſome plants are worſe for tranſplanting: lucerne and ſaintfoin are ſaid by ſome to be never ſo good after tranſplanting, as when they are left in their native places, at the ſame diſtances; and finochia removed is never ſo good and tender as when it is not. This laſt plant receives ſuch a check from tranſplanting in its infancy, that it has afterwards a diſeaſe like the rickets, which cauſes knots and ſwellings in it that ſpoil it as a delicacy. All the tap-rooted plants ſuffer by tranſplanting, for it is neceſſary in this to cut off the main long root, which afterwards, however good the ſoil may be, never arrives at the length it otherwiſe would have had, and which was neceſſary for the ſucceſs of the plant.

One great benefit of *hoeing* is, that it keeps plants moiſt in dry weather, the advantage of which to their growth is eaſily ſeen. This good office it performs on a double account. Firſt, as they are better nouriſhed by *hoeing*, they require leſs moiſture, and carry off leſs; for thoſe plants which receive the greateſt increaſe, having moſt terreſtrial nouriſhment, carry off the leaſt water, in proportion to their augment, as is proved by Woodward's experiments. Thus barley or oats being ſown on a piece of ground, well divided by tillage and dung, will come up and grow well without rains, when the ſame grains ſown on another part of the ſame land, not thus dunged or tilled, will ſcarce come up at all without rains, or if they do, will wait wholly for the rains for their growth and increaſe

The hoe alſo, particularly the horſe-hoe, for the other does not go deep enough, (and on this account horſe-*hoeing* is much preferable to *hoeing* with the hand-hoe, or ſcratch-*hoeing*,) procures moiſture for the roots from the dews which fall moſt in dry weather; and theſe dews ſeem to be the moſt enriching of all moiſture, as it contains in it a fine black earth, which will ſubſide from it in ſtanding, and which ſeems fine enough to be the proper pabulum or food for plants.

A demonſtration that the tilled earth receives an advantage from theſe dews, which the untilled does not, is this: dig a hole in any piece of land, of ſuch a depth as the plough uſually goes to; fill this with powdered earth, and, after a day or two, examine the place, and the bottom part of this earth and the bottom of the hole will be found moiſt, while all the reſt of the ground, at the ſame depth, is dry. Or if a field be tilled in lands, and one land be made fine by frequent deep ploughings, while another is left rough by inſufficient tillage, and the whole field be then ploughed acroſs in the drieſt weather, which has continued long, every fine land will be turned up moiſt, and every rough land as dry as powder from top to bottom.

Although hard ground, when thoroughly ſoaked with rain, will continue wet longer than fine tilled land adjoining to it, yet this water ſerves rather to chill than to nouriſh the plants ſtanding in it, and to keep out the other benefits of the atmoſphere; it leaves the ground much harder alſo than before, when it is finally exhaled out of it; and when, at length, the earth is thus hardened, it can receive no benefit from any thing leſs than a deluge of rain, which ſeldom falls till the ſeaſon of vegetation is over.

As fine hoed ground is not ſo long ſoaked with rain, ſo the dews never ſuffer it to become perfectly dry. This appears from the flouriſhing ſtate of plants in hoed ground, while others near them, but in ground not hoed, are ſtarved for want of nouriſhment. The common opinion is againſt this, but obſervation proves it to be true againſt the common opinion. The vulgar are guided by this, however, and will not hoe their ground in dry weather, for fear of letting in the drought, as they call it; whereas *hoeing* this is the only method of keeping away the drought, and without either this, or watering, they muſt periſh in theſe ſeaſons.

There is alſo another advantage given to plants by *hoeing*, which animals are not capable of. Meat and drink, in a proper degree, are all they require or can diſpenſe with, and unleſs new mouths could be made to them they can uſe no more; but in plants, the *hoeing* at once gives increaſe of nouriſhment in abundant quantities, and increaſe of mouths to receive it; for every time the hoe is ſtruck into the ground, new particles of earth are made by breaking the old ones; the new pores made by theſe, afford a new ſupply of food to the plant, and every ſtroke of the hoe at the ſame time cutting off ſome of the fibrous roots of the plant, great numbers are propagated in the places of every one that is cut, and the plant has at once more food, and more mouths to feed with. Tull's Horſe-hoeing Huſbandry, chap. vi.

It is a certain fact, that breaking the ſoil and expoſing it to the operation of the air are found to fertilize it; but Mr. Tull, in order to account for this fact, adopted a miſtaken theory, which ſuppoſes that fertilization conſiſted principally or ſolely in breaking the earth into fine parts, that they might be the better fitted to enter the nutritious veſſels of the plants. It would be eaſy to ſhew, nevertheleſs, that reducing the earth into ſmall parts is only one means of fertilization, and not even conſtant in every circumſtance; that the fitting earth to enter plants by mechanical action is an error, as it never does enter plants at all in a ſolid, undiſſolved ſtate; and that when earth is in the moſt pulverized and incohering ſtate, it is leaſt fertile or capable of ſupporting plants. However, the fact is certain, though for different reaſons, that ſtiff and cohering earth, broken and expoſed to the air, does gain a conſiderable degree of fertility, and is capable of yielding copious crops of ſome kinds of vegetables, which it would not otherwiſe bear. Doſſie's Mem. of Agriculture, vol. i. p. 74. See HUSBANDRY.

HOFFMANISTS, in *Eccleſiaſtical Hiſtory*, denote thoſe who eſpouſed the ſentiments of Daniel Hoffmann, profeſſor of the univerſity of Helmſtadt, who, from the year 1598, maintained, that philoſophy was a mortal enemy to religion; and that what was true in philoſophy was falſe in theology. Theſe abſurd and pernicious tenets occaſioned a warm and extenſive controverſy: at length Hoffmann was compelled, by Julius, duke of Brunſwick, to retract his invectives againſt philoſophy, and to acknowlege, in the moſt open manner, the harmony and union of ſound philoſophy with true and genuine theology.

HOG, *ſus*, in the *Linnæan Syſtem of Zoology*, a diſtinct genus of animals, of the order of *belluæ* and claſs of *mammalia*: the characters of which are, that the upper fore-teeth are four in number and convergent; thoſe of the lower jaw are ſix and prominent; the canine teeth of the upper jaw are two, and ſhort; thoſe of the under jaw are ſingle and thruſt out; the ſnout is truncated, prominent, and moveable. Of this genus are the common *hog*, the Guinea *hog* or PORCUS *Guineenſis*, the Mexican muſk *hog* or TAJACU, the *hydrochœris* or CAPYBARA, and the BABYROUSSA.

The common *hog*, or *ſus ſcrofa* of Linnæus, is covered with briſtles: in a wild ſtate it is of a dark brinded colour, and under the briſtles there is a ſoft curled hair; the ears are ſhort and a little rounded: in its tame ſtate, the ears are long, ſharp-pointed, and ſlouching; the colour is generally white, ſometimes mingled with other colours. The *hog*, in its wild ſtate, is found in moſt parts of Europe, except the Britiſh iſles and the countries north of the Baltic; in Aſia, from Syria to the borders of the lake Barkal; in Africa, on the coaſt of Barbary; and in the foreſts of South America.

Tame *hogs* are found univerſally, except in the frigid zone and Kamtſkatka, and ſuch places where the cold is very ſevere. The Chineſe *hog* is only a variety of the common *hog*; its belly hangs almoſt to the ground, its legs are ſhort, its tail reaches to the heels, and the body is generally bare: it is a much cleaner animal than ours. *Hogs* are ſtupid and voracious animals; inſomuch that they will eat their own offspring and devour even infants: but it is obſerved, that the *hog* is not indiſcriminate in the choice of its food; for it has been found to eat ſeventy-two ſpecies of vegetables, and to reject a hundred and ſeventy-one. In America it clears the country of rattle-ſnakes, which it eats with ſafety. *Hogs* cannot bear exceſſive cold, and are very reſtleſs in high winds.

There are few animals that are uſeful in a greater variety of ways than *hogs*: they are extremely prolific; their fleſh is agreeable and wholeſome food to thoſe who uſe much exerciſe; and as it takes ſalt better than any other kind, it is of great importance to a commercial nation. *Hogs* furniſh BRAWN, and lard, and briſtles. In Minorca, the aſs and the *hog* are yoked together to plough the land; and the *hog* has been applied to the ſame uſe in our own iſland, viz. in that part of Murray which lies between the Spey and Elgin. Pennant. See BOAR.

Theſe animals are very profitable to the owner, being kept at ſmall expence, feeding on things that would be otherwiſe thrown away, and producing a very large increaſe. They are apt to dig up the ground and to break fences; but this may be prevented, by putting rings in their noſes, and yoaks about their necks. Leiceſterſhire, Northamptonſhire, and Hampſhire, are famous for theſe animals, which ſeems owing to their being clayey countries, and that more beans and peas are ſown there than in other places. The wild kind never grow ſo large as the tame, but they are much better taſted. The keepers of *hogs* ſhould always chuſe ſuch boars for the purpoſe of breeding as are long-bodied, and have deep bellies and ſides, ſhort noſes, thick thighs, ſhort legs, high claws, a thick neck, and a thick chine, well ſet with large briſtles.

It is not proper to keep too many breeding ſows; for they will produce ſo many young at a time, and this three times a year, that they will not find food enough. They uſually bring thirteen or fourteen young ones in a litter, ſometimes more, but they can bring up no more than they have teats to ſuckle. Young ſhoots, as they are called, that is, ſwine of three quarters of a year old, are beſt for pork, and thoſe of a year and a half for bacon. The male pigs that are reared ſhould be gelt, and the ſows ſpayed; and for this purpoſe, thoſe which are pigged in the ſpring are the beſt. Moiſt and ſedgy grounds are good for ſwine, for they eat the roots of many of the plants that grow there; and the fruit of the beech, cheſnut, and hedge buſhes, fatten them well, and make their fleſh much better taſted than when bred entirely in the ſtye. Mortimer's Huſbandry, p. 253.

Mr. Young obſerves, that *hogs* may be kept in ſummer, with great advantage to the farmer, in clover-fields; and that lucerne is ſuperior to clover for this purpoſe, and that ſaintfoin is very good; but that burnet is very bad. In winter they may be well maintained with carrots, parſnips, beets, and potatoes. The dairy ſhould be appropriated to rearing pigs and feeding ſows that have young.

It appears, from other experiments of this writer on the fattening quality of ſeveral ſorts of food for *hogs*, that pollard alone is a cheaper food than peas alone; that boiled carrots are much the moſt profitable; that buckwheat is more profitable than peas; that ſeveral kinds of food mixed are better than any given alone; that the meal of any one, or various kinds of grain, is better and more profitable than the whole grain mixed or alone; and that peas and barley are much ſweeter food than beans.

The keeping of *hogs* in any city or market town is indictable as a public nuiſance.

The dung of *hogs* is one of the richeſt manures we are acquainted with. See DUNG.

The farmers who uſe the dung for their lands, generally take care to ſave it by well paving the ſtyes, and increaſe the quantity by throwing in bean-ſtalks, ſtubble, and many other things of a like kind; and, by good management of this kind, many farmers have procured fifty or ſixty load of excellent manure a year out of a ſmall ſtye. The very beſt way of uſing this dung is to mix it with horſe-dung; and, for this reaſon, it is beſt to have the ſtye near the ſtable, that the two cleanſings may be mixed in one heap, and uſed together.

They have, in many parts of Staffordſhire, a poor, light, ſhallow land, on which they ſow a kind of white pea. The land is neither able to bear this, nor any thing elſe, to their advantage, for reaping. But when the peas are ripe, they turn in as many *hogs* as the quantity of peas will fatten, ſuffering them to live at large, and remain there day and night; and, in conſequence of this, the land will produce good crops of hay for ſeveral years afterwards, or, if too poor for that, it will, at the worſt, raiſe graſs enough to make it a good paſture-ground.

Hedge-**HOG**, *erinaceus*, in *Zoology*, a genus of animals of the order of *feræ*, in the claſs of *mammalia*. The characters of this genus are theſe: that the upper fore-teeth are two in number and diſtant, and that the lower are two and leſs diſtant; the canine teeth are two on both ſides, and recumbent. Of this genus there are three ſpecies, viz. the European or common *hedge-hog*, the American *hedge-hog* without ears, and the Malacca *hedge-hog* or porcupine with pendulous ears.

The head and ſnout of the European *hedge-hog* reſemble thoſe of a *hog*, but the noſtrils and extremity of the ſnout have more reſemblance to thoſe of a dog; the noſtrils are narrow, and bordered on each ſide with a looſe flap; the ears are broad and like thoſe of the mouſe kind, and its eyes are ſmall and prominent; its legs reſemble thoſe of the dog, and each foot has five toes, all armed with ſharp claws; of theſe the inner is ſhorter than the reſt; the upper part of the face, the ſides, and rump, are covered with ſtrong coarſe hair, reſembling briſtles, of a yellowiſh cinereous colour; the back with ſtrong ſharp ſpines of a whitiſh colour, with a black bar through their middle; the tail is an inch long, and the length from the noſe to the tail is ten inches. See *Tab.* II. *Quadrupeds*, N° 19.

The *hedge-hog* is a nocturnal animal, keeping retired in the day, and in the night ſearching for food. It generally reſides in ſmall thickets, in hedges, or in ditches covered with buſhes; its food is roots, fruits, worms, and inſects; and it is unjuſtly reproached with ſucking cows and hurting their udders, which is impoſſible on account of the ſmallneſs of its mouth.

The *hedge-hog* is a mild and patient animal, and in the proſpect of injury rolls itſelf into the form of a ball, in which ſtate it is ſaid to lie torpid during winter, and is then invulnerable. Pennant.

Hedge-Hog, *ſea.* See Echinoderma, Centronia, and *Sea* Urchin.

Hog's-*fennel*, in *Botany*, the Engliſh name of a genus of plants, called by botaniſts *peucedanum.* See *Hog's* Fennel.

Hog-*plum*, the name of a diſtinct genus of plants, called by authors *ſpondias.* See Plum.

Hog-*weed*, the name of a diſtinct genus of plants, of the *monandria monogynia* claſs, called by Linnæus *Boerhaavia.* Its characters are theſe: the flower hath one bell-ſhaped petal, which is pentangular, and entire; it hath in ſome ſpecies one, in others, two ſhort ſtamina; the germen is ſituated below the receptacle, and becomes a ſingle oblong ſeed, having no cover. According to Miller there are four ſpecies, natives of warm climates; but Linnæus reckons ſix.

This plant is nearly allied to the valerians.

Hog *ſteer*, among *Hunters*, a wild boar of three years old. See Hunting.

Hog, on board of a *Ship*, is a ſort of flat ſcrubbing broom, formed by incloſing a number of ſhort twigs of birch or ſuch wood, between two pieces of plank faſtened together, and cutting off the ends of the twigs, and ſerving to ſcrape the filth from a ſhip's bottom, under water, particularly in the act of boot-*topping.* For this purpoſe they fit to this broom a long ſtaff, with two ropes; one of which is uſed to thruſt the *hog* under the ſhip's bottom, and the other to guide and pull it up again, cloſe to the planks. This buſineſs is commonly performed in the ſhip's boat, which is confined as cloſe as poſſible to the veſſel's ſide during the operation, and ſhifted from one part of the ſide to another, till the whole is completed. Marine Dict.

HOGGET, or Hogrel, is a young boar of the ſecond year.

HOGENHINE, Hogenheyne, or rather Agenhine, q. d. *own ſervant.* See Third *night awn hind.*

HOGI, in the *Eaſtern Churches*, as at Cairo, is an under attendant on the moſque, who is the reader under the ſheik.

HOGOE, properly Haut-Gout, a meſs in cookery, ſo denominated from its high ſavour, or reliſh.

HOGSHEAD, a meaſure, or veſſel, of wine or oil; containing the fourth part of a tun, or ſixty-three gallons.

Two of theſe *hogſheads* make a pipe or butt. See Measure.

The diſtillers weigh their veſſels when full, and for a *hogſhead* allow four hundred weight, two quarters, and twenty-two pounds, caſk and liquor.

HOIST, in *Sea Language*, denotes the perpendicular height of a flag or enſign, as oppoſed to the *fly*, which ſignifies its breadth from the ſtaff to the outer edge.

HOISTING ſignifies the operation of drawing up any body by the aſſiſtance of one or more tackles. *Hoiſting* is never applied to the act of pulling up any body, by the help of a ſingle block, except in the exerciſe of extending the ſails, by drawing them upwards along the maſts or ſtays, to which it is invariably applied. Mar. Dict.

HOITLALLOTL, in *Ornithology*, the name of an American bird, deſcribed by Nieremberg, and called by him *avis longa.* It is very remarkable for the ſwiftneſs of its running, and is of a very long ſhape, having alſo a long tail; its beak is alſo very long, black above, and grey underneath; its tail is green, and has all the ſplendor and beauty of the peacock's; its whole body is of a whitiſh yellow, and near the tail of a blackiſh yellow; but the ſhoulders are black, with white ſpots; it does not fly high, nor very well, but runs ſo ſwiftly as is ſcarce to be conceived. It is but an ill-taſted bird.

HOITZILOTXITL, in *Botany*, a name by which ſome authors have called the tree which affords the balſam of Peru.

HOITZITZIL, in *Ornithology*, the name by which ſome authors have called the guainumbi, or humming-*bird*, the ſmalleſt of all birds.

HOITZITZILLIN, in *Ornithology*, the name of a beautiful American bird, deſcribed by Nieremberg. The Indians prodigiouſly eſteem this bird, and uſe its feathers in ornamenting their images. It is not lawful to kill it, only to ſtrip it of its feathers, and then turn it looſe; and this no one may do but the principal perſon of the place. The method of getting their feathers, according to Hernandez, is the inviting them to ſome boiled Indian wheat, and placing lime-twigs in their way. They fly in large flocks, and ſit together on trees, making a confuſed hiſſing noiſe. They breed in the holes of trees.

HOKE-DAY, Hock-day, or Hock-Tuesday, in our *Ancient Cuſtoms (Dies Martis, quem quindenam paſchæ vocant)* the ſecond Tueſday after Eaſter week; a ſolemn feſtival celebrated for many ages in England, in memory of the great ſlaughter of the Danes in the time of king Ethelred, they having been, in that reign, almoſt all deſtroyed in one day in the different parts of the kingdom, and that principally by women. This is ſtill kept up in ſome counties, and the women bear the principal ſway in it, ſtopping all paſſengers with ropes and chains, and exacting ſome ſmall matter from them to make merry with. This day was very remarkable in former times, inſomuch as to be uſed on the ſame footing with Michaelmas, for a general term or time of account. We find leaſes without date reſerving ſo much rent payable *ad duos anni terminos, ſcil. ad le* hoke-day, *& ad feſtum ſancti Michaelis.* In the accounts of Magdalen college, Oxford, there is yearly an allowance, *pro mulieribus hockantibus*, of ſome manors of their's in Hampſhire; where the men *hock* the women on Mondays, and the women *hock* them on Tueſdays. The meaning of it is, that, on that day, the women in merriment ſtopped the way with ropes, and pulled paſſengers to them, deſiring ſomething to be laid out for pious uſes.

Hoke-day *money*, or Hoke-Tuesday *money*, a tribute anciently paid the landlord, for giving his tenants and bondmen leave to celebrate *hock-day*, or *hoke-day*, in memory of the expulſion of the domineering Danes.

HOLCE, Ὁλκη, a word uſed, by ſome of the Greek authors, as the name of a dram weight; and by others, as Dioſcorides, &c. to ſignify a weight in general.

HOLCUS, the name by which the ancients called the common gramen ſecalinum, or rye-graſs, commonly called by us barley graſs, or wild baſtard barley; a low graſs, with a large bearded ear, growing under old walls.

Holcus, in the Linnæan ſyſtem of *Botany.* See *Indian* Millet.

HOLD, in the *Manege.* See Retain.

Hold *of a ſhip*, the loweſt part of the ſhip, including all that part of her inſide lying between the floor and the lower deck, through her whole length. See *Tab. Ship. fig.* 2. *lit. G. fig.* 2. *n.* 116.

The *hold* is the ſtore-room in a merchant ſhip, or the place wherein the goods, at leaſt all the heavier and more cumberſome, are ſtowed: the reſt are diſpoſed between the two decks; at leaſt in Dutch ſhips, which have their *holds* very ſhallow, and the ſpace between the decks very high.

The *hold* contains the ballaſt, proviſions, and ſtores, of a ſhip of war. The ſeveral ſtore-rooms are ſeparated by bulk-heads, and are denominated according to the ſeveral articles they contain, the ſail-room, the bread-room, the fiſh-room, the ſpirit-room, &c.

To find the burden of a ſhip, the *hold* is to be meaſured.

Hold, in *Sea Language*, is underſtood to ſignify a particular ſituation with regard to the ſhore, by which ſhe is enabled to keep within a ſufficient diſtance, to facilitate her courſe, or anſwer ſome other important object. *Keep a good hold of the land*, implies to keep near, or in ſight of the land.

Hold, *after*, denotes that part of the *hold* which lies abaſt the main-maſt.

Hold, *fore*, is that part of the *hold* which is ſituated in the fore-part of the ſhip, or before the main hatchway.

Hold *its own*, at *Sea.* A ſhip is ſaid to *hold* its own, that keeps its courſe right forward.

Hold, *to rummage the*, at *Sea*, is to remove and clear the goods and things therein.

Hold, *predy the*, in the *Sea-Language.* See Predy.

Hold, *to trim the.* See Trim.

Hold, *ſtowing the*, a ſea-phraſe for taking goods into the *hold.* See Stowage.

Hold, in *Muſic*, is a mark, like an arch, with a point in the middle of it, placed over ſome ſingle notes, which has been uſed to ſignify that ſuch note is to be made longer than ordinary; but it now more commonly denotes that the ſong ends there, and is only uſed when the ſong ends with a repetition of the firſt ſtrain, or part of it.

HOLDE, in our *Old Law-Books*, is uſed for the bailiff of a city or town; and ſometimes for a general.

HOLD-FAST, an iron hook, in ſhape of the letter S, fixed in a wall, to retain and ſupport it.

This term alſo denotes a tool uſed by joiners, &c. which goes through their benches, to hold faſt ſuch work as cannot be finiſhed by being held in the hand.

HOLDING *on*, in *Sea Language*, is the act of pulling back the hind-part of any cable, or other rope, which is heaved round by the capſtan or windlaſs, or drawn in by the purchaſe of a tackle. As there are only a few turns of any rope upon the barrel of the capſtan or windlaſs, when it is employed in heaving, an equal quantity of the rope will neceſſarily come off from the capſtan at the ſame time; and this is accordingly pulled back as ſtrongly as poſſible, to prevent it from ſurging or jerking round the barrel, by being held too looſely; ſo that *holding on* denotes the act of retaining any quantity of rope, acquired by the effort of a capſtan, windlaſs, or tackle, as theſe are employed in hoiſting as well as in heaving. Mar. Dict.

Holding *water* ſignifies the operation of ſtopping a boat in her courſe, by *holding* the oars in the water, and bearing the blade or flat part ſtrongly againſt the current made along-ſide, by her paſſing ſwiftly through the water.

Holding *over a term*, &c. in *Law*. By 4 Geo. II. cap. 28. in caſe any tenant for life or years, or other perſon claiming under or by colluſion with ſuch tenant, ſhall wilfully *hold over* after the determination of the term, and demand made in writing for recovering the poſſeſſion of the premiſes, by him to whom the remainder or reverſion ſhall belong; ſuch perſon, ſo *holding over*, ſhall pay for the time he continues at the rate of double the yearly value of the lands ſo detained. See Ejectment.

HOLE, in *Anatomy*, denotes ſuch a cavity of a bone as penetrates from one ſide to the other.

Hole, *Black, at Calcutta*, denotes a place of confinement, eighteen feet by eighteen feet, containing three hundred and twenty-four ſquare feet, in which a hundred and forty-ſix perſons were ſhut up by order of the viceroy; ſo that there was a ſquare for each perſon of twenty-ſix inches and a half by twelve inches, which was juſt ſufficient to hold them, without preſſing violently upon each other. To this dungeon there was only one ſmall grated window; and the weather being very ſultry, the air within could neither circulate nor be changed. In leſs than an hour after their being incloſed, many of the unhappy people were ſeized with extreme difficulty of breathing, ſeveral were delirious, and the place was filled with incoherent ravings, and exclamations of diſtreſs; the cry of *water! water!* was predominant. This was handed to them by the centinels, but had no effect in allaying their thirſt. In leſs than four hours, many were ſuffocated, or died in violent deliriums. In an hour more, the ſurvivors, except a few at the grate, were to the higheſt degree phrenitic and outrageous. At length thoſe at the grate became ſo inſenſible, that we have no account of what happened, till they were releaſed at ſix o'clock next morning, having been confined from ſeven the preceding evening. Such were the effects of animal effluvia in a cloſe and unventilated place, in the ſpace of eleven hours, that out of a hundred and forty-ſix perſons, no more than twenty-three came out alive, and thoſe in a high putrid fever, of which, however, by freſh air, &c. they gradually recovered.

HOLIBUT, or Holyeut, in *Ichthyology*, a name given by the people of ſome parts of England to the turbot in general; but in other parts only to the larger fiſhes of that ſpecies. See Hippoglossus.

HOLLAND, in *Linen-Drapery*, a fine, white, even, cloſe kind of linen cloth, chiefly uſed for ſhirts, ſheets, &c.

It is principally wrought in the provinces of Holland, Friſeland, and other parts of the United Provinces; whence the appellation.

The principal mart or ſtaple of this cloth is at Haerlem, whither it is ſent from moſt other parts, as ſoon as wove, there to be whitened in the enſuing ſpring.

That manufactured in Friſeland is the moſt eſteemed, and called *Friſe Holland*. It is the ſtrongeſt and the beſt coloured of any of that fineneſs: it is never calendered, nor thickened, as the reſt; but it is imported juſt as it comes from the whitſter: it is diſtinguiſhed by its being yard quarter and half wide; which is half a quarter more than thoſe commonly called *Friſe Hollands*, which are not right.

Holland, *gulix*, is very white and fine, and is chiefly uſed for ſhirts, being the ſtrongeſt of any for its fineneſs, except true Friſe. It is juſt yard wide.

Holland, *Alcmaer*, is a very ſtrong cloth, and wears exceeding well. It is about yard quarter and half wide.

HOLLI, the Indian name for what the Spaniards call *ulli*; a reſinous liquor, which flows ſpontaneouſly from the tree *holquaghuytl*, or *chilli*. It is often mixed with chocolate in the making, in the proportion of one fourth part; it gives the chocolate in this caſe no very diſagreeable flavour; and becomes a very powerful medicine in dyſenteries. It is uſual, however, before the making it, to mix the cacao and *holli* on an iron plate, and torrify them thoroughly together.

HOLLOA, in *Sea Language*, is an exclamation of anſwer to any perſon who calls to another to aſk ſome queſtion, or to give a particular order. It is alſo the firſt anſwer in hailing a ſhip at a diſtance.

HOLLOW, in *Architecture*, a concave moulding, about a quadrant of a circle, by ſome called a casement, by others an abacus

Hollow *root*, in *Botany*. See Fumitory, and Moschatellina.

Hollow *ſquare*, in *Military Language*, is a body of foot, drawn up with an empty ſpace in the middle, for the colours, drums, and baggage; facing and covered by the pikes every way, to oppoſe the horſe.

Hollow *tower*, in *Fortification*, is a rounding made of the remainder of two briſures, to join the curtin to the orillon, where the ſmall ſhot are plaid, that they may not be ſo much expoſed to the view of the enemy.

Hollow-*toothed horſe*, in the *Manege*. See Shell-*toothed*.

HOLLOWNESS *of trees*. This is one of the moſt miſchievous diſtemperatures to which trees are ſubject. It is generally occaſioned by the lopping of them in an improper manner, and leaving the wet to fall in upon them, eſpecially on their heads. When this miſchief is found out in its beginning, the only method is to cut the trunk off to the quick, ſacrificing the whole *hollow* part; it is, in this caſe, to be cut off ſloping, that the wet may run off from it. All ſoft woods are liable to this miſchief, after the lopping, particularly the elm; and when it takes hold of any tree, it grows upon it daily. till the whole ſubſtance of the tree is at length eaten away, and only a coat of bark is left. The beſt way of preventing it in the elm, is never to cut off the head or top of the tree at all, but only to lop the ſide branches; theſe will yield a very large quantity, and the body of the tree will thrive the better for their being often cut off, and will be good timber at laſt.

Theſe tall elms ſometimes grow *hollow* from another cauſe, that is, from the decay of ſome of the large roots; but the ſtarving condition of its branches will ſhew this, though there be no external mark of it. This ſort of *hollowneſs* always begins at the bottom of the tree. Blaſted parts of trees are to be cut away to the quick, in the ſame manner as the hollow ones, and the wounds will heal in the ſame manner.

HOLLY, *Ilex*, in *Botany*, a genus of the *tetrandria digynia* claſs. Its characters are theſe: they have male, female, and hermaphrodite flowers, on different plants, and often on the ſame tree; the male flowers have a permanent empalement of one leaf, indented in four parts; they have but one petal, cut into four ſegments, and have four awl-ſhaped ſtamina; the female flowers have their empalements and petals the ſame as the male, but have no ſtamina; in the center is placed a roundiſh germen, which becomes a roundiſh berry with four cells, each containing a ſingle hard ſeed. There are three ſpecies, including many varieties.

The common *holly* grows naturally in woods and foreſts in many parts of England, where it riſes from twenty to thirty feet high, and ſometimes higher. It is a beautiful tree in the winter, and therefore merits a place in all plantations of evergreen trees and ſhrubs. *Holly* was formerly planted for hedges, and is a very proper plant for that purpoſe.

The ſeeds of the *holly* never come up the firſt year, but lie in the ground as the haws do. The berries therefore ſhould be buried in the ground one year, and then taken up and ſowed at Michaelmas upon a bed expoſed only to the morning ſun. In this bed the plants may remain two years, and then ſhould be tranſplanted in the autumn into beds about ſix inches aſunder, where they may ſtand two years longer, and then they will be ſtrong enough to be tranſplanted to the ground in which they are to remain.

The beſt time for tranſplanting the *holly* is in autumn, eſpecially in dry land; but if the ſoil is cold or moiſt, they may be ſafely tranſplanted in the ſpring. Miller.

Holly-hedges are a very beautiful evergreen and ſtrong fence, but liable to periſh in hard winters It has been ſuppoſed, that the ſeverity of the cold in theſe ſeaſons was the occaſion of this; but a cloſer obſervation has ſhewn, that the miſchief is owing to the field-mice, which, in very ſevere ſeaſons, when they can get at nothing elſe, diſbark the roots of theſe ſhrubs. The method of preſerving theſe hedges, in ſuch ſeaſons, is found to be by clearing away the weeds which are a harbour to theſe little animals, and placing traps and boxes in proper places, with a paſte made of butter and ratſbane, daubed over their inſides, and holes made in their ſides no bigger than what the mice or rats, if there be any there, can creep into; and thus the vermin are deſtroyed, and the miſchief which might attend ratſbane being expoſed, are prevented. See Fence.

The berries of *holly* are hot and dry, of thin parts, and expel wind. They are good againſt the colic; ten or twelve being taken inwardly, bring away by ſtool thick phlegmatic humours.

The birdlime which is made of the bark is no leſs hurtful than that of miſletoe, if taken inwardly, by glueing up the inteſtines. *Holly* beaten to powder, and drank, is an experienced medicine againſt all fluxes of the belly, as the dyſentery, and the like. James.

The timber of *holly* is the whiteſt of all hard wood, takes a fine poliſh, and is therefore uſed by the inlayers. See Marquetry.

It is alſo fit for all ſturdy uſes, and therefore preferred to al all others by the mill-wright, turner, and engraver. It makes the beſt handles and ſtocks for tools, flails, cart-whips, bowls, ſhivers, and pins for blocks; and is excellent for door-bars, &c.

Holly, *knee*, a name ſometimes given to the *ruſcus*, or butchers-*broom*.

Holly, *ſea*, the name by which ſome call the *eryngium* of botanical writers. See Eryngo.

HOLLYHOCK, or *Roſe-mallow*, *Alcea*, in *Botany*, a genus of the *monadelphia polyandria* claſs. Its characters are theſe: the flower has a double empalement, of which one is permanent, and cut into ſix parts; the inner is larger, and ſlightly cut into five; the flower is compoſed of five petals, which coaleſce at their baſe, and ſpread open at the top in the form of a roſe; in the center is placed a round germen, ſupporting a ſhort cylindrical ſtyle, with many ſtamina joined below to the pentagonal column, and ſpread open at the top; the germen afterward becomes a round, depreſſed, articulated capſule, having many cells, in each of which is lodged one compreſſed kidney-ſhaped ſeed. There are two ſpecies.

We have many varieties of this plant cultivated in our gardens, for the beauty of their flowers. They are all propagated from ſeeds, which are to be ſown about the middle of April, upon a bed of light earth, and covered with the ſame earth about half an inch deep When the plants are come up pretty ſtrong, and have put out ſix or eight leaves, they ſhould be tranſplanted out into nurſery beds at about a foot diſtance from one another. They muſt be watered till they have taken root, and will then require no farther care for the ſummer, but being kept clear of weeds. In October following they ſhould be tranſplanted into the places where they are to remain, and ſet in rows of two foot diſtance, and at a foot from each other in the rows where they may flower; and when it is obſerved which roots produce the fineſt flowers, thoſe ſhould, at the next Michaelmas, be tranſplanted into garden beds, where they will live four or five years; after which they grow weak, and ſhould be replaced by new ones. When the ſtalks of the plants begin to decay, they ſhould be cut down cloſe to the ground, otherwiſe they are apt to rot and deſtroy the roots.

HOLM, Hulmus, ſignifies as much as *inſula amnica*, a river-iſland, according to Bede; or a plain, graſſy ground, upon the water-ſide, or in the water, according to Camden.

Where any place is called by the name *holm*, or where this ſyllable is joined with any other in the name of a place, it ſignifies it to be ſurrounded with waters. As the *flatholmes*, the *ſtepholmes*, near Briſtol. If the ſituation of the place be not near the water, it may ſignify a hilly place; for *holm*, in Saxon, alſo ſignifies a *hill*, or *cliff*.

Holm *oak*. See Oak.

HOLOCAUST, ʽΟλοκαυϛον, formed from ὁλος, *whole*, and καιω, *I conſume with fire*, a kind of ſacrifice, wherein the whole offering is burnt or conſumed by fire; as an acknowlegement that God, the creator, preſerver, and lord of all, was worthy of all honour and worſhip, and as a token of men's giving themſelves entirely up to him. It is called alſo, in Scripture, a *burnt-offering*.

Sacrifices of this ſort are often mentioned by the heathens as well as Jews; particularly by Xenophon, Cyropæd. lib. viii. p. 464. ed. Hutchinſ. 1738, who ſpeaks of ſacrificing *holocauſts* of oxen to Jupiter, and of horſes to the Sun; and they appear to have been in uſe long before the inſtitution of the other Jewiſh ſacrifices by the law of Moſes. See Job i. 5. chap. xlii. 8. Gen. xxii. 13. chap. viii. 20. On this account, the Jews, who would not allow the Gentiles to offer on their altar any other ſacrifices peculiarly enjoined by the law of Moſes, admitted them by the Jewiſh prieſts to offer *holocauſts*; becauſe theſe were a ſort of ſacrifices prior to the law, and common to all nations. During their ſubjection to the Romans, it was no uncommon thing for thoſe Gentiles to offer ſacrifices to the God of Iſrael at Jeruſalem. Vid. Philo. Opera, p. 801. E. Ed. Colon. Allobr. 1613. Tertullian. Apolog. § 26. p. 26. ed. Rigalt. 1675.

Holocauſts were deemed by the Jews the moſt excellent of all their ſacrifices. It is ſaid, that this kind of ſacrifice was in common uſe among the heathens, till Prometheus introduced the cuſtom of burning only a part, and reſerving the remainder for his own uſe. See Sacrifice.

HOLOGRAPHUM, compoſed of ὁλος, *all*, and γραφω, *I write*, in the *Civil Law*, ſomething written wholly in the hand-writing of the perſon who ſigns it.

The word is chiefly uſed in ſpeaking of a testament, written wholly in the teſtator's own hand.

The Romans did not approve of *holographic* teſtaments; and, though Valentinian authorized them by a novel, they are not uſed where the civil law is in full force.

HOLOMETER, compoſed of ὁλος, all, and μετρεω, *I meaſure*, a mathematical inſtrument ſerving univerſally for the taking of all ſorts of meaſures, both on the earth and in the heavens.

The *holometer* is the ſame with what is otherwiſe denominated *pantometer*.

HOLOSCHÆNOS, in the *Materia Medica*, the name of the great bulruſh, or *juncus lævis maximus*, common in rivers.

HOLOSERICA *veſtis*, a garment entirely of ſilk, as the name imports, which was not uſed at Rome till the time of Heliogabalus.

HOLOSTEUM, in *Botany*, a genus of the *triandria trigynia* claſs; the calyx of which is five-leaved; the corolla conſiſts of five petals, and the fruit is a ſubcylindric ſingle-celled capſule, opening at the apex.

Holosteum, in *Ichthyology*, a name by which Bellonius, and ſome others, call the ostracion, a fiſh of the river Nile, covered with a hard ſhelly ſkin, and approaching in its body to a pentangular form.

HOLOTHURIA, in *Natural Hiſtory*, a genus of ſea-worms of the order of *molluſca*, in the Linnæan ſyſtem. Theſe are diſtinguiſhed by a pliable, naked, gibbous body, terminated by the anus at one extreme, and furniſhed at the other with many tentaculæ, encompaſſing the mouth. Linnæus enumerates nine ſpecies.

HOLOTONICOS, a word uſed by ſome authors to ſignify an univerſal convulſion or rigor over the whole body.

HOLQUAHVILT, in *Botany*, a name by which ſome authors have called the tree which produces the Jeſuits bark.

HOLSOM. A ſhip is ſaid to be *holſom* at ſea, when ſhe will hull, try, and ride well, without rolling or labouring.

HOLT-*waters*. Theſe have been found by experience to be of admirable efficacy in all ſcorbutic and ſcrophulous caſes. An account of ſome very remarkable cures performed by them in theſe caſes, was printed ſeveral years ago; and though known to be fact in the place, was diſbelieved by almoſt every body beſide.

Mr. Lewis, formerly miniſter of the place, confirms their efficacy from his own obſervation; and obſerves, that they are of an attenuating, aſtringent, and drying nature. The firſt of theſe properties they poſſeſs in common with all waters which dilute, attenuate, and fit the juices for paſſing the proper veſſels; their aſtringency they owe to the alum and iron which they contain; and their drying, abſorbing, and healing qualities, are probably owing to a quantity of ſulphur, and a fine light ochre, which they are impregnated with. Phil. Tranſ. N° 408.

HOLYNESS, or Holiness, ſanctity; the quality which conſtitutes or denominates a perſon or thing *holy*; i. e. pure, or exempt from ſin.

Holyness is alſo uſed in reſpect of perſons and things that are ſacred; i. e. ſet apart to the ſervice of God, and the uſes of religion.

In this ſenſe we ſay, *holy* days, *holy* ordinances, the *holy* Bible, *holy* Goſpels, *holy* war, &c. The Roman catholics call the Inquiſition the *holy* tribunal; the ſee of Rome, the *holy* ſee, &c.

Holy oil, *holy* water, &c. See Unction, Water, &c.

Paleſtine is particularly called the *holy* land, and Jeruſalem the *holy* city. Princes formerly made a practice of going to ſignalize their religion in the *holy* land; who would have manifeſted the more genuine ſpirit of religion by ſtaying at home. See Croisade.

In Romiſh countries, one third part of the year is taken up in *holy* days, ſaints days, &c. See Feasts.

Urban VIII. iſſued out an edict in the year 1643 for diminiſhing the number of *holy* days.

In Scotland they obſerve no ſtated *holy* days, beſides Sundays.

Holy *fire*. See Fire.

Holy *Thurſday* is what we otherwiſe call Ascension *day*.

Holy *week* is the laſt week of Lent, called alſo Passion-*week*.

Holy *year* is ſometimes uſed for the year of jubilee.

In the Jewiſh tabernacle, and afterwards in the temple, there were two places; the one called the *holy*, *ſanctum*; and the other, which was more retired, the *holy of holies*, *ſanctum ſanctorum*, or the sanctuary.

The *holy* was ſeparated from the *holy of holies*, by a veil. In the latter place was the ark of the covenant kept.

Holyness is alſo a title, or quality, attributed to the pope, as that of majeſty is to kings.

Anciently the ſame title, *holyneſs*, was given to all biſhops; as appears in St. Auguſtine, Fortunatus, Nicholas I. Caſſiodore, &c. St. Gregory compliments ſome of his contemporary biſhops with your beatitude, and your *holyneſs*.

The Greek emperors of Conſtantinople were alſo addreſſed under the title of *holyneſs*, on account of their being anointed with *holy* oil at their coronation. Du-Cange adds, that ſome of the kings of England have had the ſame attribute; and that the Orientals have frequently refuſed it to the pope.

HOLY GHOST, *order of the*, is a military order in France; the principal in point of dignity in that kingdom.

It was inſtituted by king Henry III. in 1569, in memory of three great events happening on the ſame day; viz. his birth, acceſſion to the crown of France, and election to that of Poland: the order is to conſiſt of a hundred knights only; who, to be admitted, are to make proof of their nobility for three deſcents.

The king is the grand maſter, or ſovereign, and takes the oath as ſuch on his coronation day; whereby he ſolemnly vows to maintain, for ever, the order of the *Holy Ghoſt*; and not to ſuffer it to ſhrink, fall, or diminiſh, ſo long as it is in his power to hinder it; nor ever to attempt to alter or diſpenſe with any of the irrevocable ſtatutes of the order.

The knights are all to wear a gold croſs hung about the neck by a blue ſilk ribband, or collar; and the officers and commanders are alſo to wear a croſs ſewed on the left ſide of their cloaks, robes, and other upper garments. Before they receive the order of the *Holy Ghoſt*, that of St. Michael is conferred, as a neceſſary degree; for which reaſon their arms are ſurrounded with a double collar.

HOLY GHOST, *croſs of the*, in *Heraldry*, conſiſts of a circle in the middle of a croſs, and on it the *Holy Ghoſt*, in figure of a dove: the four arms are drawn narrow from the centre, and widening to the ends, where the returning lines divide each of them into two ſharp points; upon each of which is a pearl.

From the intervals of the circle between the arms iſſue four fleurs-de-lis. This is the croſs worn by the knights of the order of the *Holy Ghoſt* in France.

HOLY-ROOD *day*, a feſtival obſerved by the Roman catholics, in memory of the exaltation of our Saviour's croſs. See CROSS and EXALTATION.

HOLY *roſe*. See *Rock* ROSE.

HOLY *thiſtle*. See *Bleſſed* THISTLE.

HOLY-WATER *ſprinkle*, among *Hunters*, ſignifies the TAIL of a fox.

HOMAGE, in its general ſenſe, denotes the reverence, reſpect, and ſubmiſſion, which a perſon yields his maſter, lord, prince, or other ſuperior.

The word is formed of the Latin *homo, man*; becauſe when the tenant takes this oath, he ſays, *Ego devenio homo veſter, I become your man*: for the ſame reaſon *homage* is alſo called *manhood*; ſo the *homage* of his tenant, and the *manhood* of his tenant, are the ſame. Coke on Littl. fol. 64.

HOMAGE, HOMAGIUM, HOMINIUM, in *Law*, is an engagement or promiſe of fidelity; which the vaſſal, or tenant, who holds a fee, renders to the lord, when admitted thereto.

In the original grants of lands and tenements, by way of fee, the lord did not only oblige his tenants to certain ſervices, but alſo took a ſubmiſſion, with promiſe and oath, to be true and loyal to him, as their lord and benefactor.

This ſubmiſſion, &c. is called *homage*; the form whereof, as appointed by ſtat. 17 Edward II. is in theſe words: When a free-man ſhall do *homage* to his lord, of whom he holdeth in chief, he ſhall hold his hands together, between the hands of his lord, and ſhall ſay thus: "I become your man, from this day forth, for my life, for member, and for worldly honour; and ſhall owe you my faith, for the land I hold of you; ſaving the faith that I owe unto our ſovereign lord the king, and to mine other lords."

In this manner the lord of the fee, for which *homage* is due, takes *homage* of every tenant, as he comes to the land, or fee. Glanvil, indeed, excepts women; who only perform *homage* by their huſbands; becauſe *homage* is ſuppoſed to have a more immediate relation to ſervice in war: but Fitzherbert denies this exception. Nat. Brev. fol. 157.

It is added, that biſhops do no *homage*, but only fealty; and probably for the ſame reaſon as women. Yet do we read, that the archbiſhop of Canterbury does *homage* on his knees to our kings, at their coronation; and that the biſhop of Man is *homager* to the earl of Derby.

Fulbeck reconciles this: by our law, ſays he, a religious man may do *homage*, but may not ſay to the lord, *Ego devenio homo veſter*; becauſe he has already profeſſed himſelf to be only God's man; but he may ſay to him, "I do unto you *homage*, and to you ſhall be faithful and loyal."

Homage and FEALTY, or faith, are two diſtinct things, and different duties.

Originally *homage* was performed by the gentlemen, and fealty by the peaſant. Others ſay, that *homage* was that performed to the lord himſelf, and fealty to his ſeneſchal, or ſteward, for his lord. It is added, that he who holds lands for term of life, owes *homage*, but not fealty. Biſhops take the oath of fealty and loyalty to the king, for the temporalities they hold of him; but without *homage*, or vaſſalage.

HOMAGE-*liege*, a more extenſive kind of *homage*; whereby the vaſſal held of the lord, not only for his land, but for his perſon; ſo that the lord might uſe him againſt all mankind, whether within or without the kingdom; excepting againſt the king. See LIEGE.

This kind of *homage* was rendered bare-headed, with the hands joined on the Goſpels, and one knee on the ground, and without ſword, girdle, or ſpurs. By which it was diſtinguiſhed from *frank homage*.

There are alſo other diſtinctions of *homage*; as,

HOMAGE, *plain*, or *homage* of a fee; where no oath of fidelity is taken.

HOMAGE *of devotion*, which is a donation made to the church; and does not import any duty, or ſervice at all.

HOMAGE *of peace*, which a perſon makes to another after a reconciliation, as an aſſurance, that he will no longer diſturb his peace, &c.

HOMAGE, again, is divided into *new*, or that performed upon the grant of the fee; and *aunceſtrel*.

HOMAGE, *aunceſtrel*, is where a man and his anceſtors, time out of mind, have held their land of the lord, and his anceſtors, by *homage*.

If ſuch lord have received *homage*, he is bound to acquit the tenant againſt all other lords above him, of every manner of ſervice; and if the tenant has done *homage* to his lord, and is impleaded, and vouches the lord to warranty, the lord is bound to warrant him; and if the tenant loſe, he ſhall recover in value againſt the lord ſo much of the lands as he had at the time of the voucher, or any time after.

HOMAGE is alſo uſed for a jury, in a court-baron, becauſe, commonly conſiſting of ſuch as pay *homage* to the lord of the fee. See JURY, COURT-BARON, and MANOR.

HOMAGE is alſo taken, in ſome caſes, for the particular place, or diſtrict, where the ſervices are to be performed.

HOMAGER, a perſon that does, or is bound to do HOMAGE, to another.

HOMAGIO *reſpectuando*, a writ iſſued out to the eſcheator, commanding him to deliver ſeiſin of lands to the heir that is of full age, notwithſtanding his *homage* not being done.

HOMAGIUM *reddere* has been uſed to ſignify, to renounce homage: as where the tenant or vaſſal made a ſolemn declaration of diſavowing his lord, for which there was a form preſcribed by the feudatory laws.

HOME, in *Sea Language*, denotes either the ſituation of ſome object, where it retains its full force of action; or where it is properly lodged for convenience or ſecurity. In the former ſenſe it is applied to the ſails, and ſignifies, that their clues or lower corners are cloſe to the blocks upon the yard-arm, immediately beneath them: hence, to haul *home* the top-ſail ſheets, is to extend the bottom of the top-ſail to the lower yard, by means of the ſheets. In the latter ſenſe, it uſually refers to the ſtowage of the hold; as a caſk, &c. is ſaid to be *home*, when it bears againſt and lies cloſe to ſome other object; or to the anchor, which is ſaid to come *home*, when it looſens from the ground, by the effort of the cable, and approaches the place where the ſhip floated, at the length of her moorings. Mar. Dict.

HOMER, OMER, or CHOMER, a Jewiſh meaſure, containing the tenth part of the EPHA. See CORUS and MEASURE.

HOMESOKEN, or rather HAMSOKEN; ſometimes alſo written HAMSOKA, and HAMSOKNA, the privilege or protection which every man enjoys in his own houſe.

Hamſokne, *hoc eſt quictus eſſe de amerciamentis pro ingreſſu hoſpitti violenter & ſine licentia contra pacem regis, & quod teneatis placita de hujuſmodi tranſgreſſione in curia veſtra.* W. Thorn. 2030.

Hence, he who invades that freedom, is properly ſaid, *frangere homſocnam*.

This crime ſeems to amount to what we now call BURGLARY; which is a crime of a heinous nature, as being not only a breach of the king's peace, but a breach of that liberty which a man hath in his own houſe, which, as we commonly ſay, ſhou'd be his caſtle, and therefore ought not to be invaded. Bracton. lib. iii.

HOME STALL, a manſion-houſe, or ſeat, in the country. Ruſt.

HOMICIDE, of *homo, man*, and *cædo, I kill*, in *Common Law*, the killing of a man.

Homicide is divided into *voluntary* and *caſual*.

HOMICIDE, *caſual*, is either *merely caſual*, or *mixed*. *Merely caſual* is when a perſon kills another by pure miſchance, being about his lawful occaſions; as in the caſe of an ax ſlipping out of a man's hand, or falling off the helve while he is felling a tree.

It is accounted *mixed*, when there is a negligence, or ſome other unwarrantable circumſtance, attending the action. See MANSLAUGHTER.

HOMICIDE, *voluntary*, is that which is deliberate, and committed with a ſet purpoſe, and mind to kill; and is either with a precedent malice, or without. The former is murder, which is a felonious killing, with malice prepenſe, any perſon in the realm, living under the king's protection. See MURDER.

Judge Blackſtone has diſtinguiſhed *homicide* into three kinds; viz. *juſtifiable*, *excuſable*, and *felonious*.

Juſtifiable homicide is ſuch as is owing to ſome unavoidable neceſſity, without any intention or negligence in the perſon that kills, and, therefore, without any ſhadow of blame. Of this kind is the act of a magiſtrate or officer, who puts a malefactor to death, in obedience to the law, and in the execution of public juſtice. *Homicide* is alſo *juſtifiable* for the advancement of public juſtice; as, where an officer, in the execution of his office, either in a civil or criminal caſe, kills a perſon that aſſaults or reſiſts him; where an officer, or any private perſon, attempts to take a man charged with felony, but is reſiſted, and in the endeavour to take him, kills him; where officers, in caſe of a riot or rebellious aſſembly, endeavouring to diſperſe the mob, kill them; ſuch officers are juſtified both by common law, and by the riot act, 1 Geo. I. cap. 5. Where priſoners are killed by the gaoler or officer, in endeavouring to prevent their eſcape; where treſpaſſers in foreſts, parks, chaſes, or warrens, refuſe to ſurrender to the keepers, they may be ſlain. 21 Edw. I. ſtat. 2. 3 & 4 W. & M. cap. 10. But in all theſe caſes there muſt be an apparent neceſſity, without which this kind of *homicide* is not juſtifiable. When one champion killed another in battle, ſuch *homicide* was juſtifiable, and was imputed to the juſt judgment of God. Moreover, ſuch *homicide*, as is committed for preventing any forcible and atrocious crime, is juſtifiable by the law of nature, and by the law of England. 24 Hen. VIII. cap. 25. Thus if any perſon attempts a robbery or murder, or endeavours to break open a houſe in the nighttime, or to burn it, and ſhould be killed in the attempt, the ſlayer ſhall be acquitted and diſcharged. This is agreeable to the Jewiſh law, Exod. xxii. 2. to the laws of Athens, and the Roman law of the Twelve Tables. The Engliſh law alſo juſtiſies *homicide* in defence of CHASTITY.

Excuſable homicide is ſuch as the law excuſes from the guilt of felony, though it implies ſome degree of fault and blame. This is either *per infortuniam*, by miſadventure, (ſee *Caſual* HOMICIDE, above) or *ſe defendendo*, upon a principle of ſelf-preſervation in a ſudden affray. See CHANCE-*medley*.

With regard to this, it is proper to obſerve, that the term has been often erroneouſly applied to any manner of *homicide* by miſadventure; whereas by 24 Hen. VIII. cap. 5. and our ancient books of law, it is properly applied to ſuch killing as happens in ſelf-defence, on a ſudden rencounter. The true criterion between manſlaughter and chance-medley, ſays judge Blackſtone, ſeems to be this: when both parties are actually combating at the time when the mortal ſtroke is given, the ſlayer is then guilty of MANSLAUGHTER; but if the ſlayer hath not begun to fight, or, having begun, endeavours to decline any farther ſtruggle, and afterwards, being cloſely preſſed by his antagoniſt, kills him, to avoid his own deſtruction, this is *homicide* excuſable upon ſelf-defence; and, therefore, the law requires, that the perſon, who kills another in his own defence, ſhould have retreated as far as he conveniently or ſafely can, to avoid the violence of the aſſault, before he turns upon his aſſailant: beſides, if the perſon aſſaulted does not fall upon the aggreſſor till the affray is over, or when he is running away, this is revenge, and not defence. Theſe two ſpecies of *excuſable homicide* are ſimilar in their blame and puniſhment. They formerly incurred a forfeiture, as ſome ſay, of all the goods and chattels; according to others, only of part of them, by way of fine or WEREGILD, which was probably diſpoſed of, as in France, *in pios uſus*, or for the benefit of his ſoul. But the delinquent has now a pardon, and writ of reſtitution of his goods, as a matter of courſe and right, only paying for ſuing out the ſame; and in moſt caſes the judge will grant a general verdict of acquittal.

Felonious homicide is the act of killing a human creature, without juſtification or excuſe. This is either ſelf-murder (ſee FELO *de ſe*); or the killing of another man, which is divided into MANSLAUGHTER and MURDER. Blackſt. Com. book iv. cap. 14.

HOMILY, Ὁμιλια, formed of ὁμιλος, *aſſembly*, originally ſignifies a conference, or converſation; but the word has ſince been applied to an exhortation, or ſermon, delivered to the people.

The Greek *homilia*, ſays M. Fleury, ſignifies a familiar diſcourſe, like the Latin *ſermo*; and diſcourſes delivered in the church took theſe denominations, to intimate, that they were not harangues, or matters of oſtentation and flouriſh, like thoſe of profane orators, but familiar and uſeful diſcourſes, as of a maſter to his diſciples, or a father to his children.

All the *homilies* of the Greek and Latin fathers are compoſed by biſhops. We have none of Tertullian, Clemens Alexandrinus, and many other learned perſons; becauſe, in the firſt ages, none but biſhops were admitted to preach.

The privilege was not ordinarily allowed to prieſts, till toward the fifth century. St. Chryſoſtom was the firſt preſbyter that preached ſtatedly. Origen and St. Auguſtine alſo preached, but it was by a peculiar licence, or privilege.

Photius diſtinguiſhes *homily* from ſermon; in that the *homily* was performed in a more familiar manner; the prelate interrogating and talking to the people, and they, in their turn, anſwering, and interrogating him; ſo that it was properly a converſation; whereas the ſermon was delivered with more form, and in the pulpit, after the manner of the orators.

There are ſeveral fine *homilies* of the fathers ſtill extant; and, particularly, of St. Chryſoſtom, St. Gregory, &c.

The practice of compiling *homilies*, which were to be committed to memory, and recited by ignorant or indolent prieſts, commenced towards the cloſe of the eighth century; when Charlemagne ordered Paul Deacon and Alcuin to form *homilies* or diſcourſes upon the Goſpels and Epiſtles, from the ancient doctors of the church. This gave riſe to that famous collection, entitled the Homiliarium of Charlemagne, and which being followed as a model by many productions of the ſame kind, compoſed by private perſons, from a principle of pious zeal, contributed much (ſays Moſheim) to nouriſh the indolence, and to perpetuate the ignorance of a worthleſs clergy. Eccleſ. Hiſt. vol. ii. p. 84. 8vo. ed. 1768.

At the time of the Reformation there were ſeveral of theſe *homilies* compoſed and printed, and ordered to be read in ſuch churches as were not provided with a ſufficiently learned miniſter, in order to prevent unſound doctrine being taught in remote country places.

HOMILIES, *Clementine*, in *Eccleſiaſtical Hiſtory*, are nineteen *homilies* in Greek, publiſhed by Cotelerius, with two letters prefixed; one of them writ in the name of Peter, the other in the name of Clement, to James biſhop of Jeruſalem; in which laſt letter they are entitled Clement's Epitome of the Preaching and Travels of Peter. According to Le Clerc, theſe *homilies* were compoſed by an Ebionite in the ſecond century; but Montfaucon ſuppoſes that they were forged long after the age of St. Athanaſius. Dr. Lardner apprehends, that the *Clementine Homilies* were the original or firſt edition of the Recognitions; and that they are the ſame with the work cenſured by Euſebius under the title of Dialogues of Peter and Appion. Credib. of the Goſpel Hiſt. vol. iv. p. 809, &c.

HOMINE *capto in withernam*, a writ for apprehending him that has taken any bondman or woman, and led him or her out of the country; ſo that he or ſhe cannot be replevied according to law. See WITHERNAM.

HOMINE *eligendo ad cuſtodiendam peciam ſigilli pro mercatoribus editi*, in *Law*, a writ directed to a corporation for the choice of a new perſon to keep one part of the ſeal appointed for *ſtatutes merchant*, when a former is dead, according to the ſtatute of Acton Burnel.

HOMINE *replegiando*, a writ for the bailing of a man out of priſon, when he is confined without commandment of the king or his judges, or for any cauſe that is repleviable. But this writ is now ſeldom uſed; a writ of HABEAS *corpus* being ſued out on the neceſſary occaſions.

HOMINICOLÆ, formed of the Latin *homo*, *hominis*, *man*, and *colo*, *I worſhip*, in *Antiquity*, a name which the APOLLINARIANS gave to the orthodox, to denote them worſhippers of man.

As the orthodox maintained, that Jeſus Chriſt was God-man, the APOLLINARIANS accuſed them of adoring a man, and therefore called them *hominicolæ*.

HOMMOC, in *Sea Language*, ſignifies a hillock, or ſmall eminence of land, reſembling the figure of a cone, and appearing on the ſea-coaſt of any country.

HOMO, *Man*, in *Zoology*. See MAN.

HOMOCENTRIC, compoſed of ὁμος, *ſimilar*, and κεντρον, *center*, in *Aſtronomy*, a term of the ſame import with CONCENTRIC.

HOMOCHROA, in *Natural Hiſtory*, the name of a genus of PEBBLES.

The word is derived from the Greek ὁμος, *ſimilar*, and χρωα, *colour*, and expreſſes ſuch pebbles as are not veined, but all of one ſimple and ſimilar colour. Theſe are bodies compoſed of cryſtalline matter, conſiderably debaſed by earth, and this of various kinds in the different ſpecies, but only of one kind in the ſame ſpecies, which is thence always of one colour, and not ſubject to veins. Of this genus there are only five known ſpecies; the white, red, yellow, bluiſh, and greeniſh. All theſe are covered with external coats or cruſts, like thoſe of the common pebbles. Hill's Hiſt. of Foſſ. p. 510.

HOMODROMUS *vectis*, in *Mechanics*, a lever, in which the weight is in the middle between the power and fulcrum, or the power in the middle between the weight and fulcrum. See *Tab. Mechanics*, *fig.* 2. and 3.

The word *homodromus* is derived from ὁμος, *ſame*, and δρομος, *courſe*, becauſe in this ſpecies of lever the weight and power move in the ſame direction; as in the HETERODROMUS they move in contrary directions.

HOMOEOTELEUTON, Ομοιοτελευτον, a figure in *Rhetoric*, whereby ſeveral verbs in a ſentence are made to end alike: as, *eos deduci, evehi quam deſeri malui*. Or, *ut vivis invidioſe, delinquis ſtudioſe, loqueris odioſe*.

HOMOGENEOUS, or HOMOGENEAL, compoſed of the Greek ὁμος, *like*, and γενος, *kind*, is a term applied to various ſubjects, to denote, that they conſiſt of ſimilar parts, or of parts of the ſame nature and kind: in contradiſtinction to heterogeneous, where the parts are of different natures, &c.

Natural bodies are generally compoſed of *homogeneous* parts, as a diamond, a metal, &c. Artificial bodies, on the contrary, are aſſemblages of heterogeneous parts, or parts of different qualities; as a building, of ſtone, wood, &c.

HOMOGENEAL *light*, is that whoſe rays are all of one and the ſame colour, degree of refrangibility, and reflexibility. See LIGHT.

HOMOGENEAL *numbers* and *plants*, are thoſe of the ſame kind and nature.

HOMOGENEAL *ſurds*, are ſuch as have one common radical ſign; as $\sqrt{27}$, and $\sqrt[3]{3}$. See SURD.

HOMOGENEUM *comparationis*, in *Algebra*, the known quantity in an EQUATION; called alſo *abſolute number*.

It is called *homogeneum comparationis*, of *compariſon*, to diſtinguiſh it from the other terms; which, though *homogeneous* as well as this, i. e. always raiſed to the ſame degree of power, are not the quantities to which things are here *compared* or referred.

HOMOGRAMMI, Ὁμογραμμοι, among the *Ancients*, an appellation given to the athletæ who drew the ſame letter, and on that account were to engage together; for when any number of athletæ were to enter the liſts, in order to determine with whom every one ſhould contend, they threw into an urn a number of letters equal to that of the athletæ, but ſo that there were always two letters of a ſort, as two *a*'s, or two *b*'s. After theſe had been ſhaken together, the athletæ drew them out, and thoſe who got the ſame letter were to fight each other.

HOMOIOCATALECTON, Ὁμοιοκαταληκτον, in *Rhetoric*, a figure wherein the different parts of a ſentence have the ſame termination.

Homoiocatalecton is uſed as a genus to denote ſimilar terminations and words; and *homoioptoton* and *homoioteleuton* are made its ſpecies.

HOMOIOMERICAL *principles*, of ομοιος, *ſimilar*, and μερη, *part*, a peculiar kind of principle, ſuppoſed by Anaxagoras in all mixed bodies; being determinate numbers of ſuch ſimilar principles, as, when they came to be parts, e. gr. of an animal body, would there make ſuch maſſes and combinations as their nature required; viz. the ſanguinary particles would then meet together, and make blood, the urinous particles conſtitute urine, the oſſeous ones bones, the carneous fleſh, &c. See PRINCIPLE.

HOMOIOPTOTON, Ὁμοιοπτωτον, a figure in *Rhetoric*, whereby the ſeveral parts of a ſentence end with the ſame caſe, or tenſe of a like ſound; e. gr. *mœrentes, flentes, lachrymantes, & miſerantes*. Iſocrates is particularly celebrated for this figure. Some of the beſt orators have induſtriouſly avoided this figure, becauſe it has too much the appearance of art.

HOMOLINON, a word uſed by ſome authors to expreſs crude flax, and by others for a coarſe ſort of flaxen linen, made of the rough threads unwhitened, which was uſed by the ancients for towels to rub people after bathing.

HOMOLOGATION, in the *Civil Law*, the act of confirming or rendering a thing more valid and ſolemn, by publication, repetition, or recognition thereof.

The word comes from the Greek ὁμολογια, *conſent*, *aſſent*, formed of ὁμος, *ſimilis*, *like*, and λογος, of λογειν, *dicere*, *to ſay*; q. d. *to ſay the ſame thing*, *to conſent*, *agree*.

HOMOLOGOUS, in *Geometry*, is applied to the correſpondent ſides of ſimilar figures, which are ſaid to be *homologous*, or in proportion to each other.

The word is compoſed of ὁμος, *ſimilar*, and λογος, *ratio*, *reaſon*; q. d. quantities *alike* to each other in *ratio*. So, if the ratio of A to B be the ſame as of C to D, here A is *homologous* to C, as B to D; becauſe of the ſimilitude between the antecedents and conſequents. The two antecedents, and the two conſequents, then, in any continued geometrical proportion, are *homologous* terms.

Thus, the baſe of one triangle is *homologous* to the baſe of another ſimilar triangle: ſo, in ſimilar triangles, the ſides oppoſite to equal angles are ſaid to be *homologous*. Equiangular, or ſimilar triangles, have their *homologous* ſides proportional.

All ſimilar triangles, rectangles, and polygons, are to each other as the ſquares of their *homologous* ſides.

HOMOLOGOUS *things*, in *Logic*, are ſuch as agree in name, but are of different natures. Theſe coincide with what we otherwiſe call *equivocal* and *homonymous terms*.

HOMONOPAGIA, a word uſed by ſome medicinal authors for the HEAD-*ach*.

HOMONYMIA, in *Logic*, an EQUIVOCATION. See HOMONYMON, &c.

HOMONYMON, Ὁμόνυμον, compoſed of ὁμος, *ſimilis*, and the Ionic ονυμα, for ονομα, *name*, in *Logic*, a word which has different meanings, or which is uſed to expreſs things of different nature and quality.

Homonyma are the ſame with what are otherwiſe called *polyſema*, *ſynonyma*, and *equivocals*.

HOMOOUSANS, HOMOUSIANS, HOMOUSIANIANISTS, HOMOUSIASTS, formed of ὁμουσιος, or ὁμοουσιος, ſignifying *of the ſame ſubſtance*, are names which the Arians anciently gave to the orthodox, becauſe they held that God the Son is *homoouſios*, i. e. *conſubſtantial* with the Father. Hunneric, king of the Vandals, who was an Arian, publiſhed a reſcript, directed to all the *Homoouſian* biſhops. See PERSON, &c.

HOMOOUSIOS, Ὁμοουσιος, among *Divines*, a being of the ſame ſubſtance or eſſence with another.

The divinity of Chriſt having been denied by the Ebionites and Cerinthians in the firſt century, by the Theodotians in the ſecond, by the Artemonians at the beginning of the third, and by the Samoſatenians, or Paulians, towards the cloſe of the ſame, a council was aſſembled at Antioch in 269, wherein Paulus Samoſatenus, head of this laſt ſect, and biſhop of Antioch, was condemned and depoſed, and a decree publiſhed, as ſome have ſaid, wherein Chriſt is aſſerted to be God of God, and ὁμοουσιος, i. e *conſubſtantial* with the Father.

It has been urged by ſeveral ancient writers of the fourth century, viz. Athanaſius, Hilary of Poictiers, and Baſil, that the council of Antioch rejected the word ὁμοουσιος, or *conſubſtantial*, as improper: and if we conſider that Euſebius, who has been called an Arian, ſpeaks of Malchion, who directed and governed at this council, as a man of uncommon ſoundneſs in the faith of Chriſt, we may preſume that the term was not introduced in this council. The council of Nice, however, aſſembled in 325, expreſsly eſtabliſhed the *Homoouſian* doctrine. Many learned writers have taken pains to vindicate the orthodoxy of the council of Antioch, and to ſhew that both theſe councils held the ſame doctrine. See ARIANS.

HOMOPHAGI. See OMOPHAGI.

HOMOPHONOUS, in *Muſic*, is ſaid of two or more chords, ſtrings, or voices, that are of the ſame pitch or tune, or at uniſon.

HOMORIUS, in *Mythology*, is an epithet given to Jupiter by the Greeks, anſwering to *Terminalis* among the Romans. Polyb. Hiſt. lib. ii.

HOMOTONOS, in *Medicine*, an epithet made the characteriſtic of a certain kind of fevers, which continue from the beginning to the end in one equable and uniform tenor, without exacerbation or relaxation.

HOMUNCIONALES, an appellation given by the Arians to the orthodox, who ſaid there were two natures and ſubſtances in Chriſt.

HOMUNCIONISTS, HOMUNCIONISTÆ, formed of *homuncio*, a diminutive of *homo, a man*, q. d. *little man*, a ſect of heretics, the followers of Photinus, and from him alſo called PHOTINIANS.

They had this appellation, becauſe of their denying the two natures in Jeſus Chriſt, and holding that he was only mere man.

HOMUNCIONITES, HOMUNCIONITÆ, were a ſect of ancient heretics, whoſe diſtinguiſhed dogma it was, that the image of God was impreſſed on the body, not on the ſoul or mind of man.

HOND-HABEND. See HAND-HABEND.

HONE, a fine ſort of WHET-*ſtone*, uſed for ſetting razors, penknives, &c. This is the cos *novacula* of Linnæus, with ſmall gritty particles. See OIL-*ſtone*.

It is of a yellowiſh colour, and is vulgarly, but erroneouſly, ſuppoſed to be holly-wood petrified or changed into ſtone, by lying in a petrifying water for a certain ſeaſon.

Of theſe waters there are ſaid to be ſome in Oxfordſhire, that will thus petrify in a very ſhort time.

Hones, *bed of*, or **Hone**-*pavement*, is one of the tools uſed in the operation of grinding ſpecula for teleſcopes. This is formed of pieces of the fineſt blue *hone* or whetſtone, which are nearly of the ſame breadth and thickneſs, and which, when wetted, appear moſt even and uniform in their colour and grain. Theſe pieces are to be cut into ſquare bits, and, having ground one ſide of each concave on the convex marble, to which they are to be applied, with emery or fine ſand, they are to be cemented upon this thick round piece of marble in a kind of pavement, leaving a ſpace of a ſmall ſtraw's breadth between each, and placing their grain in an alternate direction. Mr. Mudge, inſtead of marble, uſes metal made of lead and tin, on which the *hones* are to be ſo diſpoſed, that the lines between them may run ſtrait from one ſide to the other; and by this diſpoſition, the teeth of a fine ſaw, moved along each of the diviſions, will clear away the cement which riſes between the ſtones. This bed of *hones* ſhould be at leaſt a fourth part larger than the metal which is to be ground upon it. The ſurface of the metal, upon which it is to be cemented, may or may not, at the pleaſure of the workman, be turned of a convexity ſuitable to the gage. As ſoon as the *hones* are cemented down, and the joints cleared by the ſaw, the tool muſt be fixed in the lathe, and turned as exactly true to the gage as poſſible. By this inſtrument the ſpherical figure of the ſpeculum is completed, and its ſurface is rendered fit for the poliſher. See *Tab.* II. *Optics*, *fig.* 30. Smith's Optics, book iii. chap. ii. art. 79. Phil. Tranſ. vol. lxvii. part i. p. 307. See Grinding.

Hone *wort*, in *Botany*, a ſpecies of *ſiſon*. See *Baſtard ſtone* Parsley.

HONESTY, **Sattin**-*flower*, or *Moon-wort*, *lunaria*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs. Its characters are theſe: the flower has four petals placed in form of a croſs, which are entire; and it has ſix awl-ſhaped ſtamina, four of which are the length of the empalement, the other two ſhorter; it has an oblong oval germen, which becomes an erect, plain, compreſſed, elliptical pod, ſitting upon a ſmall foot-ſtalk, terminated by the ſtyle, having two cells opening with two valves which are parallel, incloſing ſeveral compreſſed kidney-ſhaped ſeeds, which are bordered, ſitting in the middle of the pod. Miller enumerates four ſpecies, and Linnæus only two.

Theſe plants grow in almoſt any kind of ſoil, require little culture, but love a ſhady ſituation.

This plant is famous in ſome parts of the kingdom for its medicinal virtues, though it has not the fortune to be received in the ſhops. The people in the northern countries dry the whole plant in an oven, and give as much as will lie on a ſhilling for a doſe, twice a day, in hæmorrhages of all kinds, particularly in the too abundant flowing of the menſes, and with great ſucceſs. The Welch, among whom it is not uncommon, Dr. Needham informs us, make an ointment of it, which they uſe externally, and pretend it cures dyſenteries.

HONEY, *mel*, is a ſweet vegetable juice, collected by the bee from the flowers of different plants, and depoſited in the cells of the combs.

It has been long known, that the bees collect their *honey* as well as their wax from the flowers of plants; but former writers had no diſtinct knowlege of the ſeveral parts of the flowers which furniſhed theſe induſtrious inſects with two ſuch different ſubſtances. It is now known, that the *honey* is procured from thoſe parts of the flowers which were firſt diſcovered by Linnæus, and to which he has given the name of *nectaria*: theſe are certain veſicles or glands ſituated near the baſis of every petal, and continually ſecreting a nectareous or melleous juice. It is not yet aſcertained from what part of the flower or plant the bees collect the wax: ſome have ſuppoſed that it is furniſhed by the farina contained in the apices of the flowers; but Mr. Polhill, an ingenious friend of the editor, of whoſe extenſive and accurate acquaintance with the oeconomy of bees he has availed himſelf in articles pertaining to this ſubject, aſſures him, that this is not the caſe; and that it is ſtill undiſcovered from whence they procure the wax.

The bee ſeizes upon this part of the flower, and ſucks from it either *honey*, or a juice of that nature, which will become *honey* under her management. She receives this into her body, and carries it home to the hive, where ſhe unloads herſelf, by emptying it into the cells which were before prepared to receive it. The bee does not receive the *honey*, in collecting it from the flowers, into the body by means of her trunk, as many have ſuppoſed; for this trunk ſerves only to collect the ſweet juice, in ſmall drops, from the nectaria of flowers. When the trunk is thus loaded with the juice or *honey*, it depoſits it on the tongue, which is exerted for that purpoſe, and being drawn back into the mouth, conveys it into the œſophagus. The œſophagus of the bee is a long and ſlender canal, paſſing from the mouth into the thorax; towards its termination in that part, it is diſtended into a ſort of bag, which forms the firſt ſtomach of the bee. Maraldi ſuppoſed the receptacle of the honey to be a bag, cloſed at the lower end, and only deſtined to receive the *honey*, and diſgorge it again upon occaſion; but Swammerdam, on a more accurate diſſection of this inſect, found it to be a real ſtomach, opening into another or ſecond ventricle. The firſt ſtomach, when empty, is no more than a white filament, which, being hollow, is capable of receiving the *honey*; and, when received, it becomes ſwelled and diſtended in proportion to the quantity it contains, and is very narrow at its lower part, where it is joined to the ſecond ſtomach. This is a ſort of white tranſparent bladder, and is uſually much diſtended, and ſo covered with large and broad circular muſcles, that it ſeems to reſemble a tub with many hoops. This ſtomach becomes again very ſlender and narrow at its lower end, where it is joined to the inteſtines. The ſecond ſtomach and the inteſtines of the bee are often found to contain a great quantity of the farina; but the firſt ſtomach contains only *honey*, and is ſeen, by diſſection, to be furniſhed with all the organs of contraction and diſtenſion, which are neceſſary for throwing out its contents. When the *honey* has undergone a kind of concoction in the ſtomach, and is become much thicker than in its undigeſted ſtate, (though the gentleman already referred to apprehends, that it undergoes no kind of change in the ſtomach of the bee) it is diſgorged again through the mouth, and not, as Swammerdam erroneouſly imagined, through a ſmall orifice in the end of the trunk. The proceſs of this operation may be eaſily diſcovered in glaſs hives, where the cells reach to the glaſs, and have only four ſides of wax, the glaſs ſerving for the other two ſides.

The bee, that comes loaded to the cell, thruſts its head very deep into it, and diſcharges the *honey* from its ſtomach in a very little time, and ſeemingly with very little trouble, by the mouth. One bee ſucceeds another, till the whole cell is filled. In this work, it has been often obſerved, that what appears to be the laſt quantity of *honey* diſgorged into the cell is always of a different appearance from the reſt: this is of the nature of a cream, and is always much thicker than the reſt of the *honey*, which appears of one colour and conſiſtence; it ſeems to be very uſeful in the œconomy of the work, ſerving at once to keep the *honey* moiſt, and to prevent its running out by any accident. Though this cream or cruſt appears to be the laſt voided quantity, it is not ſo in reality, for it ſeems to have been gathered together from the firſt; and every freſh quantity of *honey* is added under, not upon its ſurface. To this purpoſe it is always obſerved, that the bee, which comes loaded to the cell, does not at once diſcharge its *honey* into it, but, entering into the cell as deep as poſſible, it puts forward the anterior pair of legs, and with them pierces a hole through the cruſt or cream. While this hole is kept open by the feet, the bee diſgorges the *honey* in large drops from the mouth; theſe, falling into the hole made by the feet, mix with the maſs below, and the bee, before it flies off, new models the cruſt, and cloſes up the hole; and this is regularly done by every bee that contributes to the general ſtore of the cell.

The ſeveral cells of the combs in every hive are differently filled with *honey*, and for different purpoſes: ſome is laid up for immediate conſumption, on occaſions of bad weather and the like accidents, or for the uſe of thoſe bees that in good weather ſtay at home to work, and are not ſupplied in any other way by thoſe which have been abroad collecting *honey*; and ſome is more carefully preſerved and deſtined for the ſupport of the ſwarm in the winter. Whenever any cell is filled with *honey*, it is always cloſed up, and never opened again, till all the *honey* in the cells which were not full, is expended. The manner in which the bees make the lids or covers of the cells is this: they form a circle or ring of wax juſt within the verge of the cell; to this they add another ſuch ring, and then another within that; and thus the aperture is rendered ſmaller and ſmaller, and by a continuance of the ſame operation is finally cloſed, the lid being compoſed of a vaſt number of concentric circles. This covering is deſigned for preſerving the incloſed *honey* in a ſtate of proper conſiſtence, for a winter ſtore.

Honey has been ſuppoſed by many to be the only food of the bees who collect it; but this is evidently erroneous. The farina of flowers ſerves as food for young bees, whilſt they are in the form of maggots, but it is not ſo certain whether the old bees eat it or not; after which ſome ſay it is again thrown out at their mouths in form of wax, and uſed in the ſtructure of their cells; but others abſolutely deny this, becauſe the farina of different flowers varies in colour, whereas the wax is uniformly white.

Honey and WAX form ſo conſiderable an article in the riches of a kingdom, that M. Reaumur ſtrongly recommended to the court of France the encouragement of thoſe who raiſe ſwarms of bees, by deducting ſomething from their taxes in proportion to every hive of bees kept by them above a certain number. And as bees are ſo eaſily raiſed, and kept with ſo little expence and trouble, it is a wonder that they are not more generally propagated in this kingdom. One great means of preſerving and multiplying the bees would be the aboliſhing of that barbarous as well as prejudicial cuſtom, which has hitherto very generally prevailed, of deſtroying the whole hive of bees in order to obtain the *honey*. Reaumur's Hiſt. Inſ. vol. x. p. 89, &c. See HIVE.

There are many circumſtances neceſſary to the forming of good *honey*, ſuch as a warm and clear air, a good ſtate of health of the bees, and a quantity of aromatic and ſweet flowers in the neighbourhood of their hives. Some naturaliſts ſuppoſe that *honey* is of a different quality, according to the difference of the flowers or plants from which the bees ſuck it. The ancients eſteemed that of lilies and roſes to be the beſt; and Strabo relates, that there is a kind of *honey* in Pontus which is a ſtrong poiſon, being procured by bees which feed upon aconite and hemlock. F. Lamberti, however, aſſures us of the contrary, and affirms it to be the beſt *honey* in the world, on account of the great quantity of baum that grows there. He adds, that there is another very white kind of *honey*, hard as ſugar, which does not ſtick to the hands. At preſent, the *honey* of Narbonne, in France, is held to excel all others, on account of the roſemary which abounds there. Bees are uncommonly fond of the lime-tree, the privet, and phillyrea; and in Lithuania, there are large quantities of wild bees, who lodge in hollow trees in woods, and collect their *honey* chiefly from the lime; ſo that when the ſeaſon happens to be unfavourable at the time of the blowing of the lime, it is ſucceeded by a ſcarcity of *honey*. However, it is not to be ſuppoſed, that the bee confines itſelf to one particular flower; nor does it appear, that the *honey* collected from one kind of flower differs eſſentially from that which is the produce of another; the only difference being in the quantity, colour, or ſome ſlight flavour from the flower. Excellent *honey* has been produced where nothing grew but nettles and other weeds.

The *honey* taken out of the hives in the beginning of ſummer is preferable to that gathered in autumn, ſince the firſt is the ſeaſon in which the bees are moſt vigorous, and the plants in their flowering ſtate.

We have two kinds of *honey*, the *white* and *yellow*.

The *white*, *mel album*, called alſo *virgin honey*, is that depoſited in clean new cells, which, when firſt formed, are of a pure white colour; but when the combs are old, eſpecially if bees have been bred in them, they become foul and diſcoloured, and vitiate the *honey* lodged in them. Now *honey* is nearly as fluid as water; by age it acquires a greater degree of conſiſtence, and the cold of winter frequently congeals it. The ſecond kind, or *mel flavum*, is ſqueezed from the combs in a preſs, after having firſt ſoftened them with a little water over the fire. There is alſo an intermediate ſort of a yellowiſh white colour, drawn by expreſſion, without fire. That which runs ſpontaneouſly is purer than the expreſſed; a quantity of the wax and other impurities being forced out along with it by the preſſure, eſpecially when the combs are previouſly heated. The beſt ſort of *honey* is of a thick conſiſtence, eaſily and totally ſoluble in cold water, of a whitiſh colour, an agreeable ſmell, and a very pleaſant taſte.

Honey, expoſed to a gentle heat, as that of a water-bath, becomes thin, and throws up to the ſurface its waxy impurities, together with the meal or flour ſometimes fraudulently mingled with it, which may be thus ſeparated by deſpumation, ſo as to leave the *honey* pure, and to form the *mel deſpumatum* or clarified *honey*. On continuing the heat, there riſes a conſiderable quantity of aqueous fluid, impregnated with the fine ſmell of the *honey*; the inſpiſſated reſiduum, like the *honey* at firſt, diſſolves both in water and in rectified ſpirit, and promotes the union of oily and reſinous ſubſtances with watery liquors. By treating the inſpiſſated maſs with moiſt clay, as practiſed by the ſugar-baker for purifying ſugar from its unctuous treacly matter, the unctuous parts of *honey* may in like manner be ſeparated, and its pure ſweet matter obtained in the form of a ſolid, ſaline, white concrete.

This juice is an uſeful ſweet for medicinal as well as domeſtic purpoſes: it is more aperient and detergent than the ſimple ſweet prepared from the ſugar-cane; and particularly ſerviceable for promoting expectoration in diſorders of the breaſt, and as an ingredient in cooling and detergent gargariſms. For theſe and other ſimilar intentions it is ſometimes mixed with vinegar, and forms the OXYMEL *ſimple* of the ſhops; it is alſo impregnated with the virtues of different vegetables, by boiling it in the ſame manner with their juices or infuſions, till the watery parts of the juice or infuſion have exhaled and left the active matter incorporated with the *honey*. See OXYMEL *compound*.

It is obſerved, that the boiling of *honey*, though it diſſipates great part of its odorous matter, and thus proves in ſome caſes injurious to it, is nevertheleſs in other caſes of advantage. There are particular conſtitutions with which *honey* diſagrees, and in which very ſmall quantities occaſion gripes, purging, and great diſorder; but boiling deprives it of that quality which produces theſe effects. Neumann's Chem. by Lewis, p. 330. Lewis's Mat. Med. p. 376.

Honey contains a quantity of fixed air, and is antiſeptic as well as detergent and diuretic. Sir John Pringle recommends one pound and a quarter to be taken regularly every week in caſes of the gravel, or when the kidneys are loaded with ſand.

Honey is the baſis of ſeveral compoſitions in pharmacy. Of *honey*, with the addition of roſes or violets, mercurialis, &c. is made *mel roſatum*, *mercuriale*, *helleboratum*, &c. There is alſo a *mel ſcilliticum*, or a preparation of ſquills; *mel paſſulatum*, made with raiſins boiled in hot water; and *mel anthoſatum*, made with roſemary-flowers.

Honey is alſo an ingredient in ſeveral drinks, as MUM, METHEGLIN, &c.

The chemiſts alſo draw a water, a ſpirit, an oil, &c. from *honey*.

Mr. Lemery, in his analyſis of *honey*, obſerves, that two pounds of fine *honey* diſtilled in balneo Mariæ, afford ſix ounces of clear water of an inſipid taſte, and of the ſmell of *honey*: this is commonly called the dew of *honey*. A larger quantity of phlegm may be procured by continuing the diſtillation, but it becomes foul. This liquor, though inſipid to the taſte, yet contains a latent acid, for it reddens the turnſole; but it neither ferments with the volatile nor fixed alkalies. The cucurbit being now placed in a ſand-heat, there comes over four ounces of a yellowiſh pellucid water, of an acrid taſte, of a ſtrong ſmell of *honey*, and ſomewhat empyreumatic: this liquor reddens the turnſole colour more than the former. The fire being increaſed, there ariſe white clouds, which fill the head of the cucurbit and the receiver, and theſe finally condenſe into a third liquor, which is called the ſpirit of *honey*. This will be about three ounces in quantity, and of a red colour and empyreumatic ſmell, yet with an agreeable flavour, and of an acrid and burning taſte. This is a ſtronger acid than either of the former, and ferments with an alkali.

The fire being again increaſed, more clouds ariſe, and, in fine, there is a fourth liquor produced; this is in quantity about two ounces, of an orange colour, and of an acid taſte, but leſs acrid than the third liquor, as it contains more oil, which ſoftens and ſweetens it. Like the former, it ferments with alkalies, and reddens the colour of turnſole. When the diſtillation is thus finiſhed, there will remain in the cucurbit fifteen ounces and a half of a light ſpungy black coal. Mem. Acad. Par. 1706.

This is to be then put into a retort for a freſh diſtillation, and a ſtrong fire under this veſſel will raiſe from it ſeven ounces of a reddiſh brown liquor, which ſtains the fingers to an orange colour, of a burnt ſmell, yet with ſomething agreeable in it, and of an acid and very acrid pungent taſte. Beſides this, there come over two drams of a thick black oil, looking like tar; this alſo was of an acrid taſte, which was owing to ſome of the ſalts of the *honey* being blended with it. There is much more oil contained in the *honey*, but it does not come over ſeparate, but blended with the other liquors; and after they have ſtood ſome days, precipitates itſelf from them, and is found ſticking to the ſides and bottom of the veſſel. The matter remaining in the retort is about ſeven ounces of a black coal, of a light ſpungy texture, and of a taſte almoſt inſipid, and only ſeeming to contain a little ſalt. We ſee by this proceſs, that thirty-two ounces of *honey* yield twenty-four ounces and two drams of liquor, that being the difference in weight between the *honey* when firſt put in, and the laſt caput mortuum. Twenty-two ounces and ſix drams are the quantity here preſerved of the ſeveral liquors, the reſt having eſcaped through the junctures of the veſſels, as will always be the caſe in ſuch diſtillations. Id. ibid.

The caput mortuum of this, and of ſeveral other diſtillations of *honey*, the whole making three pounds and a half, were put into an unglazed earthen pot, and calcined over the fire for ten hours; this readily took fire like common charcoal, and burnt till it loſt ten ounces in weight, but without falling into aſhes. The remaining coal had then a more ſaline taſte than before. Any acid liquor poured upon this fermented, as with the common alkalies; and when thrown into water to make a lixivium, it bubbled in the manner of quick-lime thrown into water; and in the common way of making the lixivial ſalts, this yielded a dram and a half of an acrid alkaline one.

It is remarkable, that the calcined caput mortuum of *honey* contains, like other vegetable aſhes, true particles of iron, which adhere to a knife touched with a magnet.

HONEY, *wild.* St. Adaman, abbot of Hii, in his deſcription of the holy places, obſerves, that in the place where St. John Baptiſt lived in the Deſert, there are locuſts which the poor people boil with oil, and a ſort of herbs with large long leaves of a milk colour, and a taſte like that of *honey*; and that this is what in Scripture is called *wild honey*. See ACRIDOPHAGI.

HONEY-*bird.* See HUMMING *bird.*

HONEY *buzzard*, the Engliſh name of the *buteo* APIVORUS.

HONEY *of roſes.* See ROSE.

HONEY-*comb*, a waxen ſtructure, full of cells, framed by the bees to depoſit their *honey*, eggs, &c. in.

The conſtruction of the *honey-comb* ſeems one of the moſt ſurpriſing parts of the works of inſects, and the materials of which it is compoſed, which though evidently collected from flowers of plants, yet do not, that we know of, exiſt in them in that form, have given great cauſe of ſpeculation to the curious. The regular ſtructure of the comb is alſo equally wonderful. When the ſeveral cells in it are examined, it ſhould ſeem that the niceſt rules of geometry had been conſulted for its compoſition, and all the advantages that could be wiſhed or deſired in a thing of that kind are evidently found in it.

The bees, in the ſtructure of this receptacle of their *honey*, ſeem to have reſolved a geometrical problem, far from an eaſy one, and indeed clogged with ſo many conditions, that it might have puzzled able proficients in that ſcience. This may be expreſſed in theſe words: a quantity of wax being given, to form it into a number of angular and equal cells, of a determinate capacity, but the greateſt that can be made with that quantity of wax, and, at the ſame time, that theſe cells ſhall be ſo diſpoſed as to take up as little room as poſſible in the hive. In order to this laſt condition, it is neceſſary that the cells touch one another, in ſuch a manner, that there be no angular ſpace nor cavity between them. The bees have effected all this by making the cells all hexangular, or tubes of ſix equal ſides: triangular, quadrangular, and ſome other figures for the cells, might have been indeed ſo diſpoſed between one another as to leave no ſpace; but then an equal number of them could not be made with the ſame quantity of wax. The body of the bee being rounded, it will alſo be received into a hexangular cell, without leaving ſuch large ſpaces as it muſt if received into a triangular or ſquare one.

The method of making two ſets of cells in each comb is alſo admirably contrived to ſave the expence of wax, ſince, had they been made ſingle, every comb muſt have had its peculiar baſe, and every ſet of cells their bottom of wax; whereas one bottom now ſerves to two cells, and there is but one plate of wax in the center of a double comb. There is however this farther difficulty attending it, that the ſeveral cells are not ſo many hexagonal tubes with flat and broad baſes, or tubes of an equal breadth all the way; but they are truly pointed at the bottom, being every one of them a hexangular cell with a pyramidal baſe, and forming that kind of figure, as Maraldi and Reaumur firſt diſcovered, which requires the leaſt wax for containing the ſame quantity of *honey*. Each of theſe baſes is compoſed of three equal rhombuſes, and each baſe, in this manner, becomes the baſe of three other cells on the oppoſite ſide of the comb.

This is eaſily demonſtrated to thoſe who underſtand geometry, by means of the ſeveral figures and poſitions of the oppoſite baſes of the cells of the two ſides of the comb; but the moſt familiar explication of it to a common obſerver, is to ſtick three ſmall pins through the baſe of any one cell, each in the center of the rhomb that makes one ſide of that baſe: if, after this, the comb be turned, the three pins will be found in the centers of three different cells of the oppoſite ſide.

The obtuſe angles of the three equal rhombuſes that form the baſe, are found to be the doubles of an angle (which often comes under conſideration in queſtions relating to *maxima* and *minima)*, whoſe tangent is to the radius as the diagonal is to the ſide of the ſquare. By this conſtruction, three of the ſix ſolid angles at the baſe, that correſpond to the angles of the hexagon, are equal to each other, and alſo to the ſolid angle at the apex of the figure, each of which ſolid angles is reſpectively formed from three equal, plane, obtuſe angles; and the other three ſolid angles are alſo equal to each other, but each of them is formed by four equal, plane, acute angles, which are the ſupplements of the former obtuſe angles.

Monſ. Maraldi found, by menſuration, that the obtuſe angles of the rhombuſes were nearly 110°, and obſerved, that if they were ſuppoſed equal to each other, each of them muſt be 109° 28′; and Mr. Koenig, by the method of infiniteſimals, found, that this angle, in order to employ the leaſt wax poſſible in a cell of the ſame capacity, ought to be 109° 26′. Mr. Maclaurin has alſo demonſtrated, from the principles of common geometry, that the moſt advantageous angle is that which reſults from the ſuppoſed equality of the three plane angles forming the ſolid angle. We ſhall ſubjoin the demonſtration for the ſake of the mathematical reader.

Let GN and NM (*Tab.* II. *Geometry*, *fig.* 49 and 50.) repreſent any two adjoining ſides of the hexagon, or the ſection of the cell perpendicularly to its length. The ſides of the cell are not complete parallelograms as $CGNK$, $BMNK$, but trapezia $CGNE$, $BMNE$, to which a rhombus $CEBe$ is fitted at OE, that has the oppoſite point e in the apex of the figure; ſo that three rhombuſes of this kind, with ſix trapezia, may complete the figure of the cell. Let O be the center of the hexagon, of which CK and KB are adjoining ſides; join CB and KO, interſecting in A; and, becauſe COB is equal to CKB, and KE equal to Oe, the ſolid $EBCK$ is equal to the ſolid $eBCO$; whence it follows, that the ſolid content of the cell will be the ſame, wherever the point E is taken in the right line KN, the points C, K, B, G, N, and M, being given. It is, therefore, neceſſary to enquire, where the point E is to be taken in KN, ſo that the area of the rhombus $CEBe$, together with that of the two trapezia $CGNE$, $ENMB$, may form the leaſt ſuperficies. Becauſe Ee is perpendicular to BC in A, the area of the rhombus is $AE\times BC$, and that of the trapezia $\overline{CG+EN}\times KC$; the ſum of theſe is $AE\times BC+2KN\times KC-KE\times KC$; and becauſe $2KN\times KC$ is invariable, we are to enquire when $AE\times BC-KE\times KC$ is a minimum?

Suppoſe the point L to be ſo taken upon KN, that KL may be to AL as KC is to BC. From the center A deſcribe in the plane AKE, with the radius AE, an arc ER meeting AL, produced, if neceſſary, in R: let EV be perpendicular to AR in V, and KH be perpendicular to the ſame in H; then the triangles LEV, LKH, LAK, being ſimilar, we have $LV:LE::LH:LK::LK:LA::KC:BC$ by the ſuppoſition. Hence, when E is between L and N, we have $LH+LV\ (=VH):LK+LE\ (=KE)::KC:BC$; and when E is between K and L, we have $LH-LV\ (=VH):LK-LE\ (=KE)::KC:BC$; that is, in both caſes we have $KE\times KC=VH\times BC$; and conſequently $AE\times BC-KE\times KC=AE\times BC-VH\times BC=\overline{AE-VH}\times BC=\overline{AR-VH}\times BC=\overline{AH+VR}\times BC$: which expreſſion, becauſe AH and BC do not vary, is evidently leaſt when VR vaniſhes, i. e. when E is upon L. Therefore $CLBl$ is the rhombus of the moſt advantageous form in reſpect of frugality, when KL is to AL as KC is to BC. But as OK is biſected in A, $KC^2=OK^2=4AK^2$, and $AC^2=3AK^2$, or $BC=2AC=2\sqrt{3}\times AK$; conſequently $KC:BC::2AK:2\sqrt{3}\times AK::1:\sqrt{3}$; and $KL:AL::(KC:BC::)\ 1:\sqrt{3}$; or $AL:AK::\sqrt{3}:\sqrt{2}$; and (becauſe $AK:AC::1:\sqrt{3}$) $AL:AC::1:\sqrt{2}$; i. e. the angle CLA is that, whoſe tangent is to the radius as $\sqrt{2}$ to 1, or as 14142135 to 10000000; and therefore it is 54° 44′ 8′, and conſequently the angle of the rhombus of the beſt form is that of 109° 28′ 16″.

By this ſolution it is eaſy to eſtimate what ſaving is obtained by means of this conſtruction.

If the baſe were flat, and not of the pyramidal form above deſcribed, then, beſides completing the parallelograms $CGNK$ and $BMNK$, the ſurface of the baſe had would be $3CB\times AK$; what they really do form amounts in ſurface to the ſame parallelograms, and $3CB\times AH$; the ſavings therefore amount to $3CB\times\overline{AK-AH}=3CB\times AH\times\frac{\sqrt{3}-\sqrt{2}}{\sqrt{2}}$, which is almoſt a fourth part of the pains and expence of wax they beſtow above what was neceſſary for completing the parallelogram ſides of the cells.

Mr. Maclaurin has alſo demonſtrated, that the plane angles CLB, CLN, and BLN, which form the ſolid angle at L or the apex at l, are equal to each other; from which it is obvious, that the four acute, plain angles, which form the ſolid angle at C or B, are likewiſe mutually equal. It may be alſo added, that if the cells had been of any other form than hexagonal, and the baſes had ſtill been pyramidal, theſe muſt have been terminated by trapezia, and not by rhombuſes, and therefore they would have been leſs regular, becauſe OA and AK would have been unequal. Nor could there have been room for ſuch an advantageous or frugal a conſtruction as that we have deſcribed, becauſe the ſolid content of the cell would have increaſed with the right line KE. See Phil. Tranſ. abr. vol. ix. p. 2, &c.

This conſtruction not only occaſions a very great ſaving of the wax or matter of the comb; but beſides this, there is another great advantage, which is, that the angles, reſulting from this combination of the baſes, greatly ſtrengthen the whole work.

The matter of which the comb is made, coſts the bees ſo much pains and labour in collecting, that it is no wonder they are careful and ſparing of it in the work. The ſides of the cells are all much thinner than the fineſt paper, and yet they are ſo ſtrengthened by their diſpoſition, that they are able to reſiſt all the motions of the bee when within them, as they are very frequently obliged to be. The effect of their thruſting their bodies into the cells, would be the burſting of thoſe cells at the top, were not this well guarded againſt. But to prevent this, the creatures extend a cord or roll of wax round the verge of every cell, in ſuch a manner, that it is ſcarce poſſible they ſhould ſplit in that particular part. This cord or roll is at leaſt three times as thick as the ſides of the cell, and is even much thicker and ſtronger at the angles of the cells than elſewhere; ſo that the aperture of each cell is not regularly hexagonal, though its inner cavity be perfectly ſo.

The baſes of the cells are not always perfectly trilateral; ſometimes, inſtead of the three rhombs they ſhould be compoſed of, they conſiſt of four pieces, the bee having begun her work wrong; but then it is admirable to obſerve how nicely the two ſmaller pieces are afterwards joined, that the angle they make may be as nearly as poſſible equal to that of one of the rhombs, ſo that the baſe of the cell ſtill remains very nearly trilateral.

It would be a moſt deſireable thing to ſee the bees at work in their making theſe elegant and regular fabrics; but it is ſcarce poſſible to ſee any thing of this kind diſtinctly, even with the advantage of glaſs hives; for no bee ever works ſingly on this occaſion, but wherever the fabric is erecting, there are numbers together, all trying to aſſiſt one another; and their motions are ſo ſwift, and ſo hid by their ſtanding before one another, that very little is to be ſeen of them. New bees are every moment coming to the place, and old ones going away; and very frequently thoſe which arrive late are diſpatched away immediately after they arrive. There are only ſome very ſhort moments in which the glaſſes of the hives can give a view of the creatures regularly employed in their work, for the moment that one ſees a bee at work in building, that moment we ſee one either fly off, or ſome other bee get before her, ſo as to hinder the view.

Theſe momentary ſights, however, are ſufficient to make it plain, that the bee uſes her teeth in modelling and faſhioning the wax. The ſide of a cell is always received between the two teeth on this occaſion, and by means of repeated blows on each ſide from each tooth, the ſide is brought to a proper thinneſs, and the wax is by the ſame means wrought up to a proper conſiſtence and firmneſs.

The celerity with which a ſwarm of bees received into a hive, where they find themſelves lodged to their minds, bring their works of the combs to perfection, is amazing. In a week's time, when the weather favours, the half or two thirds of a hive will be filled with combs. There are vaſt numbers at work all at once, and that they may not incommode one another, they do not work upon the firſt comb till it is finiſhed; but when the foundation of that is laid, they go to work upon another; ſo that there are often the beginnings of three or four ſtories made at once, and ſo many ſwarms allotted to the carrying on the work of each.

The ſeveral combs are all placed parallel one to another, and hang perpendicularly from the top of the hive to the bottom: they begin each comb at the top or upper part of the hive, and carry it down to the floor, from ſide to ſide; and there is ſuch a ſpace left between them, that the bees can eaſily paſs between; there are alſo holes made through the ſubſtances of the ſeveral combs, by which they paſs from the ſpace that lies between one pair of combs and another. They often place a part of the combs in a contrary direction to the reſt; ſo that while the others are placed horizontally, theſe ſtand perpendicular: there are alſo ſeveral other directions, in which they are diſpoſed, which are eaſily accounted for from the nature of the place, and are always found to be the very beſt that could be uſed for the occaſion.

Though the ſides of all the cells are extremely thin, yet the combs are very heavy when full of *honey*. This might endanger their breaking their hold, if only ſuſtained from the top; and for this reaſon the bees give them ſeveral additional ſupports in whatever places they can, often faſtening them in many places one to another, and often fixing them to the ſides of the edifice by large and ſolid lumps of wax.

It has generally been ſuppoſed that every bee of a ſwarm has its particular cell in ſome comb which was its own, and contained *honey* for its peculiar food; but the uſe of the glaſs hives has ſhewn us that all the cells are uſed in common. Reaumur, Hiſt. Inſ. vol. ix. p. 282. vol. x. p. 21, &c.

HONEY-*comb*, in *Gunnery*, is a flaw in the metal of a piece of ordnance, when it is ill caſt and ſpongious.

HONEY-*comb-ſtone*, in *Natural Hiſtory*, the name given by many authors to a ſpecies of foſſile coral, which is uſually found in large maſſes, and thoſe full of large hexagonal cells, reſembling thoſe of a *honey-comb*. Theſe are but lightly ſtriated, and uſually run deep into the ſtone.

HONEY-*dew* is a ſweet taſted *dew*, found early in the morning on the leaves of divers ſorts of plants.

Honey-dews are of a very different nature from blaſtings, being cauſed by the condenſing of a fat moiſt exhalation, raiſed, in a hot dry ſummer, from plants and bloſſoms; as alſo from the earth; which, by the coolneſs and ſerenity of the air in the night, or in the upper clear region of the air, is thickened into a fat gluey matter, and then falls to the earth again; part whereof reſts upon oak-leaves, and thoſe of ſome other trees, whoſe leaves are ſmooth, and do not eaſily admit the moiſture into them. Gaſſendus holds that a viſcid juice, tranſpiring out of the leaves, helps to compoſe this *honey*; or to convert the dew, falling on them, into a *honey* ſubſtance, which before had nothing of it: hence he accounts for the reaſon why we find it on ſome trees and not on others.

This *honey-dew*, falling on the ears and ſtalks of wheat, beſmears them with a different colour from the natural; and, being of a clammy ſubſtance, ſo binds up the young, tender, and cloſe ears of the wheat, by the heat of the ſun, that it prevents the growth and completing of the perfect grain therein.

Hops, when in flower, are ſubject to the diſtemper called the *honey-dew*, which appears in the form of a meal, and is found by the microſcope to contain the eggs of ſmall inſects, which fly about in ſwarms near the time when the hop is in flower, and gnaw the leaves and ſhoots. Several methods have been propoſed for preventing the damage ariſing from this dew; particularly by ſurrounding the hop-hills with hot dung, or cauſing wood-aſhes to be ſcattered with the wind over the hops at the time when the mealy dew falls. But the moſt effectual way of preventing its ill effects is to ſtrip off the leaves, whereby the ſmall inſects contained in it periſh at once, and before freſh leaves ſpring forth, their ſeaſon of breeding is paſt.

A ſhower of rain, ſucceeding preſently after the fall thereof, or the wind blowing ſtiffly, are the only natural remedies againſt it. See DEW, MILDEW, and *Perſpiration of* PLANTS.

HONEY-*flower*, *melianthus*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower hath four narrow ſpear-ſhaped petals, divided into two lips, connected on their ſides; and a nectarium of one leaf, ſituated in the lower ſegment of the empalement, and faſtened with it to the receptacle: it hath four erect ſtamina, the two under being ſomewhat ſhorter than the other; in the center is ſituated a four-cornered germen, which afterwards becomes a quadrangular capſule with diſtended cells, divided by partitions in the center, each containing one almoſt globular ſeed. There are two ſpecies, natives of the Cape of Good Hope. Miller.

HONEY-*guide*, in *Ornithology*. See CUCULUS *indicator*.

HONEY-*locuſt*, or *three-thorned Acacia*, in *Botany*, *gleditſia*, a genus of the *polygamia dioecia* claſs. Its characters are theſe: it hath male and hermaphrodite flowers on the ſame plant, and female flowers in different plants; the male have a three-leaved empalement and three roundiſh petals, with a turbinated nectarium; they have ſix ſtamina terminated by compreſſed ſummits; the hermaphrodite flowers have quadrifid empalements, with four petals and ſix ſtamina, and have a germen, ſtyle, and pods, like the female, which are ſituated in different trees; thoſe have a five-leaved empalement and five petals, with two nectariums, and a broad germen longer than the petals; the germen becomes a large flat pod, with ſeveral tranſverſe partitions, having a pulp in each diviſion, ſurrounding one hard roundiſh ſeed. There are two ſpecies, natives of North America. Miller.

HONEY-*ſuckle*, in *Botany*, *periclymenum*, Tourn. Inſt R. H. 608. tab. 578. Its characters are theſe: the empalement of the flower is cut into five parts, ſitting upon the germen; the flower is of one petal, having an oblong tube, cut at the top into five ſegments, which turn backward; it has five awl-ſhaped ſtamina, almoſt the length of the petal, and a roundiſh germen ſituated below

low the flower, which becomes an umbilicated berry with two cells, each containing one roundiſh ſeed. Miller enumerates eight ſpecies. Linnæus has joined the periclymenum to the lonicera. See the next article.

The propagation of all the ſeveral ſorts of *honey-ſuckles* is by laying down their young ſhoots in autumn; which, if they are ſupplied with water, will by the autumn following have taken root ſo well, as to be fit to remove. They ſhould at this time be tranſplanted into nurſery-beds for a year or two, the better to train them up, either for headed plants or for creepers, to plant againſt trees, walls, &c.

They may alſo be propagated by planting cuttings in September; the cuttings ſhould have four joints, three of which ſhould be buried in the ground, and they ſhould be planted in rows, at the diſtance of about a foot, four inches aſunder in the rows, treading the earth cloſe to them. In order to preſerve them from the wind and froſt, the ground between the rows ſhould be covered with tanner's bark or dung. The plants raiſed from cuttings are preferable to thoſe propagated by layers, having generally better roots. Their ſweetneſs and long continuance in flower make them of great value in ſmall quarters. Among flowering ſhrubs they are alſo very beautiful, when planted againſt the ſtems of old trees, where, if they are not too much ſhaded, they will flouriſh exceedingly.

The proper ſeaſon for cutting them, to keep them in a regular form, is about Michaelmas, ſoon after they have done flowering. This is to be done with a knife, obſerving always to cut behind a leaf-bud; for how much ſoever the ſhoot is left longer, it will always die down to that part. They are moſt of them very hardy.

The Virginian ſcarlet *honey-ſuckle*, called the trumpet *honey-ſuckle*, is a very beautiful flowering kind, and in great eſteem. It is propagated by laying down the young branches, which will eaſily take root, and may be afterwards treated like the *honey-ſuckle*. They ſhould be planted in a ſtrong ſoil, and expoſed to the ſouth-eaſt ſun; but they muſt have a wall or pale behind them to ſupport the branches, otherwiſe they will trail upon the ground. It is a native of Virginia, but will thrive very well with us, bearing all the cold of our winters. Theſe plants begin to flower the latter end of June, and there will be a ſucceſſion of flowers till the autumn. Miller.

The leaves of the *honey-ſuckle*, which are the only parts uſed, are ſometimes put into gargariſms for ſore throats; though others affirm them not to be proper for that purpoſe, becauſe of their great heat. Some commend a decoction of them for a cough and aſthma, and to open obſtructions of the liver and ſpleen. The oil made by infuſion of the flowers, is accounted healing and warming, and good for the cramp and convulſions of the nerves. Miller's Bot. Off.

HONEY-*ſuckle, upright*, or *dwarf cherry*, *lonicera*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are: the flower hath a ſmall empalement, cut into five parts, upon which the germen ſits; it hath one petal, with an oblong tube, cut into five parts at the brim, and five awl-ſhaped ſtamina; under the petal is ſituated a roundiſh germen, ſupporting a ſlender ſtyle; the germen becomes a berry with two cells joined at their baſe, and polyſpermous. Miller enumerates ſeven ſpecies. To this genus Linnæus has joined the *caprifolium*, *periclymenum*, and *xgloſteum* of Tournefort, and the *ſymphoricarpos* of Dillenius.

Theſe plants may be propagated either by ſeeds or cuttings. The ſeeds commonly lie in the ground for a year before they vegetate, but require no particular culture. If they are ſown in autumn, many of them will grow the following ſpring. The cuttings ſhould be planted in autumn, in a ſhady border, and in the following autumn may be removed into a nurſery, whence, after two years, they may be tranſplanted into the ground where they are to remain. They are commonly intermixed with other flowering ſhrubs for the ſake of variety, but there is little beauty in their flowers. They are hardy plants, and will thrive in a cold ſituation, and love a light moiſt ſoil. Miller.

HONEY-*ſuckle, African fly*. See HALLERIA.

HONEY-*ſuckle, American upright*. See AZALEA.

HONEY-*ſuckle, French*, *hedyſarum*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, cut into five ſegments at the top; it is of the butterfly kind, the wings oblong and narrow, the keel compreſſed and convex at the baſe; it has nine ſtamina joined, and one ſtanding ſeparate, which are reflexed; in the center is ſituated a long narrow germen, which afterward becomes a jointed compreſſed pod, each joint being roundiſh, and incloſes a ſingle kidney-ſhaped ſeed. Miller enumerates nineteen ſpecies, natives of warm climates; but Linnæus reckons fifty.

The ALHAGI of the Moors is a ſpecies of this genus. From this ſhrub the Perſian manna is collected, which is an exſudation of the nutritious juice of this plant. This drug is chiefly gathered about Tauris, a town in Perſia, where the ſhrub abounds.

This plant is reckoned deobſtruent and vulnerary. James.

HONEY-*ſuckle, trumpet*. See HONEY-*ſuckle*, ſupra.

HONEY-*ſuckle graſs*. See TREFOIL.

HONEY-*wort*, *cerinthe*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has one petal, with a thick ſhort tube, and at the brim is quinqueſid, and has five ſhort ſtamina; in the bottom are ſituated four germina, two of which afterward become ſo many ſeeds, which are hard, ſmooth, plain on one ſide, but convex on the other, and are incloſed in the empalement. Miller enumerates five ſpecies, but Linnæus only two.

HONI *ſoit qui mal y penſe*, q. d. *evil to him that thinks evil*; the motto of the moſt noble order of the knights of the Garter. See GARTER and MOTTO.

HONOR. See HONOUR.

HONORABLE. See HONOURABLE.

HONORARY. See HONOURARY.

HONORIACI, in *Antiquity*, a ſpecies or order of ſoldiery under the eaſtern empire, who introduced the Goths, Vandals, Alani, Suevi, &c. into Spain.

Didymus and Verinianus, two brothers, had, with great vigilance and valour, defended the paſſages of the Pyreneans againſt the Barbarians for ſome time, at their own expence; but being at length killed, the emperor Conſtantius appointed the *honoriaci* to defend thoſe paſſages, who, not contented to lay them open to all the nations of the North then ravaging the Gauls, joined themſelves to them.

HONOUR, among the *Ancients*, was worſhipped as a divinity, and had a temple erected to it, which had no entry but through the temple of Virtue.

Honour is repreſented on many medals, under the figure of a man holding a pike, and ſometimes an olive-branch, in the right-hand, and a cornucopia in the other.

Beſide its literal ſenſe, wherein it denotes a teſtimony or token of eſteem and ſubmiſſion, *honour* is particularly applied in our cuſtoms to the more noble kind of ſeignories or lordſhips, whereof other inferior lordſhips or manors hold or depend.

As a manor conſiſts of ſeveral tenements, ſervices, cuſtoms, &c. ſo an *honour* contains divers manors, knights-fees, &c.

It was alſo formerly called *beneficium* or *royal fee*, being always held of the king in capite. Spelman.

Anciently, *honour* ſignified the ſame as *baronia*.

HONOUR, *counſellors of*, or *Honourary Counſellors*, are ſuch as have a right to enter or ſit in aſſemblies, courts, &c. to deliberate or give judgment in the ſame, though they do not regularly and properly belong thereto.

The French call *chevaliers d'*HONNEUR, *knights* or *gentlemen of honour*, the gentlemen-uſhers of queens and princeſſes, who attend them, give them their hand, &c. See USHER.

HONOUR, *maids of*, are young ladies in the queen's houſhold, whoſe office is to attend the queen when ſhe goes abroad, &c. In England they are ſix in number, and their ſalary 300*l.* per annum each.

HONOUR, *pages of*, are officers both of the king's and queen's houſhold, under the maſter of the horſe. Of the former there are four, whoſe annual ſalary is 260*l.* each; and of the latter two, with a ſalary of 150*l.* each.

HONOURS *of the Louvre*, among the *French*, are certain privileges annexed to divers dignities or offices, particularly thoſe of duke, peer, chancellor, &c. as to enter the Louvre in a coach, to have the tabouret or ſtool in the queen's preſence, &c.

HONOURS *of the houſe* are certain ceremonies obſerved in receiving viſits, making entertainments, &c. performed either by the maſter himſelf, or by ſome perſon appointed for that purpoſe; as to go and receive the gueſts, to conduct them out again, to ſee they be well ſeated, and, in ſhort, to perform all the civilities and ceremonials of polite hoſpitality.

HONOURS *of the city* are the public offices or employments thereof. He who has been conſtable, overſeer of the poor, and churchwarden of his pariſh; common-councilman, alderman, and laſtly mayor; has paſſed all the *honours* of the city.

HONOURS *of the church* are the rights belonging to the patron, &c. as a ſeat and ſepulchre in the chancel, to be firſt ſerved with the conſecrated bread and wine, &c.

HONOURS are alſo applied to the principal part of the apparatus of great ceremonies; as coronations, conſecrations, chriſtenings, &c. Such are the oil, tapers, &c. In obſequies they anciently repreſented the *honours*, that is, the ſhield, creſt, ſword, gantlets, ſpurs, banner, horſe, &c.

Honours, *funeral*, are the ceremonies performed at the interment of great men; as hangings, hearſes, funeral harangues, &c.

Honour *courts* are held within the *honours* or ſeignories above mentioned.

Honour *point*, in *Heraldry*, is that next above the center of the eſcutcheon, dividing the upper part into two equal portions. See Point and Escutcheon.

HONOURABLE *amends*, *amende honourable*. See Amende.

Honourable, or Honorable *ordinaries*, in *Heraldry*. See Ordinary.

HONOURARY, or Honorary, is underſtood of a perſon who bears or poſſeſſes ſome quality or title, only for the name's ſake, without doing any of the functions thereto belonging, or receiving any of the advantages thereof.

Thus we ſay, *honourary* counſellors. See *Counſellors of* Honour.

In the college of phyſicians, London, are *honourary* fellows. The royal academy of ſciences at Paris conſiſts of four claſſes of members, viz. *honourary*, penſionary, aſſociates, and adjuncts. See Academy.

Honourary *games*. See Games.

Honourary *ſervices* are thoſe incident to the tenure of grand ſerjeantry, and commonly annexed to *honours*.

Honourary *tutor* is a perſon of quality appointed to have an eye over the adminiſtration of the affairs of a minor, while the onerary tutors have the real effective management thereof.

Honourary, Honorarium, is alſo uſed ſubſtantively for a lawyer's fee, or a ſalary given to public profeſſors of any art or ſcience.

HONTFONGENETHEF, a thief taken hond-habend, i. e. having the thing ſtolen in hand.

HOOD. See Chaperoon and Cucullus.

Hood, in *Falconry*, is a piece of leather, wherewith the head of a hawk, falcon, or the like, is covered.

After ſealing or ſewing up the eyelids of a young hawk, ſhe is to be fitted with a large eaſy *hood*, which is to be taken off and put on very often, watching her two nights, and handling her frequently and gently about the head. When you perceive ſhe has no averſion to the *hood*, unſeal her in the evening by candle-light, continuing to handle, *hood*, and *unhood* her, as before, till at laſt ſhe takes no offence, but will patiently endure handling.

After unſealing, anoint with the finger and ſpittle the place where the ſealing thread was drawn through; then *hood* her, and hold her on your fiſt.

As ſoon as ſhe is well reclaimed, let her ſit upon a perch; but every night keep her on the fiſt three or four hours, ſtroaking, *hooding*, and *unhooding*, &c. And thus you may do in the day-time, when ſhe hath learnt to feed eagerly and without fear.

Hood, on *Ship-board*, is a copper frame, made to go on the top of the chimney, and to ſhift as the wind does, that the ſmoke may always fly to leeward.

Hood is alſo a ſort of low wooden porch, placed over the ſtair-caſe or ladder, which leads into the ſteerage or apartments, where the crew generally reſide in a merchant-ſhip. The uſe of the *hood* is to admit air and light, and at the ſame time to prevent the rain from falling into the ſteerage. The wooden porch over the entrance or ſtair-caſe of the maſter's cabin is called *companion*.

HOOF, *ungula*, the horny part which covers the feet of divers animals, as horſes, bullocks, &c.

The *hoof* ſerves much the ſame purpoſes as the nails of ſome animals, and the claws of others.

The *hoof* of a horſe ſurrounds the ſole and the coffin-bone. To be good, it ſhould be of a dark colour, ſomewhat ſhining, high, ſmooth, of a round ſhape, but a little larger below than above; ſhort, that the horſe may tread more on the toe than on the heel; and ſomewhat hollow within, having a narrow fruſh and broad heels.

The *hoof* ſhould not have circles, which are a ſign of its being brittle, and that the horſe, having been often ſhod, has had his feet ſpoiled by the many pieces broke out of it. A white *hoof* alſo is commonly brittle.

To judge whether the *hoof* be good and ſtanch, lift up the foot, and conſider if it have a ſhoe forged purpoſely for it, and be very much pierced, and the holes made in the unuſual parts, as wanting horn enough to take hold by in thoſe places where the nails are commonly driven. Sometimes they are forced to pierce the ſhoes nigh the heels, becauſe the fore-part is bad; it being unuſual to drive the nails near the heels, except the toe be ſo much ſplit and broke as not to bear nails.

If the *hoof* be not round, but broad, and ſpreading out at the ſides and quarters, the horſe commonly has narrow heels, and, in time, will be flat-footed; which ſort of foot is weak, and will not carry a ſhoe, nor travel far, but ſurbate: add, that treading more on his heels than his toes, will cauſe him to go low on his paſterns.

If the *hoof* be long, it will make him tread altogether on his heels. If crooked, viz. broad without and narrow within, ſo that the horſe is ſplay-footed, it will cauſe him to tread too much inward, and cut or interfere. If the fruſh be broad, the heels will be weak and ſoft. If the heel be narrow and tender, the horſe will in time grow *hoof*-bound.

Hoof, *bony*, is a round bony ſwelling, growing on the top of a horſe's hoof, which is always cauſed by ſome blow or bruiſe. This is firſt to be ripened and brought to ſuppuration by digeſting it with rotten litter, or hay boiled in ſtale urine, or with a plaſter of ſtale wine-lees and wheat-flour boiled together. When it is come to a head, let it be lanced with a thin hot iron, and put a tent into it made of turpentine, deer's fat, and wax, boiled together in equal quantities, and lay a plaſter of the ſame over the tent.

Hoof, *brittle*, the name of an infirmity to which horſes are ſubject. It comes ſometimes naturally, and ſometimes artificially. When it comes naturally, it is generally hereditary, the ſire or dam having had the ſame complaint. When it comes on accidentally, it is ſometimes owing to a diſtemper falling down into the feet; ſometimes to the creature's being much foundered.

The *hoof*, in this diſtemper, is ſo friable and rotten, as it were, that it cracks and flakes off on every ſlight occaſion. The cure is to be attempted in this manner: take wax, turpentine, ſuet, and hog's lard, of each four ounces; ſallad oil, a quarter of a pint by meaſure; and of dog's greaſe, half a pound: let the whole be melted together, and ſtrained through a piece of canvas into a gallypot. The *hoof* is to be thoroughly anointed with this every day, morning and evening, eſpecially at the root; and if there are any large cracks, they muſt be filled up at every dreſſing with a mixture of equal parts of cow-dung and hog's lard.

The other infirmities to which *hoofs* are liable, are, the caſting of the *hoof*, *hoof*-bound, *hoof*-hard, *hoof*-hurt, looſe *hoof*, falſe quarters, &c.

Hoof, *caſting of the*. A horſe is ſaid to *caſt his hoof*, when the whole coffin of the *hoof* becomes looſened, and falls off from the bone. This may be remedied by care, and proper application; a new *hoof* being procurable, if the coffin bone, &c. be not hurt.

Horſes ſometimes caſt their *hoofs*, by reaſon of ſome prick, ſtub, foundering, ſurbating, or other accident, that cauſes an impoſtumation in the foot; ſo that the *hoof*, and ſometimes the coffin-bone, being ſpongy and eaſily broken, fall off in large pieces. The laſt, when it happens, is a deſperate caſe.

Hoof-*bound*, is a ſhrinking in of a horſe's *hoof* on the top and at the heel, which makes the ſkin ſtare above the *hoof*, and grow over the ſame.

It befalls a horſe divers ways, either by keeping him too dry in the ſtable, by ſtrait ſhoeing, or by ſome unnatural heat after foundering.

Hoof-*hurt*. In labouring beaſts, eſpecially oxen, if the *hoof* be hurt with a coulter or ſhare, it may be cured by a ſalve of pitch and greaſe mixed with powder of brimſtone, diſſolved together, and with a hot iron melted in the cleft of the hoof.

Hoof-*looſened*, is a diſſolution or dividing of the horn or coffin of a horſe's *hoof* from the fleſh, at the ſetting on of the coronet.

If the parting be round about the coronet, it comes by means of foundering; if in part, then by a prick of ſome chanel-nail, quitter-bone, retreat, graveling, cloying, or the like. The ſigns of being looſened by foundering, is its breaking firſt in the fore-part of the coronet, right againſt the toes; becauſe the humour always deſcends towards the toe. If it proceeds from pricking, graveling, or the like, the *hoof* will looſen round about equally, even at firſt. If occaſioned by a quitter-bone, or hurt on the coronet, it will break right above the grieved part, and rarely be ſeen to go any farther.

Hoof-*ſwelled*, is an infirmity that ſometimes befalls young horſes, when they are over-rid or wrought hard, which makes them ſwell in that part, becauſe of the blood falling down and ſettling there; which, if not ſpeedily removed, will uſually beget a wet ſpavin.

For the cure, take the ſtrongeſt aqua fortis, and firſt file or draw away the old *hoof* to a conſiderable degree with a file or drawing iron; then touch what is left of the *hoof* for three or four dreſſings with the aqua fortis; anoint the foot with an ointment made of one pound of hog's greaſe, three quarters of a pound of patch greaſe, five ounces of Venice turpentine, three ounces of new wax, and three ounces of ſallad oil, melted together over the fire; and thus a new *hoof* will be made to grow on the foot.

HOOK, in *Angling*, &c. See Fishing-*hook*.

Hooks, in *Building*, &c. are of various ſorts; ſome of iron, and others of braſs, viz. 1. *Armour-hooks*, which are generally of braſs, and are to lay up arms upon, as guns, muſquets, half-pikes, pikes, javelins, &c. 2. *Caſement-hooks*. 3. *Chimney-hooks*, which are made both of braſs and iron, and of different faſhions: their uſe is to ſet the tongues and fire-ſhovel againſt. 4. *Curtain-hooks*. 5. *Hooks for doors, gates*, &c. 6. *Double line-hooks*, large and ſmall. 7. *Single line-hooks*, large and ſmall. 8. *Tenter-hooks*, of various ſorts. See TENTER.

Hooks *of a ſhip*, are all thoſe forked timbers which are placed directly upon the keel, as well in her run as in her rake. See BREAST-*hooks*.

Hook, *boat*, in a *Ship*. See BOAT.

Hooks, *can*, thoſe which being made faſt to the end of a rope, with a nooſe (like that which brewers uſe to ſling or carry their barrels on), are made uſe of for ſlings.

Hooks, *foot*, in a *Ship*, the ſame with FUTTOCKS.

Hook-*land*, or OPE-*land*, land ploughed and ſowed every year. Dict. Ruſt.

Hooks, *loof*, in a *Ship*, a tackle with two hooks; one to hitch into a cringle of the main or fore-ſail, in the bolt-rope at the leech of the ſail by the clew; and the other is to hitch into a ſtrap, which is ſpliced to the cheſs-tree. Their uſe is to pull down the ſail, and ſuccour the tackles in a large ſail and ſtiff gale, that all the ſtreſs may not bear upon the tack. It is alſo uſed when the tack is to be ſeized more ſecure, and to take off or put on a bonnet or drabler.

Hook-*pins*, in *Architecture*, are taper iron pins, only with a *hook*-head, to pin the frame of a roof or floor together.

Hooks, *ſheer*, in a *Ship*, thoſe *hooks* like ſickles fixed in the ends of the yard-arms, that if a ſhip under ſail come to board her, thoſe *ſheers* may cut her ſhrowds, and ſo ſpoil her tackling. But as thoſe *ſheer-hooks* are ſubject to break their own yards, and cut the ropes that come from the top-ſails, they are now very ſeldom uſed.

Hooks, *trill*. See TRILL-*hooks*.

Hooks, *draught*. See DRAUGHT-*hooks*.

HOOKER is the name of a veſſel built like a pink, but rigged and maſted like a hoy; much uſed by the Dutch.

HOOP-*wheel*. See DETENT-*wheel*.

HOOPER, in *Ornithology*, a name by which ſeveral have called the cygnus ferus, or wild SWAN.

HOOPING *cough*, in *Medicine*. See CHIN-COUGH.

HOOPOE, *Upupa*, in the Linnæan ſyſtem of *Zoology*, makes a diſtinct genus of birds of the order of *picæ*; the characters of which are, that the beak is bent, convex, ſubcompreſſed, and in a ſmall degree obtuſe; the tongue is obtuſe, triangular, and very ſhort; and the feet are ambulatory. Under this genus Linnæus has claſſed three ſpecies; the *upupa epops*, the *promerops*, and *bird of* PARADISE.

The *hoopoe*, or *upupa epops*, is found in many parts of Europe, in Egypt, and even as remote as Ceylon. It frequently viſits our iſlands, but not at ſtated ſeaſons, and never breeds with us. In Sweden it is vulgarly conſidered as a preſage of war, and it was formerly deemed in our country as a fore-runner of ſome calamity. Its general weight is about three ounces; the beak is black, ſlender, ſharp, and a little hooked; its head is adorned with an extremely beautiful and elegant creſt, riſing two fingers high, and compoſed of two ſeries of feathers, reaching from the inſertion of the back to the back part of the head, which it raiſes and depreſſes at pleaſure. The tips of theſe feathers are ornamented with black and white; the reſt is of a cheſtnut colour; its neck is of a pale reddiſh brown; its breaſt and belly white, variegated with longitudinal ſtreaks, which diſappear in the middle, as the bird grows older; the tail is black, and compoſed of ten feathers, but has a large ſpot in it, in form of a creſcent, the horns pointing towards the extremity of the tail; the legs are ſhort and black. Its wings, when folded, do not reach to the end of the tail, and are ſtreaked acroſs with white; it feeds on beetles, worms, ants, &c. and is ſaid alſo to eat berries, and other vegetables. It breeds in hollow trees, and lays two aſh-coloured eggs. According to Linnæus it takes its name from its note, which has a ſound ſimilar to the word; or it may be derived from the French *huppé*, *creſted*. Ray and Pennant. See *Tab*. II. *Birds*, N° 22.

HOP, *Lupulus*, or *Humulus*, in *Botany*, a genus of the *dioecia pentandria* claſs. Its characters are theſe: it has male and female flowers upon different plants; the empalement of the male flower is compoſed of five ſmall concave obtuſe leaves; it has no petal, but five ſhort, hairy ſtamina; the female flowers have a general, four-pointed, acute perianthium, and a ſeparate oval one of four leaves, including eight flowers; each of theſe have an empalement of one leaf, cloſed at the baſe; theſe have neither petal nor ſtamina, but a ſmall germen, ſituated in the center, ſupporting two awl-ſhaped ſtyles, which turns to a roundiſh ſeed, covered with a thin ſkin, incloſed in the baſe of the empalement. We have but one ſpecies of this genus, which is diſtinguiſhed into the male and female *hop*.

The male *hop* grows wild by the ſide of hedges and upon banks, in many parts of England. The young ſhoots of theſe plants are often gathered by the poor people, and boiled as an eſculent herb; but theſe muſt be taken very young, otherwiſe they are tough and ſtringy. This is eaſily diſtinguiſhed by the flowers, which are ſmall, and hang in long looſe bunches from the ſide of the ſtalks, abounding with farina on their ſummits, and have no *hops* ſucceeding to the flowers.

The female *hop* is the ſort which is cultivated for uſe; of this ſort, the people who cultivate them reckon three different varieties: as firſt, the long and ſquare garlick *hop*, the long white *hop*, and the oval *hop*, all which are indifferently cultivated in England.

There being the greateſt plantation of hops in Kent of any county in England, it is very probable that their method of planting and ordering them ſhould be the beſt.

Hops were firſt brought into England from the Netherlands in the year 1524. They are firſt mentioned in the Engliſh ſtatute-book in the year 1552, viz. in the fifth and ſixth of Edw. VI. cap. 5. And by an act of parliament of the firſt year of king James I. anno 1603, cap. 18. it appears, that *hops* were then produced in abundance in England.

The *hop* being a plant of great importance in the article of brewing, we ſhall conſider what relates to the culture and management of it, under the following heads:

Hops, *the ſoil proper for*. As for the choice of their *hop-grounds*, they eſteem the richeſt and ſtrongeſt grounds as the moſt proper; and if it be rocky within two or three feet of the ſurface, the *hops* will proſper well; but they will by no means thrive on a ſtiff clay, or ſpongy wet land.

The Kentiſh planters account new land beſt for *hops*; they plant their *hop-gardens* with apple trees at a large diſtance, and with cherry trees between; and when the land hath done its beſt for *hops*, which they reckon it will in about ten years, the trees may begin to bear. The cherry trees laſt about thirty years, and by that time the apple trees are large, they cut down the cherry trees.

The Eſſex planters account a moory land the moſt proper for *hops*.

As to the ſituation of a *hop-ground*, one that inclines to the ſouth or weſt is the moſt eligible; but if it be expoſed to the north-eaſt or ſouth-weſt winds, there ſhould be a ſhelter of ſome trees at a diſtance, becauſe the north-eaſt winds are apt to nip the tender ſhoots in the ſpring, and the ſouth weſt winds frequently break and blow down the poles at the latter end of the ſummer, and very much endanger the *hops*.

In the winter time provide your ſoil and manure for the *hop-ground* againſt the following ſpring.

If the dung be rotten, mix it with two or three parts of common earth, and let it incorporate together till you have occaſion to make uſe of it in making your *hop-hills*; but if it be new dung, then let it be mixed as before, till the ſpring in the next year, for new dung is very injurious to *hops*.

Dung of all ſorts was formerly more commonly made uſe of than it is now, eſpecially when rotted, and turned to mould, and they who have no other manure muſt uſe it; which, if they do, cows or hogs-dung, or human ordure mixed with mud, may be a proper compoſt, becauſe *hops* delight moſt in a manure that is cool and moiſt.

Hops, *the planting of*. *Hops* require to be planted in a ſituation ſo open, as that the air may freely paſs round and between them, to dry up and diſſipate the moiſture, whereby they will not be ſo ſubject to FIRE-BLASTS, which often deſtroy the middles of large plantations, while the outſides remain unhurt.

As for the preparation of the ground for planting, it ſhould, in the preceding winter, be ploughed and harrowed even; and then lay upon it in heaps a good quantity of freſh rich earth, or well rotted dung and earth mixed together, ſufficient to put half a buſhel in every hole to plant the *hops* in, unleſs the natural ground be very freſh and good.

The hills where the hops are to be planted, ſhould be eight or nine feet aſunder, that the air may freely paſs between them; for in cloſe plantations, they are very ſubject to what the *hop-planters* call the fire-blaſt.

If the ground is intended to be ploughed with horſes between the hills, it will be beſt to plant them in ſquares chequerwiſe; but if the ground is ſo ſmall, that it may be done with the breaſt-plough or ſpade, the holes ſhould be ranged in a quincunx form. Which way ſoever you make uſe of, a ſtake ſhould be ſtuck down at all the places where the hills are to be made.

Perſons ought to be very curious in the choice of the plants, as to the kind of *hop*; for if the *hop-garden* be planted with a mixture of ſeveral ſorts of *hops* that ripen at ſeveral times, it will cauſe a great deal of trouble, and be a great detriment to the owner.

The two beſt ſorts are the white and the grey bind; the latter is a large ſquare *hop*, more hardy, and is the more plentiful bearer, and ripens later than the former.

There is alſo another ſort of the white bind, which ripens a week or ten days before the common; but this is tenderer and a leſs plentiful bearer; but it has this advantage, that it comes firſt to market.

But if three grounds, or three diſtant parts of one ground, be planted with theſe three ſorts, there will be this conveniency, that they may be picked ſucceſſively as they become ripe. The ſets ſhould be five or ſix inches long, with three or more joints or buds on them.

If there be a ſort of *hop* you value, and would increaſe plants and ſets from, the ſuperfluous binds may be laid down when the *hops* are tied, cutting off the tops, and burying them in the hill; or when the *hops* are dreſſed, all the cuttings may be ſaved; for almoſt every part will grow, and become a good ſet the next ſpring.

As to the ſeaſons of planting *hops*, the Kentiſh planters beſt approve the months of October and March, both which ſometimes ſucceed very well; but the ſets are not to be had in October, unleſs from ſome ground that is to be deſtroyed; and likewiſe there is ſome danger that the ſets may be rotted, if the winter prove very wet; therefore the moſt uſual time of procuring them is in March, when the *hops* are cut and dreſſed.

As to the manner of planting the ſets, there ſhould be five good ſets planted in every hill, one in the middle, and the reſt round about ſloping, the tops meeting at the center; they muſt ſtand even with the ſurface of the ground; let them be preſſed cloſe with the hand, and covered with fine earth, and a ſtick ſhould be placed on each ſide the hill to ſecure it.

The ground being thus planted, all that is to be done more during that ſummer, is to keep the hills clear from weeds, and to dig up the ground about the month of May, and to raiſe a ſmall hill round about the plants. In June you muſt twiſt the young binds or branches together into a bunch or knot; for if they are tied up to ſmall poles the firſt year, in order to have a few *hops* from them, it will not countervail the weakening of the plants.

A mixture of compoſt or dung being prepared for your *hop-ground*, the beſt time for laying it on, if the weather prove dry, is about Michaelmas, that the wheels of the dung-cart may not injure the *hops*, nor furrow the ground: if this be not done then, you muſt be obliged to wait till the froſt has hardened the ground, ſo as to bear the dung-cart; and this is alſo the time to carry on your new poles, to recruit thoſe that are decayed, and to be caſt out every year.

If you have good ſtore of dung, the beſt way will be to ſpread it in the alleys all over the ground, and to dig it in the winter following. The quantity they will require will be forty loads to an acre, reckoning about thirty buſhels to the load.

If you have not dung enough to cover all the ground in one year, you may lay it on one part one year, and on the reſt in another, or a third; for there is no occaſion to dung the ground after this manner oftener than once in three years.

Thoſe who have but a ſmall quantity of dung, uſually content themſelves with laying on about twenty loads upon an acre every year; this they lay only on the hills, either about November, or in the ſpring; which laſt ſome account the beſt time, when the *hops* are dreſſed, to cover them after they are cut; but if it be done at this time, the compoſt or dung ought to be very well rotted and fine.

HOPS, *the dreſſing of*. As to the dreſſing of the *hops*, when the *hop-ground* is dug in January or February, the earth about the hills, and very near them, ought to be taken away with a ſpade, that you may come the more conveniently at the ſtock to cut it.

About the end of February, if the *hops* were planted the ſpring before, or if the ground be weak, they ought to be dreſſed in dry weather; but elſe, if the ground be ſtrong and in perfection, the middle of March will be a good time; and the latter end of March, if it be apt to produce over-rank binds, or the beginning of April, may be ſoon enough.

Then having with an iron picker cleared away all the earth out of the hills, ſo as to clear the ſtock to the principal roots, with a ſharp knife you muſt cut off all the ſhoots which grew up with the binds the laſt year; and alſo all the young ſuckers, that none be left to run in the alley, and weaken the hill. It will be proper to cut one part of the ſtock lower than the other, and alſo to cut that part low that was left higheſt the preceding year. By purſuing this method, you may expect to have ſtronger buds, and alſo keep the hill in good order.

In dreſſing thoſe *hops* that have been planted the year before, you ought to cut off both the dead tops, and the young ſuckers, which have ſprung up from the ſets, and alſo to cover the ſtocks with fine earth a finger's length in thickneſs.

HOPS, *the poling of*. About the middle of April the *hops* are to be poled, when the ſhoots begin to ſprout up; the poles muſt be ſet to the hills deep into the ground, with a ſquare iron picker or crow, that they may the better endure the winds; three poles are ſufficient for one hill. Theſe ſhould be placed as near the hills as may be, with their bending tops turned outwards from the hill, to prevent the binds from entangling; and a ſpace between two poles ought to be left open to the ſouth, to admit the ſun-beams.

The poles ought to be in length ſixteen or twenty feet, more or leſs, according as the ground is in ſtrength; and great care is to be taken not to overpole a young or weak ground, for that will draw the ſtock too much, and weaken it. If a ground be overpoled, you are not to expect a good crop from it; for the branches, which bear the *hops*, will grow very little, till the binds have over-reached the poles, which they cannot do when the poles are too long. Two ſmall poles are ſufficient for a ground that is young.

If you wait till the ſprouts or young binds are grown to the length of a foot, you will be able to make a better judgment where to place the largeſt poles; but if you ſtay till they are ſo long as to fall into the alleys, it will be injurious to them, becauſe they will entangle one with another, and will not claſp about the pole readily.

Maple or aſpen poles are accounted the beſt for *hops*, on which they are thought to proſper beſt, becauſe of their warmth; or elſe, becauſe the climbing of the *hop* is promoted by means of the roughneſs of the bark. But for durability, aſhen or willow poles are preferable; but cheſtnut poles are the moſt durable of all.

If after the *hops* are grown up, you find any of them have been under poled, taller poles may be placed near thoſe that are too ſhort, to receive the binds from them.

HOPS, *the tying of*. As to the tying of *hops*, the buds that do not claſp of themſelves to the neareſt pole when they are grown to three or four feet high, muſt be guided to it by the hand, turning them to the ſun, whoſe courſe they will always follow. They muſt be bound with withered ruſhes, but not ſo cloſe as to hinder them from climbing up the pole.

This you muſt continue to do till all the poles are furniſhed with binds, of which two or three are enough for a pole; and all the ſprouts and binds that you have no occaſion for, are to be plucked up; but if the ground be young, then none of theſe uſeleſs binds ſhould be plucked up, but ſhould be wrapt up together in the middle of the hill.

When the binds are grown beyond the reach of your hands, if they forſake the poles, you ſhould make uſe of a ſtand-ladder in tying them up.

Towards the latter end of May, when you have made an end of tying them, the ground muſt have the ſummer dreſſing: this is done by caſting up with the ſpade ſome fine earth into every hill; and a month after this is done, you muſt hoe the alleys with a Dutch hoe, and make the hills up to a convenient bigneſs.

HOPS, *the gathering of*. About the middle of July *hops* begin to blow, and will be ready to gather about Bartholomew Tide. A judgment may be made of their ripeneſs by their ſtrong ſcent, their hardneſs, and the browniſh colour of their ſeed.

When by theſe tokens they appear to be ripe, they muſt be picked with all the expedition poſſible; for if at this time a ſtorm of wind ſhould come, it would do them great damage, by breaking the branches, and bruiſing and diſcolouring the *hops*; and it is very well known that *hops*, being picked green and bright, will ſell for a third part more than thoſe which are diſcoloured and brown.

The moſt convenient way of picking them is into a long ſquare frame of wood, called a bin, with a cloth hanging on tenter-hooks within it, to receive the *hops* as they are picked.

The frame is compoſed of four pieces of wood joined together, ſupported by four legs, with a prop at each end to bear up another long piece of wood, placed at a convenient height over the middle of the bin; this ſerves to lay the poles upon, which are to be picked.

This bin is commonly eight feet long, and three feet broad; two poles may be laid on it at a time, and ſix or eight perſons may work at it, three or four on each ſide.

It will be beſt to begin to pick the *hops* on the eaſt or north ſide of your ground, if you can do it conveniently;

this will prevent the ſouth-weſt wind from breaking into the garden.

Having made choice of a plot of the ground containing eleven hills ſquare, place the bin upon the hill, which is in the center, having five hills on each ſide; and when theſe hills are picked, remove the bin into another piece of ground of the ſame extent, and ſo proceed till the whole *hop-ground* is finiſhed.

When the poles are drawn up to be picked, you muſt take great care not to cut the binds too near the hills, eſpecially when the *hops* are green, becauſe it will make the ſap to flow exceſſively.

The *hops* muſt be picked very clean, i. e free from leaves and ſtalks; and, as there ſhall be occaſion, two or three times in a day the bin muſt be emptied into a *hop-bag* made of coarſe linen cloth, and carried immediately to the oaſt or kiln, in order to be dried; for if they ſhould be long in the bin or bag, they will be apt to heat, and be diſcoloured.

If the weather be hot, there ſhould no more poles be drawn than can be picked in an hour, and they ſhould be gathered in fair weather, if it can be, and when the *hops* are dry; this will ſave ſome expence in firing, and preſerve their colour better when they are dried.

The crop of *hops* being thus beſtowed, you are to take care of the poles againſt another year, which are beſt to be laid up in a ſhed, having firſt ſtripped off the haulm from them; but if you have not that conveniency, ſet up three poles in the form of a triangle, or ſix poles (as you pleaſe) wide at bottom; and having ſet them into the ground, with an iron picker, and bound them together at the top, ſet the reſt of your poles about them; and being thus diſpoſed, none but thoſe on the outſide will be ſubject to the injuries of the weather, for all the inner poles will be kept dry, unleſs at the top; whereas, if they were on the ground, they would receive more damage in a fortnight, than by their ſtanding all the reſt of the year.

Hops, *drying of*. The beſt method of drying *hops* is with charcoal on an oaſt or kiln, covered with hair-cloth, of the ſame form and faſhion that is uſed for drying malt. There is no need to give any particular directions for making theſe, ſince every carpenter or bricklayer, in thoſe countries where *hops* grow, or malt is made, knows how to build them.

The kiln ought to be ſquare, and may be of ten, twelve, fourteen, or ſixteen feet over at the top, where the *hops* are laid, as your plantation requires, and your room will allow. There ought to be a due proportion between the height and breadth of the kiln, and the beguels of the ſteddle where the fire is kept. viz. if the kiln be twelve feet ſquare on the top, it ought to be nine feet high from the fire, and the ſteddle ought to be ſix feet and a half ſquare, and ſo proportionable in other dimenſions.

The *hops* muſt be ſpread even upon the oaſt a foot thick or more, if the depth of the curb will allow it; but care is to be taken not to overload the oaſt, if the *hops* be green or wet.

The oaſt ought to be firſt warmed with a fire before the *hops* are laid on, and then an even ſteady fire muſt be kept under them; it muſt not be too fierce at firſt, leſt it ſcorch the *hops*; nor muſt it be ſuffered to ſink or ſlacken, but rather be increaſed, till the hops be nearly dried, leſt the moiſture or ſweat, which the fire has raiſed, fall back or diſcolour them. When they have lain about nine hours, they muſt be turned, and in two or three hours more they may be taken off the oaſt. It may be known when they are well dried, by the brittleneſs of the ſtalks, and the eaſy falling off of the *hop* leaves.

It is found by experience, that the turning of *hops*, though it be after the moſt eaſy and beſt manner, is not only an injury or waſte to the *hops*, but alſo an expence of fuel and time, becauſe they require as much fuel, and as long a time to dry a ſmall quantity, by turning them, as a large one. Now this may be prevented, by having a cover (to be let down and raiſed at pleaſure) to the upper bed whereon the *hops* lie. This cover may alſo be tinned, by nailing ſingle tin plates over the face of it; ſo that when the *hops* begin to dry, and are ready to burn, i. e. when the greateſt part of their moiſture is evaporated, then the cover may be let down within a foot or leſs of the *hops* (like a reverberatory) which will reflect the heat upon them, ſo that the top will ſoon be as dry as the lowermoſt, and every *hop* be equally dried.

Hops, *bagging of*. As ſoon as the *hops* are taken off the kiln, lay them in a room for three weeks or a month to cool, give, and toughen; for if they are bagged immediately, they will powder, but if they lie awhile (and the longer they lie the better, provided they be covered cloſe with blankets to ſecure them from the air) they may be bagged with more ſafety, as not being liable to be broken to powder in treading, and this will make them bear treading the better, and the harder they are trodden the better they will keep.

The common method of bagging is as follows: they have a hole made in an upper floor, either round or ſquare, large enough to receive a *hop-bag*, which conſiſts of four ells and a half of ell-wide cloth, and alſo contains ordinarily two hundred and a half of *hops*, they tie a handful of *hops* in each lower corner of the bag, to ſerve as handles to it; and they faſten the mouth of the hole, ſo placed that the hoop may reſt upon the edges of the hole.

Then he that is to tread the *hops* down into the bag, treads the *hops* on every ſide, another perſon continually putting them in as he treads them, till the bag is full, which being well filled and trodden, they unrip the faſtening of the bag to the hoops, and let it down, and cloſe up the mouth of the bag, tying up a handful of *hops* in each corner of the mouth, as was done in the lower part.

Hops being thus packed, if they have been well dried, and laid up in a dry place, will keep good ſeveral years; but care muſt be taken, that they be neither deſtroyed, nor ſpoiled by the mice making their neſts in them. Miller's Gard. Dict.

Hops, *diſeaſes of*. See FIRE-BLAST, FEN, HONEY-*dew*, &c.

Hops, *produce of*. The charge of an acre of *hop-ground*, in moſt parts of England where *hops* are cultivated, is computed thus: three pounds for the huſbandry, four pounds for the wear of the poles, five pounds for picking and drying, one pound ten ſhillings for dung, one pound for rent, though in ſome places they pay four or five pounds an acre yearly for the rent of the land, and ten ſhillings for tythe; in all fifteen pounds a year. The *hop planters* in England reckon, that they have but a moderate return, when the produce of an acre of *hops* does not ſell for more than thirty pounds. They frequently have fifty, ſixty, eighty, or a hundred pounds; and in a time of general ſcarcity conſiderably more: ſo that, upon the whole, if the total charge of an acre of *hops* is computed at fifteen pounds a year, and its average produce at thirty pounds, the clear profit from an acre will be fifteen pounds a year. But the plantation of *hops* has lately ſo much increaſed, and the average produce ſo much exceeded the conſumption, that *hops* have been with many planters rather a loſing than a very profitable article.

Hops, *uſe of*. In the ſpring time, while the bud is yet tender, the tops of the plant being cut off, and boiled, are eat like aſparagus, and found very wholeſome and effectual to looſen the body; the heads and tendrils are good to purify the blood in the ſcurvy, and moſt cutaneous diſeaſes; decoctions of the flowers, and ſyrups thereof, are of uſe againſt peſtilential fevers; juleps and apozems are alſo prepared with *hops*, for hypochondriacal and hyſterical affections, and to promote the menſes.

A pillow ſtuffed with *hops*, and laid under the head, is ſaid to procure ſleep in fevers, attended with a delirium. But the principal uſe of *hops* is in the brewery, for the preſervation of malt liquors; which by the ſuperaddition of this balſamic, aperient, and diuretic bitter, become leſs viſcid, leſs apt to turn ſour, more detergent, more diſpoſed to paſs off by urine, and in general more ſalubrious. They are ſaid to contain an agreeable odorous principle, which promotes the vinous fermentation. When ſlightly boiled or infuſed in warm water, they increaſe its ſpirituoſity.

Hops, *laws relating to*. By 9 Anne, cap. 121. an additional duty of 3*d*. a-pound is laid on all *hops* imported, over and above all other duties; and *hops*, landed before entry and payment of duty, or without warrant for landing, ſhall be forfeited and burnt; the ſhip alſo ſhall be forfeited, and the perſon concerned in importing or landing ſhall forfeit 5*l*. a hundred weight. 7 Geo II. cap. 19. By 9 Anne, cap. 12. there ſhall be paid a duty of 1*d*. for every pound of *hops* grown in Great Britain, and made fit for uſe, within ſix months after they are cured and bagged; and *hop-grounds* are required to be entered, on pain of 40*s*. an acre. Places of curing and keeping are alſo to be entered, on pain of 50*l*. which may be viſited by an officer at any time without obſtruction, under the penalty of 20*l*. All *hops* ſhall, within ſix weeks after gathering, be brought to ſuch places to be cured and bagged, on pain of 5*s*. a pound. The rebagging of foreign *hops* in Britiſh bagging for ſale or exportation, incurs a forfeiture of 10*l*. a hundred weight; and defrauding the king of his duty by uſing twice or oftener the ſame bag, with the officer's mark upon it, is liable to a penalty of 40*l*. The removal of *hops* before they have been bagged and weighed, incurs a penalty of 50*l*. Concealment of *hops* ſubjects to the forfeiture of 20*l*. and the concealed *hops*; and any perſon who ſhall privately convey away any *hops*, with intent to defraud the king and owner, ſhall forfeit 5*s.* a pound. And the duties are required to be paid within ſix months after curing, bagging, and weighing, on pain of double duty, two-thirds to the king, and one-third to the informer. No common brewer, &c. ſhall uſe any bitter ingredient inſtead of *hops*, on pain of 20*l.* *Hops*, which have paid the duty, may be exported to Ireland; but by 6 Geo. cap. 11. there ſhall be no drawback; and by 7 Geo. II. cap. 19. no foreign *hops* ſhall be landed in Ireland. Notice of bagging and weighing ſhall be ſent in writing to the officer, on pain of 50*l.* 6 Geo. cap. 21. And by 14 Geo. III. cap. 68. the officer ſhall, on pain of 5*l.* weigh the bags or pockets, and mark on them the true weight or tare, the planter's name, and place of abode, and the date of the year in which ſuch *hops* were grown; and the altering or forging, or obliterating ſuch mark, incurs a forfeiture of 10*l.*

The owners of *hops* ſhall keep at their oaſts, &c. juſt weights and ſcales, and permit the officer to uſe them, on pain of 20*l.* 6 Geo. cap. 21. And by 10 Geo. III. cap. 44. a penalty of 100*l.* is inflicted for falſe ſcales and weights. The owners are allowed to uſe caſks inſtead of bags, under the ſame regulations. 6 Geo. cap. 21. If any perſon ſhall mix with *hops* any drug to alter the colour or ſcent, he ſhall forfeit 5*l.* a hundred weight. If any perſon ſhall unlawfully and maliciouſly cut *hop-binds* growing on poles, in any plantation, he ſhall be guilty of felony, without benefit of clergy. 6 Geo. II. cap. 37. By a late act, five per cent. is added to the duties on *hops*.

Hop, *wild*. See *Shrub* Trefoil.

Hop-*tree*. See Holly.

Hop *hornbeam*, in *Botany*. See Hornbeam.

HOPE, in *Ethics*, is the deſire of ſome good, attended with a belief of the poſſibility, at leaſt, of obtaining it, and enlivened with joy, greater or leſs, according to the greater or leſs probability of our poſſeſſing the object of our *hope*. Alexander, preparing for his Aſian expedition, diſtributed his hereditary dominions among his friends; allotting to ſome villages, to others boroughs, to others cities; and being aſked what he had reſerved for himſelf, replied, *Hope*.

HOPEA, in *Botany*, a genus of the *polyadelphia polyandria* claſs. Its characters are, that the calyx is divided into five ſegments; the corolla has five petals; there are many ſtamina growing together in five bodies; the ſtyle is ſingle, and the fruit is a drupe, containing a three-celled nut. There is only one ſpecies.

HOPLITES, Hoplitæ, formed of ὁπλον, *armour*, in *Antiquity*, were ſuch of the candidates at the Olympic and other ſacred games, as ran races in armour.

One of the fineſt pieces of the famous Parrhaſius, was a painting which repreſented two *hoplites*; the one running, and ſeeming to ſweat large drops; the other laying his arms down, as quite ſpent, and out of breath. Pliny, lib. xxxv. cap. 10. and Paſchaſ. De Coronis, lib. vi. cap. 14.

Hoplites *lapis*, in *Natural Hiſtory*, a name given by ſome of the writers among the ancients, to a ſtone of a ſhining braſs-like appearance, looking like the ſurface of the poliſhed braſs-armour worn in thoſe times. It is eaſy to conclude, from this account, that the *hoplites* was one of our mundics.

HOPLITODROMOS, formed of ὁπλον, *armour*, and δρεμω, *I run*, in the ancient gymnaſtic ſports, a term applied to ſuch perſons as went through thoſe toilſome and robuſt exerciſes, in complete armour; by which the exerciſe became much more violent, and the wearing of armour, in the time of battle, much more eaſy.

HOPLOCHRISMA, a term uſed, by the ancient writers in *Medicine*, for the anointing a ſword, or other weapon, with which a perſon had been wounded, in order to the curing of the wound; ſo early was the idle notion of curing by ſympathetic remedies received in the world. Some late authors have alſo uſed the word in a very different ſenſe, namely, for the anointing the points of darts or ſwords with poiſonous ingredients, in order to render the leaſt wound given with them fatal; a practice moſt known, as it is ſaid, among the ſavage inhabitants of America.

HOPLOMACHI, Ὁπλομαχοι, compoſed of ὁπλον, *armour*, and μαχομαι, *I fight*, in *Antiquity*, were a ſpecies of gladiators, who fought in armour; either completely armed from head to foot, or only with a caſque and cuiraſs.

HOPPER, a veſſel wherein ſeed-corn is carried at the time of ſowing.

The word is alſo uſed for that wooden trough in a mill, into which the corn is put to be ground.

HORÆA, Ὡραια, in *Antiquity*, ſolemn ſacrifices, conſiſting of fruits, &c. offered in ſpring, ſummer, autumn, and winter, that heaven might grand mild and temperate weather. Theſe, according to Meurſius, were offered to the goddeſſes, called Ὡραι, i. e. *Hours*, who were three in number, attended upon the Sun, preſided over the four ſeaſons of the year, and had divine worſhip paid them at Athens. Potter, Archæol. Græc. lib. ii. cap. 20. tom. i. p. 439.

HORARY, ſomething relating to *horæ*, *hours*. See Hour.

Horary *circle of the globe*. See Circle.

Horary *circles*. See Hour-*circles* and Circle.

Horary *circles*, or *lines*, in *Dialling*, are the lines or circles which mark the hours on *ſun*-dials.

Horary *motion of the earth*, is the arch it deſcribes in the ſpace of an hour.

This is nearly fifteen degrees; for the earth completes its revolution through 360° in a day, or twenty-four hours, and the twenty-fourth part of 360 is 15; though this is not the exact meaſure of the *horary* arc, becauſe the earth moves with different velocity, according to its greater or leſſer diſtance from the ſun; but it is near enough for ordinary computations. See Equation *of time*.

HORCUS *lapis*, the name of a ſtone, mentioned by the writers of the middle ages as uſeful in ſoldering ſilver and other metals. All the deſcription they give of it is, that it was black, and was eaſily reduced to powder. It was called alſo catemia.

HORD, Horda, a Tartarian term, and literally denoting a *multitude*, in *Geography*, is uſed for a company or tribe of wandering people, which have no ſettled abode or habitation, but ſtroll about, dwelling in chariots, or under tents, to be ready to ſhiſt as ſoon as herbage, fruits, and the preſent province is eaten bare.

Hord is more properly the name which the Tartars, who inhabit beyond the Wolga, in the kingdoms of Aſtracan and Bulgaria, give to their villages.

A *hord* conſiſts of fiſty or ſixty tents ranged in a circle, leaving an open place in the middle. The inhabitants of each *hord* uſually form a military company or troop; the eldeſt whereof is commonly the captain, and depends on the general or prince of the whole nation.

HORDEATUM, a liquid medicine, made of barley, boiled till it burſt.

Sometimes other ingredients are added, as the cold ſeeds, almonds, and the like.

HORDEOLUM, from *hordeum*, *barley*, as reſembling a barley corn, in *Medicine*, a ſmall tubercle ariſing on the outer verge of the palpebræ, or eye-lids. See Stye.

HORDEUM, *Barley*, in *Botany*, a genus of the *triandria digynia* claſs. The characters are, that it hath a partial involucrum of ſix narrow pointed leaves, containing three flowers: the petal of the flower opens with two valves; the flower hath three hairy ſtamina, ſhorter than the petal; it hath an oval germen, ſupporting two reflexed ſtyles, which becomes an oblong bellied ſeed, pointed at both ends, with a longitudinal furrow, ſurrounded by the petal of the flower, which does not fall off. Miller enumerates four ſpecies; viz. 1. The ſpring barley with many rows of grain, principally cultivated in England, of which the farmers make two ſorts, the common and rath-ripe barley, though the latter is only a variety produced from the other, by being long cultivated in warm gravelly lands. This ſort of barley is eaſily diſtinguiſhed by the two orders of beards ſtanding erect; the chaff is alſo thinner, and it is, therefore, eſteemed better for malting. 2. The long-eared barley, the grains of which are regularly ranged in a double row, lying over each other like the ſcales of fiſhes; the chaff is very thin, and this barley is much valued for malting. 3. Sprat or battledore barley, with ſhorter and broader ears, longer beards, and ſhorter ſtem. 4. The ſquare or bear barley, or bigg, ſown in the northern counties, and generally in Scotland, with its grains diſpoſed in ſix rows. This ſpecies is much hardier than the others, but is not ſo good for malting. For the culture and produce, &c. of barley, ſee Barley.

When barley and malt does not exceed 32*s.* a quarter, there is a duty on importation of 16*s.* by 22 Car. II. cap. 13. but when the price exceeds this rate, the duty is 2*s.* 8*d.* a quarter by 15 Car. II. cap. 27. Theſe duties on importation ceaſe, when barley, bear, or bigg, ſhall be at or above 24*s.* a quarter, and in lieu of it, the duty ſhall be only 2*d.* a quarter, by 13 Geo. III. cap. 43. When the price of barley, bear, or bigg, ſhall be at or above 22*s.* a quarter, exportation is prohibited, under a penalty of 20*s.* a buſhel, and forfeiture of the veſſel, &c. 13 Geo. III. cap. 43. By this ſtatute the former bounties on exportation ſhall ceaſe; and when barley, bear, or bigg, is under 22*s.* a quarter, there ſhall be allowed a bounty of 2*s.* 6*d.* for every quarter of barley, &c. or of malt.

HORDICALIA, or Hordicidia, in *Antiquity*, a religious feaſt held among the Romans, wherein they ſacrificed cattle big with young.

The word *hordicidia* is formed of *horda*; which Feſtus explains by *prægnans, pregnant*; and *cædo, I ſacrifice.* Ovid. in his Faſti, lib. iv. ver. 631. deſcribes *horda* or *forda,* to be *bos prægnans*; of φορος, *gravida.*

This feaſt fell on the fifteenth of April; on which day they ſacrificed thirty cows, big with calf, to the goddeſs Tellus, or Terra, Earth: part of them were ſacrificed in the temple of Jupiter. The calves taken out of their bellies were burnt to aſhes at firſt, by the pontifices; afterwards, by the eldeſt of the veſtal virgins.

Alexander ab Alexandro, Genial. Dier. writes *hordalis dies*; and from him, ſome of the moderns call the feaſt *hordalia*; but Varro writes it *hordicalia*, and Feſtus, *hordicidia.*

HOREHOUND, *Marrubium*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the empalement of the flower is funnel-ſhaped, of one leaf, and equal at the brim, which ſpreads open; the flower is of the lip kind, with a cylindrical tube, divided into two lips; it has four ſtamina, which are under the lip, two of which are ſomewhat longer than the other; it has a four-pointed germen, which afterward turns to four oblong ſeeds, ſitting in the empalement. There are fifteen ſpecies. Miller.

The leaves of the common white *horehound*, or *praſium*, with hooked briſtly indentures to the empalement, are ſaid to be attenuant and reſolvent; they are famous for the relief they give in moiſt aſthmas, and in all diſeaſes of the breaſt and lungs, in which a thick and viſcous matter is the cauſe. They are alſo capable of doing great good in menſtrual ſuppreſſions, cachexies, and other chronical diſorders, proceeding from a viſcidity of the fluids, and obſtructions of the viſcera. A dram of the dry leaves in powder, or two or three ounces of the expreſſed juice, or an infuſion of half a handful, or a handful of the freſh leaves, are commonly directed for a doſe. There uſed to be a compound ſyrup of it, called *ſyrupus de Praſio*, which is now out of uſe. See ASTHMA.

HOREHOUND, *baſe*, *Stachys*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower has a tubulous, permanent empalement, cut into five acute parts at the top; and it has one lip-ſhaped petal, with a ſhort tube, having oblong chaps: the upper lip is erect, hooked, and a little indented at the point, being cut into three parts; it has four awl-ſhaped ſtamina, two of which are longer, and inclined to the upper lip; the other two are ſhorter, terminated by ſingle ſummits; and it has a four-pointed germen, ſupporting a ſlender ſtyle of the length of the ſtamina, crowned by a bifid, acute ſtigma; the germen turns to four oblong, angular ſeeds, which ripen in the empalement. Miller reckons eight ſpecies, and Linnæus fifteen; adding to this genus ſome ſpecies of the *galeopſis*; one of theſe is common by the ſides of ditches, and is ordered in the diſpenſaries as a good vulnerary herb.

HOREHOUND, *baſtard*. See IRON-*wort*.

HOREHOUND, *black*, or *ſtinking*, *Ballota*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs of plants: the flower is monopetalous and cloven, the upper lip being concave and crenated, and the lower obtuſe, and divided into three ſegments; the empalement of the flower is funnel-ſhaped, terminated by five horizontal points, and marked with ten furrows. This is a common weed, growing on the ſides of banks in moſt parts of England, ſo is ſeldom allowed a place in gardens. There are two ſorts of it, one with white, the other with purple flowers. Miller.

Linnæus enumerates five ſpecies of this genus.

Mr. Ray recommends a ſtrong decoction of this plant in hyſterical and hypochondriacal caſes. Make a tea of equal parts of white *horehound*, *ſtinking horehound*, and betony leaves; three or four cups of it drank every day, will prevent the gout, or mitigate its attacks.

HOREHOUND, *water*, *Lycopus*, in *Botany*, the name of a genus of plants of the *diandria monogynia* claſs; the characters of which are theſe: the flower conſiſts of one leaf, and is of the labiated kind; but, in ſome degree, reſembles the bell-faſhioned flowers; for the upper lip is ſcarce at all to be diſtinguiſhed from the lower, ſo that the flower appears at firſt ſight a tubular one, divided ſimply into four ſegments; the piſtil ariſes from the cup, and is fixed in the manner of a nail to the lower part of the flower; it is ſurrounded by four embryos, which afterwards become as many ſeeds of a roundiſh form, and are contained in an open capſule, which was before the cup of the flower.

The ſpecies of *lycopus* enumerated by Mr. Tournefort are four, and by Linnæus two.

This plant grows in great plenty at the ſides of ditches.

ORIZON, or HORISON, in *Aſtronomy*, a great circle of the ſphere, dividing the world into two parts, or hemiſpheres; the one upper, and viſible; the other lower, and hid. The word is ὁριζων, which literally ſignifies *bounding* or *terminating the ſight*; being formed of ὁριζω, *termino*, *definio*, *I bound*, *I limit*; whence it is alſo called *finitor*, *finiſher*.

The *horizon* is either *rational* or *ſenſible*.

HORIZON, *rational*, *true*, or *aſtronomical*, which is alſo called ſimply and abſolutely the *horizon*, is a great circle, whoſe plane paſſes through the center of the earth, and whoſe poles are the zenith and nadir. It divides the ſphere into two equal parts, or hemiſpheres.

Such is the circle HR (*Tab. Aſtronom. fig.* 52.) whoſe poles are the zenith and nadir; whence it follows, that the ſeveral points of the *horizon* are a quadrant diſtant from the ZENITH and NADIR.

The meridian and vertical circles cut the rational *horizon* at right angles, and into equal parts.

HORIZON, *ſenſible*, *viſible*, or *apparent*, is a leſſer circle of the ſphere, as *hr*, which divides the viſible part of the ſphere from the inviſible, and whoſe plane touches the ſpherical ſurface of the earth.

Its poles, too, are the zenith and nadir; and, conſequently, the *ſenſible horizon* is parallel to the *rational*; and it is cut at right angles, and into two equal parts, by the verticals.

The *ſenſible horizon* is divided into *eaſtern* and *weſtern*.

HORIZON, *the eaſtern*, or *ortive*, is that part of the *horizon* wherein the heavenly bodies riſe.

HORIZON, *the weſtern*, or *occidual*, is that wherein the ſtars ſet.

HORIZON, in *Geography*, is a circle paſſing over the earth, and dividing the viſible part of the earth and heavens from that which is inviſible.

The altitude, or elevation, of any point of the ſphere, is an arch of a vertical circle, intercepted between it and the ſenſible *horizon*.

This is peculiarly denominated *ſenſible* or *apparent horizon*, to diſtinguiſh it from the *rational*, or *true*, which paſſes through the centre of the earth; as already obſerved.

Theſe two *horizons*, though diſtant from one another by the ſemidiameter of the earth, will appear to coincide, when continued to the ſphere of the fixed ſtars; becauſe the earth compared with this ſphere is but a point.

By *ſenſible horizon* is alſo frequently meant a circle, which determines the ſegment of the ſurface of the earth, over which the eye can reach; called alſo the *phyſical horizon*.

In this ſenſe we ſay, a ſpacious *horizon*; a narrow, ſcanty *horizon*.

It is evident, that the higher the eye is, the farther is the viſible *horizon* extended. Thus, let H*hr*R (*Tab. Geography, fig.* 1.) repreſent a part of the ſpherical ſurface of the earth; if the eye be at A, draw A*h* and A*r* tangents to the globe of the earth; and let one of theſe lines A*h*, the point A continuing immoveable, be carried round, and in its revolution always touch the ſurface of the earth; the point *h* will deſcribe the viſible *horizon*, part of which is repreſented by the curve *hor*. But if the eye be placed higher, as at B, the tangents BH and BR will reach farther, and the viſible *horizon* will be larger, viz. HOR. The viſible *horizon* is moſt accurately obſerved upon the ſea, and is, therefore, ſometimes called the *horizon of the ſea*. In obſerving this *horizon*, the viſual rays, A*h* and A*r*, will, on account of the ſpherical ſurface of the ſea, always point a little below the true ſenſible *horizon* SS, and conſequently below the rational *horizon* TT, which is parallel to it.

To find the DEPRESSION of the *horizon* of the ſea below the true *horizon*, which varies with the height of the eye, and in a ſmall degree with the variation of the refractive power of the atmoſphere, ſee DEPRESSION.

The ſemidiameter of the earth and the height of the eye being given, the extent of the viſible *horizon* is thus found. Let ADE (*Tab. Geograph. fig.* 2.) be an arch of a great circle upon the earth, C the center of the earth, B the eye of the obſerver, BD the height of the eye, BA and BE lines drawn from the eye, touching the ſurface of the earth at A and E, and terminating the viſible *horizon*: in order to find AD, draw CA, and in the triangle BAC, right-angled at A, we have CB to CA as the whole ſine or radius is to the ſine of the angle ABC, whoſe complement is the angle C, meaſured by the arc AD. E. gr. Let DB, the height of the eye, be five feet, DC, or CA, the ſemidiameter of the earth, be 20949655 feet, and CB will be 20949660 feet: then will the logarithm of CB be to that of CA, or 7.3201769 to 7.3201768 as 10.0000000 to 9.9999999 the ſine of $ABC = 89^\circ\,58'$; therefore the angle C is $= 2'$ or 12188 feet $= 2.308$ miles, or 2 miles 542 yards, nearly. BA, or the right-lined diſtance of the fartheſt point of ſight from the eye, may eaſily be found, as the angles and other ſides are known: thus, radius or ſine of the angle A is to CB as the ſine of C is to BA: or, ſince BA

$= \overline{CB^2 - CA^2}|^{\frac{1}{2}} = \overline{CB + CA} \times \overline{CB - CA}^{\frac{1}{2}}$, if the logarithm of the ſum of the two given ſides be added to that of their difference, the half of theſe two logarithms will be equal to the logarithm of BA, nearly; i. e. $\frac{7.6222069 + 0.6989700}{2} = 4.1605884$, the logarithm of 14474 feet = BA, nearly. See DISTANCE.

The depreſſion of the *horizon* of the ſea at a given height of the eye, may be thus found by calculation: for if the eye be at B, the ſenſible *horizon* is FG, the depreſſion is the angle FBA, which being the complement of ABC, is equal to ACD. See DEPRESSION.

The diſtance on a perfect globe, if the viſual rays came to the eye in a ſtrait line, would be as it has been now ſtated; but by means of the REFRACTION of the atmoſphere, diſtant objects on the *horizon* appear higher than they really are, and may be ſeen at a greater diſtance, eſpecially on the ſea. Thus, without refraction, the moſt diſtant part of the ſea viſible to the eye at B, would be A; but refraction elevates the parts of the ſea, which are farther from the eye than A, ſo that the tangent or viſual ray ſhall fall upon a more diſtant point, as H, and conſequently the extent of the viſible *horizon* is enlarged by refraction: for it is DH, inſtead of DA; and refraction makes the angle of depreſſion leſs than it would be, viz. HBF, inſtead of ABF.

Father Laval, profeſſor of hydrography at Marſeilles, found, that the *horizon* of his obſervatory toward the ſea was never more than 15 minutes, nor leſs than 13½; that is, the arch of the circumference of the earth, intercepted between the obſervatory and the *horizon*, fluctuated between thoſe two quantities; whence M. Caſſini deduces, that the extent of the *horizon* is ſeven French leagues, of three miles each; and that the obſervatory is 175 feet high.

The height of the *horizon*, at the ſame place, and the ſame elevation above it, is very ſubject to vary, by means of differences in the atmoſphere, which occaſion others in the refractions.

When the ſea was full, or the north-weſt or ſouth-weſt wind blew, and the air hazy about the *horizon*, F. Laval always found his *horizon* depreſſed, or lower; i. e. the refraction which ſhould raiſe it in that caſe was leſs than ordinary. And yet, on the common principles, the air being now much charged with vapours, the very contrary was rather to be expected. This makes M. Caſſini ſuſpect, that there is ſome other refractive matter in the atmoſphere, beſide the air itſelf.

The ſame author obſerves, that at a height ten times greater than that of F. Laval's obſervatory, he found the arch terminated by the *horizon* toward the ſea, 42′, without any ſenſible variation; whence he concludes, that the variations are the greater, as the height is the leſs; which may ſeem contrary to what he had aſſerted in another place, viz. that the variations in the apparent altitudes of bodies are greater, as theſe objects are more remote, becauſe they are ſeen through the larger quantity of air, which is liable to be varied. But the contradiction may be ſolved.

HORIZON *of the globe*. See GLOBE.

HORIZONTAL, ſomething that relates to the *horizon*, or that is taken in the *horizon*, or on a level with the *horizon*.

We ſay, a *horizontal* plane, *horizontal* line, *horizontal* diſtance, &c.

HORIZONTAL *dial*, is that drawn on a plane parallel to the horizon; having its gnomon, or ſtyle, elevated according to the altitude of the pole of the place it is deſigned for.

Horizontal dials are of all others the moſt ſimple and eaſy. The manner of deſcribing them, ſee under the article DIAL.

HORIZONTAL *diſtance*. See DISTANCE.

HORIZONTAL *line*, in *Perſpective*, is a right line drawn through the principal point, parallel to the horizon; or it is the interſection of the *horizontal* and perſpective planes.

Such is the line PL (*Tab. Perſpective*, *fig.* 12.) paſſing through the principal point F.

HORIZONTAL *line*, or baſe of a hill, in *Surveying*, a line drawn on the *horizontal* plane of the hill, or that on which it ſtands.

HORIZONTAL *moon*. See *Apparent* MAGNITUDE.

HORIZONTAL *parallax*. See PARALLAX.

HORIZONTAL *plane*, is that which is parallel to the horizon of the place, or not inclined to it.

The buſineſs of LEVELLING is, to find whether two points be in the *horizontal* plane; or how much the deviation is.

HORIZONTAL *plane*, in *Perſpective*. See PLANE.

HORIZONTAL *projection*. See PROJECTION and MAP.

HORIZONTAL *range*, or *level range*, of a piece of ordnance, is the line it deſcribes, when directed parallel to the horizon, or *horizontal* line.

Dr. Halley gives two very ready theorems: the one, to find the greateſt *horizontal* range at 45 degrees elevation, in any ſhot made upon any inclined plane, with any elevation of the piece whatſoever; and the other, to find elevations proper to ſtrike a given object with any force, greater than what is ſufficient to reach it with the middle elevation.

1. A ſhot being made on an inclined plane; having the *horizontal* diſtance of the object it ſtrikes, with the elevation of the piece, and the angle at the gun between the object and the perpendicular; to find the greateſt *horizontal* range of that piece laden with the ſame charge; that is, half the latus rectum of all the parabolæ made with the ſame impetus. Take half the diſtance of the object from the nadir, and the difference of the given elevation from that half; ſubtract the verſed ſine of that difference from the verſed ſine of the diſtance of the object from the zenith; the difference of thoſe verſed ſines will be to the ſine of the diſtance of the object from the zenith, as the *horizontal* diſtance of the object ſtruck, to the greateſt range at 45 degrees.

2. Having the greateſt *horizontal* range of a gun, the *horizontal* diſtance and angle of inclination of an object to the perpendicular: to find the two elevations neceſſary to ſtrike that object. Halve the diſtance of the object from the nadir; this half is equal to the half ſum of the two elevations ſought; then ſay, as the greateſt *horizontal* range is to the *horizontal* diſtance of the object, ſo is the ſine of the angle of inclination, or diſtance of the object from the perpendicular, to a fourth proportional; which fourth being ſubtracted from the verſed ſines of the diſtance of the object from the zenith, leaves the verſed ſine of half the difference of the elevations ſought; which elevations are therefore had, by adding and ſubtracting that half of the difference to and from the aforeſaid ſum. See PROJECTILE and GUNNERY.

HORIZONTAL *refraction*. See REFRACTION.

HORIZONTAL *roots*. See FIBROSE *roots*.

HORIZONTAL *ſhelters*, among *Gardeners*, are defences, diſpoſed parallel to the horizon, for tender plants, bloſſoms, and fruits, in the ſpring, to defend them againſt blaſts, and pinching nights.

The uſual ſhelters that have obtained, are baſs-mats, and other warm coverings, which are rolled up in the day-time, and let down in the night. It was the reverend Mr. Lawrence who firſt propoſed *horizontal ſhelters*, chiefly on this principle; that moſt of our froſts and blaſts fall perpendicularly, i. e. the condenſed vapours, falling from the upper region, do at night form themſelves, toward the ſurface of the earth, into drops of dew, ſubject to be frozen by the coldneſs of the air.

Horizontal ſhelters are to be made by laying rows of tiles, at certain diſtances one above another, in the ſtructure of the wall, ſo as to project or hang over the plane of the wall, to carry off the dew, wet, &c. It is an inconvenience objected to this method, that it is difficult to lead a tree rightly among the tiles, or to keep its figure duly filled up.

But the principal objection againſt theſe tiles is this, that they prevent vegetables from receiving the advantage of dews, rains, &c. in conſequence of which they become weak and languid, and at laſt entirely decay. The only ſort of *horizontal ſhelters*, which Mr. Miller has ever obſerved to be uſeful for fruit-trees, are made with two leaves of ſlit-deal, joined over each other, and painted. This kind of ſhelter being fixed upon the top of the wal with pullies, to draw up and down at pleaſure, forms ſort of pent houſe; which being let down in great rain or cold nights, whilſt the trees are in flower, or the frui is ſetting, proves ſerviceable; but it muſt be remove ſoon after the fruit is ſet, ſo that the trees may enjoy a the advantages of rain, dew, &c. in the ſummer, whic are abſolutely neceſſary for producing healthy trees, good fruit.

HORIZONTAL *ſpeculum*. One of the great inconvenienci mariners have to ſtruggle with, is the frequent want of horizon; for though the atmoſphere may, at the heig of ten or twelve degrees and upward, be clear enough give a view of the ſun and other objects, yet all belo that height is often ſo hazy, as to hinder a diſtinct ſig of the horizon, and conſequently to prevent obſervatio from having the requiſite correctneſs. This inconven ency is removed by a *horizontal ſpeculum*, invented Mr. Serſon, who was loſt in the Victory man of w in which ſhip he was ſent out to make trial of his m chine.

The principle on which this machine was conſtructe was derived from the conſideration of a top while ſpi ning: for this author obſerving that the top had a co deral derable degree of ſteadineſs in, and force to acquire, an upright motion, whether the body which ſuſtained it was in motion or at reſt: he therefore concluded, that if a circular machine, whoſe upper face was a flat poliſhed ſpeculum, was to have a ſwift circular motion communicated to it, that ſpeculum, by acquiring a *horizontal* ſituation, would ſhew all objects which it reflected, as much below the horizon, as they really are above it. Conſequently, if the image of the ſun, as ſeen reflected from the ſpeculum, were made to coincide with the ſun's image ſeen in a Hadley's quadrant, the angle given by the quadrant would in all caſes be double the real altitude. Mr. Serſon alſo found, that to confine the ſpeculum to one place, it was neceſſary to let the point ſpin in a cup; for the *horizontality* of the ſpeculum would not be altered, whatever poſition might be given to the cup; provided it touched only at the point on which it ſpun. This curious and uſeful inſtrument, as it is now improved by Mr. Smeaton, conſiſts in a well poliſhed metal ſpeculum, of about three inches and a half in diameter, incloſed within a circular rim of braſs; ſo fitted that the center of gravity of the whole ſhall fall near the point whereon it ſpins. This is the end of a ſteel axis running through the center of the ſpeculum, above which it finiſhes in a ſquare, for the conveniency of fitting a roller on it, by which it is ſet in motion by means of a piece of tape wound round the roller. The cup in which it ſpins, is made of agate, flint, or other hard ſubſtance; and a pyramidal cover may be made to the whole, compoſed of glaſs panes: by this means an obſervation may be made with it as well covered as open, and it will thereby be prevented from tarniſhing by the moiſt air and ſpray of the ſea.

If the box be placed ſteadily, and as level as may be, after the tape is untwirled, the ſpeculum will be fit for obſervation in leſs than two minutes, and will generally continue ſo for twelve or fifteen. When it is to be uſed for a meridian obſervation, it may be convenient to know what time to ſet it up; and this may be had near enough by taking the ſun's bearing from the meridian with an azimuth compaſs, allowing for the variation; and if it has about five degrees to run before it culminates, it is then time to ſpin the ſpeculum. The obſerver is to place himſelf as near the box as he conveniently can, and look down on the ſun's image in the ſpeculum, and bring the ſun's image ſeen in the quadrant to agree with it, ſo that their centers coincide; the quadrant will then give the double altitude, without any allowance for the height of the ſhip, or the ſun's ſemidiameter.

When the ſun is about 45° high, the obſerver muſt look through that ſight of the quadrant, which is uſed for a back obſervation; but he muſt look down on the *horizontal* image, or that in the ſpeculum, as it was the back horizon; and then making the ſolar images to agree, the quadrant, according as it is numbered, will give the double altitude, or double zenith diſtance.

Theſe ſpeculums are as uſeful by night as by day; for as the images of the ſmalleſt ſtars may be ſeen in the ſpeculum, conſequently any object that can be ſeen reflected from the glaſſes of the quadrant, may be obſerved by the ſpeculum; and theſe are all the ſtars of the firſt magnitude, the planets Venus, Mars, Jupiter, Saturn, and the moon. So that by having the declinations of theſe bodies in an ephemeris, they may be uſed in obſervations as well as the ſun.

As the great diſtreſſes to which ſhips are ſometimes driven in ſeveral parts of the world, for want of a horizon to obſerve by, are by this ingenious contrivance quite removed, it is hoped the uſe of this inſtrument may become general. See HADLEY'S QUADRANT.

HORMEZION, or HORMESION, in *Natural Hiſtory*, the name of a gem deſcribed by Pliny, and ſeeming to have been a ſpecies of HYACINTH. He ſays it was very bright, and of a yellowiſh red or flame colour, with a whitiſh caſt at the edges.

HORMINODES, in *Natural Hiſtory*, the name of a gem deſcribed by Pliny, and others of the ancient writers. The ſtone itſelf, they tell us, was either black or white, but had in it a green ſpeck, ſurrounded by a circle of a bright yellow. It ſeems to have been no other than one of the oculus beli's of our jewellers.

HORMINUM, in *Botany* See CLARY.

HORMINUM, *Pyrenæan Clary*, in the Linnæan ſyſtem of *Botany*, a genus of the *didynamia gymnoſpermia* claſs; the calyx is bell-ſhaped, with four equal ſegments, and a fifth, which is larger, and emarginated; the upper lip of the corolla is concave. There are two ſpecies.

HORN, *Cornu*, a hard, callous ſubſtance, growing on the head of divers animals, and ſerving them as weapons of offence and defence.

It is laid down as a rule, by ſome naturaliſts, that no animals have *horns* but thoſe that are cloven-footed. The *horns* are uſually a double part; inſomuch that there is but one exception, which is in the rhinoceros.

The *horns* of many animals, particularly of the deer-kind, are caſt every year, and new ones grow up in their places. With us the deer drop them in March, and the new *horns* are full grown by the July following. Voſſius very juſtly ranks this among the moſt wonderful phenomena of nature: he ſays, that we have nothing analogous to the growth of ſuch hard and ſolid bodies of ſo great a bulk, in ſo ſhort a time.

The growth and caſting of the *horns* of deer is a very ſingular circumſtance in the animal world. The ſtag puts out its firſt *horns* in the ſecond year of its age, and after this they caſt them every year in March. The luſty and well-fed ones caſt their *horns* firſt; the ſickly or weak ones ſometimes keep the old ones till the end of April. Theſe *horns* are faſtened to the bones of the ſkull, not to the ſkin of the head only, as ſome people would have it thought, who are for making the caſting of them the leſs wonderful. About ten days after the *horns* are caſt, the new or young *horns* begin to appear; they are ſoft and hairy at firſt, but they grow hard in about three months, and the ſtag then rubs off their hairy ſkin.

Many idle opinions have been formed of the cauſe of the falling of theſe parts of the animal; and worms in the head, and many other things, have been ſuppoſed inſtrumental to it, which have no ſhare in it. The true reaſon ſeems, that theſe are a ſort of vegetables growing on the animal, as our nails and hair have by many been ſaid alſo to be; and there appears a great analogy between them and the ſprouting of the leaves and branches in trees and plants. Trees commonly caſt their ripe fruit in ſummer, and drop their leaves in autumn, becauſe the ſap, or nouriſhing juice, flows into them no longer; and in the ſame manner, at certain ſtated periods, the blood and juices ceaſe to flow into theſe parts of the animal, and they drop off. The cavernous part, at the root of the *horns*, probably grows hard, and the pores through which the veſſels paſs, grow up at this time; and then, as no juices can be carried through them to the *horn*, it is not at all wonderful that it decays, and falls off, for want of nouriſhment.

It is probable that this ſtoppage of the pores, and denying of the paſſage of any juices, happen in the *horns* as ſoon as they are arrived at their full growth in July; but they are ſo firmly fixed to the head, that it takes a long time for them to looſen and fall; whereas in the leaves of plants the pedicles are ſo tender, that they wither and fall immediately on the juices ceaſing to flow into them. This analogy between the operations of nature, in the caſting the *horns* of deer, and the falling off of ripe fruit and leaves from vegetables, derives great force from obſervation of the orange and other trees. If the ſtalk, from which a ripe orange has fallen, be compared with that part of the forehead of a deer from which a *horn* is juſt fallen, there will be ſeen ſuch a ſimilarity between the one and the other, that it will appear very obvious, that nature has operated by the ſame laws in both. Phil. Tranſ. N° 227. p. 494.

The number of branches in the *horns* is proportioned to the AGE of the animal, the young ones always having but few, the old ones moſt. Six or ſeven branches are the common number, and in Tuſcany they have ſometimes eight or nine. But in Saxony, where theſe creatures are very long lived, they are ſometimes ſeen with fourteen or fifteen branches, and ſometimes more. The young *horns*, while yet ſoft, are full of blood-veſſels; and if cut off, eſpecially near the head, they are found to bleed very violently, and the creature will ſometimes even bleed to death at the wound. This blood was found by Redi to coagulate alſo like the other blood of the ſtag, let out of the other parts of the body; though this is contrary to the accounts of Ariſtotle and Galen. Blood-veſſels are ſent in large numbers into all *horns*, while young, to furniſh them with nouriſhment for their increaſe and growth; but when they are arrived at their full growth, theſe veſſels dry up, there being no farther occaſion for them; and hence it is that no ill ſymptoms attend the falling off of theſe parts, when full grown. If a ſtag be caſtrated while he is ſo young as not to have *horns*, he will never have any at all; and if caſtrated afterwards, while his *horns* are on, he will never caſt them, but always retain the ſame pair which he had at the time of the operation. The *horns* of a deer are by huntſmen called his HEAD.

In the hiſtory of the French Academy of Sciences, we have an account of a bullock's *horn*, dug out of the ground in plowing, which had ſhot forth fibrous roots, and appeared to have grown, or vegetated, after the manner of a plant.

Horns make a conſiderable article in the arts and manufactures. Bullocks *horns*, ſoftened by the fire, ſerve to make lanthorns, combs, knives, ink-horns, tobacco-boxes, &c.

Horn, *ſtaining of.* See Bones, Dying, Ivory, Tortoiſe-*ſhell*, and Wood.

Horn is ſometimes alſo uſed for the hoof of a horſe, &c.

Horn, *Ammon's.* See Cornu *Ammonis.*

Horn-*blend*, is a black or green indurated bole or clay, conſiſting of ſcaly particles, which are diſtinguiſhable from thoſe of mica, by being leſs ſhining, thicker, and rectangular. It is generally found among iron ores, and ſometimes intermixed with mica, forming a compact ſtone.

Horn, *harts, cornu cervi.* The ſcrapings or raſpings of the *horn* of this animal are medicinal, and uſed in decoctions, ptiſans, &c.

Hartſhorn-jelly is nutritive and ſtrengthening, and is ſometimes given in diarrhœas; but a decoction of burnt *hartſhorn* in water is more frequently uſed for this purpoſe, and is called *hartſhorn drink.*

The coal of *hartſhorn*, by being calcined with a long continued and ſtrong fire, is changed into a very white earth, called *hartſhorn* calcined to whiteneſs. This earth is employed in medicine as an abſorbent, and adminiſtered in dyſenteries and labour-pains, which are ſuppoſed to be cauſed by acrid and ill-digeſted matters. This earth levigated is the baſis of Sydenham's white decoction, which is commonly preſcribed in theſe diſeaſes.

The ſalt of *hartſhorn* is a great ſudorific, and given in fevers with ſucceſs; and *hartſhorn* alſo yields, by diſtillation, a very penetrative volatile ſpirit.

Horn, in the *Manege.* To give a ſtroke with the *horn*, is to bleed a horſe in the roof of the mouth, with the *horn* of a ſtag or roebuck, the tip or end of which is ſo ſharp and pointed, as to produce the ſame effect as a lancet. They ſtrike with the *horn* in the middle of the fourth notch or ridge of the upper jaw.

Horn-*hipped.* A horſe is ſaid to be ſo, when the tops of the two haunch-bones appear too high.

Horn is alſo a ſort of muſical inſtrument, of the wind kind; chiefly uſed in hunting, to animate and bring together the dogs, and the hunters.

The *horn* may have all the extent of the trumpet.

The term for ſounding anciently was, wind a *horn*; all *horns* being in thoſe times compaſſed: but ſince ſtrait *horns* are come in faſhion, they ſay, blow a *horn*; and ſometimes, plainly, ſound a *horn.*

There are various leſſons on a *horn:* as the recheat, double recheat, royal recheat, running or farewel recheat, &c. See Recheat.

The French *horn* is no other than a wreathed or contorted trumpet. It labours under the ſame defects as the trumpet itſelf; but theſe have of late been ſo palliated, as to require no particular ſelection of keys for this inſtrument. In the beginning of the year 1773, a foreigner, named Spandau, played in a concert at the opera-houſe a concerto, part whereof was in the key of C, with the minor-third; in the performance of which all the intervals ſeemed to be as perfect as in any wind-inſtrument. This improvement was effected by putting his right-hand into the bottom or bell of the inſtrument, and attempering the ſounds by the application of his fingers to different parts of the tube.

The Hebrews made uſe of *horns*, formed of rams *horns*, to proclaim the jubilee; whence the name Jubilee.

Horns *of the uterus*, two proceſſes ariſing from the ſides of the fund. See Uterus.

Horn, in *Architecture*, is ſometimes uſed for Volute.

Horn *of plenty.* See Cornucopia.

Horn *with horn*, or Horn *under horn (cornutum cum cornuto)*, is when there is common *per cauſe de vicinage*, intercommoning of horned beaſts. See Common and Intercommoning.

Horns, in *Botany.* See *Snail* Trefoil.

Horns *and hedghog.* See Lucerne.

Horns *of inſects.* See Feelers.

Horns, *foſſil.* See Moose-*deer*, and Elk.

Horn-*coot*, a name given by fowlers to the great *horn*-owl. A ſportſman who has got one of theſe birds, has a conſtant lure to draw together almoſt what numbers of others he pleaſes. The method of taking other birds by it, is thus: the ſportſman fixes upon ſome ſingle tree which ſtands in the middle of an open field, and cutting the boughs of this into a regularity, he ſpreads nets all about it, and then places his owl within them, with a ſtring faſtened to its leg, by means of which the bird may be put in motion by the ſportſman as he ſtands at a diſtance under covert. There are to be two perches placed near one another, ſo that the owl can eaſily go from the one to the other. It is the nature of this bird to fly only by night, and therefore whenever it is ſeen by day-light, all the other birds quarrel with it, and abuſe it; even the hawks will make at it wherever it comes in their way. The ſportſman depends upon this; and as ſoon as he ſees any bird approach, or as ſoon as the owl, who ſees farther than he can, gives him the ſignal that ſome bird is in ſight, he pulls the ſtring, on which the owl, being diſturbed, flies from one perch to the other. This draws the ſtrange bird to her; and flying violently at her, it is entangled in the net placed with that intent, and the ſportſman muſt immediately run up and take it out, and replace the net for the next.

Horn-*fiſh*, an Engliſh name for the fiſh which we alſo call the gar-fiſh. It is by ſome accounted a ſpecies of the acus or tobacco-pipe fiſh; but the only reaſon for this opinion ſeems to have been, that it is as long and ſlender as that fiſh. It is properly a ſpecies of pike or eſox. See Acus and Esox.

Horn-*fiſh*, in *Ichthyology* See Cornutus *piſcis.*

Horn-*owl*, in *Zoology.* See Owl.

Horn-*work*, in *Fortification*, a ſort of out-work, advancing toward the field, to cover and defend a curtin, baſtion, or other place, ſuſpected to be weaker than the reſt: as alſo to poſſeſs a height, &c. See *Tab. II. Fortification, fig.* 21. N°. 2. *lit f.*

It conſiſts of a front and two branches; the front is made into two demi-baſtions, and a curtin; its ſides, or flanks, are uſually parallel; though ſometimes they approach or contract towards the place, forming what they call a Queue *d'yronde*, or *ſwallow's tail.*

When the flanks are too long, they ſometimes make epaulements to flank them. The parts of the *horn-work* next the country are to be defended by a parapet.

For the conſtruction of *horn-works*, produce the capital of the ravelin beyond the ſaliant angle A (*Tab.* VIII. *Fortification, fig.* 42.) to the diſtance AB, of about eighty toiſes; draw DBE at right angles to AB, in which take BD, BE, each equal to fifty-five toiſes; and on the outward ſide DE, trace the front of a polygon in the ſame manner as that of the body of the place, making the perpendicular BF eighteen toiſes, and the faces thirty. The branches D*a*, E*b*, of the *horn-work*, when produced, terminate on the faces of the baſtions, within five toiſes of the ſhoulders. The ditch of the *horn-work* is twelve toiſes, and its counterſcarp parallel to the branches, and in the front terminates at the ſhoulders. The capital of the ravelin before the front of the *horn-work* is thirty-five toiſes, and the faces terminate on the ſhoulders, or rather two or three toiſes beyond them; and the ditch before the ravelin is eight toiſes. There are ſometimes made retrenchments within the *horn-work*, ſuch as S, S; which are conſtructed by erecting perpendiculars to the faces of the ravelins, within twenty-five toiſes of their extremities. This retrenchment, like all others, has a parapet turfed only with a berm of eight feet before it, and likewiſe, a ditch from three to five toiſes broad. When a *horn-work* is made before the baſtion, the diſtance of the front from the ſaliant angle of the baſtion is a hundred toiſes; and the branches terminate on the faces of the adjacent ravelins within five toiſes from their extremities; the reſt of the conſtruction is as before.

Two *horn-works* joined together make a crown-work, which is conſtructed by deſcribing from the ſaliant angle A (*fig.* 43.) of the ravelin, as a center, an arc of a circle, with a radius of about 120 toiſes, cutting the capital of the ravelin produced at C; from the point C ſet off the chords CB, CF, each equal to a hundred and ten toiſes, and on each of theſe conſtruct the front of a polygon of the ſame dimenſions, as in the *horn-work*, that is, the perpendicular ſhould be eighteen toiſes, the faces thirty, and the branches terminate on the faces of the baſtions, within twenty-five toiſes of the ſhoulders. The ditch is twelve toiſes; the capital of the ravelin thirty-five, and its ditch eight. When the crown-work is made before the baſtion, the arc is deſcribed from the ſaliant angle of the baſtion with a radius of a hundred and twenty toiſes, and the branches terminate on the faces of the adjacent ravelins, within twenty-five toiſes of their extremities, &c. as before. Muller's Elem. of Fortif. p. 39, &c.

HORNAGIUM, Hornage, in our ancient *Law-Books*, ſeems to import the ſame with *horngeld.*

HORNBEAM, *Carpinus*, in *Botany*, a genus of the *monoecia polyandria* claſs. Its characters are theſe: it has male and female flowers, growing ſeparate on the ſame plant; the male flowers are diſpoſed in a cylindrical rope or catkin, and have ten ſmall ſtamina; the female flowers are diſpoſed in the ſame form, and have one petal ſhaped like a cup, cut into ſix parts, with two ſhort germina; the catkin afterwards grows large, and at the baſe of each ſcale is lodged an oval angular nut. There are four ſpecies. Miller.

Linnæus enumerates only two ſpecies.

The *hornbeam* is very common in many parts of England, but is rarely ſuffered to grow as a timber-tree, being generally reduced to pollards by the country people; yet where the young trees have been properly treated, they have grown to a large ſize.

Theſe trees will thrive on cold and barren hills, and may therefore be cultivated in ſuch places with great advantage. When they are deſigned for timber, they ſhould be raiſed from ſeeds in the ſame ſoil and ſituation where they are deſigned to grow. The ſeeds ſhould be ſown in the autumn, ſoon after they are ripe. As the plants grow up, they ſhould be kept free from weeds, and in two years time they will be fit to tranſplant; and as the trees advance in their growth, they ſhould be carefully thinned.

The timber of this tree is very tough and flexible, and might be converted to many uſeful purpoſes, if ſuffered to grow to a proper ſize; but as it has been generally treated otherwiſe, ſo the principal uſes it has been applied to, have been for turnery ware, for which it is an excellent wood; and alſo for making mill-cogs, heads of beetles, &c. It is alſo excellent fuel. Miller's Gard. Dict.

HORNBEAM *pollengers*, a denomination given by ſome to trees of this ſpecies, which have been lopped, and are of about twenty years growth. See TREE.

HORNED *poppy*. See POPPY.

HORNET, *Crabro*, in *Zoology*, a ſpecies of the WASP, with a black thorax, and double black ſpots on the ſegments of the abdomen. This inſect is very bold and venomous; and wholly reſembles the waſp, only it is twice as large, and that the head is of a longer and ſlenderer ſhape, and the eyes formed ſomewhat like a half moon. They build under ground, and in winter hide themſelves in hollow trees. They feed on fleſh, and, when very hungry, will ſeize upon a ſmall bird. Mouffett relates, that they have been ſeen ſingly to purſue and kill a ſparrow, and afterwards feed on its fleſh. See WASP.

HORNET-*fly*, in *Natural Hiſtory*, a very large two-winged fly, which has the ſhape and colours of the *hornet*, and is, at firſt ſight, ſcarce to be diſtinguiſhed from it. The principal colour of the body of this fly is yellow; but it has two long and large black lines placed tranſverſely on it, and has a black corcelet, and a yellow head.

Theſe lay, at a proper ſeaſon, a large number of oblong white eggs, which hatch into large and long worms, whoſe chief food is the worms and nymphs of the humble bees. The worm of this fly is continually found in the neſts of theſe bees, where it never meddles either with the wax or honey, but preys only on the young offſpring of the creature.

HORNGELD ſignifies a tax, within the foreſt, to be paid for the feeding of *horned* beaſts. See GELD.

Quietum eſſe omni collectione in foreſta de beſtiis cornutis, &c. *Et ſint quieti de omnibus geldis*, *&* *danegeldis*, *&* *wodgeldis*, *&* *ſenegeldis*, *&* horngeldis, &c.

To be free of *horngeld*, is a privilege granted by the king to ſuch as he thinks good.

HORNPIPE, a common inſtrument of muſic in Wales, conſiſting of a wooden pipe, with holes at ſtated diſtances, and a horn at each end; the one to collect the wind blown into it by the mouth, and the other to carry off the ſounds as modulated by the performer. See the deſcription and form of this inſtrument by the honourable Daines Barrington, in Archæol. vol. iii. p. 33.

HORNPIPE is alſo the name of an Engliſh air, probably derived from the above inſtrument. The meaſure of this air is triple time, with ſix crotchets in a bar; four of which are to be beat with the hand down, and two up.

HORNSTEIN, in *Natural Hiſtory*, is a name given in Germany to the ſiliceous ſtone, called in England chertz, or CHERT.

HORODICTIC *quadrant*. See QUADRANT.

HOROGRAPHY, compounded of *ὡρα*, *hour*, and *γραφῶ*, *I write*, the art of making or conſtructing dials; called alſo *horologiography*, *gnomonica*, *ſciatherica*, *photoſciatherica*, &c. See DIALLING.

HOROLOGIOGRAPHY, the art of making or conſtructing dials. See DIALLING.

HOROLOGIUM, Ὡρολογιον, compoſed of *ωρα*, *hora*, *time*, *hour*, and *λογος*, *ſpeech*, *diſcourſe*, a common name, among ancient writers, for any inſtrument or machine for meaſuring the hours. See CHRONOMETER.

Such are our clocks, watches, ſun-dials, &c. See CLOCK, WATCH, DIAL, and CLEPSYDRA.

Modern inventions, and gradual improvements, have given birth to ſome new terms that come properly under this head, and annexed new meanings to others totally different to what they had originally. All chronometers that announced the hour by ſtriking on a bell, were called CLOCKS: thus, we read of pocket-clocks, though nothing could ſeem more abſurd than to ſuppoſe that a clock, according to the modern idea, ſhould be carried in the pocket. In like manner, all clocks that did not ſtrike the hour were called WATCHES, or time-pieces; and the different parts of a ſtriking clock were diſtinguiſhed by the watch-part, and the clock-part; the former, meaning that part which meaſures the time, and the latter, the part which proclaims the hours. In the report of Sir Iſaac Newton to the houſe of commons, anno 1713, relative to the longitude act, he ſtates the difficulties of aſcertaining the longitude by means of a WATCH; yet it is obvious, from ſeveral circumſtances, that his remarks were directly to be underſtood of a time-piece, regulated by a pendulum; for his objections are founded on the known properties of the pendulum, ſome of which differ eſſentially from the properties of the balance and ſpring. It is alſo to be remembered, that all the attempts of Huygens for finding the longitude were by means of pendulum clocks, that did not ſtrike the hour, and conſequently, according to the language of the times, were called watches. At this time ſuch machines for meaſuring time as are fixed in their place, are called CLOCKS, if they ſtrike the hour; if they do not ſtrike the hour, they are called time-pieces; and when conſtructed with more care, for a more accurate meaſure of time, they are called regulators. Some artiſts of late have affected to call ſuch watches as were conſtructed for aſtronomical and nautical obſervations, by the name of *time-pieces*, probably to intimate that they poſſeſs the advantages of thoſe conſtructed with a pendulum.

Mr. John Harriſon firſt gave the name of TIME-KEEPER to his watch, for the performance of which he received from parliament the ſum of twenty thouſand pounds. See LONGITUDE.

For the account of the principles of this machine, ſee TIME-KEEPER. And for the chief improvements that have been made for the more accurate meaſure of time, ſee PALLETS, PENDULUM, SCAPEMENT, and THERMOMETER.

HOROLOGIUM, HOROLOGION, is alſo a name the Greeks give to their liturgy, or breviary; becauſe it contains the daily hours, or the ſeveral offices to be rehearſed each day.

The Greeks call it ωρoλoſιcν, which anſwers to what in Latin and Engliſh we call *diurnum*, or *diurnal*.

The ωϱολογιον is the breviary of the Greeks.

HOROMETRY, the art of meaſuring, or dividing the hours, and keeping an account of time.

HOROPTER, in *Optics*, is a right line, drawn through the point where the two optic axes meet, parallel to that which joins the centers of the two eyes, or the two pupils.

Such is the line AB (*Tab.* II. *Optics*, *fig.* 31.) drawn through the point of concourſe C, of the optic axes of the eyes D and E, parallel to HI, which joins the centers of the eyes H and I.

It is called *horopter*; as being found, by experience, to be the limit of diſtinct viſion.

The *horopter* has ſeveral properties in optics, which are deſcribed at large in Aguillonius, Opt. lib. ii. Diſſ. 10.

HOROPTER, *plane of the*. See PLANE *of the horopter*.

HOROSCOPE, in *Aſtrology*, the degree or point of the heavens riſing above the eaſtern point of the horizon, at any given time when a prediction is to be made of a future event: as, the fortune of a perſon then born, the ſucceſs of a deſign then laid, the weather, &c.

The word is compoſed of *ωϱα*, *hora*, *hour*, and the verb σκεπτομαι, *ſpecto*, *conſidero*, *I conſider*. The Latins call it *cardo orientalis*; ſometimes *aſcendens*. See ASCENDANT.

They were formerly ſo infatuated with *horoſcopes*, that Albertus Magnus, Cardan, and others, are ſaid to have had the temerity to draw that of Jeſus Chriſt.

HOROSCOPE is alſo uſed for a ſcheme, or figure, of the twelve houſes; i. e. the twelve ſigns of the zodiac, wherein is marked the diſpoſition of the heavens for any given time.

Thus we ſay, to draw a *horoſcope*, conſtruct a *horoſcope*, &c. We call it, more peculiarly, *calculating* a nativity, when the life and fortune of a perſon are the ſubject of the prediction; for they draw *horoſcopes* of cities, great enterprizes, &c. See HOUSE.

HOROSCOPE, *lunar*, is the point which the moon iſſues out of, when the ſun is in the aſcending point of the eaſt.

This is alſo called the *part of fortune*.

HOROSCOPE is alſo a mathematical inſtrument, in manner of a planiſphere; but now diſuſed.

It was invented by J. Paduanus, who compoſed a ſpecial treatiſe thereon.

HORREA, in *Roman Antiquity*, were public magazines of corn and ſalt meat, out of which the ſoldiers were furniſhed on their march in the military roads of the empire.

Horrea was alſo the name which they gave to their GRANARIES.

HORROR, Horrour, ſtrictly ſignifies ſuch an exceſs of fear as makes a perſon tremble. It is a compound of admiration and fear, not without an occaſional mixture of pleaſure, from which, when predominant, it is denominated a pleaſing *horror*. In *Phyſic*, it denotes ſuch a ſhuddering, or quivering, as precedes an ague fit; and is often joined with rigores, and lumbagines. See Ague, Fever, &c.

Through ignorance of this acceptation, ſome have underſtood fear to be accounted by authors among the antecedent ſymptoms of thoſe diſtempers.

Horror *of a vacuum* was an imaginary principle among the ancient philoſophers, to which they aſcribed the aſcent of water in pumps, and other ſimilar phenomena, which are now known to be occaſioned by the weight of the air.

HORS *de ſon fee*, q. d. *out of his fee*, is an exception to avoid an action brought for rent, or other ſervice, iſſuing out of certain lands, by him that pretends to be the lord. For if the defendant can prove the land to be without the compaſs of his fee, the action fails.

HORSE, *equus*, in *Zoology*. In the Linnæan ſyſtem this makes a diſtinct genus of animals, of the order of *belluæ*, the characters of which are: that the fore-teeth are ſix in each jaw, the upper erect and parallel, the lower more prominent; the canine, or dog-teeth, are ſingle, placed at a diſtance from the others, and are but little longer than they; and the hoof conſiſts of one piece. According to theſe characters, the author includes in this genus the *equus caballus* with a hairy tail, or *horſe*, the ass, the wild aſs, the mule, and the zebra, or, as he calls it, the ſtriped *horſe*.

The *horſe* makes the ſubject of a very extenſive art, called horsemanship, conſiſting of divers ſubordinate arts or branches.

From the ſame beaſt alſo ariſe the profeſſions of chivalry, knighthood, &c.

Authors are divided as to the time when men firſt began to mount *horſes*. The ſcholiaſt of Euripides, and Euſtathius on the ſecond book of the Iliad, ſpeak as if the ancients had been unacquainted with the uſe of ſaddle-*horſes*, and had only uſed them to draw chariots, &c. They add, that courſes on *horſe*-back were not introduced at the Olympic games before the fifteenth Olympiad. But this can ſcarce be; becauſe the Centaurs, to whom the invention is attributed, lived long before that time. Beſides, Homer, though he mentions only chariots in his account of the ſiege of Troy, ſpeaks of riding ſo familiarly in ſome parts of his Iliad and Odyſſey, that it muſt have been practiſed among the Greeks before he compoſed either of theſe poems. In the fifteenth book of the Iliad he repreſents the ſtrength and activity of Ajax, when he fought in defence of the Grecian ſhips that were attacked by the Trojans, and leaped from one ſhip to another, by the readineſs and addreſs with which a ſkilful horſeman would vault from the back of one *horſe* to that of another; and his ability to defend many ſhips at once by that of the accompliſhed rider, who is capable of managing and controuling ſeveral *horſes* at the ſame time. This compariſon proves not only, that riding was commonly known at the time when Homer wrote, but that it muſt have been ſtudied and cultivated with great care and attention. In the fifth book of the Odyſſey, the poet compares Ulyſſes, ſhipwrecked and ſitting aſtride a plank which was floating on the waves, to a man beſtriding a *horſe*, and keeping his ſeat in ſpite of the motions which the animal could make. Herodotus, in Thalia, ſpeaks of hunting on *horſe*-back, as an exerciſe practiſed in the time of Darius: in Melpomene, likewiſe, he ſays, the Amazons hunted on *horſe*-back, with their huſbands, the Sarmatians. Xenophon ſays, that Cyrus hunted on *horſe*-back, when he had a mind to exerciſe himſelf and his *horſes*.

It appears, likewiſe, from Pauſanias, that there were *horſe*-courſes even in the time of Hercules, the inſtitutor of the Olympic games.

It alſo appears, from the moſt ancient hiſtory extant, viz. the hiſtory of the Bible, that the *horſe* was made ſubſervient to the will of man in the earlieſt times, and therefore the uſe of this animal is probably almoſt coeval with mankind. See Gen. ch. xlvii. 17. Job xxxix. 18, 19. Gen. l. 9. Exodus, xiv. 9.

From the two laſt cited paſſages, in which chariots and horſemen are named together, it appears probable, that the uſe of chariots and the art of riding were introduced about the ſame time, the latter being a little prior to the former; and Egypt ſeems to have been the country to which mankind are indebted for the equeſtrian art, though the preciſe period of time, in which it was at firſt practiſed, cannot ſo eaſily be aſcertained. From hence it was conveyed to the Æthiopians, Arabs, Indians, Perſians, Parthians, Armenians, Scythians, &c. The colonies which came from Phœnicia and Egypt, brought this art with them, and eſtabliſhed it in Greece, and with the art tranſplanted thither the *horſe*, which was not originally a native of Greece. The Theſſalian *horſes* were the moſt famous of ancient Greece, and valued and admired not only by the inhabitants of that country, but by the moſt judicious and experienced of other nations. From Greece the art of horſemanſhip was tranſmitted to the Romans, who cultivated it with ſuch diligence and zeal, that they were ſoon able to excel their maſters.

It was the cuſtom, among the ancients, to impreſs ſome mark on their *horſes*: the moſt common were, a Σ, *ſigma*; a K, *kappa*; and a bullock's head. Hence thoſe marked with Σ's were called Σαμφοραι; thoſe with a K, Καππατιαι; and thoſe with a bull's head, Βουκεφαλοι, *Bucephali*. It is, however, more probable, that the famous *horſe* Bucephalus owes his appellation to the reſemblance which this head bore to that of a bull, and not to the impreſſion of one which was burnt into his fleſh, and was a mark in no wiſe peculiar to him, but common to all *horſes*, ſo that he could not have been particularly diſtinguiſhed by it. And Aulus Gellius, lib. v. cap. 2. expreſsly tells us, that this was the fact; and that the head exactly reſembled, in ſhape and figure, the head of a bull. This mark was ſtamped on the *horſe*'s buttocks and his harneſs, as appears from the ſcholiaſt in Ariſtophanes's Clouds, Heſychius, &c.

In modern times, Arabia is moſt diſtinguiſhed for the excellence of its *horſes*, and the addreſs of its inhabitants in riding them.

The Arabians breed their *horſes* for ſale, and there is a conſiderable revenue ariſing from thoſe that are ſent out of the country, the tax being about 10*l.* ſterling for each *horſe*. Theſe people are ſcrupulouſly exact in preſerving the pedigree of their *horſes* for ſeveral ages; ſo that they know their parentage, alliances, and genealogy, diſtinguiſhing each breed by different appellations, and dividing the whole kind into three claſſes. The firſt claſs is called *noble*, being the moſt pure and ancient, without any mixture, on the ſide of the ſires or dams. The ſecond claſs is compoſed of *horſes*, whoſe race, though ancient, has been mixed with plebeian blood, either on the male or female ſide, which, nevertheleſs, is deemed noble, but miſcalled. The laſt claſs comprehends the common *horſes*, which are ſold at a low price; but the two former ſorts are extremely dear, the loweſt-priced mares of the firſt claſs being worth five hundred French crowns, and ſome fetching even four, five, or ſix thouſand livres.

When a ſtallion covers a mare among the Arabs, both being of equal quality, witneſſes are called to be preſent on the occaſion, who ſign a certificate in the preſence of a magiſtrate, in which the names of the horſe and mare are mentioned, with their pedigrees. When the mare drops her foal, witneſſes are called again, and another certificate is drawn up and ſigned; and theſe vouchers are given with the animal, like the deeds of an eſtate when it is ſold.

The Arabian *horſes* are generally of a middling ſize, neat and clean in their ſhape and limbs, and of a thin and ſlender figure. Their keepers curry and feed them morning and evening, and only let them drink two or three times in the day. About March, when the graſs is ſtrong and plentiful, they ſoil them, and devote this ſeaſon likewiſe to procreation; obſerving the cuſtom, which we have probably derived from them, of throwing cold water upon the mare as ſoon as the ſtallion deſcends from her back. When the ſpring is paſt, the *horſes* are taken from the paſtures, and kept for the reſt of the year without graſs or hay, ſolely upon barley, with a certain portion of ſtraw. When the colts are about eighteen months old, they ſheer the hair of their tails, in order to make it grow thicker and ſtronger. They begin to ride their colts at the age of two years, or two and a half at moſt.

The beſt breeds of this country are ſaid to be ſprung from the wild *horſes* of the Deſert, of which, many ages ago, a ſtud was compoſed, which increaſed the breed, and furniſhed Europe, Aſia, and Africa, with theſe noble animals. The beſt *horſes* are, therefore, immediately or remotely deſcended from Barbs, deſcended from Arabians, whoſe climate is peculiarly favourable to the breed of *horſes*.

The Arabian breed is propagated in Barbary, among the Moors, and even among the negroes, on the banks of Gambia and Senegal, where they are fed with Indian corn, bruiſed and mixed with milk. Egypt, Turkey, and Perſia, are ſupplied with *horſes* from Arabia. The Barbary *horſes* are to be found in moſt countries of Europe.

The foreheads of theſe *horſes* are generally long, ſlender, and ill furniſhed with mane, but riſing diſtinctly and boldly out of their withers; their heads lean and ſmall, and reſembling that of a ſheep; the ears handſome and well placed; the ſhoulders light, ſloping backwards, and flat; their withers fine, and ſtanding high; loins, ſhort and ſtrait; flanks and ribs round and full, without having too large a barrel; their haunches ſtrong and elaſtic; the croupe often ſomewhat too long; the tail placed high; thighs well turned and rounded; legs clean, well made, and thin of hair; the ſinews detached from the bone, but the paſtern generally too long and bending; the foot good and ſound. Theſe *horſes* are of all colours; but the moſt common ſort is grey; they are generally cold and ſlow in their paces, and require to be rouzed and animated by the rider, when they will diſcover a great fund of vigour, wind, and ſpeed. They are very light and nimble, formed for running, and are more valued in their offspring than for their own merit, being thought, when tranſported into foreign countries, to get colts which excel their ſires in goodneſs; on which account they are valuable in ſtuds.

The Algerines are ſaid not to like to caſtrate their *horſes*, but only ſqueeze their teſticles when they are about three months old, and thus render them incapable of propagation.

It is thought that the *horſes* of the kingdom of Morocco are the beſt, and next to them a breed called the mountain Barbs, which are ſure-footed, of a gentle diſpoſition, and very attentive and docile. Their walk is free and bold, and their gallop very rapid.

In Turkey, Arabia, and Perſia, they expoſe the dung of their *horſes* in the ſun, and when it is capable of being finely powdered, they ſpread it under them inſtead of litter, which gives their coat a beautiful gloſs and luſtre. The Perſian *horſes* are reckoned next in value to thoſe of the Arabians. The Spaniſh *horſes* are much commended: ſome make them ſecond to the Arabians, and place them before the Barb. Holland furniſhes a race of *horſes*, which are principally ſerviceable in the coach: the beſt come from Frieſland. France abounds in *horſes* of all kinds, but by no means excels. The beſt of thoſe fit for the ſaddle come from Limoſin; and next to thoſe, Normandy claims precedence, for its handſome, generous, and uſeful breed. The French *horſes* are apt to have their ſhoulders too looſe and open, as thoſe of the Barbs are too confined and narrow.

The finer and better ſort of the more modern Engliſh horſes are deſcended from Arabians and Barbs, and frequently reſemble their ſires in looks and appearance, but differ from them conſiderably in ſize and mould, being more furniſhed, ſtout, and luſty. In general, they are ſtrong, nimble, of good courage, capable of enduring much fatigue, and both in perſeverance and ſpeed ſurpaſs all *horſes* in the world. However, it is objected to Engliſh *horſes*, that they want grace or expreſſion in their figure and carriage; that they are obſtinate and ſullen; that they have ſtiff ſhoulders, and want ſuppleneſs in their limbs, which render them unfit for the manege. England has at all times, even in its rudeſt ſtate, been poſſeſſed of a breed of *horſes* ſufficient to anſwer every neceſſary purpoſe. But it is probable, that thoſe now uſed in the ſervice of war, as well as for draught, are an offspring of the German or Flemiſh breed, meliorated by our ſoil, and a judicious culture; as our race *horſes* derive their origin from Arabia. The venerable Bede ſays, that the Engliſh began to uſe ſaddle *horſes* about the year 631, when prelates and others rode on *horſe-back*, who till that time were accuſtomed to walk. In the reign of Athelſtan the Engliſh became ſo jealous of their *horſes*, which were alſo held in high eſteem by foreigners, that a law was made by that monarch to prohibit the exportation of them, unleſs they were deſigned for preſents; and in the reign of this prince many foreign *horſes* were introduced into this kingdom. The variety of breeds in this iſland was farther augmented by William the Conqueror, and particularly by Roger de Beleſme, earl of Shrewſbury, in his time, who introduced the Spaniſh ſtallions into his eſtate in Powis Land, from which that part of Wales was for many years celebrated for a ſwift and generous race of *horſes*. See on this ſubject Berenger's Hiſtory and Art of Horſemanſhip, vol. i. paſſim; and Pennant's Britiſh Zoology, vol. i. p. 1, &c. The importation and breed of *horſes* were much promoted by Edward II. and Edward III. Polydore Virgil informs us, that in the reign of Henry VII. the Engliſh were wont to keep large herds of *horſes* in their paſtures and common fields; and by 11 Hen. VII. cap. 13. it was prohibited to convey *horſes* out of the realm without the king's licence, on pain of forfeiture. In the reign of the ſucceeding prince, a particular regard was paid to the raiſing of a breed of good and ſtrong *horſes*; and accordingly ſeveral laws were made, enjoining thoſe who had parks, incloſures, &c. to keep at leaſt two brood mares, of a certain ſize, &c. and prohibiting ſtoned *horſes* from being put into foreſts or commons where mares were kept, within certain counties, which were above the age of two years, but not fifteen hands high, on pain of forfeiture; and ſcabbed *horſes* from being kept in ſuch places, on pain of 10*s*. 27 Hen. VIII. cap. 6. 32 Hen. VIII. cap. 13.

By 1 Ed. VI. cap. 12, & 2 & 3 Ed. VI. cap. 33. *horſe*-ſtealers are excluded from the benefit of clergy. By theſe prudent and judicious meaſures, the Engliſh breed of *horſes* was not only improved in ſtrength and ſize, but alſo greatly increaſed in number. Till the uſe of COACHES was introduced in the reign of queen Elizabeth, ſaddle *horſes* and carts were the only methods of conveyance for all ſorts of people; and the queen rode behind her maſter of the *horſe*, when ſhe went in ſtate to St. Paul's. By the 2 & 3 Ph. & M. cap. 7. and 31 Eliz. cap. 12. it is enacted, in order to prevent *horſes* from being ſtolen or ſold in private places, that owners of fairs and markets ſhall appoint toll-takers or book-keepers, who are to enter the names of buyers and ſellers of *horſes*, &c. And to alter the property, the *horſes* muſt be rid or ſtand in the open fair one hour; and all the parties to the contract muſt be preſent with the *horſe*. Sellers of *horſes* are to procure vouchers of the ſale; and the names of the buyer, ſeller, and voucher, price of the *horſe*, the colour, and one ſpecial mark at leaſt, are to be entered in the toll-taker's book, and a note of the ſame delivered to the buyer; and if any perſon ſhall ſell a *horſe*, without being known to the book-keeper, or bringing a voucher; or if any one ſhall vouch, without knowing the ſeller, or the book-keeper ſhall make an entry, without knowing either; in each of theſe caſes the ſale is void, and a forfeiture is incurred of 5*l*. The owner may ſeize and take his *horſe* again, or have an action of detinue, &c. A ſtolen *horſe*, though ſold according to the direction of the act, may be redeemed and taken by the owner within ſix months, repaying the buyer what he ſhall ſwear he gave for the ſame. Any perſon killing a *horſe* in the night-time is guilty of felony, and liable to tranſportation for ſeven years; and maiming a *horſe* incurs the penalty of treble damages. 22 & 23 Car. II. cap 7.

Horſes in hackney-coaches are to be fourteen hands high. 9 Anne, cap. 23. If hired *horſes* are abuſed by immoderate riding, &c. there lies an action of treſpaſs on the caſe.

Britiſh *horſes*, mares, and geldings, pay on exportation a duty of 5*s*. each.

The parts of a *horſe*'s body furniſh a great variety of terms, by no means to be overlooked. The ſkin and coat are called the *hair*; the long hair on the neck, the *mane*; the fore-top, the *toping* or *tuke*; the hair behind, on the feet, the *ſet-lock* or *fetter-lock*; that growing over the top of the hoof, the *coronet*, or *cronet*; that on the eye-lids, the *brills*. The ridge whereon the mane grows, is called the *creſt* or *criſt*; the fore part, from the neck to the fore-legs, the *briſket* or *cheſt*; the mark frequently running down his face, the *rache*; and that in the forehead, the *ſtar*. The top of the ſhoulder-blades, at the ſetting of the neck, is called the *withers*; the place where the ſaddle is ſet, the *dock*; and a bruiſe or hurt thereon, a *navel-gall*; the middle of the back, from the mane to the hips, the *reins*; the extremity of the reins above the *hips*, the *croupe*; the tail, the *dock* or *runt*; the hollow or ſinking of the back-bone, the *ſway*; the hind part of the belly, next the genital, the *flank*; that nearer the thighs, the *groin*; the looſe ſkin wherein the yard is, the *ſheath*; and the fore parts of the ſhoulders, next the breaſts, the *fillets*. The uppermoſt part of the hind-leg, next the buttock, is called the *ſtiffle* or *ſtiffle joint*; the after-joint, or bending of the hind-leg, the *chambrel* or *elbow*; the inner, the *ham* or *hough*; the joint at the fetlock, the *paſtern ancle* or *fetlock joint*; the foot, above the hoof of the ancle-joint, the *coronet*. The part from the withers to the top joint of the thigh, is called the *ſhoulder*; the middle joint of the fore leg, the *knee*; the right-leg before, the *farther leg*; and the left, the *nearer*. The hoof is called the *horn*; the hollow of the hoof, the *coffin*; the tender part of the hoof, next the heel, the *fruſh*; the ball of the foot, the *frog*; the part to be pared or cut off the hoof, when overgrown, the *rift*; the fore part of the hoof, the *toes*; the hind part, where there is a riſing in the middle of the ſole, the *heel*; and the inſides meeting on the heel, the *quarters*. Of moſt of theſe a farther account will be found under the reſpective articles.

The maſters of this art lay it down, that a *horſe*, to be good and well-made, muſt have three parts like thoſe of a woman; viz. the breaſt, which is to be broad, the hips round, and the mane long; three of a lion, viz.

countenance, intrepidity, and fire; three of a bullock, viz. the eye, noſtril, and joint; three of a ſheep, viz. the noſe, gentleneſs, and patience; three of a mule, ſtrength, conſtancy, and foot; three of a deer, head, leg, and hair, ſhort; three of a wolf, throat, neck, and hearing; three of a fox, ear, tail, and trot; three of a ſerpent, memory, ſight, and turning; three of a hare or cat, running, walking, and ſuppleneſs.

Horſes are diſtinguiſhed into divers kinds, and are differently denominated, with regard to their ſtrain or country. As the Neapolitan, known by his hawk noſe; the Spaniſh *genet*, by his ſmall limbs; the Barb, by his fine head and deep hoof; the Dutch, by the roughneſs of his legs; the Engliſh by a ſtrong knitting together, &c. the Flandrin, &c.

Horſes are alſo diſtinguiſhed, with regard to the uſes or offices they are reſerved for; as the *coach-horſe*, *war-horſe*, *hunting-horſe*, *running-horſe*, *pack-horſe*, &c.

Horſes are alſo diſtinguiſhed with regard to their colours; as a *bay*, which admits of divers ſhades or caſts; viz. a black-bay, brown-bay, dapple-bay; all which have conſtantly black manes and tails. *Dun* and *mouſe-dun*, having frequently a black liſt along the back, which denominates them *flea-backed*. *Flea-bitten*, which is white ſpotted with red. *Grey*, dapple-grey, ſilver-grey, ſad or powdered grey, black-grey, branded-grey, ſandy-grey, and iron-grey. *Griſſel* or *rount*, a light fleſh-colour intermixed with white. *Peach-colour* or *bloſſom-colour*. *Pyebald*, which conſiſts of two colours, one of them white. *Roan*, a bay, black, or ſorrel, intermixed with white hairs. *Rubican*, black or ſorrel, with a few white hairs ſcattered about his body. *Sorrel*, common ſorrel, red or cow-coloured ſorrel; bright, or light-coloured ſorrel; burnt ſorrel; all chiefly diſtinguiſhed by the colour of their mane. *Starling-colour*, reſembling a browniſh or blackiſh grey, only more freckled, or intermixed with white. *Tyger colour*, much the ſame with the branded grey, only the ſpots ſmaller. *Wolf-colour*, *deer-colour*, *black*, *white*, &c.

Theſe colours are generally conſidered as ſymbolical of the nature, qualities, &c. of the beaſts; and accordingly their value is much influenced hereby. The dapple-grey is prized for beauty; the brown-bay for ſervice; the black, with ſilver hair, for courage; the roan for countenance; the ſorrel, black without white, and iron-grey, are reputed hot and fiery; the bright-grey, flea-bitten, and black with white ſpots, are ſanguine; the white, dun, and pye-bald, phlegmatic and heavy; the mouſe-dun, red-bay, and blue-grey, are dull; the peach-colour rarely prove obedient to the ſpur; the ſorrel ſeldom fail of being good, eſpecially if their legs, tails, and manes, be black; and the ſame may be ſaid of the flea-bitten, at leaſt thoſe ſo marked in the fore parts, or over the whole body; for, when only behind, it is an ill ſign.

Indeed, it is hard to lay down any univerſal rules in this caſe. The white, which promiſe the leaſt, often prove good, when black about the eyes and noſtrils; and there are excellent iron-greys, though that is not reputed a good colour.

The common marks of a dull, ſtupid *horſe*, are white ſpots round the eye, and on the tip of the noſe, upon any general colour whatever. Though the vulgar take theſe ſpots for ſigns of ſtupidity, yet it is certain they are marks of the goodneſs of a *horſe*; and ſuch *horſes* as have them, are very ſenſible and quick upon the ſpur. The French call theſe ſpots *marques de ladre*.

Our dealers in *horſes* uſe the term mettled *horſe* to expreſs a creature of that ſpecies which has a great deal of vigour and heart, as they call it. Otherwiſe there is a great difference between a *mettled horſe*, a *horſe* of vigour, and a fiery *horſe*; but as this is not ſufficiently attended to by gentlemen in their purchaſes of this animal, ſome general rules for the diſtinguiſhing real vigour in a *horſe*, may be acceptable in a work of this general kind.

When a *horſe* is ſtanding ſtill, the rider who has a mind to try whether he has vigour in him, ſhould keep him faſt with the bridle-hand, and apply the ſpurs to the hair of his ſides; this is called by horſemen pinching. If the *horſe* is impatient under this, gathering himſelf up, and endeavouring to go forwards, and champs upon the bit, without thruſting out his noſe, it is a ſign of vigour and right mettle in him. Some caution is to be uſed, however, in judging by this, to diſtinguiſh between a *horſe* that has vigour really in him, and one that has only a fine ſkin, and is rather ticklish than mettled. This is the caſe with a great many *horſes*, and is found by their being very ſenſible of the touch of the ſpur, and ſhewing the appearance of a great deal of mettle and vigour when touched, but immediately loſing the apprehenſion of it. Theſe are of a dull diſpoſition, but only have a tender ſkin.

The *mettled horſe* is to be highly valued, but the fiery one is good for nothing; a *horſe* that is truly vigorous ſhould be calm and cool; he ſhould in general move on patiently, and only ſhew his mettle when it is required of him. The ſureſt method is to chooſe ſuch *horſes* as are extremely apprehenſive of ſtrokes, and are afraid at the leaſt appearance of their coming. Theſe, at the only cloſing of the legs and thighs, ſeem to be ſeized with fear, and alarmed, but without fretting or fierceneſs. A *horſe* that walks deliberately and ſecurely, and that, without requiring the whip too often, will go on briſkly and without fretting, will go from the walk to the gallop, and as eaſily from the gallop to the walk again, and continually champs upon the bit, and trots with glibneſs, upon the ſhoulders eaſily, and ſnorting a little through his noſtrils: this is generally a creature of true mettle and vigour, though it does not riſe to ſuch a fierceneſs as is troubleſome or dangerous. If to theſe good qualities a *horſe* be well upon his haunches, and have a light and eaſy ſtop, his head well placed and firm, and the feeling of his bit equal and juſt, the gentleman who loves riding will ſeldom need to complain of the price. All the good qualities of a *horſe* ſhould, however, never recommend him, unleſs he has a good mouth, and a ſenſible obedience to the ſpur.

Horses, *for the age*, *height*, *teeth*, &c. *of*, ſee Age, Height, &c.

Horse, *airing of a*. See Airing.

Horses, *backing of*. The firſt backing of a *horſe* is a thing of great conſequence, as his value afterwards very much depends on it. After a colt has been exerciſed ſome time, morning and evening, and becomes ſomewhat obedient, he is to be taken to ſome ploughed lands, the lighter the better; he muſt be made to trot over theſe in the hand, by that means to tire him and abate his wantonneſs. When this is done, care muſt be taken that all the tackling be good and firm, and every thing in its due and proper place; then a perſon is to hold his head, and another to mount him; but this muſt not be done ſuddenly, or at a jerk, but very gradually and ſlowly, by ſeveral half riſings and heavings. If he bears this patiently, the perſon is to ſeat himſelf firmly on his back; but if he be troubleſome, and not tamed enough, the perſon is to forbear the attempt to mount, and he is to be trotted hard in the hand over the ſame ploughed lands again, till he is willing to receive the rider quietly on his back. When this is done, the perſon who is on his back muſt cheriſh him, and the man who has his head muſt lead him a few paces forward; then he is to be cheriſhed again. The feet are to be fitted well in the ſtirrups, and the toes turned out; afterwards the rider is to ſhrink and move himſelf in the ſaddle, and the perſon who holds his head, is to withdraw his hand a little farther from the mouth. As the rider moves his toes forward, the holder muſt move him forward with the rein, till he is made to apprehend the rider's motion of body and foot, which muſt always go together, and with ſpirit, and will go forward without the other's aſſiſtance, and ſtay upon the reſtraint of the rider's hands.

When this is accompliſhed, let him be cheriſhed, and have graſs and bread to eat; and then let the rider mount and alight ſeveral times, cheriſhing him between each time: and thus he is to be managed till he will go on, or ſtand ſtill at pleaſure. This being done, the long rein may be laid aſide, and the band about the neck, which are always uſed on this occaſion, and nothing will be neceſſary but the trenches and caveſon, with the martingal. A groom muſt lead the way before; or another *horſe* going only ſtraight forwards, and making him ſtand ſtill when deſired. In this manner, by ſometimes following, and ſometimes going before another *horſe* on the trot, the creature will by degrees be brought to know that it is his buſineſs to be quiet and governable. See Foal.

Horses, *breeding of*. In order to have a good and beautiful race of *horſes*, it is neceſſary to chooſe for a ſtallion a fine barb, free from hereditary infirmities; ſuch as weak eyes, bad feet, ſpavins, purſineſs, or the like. Diſorders that ariſe from accidents are of no conſequence; nor is the *horſe* to be at all the leſs valued for them as a ſtallion. Three months before this *horſe* is to cover a mare, he ſhould be fed with ſound oats, peaſe, or beans, or with coarſe bread, and a little hay, but a good quantity of wheat ſtraw; he ſhould be led out twice a day to water all this time, and after every watering walked about an hour, but not over-heated. If he be not prepared and put in heart in this manner, the colts will be weakly, and the *horſe* himſelf will be ſpoiled, growing purſy and broken-winded.

If he is put to too many mares, he will not laſt long; his main and tail will begin to fall off through weakneſs, and it will be difficult to get up his fleſh again by the next year. The number of mares ſhould be proportioned to his ſtrength, and twelve, fifteen, or at the moſt twenty, are as many as a *horſe* will well ſerve for in a ſeaſon. Mares go with foal eleven months, and as many days over as they are years old. This being certainly known, it is eaſy to contrive ſo that all the foals may be brought forth at a time when there is plenty of graſs. About the end of May the mares are to be put into an incloſure capable of feeding them as long as the ſtallion is to be with them, or that they are in ſeaſon. In this incloſure all the mares are to be put together, as well thoſe which are barren as others. The ſtallion's hind-ſhoes are to be taken off, but the fore-ſhoes ſhould be left on to preſerve his feet; then lead him forth, and let him cover a mare twice in hand, to render him more tame and gentle. After this take off the bridle, and turn him looſe among the reſt, where he will become familiar with them, and not one of them will be horſed but when they are in ſeaſon. There ſhould be a little lodge built up in ſome part of the incloſure, and peaſe, beans, oats, bread, and other good food, put into the manger in it, that the *horſe* may retire into it in the ſcorching heats, and eat what he likes beſt. He muſt be thus entertained during the whole time he is with the mares, which is to be about ſix or ſeven weeks.

Mares that are very fat and groſs do not hold well; but thoſe which are moderately fat conceive with the greateſt ſucceſs and eaſe. To bring a mare in ſeaſon, it is a common thing to give her a quart of hemp-ſeed, or twice that quantity, night and morning, for eight days before ſhe is brought to the *horſe*. If ſhe refuſe it alone, it may be mixed with beans or oats, and will go down; and if the ſtallion eat of it alſo, it will make him the better.

The ſtallion ſhould not cover before he is ſix years old, nor after he is fifteen. A mare ſhould never be covered before ſhe is three years old; they ſhould be always ſound and healthful, and of a good breed; ſuch as theſe will bring forth better and finer foals than any others. The colts produced from theſe, are not to be uſed for ſtallions; for they will degenerate, and the race will ſoon become exactly our own country breed. If a barb is not to be had, a Spaniſh *horſe* is to be choſen. See MARE.

HORSES, *diſeaſes of*. See BOTTS, CONSUMPTION, COUGH, FEVER, GRIPES, HORSE-*worm*, &c.

The *horſe* is likewiſe in ſome caſes ſubject to the ſtone.

HORSES, *eyes of*. See EYES *of horſes*.

HORSES, *fattening of*. The being able to do this ſpeedily is one of the greateſt arts our dealers have, and indeed one of the greateſt niceties in the whole management of theſe animals. Many methods have been preſcribed; but the following ſeems moſt to be depended on: take elecampane, cummin-ſeed, tamariſk, and aniſeed, of each two ounces; common groundſel, one handful: boil all theſe very well, with two handfuls of garlic, ſcraped and cleaned, in a gallon of good ale; ſtrain the liquor well off, and give the *horſe* a quart of it every morning made hot; keep him warm after it. After he has taken this for four or five mornings, he may be turned out to graſs, or kept in the houſe, as the ſeaſon will permit. But whenever provender is given him, a quantity of powder is to be prepared of equal parts of cummin-ſeeds and elecampane, and give him half an ounce of it every time, ſprinkling it in by degrees as he eats, that he may not nauſeate the whole.

If this method does not ſucceed in a ſhort time, then take two ſpoonfuls of diapente; brew it in a pint of ſweet wine, and give it the horſe for three mornings. This will take off any inward ſickneſs, and make the other things take effect. After this feed him with good provender three times a day; that is, after his watering in the morning, after his watering in the evening, and at nine o'clock at night. If he does not eat the provender well and freely, it muſt be changed for ſome other kind.

If all this does not ſucceed, let the horſe be blooded; and then take half a buſhel of coarſe barley meal, put it into a pail-full of water, and ſtir the whole together very well; then let it ſettle by ſtanding. Pour off the clear liquor into another veſſel, and let him drink it for his common drink, and eat the remainder, which falls to the bottom of the pail. If he refuſe to eat this alone, there may be ſome bran mixed among it. This ſhould be given him three times a day, morning, noon, and night. If he does not rightly take to the meal with the bran, ſome oats muſt be mixed with it, and this will readily bring him to feed on it. But which ever way is uſed, they muſt be by degrees diminiſhed in quantity, till at length he is brought to eat the meal alone; for that is the thing that muſt fatten him up. Care muſt be taken that the barley is ground freſh every day as it is uſed, for it quickly grows ſour; and when this has once been the caſe with one parcel, no art will ever bring the *horſe* to touch any of it afterwards. Scarce any *horſe* but will be well fattened by keeping him to this diet for about twenty days. Barley ground in this manner cools and purges the creature; but the greateſt efficacy, as to the fattening him, lies in the water, which by this management takes up all the rich part of the barley into itſelf. When the *horſe* grows luſty on this diet, it muſt be taken from him by degrees, giving him at firſt oats once, and barley-meal twice a day; and then oats twice, and the barley-meal once, till he is perfectly weaned from it. In the mean time he muſt have good hay, and he muſt not be rid; only it will be proper to walk him gently about an hour or two in the heat of the day. If it be found that the *horſe* wants a good ſmart purging during the time of his continuing in the barley-diet, the beſt time to give it him is after the firſt eight days, and the following is a very proper ſort of phyſic: take of the fineſt aloes one ounce, agaric in powder, half an ounce; and powder of Florentine orrice, one ounce: let all theſe be mixed together, and put into a quart of milk, warm from the cow. This will work very briſkly; and after it is over, the uſual diet is to be continued. If horſes of value were to be kept to this diet once a year, it would make them leſs hot and dry, and not ſubject to many diſeaſes which they are troubled with at preſent, and would be particularly uſeful after campaigns and long journeys. If the horſe loſes his appetite by this diet, it will be proper to tie a chewing-ball to his bit, renewing it ſo often, till at length he begins to feed heartily on the barley; for theſe balls at once reſtore appetite, and are themſelves of a fattening nature. See CHEWING-*balls*.

HORSE *on a journey, management of a*. The common method of travelling in England being on horſeback, it may be proper to give ſome general rules for keeping the creature ſound, and doing the buſineſs agreeably, without many of the accidents which uſually attend it.

Care muſt be taken that the ſhoes be not too ſtreight, and do not pinch the horſe's feet any way; but be well ſhaped, and ſet eaſy. It is proper to have them put on freſh a few days before the journey, that they may laſt well, and that they may be ſettled to the feet before the ſetting out. The bridle is next to be examined; that the bit of it be proper, and not too heavy; for if it be, it will incline him to carry low when he grows tired, and reſt upon the rider's hand: this is what they call the uſing a fifth leg. It is a very diſagreeable thing, but may often be avoided, only by taking a proper care of the bit. The mouth of the bit ſhould reſt upon his bars, about a finger's breadth from his tuſhes, ſo as not to make his lips uneaſy. The curb ſhould reſt in the hollow of his head, a little above the chin; and if it gall him, the place muſt be defended with a piece of buff or other ſort of leather.

The next thing to be regarded, is the ſaddle; and proper care muſt be taken as to this, that it do not reſt either upon the withers, reins, or back-bone; and that one part of it do not preſs upon the back, any more than another. Some riders gall a *horſe's* ſides below the ſaddle with their ſtirrup-leathers. This is moſt likely to happen to a lean *horſe*; and to prevent it, a leather ſtrap ſhould be fixed between the points of the fore and hinder bows of the ſaddle, and the ſtirrup-leathers ſhould be made to paſs over theſe leathers.

It is always beſt to begin a long journey by ſhort ſtages; and this is the more neceſſary, if the *horſe* has not been exerciſed for ſome time before. If it be a *horſe* that is rid, he ſhould be ſuffered to ſtale as often as he likes, and even invited to it; but, if a mare, ſhe is to be leſs indulged in it as leſs neceſſary, and often diminiſhing her ſtrength. It is always adviſable to ride very ſoftly for a quarter of an hour, or half an hour before coming in to the inn at night, that he may not be over hot when put into the ſtable; but if the haſte of the journey will not admit of this, the *horſe* ſhould be walked in ſome perſon's hands, to cool him gently before he is put up.

If the weather is cold, a cloth ſhould be laid over him while he is walked; and when taken in, his whole body ſhould be rubbed and dried with ſtraw. Some have a cuſtom of ordering their *horſes* legs to be rubbed well down, on their firſt coming in; but this is very prejudicial while the *horſe* is hot, and ſhould always be let alone till he is perfectly cooled.

As ſoon as the *horſe* is cooled, and ceaſes to heat in the flanks, the bridle is to be taken off, the bit waſhed, and hay given him, that he may eat at pleaſure. The duſt in very dry weather will ſometimes clog up the tongue of the *horſe* in ſuch a manner, that he cannot eat without great difficulty; in this caſe ſome bran and water ſhould be firſt given him to waſh his mouth, or the ſervant ſhould do it with a wetted ſpunge.

Theſe are the proper methods, when the *horſe* has been rode moderately; but when he has been hurried at a great rate, the ſaddle is to be taken off as ſoon as he is put up, and the ſweat rubbed off with a ſweat-knife; and then the whole body and legs are to be rubbed carefully down, and the head is to be wiped with a cloth, as alſo the back under the ſaddle, and the thighs; then the ſaddle ſhould be clapped on again, and the *horſe* gently led up and down, till cool and dry. The feet are alſo to be examined, to ſee if a ſhoe be wanting, or if any of them preſs upon the ſole; and the dirt, gravel, or other foulneſs, is to be picked out from between the ſhoe and the foot. The openings of the feet may be ſtopped with cow-dung, and the hoofs, if brittle, ſhould be anointed with ſome fatty ſubſtance juſt at the ſetting on; and in dry weather they ſhould be greaſed, not only at night, but noon. Many horſes, as ſoon as unbridled, will lay themſelves down, inſtead of eating.

Many are apt on this to ſuppoſe the *horſe* ſick; but it is generally owing only to the heat and pain they find in their feet, which renders them unable to ſtand upon them. In this caſe, if their eyes are examined, they will be found briſk and good; and the hay being offered them as they lie, they will eat it greedily. This ſhews there is no inward diſorder, and the heat and tenderneſs of the feet, if examined, will ſhew that they are the part in pain. The principal thing to be done in this caſe, is taking care that the ſhoes do not reſt upon the ſoles. This is not eaſily known, but by taking off the ſhoes, which in caſes of extremity ſhould always be done; it will then be found where the ſole is touched by the ſhoe, being in that part more ſmooth and ſhining than elſewhere. In this caſe the feet are to be pared in thoſe parts, and then the ſhoes are to be fixed on again, anointing the hoofs, and ſtopping the ſoles with hot black pitch or tar.

Theſe are the means by which travelling will be rendered eaſy and commodious both to the rider and the *horſe*; but there is ſome care alſo to be taken of the creature, after he comes off from a long journey. The firſt thing to be done is, to draw the two heel-nails of the fore-feet, and if the ſhoe be large, then four ſhould be drawn; two or three days after the *horſe* ſhould be blooded, and for ten or twelve days after this he ſhould be fed with wet bran, without any oats; but he is to be kept well littered. The reaſon of drawing the heel-nails is, that the feet are apt to ſwell after journies; and if this is not done, the ſhoes preſs upon them in that part, and become very uneaſy to them. It is adviſeable to ſtop them alſo with cow-dung for ſome time; but they are in the wrong who pare them down after taking off the ſhoes, for the humours being all in motion after this, they are apt to fall into the feet.

If there appear any danger of the creature's legs ſwelling after the journey, it may be eaſily prevented by this means: take a quantity of the dung of an ox or cow freſh made; mix it with ſo much vinegar as will reduce it to a ſoft paſte, and add to it a handful of ſalt; with this rub all the hips thoroughly up to the knees, and let it dry on; give the water in a pail that evening, that the legs may not be wetted, and the next morning the *horſe* is to be led to water, and the whole remaining matter waſhed off. The jockies have a very cunning trick to recover the hoofs of a *horſe* injured by a long journey: they make a hole in the foot, and fill it with moiſtened cow-dung; they keep this in it a month, and the continual moiſture occaſioned by it makes the hoof grow very quick, and ſoon recover the proper dimenſions; but it ſoon after dries and ſhrinks ſo, that the foot is ſtreightened, and the whole hoof becomes brittle.

Cow-dung applied to a *horſe's* foot always moiſtens the ſole; but it dries up the hoof, if continued any length of time to it. The beſt method of recovering a *horſe's* hoofs is to make a hole in the ſtable floor, filled with blue clay a little wetted; in this the *horſe* ſhould keep his fore-feet a month; this will have more effect than a ſmall portion of cow-dung in the foot; and the effect will be of ſo different a nature, that the hoof will be rendered more tough than before, inſtead of being made brittle by it.

Moſt *horſes* that are fatigued, or overworked by long journies, have their flanks altered by it, without being purſy; eſpecially *horſes* naturally vigorous, which have been worked too violently. The beſt remedy in this caſe, is to give the *horſe* half a pound of honey in the morning, mixed among a feed of ſcalded bran: if he eats the half pound readily, give him a pound the next morning; continue this till the honey ceaſes to purge the creature; after this, powder of liquorice may be added to the ſcalded bran, and this continued ſome time, and two or three glyſters at convenient diſtances of time will be found very ſerviceable. If the *horſe* be very lean, it will be proper to give him ſome wet bran over and above his proportion of oats; and graſs is alſo very proper, if the creature be not inclined to be purſy. This caution, however, is to be had at all times, that exceſſive feeding may be bad, by ſubjecting the *horſe* to the farcy. When the *horſe* begins to drink heartily, it is a ſign that he will ſoon recover. Though this ſometimes fails, it is a good general rule.

When a *horſe* comes tired into a ſtable, freſh litter has the virtue always to occaſion him immediately to ſtale. This is known to be a very great advantage to a *horſe* in a tired ſtate; and when the litter is old and dirty, it never has any ſuch effect upon him. If the owners knew how refreſhing it is to a *horſe* to diſcharge his urine on his return from labour, they would be more careful in giving him all means and occaſions of it than they are. This ſtaling after fatigue prevents thoſe obſtructions in the neck of the bladder or urinary paſſages, which *horſes* are too ſubject to; the bladder being often inflamed by the long retention of the heated urine in it, and the creature periſhing by it. Some of our farmers act wrong in this caſe of the litter, not through careleſſneſs or accident, but by principle; they order the old litter to be left a long time in the ſtables, that it may be impregnated with more and more of the urine, &c. of the animal, and be made richer for the fields. It is not to be doubted but the manure is greatly improved by this; but the damage done to the *horſe* by it is greatly over proportioned to the benefit. The heat which the dung acquires, by thus lying together, ſpoils the feet of the creature, and makes it unfit for any ſervice, and occaſions many diſtempers, which are ignorantly continued and increaſed by the continual addition of heat in the fermenting dung, till at length the *horſe* periſhes.

Thoſe who have any concern with *horſes* know, that it is ſometimes very difficult to make them lie down in the ſtable. The following ſimple method is propoſed for this purpoſe by a noted dealer. When you have a mind to make him lie down, take a piece of ſtrong packthread, or laycord, and tie it as tight round the *horſe's* tail as poſſible, without breaking the ſkin, and as near as you can to the rump-bone: this will give him a pain in the back, and he will be glad to change his poſture, to get eaſe; and when he finds he cannot in any other way procure it, he will lie down, which he will find the moſt eaſy poſture, and he will of courſe take a liking to it.

HORSES, *watering of.* Whilſt a perſon is on a journey, the *horſe* ſhould always be ſuffered to drink of the firſt good water he comes to after ſeven o'clock in the morning in ſummer, and after nine or ten in the winter. Moderately pure water is to be preferred, that being beſt of all which is neither too clear nor penetrating, nor muddy and ſtinking.

Though it is the cuſtom in England to run and gallop *horſes* after drinking, which we call *watering-courſes*, and which we ſuppoſe brings them into wind, yet Sollyſel, and many other of the beſt judges of *horſes*, tell us, that it is one of the worſt and moſt pernicious practices that we can be guilty of; no good can accrue from it, and many *horſes* are rendered purſy by it.

While a *horſe* is drinking, the rider ſhould draw up his head five or ſix times, making him move a little between every draught. The rider need not be afraid of giving him water, with proper moderation, even in almoſt any circumſtances. If he be warm and ſweat very much, yet if he is not quite out of breath, and there are four or five miles to ride, he will be better after drinking a little, than if he had drank none at all; only obſerving, that if the *horſe* were very warm at his going into the water, his pace muſt not be leſs than a moderate trot when he comes out, that he may not be chilled.

In the time of a journey the *horſe* ought to be ſuffered to drink in this manner of the waters that come in the way, as often as may be; for if the rider happens to bait when he is hot and ſweaty, he muſt not be ſuffered to drink for a long time, as it would endanger his life; and if he has not been watered in this manner on the road, his exceſſive thirſt will often prevent his eating, and he will not be able to touch any ſort of food for an hour or two, which is uſually more time than the rider can ſtay; and yet without eating at baiting times, he will not have ſtrength to go on. The giving him water on the road will, on the contrary, keep him ready for food whenever it is offered him, and the rider need ſtay no longer than his own refreſhment requires, the *horſe* eating immediately, and being readily qualified to go on again.

If there be any ſhallow water in the way, a little before the coming to the inn where the *horſe* is to reſt all night, it is always proper to ride him in, and not only give him a little drink, but ride him about ſeveral times, not quite up to the belly; this will clean his legs, and prevent humours from falling down into them. If the *horſe* be very warm, and there has been no convenience of watering him upon the road, the oats that are given him ſhould be firſt ſteeped a while in ale; this will induce him to eat, though he could not have touched any that were wholly dry.

Many are of opinion, that *horſes* are ſometimes ſpoiled by giving them oats before their water; but Mr. Sollyſel affirms, that though it be not the cuſtom to give oats till afterwards, yet it never does any harm to feed the *horſe* with them both before and after drinking; and that it is often proper and neceſſary, eſpecially when the *horſe* has been hard rid, and is warm.

Horse, *Draught*, in *Farming*, a ſort of coarſe-made horſe deſtined for the ſervice of the cart or plough. In the choice of theſe horſes for what is called the ſlow *draught*, they are to be choſen of an ordinary height, for otherwiſe when put into the cart one draws unequally with the other. The *draught-horſe* ſhould be large bodied and ſtrong loined, and of ſuch a diſpoſition, as rather to be too dull than too briſk, and rather to crave the whip than to draw more than is needful. Mares are the fitteſt for this uſe for the farmer, as they will be kept cheap, and not only do the work, but be kept breeding, and give a yearly increaſe of a foal. They ſhould have a good head, neck, breaſt, and ſhoulders; for the reſt of the ſhape, it is not of much conſequence. Only, for breeding, the mare ſhould have a large belly; for the more room a foal has in the dam, the better proportioned it will be. *Draught-horſes* ſhould be always kept to that employ. Some put them to the ſaddle on occaſion, but it does them great harm, alters their pace, and ſpoils them for labour. The *draught-horſe* ought to have a large broad head, becauſe horſes of this ſhaped head are leſs ſubject than others to diſeaſes of the eyes. The ears ſhould be ſmall, ſtraight and upright; the noſtrils large and open, that he may breathe with the more freedom. A horſe with a full and bold eye always promiſes well. On the other hand, a ſunk eye and an elevated brow are bad ſigns. The horſe is eſteemed fitteſt for this purpoſe alſo, that has a large and round buttock, which neither ſinks down nor cuts. He muſt have a firm and ſtrong tail, and the dock muſt be thick and well furniſhed with hair, and placed neither very high nor very low. The legs ſhould be rather flat and broad than round: the roundneſs of the leg being a fault in a horſe deſtined to labour, that will ſoon ruin him. As to the hinder legs, the thighs ſhould be fleſhy and long, and the whole muſcle which ſhews itſelf on the outſide of the thigh ſhould be large and very thick. No country can bring a parallel to the ſize and ſtrength of our *horſes* deſtined for the draught. In London there are inſtances of ſingle *horſes* that are able to draw on a plain, for a ſmall ſpace, the weight of three tuns, and which can with eaſe, and for continuance, draw half that weight. The pack *horſes* of Yorkſhire uſually carry a burden of four hundred and twenty pounds, over the higheſt hills of the North, as well as the moſt level roads: but the moſt remarkable proof of the ſtrength of our Britiſh *horſes* is derived from that of our mill *horſes*; ſome of which will at one load, carry thirteen meaſures, which at a moderate computation of ſeventy pounds each, will amount to nine hundred and ten pounds. Nothing is ſo eſſential to the health of theſe ſerviceable creatures as cleanlineſs; if they are fed ever ſo well, and not kept clean, they will be ſubject to numerous diſeaſes.

The ſervant who has the care of them ought to be up very early, and to clean the racks and mangers from all filth. The currying of them ought to be carefully performed every morning, but not in the ſtable, for the duſt to fall upon the other horſes, as it is too often done. After the horſes are duſted, they ſhould daily twiſt a whiſp of ſtraw hard up, and wetting it in water, rub the legs, ſhoulders and body with it. Many of the diſeaſes of *draught-horſes*, which are not owing to naſtineſs, are owing to bad water; ſuch as are too raw, too muddy, or too cold, being all improper. If there be any running ſtream in the neighbourhood, they ſhould always be led to that to water, every day in ſummer, but in winter, well-water is warmiſh, and is better for them. If there be a neceſſity of giving them well-water in ſummer, it muſt be drawn up ſome hours before the time, and expoſed to the ſun-beams in tubs or troughs; marſh-water or that of lowland ditches is worſt of all. When the labouring horſe has drank his water, he ſhould have his oats given him, and theſe ſhould be carefully ſifted, and the manger duſted firſt. It is a common practice as ſoon as a horſe is come in from his work, to rub down his legs with a hard whiſp of hay, but the beſt judges of horſes abſolutely condemn this, and obſerve, that this rubbing of the legs after hard labour, brings down humours into them, and makes them ſtiff.

The rubbing itſelf is wholeſome, but the doing it when the creature is hot is the miſchief; while a horſe is in a ſweat it is a great relief and refreſhment to him to have his body rubbed down, but when he is cold is the proper time to rub his legs. The racks are to be well ſupplied with hay, and the horſes ſhould be left to reſt and eat, about two hours, and then led to water; after this their oats ſhould be given them, and they ſhould then go to work again.

In the evening when the labour of the day is over, the firſt thing to be done, is to examine the feet, and ſee if any thing is amiſs about the ſhoes, and what earth or gravel is lodged in the foot, between the ſhoe and the ſole, is to be picked out and ſome freſh cow-dung put in its place, which will cool and refreſh the part.

A very material thing for the preſervation of all ſorts of cattle, but of none ſo much as *draught-horſes*, is freſh and clean litter.

Horse, *Hunting*. See Hunter.

Horse, *Race*. See Racing.

Horse, *Stone*. See Stallion.

Horse, *War*. The proper rules for chooſing a horſe for ſervice in war, are theſe: he ſhould be tall in ſtature, with a comely head, and out-ſwelling forehead. His eye ſhould be bright and ſparkling, and the white part of it covered by the eye brow. The ears ſhould be ſmall, thin, ſhort, and pricking; or, if long, they ſhould be moveable with eaſe, and well carried. The neck ſhould be deep, and the breaſt large and ſwelling. The ribs bending, the chine broad and ſtraight, and the buttocks round and full. The tail ſhould be high and broad, neither too thick, nor too thin; the thigh ſwelling; the leg broad and flat, and the paſtern ſhort. When ſuch a horſe is choſen, he muſt be kept high during the time of his teaching, that he may be full of vigour. His food muſt be ſweet hay, and good clean oats, or two parts of oats, and one part of beans or peas, well dried and hardened. The quantity ſhould be half a peck in the morning, and the ſame quantity at noon, and in the evening. Upon his reſting days he is to be dreſſed between five and ſix in the morning, and watered at ſeven or eight. In the evening he is to be dreſſed at four, and watered about five, and he muſt always have provender given him after watering; he muſt be littered about eight, and then muſt have food given him for all night.

The night before he is ridden, all his hay is to be taken away about nine o'clock, and he muſt have a handful or two of oats about four in the morning: when he has eaten theſe, he is to be turned upon the ſnaffle, and rubbed very well with dry cloths; then ſaddled, and made fit for his exerciſe. When he has performed this, he is to be brought ſweating into the ſtable, and rubbed down with dry whiſps. When this has been done, the ſaddle is to be taken off, and he is to be rubbed down with dry cloths; the houſing cloth is then to be laid on, and the ſaddle being again laid on, he is to be walked gently about till thoroughly cool. After this, he muſt ſtand without meat two or three hours, then he muſt be fed; and in the afternoon he is to be rubbed and dreſſed as before, and watered in the uſual manner.

Horse, *River*, in *Zoology*. See Hippopotamus.

Horse, *Sea*. See Hippocampus.

Horse is alſo uſed, in the *Military Language*, to expreſs the cavalry; or the body of ſoldiers who ſerve on horſeback.

The *horſe* includes *horſe* guards, *horſe* grenadiers, and troopers. Dragoons are alſo frequently comprehended under this name, though they fight on foot: of theſe there are now eighteen regiments; beſides three regiments of dragoon-guards, raiſed in 1685. See Granadier, and Dragoons.

Horſe guards, by the Spaniards called *guardas a cavallo*; by the French, *gardes de corps*; by the Engliſh uſually, *life-guards*; are the guards of the king's perſon and body.

Of theſe there are now two troops, raiſed in 1660: each troop has a colonel, two lieutenant-colonels, one cornet and major, one guidon and major, four exempts and captains, four brigadiers and lieutenants, one adjutant, four ſub-brigadiers and cornets, and ſixty private men. To which have been ſince added, by eſtabliſhment, viz. in 1693 and 1702, two troops of *horſe*-grenadier-*guards*, each of which conſiſts of a colonel, lieutenant-colonel, one guidon or major, three exempts and captains, three lieutenants, one adjutant, three cornets, and ſixty private men: and the royal regiment of *horſe-guards*, raiſed in 1661. There are beſides only four regiments of *horſe*, which are quartered in Ireland.

The duty is, by parties from the guard, to attend the king's perſon when he goes out near home; an honour which has been lately appropriated to the *light-horſe*. On ſtate-days he is attended by detachments out of the *horſe* and grenadier guards.

One of three captains of the *horſe* guards attends on the king when he walks on foot, immediately next his perſon; carrying in his hand an ebony ſtaff, or truncheon, with a gold head.

Horse, *Maſter of the*. See Master *of the horſe*.

Horse, *Light*, are regiments of cavalry, mounted on light ſwift horſes, whoſe men are ſmall and lightly accoutred. They were firſt raiſed in 1757.

The denomination aroſe hence, that anciently they were lightly armed, in compariſon of the royal guards, which were armed at all points.

Horse, *Hungarian.* See Hussars.

Horse is alſo a term uſed in various arts and manufactories, for ſomething that helps to ſuſtain their work from the ground, for the more commodious working at it.

The *horſe* uſed by tanners and ſkinners, alſo called the *leg*, is a piece of wood cut hollow and roundiſh, four or five feet long, and placed aſlope; upon which they pare their ſkins to get off the dirt, hair, fleſh, &c.

Horse is alſo uſed, in *Carpentry*, for a piece of wood jointed acroſs two other perpendicular ones, to ſuſtain the boards, planks, &c. which make bridges over ſmall rivers; and on divers other occaſions.

Horse, *Little.* See Equuleus.

Horse, in *Sea-language*, is the name of a rope reaching from the middle of a yard to its extremity, or what is called the yard-arm, and depending about two or three feet under the yard, for the ſailors to tread upon, whilſt they are looſing, reefing or furling the ſails, rigging out the ſtudding-ſail booms &c. In order, therefore, to keep the *horſe* more parallel to the yard, it is uſually ſuſpended to it, at proper diſtances, by certain ropes called *ſtirrups*, which hang about two feet under the yard, having an eye in their lower ends through which the *horſe* paſſes.

Horse is alſo a thick rope, extended in a perpendicular direction near the fore or after-ſide of a maſt, for the purpoſe of hoiſting or extending ſome ſail upon it. When it is fixed before a maſt, it is calculated for the uſe of a ſail called the ſquare-ſail, whoſe yard being attached to the *horſe*, by means of a traveller or bull's eye, which ſlides up and down occaſionally, is retained in a ſteady poſition; either when the ſail is ſet, or whilſt it is hoiſting or lowering. When the *horſe* is placed abaſt or behind a maſt, it is intended for the try-ſail of a ſnow, and is accordingly very rarely fixed in this poſition, except in thoſe ſloops of war which occaſionally aſſume the form of ſnows; in order to deceive the enemy. Falconer's Mar. Dict.

Horse is alſo a cant name introduced into the management of lotteries, for the chance or benefit of a ticket, or number for one or more days, upon condition, if it be drawn a prize within the time covenanted for, of returning to the ſeller an undrawn ticket.

To determine the value of a *horſe.* Multiply the amount of the prizes in the lottery by the time the *horſe* is hired for; and from the product ſubſtract the amount of the number of prizes by the value of an undrawn ticket into the time of the *horſe*: the remainder being divided by the number of tickets into the whole time of drawing, the quotient is the value of the *horſe.* See Lottery.

Horse *Bean.* See Bean.

Horse-*bread.* Bread of a proper kind is often given to *horſes* to hearten and ſtrengthen them when they have gone through great fatigues, or are to prepare for ſuch. Common houſehold-bread will anſwer the purpoſe, but the more common way is to prepare a kind of bread on purpoſe. There are two different receipts for making this ſort of bread, each of which has its admirers. The firſt method is this: take wheat-meal, oat-meal, and beans ground fine, of each half a peck; aniſeed, two ounces; gentian and fenugreek-ſeed, of each an ounce; liquorice, two ounces; let all theſe be made into a fine powder, and ſifted together, that they may be perfectly mixed: then add the whites of twenty new-laid eggs, and as much fine-ale as will knead the whole into dough. This is to be made into loaves, and well baked, but not burnt; and the *horſe* is to have a good quantity of it every morning for five or ſix days, without any other provender.

The other method is much nicer, but perhaps does not any way better anſwer the intended purpoſe of heartening up the creature. It is this: take wheat-meal, rye-meal, bean-meal, and oat-meal, of each half a peck; aniſeed and liquorice, of each an ounce; white ſugar-candy, four ounces: beat all theſe to powder, and ſift them together; then add the whites and yolks of twenty new-laid eggs, and as much white-wine as will make the whole into a dough. Let this be made into great loaves, and well baked; it muſt not be given the *horſe* too new, but when it has ſtood about three days, it may begin to be uſed; the outſide is always to be chipped off when any of it is given. Theſe are the two ſorts of bread uſually given to prepare *horſes* for long journies. But there are three other receipts for making bread for race *horſes*, which are as much eſteemed, and are given by our expert jockies for the ſecond, third, and fourth fortnight's feed. The firſt kind is made in this manner: take three pecks of clean beans, and one peck of fine wheat; let theſe be ground together, and kneaded into dough, with a large quantity of freſh barm or yeaſt, but with as little water as may be: when this has heaved and worked up a little, let it be kneaded again, and then made into large loaves and carefully baked; when three days old, it may be given to the *horſe*, but not ſooner.

The ſecond ſort is to be made as the other, only with equal quantities of beans and wheat, and the cruſt of this is to be cut quite away before it is eat. This is to be given to the *horſe* at his uſual meals, either alone, or mixed with oats and ſplit beans.

The third ſort of bread is ſtronger than either of the others, and is to be made thus: take three pecks of wheat, and one of beans; let them be ground together, and made into very fine flour; knead this up into dough with a good quantity of yeaſt diſſolved in as much ſtrong ale as is neceſſary; add the whites of twenty eggs, and make the whole into large loaves. Theſe muſt be thoroughly baked, and when they have ſtood three days, the cruſt muſt be cut off, and the crumb only given, either alone, or mixed with oats or ſplit beans. This is to be the food for the laſt fortnight.

Horse, *Cheſtnut.* See *Horſe* Chestnut.

Horse, *Courſe.* See Hippodrome.

Horse *dung*, in *Gardening*, is of great uſe in making hot beds, for the raiſing all ſorts of early crops; as ſallading, cucumbers, melons, aſparagus, &c. for which purpoſes no other kinds of dung will do ſo well. *Horſe dung* ferments the ſtrongeſt; and if mixed with litter and ſea-coal aſhes in a due proportion, will continue its heat much longer, than any other ſort of dung whatſoever: and afterward when rotted, becomes an excellent manure for moſt ſorts of land; more eſpecially for ſuch as are of a cold nature. For ſtiff clayey land, *horſe dung* mixed with ſea-coal aſhes, and the cleanſing of London ſtreets, will cauſe the parts to ſeparate much ſooner than any other compoſt: ſo that where it can be obtained in plenty, it is always to be recommended for ſuch lands. See Dung.

Horse-*hairs*, *animated*, a term uſed to expreſs a ſort of long and ſlender water-worm, of a blackiſh colour, and ſo much reſembling a *horſe-hair*, that it is generally, by the vulgar, ſuppoſed to be the hair fallen from a *horſe's* mane into the water as he drinks, and there animated by ſome ſtrange power. Dr. Liſter has at large confuted this abſurd opinion, in the Philoſoſophical Tranſactions. See Amphisbæna *aquatica.*

Horse-*hair-worms*, See Amphisbæna.

Horse *heal*, in *Botany.* See Star *wort.*

Horse, *hoeing*, *Huſbandry.* See Hoeing and Husbandry.

Horse-*mackrel.* See Mackrel.

Horse-*man*, the name given to a particular ſpecies of pigeon, called by Moore the *columba tabellaria minor.* It very much reſembles in ſhape the carrier *pigeon*, but it is ſmaller, and ſhorter necked; the protuberant fleſh on the beak, and round the eye, is alſo leſs in quantity; it is more barrel-headed alſo, and the eye is ſomewhat pinched. It is matter of diſpute whether this be an original ſpecies of pigeon, or a baſtard between the carrier and tumbler pigeons.

There are of this ſpecies of all ſorts of feathers, but the blue and blue-pieds are the moſt valued. Theſe are one of the ſort of pigeons made uſe of in England for carrying letters, and flying for wagers; for the true original carriers are now very ſcarce, and not riſked on every trifling occaſion.

HORSEMANSHIP, the art of breaking, diſciplining, and managing horſes.

Horſemanſhip, in its latitude, includes what relates to the knowlege of the make, colour, age, temper, and qualities, of *horſes*; their reſpective countries and climates, with the manner of breeding, propagating, &c. the diſcovery of the uſes or ſervices they are fitted for; whether the wars, the race, the ſaddle, or labour; and forwarding and accommodating them for this purpoſe.

In this general ſenſe, it alſo includes the knowlege of the defects and diſeaſes of *horſes*, and the remedies proper for the ſame, with the ſeveral operations requiſite thereto, as *docking*, *gelding*, *ſhoeing*, &c. and thus takes in the farrier's province.

But the word is in a more peculiar manner underſtood of the art of riding, or of directing a horſe to advantage; not only in the ordinary motions, but more eſpecially in the managing, or making him work upon volts, airs, &c. See Manege.

Horse *mint.* See Mint.

Horse *muſcle.* See Muscle.

Horse *radiſh.* See *Horſe* Radish.

HORSE-SHOE, a cover or defence for the ſole of a horſe's foot.

Of theſe there are ſeveral ſorts; as, the

Shoe, *Planch*, or *Pancelet*, which is ſaid to make a good foot, and a bad leg; becauſe it makes the foot to grow beyond the meaſure of the leg. It is choſen for a weak heel, and will laſt longer than any other *ſhoe*; being borrowed from the moil, which has weak heels, and fruſhes, to keep the feet from ſtones and gravel.

Shoes *with Calkins*, which, though intended to ſecure the horſe from ſliding, yet are reputed by many to do him more harm than good, in that he cannot tread evenly upon the ground; whereby, many times, he wrenches his foot, or ſtrains ſome ſinew, eſpecially upon ſtony ways, where ſtones will not ſuffer the calkins to enter. *Double calkins* are leſs hurtful, as he treads evener with them than on the ſingle calkins; but then they muſt not be over-long, or ſharp-pointed, but rather ſhort and flat.

Shoes *with Rings*: theſe were firſt invented to make the horſe lift his feet up high; though ſuch *ſhoes* are more painful, than helpful, beſides the unhandſomeneſs of the ſight. The fault of not lifting the feet high enough is moſt incident to horſes that have not ſound hoofs; for tender feet fear to touch the ground hard: but what is intended for remedy proves a prejudice to the horſe, by adding high calkins, or rings to his *ſhoes*; as by that means his heels are made weaker than before.

Shoes *with ſwelling Welts or Borders* round about them, are uſed in Germany, &c. which being higher than the heads of the nails, ſave them from wearing. Theſe are the beſt ſort of laſting *ſhoes*, if made of well tempered ſtuff, as they wear equally in all parts; and the horſe treads evenly upon them. Others, who uſe to paſs mountains and places where ſmiths are not ſo eaſily met with, carry *ſhoes* about them, with vices, whereby they faſten them to the horſe's hoofs without the help of the hammer or nail: yet is this more for ſhew than ſervice; for though ſuch *ſhoe* may ſave a horſe's feet from ſtones, yet it ſo pinches his hoof, that he goes with pain; and perhaps injures it more than the ſtones do. On ſuch emergent occaſions, therefore, it were better to make uſe of the

Shoe, *Joint*, which is made of two pieces, with a flat rivet nail joining them together in the toe, ſo that it might be taken both wide and narrow, to ſerve any foot.

Shoe, *Panton* or *Pantable*, which opens at the heels, and helps hoof-binding. To which may be added, *half pantin ſhoe*.

Shoe, *Patten*, is uſed for a horſe that is burnt in the hip, ſtiffle, or ſhoulder; as it cauſes him to bear upon that leg the grief is on, and conſequently makes him uſe it better.

Horse-shoe, in *Fortification*, is a work ſometimes of a round, ſometimes of an oval figure, incloſed with a parapet, raiſed in the ditch of a marſhy place, or in low grounds; ſometimes alſo to cover a gate; or to ſerve as a lodgment for ſoldiers, to prevent ſurprizes, or relieve an over-tedious defence.

Horse-shoe Head, a diſeaſe in infants, wherein the ſutures of the ſkull are too open, or too great a vacuity is left between them; ſo that the aperture ſhall not be totally cloſed up, or the cranium in that part not be ſo hard as the reſt for ſome years after.

This openneſs is found to be increaſed upon the child's catching cold. When the diſeaſe continues long, it is reputed a ſign of weakneſs, and ſhort life. In this caſe, it is uſual to rub the head now-and-then with warm rum, or brandy, mixed with the white of an egg, and palm-oil.

Sometimes the diſorder ariſes from a collection of waters in the head, called an HYDROCEPHALUS.

Horse-*ſhoe Vetch*. See Vetch.

Horse *Meaſure* is a rod of box, to ſlide out of a cane, with a ſquare at the end, being divided into hands and inches, to meaſure the height of horſes.

Horse *tail*, *equiſetum*, in *Botany*, the name of a genus of ferns of the *cryptogamia* claſs, the characters of which are theſe: the flower is of the apetalous kind, being compoſed of a number of ſtamina, each furniſhed with a muſhroom-like head, and all diſpoſed in a ſort of ſpiked form. Theſe flowers are barren, and the ſeeds of the ſame ſpecies grow on plants of a very different figure, which have no flowers, and only produce black rough ſeeds. To this it is to be added, that the plant conſiſts of ſeveral joints, one received into another, in the manner of larger and ſmaller tubes. There are ſeveral ſpecies of *horſe tail*, which are found in England, on the ſides of ditches or in ſhady woods; but they are never cultivated in gardens.

The common great marſh *horſetail* is uſed in medicine as an aſtringent and vulnerary. Schroder recommends it in all kinds of hæmorrhages, and exulcerations of the kidneys and bladder.

Horse *tail*, *ſhrubby*, *Ephedra*, in *Botany*, a genus of the *dioecia monadelphia* claſs: the characters are, that it has male and female flowers in different plants; the male flowers are collected in katkins, which are ſcaly, each ſcale covering a ſingle flower; theſe have no petals, but ſeven ſtamina, which are joined in form of a column, and terminated by roundiſh ſummits: the female flowers have an oval perianthium, compoſed of five ſeries of leaves; theſe have no petals, but have two oval germina, ſitting upon the perianthium, ſupporting ſhort ſtyles, crowned by ſingle ſtigmas: the germina afterwards turn to oval berries, each of which has two ſeeds. This is a low ſhrubby plant, which grows naturally upon the rocks by the ſea, in the ſouth of France, in Spain, and in Italy; and is preſerved in ſeveral gardens for the ſake of variety, but has little beauty. Miller.

Horse, *Tongue*. See Butcher's *Broom*.

Horse *Worm*, in *Natural Hiſtory*, a ſpecies of fly-worm called alſo BOTT, produced of eggs depoſited by a two-winged fly of the ſhape and ſize of the humble-bee, in the inteſtines of *horſes*.

The worms of the human bowels have not been longer known to the world than thoſe of the *horſe*; and the farriers in all ages, who have undertaken the care of theſe valuable animals, have had their remedies for the long worms bred in their inteſtines, and alſo for the ſhort ones. The ſhort ones are the creatures here to be deſcribed. But though the world has ſo long been acquainted with their exiſtence, it never knew their origin till Mr. Valliſnieri diſcovered of late that they were produced from one of the humble-bee flies.

Theſe flies always live in the open fields, and are never found about towns and houſes, and this is the reaſon that thoſe *horſes* which are kept up in the ſtable in the ſummer and autumn, are never found to be ſubject to theſe worms.

In the latter end of ſummer, and toward autumn, theſe flies are found continually buzzing about the backs of *horſes* in the open fields, and their whole buſineſs there is to depoſit their eggs, where nature has inſtructed them to do it.

Horſes at this ſeaſon are ſenſible of the buſineſs of this little annoyer, and have been ſeen from the moſt quiet ſtate to jump, run about, and kick, only at the ſound of the wings of one of theſe flies, which has been at that time ſearching for an opportunity to depoſit its eggs in them.

A fly has been ſeen, when it has not ſucceeded in its attempt in this manner, to fly with leſs noiſe toward a ſingle *horſe* in another part of the field, ſlily to creep under his tail, to uſe ſome gentle titillation in order to make the creature open his fundament, and, when a little open, has ventured to crawl in, and without doubt then only found herſelf in a proper place for the depoſiting her eggs for a few moments. After this the *horſe* has jumped, kicked, and capered as if mad, and continued ſo for a quarter of an hour: hence we may infer one reaſon againſt depriving *horſes* of the ſafeguard of their tails, in compliance with an abſurd faſhion.

The worms hatched from theſe eggs, or perhaps living worms there depoſited, if the fly be of the viviparous kind, ſoon find their way farther up the inteſtines, and often penetrate even into the ſtomach.

After a ſufficient time for theſe worms to acquire their deſtined growth, they naturally quit their old place of abode; in order to this they all get toward the lower part of the inteſtines, and are either voided by the creature with its dung, or of themſelves crawl out.

There is nothing ſingular in the figure of theſe worms; they are larger than thoſe of the common fleſh-fly, and ſmaller than thoſe of the ox-fly; they are ſomewhat of a conic figure, their head being pointed, and their poſterior part much larger; they are of different colours, ſome greeniſh, and others yellowiſh, and ſome brown; they are provided with each two cruſtaceous hooks, by which they lay hold and pull themſelves along by that means; and prevent their being forced out of their habitation by the fæces of the *horſes*. It is ſuppoſed that clyſters of oil are a remedy for this diſorder in *horſes*; but it probably is of no effect, ſince the oiling over the whole body of the worm, nay, the introducing drops of oil into the cavity where the great ſtigmata are, has not been found to kill the animal.

When theſe worms are only in ſmall numbers in a *horſe*, they are of no harm to the animal; but there are ſeaſons in which they increaſe to ſuch vaſt numbers, that they are a very fatal malady; and, in ſome years, when *horſes* have died of a ſort of epidemic malady, after they have been opened, prodigious numbers of theſe worms have been found living in their ſtomachs, each having eat itſelf a ſort of cell in the membrane of the ſtomach, and all being lodged there as cloſe together as the ſeeds in a pomegranate.

We are not to wonder at all how ſuch immenſe numbers of worms come into one *horſe*, ſince one female is able to depoſit more than ſeven hundred, as Mr. Valliſnieri has obſerved.

When theſe worms are fallen from the inteſtines of the *horſe*, they crawl about till they find ſome place of ſafety, where they make a ſhell of their ſkin, and paſs all their changes, and from whence they finally come out in form of the parent fly. See Reaumur, Hiſt. Inſ. vol. iv. p. 540. ſeq. See alſo Valliſnieri.

HORSHAM *ſtone* is a kind of thin broad ſlate, of a greyiſh colour; formerly much uſed, eſpecially in Suſſex, to heal or cover churches and chancels, great houſes, &c. but on account of its weight very unfit for the purpoſe.

It is called *Horſham ſtone*, becauſe chiefly brought from the town of Horſham in Suſſex.

HORTA, in *Mythology*, a goddeſs among the Romans, who preſided over youth and excited them to virtue by her exhortations. Her temple is never ſhut, to admoniſh youth, ſo liable to be ſeduced, *cerea in vitrum flecti*, that they ſhould be always diſpoſed with particular vigilance over themſelves to the practice of virtue.

HORTAGILERS, in the grand ſeignior's court, are upholſterers, or tapeſtry-hangers.

There is no city better or more orderly regulated than the grand ſeignior's camp; and to have a notion of the magnificence of that prince, he muſt be ſeen in that equipage; as he is much better lodged and accommodated there, than at Conſtantinople, or any other city of his dominions.

He has always two tents or pavilions, and two ſets of furniture entire; that, while he is in one, they may pitch or ſpread the other.

In order to this, he has conſtantly four hundred *hortagilers*, or upholſterers, in his retinue, who go a day's journey before him to fix on a proper place. They firſt prepare the ſultan's tent, and then thoſe of the officers of the Porte; and the beglerbegs, according to their rank.

HORTATOR, in the *Roman Navigation*, an officer whoſe buſineſs it was to give the word of command to the rowers, and to direct them when to ſtop, and when to ply their oars.

The Greeks gave the name of CELEUSTES to this officer.

HORTICULTURE, compounded of *hortus*, *garden*; and *colo*, I *till*, *dreſs*, &c. the art of gardening. See GARDENING.

HORTULANUS, in *Ornithology*, the name of a ſpecies of the EMBERIZA, in the Linnæan Syſtem, though ſome writers have made this a diſtinct genus.

HORTUS, a name uſed by ſome authors for the female genital parts of animals.

HORTUS *ſiccus*, a dry garden, a name given to a collection of ſpecimens of plants, carefully dried and preſerved.

The value of ſuch a collection is very evident, ſince a thouſand minutiæ may be preſerved in the well dried ſpecimens of plants, which the moſt accurate engraver would overlook. We ſhall therefore give two methods of drying and preſerving a *hortus ſiccus*; the firſt by Sir Robert Southwell in Phil. Tranſ. N°. 237, and the other by Dr. Hill, in his Review of the Works of the Royal Society; with his objections to Sir Robert's method.

According to the former gentleman, the plants are to be laid flat between papers, and then put between two ſmooth plates of iron, ſcrewed together at the corners; and in this condition committed to a baker's oven for two hours. When taken out, they are to be rubbed over with a mixture of equal parts of aqua fortis and brandy; and after this to be faſtened down on paper with a ſolution of the quantity of a walnut of gum tragacanth diſſolved in a pint of water. See HERBAL.

To this the Dr. objects, that the heat of an oven is much too uncertain to be employed in ſo nice an operation; and that the ſpace of time ordered for continuing the plants in it, is of no information, unleſs the degree of heat, and even the different nature of the plant, as to its ſucculency, and the firmneſs or tenderneſs of its fibres, be attended to; there being ſcarcely any two plants alike in theſe particulars: conſequently the degree and duration of heat ſufficient for one plant, would deſtroy another. Beſide which, the acid uſed, deſtroys the colour of many plants; and never recovers that of others loſt in the drying; and frequently after the plant is fixed down, rots both the paper it is fixed to, and that which falls over it. Dr. Hill's method is as follows. Take a ſpecimen of a plant in flower, and with it, one of its bottom leaves if it have any; bruiſe the ſtalk if too rigid, or ſlit it if too thick: ſpread out the leaves and flowers on paper, cover it with more paper, and lay a weight over all. At the end of eighteen hours take out the plants, now perfectly flattened, and lay them on a bed of dry common ſand; ſift more dry ſand over them to the depth of two inches; and thus let them lie about three weeks: the leſs ſucculent dry much ſooner, but they take no harm afterward. If the floor of a garret be covered in ſpring with ſand two inches deep, leaving ſpace for walking to the ſeveral parts, it will receive the collection of a whole ſummer; the covering of ſand being ſifted over every parcel as laid in, they need no farther care, from the time of laying them till they are taken up to be ſtuck on paper. The cement uſed by the doctor is thus prepared: early in the ſpring, put two ounces of camphor into three quarts of water in a large bottle, ſhake it from time to time, and when the firſt collected plants are ready for the faſtening down, put into a pint of the water, poured off into an earthen veſſel that will bear the fire, two ounces of common glue, ſuch as is uſed by the carpenters, and the ſame quantity of ichthyocolla beat to ſhreds; let them ſtand ſix and thirty hours, then gently boil the whole a few moments, and ſtrain it off through a coarſe cloth: this is to be warmed over a gentle heat when it is to be uſed, and the back of the plants ſmeared over with a painter's bruſh: after this lay them on paper, and gently preſs them for a few minutes, then expoſe them to the air a little, and finally lay them under a ſmall weight between quires of paper to be perfectly dried.

It is ſcarce to be conceived how ſtrongly the water becomes impregnated with the camphor by this ſimple proceſs: a part of it indeed flies off in the making of the cement and the uſing of it: but enough remains with the plants to prevent the breeding of inſects in it. He farther obſerves, that plants may be dried very well without ſand, by only putting them frequently into freſh quires of paper, or a few, by only preſſing them between the leaves of a book: but the ſand method preſerves the colour beſt, and is done with leaſt trouble.

Another method much better than that of the oven, is the flattening and drying the plant by paſſing a common ſmoothing iron for linen over the papers between which it is laid: but for nice things the moſt perfect of all methods is that by a common ſand heat, ſuch as is uſed for chemical purpoſes. The cold ſand is to be ſpread ſmooth upon this occaſion, the plant laid on it carefully flatted, and a thick bed of ſand ſifted over: the fire is then to be made and the whole proceſs carefully watched, until by a very gentle heat the plant be carefully dried. The colour of the tendereſt herb, may by this manner be preſerved; and flowers that can no way elſe be preſerved, may be managed perfectly well thus.

HOSANNA, in the *Hebrew Ceremonies*, a prayer which they rehearſed on the ſeveral days of the feaſt of tabernacles.

It was thus called, becauſe there was frequent repetition therein of the word הושענא, *ſerva nunc*, or *ſerva precor*, i. e. ſave us now; or, ſave us, we pray.

There are divers of theſe *hoſanna's*. The Jews call them *hoſchannoth*; i. e. the *hoſannas*. Some are rehearſed on the firſt day, others on the ſecond, &c. which they call *hoſanna* of the firſt day, *hoſanna* of the ſecond day, &c.

HOSANNA *Rabba*, or Grand HOSANNA, is a name they give to their feaſt of tabernacles, which laſts eight days; becauſe during the courſe thereof, they are frequently calling for the aſſiſtance of God, the forgiveneſs of their ſins, and his bleſſing on the new year; and to that purpoſe they make great uſe of the *hoſchannoth*, or prayers above mentioned.

The Jews, alſo, apply the term *hoſanna rabba*, in a more peculiar manner, to the ſeventh day of the feaſt of tabernacles; becauſe they apply themſelves more immediately on that day toinvoke the divine bleſſing, &c.

HOSE, from the Saxon *hoſa*, a ſtocking. See STOCKING.

HOSE in HOSE, among *Botaniſts*, ſignifies one long huſk of a flower within another; as in the polyanthus. See PRIMROSE.

HOSE-HUSK, in *Botany*, a long round huſk; as in pinks, july-flowers, &c.

HOSEA, in *Scripture Hiſtory*, a canonical book of the old Teſtament, ſo called from the prophet of that name, its author; the firſt of the leſſer prophets. He lived in the kingdom of Samaria, and delivered his prophecies under the reign of Jeroboam II, and his ſucceſſors, kings of Iſrael; and under the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. His principal deſign is to publiſh the groſs idolatry of the people of Judah and Iſrael, to denounce the divine vengeance againſt them, and to foretel the captivity in Aſſyria.

HOSPITA, in *Mythology*, a ſurname of Venus, under which appellation ſhe was worſhipped, and had a temple at Memphis in Egypt.

HOSPITAL, popularly SPITAL, a place or building erected, endowed, or ſupported by charitable contributions, for the reception and relief of the poor, aged, infirm, ſick, and otherwiſe helpleſs.

The word is formed of the Latin *hoſpes*, *hoſt* or *ſtranger*.

In the firſt ages of the church, the biſhop had the immediate charge of all the poor, both ſound and diſeaſed; as alſo of widows, orphans, ſtrangers, &c. When the churches came to have fixed revenues allotted them, it was decreed, that, at leaſt, one fourth part thereof ſhould go to the relief of the poor; and to provide for them the more commodiouſly, divers houſes of charity were built, which are ſince denominated *hoſpitals*.

They were governed wholly by the prieſts and deacons, under the inſpection of the biſhop.

In courſe of time, ſeparate revenues were aſſigned for the *hoſpitals*; and particular perſons, out of motives of piety and charity, gave lands and money for erecting of *hoſpitals*.

When the church-diſcipline began to relax, the prieſts, who, till then, had been the adminiſtrators of *hoſpitals*, converted them into a ſort of benefices, which they held at pleaſure, without giving an account thereof to any body, reſerving the greateſt part of the income to their own uſe; ſo that the intentions of the founders were fruſtrated. To remove this abuſe, the council of Vienne expreſly prohibited the giving any *hoſpital* to ſecular prieſts in the way of a benefice; and directed the adminiſtration thereof to be given to ſufficient and reſponſible laymen, who ſhould take an oath, like that of tutors, for the faithful diſcharge thereof; and be accountable to the ordinaries. This decree was executed, and confirmed by the council of Trent.

In England, *hoſpitals*, founded for the mere relief of the indigent and neceſſitous, are peculiarly called *alms-houſes*; the name *hoſpital* being reſerved to thoſe deſtined for the ſick, aged, young, &c.

Any perſon ſeiſed of an eſtate in fee ſimple, may by deed inrolled in chancery, erect and found an *hoſpital* for the ſuſtenance and relief of the poor, to continue for ever; and place ſuch heads &c. therein, as he ſhall think fit: and ſuch *hoſpital* ſhall be incorporated, and ſubject to ſuch viſitors &c. as the founder ſhall nominate. Alſo ſuch corporations ſhall have power to take and purchaſe lands not exceeding two hundred pounds per annum, ſo as the ſame be not holden of the king, &c. and to make leaſe for twenty-one years, reſerving the accuſtomed yearly rent: but no *hoſpital* is to be erected, unleſs upon the foundation it be endowed with lands or hereditaments of the clear yearly value of ten pounds per annum. Stat. 39 Eliz. cap. 5.

This act was made perpetual by the 21 Jac. cap. 1. It is underſtood in conſequence of this ſtatute, that if the lands given to an *hoſpital* be afterwards improved, they ſhall be enjoyed by the *hoſpital*, though they ſhould be above the yearly value of two hundred pounds. And goods and chattels, real or perſonal, may be taken of what value ſoever. But by 9 Geo. II. cap. 36. no lands nor money ſhall be conveyed or ſettled in truſt, for the benefit of any charitable foundations, unleſs the appointment of lands, money, or perſonal eſtate, ſtocks in the public funds excepted, be made by deed indented, ſealed and delivered in the preſence of two witneſſes, at leaſt twelve calendar months before the death of the donor, and be inrolled in chancery within ſix calendar months next after the execution thereof; and unleſs ſuch ſtock in the public funds be transferred in the public books uſually kept for the transfer of ſtocks, at leaſt ſix calendar months before the death of the donor, and take effect immediately and without the power of revocation. By 43 Eliz. cap. 4. the lord chancellor may iſſue commiſſions to take account of miſapplication of lands and goods, given to *hoſpitals*, which have no ſpecial viſitors or governors. By 31 Eliz. cap. 6. the place of any perſon, taking reward for nominating to an *hoſpital*, ſhall be void. By the aforeſaid ſtat. of the 39 Eliz. cap. 5. it is provided, that all leaſes of eſtates for a term exceeding the number of twenty-one years, in poſſeſſion, and on which the accuſtomable yearly rent or more, by the greater part of twenty-one years next before the taking of ſuch leaſe ſhall not be reſerved and yearly payable, ſhall be void. By 43 Eliz. cap. 2. all lands within the pariſh are to be aſſeſſed to the poor's rate, and it is determined by 1 Anne, that *hoſpital* lands are chargeable to the poor as well as others. In the caſe of St. Luke's *hoſpital*, by 1 Geo. III. it was determined in general, that no *hoſpital* is chargeable to the pariſh rates, with reſpect to the ſcite thereof, except thoſe parts of it which are inhabited by the officers, whoſe apartments are to be rated as ſingle tenements, of which the ſaid officers are the occupiers. By the annual acts for the land tax, it is provided, that the ſame ſhall not extend to charge any *hoſpital*, for or in reſpect to the ſcite of ſuch *hoſpital*, or any of the buildings within the walls or limits thereof; or to charge any of the houſes or lands, which on or before Mar. 25. 1693, did belong to Chriſt's *hoſpital*, St. Bartholomew, Bridewell, St. Thomas, and Bethlehem *hoſpitals*; or to charge any other *hoſpitals* or alms-houſes, for or in reſpect of any rents or revenues, which on or before March 25. 1693, were payable to the ſaid *hoſpitals* or alms-houſes, for the immediate relief of the poor. But all ſuch lands &c. belonging to any *hoſpital* or alms-houſe, or ſettled to any charitable or pious uſe, as were aſſeſſed in the fourth year of W. and M. ſhall be liable to be charged.

The principal Engliſh *hoſpitals* are the following:

Hospital, *Aſke's* or *Haberdaſhers*, is an *hoſpital* ſituated at Hoxton and erected in 1692, by the company of Haberdaſhers, in purſuance of the will of Robert Aſke, eſq. who left for building and endowing it 30,000l. This *hoſpital* is eſtabliſhed for the maintenance of twenty poor haberdaſhers, and the ſupport and education of twenty boys. Each of the penſioners in this *hoſpital* has convenient apartments, is provided with proper diet and firing, three pounds yearly in money, and a gown every ſecond year. There are alſo eſtabliſhed ſalaries, &c. for chaplain, clerk, butler, porter, and other domeſtics.

Hospital, *St. Bartholomew's*, is ſituated on the ſouth-eaſt ſide of Smithfield, and incorporated by the name of the *hoſpital* of the mayor, commonalty and citizens of London, governors for the poor, called Little St. Bartholomew's, near Weſt-Smithfield. This *hoſpital* formerly belonged to the priory of St. Bartholomew, in Smithfield, founded by one Rahere, about the year 1102.

At the diſſolution of the monaſteries, Henry VIII. left five hundred marks a year to it, on condition that the city ſhould add five hundred marks per annum for the relief of ſick and poor people; but it was more largely endowed, for the uſe of ſick and lame perſons only, by Edward VI. by the munificence of the city and private benefactors. This *hoſpital*, having eſcaped the dreadful fire in 1666, was repaired and beautified by the governors in the year 1691. But the buildings became by length of time ſo ruinous and dangerous, that a ſubſcription was entered into in 1729, for defraying the expence of rebuilding it, on a plan comprehending four detached piles of building to be joined by ſtone gate-ways, about a court or area. Four piles have been erected and finiſhed; one of theſe piles contains a large hall for the reſort of the governors at general courts, a compting-houſe for the committees, and other neceſſary offices: the other three piles contain wards for the reception of the patients, &c.

It is governed by a preſident, treaſurer, &c. It is furniſhed with three phyſicians, and three maſter ſurgeons, beſides as many aſſiſtant ſurgeons, an apothecary, and vicar. The officers of this *hoſpital*, are a cook, ſteward, renter, matron, and porter. This *hoſpital*, ſince its enlargement, is capable of accommodating four hundred and twenty patients: it extends relief alſo to a great number of out-patients. By the report of 1780, it appears that this *hoſpital* adminiſtered relief to 10846 patients, in the courſe of the preceding year.

Hospital, *Bethlehem*, or *Bedlam*, was originally a priory, founded by Simon Fitzmary, ſheriff of London, in the year 1246; but in the year 1546, king Henry VIII. gave this *hoſpital* to the city, who employed it for the accommodation of lunatics. The preſent ſtately fabric was erected by the city of London in the year 1675, at a charge of about ſeventeen thouſand pounds. It is in length five hundred and forty feet, and forty feet broad, and contains a great number of cells, or rooms for the accommodation of the unfortunate, who are maintained without any expence to their friends; except an allowance for bedding. At each end of this ſtately edifice are erected, by the charitable contributions of the citizens, two wings, or ſpacious buildings for the reception of poor incurable lunatics. Before this magnificent ſtructure there is a pleaſant garden, incloſed by a ſtately wall about ſeven hundred feet in length. This *hoſpital*, being united to that of Bridewell, has the ſame preſident, governors, whoſe number is about two hundred, treaſurer, clerk, auditor, phyſician, ſurgeon and apothecary; but each *hoſpital* has a ſteward, and inferior officers peculiar to itſelf. The number of patients in this *hoſpital* under cure in 1780 was 252.

Hospital, *Bridewell*. See **Bridewell**.

The domeſtics peculiar to this houſe are, a ſteward, chaplain, reader, porter and his ſervant, matron, and beadles, one of whom is chapel clerk.

Hospital, *Charter houſe*. See **Chartreuse**.

This is alſo called king James's *hoſpital*, becauſe he eſtabliſhed it by letters patent, in the year 1611, confirmed by parliament in 1628; and *Sutton's hoſpital*; from the name of its founder.

Hospital *Chriſt's*, popularly called the *Blue-coat hoſpital*, was anciently a monaſtery of grey friars, founded by Rahere, the firſt prior thereof, in the time of Henry I. It was diſſolved by Henry VIII, and granted by him to the city in 1547; and the grant to the citizens was confirmed in 1552, by charter of Edward VI, who converted it into an *hoſpital* for poor children; who are ſupplied with all neceſſaries and conveniencies, cloathed, dieted, and taught.

Since its firſt endowment it has received abundance of new donations. Beſides the numerous benefactions of private perſons, the city allows this houſe the benefit of ſuperintending and licenſing the carts of London; and a duty of about $\frac{1}{4}$ upon every cloth brought to Blackwell-hall, where clerks are kept to receive it. The citizens by king Edward's charter are incorporated governors of his ſeveral foundations in the city and liberties of London, by the name of the mayor, commonalty and citizens of the city of London, governors of the poſſeſſions, revenues, and goods of the *hoſpitals* of Edw. VI. &c. A great part of it was burnt down by the great fire; but is again rebuilt by the care of the governors; though not without incurring a great debt, and anticipating the revenues of the *hoſpital*.

Formerly, a thouſand poor children, moſt of them orphans, were maintained on this foundation; eight or nine ſcore yearly put out apprentices, and the girls to ſervice; but the number, through the deficiency of the funds, grew afterwards much leſs.

Beſides the children that are maintained within the walls of this *hoſpital*, there is a conſiderable number of the leaſt and youngeſt provided for in the country, viz. at Hertford in Hertfordſhire, where there are a ſchool-houſe, a maſter's houſe, and ſeveral houſes for nurſes employed in taking care of the children. The number of children under the care and charge of this *hoſpital* in 1780 was 1200.

Here were two mathematical ſchools; the firſt founded by king Charles II. but they are now united. Youths are there taught ſeveral parts of practical mathematics, particularly navigation, to fit them for apprentices to maſters of ſhips: there is alſo a grammar-ſchool (whence the moſt improved boys are yearly ſent to the univerſity), a writing-ſchool, and a ſchool for the girls, where they learn to read, to ſew, and to mark. The maſters of theſe ſchools are four; viz. a grammar maſter, who is aſſiſted by an under maſter, a mathematical maſter, and a writing maſter, who have 100 l. per annum each, for their ſalaries, beſides houſes. There are alſo two ſchool-miſtreſſes. The grammar maſter hath an addition of 20 l. yearly for catechiſing the boys, and his uſher is allowed 50 l. a year. There are likewiſe a drawing-maſter, and a muſic-maſter.

The officers of this *hoſpital* are a preſident, treaſurer, phyſician, chief-clerk, under clerk and receiver, ſurgeon, apothecary, wardrobe-keeper, and aſſiſtant clerk, ſteward, matron &c. The number of governors ſuperintending this *hoſpital* is very conſiderable; generally above three hundred.

Hospital, *Emanuel*, is ſituated at Tothill-fields, in Weſtminſter, and was founded by Lady Dacres in 1601, for twenty aged ſingle men and women, each of whom have an allowance of 10 l. per annum, with the liberty of bringing up a poor child. The city of London has this charity in truſt, with 200 l. a year for its ſupport, iſſuing from a leaſe of 199 years, at the expiration of which, the whole manor of Bramſburton in the county of York, amounting to above 600 l. per annum, is deviſed for the augmentation of this foundation. In 1735 the court of lord mayor and aldermen erected a ſchool-houſe and dormitory, adjoining to this *hoſpital*, for the reception of twenty poor boys and girls, who are ſupplied with all the neceſſaries of life; the boys are taught to read, write and account, and the girls to read, write and do plain-work.

Hospital, *Foundling*, was eſtabliſhed, at the ſolicitation of Thomas Coram, eſq. by royal charter, in the 13th year of George the II. and incorporated by the name of *The governors and guardians of the hoſpital for the maintenance and education of expoſed and deſerted young children*: and the powers granted by charter were enlarged and confirmed by a ſtatute of the ſame year. This charity is under the management of a preſident, the king being patron; five vice-preſidents, treaſurer, and governors. The ſubordinate officers are a chaplain, morning preacher, ſecretary, ſolicitor, ſteward, matron, ſchool-maſter, and treaſurer's clerk. This *hoſpital* has two phyſicians, a ſurgeon and apothecary. In 1742 the noble building in Lambs-conduit fields for the uſe of this *hoſpital* was begun to be erected; one wing was finiſhed in 1745; the chapel was begun in 1747; and in 1749 orders were given for building the other wing of the *hoſpital*. The children admitted to this *hoſpital* are nurſed, educated and employed under proper regulations, and provided with all neceſſaries, till they attain the age appointed by parliament for their diſcharge viz. twenty-four for males, and twenty-one for females, unleſs they be previouſly married with the conſent of the committee: at ſuch time, the general committee, at their diſcretion, may give them cloaths, money, or neceſſaries, not exceeding the value of ten pounds. In the mean while, the corporation of the *hoſpital* may employ the children educated and maintained here in any ſort of labour, or manufacture, or in the ſea ſervice; and bind ſuch children apprentices, or place them out as ſervants, or mariners, to any huſbandman, maſter or captain of a ſhip, or other perſon, until the aforeſaid reſpective ages. The corporation of this *hoſpital* is allowed to purchaſe lands or tenements to the yearly value of 4000 l.

Hospital, *French*, in the pariſh of St. Luke, was erected in the year 1717; and the governors of it, by letters patent of Geo. I. anno 1718, were conſtituted a body politic and corporate, by the appellation of *The governor and directors of the* HOSPITAL, for the *poor French Proteſtants and their deſcendants, reſiding in Great Britain.* To this foundation belong a governor, ſub-governor, treaſurer, ſecretary, ſteward and chaplain, phyſician, ſurgeon and matron.

Hospital, *St. George's*, near Hyde-park Corner, was inſtituted in 1733 for the relief of the poor, ſick, and lame, who are ſupplied with advice, medicine, diet, waſhing, lodging, and ſome of them alſo with cloaths. This *hoſpital* is under the direction of a general board of the governors, who meet regularly five times a year. The qualification for a governor is 5 l. as an annual ſubſcription, or 50 l. as a ſingle benefaction. The king is preſident, there are three vice-preſidents, two treaſurers, four phyſicians, four ſurgeons and one aſſiſtant ſurgeon, ſix viſiting apothecaries: the domeſtic officers are a chaplain, apothecary, ſecretary, matron, and meſſenger. Beſides the patients that are admitted into the houſe, relief is afforded to a conſiderable number of out-patients. Recommendations to this charity are received every Wedneſday morning.

Hospital, *Greenwich*, is a retreat for ſeamen, who, by age, wounds, or other accidents, are diſabled from ſervice; and for the widows and children of ſuch as are ſlain in the ſervice.

This, in point of magnificence and ſpaciouſneſs, greatly excels even Chelſea *hoſpital*. King William and Queen Mary had the benevolent deſign of eſtabliſhing this *hoſpital* much at heart; and they accordingly made a grant of the royal palace at Greenwich, a part of which, on the weſt ſide, had been begun to be rebuilt for a royal palace by king Charles the ſecond, and alſo of a large adjoining ſpace of ground, for this purpoſe. King William, after Queen Mary's death, on the 25th of October 1695, appointed by patent a number of commiſſioners for directing the building and endowing of this intended *hoſpital*, and granted a large ſum out of his civil liſt for that end, and his royal ſucceſſors were alſo conſiderable benefactors to it. At length annual ſums were granted by parliament for finiſhing this truly magnificent ornament and glory of Great Britain: and it was fully completed in the reign of George the IId. By an act of the 7th and 8th of king William, cap. 21. the privilege of admiſſion into this *hoſpital* was granted to regiſtered ſeamen, when maimed or ſuperannuated, and to the widows and children of thoſe, who were killed in the ſervice. This act for regiſtering ſeamen was enforced by 8 and 9 W. III. cap. 22. but repealed by 9 Anne. Every ſeaman is required to allow out of his wages ſixpence a month, for the better ſupport of the ſaid *hoſpital*; for which duty receivers are appointed &c. The money is paid into a receivers office, on Tower-hill, which is under the management of three commiſſioners and their clerks. 8 and 9 W. 3. cap. 23. 10 Anne 2 Geo. II. cap. 7. By the laſt act a ſeaman abſenting himſelf from his ſhip without leave, ſhall forfeit for every day's abſence two day's pay to Greenwich *hoſpital* to be deducted out of his wages: and a ſeaman, not entering into the king's ſervice, who ſhall leave his ſhip before he hath a diſcharge in writing, ſhall forfeit one month's pay, in like manner.

By 8 Geo. II. cap. 29. the net rents and profits of the eſtates forfeited by the attainder of James late earl of Derwentwater, and of Charles Radcliffe, were applied in the firſt place to the completing of the building of Greenwich *hoſpital*; and it is hereby enacted, that all ſeamen in the merchants ſervice who ſhall happen to be maimed in fighting, not only againſt pirates, but againſt any enemy of his majeſty, &c. ſhall be admitted into and provided for in the ſaid *hoſpital*, as well as ſeamen maimed or diſabled in the king's actual ſervice: and in the next place, the whole net rents of thoſe forfeited eſtates ſhall be for ever applicable for the ſupport of the ſaid royal *hoſpital*, for the better maintenance of the ſeamen therein, worn out and become decrepit in the ſervice of their country. This law was farther explained and amended by 11 Geo. II. cap. 30.

Proviſion is made for ſecuring the payment of the ſix pence per month from privateers by 18 Geo. II. cap. 21. and for ſecuring prize money belonging to the *hoſpital* by 20 Geo. II. cap. 24. The governors are empowered to grant out penſions to decrepit ſeamen, by 3 Geo. III. cap. 16. and perſons perſonating or falſely aſſuming the name and character of out-penſioners, ſhall be guilty of felony without benefit of clergy: and thoſe who receive half-yearly penſions ſhall, together with the printed bill delivered to them by the commiſſioners, produce a certificate under the hand of the miniſter and churchwardens, where they reſide, teſtifying that they are the perſons named in ſuch bill.

To this *hoſpital* there belong 2169 penſioners, 140 boys, and 138 nurſes. The penſioners are cloathed in blue, and are allowed ſtockings, ſhoes, linen, and a ſhilling a week for other neceſſaries. The victualling is according to the allowance of Chelſea *hoſpital*, viz. four men to a meſs, each meſs to contain four pounds of fleſh, a gallon of beer, &c.

The governors of this *hoſpital* are the great officers of ſtate, and perſons in high poſts under the king; and it is under the more particular inſpection and government of twenty-four commiſſioners, a governor with an annual ſalary of 1000l. and clerk; a lieutenant governor, whoſe ſalary is 400l. a year; four captains, allowed 230l. a year each; and ſeven lieutenants, with 115l. a year each; a treaſurer whoſe ſalary is 200l. with two clerks; ſecretary, with 160l. a year and clerk, auditor whoſe annual ſalary is 100l. and clerk, ſurveyor with 200l. ſalary, clerk of works at five ſhillings a day, a phyſician at ten ſhillings a day, a ſurgeon with an annual ſalary of 150l. a ſervant and two aſſiſtants, diſpenſer with 50l. a year and his aſſiſtant, two chaplains with a ſalary of 130l. each, ſteward with a ſalary of 160l. and three clerks, clerk of checque with 100l. ſalary and three clerks; brewer, three matrons, organiſt, meſſenger, two chief cooks and four mates, ſcullery man and two mates, butler and two mates, porter and barber.

Hospital, *Guy's*, ſituated in the pariſh of St. Thomas, Southwark, was founded in his life-time, by Thomas Guy, eſq. a very wealthy citizen and bookſeller of London. For this purpoſe he took a leaſe of a piece of ground belonging to St. Thomas's *hoſpital*, for the term of 999 years, at a ground-rent of 30l. per annum; the foundation of the intended *hoſpital* was laid in 1722, and the fabric was roofed before the death of the founder, which happened in the year 1724. The charge of erecting and furniſhing this *hoſpital* amounted to the ſum of 18793l. and the ſum left to endow it to 200,000l. and upwards. The governors of this *hoſpital* were incorporated by act of parliament, made in the eleventh year of Geo. I. Anno 1725, under the title of *The Preſident and Governors of the* HOSPITAL founded at the ſole coſt and charges of Thomas Guy, eſq. and under this title they are impowered to purchaſe, either in perpetuity or for a term of years, any eſtate not exceeding 12,000l. per annum. The number of governors appointed to be choſen from thoſe of St. Thomas's *hoſpital* by the founder is ſixty; and it is enacted, that if the number does not exceed 40, the vacancies ſhall be ſupplied by the lord chancellor, lord keeper, or commiſſioners of rhe great ſeal, lords chief juſtices of the king's bench and common pleas, and lord chief baron of the exchequer, ſo as to make up the number of fifty. It is alſo enacted, that the management of the *hoſpital* be referred to a preſident, treaſurer, and twenty-one governors; forming a committee appointed by a general court, ſeven of whom are annually changed; this committee is impowered to chuſe, and at pleaſure to remove, all officers and ſervants employed in the *hoſpital*, except the phyſicians, ſurgeons, clerk, and chaplain, who are elected by the general court, to appoint their ſalaries, to admit objects of charity, and in general to tranſact the affairs of the *hoſpital*, ſubject to the inſpection and control of a general court: and this general court has power to make any by-laws for the better government of the corporation. This *hoſpital* ſo liberally endowed by its founder, was eſtabliſhed for the reception and relief of upwards of 400 ſick and diſeaſed poor objects; beſides twenty incurable lunatics, who are provided for in a ſeparate building. Since the deceaſe of Mr. Guy, the governors have taken a leaſe of an additional ſpot of ground, for which with the former, they annually pay to St. Thomas's *hoſpital* the ſum of 100l. on this ground they have erected two handſome wings; in the centre of one wing there is a ſpacious hall and rooms for public buſineſs, and oppoſite to it in the other a neat and elegant chapel, in which there is a finely executed ſtatue of the founder by Mr. Bacon. The corner houſe in one wing is for the reſidence of the treaſurer, and the other houſes are for the chaplain, ſteward, and apothecary. This *hoſpital* is under the medical inſpection of three phyſicians and three ſurgeons, who are allowed 40l. a year each, an apothecary, who has 90l. a year for himſelf and aſſiſtant, and a houſe. The officers are a clerk, chaplain, ſteward, accomptant, matron, butler and aſſiſtant; ſurgery man, porter, beadle, keeper of the lunatic men, and keeper of the lunatic women. It contains at this time, 13 wards and 411 beds; and the number of patients admitted into this *hoſpital*, at an average for the laſt ten years, has been 2244 yearly; of whom 2014 have been diſcharged, and 230 have died: under the prudent conduct of the treaſurer and governors, it does great honour to the liberality of its founder. The day of admiſſion to this *hoſpital* is Wedneſday. We ſhall add under this article, that Mr. Guy has bequeathed to the preſident and governors of *Chriſt's* HOSPITAL, a perpetual annuity of 400l. for taking into the ſaid *hoſpital* four children yearly, at the nomination of the governors of his *hoſpital*: preference being always given to his own relations, who have never failed to offer themſelves. To his poor aged relations he gave annuities during life to the amount of 870l. and among his younger relations and executors the ſum of 75589l. together with the ſum of 1000l. for diſcharging poor priſoners, within the city of London, and counties of Midddleſex and Surry, who could be releaſed for the ſum of five pounds.

He likewiſe erected an almshouſe, with a library, at Tamworth, where his mother reſided, and which he repreſented in ſeveral parliaments, for the uſe of fourteen poor men and women; to whom he allowed certain penſions during life, and at his death, for their future ſupport and putting out children apprentices &c. he bequeathed a perpetual annual ſum of 115l. Mr. Guy alſo built and finiſhed, at his own expence, in the year 1707, three wards on the north ſide of the outer court of St. *Thomas's* HOSPITAL; and gave to the ſame 100l. per annum, for eleven years immediately preceding the foundation of his *hoſpital*. Some time before his death, he removed the frontiſpiece of the ſaid *hoſpital* of St. Thomas, which ſtood over the gate-way in the borough, and erected the ſame in the place where it now ſtands, fronting the ſtreet; and having enlarged the gate-way, rebuilt the two large houſes on the ſides thereof, and erected the ſtately iron-gate between them, at an expence of between 2 and 3000l. To many of his relations he gave ſtated allowances of 10 or 20l. per annum, and to others, money for advancing them in the world.

Hospital, *of Jeruſalem*. See **Hospitaler**.

Hospital, *Jews*, called *Beth-holem*, or houſe for the relief of the ſick, was founded by ſubſcription in 1748. This charity, which adminiſters medicines and advice gratis, is maintained by a certain ſum, allowed by the ſynagogue, and private contributions, amounting to about 500l. a year. They have likewiſe a ward aſſigned for poor lying-in women.

Hospital, *Lock*, near Hyde-park Corner, was inſtituted in the year 1746, for the relief of foul patients. Every gentleman ſubſcribing five pounds a year or upwards ſhall be a governor of this *hoſpital*, and whoever gives a benefaction of fifty pounds at one time becomes a governor for life. This *hoſpital* is under the direction of a preſident, ſeven-vice preſidents, two treaſurers, and a committee of the governors. It is attended by a phyſician, two ſurgeons, and two viſiting apothecaries. The officers are, a chaplain, houſe-ſurgeon, ſecretary, collector, and matron.

Hospital, *London*, in Mile-end road, was inſtituted in 1740, and incorporated in 1758. This *hoſpital* is ſupported in a very large and commodious building, furniſhed with about 215 beds, by voluntary contributions for the relief of all ſick and diſeaſed perſons. The charity is under the government and direction of a preſident, three vice-preſidents, a treaſurer, and of ſuch perſons, who, by giving a benefaction of thirty guineas or more at one time become governors for life; or who ſubſcribe five guineas or more per annum. A houſe-committee of twelve governors is appointed at every general quarterly court, one of whom is choſen chairman; four of theſe governors take the firſt month, four the next, and the other four the laſt month of the quarter; and they meet every week at the *hoſpital* to tranſact the neceſſary buſineſs.

There is alſo a committee of accounts and a phyſical committee, each of which conſiſts of twelve governors. The management of the houſe is inſpected by two governors, appointed viſitors by the houſe-committee. Three phyſicians and three ſurgeons attend this *hoſpital*: the officers are a chaplain, apothecary, ſecretary and receiver, ſteward and two matrons. Every governor is entitled to ſend one in-patient at a time, and out-patients without limitation. Subſcribers, that are not governors, may ſend as many out-patients, as they pleaſe: the day of admiſſion is Tueſday. Since the inſtitution of this *hoſpital*, upwards of 392,063 diſtreſſed objects have been relieved by it.

Hospital, *St. Luke's, for lunatics*, in Upper Moor-fields was inſtituted in 1751. Perſons paying the entire ſum of twenty guineas or upwards, or pay ing five guineas at leaſt, and ſigning an agreement to pay five guineas yearly for the four next ſucceeding years, are admitted governors of this *hoſpital*; nine of whom conſtitute a general court, to be held twice every year. At one of theſe courts one preſident, four vice-preſidents, a treaſurer, a general committee, phyſician, ſurgeon, apothecary, and ſecretary, ſhall be elected for the enſuing year. The general committee is impowered to tranſact all the neceſſary buſineſs of this *hoſpital*, and to appoint ſub-committees. Patients are admitted into this *hoſpital* according to the order of time in which their petitions, previouſly ſigned by a governor, have been delivered to the ſecretary, and without any expence, except that the pariſh poor ſhall provide their bedding, which they may take away at their diſcharge. But no perſon can be admitted into this *hoſpital* who is not poor and mad; or who hath been a lunatic more than twelve calendar months; or who hath been diſcharged uncured from any other *hoſpital* for the reception of lunatics, or who is troubled with epileptic or convulſive fits; or who is deemed an ideot; or who is infected with the venereal diſeaſe; nor any woman with child. Beſides a petition, the governors require two printed certificates; one teſtifying the above particulars, ſigned by the miniſter and churchwardens, or overſeers of the poor of the pariſh or place where the propoſed patient reſides; and the other to the ſame purpoſe, ſigned by ſome phyſician, ſurgeon, or apothecary, who hath viſited ſuch patient; which ſignatures muſt be atteſted upon oath.

On the admiſſion of every patient, two reſponſible houſekeepers enter into a bond to the treaſurer, in the penalty of 100l. to take away ſuch patient within ſeven days after notice for that purpoſe from the committee or ſecretary. It it alſo provided, that the general committee may receive immediately into this *hoſpital* any patient who ſhall have been diſcharged cured, in caſe ſuch patient relapſe within two months; and that ſuch patients who have been diſcharged uncured, not exceeding thirty, ſhall be admitted by rotation; on condition of the payment of five ſhillings per week for each, till the charity ſhall be enabled to leſſen that expence.

It appears from the printed ſtate of this *hoſpital*, that the balance of the *hoſpital* eſtate in the funds on the firſt day of January 1779 was 89150l. 4*s.* 11*d.* and that from the opening of the *hoſpital* on the 30th of July 1751, to the 30th of July 1780, 2812 patients have been received into the houſe, of whom 1286 have been diſcharged cured; and that 105 perſons diſcharged uncured have been again received into the houſe at five ſhillings a week.

Hospital, *Lying-in.* There are ſeveral *hoſpitals* of this kind in the cities or ſuburbs of London and Weſtminſter. The Middleſex *hoſpital* for ſick and lame, and lying-in married women, in Mary-le-bone Fields, was inſtituted in 1745: it is under the direction of a preſident, five vice preſidents, two treaſurers, and a committee of the governors; the qualification for a governor is an annual ſubſcription of three guineas, and of a governor for life thirty guineas at one payment. The lying-in ward in this *hoſpital* has no communication with thoſe of the ſick and lame. The patients are viſited by four phyſicians, two men-midwives, and four ſurgeons. The domeſtic officers are a houſe-ſurgeon, chaplain, ſecretary, collector, apothecary, and two matrons or midwives. The day for admiſſion of patients is Tueſday.

The *Britiſh lying-in hoſpital* for married women in Brownlow-ſtreet, Long-acre, was inſtituted in 1749. This *hoſpital* is governed by a preſident, four vice-preſidents, a treaſurer and a committee of fifteen governors, who meet every Friday to receive the women recommended, and to direct the ordinary affairs of the houſe. The qualification of an annual governor is a ſubſcription of three guineas or upwards per annum, and of a perpetual governor a ſingle payment of thirty guineas. This *hoſpital* is occaſionally viſited by two phyſicians, and two ſurgeons: and it is provided with an apothecary, chaplain, ſecretary, matron and midwife, ſix nurſes and ſixty two beds. Four female pupils, being widows or married women, not leſs than twenty-five years of age, and of approved character, are permitted to attend this *hoſpital*, for inſtruction in midwifery, and have a right to ſtay in the *hoſpital* ſix months. They are to board in the *hoſpital*, and dine at the ſteward and matron's table; and on leaving the *hoſpital* to receive certificates of their qualification. The expences of inſtruction and board are ſettled by a general court.

The city of London lying-in hoſpital for married women, in the city-road, was inſtituted in 1750. The government of this *hoſpital* is referred to a preſident, four vice-preſidents, and a treaſurer, choſen annually from among the governors and ſelect committees. The ſubſcription of twenty guineas conſtitutes a governor for life; thoſe who ſubſcribe five guineas, or three guineas per annum, are governors ſo long as they continue their ſubſcription, and may recommend one pregnant woman at a time. A general court is held four times a-year, which appoints a houſe-committee conſiſting of thirteen governors, who meet every Tueſday to receive and diſcharge women, &c. This *hoſpital* is viſited by a phyſician in ordinary, men-midwives and two ſurgeons. It is alſo provided with an apothecary, chaplain, ſecretary, matron or midwife, and a ſufficient number of nurſes and ſervants.

The Weſtminſter new lying-in hoſpital, on the Surry ſide of Weſtminſter bridge, was inſtituted by ſubſcription in the year 1765. It is governed by a preſident, ſix vice-preſidents, and a committee of governors. It is attended by two men-midwives, a conſulting phyſician, two ſuperintendant apothecaries, and a ſurgeon. The officers are a ſecretary, receiver, and matron or midwife.

Hospital, *Magdalen*, in St. George's Fields, was inſtituted in the year 1758 for the relief and reformation of proſtitutes. The queen is patroneſs of this charity; it is under the direction of a preſident, ſix vice-preſidents, treaſurer and committee of thirty governors. It is attended by a phyſician, two ſurgeons and two apothecaries. The domeſtic officers are a chaplain, ſteward, ſecretary, matron and aſſiſtant, and meſſenger and aſſiſtant. Twenty guineas conſtitute a governor for life, and an annual ſubſcription of five guineas is a qualification for a governor for one year, which ſubſcription, when it amounts to twenty-five guineas, qualifies a governor for life. In twenty one-years, viz, from Aug. 10, 1758, to Dec. 25, 1779, there have been admitted into this *hoſpital* 1929, of which number 1209 have been reconciled to, and received by their friends, or placed in ſervice in reſpectable families, and to trades.

Hospital, *Miſericordia*, in Goodman's Fields, was eſtabliſhed by ſubſcription, in 1774, for the cure and relief of indigent perſons afflicted with the venereal diſeaſe. It is under the direction of a preſident, four vice-preſidents, treaſurer, and governors. It is attended by a phyſician, and two ſurgeons: the officers are a chaplain, ſecretary, clerk, apothecary, and matron.

Hospital, *St. Peter's*, at *Newington-Butts*, was erected by the company of Fiſhmongers, by virtue of letters patent of king James I. in 1618, for the reception of divers of their poor members, who had penſions bequeathed them by the wills of ſome of their company.

Hospital, *Royal*, for diſabled ſoldiers, commonly called *Chelſea-College*.

It was founded by king Charles II. carried on by king James II. and finiſhed by king William and queen Mary.

The building is very ſpacious and magnificent: its figure is a Π; the middle or front part whereof conſiſts of a chapel and hall; the other two lines, being four ſtories high, are divided into wards or galleries, two in each ſtory; containing each twenty-ſix diſtinct apartments for the foot-ſoldiers. At each of the four corners of the main building, there is a pavilion, in one whereof is the governor's lodging, and the council-chamber; the other being lodgings for ſeveral of the officers of the houſe. Beſide the main building, there are four wings or out-buildings; one for the infirmary, another for ſeveral officers of the houſe, another for old maimed officers of horſe and foot; and the fourth for the baker, laundreſs, &c. The number of ordinary penſioners is 476; beſides the officers and ſervants in the houſe: the out or extraordinary penſioners are alſo very numerous; and theſe, upon occaſion, do duty in the ſeveral garriſons, from whence draughts are made for the army, &c.

The penſioners are all provided with cloaths, diet, waſhing, lodging, firing; and have one day's pay in every week for ſpending-money.

The qualifications required to be admitted of this body, are, that the candidate bring a certificate from his ſuperior officer, that he has been maimed or diſabled in the ſervice of the crown; or that he has ſerved the crown twenty years, which muſt be made appear by muſter-rolls.

To defray the charges of this *hoſpital*, there is a conſiderable ſum paid yearly out of the poundage of the army; beſide one day's pay of each officer, and each common ſoldier, every year, which in time of war, amounts to a very conſiderable ſum.

For the adminiſtration of this *hoſpital* there are commiſſioners, a governor whoſe ſalary is 500l. per annum, a lieutenant governor with 400l. a major with 150l. an adjutant with 100l. two chaplains with 100l. a year each, a phyſician and ſurgeon, whoſe ſalaries are 100l a year each, beſides ſurgeon's mates and apothecary, a treaſurer, who is the pay-maſter-general of the land-forces for the time being; and his deputy and clerk, ſecretary and regiſter and clerks, agent and pay-maſter to the out-penſioners and his clerks, comptroller, ſteward, &c. &c.

Hospital, *Scots*, or *Corporation*, was formed for the relief of the aged and neceſſitous poor of Scotland, within the cities of London and Weſtminſter, and incorporated by charter in 1665, which was confirmed by letters patent of Charles II. in 1666, by the appellation of *The Scots hoſpital of king Charles II.* to be governed by eight Scotſmen, who were allowed to elect thirty-three aſſiſtants, and to purchaſe in mortmain 400l. per annum, above the annual ſum mentioned in the firſt charter. This corporation has a hall in Black-Friars: the officers belonging to it are a treaſurer, regiſter, two ſtewards and a beadle; and the ſum annually diſburſed by the ſociety is about 600l.

HOSPITAL, *Small-Pox*, or HOSPITAL for relieving poor people afflicted with the ſmall-pox and for inoculation, was inſtituted by voluntary ſubſcription in the year 1746. This *hoſpital* conſiſts of two houſes, at a due diſtance from each other, in airy ſituations. The houſe for preparing patients for inoculation is at Pancras, and that for receiving them when the diſeaſe appears, and for accommodating patients who have it in the natural way, is in Cold-bath Fields. The king is the patron of this *hoſpital*, and it is under the ſubordinate government of a preſident, four vice-preſidents, a treaſurer and a committee of thirteen governors, choſen at general courts, which are held half-yearly. Thirty guineas conſtitute a governor for life, and five guineas per annum a governor during ſuch ſubſcription. Every governor is entitled to have one patient in the houſe for inoculation, and one in the houſe for the natural way, at the ſame time. Patients in the natural way are received every day, whenever there are vacancies; and thoſe for inoculation are alſo received every day, provided they come before nine in the morning. The *hoſpital* is under the medical care of a phyſician; and each houſe has its apothecary and matron and proper nurſes. From the annual ſtate of this *hoſpital*, it appears, that there have been received into the houſe for the natural way, from September 26, 1746 to the 24th of March 1780, 14833 patients; and there have been inoculated to the ſame period 18716.

HOSPITAL, *Sutton's*. See CHARTREUSE.

HOSPITAL, *St. Thomas's*, in Southwark, is eſtabliſhed for the ſame purpoſes as that of St. Bartholomew.

It was originally founded an *hoſpital*, by Richard prior of Bermondſey, in 1213, and ſurrendered to king Henry VIII. in 1538; in the year 1551, the mayor and citizens of London, having purchaſed of king Edward VI. the manor of Southwark, including this *hoſpital*, repaired and enlarged it, and admitted into it 260 poor, ſick and helpleſs objects; wherefore the king in 1553 incorporated it together with thoſe of Chriſt and Bridewell. This ancient ſtructure, much damaged by time and by fire, was rebuilt by voluntary ſubſcription in the year 1693; and by additional buildings greatly enlarged; in conſequence of which it conſiſted of three beautiful ſquares; to which the governors, in 1732, added a magnificent new building, conſiſting of ſeveral wards, a brew-houſe and other neceſſary offices, at their own expence. It now conſiſts of four quadrangular courts; in the firſt are wards for women; in the ſecond two chapels, the leſſer for the private uſe of the *hoſpital*, and the larger, parochial; in the ſame court and adjoining to it, are the houſes of the treaſurer, and other officers; in the third court are ſeveral wards for men; the fourth hath alſo wards, hot and cold baths, a ſurgery, theatre, apothecary's ſhop &c. The number of patients relieved by this *hoſpital* in the year 1780 was 8624; and 3007 in-patients, and 4693 out-patients were diſcharged cured. The annual diſburſements of this *hoſpital* are about 8000l. The governors of this *hoſpital* are the lord mayor and court of aldermen, and the number of others, who on receiving a governor's ſtaff, give a benefaction of 50l. or upwards, is unlimited; but it is commonly between four and five hundred. They chooſe their officers and ſervants, who are a preſident, treaſurer, hoſpitaller or chaplain, beſides the miniſter of the pariſh, who is paid by the *hoſpital*, three phyſicians, three ſurgeons, apothecary, clerk, receiver, ſteward, matron, butler, and brewer, baker, cook, aſſiſtant and ſervant, an aſſiſtant clerk in the compting-houſe, two porters, four beadles, nineteen ſiſters, nineteen nurſes, nineteen watch-women, a chapel-clerk and ſexton, and one watchman. The houſe contains at this time eighteen wards and 485 beds.

Beſides the *hoſpitals* already enumerated, there are royal *hoſpitals*, ſuch as that at Haſlar, near Portſmouth, for ſick and hurt ſeamen and marines, and the royal *hoſpital* at Plymouth, and many others, ſupported by the benefactions of private and voluntary contributors, which provide relief for almoſt every ſpecies of diſeaſe or injury.

HOSPITALS, *Camp*, are either general or regimental.

The general *hoſpitals* are of two kinds, viz. the flying *hoſpital*, attending the camp at ſome convenient diſtance, and the ſtationary *hoſpital*, which is fixed to one place. In the choice of both, it will be better to have them in towns than villages, as the former will afford larger wards, beſides more of other conveniencies: theſe wards ſhould be as airy as poſſible.

As to the diſpoſition of *hoſpitals*, in regard to preſerving the purity of the air, the beſt rule is to admit but few patients into each ward. It will alſo be found a good expedient, when the ceilings are low, to remove ſome part of them, and to open the garret-ſtory. The doors and windows may likewiſe be opened, and VENTILATORS uſed to purify the air of every ward. In winter-*hoſpitals*, the wards are to be warmed with chimneys, and never by ſtoves: for, though the latter may warm a large ward better, and at a leſs expence, yet by ſcarce making any draught of air, they will be apt to increaſe its putrid quality; whereas a fire, kept up in a chimney, acts like a conſtant ventilator.

The general *hoſpital* ſhould receive only ſuch ſick as the regimental ones cannot conveniently contain, together with thoſe who cannot be moved with the army. Without this diſperſion of the ſick, the general *hoſpital*, in bad ſeaſons, would have a greater number than could be well attended; and what is equally, if not more pernicious, it would be too much crouded, by which means the contagion would ſpread, and the mortality be rendered more general.

Regimental *hoſpitals* are of the greateſt importance, and therefore ſhould be ſupplied with blankets and medicines from the public ſtores, with an allowance alſo for nurſes and other neceſſaries. Nor are they to be maintained in the field only, but alſo in winter-quarters, as there will always be a great many more ſick than can be taken care of in the general *hoſpital*.

Barns, ſtables, granaries, and other out-houſes, but above all, churches, make the beſt *hoſpitals*, from the beginning of June to October: for as the greateſt danger ariſes from foul air, which cannot be compenſated by diet or medicine, we may lay it down as a rule, that the more airy and large the *hoſpitals* are, the leſs danger there is of the ſickneſs ſpreading. Pringle Obſerv. on the Diſeaſes of the Army, p. 104, ſeq.

HOSPITAL-*fever*, a name given to the *malignant catarrhal fever*, as being frequent in *hoſpitals*. See FEVER.

Dr. Pringle has given us an elaborate account of the riſe, ſymptoms, and cure of this terrible diſeaſe, in his Obſervations on the Diſeaſes of the Army. It may be owing to a great many concurring cauſes, but the principal are foul and putrid air, occaſioned by filth and impurity of any kind. Hence it is no wonder that it prevails in marſhy countries after hot ſeaſons, and in populous cities; eſpecially if low, and ill aired, unprovided with common ſhores, or where the ſtreets are narrow and foul, the houſes dirty, water ſcarce, and where jails or hoſpitals are crouded, and not ventilated and kept clean; when in ſickly times the burials are within the town, and the bodies not laid deep; when ſlaughter-houſes are alſo within the walls; or when dead animals or offals are left to rot in the kennels, or on dunghills; when drains are not provided, to carry off any large body of ſtagnating or corrupted water, in the neighbourhood; when fleſh meats make the greateſt part of the diet, without a proper mixture of bread, greens, wine, or other fermented liquors; from the uſe of old and muſty grain, or what has been damaged by a wet ſeaſon; or, laſtly, when the fibres are relaxed by immoderate warm bathing.

When the diſeaſe comes on ſlowly, the ſymptoms are ſmall interchanges of heats and cold, trembling of the hands, interrupted ſleep, &c. But when it advances faſt, the above ſymptoms are all in a higher degree; and beſides theſe, the patient is afflicted with great laſſitude, a nauſea, pains in the back, a conſtant pain and confuſion in the head, a dejection of ſpirits, and an uncommon tremor of the hands. If the ſick lie warm, and have had no preceding flux, the body is generally coſtive; but when they lie cold, as they often do in field-hoſpitals, the pores of the ſkin being ſhut, a diarrhœa is a common ſymptom: in the worſt caſes, a flux appears in the laſt ſtage: when the ſtools are involuntary, colliquative, ichorous, or bloody, and of a cadaverous ſmell, which are the effect of a mortification of the bowels, and the ſigns of approaching death: ſome are never delirious, but all are under a great ſtupor or confuſion. The petechiæ are the frequent, but not inſeparable attendants of the fever: they are ſometimes of a brighter or paler red, at other times of a livid colour, but are never raiſed above the ſkin. For the moſt part, theſe ſpots are ſo little conſpicuous, that unleſs looked for attentively, they may eſcape notice. They are thickeſt on the breaſt and back, leſs on the legs and arms, and the Dr never remembers to have ſeen any upon the face. This fever, though of the continued kind, has often exacerbations at night, with remiſſions, and partial ſweats next day; and, after a long continuance, is apt to change into a hectic, a remitting, or intermitting form.

Prognoſtics in it. To have a little delirium, the ſtrength little impaired, turbid urine in the decline of the diſeaſe, and at the ſame time a gentle ſweat or moiſture diffuſed over the body, are reckoned good ſigns; and it ſeems peculiar to malignant fevers, that deafneſs is rather a good ſign.

Method of cure. This varies according to the ſtate of the diſeaſe, which may be diſtinguiſhed into three periods; the firſt continuing as long as the perſon is able to go about; the ſecond beginning with his confinement, and the third when the pulſe ſinks and a ſtupor comes on.

In the firſt, as well as in the other periods, the cure is principally to be aimed at by removing the patient out of the foul air. When this cannot be done, the ward or room ſhould be purified by making a ſucceſſion of air by means of fires, or letting it in by doors and windows, or diffuſing the ſteams of vinegar.

The next thing to be done, is to promote a diaphoreſis, which, in this period, ſhould only be attempted by mild ſudorifics, as the ſpiritus Mindereri.

When the fever is confirmed, contrayerva powders, with nitre, camphor, the common ptiſan acidulated, and ſuch medicines as are good in inflammatory caſes, ought to be given. Coſtiveneſs is to be prevented by emollient clyſters. But opiates are dangerous, both in this and the third ſtage, in which the pulſe ſinks, and ſtupor is greater, a delirium impends, and petechiæ often appear. When this is obſerved to be the caſe, the nitre and diaphoretic medicines are to make room for a decoction of ſnake-root, to which a ſmall quantity of ſtrong water may be added. It may alſo be given in ſubſtance from two to four ſcruples a day, with ſenſible good effects. Towards the decline of the fever, an equal quantity of Peruvian bark may be joined with the root. Wine is alſo an excellent cordial at this period, and may be given either made into whey, or added to the panada, which was the only food allowed to the ſick. It may be taken from half a pint to a quart a day, according to the ſtrength of the patient. Perhaps there is no rule of more importance, than to give ſtrict charge to the attendants of the ſick, never to let the patient, when low, remain above two or three hours without taking ſomething cordial and nouriſhing. But however neceſſary wine, volatiles, and other cordials are, in this low ſtate of the fever, it ought to be remembered, that they muſt never be given with an intention to force a ſweat, but only as antiſeptics, and to ſupport the *vis vitæ*. If there be danger of a phrenitis coming on, it will be proper to call in the aſſiſtance of epiſpaſtics. Sinapiſms too may be uſed when the pulſe is greatly ſunk. If a diarrhœa comes on in the decline of the fever, it is to be moderated by adding a few drops of the tinctura thebaica to the full quantity of the alexipharmic decoction; or by giving a ſpoonful or two of an aſtringent mixture. In proportion, however, to the putrid nature of the ſtools, aſtringents are to be uſed with the more caution. When the fever is over, there are few but complain of a vertigo, and want of reſt; a continuation of the deafneſs, and other nervous ſymptoms, are frequently the conſequence of great lowneſs; in which caſe, the pilulæ Matthæi are to be given at night, with analeptics and medicines of the ſtrengthening kind. Vide Pringle's Obſerv. on Diſeaſes of the Army, p. 243. 278.

HOSPITALER, one that entertains and provides for poor people, travellers, &c.

The appellation is chiefly given to certain communities of religious; as, the *hoſpitalers* of Elſefort in Eſſex, inſtituted to take care of lepers; *hoſpitalers* of St. John Baptiſt, of Coventry; *hoſpitalers* of St. Julian; *hoſpitalers* of St. Leonard, at York, &c.

The religious *hoſpitalers* generally follow the rule of St. Auguſtine. Moſt of them pretend, that St. Martha was their firſt foundreſs, and choſe her for their patron, becauſe ſhe entertained Jeſus Chriſt at her houſe. Some of them go back to the patriarch Abraham for their founder.

There are alſo *hoſpitalers* among the military orders; ſuch as the knights of St. Lazarus, and St. John of Jeruſalem.

Hospitalers, Hospitalarii, more particularly denote an order of religious knights, who built an hoſpital at Jeruſalem, wherein pilgrims were received. To theſe pope Clement V. transferred the effects and revenues of the Templars; whom, by a council held at Vienne, he ſuppreſſed, for their many and great miſdemeanours.

Theſe *hoſpitalers* were otherwiſe called *Knights of St. John of Jeruſalem*; and are the ſame with thoſe whom we now call *Knights of* Malta.

Hospitaler, in *Mythology*, is a name which the ancient Romans gave to Jupiter, calling him Jupiter Hoſpes, becauſe they conſidered him as the guardian of hoſpitality.

HOSPITIUM, *Inn*; a term peculiarly uſed, in our law-books, for an inn *of court*.

Hospitium is alſo uſed for a little convent, which the religious built for the reception of ſtrangers and travellers of the ſame order, who had occaſion to ſtay with them ſome time.

Moſt of theſe *hoſpitia*, or inns, in time became fixed convents.

Hospitium was likewiſe formerly uſed for procuration, or viſitation money.

HOSPODAR, the title borne by the princes of Walachia and Moldavia.

The *hoſpodars* of Walachia and Moldavia receive the inveſtiture of thoſe principalities from the grand ſeignior, by a veſt, and a ſtandard which he gives them.

They are ſometimes depoſed by him; though in other reſpects they have ſovereign power within their ſtates.

HOST, Hospes, which ſome will have thus called, *quaſi hoſtium*, or *oſtium petens*; for *oſtium* was anciently written with an aſpirate; a term of mutual relation, applied both to a perſon who lodges and entertains another, and to the perſon thus lodged, &c.

Thus the innkeeper ſays, he has a good *hoſt*, in ſpeaking of the traveller who lodges with him; and the traveller again ſays, he has a kind *hoſt*, in ſpeaking of his landlord. It muſt be obſerved, then, that it was the cuſtom among the ancients, when any ſtranger aſked for lodging, for the maſter of the houſe, and the ſtranger, each of them to ſet a foot on each ſide of the threſhold, and ſwear they would neither of them do any harm to the other. It was this ceremony that raiſed ſo much horror againſt thoſe who violated the law or right of hoſpitality on either ſide; inaſmuch as they were looked on as perjured. Inſtead of *hoſpes*, the ancient Latins called it *hoſtis*, as Cicero himſelf informs us; though, in courſe of time, *hoſtis* came to ſignify an *enemy*; ſo much was the notion of hoſpitality altered.

Host is alſo uſed by way of abbreviation for hostia, a victim, or ſacrifice, offered to the Deity.

In this ſenſe, *hoſt* is more immediately underſtood of the perſon of the Word incarnate, who was offered up a *hoſt*, or *hoſtia*, to the Father on the croſs, for the ſins of mankind.

Host, or Hoast, is chiefly uſed in the Romiſh church, for the body of Jeſus Chriſt, contained under the ſpecies of bread and wine, which is offered up every day, a new *hoſt*, or ſacrifice in the maſs.

Pope Gregory IX. firſt decreed a bell to be rung, as the ſignal for the people to betake themſelves to the adoration of the *hoſt*.

The veſſel wherein the *hoſts* are kept, is called the *cibory*; being a large kind of covered chalice.

HOSTAGE, formed of *hoſt*, and that of *hoſpes*, a perſon left as ſurety for the performance of the articles of a treaty.

When two enemies are on the point of concluding a treaty, or capitulation, it is frequent for them to give *hoſtages* on each ſide, as ſureties for the execution of what is contained therein.

A *hoſtage* is either a principal, or an acceſſary, according to the ſtate of the caſe. He is only an acceſſary, when, for inſtance, a prince promiſes fidelity to another, and gives up his ſon, or ſome other great lord, to aſſure his engagement, without any farther ſtipulation. For here, if the prince fail of his word, the *hoſtage* is no ways accountable for it.

But the *hoſtage* becomes a principal, when it is expreſly ſtipulated, that he ſhall be anſwerable for the event: for inſtance, if a city engage to ſurrender, in caſe it be not relieved in ſo many days, and to ſecure the engagement, give *hoſtages*, theſe *hoſtages* are what a ſurety is to a creditor for the debt of his principal. So that, if the relief do not come, and yet the citizens refuſe to ſurrender, the *hoſtages* ſtand in their place, become principals, and are liable to be puniſhed for the prevarication of thoſe they are become ſureties for.

A *hoſtage* given for another perſon becomes free when that perſon dies.

HOSTEL, or Hotel, a French term, anciently ſignifying a houſe, or dwelling-place.

It is now more commonly uſed for the palaces or houſes of the king, princes, and great lords.

In this ſenſe they ſay, the *hotel de Condé*, *hotel de Conti*, *hotel de Louvre*, &c.

The grand prevot *de l'hotel* is the firſt judge of the officers of the king's houſhold. His juriſdiction is much like that of lord-ſteward of the houſhold of the king of England.

The *hotel de ville* is what we call a *town-houſe*, or *town-hall*.

Hotel-Dieu, is a common name for the chief hoſpital for the reception of ſick perſons, in moſt of the cities of France.

The **Hotel** *de Mars*, is a hoſpital near Paris; of the ſame nature with Chelſea hoſpital.

HOSTIA, Host, in *Antiquity*, a victim offered in ſacrifice to a deity.

The word is formed from *hoſtis, enemy*; it being the cuſtom to offer up a ſacrifice before they joined battle, to render the gods propitious; or, after the battle was over, to give them thanks. Some chooſe to derive the word from *hoſtio*, q. d. *ferio, I ſtrike*. Iſidore on this word remarks, that the name *hoſtia* was given to thoſe ſacrifices which they offered before they marched to attack an enemy: *Antequam*, ſays he, *ad hoſtem pergerent*, in contradiſtinction from *victims*, which were properly thoſe offered after the victory. Ovid ſeems to diſtinguiſh otherwiſe, when he ſays,

> *Victima quæ cecidit dextra victrice, vocatur*;
> *Hoſtibus a domitis* hoſtia *nomen habet*.

As if the *hoſtia* might be ſlain by any prieſt, but the victim only by the hands of the victor. Fronton makes another diſtinction: according to him, *victima* was a grand oblation, and *hoſtia* a ſmaller and leſs conſiderable one.

HOSTILINA, in *Mythology*, a goddeſs adored among the Romans, and invoked particularly for the fertility of the earth.

HOSTILITY, the action of an enemy. During a truce, all *hoſtilities* are to ceaſe on both ſides: ſuch a city ſtands neuter, and commits no *hoſtilities* on either ſide.

The word is Latin, *hoſtilitas*, formed of the primitive *hoſtis*, which ſignifies *enemy*; and which anciently ſignified ſtranger, *hoſpes*.

HOSTILLERS, in our *Old Writers*, is uſed for inn-keepers; and in ſome old books the word *hoſters* is taken in the ſame ſenſe. 31 Ed. III. cap. 2.

The word is French, *hoſteliers*, of the ſame import.

HOSTIS, in *Antiquity*. See Bishop.

HOT-*bath*. See Bath, and Thermæ.

Hot-*bed*, in *Gardening*, a bed of earth ſheltered from the cold air, and heated by means of a ſufficient quantity of freſh horſe-dung, or tanner's bark, &c. laid underneath it. Its uſe is to forward the growth of plants before the natural ſeaſon, or to force vegetation, where the climate is not ſufficiently warm for the particular occaſion.

By means of *hot-beds*, ſkilfully managed, we can ſo nearly imitate the temperature of other climates, that ſeeds of plants brought from any country between the tropics, may be made to flouriſh even under the poles.

Hot-beds are of general uſe in the northern parts of Europe, without which we could not enjoy ſo many of the products of the warmer climes as we now do, nor have our tables furniſhed with the various products of the ſummer ſo early in the ſpring.

The common *hot-beds*, uſed in kitchen-gardens, are made with horſe-dung, in the following manner: a large quantity of new dung from the ſtable, with the litter among it, ſhould be mixed with ſome ſea-coal aſhes; and when it has ſtood a week, it ſhould be turned over, and the parts ſhould be well mixed together; in this ſtate it may continue five or ſix days longer, and it will then have acquired a conſiderable heat. This dung is then to be placed in a ſhallow trench, made in a ſheltered part of the garden, and dug about a foot or a foot and a half deep, if the ground be dry; but if it be wet, not above ſix inches: the dung muſt then be laid exactly ſmooth and even; and the lower part of the heap, which is commonly free from litter, ſhould be ſcattered over the ſurface of the bed; or the heat may be prevented from riſing, and the mould from burning, by ſpreading a layer of neat's dung over the ſurface of the horſe-dung. If the bed be intended for the planting out of MELONS or CUCUMBERS, there muſt be made, at proper diſtances, where the middle of the light of the glaſs they are to be covered with will come, holes of ten inches over, and ſix deep, which muſt be filled up with freſh earth, thruſting a ſtick in the middle, to ſhew the place where the hole is. The whole bed is then to be covered about four inches thick, with the earth taken out of the trench. When this is done, the beds are to be covered with frames of wood, fitted with lights of glaſs, and after about two days the earth will be of a proper degree of warmth to receive the plants to be ſet in it.

In the making of theſe beds, great care muſt be taken to lay the dung cloſe and even; and if it be full of long litter, it ſhould be trod down, otherwiſe it will heat too violently, and the warmth be ſoon diſſipated. For the firſt week or ten days the glaſſes muſt be but ſlightly covered in the night, and in the day-time carefully raiſed to let out the ſteam, which is ſubject to riſe very copiouſly while the dung is freſh. Afterwards the covering muſt be increaſed; and if the bed cools too faſt, new dung muſt be laid about its ſides, which will give it a great warmth throughout; and by that time this is diſſipated, the ſun's rays will have power enough to ſupply the place of artificial heat. Only, at this time, if the nights happen to be cold, as is indeed often the caſe, it will be neceſſary to lay ſome mowings of graſs about the ſides of the bed.

This is the ſort of *hot-bed* moſt in uſe in kitchen-gardens; but thoſe made with tanners bark are much more proper for the tender exotic plants and fruits, which require a ſteady and equal degree of warmth to be kept up for ſeveral months. In order to the making of theſe, a trench muſt be dug in the earth, about three feet deep, if the ſoil be dry; but if it be wet, it muſt be only dug one foot, and the bed raiſed two feet above ground. The length muſt be proportioned to the number of frames it is intended to be covered with; but it ſhould never be leſs than eleven or twelve feet, nor its breadth leſs than ſix, in order to admit a body of bark ſufficient to keep up the heat. This trench is to be bricked up to the height above mentioned, and in the ſpring ſhould be filled with freſh tanners bark, that is, ſuch as the tanners have lately drawn out of their vats, after having tanned leather with it. This ſhould be laid in a round heap for a week or ten days before it is put into the trench, that the moiſture may run off; it is then to be put into the trench, and gently beat down with a dung-fork; it muſt then be covered with a wooden frame and glaſſes, and in about ten days or a fortnight it will begin to heat, and is then fit to have the pots of plants and ſeeds plunged into it.

A bed of this kind will continue in a good temper of warmth for two or three months; and when the heat declines, if it be ſtirred up thoroughly from the bottom with a fork, and a load or two of freſh bark added to it, will recover its heat, and keep it for two or three months longer.

The frames that cover theſe beds ſhould be proportioned to the plants they are to contain; if for the PINE-*apple*, the back ſhould be three feet high, and the lower part fifteen inches, in order to drain off the wet. If the bed be intended for taller plants, the frame muſt be higher in proportion; but if deſigned only for ſowing of ſeeds, it need not be more than fourteen inches high at the back, and about ſeven inches deep at the front. Miller.

In Holland they make uſe of *hot-beds* made of ſand; which are not ſo apt to raiſe unwholeſome damps, as thoſe of horſe-dung.

Bradley, with very good reaſon, propoſes a thermometer to be uſed to regulate the heat of *hot-beds*. For plants that are either to be brought up in a colder ſeaſon, or colder climate than what they naturally require, you are to take the height at which the thermometer ſtands in their proper ſeaſon, or clime, as a ſtandard; and by applying a thermometer to the *hot-bed*, judge whether the heat is to be increaſed, or remitted. Thus, a *hot-bed* for cucumbers muſt be kept, to raiſe the ſpirit in the glaſs to the ſame height as the natural temperature of the weather will raiſe it to, about the latter end of May and June, when cucumbers will grow abroad, without any artificial heat or ſhelter.

Hot-*houſe*. See Stove, and Hypocaustum.

Hot-*houſe*, in the *Salt Works*, the place where they dry the ſalt after it is taken out of the boiling-pan. In the Cheſhire ſalt-works, this is ſituated between the furnace, and the funnels of the chimney which convey up the ſmoak. Along the floor of this room there run two funnels, nearly in a horizontal direction. From the furnace, after this courſe along the floor, they riſe perpendicularly. In theſe the flame and ſmoak running along, heat the room by the way.

Hot-*ſhoots*, or Hovilses, a ſort of factitious, or compound fire, made of a third part of any coal, pit, ſea, or charcoal, mixed with two thirds of loam.

Theſe ingredients are to be made up into balls, moiſtened with a little urine, round, or in any other form, at pleaſure, and expoſed to the air till thoroughly dry; then may they be built in the moſt orderly fire imaginable, affording a glowing, regular, and conſtant heat, for ſeven or eight hours, without ſtirring. This mixture is alſo uſed in ſome parts to ſlacken the impetuous devouring of the fire, and keep coals from conſuming too faſt.

HOTAMBÆIA, in *Zoology*, the name of a ſpecies of ſerpent found in the Eaſt Indies, of a greyiſh-yellow colour, and very rank ſmell.

HOTCH-POTCH, or Hodge-Podge, from the French *hache in poche*, or, according to Camden, *hachee en pot*, i. e. *boiled in a pot*, primarily denotes a Flemiſh medley diſh, made of fleſh cut in pieces, and ſodden with herbs, roots, &c.

Hotch-Pot, in *Law*, ſignifies a mixture or blending of lands, given in marriage, with other lands in fee accruing by deſcent. Thus, a man ſeiſed of thirty acres of land in fee, hath two daughters, and gives with one of them ten acres in frank-marriage, and dies ſeiſed of the other twenty. If now, ſhe that is thus married will have any part of the twenty acres, ſhe muſt put her lands given in frank-marriage in *hotch-pot*, that is, ſhe muſt refuſe to take the ſole profits of the ten acres, but ſuffer them to be mingled with the other twenty, ſo that an equal diviſion may be made of the whole thirty between her and her ſiſter. Thus, for her ten acres ſhe will be entitled to fifteen. Coke on Littl.

HOTTONIA, in *Botany*. See *Water* VIOLET.

HOTTENTOT *cherry*, in *Botany*. See CHERRY.

HOTTS, or HUTTS, pounces, and round balls of leather ſtuffed or tied on the ſharp ends of fighting-cocks ſpurs, to keep them from hurting one another in SPARRING, or breathing themſelves.

HOVEL, a covering or ſhelter for cattle, made of hurdles or the like, or any other mean building.

HOVELLING, in *Architecture*, is a method of working up the ſides of a chimney, and covering the top with tiles or bricks, ſet up in a pyramidical form, ſo that the ſmoke may eſcape below the current, when the wind makes over the CHIMNEY, or againſt any one ſide of it. This is uſed to prevent the inconvenience ariſing from adjoining buildings higher than the chimney, or from its being in the eddy of any very lofty building, or in the vicinity of high trees: the covered ſide muſt in this caſe be kept towards the building which occaſions the inconvenience.

HOVEN is the name of a diſeaſe incident to horned cattle, on eating too greedily of green clover. This diſeaſe conſiſts of a ſwelling of the paunch, which, without ſpeedy relief, proves fatal. The ſureſt and ſpeedieſt method of relief is that of making an inciſion into the paunch of the beaſt, by which means the wind, that cauſed the ſwelling, will eſcape through the orifice, and the animal recover. This operation is performed with a penknife, the blade of which ſhould be puſhed in, till wind be perceived to iſſue out: the blade may be five inches long, ſharp at the point, but enlarged and rounded off at the edges towards the ſhank, and penetrated quite to the hilt. The wounds thus made ſhould not be ſown up, as they will ſoon heal, provided that the knife does not penetrate too near the hip-bone: it is therefore proper to feel for the ſhort ribs before the puncture is made, and to paſs the knife as near the center as poſſible between theſe ribs and the hip-bone. It is alſo adviſeable, as ſoon as the beaſt is relieved of his wind, to throw up a proper clyſter, as hot as he can bear it.

HOUGH and HOUGHING, in *Gardening*. See HOE and HOEING.

HOUGH, *Ham*, in the *Manege*, the joint of the hind-leg of a beaſt, which connects the thigh to the leg. See HAM.

To HOUGH, *or cut the houghs*, is to ham-ſtring, or to diſable by cutting the ſinews of the ham.

HOUGH, *bony*, is a hard, round ſwelling, or tumor, growing upon the tip or elbow of the *hough*.

It generally proceeds from ſome ſtroke or bruiſe; and if neglected till the ſubſtance of the ſwelling becomes hard, like glue, it proves difficult to cure.

HOUND, *canis venaticus*, a hunting dog. See CANIS and DOG.

Hounds may be diſtinguiſhed, with regard to the manner of their hunting, into ſuch as find out and purſue the game by ſight, and the quickneſs and ſwiftneſs of their motion; of which kind are the *gaze-hound*, *agaſæus*; and *grey-hound*, *canis graius*; the *terrier*, &c. And thoſe which find and purſue the game by the goodneſs of their ſmell.

The ſpecies of ſcenting-dogs may be divided farther; into *hounds*, ſimply ſo called, and *blood-hounds*; each whereof admits of ſome diverſities.

1. As to *hounds*, ſimply thus called, thoſe which are all of one colour, as white, black, &c. are moſt valued; then thoſe ſpotted with red; the white with black ears, and a black ſpot at the ſetting on of the tail, are generally eſteemed the beſt for compoſing a kennel, and are of the beſt ſcent and condition; thoſe ſpotted with dun are leſs prized, as uſually wanting courage and boldneſs. The black-tanned, or the all liver-coloured, or all white, the true talbots, are beſt for the ſtring or line; and the grizzled, whether mixed or unmixed, if their hairs are ſhagged, are uſually the beſt runners. There ſhould always be a couple of theſe in the pack. *Fallow-hounds* are of good ſcent, and hardy, not fearing the water; they keep the chace well, without change; but are not ſo ſwift as the white; they love the hart above any other chace, having little ſtomach for the hare, &c. whence they are not ſo fit for private gentlemen; beſide that, they are apt to run at tame beaſts.

The *dun hounds* are of a more general uſe, being fit for all chaces. Their ſagacity and fidelity in knowing and ſticking to their maſter's voice and horn, and to none elſe, are much admired; they alſo underſtand each other, and know which are babblers, which liars, &c. They are of different ſizes and qualities in the ſeveral countries, &c. Mountainous and woodland parts breed a tall heavy ſort, called *ſlow-hounds*; moderate ſoils, where the champain and covert ſhare pretty equally, produce a middle-ſized *hound* of a nimbler make.

The marks of a good and fair *hound* are to be of a middle proportion, rather long than round, the noſtrils wide, back bowed, fillets great, haunches large, ham ſtrait, tail big near the reins, and the reſt ſlender to the end, the leg big, the ſole dry, and claws large.

For the terms uſed in reſpect of *hounds*, their noiſes, &c. ſee HUNTING.

Nothing is more eſſential to the having a good pack of *hounds*, than a proper care of the whelps, and of the parents from which they are to be bred.

The bitches, in particular, ſhould be carefully choſen, and ſhould be ſuch as are the ſtrongeſt and beſt proportioned; they muſt alſo have large ribs and flanks.

The beſt ſeaſon for the coupling of hounds is in January, February, or March; for then they will litter in a good time of the year, that is, in ſpring; ſo that they will be fit to enter in due courſe, without loſs of time, or of the ſeaſon; for if bitches litter in winter, it is very difficult to bring up the whelps, the cold killing them if there is not great care taken of them.

The dogs that line the bitches muſt not be above five years old; for if they are older than this, the young ones will be dull and heavy. Care ſhould be taken to have a proper dog ready the firſt time of the bitch's going proud; for it is affirmed by many, who ſay they have experience for it, that whatever kind of dog lines a bitch the firſt time, there will be one puppy at leaſt in all her ſucceeding litters that will have ſome reſemblance of him.

The firſt litter of puppies that a bitch brings, are never eſteemed ſo good as the ſecond or third. When a bitch has been lined, and grows big with whelps, ſhe is not to be ſuffered to hunt among the pack, nor to take any other violent exerciſe; for that would endanger her caſting her whelps; ſhe ſhould be kept up, and fed well, and a good place ſhould be provided for her to litter in.

As ſoon as ſhe has littered, thoſe which are intended to be kept ſhould be ſelected out, and the reſt immediately drowned. There is great difficulty in chooſing the beſt at this early time; but the general opinion gives it for thoſe which are the lighteſt, that they will be the ſwifteſt and beſt as they grow up.

Others take all the whelps away; and having determined what number they will keep, they ſettle the choice on thoſe which the bitch carries back firſt to the place where ſhe littered. But all this ſeems very uncertain. Others ſelect that which was pupped laſt.

The whelps muſt have good freſh ſtraw to lie in, and it muſt be often changed. They are to be kept in a place where neither the rain nor ſun-ſhine can be troubleſome to them; and once a week it will be proper to anoint them all over with a little nut-oil, with ſome ſaffron infuſed in it. This will prevent the flies from annoying them ſo much as they otherwiſe would, and will kill worms of all kinds. When they are fifteen days old, it is the cuſtom to worm them, and a week after one joint of their ſtern ſhould be twiſted off. As ſoon as they can ſee, they ſhould have milk given them to lap; and at two months old they muſt be weaned, keeping them wholly from the bitch; they muſt at this time be well kept, but not too high fed; and it is proper to put ſome cumin ſeed into their food, to keep the wind out of their bellies.

Many let the whelps of their hounds ſuck three months, and then ſend them away to villages to be bred up till they are ten months old, cautioning thoſe people who have the care of them, not to let them eat carrion, nor frequent warrens.

Rye-bread is a very common food for young *hounds*, and is particularly recommended by many, but wrongly; for it ſoon paſſes through them, and gives them very little nouriſhment. When they are fed conſtantly with this, in the time of their growing up, they always become narrow-backed; and this is a great fault in this ſort of dog; a broad back being one of the greateſt recommendations in a *hound*. Wheat-bread is greatly preferable on all accounts for the food of the young *hound*, giving him ſtrength and firmneſs.

At ten months old they are to be taken home, and put into the company of the others, to live as they do; and after a few weeks keeping company with the reſt, they are to be coupled, and to go out to hunt.

For the method of entering young *hounds*, ſee ENTRANCE.

It ought to be noted, that whatever young *hounds* are firſt entered at, and rewarded with, they will ever after covet moſt; ſo that if they be intended, e. gr. for the hart, they muſt not be entered at the hare.

2. The *grey*-HOUND, or *leporarius*, or *canis venaticus graius*, might deſerve the firſt place, on account of his ſwiftneſs, ſtrength, and ſagacity, in purſuing his game;

ſuch being the nature of this dog, that he is ſpeedy and quick of foot to follow, fierce and ſtrong to overcome, yet ſilent, coming upon his prey unawares.

Dr. Caius derives the name of the *grey-hound*, or *gre-hund*, from its being the firſt in rank among dogs; and that it was formerly ſo eſteemed, appears from the foreſt-laws of king Canute, who enacted, that no one under the degree of a gentleman ſhould preſume to keep a *grey-hound*. The varieties of this ſpecies are the *Italian grey-hound*, which is ſmall and ſmooth, and the *Oriental*, which is tall and ſlender, with very pendulous ears, and very long hairs on the tail, hanging down a great length. There was formerly a variety, called the Highland *grey-hound*, which is now become very ſcarce, of a very great ſize, ſtrong, deep-cheſted, and covered with long and ſtrong hair.

The make and proportions required in a good *grey-hound* are, that he have a long body, ſtrong, and pretty large, a neat ſharp head, ſparkling eyes, a long mouth, and ſharp teeth, little ears, with thin griſtles in them, a ſtrait, broad, and ſtrong breaſt, his fore legs ſtrait and ſhort, his hind legs long and ſtrait, broad ſhoulders, round ribs, fleſhy buttocks, but not fat, and a long tail, ſtrong and full of ſinews.

Of this kind, thoſe are always fitteſt to be choſen among the whelps that weigh lighteſt; for they will be ſooner at the game, and ſo hang upon it, hindering its ſwiftneſs, till the heavier and ſtrong *hounds* come in to offer their aſſiſtance; whence, beſides what has been already ſaid, it is requiſite for a *grey-hound* to have large ſides, and a broad midriff, that he may take his breath in and out the more eaſily; his belly ſhould alſo be ſmall, which otherwiſe would obſtruct the ſwiftneſs of his courſe; and his hairs thin and ſoft.

The huntſman is to lead theſe *hounds* on his left hand, if he be on foot; and on the right, if on horſeback. The beſt time to try and train them to the game, is at twelve months old, though ſome begin ſooner, with the males at ten, and the females at eight months old, which laſt are ſaid to be generally more ſwift than the dogs; they ſhould be kept in a ſlip, while abroad, till they ſee their courſe; neither ſhould you looſen a young dog till the game has been a conſiderable time on foot, he being apt, by over eagerneſs at the prey, to ſtrain his limbs.

The *grey-hound* is the beſt uſed in open countries where there is little covert; in theſe places there will ſometimes be a courſe after a hare of two miles or more, and both the dogs and the game in ſight all the while. It is generally ſuppoſed, that the *grey-hound* bitch will beat the dog in running; but this ſeems to be an error, for the dog is both longer made, and conſiderably ſtronger than the bitch of the ſame kind. In the breeding of theſe dogs the bitch is principally to be regarded; for it is found by experience, that the beſt dog, with a bad bitch, will not get ſo good puppies as an indifferent dog with a good bitch. The dog and bitch ſhould be as nearly as can be of the ſame age; and for the breeding of perfect and fine dogs, they ſhould not be more than four years old; an old bitch may be uſed with a young dog, but the puppies of a young bitch and an old dog will never be good for any thing.

The general food of a *grey-hound* ought to be chippings or raſpings of bread, with ſoft bones and griſtles; and theſe chippings ought always to be ſoaked in beef or mutton-broth; and when it is nearly cool, ſome milk ſhould be added: this given the dog morning and evening will keep him in good heart and ſpirits; he muſt never have any hard bones given him, becauſe they harden his mouth, and hurt his teeth. If the dog grow ſick and weakly upon this diet, then take ſheep's heads with the wool on, waſh them clean, and boil them in a ſufficient quantity of water, to make a very rich and ſtrong broth, and add a large quantity of oat-meal to it. When the meat is very tender, and the broth rich, it is good and fit for the dog; and giving him ſometimes the one, and ſometimes the other, will very ſoon recover him.

If one of theſe dogs is to run for a wager, or on any particular occaſion, he may be dieted with the following bread: take half a peck of good wheat, and the ſame quantity of the fineſt and drieſt oat-meal; grind theſe together, and let the meal be ſifted very fine; then add as much liquorice and aniſeeds, in powder, as will not give it too diſagreeable a flavour; and knead the whole into dough with the whites of eggs. This ſhould be baked in ſmall loaves conſiderably hard; and when the dog is to be fed with it, it is to be ſoaked in beef or other broth. He is to be led out to walk half an hour after ſun-riſe every morning, and half an hour before ſun-ſet every evening, and at his coming in fed with this ſoaked bread. The proper exerciſe for a *grey-hound* is the courſing him three times a week, and rewarding him with blood, which will animate him in the higheſt degree, and encourage him to proſecute his game. But the hare alſo ſhould ever have fair play; ſhe ſhould have the law, as it is called, that is, have leave to run twelve ſcore yards before the dog is ſlipped at her, that he may have ſome difficulty in the courſe, and not pick up the game too eaſily. If he kill the hare he muſt never be ſuffered to tear her, but ſhe muſt be taken from him, his mouth cleaned of the wool, and the liver and lights given him by way of encouragement. Then he is to be led home, and his feet are to be waſhed with butter and beer, and about an hour after he is to be fed.

When the dog is to be taken out to courſe, he ſhould have nothing in the morning but a toaſt and butter, and then he is to be kennelled till taken out to the field. The kennelling theſe dogs is of great uſe, always giving them ſpirit and nimbleneſs when they are let looſe; and the beſt way of managing a fine *grey-hound* is never to let him ſtir out of the kennel, except at the times of feeding, walking, or courſing.

3. The *gaze*-HOUND, or *beagle*, is a dog more beholden to the ſharpneſs of his ſight, than his noſe or ſmelling; by virtue of which he makes excellent ſport with the deer and hare. He is alſo noted as exquiſite in chooſing of one that is not lank or lean, but full, fat, and round, which, if it happen to return, and be mingled again with the reſidue of the herd, he will ſoon ſpy out, and leave the reſt untouched, never ceaſing, after he has ſeparated it from its company, and till he has wearied it to death.

Theſe dogs were much uſed in the north of England, and on champain ground, rather than buſhy and woody places, and by horſemen, more than footmen. If at any time he happen to take a wrong way, upon the uſual ſign made by his maſter, he immediately returns, takes the right and ready courſe, beginning his chace afreſh, with a clear voice, and ſwift foot, following the game with as much courage as at firſt.

This ſpecies, which was the *agaſæus* of Dr. Caius, ſays Mr. Pennant, is now loſt, or at leaſt unknown to us; and it is very different from the *agaſæus* of Oppian, which is our BEAGLE.

4. The *blood*-HOUND, or *canis ſagax* of Linnæus, differs nothing in quality from the *Scottiſh ſlut hound*, derived from the Saxon *ſlot*, the impreſſion which a deer leaves of its foot in the mire, and *hund*, a *dog*, ſaving that it is longer ſhaped, and not always of the ſame colour, but ſometimes red, ſanded, black, white-ſpotted, &c. though moſt commonly either brown or red.

Their nature is, that being ſet on by the voice and words of their leader, to caſt about for the ſitting of the preſent game, and having found it, they will never ceaſe purſuing it with full cry, till it be tired, without changing for any other.

They ſeldom bark, except in their chace, and are very obedient and attentive to the voice of their leader. Thoſe that are really good, when they have found the hare, make ſhew thereof to the huntſman by running more ſpeedily, and with geſture of head, eyes, ears, and tail, winding to the form or hare's muſe, never giving over proſecution, and running with a gallant noiſe.

They have good and hard feet, and ſtately ſtomachs, and are very properly denominated *ſanguinary* or *blood-hounds*, on account of their extraordinary ſcent; for if their game be only wounded, ſo that it eſcape the huntſman's hands, or if it be killed, and never ſo cleanly carried away, theſe dogs, by their exquiſite ſmell, will diſcover it, and not be wanting, either by nimbleneſs or greedineſs, to come at it, provided there be any ſtains of blood. Nay, though by all the cunning and foreſight imaginable, a beaſt be conveyed away without ſpot or blood, yet through the rougheſt and moſt crooked ways and meanders, this dog will find out the deer-ſtealer, and, even in the thickeſt throng, will, by his ſmell, ſeparate and pick him out.

The *blood-hound* was in great requeſt on the confines of England and Scotland, where the borderers were continually preying on the herds and flocks of their neighbours. The true *blood-hound*, ſays Mr. Pennant, was large, ſtrong, muſcular, broad-breaſted, of a ſtern countenance, of a deep tan-colour, and generally marked with a black ſpot above each eye.

5. The *terrier* or *tarrier*, only hunts the fox or badger; being thus called, becauſe after the manner of a ferret in ſearching for coneys, he leaps into the ground, and affrights or attacks the beaſts, either tearing them in pieces, or haling them out by force; or, at leaſt, driving them out of their harbours to be taken in a net, or otherwiſe.

The huntſmen have commonly a couple of *terriers*, that they may put in a freſh one, as occaſion ſerves, to relieve the other.

The time of entering the *terrier* is when he is near a twelvemonth old: if it be not done within that time, he will hardly be brought to take the earth. This entering and fleſhing of them may be performed ſeveral ways Firſt, when the foxes and badgers have young cubs, take an old *terrier*, ſet him into the ground, and when he begins to bay, hold the young one at the hole or mouth of the earth, that he may liſten and hear the old one's bay. The old fox or badger being taken, ſo that nothing remains within but the cubs, couple up the old ones, and put in the young in their ſteads, encouraging them by crying, *to him, to him*. If they take any cub within, let them do with it what they liſt; not forgetting to give the old *terriers* their reward, which is blood and livers, fried with cheeſe, and ſome of their greaſe; ſhewing them alſo heads and ſkins to encourage them.

Hound-*fiſh*, in *Ichthyology*, an Engliſh name given to two different fiſh of the ſqualus kind, the one called the ſmooth, and the other the prickly *hound*. See Galeus *lævis*, and Galeus *ſpinax*.

We find in Willughby, and almoſt all the other writers on fiſhes, the name of another ſpecies of *hound-fiſh* beſide theſe, called the ſtarry *hound*, or *galeus aſterias*, and mustelus *aſterias*; or *ſtellaris*; but this has been found by Artedi to be no other than a variety of the firſt ſpecies, or ſmooth *hound-fiſh*.

There is alſo another fiſh of the ſqualus kind, ſometimes called by this name, with the addition of the epithet rough. This is the morgay, or rough *hound-fiſh*. It is the *peſce gotto* of the Italians, the *catulus minor* of authors, and the *muſtelus ſtellaris tertius*, or the third ſpecies of ſtarry *hound-fiſh* of Bellonius. Artedi diſtinguiſhes it from the others, and from all the other ſquali, by the name of the ſqualus with a variegated back, and with the belly-fins concreted together. See Squalus and Catulus.

Hound's *tongue*, *cynogloſſum*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: it has a funnel-ſhaped flower of one leaf, with a long tube, and has five ſhort ſtamina in the chaps of the petal; at the bottom of the tube are ſituated four germina; and the empalement afterwards becomes four capſules, incloſing four oval ſeeds. There are eight ſpecies. Miller.

The common *hound's tongue* is eaſily known by the whitiſh colour, and ſoftneſs of its leaves, the beautiful purple of its flowers, and its diſagreeable ſmell. It is an excellent remedy in catarrhs, and will alone often cure a gonorrhœa ſimplex. The root is the part in which its virtues principally reſide. Externally it is uſed as a vulnerary, and is ſaid to cure even in ſcrophulous caſes. See Cynoglossi *radix*.

Hounds, in a *Ship*, are thoſe parts of a maſt head, which gradually project on the right and left ſide, beyond the cylindrical or conical ſurface, which it preſerves from the partners upwards. The *hounds*, whoſe upper parts are alſo called cheeks, are uſed as ſhoulders to ſupport the frame of the top, together with the top-maſt and rigging of the lower maſt.

HOUR, ῾Ωρα, *Hora*, in *Chronology*, an aliquot part of a natural day, uſually a 24th, ſometimes a 12th.

The origin of the word *hora*, or ὡρα, comes, according to ſome authors, from a ſirname of the ſun, the father of *hours*, whom the Egyptians call *Horus*. Others derive it from the Greek ὁριζειν, *to terminate, diſtinguiſh*, &c. Others from the word ȣρον, *urine*; pretending that Triſmegiſtus was the firſt that ſettled the diviſion of *hours*; which he did from obſervation of an animal conſecrated to Serapis, named the *cynocephalus*, which makes water twelve times a day, and as often in the night, at equal intervals.

An *hour* with us is a meaſure or quantity of time, equal to a twenty-fourth part of the natural day, or nycthemeron; or it is the duration of the twenty-fourth part of the earth's diurnal rotation. Fifteen degrees of the equator anſwer to an *hour*; though not preciſely, but near enough for common uſe.

The *hour* is divided into ſixty minutes, the minute into ſixty ſeconds, &c.

The diviſion of the day into *hours* is very ancient; as is ſhewn by Kircher, Oedip. Ægypt. tom. ii. part ii. claſs vii. cap. 8. though the paſſages he quotes from Scripture do not prove it. The moſt ancient *hour* is that of the twelfth part of the day. Herodotus, lib. ii. obſerves, that the Greeks learnt from the Egyptians, among other things, the method of dividing the day into twelve parts.

The aſtronomers of Cathaya, &c. biſhop Beveridge obſerves, ſtill retain this diviſion. They call the *hour chag*; and to each *chag* they give a peculiar name, taken from ſome animal: the firſt is called *zeth, mouſe*; the ſecond *chiu, bullock*; the third *zem, leopard*; the fourth *mau, hare*; the fifth *chin*, the *crocodile*, &c.

The diviſion of the day into twenty-four *hours* was not known to the Romans before the Punic war. Till that time they only regulated their days by the riſing and ſetting of the ſun.

They divided the twelve *hours* of their day into four; viz. *prime*, which commenced at ſix o'clock, *third* at nine, *ſixth* at twelve, and *none* at three. They alſo divided the night into four watches, each containing three *hours*.

There are divers kinds of *hours*, uſed by chronologers, aſtronomers, dialiſts, &c. Sometimes,

Hours are divided into *equal* and *unequal*.

Hours, *equal*, are the twenty-fourth parts of a day and night preciſely; that is, the time wherein the fifteen degrees of the equator mount above the horizon.

Theſe are alſo called *equinoctial hours*, becauſe meaſured on the equinoctial; and *aſtronomical*, becauſe uſed by aſtronomers.

They are alſo differently denominated, according to the manner of accounting them in different countries.

Hours, *aſtronomical*, are equal *hours*, reckoned from noon, or mid-day, in a continued ſeries of twenty-four.

Hours, *Babyloniſh*, are equal *hours*, reckoned from ſunriſe in a continued ſeries of twenty-four.

Hours, *European*, are equal *hours*, reckoned from midnight; twelve from thence till noon, and from noon till midnight twelve more.

Hours, *Jewiſh*, or *planetary*, or *ancient*, are twelfth parts of the artificial day and night.

Hence, as it is only in the time of the equinoxes that the artificial day is equal to the night, it is then only that the *hours* of the day are equal to thoſe of the night: at other times they will be always either increaſing or decreaſing.

They are called *ancient* or *Jewiſh hours*, becauſe uſed by the ancients, and ſtill among the Jews. They are called *planetary hours*, becauſe the aſtrologers pretend, that a new planet comes to predominate every *hour*; and that the day takes its denomination from that which predominates the firſt *hour* thereof: as Monday from the moon, &c.

Hours, *Italian*, are equal *hours*, reckoned from ſun-ſet, in a continued ſeries of twenty-four.

Hours, *unequal*, or *temporary*, are twelfth parts of the artificial day and night. The obliquity of the ſphere renders theſe more or leſs unequal at different times; ſo that they only agree with the equal *hours* at the times of the equinoxes.

To find the *hour* of the day, when the latitude of the place, the ſun's declination, and his altitude, are given. Thus, ſuppoſe the latitude is 51° 32′, the ſun's declination 18° north, and his altitude 40°, to find the *hour* of the day.

The geometrical ſolution of this problem is performed by projecting ſtereographically on the plane of the meridian the oblique angled ſpherical triangle, which is made by the complement of the latitude, the complement of the ſun's altitude, and the ſun's diſtance from the elevated pole. Thus, with the chord of 60° (*Tab.* III. *Aſtronomy*, *fig.* 80.) draw the primitive circle ZONH; quarter it; alſo draw the axis PCP through the poles, and the equinoctial ÆCQ; likewiſe the parallel of declination D ⊙ *d* equal 18°; then draw parallel to the horizon HO, the almacanter or parallel of the ſun's altitude A *a* = 40°, to cut the parallel of the ſun's declination in ⊙ the place of the ſun at that time. Then through ⊙ draw two great circles, one through Z and N the poles of the horizon, and the other through P and P the poles of the equinoctial, as Z ⊙ N, and P ⊙ P; which form the oblique angled ſpherical triangle PZ ⊙, and the angle ZP ⊙, meaſured on the line of half tangents, gives the hour of the day from twelve, viz. 47° 20′ equal to 3 hours 9 minutes nearly, or to 51 minutes after eight in the morning, or 51 minutes before four in the afternoon.

But by ſpherical trigonometry, having three ſides given, that is ZP 38° 28′ the complement of the latitude, Z ⊙ 50° 00′ the complement of the ſun's altitude, and P ⊙ 72° 00′ the ſun's diſtance from the elevated pole (which is the declination added to 90°, when the latitude and declination are of a contrary name; but if of one name, it is the complement of the declination); and the angle ZP ⊙, the *hour* of the day is found by caſe 11. of ſpherical trigonometry, as follows.

Firſt add the complement of the latitude, complement of the ſun's altitude, and the ſun's diſtance from the elevated pole, into one ſum. Secondly, from half that ſum ſubtract the complement of the ſun's altitude, noting the half ſum, and the remainder; then the complement arithmetical of the ſines of the complement of the latitude, and the ſun's diſtance from the pole, and the ſines of the ſaid half ſum and remainder, added together; the ſine of half this ſum, doubled, and ſubtracted from 180 degrees, gives the hour from noon.

Side	ZP Co. lat.	38° 28′	containing ſides	S. co. ar.—0.206168
	⊙P Co. decl.	72° 00′		S. co. ar.—0.021794
	Z⊙ Co. alt.	50° 00′	half ſum ſides 80° 14′	S.—9.993660
	Sum is,	160° 28′	remainder 30° 14′	S.—9.700019
	Half is,	80° 14′	ſum of the 4	—19.923641
	Co. alt.	50° 00′	ſine half ſum 66° 20′	—9.961820
	Remainder	30° 14′	66° 20′	
			Which doubled gives 132° 40′	

This ſubtracted from 180° 00′ leaves 47° 20′ equal to 3 hours 9′ nearly, the ſame as before.

By the ſame operation you may find the ſun's azimuth PZ⊙, if inſtead of the complement of the ſun's altitude you ſubtract the ſun's diſtance from the pole, noting the half ſum and remainder as before. And the rule will ſtand thus: to the complement arithmetical of the ſines of the complement of the latitude, and complement of the ſun's altitude, add the ſines of the aforeſaid half ſum and remainder; then the ſine of half the total of theſe four, doubled, and taken from 180 degrees, gives the ſun's azimuth from the north, in north latitude; and from the ſouth, in ſouth latitude.

If the *hour* of the night is required, the height of ſome ſtar muſt be taken. And it is found by adding to, or ſubtracting the right aſcenſion of that ſtar from that of the ſun.

To find the *hour* of the day or night by the globe, ſee GLOBE.

HOURS, HORÆ, in the *Ancient Mythology*, were certain goddeſſes, the daughters of Jupiter and Themis; at firſt only three in number, Eunomia, Dice, and Irene; to which were afterwards added two more, Carpo, and Thallote.

Homer makes them the door-keepers of heaven. Ovid allots them the employment of harneſſing the horſes of the ſun:

> *Jungere equos Titan velocibus imperat* Horis.

And ſpeaks of them as ſtanding, at equal diſtances, about the throne of Sol:

> ——*et, poſitæ ſpatiis equalibus*, Horæ.

The poets repreſent them as dreſſed in fine coloured or embroidered robes, and gliding on with a quick and eaſy motion. Ovid. Faſt. v. ver. 218. Met. ii. ver. 119. Stat. Theb. iii. ver. 410.

HOURS, *Horæ*, in the *Romiſh Church*, are certain prayers performed at ſtated times of the day; as *matins*, *veſpers*, *lauds*, &c.

The leſſer *hours*, are *prime*, *tierce*, *ſixth*, and *none*. They are called *hours*, or *canonical hours*, as being to be rehearſed at certain *hours* preſcribed by the canons of that church, in commemoration of the myſteries accompliſhed at theſe *hours*. Theſe *hours* were anciently alſo called *courſe*, *curſus*. F. Mabillon has a diſſertation on them, entitled, De Curſu Gallicano.

The firſt conſtitution enjoining the obſervation of the canonical *hours*, is of the ninth century, being found in a capitular of Heito, biſhop of Baſil, directed to his curates, importing, that the prieſts ſhall never be abſent at the canonical *hours*, either by day or night.

HOURS, *prayers of forty*, are public prayers continued for the ſpace of three days ſucceſſively, and without intermiſſion, before the holy ſacrament, to obtain the aſſiſtance of heaven on ſome important occaſion.

In theſe days, care is taken, that the holy ſacrament be expoſed forty *hours*, viz. thirteen or fourteen *hours* each day.

HOUR-*circles*, or HORARY *circles*, in *Aſtronomy*, &c. are great circles, meeting in the poles of the world, and croſſing the equinoctial at right angles; the ſame as *meridians*.

They are ſuppoſed to be drawn through every fifteenth degree of the equinoctial and equator, and on both globes are ſupplied by the meridian *hour-circle* and index. See GLOBE.

The planes of the *hour-circles* are perpendicular to the plane of the equinoctial, which they divide into twenty-four equal parts.

HOUR-*glaſs*, a popular kind of chronometer or clepſydra, ſerving to meaſure the flux of time, by the deſcent or running of ſand out of one glaſs veſſel into another.

The beſt *hour-glaſſes* are thoſe, which inſtead of ſand have egg-ſhells well dried in the oven, then beaten fine and ſifted.

Hour-glaſſes are much uſed at ſea for reckoning, &c.

There is alſo a ſort of *hour-glaſſes*, which depend on the flux of water, or ſome other liquid, more properly called *clepſydræ*. See CLEPSYDRA.

HOUR-*lines*, on a *Dial*, are lines which ariſe from the interſections of the plane of the DIAL, with the ſeveral planes of the *hour-circles* of the ſphere, and therefore muſt be all right lines.

HOUR-*ſcale*, a divided line on the edge of Collins's quadrant, being only of tangents of forty-five degrees each, ſet together in the middle. Its uſe, together with the lines of latitude, is to draw the *hour-lines* of dials that have centers, by means of an equilateral triangle, drawn on the dial-planes. See DIALLING *lines*, and SCALE.

HOURIS, in *Modern Hiſtory*, is a name given by the MAHOMETANS to thoſe females that are deſigned for the faithful in paradiſe. Theſe are not the ſame with whom they have lived on earth, but formed for this purpoſe, with ſingular beauty and undecaying charms.

HOUSAGE, a fee which a carrier, or other perſon, pays for laying up goods in a houſe.

HOUSE, *habitation*; a place built with conveniencies to live in; or a building wherein to ſhelter a man's perſon and goods from the inclemencies of the weather, and the injuries of ill diſpoſed perſons.

We ſay a brick *houſe*, a ſtone *houſe*, a *houſe* of two ſtories, of three ſtories, a manor *houſe*, a farm *houſe*, &c.

Ancient Rome conſiſted of forty-eight thouſand *houſes*, all inſulated or detached from one another.

For the number of *houſes*, and of inhabitants to a *houſe* in England, &c. ſee the article EXPECTATION *of life*.

A pleaſure *houſe*, or country *houſe*, is that built for a perſon to enjoy and divert himſelf occaſionally in. This is the *villa* of the ancient Romans; and what in Spain and Portugal they call *quinta*; in Provence, *caſſine*; in ſome other parts of France, *cloſerie*; in Italy, *vigna*.

The word *vigna* is itſelf ſometimes uſed in Engliſh to denote the country-ſeats of the noble Romans; as the *vigna Farneſe*, *vigna Borgheſe*, &c.

The citizens of Paris have alſo their *maiſons de bouteilles*, *bottle-houſes*, to retire to, and entertain their friends; which in Latin might be called *micæ*; the emperor Domitian having a *houſe* built for the like purpoſe, mentioned under this name by Martial, lib. ii. ep. 59.

It is a thing principally to be aimed at, in the ſite or ſituation of a country *houſe*, or ſeat, that it have wood and water near it. If it cannot conveniently be built among trees, yet there are few places where trees may not be ſpeedily raiſed about it.

It is far better to have a *houſe* defended by trees than hills; for trees yield a cooling, refreſhing, ſweet, and healthy AIR and ſhade, during the heat of the ſummer, and very much break the cold winds and tempeſts, from every point in the winter. The hills, according as they are ſituated, defend only from ſome certain winds; and if they are on the north-ſide of the *houſe*, as they defend from the cold air in the winter, ſo they alſo deprive you of the cool refreſhing breezes, which are commonly blown from thence in the ſummer. And if the hills are ſituate on the ſouth-ſide, they then prove alſo very inconvenient.

A *houſe* ſhould not be too low ſeated, ſince this precludes the convenience of cellars. If you cannot avoid building on low grounds, ſet the firſt floor above the ground the higher, to ſupply what you want to ſink in your cellar in the ground; for in ſuch low and moiſt grounds, it conduces much to the drineſs and healthineſs of the air to have cellars under the *houſe*, ſo that the floors be good and cieled underneath. *Houſes* built too high, in places obvious to the winds, and not well defended by hills or trees, require more materials to build them, and more alſo of reparations to maintain them; and they are not ſo commodious to the inhabitants as the lower-built *houſes*, which may be built at a much eaſier rate, and alſo as complete and beautiful as the other.

In buildings or *houſes* not above two ſtories with the ground-room, and not exceeding twenty feet to the raiſon-place, and upon a good foundation, the length of two bricks, or eighteen inches for the heading courſe, will be ſufficient for the ground-work of any common ſtructure, and ſix or ſeven courſes above the earth to a water-table, where the thickneſs of the walls is abated, or taken in, on either ſide the thickneſs of a brick, namely, two inches and a quarter.

For large and high *houſes*, or buildings, of three, four, or five ſtories with the garrets, the walls of ſuch edifices ought to be from the foundation to the firſt water-table three heading courſes of brick, or twenty-eight inches at leaſt; and at every ſtory a water-table, or taking in on the inſide for the ſummers, girders, and joints, to reſt upon, laid into the middle, or one quarter of the wall at leaſt, for the better bond. But as for the innermoſt or partition wall, a half brick will be ſufficiently thick; and for the upper ſtories, nine inches, or a brick length, will ſuffice.

The parts, proportions, &c. of the *houſes* in London, are regulated by ſtatute. See BUILDING, and article FIRE-*cocks*.

Every man has a right to air and light in his own *houſe*; and therefore if any thing of an infectious ſmell be laid near the *houſe* of another, or his lights be ſtopped up and darkened by buildings, &c. they are nuiſances puniſhable by our laws; but no action lies for merely obſtructing the opening of a proſpect. If a man's *houſe* be attacked with intent to kill, and the owner or his ſervants kill the thieves in defending him and his *houſe*, this is not felony, and incurs no forfeiture. One man may compel another to repair his *houſe* in ſeveral caſes, by the writ *de domo reparanda*. The doors of a *houſe* may not be broken open on arreſts, except in caſes of treaſon or felony, &c. The riotouſly pulling down of a *houſe* is felony excluded clergy. Stealing lead, or iron bars, or rails fixed to *houſes*, &c. is felony puniſhable by tranſportation, by 4 Geo. cap. 32. The hundred is liable to damages by the burning of *houſes*. 9 Geo. cap. 32. See ARSON, BURGLARY, &c.

HOUSE, *hot*. See HOT and STOVE.

HOUSE, *green*. See GREEN.

HOUSE, *ice*. See ICE.

HOUSE, *ſummer*, a little edifice erected at the corner of a garden, and contrived ſo as to let air in on all ſides; or to exclude it, as you find proper.

HOUSE, *town*, or *hall*, is a place where the officers and magiſtrates of a town or city hold their meetings, for the due adminiſtration of their laws and policy. See HALL and GUILD.

HOUSE, *work*. See WORK-*houſe* and BRIDEWELL. See alſo the article RASPHUYS.

HOUSE *of correction*. Juſtices of the peace in their quarter-ſeſſions are to make orders for erecting *houſes of correction*, and for the maintenance and government of the ſame, and for the puniſhment of offenders committed thither. 39 Eliz. cap. 4. 17 Geo. II. cap. 5. In every county of England there ſhall be a *houſe of correction*, built at the charge of the county, with all conveniencies for the ſetting of people to work, or every juſtice ſhall forfeit 5*l*. And the juſtices in ſeſſions are to appoint governors or maſters of ſuch *houſes of correction*, and their ſalaries, &c which are to be paid quarterly out of the county ſtock. Theſe governors are to ſet the perſons ſent on work, and moderately to correct them, by whipping, &c. and to yield a true account every quarter-ſeſſions of perſons committed to their cuſtodies; and if they ſuffer any to eſcape, the juſtices may fine them. 7 Jac. I. cap. 4. 12 Geo. II. cap. 29.

The *houſe of correction* is for the puniſhing of idle and diſorderly perſons, parents of baſtard children, beggars, ſervants running away, treſpaſſers, rogues, vagabonds, &c. Poor perſons refuſing to work, are there to be whipped, and ſet to work and labour; and any perſon who lives extravagantly, having no viſible way to ſupport himſelf, may be ſent to the *houſe of correction*, and ſet to work there, and may be kept there, until he gives the juſtice ſatisfaction in reſpect to his living, but not to be whipped. A perſon ought to be convicted of vagrancy, &c. before he is ordered to be whipped.

BRIDEWELL is a priſon for correction in London, and offenders may be ſent thither.

HOUSE is alſo uſed for a convent or monaſtery.

Regular prieſts give the name *houſes* to the places they reſide in, and not that of convents or monaſteries, which properly belong to ſimple friers. Thus we ſay, the *Jeſuits houſe*, and the *Barnabites* or *Theatins houſe*.

The Jeſuits have both profeſſed *houſes*, and colleges for novices, which they call *houſes of probation*.

They have alſo *houſes of retreat* for ſpiritual exerciſes, where they receive ſecular perſons and eccleſiaſtics, diſpoſed to practiſe the ſame with them for eight or ten days.

HOUSE is alſo uſed for one of the eſtates of the kingdom aſſembled in parliament.

Thus we ſay, the *houſe* of lords, the *houſe* of commons, &c. See COMMONS, PARLIAMENT, and PEERS.

HOUSE is alſo uſed for a noble family; or a race of illuſtrious perſons iſſued from the ſame ſtock. See GENEALOGY.

In this ſenſe we ſay, the *houſe* or family of the Stuarts, the *houſe* of Bourbon, the *houſe* of Hanover, of Auſtria, of Lorrain, of Savoy, &c.

HOUSE, in *Aſtrology*, a DODECATEMORY, or twelfth part of the heavens.

The diviſion of the heavens into *houſes* is founded on this, that the ſtars and planets, when found herein, are ſuppoſed to have certain influences, either good or evil, upon ſublunary bodies; and to each *houſe* is aſſigned its particular virtue or influence; upon the conſideration whereof they draw HOROSCOPES.

This diviſion is made by ſix great circles, called *circles of poſition*, which cut each other in the common interſection of the meridian and horizon, in the ordinary way of domifying, which is that of Regiomontanus; for the ancients had three other ways.

Theſe circles divide the equator into twelve equal parts, of thirty degrees each, without any regard to the zodiac. The horizon and meridian are two circles of the celeſtial *houſes*, which divide the heavens into four equal parts, each whereof comprehends three *houſes*. There are ſix above the horizon, and as many below it; and ſix eaſtern and ſix weſtern *houſes*.

The ſcheme or figure of the heavens conſiſts of twelve triangles, which are likewiſe called *houſes*; wherein are laid down the ſtars, ſigns, and planets, compriſed within the reſpective ſpaces of the circles of poſition.

Each planet has two certain *houſes*, wherein they ſay it exerts itſelf with peculiar vigour. Leo is the ſun's *houſe*, and Cancer that of the moon; Capricorn is Saturn's, &c.

Some call the *houſes*, *dodecatemories*; but that name is more immediately appropriated to the twelve ſigns or diviſions of the zodiac. See DODECATEMORY.

The aſtrological *houſes* have their particular names according to their qualities. The firſt is the *houſe of life*; being the aſcendant, and containing five degrees above the horizon, the reſt beneath it; the ſecond is the *houſe of riches*; the third, the *houſe of brothers*; the fourth, in the loweſt part of heaven, the *houſe of relations*, and the angle of the earth; the fifth, the *houſe of children*; the ſixth, the *houſe of health*; the ſeventh, the *houſe of marriage*, and the angle of the weſt; the eighth, the *houſe of death*, and upper gate; the ninth, the *houſe of piety*; the tenth, the *houſe of offices*; the eleventh, the *houſe of friends*; and the twelfth, the *houſe of enemies*.

It is popularly, and as it were poetically, ſaid, that the ſun had twelve *houſes*, by which are meant the twelve ſigns, though in reality it has only one ſign, viz. Leo: beſides, the diviſion of *houſes* is accommodated to the equator, and not the zodiac.

They begin numbering the *houſes* with the aſcendant, and paſs them to the imum cœli; ſo that the vertical point makes the beginning of the tenth.

HOUSES, *differences of*, in *Heraldry*. See DIFFERENCES.

HOUSE-*bote*, *Eſtovers*, in *Law*; or an allowance of timber out of the lord's wood, for the repair and upholding a *houſe*, or tenement.

Some make *houſe-bote* two-fold, viz. *Eſtoverium ædificandi & ardendi*. See ESTOVERS.

HOUSE-*breaking*, or **HOUSE**-*robbing*, the robbing or plundering a man in ſome part of his *houſe*, or his booth or ſtall, in a fair or market; the owner, or his wife, children, or ſervants, being within the ſame.

This was made felony by ſtat. 23 Hen. VIII. and 3 Ed. VI. but it is ſince alſo made felony, though none be within the *houſe*, 26 Eliz. See BURGLARY and LARCENY.

HOUSE-*burning*. See ARSON.

HOUSE-*painter*. See PAINTER.

HOUSE-*tax*. See WINDOW.

HOUSE-*wife's cloth*, is a middle ſort of linen cloth between fine and coarſe, fit for family uſes.

HOUSED-*in*, in *Ship-Building*. The ſeamen ſay of a ſhip, which, after the breadth of her bearing is brought in too narrow to her upper-works, that ſhe is *houſed-in*, or pinched in too much.

HOUSED is alſo applied to the ſituation of the great guns of a ſhip, when they are ſecured at ſea by their tackles and breechings.

HOUSE'E, in the *Manege*. See HOUSING.

HOUSELEEK, *Sempervivum*, in *Botany*, a genus of the *dodecandria dodecagynia* claſs. Its characters are theſe: the flower has a concave empalement, cut into many acute ſegments; it has ten oblong, ſpear-ſhaped, pointed petals, and twelve or more narrow awl-ſhaped ſtamina, terminated by roundiſh ſummits; it has twelve germina placed circularly, ſitting upon ſo many ſtyles, which ſpread out, and are crowned by acute ſtigmas; the germina afterward become ſo many ſhort, compreſſed capſules, pointed on the outſide, and open on the inſide, filled with ſmall ſeeds. There are ſeven ſpecies.

The common large *houſeleek* is ſeen in every part of England, growing on the tops of houſes and walls, and is eaſily planted by off-ſets, which they put out in plenty. If theſe are planted in mud or ſtrong earth, on a building or old wall, they will thrive without farther care. Miller.

Houſeleek is cooling and reſtringent; and though not often given inwardly, is commended by ſome as good to quench thirſt in fevers, mixed with poſſet drink; as alſo for heat and ſharpneſs of urine. Prevotius, in his Medicinæ Pauperum, commends an equal quantity, that is, three ounces of the juice of this, and Perſicaria maculata, boiled to the conſumption of a third part, and given in drink as a certain medicine to ſtop a looſeneſs and bloody flux. Outwardly it is uſeful againſt burns and ſcalds, St. Anthony's fire, and the ſhingles.

HOUSELEEK, *leſſer*. See SEDUM.

HOUSELEEK, *ſmall annual*. See TILLÆA.

HOUSELEEK, *water, of Egypt*. See PISTIA.

HOUSHOLD, the family or domeſtics of a prince, or private perſon.

The civil government of the king's court belongs chiefly to the lord ſteward of the *houſhold*, who has an annual ſalary of 1460*l*. He has authority over all officers and ſervants of the king's houſe, except thoſe of the chapel, chamber, and ſtable, who are under the juriſdiction of the lord chamberlain, maſter of the horſe, and dean of the chapel.

Under the lord ſteward are a treaſurer of the *houſhold*, whoſe place is 1200*l*. a year; comptroller, with the ſame ſalary; cofferer, with 500*l*. a year; deputy cofferer, maſter of the *houſhold*, clerks of the green cloth, clerks comptrollers, &c.

The troops of the *houſhold* are the *horſe*-GUARDS, *horſe*-GRENADIERS, and *foot*-GUARDS. The *houſhold* troops of France are called the GENDARMERIE.

HOUSHOLD *days* are four ſolemn feſtivals in the year, when the king, after divine ſervice, offers a BESANT of gold to God on the altar.

The *houſhold days* are Chriſtmas, Eaſter, Whitſunday, and All-Saints.

The *houſhold days* are a part of the twelve collar and offering days.

HOUSING, or HOUSEE, a cover laid over the ſaddle of a horſe, in order to ſave it from the weather, dirt, &c.

The word is formed of the French *houſſe*, which ſignifies the ſame thing; though it anciently denoted a kind of *hood*, worn by country people.

The cavaliers appeared with their embroidered *houſings*.

HOUSING, *boot*, is a piece of ſtuff faſtened to the hinder part of the ſaddle, that covers a horſe's croupe; either for the ſake of ornament, to hide the horſe's leanneſs, or to ſave the cloaths of the rider from being daubed and ſoiled by the ſweat of the horſe.

HOUSING, *ſhoe*, is a piece of cloth bordered with a fringe, oftentimes put round the ſaddle, to cover the croupe, and hang down to the lower part of the belly, to ſave the ſtockings of thoſe who ride without boots.

HOUSING, among *Bricklayers*, a term uſed for a brick which is warped, or is caſt crooked or hollow in burning; in ſuch a caſe, they ſay it is *houſing*.

HOUSING, or HOUSE-LINE, in *Sea-Language*, denotes a ſmall line formed of three fine ſtrands or twiſts of hemp, ſmaller than rope-yarn. It is chiefly uſed to ſeize blocks into their ſtrops, to bind the corners of the ſails, or to faſten the bottom of a ſail to its BOLT-*rope*, &c.

HOUSTONIA, in the Linnæan ſyſtem of *Botany*, the name of a plant called *paronychiæ affinis* by Moriſon and ſome others. This makes alſo a diſtinct genus of plants of the *tetrandria monogynia* claſs; the characters of which are, that the calyx is an extremely ſmall erect perianthium, divided into four ſegments, and remaining after the flower is fallen; the flower conſiſts of one petal, in the ſhape of a funnel, with a long cylindric tube, and an open mouth divided into four ſegments, which are roundiſh at their ends; the ſtamina are four extremely ſmall filaments, ſituated in the neck of the flower; the antheræ are ſimple; the germen of the piſtillum is roundiſh and flatted; the ſtyle is ſingle, and ſhorter than the ſtamina; and the ſtigma bifid and acute; the fruit is a roundiſh double capſule, containing two cells, with two valves; the ſeeds are ſingle, and the valves placed oppoſite to the partition of the cells. There are two ſpecies.

HOWITZES, in *Artillery*, are a kind of mortars, of German invention, which are mounted upon carriages like travelling gun-carriages, and have their trunnions placed nearly in the middle. The conſtruction of *howitzes* is as various as that of mortars, excepting the chambers, which are all cylindric. They are diſtinguiſhed by the diameter of the bore; e. g. a ten inch *howitz* is that, the diameter of which is ten inches. *Howitzes* are capable of doing great execution, by firing ſhells and grapes of ſhots, in a ſiege where the diſtance is ſmall, and in the field, if they were placed in the flanks, or between the battalions. They are alſo more eaſily carried from one place to another than mortars. For the dimenſions of different *howitzes*, and remarks on their conſtruction, the reader may conſult Muller's Treatiſe of Artillery, part iii. p. 116, &c. See *Tab*. II. *Gunnery*, *fig*. 11. in which AE repreſents the firſt reinforce, EF the ſecond, FG the chaſe, GH the muzzle, I the button, KK the trunnions. The other parts are the ſame as thoſe of the CANNON and MORTARS.

HOWKER, or HOOKER, a veſſel much uſed by the Dutch; built ſomething like a pink, but rigged and maſted like a hoy.

Howkers carry from fifty to two hundred ton; and with a ſmall number of hands will go to the Eaſt Indies. They are commonly navigated with two maſts, viz. a main-maſt and a mizen-maſt. They tack ſoon and ſhort, will ſail well, and lie near the wind, and live almoſt in any ſea.

HOWLE, in *Ship-Building*. When the foot-hooks of a ſhip are ſcarfed into the ground-timbers, and bolted, and then the plank laid on them up to the orlop, the carpenters ſay, they begin to make the ſhip *howle*.

HOY, a ſmall veſſel or bark, uſually rigged like a ſloop, and employed for carrying paſſengers and luggage from one place to another, particularly on the ſea-coaſt. In Holland the *hoy* has two maſts; in England it has but one, when the main-ſail is ſometimes extended by a boom, and ſometimes without it.

HOYACHU, in *Botany*, the name given by the Chineſe to the ACACIA-*tree*. They make great uſe of this tree in arts and medicine. They have a way of ſtriking a fine yellow upon paper with its flowers; and they give the ſeeds in ſeveral diſeaſes, in ſome of which, as in the dyſentery and hæmorrhages, they are of great ſervice But, beſide theſe, they make an odd medicine of them, which they take with great readineſs for purpoſes it can never anſwer. They pick out the ſeeds carefully from the pods, as ſoon as ripe; they put theſe into a flat veſſel, and cover them with ox's gall; this is to be ſet for a hundred days to dry, in a place where the ſun does not come; after this, one of theſe ſeeds is to be ſwallowed every day before the firſt meal; and, by continuing this a proper time, they ſay the eye-ſight, if loſt, is reſtored, and their grey hairs become black. Obſerv. ſur les Coûtumes de l'Aſie, p. 240.

HOZING *of dogs*, the cutting out the balls of their feet. See EXPEDITATION.

HUBARI, in *Natural Hiſtory*, the name of a bird very often mentioned by the Arabian authors. It is deſcribed to be a bird ſomewhat larger than a gooſe, having very ſhort wings in proportion to its bulk, ſo that it cannot fly well, and therefore affording great ſport to the Syrian hunters. It is ſaid to be common about Damaſcus. By this place of its frequenting, and by the deſcription, it appears to be the BUSTARD; that bird being very plentifully found about Damaſcus, and being hunted with ſwift dogs on the ſandy plains thereabout.

HUCK, in *Ichthyography*, a name uſed by ſome authors for the German river trout. It much reſembles the common river trout in ſhape, but is covered all over the back with innumerable black ſpots; the ſides are red, and have alſo ſome black ſpots, though they are not very numerous, on them; the under-jaw has alſo ſome ſpots, but there are none on any other part of the head; the fins are red, and it differs from the common trout in having no teeth on the middle of its palate; it alſo grows to a much larger ſize than our trout, and has none of the red ſpots which are ſo plentiful on that fiſh.

HUCKABACK, in *Commerce*, is a kind of linen, on which the figures are raiſed.

HUCKLE-*bone*, the hip-bone. See COXÆ *oſſa*.

HUCKSTER, one that ſells proviſions or ſmall wares by retail.

HUDSON'S BAY *Company*. See COMPANY.

HUDSON'S *Bay porcupine*. See PORCUPINE.

HUDSONIA, in *Botany*, a genus of the *dodecandria monogynia* claſs. Its characters are, that it has no corolla, a five-leaved tubulous calyx, fifteen ſtamina, and a ſingle-celled three-valved capſule, containing three ſeeds.

HUE-AND-CRY, derived from the French *huer* and *crier*, which both ſignify *to ſhout*, or *cry aloud*, denotes the purſuit of one who has committed felony, &c. on the highway.

If a party robbed, or any in the company of one murdered or robbed, come to the conſtable of the next town, and require him to raiſe *hue-and-cry*, or to purſue the offender, deſcribing him, and ſhewing, as near as he can, which way he is gone, the conſtable is forthwith to call for aid from the pariſh to ſeek the felon; and if he is not found there, he is to give the next conſtable warning, till he be apprehended, or at leaſt purſued to the ſea-ſide.

The Normans had a purſuit with a cry after offenders, not unlike this; which they called *clamor de haro*. See CLAMOR.

Hue is alſo uſed alone, ann. 1 Edw. I. ſtat. 2. In ancient records it is called *hutesium & clamour*, which properly ſignify a purſuit by horn and by voice.

This proceſs of purſuing is mentioned by ſtatute Weſtm. 1. 3 Edw. I. cap. 9 & 4 Edw. I. *de officio coronatoris*. But the principal ſtatute relative to this matter is that of Wincheſter, 13 Edw. I. cap. 1. & 4. which directs that from thenceforth every county ſhall be ſo well kept, that immediately upon robberies and felonies committed, freſh ſuit ſhall be made from town to town, and from county to county; and that *hue-and-cry* ſhall be raiſed upon the felons, and they who keep the town ſhall follow with *hue-and-cry*, with all the town and towns near; and ſo *hue-and-cry* ſhall be made from town to town, until they be taken and delivered to the ſheriff. And that ſuch *hue-and-cry* may more effectually be made, the hundred is bound by the ſame ſtatute, cap. 3. to anſwer for all robberies therein committed, unleſs they take the felon, which is the foundation of an action againſt the hundred, in caſe of any loſs by robbery. By ſtat. 27 Eliz. cap. 13. no *hue-and-cry* is ſufficient, unleſs made with both horſemen and footmen. And by ſtat. 8 Geo. II. cap. 16. the conſtable or like officer refuſing or neglecting to make *hue-and-cry*, forfeits 5*l.* and the whole vill or diſtrict is ſtill in ſtrictneſs liable to be amerced, according to the law of Alfred, if any felony be committed therein, and the felon eſcape. *Hue-and-cry* may be raiſed either by precept of a juſtice of the peace, or by a peace-officer, or by any private man that knows of a felony. But if a man maliciouſly or wantonly raiſes a *hue-and-cry*, without cauſe, he ſhall be ſeverely puniſhed as a diſturber of the public peace. Blackſt. Comm. vol. iv. p. 290, &c. See Highwaymen.

In ſupplement to this ancient eſtabliſhment, Sir John Fielding's plan was inſtituted for the diſcovery of offenders, after they have eſcaped the freſh purſuit upon *hue-and-cry*, by ſending immediate notice to a certain known office in London, from whence are iſſued weekly accounts to every part of the kingdom, deſcribing the offence and the offenders with as much accuracy as the caſe will admit. By theſe means many notorious offenders have been apprehended, and much ſtolen property hath been recovered.

HUERS. See Balkers and *Pilchard* Fishery.

HUG, or *Corniſh* Hug, a term uſed in wreſtling, when one has an adverſary on his breaſt, and holds him faſt there.

HUGONIA, in *Botany*, the name of a genus of plants of the *monadelphia decandria* claſs, the characters of which are theſe: the perianthium is ſmall, narrow, acute, and divided into five ſegments; the flower is compoſed of five large, round, and expanded petals; the ſtamina are ten ſubulated filaments, ſhorter than the flower; the antheræ are ſimple; the germen of the piſtil is roundiſh; the ſtyles are five in number, and are very ſlender; the ſtigmata are capitated; the fruit is a globoſe berry, affixed upon the cup; the ſeed is ſingle, ſtriated, and hard.

HUGUENOTS, an appellation given by way of contempt to the reformed or proteſtant Calviniſts of France.

The name had its firſt riſe in 1560; but authors are not agreed as to the origin and occaſion thereof: but one of the two following ſeems to be the leaſt forced derivation.

One of the gates of the city of Tours is called the gate Fourgon, by corruption from *feu Hugon*, i. e. the late Hugon. This Hugon was once count of Tours, according to Eginhardus, in his Life of Charles the Great, and to ſome other hiſtorians. He was it ſeems a very wicked man, who by his fierce and cruel temper made himſelf dreadful; ſo that after his death he was ſuppoſed to walk about in the night time, beating all thoſe he met with: this tradition the judicious Thuanus has not ſcrupled to mention in his hiſtory. Davila and other hiſtorians pretend, that the nickname of *Huguenots* was firſt given to the French proteſtants, becauſe they uſed to meet in the night time in ſubterraneous vaults near this gate of Hugon; and what ſeems to countenance this opinion is, that they were firſt called by the name of *Huguenots* at this city of Tours.

Others aſſign a more illuſtrious origin to that name; and ſay that the leaguers gave it to the reformed, becauſe they were for keeping the crown upon the head of the preſent line deſcended from Hugh Capet; whereas they were for giving it to the houſe of Guiſe, as deſcended from Charles the Great.

Others again derive it from a French and faulty pronunciation of the German word *eidgnoſſen*, ſignifying *confederates*, and originally applied to that valiant part of the city of Geneva, which entered into an alliance with the Swiſs cantons, in order to maintain their liberties againſt the tyrannical attempts of Charles III. duke of Savoy. Theſe confederates were called *Eignots*, whence *Huguenots*.

The perſecution which they underwent has ſcarce its parallel in the hiſtory of religion: though they obtained a peace from Henry III. in 1576, it was only of ſhort continuance; and their ſufferings, mitigated by the famous edict of Nantes, granted to them in 1598 by Henry IV. were again renewed, after the revocation of this edict, by Lewis XIV. in 1685.

HUISSIER, a French name for an uſher, ſerjeant, or beadle.

HUITINGO *pollachius*, in *Ichthyology*, the fiſh we commonly call in Engliſh the whiting-pollack. It is a fiſh very like the common whiting in ſhape, but much larger, and is ſomething broader, and leſs thick. It is common in the northern ſeas, and is a good fiſh for the table. Its food is other ſmaller fiſh, and particularly the ammodytæ or ſand-eels, numbers of which are uſually found in its ſtomach. It is diſtinguiſhed from the cod by its head, being ſmaller, and its body broader and thinner; by its having no beard; and its lower pair of fins is much ſmaller than in that fiſh.

HUJUS, or Hujusce Diei, in *Mythology*, a ſurname given by the Romans to Fortune. She had a temple at Rome, erected by Q. Catulus.

HULKS are large veſſels, having their gun-decks from a hundred and thirteen to a hundred and fifty feet long, and from thirty-one to forty feet broad, and fitted with an apparatus, in order to fix or take out the maſts of his majeſty's ſhips, as occaſion requires. They will carry from four hundred to a thouſand tons.

Anciently, the word *hulka* ſeems to have ſignified a *ſmall veſſel*.

Hulk is alſo a name beſtowed on any old veſſel laid by, as unfit for farther ſervice. It is probably derived from the ολκαδες, or veſſels of burthen of the ancient Grecians.

HULL *of a ſhip* is her main body, without any maſts, yards, ſails, or rigging. See *Tab. Ship. fig.* 1. *litt.* A *to* R.

To **Hull**, or *lie a* Hull, is underſtood of a ſhip, when, either in a dead calm, or in a ſtorm, ſhe cannot carry all her ſails, but they are taken in to preſerve them; ſo that nothing but her maſts, yards, and rigging, are abroad, and her helm tied down to the lee-ſide of the ſhip. In this ſtate ſhe will lie eaſily under the ſea, if ſhe be a good ſailer, and make her way one point before the beam.

To ſtrike a **Hull**, is to lie cloſely or obſcurely in the ſea in a ſtorm, or to tarry for ſome conſort, bearing no ſail, with the helm laſhed a-lee.

To **Hull** *a ſhip*, is to fire cannon-balls into her *hull*, within the point-blank range.

HULLOCK *of a ſail*, at *Sea*, is when, in a great ſtorm, ſome ſmall part of a ſail is cut and left looſe. It is chiefly uſed in the mizzen-ſail, to keep the ſhip's head to the ſea; then all the reſt of the ſail is made up, except a little at the mizzen-yard-arm. Alſo, when a ſhip will not *weather coyle*, to lay her head the other way, they looſe a *hullock* of her fore-ſails; and then changing the helm to the weather ſide, ſhe is made to fall off, and to lay her head where her ſtern lay.

HUMAN, ſomething that relates to man, or the nature of man.

The *human* body is the ſubject of medicine. See *Human* Body.

Epicurus and his followers deny that the gods concern themſelves with *human* affairs. See Epicureans.

Faith is diſtinguiſhed into divine and *human*. See Faith.

HUMANITY, the nature of man, or that which denominates him *human*.

Neſtorius would not allow the infirmities of *humanity* to be attributed to the Deity; nor the attributes of the Deity to *humanity*. See Nestorians.

HUMANITIES is uſed, plurally, for the *humaniores literæ*, i. e. the ſtudy of the Greek and Latin tongues, grammar, rhetoric, poetry, and the ancient poets, orators, and hiſtorians.

HUMATION, *Humatio*. The moſt ancient way of diſpoſing of the dead was by *humation*, or interment. Pitiſc. See Burial.

HUMBLE-*bee*, in the *Hiſtory of Inſects*. See Bombylius.

Humble-*bee*, *baſtard*. See Faux *bourdon*.

Humble-*bee flies*, in *Natural Hiſtory*, the name of a claſs of flies of different ſizes, but all agreeing in the great reſemblance they bear to the *humble-bees*, of the ſmaller or middle-ſized ſpecies. Theſe might, at firſt ſight, very naturally paſs for real *humble-bees*; but a cloſer examination will ſhew them not to be ſuch, as they have not the trunk of the *humble-bee*, and have only two wings. The ſpecies of the *humble-bee* fly are many of them of abſolutely different genera one from another, ſome of them having trunks, and others having a diſtinguiſhable mouth. See Culex.

If the figure of theſe flies, in their winged ſtate, attracts our curioſity and attention, their prior ſtate, that of the fly-worm, of moſt of them ought ſurely much more to do ſo. The place nature has aſſigned the worms of theſe flies for their habitation, is indeed a moſt ſtrange one; there is no other place for them to live in under this form, to begin their deſtined growth, and be fitted for their transformations, but in the inteſtines of horſes, or under the thick and firm ſkin of oxen. In the latter caſe, the worm hatched from the egg of its parent fly, depoſited there, makes the tumor in the places which alone furniſhes it with food and habitation, and in the middle of which it has a place to breathe. See Horse-*worm*.

It is not an invariable law of nature, however, that all the worms of the *humble-bee* flies are to feed on animal ſubſtances; for we find ſome delighted with vegetable food, and particularly one which loves none but the bulbous roots of flowers. Reaumur's Hiſt. Inſ. vol. iv. p. 497, &c.

Humble *plant*. See Sensitive *plant*.

HUMECTATION, formed of *humor*, *moiſture*, *moiſtening*, in *Pharmacy*, the preparing of a medicine, by ſteeping it awhile in water, in order to ſoften and moiſten it when too dry; or to cleanſe it, or prevent its ſubtle parts from being diſſipated in grinding, or the like.

Humectation is alſo uſed for the application of moiſtening remedies.

In this ſenſe we ſay, embrocations, emplaſters, unctions, *humectations*, fomentations, &c.

HUMERUS, or *Os* Humeri, in *Anatomy*, the uppermoſt bone of the arm, popularly called the *ſhoulder-bone*; extending from the ſcapula, or ſhoulder-blade, to the upper end of the cubitus, or elbow. See *Tab. Anat. (Oſteol.) fig.* 3. *n.* 6. *fig.* 7. *n.* 8. *fig.* 3.

The *humerus* is a large, round, fiſtular bone, of a pretty hard compact ſubſtance; its inward cavity, which contains the marrow, is conſiderable long and large.

At its upper end it has a large round head, which is covered with a very ſmooth cartilage, and is received into the cavity of the ſcapula, which makes a juncture per arthrodiam. This head of the bone being much larger than the ſocket into which it is received, the part extant is ſtrictly embraced by a ligament, one edge of which is faſtened to the margin of the cartilaginous ſocket of the ſcapula, and the other to the lower part of the head of this bone, hereby uniting them firmly together; yet ſo as to leave the motion the freeſt of all the articulations of the body, and therefore the bone very liable to diſlocations.

At the lower end of the *humerus* are two proceſſes, covered each with a cartilage; the external and leſſer receiving the extremity of the radius, and the internal the head of the cubitus.

On the outſide of each of theſe proceſſes is a ſmall eminence, to which are faſtened the ligaments and heads of the muſcles that move the carpus and fingers.

In this bone are alſo three ſinuſes; one on the fore-ſide of the large proceſs, receiving a proceſs of the cubitus; another on the back-part, which receives the olecranum; and the third, a ſmall ſemilunar one between the two proceſſes, anſwering to the eminence of the ſinus of the cubitus.

The later anatomiſts allow this bone five different motions, viz. upwards, downwards, forwards, backwards, and rotatory; and five pair of muſcles for the performance of the ſame, viz. the deltoides, teres, pectoralis, infraſpinatus, ſubſcapularis, &c. which ſee.

Os Humeri, *cartilages of the*. The cartilage by which the hemiſphere at the head of the *os humeri* is covered, is gradually thicker towards the middle, and thinner towards the edges. The four ſurfaces of the tuberoſities, which appear cartilaginous in dry bones, ſerve only for the inſertion of the tendons of four muſcles, which move the *os humeri* on the ſcapula. The channel or ſinus between the two tuberoſities is partly covered by a thin cruſt, which appears rather ligamentary than cartilaginous, and partly by a tendinous ſtratum. The trochlea and ſmall head of the lower extremity of the *os humeri*, are covered with a common cartilage, in which the ſame proportion of thickneſs is obſervable, as in that of the upper extremities; and this holds indeed pretty generally of the convex articular cartilages; and the foſſulæ near the pulley and the ſmall head, are covered with a thin cartilaginous and ligamentary varniſh.

Os Humeri, *ligaments of the*. The capſular, or mucilaginous ligament, looſely ſurrounds the whole articulation of the ſcapula with the head of the *os humeri*. The true ligament of this joint ſeems to be made up of two ſorts of ligaments cloſely united together, viz. of a capſular ligament, which ſurrounds the whole articulation, and of ſeveral true ligaments which run over, and cloſely adhere to the former at different diſtances. On the body of the *os humeri* there are two particular ligaments, which may be termed the intermuſcular, or lateral ones; they are long, flat, thin, but ſtrong and narrow, fixed by one edge along the two lower thirds of the bone, and reaching to both condyles; they are broad, pretty tight, and are very narrow at the upper part, but broader toward the condyles.

The lower extremity of the *os humeri* is joined to the bones of the fore arm, by two faſciculi of ligamentary fibres, one fixed to the internal condyle, the other to the external. Each faſciculus is compoſed of fibres cloſely joined together near the condyle, but afterwards parting in diſtinct bands like a gooſe's foot. The capſular ligament is fixed to the condyles, and then covers them, and is afterwards fixed round both ſides of this lower extremity above the foſſulæ. The foſſulæ are ſlightly varniſhed over alſo with a cartilaginous ſubſtance. This capſula ſeems to be ſtrengthened by a ligamentary web, the fibres whereof croſs one another in different directions, and appears larger and looſer when the muſcles are ſeparated from it, than when cloſely united to them in its natural ſtate. Winſlow's Anatomy, p. 139.

Humerus, *luxated*. The *humerus*, from the length and laxity of its ligaments, the largeneſs of its motion, and the ſhallowneſs of its cavity in the ſcapula, into which it is articulated, is rendered, of all the bones, the moſt ſubject and eaſy to be luxated. The head of this bone may often be diſlocated, under the arm-pit; ſometimes forward, ſometimes backward, and even below the ſcapula, but ſeldom perpendicularly downwards, and never directly upwards, unleſs the acromion and coracoide proceſſes of the ſcapula ſhould chance to be fractured at the ſame time; beſides, as long as the ſtrong deltoide and bicipital muſcle of the *humerus* remain entire, they greatly reſiſt and keep down the *humerus* from being luxated upwards.

A diſlocation of the *humerus* may be known by a depreſſion or cavity on the top of the ſhoulder, and an inability to move the arm. When the diſlocation is downward or forward, the arm is elongated, and a ball or lump is perceived under the arm-pit; but when it is backward, there appears a protuberance behind the ſhoulder, and the arm is thrown forward toward the breaſt.

As ſoon as a luxation is diſcovered in the *humerus*, the ſafeſt way to attempt the reduction of it, is to place the patient on the floor, or on a low ſtool; two ſtrong aſſiſtants are then to be placed on each ſide of him, one to keep firmly hold of his body, that it may not give way to the extenſion, while the other lays hold of the luxated arm with both his hands, a little above the cubitus, gradually and ſtrongly extending it. But before that extenſion be made, the ſurgeon himſelf ſhould have a large and ſtrong napkin, of a ſufficient length, tied at the ends, and hung about his neck, ſo that the knot may hang behind, but the other part of the napkin over his breaſt. The patient's arm muſt then be put through this napkin, up to the ſhoulder, and the ſurgeon muſt lay hold of the head of the *humerus* with both his hands: this done, the aſſiſtant, who has hold of the arm, is to extend it ſufficiently, and the ſurgeon is to elevate the head of the *humerus*, by means of the napkin through which the arm is put, directing it with his hands, till it ſlips into its former cavity in the ſcapula.

This ſeems the moſt ſafe, ready, and commodious of all methods, for reducing luxations of the *humerus*; but it is to be acknowleged, that the extenſion cannot, by this means, be made ſufficiently ſtrong, in ſome caſes, particularly when the patient is very robuſt, or when the caſe has been delayed a conſiderable time without aſſiſtance. When one or two aſſiſtants therefore are not ſufficient to make a proper extenſion, it is eaſy to employ more, by means of napkins tied about the limb, and a proper number of aſſiſtants to hold the patient's body ſteady againſt that force. And when all this is not ſufficient, the ſurgeon is forced to have recourſe to machines with ropes and pullies; which, though the patient is uſually terrified a little at them, yet make an eaſier and a more equal and regular extenſion than can be done by the hands of ever ſo many aſſiſtants. Heiſter, book iii. cap. 7. See Ambe.

Mr. Freke has contrived a portable inſtrument for this purpoſe, which conſiſts of two boxes A, A, joined together by a hinge, F, in the middle, in which, when folded together, is contained all the apparatus neceſſary for reducing a diſlocated ſhoulder. See *Tab.* III. *Surgery*, *fig.* 32.

The length of this inſtrument, when ſhut up, is one foot eight inches, its breadth nine inches, and its thickneſs three inches and a quarter. When it is opened, it is kept ſo by two hooks fixed on the back-ſide of it; and, when one end of it ſtands on the ground, the other ſtands high enough to become a fulcrum, or ſupport of the lever BB, which is fixed on a roller *b*, by a large wood-ſcrew, which turning ſideways, as well as with the roller, it obtains a circumrotatory motion, ſo that it will ſerve to reduce a luxation, either backward, forward, or downward. The roller on which the lever is fixed, is juſt the diameter of the depth of one of the boxes, into which are driven two iron pins, the ends of which are received by the two ſides of the box, which are an inch thick. The lever is two feet four inches long, and is cut off and joined again by two hinges C, to fold up ſo as to be contained in the boxes. On the backſide of it is a hook, to keep it ſtrait. One other end of it is to hang over the roller about an inch and a half, which is to be excavated and covered with buff leather, for the more eaſy reception of the head of the *os humeri*. Two iron cheeks, D, are ſcrewed on each ſide of the lever, to receive through them an iron roller, which has two holes through it, to receive two cords coming from a brace E, fixed on the lower head of the *os humeri*; for if it be applied on the muſcular part of the arm, it never fails ſlipping down to the joint, before you can extend the limb. The iron roller has a ſquare end, on which is fixed a wheel G, within the cheek notched round, which works as a ratchet, on a ſpring-ketch underneath the lever, by which it is ſtopped, as you wind it with a winch; and may at pleaſure be let looſe, as there ſhall be occaſion for it, by diſcharging the ketch. The brace E, compared with common bandages, is of more conſequence than can eaſily be imagined by unexperienced perſons. It conſiſts of a large piece of buff leather, big enough to embrace the arm, ſewed on two pieces of ſtrong iron curved plates, rivetted together, one of them having an eye at each end to faſten two cords in; the other is bent at the ends into two hooks, which are to receive the cords, after they have croſſed over the arm above.

In order to keep the patient ſteady in his chair from coming forward, or letting the ſcapula riſe up on depreſſing the lever, after the limb is extended by the winch, there muſt be fixed over the ſhoulder a girth, H, H, with two hooks at the ends of it, long enough to reach to the ground on the other ſide, where it muſt be hooked into a ring I, ſcrewed into the floor for that purpoſe.

We ought not to omit obſerving here, that there are ſeveral other contrivances invented both by ancient and modern ſurgeons for reducing a luxation of the *humerus*; ſome of which the reader will find deſcribed in Heiſter's Surgery, part i. book iii. chap. 7.

After all, Mr. Heiſter obſerves, that the ſurgeon's hands and a napkin, with ſtrong and dexterous aſſiſtants to make the extenſion, and hold the patient firm, will, of themſelves, be generally ſufficient for this purpoſe.

Mr. White, ſurgeon of the Mancheſter infirmary, gives an account of a new method of reducing ſhoulders, without the uſe of an ambe, which he has tried with ſucceſs in caſes where the common methods have failed. For this purpoſe, having ſcrewed an iron ring into a beam at the top of the room, he fixed one end of his pullies to it, and faſtened the other to the diſlocated arm by ligatures about the wriſt, placing the arm in an erect poſition. In this manner he drew up his patient, till his whole body was ſuſpended, whilſt two perſons ſupported his arm above the elbow. He then attempted to conduct the bone into its place with his hands; when feeling it to give way, and hearing it ſnap, he concluded it muſt have returned into its ſocket, and ordered him to be taken down as carefully as poſſible. The bone having ſomewhat changed its ſituation, he tried the heel in the armpit, and the bone returned to its place with the greateſt facility. London Med. Obſ. &c. vol. ii. p. 373, &c.

Os **Humeri** *fractured*. Fractures of the *os humeri* are the leaſt dangerous when near its middle, and much worſe when near its upper or lower head. It ſometimes happens, that the fractured ends of this bone keep their places, but much more frequently they are found ſlipped one over another; by which means the fractured limb is made ſhorter than the ſound one: ſometimes alſo, though much more rarely, it happens, that the divided ends of the bone recede from one another, on account of the weight of the arm, and by that means the fractured limb becomes longer than the ſound one. In fractures of this bone, where the ends of the divided bone have ſlipped one over another, as is uſually the caſe, there are required both force and ſkill to reduce them, eſpecially if the patient has tenſe nerves and large muſcles, as is uſually the caſe in ſtrong men. To extend the arm on this occaſion, the patient muſt be ſeated on a high ſtool, and an aſſiſtant muſt lay hold of his arm firmly above the fracture, keeping his elbow gently bent; then the lower part of the arm beneath the fracture is in like manner to be taken hold of, and the arm is to be gently extended forward, by endeavouring to remove eaſily each part from the other, in a right line. The ſurgeon is then to take hold of the fractured part of the arm, and with both his hands reduce the fractured bones into their proper places, while the arm is kept in a proper ſtate of extenſion by the aſſiſtants; and when they are replaced, the limb is to be rolled up with the proper bandages. Heiſter's Surg. book ii. cap. 7.

Humeri *octavus*, in *Anatomy*, a name given by Fallopius, and others, to a muſcle called by Cowper, and ſince by Albinus and others, TERES *minor*, and by the French anatomiſts, *la petite ronde*.

Humerum *attollens*, in *Anatomy*, a name given by Spigelius, and others, to a muſcle now generally known under the name of the DELTOIDES.

Humeri *primus*, in *Anatomy*, a name given by ſome anatomical writers to a muſcle generally known under the name of the PECTORALIS.

HUMID, Humidum, *moiſt*. The ſchool philoſophers make water the *primum humidum*, the firſt of *humid* bodies, and the cauſe or principle of humidity in others; which are more or leſs moiſt, as they partake more or leſs of this element.

HUMIDITY, *moiſture*; the quality or power of wetting or moiſtening other bodies.

Modern writers conſider *humidity* as a particular ſpecies of fluidity; and define it a fluor, which, being applied on a ſolid body, adheres to, and communicates the quality to other bodies. Others, ſomewhat more accurately, call *humidity* the power whereby a body moiſtens another; but what that power is they do not ſhew.

But of this we are certain, *humidity* is only a ſort of relative mode. So far as the component particles of a fluid, compared with reſpect to the pores and particles of other bodies, or the texture thereof, are apt and diſpoſed to enter thoſe pores, or ſtick to thoſe particles, ſo far is that fluid humid: on the contrary, ſo far as there is a repugnance or incongruity between the particles, &c. in reſpect of ſuch bodies, the fluid is not *humid*.

Thus quickſilver is not moiſt in reſpect to our hands or clothes, and other things, which it will not ſtick to; but it may be called *humid*, in reference to gold, tin, or lead, to whoſe ſurfaces it will preſently adhere, and render them ſoft and moiſt. Even water itſelf, which wets almoſt every thing, and is the great ſtandard of moiſture and *humidity*, is not capable of wetting all things; for it ſtands or runs off in globular drops from the leaves of cabbages, and many other plants; and it will not wet the feathers of ducks, ſwans, and other water-fowl.

Add, that the texture alone may cauſe the fluid to be *humid*; as is plain, in that neither quickſilver, lead, or biſmuth, alone will ſtick upon glaſs; yet, being mixed together, they will form a maſs that will do ſo; as appears from ſuch a compoſition being frequently uſed in foliating looking-glaſſes.

HUMIDUM *radicale*, or *radical moiſture*. This in reality ſeems to amount to no more than the pureſt and moſt defecate part of the nutritious matter, in a condition ready to be aſſimilated.

By too much heat, as in fevers, hectics, &c. this *humidity* is too haſtily exhauſted and ſpent. See Radical.

HUMILIATI, a congregation of religious in the church of Rome, eſtabliſhed by ſome Milaneſe gentlemen on their releaſe from priſon, where they had been confined under the emperor Conrad, or, as others ſay, under Frederick I. in the year 1162. This order, which acquired great wealth, and had no leſs than ninety monaſteries, was aboliſhed by pope Pius V. in 1570, and their houſes given to the Dominicans and Cordeliers, for their luxury and cruelty.

HUMILIATION, the act of humbling, i. e. of abating a perſon's pride, and bringing him lower in his opinion.

In this ſenſe, *humiliation* ſtands diſtinguiſhed from mortification: *humiliation* brings down the mind; mortification ſubdues the fleſh.

HUMILIS *muſculus*, in *Anatomy*, a name mentioned by Caſſerius, as given by ſome people of his time to one of the muſcles of the EYE, the rectus inferior of Fabricius, and deprimens of Riolan: it is the depreſſor oculi of Albinus, being one of the quatuor recti muſculi oculorum of that author.

HUMILITY, in *Ethics*, is a virtue conſiſting in the moderate value which a perſon puts upon himſelf, and every thing relating to him. Or, more particularly, it conſiſts in not attributing to ourſelves any excellence or good which we have not; in not over-rating any thing which we have or do; in not taking an immoderate delight in one's ſelf; in not aſſuming more of the praiſe of a quality or action than belongs to us, and in a lowly ſenſe and acknowlegement of our imperfections, errors, and ſins. This virtue expreſſes itſelf in the modeſty of our appearance, of our purſuits, and of our behaviour towards other men. It is diſtinguiſhed from affectation, baſhfulneſs, and meanneſs.

HUMISUGA, the *Ground-ſucker*, in *Natural Hiſtory*, the name of a fly, ſo called, becauſe it is ſuppoſed to live by ſucking the juices of the earth, without taking in any ſolid food. It has a browniſh or dun body; a white ſpot at the inſertion of the wings, and another at the head; the legs are black; the back is grey, with four ſullied white lines running longitudinally; the wings are ſilvery, and, if put into water, they ſhine with a bright light like that of the glow-worm. This creature is common with us about path-ways, on mole-hills, and in other places where the ground is newly turned up. We call it the *path-fly*.

HUMMING-*bird*, *Trochilus*, or *Guainumbi*, in *Ornithology*, the name of a very beautiful genus of American birds, the diſtinguiſhing characters of which are, that its beak is of a ſubulated figure, but fine as a thread; it is longer than the head, and terminated in a fine tube or pipe; the upper mandible forms a kind of ſheath or caſe for the lower; the tongue is filiform, and rendered tubulous by the junction of two threads; and the feet are formed for walking. Linnæus enumerates twenty-two ſpecies of this genus. Mr. Edwards has likewiſe deſcribed ſeveral different ſpecies. The leaſt ſpecies is the ſmalleſt of all birds, but of the moſt beautiful and lively colours of all others: the colour of the body is a ſhining green; it flies very ſwiftly, and in flying makes a noiſe exactly like the humming of a bee, and is not much larger than the humble-bee; it can ſuſtain itſelf a long time on the wing, and in that poſture thruſts its little beak into flowers, the juices of which it ſucks and feeds on. As it has no other food but this, there is no keeping it alive, but all die that are taken; and they are preſerved and ſent over as curioſities to us. Many have reported ſtrange ſtories of their ſleeping all the winter-months, and reviving at the approach of ſpring; but Marcgrave ſaw them in great plenty in the woods in all ſeaſons. The Indians make pictures with the feathers of theſe birds, which are ſo brightly coloured, as to vie with the fineſt paint, and ſo thin as to be as cloſe as colours on canvas. Ray's Ornithol. p. 165.

The *humming-bird* is ſo ſmall, that its leg and foot together meaſure but half an inch, and its whole trunk not an inch. The body weighs only one-tenth of an ounce, which is about equivalent to a ſilver ſixpence; whereas a titmouſe, the ſmalleſt bird among us, weighs two ſhillings, or half a crown. Its neſt, which is made of cotton, is much of the ſize and figure of the thumb of a man's glove; its egg about the bigneſs of a pea. Some of the Indians wear them in their ears for pendants. Phil. Tranſ. N° 200, p. 760; and N° 206, p. 993. or Abr. vol. ii. p. 854. See *Tab.* III. *of Birds*, *fig.* 23.

HUMOR, or Humour. See Humour.

HUMORISTS, *gli* Humoristi, the title of a celebrated academy of learned men at Rome. See Academy *of Humoriſts*.

HUMOROSI, the name of an academy eſtabliſhed at Cortona in Italy.

The *Humoroſi* of Cortona muſt not be confounded with the *Humoriſti* of Rome.

HUMOUR, or Humor, in its general ſenſe, ſignifies the ſame as *liquor*, or liquid.

Humour, in *Medicine*, is applied to any juice or fluid part of the body; as the chyle, blood, milk, fat, ſerum, lymph, ſpirits, bile, ſeed, ſalival and pancreatic juices, &c. See each of theſe under its proper head, Chyle, Blood, Bile, &c.

The *four humours*, ſo much talked of by the ancient phyſicians, are four liquid ſubſtances, which they ſuppoſe to moiſten the whole body of all animals, and to be the cauſe of the divers temperaments thereof.

Theſe are *phlegm*, *blood*, *bile*, and *melancholy*.

But the moderns do not allow of theſe diviſions. The *humours* they rather chooſe to diſtinguiſh into *nutritious*, called alſo *elementary*; as chyle and blood: thoſe ſeparated from the blood; as bile, ſaliva, urine, &c. and thoſe returned into the blood.

Humours, again, are diſtinguiſhed into *natural*, or ſalutary, and *morbid* or corrupted. To the former claſs belong all the juices ordinarily ſecreted for the uſes of the body.

To the latter belong thoſe compound *humours*, which, thickening and growing putrid, cauſe tumours, abſceſſes, obſtructions, and moſt diſeaſes.

Theſe are diſtinguiſhed by various names; *malignant*, *aduſt*, *acrimonious*, *corroſive*, *crude*, *peccant*, &c.

Humour is alſo uſed for the particular temperament or conſtitution of a perſon, conſidered as ariſing from the prevalence of this or that *humour*, or juice of the body.

Thus we ſay, a bilious, choleric *humour*; a phlegmatic *humour*; a melancholic, hypochondriac *humour*; a ſanguine, gay, ſprightly *humour*, &c.

Humours *of the eye*. Anatomiſts and opticians diſtinguiſh three particular *humours* of the eye; which they call the aqueous, crystalline, and vitreous.

Theſe three *humours* have each their ſhare in the refraction of the rays of light neceſſary to viſion.

Authors, both ancient and modern, ſpeak of the regeneration of the *humours* of the eye; and give us inſtances of their reproduction, when, by any accident, they had been let out; but their inſtances, ſtrictly conſidered, generally go no farther than to the aqueous and vitreous *humours*.

Borri only, in a letter to Bartholine, ſays as much of the cryſtalline. He affirms, that he has ſlit the pupil of the eye of divers animals, and ſqueezed out all the *humours*, even the cryſtalline, and has afterwards perfectly reſtored them again to fight; and that the eyes of the birds, whereon the operation had been performed, inſtead of being damaged thereby, were rendered more lively and vigorous than uſual. He adds, that he had performed the ſame experiment on divers perſons, with ſo much ſucceſs, that there remained not the ſmalleſt appearance of a cicatrix in the eye. See Cataract.

Humour is alſo uſed, in *Dramatic Poetry*, for a ſubordinate ſpecies of what the critics call *manners*.

Humour is uſually looked on as peculiar to the Engliſh drama, at leaſt our comic poets have excelled therein, and carried it beyond thoſe of any other nation; and our's is, perhaps, the only language that has a name for it.

Humour is uſually conſidered by critics as a fainter or weaker habitual paſſion peculiar to comic characters, as being chiefly found in perſons of a lower degree than thoſe proper for tragedy.

Every paſſion may be ſaid to have two different faces: one that is ſerious, great, formidable, and ſolemn, which is for tragedy; and another that is low, ridiculous, and fit for comedy; which laſt is what we call its *humour*.

Wit only becomes few characters: it is a breach of character to make one half the perſons in a modern, or indeed in any comedy, talk wittily and finely; at leaſt at all times, and on all occaſions. To entertain the audience, therefore, and keep the dramatic perſons from going into the common, beaten, familiar ways and forms of ſpeaking and thinking, recourſe is had to ſomething to ſupply the place of wit, and divert the audience, without going out of character; and this end is attained by *humour*; which therefore is to be looked on the true wit and humour.

A very good judge, the duke of Buckingham, makes *humour* to be all in all: wit, according to him, ſhould never be uſed, but to add an agreeableneſs to ſome proper and juſt ſentiment, which, without ſome ſuch turn, might paſs without its effect.

Humour, or *continued wit*, in *Oratory*, is a certain ſprightlineſs and vivacity of thought, which runs through a diſcourſe, and ſhews itſelf in agreeable images, beautiful turns, and a facetious manner of expreſſion, ſuited to the ſubject, and affecting the hearers with pleaſure and delight, though not to that degree as to excite laughter, or any great emotion of the paſſions.

HUMP-*back*. See Gibbous.

HUMULUS, in *Botany*. See Hop.

HUNDRED, *centum*, *cent.* the number of ten times ten, or the ſquare of ten.

The place of *hundreds* makes the third in order in the Arabic numeration.

We uſually expreſs the proportion of the profits made in the way of commerce, &c. by the *hundred*.

Hundred is alſo uſed as a meaſure to expreſs a certain quantity or number of things. A *hundred* of ſalt at Amſterdam is fourteen tuns.

Deal boards are ſold at ſixſcore to the *hundred*, called the *long hundred*. Pales and laths are counted at five ſcore to the *hundred*, if five feet long; and ſix ſcore, if three feet long.

Hundred *weight*, or the *great hundred*. See Quintal.

Hundred, *docimaſtic*. See Centner.

Hundred, Hundredum, *centuria*, is alſo a part of diviſion of a shire or county. It was ſo called, according to ſome, becauſe each *hundred* found a *hundred* fidejuſſors or ſureties of the king's peace, or a *hundred* able men of war.

Others rather think it to have been ſo called, becauſe originally compoſed of a *hundred* families. It is true, Brompton tells us, that a *hundred* contains *centum villas*; but then Giraldus Cambrenſis writes, that the Iſle of Man hath three hundred and forty-three villas. In both theſe places the word *villa* muſt be taken for a country family; for it cannot mean a village, becauſe there are not above forty villages in that iſland.

So, where Lambard tells us, that a *hundred* is ſo called, a *numero centum hominum*, it muſt be underſtood of a *hundred* men who are heads and chiefs of ſo many families.

Hundreds were firſt ordained by king Alfred, the twenty-ninth king of the Weſt Saxons: *Alfredus rex* (ſays Lambard, *verbo* centuria) *ubi cum Guthruno Dano fœdus inierat, prudentiſſimum olima Jethrone Moiſi datum ſecutus concilium, Angliam primus in ſatrapias*, centurias, *& decurias partitus eſt. Satrapiam, ſhyre, a* Scyrian *(quod partiri ſignificat) nominavit, centuriam* hundred; *& decuriam, teothing ſive tienmantale*, i. e. *decemviralo collegium, appellavit*; *atque iiſdem nominibus vel hodie vocantur*, &c. See County and Tithing.

This dividing of counties into *hundreds*, for the better government, king Alfred borrowed from Germany, where *centa*, or *centina*, is a juriſdiction over a hundred towns.

Such is the original of *hundreds*, which ſtill retain the name; though the juriſdiction be devolved to the county-court, ſome few excepted, which have been by privilege annexed to the crown, or granted to ſome great ſubject, and ſo remain ſtill in the nature of a franchiſe.

This has been ever ſince the ſtat. 14 Edw. III. whereby theſe *hundred* courts, formerly farmed out by the ſheriff to other men, were all, or moſt part, reduced to the county-court, and ſo remain at preſent; ſo that where we read now of *hundred*-courts, they are to be underſtood of ſeveral franchiſes, wherein the ſheriff has nothing to do by his ordinary authority, except they of the *hundred* refuſe to do their office.

If any homicide be committed, or dangerous wound given in the day-time, and the offender eſcape, the town ſhall be amerced; and if out of a town, the *hundred* ſhall be amerced. The *hundred* ſhall alſo make good the damages, in caſes of robbery (ſee HUE-*and*-CRY), cutting banks or hop-binds; burning houſes, barns, outhouſes, hovels, cocks, mows, or ſtacks of corn, ſtraw, hay, or wood; mines or pits of coal; deſtroying granaries or corn intended for exportation; deſtroying turnpikes or works of navigable rivers, &c. 1 Geo. I. cap. 5. 9 Geo. I. cap. 22. 29 Geo. II. cap. 36. 8 Geo. II. cap. 22. 10 Geo. II. cap. 32. 11 Geo. II. cap. 22. 22 Geo. II. cap. 46.

HUNDRED, or HUNDREDUM, is ſometimes alſo uſed for an immunity or privilege, whereby a man is quit of the *hundred*-penny, or cuſtom, due to the *hundred*.

HUNDRED-*court*. See COURT.

HUNDRED-*lagh* ſignifies the *hundred* court, from which all the officers of the king's foreſt were freed by the charter of Canutus.

HUNDRED *Suit*, the payment of perſonal attendance, ordering ſuit and ſervice at the *hundred*-court.

HUNDREDERS, or HUNDREDORS, HUNDREDARII, are men impanelled, or fit to be impanelled, of a jury, upon any controverſy, dwelling within the *hundred* where the land in queſtion lies.

HUNDREDER is alſo uſed for him who hath the juriſdiction of a *hundred*, and holds the *hundred*-court. See HEADBOROUGH.

Sometimes it is alſo uſed for the bailiff of a *hundred*. See BAILIFF.

HUNEN, in the *Materia Medica*, a name given by ſome writers to the JUJUBE.

HUNGARIAN *Machine*, in *Hydraulics*, is repreſented *Tab.* IV. *Hydraulics*, *fig.* 40. In this figure AA, is the ſide of a hill, cloſe by the brink of the ſhaft or mine-pit BB, which is 104 feet deep below the ſurface of the ground C at the foot of the hill. In this hill is a large ſpring of water, 143 feet above the ſurface of the ground at C (taken in perpendicular meaſure) and the ſpring affords much more water than what the ſpring D, under ground, lets in to the mine.

A pipe EFG lets the water down from the ſpring in the hill, into a cloſe air-tight veſſel H that ſtands at the foot of the hill, and contains 57½ cubic feet, or 430 gallons in wine meaſure. In this pipe is a cock *a*, which being opened or ſhut, lets the water of the ſpring run into H, or ſtops it, as occaſion requires: and in H are two cocks *b* and *c*, the uppermoſt of which is for letting air into H, and the lowermoſt for letting the water out of it.

A ſmall pipe I goes from the veſſel H on the ſurface of the ground to a veſſel K in the bottom of the mine, and terminates in the top thereof. This veſſel is air-tight, and contains 27½ cubic feet, or 205⅓ gallons in wine meaſure, which is forced up the aſcending pipe LM, and runs off to waſte, at N, above ground. The lower end of this pipe goes down ſo far into the veſſel K, as almoſt to touch its bottom.

From this veſſel, a pipe O goes to the ſpring D under ground, which lets water into the mine, and would overflow it if the water was not forced up or raiſed from the mine, through the pipe LM. The pipe O lets this water into the veſſel K when the cock *d* is turned open, and keeps back the water when the cock is ſhut.

The operation is as follows: the cock *b* being open, and the cocks *a* and *c* ſhut, and no water in the veſſel K, open the cock *d* to let the veſſel K fill with water from the ſpring in the mine. As this veſſel fills, the water will drive the air out of it, up through the ſmall pipe I into the veſſel H, and all that air will go out of the veſſel H by the open cock *b*, and then H will remain, as it was before, full of air in the ſame ſtate of denſity as the common air is on the outſide of H. When K is full of water, ſhut the cocks *b* and *d*, and open the cock *a*, to let water run down from the ſpring in the hill, by the pipe EF, into the veſſel H. As the water riſes in that veſſel, the air will thereby be driven out of it, down through the pipe I, into the veſſel K: and as this air is compreſſed by the weight of the running water in the pipe EF, the compreſſed air will force all the water out of the veſſel K, up through the pipe LM, from which it will run off at N on the ſurface of the ground; and then the compreſſed air will ruſh out, after the water.

When the veſſel K in the mine is emptied of water, and the air is heard to begin to ruſh out, ſhut the cock *a* to ſtop the water from the ſpring, and open the cocks *b* and *c*: then the water that came from the ſpring will run out of the veſſel H by the cock *c*, and air will go in by the cock *b*: at the ſame time, open the cock *d* in the mine, to let the veſſel K fill with water from D the ſpring in the mine; and as H empties above-ground, K will fill below it; and the air that remained in K will (by the riſing of the water in it) be driven back into the veſſel H through the pipe I.

When H is empty of water, and K full, ſhut the cocks *b*, *c*, and *d*, and open the cock *a*: then H will fill with water from the ſpring in the hill; and this water, as it riſes in H, will force the air out of H, down the pipe I, upon the water in K; and the force of the compreſſed air will drive all the water out of K, up the pipe LM, from which it will run off at N, as before.

And thus, wherever there is a ſpring in a hill, near a mine, that affords more water than what flows into the mine from a ſpring under ground; and the perpendicular height of the ſpring in the hill is greater than the depth of the mine, water may thus be raiſed from the mine, in a moſt ſimple and eaſy manner, by an engine in which there are neither pumps, piſtons, nor valves: and ſuch an engine will not be liable to be out of order, nor need repairs in many years.

But as there are very few mines that have hills near them with high ſprings, water cannot then be raiſed from them in this manner; and therefore Mr. Blakey propoſed another method, which was, to make H an air-veſſel, with a pipe going from it to another veſſel in which is water, kept boiling by a fire under it, and this veſſel to have a cock to let out the ſteam occaſionally that riſes from the ſurface of the boiling water. When the cock is ſhut, the ſteam will go off from the boiler into the air-veſſel H, and drive the air out of it, down through the pipe I into the veſſel K in the mine: and the force of the air compreſſed by the elaſticity of the ſteam, will raiſe the water from K, up through the pipe LM, till K be emptied of water. Then the cock in the boiler is to be turned open, to let out the ſteam, and the cock *d* is to be opened to let the veſſel K fill from the ſpring in the mine: and when it is full, both theſe cocks are to be ſhut, and the operation will go on as before.

That Blakey's ſcheme would do, the Hungarian machine puts beyond all doubt. In both of them the veſſels muſt be made very ſtrong, becauſe every part of each veſſel, equal in ſurface to the bore of the aſcending pipe LM, will ſuſtain an outward preſſure equal to the whole weight of water in that pipe. It will not anſwer for ſuch depths as the common fire-engine will, nor will it raiſe ſo much water; but it may be built for leſs than a third part of the expence, and would anſwer very well where the depth is not above a hundred feet.

HUNGARICA *bolus*, in the *Materia Medica*, a medicinal earth, commonly known by the name of *bolus* TOCCAVIENSIS.

HUNGARICUS *morbus*, a diſeaſe ſo called from its being firſt obſerved in the imperial army in Hungary, in the year 1566; from whence it ſpread over a great part of Europe.

It is deſcribed as a malignant fever, attended with ſickneſs at the ſtomach, a pain and hardneſs about the epigaſtric region, great thirſt from the beginning, a parched tongue, and a conſtant head-ach, ending in a delirium. It was highly contagious and mortal, and is ſuppoſed to have been a compound of the BILIOUS and *hoſpital* fever, taking its riſe firſt in the camp, but acquiring that high degree of malignity from the foul air of the places in which the ſick were crowded, Pringle, Obſerv. on the Diſeaſes of the Army, p. 118, ſeq.

HUNGARY *water*, *Aqua* HUNGARICA, a diſtilled water, ſo denominated from a queen of *Hungary*, for whoſe uſe it was firſt prepared, and who was cured by the continued uſe of it, of a paralytic diſorder.

Hungary-water is one of the diſtilled waters of the ſhops; and is directed, in the college diſpenſatory, to be made of ROSEMARY-flowers infuſed ſome days in rectified ſpirit of wine, and the ſpirit then diſtilled. The college of Edinburgh directs a gallon of rectified ſpirit, to be drawn over in the heat of a water bath from two pounds of the flowers as ſoon as they are gathered; that of London takes the tops and a ſpirit not quite ſo ſtrong; putting a gallon of proof ſpirit to a pound and a half of the freſh tops, and drawing off in the heat of a water-bath five pints.

It is an agreeable perfume, and its virtues are much the ſame as thoſe of the ſimple it is drawn from. The *Hungary* water brought from France is more fragrant than ſuch as is generally prepared among us.

HUNGER, *fames*, a natural appetite or deſire of food. *Hunger* is properly diſtinguiſhed into *natural* and *animal*. *Natural hunger* is an irritation of the ſtomach, occaſioned by faſting; *animal hunger* is the ſenſation or perception of that irritation, and the deſire of food conſequent thereon.

There are various opinions as to the nature, cauſe, and definition, of *hunger*; the point having been controverted from Ariſtotle to our time. Galen defines it, a painful ſenſation, ariſing from a divulſion of the ſtomach; the other Peripatetics call it an appetite, or deſire, of hot and dry, which two ſyſtems ſome authors have endeavoured to reconcile, by taking them both in; and, accordingly, define *hunger* a natural appetite of hot and dry, occaſioned by a painful divulſion of the membranes of the ſtomach, ariſing from its emptineſs.

The modern philoſophers ſpeak much more accurately and intelligibly on the point. *Hunger* is generally conſidered, by them, as owing to the ſharpneſs or acrimony of the liquor contained in the ſtomach; which, vellicating its fibres, occaſions this uneaſy ſenſation. They add, that the occaſional cauſe of this vellication is, the emptineſs of the ſtomach; which not furniſhing food for the ſtomach-liquor to be employed on, expoſes its inner membrane to the action thereof.

In effect, it is generally agreed, that there is ſome menſtruous juice, or humour, continually diſcharged from the excretory ducts of the neighbouring glands into the ſtomach, to aſſiſt in the diſſolution and digeſtion of the food; and that this liquor, after the food is gone, falls upon the ſtomach itſelf, and irritates its nerves ſo ſtrongly, as to propagate the impreſſion to the brain, and thus produce the perception of *hunger*.

This juice ſome will have to be acid, becauſe bodies of that claſs are uſed to whet the appetite, and excite *hunger*; and that fatty bodies more readily remove it than others, by their adhering to the acid ſpicula, and blunting the points of them.

Others, denying the exiſtence of any ſuch ſtomach-liquor, and accounting for digeſtion without it; conſequently deny *hunger* to have any dependence thereon. The dry attrition of the coats of the ſtomach, according to them, is the only cauſe of it.

On both theſe principles, they ſay, it is, that the Indians elude their *hunger*, by ſwallowing pills, made of tobacco-leaves and calcined ſhells. Theſe pills take away the appetite; both as the tobacco-leaves gradually diminiſh the ſenſibility of the ſtomach; and as the calcined ſhells abſorb the ſalino-acid menſtruum. Thus alſo it is, that poor people frequently ſmoke tobacco to deceive their *hunger*, not to ſatisfy it: for tobacco affords no nutriment; but it occaſions a plentiful ſpitting, and by this means diſcharges the body of the acrid humour which cauſes *hunger*.

The latter ſyſtem Dr. Drake thus lays down: when all the chyme and chyle is preſſed out of the ſtomach, it follows the motions of its contents, and is again, by means of its muſcular coat, reduced to a ſtate of contraction; and by that means the inner coat is brought to lie in folds, which touching and, by means of the periſtaltic motion, rubbing lightly, upon one another, produce the gentle ſenſe of fretting, or vellification, which we call *hunger*; which being felt much in the upper orifice, which is firſt evacuated, begins there to prompt us to repleniſh: but as, by degrees, the remainder of the contents are expelled, this friction, or rubbing, of the membranes upon each other, ſpreads gradually over the whole ſtomach, and renders our *hunger* more urgent and impatient, till, by a new repletion, we take away the cauſe.

Others think the blood, derived from the adjacent ramifications of the arteries into the ſtomach, ſufficient to account for *hunger*, without the mediation either of the attrition, or the menſtruum. The maſs of blood itſelf, they obſerve, is rendered acid through abſtinence from food; its ſoft balſamic parts having been carried into all parts of the body, and lodged therein as nutriment, to ſupply the abſence of thoſe worn off, and exhaled: to which it may be added, that the velocity of the blood is conſiderably augmented, a good while after eating, beyond what it was during the action of digeſtion.

Hence it is, 1. That perſons of a bilious conſtitution, young people, and thoſe who labour hard, muſt ſooner find themſelves *hungry* than others. 2. That *hunger*, if it hold long, occaſions a violent heat, and even ſometimes a fever. 3. That thoſe whoſe humours are craſs and viſcid, are leſs incommoded with *hunger* than others.

In effect, we obſerve, that ſome animals, whoſe humours are found to have thoſe conditions, as tortoiſes, &c. will live a long time without food. For man, ſix or ſeven days are commonly ſuppoſed the limit within which, if he take no ſolid food, he dies; though we have inſtances of abſtinence which far ſurpaſs this. See ABSTINENCE, BULIMY, and OREXIS.

HUNGRY *evil*, a term uſed among the farriers for the ſame diſtemperature in horſes, which in men we call a canine appetite. It manifeſts itſelf ſufficiently in an inordinate deſire to eat, and is ſometimes the effect of long ſtarving, ſometimes of cold, or ſome other internal or external cauſe. In the latter caſe the horſe not only eats a large quantity, but he devours it in a very remarkable manner, chopping it up as if he would eat the very manger. The method of cure is to give him large toaſts of bread ſteeped in ſack, or ſome other ſweet wine; or give him a quantity of wheat flour in wine, or in milk, a quart or more at a time. Theſe are very good remedies in caſe of extremity, but otherwiſe he may be cured by feeding him moderately with bean bread ſeveral times a day, allowing no other food.

HUNTER, a name given to a horſe qualified to carry a perſon in the chace. The ſhape of the horſe deſigned for this ſervice, ſhould be ſtrong and well knit together, as the jockies expreſs it. Irregular or unequal ſhapes in theſe creatures, are always a token of weakneſs. The inequalities in ſhape which ſhew a horſe improper for the chace, are the having a large head and a ſmall neck, a large leg and a ſmall foot, and the like. The head of the *hunter* ſhould indeed always be large, but the neck ſhould alſo be thick and ſtrong to ſupport it. The head ſhould be lean, the noſtrils wide, and the windpipe ſtraight.

The *hunter*, in order to his behaving well in the field, ought to have great care and indulgence in the ſtable: he ought to have as much reſt and quiet as may be, to be kept well ſupplied with good meat, clean litter, and freſh water by him; he ſhould be often dreſſed, and ſuffered to ſleep as much as he pleaſes. He ſhould be ſo fed that his dung may be rather ſoft than hard, and it muſt be of a bright and clean colour. All this may be eaſily managed by the continual obſervance and change of his food, as occaſion requires. After his uſual ſcourings he ſhould have exerciſes and maſhes of ſweet malt, or bread and beans; or wheat and beans mixed together, are to be his beſt food, and beans and oats his worſt.

Some very great ſportſmen are for keeping their horſes out at graſs all the buck-hunting ſeaſon, never taking them up into the ſtable at all, but allowing them in the field as much oats with their graſs as they will eat. The horſe may be thus rid three days in the week for the whole ſeaſon, and never damaged by it, nor ever ſhewing any marks of harm afterwards.

The whole ſhape of a horſe intended for a *hunter*, ſhould be this: the ears ſhould be ſmall, open, and pricked; or though they be ſomewhat long, yet if they ſtand up erect, and bold like thoſe of a fox, it is a ſign of toughneſs or hardineſs. The forehead ſhould be long and broad, not flat; or, as it is uſually termed, mare-faced, but riſing in the middle like that of a hare; the feather ſhould be placed above the eye, the contrary being thought by ſome to threaten blindneſs. The eyes ſhould be full, large, and bright; the noſtrils not only large, but looking red and freſh within; for an open and freſh noſtril is always eſteemed a ſign of a good wind. The mouth ſhould be large, deep in the wicks and hairy. The wind pipe ſhould be large, and appear ſtraight when he bridles his head; for if, on the contrary, it bends like a bow on his bridling, it is not formed for a free paſſage of the breath. This defect in a horſe is expreſſed among the dealers by the phraſe cock-throppled. The head ſhould be ſo ſet on to the neck, that a ſpace may be felt between the neck and the chine; when there is no ſuch ſpace, the horſe is ſaid to be bull-necked, and this is not only a blemiſh in the beauty of the horſe, but it alſo occaſions his wind not to be ſo good. The creſt ſhould be ſtrong, firm, and well riſen; the neck ſhould be ſtraight and firm, not looſe and pliant; the breaſt ſhould be ſtrong and broad, the ribs round like a barrel, the fillets large, the buttocks rather oval than broad, the legs clean, flat, and ſtraight; and, finally, the mane and tail onght to be long and thin, not ſhort and buſhy, the laſt being counted a mark of dulneſs. When a *hunter* is thus choſen, and has been taught ſuch obedience, that he will readily anſwer to the rider's ſignals both of the bridle and hand, the voice, the calf of the leg, and the ſpurs; that he knows how to make his way forward, and has gained a true temper of mouth, and a right placing of his head, and has learned to ſtop and to turn readily, if his age be ſufficiently advanced, he is ready for the field. It is a rule with all ſtaunch ſportſmen, that no horſe ſhould be uſed in hunting till he is full five years old; ſome will hunt them at four, but the horſe at this time is not come up to his true ſtrength and courage, and will not only fail at every tough trial, but will be ſubject to ſtrains and accidents of that kind, much more than if he were to be kept another year firſt, when his ſtrength would be more confirmed.

When the *hunter* is five years old, he may be put to graſs from the middle of may till Bartholomew-tide; for the weather between theſe is ſo hot, that it will be very proper to ſpare him from work. At Bartholomew-tide the ſtrength of the graſs beginning to be nipped by froſts and cold dews, ſo that it is apt to engender crudities in the horſe, he ſhould be taken up, while his coat is yet ſmooth and ſleek, and put into the ſtable. When he is firſt brought home, he ſhould be put in ſome ſecure and ſpacious place, where he may evacuate his body by degrees, and be brought not all at once to the warm keeping; the next night he may be ſtabled up. It is a general rule with many not to clothe and ſtable up their horſes till two or three days after they are taken from graſs, and others who put them in the ſtable after the firſt night, yet will not dreſs and clothe them till three or four days afterward; but all this, except the keeping the horſe one day in a large and cool place, is needleſs caution.

There is a general practice among the grooms, in many places, of giving their *hunters* wheat-ſtraw as ſoon as they take them up from graſs. They ſay they do this to take up their bellies; but there ſeems much reaſon to diſapprove of this. The change is very violent, and the nature of the ſtraw ſo heating and drying, that there ſeems great reaſon to fear that the aſtringent nature of it would be prejudicial, more than is at firſt perceived. It is always found that the dung is hard after this food, and is voided with pain and difficulty, which is in general very wrong for this ſort of horſe. It is better therefore to avoid this ſtraw-feeding, and to depend upon moderate airing, warm cloathing, and good old hay, and old corn, than to have recourſe to any thing of this kind.

When the horſe has evacuated all his graſs, and has been properly ſhod, and the ſhoes have had time to ſettle to his feet, he may be ridden abroad, and treated in this manner: the groom ought to viſit him early in the morning, at five o'clock in the long days, and at ſix in the ſhort ones; he muſt then clean out the ſtable, and feel the horſe's neck, flank, and belly, to find the ſtate of his health. If the flank feels ſoft and flabby, there is a neceſſity of good diet to harden it, otherwiſe any great exerciſe will occaſion ſwellings and goutineſs in the heels. After this examination, a handful or two of good old oats, well ſifted, ſhould be given him; this will make him have more inclination to water, and will alſo make the water ſit better on his ſtomach, than if he drank faſting. After this he is to be tied up and dreſſed. If in the doing of this he opens his mouth, as if he would bite, or attempts to kick at the perſon, it is a proof that the teeth of the curry-comb are too ſharp, and muſt be filed blunter. If after this he continues the ſame tricks, it is through wantonneſs, and he ſhould be corrected for it with the whip. The intent of currying being only to raiſe the duſt, this is to be bruſhed off afterwards with a horſe-tail nailed to a handle, or any other light bruſh. Then he is to be rubbed down with the bruſh, and duſted a ſecond time; he ſhould then be rubbed over with a wet hand, and all the looſe hairs, and whatever foulneſs there is, ſhould be picked off. When this is done, and he is wiped dry as at firſt, a large ſaddle-cloth is to be put on, reaching down to the ſpurring place; then the ſaddle is to be put on, and a cloth thrown over it that he may not take cold: then rub down his legs, and pick his feet with an iron picker, and let the mane and tail be combed with a wet mane-comb. Laſtly, it is a cuſtom to ſpurt ſome beer in his mouth juſt before the leading him out of the ſtable. He ſhould then be mounted, and walked a mile at leaſt to ſome running water, and there watered; but he muſt only be ſuffered to take about half his water at one drinking.

It is the cuſtom of many to gallop the horſe at a violent rate as ſoon as he comes out of the water, but this is extremely wrong for many reaſons. It endangers the breaking a horſe's wind more than any other practice, and often has been the occaſion of burſting very good horſes. It uſes them alſo to the diſagreeable trick we find in many horſes, of running away as ſoon as ever they come out of the water; and with ſome it makes them averſe to drinking, ſo that they will rather endure thirſt, and hurt themſelves greatly by it, than bring on the violent exerciſe which they remember always follows it. The better way is to walk him a little after he is out of the water, then put him to a gentle gallop for a little while, and after this to bring him to the water again. This ſhould be done three or four times, till he will not drink any more. If there is a hilly place near the watering place, it is always well to ride up to it; if otherwiſe, any place is to be choſen where there is free air and ſun. That the creature may enjoy the benefit of this, he is not to be galloped, but walked about in this place an hour, and then taken home to the ſtable. The pleaſure the horſe himſelf takes in theſe airings, when well managed, is very evident, for he will gape, yawn, and ſhrug up his body; and in theſe, whenever he would ſtand ſtill to ſtale, dung, or liſten to any noiſe, he is not to be hindered from it, but encouraged in every thing of this kind.

The advantages of theſe airings are very evident, they purify the blood, teach the creature how to make his breathing agree with the reſt of the motions of his body, and give him an appetite to his food, which *hunters* and racers, that are kept ſtalled up, are otherwiſe very apt to loſe. On returning from airing the litter of the ſtable ſhould be freſh, and by ſtirring this, and whiſtling, he will be brought to ſtale. Then he is to be led to his ſtall, and tied up, and again carefully rubbed down; then he ſhould be covered with a linen cloth next his body, and a canvas one over that, made to fit him, and reaching down to his legs. This, as the duke of Newcaſtle obſerves, is a cuſtom which we learnt of the Turks, who are of all people the moſt nice and careful of their horſes. Over this covering there ſhould be put a body-cloth of ſix or eight ſtraps; this keeps his belly in ſhape, and does not hurt him. This cloathing will be ſufficient while the weather is not very ſharp, but in ſevere ſeaſons, when the hair begins to riſe and ſtart in the uncovered parts, a woollen cloth is to be added, and this will always prove fully ſufficient.

Different horſes, and different ſeaſons, make variety of the degree of cloathing neceſſary; but there always is an obvious rule to point out the neceſſary changes, the roughneſs of the coat being a mark of the want of cloathing, and the ſmoothneſs of it a proof that the cloathing is ſufficient. Therefore if at any time the hair is found to ſtart, it is a notice that ſome farther cloathing is to be added.

If the horſe ſweat much in the night, it is a ſign that he is over fed, and wants exerciſe; this therefore is eaſily remedied. An hour or more after the horſe is come in from his airing, the groom ſhould give him a wiſp of clean hay, making him eat it out of his hand; after this let the manger be well cleaned out, and a quartern of oats clean ſifted be given him. If he eats up this with an appetite, he ſhould have more given him; but if he is ſlow and indifferent about it, he muſt have no more. The buſineſs is to give him enough, but not to cloy him with food.

If the horſe gets fleſh too faſt on this home feeding, he is not to be ſtinted to prevent it, but only his exerciſe increaſed; this will take down his fleſh, and at the ſame time give him ſtrength and wind. After the feeding in the morning is over the ſtable is to be ſhut up, only leaving him a little hay on his litter. He need be no more looked at till one o'clock, and then only rubbed down, and left again to the time of his evening watering, which is four o'clock in the ſummer, and three in the winter. When he has been watered, he muſt be kept out an hour or two, or more if neceſſary, and then taken home and rubbed as after the morning watering. Then he is to have a feed of corn at ſix o'clock, and another at nine at night; and being then cleaned, and his litter put in order, and hay enough left for the night, he is to be left till morning. This is the direction for one day, and in this manner he is to be treated every day for a fortnight, at the end of which time his fleſh will be ſo hardened, his wind ſo improved, and his mouth ſo quickened, and his gallop brought to ſo good a ſtroke, that he will be fit to be put to moderate hunting. During the time that he is uſed to hunting, he muſt be ordered on his days of reſt exactly as he is directed for the fortnight when he is in preparation; but as his exerciſe is now greatly increaſed, he muſt be allowed a more ſtrengthening food, mixing ſome old ſplit beans at every feeding with his oats.

And if this is not found to be ſufficient, the following bread muſt be given: let two pecks of old beans, and one peck of wheat be ground together, and made into an indifferently fine meal; then knead it into dough with ſome warm water, and a good quantity of yeaſt; let it lie a time that it may riſe and ſwell, which will make the bread the lighter; then make it into loaves of a peck each, and let it be baked in a ſlow oven, that it may be thoroughly done without being burnt; when it is taken out of the oven, it muſt be ſet bottom upwards to cool; when it is one day old the cruſt is to be chipped off, and the crumb given him for food. When this is ready, he ſhould have ſome of it at leaſt once in the day; but it is not to be made the only food, but ſome feeds are to be of oats alone, ſome of oats and this bread, and ſome of oats and beans mixed together. The making a variety in this manner, being the beſt of all methods of keeping up the appetite, which is often apt to fail.

The day before the horſe is to hunt, he muſt have no beans, becauſe they are hard of digeſtion, but only ſome oats with this bread; or if he will be brought to eat the bread alone, that will be beſt of all. His evening feed ſhould, on this day, be ſomewhat earlier than uſual; and after this he is only to have a wiſp of hay out of the groom's hand till he return from HUNTING.

HUNTING, the art, or act, of purſuing and chaſing beaſts of GAME.

In its general ſenſe, *hunting* includes the purſuit both of hairy and feathered game; but in its more proper and reſtrained ſignification, it is only applicable to beaſts of venery and chace.

F. De Launay, profeſſor of the French laws, has an expreſs treatiſe of *hunting*. We find, that, among the more civilized nations, as the Perſians, Greeks, and Romans, it always made one of their genteeler diverſions; and as to the wilder and more barbarous, it ſerved them with food and neceſſaries. The Roman juriſprudence, which was formed on the manners of the firſt ages, made a law of it; and eſtabliſhed it as a maxim, that as the natural right of things, which have no maſter, belongs to the firſt poſſeſſor; wild beaſts, birds, and fiſhes, are the property of him, whoever he be, that can firſt take them.

But the northern nations of barbarians who over-ran the Roman empire, bringing with them a ſtronger taſte for the diverſion; and the people being now poſſeſſed of other and more eaſy means of ſubſiſtence from the lands and poſſeſſions of thoſe they had vanquiſhed; their chiefs and leaders began to appropriate the right of *hunting*, and inſtead of a natural right, to make it a royal one. Thus it continues to this day; the right of *hunting*, among us, belonging only to the king, and thoſe who derive it from him.

And hence have ariſen all our laws and charters of the foreſt, laws and regulations for preſervation of the game, &c. See FOREST.

The *hunting* uſed by the ancients was much like that now practiſed for the rein deer; which is ſeldom *hunted* at force, or with hounds; but only drawn with a bloodhound, and foreſtalled with nets and engines.——Thus did they with all beaſts; whence a dog is never commended by them for opening, before he has diſcovered where the beaſt lies: hence, they were not in any manner curious as to the muſic of their hounds, or the compoſition of their kennel or pack, either for deepneſs, loudneſs, or ſweetneſs of cry, which is become a principal point in the *hunting* of our days.

Their huntſmen, indeed, were accuſtomed to ſhout and make a great noiſe, as Virgil obſerves in the third of his *Georgics: ingentem clamore premes ad retia cervum.* But that clamour was only to bring the deer to the nets laid for him.

The Sicilian way of *hunting* had ſomething in it very extraordinary.——The nobles or gentry being informed which way a herd of deer paſſed, gave notice to one another, and appointed a meeting; every one bringing with him a croſs-bow or long-bow, and a bundle of ſtaves ſhod with iron, the heads bored, with a cord paſſing through them all: thus provided, they came to the herd, and caſting themſelves about in a large ring, ſurrounded the deer.——Then, each taking his ſtand, unbound his faggot, ſet up his ſtake, and tied the end of the cord to that of his next neighbour, at the diſtance of ten feet from one another.——Then taking feathers, dyed in crimſon, and faſtened on a thread, they tied them to the cord; ſo that with the leaſt breath of wind, they would whirl round.——Which done, the perſons who kept the ſtands withdrew, and hid themſelves in the next covert.

Then the chief ranger entering within the line with hounds to draw after the herd, rouſed the game with their cry; which flying towards the line, were turned off, and ſtill gazing on the ſhaking and ſhining feathers, wandered about as if kept in with a real wall or pale.

The ranger ſtill purſued, and calling every perſon by name, as he paſſed by their ſtand, commanded him to ſhoot the firſt, third, or ſixth, as he pleaſed; and if any of them miſſed, or ſingled out another than that aſſigned him, it was counted a grievous diſgrace.

By ſuch means, as they paſſed by the ſeveral ſtations, the whole herd was killed by the ſeveral bands.

Hunting is practiſed in a different manner, and with a different apparatus, according to the nature, genius, and addreſs, of the particular beaſt which is the object thereof. Theſe beaſts are, the hart, hind, hare, boar, wolf, buck, doe, fox, marten, and roe; the five firſt whereof are denominated beaſts of the foreſt, or venery, *ſylveſtres*; and the five latter, beaſts of the field, or of chace, *campeſtres*.

The gentlemen, and maſters of the ſport, have framed a new ſet of terms, which may be called the *hunting language*; a little view or vocabulary whereof we ſhall here give the reader.

The terms, then, uſed for beaſts of venery and chace, as they are in company, are theſe: they ſay, a *herd* of harts, and all manner of deer; a *bevy* of roes; a *ſounder* of ſwine; a *rout* of wolves; a *richeſs* of martens; a *brace* or *leaſh* of bucks, foxes, or hares; a *couple* of rabbets or conies.

There are alſo terms for their lodging: a hart is ſaid to *harbour*; a buck *lodges*; a roe *beds*; a hare *ſeats*, or *forms*; a coney *ſits*; a fox *kennels*; a marten *trees*; an otter *watches*; a badger *earths*; a boar *couches*.

Hence, to expreſs their diſlodging, they ſay, *unharbour* the hart: *rouſe* the buck; *ſtart* the hare; *bolt* the coney; *unkennel* the fox; *tree* the marten; *vent* the otter; *dig* the badger; *rear* the boar.

The terms for their noiſe at rutting time are as follows: a hart *belleth*; a buck *growns* or *troats*; a roe *bellows*; a hare *beats* or *taps*; an otter *whines*; a boar *freams*; a fox *barks*; a badger *ſhrieks*; a wolf *howls*; a goat *rattles*.

Terms for their copulation: a hart or buck goes to *rut*; a roe goes to *tourn*; a bear goes to *brim*; a hare or coney goes to *buck*; a fox goes to *clicketing*: a wolf goes to *match* or *make*; an otter *hunteth* for his kind.

Terms for the footing and treading: of a hart we ſay, the *ſlot*; of a buck, and all fallow deer, the *view*: of all deer, if on the graſs, and ſcarce viſible, the *foiling*; of a fox, the *print*; and of other the like vermin, the *footing*; of an otter the *marks*; of a boar, the *track*: the hare, when in open fields, is ſaid to *ſore*; when ſhe winds about to deceive the hounds, ſhe *doubles*; when ſhe beats on the hard highway, and her footing comes to be perceived, ſhe *pricketh*: in ſnow it is called, the *trace* of the hare.

The tail of a hart, buck, or other deer, is called the *ſingle*; that of a boar, the *wreath*; of a fox, the *bruſh* or *drag*; and the tip at the end, the *chape*; of a wolf, the *ſtern*; of a hare and coney, the *ſcut*.

The ordure or excrement of a hart, and all deer, is called *fewmets* or *fewmiſhing*; of a hare, *crotiles* or *crotiſing*; of a boar, *leſſes*; of a fox, the *billiting*; and of other the like vermin, the *fuants*; of an otter the *ſpraints*. As to the heads of deer, ſomething has already been ſpoken under the article HEAD.

For the attire or parts thereof, thoſe of a ſtag, if perfect, are, the *bur*, the *pearls*, the little *knobs* on it, the *beam*, the *gutters*, the *antler*, the *ſur-antler*, *royal*, *ſur-royal*, and all at top, the *croches*; of the buck, the *bur*, *beam*, *brow-antler*, *back-antler*, *advancer*, *palm*, and *ſpellers*.

If the croches grow in the form of a man's hand, it is called a *palmed head*. Heads bearing not above three or four, and the croches placed aloft, all of one height, are called *crowned heads*. Heads having double croches, are called *forked heads*, becauſe the croches are planted on the top of the like forks.

They ſay a *litter* of cubs; a *neſt* of rabbets; a ſquirrel's *dray*.

The terms uſed in reſpect to the dogs, &c. are as follow: of grey-hounds, two make a *brace*; of hounds, a *couple*; of grey-hounds, three make a *leaſh*; of hounds, a *couple* and *half*: they ſay, *let ſlip* a grey-hound; and *caſt off* a hound: the ſtring wherein a grey-hound is led is called a *leaſh*; and that of a hound a *lyome*: the grey-hound has his *collar*, and the hound his *couples*: we ſay a *kennel* of hounds, and a *pack* of beagles.

Hunting conſidered as an exerciſe, is perhaps the beſt that can poſſibly be contrived for ſtrengthening the general habit, and procuring health and vigour. The ſeaſon of the year, the time of the day deſtined for this amuſement, and the motion neceſſary on this occaſion, are all admirably adapted to the reſtoration and continuance of health. It is beſides of no ſmall importance to have the mind recreated at the time the body is exerciſed; for this admirably aſſiſts the due circulation of the fluids through the minute canals deſtined for their conveyance; and there are few people not utterly abandoned to idleneſs and debauchery of ſome kind or other, who do not perceive a ſpontaneous flow of ſpirits when they ride at or about the riſe of the ſun, when they reſpire the pureſt air, when variety of perpetually changing ſcenes preſent themſelves, and when the mind is agreeably agitated concerning the event of the chace.

HUNTING, *ſtyles or manners of*, are various, according to the country, the beaſt, and the means whereby he is to be caught.

Hunting, as practiſed among us, is chiefly performed with dogs; of which we have various kinds, accommodated to the various kinds of game: as *hounds*, *grey-hounds*, *ſtaunch-hounds*, *blood-hounds*, *terriers*, &c. See Hound.

In the kennels or packs, they generally rank them under the heads of *enterers*, *drivers*, *flyers*, *tyers*, &c.

On ſome occaſions, nets, ſpears, and inſtruments for digging the ground are alſo required: nor is the *hunting-horn* to be omitted.

The uſual chaces among us are, the *hart*, *buck*, *roe*, *hare*, *fox*, *badger*, and *otter*. We ſhall here give ſomething of what relates to each of theſe.

With regard to the ſeaſons of *hunting*, hart and buck *hunting* begins at the end of fence-month, which is a fortnight after Midſummer, and laſts till Holy-rood-day. The hind and doe come in courſe on Holy-rood-day, and laſt till Candlemas. Fox *hunting* comes in at Chriſtmas, and holds till Annunciation.

Roe *hunting* begins at Michaelmas, and ends at Candlemas. Hare *hunting* commences at Michaelmas, and goes out at the end of February. Where the wolf and boar are *hunted*, the ſeaſon for each begins at Chriſtmas; the firſt ending at the Annunciation, the ſecond at the Purification.

Here, too, is the place for ſome general terms, and phraſes, more immediately uſed in the progreſs of the ſport itſelf; what belongs to the ſeveral ſorts of game in particular, being reſerved for the reſpective articles.

When the hounds then being caſt off, and finding the ſcent of ſome game begin to open and cry, they are ſaid to *challenge*; when they are too buſy before the ſcent be good, they are ſaid to *babble*; when too buſy where the ſcent is good, to *bawl*; when they run it end-ways orderly, holding in together merrily, and making it good, they are ſaid to be in *full cry*; when they run along without opening at all, it is called *running mute*.

When ſpaniels open in the ſtring, or a grey-hound in the courſe, they are ſaid to *lapſe*.

When beagles bark and cry at their prey, they are ſaid to *yearn*.

When the dogs hit the ſcent the contrary way, they are ſaid to *draw amiſs*.

When then they take freſh ſcent, and quit the former chace for a new one, it is called *hunting change*.

When they hunt the game by the heel or track, they are ſaid to *hunt counter*.

When the chace goes off, and returns again, traverſing the ſame ground, it is called *hunting the foil*.

When the dogs run at a whole herd of deer inſtead of a ſingle one, it is called *running riot*.

Dogs ſet in readineſs where the game is expected to come by and caſt off after the other hounds are paſſed, are called a *relay*. If they be caſt off before the other dogs be come up, it is called a *vauntlay*.

When, finding where the chace has been, they make a proffer to enter, but return, it is called a *blemiſh*.

A leſſon on the horn to encourage the hounds, is named a *call* or *recheat*. That blown at the death of a deer, is called the *mort*. The part belonging to the dogs of any chace they have killed, is the *reward*. They ſay, *take off* a deer's ſkin; *ſtrip* or *caſe* a hare, fox, and all ſorts of vermin; which is done by beginning at the ſnout, and turning the ſkin over the ears, down the tail.

Hunting, *Laws relating to*, ſee Game.

Notwithſtanding all the game laws, and the various qualifications for *hunting* pointed out by ſtatutes, which imply a power for perſons ſo qualified to *hunt*, yet according to judge Blackſtone, no man but he who has a chace, or free-warren by grant of the crown or preſcription, which ſuppoſes one, can juſtify *hunting* or ſporting upon another man's ſoil; nor indeed, in thorough ſtrictneſs of common law, either *hunting* or ſporting at all. Perſons ſo *hunting* are liable to actions of treſpaſs by the poſſeſſors of the land. Comment, vol. ii. p. 418. and vol. iv. p. 174.

Hunting, *Badger*. A badger is called by ſeveral names, *viz.* a *grey brock*, *boreſon*, or *bauſon*: the male is called a *badger* or *bore-pig*, and the female a *ſow*. See Badger.

This beaſt is very frequent in Italy, Sicily, the Alpine, and Helvetian coaſts; and is not uncommon in France and England.

The badger is a very ſleepy beaſt, eſpecially in the daytime, ſeldom ſtirring abroad but in the night; whence the denomination *lucifuga*, q. d. *avoider of the light*. It burrows under ground like the fox, and forms ſeveral different apartments, though with only one entrance, carrying in its mouth graſs in order to form a bed for its young. It is ſo cleanly an animal, that it never obeys the call of nature in its apartments, but goes out for that purpoſe. It breeds only once in a year, and brings four or five at a time.

The badger is a deep-biting beaſt, having very ſharp teeth; to guard againſt the effects whereof, it is uſual to put great broad collars about the dogs necks. He fights on his back, and by this means is at liberty to uſe both his teeth and nails. He has a faculty of blowing up his ſkin after a ſtrange manner, by which he defends himſelf againſt any blow or bite of the dogs; ſo that you may threſh on his back till you are weary to no purpoſe: but a ſmall ſtroke on the noſe diſpatches him preſently. The ſkin of the badger when dreſſed with the hair is uſed for piſtol furniture. The Highlanders make their pendant pouches of it. The hair is often uſed for making bruſhes to ſoften the ſhades in painting, called ſweetening tools. Theſe animals are alſo hunted in the winter nights for the ſake of their fleſh, for the hind quarters may be made into hams, not inferior in goodneſs to the beſt bacon. The fat is much valued for ointments and ſalves.

The method of *hunting* the badger is thus: ſeek the earth and burrows where he lies, and in a clear moonſhine night go and ſtop all the holes but one or two, and therein place ſacks, faſtened with drawing-ſtrings, which may ſhut him in as ſoon as he ſtrains the bag. The bags thus ſet, caſt off your hounds, and beat all the groves, hedges, or tufts, within a mile or two: what badgers are abroad, being alarmed by the dogs, will ſtraight repair to their earths, and ſo be taken. He that ſtays to watch the ſacks muſt ſtand cloſe, and upon a clear wind; or elſe the badger will find him, and fly ſome other way for ſafety. If the hounds either encounter him, or undertake the chace before he can get into his earth, he will ſtand at bay like a boar, and make excellent ſport.

If the badger be attacked in his earth, as ſoon as he perceives the terriers yearn him, he will ſtop the hole between the dogs and himſelf; and if the dogs continue baying he removes his baggage with him, and goes into another apartment or chamber, of which he uſually has half a dozen in the burrow; thus retreating from one to the other, tlll he can go no farther, and barricading the way as he goes. In *hunting* the badger as well as the fox, a man cannot juſtify breaking the ſoil, and digging him out of his earth.

Hunting, *Buck*, or *hunting fallow deer*. See Buck.

The female is called *doe*, or *doo*: the firſt year, a *fawn*; ſecond, a *tegg*; the third, a *doe*. See Deer.

This beaſt is common in moſt countries, being as corpulent as a hart, but in moſt things reſembling more a roe, except in colour; which is various, but moſt commonly branded, or ſandy on the back, having a black liſt all along on the ridge, and the belly and ſides ſpotted with white.

The male has horns not much differing from a hart, except in largeneſs, and they grow out of the head like fingers out of the hand; whence it is called *cervus palmatus*. The female is without horns.

Leſs art and ſkill are required in lodging a buck, than in harbouring a hart; nor does there need ſo much drawing after: it is ſufficient that you judge by the view, and mark what grove or covert he enters; for he does not wander and rove ſo often as a hart, nor ſo frequently change his layer. When hard hunted he uſually takes to ſome ſtrong hold or covert, with which he is acquainted; not flying far before the hounds, nor croſſing nor doubling, nor uſing any of the ſubtleties the hart is accuſtomed to.

The buck will beat a brook, but ſeldom a great river as the hart; nor can he ſtay ſo long at ſoil.

The greateſt ſubtlety a huntſman need uſe in *hunting* the buck is to beware of *hunting* counter or change, becauſe of the plenty of fallow deer, which uſe to come more directly upon the hounds than the red deer do.

The buck herds more than the hart, and lieth in the drieſt places; but if he be at large, unconfined in a park, he herds but little from May to Auguſt, becauſe the flies trouble him. He takes delight in hilly places, but chooſes the dales to feed in.

Hunting, *Fox*. This animal, the firſt year, is called a *cub*; the ſecond, a *fox*; the third, an *old fox*. See Fox.

His nature in many reſpects is like that of a wolf; and both bring the ſame number of cubs at a litter: but the fox litters deep under ground, which the wolf does not.

A bitch fox is hard to take when bragged and with cub, in regard ſhe lies near her burrow, into which ſhe runs upon hearing the leaſt noiſe: indeed it is no eaſy matter to take her at any time, as being a beaſt of exceeding ſubtlety. What makes *fox-hunting* the more entertaining is, the ſtrong hot ſcent this creature affords, which keeps up an excellent cry; but as his ſcent is hotter at hand, ſo it dies ſooner than that of a hare, *&c.* Add, that he never flies far before the hounds as not truſting to his legs, or the champaign ground, but has recourſe to the ſtrongeſt coverts.

verts. When he can no longer ſtand up before the hounds, he takes earth, and muſt be dug out. When courſed by grey-hounds on a plain, his laſt refuge is, uſually, to piſs on his tail, and flap it in their faces as they come near him; ſometimes ſquirting alſo his thicker excrement upon them, to make them give over their courſe.

When a bitch fox goes a clicketing, and ſeeks the dog, ſhe cries with a hollow voice, not unlike the howling of a mad dog; and the like noiſe ſhe makes when ſhe miſſes any of her cubs: but ſhe never cries at all when ſhe is about to be killed, but defends herſelf in ſilence to the laſt gaſp.

The fox is taken with hounds, grey-hounds, terriers, nets, and gins. Of terriers there are two ſorts: the one crook-legged, and commonly ſhort-haired, which take earth well, and lie long at fox, or badger; the other is ſhagged, and ſtrait-legged, which will not only hunt above ground as others, but alſo enter the earth with great fury, though theſe cannot ſtay in ſo long, on account of their vehemence.

The fox chuſes to earth in ground hard to dig; as in clay, or ſtony ground, or amongſt the roots of trees; and his earth has commonly but one hole, which goes ſtrait along in, before it comes at their couch: he ſometimes by craft poſſeſſes himſelf of a badger's old burrow, which has variety of chambers, holes, and angles. Geſner relates, that he frequently cheats the badger of his habitation, by laying his excrement at the mouth of the other's burrow.

HUNTING, *hare*. A hare the firſt year is called a *leveret*; the ſecond year, a *hare*; the third, a *great hare*. See HARE.

Thoſe of the mountains are the moſt ſwift, and thoſe of the marſhes the ſloweſt; the wandering hares are the moſt difficult and dangerous to follow.

Each part and member of the hare is formed for celerity. The head is round and ſhort, of a convenient length; the ears long and lofty, to hear the enemy at a diſtance, and ſave itſelf in time; the lips continually move, ſleeping and waking; and the eye is too big and round for the lid to cover it, even when aſleep; ſo that the creature ſleeps as it were on the watch. The breaſt is capacious, and fitted to take more breath than that of any other beaſt. They feed abroad, to conceal their forms; and never drink, but content themſelves with the dew. The hare's ears lead the way in her chace; for with one of them ſhe hearkeneth to the cry of the dogs, the other being ſtretched forth like a ſail to promote her courſe.

The hares of the mountains often exerciſe themſelves in valleys and plains, and through practice grow acquainted with the neareſt way to their forms: thoſe which frequent buſhes and brakes, are not able to endure labour; nor are very ſwift, being tender-footed, and growing fat through diſcontinuance of exerciſe.

When the hare has left the dogs far behind, ſhe goes to ſome hill or riſing-ground, where, rearing on her hinder legs, ſhe obſerves at what diſtance her purſuers are.

The ſcent is naturally ſtronger in wood-hares than field-hares; but in all ſorts it is ſtrongeſt when they feed on green corn. In winter mornings, the ſcent does not lie till the froſt be a little thawed; and it may be added, that a hare always leaves more ſcent when ſhe goes to relief, than when ſhe goes to form.

Her footſteps are more ſeen in winter, than ſummer; becauſe, as the nights are longer, they travel farther. Their prints are very uncertain at the full moon, at which time they leap and play together. The young, it is to be obſerved, tread heavier than the old, becauſe their limbs are weaker. A buck, or male hare, is known by his beating the hard highways, feeding farther out in the plains, and making his doublings of a greater compaſs than the female, who keeps cloſe by ſome covert ſide; turning, winding, and croſſing in the buſhes, like a coney, and rarely running out an end; whereas the buck, having once made a turn or two about his form, then farewel turns; for he will frequently lead them five or ſix miles without once turning his head. Add, that the buck is known, at his riſing out of form, by his hinder parts, which are more white, and his ſhoulder, which is redder than the doe's.

The hare regulates its conduct according to the weather. In a moiſt day ſhe holds the highways more than at any other time, becauſe the ſcent is then moſt apt to lie; and if ſhe come at the ſide of any young grove or ſpring, ſhe forbears to enter, but ſquats down aſide thereof, till the hounds have overſhot her; upon which ſhe returns the ſame way ſhe came, without turning into any covert, for fear of the wet and dew hanging on the boughs.

Regard is alſo to be had to the place where the hare ſits, and upon what wind; for if her form be either upon the north or ſouth wind, ſhe will not willingly run into the wind, but aſide, or down the wind: on the contrary, if ſhe form in the water, it is a ſign ſhe is foul and meaſled, and in the courſe will make all her doubling and croſſing about brook-ſides, and near plaſhes; for her ſcent, under this condition, being very ſtrong, ſhe needs a place that will take but little. Sometimes, when hunted down, ſhe will ſtart a freſh hare, and ſquat in the ſame form; at other times ſhe will creep under the door of a ſheep-cote, and hide among the ſheep, or run among a flock of ſheep, and will not, without the utmoſt difficulty, be taken from among them. Add, that ſome will take the ground like a coney: this is called going to *vault*.

Some hares will go up on one ſide of the hedge, and come down the other; and we have known a hare, that, being ſorely hunted, has got upon a quickſet hedge, and ran a good way on the top thereof, and then leaped off upon the ground; and it is no unuſual thing for them to take themſelves to furz-buſhes, and leap from one to another, whereby the hounds are frequently in default.

A hare, it is ſaid, does not live above ſeven years at moſt, eſpecially the buck; and if he and the doe keep one quarter, they will not ſuffer any ſtrange hare to ſit by them; whence the proverb, "The more you hunt, the "more hares you ſhall have;" ſince, having killed one hare, another comes and poſſeſſes his form. By the way it is to be obſerved, that to enter a young kennel of hounds, regard muſt be had to the nature of the country, and of the quarry: for according to the place wherein they are entered, and the game firſt given them, will they afterwards prove. Thus, if they be entered in a champaign country, they will ever after more delight to hunt there than on any other ground.

Having found where a hare hath relieved in ſome paſture, or corn-field; to find her form, the ſeaſon of the year and the ſtate of the weather are to be conſidered. In the ſpring, or ſummer, a hare will not ſit in the buſhes, becauſe frequently offended with piſmires, ſnakes, and adders; but will ſit in corn-fields, and open places. In winter they chooſe to ſit near towns and villages, in tufts of thorns and brambles, eſpecially when the wind is northerly or ſoutherly. According to the ſeaſon, and nature of the place where the hare is accuſtomed to ſit, there beat with your hounds, and ſtart her; which is better ſport than trailing of her from her relief to her form. Having ſtarted her, ſtep in, and halloe in the hounds till they have undertaken it; crying, *that*, *that*, or *there*, *there*, and go on with full cry; then recheat them, and follow at a diſtance, taking care not to forward them too much at firſt, as being apt, if the firſt heat, to overſhoot the game. Above all things, mind the firſt doubling the hare makes, which is to be a key or direction for the whole day; all the other doublings ſhe afterwards makes being like the firſt. According to the policies you ſee her uſe, and the place where you hunt, make your compaſs, to help the defaults, great or little, long or ſhort; always ſeeking the moiſteſt and moſt commodious place for the hounds to ſcent in.

HUNTING, *hart*, or HUNTING *of red deer*. This animal the firſt year is called a *calf*, or *hind-calf*; the ſecond year, a *knobber*; the third, a *brock*; the fourth, a *ſtaggard*; the fifth a *ſtag*; the ſixth, a *hart*.

The female is called a *hind*. The firſt year ſhe is *calf*; the ſecond, a *hearſe*, and ſometimes a *brocket's ſiſter*; the third a *hind*.

Terms occurring more eſpecially in *hunting* the hart, and not yet explained, are as follow. The print, or impreſſion, where a deer has lain, is called a *layer*: if it be in covert, or a thicket, it is called his *harbour*; where a deer has paſſed into a thicket, leaving marks whereby his bulk may be gueſſed at, it is called an *entry*; when they caſt their heads, they are ſaid to *mew*; when they rub their heads againſt trees, to bring off the peels of their horns, they are ſaid to *fray*; when a deer, hard hunted, takes to ſwimming in the water, ſhe is ſaid to go to *ſoil*; when they turn head againſt the hounds, they are ſaid to *bay*; when the hounds touch the ſcent, and draw on till they put up the hart, they are ſaid *to draw on the ſlot*.

As to the nature and qualities of the hart, it is to be obſerved, that he is an excellent ſwimmer; there being inſtances, when ſore hunted, of his plunging in the ſea, and being killed by fiſhermen twelve miles from land. When, in going to rut, they have occaſion to croſs a great river, or arm of the ſea, it is ſaid they aſſemble in great herds; the ſtrongeſt goes in firſt, and the next of ſtrength follows; and ſo one after the other, relieving themſelves by ſtaying their heads on the buttocks of each other.

The hind commonly carries her calf eight or nine months, which uſually falls in May: ſome have two at once; and they always eat up the ſkin wherein the calf lay. As the young grow up, the old one teacheth it to run and leap, and how to defend itſelf from the hounds.

The hart is amazed at hearing any one call, or whiſtle, in his fiſt: if you cry *ware, ware,* or *take heed,* you will ſee him inſtantly turn back, and make ſome little ſtand. His ſenſe of hearing is very perfect when his head and ears are erected; but very imperfect when he holds them down: hence, when he pricks up his ears, he is known to be apprehenſive of danger. When he is on foot, and not afraid, he wonders, and takes a pleaſure to gaze at every thing he ſees.

The hart is very long lived, commonly reaching to a hundred years, or upwards. The principal marks of his age are taken from his head, yet this is ſomewhat precarious; ſome having more croches thereon at the ſame age than others. Thoſe are accounted to excel in beauty of horns, which bear them high: though ſolid throughout as ſtones, yet, if they remain a while in the air, they grow very light and friable, diſcovering themſelves to be no other than an earthy ſubſtance, concrete and hardened with a ſtrong juice into the form of bones.

The horns being fallen, they retire, and hide themſelves in the ſhade, to avoid the annoyance of flies, and only come out to feed in the night. Their new horns appear, at firſt, like bunches, very ſoft and tender; but by the increaſe of the ſun's heat, they at length grow harder, and are covered with a tough ſkin, called a *velvet head.* As that ſkin dries, they daily try the ſtrength of their new heads upon trees, which not only burniſhes and ſcrapes off the roughneſs, but by the pain they feel hereby, admoniſhes them how long to forbear the company of their fellows; for when the horns grow inſenſible, they return to their former condition.

The taking of this beaſt requires great art and attention. When the hunter goes for ſport, he is firſt to encompaſs the beaſt *en ſong giſte,* in her own layer, and thus unharbour her in the view of the dogs, ſo they may never loſe her ſlot or footing. But note, a deal of choice and diſcretion is here required; for he may not ſet off upon every one, either of the herd, or thoſe which wander ſolitary: the young, the ſmall, &c. are to be paſſed over; and partly by ſight, and partly by the footing, fewmets, the largeneſs of the layer, &c. he muſt make judgment of the game, ſingling out for that purpoſe the largeſt head in the whole herd.

There are divers means for knowing an old hart; viz. by the *ſlot,* the *entries,* the *abatures* and *foils,* the *fumets, gait* and *walks, fraying-ſtocks,* and the *head* and *branches.* 1. As to the *ſlot.* The treadings of the hart's foot are to be carefully noted: if you find the treadings of two, the one long, and the other round, yet equally big, the longeſt ſlot declares the largeſt hart; add, that the old hart's hind-foot never over-reaches the fore-foot, as that of the young ones does. 2. The fewmiſhing is chiefly to be judged of in April or May: if it be large and thick, it ſignifies the hart to be old. 3. To know the height and thickneſs of the hart, obſerve his entries and galleries into the thickets, and what boughs he hath over ſtridden, and mark from thence the height of his belly from the ground; for a young deer uſually creeps low, as he paſſes to his harbour, and goes through places which the old one, being ſtiff and ſtately, will not ſtoop to. 4. By his gait it may be known whether the hart be large, and whether he will ſtand long before the hounds: if he have a long ſtep, he will ſtand long, being ſwift, light, and well breathed; if he have a great ſlot, which is the ſign of an old deer, he will be a laſter. As to his fraying-poſt, note, that the older the hart is, the ſooner he goeth to fray, and the greater is the tree he chooſes to fray upon; it being neceſſary it be ſuch as may not bend. Now, to ſeek or find out a hart in his haunt, or feeding-place, it is to be obſerved, that he changes his manner of feeding every month. From the concluſion of the rutting time, which is in November, they feed in heaths and broomy places. In December they herd together, and withdraw into the ſtrength of the foreſts, to ſhelter themſelves from the ſevere weather, feeding on holm-trees, elder-trees, brambles, &c. The three following months they leave the herding, but keep four or five in a company, and in the corners of the foreſt will feed on the winter paſture, ſometimes making their excurſions into the neighbouring corn-fields, if they can perceive the blades of wheat, rye, &c. appear above ground. In April and May they reſt in thickets and ſhady places, ſtirring very little till rutting time, unleſs diſturbed. The three ſucceeding months they are in their pride of greaſe, and reſort to ſprings, copſes, and corn fields. In September and October they leave the thickets, and go to rut; during which ſeaſon, they have no certain place either for food or harbour.

Having found out the game, the *hunters* diſcouple and caſt off the dogs; and ſome on horſeback, others on foot, follow the cry with the utmoſt art, obſervation, and ſpeed, remembering and preventing the ſubtle turning and headings of the hart; ſtanding with dexterity and intrepidity to leap hedge, pales, ditch, &c.

The utmoſt addreſs and circumſpection are to be uſed to keep to the beaſt firſt attempted, and to prevent the dogs from purſuing any other: this, in effect, makes one of the principal difficulties and glories of the chace; the beaſt having a hundred devices to put off ſome other head for his own: ſometimes he will ſend forth ſome other little deer in his ſtead into the dogs way, laying cloſe the while himſelf; on which occaſion the huntſman is to ſound a retreat, and break off the dogs, and take in leam, till the game be recovered.

Sometimes he will purpoſely ſeek out other deer at layer, and rouſe them to make the hounds hunt change, himſelf lying down flat in ſome of their layers upon his belly, to make the hounds over-ſhoot him: add, that they may neither ſcent nor vent him, he will gather up his fore-feet under his belly, and blow or breathe on ſome moiſt place of the ground, ſo that the hounds ſhall paſs within a yard, without apprehending him. He will break into one thicket after another, to find deer, rouſing, gathering them together, and herding with them, and even beating ſome of them into his treads, that he may the more eaſily eſcape. Finding himſelf ſpent, he will break herd, and fall to doubling and croſſing in ſome hard beaten highway, always running againſt the wind, not only to cool himſelf, but the better to hear the voice of his purſuers.

The laſt refuge of a hart ſorely *hunted,* is the foil; keeping the middle, for fear, leſt by touching a bough, or the like, he may give ſcent to the hounds. He always ſwims againſt the ſtream; whence the old rule, "He that will "his chace find, let him try up the river, and down the "wind." In taking ſoil, he will ſometimes cover himſelf under water, ſo as to ſhew nothing but his noſe.

Where opportunity of water fails, he will fly into herds of cattle, as cows, ſheep, &c. and will ſometimes leap on an ox, cow, or the like, laying the fore part of his body thereon, that ſo touching the earth with his hinder feet, he may leave a ſmall or no ſcent behind. What is farther ſtill, the chief huntſman of Lewis XII. relates, that a hart which they were in hard chace of, leaped into a great tall white thorn, which grew in a ſhadowy place, and there ſtood aloſt till he was run through by a huntſman, rather than he would ſtir.

The hart being killed, the huntſman with his horn windeth the fall of the beaſt; upon which every one approaches: the ſkilfulleſt opens the beaſt, rewarding the hounds with what properly belongs to them; the huntſman, at the ſame time, dipping bread in the ſkin and blood of the beaſt to give the hounds their full ſatisfaction.

The hart is known to be ſpent by his running ſtiff, high, and lampering; by his mouth being black and dry, without foam on it, and his tongue hanging out; though he will ſometimes cloſe his mouth to deceive the ſpectators, and by his ſlot, for he will ſometimes cloſe his claws together, as if he went at leiſure, and ſtrait again open them wide, making great glidings, and hitting his dew-laps upon the ground, &c. When quite ſpent, and cloſe beſet, or intercepted on all ſides, the hart uſually takes to bay, and makes force with his head againſt the firſt man or dog that cloſes in upon him, unleſs prevented with a ſpear, ſword, or the like. Hence it is very dangerous going into a hart at bay, eſpecially at rutting time, for then they are more than ordinarily fierce.

The hart being killed, his death is ſolemnized with great ceremony. The firſt thing, when the huntſmen come in, is to cry, *Ware haunch,* that the hounds may not break in to the deer: having ſecured this, they cut his throat, and blood the younger hounds, to make them love deer, and learn to leap at his throat; then having blown the mort, and all the company being come in, the moſt diſtinguiſhed perſon, who has not taken *ſay* before, takes up the knife, and lays it acroſs the belly of the deer (ſome of the aſſiſtants holding by the fore-legs, and at the ſame time the huntſman drawing down the pizzle) and thus he draws the knife along the middle of the belly, beginning near the briſket, cutting deep enough, to diſcover how fat he is. Then the moſt ſkilful perſon breaks up the deer, by firſt ſlitting the ſkin from the cutting of the throat downwards, making the arber, that the ordure may not break forth, and then paunching him, and rewarding the hounds therewith.

Laſtly, the perſon that took the *ſay,* being preſented with a drawn hanger, he is to cut off the head; which done, and the hounds rewarded therewith, the concluding ceremony, if a buck, is a double; if a ſtag, a treble mort blown by one, and a recheat in concert by all that have horns: the whole is then concluded with a general *whoo whoop.*

HUNTING, *otter.* See OTTER.

The otter is to be hunted by particular dogs, called *otter hounds,* and alſo with ſpecial inſtruments, called *otter ſpears.* To find him out, ſome are to go on one ſide of the river, and ſome on the other, beating all the way on the banks, with the dogs following. Thus it is ſoon found if there be an otter in that quarter; for the otter cannot endure long in the water, but muſt come forth to make his ſpraints, and in the night ſometimes to feed on graſs, and other herbs. If the hounds find an otter, look in the ſoft and moiſt places, to learn by the prints which way he bent his head: if theſe make no diſcovery, it may be partly perceived by the ſpraints. This done, follow the hounds, and lodge him as a hart or deer.

The otter always endeavours to keep to the water, where he is maſter. In *hunting* him therefore, you are to be ready with your ſpears, to watch its vents; for that is the chief advantage: if you perceive where he ſwims under water, ſtrive to ſet a ſtand before him, where you expect he will vent, and there endeavour to ſtrike him with the ſpear: if you miſs, purſue him with the hounds; which, if they be good, and well entered, will come chaunting and trailing along the river-ſide, and beat every tree, root, every oſier-bed, and tuft of bulruſhes; nay, ſometimes, they will take the water, and beat it like a ſpaniel; by which means the otter can hardly eſcape.

If the beaſt find himſelf wounded with a ſpear, he uſually makes to land, where he will maintain a furious battle with the dogs.

HUNTING, *roe-buck*. See ROE-BUCK, and *Roe*-DEER.

We have no roe-deer in England; but they abound in the Highlands of Scotland, Germany, Africa, &c. And it ſhould ſeem that they have been more common among us, our huntſmen ſtill retaining the proper terms for the chace.

They make good chace, ſtand long, and fly end-way. When a roe croſſes and doubles, it is called *trapyning*.

Their ſwiftneſs appears not only on the earth, but in waters, through which they cut their way as with oars; whence they love lakes and ſtreams, breaking the floods to come at freſh paſture, feeding on ruſhes, &c.

Horns grow only on the male; being ſet with ſix or ſeven branches not palmed, but branchy, yet ſhorter than fallow deer. After rutting he caſts his head.

They are ſaid never to wink, not even when aſleep; for which conceit their blood is by ſome fanciful people preſcribed to perſons dim-ſighted or purblind. The tail of this beaſt is leſs and ſhorter than that of a fallow-deer, inſomuch that it is queſtioned whether it ought to have that denomination.

They keep moſt in mountains among the rocks; and when hunted, Martial tells us, will hang thereon with their horns, to delude the dogs. They are often taken by counterfeiting their voice, which the huntſman does by the aſſiſtance of a leaf in his mouth.

When hunted, they turn much and often, and will come back on the dogs directly, when they can no longer endure. They alſo take ſoil, as the hart; and will ſometimes hang by a bough in ſuch a manner, as that nothing ſhall appear but their ſnout.

HUNTING-*match*. The firſt thing that is to be conſidered by one who deſigns to match his horſe for his own advantage, and his horſe's credit, is not to flatter himſelf with the opinion of his horſe, by fancying that he is a ſwift, when he is but a ſlow gallopper; and that he is a whole running horſe (that is, that he will run four miles without a ſob at the height of his ſpeed) when he is not able to run two or three. Very probably ſome gentlemen are led into this error, by their being miſtaken in the ſpeed of their hounds, who, for want of trying them againſt other dogs that have been really fleet, have ſuppoſed their own to be ſo, when, in reality, they are but of a middling ſpeed; and becauſe their horſe, when trained, was able to follow them all day, and upon any hour, to command them upon deep as well as light earths, have therefore made a falſe concluſion, that their horſe is as ſwift as the beſt; but upon trial againſt a horſe that has been rightly trained after hounds that were truly fleet, have bought their experience perhaps full dear: therefore it is adviſeable for all lovers of *hunting* to procure two or three couple of tried hounds, and once or twice a week to follow after them a train-ſcent, and when he is able to top them on all ſorts of earth, and to endure heats and colds ſtoutly, then he may better rely on his ſpeed and toughneſs.

That horſe which is able to perform a hare-chace of five or ſix miles briſkly and courageouſly, till his body be as it were bathed in ſweat; and then, after the hare has been killed, in a nipping froſty morning, can endure to ſtand till the ſweat be frozen on his back, ſo that he can endure to be pierced with the cold as well as the heat, and then even in that extremity of cold to ride another chace as briſkly and with as much courage as he did the former, that horſe which can thus endure heats and colds is moſt valued by ſportſmen. Therefore, in order to make a judgment of the goodneſs of a horſe, obſerve him after the death of the firſt hare, if the chace has been in any degree briſk; if when he is cold, he ſhrinks up his body, and draws his legs up together; it is an infallible ſign of want of vigour and courage: the like may be done by the ſlackening of his girths after the firſt chace, and from the dulneſs of his teeth, and the dulneſs of his countenance, all which are true tokens of faintneſs, and being tired; and ſuch a horſe is not to be relied on, in caſe of a wager.

Here it will not be improper to take notice of the way of making matches in former times, and the modern way of deciding wagers. The old way of trial was, by running ſo many train-ſcents after hounds, as were agreed upon between the parties concerned, and a bell-courſe, this being found not ſo uncertain, but more durable than hare-hunting; and the advantage conſiſted in having the trains laid on earth moſt ſuitable to the qualifications of the horſes. But now others chooſe to hunt the hare till ſuch an hour, and then to run this wild-gooſe-chace, a method of racing that takes its name from the manner of the flight of wild-geeſe, which is generally one after another; ſo the two horſes after running of twelveſcore yards, had liberty, which horſe ſoever could get the leading, to ride what ground he pleaſed, the hindmoſt horſe being bound to follow him, within a certain diſtance agreed on by articles, or elſe to be whipped up by the triers or judgers which rode by; and whichever horſe could diſtance the other, won the match.

But this chace was found by experience ſo inhuman, and ſo deſtructive to good horſes, eſpecially when two good horſes were matched; for neither being able to diſtance the other, till both were ready to ſink under their riders through weakneſs, that oftentimes the match was fain to be drawn, and left undecided, though both the horſes were quite ſpoiled.

This brought up the cuſtom of train-ſcents, which afterwards was changed to three heats, and a ſtraight courſe; and that the lovers of horſes might be encouraged to keep good ones, plates have been erected in many places of England. The fewer of theſe before you come to the courſe, if your horſe be fiery and mettled, the better, and the ſhorter the diſtance the better. Alſo, above all things, be ſure to make your bargain to have the leading of the firſt train, and then make choice of ſuch grounds where your horſe may beſt ſhow his ſpeed, and the fleeteſt dogs you can procure: give your hounds as much law before you as your triers will allow, and then, making a looſe, try to win the match with a wind; but if you fail in this attempt, then bear your horſe, and ſave him for the courſe; but if your horſe be ſlow, but well winded, and a true ſpurred nag, then the more train-ſcents you run before you come to the ſtraight courſe, the better. But here you ought to obſerve to gain the leading of the firſt train; which in this caſe you muſt lead upon ſuch deep earths, that it may not end near any light ground; for this is the rule received among horſemen, that the next train is to begin where the laſt ends, and the laſt train is to be ended at the ſtarting-place of the courſe; therefore remember to end your laſt on deep earths, as well as the firſt.

HUNTING *ſaddle*. See SADDLE.

HURA, in *Botany*. See *Sand* BOX-*tree*.

HURDLE is the name of the ſledge uſed to draw traitors to the place of execution.

HURDLES, in *Fortification*, twigs of willows or oſiers, interwoven cloſe together, in the form of a long ſquare, five or ſix feet long, and three or three and a half broad, ſuſtained by ſtrong ſtakes, and uſually laden with earth.

Hurdles, called alſo CLAYES, ſerve to render batteries firm, to conſolidate the paſſage over muddy ditches, and cover traverſes, and lodgments for the defence of the workmen againſt the artificial fires or ſtones that may be caſt upon them.

HURDLES, in *Huſbandry*, are frames made either of ſplit timber or of hazel-rods, platted together, to ſerve for gates in incloſures, to make ſheepfolds, &c.

HURDS, or HARDS *of flax* or *hemp*, the coarſer parts, ſeparated in the dreſſings from the tear or fine ſtuff. See HEMP and FLAX.

HURENHUTTERS, in *Eccleſiaſtical Hiſtory*. See HERRNHUTERS.

HURLE *bone*, in a horſe, is a bone near the middle of the buttock; very apt to go out of its ſockets with a ſlip or ſtrain.

HURLERS, a number of large ſtones, ſet in a kind of ſquare figure near St. Clare, in Cornwall, ſo called from an odd opinion held by the common people, that they are ſo many men petrified, or changed into ſtones, for profaning the ſabbath-day by *hurling* the ball, an exerciſe for which the people of that country have been always famous.

The *hurlers* are oblong, rude, and unhewed. Many authors ſuppoſe them to have been trophies erected in memory of ſome battle; others take them for boundaries to diſtinguiſh lands. Laſtly, others, with more probability, hold them to have been ſepulchral monuments.

HURLY-*burly*, in *Vulgar Language*, denotes confuſion or tumult, and is ſaid to owe its origin to two neighbouring families, Hurleigh and Burleigh, which filled their part of the kingdom with conteſt and violence. Johnſon.

HURRERS, in our *Old Writers*. The cappers and hat-makers of London, formerly one company of the haberdaſhers, were called by this name.

HURRICANE, a furious ſtorm of wind, rain, thunder, and lightning, attended with a great ſwelling of the ſea, and ſometimes with an earthquake; and, in ſhort, with every circumſtance which the elements can aſſemble that is terrible and deſtructive.

Hurricanes are frequent in the Eaſt and Weſt Indies, making terrible ravages in the iſlands thereof; blowing down houſes, rooting up trees, and even whole woods, making caverns in the earth, and ſcattering earth, bricks, ſtones, timber, &c. to a great diſtance, in every direction. Great quantities of water have been left, or raiſed by them, ſo as to make a kind of deluge; and they have been always attended with a prodigious rumbling noiſe. As a prelude to the enſuing havock, whole fields of ſugar-canes are ſeen whirled into the air, and ſcattered over the face of the country; the ſtrongeſt trees of the foreſt are torn up by the roots, and driven about like ſtubble; their wind-mills are ſwept away in a moment; their works, their fixtures, the ponderous copper boilers and ſtills, of ſeveral hundred weight, are wrenched from the ground, and battered to pieces; the roofs of their houſes are torn off at one blaſt, whilſt the rain, which in an hour riſes five feet, ruſhes in upon them with an irreſiſtible violence.

They uſually begin in the north, ſome ſay the weſt, but turn round; and in a little time veer through all points of the compaſs.

Great miſchiefs are done to our veſſels about the Caribbee iſlands, and elſewhere, by means of the *hurricanes*, and at the time of year when they are moſt frequent, which is in the midſt of ſummer, principally in the month of Auguſt, more rarely in July and September.

It is the cuſtom for the French and Engliſh inhabitants in the Caribbee iſlands, to ſend every year about June to the native Caribbees of St Dominico and St. Vincent, to know whether there will be any *hurricanes* that year; and about ten or twelve days before any *hurricane* come, they conſtantly ſend them word.

The prognoſtics thoſe people go by, are given us by captain Langford, who, in 1697, engaged one of them, by civilities, to reveal them to him.

It is one of their principles, that all *hurricanes* come either on the day of the full, or of the change, or quarter of the moon; each of which is diſcovered by a number of phenomena in the preceding quarters, as a turbulent ſky, ſun red, univerſal calm, the ſtars appearing red, larger than uſual, and ſurrounded with a ſort of burs, noiſes in hollows or cavities of the earth, ſtrong ſwell of the ſea, which riſes into large waves, a ſettled weſterly wind, blowing, with intermiſſions, violently and irregularly, for about two hours at a time; and at the full of the moon, the moon itſelf is ſurrounded with a great bur, and ſometimes the ſun has the ſame appearance. That author aſſures us, he received this benefit from the information, that whereas *hurricanes* are ſo dreadful, that all ſhips are afraid to put out to ſea while they laſt, and chooſe rather to periſh at anchor in the roads, yet, with good management, he found, that a veſſel may lie out at ſea in theſe, as ſafely as in other ſtorms, by taking care the ports are well barred and calked, the top-maſts and tops taken down, the yards a-port laſt, and the doors and windows ſecured. With theſe precautions that experienced navigator preſerved his veſſel in two great *hurricanes*, and taught others how to do the ſame, by putting out from port, where they would inevitably have periſhed. And from the prognoſtics above, he foretold ſeveral *hurricanes* at land.

He adds, that all *hurricanes* begin from the north, and turn to the weſtward, till arriving at the ſouth-eaſt, their force is ſpent.

The cauſe he ſuggeſts to be the ſun's leaving the zenith of thoſe places, and going back towards the ſouth; and the repelling or bounding back of the wind, occaſioned by the calming of the general trade-wind. Phil. Tranſ. N° 246.

It is obſervable, that the air is much colder during theſe *hurricanes* than at other times; but Ligon, and ſome others, fond of relating ſtrange ſtories, make it much more ſo than it really is, the ſailors who have been in theſe ſtorms declaring that they have felt no ſuch chillineſs as thoſe authors relate. The wind during the *hurricane* is ſo ſtrong, and varies ſo faſt between the north and the north-eaſt point, that it is impoſſible for any ſhip to anſwer the veerings of it; it is hence that all the art of the ſailors often cannot prevent the backs of the veſſels from being broken, and the maſts being carried by the board. The main-maſt of a ſhip of four hundred ton will be in an inſtant wreathed like a withe, and borne by the board before they can hand a ſail. Phil. Tranſ. N° 36.

Swiſſerland is ſubject to very violent *hurricanes*, which do great miſchief, and that in a very ſingular manner. Thunder and lightning are frequent with them in winter as well as in ſummer; and the more violent ſtorms of theſe, are ſometimes attended with whirlwinds and *hurricanes*, which will raiſe the water of ſome lakes in form of a thick pillar up to the cloud, and carrying on before the wind this vaſt body of water, will ſometimes fall in other places on dry land, and drown the houſes and gardens where it chances to fall.

Theſe are all phenomena of electrical origin, and depend on the ſame general cauſes. See ELECTRICITY, LIGHTNING, and SPOUT.

HURST, or HYRST, in our *Old Writers*, denotes a wood or grove of trees. Hence ſuch places as have this word for part of their names, have been ſituated near a wood. In Kent, Suſſex, and Hampſhire, there are many ſuch, becauſe formerly the great wood called Andreſwald, extended itſelf through theſe counties.

HURTER, in *Artillery*, a flatted iron fixed againſt the body of an axle-tree, with ſtraps, to take off the friction of the naves of wheels againſt the body.

HURTERS, in *Fortification*, denote pieces of timber about ſix inches ſquare, placed at the lower end of the PLATFORM, next to the parapet, to prevent the wheels of the gun-carriages from damaging the parapet.

HURTS, in *Heraldry*, by ſome wrote HEURTS, and by others HUERTS, are azure or blue rundles.

The Engliſh heralds diſtinguiſh between the colours of rundles, and give them different names agreeable thereto: thoſe of other nations content themſelves to call thoſe *torteaux d'azure*; and in other caſes only add the reſpective colour to the term *torteaux*.

But theſe being blue, ſome will have them to ſignify bruiſes or contuſions in the fleſh, which often turn to that colour; others ſuppoſe them whortle berries.

HUSBAND, *Maritus*, a man joined, or contracted with a woman in MARRIAGE.

By the laws of England, the wife is ſuppoſed wholly under the dominion of her *huſband*, nor can act or will any thing of herſelf. See WIFE. See alſo COVERTURE, DIVORCE, DOWER, FEME *covert*, &c.

In Germany, the power of the *huſband* is not ſo extenſive; even the princes of the empire have not a ſovereign and deſpotic power over their wives and children.

HUSBAND-*land*, a term uſed in Scotland for a portion of land containing ſix acres of ſock and ſcythe land; that is, of land that may be tilled with a plough, and mowen with a ſcythe.

HUSBANDRY denotes the ſame with AGRICULTURE.

The reader will find an account of the principal operations, implements, and produce of *huſbandry*, arranged under their proper heads, in the courſe of this work.

The new method of *huſbandry*, called by Tull the *horſe*-HOEING *huſbandry*, has many evident advantages over the other, or old way, called the BROAD-*caſt*; but the difference between them is beſt explained by a fair compariſon. In order to do this juſtly, there are four things to be carefully conſidered. 1. The expence of a crop. 2. The goodneſs of the crop. 3. The certainty of it. And, 4. The condition in which the land is left after the crop.

The profit or loſs ariſing from land, is not to be computed only from the value of the crop it produces, but from its value after all expences of ſeed, tillage, &c. are deducted. Thus when an acre of land produces a crop worth four pounds, and the expences of it amount to five pounds, the loſs of the farmer is one pound upon it; whereas, when as much land produces a crop only of the value of thirty ſhillings, and the expences are only ten ſhillings, the owner receives one pound advantage. The common expence of an acre of ſowed wheat, in the uſual way, is four pounds ten ſhillings, and the common expence of an acre of wheat, in the horſe-hoeing *huſbandry*, is only ten ſhillings, including all the expences that can attend it. Thus, the charge of this method of *huſbandry* is but a ninth part of that of the common way; and as no ſheep are required, as there are in the other way, the leſs ſtock will do to begin with. The goodneſs of a crop conſiſts in the quality of it as well as in the quantity, and wheat being the moſt uſeful of all grain, a crop of this is more valuable than a crop of any other corn. Add to this, that a crop of hoed wheat has always larger ears, and a fuller body, than a crop when ſown in the common way. More wheat may alſo be obtained this way than any other, becauſe the ſame land will thus produce crops every year; and even the land which has been exhauſted by the common *huſbandry*, will produce wheat in plenty this way, without fallowing or dunging, both which would otherwiſe be neceſſary; ſo that, in many places, this *huſbandry* can raiſe ten acres of wheat for one that the old way could produce, becauſe where land is poor, they ſow but a tenth part of it in wheat.

The largeſt produce of an acre of wheat-land, ſo far as has yet been experienced, ſeems to be ten quarters, or eighty buſhels to an acre. This is leſs indeed than the produce of an acre in the common way, according to Houghton's computation; but to compare the different profits to the farmer, we proceed thus: the rent and expences of a drilled acre being one pound, and that of a ſowed acre in the common way being five pounds, one quarter of corn produced by the drilled, bears an equal proportion in profit to one pound, as five quarters produced in the common way do to five pounds. As ſuppoſe it to be of wheat at two ſhillings and ſix pence a buſhel, there is neither gain nor loſs in the one nor the other acre, though the drilled produce only one quarter, and the other five quarters. But if the drilled acre yield two quarters, and the ſown acre yield only four quarters at the ſame price, the drilled acre brings the farmer one pound profit, while the other has one pound loſs. Likewiſe ſuppoſe the drilling farmer to have his five pounds laid out in five acres of wheat, and the other to have his five pounds laid out in one dunged acre, then let the price be what it will for the wheat, if the five acres have an equal crop to the one acre, the gain and loſs muſt be equal. But if the price of wheat be at two ſhillings and ſix pence, the farmer in the common way, if he has five quarters on his acre, muſt ſell it all to pay his rent and expence; whereas if he who drills the land have five quarters on each acre, the produce of one acre will pay for all five. Or ſuppoſe a drilled acre to produce no more than one third of the ſown acre, which is rating it very low indeed, the expence of the ſown acre being five times as much as that of the drilled one, it is much more profitable to the owner to have the drilled acre; becauſe a third part of five pound is one pound thirteen and four pence, and a fifth of the rent and expence, which is all his charge, being only one pound, ſuch a drilled acre brings the owner thirteen and four-pence profit more than the ſown acre, though that brings three times as great a crop.

We ſhall here ſubjoin a comparative view of the old and new method of culture, furniſhed for the editors of Mr. Tull's Horſe-hoeing Huſbandry, by a gentleman, who for ſome years practiſed both in a country where the ſoil was light and chalky, like that from which he drew his obſervations. It is neceſſary to remark, that in the new *huſbandry* every article is ſtated at its full value, and the crop of each year is four buſhels ſhort of the other; though, in ſeveral years experience, it has equalled and generally exceeded thoſe of the neighbourhood in the old way.

An eſtimate of the expence and profit of ten acres of land in twenty years.

I. In the old way.

	l.	*s.*	*d.*	*l.*	*s.*	*d.*
Firſt year, for wheat, coſts 33*l.* 5*s.* viz.						
Firſt plowing, at 6*s.* per acre	3	0	0			
Second and third ditto, at 8*s.* per acre - - -	4	0	0			
Manure, 30*s.* per acre -	15	0	0			
				22	0	0
Two harrowings, and ſowing, at 2*s.* 6*d.* per acre -	1	5	0			
Seed, three buſhels per acre, at 4*s.* per buſhel - -	6	0	0			
Weeding, at 2*s.* per acre -	1	0	0			
Reaping, binding, and carrying at 6*s.* per acre - -	3	0	0			
				11	5	0
Second year, for barley, coſts 11*l.* 6*s.* 8*d.* viz.						
Once plowing, at 6*s.* per acre -	3	0	0			
Harrowing and ſowing, at 1*s.* 6*d.* per acre - - -	0	15	0			
Weeding, at 1*s.* per acre -	0	10	0			
Seed, four buſhels per acre, at 2*s.* per buſhel - -	4	0	0			
Cutting, raking, and carrying, at 3*s.* 2*d.* per acre -	1	11	8			
Graſs-ſeeds, at 3*s.* per acre -	1	10	0			
				11	6	8
				44	11	8
Third and fourth years, lying in graſs, coſt nothing: ſo that the expence of ten acres in four years comes to 44*l.* 11*s.* 8*d.* and in twenty years to -				222	18	4
Firſt year's produce is half a load of wheat per acre, at 7*l.* -	35	0	0			
Second year's produce is two quarters of barley per acre, at 1*l.* - - -	20	0	0			
Third and fourth years graſs is valued at 1*l.* 10*s.* per acre	15	0	0			
So that the produce of ten acres in four years is - -	70	0	0			
And in twenty years it will be - -				350	0	0
Deduct the expence, and there remains clear profit on ten acres in twenty years by the old way - - -				127	1	8

II. In the new way.

	l.	*s.*	*d.*	*l.*	*s.*	*d.*
Firſt year's extraordinary expence is, for plowing and manuring the land, the ſame as in old way - -				22	0	0
Plowing once more, at 4*s.* per acre - - -	2	0	0			
Seed, nine gallons per acre, at 4*s.* per buſhel - -	2	5	0			
Drilling, at 7*d.* per acre -	0	5	10			
Hand-hoeing and weeding, at 2*s.* 6*d.* per acre - - -	1	5	0			
Horſe-hoeing ſix times, at 10*s.* per acre - - -	5	0	0			
Reaping, binding, and carrying, at 6*s.* per acre - -	3	0	0			
The ſtanding annual charge on ten acres is - -	13	15	10			
Therefore the expence on ten acres in twenty years is - - -				275	16	8
Add the extraordinaries of the firſt year, and the ſum is - - -				297	16	8
The yearly produce is at leaſt two quarters of wheat per acre, at 1*l.* 8*s.* per quarter; which, on ten acres in twenty years, amounts to - - - -				560	0	0
Therefore, all things paid, there remains clear profit on ten acres in twenty years by the new way - - -				262	3	4

So that the profit on ten acres of land in twenty years, in the new way, exceeds that in the old by 135*l.* 1*s.* 8*d.* and conſequently is conſiderably more than double thereof; an ample encouragement to practiſe a ſcheme, whereby ſo great advantage will ariſe from ſo ſmall a quantity of land, in the compaſs of a twenty-one years leaſe; one year being allowed, both in the old and new way, for preparing the ground.

It ought withal to be obſerved, that Mr. Tull's *huſbandry* requires no manure at all, though we have here, to prevent objections, allowed the charge thereof for the firſt year; and moreover, that though the crop of wheat from the drill-plough is here put only at two quarters on an acre, yet Mr. Tull himſelf, by actual experiment and meaſure, found the produce of his drilled wheat-crop amounted to almoſt four quarters on an acre.

It appears alſo from a comparative calculation of expence and profit between the drill and common *huſbandry*, taken from Mr. Baker's report to the Dublin Society of his experiments in agriculture for the year 1765, that there is a clear profit ariſing upon an Iriſh acre of land in fifteen years in the drill *huſbandry* of 52*l.* 3*s.* 11*d.* and in the common *huſbandry* of 27*l.* 19*s.* 2*d.* and therefore a greater profit in the drilled acre in this time of 24*l.* 4*s.* 9*d.* which amounts to 1*l.* 12*s.* 3½*d.* per annum. From hence he infers, that in every fifteen years the fee-ſimple of all the tillage-lands of the kingdom is loſt to the community by the common courſe of tillage. In ſtating the accounts, from which their reſult is obtained, no notice is taken of fences, water-cutting the land, weeding and reaping, becauſe theſe articles depend on a variety of circumſtances, and will, in general, exceed in the common *huſbandry* thoſe incurred by the other.

Beſides, the certainty of a crop is greater in this new way than in the old way of ſowing; for moſt of the accidents attending wheat crops, are owing to their being late ſown, which is neceſſary to the farmer in the old way; but in the horſe-hoeing method the farmer may plough two furrows whereon the next crop is to ſtand, immediately after the firſt crop is off. In this manner of *huſbandry* the land may be ploughed dry and drilled wet, without any inconvenience; and the ſeed is never planted under the furrow, but placed juſt at the depth which is moſt proper, that is, at about two inches, in which caſe it is eaſy to preſerve it, and there is no danger of burying it. Thus the ſeed has all the advantage of early ſowing, and none of the diſadvantages that may attend it in the other way, and the crop is much more certain than by any other means that can be uſed.

The condition in which the land is left after the crop, is no leſs in favour of the horſe-hoeing *huſbandry*, than all the other articles. The number of plants is the great principle of the exhauſting of land. In the common *huſbandry*, the number is vaſtly greater than in the drilling way, and three plants in four often come to nothing, after having exhauſted the ground as much as profitable plants; and the weeds which live to the time of harveſt in the common way, exhauſt the land no leſs than ſo many plants of corn, often much more. The horſe-hoeing method deſtroys all the weeds in the far greater part of the land, and leaves that part unexhauſted and perfectly freſh for another crop. The wheat plants being alſo but a third part of the number at the utmoſt of thoſe in the ſowing way, the land is ſo much the leſs exhauſted by them; and it is very evident from the whole, that it muſt be, as experience proves that it is, left in a much better condition after this than after the common *huſbandry*.

The farmers who are againſt this method object, that it makes the plants too ſtrong, and that they are more liable to the blacks or blights of inſects, for that reaſon; but as this allows that the hoeing can, without the uſe of dung, give too much nouriſhment, it is very plain that it can give enough; and it is the farmer's fault if he do not proportion his pains ſo as to have the advantage of the nouriſhment without the diſadvantages. It is alſo objected, that as hoeing can make poor land rich enough to bear good crops of wheat, it may make good land too rich for it. But if this ſhould happen, the ſowing of wheat on it may be let alone a while, and in the place of it the farmer may have a crop of turneps, carrots, cabbages, and the like, which are excellent food for cattle, and cannot be over-nouriſhed: or, if this is not choſen, the land, when thus made too rich, may ſoon be ſufficiently impoveriſhed by ſowing corn upon it in the common old way. Tull's Horſe-hoeing Huſbandry, Preface, and chap. xvii. See HOEING.

The method of horſe-hoeing *huſbandry*, ſo ſtrongly recommended by Mr. Tull, is objected to by many, on account of the largeneſs of the intervals which are to be left behind the rows of corn. Theſe are required to he about five feet wide; and it is thought that ſuch wide ſpaces are ſo much loſt earth, and that the crop is to be ſo much the leſs for it. But it is to be obſerved, that the rows of corn ſeparated by theſe intervals need not be ſingle; they may be double, triple, or quadruple, at the pleaſure of the farmer; and four rows thus ſtanding as one will have the five foot interval but one fourth of its bigneſs as to the whole quantity, and it will be but as fifteen inch intervals to plants in ſingle rows. Corn that is ſown irregularly in the common way, ſeems indeed to cover the ground better than that in rows; but this is a mere *deceptio viſus*, for the ſtalks of corn are never ſo thick as when they come out of one plant, or as when they ſtand in a row, and a horſe-hoed plant of corn will have twenty or thirty ſtalks in a piece of ground of the ſame quantity, where an unhoed plant will have only two or three ſtalks. If theſe ſtalks of the hoed plant were ſeparated and planted over the intervals, the whole land would be better covered than it is in the common way; and the truth is, that though theſe hoed fields ſeem to contain a much leſs crop than the common ſown fields, yet they in reality do contain a much greater. It is only the different placing that makes the ſown crop ſeem the larger, and even this is only while both crops are young.

The intervals are not loſt ground, as is uſually ſuppoſed, but when well horſe-hoed they are all employed in the nouriſhment of the crop, the roots of the plants in the adjoining rows ſpreading themſelves through the whole interval, and drawing ſuch nouriſhment from it, that they increaſe accordingly. When the plants ſtand in the ſcattered way, as in common ſowing, they are too cloſe to one another; each robs its neighbours of part of their nouriſhment, and conſequently the earth is ſoon exhauſted, and all the plants half ſtarved. The cloſe ſtanding of them alſo prevents the benefit of after-tilling, as the hoe cannot be brought in, nor the ground by any means ſtirred between them to give it a new breaking, and conſequently afford them new food.

Experiments have abundantly proved, that in large grounds of wheat where the different methods have been tried, thoſe parts where the intervals were largeſt have produced the greateſt crops, and thoſe where hoeing was uſed without dung, have been much richer, than thoſe where dung was uſed without hoeing. If it were poſſible that plants could ſtand as thick, and thrive as well over the whole ſurface of the ground, as they do in the rows ſeparated by theſe large intervals, the crops of corn ſo produced would be vaſtly greater than any that have been heard of; but the truth is, that plants receive their growth not according to the ground they ſtand on, but to the ground they can extend their roots into; and therefore a ſingle row may contain more plants than a large interval can nouriſh, and therefore the ſame number that ſtand in that row, and no more than theſe, could be nouriſhed, if ſcattered over the whole interval; and they would be much worſe nouriſhed in that way, becauſe while the interval is void, the earth may be ſtirred about them, and new roots will be formed in great numbers from every one broken by the inſtruments, and new nouriſhment laid before theſe roots by the breaking the particles of earth, by which the plants will have ſupplies that they cannot have when ſcattered over the whole ſurface, becauſe the ground is then all occupied, and cannot be moved between the plants.

The horſe-hoeing which takes place in theſe large intervals, is to be repeated ſeveral times; once or twice are of great advantage, but the oftener it is repeated the better the crop will ſucceed. In the beginning, or while the plants are young, it is to be done only in the middle of the interval, that the roots of the tender plants may not be injured by coming too near them; but in the grown plants the hoe may be brought very near their roots without any fear of harm from it; and though the larger roots are many of them broken off by it, they are ſo ſoon ſupplied with new ones, that no ill conſequence was ever known to attend it. Poor land, though it be ever ſo light, ſhould have many hoeings; for the plants receive but little nouriſhment from its natural poſture, and it is therefore neceſſary to make a continual ſupply of the artificial. The young roots multiplied by the breaking of the old ones with the hoe, are fuller of lacteal mouths for receiving of nouriſhment, than the old ones; and it is therefore no wonder, that the faſter theſe are propagated the better the plant thrives. And there is a diſadvantage in the plants of corn ſown in the common way, which is, that their ſtalks being as numerous, or nearly ſo at firſt as afterwards, they very quickly exhauſt the ground, while the plants in rows with intervals between have much fewer ſtalks at firſt, and only increaſe in number as their roots are increaſed by the cutting, and the nouriſhment increaſed alſo by the ſame operation. The earth about the ſown plants in the common way ſoon hardens and ſhuts out the benefit of the atmoſphere, whereas in the other way the hoe keeps it ſoft and open, ready to receive all the benefits of rains and dews; and though the crop of corn from the hoed interval way ſhould be twice as large as the other, the land is yet left twice as rich for the next crop.

It is impoſſible to bring theſe calculations to mathematical rules; but it is very certain that a ſown crop ſucceeding a large undunged hoed crop, is much better than a ſown crop that ſucceeds a ſmall dunged ſown crop; and experience ſhews, that poor worn-out heath-ground will produce four ſucceſſive good hoed crops, the latter all better and better, till the whole is become at length good ground by the benefit of the hoeing, in ſpite of the nouriſhment drained out by the potatoes.

The wider the intervals are, the more the earth may be divided; for the row takes up the ſame room with a wide or a narrow interval; and therefore with the wide the unhoed part bears a leſs proportion to the hoed part than in the narrow.

There are many ways of hoeing with the hoe-plough, but there is not room to turn two deep and clean furrows in an interval that is narrower than four feet eight inches; for if it want much of this breadth, one at leaſt of theſe furrows will reach and fall upon the next row, which will be very injurious to the plants, except of grown ſaint-foin or ſome other ſuch plants, which can bear to have the earth pulled over them with a harrow.

All ſoils and all ſituations are not equally proper for this method of planting in rows, with large intervals and hoeing between. The lighteſt ſoils ſeem to be beſt for it, and the tough and wet clays the worſt.

Such grounds as lie on the ſides of hills are alſo leſs proper than others for this work.

This method is not ſo proper in common fields, but that not in reſpect of the ſoil, but of the huſbandry of the owners, who are uſually in the old way, and change the ſpecies of corn, and make it neceſſary to fallow every ſecond, third, or fourth year. Tull, ubi ſupra, chap. vi. Neverthelеſs it has been found by later experiments, that the intervals betwixt the rows of plants, as recommended by Mr. Tull, were too great, perhaps double of what they ſhould be in the moſt profitable method of culture; by which means much leſs crops are obtained than might be produced at nearly the ſame expence. This has rendered the profits of the drill method much leſs than they would have been in a more judicious practice, and, conſequently, has proved a great diſadvantage to it in compariſon with the broad-caſt. Mr. Tull was led into this, partly from the want of more perfect inſtruments for hoeing, and of ploughs proper for drilling. Doſſie's Mem. of Agriculture, vol. i. p. 75.

HUSBANDRY, *broad-caſt.* See BROAD-*caſt.*

HUSBANDRY, *Virgilian*, a term uſed by authors to expreſs that ſort of *huſbandry*, the precepts of which are ſo beautifully delivered in Virgil's Georgics. The *huſbandry* in England is Virgilian in general, as is ſeen by the method of paring and burning the ſurface, of raſtering or croſs-plowing, and of the care in deſtroying weeds upon the ſame principle, and by much the ſame means. In thoſe parts of England along the ſouthern coaſt, where the Romans principally inhabited, not only the practice, but the expreſſions are in many reſpects the ſame with thoſe of the ancient Romans, many of the terms uſed by the plowmen being of Latin origin, and the ſame with thoſe uſed by thoſe people on the like occaſions. And on a ſtrict obſervation, more of Virgil's *huſbandry* is at this time practiſed in England than in Italy itſelf. This change in the Italian *huſbandry* is, however, much more to the credit of that people, than the retaining the Virgilian ſcheme is to our's.

Tull, who has eſtabliſhed a new method of *huſbandry*, obſerves, that it is upon the whole ſo contradictory to this old plan, that it may be called the *anti-Virgilian huſbandry*; and adds, that no practice can be worſe than the Virgilian.

HUSBRECE, in our *Old Writers*, an offence now called BURGLARY.

The word is Saxon, from *hus*, a *houſe*, and *brice*, a *breaking*. Blount, in voc.

HUSCANS, in our *Old Writers*, a ſort of boot or buſkin made of coarſe cloth, and worn over the ſtockings. We find them mentioned in the ſtat. 4 Edw. IV. cap. 7.

HUSGABLE, *Huſgablum*, in our *Old Writers*, denotes houſe-rents, or ſome tax or tribute laid upon houſes.

HUSK, among *Botaniſts*, the part which a flower grows out of.

Of theſe there are ſeveral kinds; as *bulbous*, or *round huſks*, *bottle huſks*, *middle huſks*, *foot huſks*, *hoſe huſks*, &c. See CALYX.

The *huſks* or cups of the flowers of plants are not ſo much regarded with a view to their medicinal virtues as they deſerve. Petiver, in the Philoſophical Tranſactions, ſpeaking of the virtues of the verticellate claſs of plants, among which are included the ſage, roſemary, and the like, obſerves that it is an erroneous, though general opinion, that the flowers of theſe plants contain their principal virtues, for that the *huſks* are the part in which this is lodged. For inſtance, in the roſemary, the fine ſcent of the HUNGARY-*water* is not in the flowers, but *huſks*; and the flowers alone, when clean picked from them, yield very little odour. The cup, in this and other plants of the ſame claſs, is the only part in which their viſcous and ſulphureous qualities are lodged, and that ſomething of this kind is depoſited particularly there, may be perceived by the touch and ſmell; for they appear moiſt, and feel clammy; and this clammy matter, when received upon the fingers, is of a very ſtrong and agreeable ſmell, much more ſo than the reſt of the plant.

HUSK denotes a diſeaſe of young bullocks. See COUGH.

HUSO *Germanorum*, in *Ichthyology*, the name of a large fiſh of the STURGEON or ACCIPENSER kind, without tubercles, caught in the Danube, Boriſthenes, and other large rivers, and paſſing at times into the ſea. It has a very long ſnout, and under it either four or eight beards; it has one back-fin, which is placed near the tail, and two pair under the belly; its general ſhape ſomewhat reſembles that of the pike, and its back is black, and its belly yellow; it has thirteen dorſal and forty-three caudal ſcales, and has cartilages inſtead of bones. It is caught in October and November, and in ſome places till January; and great numbers of them are uſually brought to market together in thoſe months in the countries where they are caught. They always ſwim in ſhoals. It grows to twenty-four feet long, and weighs one, two, three, or even four hundred pounds. The drug called ISINGLASS, and the food called CAVEAR, are prepared from this fiſh. See *Tab.* II. *Fiſh*, Nº 14. Ray's Ichthyograph. p. 243.

HUSSARS, HUSSARDS, or HUSSARTS, an order or ſpecies of ſoldiery in Poland and Hungary, commonly oppoſed to the Ottoman cavalry.

The *huſſars* are horſemen, whoſe uniform is a large furred cap, adorned with a cock's feather; thoſe of the officers with an eagle's or heron's; a very ſhort waiſtcoat, with breeches and ſtockings in one piece; ſhort light boots; and a doublet, having five rows of buttons, which hangs looſely on the left ſhoulder. Their arms are a long crooked ſabre, light carbines, and piſtols. Before they begin an attack, they lay themſelves flat on the necks of their horſes; but being come within piſtol ſhot of the enemy, they raiſe themſelves with ſuch quickneſs, and fall on with ſuch alertneſs, that it is very difficult for the troops they oppoſe to preſerve their order. In a retreat, no other cavalry can pretend to follow them; as they leap over ditches, and ſwim through rivers with a ſurpriſing facility. Moſt of the princes on the continent have troops under this name.

HUSSITES, in *Eccleſiaſtical Hiſtory*, a party of reformers, the followers of John Huſs.

John Huſs, from whom the *Huſſites* take their name, was born in a little village in Bohemia, called Huſs, and lived at Prague in the higheſt reputation, both on account of the ſanctity of his manners, and the purity of his doctrine. He was diſtinguiſhed by his uncommon erudition and eloquence, and performed, at the ſame time, the functions of profeſſor of divinity in the univerſity, and of ordinary paſtor in the church of that city. He adopted the ſentiments of Wickliff, and the Waldenſes; and in the year 1407 began openly to oppoſe and preach againſt divers errors in doctrine, as well as corruptions in point of diſcipline, then reigning in the church. Huſs likewiſe endeavoured to the utmoſt of his power to withdraw the univerſity of Prague from the juriſdiction of Gregory XII. whom the kingdom of Bohemia had hitherto acknowleged as the true and lawful head of the church. This occaſioned a violent quarrel between the incenſed archbiſhop of Prague, and the zealous reformer, which the latter inflamed and augmented, from day to day, by his pathetic exclamations againſt the court of Rome, and the corruptions that prevailed among the ſacerdotal order.

There were other circumſtances that contributed to inflame the reſentment of the clergy againſt him. He adopted the philoſophical opinions of the REALISTS, and vehemently oppoſed and even perſecuted the NOMINALISTS, whoſe number and influence were conſiderable in the univerſity of Prague. He alſo multiplied the number of his enemies in the year 1408, by procuring, through his great credit, a ſentence in favour of the Bohemians, who diſputed with the Germans concerning the number of ſuffrages which their reſpective nations were entitled to in all matters that were carried by election in this univerſity. In conſequence of a decree, obtained in favour of the former, which reſtored them to their conſtitutional right of three ſuffrages, uſurped by the latter, the Germans withdrew from Prague, and, in the year 1409, founded a new academy at Leipſick. This event no ſooner happened, than Huſs began to inveigh with greater freedom than he had before done againſt the vices and corruptions of the clergy, and to recommend, in a public manner, the writings and opinions of Wickliffe, as far as they related to the papal hierarchy, the deſpotiſm of the court of Rome, and the corruption of the clergy. Hence an accuſation was brought againſt him, in the year 1410, before the tribunal of John XXIII. by whom he was ſolemnly expelled from the communion of the church. Notwithſtanding this ſentence of excommunication, he proceeded to expoſe the Romiſh church with a fortitude and zeal, that were almoſt univerſally applauded.

This eminent man, whoſe piety was equally ſincere and fervent, though his zeal was perhaps too violent, and his prudence not always circumſpect, was ſummoned to appear before the council of Conſtance. Secured, as he apprehended, from the rage of his enemies by the ſafe-conduct granted him by the emperor Sigiſmund, for his journey to Conſtance, his reſidence in that place, and his return to his own country, John Huſs obeyed the order of the council, and appeared before it, to demonſtrate his innocence, and to prove that the charge of his having deſerted the church of Rome was entirely groundleſs. However, his enemies ſo far prevailed, that, by the moſt ſcandalous breach of public faith, he was caſt into priſon, declared a heretic, becauſe he refuſed to plead guilty againſt the dictates of his conſcience, in obedience to the council, and burnt alive in 1415; a puniſhment which he endured with unparalleled magnanimity and reſignation.

The ſame unhappy fate was borne by Jerome of Prague, his intimate companion, who attended the council, in order to ſupport his perſecuted friend. Jerome, indeed, was terrified into temporary ſubmiſſion; but he afterwards reſumed his fortitude, and maintained the opinions, which he had for a while deſerted through fear, in the flames, in which he expired in 1416.

The diſciples of Huſs adhered to their maſter's doctrine after his death, with a zeal which broke out into an open war, that was carried on with the moſt ſavage and unparalleled barbarity. John Ziſka, a Bohemian knight, in 1420, put himſelf at the head of the *Huſſites*, who were now become a very conſiderable party, and threw off the deſpotic yoke of Sigiſmund, who had treated their brethren in the moſt barbarous manner. Ziſka was ſucceeded by Procopius, in the year 1424. The acts of barbarity that were committed on both ſides were ſhocking and horrible beyond expreſſion: for notwithſtanding the irreconcileable oppoſition between the religious ſentiments of the contending parties, they both agreed in this one horrible principle, that it was innocent and lawful to perſecute and extirpate with fire and ſword the enemies of the true religion; and ſuch they reciprocally appeared to each other. Theſe commotions in a great meaſure ſubſided, by the interference of the council of Baſil, in the year 1433.

The *Huſſites*, who were divided into two parties, viz. the CALIXTINES and TABORITES, ſpread over all Bohemia and Hungary, and even Sileſia and Poland; and there are ſome remains of them ſtill ſubſiſting in all thoſe parts. Moſheim's Eccl. Hiſt. vol. iii. p. 227, &c. 260, &c. Engl. ed. 8vo. 1768.

HUSTINGS. See COURT *of Huſtings*.

HUT, or HUTT, from the Saxon *hutte*, a ſmall cottage or hovel.

The word is alſo uſed for the ſoldiers lodges in the field; otherwiſe called BARRACKS, or CASERNS.

HUTCH, among *Farmers*, denotes a veſſel or particular place in which to lay corn: alſo a kind of hollow trap for the taking of weaſels, or other vermin, alive: and it alſo ſignifies a ſort of caſe, formed of boards and ſlips of wood, opening in front, and divided within, for keeping and breeding rabbits.

HUTCHINSONIANS, in *Eccleſiaſtical Hiſtory*, a kind of cabaliſtic ſect, that ſprung up in this country towards the beginning of this century, and that derived its name from John Hutchinſon, who was born in Yorkſhire, A. D. 1674. Having been educated in his father's houſe with a view to the office of ſteward to ſome gentleman or nobleman, he was advanced at an early period of life to this ſtation in the ſervice of the duke of Somerſet; and his buſineſs calling him to London about the year 1700, he became acquainted with Dr. Woodward, who employed him in making that large and noble collection of foſſils, &c. which the doctor bequeathed to the univerſity of Cambridge. Mr. Hutchinſon, being deſirous of proſecuting his literary ſtudies, begged leave to quit the ſervice of the duke, who appointed him his riding-purveyor, with a fixed ſalary of 200*l.* per annum; and this place he enjoyed till his death in 1737. In 1724 he publiſhed the firſt part of his Moſes's Principia, in which he ridiculed Dr. Woodward's Natural Hiſtory of the Earth, and his account of the ſettlement of the ſeveral ſtrata, ſhells, and nodules, by the law of gravity; and from this time to his death he continued publiſhing a volume every year, or every other year; which, with the manuſcripts left behind, were publiſhed in 1748, in twelve volumes octavo; an abſtract of his works was alſo publiſhed in 1752. In 1712 Mr. Hutchinſon completed a machine of the watch kind for the diſcovery of the longitude at ſea, which is ſaid to have been ſo contrived, that the ſpring, wheels, and pivots, &c. were not in any conſiderable degree influenced by heat, cold, moiſture, and drought, and to be capable of that degree of exactneſs which is requiſite for the purpoſe. In 1727 he publiſhed the ſecond part of Moſes's Principia, containing the principles, as he apprehends, of the Scripture philoſophy; which are, a plenum, and the air. The air he ſuppoſes to exiſt in three conditions, viz. fire, light, and ſpirit; the two latter are the finer and groſſer parts of the air in motion: from the earth to the ſun, the air is finer and finer, till it becomes pure light near the confines of the ſun, and fire in the orb of the ſun, or ſolar focus. From the earth, towards the circumference of this ſyſtem, in which he includes the fixed ſtars, the air becomes groſſer and groſſer, till it becomes torpid and ſtagnant, in which condition it is at the utmoſt verge of this ſyſtem; from whence he ſays, the expreſſion of "outer darkneſs, and blackneſs of darkneſs," uſed in the New Teſtament, ſeems to be taken. The ſun, which he places in the center, is the active vivifying agent, which, by melting the ſpirit or groſſer parts of the air into atoms or finer parts, or æther, ſets the machine forward, and keeps it a-going; for the light is preſſed out by the influx of ſpirit, and the ſpirit is preſſed in by the efflux of light; and thus the whole matter of the heavens or air is perpetually changing conditions, and circulating. In the introduction to his work, Mr. Hutchinſon ſuggeſted, that the idea of the Trinity was to be taken from the three grand agents in the ſyſtem of nature, fire, light, and ſpirit; which are three conditions of one and the ſame ſubſtance, and wonderfully anſwer in a typical or ſymbolical manner to the three perſons of one and the ſame eſſence. He alſo diſcovers this doctrine in the term *cherubim*, which he derives from כ *ſicut*, denoting *ſimilitude* or *reſemblance*, and רבים, plural of רב, a *great* or *mighty one*; and ſo the cherubim, i. e. the ſimilitude of the great ones, were repreſented by a bull, the chief of the tame animals, the lion the chief of the wild, and the eagle of the winged; and theſe again were figures of the celeſtial cherubim, or fire, light, and ſpirit. The bodies of theſe three animals were all joined in one, in order to ſignify the unity of the eſſence, and the diſtinction of the perſons, and man taken into the eſſence by his perſonal union with the ſecond perſon, whoſe conſtant emblem was the lion; and Mr. Hutchinſon contends, that the very name of the figure was an hieroglyphical repreſentation of the Trinity. The ſame doctrine is alſo taught by the word שמים, tranſlated *heavens*; but which the *Huthinſonians* ſuppoſe to ſignify *names*, being, as they ſay, the plural of שם, a *name*; and the heavens, according to them, are called names, becauſe the material heaven, having in its one ſubſtance three conditions of fire, light, and ſpirit, is the proper name or repreſentation of the Deity in its unity of eſſence, and trinity of perſons; or of the אלהים, *Elohim*, or *Aleim*, which they derive from אלה, *alah*, an *oath*, or *conditional imprecation*, and, therefore, muſt ſignify perſons that have bound themſelves by an indiſpenſible obligation; hereby intimating that the three perſons of the Godhead have abſolutely covenanted together, to redeem man. On this account the ſingular Jehovah, q. d. the eſſence-exiſting, is ſo commonly found in conjunction with the plural *Aleim*, i. e. the *confederates* or *adjurators*. They derive אלוה, *Eloah*, alſo from the ſame root, and tranſlate it the *accurſed one*, referring to Chriſt, who was really made a curſe for us. The word ברית, which we tranſlate *covenant*, they derive from ברר, *to purify*, and render *purifier*; and thus ברת ברית, which is commonly rendered to *make a covenant*, they tranſlate *to cut off the purifier*. In this way Mr. Hutchinſon and his followers have founded their whole ſyſtem of theology and philoſophy on a forced and fanciful etymology of Hebrew words; indulging their minds in all the wildneſs of imagination and unbounded whim, making words ſignify what they pleaſe, turning the plaineſt hiſtory into ſublime prophecy, and conſtraining ſentences to be oracular in various ways, with meanings which they were never deſigned to bear, and which they are incapable of bearing. The Scriptures, according to this author, written in Hebrew without points, which is the language framed in paradiſe, and each root of which repreſents ſome obvious idea of action or condition, raiſed by the ſenſible object which it expreſſes, and farther deſigned to ſignify ſpiritual or mental things; the Hebrew Scriptures, he ſays, rightly tranſlated and underſtood, compriſe a perfect ſyſtem of natural philoſophy, theology, and religion. Mr. Hutchinſon expreſly ſays, that as God was primarily repreſented by the heavens, ſo emblems, or draughts of theſe, or deſcriptions in Hebrew words, were no more than copies of the archetype; and thus the knowlege of the *Aleim* is derived from the light of nature, not as that phraſe is vulgarly underſtood, by any innate or inbred power in man, but by the immediate inſtruction of the Moſt High, the alone interpreter as well as the lord of nature. The Greek, he ſays, that language of erring heathens, became of neceſſary uſe to the apoſtles, to ſpread the hiſtory of facts, which it behoved all men to be apprized of; but Chriſt and his diſciples knew too well its imperfection and unfitneſs to give juſt ideas of the divine oeconomy, to make uſe of it for that purpoſe. The original Scriptures in Hebrew were diſtinct permanent evidence; to theſe references are always made, and there complete ſatisfaction is to be found. He alſo obſerves, that as the material machine is primarily ſuited to the ſervice of the body; ſo its ſecondary, but moſt important uſe, is to treaſure up ideas for the immortal ſoul, by affording types and evidences of the otherwiſe unutterable attributes of the Deity. Hence it muſt follow, that the language of Scripture, which is admirably adapted to convey true and literal deſcriptions, will alſo in many places require an emblematical or ſpiritual interpretation, correſponding to the circumſtances of that creature who has a *ſoul* of *lives* to provide for. The *Hutchinſonians* not only erect their fanciful ſyſtem of theological and philoſophical opinions on the conſtruction of roots and ſymbols, to the ruin of natural religion and morality, but they loudly declaim againſt human learning and reaſon; and they expreſly call abſtract reaſoning the very province of the devil.

The reader may find a diſtinct and comprehenſive account of the *Hutchinſonian* ſyſtem in a book, entitled, Thoughts concerning Religion, &c. printed at Edinburgh, 1743; and in a Letter to a Biſhop, annexed to it, firſt printe in 1732.

HUXING *of pike*, among *Fiſhermen*, a particular metho of catching that fiſh.

For this purpoſe, they take thirty or forty as large bladders as can be got; blow them up, and tie them clo an and ſtrong; and at the mouth of each tie a line, longer or ſhorter, according to the depth of the water. At the end of the line is faſtened an armed hook, artfully baited; and thus they are put into water with the advantage of the wind, that they may gently move up and down the pond. When a maſter pike has ſtruck himſelf, it affords great entertainment to ſee him bounce about in the water with a bladder faſtened to him; at laſt, when they perceive him almoſt ſpent, they take him up.

HYACINTH, *Hyacinthus*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has no empalement; it has one bell-ſhaped petal, whoſe rim is cut into ſix parts; and three nectariums on the point of the germen, with ſix ſhort awl-ſhaped ſtamina; in the center is ſituated a roundiſh three-cornered germen, having three furrows, which afterward becomes a roundiſh three-cornered capſule, having three cells, which contain roundiſh ſeeds. There are ſeveral ſpecies, including many varieties.

All the kinds of this beautiful flower may be propagated either by ſowing their ſeeds, or by parting their bulbous roots. The latter has been the method moſt practiſed among us, though the former is evidently the way to procure the fineſt varieties of the flowers, and has been always practiſed in Holland. The diſcouragement in this, is the long time the plants take from the ſowing, which is uſually four or five years, before they flower; but then if they are ſowed every year after the firſt four or five years, there is always a yearly ſucceſſion of flowers from ſeed.

The ſeed ſhould be carefully ſaved either from ſemi-double, or the fineſt ſingle flowers, and ſown on a freſh, light, and ſomewhat ſandy ſoil, in ſhallow pots or boxes, covering them with half an inch of the ſame earth. This ſhould be done about the middle of Auguſt, and the pots ſhould be placed where they may have the morning ſun till the latter end of September; they ſhould then be removed to a ſomewhat warmer ſituation, and towards the end of October be put under a common hot-bed frame. In February the young plants will appear above ground, and muſt be carefully ſcreened from froſts; but they muſt not be cloſe covered, except at nights. At the end of March, in good weather, they muſt be taken out of the frames, and ſet in a warm place; and when the weather is dry, they muſt be gently watered at times, and always kept carefully clear from weeds.

Towards the latter end of April, or beginning of May, they muſt be removed into a cooler ſituation, as the heat of the ſun would then be too much for them. After their blades are decayed, they muſt have no more watering; but towards the latter end of Auguſt, a ſmall quantity of light rich earth ſhould be ſifted over the pots; after this they muſt be preſerved, and managed as in the former ſeaſon, and in the Auguſt following, a bed of a light, rich, ſandy ſoil, ſhould be prepared. Then the earth is to be taken out of the pots and boxes, and the roots, which will at this time be about the bigneſs of a ſmall quill, muſt be ſeparated, and carefully placed upon the bed, at two or three inches aſunder; they are to be ſet with the bottom part downwards, and covered two inches thick, with the ſame fine earth ſifted over them. Theſe beds muſt be arched over, and in froſty weather covered with mats. In ſpring, if the weather prove dry, they muſt be watered ſparingly. In ſummer they muſt be carefully kept clear of weeds, and in autumn have an inch more of light earth ſtrewed over them. In the third year, the roots ſhould be carefully taken up, when their leaves decay, and kept out of the ground till Auguſt, then planted into new beds as before, at the diſtance of ſix inches aſunder, where the roots may remain till they flower, and treated in the manner already directed, with this difference, that, inſtead of covering them with mats in the winter, the ſurface of the ground ſhould be covered with tanners bark.

When they are in flower, the finer ſorts ſhould be marked with a ſtick, that they may be taken up and planted ſeparate.

When the green leaves of theſe plants begin to decay, their roots muſt be taken up, and the earth of the bed being raiſed into a ridge to ſhoot off the moiſture, they ſhould be laid into the earth again in a horizontal poſition, leaving the green leaves hanging down from the roots, to prevent their moiſture from running into the roots, which often rots them. When the leaves are quite dried off, the roots are to be taken up and cleared of filth, and laid up in boxes, where they may be preſerved dry till September, which is the time of planting them again. The proper ſoil for planting theſe in, is this: take one half freſh earth from a common, or paſture, which is of a ſandy loam; this ſhould not be got beyond nine inches deep; to this add a fourth part of ſea-ſand, and a fourth part of rotten cow-dung.

This ſhould be mixed a long while before it is uſed, and often turned; and ſhould be ſpread two feet deep on the beds, with a little rotten cow-dung, or old tanners bark, at the bottom. Theſe beds ſhould be raiſed from three to four inches above the ſurface of the earth, in a dry ſoil, but from ten to twelve inches, if the ſoil be wet, and be a little riſing or rounded in the middle. In ſevere froſt, ſpread over the beds ſome rotten tan, about four inches thick, and fill up the alleys on each ſide with rotten tan, dung, or ſand. When the flowers are about to blow, the ſtalks ſhould be faſtened by a loop of wire to a ſmall ſtick, to prevent their bending down, and they muſt be ſheltered from the great heat of the ſun in the middle of the day, by which means they will continue in flower a month or longer.

When the flowers are quite decayed, and the tops of the leaves begin to change their colour, let the roots be carefully raiſed out of the ground with a narrow ſpade, or ſome other convenient inſtrument, to prevent their receiving any more nouriſhment from the ground; and about a fortnight after this operation, take the roots entirely out of the ground, raiſe the earth of the beds into a high ridge, and lay the roots into it in a horizontal poſition, with their leaves hanging out, by which means the moiſture of the ſtalks and leaves will evaporate, and thus be prevented from returning to the roots, and cauſing them to decay. In this poſition they ſhould remain, till the green leaves are entirely decayed, which may be in about three weeks time; by which method the roots become firm, and the outer cover is ſmooth, and of a bright purple colour. After this, take them out of the ground, wipe them clean with a ſoft woollen cloth, taking off all the decayed parts of the leaves and fibres, and put them into open boxes, where they may lie ſingly; and thus they may be preſerved out of the ground till September, the ſeaſon for planting them again. Miller.

HYACINTH, *African blue, umbellated, Crinum*. See *Aſphodel* LILY.

HYACINTH, *grape* or *muſk*, *Muſcari*, in *Botany*. Its characters are theſe: the flower has no empalement; it hath one oval pitcher-ſhaped petal, which is reflexed at the brim; it hath three nectariums on the top of the germen, and ſix awl-ſhaped ſtamina, which are ſhorter than the petal, whoſe ſummits join together; in the center is ſituated a roundiſh three-cornered germen, ſupporting a ſingle ſtyle, crowned by an obtuſe ſtigma; the germen afterwards turns to a roundiſh three-cornered capſule, having three cells filled with roundiſh ſeeds. Miller enumerates ſix ſpecies. Linnæus makes this a ſpecies of the HYACINTH.

We have ſeveral ſpecies of this plant cultivated in gardens; three or four for the beauty of their flowers, and one with a purpliſh green flower for the remarkable ſweetneſs of its ſcent. In June, when the leaves of theſe plants are decayed, the roots ſhould be taken up, and ſpread upon mats in a dry place for a fortnight, till the bulbs are dried; then they may be packed up, each ſort by itſelf, till October, when they are to be planted in borders for flowering the following ſpring. They ſhould never be ſuffered to remain in the ground more than two years unremoved; for they multiply ſo faſt that the number of the off-ſets greatly weakens the flowering roots, and the flowers are conſequently ſmall. They are eaſily propagated by theſe off-ſets, which are ſo hardy as to grow even if buried a foot under ground; and the common kind propagates itſelf ſo faſt this way, that when it has once got poſſeſſion of a bed, it is with great difficulty extirpated.

HYACINTH, *lily*. See SQUILL.

HYACINTH, *ſtarry*. See STAR *of Bethlehem*.

HYACINTH, *tuberoſe*. See POLYANTHUS.

HYACINTH, or JACINTH, in *Natural Hiſtory*, a precious ſtone; originally thus called, from its reſemblance of the purple flower named *hyacinth*.

This is a very different gem from that known by the ancients under the name of the *hyacinth*, which was a variety of the amethyſt, with a larger admixture of a deep blue, a ſtone ſeldom ſeen among us. The ancients knew this gem, called the *hyacinth* by us, under the name of *lapis lyncurius*.

It is a leſs gaudy looking gem than any other of the red ones; but is not without its beauty, which in the fineſt ſpecimens is great, though not glaring; and is as ſeldom found blemiſhed or faulty as almoſt any other gem. It is of various ſizes, but is ſeldom found ſmaller than a hempſeed, or larger than a nutmeg. We have had accounts, indeed, of ſome of a much larger ſize; but they ſeem not much to be depended upon. It is not leſs irregular in ſhape than ſize, being found ſometimes in the figure of a regularly hexangular column, terminated by an hexangular pyramid, and in all reſpects, except colour and hardneſs, reſembling ſprig cryſtal; and at other times it is found in form of a ſmall roundiſh or oblong pebble, generally flatted on one ſide. It makes much the beſt external appearance in its cryſtalliform ſtate; but the pebble-ſhaped maſſes are much the harder, and of the finer luſtre. It is leſs hard than the ruby or ſapphire, but much more ſo than cryſtal.

It is the ninth in degree of hardneſs from diamonds, and fuſible by fire; changing its red colour into a dark black, but preſerving even in this form a great degree of hardneſs. The colour and fuſibility of this ſtone appear to proceed from iron, a portion of which is ſeparable from it by the magnet.

It is found of various degrees of deepneſs or paleneſs; but its colour is always a dull or deadiſh red, with a conſiderable admixture of yellow, ſometimes indeed ſo much, that the laſt ſeems the predominant colour. It is ſometimes ſo deep as to ſeem almoſt black, till held up againſt a ſtrong light, and at others is almoſt colourleſs; and probably, not unfrequently is wholly ſo, though in that caſe wanting its true character, which is taken from its colour, it is not to be diſtinguiſhed from pebble cryſtal on the one hand, nor from the white ſapphire on the other, without the aſſiſtance of the wheel to aſcertain its hardneſs. Its moſt uſual ſtate, however, is its having that colour mixed of red and yellow, which we uſually call flame colour.

These are the characters by which the *lyncurius* of the ancients, or *hyacinth* of our times, is to be diſtinguiſhed from all other gems. And our jewellers and lapidaries, according to its different degrees of colour, diſtinguiſh it into three kinds, which they call by its own name, with different epithets; and a fourth, which uſually, but improperly, is accounted by authors a ruby.

The firſt kind is the *la bella hyacintha:* this is the name given to the *hyacinth* in its moſt perfect and beautiful ſtate, when it is of a pure and bright flame colour, ſeemingly formed of a mixture of cinnabarine red, and a moderate proportion of a fine amber yellow. The ſecond is the *ſaffron hyacinth:* this is the name which they give to this gem, when it has more of the red, and that of a deeper and duſkier colour, and is tinged with an admixture of a dead and browniſh yellow. The third is the *amber hyacinth:* this is the name given to thoſe *hyacinths*, which are tinged with a fainter red, in a ſmall proportion, and a dead whitiſh yellow. The fourth is the *rubacelle*, a name given to the *hyacinth*, when of a very deep and ſhining red, blended with a very deep but duſky yellow. The ſtrong colour of the red in this ſtone has generally made it have a place among the rubies, in the accounts of authors; but a compariſon of it with the two gems will evidently ſhew that it belongs not to the ruby, but to the *hyacinth* kind.

The firſt of theſe are the finer *hyacinths*, and are of conſiderable value. They are brought to us both from the Eaſt and Weſt Indies. The *rubacelle* is only found in the Eaſt Indies, but is of very little value; and the other two varieties are common both to the Eaſt and Weſt Indies, and to Sileſia and Bohemia, and ſeveral other parts of Europe. Theſe are, indeed, ſometimes brought over to us from the Eaſt Indies, among the finer kind; as is alſo the *la bella hyacintha* ſometimes found in Bohemia, though poor in compariſon of the oriental. It is no wonder, indeed, that they ſhould be all found equally in both places, being, in reality, only varieties of the ſame gem; but the oriental are, in general, much the finer and better coloured.

The ſtone graves or cuts fine, and would be more uſed for ſeals, &c. but that the graving frequently coſts more than the ſtone.

The ancients uſed it for amulets and taliſmans; and bore it about their necks, or ſet in rings, &c. ſuppoſing it to have the virtue of ſecuring them from the plague, &c.

The *hyacinth* uſed in medicine, and whereof the confection of *hyacinth* is made, is a different ſtone from all theſe, of which there are three ſeveral ſorts: the firſt about the bigneſs and figure of a grain of ſalt, and pretty ſoft; the ſecond ruddy, and ſhaped like the point of a diamond, found in divers parts of Italy, Sileſia, Bohemia, &c. The third is white, intermixed with yellow, and ſome other colours; being found in the ſame places as the red.

In ſtrictneſs, only the firſt kind ſhould be uſed in the CONFECTION *of hyacinth*; but the druggiſts and apothecaries frequently ſubſtitute the other. However, the medical virtues of this and other coſtly concretes, are very doubtful; the preparations from them are very liable to be adulterated, and ſimilar effects may be produced with much greater certainty by other cheaper ſubſtances.

HYACINTHIA, in *Antiquity*, feaſts held at Sparta, in honour of Apollo, and in commemoration of his favourite Hyacinth.

This Hyacinth was the ſon of Amyclas, king of Sparta, and was beloved both by Apollo and Zephyrus. The youth ſhewing moſt inclination to the former, his rival grew jealous; and, to be revenged, one day, as Apollo was playing at the diſcus, i. e. quoits, with Hyacinth, Zephyrus turned the direction of a quoit which Apollo had pitched, full upon the head of the unhappy Hyacinth, who fell down dead. Apollo then transformed him into a flower of the ſame name; and, as a farther token of reſpect, they ſay, commanded this feaſt. The *Hyacinthia* laſted three days; the firſt and third whereof were employed in bewailing the death of Hyacinth, and the ſecond in feaſting and rejoicing.

The perſons who aſſiſted at the ceremony were crowned with ivy; becauſe, ſays Voſſius, De Idolol. lib. ii. cap. 14. that Bacchus and Apollo were the ſame perſon.

HYADES, Ὑαδες, from *υειν*, *to rain*, in *Aſtronomy*, are ſeven ſtars in the Bull's head, famous among the poets for the bringing of rain.

The principal of them is in the Bull's left eye, by the Arabs called Aldebaran. Their longitudes, latitudes, &c. ſee among thoſe of the other ſtars in the conſtellation TAURUS.

The poets feign them to have been the daughters of Atlas and Pleione. Their brother Hyas being torn in pieces by a lioneſs, they wept his death with ſuch vehemence, that the gods, in compaſſion to them, tranſlated them into heaven, and placed them in the Bull's forehead; where, as they ſay, they continue to weep: this conſtellation being ſuppoſed to preſage rain.

Others repreſent the *Hyades* as Bacchus's nurſes, and the ſame with the Dodonides, who fearing the reſentment of Juno, and flying from the cruelty of king Lycurgus, were tranſlated by Jupiter into heaven.

HYÆNA, or HIÆNA, in *Natural Hiſtory*, a ſpecies of the CANIS, with a ſtraight annulated tail, and the hairs of the neck long and erect; naked ears, and four toes on each foot. It has ſix cutting teeth, and two canine in each jaw; and between the tail, which is ſhort, and the anus, a tranſverſe orifice. The animal which is known to us by this name is a quadruped almoſt as large as a wolf, excepting that its legs are not ſo long; the hair of it is rough, and its ſkin ſpotted with divers colours. *Hyænas* were formerly produced at Rome in the public games, and they have been repreſented on ſome medals, on account of their rarity. Spanheim, who had copies of it engraved from medals, deſcribes it with the head of a maſtiff, with ſhort triangular ears, a lion's tail and feet, and hair ſpotted all over like a tyger's. It inhabits Aſiatic Turky, Syria, Perſia, and Barbary.

Pliny's account of this animal is very fabulous. He ſays, that it changes its ſex every year; and that from its eyes are taken precious ſtones, called *hyænia*. Ariſtotle and Ælian ſay, that it makes dogs dumb with its ſhadow; and that it imitates the ſpeech of mankind, in order to deceive them, and thus draw them out of their houſes, and devour them. The ſuperſtitious Arabs carefully bury the head, when they kill a *hyæna*, leſt it ſhould be applied to magical purpoſes, as the neck was of old, by the Theſſalian ſorcereſs. Lucan, lib. vi. 672.

Buſbequius, in his Travels to Amaſia, relates ſeveral particulars of this animal. He ſays it is almoſt of the ſhape of a wolf, but not ſo tall; that its hair is like that of a wolf, except its being more briſtly, and marked at certain diſtances with great black ſpots; it has no neck, but its head is faſtened to the vertebræ of the back, ſo that it is forced to turn itſelf quite round, whenever it would look behind. It is very cruel and voracious; it drags dead bodies out of graves, and carries them to its den. It alſo preys on the herds and flocks. It is ſaid to imitate the voice of a man, and that by this means it often deceives travellers. It is a ſolitary unſociable animal, and inhabits the chaſms of rocks. Theſe animals have a moſt malevolent aſpect; and they are in their nature cruel, fierce, and untameable. See *Tab.* III. *Quadrupeds*, N° 22.

HYÆNIUS *lapis*, in *Natural Hiſtory*, the name of a ſtone ſaid to be found in the eyes of the *hyæna*. Pliny tells us, that theſe creatures were anciently hunted and deſtroyed for the ſake of theſe ſtones, and that it was ſuppoſed they communicated the gift of prophecy, on being put under the tongue.

HYALE, in *Mythology*, one of the nymphs of DIANA.

HYALINÆ, in *Natural Hiſtory*, derived from *υαλη*, *glaſs*, the name of a genus of foſſils, of the claſs of the talcs; the characters of which are, that they are compoſed of ſeparate plates, of conſiderable thickneſs, and thoſe not fiſſile into any thinner. See *Tab. of Foſſils, Claſs* I.

There is but one ſpecies known of this genus, which is found lodged in the clay, in the ſteep banks of the river Aube in Champaigne, near the town of Bar, and in ſome other places along that river; but ſo far as is yet known, in no other part of the world.

HYALOIDES, in the *Natural Hiſtory of the Ancients*, the name of a tranſparent ſtone fit to engrave ſeals on, which was the great uſe they made of the gems, and very bright and readily reflecting the images of things. We have this ſtone to this day in many parts of America, particularly about the river of the Amazons, from whence many fair ſtones of it have at times been brought, and have been by ſome miſtaken for diamonds; they are a ſort of pebble cryſtal, approaching to what the jewellers call the white ſapphire. Hill's Theophraſt. p. 80.

Hyaloides, from ὑαλη, *glaſs*, in *Anatomy*, is ſometimes applied to the VITREOUS humour of the eye, contained betwixt the tunica retina, and the uvea.

HYANCHE, a word uſed by the old medicinal writers to ſignify a quinſy, attended with a ſwelling on each ſide of the throat.

HYARITH, a word uſed by ſome of the affected chemical writers, for ſilver.

HYBERNAL *occident*. See OCCIDENT.

Hybernal *orient*. See ORIENT.

HYBERNICUS *lapis*. See *Iriſh* SLATE.

HYBLÆANUM *bitumen* See BITUMEN.

HYBOMA, a word uſed by the old medicinal writers for a gibboſity of the ſpine.

HYBRISTICA, of ὑϐρις, *injury*, in *Antiquity*, a ſolemn feaſt held among the Greeks, with ſacrifices, and other ceremonies; at which the men attended in the apparel of women, and the women in that of men, to do honour to Venus in quality either of a god, or a goddeſs, or both.

Or, according to the account given by others, the *Hybriſtica* was a feaſt celebrated at Argos, wherein the women, being dreſſed like men, inſulted their huſbands, and treated them with all marks of ſuperiority, in memory of the Argian dames having anciently defended their country with ſingular courage againſt Cleomenes and Demaratus.

Plutarch ſpeaks of this feaſt in his treatiſe of the great actions of women. The name, he obſerves, ſignifies *infamy*; which is well accommodated to the occaſion, wherein the women ſtrutted about in men's cloaths, while the men were obliged to dangle in petticoats.

HYDAGE. See HIDAGE.

HYDARTHROS, of ὑδωρ, *water*, and αρθρον, *joint*, a word uſed by the ancient writers in medicine to expreſs a clear water running from the joints when wounded or ulcerated. It is a very common ſymptom in horſes, and our farriers call it *joint-water*.

HYDATIDES, in *Medicine*, are little tranſparent bags or bladders full of water, frequently found in divers parts of the body.

The word is formed of the Greek ὑδωρ, *water*, which in the genitive caſe gives ὑδατος, whence ὑδατις, *hydatis*.

Hydatides are moſt common in dropſical perſons, and are ſuppoſed to ariſe from a diſtention and rupture of the lympheducts; being found chiefly in the parts abounding in thoſe veſſels, as the liver, lungs, &c. They are alſo ſometimes found in icterical caſes. See DROPSY, JAUNDICE, &c.

We have inſtances of *hydatides* voided both by ſtool, by urine, and by vomiting. They are of all ſizes, from a pin's head to that of a pullet's egg. Theſe tumors are ſometimes voided by the vagina. Of this Mr. Watſon has given a remarkable inſtance in Phil. Tranſ. N° 461, p. 770.

Hydatides, Ὑδατιδες, of ὑδας for ὑδωρ, *water*, in *Natural Hiſtory*, a name given by ſome writers to a ſpecies of ASTROITES, the lineations of which reſemble waves. It is by others uſed as a name of the ENHYDROS.

HYDATINON, in the *Medical Writings of the Ancients*, the name of a collyrium made principally of rain-water.

HYDATIS, Ὑδατις, called alſo *Aquula*, in *Medicine*, a diſeaſe in the eyes; being a fatty ſubſtance, growing under the ſkin of the upper eye-lid; by which the whole eyelid, in children, is ſometimes rendered œdematous.

In order to the cure, an inciſion is made through the ſkin of the eye-lid, and the cyſt is to be diſſected out, if it cannot be drawn away by gently pulling and moving it about. Mr. St. Yves takes notice of a complaint on the edge of the eye-lids, or on the tunica conjunctiva, reſembling the bladders that appear on the ſkin after a burn, which he calls *hydatis*. The method of cure which he propoſes is to open the tumor with the point of a lancet; but if the whole circumference of the globe is covered with water, the conjunctiva will be inflamed, and bleeding, purging, &c will be neceſſary.

HYDATISM, a word uſed, by ſome writers in *Surgery*, to expreſs the noiſe or ſound made by the fluctuating humours contained in abſceſſes.

HYDATOCHOLOS, of ὑδωρ, *water*, and χολη, *bile*, an epithet uſed by the old writers on medicine, for ſtools more than ordinarily liquid or bilious.

HYDATOIDES, Ὑδατοειδης, formed of ὑδωρ, ὑδατος, *water*, and ειδος, *form*, *reſemblance*, a name ſome authors give to the AQUEOUS humour of the eye, incloſed between the cornea and uvea.

HYDATOSCOPIA, compounded of ὑδατος, the genitive of ὑδωρ, *water*, and σκοπεω, *I view*, *I conſider*, called alſo HYDROMANCY, a kind of divination, or method of foretelling future events, by means of water.

There is a natural or allowable kind of *hydatoſcopia*: it conſiſts in foretelling ſtorms, tempeſts, hurricanes, &c. from natural ſigns or indications in the ſea, air, clouds, &c.

HYDE *of land*. See HIDE.

Hyde-*gild*. See HIDE-*gild*.

HYDNOPHYLLUM, or **Hydnophyllon**, in *Botany*, a name given by the ancient Greeks to a plant which they tell us grew on thoſe places where the tubera or truffles lay underneath.

They have left us no deſcription of this plant; ſo that it is not eaſy to gueſs what it was; and the whole account ſeems ſo contrary both to their own opinions delivered in other places, and to truth, that there is reaſon to ſuſpect ſome error in the caſe. They tell us, that they were led by this plant to look for the truffles, and knew by it where they were. But we obſerve, that in places where truffles are, there grows no plant at all upon the ſurface: they alſo tell us the ſame thing in other places.

It is probable that ſome of the writers of that age confounded the truffle and the bulbocaſtanum, or earth-nut. In this caſe, the leaves of the latter would, indeed, ſerve as a certain indication; and the udnophyllon would then be only another name for the bulbocaſtanum. See UDNON.

HYDNUM, in *Botany*, the name of a genus of fungi, in the claſs of *cryptogamia*, called by Dillenius and Micheli, *erinacei*. Theſe are a ſort of horizontal funguſes, which always grow by the ſide to trees, &c. having no pedicle. There are three of this kind; the agaric, which is lamellated underneath; the boletus, which is porous underneath; and the *hydnum*, which is echinated, or beſet with pointed fibres on its under part. The three form diſtinct genera, comprehending ſeveral ſpecies in the Linnæan ſyſtem. See AGARICUS, BOLETUS, and FUNGUS.

HYDRA *of Lerna*, in *Mythology*, a terrible monſter, born of Typhon and Echidne, according to Heſiod; which was deſtroyed by Hercules. The poets repreſent it ſometimes as a ſerpent, branched out into ſeveral other ſerpents, and ſometimes with a human head, bearing ſerpents inſtead of hair; and they add, that when one of the ſerpents heads were cut off, a double head ſprouted in its place.

This *hydra* with many heads is ſaid to have been only a multitude of ſerpents, which infeſted the marſhes of Lerna, near Mycenæ, and which ſeemed to multiply as they were deſtroyed. Hercules, with the aſſiſtance of his companions, cleared the country of them, by burning the reeds in which they lodged.

Hydra, in *Aſtronomy*, a ſouthern conſtellation, conſiſting of a number of ſtars, imagined to repreſent a water ſerpent. The ſtars in *Hydra*, in Ptolemy's Catalogue, are twenty-ſeven; in Tycho's, nineteen; in Hevelius's, thirty-one; and in the Britannic Catalogue, ſixty: the longitudes, latitudes, &c. whereof, are as follow.

Names and ſituations of the ſtars.	Bayer's Cha.	Signs.	Longit.			Latitude.			Magnitude.
			°	′	″	°	′	″	
		♌	5	13	29	22	24	32	4
			5	46	9	22	30	10	4
			9	17	52	25	46	6	6
Northern of the 5 in the head above the eye	δ		5	59	3	12	25	37	4
In the noſtril	σ		6	53	14	14	38	5	5
5.									
			11	58	2	29	44	42	6
South. in the aperture of the mouth	η		7	59	12	14	17	10	4
			10	53	30	24	27	0	6
			13	39	49	32	55	23	6
			7	47	49	11	58	23	5
10.									
North. of the 2 in the ſkull	ε		8	1	52	11	7	59	4
			14	2	39	30	18	40	6
	S		8	35	4	11	35	0	5
			11	31	8	20	26	14	5.6
			13	15	41	23	50	45	6
15.									
In the chin	ζ		10	15	18	11	0	3	4
			14	31	58	24	18	44	6
Firſt of the 2 in the root of the neck	ω		13	4	5	11	3	45	6
			18	8	22	23	53	9	6
			18	26	1	24	0	29	6
20.									
			18	34	27	22	11	35	6
Second of 2 in root of the neck	θ		15	57	4	13	2	47	4
			19	23	26	21	8	10	6
			20	14	28	23	23	33	6
			21	37	12	26	21	24	6
25.									

Names and ſituations of the ſtars.	Bayer's Cha.	Signs.	Longit.			Latitude.			Magnitude
			°	′	″	°	′	″	
			22	12	42	26	11	13	6
			21	29	56	23	50	49	6
	A		21	9	15	19	15	8	6
			23	4	56	22	57	49	6
Cor *Hydræ*	α		22	57	59	22	24	32	2
30.									
Southern of 3 in the bend of the neck	τ		21	15	42	16	44	1	5
Middle	τ		21	25	41	15	0	3	5
			23	42	29	19	15	1	6
			25	49	39	22	15	0	6
Laſt	ι		23	19	19	14	18	17	4
35.									
			26	20	0	22	5	19	6
			26	53	18	23	6	24	6
	κ		28	19	43	26	37	21	4.5
	1. υ	♍	1	23	33	26	5	14	5
	2. υ		4	1	45	23	11	31	5
40.									
	λ		5	4	10	22	1	2	4
	μ		10	44	50	24	40	10	4
	1. φ		12	22	47	24	8	24	5
			15	52	28	30	11	55	6
	ψ	♎	20	32	5	14	33	15	6
45.									
Behind Corvus, in the root of the tail	γ		22	42	30	13	43	18	3
		♏	1	59	34	12	2	6	6
			2	32	43	11	52	30	6
In the extremity of the tail	π		4	11	8	13	3	58	4
			5	52	38	13	4	11	6
50.									
			8	20	0	12	54	21	5
			9	55	55	14	2	26	5
			11	45	29	8	42	11	6
			12	30	0	9	0	50	5.6
			12	49	10	9	1	56	6
55.									
			13	1	49	9	26	50	6
			13	14	24	9	57	48	7
			14	8	58	11	3	9	5
			15	52	1	10	13	50	6
60.			16	43	19	10	23	52	6.7

HYDRA, in *Zoology*. See NATRIX.

HYDRA, in the Linnæan ſyſtem, is a genus of zoophytes, comprehending ſeven different ſpecies. See POLYPE.

HYDRAGOGUES, Ὑδραγωγα, formed of *υδωρ*, *water*, and *αγειν*, *to draw*, a ſpecies of purgative medicines; being ſuch as are ſuppoſed peculiarly fitted to diſcharge ſerous or watery humours.

The ſtrongeſt cathartics, Dr. Quincy obſerves, chiefly anſwer to the character of *hydragogues*; becauſe by their forcibly ſhaking and vellicating the bowels, and their appendages, they ſqueeze out water enough to make the ſtools appear little elſe.

The principal *hydragogues*, in the common opinion, are the juices of the roots of iris, of ſoldanella, mechoachan, jalap, &c. In the general, all ſudorific, aperitive, and diuretic medicines, are truly *hydragogues*.

HYDRANGEA, in *Botany*, a genus of the *decandria digynia* claſs. Its characters are theſe: the flower has a ſmall permanent empalement of one leaf, and five roundiſh petals, which are equal; it has ten ſtamina, which are alternately longer than the petal; under the flower is ſituated a roundiſh germen, which turns to a roundiſh capſule, crowned by two horned ſtigmas, divided tranſverſely into two cells, filled with ſmall angular ſeeds. We know but one ſpecies of this genus, which is a native of North America.

HYDRARGYROSIS, a term uſed by the chirurgical writers to expreſs the anointing the body with a mercurial unction, in order to the raiſing a ſalivation.

HYDRARGYRUM, Ὑδραργυρον, a name given to MERCURY, or quickſilver.

The word is formed of *υδωρ*, *aqua*, *water*, and *αργυρος*, *argentum*, *ſilver*; q. d. *water of ſilver*, on account of its reſembling liquid or melted ſilver.

HYDRASPIS, *water-ſhield*, or *water-buckler*, a machine of wood, invented by John Chriſtopher Wagenſeil, a German, by the help of which a perſon may walk on the water, without fear of ſinking. It encompaſſes the breaſt, ſerving the office of the cheſt in water-fowl, and is furniſhed with apertures for receiving a quantity of food, or for preſerving money, writings, or other valuable things, in caſe of an inundation. The perſon who uſes it is provided with paddles for the feet, conſiſting of moveable flaps of very thick leather, which open and ſhut, and are faſtened to a wooden ſole, on which the foot reſts, by an iron pin paſſing through their hinges. They are faſtened to the feet by ſtraps or thongs. The inventor of this machine made trial of it in a whirlpool of the Danube, where he moved about in the current without danger. He propoſes that this machine ſhould be uſed in a ſhipwreck, in eſcaping the danger of ſudden inundation in paſſing a river, for the ſervice of war, and in hunting and taking water-fowl, &c. Acta Erud. ann. 1691, p. 40.

HYDRASTIS, *yellow root*, in *Botany*, a genus of the *polyandria polygynia* claſs. This genus of plants has neither calyx nor nectaria; the number of petals is three, and the fruit is a berry containing ſingle-ſeeded kernels. There is only one ſpecies.

HYDRAULICS, that part of ſtatics which conſiders the motion of fluids, and particularly water; with the application thereof in artificial water-works.

The word is derived from the Greek, *υδραυλος*, *ſounding water*, formed of *υδωρ*, *aqua*, *water*; and *αυλος*, *tibia*, *pipe* or *flute*: the reaſon whereof is this, that at the time of the firſt invention of organs, being unacquainted with the method of applying bellows to blow them, they made uſe of a cataract or fall of water to make a wind, and ſound them.

To *hydraulics* belong not only the conducting and raiſing of water, with the conſtructing of engines for thoſe purpoſes; but alſo the laws of the motion of fluid bodies, the nature of ſprings, the theory of the tides, &c.

Hydroſtatics explain the æquilibrium of fluids, or the gravitation of fluids at reſt: upon removing that æquilibrium motion enſues; and here *hydraulics* commence.

Hydraulics, therefore ſuppoſe hydroſtatics; and the generality of writers, from the immediate relation between the two, join them together, and call them both either *hydraulics* or *hydroſtatics*.

The laws of *hydraulics* the reader will find under FLUID.

The art of raiſing waters; with the ſeveral machines employed for that purpoſe, as *ſiphons*, *pumps*, *ſyringes*, *fountains*, *jets d'eau*, *fire-engines*, &c. are deſcribed under SIPHON, PUMP, SYRINGE, FOUNTAIN, HYDROCANISTERIUM, *&c.*

The principal writers who have cultivated and improved *hydraulics*, are Jo. Ceva, in his Geometria Motus; Jo. Bap. Balianus, De Motu Naturali Gravium, Solidorum & Liquidorum; Mariotte, in his Mouvement des Eaux & autres Fluides; D. Guglielmini, in his Menſura Aquarum Fluentium, where the higher laws of *hydraulics* are reduced to practice; Sir Iſaac Newton, in his Phil. Nat. Prin. Mathemat. Varignon, in the Memoirs of the Royal Academy of Sciences; Jurin, Belidor, Bernouilli, &c.

As to *hydraulic* machines, Hero of Alexandria is the firſt who has written on them. Of the moderns, the principal are Solomon de Caux, in a French treatiſe of Machines, and chiefly *hydraulic* ones; Caſp. Scottus, in his Mechanica Hydraulico-pneumatica; De Chales, in his Mundus Mathematicus; Boecler, in his Architectura Curioſa: Luc. Antonius Portius, Deſaguliers, Ferguſon, &c.

HYDRAULO-PNEUMATICAL, a compound term, applied by ſome authors, to ſuch engines as raiſe water by means of the ſpring of the air. See AIR, WATER, and ENGINE.

Mr. Boyle mentions a very pretty fountain, which he calls *hydraulo-pneumatical*; made by the ſpring of the air preſſing up water in a pipe upon the air's being exhauſted out of a receiver, and thus the weight of the atmoſphere taken off. See FOUNTAIN.

HYDRELÆON, Ὑδρελαιον, compounded of *υδωρ*, *water*; and *ελαιον*, *oil* in *Pharmacy*, a mixture of common oil and water.

The *hydrelæon* was taken internally to excite vomiting; externally it is anodyne, and promotes ſuppuration.

HYDRENTEROCELE, Ὑδρεντεροκηλη, compounded of *υδωρ*, water; *εντερον*, *inteſtine*; and *κηλη*, *tumour*, in *Medicine*, an hernia, or tumour, occaſioned by a deſcent of the inteſtines, and water along with them, into the ſcrotum. See HYDROCELE.

HYDRIAPHORÆ, compounded of *υδωρ*, *water*, and *φερω*, *I carry*, among the *Athenians*, a deſignation given to wives of ſtrangers reſiding at Athens.

They were thus called, as being obliged during the proceſſion of the feſtival *Panathenæa*, to carry veſſels of water. Potter, tom. i. p. 56, and 401.

HYDRINUS, a name given by ſome authors to the OPHITES, or ſerpent ſtone.

HYDROCANISTERIUM, a fire-engine; or a machine which ſpouts water plentifully, and with force; uſed to be applied to the extinguiſhing of fires, and conflagrations of houſes, *&c.* We have various contrivances to this effect: the firſt, and which is as it were, the baſis of all the reſt, is a pump incloſed in a ciſtula, or wooden vehicle filled with water, and mounted on wheels; the pump being wrought with long levers which come out of the ciſtula; and the water it raiſes directed to the place by means of a jointed tube.

The Dutch and others uſe a long flexible tube of leather, ſail-cloth, or the like, which they carry or conduct in the hand from one room to another as occaſion requires; ſo that the engine may be applied where the fire is only within-ſide, and does not burſt out to expoſe it to its external action. To improve on this original fire-engine, they have ſince contrived to make it yield a continued ſtream; by ſubſtituting a forcing or preſſing pump in lieu of the ſucking pump. See FIRE-*Engine*, and *Forcing* PUMP.

HYDROCANTHARUS, in *Zoology*. See *Water* BEETLE.

HYDROCARDIA, a term invented by Hildanus to expreſs a ſerous, ſanious, or purulent tumour of the pericardium.

HYDROCELE, Ὑδροκηλη, formed of *ὑδωρ*, *water*, and *κηλη*, *tumour*, in *Medicine*, a ſwelling, or bloating of the outer integument or ſkin of the ſcrotum, occaſioned by watery humours detained therein, and called alſo *hydrops teſtis*, and *hernia aquoſa*.

Celſus, De Teſticulorum Natura & Morbis, lib. vii. cap. 18. has long ago obſerved that there are two ſpecies of this diſeaſe: the one is a dropſy of the membrana cellularis, otherwiſe termed *hydrops ſcrotalis*, and is formed by a collection of extravaſated lymph, depoſited and become ſtagnant in the numerous cavities of the cellular membranes of the ſcrotum. The other, commonly called the *hydrocele*, is occaſioned by a collection of extravaſated lymph cloſely confined in the cavity of the *tunica vaginalis teſtis*. In the former caſe, i. e. when a conſiderable quantity of extravaſated lymph is confined in the cells of the *tela celluloſa*, or cellular membrane of the ſcrotum, the ſcrotum becomes uniformly enlarged; the teſticles cannot be felt, and the common integuments appear thickened, diſtended, pale, ſhining, and poliſhed, unleſs the ſkin be inflamed, and then the part becomes red. The penis often exhibits ſimilar appearances, and becomes conſiderably elongated and enlarged by the diſeaſe. Upon preſſure the tumours feels ſoft, the integuments aſſume an œdematous appearance, and for ſome little time afterwards there remains a depreſſion, or cavity on the part that was preſſed. This affection of the ſcrotum is moſt frequently a ſymptom of a dropſical habit, and very often accompanies the general anaſarca, and the particular collection within the abdomen, called the aſcites. On this account Mr. Pott is of opinion, that this diſeaſe is improperly ranked among the ſpecies of *hydrocele*. The relief which the patients can expect muſt be derived more from a proper regimen in diet, gentle exerciſe, and internal medicines than from manual operation and topical applications. However, when a reduction of the ſize of the ſcrotum and penis become abſolutely neceſſary, a ſurgeon may uſe his beſt endeavours to promote a temporary diſcharge of the redundant lymph, and thus to eaſe the pain, and to prevent mortification. The means of making this diſcharge are puncture and inciſion; the former is performed with the point of a lancet; the latter with a lancet or with a knife. Of theſe two methods of relief, that by ſimple puncture is much preferable to the other, as it is leſs painful in the operation, and leſs liable to pernicious conſequences. The fomentations proper to be uſed after the operation ſhould be of the moſt emollient kind, as heated cow's milk, or equal parts of hot pearl-barley, water and milk, or common ſoft water and milk; or, a decoction of bran, oat-meal, marſh-mallow leaves, or poppy-heads, prepared in water: the dreſſings ſhould be pledgits of lint dipped in warm ſweet oil, or warm linſeed oil, and they may be firſt thinly ſpread with yellow baſilicon, liniment of Arceus, or ſuch digeſtive ointment. Over theſe pledgits ſhould be applied a cataplaſm of bread and milk made warm, and mixed with a ſufficient quantity of elder-flower ointment, or oil of olives, or freſh hog's lard; or, inſtead of this cataplaſm another may be uſed, compoſed of freſh linſeed meal and warm water. But in the caſe of a ſingle puncture, a ſuperficial pledgit will be a ſufficient dreſſing.

Mr. Pott, excluding this diſeaſe from the claſs of *hydrocele*, enumerates three different kinds, viz. 1. That which conſiſts of a collection of water in the cells of the tunica communis, or cellular membrane, enveloping and connecting the ſpermatic veſſels. 2. That which is formed by the extravaſation of a fluid in the ſame coat, and confined to one cavity or cyſt, whilſt the reſt of the membrane remains in its natural ſtate. 3. That which is produced by the accumulation of a quantity of water in the cavity of the tunica vaginalis teſtis. The firſt ſpecies of *hydrocele*, when uncombined with any other diſeaſe, is perfectly local, or confined to the tunica communis, and does not at all affect the dartos, the tunica vaginalis teſtis, or any other part. This occaſions little trouble, and is ſeldom much regarded: whilſt it continues of a moderate ſize, the ſcrotal bag has no appearance of a diſeaſe; except that it ſeems rather fuller, and hangs ſomewhat lower on one ſide than the other; the teſticle with its epididymis may be diſtinctly felt in its natural ſtate; the ſpermatic proceſs is conſiderably larger than it ought to be, and feels like a varix, or like an omental hernia, according to the different ſize of the tumour: it has a pyramidal form, being broader at the bottom than at the top; and by continual preſſure it goes up, but drops down again on removing the preſſure. The ſmall degree of uneaſineſs that attends it is felt in the loins, and not in the ſcrotum: when it becomes large and troubleſome, it will require a hazardous ſurgical operation. The ſecond, or encyſted ſpecies of *hydrocele*, is conſtituted by water contained in a bag, which is formed like the coats of all encyſted tumours, by mere preſſure and condenſation of the common membrane. This is a complaint by no means infrequent, eſpecially in children. It has been often repreſented as a ſpecies of wind-rupture, or PNEUMATOCELE. It moſt commonly poſſeſſes the middle part of the proceſs, between the teſticle and groin, and is generally of an oblong figure; whence it has been compared to an egg, and to a fiſh's bladder. It is moderately tenſe, ſo that the fluctuation of the water within it is not eaſily perceptible; it gives no pain, and is attended with little inconvenience, unleſs it be very large; it has no communication either with the cavity of the belly above, or that of the vaginal coat of the teſticle below it. The teſtis and its epididymis may be diſtinctly felt below the tumour; the upper part of the ſpermatic proceſs in the groin is moſt frequently very diſtinguiſhable. It does not retain the impreſſion of the fingers, and a light ſtroke upon it occaſions a ſound, as if it contained only wind. The poſture of the patient produces no alteration in it, nor is it affected by his coughing, ſneezing, &c. and it has no effect on the diſcharge per anum. The diſeaſes with which it is moſt likely to be combined are the *hydrocele* of the tunica vaginalis teſtis, and the true hernia; becauſe the parts within the groin, the ſpermatic proceſs, and the ſcrotum are the ſeat of all three: but it is diſtinguiſhed from the former by the tumour's being always above the teſticle, and by being the ſame to the touch in all parts of it, and feeling throughout like a diſtended bladder; and from the latter by the gradual increaſe of the ſwelling, by the indolent ſtate of it, by its being incapable of reduction, and being unaffected by the patient's coughing, &c. In young children, who are more ſubject to this diſeaſe than adults, it is often diſſipated in a little while by means of warm fomentation, and preſerving an open belly. But if it does not diſperſe, the water may be diſcharged by the point of a lancet: whereas in the caſe of adults, the cyſt becomes ſometimes ſo thick as to require diviſion through its whole length; and the operation may be performed with great eaſe, and perfect ſafety. In order to underſtand the nature and formation of the third ſpecies of *hydrocele*, which is confined to the vaginal coat or bag, which looſely envelopes the teſticle, it is to be conſidered that the cavity of this tunic in a natural healthy ſtate, always contains a ſmall quantity of a fine fluid, exhaled from capillary arteries, and conſtantly abſorbed by veſſels deſtined to this uſe: but if the quantity of this fluid be too large, or if the regular abſorption of it be by any means prevented, it will be gradually accumulated, and by diſtending the containing bag form this diſeaſe. No period of life is exempt from this malady; adults and young children are ſubject to it, and infants are ſometimes born with it. Ruyſch is of opinion that it proceeds from a varicoſe ſtate of the ſpermatic veſſels, a circumſtance which is obſerved to attend this diſorder, whether it be the cauſe of it or not. The tumour in its firſt ſtate is rather round, and as it increaſes acquires a pyriform figure, with its larger extremity downward; it is ſometimes hard, and almoſt incompreſſible; at other times ſo ſoft and lax, that both the teſticle, and the fluid ſurrounding it are eaſily diſcoverable. It is indolent in itſelf, though its weight will produce a ſmall degree of ſenſible uneaſineſs in the back. Some have laid great ſtreſs on the tranſparency of the tumour, but this is a very fallible criterion, neither can the colour of the fluid be depended upon; but the principal circumſtance that diſcriminates the ſimple *hydrocele* of the tunica vaginalis from the anaſarcous ſwelling of the ſcrotum, from the encyſted *hydrocele* of the chord, and from the inteſtinal *hernia*, is the fluctuation of the tumour. The firſt is every where equal, tumid and ſoft; and every where equally receives, and retains the impreſſion of the fingers; the ſecond, though circumſcribed, not very compreſſible, and affording the ſenſation of fluctuation, yet does not pit, and is alike to the touch in all its parts; and in the third, if the teſticle be diſtinguiſhable at all, it is found at the inferior part of the whole tumour.

The methods of cure in this ſpecies of *hydrocele* are reducible to two, viz. the palliative, which propoſes to give preſent relief by diſcharging the fluid; and the radical, which aims at a perfect cure, without leaving a poſſibility of relapſe. The inſtruments commonly uſed in the former method are the bleeding or the impoſthume lancet, and the trochar. Mr. Warren prefers the impoſthume lancet to the trochar, becauſe it is the moſt eaſy and expeditious way of evacuating the fluid, and becauſe the tunica vaginalis does not ſuffer as it does from the canula of the trochar being left in the wound during the diſcharge of the lymph. But Mr. Pott thinks that the trochar is preferable to the lancet; becauſe by means of its canula it ſecures the exit of the whole fluid, without a poſſibility of prevention. The operation ſhould always be performed on that part of the tumour, where the tunica vaginalis and albuginea are at the greateſt diſtance from each other, and where the fluid muſt of courſe be accumulated in the greateſt quantity. When the lymph has been totally evacuated, a bit of ſoft lint ſhould be applied to the wound, and over the lint a piece of ſticking plaſter; and if the ſcrotum has been conſiderably diſtended, it may be neceſſary to ſuſpend it in a bag-truſs. The radical method of cure is by inciſion, by cauſtic, by the puncture and tent, and by the ſeton; each of which operations has been adopted and recommended by different practitioners. Some have added a fifth kind of operation, viz. that of opening the tumour by inciſion, and then diſſecting away the whole of the tunica vaginalis; but this method is ſo tedious, painful, and dangerous, that it is now generally rejected.

The operation by inciſion is performed with a ſharp ſmall knife, having a convex edge and point, and a pair of probe-ſciſſars. The operator embracing the tumour on its upper part with one hand, makes a wound with his knife in the other hand, beginning at the upper and anterior part of the tumour, and continuing it to its inferior extent; by this inciſion the water is ſuddenly evacuated, and the tumour diſappears: but if the edges of the divided tunic project on each ſide of the ſcrotum, they muſt be clipped off with a ſharp pair of ſciſſars; and the ſciſſars may likewiſe be made uſe of to enlarge the wound, if it ſhould be neceſſary. The wound muſt be dreſſed with dry lint, or with a pledgit of lint ſpread with ſome ſoft and cooling ointment, ſuch as the linimentum album, ung. ſaturninum, or the ung. florum ſambuci; over the lint apply a pledgit of ſoft tow ſpread with the ſame kind of ointment; ſuſpend the parts in a bag-truſs, and purſue the ſame methods for completing the cure.

In the operation by cauſtic, a piece of the common paſte cauſtic, rather leſs than a finger in breadth, properly ſecured by plaſter, is applied to the whole length of the anterior part of the tumour; and when the eſchar thus produced, caſts off, or is divided, an opening of nearly the ſame length is thereby intended to be made into the cavity of the tunica vaginalis teſtis; by which means the ſurgeon has an opportunity of applying ſuch dreſſings to the inſide of the ſaid tunic, as ſhall by the generation of new fleſh, fill up and aboliſh its cavity.

The radical cure by the puncture and tent, is performed by making a puncture in the ſcrotum with a lancet or trochar, and when the contents of the tumour are evacuated, introducing a bit of lint of the ſize of the orifice, and about three-fourths of an inch in length through the wounded ſcrotum and tunic; but it is neceſſary firſt to ſecure the tent by a piece of double thread paſſed through one end of it, that it may not ſlip into the cavity of the tunic; cover the tent with ſoft lint, and over the lint apply a bit of ſticking plaſter; ſuſpend the parts in a bag-truſs: when an inflammation commences, remove the plaſter, lint, and tent, and renew them as at firſt, a ſecond time. Repeat the operation as often as it may be found ſafe and expedient for producing a general inflammation of the part. The wound may be ſuperficially dreſſed with yellow baſilicon ſpread on a ſoft pledgit of lint; and the whole ſcrotum may be covered and immerſed in a cataplaſm, compoſed of ſtale crumbs of bread and milk, adding a ſufficient quantity of ſallad-oil, in order to keep the application moiſt and ſoft. In the operation by the ſeton, Mr. Warner recommends a ſilver needle of a convex form, about ſix inches long, and tipped with a ſharp ſteel-point. Through the eye of the needle draw a narrow ribband or tape, about ten or eleven inches long, ſoftened with oil or pomatum; introduce the point of the needle through the upper and anterior part of the tumour, or through its upper and exterior part, with its convex ſide towards the teſticle; direct it downwards to the lower end of the tunica vaginalis and ſcrotum, and there puncture the integuments quite through; then convey the needle and ligature downwards, till it may be properly ſecured. Let the ribband remain unmoved for forty-eight hours; obſerving to draw it upwards and downwards once or twice a day, as may be thought needful. Treat the patient in the manner already adviſed in the account of the other operations. See on this ſubject Pott's Treatiſe on the *hyrdocele*in his chirurgical works, vol. ii. p. 197, &c. Warner's Account of the Teſticles, &c. p. 26, &c. Elſe's Treatiſe on the *Hydrocele* of the Tunica Vaginalis Teſtis.

HYDROCEPHALUS, Ὑδροκεφαλος, formed of *ὕδωρ*, *water*, and *κεφαλη*, a *head*, in *Medicine*, a watery head, or dropſy in the head.

The *hydrocephalus* is a congeſtion of water in the head, ſo as to diſtend and render it ſoft.

There are two kinds of *hydrocephali*. The firſt, when the water is gathered between the ſkull and the ſkin, called *hydrocephalus externus*: the ſecond, when it is collected between the ſkull and the brain, or in the ventricles of the brain, called *hydrocephalus internus*.

Children are much more liable to *hydrocephali* than adults; by reaſon their head is ſoft, and has been much compreſſed in the womb; or perhaps, by their having been too roughly handled by the midwife: add, that the bones of children's heads being very ſoft, and their ſutures not yet exactly cloſed, they eaſily open, and give way to an influx of water from without; whereas, in adults, the bones of the cranium are very hard, and cloſely bound together: nevertheleſs, inſtances occur in which they have been ſeized with this diſorder.

The internal *hydrocephalus* is a diſeaſe very difficult, if not abſolutely impoſſible to cure. It ſometimes ends in mortal convulſions, and ſometims in lethargies, or apoplexies.

The head, in this caſe, is ſometimes extended to a prodigious bulk, ſo that the perſon cannot bear or ſuſtain it. Of this we have an extraordinary inſtance given us by Dr. Friend, of a girl two years old, whoſe head was twenty-ſix inches in circumference. Philoſph. Tranſact. N^{o} 318.

We owe to Mr. Hunauld, of the royal academy of Paris, ſome very ſingular and valuable obſervations on this remarkable ſubject. This gentleman, examining the head of a child which had died at ſeven months old of a *hydrocephalus*, found it larger in all parts, except before, than that of an adult. Toward the face, the ſkull was no larger than is natural at that age; but ſideways and behind, it had ſwelled to this monſtrous bulk. The water was incloſed in the ventricles, and was in quantity a pint.

On conſidering what could be the time when this unhappy diſorder began, it appeared to that gentleman, that it did not happen till after the bones of the ſkull began to be joined to one another by the ſutures; for otherwiſe the head muſt have been in the ſame ſtate with thoſe in which the *hydrocephalus* has begun earlier; in which caſe, the bones of the ſkull ſeparate themſelves to a great diſtance one from another, and the membrane which unites them to one another is extremely extended. The beginning of this *hydrocephalus* muſt have been at a time when the bones of the ſkull, united by their ſutures, had already had time conſiderably to extend themſelves; and the action of the water on the ſides of the ventricles, and on the brain, forced the bones of the ſkull to take this unnatural growth. And from the whole, it is eaſy to conclude that thoſe children in whom a *hydrocephalus* begins, before the bones of the ſkull are ſtrongly united, may live a conſiderable time.

The effect which the water, contained in the head, had on the brain, in the caſe under conſideration, deſerves to be remarked. The ſides of the ventricles are, in a natural ſtate, applied cloſely on one another, and ſcarce leave any ſenſible cavity; whereas in this head, theſe ſides were ſo far ſeparated from one another, as to contain a pint of water. It muſt therefore have happened, that the ſubſtance of the brain, which compoſes theſe ſides, muſt have been conſiderably elongated, and the cortical ſubſtance muſt alſo have been greatly extended beyond its natural dimenſions. And, in order to be capable of this extenſion, it was found without any circumvolutions, and made only a flat even ſurface regularly of that extent and ſize that would reſult from the expanſion of all its circumvolutions. The medullary ſubſtance formed a ſecond even ſurface like the former. This was very thin, and lay under the former. The reaſon of this diſpoſition of the parts of the brain in this caſe is obvious; for the pia mater not having in this caſe, the circumvolutions of the brain to follow, as in a natural ſtate, formed of itſelf a flat ſubſtance upon the cortical part.

It is evident, from theſe obſervations, and from others in Veſalius and other authors, that the brain may, from accidental cauſes, become of a growth and figure very different from what it naturally would have had; and that the very bones of the ſkull are in like manner capable of aſſuming a different figure and growth, and that even after they have acquired a great deal of their natural thickneſs and hardneſs, and are capable of reſiſting, with conſiderable force, the accidents which tend to determine this unnatural growth in them: and applying this to the caſe of a tender fœtus, in which the parts have yet ſcarce any degree of ſolidity or hardneſs, we ſhall ſee an eaſy account of all the unnatural configurations which anatomiſts ſometimes meet with in the ſkulls of adults. Memoirs de l'Acad. de Scienc. Par. 1740.

Dr. Fothergill obſerves, that the *hydrocephalus internus* is much more frequent than perſons generally imagine; and this is the more to be lamented, as it has hitherto baffled the ſkill of our ableſt phyſicians. A ſingle inſtance only occurs under the care of Dr. Watſon, out of a great number, in which a recovery was effected. It appears from ſeveral diſſections, that the proximate cauſe of this diſeaſe is a collection of clear pellucid lymph, amounting in ſome caſes to two, three, four, or five ounces, contained in the ventricle of the brain under the corpus calloſum, from whence it is impoſſible to diſcharge it by any medicine, or operation hitherto diſcovered. Dr. Fothergill ſubmits to conſideration, whether this extravaſated lymph may not proceed from the breach of a lymphatic. This conjecture is confirmed by its happening more commonly to healthy, active, lively children, than to ſuch in whom from previous indiſpoſition, there is room to ſuſpect any unequal or weakened abſorption. Beſides, accidents have often preceded this complaint. Dr. Watſon is of opinion, that whenever this fluid is productive of diſeaſe and death, its effects ariſe not from any preternatural acrimony, but from the ventricle's being overloaded with it; ſo that it forces the brain againſt the ſkull, and impedes the free paſſage of the blood through the veſſels of the brain and its meninges: and, by its preſſure diſturbs the functions of the brain itſelf; and its effects on the optic nerve are early ſeen in the ſenſibility of the retina, and at length in a loſs of ſight and dilatation of the pupil to its greateſt extent. The ſame cauſe affecting the third pair of nerves, which are ſubſervient to the motions of the eyes, occaſions the irregular convulſive motions and diſtentions which are uſually obſerved in that organ in the courſe of this diſeaſe. A greater degree of diſtenſion of the brain, and its compreſſion from this fluid brings on general convulſions, and is moſt uſually fatal. The diſorders to which the *hydrocephalus internus* bears the neareſt reſemblance, are ſuch as are ſuppoſed to proceed from worms; many of the ſame ſymptoms occur, and indicate the neceſſity of preſcribing anthelmintics. Dr. Whytt ſuppoſes that this diſeaſe is gradually formed, and that it continues ſome weeks before it ends fatally: but Dr. Fothergill has met with many caſes of perſons who were well, healthy, and active, that have been ſeized with it, and carried off in about fourteen days; nor has he ſeldom been able to trace the commencement of it above three weeks. The firſt complaint in this diſorder is a pain ſomewhere below the head; moſt commonly about the nape of the neck and ſhoulders, often in the legs, ſometimes, but more rarely in the arms; when the pain does not ſeem to affect any of the limbs, the head and ſtomach are moſt diſordered. In the courſe of three, four, or five days, after children have been firſt ſeized, they have commonly complained of a very acute pain in the head; extending acroſs the forehead from temple to temple: this head-ach is attended with occaſional ſickneſs and doſing, irregular breathing, and much ſighing. The pulſe is at firſt ſlower than it ought to be; and as the pain increaſes becomes gradually ſlower and irregular. The firſt acceſs of the diſorder is often attended with feveriſh heat; afterwards the heat ſubſides till within a day or two of the diſſolution of the patient; when the pulſe becomes extremely quick, the breathing deep, irregular and laborious, and the heat exceſſive and more general. The head and præcordia are always hot from the firſt attack. Every ſymptom almoſt that attends an irritating cauſe in the brain appears in its turn; firſt, pains in the limbs, ſickneſs and head-ach; ſhort diſturbed ſleeps, ſtartings, irregular pulſe, watchfulneſs, and conſiderable dilatation of the pupils. The patient is unwilling to be diſturbed, averſe to light, takes things greedily, and can bear no poſture but that of lying horizontally. The whites of the eyes are much ſeen when he is aſleep; the urine and ſtools come away inſenſibly; he often ſcreams, and puts one or both hands to his head; at length the eye-lids become paralytic, and the iris immoveable. The heat of the head and trunk become exceſſive, a great heat and ſweat ſpread over the whole body, reſpiration is altogether ſuſpirious, the pulſe trembling, and very quick; and ſometimes a ſpaſm terminates the diſorder in death. Many of theſe ſymptoms are familiar to worm caſes, teeth, and other irritating cauſes: but the pains in the limbs, and inceſſant head-ach, and ſickneſs ſeem to be the moſt certain intimations of the danger. The patient in this diſeaſe is very coſtive; and the ſtools, which are procured with great difficulty, are commonly of a dark greeniſh colour, with an oilineſs, or gloſſy bile, and ſingularly offenſive. In the earlier ſtages of this diſeaſe, it is uſual to treat it as if it proceeded from worms, or ſome irritating cauſe capable of being removed. Three or four grains of calomel, or more, according to the age and habit of the patient, with rhubarb, and the pulv. e ſcam. compoſ. are given to empty the bowels; and if the ſtomach appears to be loaded, one fourth, or one half of a grain of the emetic tartar may be joined with it, and the ſtomach waſhed with any ſuitable liquor. After this, it ſeems prudent to abate the vomiting by the ſaline abſorbent medicines, adding a few drops of the tinctura thebaica as occaſion requires; giving broth, thin decoctions of hartſhorn ſhavings, and other proper ſupport. Anthelmintics in broth are adminiſtered by way of clyſters, and occaſionally ſmall doſes of anodynes; a decoction of ſem. ſanton. with thirty-eight or forty drops of ol. terebinth. in three or four ounces of broth; or aloes boiled with milk. Heating medicines, and a great degree of ternal warmth increaſe the malady; when the diſeaſe proceeds from worms, the ſymptoms abate by this proceſs: but if they continue it is of a more fatal kind The moſt preſſing ſymptoms however ſhould be abated by the application of bliſters, ſinapiſms and embrocations externally, and by the leſs heating antiſpaſmodics internally; and the bowels ſhould be always kept as much as poſſible free from impurities. Dr. Buchan alſo recommends diuretics, and ſuch medicines as promote the ſecretion of urine: a diſcharge from the noſe ought likewiſe to be promoted, by cauſing the patient to ſnuff the powder of aſarum, white hellebore, or the like. London Med. Obſerv. and Inquiries, vol. iv. p. 40, &c. p. 78, &c. p. 321, &c. Whytt's Hiſtory of the *Hydrocephalus*, in a tract at the end of his works. Buchan's Dom. Med. p. 617. edit. 1776.

In the external *hydrocephalus*, where the water is retained between the common integuments and the cranium, there is ſome hope of a cure, eſpecially if it be not of very long ſtanding. Internal medicines muſt be given: theſe muſt be cathartics, diuretics, and diaphoretics; and at the ſame time externally large compreſſes, covering the whole head, muſt be applied, dipped in lime-water and ſpirit of lavender, or Hungary-water. Bags of the dried herbs of lavender, marjoram, penny-royal, and the like herbs, may be wetted in the ſame liquors, and applied; and the frequent uſe of an errhine made of marjoram, lily of the valley, marum, and the like, ſhould be recommended, as alſo the chewing of tobacco, to diſcharge the ſeroſities in form of ſaliva. If theſe do not ſucceed, a bliſter muſt be tried behind the ears, on the occiput and neck, and cupping on the parts. Iſſues and ſetons alſo are of great uſe. And, in the cupping, the ſcarification may be made very deep, and afterwards dreſſed with digeſtive ointments and precipitate, to keep up the diſcharge. Heiſter's Surgery, p. 355.

But even in this diſeaſe, as well as in the SPINA *bifida*, when, through ignorance or deſign, the integuments have been divided, and the contained fluid evacuated, life has continued but for a ſhort time after the operation.

HYDROCERATOPHYLLON, in *Botany*, the name given by Vaillant, and many others, to a genus of plants called by Dillenius, dichotophyllum; and by Linnæus, in his Genera Plantarum, CERATOPHYLLUM. Vaillant, Act. Germ. 1719.

HYDROCHARIS, *frog's-bit*, in *Botany*, the name of a genus of plants of the *dioecia enneandria* claſs. The characters of the genus are theſe: the flowers are ſome male, others female; in the male the cup is a two-leaved oblong ſpatha, containing two flowers; the peculiar perianthium of each flower is compoſed of three leaves, of an oblong oval figure, hollow, and with membranaceous edges; the flower conſiſts of three large petals, flat, and of a roundiſh figure; the ſtamina are nine erect pointed filaments, diſpoſed in three orders; the antheræ are ſimple; the piſtil is a ſort of rudiment of a germen in the center of the flower; in the female flowers there is no ſpatha, but the flowers grow each by itſelf; the perianthium and petals are the ſame as in the male; the piſtil has a roundiſh germen placed under the cup, and from this ariſe ſix ſtyles of the length of the cup; theſe are compreſſed and furrowed; the ſtigmata are bifid and pointed; the fruit is a coriaceous capſule of a roundiſh figure, containing ſix cells; the ſeeds are very numerous, and are ſmall and roundiſh.

HYDROCHÆRIS, in the Linnæan ſyſtem of *Zoology*, a ſpecies of HOG, found in Surinam. See CAPYBARA.

HYDROCHOOS, in *Aſtronomy*, derived from *ὑδωρ*, *water*, and *χεω*, *I pour*. See AQUARIUS.

HYDROCORAX, in *Ornithology*. See BUCEROS, and CORVUS INDICUS.

HYDROCOTYLE, in *Botany*. See *Marſh* PENNYWORT.

HYDRODES *febris*, a fever, in which the patient is, from the beginning, afflicted with very copious and weakening ſweats, and great weakneſs.

HYDRONAMICS, of *ὑδωρ*, *water*, and *δυναμις*, *force*, is uſed for the ſcience of the laws of the motion of FLUIDS, and denotes the ſame with HYDRAULICS.

HYDROGARON, a word uſed by ſome of the old authors for garum, or brine diluted with water, and uſed as a purge, taken in large quantities.

HYDROGRAPHICAL *Maps*, more uſually called *ſea charts*, are projections of ſome part of the ſea, in plano, for the uſe of navigation.

In theſe are laid down all the rhumbs, or points, of the compaſs, the meridians, parallels, &c. with the coaſts, capes, iſlands, rocks, ſhoals, ſhallows, &c. in their proper places, proportions, &c.

Chriſtopher Columbus, the firſt great diſcoverer of America, was a man that earned his living by making and ſelling *hydrographical maps*. He happened to be heir to the memoirs, or journals of a noted pilot, one Alonzo Sanchez de Huelva, captain of a ſhip, who, by chance, had been driven by a ſtorm to the iſland of S. Domingo, and died at Columbus's houſe ſoon after his return. This gave Columbus the firſt hint to attempt a diſcovery of the Weſt-Indies, in which he ſucceeded.

For the conſtruction of the ſeveral kinds of *hydrographical maps*, ſee CHART.

For their uſes, ſee SAILING.

HYDROGRAPHY, compounded of *ὑδωρ*, *aqua water*; and *γραφω*, *I deſcribe*, that part of geography which conſiders the ſea; principally, as it is navigable.

Hydrography teaches how to deſcribe and meaſure the ſea; it gives an account of its tides, counter-tides, currents, ſoundings, bays, gulfs, &c. as alſo of its rocks, ſhelves, ſands, ſhallows, promontories, harbours, diſtances, &c. from port to port; with all that is remarkable, either out at ſea, or on the coaſt.

Some of the beſt authors uſe the term in a more extenſive ſenſe; ſo as to denote the ſame with *navigation*.

In this ſenſe *hydrography* includes the doctrine of ſailing; the art of making ſea charts, with the uſes thereof; and every thing neceſſary to be known, in order to the ſafeſt and moſt expeditious performance of a voyage. See SAILING.

Hydrography is the moſt perfect of all the mathematical ſciences; there being ſcarce any thing wanting to its perfection, but the diſcovery of the longitude.

The Jeſuits Ricciolus, Fournier, and de Chales, have written on the ſubject of *hydrography*.

In France they have profeſſors of *hydrography* eſtabliſhed in all their ſea-ports, who are to inſtruct the youth intended for the ſea, in all the parts of navigation, ſailing, ſteering, &c. with the ſeveral branches of mathematics neceſſary thereto; as arithmetic, and the doctrine of the ſphere, and trigonometry.

They are royal profeſſors, and teach gratis; having ſalaries allowed them by the king. They are alſo charged with the examination of pilots, &c.

HYDROLEA, in *Botany*, a genus of the *pentandria digynia* claſs: the calyx is five-leaved, the corolla rotated, and the fruit is a double-celled and double-valved capſule: there is only one ſpecies.

HYDROLOGY, compounded of *ὑδωρ*, *water*, and *λογος*, *ſcience*, denotes that part of natural hiſtory, which examines and explains the nature and properties of WATER in general.

HYDROMANCY, Ὑδρομαντεια, compoſed of *ὑδωρ*, *water*; and *μαντεια*, *divination*; the act, or art, of divining, or foretelling, future events, by means of water.

Hydromancy is one of the four general kinds of DIVINATION: the other three, reſpecting the other elements; *viz.* fire, air, and earth; are denominated pyromancy, aeromancy, and geomancy.

Varro mentions the Perſians as the firſt inventors of *hydromancy*, adding, that Numa Pompilius, and Pythagoras, made uſe thereof.

This ſpecies of divination was performed in various ways: ſometimes they uſed invocations, and magic ceremonies, in conſequence of which they diſcovered the names of certain perſons, or events, which they wiſhed to know upon the water: ſometimes they ſuſpended a ring by a thread over a veſſel full of water, and ſtruck the ſides of the veſſel with it a certain number of times: they alſo formed preſages by caſting ſmall ſtones into ſtill water, and obſerving the circles hereby formed on the ſurface of the water; by examining the various agitations of the waves of the ſea; by obſerving the colour of the water, and the figures repreſented in it, &c. &c. See an account in Delrio Diſquiſ. Magic. lib. iv. queſt. 6. ſect. 3.

The writers in optics furniſh us with divers *hydromantic* machines, veſſels, &c.

To conſtruct an *hydromantic* machine, by means whereof an image, or object, ſhall be removed out of the ſight of the ſpectator, and reſtored again, at pleaſure, without altering the poſition, either of the one or the other. Provide two veſſels, ABF, CGLK (*Tab.* IV. *Hydraulics*, *fig.* 41); the uppermoſt filled with water, and ſuſtained by three little pillars, one whereof, BC, is hollow, and furniſhed with a cock B. Let the lower veſſel CL be divided by a partition HI, into two parts; the lower whereof may be opened, or cloſed, by means of a cock at P.

Upon the partition place an image, which the ſpectator in O cannot ſee, by a direct ray GL.

If now the cock B be opened, the water deſcending into the cavity CI, the ray GL will be refracted from the perpendicular GR to O; ſo that the ſpectator will now ſee the object by the refracted ray OG. And again, ſhutting the cock B, and opening the other P, the water will deſcend into the lower cavity HL; whence, the refraction ceaſing, no rays will now come from the object to the eye: but, ſhutting the cock P again, and opening the other B, the water will fill the cavity again, and bring the object in ſight of O afreſh.

To make an *hydromantic* veſſel, which ſhall exhibit the images of external objects, as if ſwimming in water. Provide a cylindrical veſſel ABCD (*Tab.* IV. *Hydraulics*, *fig.* 42). divided into two cavities by a glaſs EF, not perfectly poliſhed: in G apply a lens convex on both ſides; and in H incline a plain mirror, of an elliptic figure, under an angle of 45°; and let IH and HG be ſomething leſs than the diſtance of the focus of the lens G; ſo that the place of the images of an object radiating through the ſame may fall within the cavity of the upper veſſel: let the inner cavity be blackened, and the upper filled with clear water.

If, now, the veſſel be diſpoſed in a dark place, ſo as the lens be turned towards an object illuminated by the ſun, its image will be ſeen as ſwimming in the water.

HYDROMEL, Ὑδρομελι, compoſed of *ὑδωρ*, *water*, and *μελι*, *honey*, a drink made of water and honey, nearly in equal quantities; called alſo by the Greeks, *μελικρατον*.

When this liquor has not fermented, it is called *ſimple hydromel*; and *compound*, when other ingredients are added to the water and honey, in order to improve and exalt the flavour and virtues.

When it has undergone the ſpirituous fermentation, it is called the *vinous hydromel*, or MEAD and METHEGLIN. To induce this fermentation, nothing is neceſſary but to dilute the honey ſufficiently in water, and to expoſe the liquor to a convenient degree of heat.

Hydromel is the common drink of the Poles and Ruſſians. Diodorus Siculus, lib. v. and Ariſtotle, relate, that the Celtiberi, and Taulantii, ancient people of Illyria, drank *hydromel* inſtead of wine.

HYDROMELON, a name given by the ancients to a liquor prepared with one part of honey, impregnated with the juice of quinces, and two parts of boiled water ſet in the ſun during the dog-days.

HYDROMETER, compounded of *ὑδωρ*, *water*, and *μετρον*, *meaſure*, an inſtrument wherewith to meaſure the gravity, denſity, velocity, force, or other properties of water.

That wherewith the ſpecific gravity of water is determined, is often called an areometer, or water-poiſe.

The general principle on which the conſtruction and uſe of the *hydrometer* depends, has been illuſtrated under the article *ſpecific* GRAVITY: for it has there been ſhewn, that a body ſpecifically lighter than ſeveral fluids will ſerve to find out their ſpecific gravities; becauſe it will ſink deepeſt in the fluid whoſe ſpecific gravity is the leaſt.

Thus, let AB, (*Tab.* II. *Pneumatics*, *fig.* 25.) be a ſmall even glaſs tube, hermetically ſealed, having a ſcale of equal diviſions marked upon it, with a hollow ball of about an inch in diameter at bottom, and a ſmaller ball C under it, communicating with the firſt. Into the little ball put mercury or ſmall ſhot, before the tube be ſealed, ſo that it may ſink in water below the ball, and ſtand upright, the diviſions on the ſtem ſhewing how far it ſinks. If this inſtrument be dipped in common water and ſink to D, it will ſink only to E in ſalt water; but in Port wine it will ſink to F, and in brandy under proof, it will perhaps ſink to B. It is evident that an *hydrometer* of this kind will only ſhew that one liquid is ſpecifically heavier than another; but the true ſpecific weight of any liquid cannot be determined without a calculation for this particular inſtrument, the tube of which ſhould be truly cylindric, and not tapering as they commonly are. Beſides, theſe inſtruments will not ſerve for fluids, whoſe denſities are conſiderably different. With a view of remedying theſe and ſome other inconveniences, Mr. Clarke conſtructed a new *hydrometer*, for the uſe of dealers in brandy and ſpirits, that they might be able to determine, by inſpection, whether any ſpirituous liquor be proof, above proof, or under proof, and exactly in what degrees. This inſtrument is made of copper, becauſe ivory imbibes ſpirituous liquors, and glaſs is apt to break. It conſiſts of a braſs wire about one-fourth of an inch thick, paſſing through and ſoldered into the copper ball B*b*, (ſee *fig.* 26). The upper part of the wire is filed flat on one ſide for the ſtem of the *hydrometer*, and marked at *m*, to which diviſion it exactly ſinks in proof-ſpirits. There are two other marks A and B; the one ſhewing that the liquor is one tenth above proof, when the inſtrument ſinks to A, and the other indicating one tenth under proof when it emerges to B; a braſs weight, as C, having been previouſly ſcrewed on to the bottom at *c*. There is a great variety of weights of different ſizes, as K, &c. adapted to liquors that differ more than one tenth from proof, and for determining the ſpecific gravities of all ſuch liquors as occur in trade, as well as for ſhewing the ſpecific gravities of all fluids quite to common water. The round part of the wire above the ball may be marked acroſs, as in *fig.* 27; ſo that with the weight as C, which fits the inſtrument for the trial of river water, in which it ſinks to RW, it may ſerve for wines or other waters: thus in ſpring water it will ſink to SP; in mineral water to MI; in ſea-water to SE; and in the water of ſalt ſprings to SA: and the marks *br*, *ra*, *po*, *me*, denote the diviſions to which the inſtrument deſcends in Briſtol water, rain water, Port wine, and Mountain wine, reſpectively. Phil. Tranſ. abr. vol. vi. p. 326, &c.

Dr. Deſaguliers contrived an *hydrometer*, for determining the ſpecific gravities of different waters to ſuch a degree of nicety, that it would ſhew when one kind of water was but one forty thouſandth part heavier than another. This inſtrument (ſee *fig.* 28.) conſiſts of CB*b*, a hollow glaſs ball of about three inches in diameter, with a ſmall ball under it of about an inch in diameter. To a ſhort neck at C there is fixed a braſs head, with a fine ſcrew, into which the piece C*c* is to be ſcrewed; and this piece is joined to a wire CA, about one fortieth part of an inch in diameter, and ten inches long, which is divided into inches, and tenths of inches. Having put a certain quantity of ſmall ſhot into the ball *b*, ſo that when the head C*c*, with its wire CA is ſcrewed on, it ſhall ſink as far as D, e. g. five inches, in river or ſoft ſpring water, we may know by obſerving how far this *hydrometer* ſinks lower in one kind of water than another, their different ſpecific gravity to a forty thouſandth part, which correſponds with one tenth of an inch marked on the ſtem AC. For let the *hydrometer* float in water in the jar IKLM, and the ſurface of the water cut the ſtem at D, a grain weight laid on the ſtem at A, will cauſe the inſtrument to ſink, till the mark D of the ſtem ſettles one inch under the ſurface; and therefore, a grain depreſſes it an inch. The *hydrometer* weighs four thouſand grains, and every inch of the graduated wire weighs ten grains; and, therefore, the part of it DCB*bc*D muſt weigh three thouſand nine hundred and fifty grains. But it is known from the principles of *ſpecific* GRAVITY, that a bulk of water equal to DCB*bc*D the immerſed part, weighs juſt as much as the whole *hydrometer*, or four thouſand grains: and, therefore, this inſtrument ſerves to compare together the different bulks of four thouſand grains of water, according to their different ſpecific gravities: and ſince the whole inſtrument is ſunk an inch by the weight of one grain, and the inſtrument will ſtand at one tenth of an inch, the difference indicated by it in waters in which it floats, it is evident that it will diſtinguiſh the tenth of a grain in four thouſand, or the forty thouſandth part of the whole bulk of water. By altering the quantity of ſhot in the ball *b*, the inſtrument may be prepared for the compariſon of any other two liquors that are nearly of the ſame ſpecific gravity. Deſaguliers, &c. vol. ii. p. 234.

This inſtrument is capable of ſtill greater exactneſs, by making the ſtem of a flat thin ſlip of braſs or of ſteel, by which means we increaſe the ſurface without diminiſhing the ſolidity: on one ſide of this ſtem may be ſeveral marks denoting the depths to which the inſtrument would ſink in various ſorts of water, as rain water, river water, &c. and on the other ſide may be the diviſions to which it would ſink in lighter fluids, as hot-bath water, Briſtol water, Port wine, &c. but in determining the ſtrength of ſpirituous liquors, a cylindric ſtem is beſt.

Mr. Quin has lately conſtructed an *hydrometer*, recommended by many diſtillers, &c. on account of its accuracy, which requires only eighteen weights uſed on the top of the inſtrument, to ſhew all the under and over proofs to the certainty of one pint in a hundred gallons, from proof to ſeventy gallons to one hundred over proof, and to fifty gallons in a hundred under proof, which would require nine hundred and ſixty-eight weights, beſides forty-five air weights, according to the old conſtruction of Clarke's *hydrometers*. The weights are numbered 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 30, 40, 50, 100, 200, 300, 600 grains. He has alſo formed a table ſhewing the degrees of the thermometer, and the number of grains correſponding with each degree; the number of grains required for each ſtrength; the over proofs, or the quantity of water neceſſary to reduce one hundred gallons of ſpirit to proof, with the former manner of expreſſing the ſeveral preparations, as one to two, one to three, &c. and likewiſe the under proofs.

There is one circumſtance, which deſerves particular attention in the conſtruction and graduation of *Hydrometers* for determining the preciſe ſtrength of different brandies, and other ſpirituous liquors. M. Reaumur, in making his ſpirit thermometers diſcovered, that when rectified ſpirit and water, or phlegm, the other conſtituent part of brandy, are mixed together, there appears to be a mutual penetration of the two liquors, and not merely juxtapoſition of parts; ſo that a part of the one fluid ſeems to be received into the pores of the other; thus e. g. if a pint of rectified ſpirit be added to a pint of water, the mixture will be ſenſibly leſs than a quart. The variations hereby produced in the bulk of the mixed fluid, render the *hydrometer*, when graduated in the uſual way, by equal diviſions, an erroneous meaſure of its ſtrength; becauſe the ſpecific gravity of the compound is found not to correſpond to the mean gravity of the two ingredients. M. Montigny conſtructed a ſcale for this inſtrument in the manner before ſuggeſted by Dr. Lewis, on actual obſervation of the ſinking or riſing of the *hydrometer* in various mixtures of alcohol and water, made in certain known proportions. Hiſt. de Acad. Roy. Sciences, &c. Paris, for 1768, Memoire iv. Neumann's Chem. by Lewis, p. 450, note *r*.

M. de Luc has lately publiſhed a ſcheme of the conſtruction of a comparable *hydrometer*, ſo that a workman after having conſtructed one after his principles, may make all others ſimilar to each other, and capable of indicating the ſame degree on the ſcale, when immerſed in the ſame liquor of the ſame temperature.

For this purpoſe he propoſes to uſe an *hydrometer* of the common conſtruction, ſuch as is repreſented in *fig.* 29, made of flint glaſs; becauſe glaſs is a ſubſtance which undergoes the leaſt change of bulk by heat, and its changes are the moſt regular. The ball *a* ſhould be one and a half inch in diameter, with which ſhould communicate a ſmall hollow cylinder *b*, containing ſuch a quantity of quickſilver for a ballaſt, that the inſtrument may ſink nearly to the top in the moſt ſpirituous liquor, made as hot as poſſible. To the ball *a* is cemented a thin braſs tube ſilvered over, or a ſilver tube *c c*, made perfectly cylindrical, by drawing it through a hole. This tube, or *branch*, as he calls it, ſhould be long enough to admit the immerſion of a ſmall part of it in the leſs ſpirituous liquors, e. g. wine reduced to congelation. In order to determine a ſtandard for the conſtruction of the ſcale of this inſtrument, he forms a weak ſpirit of wine, by mixing one part of water with ſix parts of ſuch ſpirits of wine as fire gun-powder, or linen ſteeped in them. He alſo finds the ſpecific gravity of this mixture, at the temperature of fifty-four and a half of Fahrenheit's thermometer, by a nice hydroſtatical balance. Having dipped the *hydrometer* into this ſpirit of wine, at the fixed temperature, he marks upon its branch or ſtem with a thread, the point to which it ſinks; then preparing a ſort of brandy ſtronger than the common, by mixing three parts of water with ſeven parts of this ſame ſpirit of wine, he determines the point on the ſtem to which the inſtrument would ſink in it at the ſame temperature; and marks it with a thread. Theſe points, viz. 45 and 15 in the figure, are the fixed points of the *hydrometer*. The interval between them may be divided into thirty equal parts, each of which will rerepreſent one thirtieth part of the total effect of the ſuperadded water, or the ſpecific gravity of the liquor. This fundamental interval in inſtruments for common uſe may be divided into fifteen parts, which will then be double degrees. In order to find a convenient place for the o of this ſcale, M. De Luc propoſes to reduce one of the wines of which brandy is commonly made, to the temperature of water in ice, and dipping the *hydrometer* in it, to obſerve how much higher it will ſtand than the inferior fixed point. This exceſs of emerſion, compared with the fundamental ſcale, and reduced to the neareſt number of degrees which will be an aliquot part of it, will be a proportional quantity invariably fixed, to be added to the ſcale below the inferior fixed point, for determining the place of o. e. g. let this exceſs of emerſion be about 15°, or half the fundamental ſcale; then one ſhould conſtantly add half the fundamental diſtance below the inferior fixed point, and thence begin to count the degrees: ſo that o would be at the bottom of the whole ſcale, the inferior fixed point would be at 15°, the ſuperior at 45°, and the ſcale could be prolonged at the top as much as may be neceſſary for the eſſays of the moſt ſpirituous liquors. Another ſcale may be applied on the oppoſite ſide of the ſtem, for trying merely the ſpecific gravity of the liquids in which the *hydrometer* may be dipped. The particular fixed points of this ſcale, e. g. *d d*, may be taken in any two liquids, whoſe ſpecific gravities, tried by the hydroſtatic balance, ſhall have a convenient relation, and the ſpace between thoſe two points will be divided into a convenient number of equal parts. For the correction on account of the differences of heat, M. De Luc would take a liquor of mean ſpirituoſity, e. g. a mixture of one part of water, and ſeven parts of the ſpirits of wine determined by the hydroſtatic balance; reduce this liquor to the temperature of 45° of Fahrenheit; plunge into it the *hydrometer* already graduated, and obſerve the point to which it ſinks; he propoſes afterwards to heat the liquor to 65°, and then to obſerve the ſinking of the inſtrument. From this obſervation a table might eaſily be formed, in which we might expreſs in degrees of the *hydrometer*, the effects of the differences of heat correſponding to each degree of the thermometer, beginning from a fixed point: or, a particular ſcale might be prepared for experiments of this nature, by changing the number of degrees contained between the fixed points, in order to eſtabliſh an eaſy proportion between them and the degrees of the areometer; and thus the correction might be made without tables. If an *hydrometer* of this kind were come into general uſe, the police of the places in which the trade of ſpirituous liquors is carried on, might take cognizance of it; and keep the public ſtandard of the *hydrometer* or areometer, as they keep the ſtandards of weights and meaſures. Phil. Tranſ. vol. lxviii. part i. art. 20. p. 500, &c. M. Le Roi has alſo publiſhed a propoſal for conſtructing comparable *hydrometers*. Hiſt. de l'Acad. des Scien. Paris, for 1770. Mem. 7.

HYDROMETRIA, HYDROMETRY, the menſuration of water, and other fluid bodies, their gravity, force, velocity, quantity, &c.

Hydrometria includes both HYDROSTATICS and HYDRAULICS.

The term is modern, but very little in uſe. The firſt inſtance where we meet with it, is in the year 1694, when a new chair, or profeſſorſhip, of *hydrometry*, was founded in the univerſity of Bologna, in favour of S. Guglielmini, who had carried the doctrine of running waters, with reſpect to rivers, canals, dykes, bridges, &c. to an unuſual length.

HYDROMPHALUS, Ὑδρομφαλος, formed of ὑδωρ, *water*, and ομφαλος, *navel*, in *Medicine*, a tumor in the navel, ariſing from a collection of water.

The *hydromphalus* is diſtinguiſhed from other tumors of the navel, by its being very ſoft, and yet not tractable and obedient to the touch, ſo as to diminiſh or enlarge, by compreſſing it. When viewed, placed between the eye and the light, it is found tranſparent.

The *hydromphalus* is to be diſcuſſed by emollient and reſolutive medicines. It is alſo cured by a puncture made in the middle of the navel. See DROPSY.

HYDROMYSTES, or HYDROMISTA, compounded of ὑδωρ, *water*, and μυςης, a *perſon ſet apart for the offices of religion*, a name anciently given to certain officers in the Greek church, whoſe buſineſs was to make the *holy* WATER, and ſprinkle it on the people.

HYDROPARASTATÆ, or HYDROPARASTÆ, in *Eccleſiaſtical Hiſtory*, a ſect of heretics, the followers of Tatian; called alſo Encratitæ, Apotactitæ, Saccophori, Severiani, and Aquarians.

The word is formed of ὑδωρ, *water*, and παριςημι, *I preſent*.

The *hydroparaſtatæ* were a branch of Manichees, whoſe diſtinguiſhing tenet was, that water ſhould be uſed in the euchariſt inſtead of wine.

HYDROPHANÆ, in *Natural Hiſtory*, the name of a genus of the ſemi-pellucid gems.

The word is derived from ὑδωρ, *water*, and φανεσκω, *to ſhine*; the diſtinguiſhing character of theſe ſtones being, that they become lucid on being plunged into water.

They are ſemi-tranſparent ſtones, compoſed of cryſtal and earth, the latter ingredient being in large proportion, and mixed but imperfectly, as in the chalcedony, and giving a general miſty or cloudy look to the maſs, but conſiderably opake, and not capable of a fine poliſh, but appearing of a duſky and foul ſurface, till thrown into water, in which they become lucid, and in ſome degree tranſparent, and either in part or wholly change their colour, which returns to them again when taken out and dried. Of this genus we know only two ſpecies, one a whitiſh grey, without veins, called *lapis mutabilis*, and OCULUS *mundi*; and the other a whitiſh-grey one, variegated with yellow, and with a black central nucleus, called by authors the OCULUS *beli*.

HYDROPHOBIA, Ὑδροφοϐια, compounded of ὑδωρ, *water*, and φοϐος, *fear*, in *Medicine*, an averſion or dread of water; a ſymptom ariſing in perſons bitten by a mad dog, or other animal.

This diſeaſe is alſo called *rabies canina*.

Some have obſerved that this kind of madneſs ſcarcely ever appears in any animals except dogs, foxes, and wolves, unleſs by contagion.

The marks whereby to know that a dog is mad, are, his neither eating nor drinking, looking ſad and ſullen, running at any thing in his way, whether man or beaſt, known or unknown, with a murmuring noiſe, but without barking, nodding as if he were overpowered with ſleep, and endeavouring to hide himſelf. Theſe are the ſymptoms, according to Boerhaave, in the firſt ſtage of madneſs, when a bite, though dangerous, is leſs malignant than in the next ſtage, when he begins to pant, hangs out his tongue to diſcharge a great quantity of froth from his mouth, which he keeps always open; alternately walking ſlowly and running; his eyes are dull and red, and full of tears; his tongue is of a leaden colour; he becomes faint and weak, falling down and riſing up, and attempting to fly at every thing; and then he becomes mad and furious; this ſtage ſeldom continues thirty hours, when death terminates the diſeaſe, and a bite received now is reckoned incurable. In the firſt ſtage Boerhaave ſays, that he remembers and reſpects his maſter, but forgets him in the ſecond ſtage. Other ſymptoms of madneſs are the dog's being avoided by other dogs that ſmell him, their running away with horror, and the tone of his voice when he barks, which is hoarſe and hollow. This diſeaſe is moſt common after long dry hot ſeaſons; and ſuch dogs as live upon putrid ſtinking carrion, without having ſufficient water, are moſt liable to it.

Baldus, a famous lawyer, died of the *hydrophobia* four months after his being bit in the lip by a little dog. And the ſame is ſaid of Diogenes the Cynic.

Though the term *hydrophobia* in ſtrictneſs only denotes this one ſymptom of dreading water, yet it is frequently applied to the whole diſeaſe conſequent on ſuch a bite, with all its ſymptoms.

The hiſtory of this horrible diſeaſe, as given by Celſus, Aurelianus, Dr. Mead, Etmuller, Liſter, &c. is as follows: the bite of a mad dog is attended with this ſurpriſing circumſtance, that its effects frequently do not diſcover themſelves till after the cauſe is forgot; the wound itſelf cloſing and healing like any other common wound. But ſome time after direful ſymptoms enſue; uſually they commence in about forty days, ſometimes in ſixty, ſometimes not till ſix months, and ſometimes not till a year, or even two years. However, if no ſign of the diſorder manifeſts itſelf in about ſix weeks, the patient is commonly concluded to be ſafe. The firſt thing obſerved, is a wandering pain reſembling the rheumatiſm throughout the whole body, but chiefly about the wounded part, which begins to ſwell, inflame, and diſcharge an ichor; the patient grows anxious, drowſy, and melancholy, and very prone to anger; complaining of every thing, as the ambient air, the heavineſs of his bed-cloaths, &c. His ſlumbers are diſturbed, and ſucceeded by convulſive agitations: a deafneſs is ſometimes complained of; the eyes are watery, the countenance ſorrowful, the face pale and contracted; ſweat breaks out about the temples; an unuſual flow of ſaliva at length comes on with a dryneſs of the fauces, a foulneſs of the tongue, and ſometimes fœtid breath. From the beginning there is a peculiar ſtricture and heavineſs in the breaſt, a ſtruggling for breath, a ſighing, nauſea and vomiting. The pulſe of the patient intermits, and ſomewhat of a tremor is obſerved, with convulſions of the nerves and tendons: along with theſe he feels an inward heat and thirſt, watchfulneſs becomes continual, the mind is more diſturbed, and a delirium approaches: at laſt the grand ſymptom appears which denominates the diſeaſe, viz. the aquæ pavor, or dread of water, ſo that he cannot bear ſo much as the ſight of any liquid, without the utmoſt conſternation; much leſs can he ſwallow the ſmalleſt drop. At firſt a conſtriction of the gullet is perceived; ſpaſms are produced by the ſight of liquors, and when the ſurface of any liquid is touched, a ſtrangulation may be felt in the throat, the ſtomach is inflated, the larynx is outwardly ſwelled, which riſes ſuddenly, and as ſuddenly falls. Lond. Med. Obſ. vol. v. p. 195, and App.

This is the pathognomonic ſign of the diſeaſe's being come to its height; and never happens till two or three days before the patient's death; the diſeaſe being then, by the unanimous conſent both of ancient and modern phyſicians, abſolutely incurable.

With this there are other concomitant ſymptoms: he foams at the mouth, his eyes ſtare, he cannot ſwallow his ſpittle without pain; and his penis is conſtantly erected, attended with involuntary emiſſions of ſemen and frequent calls to make water: ſome bark and ſnarl like dogs; and actually fancy themſelves transformed into thoſe creatures; and in the height of their madneſs, are ready to fly upon, and tear to pieces the by-ſtanders: yet it is obſerved, that in the intervals of reaſon, the patient is afraid of doing harm, and warns thoſe that are about him of their danger. Palmarius obſerves, that the *hydrophobous* patient cannot bear to look in a glaſs, or any tranſparent body; and adds, that he never recovers, unleſs he knows himſelf in a glaſs; this being a ſign that the poiſon has not laid hold of the vital parts. Towards the laſt ſtage of the diſeaſe, theſe ſeveral ſymptoms increaſe; ſtrength fails, cold ſweats come on, the tightneſs of the breaſt increaſes, and the patient ſoon expires in ſpaſms.

An abſolute bite or wound is not at all neceſſary to produce this terrible diſeaſe; the ſaliva of a mad dog, &c. being able to convey the diſeaſe by mere contact, or application to the ſkin.

For the nature and cauſe of the *hydrophobia*; Dr. Mead, from ſeveral hiſtories of particular caſes, concludes, that it is the effect of a particular kind of inflammation in the blood, accompanied with ſo great a tenſion and drineſs of the nervous membranes, and ſuch an elaſticity and force of the fluid with which they are filled, that the moſt common repreſentations are made to the mind with too great effect; ſo that the uſual impreſſions on the organs cannot be ſuffered. Hence that timorouſneſs, unaccountable anxiety and diſquietude, which are always the forerunners of the dread of liquids; as alſo the pain often felt in making water; and the ſtrange averſions ſometimes found in patients at the ſight of any thing white, the retina being hurt and grieved by the lively impreſſions of that colour thereon. Nor is it hard to conceive, that when the ſaliva is hot, and the throat inflamed and dry, the ſwallowing of drink ſhould cauſe ſuch an intolerable agony.

M. Tauvry, from a nice diſſection and examen of the parts of a perſon who died of this diſorder, conjectures that the ſaliva and bile are the fluids firſt infected; and that the patient vomiting a mixture hereof, the throat becomes excoriated thereby; and hence that horror for all foods; and particularly for fluids, becauſe theſe diſſolve thoſe grievous ſalts contained in the ſaliva and bile. He adds, that the nature of the poiſon is ſuch, as diſſolves the balſamic and nutritious part of the blood, whence the veins are dried up, ſo as not eaſily to admit any blood from the arteries; and the arterial blood by this means ſuſtaining the action and impreſſion of its veſſels for ſo long a time, is ſtill farther diſſolved, attenuated, and ſpiritualized; and thus ſent, in too great quantity, and with too great rapidity to the brain; whence thoſe convulſions, diſtractions, &c.

As to the cure of the *hydrophobia*, Dr. Mead, after Galen, recommends in this as in other venomous caſes, to enlarge the wound, made by the bite, by a circular inciſion, to apply a cautery to it, and to keep it open for at leaſt forty days. But if this method ſeem too cruel, it may ſuffice to extract the poiſon by clapping a cupping-glaſs on the place, having firſt made a deep ſcarification. The doctor adds, he has known a perſon freſh-bitten, happily ſaved by the ſole application of the unguentum Ægyptiacum made exceedingly hot.

If theſe external precautions have not been uſed, or not in time, recourſe muſt be had to internal remedies; alexipharmacs muſt be drank; among which, the aſhes of river lobſters, or cray-fiſh, are principally extolled by all the ancient phyſicians; ſo that Galen affirms, nobody had ever died who uſed this remedy. Theſe aſhes to be taken to the quantity of one or two ſpoonfuls every day for forty days ſucceſſively, either alone or with gentian root and frankincenſe, in wine.

But the frequent and ſudden plunging of the patient over head and ears in the ſea-water after the bite, has been generally rekoned the beſt and ſureſt preſervative againſt this diſeaſe, without ſufficient reaſon. See Madness.

Etmuller recommends cardiacs and alexipharmacs, but all in a double doſe, and long continued; and garlick, rue, and ſalt to be beat together, and applied in form of a cataplaſm over the wound. Purging with hellebore and mercurius dulcis is alſo good; and cantharides are a ſort of ſpecific. Scarifying is commended; and after the ſcarification, an onion roaſted under the aſhes is to be applied. But the readieſt remedy, he adds, is burning the place affected with a red-hot iron, which effectually removes all the malignity. If the phyſician be not called till late, a cupping-glaſs is to be applied very hot; an iſſue near the place may likewiſe be of ſervice. Sir Theodore Mayerne gives the following preſcriptions for the bite of a mad dog: pluck the feathers from the breech of an old cock, and apply it bare to the bite; if the dog were mad, the cock will ſwell and die; and the perſon bitten will do well; if the cock dies not, it is a proof the dog was not mad. Philoſoph. Tranſ. Nº 191.

The members of the Royal Academy of Sciences furniſh us with various inſtances of perſons cured of the diſeaſe by various means. M. Poupart mentions a woman perfectly recovered by bleeding her to deliquium, binding her in a chair for a year, and feeding her all the time with bread and water. M. Borger relates, that, of ſeveral perſons bitten, two were cured by bleeding them in the forehead. M. du Hamel adds, that he has known ſalt-water, applied on the wound, effect a cure. Divers caſes are produced of thoſe cured of the aquæ pavor, by being overwhelmed with a great quantity of water; and one by being only tied to a tree, and two hundred pails of water thrown on him. But the beſt inſtance is that of M. Morin: a maid of twenty years of age, having all the ſymptoms, was bathed in a tub of river-water, wherein a buſhel of ſalt had been diſſolved. They plunged her in naked again and again, till harraſſed almoſt to death, they then left her ſitting in it quite ſenſeleſs. When ſhe came to herſelf, ſhe was ſurpriſed to find herſelf looking at the water without any concern. Hiſtoire de l' Acad. an. 1709.

Vinegar is recommended by Dr. Kramer as a ſpecific againſt the *hydrophobia*, eſpecially if ſome powder of cantharides is mixed with it. The receipt given by him is, to boil from four to ten grains of the fine powder of cantharides in an ounce and an half, or two ounces of the beſt vinegar; which is to be given warm to the patient. Commerc. Norimb. 1735, hebd. 1183.

The *hydrophobia* appears to be a diſorder primarily and principally nervous, from the flying pains, the tightneſs of the præcordia, the difficulty of ſwallowing, the horror on approach of water, the great ſenſibility diſcovered on the impreſſion of air, &c. and other ſymptoms that attend it. Boerhaave and Mead apprehend, that the poiſon is conveyed into the conſtitution by means of the nervous fluid; but Dr. James, in his Treatiſe on Canine Madneſs, more rationally ſuppoſes that the cellular membrane is the receptacle of this as well as ſome other infections, which may be conveyed to the blood by thoſe abſorbing veſſels, which are diſtributed to every part of the body, and preſerve a conſtant communication between the cellular membrane and blood-veſſels. The cure of this dreadful diſeaſe has been commonly attempted by ſuch means as deſtroy nervous or ſpaſmodic irritation, or that peculiar acrimony that occaſions the diſorder. Opium, muſk, mercury, the warm bath, &c. have been preſcribed for this purpoſe.

For an account of various medicines, and the method of treatment recommended in this diſorder, ſee the article Madness, *from the bite of animals.*

The *hydrophobia* is a ſymptom in ſome fevers, and particular inflammations, &c.

HYDROPHORIA, formed of ὑδωρ, *water*, and φερω, *I bear*, in *antiquity*, a feaſt, or funeral ceremony, held among the Athenians, and people of Ægina, in memory of thoſe who periſhed in the deluge of Deucalion and Ogyges.

HYDROPHTHALMIA, a name by which ſome have called the PROLAPSUS *oculi*, when owing to a quantity of aqueous humours.

HYDROPHYLACIA, of ὑδωρ and φυλαττω, *I keep*; a word uſed by Kircher, and ſome others who have written in the ſame ſyſtem, to expreſs thoſe great reſervoirs of water which he places in the Alps, and other mountains, for the ſupply of the rivers which run through the ſeveral lower countries. This he makes to be one of the great uſes of mountains in the œconomy of the univerſe.

HYDROPHYLLUM, in *Botany*, ſee *Water* LEAF.

HYDROPHYSOCELE, formed of ὑδωρ, *water*, φυσαω, *I cauſe flatulence*, and κηλη, *rupture*, a term uſed by ſome authors for a ſort of hernia, or rupture, occaſioned by a mixture of water and flatulencies.

HYDROPIC, ὑδρωπικος, formed of ὑδωρ, *water*, and ωψ, *face*; a dropſical patient, or a perſon ſwelled and bloated with the abundance of water.

HYDROPIPER, in *botany*, ſee PERSICARIA.

HYDROPNEUMOSARCA, a word uſed by ſome writers in ſurgery, to expreſs a tumour filled partly with water, partly with flatulencies, and partly with fleſh.

HYDROPS, ὑδρωψ. of ὑδωρ, *aqua*, and ωψ, *vultus*, in *medicine*, See DROPSY.

HYDROPS *ad matulam*, a term ſometimes uſed for a DIABETES.

HYDROPOTA, of Ὑδροποτης, formed of ὑδωρ, *water*, and ϖοτης, *drinker*; of πινω, *I drink*, in *Medicine*, a perſon who drinks nothing but water.

It has long been controverted among phyſicians, whether or no the *hydropotæ* lived longer than other perſons? See DRINK.

HYDROPYRETOS, formed of ὑδωρ, *water*, and πυρετος, *fever*; a word uſed by ſome authors to expreſs a malignant fever, attended with very copious ſweats. Some make it the ſame with the ſudor Anglicus, or SWEATING *ſickneſs*.

HYDRORHODINON, formed of ὑδωρ, *water*, and ῥοδοι, *roſe*; a name given by the ancients to a mixture of water and oil of roſes, this, as it was at once cooling and emetic, was very much uſed by the ancients, to provoke vomiting after the taking of poiſons.

HYDROROSATON, in the writings of the ancient phyſicians, a name given to a drink made of water, honey, and the juice of roſes. The proportions were four pounds of roſes, five pints of water, and two pints of honey.

HYDROSARCA, of ὑδωρ, *water*, and σαρξ, *fleſh*, in the writers of ſurgery, a word uſed to expreſs a tumour, compoſed partly of water, and partly of fleſh.

HYDROSCOPE, ὑδροσκοπιον, formed of ὑδωρ, *water*, and σκοπεω, *I conſider*; an inſtrument anciently uſed for the meaſuring of time.

The *hydroſcope* was a kind of water-clock, conſiſting of a cylindrical tube, conical at bottom; the cylinder was graduated, or marked out with diviſions, to which the top of the water becoming ſucceſſively contiguous, as it trickled out of the vertex of the cone, pointed out the hour.

Syneſius deſcribes the *hydroſcope* at large in one of his letters. ſee CLEPSYDRA.

HYDROSELINUM, in *Botany*, a name given by ſome authors to SMALLAGE.

HYDROSTATICAL *Balance*, a kind of balance contrived for the eaſy and exact finding the *ſpecific* GRAVITIES of bodies, both liquid and ſolid.

The inſtrument is of conſiderable uſe in eſtimating the degree of purity of bodies of all kinds; the quality and richneſs of metals, ores, minerals, &c. the proportions in any mixture, adulteration, or the like; of all which the ſpecific weight is the only adequate teſt.

The *hydroſtatical* balance is founded on this theorem of Archimedes, that a body heavier than water weighs leſs in water than in air, by the weight of as much water as is equal to it in bulk. Whence, if we ſubtract the weight of the body in water from its weight in air, the difference gives the weight of as much water as is equal in magnitude to the ſolid propoſed.

Having, therefore, two bodies, the one firm, the other fluid, together with the weight of each apart; to find their proportion, divide the greater by the leſſer; the quotient compared to one, that is, unity, will be the antecedent of the proportion deſired.

The inſtrunment, with its apparatus, is repreſented *Tab.* IV. *fig.* 43 and 44. *Hydroſtatics* and *Hydraulics*, and needs little deſcription. See GOLD.

AB is a nice balance, turning with a ſmall part of a grain, and furniſhed with a long examen D, for determining the exact horizontal poſition of the balance.

1. To find the ſpecific gravity of a fluid: hang to the end B of the beam the little ſcale S, and to the bottom of the ſcale S, by a horſe-hair, which is of the ſame ſpecific gravity with water, the glaſs bubble G, which muſt be ſpecifically heavier than any fluid except mercury. To the oppoſite end A of the beam hang a braſs ſcale E, which is a counterpoiſe to the bubble G immerſed in water; but when the bubble hangs out of the water, a weight muſt be laid on E to keep it *in æquilibrio*, which weight will be equal to what the bubble loſt in water, or to a bulk of water equal to the bubble; when rain water is uſed, this weight will be a thouſand grains. Then fill a cylindrical veſſel I, about two thirds with common water; and when the bubble is let into it. the beam will remain in a horizontal poſition, if the water be of the ſame ſpecific gravity as that in which the bubble was adjuſted; if it be not, there will be a variation, which is to be corrected by means of little weights for that purpoſe. Having thus adjuſted the bubble in water, the ſpecific gravity of any other fluid will be found by weighing the bubble in it; and ſince you always weigh ſo much of the liquid as is equal to the bulk of the bubble, if there be any difference between ſuch quantity and the like quantity of water, it will be diſcovered by putting weights into the aſcending ſcale. E. g. if red Port wine be put into the veſſel I, the bubble will ſink and require the addition of ten grains in the ſcale E, when the balance has been adjuſted in rain water, for reſtoring the equilibrium; which ſhews that Port wine is lighter than rain water ten parts in a thouſand, or one hundredth part. If proof brandy be uſed, ſeventy-ſeven grains will be required to reſtore the equilibrium, and therefore brandy, or proof ſpirits weighs ſeventy-ſeven parts in a thouſand, or one thirteenth part leſs than rain water. But in a denſer medium G would riſe; and if ſea water be uſed, twenty-ſix grains muſt be put into the ſcale S to reſtore the equilibrium, which ſhews that ſea water is twenty-ſix parts in one thouſand, or one thirty-eighth part, heavier than rain water.

2. To find the ſpecific weight of a ſolid: inſtead of the bubble, hang on the glaſs bucket K, *fig* 44, which with its ſuſpending piece H, will be *in æquilibrio* with the counterpoiſing ſcale E. Having weighed the ſolid in air in the bucket, by counterpoiſing it with weights on the ſcale E, note its weight; but becauſe not only the ſolid to be tried, but the glaſs bucket itſelf will loſe of its weight when immerſed in water, you muſt reſtore to the bucket the weight that it loſes by being immerſed, that the body in it alone may be examined: this is done by means of the piece F, which weighs juſt as much as a bulk of water equal to the bucket; and being ſlipped on the ſuſpending piece at H, it not only reſtores to the bucket what it had loſt by being immerſed in water, but makes a ſcale for receiving weights, in order to reſtore the equilibrium to the ſolid contained in the bucket, and to ſhew how much it has loſt of its weight in water. When many bodies are to be weighed *hydroſtatically*, it is beſt to weigh them all in the air ſucceſſively, and ſet down their weights before you begin to weigh them in water, becauſe it would be troubleſome to dry the bucket every time. Care muſt alſo be taken that no bubbles of air adhere to the bodies weighed in water, which would make them lighter.

Dr. Deſaguliers has added a contrivance to this machine to make it more nice, ſee *fig*. 45. S, S, S, are three ſcrews which ſerve to ſet the foot and ſtem upright; and OM is a ſtring and plummet, whoſe point hanging over M, ſhews when the piece PC is truly vertical. There is alſo a piece EO, which has a ſlit to compare with the examen D playing in the notches C*c*. Deſag. Exp. Phil. vol. ii. p. 196.

Mr. Martin propoſes the following conſtruction of an accurate *hydroſtatical* balance. AB, ſee *fig*. 46, is the foot on which it ſtands; CD, a pillar ſupporting a moveable braſs plate EF, faſtened thereto by the ſcrew in the knob *e*. In the end of this plate is fixed an upright piece IK, ſupporting another plate GH, which ſlides backwards and forwards thereon, and is moveable every way about it. In the end of this plate at H, is fixed (by a nut beneath) a wire LM, taped with a fine thread from one end to the other; upon this moves the ſwan-neck ſlip of braſs NO, to which a very exact balance is hung at the point N; to one of whoſe ſcales P is appended the heavy body R, by a fine horſe-hair or piece of ſilk S: the weight of the ſaid body R in the air is expreſſed by the weights put into the ſcale Q to make an equilibrium therewith, which being deſtroyed by immerging the ſolid in the fluid TV, contained in the glaſs WV, is again reſtored by weights put into the ſcale P. So that the weights in the ſcale Q compared with thoſe in the ſcale P, ſhew at once the ſpecific gravity of the ſolid R to that of the fluid TV.

For ſeveral other conſtructions of this inſtrument, deſigned for greater accuracy than that of the common ſort, the reader may conſult s'Graveſande's Phyſices Elem. Math. &c. tom. i. lib. 3. cap. 3. The ſpecific gravities of ſmall weights may be determined by ſuſpending them in loops of horſe hair, or ſilk threads, to a hook at the bottom of the ſcale of the common *hydroſtatical* balance. E. g. if a guinea ſuſpended in air be counterbalanced by 129 grains in the oppoſite ſcale; and upon being immerſed in water, requires 7 ¼ grains to be put into the ſcale over it, in order to reſtore the equilibrium; we thus find that a quantity of water of equal bulk with the guinea, weighs 7 ¼ grains, or 7. 25; by which divide 129, the weight of the guinea in air, and the quotient, or 17.793, ſhews that the guinea is ſo many times heavier than its bulk of water. Whence, if any piece of gold be tried, by weighing it firſt in air, then in water, and if upon dividing the weight in air by the loſs in water, the quotient is 17.793, the gold is good; if the quotient be 18, or between 18 or 19, the gold is very fine; but if it be leſs than 17 ½, the gold is too much alloyed with other metal. If ſilver be tried in this manner, and found to be eleven times heavier than water, it is very fine; if it be 10½ times heavier, it is ſtandard; but if it be any leſs weight compared with water, it is mixed with ſome lighter metal, ſuch as tin.

In order to find the ſpecific gravities of thoſe bodies that are lighter than water, let an upright ſtud be fixed into a thick flat piece of braſs, and in this ſtud let a ſmall lever, whoſe arms are equally long, turn upon a fine pin as an axis. Let the thread which hangs from the ſcale of the balance be tied to one end of the lever, and a thread from the body to be weighed, tied to the other end. This done, put the braſs and lever into a veſſel; then pour water into the veſſel, and the body will riſe and float upon it, and draw down the end of the balance from which it hangs; then put as much weight in the oppoſite ſcale as will raiſe that end of the balance, ſo as to pull the body down into the water by means of the lever; and this weight in the ſcale will ſhew how much the body is lighter than its bulk of water. Ferguſon's Lect. p. 160, 8vo.

HYDROSTATIC *bellows*, in *Hydroſtatics*, is a machine for demonſtrating the upward preſſure of FLUIDS, conſiſting of two thick oval boards A, (*Tab.* IV. *Hydraulics*, &c. *fig*. 47.) each about ſixteen inches broad, and eighteen inches long, covered with leather, to open and ſhut like a common bellows, but without valves, only a pipe B, about three feet high, is fixed into the bellows at *c*; let water be poured into the pipe at C, which will run into the bellows, and ſeparate the boards a little. Then lay three weights *b*, *c*, *d*, each weighing a hundred pounds upon the upper board; and pour more water into the pipe B, which will run into the bellows, and raiſe up the board with all the weights upon it; and if the pipe be kept full until the weights are raiſed as high as the leather, which covers the bellows, will allow, the water will remain in the pipe, and ſupport all the weights upon it; even though it ſhould weigh no more than a quarter of a pound, and theſe three hundred pounds; nor will all their force be able to cauſe them to deſcend and force the water out of the top of the pipe. The reaſon of this will appear, if we conſider that if a hole be made in the upper board, and a tube be put into it, the water will riſe in the tube to the ſame height as it riſes in the pipe; and would riſe as high by ſupplying the pipe in as many tubes as the board could contain holes. Now, ſuppoſe only one hole to be made in any part of the board, of an equal diameter with the bore of the pipe B, and that the pipe holds juſt a quarter of a pound of water; if a perſon puts his finger upon the hole, and the pipe be filled with water, he will find his finger to be preſſed upward with a force equal to that of a quarter of a pound. As the ſame preſſure is equal upon all equal parts of the board, each part, whoſe area is equal to the area of the whole, will be puſhed upward, with a force equal to that of a quarter of a pound; the ſum of all which preſſures againſt the under ſide of an oval board, ſixteen inches broad, and eighteen inches long, will amount to three hundred pounds; and, therefore, ſo much weight will be raiſed up and ſupported by a quarter of a pound of water in the pipe. Hence if a man ſtands upon the upper board, and blows into the bellows through the pipe B, he will raiſe himſelf upon the board; and the ſmaller the bore of the pipe is, the eaſier he will be able to raiſe himſelf; and then by putting his finger upon the top of the pipe, he can ſupport himſelf as long as he pleaſes; provided that the bellows be air-tight. Mr. Ferguſon has deſcribed another machine, which may be ſubſtituted inſtead of this common *hydroſtatical bellows*; A B C D, *fig*. 48, is an oblong ſquare box, in one end of which is a round groove, as at *a*, from top to bottom, for receiving the upright glaſs tube I, which is bent to a right angle at the lower end as at *i*, in *fig*. 49, and to that part is tied the end of a large bladder K, which lies in the bottom of the box. Over this bladder is laid the moveable board L, *fig*. 48 and 50, in which is fixed an upright wire M; and leaden weights N N, to the amount of ſixteen pounds, with holes in their middle, are put upon the wire over the board, and preſs upon it with all their force. The croſs bar *p* is then put on to ſecure the tube from falling, and keep it in an upright poſition; and then the piece E F G is to be put on, the part G ſliding tight into the dove-tailed groove H, to keep the weights N N horizontal, and the wire M upright, which is received into a round hole *e*, in the part E F. There are four upright pins in the four corners of the box within, each almoſt an inch long, for the board L to reſt upon, in order to keep it from preſſing the ſides of the bladder below it cloſe together at firſt. The whole machine being thus put together, pour water into the tube at top, and the water will run down the tube into the bladder below the board, and after the bladder has been filled up to the board, continue pouring water into the tube, and the upward preſſure of the bladder will raiſe the board with all the weight upon it, even though the bore of the tube ſhould be ſo ſmall, that leſs than an ounce of water would fill it. Ferguſon's Lectures, Supplement 1767, p. 16.

Bradford's HYDROSTATICAL *Inſtrument*, is a new invention for weighing money, and diſcovering its defect either of weight or purity.

It conſiſts of a thin flat braſs ruler, about half a foot long; on each ſide of which are two graduated lines, thoſe on the upper ſide marked A and W. (ſee *Tab*. IV. *Hydraulics*, *fig*. 51. N° 1.) and thoſe on the under ſide B and W, *ibid*. N° 2. There are alſo a ſmall chain and pincers, wherein to fix the piece of money intended to be weighed and proved, together with two pair of centre pins, marked A and B, *ibid*. N° 2 and 3, being the points of ſuſpenſion of the rod when uſed; whereof the former pair A are to be uſed for proving all pieces of gold under thirty-ſix ſhillings value; and the other pair, marked B, for all pieces from thirty-ſix ſhillings to ſeventy-two ſhillings, or three pounds twelve ſhillings. Laſtly, there is a ſliding piece, or index C, *ibid*. N° 2. by the motion of which backward or forward until the point of equilibrium is diſcovered, the value of any piece ſuſpended in the pincers is found upon the graduated lines already mentioned. Of theſe lines thoſe marked A and B are called ſtatical lines, as being calculated for weighing the piece in air; and thoſe marked W W, are called *hydroſtatical* lines, as ſerving to point out the alloy or adulteration of the piece weighed. A whole diviſion on each line is equal to the weight or value of one ſhilling in gold; a half diviſion to ſix pence, and a quarter diviſion to three pence.

To prove a guinea: firſt ſuſpend it in the pincers, and then placing the inſide of the ſliding piece C to twenty-one on the line A on the upper ſide of the ruler, which muſt move freely on the centre pin marked A, and if the guinea and ſliding piece exactly balance each other, the guinea is full weight; if not, move the ſlider backwards or forwards until they equiponderate; when the diviſion cut by the inſide of the ſlider is the true weight of the gold; and if it reſts for inſtance, at twenty and a half, then the guinea weighs only twenty ſhillings and ſix pence. In the next place, to prove the alloy of this piece, let the ſlider be brought to the diviſion twenty and a half, upon the *hydroſtatical* line marked W, for whatever diviſion is cut by the ſlider in weighing on the ſtatical line, it muſt be placed at the ſame on the *hydroſtatical* line adjoining. Then let the piece, together with the pincers, and the braſs link whereon it is ſuſpended, be immerſed in water (*ibid*. N° 3.) as far as the notch on the ſaid link; if then the inſtrument acts in equilibrio, or the piece ſink deeper in the water, the guinea is ſtandard gold; but if the ſlider muſt be moved farther backward before it will equiponderate, the guinea is adulterated. If it is alloyed with ſilver, allow two ſhillings for every penny it wants in the *hydroſtatical* weight; and then if the number of pence the piece is deficient in weight *hydroſtatically*, when doubled, exceed the number of ſhillings it weighs ſtatically, it may be concluded to be adulterated with ſome baſer metal than ſilver. However, a more ſpeedy method of diſcovering whether a piece of gold be adulterated or not, without moving the ſlider more than once, is this: when the piece is weighed ſtatically, bring the ſlider to the diviſion on the *hydroſtatical* line expreſſing its weight; and immerſing the piece and pincers as before, ſo that the ſurface of the water may be exactly at the mark on the long link, if the inſtrument does not then equiponderate, gently lower the hand that holds the fluid, until the inſtrument comes to an equilibrium; at which time, if the guinea be a counterfeit, great part of the pincers will appear above the water; if a 36*s*. piece be tried, not only the pincers, but a ſmall part of the coin, will appear above the ſurface, if the piece be counterfeit. This laſt method is ſufficiently near the truth for common practice.

If there is occaſion to weigh and prove a very ſmall piece of gold, as a 2*s.* 3*d.* 4*s.* 6*d.* &c. the method is, to put the ſaid pieces in the pincers, with ſome other piece that has been approved before; by which means the weight and alloy of the ſmall piece may be eaſily diſcovered, as above. If the piece be above 36*s.* the ſlider is to be placed according to the diviſions of the ſtatical and *hydroſtatical* lines on the under ſide of the inſtrument, which are fitted to the ſtandard of the mint; by which a guinea weighs 129 grains.

HYDROSTATICS, (compoſed of *ὑδωρ*, *water*, and *ϛατικη*, *ſtatics*; of *ϛατος*, *ſtans*, *ſtanding*, of *ιϛημι*, *ſto*, *I ſtand*; *hydroſtatics* being conceived as the doctrine of the EQUILIBRIUM of liquors), is the doctrine of gravitation in fluids; or that part of mechanics which conſiders the weight or gravity of fluid bodies, particularly of water, and of ſolid bodies immerged therein.

To *hydroſtatics* belong whatever relates to the gravities and æquilibria of liquors, with the art of weighing bodies in water, in order to eſtimate their ſpecific gravities.

Mr. Boyle has applied *hydroſtatics* to good purpoſe, in examining and proving the goodneſs and purity of metals, minerals, and other bodies, particularly fluids, in an expreſs treatiſe entitled, Medicina Hydroſtatica.

The laws of *hydroſtatics*, with the application thereof, ſee delivered at large under the articles FLUID and *Specific* GRAVITY.

Hydroſtatics are frequently confounded with *hydraulics*, on account of the affinity of the ſubjects; and ſeveral authors chooſe to treat of the two promiſcuouſly.

The oldeſt writer on *hydroſtatics* is Archimedes, who firſt delivered the laws thereof in his book De inſidentibus humido. Marin Ghetaldus firſt brought his doctrine to experiment, in his Archimedes promotus; and from him Mr. Oughtred took the greateſt part of what he has given us on this ſubject. The celebrated M. Paſchal has written an excellent treatiſe on this ſubject, entitled, Traité de l'Equilibre des Liqueurs & de la Peſanteur de l'Air. M. Mariotte, in a French treatiſe, publiſhed at Paris in 1686, Of the Motion of Water, and other Fluids, gives moſt of the propoſitions of *hydroſtatics* and hydraulics, proved by reaſon, and confirmed by experiments. The Jeſuit F. Tertius de Lanis, in the third tome of his Magiſterium Naturæ & Artis, lays down the doctrines of *hydroſtatics* more amply than they are elſewhere found. F. Lamy, in the ſecond part of his mechanics, entitled, Traité de l'Equilibre des Liqueurs, delivers the fundamental laws of *hydroſtatics* and hydraulics; and the like is done by Dr. Wallis, in his Mechanica. Laſtly, Sir Iſaac Newton gives ſome of the ſublimer matters, in the ſecond book of his Philoſoph. Nat. Princip. Mathematic.

HYDROTICS, formed of *ὑδωρ*, *water*, in *Medicine*. See HYDROPIC.

HYDRUS, or *Water Serpent*, in *Aſtronomy*, is a ſouthern conſtellation, including ten ſtars; the longitudes, latitudes, &c. of which, are as follow:

Names and ſituations of the ſtars.	Signs.	Longit.			Latitude			Magnitude.
		°	′	″	°	′	″	
In the head	♓	8	4	34	64	10	20	3
1ſt in the neck	♒	25	6	36	67	8	36	5
2d		25	17	13	69	50	46	4
3d		28	2	10	71	14	49	4
4th	♓	0	50	54	71	33	18	5
5.								
Between both ſmall clouds	♒	6	34	48	76	45	35	3.4
		6	23	22	72	56	53	6
Near the leſſer cloud	♑	26	51	48	64	31	27	3
Northern of the 2 next to the neck	♈	3	37	35	78	5	20	3.4
Southern	♓	17	32	56	76	5	23	5

HYEMAL *ſolſtice*, the ſame with *winter ſolſtice*. See SOLSTICE.

HYEMANTES, in the *Primitive Church*, offenders who had been guilty of ſuch enormities, that they were not allowed to enter the porch of the churches with the other penitents, but were obliged to ſtand without, expoſed to all the inclemency of the weather.

HYES, in *Mythology*, a ſurname given to Bacchus, from the name Hye given to his mother Semele: or, according to others, becauſe her feaſt commonly happened in a rainy ſeaſon; from *ὕω*, *to rain*. The Athenians worſhipped Jupiter under the character Pluvialis, and erected an altar to him on mount Hymetta.

HYGEIA, in *Mythology*. See HEALTH.

HYGIEINE, Ὑγιεινη, formed of *ὑγιης*, *ſound*, *healthy*, that branch of medicine which conſiders *health*, and diſcovers proper means and remedies, with their uſe, in the preſervation of that ſtate.

The objects of this branch of medicine are, the NON-NATURALS. See AIR, DIET, EXERCISE, &c.

Hygieine, more largely taken, is divided into three parts; PROPHYLACTICE, which foreſees and prevents diſeaſes; SYNTERITICE, employed in preſerving health; and ANALEPTICE, whoſe office is to cure diſeaſes, and reſtore health.

HYGRA, of *ὑγρος*, *moiſt*, a name given by the ancients to what they called liquid plaſters, in oppoſition to thoſe called xeria, or dry ones. Theſe firſt were a ſort of liniments.

HYGROCIRSOCELE, compounded of *ὑγρος*, *moiſt*, and *κιρσοκηλη*, *ramex varicoſus*, in *Medicine*, a branch of a vein ſwelled with ill blood, or other humours; or a varicous tumor of ſome of the veins of the teſtes, attended with a gathering of water in the ſcrotum.

HYGROMETER, or NOTIOMETER, compounded of *ὑγρος*, *moiſt*, and *μετρεω*, *I meaſure*, a machine, or inſtrument, whereby to meaſure the degrees of drineſs, or moiſture, of the air.

There are divers kinds of *hygrometers*; for whatever body either ſwells or ſhrinks by drineſs or moiſture, is capable of being formed into an *hygrometer*. Such are woods of moſt kinds, particularly aſh, deal, poplar, &c. Such alſo is cat-gut, the beard of a wild oat, &c.

The beſt and moſt uſual contrivances for this purpoſe are as follow.

HYGROMETERS, *conſtruction of*. Stretch an hempen cord or a fiddle-ſtring, as AB (ſee *Tab.* II. *Pneumatics*, *fig.* 30.) along a wall, bringing it over a truckle, or pulley D; and to the other extreme D, tie a weight E; into which fit a ſtyle, or index, FG. On the ſame wall fit a plate of metal HI, divided into any number of equal parts, and the *hygrometer* is complete.

For it is a matter of undoubted obſervation, that moiſture ſenſibly ſhortens the length of cords and ſtrings; and that as the moiſture evaporates, they return to their former length; and the like may be ſaid of a fiddle-ſtring. The weight, therefore, in the preſent caſe, upon an increaſe of the moiſture of the air, will aſcend; and, upon a diminution of the ſame, it will deſcend.

Hence, as the index FG will ſhew the ſpaces of aſcent and deſcent, and thoſe ſpaces are equal to the increments and decrements of the length of the cord or gut, ABD, the inſtrument will diſcover whether the air be more or leſs humid now than it was at another given time.

Or thus: if a more ſenſible and accurate *hygrometer* be required, ſtrain a whipcord, or fiddle-ſtring; over ſeveral truckles, or pullies, A, D, E, F, and G (*fig.* 31.); and proceed with the reſt as in the former example. Nor does it matter whether the ſeveral parts of the cord AB, CD, DE, EF, FG, be parallel to the horizon, as expreſſed in the preſent figure, or perpendicular to the ſame.

The advantage of this, above the former *hygrometer*, is, that we have a greater length of cord in the ſame compaſs; and the longer the cord, the greater its contraction and dilatation.

Or thus: faſten a twiſted hempen cord, or fiddle-ſtring, HW, by one end, ſuſtaining a weight W (*fig.* 32.) to an iron hook; and let the other end deſcend upon the middle of an horizontal board, or table, AB, and fit an index, I. Laſtly, from the center B deſcribe a circle; which divide into any number of equal parts.

Now, it is matter of obſervation, that a cord or gut twiſts itſelf as it is moiſtened, and untwiſts again as it dries. Mr. Molyneux, ſecretary of the Dublin ſociety, writes, that he could perceive this alternate twiſting and untwiſting in a cord, by only breathing on it eight or ten times, and then applying a candle toward it. Hence, upon an increaſe or decreaſe of the humidity of the air, the index will ſhew the quantity of twiſting or untwiſting; and, conſequently, the increment or decrement of humidity, or drineſs.

Thoſe Dutch toys, called weather-houſes, where a ſmall image of a man, and one of a woman, are fixed upon the ends of an index, are conſtructed upon this principle. For the index being ſuſtained by a ſtring, or twiſted catgut, turns backwards and forwards, bringing out the man in wet weather, and the woman in dry.

Or thus: faſten one end of a cord, or fiddle-ſtring, HI, (*fig.* 33.) to a hook, H; and to the other end faſten a ball, K, of a pound weight. Draw two concentric circles on the ball, and divide them into any number of equal parts; fit a ſtyle, or index, NO, into a proper ſupport, N, ſo as the extremity O may almoſt touch the diviſions of the ball.

Here, the cord or gut twiſting or untwiſting, as in the former caſe, will indicate the change of moiſture, &c. by the ſucceſſive application of ſeveral diviſions of the circles to the index.

Or thus: provide two wooden frames, AB and CD, (*fig*. 34.) with grooves therein; and between thoſe grooves fit two thin leaves of aſh, AEFC, and GBDH, ſo as they may eaſily ſlide either way. At the extremes of the frames, A, B, C, D, confine the leaves with nails, leaving between them the ſpace EGHF, about an inch wide. On I faſten a ſlip of braſs dented, IK; and in L a little dented wheel, upon whoſe axis, on the other ſide of the machine, an index is to be put. Laſtly, from the center of the axis, on the ſame ſide, draw a circle, and divide it into any number of equal parts.

Now, it being found by experience, that aſhen wood readily imbibes the moiſture of the air, and ſwells therewith; and as that moiſture ſlackens, ſhrinks again; upon any increaſe of the moiſture of the air, the two leaves AF and BH, growing turgid, will approach nearer each other: and, again, as the moiſture abates, they will ſhrink, and again recede. Hence, as the diſtance of the leaves can neither be increaſed nor diminiſhed without turning the wheel L, the index will point out the changes in reſpect of humidity and drineſs.

It is to be noted, that all the *hygrometers* above deſcribed become ſenſibly leſs and leſs accurate; and, at length, undergo no ſenſible alteration at all from the humidity of the air. The following is much more laſting; though no *hygrometer* will ſerve for years, like a barometer and thermometer; but whatever be the ſubſtance of which it is made, will be ſo altered as to become in a great degree uſeleſs.

Take the MANOSCOPE, deſcribed under that article, and inſtead of the exhauſted ball E (*fig*. 35.) ſubſtitute a ſponge, or other body, which eaſily imbibes moiſture. To prepare the ſponge, it may be neceſſary firſt to waſh it in water; and when dry again, in water or vinegar, wherein ſal ammoniac, or ſalt of tartar, has been diſſolved, and let it dry again.

Now, if the air become moiſt, the ſponge growing heavier, will preponderate; if dry, the ſponge will be hoiſted up, and, conſequently, the index will ſhew the increaſe or decreaſe of humidity of the air.

In the laſt mentioned *hygrometer*, Mr. Gould, in the Philoſophical Tranſactions, inſtead of a ſponge, recommends oil of vitriol, which is found to grow ſenſibly lighter or heavier, in proportion to the leſſer or greater quantity of moiſture it imbibes from the air; ſo that being ſatiated in the moiſteſt weather, it afterwards retains or loſes its acquired weight, as the air proves more or leſs moiſt. The alteration in this liquor is ſo great, that in the ſpace of fifty-ſeven days it has been known to change its weight from three drachms to nine; and has ſhifted an index or tongue of a balance thirty degrees. A ſingle grain, after its full increaſe, has varied its æquilibrium ſo ſenſibly, that the tongue of a balance, only an inch and half long, has deſcribed an arch one-third of an inch in compaſs; which arch would have been almoſt three inches, if the tongue had been one foot, even with ſo ſmall a quantity of liquor; conſequently, if more liquor, expanded under a large ſurface, were uſed, a pair of ſcales might afford as nice an *hygrometer* as any kind yet invented. The ſame author ſuggeſts, that oil of ſulphur per campanam, or oil of tartar per deliquium, or the liquor of fixed nitre, might be ſubſtituted in lieu of the oil of vitriol.

This balance may be contrived two ways; by either having the pin in the middle of the beam, with a ſlender tongue a foot and half long, pointing to the diviſions on an arched plate, as repreſented in *fig*. 35.

Or, the ſcale with the liquor may be hung to the point of the beam near the pin, and the other extreme be made ſo long, as to deſcribe a large arch on a board placed for the purpoſe, as repreſented in *fig*. 36.

Mr Arderon has propoſed ſome amendment in the ſponge *hygrometer*. He directs the ſponge A (*fig*. 37.) to be ſo cut, as to contain as large a ſuperficies as poſſible, and to hang by a fine thread of ſilk, upon the beam of a balance B, and exactly balanced on the other ſide by another thread of ſilk at D, ſtrung with the ſmalleſt lead-ſhot, at equal diſtances, ſo adjuſted as to cauſe an index, E, to point at G, the middle of a graduated arch, FGH, when the air is in a middle ſtate, between the greateſt moiſture and the greateſt dryneſs. Under this ſilk ſo ſtrung with ſhot, is placed a little table or ſhelf, I, for that part of the ſilk and ſhot, which is not ſuſpended, to reſt upon. When the moiſture imbibed by the ſponge increaſes its weight, it will raiſe the index, and alſo part of the ſhot, from the table, and *vice verſa*, when the air is dry. Phil. Tranſ. N° 479. vol. xliv. p. 96.

From a ſeries of hygroſcopical obſervations, made with an apparatus of deal wood, deſcribed in the Philoſophical Tranſactions, N° 480, Mr. Coniers concludes, 1. That the wood ſhrinks moſt in ſummer, and ſwells moſt in winter, but is moſt liable to change at ſpring and fall. 2. That this motion happens chiefly in the day-time, there being ſcarce any variation in the night. 3. That there is a motion even in dry weather, the wood ſwelling in the morning, and ſhrinking in the afternoon. 4. The wood, by night as well as day, uſually ſhrinks when the wind is in the north, north-eaſt, and eaſt, both in winter and ſummer. 5. That by conſtant obſervation of the motion and reſt of the wood, with the help of a thermometer, one may tell the ſituation of the wind without a weather-cock.

He adds, that the time of the year may be known by it; for in ſpring it moves quicker and more than in winter; in ſummer it is more ſhrunk than in ſpring; and has leſs motion in autumn than in ſummer.

See an account of the method of conſtructing theſe and other *hygrometers* in Lowthorp's Abridg. Phil. Tranſ. vol. ii. p. 36, &c. and plate 1. annexed. See alſo Phil. Tranſ. vol xliii. N° 473. p. 6, &c. vol. xliv. p. 169, and p. 184.

Dr. Hooke's *hygrometer* was made of the beard of a wild oat, ſet in a ſmall box, with a dial-plate and an index. See his Micrographia, p. 150, &c.

An *hygrometer* of this kind may be conſtructed in the following manner. Let ABCD (*fig*. 38.) be a ſquare braſs plate, about four inches ſquare, with a ring or circle fixed to it, graduated on the flat and the inner edge. IC repreſents a very light index of braſs or ſteel, with a ſmall cylindric lump in its center, into which is faſtened the top of the beard of a wild oat, by a little peg, and the other end of it in another lump, about an inch under the plate, which, having a little hole under C, allows the beard of the oat to come through, in order to carry the hand, and yet keep it in its place, without hindering it to twiſt and untwiſt. There are alſo two wires coming down under the middle of the plate, which hold a little croſs-bar, making a ſmall frame to carry the lump that holds the bottom of the beard expoſed to the air. The four feet of this inſtrument, two of which are ſeen at C, D, muſt be about one inch and a quarter long, to keep the frame under the plate from touching any thing which the inſtrument is ſet upon. AB, in *fig*. 39. repreſents the plate, F and F two of its feet, C and D the little lumps to which the wild oat-beard, CD, is faſtened; *ef* and *gh* the wires ſupporting the piece *fh*, and all together form an open frame, to hold the lump D. The beard paſſes through the hole *i*, in order to carry the index I*i*, which points to the degrees on the graduated circle AB.

The following *hygrometer* was contrived by doctors Hales and Deſaguliers. P*cpw*C, (*fig*. 40.) is a piece of lignum vitæ, cylindric at C*w*P, but from C*w* to *p* a truncated cone, and ſcrewed like the fuzee of a watch, but not ſo taper. The length of the inſtrument is about a foot, the cylindric part an inch in diameter, and half an inch long; the large part of the ſcrew about three quarters of an inch, and the ſmall part half an inch; at each end there are fine ſteel pivots, bearing on two fine conic holes in braſſes in the frame that carries the inſtrument, that it may turn eaſily. A ſponge, S, hangs by a ſilk from the cylinder of the inſtrument, ſo as to turn it by its riſing or falling; a weight W, hanging from another ſilk *u*, coiled upon the ſcrew C*p*, keeps the ſponge in equilibrio. When the ſponge becomes heavier, by imbibing moiſture from the air, it runs down, and draws up W; but as W comes up, its ſtring muſt advance towards C*w*, where hanging farther from its center, its power will be ſo increaſed, that it will keep the ſponge in equilibrio, though its weight be increaſed. But as the weight riſes, it will ſhew on the ſcale, DD, how much the ſponge is heavier, and conſequently the air moiſter. This inſtrument will be made ſtill more ſenſible, when its pivots are ſupported by four friction wheels. Salt of tartar, or any other ſalt, or pot-aſhes, may be put into the ſcale of a balance, and uſed inſtead of the ſponge. Deſag. Exp. Phil. vol. ii. p. 300.

In an *hygrometer* invented and deſcribed by Mr. Ferguſon, AAAA (*fig*. 41.) is a frame of wainſcot or mahogony, grooved in the longeſt ſides, to hold the pannel BBBB of white deal board, without pinching it. The pannel is about the thickneſs of a crown-piece, and fifteen inches long croſs-wiſe to the grain of the wood. The middle part projects at C and C, where it is faſtened into the frame by two ſcrews; ſo that this part always remains in the ſame place, whilſt the reſt of the pannel expands by moiſt air towards both ends of the frame, and contracts towards the middle, when the air is dry. To a pin at F is faſtened one end of a ſmall flexible cord DE, and the other end goes round the pulley G, and is fixed into the bottom of its groove at *h*. One end of another ſmall cord, IK, is fixed into the groove of the large pulley, H, at *a*, going round the part *ai*H, and paſſing round to M, round a ſmall pulley L, the axis of which turns in the piece O, lying above it, and ſcrewed to the frame at C. To the end of the cord is ſuſpended a flattiſh weight N. The diameters of the pullies, G and L, are equal, and about one-tenth of the diameter of H. The diſtance of the pullies, G, and pin F, will determine the expanſion of the pannel between F and G; which will cauſe the pulley, G, to turn backward, and any point in H ten times as much; and in this proportion will the weight N be raiſed: therefore if the pannel extend one-tenth of an inch by moiſt air, the pulley L will be turned quite round. As the air grows dry, the pannel contracts, the weight N deſcends, and turns all the pullies the contrary way. The back of the plate AA, (*fig.* 42.) is ſcrewed to the other ſide of the frame, ſo that the ſtrait edge of the plate may be even with the uppermoſt ſide of the frame, and the center B may be directly over the center of the pulley L (*fig.* 41.) on whoſe axis the index BC (*fig.* 42.) is fixed, which, by moving on the graduated edge of the plate, indicates the moiſture or dryneſs of the air. The pannel ſhould be changed in three or four years. Phil. Tranſ. vol. liv. art. 47.

Mr. Smeaton's *hygrometer* is exhibited in *fig.* 43. and *fig.* 44. ABC (*fig.* 43.) is an orthographic delineation of the whole inſtrument ſeen in front, with the box cover H, which defends the index, &c. from injury, and by a glaſs expoſes the ſcale to view. FG in both figures repreſents a flaxen cord, about thirty-five inches long, ſuſpended by the turning peg F, attached to a loop of braſs wire at A. This cord is that which is called by net-makers in London *flaxen three threads laid*, and is between one-twentieth and one-thirtieth of an inch in diameter. It is previouſly boiled in a ſolution of two penny-weights troy of common ſalt, in one pound avoirdupoiſe of water, boiled till the whole is reduced to ſix ounces avoirdupoiſe. The cord ſoaked in this brine is dried, and then ſtretched, by tying three or four yards of it to two nails againſt a wall, in a horizontal poſition, and hanging a weight of a pound or two to the middle. When it has remained in this poſition for a week or more in a room, it will be fit for uſe. G, I, (*fig.* 44.) are two loops, or long links of braſs wire, laying hold of the index KL, which is moveable on a ſmall ſtud or center, K. The cord FG is kept moderately ſtrained by a weight M, about half a pound avoirdupoiſe. As the cord lengthens or ſhortens, the end of the index paſſes over the ſcale NQ, diſpoſed in the arc of a circle, and containing a hundred equal diviſions. This ſcale is attached to the braſs ſliding ruler QP, which moves upon the directing piece RR, fixed by ſcrews to the board, which makes the frame or baſe of the whole; and the ſcale and ruler, NQP, are retained in any place nearer to or farther from the center K, by the ſcrew S. *Fig.* 45. repreſents in profile the ſliding-piece and ſtud I, which traverſes on that part of the index next the center K; and which can, by the two ſcrews of the ſtud, be retained upon any part of the index that is made parallel, and which is done for three or four inches from the center, for that purpoſe. The ſtud is filed to the edges like the fulcrum of a ſcale-beam, one being formed on the under-ſide, and the other upon the upper, as near as poſſible to one another. A hook, formed at the lower end of the wire loops, G, I, retains the index by the lowermoſt end of the ſtud, while the weight M hangs by a ſmall hook upon the upper edge. By theſe means the index is kept ſteady, and the cords ſtrained by the weight, with very little friction or burthen upon the central ſtud K. *Fig.* 46. is a parallelogram of plate braſs, to keep out duſt, which is attached to the upper edge of the box cover H, and ſerves to ſhut the part of the cover, neceſſarily cut away, to give leave for the wire, GI, to traverſe with the ſliding ſtud (*fig.* 45.) nearer to or farther from the center of the index K. In this (*fig.* 46.) there is a hole *a*, about one-fifth of an inch diameter, for the wire GI to paſs through, in the motion of the index, without touching; *b* is a ſlit of a leſſer ſize, ſufficient for the wire to paſs, and allow the cover to come off without deranging the end or index; *c c* are two ſmall ſcrews applied to two ſlits, by which the plate ſlides lengthways, in order to adapt the hole *a* to the wire GI, at any place of the ſtud I, upon the index KL. This index is twelve inches long, four inches of which, from the extreme end, are filed ſo narrow, that any part of them may ſerve for an index to the diviſions of the ſcale; the ſcale itſelf alſo ſlides four inches. The directing piece, RR, is parallel to a line drawn from o upon the ſcale to the center, K, of the index; conſequently, as the attenuated part of the index forms a part of a right line drawn from the ſame center, whenever the index points to o upon the ſcale, though the ſcale be removed nearer to or farther from the center of the index, yet it produces no change in the place to which the index points. When the divided arc of the ſcale is at ten inches from the center, which is its mean diſtance, then the center of the arc and the center of the index are coincident. At other diſtances, the extremes of which are eight or twelve inches, the center of the diviſions, and the center of the index, pointing to them, not being coincident, the index cannot move over ſpaces geometrically proportionable to one another in all ſituations of the ſcale; yet the whole ſcale not exceeding thirty degrees of a circle, it will be found, on computation, that the error can never be ſo great as $\frac{1}{100}$th part of the ſcale, or one degree of the *hygrometer*.

For adjuſting the inſtrument, take off the box cover, and ſet the inſtrument nearly upright about a yard from a moderate fire; there let it remain, till the index ſinks as low as it will go, ſtroking the cord occaſionally between the thumb and finger downwards. When it is become ſtationary, raiſe or depreſs the index by means of the peg at top, till it lies over the point o; then remove the inſtrument from the fire, and with a camel-hair pencil dipped in warm water, moiſten the cord, without ſuffering any drops of wet to fall from it, till it is ſaturated, and the index becomes ſtationary. If the index lies over the degree marked 100, all is right; if not, ſlack the ſcrew S, and ſlide the ſcale nearer to or farther from the center, till the point 100 comes under the index, and the inſtrument is adjuſted for uſe. If the compaſs of the ſlide be not ſufficient to effect this, ſlack the proper ſcrews, and move the ſliding ſtud I nearer to or farther from the center of the index, as the angle, formed by the index between the points of dry and wet, happens to be too ſmall or too large for the ſcale. Mr. Smeaton was led by obſervation to mark the point of o *dry*, 20° the *mean*, 40° *moiſt*, 70° *very moiſt*, and 100° *wet*. Phil. Tranſ. vol. lxi. part i. art. 24.

The laſt *hygrometer* we ſhall deſcribe is that of M. de Luc. The part of this *hygrometer* which is affected by the moiſture of the air, is a hollow tube of ivory *a a b*, (*fig.* 47.) two inches eight lines long, and internally two lines and a half in diameter. This tube is open at the end *a a*, and cloſed at *b*, terminating in a point; and the thickneſs of its ſides, for the length of two inches ſix lines from the bottom, is but three-ſixteenths of a line: it is this thin part which does the office of an *hygrometer*; the remaining part of the cylinder, towards its orifice *a a*, muſt be kept a little thicker, in order to bear the preſſure of a tube of glaſs, about fourteen inches long, the lower end of which is ſeen *d d e e*. The internal diameter of this tube is about three-eighths of a line, and the outſide diameter about two lines, in order that the part *g g* of a braſs piece *f f g g*, through which it paſſes, and which is to enter into the ivory pipe, be as thin as poſſible. In order to hinder the part of that tube, which incloſes the braſs piece, from being affected by the variations of moiſture, it is covered with a braſs ferrel *h h i i*. Theſe pieces are united together with gum lac or maſtich, which melts by the heating of the glaſs and braſs. M. de Luc's reaſon for chuſing ivory for his *hygrometer*, is, that this matter appeared to him more proper than any other for receiving the impreſſion of the moiſture of the air, without ſuffering thereby any material change. The cylinder made of it becomes more capacious, in proportion as it grows moiſter; and this is the fundamental principle of the inſtrument. M. de Luc has alſo found, that upon letting this cylinder lie for ſome time in water of an uniform temperature, it ſwells to a certain point, after which it dilates no farther. This circumſtance furniſhed him with a *maximum* of humidity; and, conſequently, with one point of compariſon in the ſcale of the *hygrometer*; and this point he has fixed at the temperature of melting ice. For meaſuring the differences in the capacity of this ivory cylinder, and thereby diſcovering its different degrees of moiſture, M. de Luc makes uſe of quickſilver, with which he fills the cylinder, and a part of the communicating glaſs tube. The more capacious this cylinder is, or, which is the ſame, the moiſter it is, the lower does the mercury ſtand in the glaſs tube, and *vice verſa*. Now M. de Luc has found, that the loweſt point to which it can ſink, is that where it ſtands when the ivory cylinder is ſoaked in melting ice: he, therefore, names or graduates this point o in the ſcale of his *hygrometer*; and, conſequently, the degrees of this ſcale are degrees of dryneſs, counted from below upwards, as the quickſilver riſes in the glaſs tube. To give theſe degrees a determinate length, and thus to render the *hygrometers* capable of being compared with each other, M. de Luc employs in conſtructing them ſuch glaſs tubes as have been previouſly prepared, by being made into thermometers, and filled with mercury, ſo as to aſcertain upon them the points of melting ice and boiling water, and to take exactly the diſtance between theſe points by any ſcale at pleaſure. When this is done, the bulb of this preparatory thermometer muſt be broken, and the quickſilver it contains exactly weighed. It is by knowing the weight of this, together with the diſtance between the fixed points of the thermometer, that the ſcale of the *hygrometer* is determined. E. gr. Let the weight of the quickſilver be one ounce, and the diſtance between the above mentioned points one thouſand parts of a certain ſcale; then ſuppoſe that the quickſilver in the *hygrometer*, to which this tube is to be applied, weighs only half an ounce; this will give a fundamental line, conſiſting of five hundred parts of the ſame ſcale. The fundamental line, thus found, is applied to the ſcale of the *hygrometer*, beginning at 0, and meaſuring it off about four times over, that the whole variation of the inſtrument may be comprehended. Each of thoſe ſpaces being afterwards divided into forty equal parts, gives ſuch degrees as M. de Luc has found moſt convenient. In general terms, the length of the fundamental line of the *hygrometer* muſt be to the interval between the two fixed points of the preparatory thermometer, as the weight of the quickſilver in the *hygrometer* is to the weight of the quickſilver in that thermometer. This proportion between the ſcale of the *hygrometer*, and that of the preparatory thermometer, furniſhes an eaſy method of correcting in this inſtrument the effects of heat upon the mercury which it contains. It will eaſily be conceived, from the conſtruction of the ſcale of this *hygrometer*, that if its cylinder of ivory was ſuddenly changed into glaſs, the inſtrument would become a true thermometer, in which the interval between the points, anſwering to melting ice and boiling water, would be divided into forty parts. If, therefore, a thermometer with a ſcale ſimilarly divided into forty parts between the fixed points, be placed near the *hygrometer*, it will ſhew immediately the correction to be made on that inſtrument for its variation as a thermometer, under particular reſtrictions, which M. de Luc has ſtated.

That part of the frame of the inſtrument on which the ſcale is marked, is moveable; ſo that, before obſerving the points at which the mercury ſtands, it may be puſhed upwards or downwards, according as the thermometer has riſen or fallen with reſpect to the point of melting ice; and thus the indications of the *hygrometer* can at once be freed from the errors which would ariſe from the difference in the volume of the quickſilver, on account of the different degrees of heat.

For this purpoſe, at the top of this ſcale, there is an index over-againſt another ſmall ſcale, marked upon the unmoveable part of the frame: the degrees of this ſmall ſcale are eightieth parts of the fundamental line, and anſwering to the degrees of the thermometer on the ſame frame. When the index points to 0 of the ſmall ſcale, the thread which indicates upon the tube of the *hygrometer* the point to which the mercury ſunk in the melting ice, anſwers likewiſe to 0 in the ſcale of the *hygrometer*. See an elaborate account of the principles and advantages of this *hygrometer*, the particular proceſs of its conſtruction, and obſervations made with it by M. de Luc, in the Phil. Tranſ. vol. lxiii. part ii. art. 38.

The inſtrument, with its frame, is ſeen in *fig*. 48. It is mounted on deal, becauſe this wood ſuffers the leaſt change in the length of its fibres. The lower part of the frame is ſlit through the whole length of the ivory pipe, in order that the air may circulate freely round this pipe, and the bulb of an annexed thermometer. The *hygrometer* is faſtened in three parts, viz. at bottom on a ſmall bracket, at top by a tube paſſing through a piece either of hard wood or of metal faſtened by ſcrews, but chiefly by means of a braſs wire on the neck of the braſs piece, which unites the glaſs with the ivory pipe. This piece is laid in a ſmall plate of a hard wood, which in that place fills a groove originally made through the whole length of the board. To prevent duſt from getting through the opening of the tube, it is ſhut up in a ſmall ivory caſe. The ſcale of the *hygrometer* is marked upon a deal ſlip, which ſlides along the groove juſt mentioned. This and all the other parts of the frame muſt be lined with paper, for marking the neceſſary ſcales, and this paper is afterwards varniſhed over. The ſcale of the *hygrometer* is carried to the proper point, by means of a knob fixed on a ſmall piece of hard wood or metal, ſcrewed to the bottom of the board, and which affords a free paſſage to the tube of the *hygrometer*.

HYGROPHOBIA, in *Medicine*, is ſometimes uſed in the ſame ſenſe with HYDROPHOBIA.

HYGROSCOPE, compounded of *ὑγρος*, *moiſt*, and *σκοπεω*, *I obſerve*, or *conſider*, is commonly uſed in the ſame ſenſe with HYGROMETER.

Wolfius, however, regarding the etymology of the word, makes ſome difference. According to him, the *hygroſcope* only ſhews the alterations of the air in reſpect of humidity and drineſs; but the hygrometer meaſures them. A *hygroſcope*, therefore, is a leſs accurate hygrometer.

HYIOTES, Ὑιωτης, *Filiation*. See ADOPTION.

HYKES, a ſort of blankets, in great uſe among the natives of Barbary. They are woven by the women, who make no uſe of a ſhuttle therein, but conduct every thread of the woof with their fingers. One of theſe *hykes* is uſually ſix yards long, and five or ſix broad, ſerving the Kabyle as well as Arab, both male and female, for a complete dreſs in the day, and for his bed and covering in the night. It is a looſe and troubleſome kind of garment, being frequently diſconcerted, and falling on the ground; ſo that the wearer is every moment to be tucking it up, and folding it anew round his body. Dr. Shaw (Trav. p. 286.) takes it to be much the ſame with the peplus, if not with the toga, of the ancients.

HYLARCHIUS, formed of ὑλη, *matter*, and αρχη, *government*, or *hylarchic principle*, a word by which ſome authors expreſs what they call a ruling and preſiding ſpirit, which governs and actuates all matter. See PLASTIC.

HYLE, or HYLEC, from ὑλη, which ſignifies *matter*, among *Alchemiſts*, is their firſt matter; or it is matter conſidered as produced by nature herſelf; called alſo chaos.

HYLEG, or HYLECH, in *Aſtrology*, an Arabic term for a planet, or for a point of the heavens, which in a man's nativity becomes, as is pretended, the moderator and ſignificator of life.

HYLEGIAL *places*, among *Aſtrologers*, are thoſe wherein a planet being found, is qualified to have the government of life attributed to it.

HYLOBII, or HYLOBIANS, compounded of ὑλη, which, beſide *matter*, ſignifies alſo *wood*, *foreſt*, and βιος, *life*, a ſect of Indian philoſophers, thus denominated by the Greeks, becauſe they retired to foreſts, to be more at leiſure for the contemplation of nature.

HYLOPATHIANS, formed of ὑλη, *matter*, and παθος, of πασχω, *I ſuffer*. See the following article, and ANAXIMANDRIANS.

HYLOZOISTS, formed of ὑλη, *matter*, and ζωη, *life*, the name of a ſect of atheiſts among the ancient Greek philoſophers, who held matter to be animated; maintaining that matter had ſome natural perception, without animal ſenſation, or reflection in itſelf conſidered; but that this imperfect life occaſioned that organization, whence ſenſation and reflection afterwards aroſe. Of theſe, ſome held only one life, which they called a PLASTIC nature, preſiding regularly and invariably over the whole corporeal univerſe, which they repreſented as a kind of large plant or vegetable: theſe were called the coſmoplaſtic and ſtoical atheiſts, becauſe the Stoics held ſuch a nature, though many of them ſuppoſed it to be the inſtrument of the Deity. Others thought that every particle of matter was endued with life, and made the mundane ſyſtem to depend upon a certain mixture of chance and plaſtic or orderly nature united together. Theſe were called the Stratonici, from Strato Lampſacenus, a diſciple of Theophraſtus, called alſo Phyſicus, (Cicero, De Nat. Deor. lib. i. cap. 13.) who was firſt a celebrated Peripatetic, and afterwards formed this new ſyſtem of atheiſm for himſelf. Beſides theſe two forms of atheiſm, ſome of the ancient philoſophers were Hylopathians, or ANAXIMANDRIANS, deriving all things from dead and ſtupid matter, in the way of qualities and forms, generable and corruptible; and others again adopted the ATOMICAL or Democritical ſyſtem, who aſcribe the production of the univerſe to atoms and figures. See on this ſubject Cudworth's Intellectual Syſtem, vol. i. book i. chap. 3. Birch's edit. 1743.

HYMEN, Ὑμην, in *Anatomy*, a thin membrane or ſkin, ſometimes circular, of different breadths, more or leſs ſmooth, and ſometimes ſemilunar, formed by the union of the internal membrane of the great canal with that on the inſide of the alæ, reſembling a piece of fine parchment. This membrane is ſuppoſed to be ſtretched in the neck of the womb of virgins, below the nymphæ, leaving in ſome ſubjects a very ſmall opening, in others a larger, and in all rendering the external orifice narrower than the reſt of the cavity, and to be broke when they are deflowered; an effuſion of blood following the breach.

This membranous circle may likewiſe ſuffer ſome diſorder by too great a flux of the menſes, by imprudence, levity, and other particular accidents.

The *hymen* is generally looked upon as the teſt of virginity; and when broke, or withdrawn, ſhews that the perſon is not in a ſtate of innocence. This notion is very ancient. Among the Hebrews, it was the cuſtom for the parents to ſave the blood ſhed on this occaſion, as a token of the virginity of their daughter, and to ſend the ſheets next day to the huſband's relations. And the like is ſaid to be ſtill practiſed in Portugal, and ſome other countries.

And yet authors are not agreed as to the exiſtence of ſuch a membrane. Nothing, Dr. Drake obſerves, has employed the curioſity of anatomiſts, in diſſecting the organs of generation in women, more than this part: they have differed not only as to its figure, ſubſtance, place, and perforation, but even its reality; ſome poſitively affirming, and others flatly denying it.

De Graaf himſelf, the moſt accurate inquirer into the ſtructure of theſe organs, confeſſes, he always ſought it in vain, though in the moſt unſuſpected ſubjects and ages: all he could find was, a different degree of ſtraitneſs or wideneſs, and different corrugations, which were greater or leſs, according to the reſpective ages; the aperture being ſtill the leſs, and the rugoſities the greater, as the ſubject was younger, and more untouched.

Dr. Drake, on the other hand, declares, that in all the ſubjects he had opportunity to examine, he does not remember to have miſſed the *hymen* ſo much as once, where he had reaſon to depend on finding it. The faireſt view he ever had of it was, in a maid who died at thirty years of age; in this he found it a membrane of ſome ſtrength, furniſhed with fleſhy fibres, in figure round, and perforated in the middle with a ſmall hole, capable of admitting the end of a woman's little finger, and ſituate a little above the orifice of the urinary paſſage, at the entrance of the vagina of the womb.

In infants, it is a fine thin membrane, not very conſpicuous, becauſe of the natural ſtraitneſs of the paſſage itſelf, which does not admit of any great expanſion in ſo little room; which might lead De Graaf into a notion of its being no more than a corrugation.

This membrane, like moſt others, does, probably, grow more diſtinct, as well as firm, by age. That it not only exiſts, but is ſometimes very ſtrong and impervious, may be collected, from the hiſtory of a caſe reported by Mr. Cowper. In a married woman, twenty years of age, whoſe *hymen* was found altogether impervious, ſo as to detain the menſes, and to be driven out, by the preſſure thereof, beyond the labia of the pudendum, not unlike a prolapſus of the uterus: on dividing it, at leaſt a gallon of grumous blood came forth. It ſeems the huſband, being denied a paſſage that way, had found another through the meatus urinarius; which was found very open, and its ſides extruded like the anus of a cock.

Upon a rupture of the *hymen*, after the conſummation of marriage, and eſpecially delivery, its parts, ſhrinking up, are ſuppoſed to form thoſe little fleſhy knots, called CARUNCULÆ *myrtiformes*.

Hymen, in *Botany*, is uſed for a fine, delicate ſkin, wherewith flowers are incloſed while in the bud, and which burſts as the flower blows or opens.

The term *hymen*, in this ſenſe, is particularly uſed in ſpeaking of roſes.

Hymen, in *Mythology* and *Poetry*, a term of invocation. *Hymen*, or *Hymenæus*, is properly a fabulous divinity, ſuppoſed by the ancients to preſide over marriages; and who accordingly was invoked in epithalamiums, and other matrimonial ceremonies, under the formula, *Hymen o Hymenæe!*

The poets generally crown this deity with a chaplet ſometimes of roſes, at other times of ſweet marjoram; and repreſent him, as it were, diſſolved and enervated with pleaſures; dreſſed in a yellow robe, and ſhoes of the ſame colour, with a torch in his right-hand, and a flame-coloured veil in his left. Catullus, in one of his epigrams, addreſſes him thus:

> *Cinge tempora floribus,*
> *Suaveolentis amaraci.*

It was for this reaſon, that the new married couple bore garlands of flowers on the wedding-day; which cuſtom alſo obtained among the Hebrews, and even among the Chriſtians, during the firſt ages of the church, as appears from Tertullian, De Corona Militari, where he ſays, *Coronant & nuptæ ſponſos*. St. Chryſoſtom likewiſe mentions theſe crowns of flowers; and to this day the Greeks call marriages ϛεφανωμα, in reſpect of this crown or garland.

HYMENÆA, in *Botany*. See Locust-*tree*.

HYMENODES, of ὑμην, *membrane*, and ειδος, *form*, an epithet applied by the old authors to ſuch urine as is found to be full of little films and pellicles. Hippocrates alſo applies it to the menſtrual diſcharges, when they are mixed with a tough viſcid phlegm.

HYMENOPTERA, derived from ὑμην, *membrane*, and ϖτερον, *wing*, in the Linnæan ſyſtem of *Natural Hiſtory*, is an order of inſects, having four membranaceous wings, and the tails of the females are furniſhed with ſtings, which in ſome are uſed for inſtilling poiſon, and in others for merely piercing the bark and leaves of trees, and the bodies of other animals, in which they depoſit their eggs. To this claſs belong ten genera, viz. *cynips*, *tenthredo*, *ſirex*, *ichneumon*, *ſphex*, *chryſis*, *veſpa*, or the *waſp*, *apis* or *bee*, *formica* or *ant*, and *mutilla*, comprehending a great number of ſubordinate ſpecies.

HYMETTIUM *marmor*. See Marble.

HYMN, a ſong, or ode, in honour of God; or a poem proper to be ſung, compoſed in honour of ſome deity. See Ode, and Song.

The word is Greek, ὑμνος, *hymn*; formed of the verb ὑδω, *celebro*, *I celebrate*.

Iſidore, on this word, remarks, that *hymn* is properly a ſong of joy, full of the praiſes of God; by which, according to him, it is diſtinguiſhed from *threna*, which is a mourning ſong, full of lamentation.

The *hymns*, or odes, of the ancients, generally conſiſted of three ſtanzas or couplets: the firſt called *ſtrophe*; the ſecond, *antiſtrophe*; and the laſt, *epode*.

St. Hilary, biſhop of Poitiers, is ſaid to have been the firſt that compoſed *hymns* to be ſung in churches: he was followed by St. Ambroſe. Moſt of thoſe in the Roman Breviary were compoſed by Prudentius. They have been tranſlated into French verſe by Meſſieurs De Port Royal. The Te Deum is alſo commonly called a *hymn*, though it be not in verſe; ſo alſo is the *Gloria in excelſis*.

In the Greek Liturgy there are four kinds of *hymns*; but then the word is not taken in the ſenſe of a praiſe offered in verſe, but ſimply of laud, or praiſe. The angelic *hymn*, or Gloria *in excelſis*, makes the firſt kind; the trisagion, the ſecond; the cherubic *hymn*, the third; and the *hymn* of victory and triumph, called επινικιος, the laſt.

HYMNIA, in *Mythology*, a ſurname given to Diana, under which appellation ſhe was worſhipped, and had a temple in Arcadia.

HYO-EPIGLOTTICI, in *Anatomy*, are muſcular fibres, which go from the convex ſide of the baſis of the os hyoides to the convex ſide of the epiglottis.

HYOGLOSSUS, in *Anatomy*, a muſcle of the tongue, which ſome divide into three, calling them basio-*gloſſum*, cerato-*gloſſum*, and chondro-*gloſſum*. When they act together, they ſerve to ſhorten the tongue, and likewiſe to turn the point of the tongue between the teeth and the upper lip, and make it paſs over that lip. The ſuperior fleſhy plane of the body of the tongue bends it upward toward the palate, and makes it paſs along or lick the upper lip.

HYOIDES, Ὑοειδες, in *Anatomy*. The *os hyoides*, called alſo *bicorne*, is a bone ſituate in the middle ſpace between the angles of the lower jaw, or at the root of the tongue, making, as it were, the baſis or foundation thereof.

It is thus called from its imperfect reſemblance of the Greek upſilon Υ; the word being formed of υ and ειδος, *form*; for which reaſon it is alſo called *ypſiloides*, and *hypſiloides*.

It is diſtinguiſhed into the *baſis*, which is the anterior part, and is the broadeſt and thickeſt; two large *cornua*, or *horns*, which are the lateral parts, and two ſmall *cornua* or appendices, which are the ſuperior parts, to the upper end of which other appendices are frequently joined; whence alſo the appellation *bicorne* and *ceratoides*.

The baſis of the *hyoides* is ſituated tranſverſely, and is about a thumb's breadth long on the outer ſide, which is unequally convex; the inner being unequally concave. It is half a finger broad, and has a ſmall protuberance in the middle. The cornua are an inch and half long, and broader at bottom than at the extremes, which are about two inches aſunder.

It has two cartilaginous proceſſes, which oſſify in adults, called *cornicula*, faſtened about the juncture of its cornua with the baſis: they are tyed to the proceſſus ſtyloides by long ſlender ligaments; though ſometimes between them and the ſtyloides there is found a ſmall muſcle, beſide the ſtyloceratohyoideus.

The baſis of this bone lies, as it were, on the head of the larynx; and its horns are faſtened by ligaments to the upper proceſſes of the cartilago ſcutiformis, and ſtyloides.

It is moved by five pair of muſcles; viz. the ſternohyoideum, the coracohyoideum, the mylohyoideum, the geniohyoideum, and ſtylohyoideum.

The chief uſe of this bone is to be the baſis and ſupport of the tongue. The pliableneſs of the ſmall *cornua* is ſaid likewiſe to contribute to the perfection of ſinging.

HYO-PHARYNGÆI, in *Anatomy*, are three pair of muſcles, inſerted in the baſis, and in the ſmall and great cornua of the os hyoides.

HYOSCIAMUS, in *Botany*. See Henbane.

Hyosciamus *Peruvianus*, *henbane of Peru*, a name by which Dodonæus and many other authors have called the tobacco plants, more uſually known by the name nicotiana.

HYOSERIS, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs; with a naked receptacle, ſub-equal calyx, and ſcarce diſcernible capillary down.

HYOSYRIS, in *Botany*, a name given by Pliny and ſome other authors to the common knapweed, or *jacea nigra*.

HYOTHYROIDÆ, compounded of *hyoides*, and *thyroides*, in *Anatomy*, a pair of muſcles of the larynx; which, ariſing from the anterior part of the os hyoides, are inſerted into the cartilago thyroides. They ſerve as antagoniſts to the ſternothyroides, and lift up the thyroid cartilage.

HYPACTIC *medicines*, formed of ὑπαγω, *I take away*, a term uſed by ſome authors for cathartic medicines.

HYPÆTHROS, or Hypæthrion, ʽΥπαιθριον, formed of ὑπο, *under*, and αιθρα, *air*, in the *Ancient Architecture*, a kind of temple, open at the top, and thereby expoſed to the air.

The *hypæthron*, according to Vitruvius, is an open building or portico, ſuch as anciently were certain temples that had no roof or covering. Of this we have an inſtance, in the temple of Jupiter Olympius, built by Coſſutius, a Roman architect at Athens.

Of *hypæthrons*, ſome were decaſtyle, others pycnoſtyle; but they had all rows of columns within-ſide, forming a kind of peristyle; which was eſſential to this ſort of temple.

HYPALLAGE, *immutation*; a grammatical figure, whereby, of different expreſſions which give the ſame idea, we make choice of that which is leaſt natural and obvious; or, when there is a mutual permutation or change of caſes, moods, regimens, &c.

The term is formed of ὑπαλλαττω, *I change*, compoſed of ὑπο and αλλαττω, *I change*; of αλλος, *another*.

As in this inſtance, *Dare claſſibus auſtros*; inſtead of *Dare claſſes auſtris*.

HYPAPANTE, or Hypante, a name which the Greeks give to the feaſt of the purification of the holy Virgin; or the preſentation of Jeſus in the temple.

The words are Greek, ὑπαντη, and ὑπαπαντη, which properly ſignify *humble*, and *lowly meeting*; being compounded of ὑπο, *under*, *beneath*, and αντaω, or απανταω, *I meet*; of αντι, *contra*, *againſt*. The denominations are taken from the meeting of old Simeon, and Anna the propheteſs, in the temple, at the time the child Chriſt Jeſus was brought thither.

HYPATE, in the *Ancient Muſic*, an appellation given to the loweſt chord or ſound of a tetrachord.

The word is Greek, ὑπατη, which ſome Latin interpreters tranſlate by *ſuprema*; as they tranſlate νητη, by *ultima* or *ima*.

Dr. Wallis ſays, that the firſt contrivers of theſe names took, contrary to our cuſtom, the grave for the higheſt place, and the acute for the loweſt of their ſchemes. This was the practice of Boethius; and Nichomachus, in the heptachord lyre, aſcribes the *hypate* to Saturn, and the *neate*, or *nete*, to the Moon. Some however interpret ὑπατος, as if it were ὑποατος, but erroneouſly, according to the learned doctor juſt quoted, who obſerves, that Homer calls Jove ʽΥπατον κρειοντων, as if ὑπατον were derived from ὑπερτατον. Afterwards it is ſaid, the grave was taken for the loweſt, and the acute for the higheſt place, agreeably to our notions. Some think that the *hypate* might obtain its name from being placed higheſt in the lyre. Martianus Capella and Boethius, tranſlate *hypate*, *principalis*; and *parypate*, *ſubprincipalis*. Alſo Ariſtides Quintilianus chooſes to call the *hypate* firſt, rather than ſupreme or higheſt, and calls the *nete* laſt, inſtead of loweſt. Perhaps the truth of the matter is, that the *hypate* was called higheſt or loweſt, according as muſicians conſidered the deſcending or the aſcending ſcale. The moveable chord next the *hypate*, was called *parypate*; and that next the *nete* was called *paranete*. See Tetrachord and Interval.

Hypate *hypaton*, in the *Ancient Greek Scale*, was the note next to the proſlambanomenos, and anſwers to the loweſt *mi* of Guido's ſcale. See Diagram and Interval.

Hypate *meſon*, in the *Greek Scale of Muſic*, was the firſt note of the meſon, and the laſt of the hypaton tetrachord. It anſwers to *elami* of the Guidonian ſcale. See Diagram and Interval.

HYPECOUM, in *Botany*, a genus of the *tetrandria digynia* claſs. Its characters are theſe: the flower has four petals, and a two-leaved empalement; and has four ſtamina ſituated between the petals; in the center is placed an oblong cylindrical germen, which becomes a long, compreſſed, jointed pod, which is incurved, with one roundiſh compreſſed ſeed in each joint. There are three ſpecies.

The juice of this plant is of a yellow colour, reſembling that of celandine; and is affirmed by ſome eminent phyſicians to have the ſame effect as opium. Miller.

HYPENEMIUS, an epithet applied by authors to barren eggs, or ſuch as a hen lays before ſhe has been trod by the cock. They are alſo called *zephyria ova*, and had both theſe names from the winds being ſuppoſed to generate them.

HYPER, a Greek word uſed in the compoſition of divers terms derived from that language.

The Greek prepoſition ὑπερ, *hyper*, literally ſignifies *above*, *beyond*; and, in compoſition, it expreſſes ſome exceſs, or ſomething beyond the ſignification of the ſimple word it is joined with. Hence,

HYPERBATON, or Hyperbasis, in *Grammar* and *Rhetoric*, is a transposition, or a figurative conſtruction, inverting the natural and proper order of the terms of a diſcourſe.

The word is ὑπερϐατον, or ὑπερϐασις, derived of ὑπερϐαινω, *tranſgredior*, *I go beyond*; formed of ὑπερ, *ultra*, *beyond*, and βαινω, *eo*, *I go*.

The *hyperbaton*, Longinus obſerves, is no other than a tranſpoſal of ſentiments, or words, out of the natural order and method of diſcourſe, and always implies great violence, or ſtrength of paſſion, which naturally hurries a man out of himſelf, and diſtracts him variouſly. Thucydides is very liberal in *hyperbatons*.

Quintilian calls the *hyperbaton*, *verbi tranſgreſſio*. It is of uſe to enliven and animate the diſcourſe: it is very proper to expreſs a violent paſſion, and repreſent an agitation of mind in the livelieſt manner.

HYPERBIBASMUS, ʽΥπερϐιϐασμος, in *Rhetoric*, a figure which inverts the order of conſtruction. Cornelius Nepos gives an inſtance of it in his Life of Chabrias: *Athenienſes diem certam Chabriæ præſtituerunt, quam ante domum niſi rediſſet*, &c. for *ante quam*.

HYPERBOLA, in *Geometry*, one of the curve lines, formed by the ſection of a cone. See Conic *ſection*.

The *hyperbola* ariſes when the plane that cuts the cone is not parallel to one of its ſides, as it is in the *parabola*; but diverges from it outwards, not inward, as in the *ellipſis*.

Thus: if the cone A B C (ſee *Tab. Conics*, *fig.* 27.) be ſo cut, as that the axis of the ſection D Q continued, concur with the ſide of the cone A C, continued to E; the curve ariſing from this ſection is an *hyperbola*.

Some authors define the *hyperbola* to be, a ſection of the cone by a plane parallel to its axis; but this definition is faulty: for though it be true, that ſuch a ſection really deſcribes an *hyperbola*; yet it is likewiſe true, that a thouſand others may be deſcribed where the plane is not parallel to the axis, and which of conſequence are not included in the definition.

Authors ſometimes call the plane terminated by this curve, an *hyperbola*; and in reſpect thereof, call the curve itſelf, the *hyperbolic line*.

An *hyperbola* may be defined, with reſpect to its properties, to be a curve-line, wherein the ſquare of the ſemiordinate is to the rectangle of the abſciſs into a right line compoſed of the ſame abſciſs, and a given right line called the *tranſverſe axis*, as another given right line, called the *parameter* of the axis, is to the tranſverſe axis: or it is a curve line, calling the ordinate y, abſciſs x, and parameter b, wherein $a y^2 = a b x + b x x$, that is, $b : a :: y^2 : a x + x^2$.

In the *hyperbola*, a mean proportional between the tranſverſe axis and parameter, is called the *conjugate axis*: and if the tranſverſe axis AB (*Tab. Conics*, *fig.* 27, *n.* 2.) be joined directly to the axis AX, and be biſected in C; the point C is called the *centre* of the *hyperbola*.

If a right line DE paſs through the vertex A, *fig.* 20, parallel to the ordinate Mm, it is a tangent to the *hyperbola* in A.

If a right line DE be drawn through the vertex A of an *hyperbola* parallel to the ordinate Mm, and be equal to the conjugate axis, *viz.* the parts DA and AE equal to the ſemi-axis; and right lines CF and CG be drawn from the centre C through D and E; thoſe lines are called *aſymptotes* of the *hyperbola*.

The ſquare of the right line CI, or AI, is called the *power* of the *hyperbola*.

Properties of the Hyperbola. 1. In the *hyperbola*, the ſquares of the ſemiordinates are to each other, as rectangles of the abſciſs into a certain right line compoſed of the abſciſs and tranverſe axis. Hence, as the abſciſſes x increaſe, the rectangles $a x + x^2$, and conſequently the ſquares of the ſemi-ordinates y^2; and therefore the ſemiordinates themſelves increaſe. The *hyperbola*, therefore, continually recedes from its axis.

2°. The ſquare of the conjugate axis is to the ſquare of the tranſverſe, as the parameter to the tranſverſe axis. And hence, ſince $b : a :: PM^2 : AP \times PB$, the ſquare of the conjugate axis, is to the ſquare of the tranſverſe, as the ſquare of the ſemiordinate is to the rectangle of the abſciſs into a line compoſed of the abſciſs and tranſverſe axis.

3°. *To deſcribe an* hyperbola, by a continued motion; the tranſverſe axis, and the diſtance from the vertex, being given. In the two foci F and Z, *fig.* 28. fix two nails or pins; and to one of them, in F, tie a thread, FMC, faſtening the other end C to the ruler CZ, which exceeds the ſame by the tranſverſe axis AB. The other end of the ruler being perforated, put it on the pin Z; and fixing a ſtyle to the thread, move the ruler. Thus will the ſtyle trace out an *hyperbola*. Again, with the ſame data, any number of points in an *hyperbola* are eaſily found, which may be connected into an *hyperbola*. Thus, from the focus Z, with any interval Z *m* greater than AB, deſcribe an arch; and making *z b*=AB; with the remaining interval *b m*, from the point F, draw another arch interſecting the former in *m*: therefore Z*m*—F*m*=AB; *m* is a point in the *hyperbola*. And ſo of the reſt.

4°. If in an *hyperbola*, the ſemiordinate PM, *fig*. 20. be produced till it meet the aſymptote in R; the difference of the ſquares of PM and PR is equal to the ſquare of the conjugate ſemi-axis DA or C *d*. Hence as the ſemiordinate PM increaſes, the right line MR decreaſes, and therefore the *hyperbola* itſelf approaches nearer to the aſymptote; but it can never abſolutely meet it, becauſe as $PR^2 - PM^2 = DA^2$; it is impoſſible $PR^2 - PM^2$ ſhould ever become $=0$.

5°. In an *hyperbola*, the rectangle of MR and M *r* is equal to the difference of the ſquares PR^2 and PM^2. And hence the ſame rectangle is equal to the ſquare of the conjugate ſemi-axis DA; and conſequently all rectangles formed in the ſame manner are equal.

6°. If *q m* be parallel to the aſymptote CF, the rectangle of *q m* into C *q* is equal to the power of the *hyperbola*. And hence, 1°. If we make $CI = AI = a$, $Cq = x$, and $qm = y$, we ſhall have $a^2 = xy$; which is the equation expreſſing the nature of the *hyperbola* between its aſymptotes. 2°. The aſymptotes, therefore, being given in poſition, and the ſide of the power of CI or AI; if in one of the aſymptotes CG, you take any number of abſciſſes; ſo many ſemiordinates will be found, and by them any number of points in an *hyperbola* will be determined by finding third proportionals to the abſciſs, and the ſide of the power CI.—3°. If the abſciſſes be not computed from the centre C, but from ſome other point L; and CL be ſuppoſed $=b$; we ſhall have $Cq = b + x$; and conſequently $a^2 = by + xy$.

7°. In the *hyperbola*, as the tranſverſe axis is to the parameter, ſo is the aggregate of the tranſverſe ſemi-axis and abſciſs, to the SUBNORMAL: and as the aggregate of the tranſverſe ſemi-axis and abſciſs is to the abſciſs; ſo is the aggregate of the entire tranſverſe axis and abſciſs to the SUBTANGENT.

8°. If within the aſymptotes of an *hyperbola*, from a point thereof, *m*, *fig*. 29. be drawn two right lines *H m* and *m* K, and other two LN and NO, parallel to the ſame; H *m* × *m* K=LN × NO. And the ſame will hold, ſf you draw L N *o* parallel to the right line thus drawn H *m* K; *viz*. in this caſe, likewiſe, H *m* × *m*K=LN × N *o*. Conſequently, all rectangles formed after this manner of right lines drawn parallel either to the ſame line HK, or to two, H*m* and *m*K; are equal to each other.

9°. If a right line HK be drawn in any manner between the aſymptotes of an *hyperbola*; the ſegments H E and *m* K intercepted on each ſide between the *hyperbola* and aſymptotes are equal. And hence, if E*m*=*o*; the right line *H* K is a tangent to the *hyperbola*: conſequently the tangent FD intercepted between the aſymptotes, is biſected in the point of contact V. Laſtly, the rectangle of the ſegments H *m* and *m* K, parallel to the tangent FD, is equal to the ſquare of half the tangent DV.

10°. If from the centre C, *fig*. 30, you draw a right line CA, and through the point A a tangent E A D terminated by the aſymptotes, CA is a ſemi-tranſverſe diameter, and E A D is equal to its conjugate diameter: and the ſquare of the ſemiordinate in an *hyperbola* PM drawn parallel to the conjugate diameter is to the rectangle of the abſciſs, and aggregate of the tranſverſe diameter AB, and abſciſs A P, as the ſquare of the conjugate ſemidiameter AD, is to the ſquare of the tranſverſe ſemidiameter CA. Hence if you ſuppoſe $AP = x$, $PM = y$, $AB = a$, $DA = c$, we ſhall have $y^2 = \frac{(c^2 a x + c^2 x^2)}{\frac{1}{4} a^2} = \frac{4c^2 x}{a} + \frac{4c^2 x^2}{a^2}$; and making $\frac{4c^2}{a} = b$, we ſhall have $y^2 = bx + \frac{bx^2}{a}$. So that the ſame equation defines the nature of the *hyperbola*, in reſpect of its diameter, as expreſſes it in reſpect of its axis; and the parameter is a third proportional to the conjugate diameters D E and A B.

11°. If from the vertex A, and any point of the *hyperbola* N, you draw A F and T N parallel to the aſymptote C R; the rectangle of T N into T C will be equal to the rectangle of FA into FC. Hence, if $TC = x$, $TN = y$, $FC = a$, and $FA = b$; the equation expreſſing the nature of an *hyperbola* within its aſymptotes, in reſpect of its diameter, will be $xy = ab$.

12°. An aſymptote being taken for a diameter; divided into equal parts, and through all the diviſions, which form ſo many abſciſſes continually increaſing equally, ordinates to the curve being drawn parallel to the other aſymptote; the abſciſſes will repreſent an infinite ſeries of natural numbers; and the correſponding *hyperbolic* or aſymptotic ſpaces, will repreſent the ſeries of LOGARITHMS of the ſame numbers. Hence different *hyperbolas* will furniſh different ſeries of logarithms to the ſame ſeries of natural numbers; ſo that to determine any particular ſeries of logarithms, choice muſt be made of ſome particular *hyperbola*. See CONIC *ſection* and *Logarithmic* CURVE. Now, the moſt ſimple of all the *hyperbolas* is the equilateral one, i. e. that whoſe aſymptotes make a right angle between them. This, M. De Lagni alleges in favour of the BINARY *arithmetie*, as being the reſult of ſuch equilateral *hyperbola*.

Ambigenal HYBERBOLA is that which has one of its infinite legs inſcribed, and the other circumſcribed.

Equilateral HYPERBOLA is that wherein the conjugate axes A B, *fig*. 20. and D E, are equal.

Properties of the equilateral HYPERBOLA. Since the parameter is a third proportional to the conjugate axes, it is alſo equal to the axis: wherefore, if in the equation $y^2 = bx + \frac{bxx}{a}$ you ſuppoſe $b = a$; the equation $y^2 = ax + x^2$ will expreſs the nature of the equilateral *hyperbola*.

And hence the ſquares of the ordinates y^2 and z^2 are to each other as $ax + x^2$ and $av + v^2$: that is, as the rectangles of the abſciſſes into right lines compoſed of the abſciſs and parameter.

If you ſuppoſe $PC = x$, $CA = r$, then will $AP = x - r$, and $PB = r + x$. Conſequently $y^2 = x^2 - r^2$.

And ſince $AE = CA$: the angle ACE will be half right; and conſequently the angle of the aſymptotes FCG a right angle.

Infinite HYPERBOLAS, or HYPERBOLAS *of the higher kinds*, are thoſe defined by the equation $ay^{m+n} = bx^m (d+x)^n$. Hence in the infinite *hyperbolas* $ay^{m+n} : av^{m+n} = bx^m (a+x)^n : bz^m (a+z)^n$: that is $y^{m+n} : v^{m+n} :: x^m (a+x)^n : z^m (a+z)^n$. See HYPERBOLOID.

As the *hyperbola* of the firſt kind, or order, has two aſymptotes; that of the ſecond kind, or order, has three; that of the third, four, *&c*.

In reſpect of theſe, the *hyperbola* of the firſt kind is called the *Apollonian* or *conical hyperbola*.: it is thus called in contradiſtinction to the *hyperbolas* of the higher kinds. It is called *hyperbola* from ὑπερϐαλλειν, *to exceed*, becauſe in this curve the ſquare of the ordinate or y^2 is equal to $bx + \frac{bx^2}{a}$, and therefore exceeds the product of the parameter *b*, by the abſciſs *x*.

Inſcribed HYPERBOLA. See INSCRIBED.

For the locus of an HYPERBOLA, ſee LOCUS.

For the quadrature of an HYPERBOLA, ſee QUADRATURE.

Conjugate HYPERBOLAS, a name given to four *hyperbolas*, when the firſt and ſecond axes of two oppoſite *hyperbolas* are the ſecond and firſt axes of two other oppoſite *hyperbolas*.

Thus if two oppoſite *hyperbolas* A M, *a m* (*Tab*. III. *Analyſis*, *fig*. 59.) have the line A *a*, for their firſt axis, and the line B *b* for their ſecond axis; and if two other oppoſite *hyperbolas* B S, *b s*, have on the contrary, B *b* for their firſt axis, and A *a* for their ſecond axis, theſe two *hyperbolas* B S, *b s* are ſaid to be conjugate to the *hyperbolas* A M, *a m*, and the four together are called conjugate *hyperbolas*.

The aſymptotes H C *h*, G C *g*, of the *hyperbolas* A M, *a m*, will alſo be the aſymptotes to the *hyperbolas* B S, *b s*. See L'Hopital, Sect. Coniq. art. 132.

Hyperbolas of all degrees may be expreſſed by the equation $x^m y^n = a^{m+n}$ where *a* is a given quantity, *x* an abſciſſa taken on the aſymptote, and *y* an ordinate to the aſymptote.

If from any point B of ſuch an *hyperbola*, (*Tab*. III. *Analyſis*, *fig*. 60.) a line B C be drawn parallel to one aſymptote, and terminated by the other, and the parallelogram B C A D be completed: then will this parallelogram be to the *hyperbolic* ſpace B C E O infinitely produced, as *m*—*n* to *n*. L'Hopital. Sect. Coniq. art, 240. Hence, 1°. Whence *m*—*n* is poſitive: that is, when *m* is greater than *n*, we may always find the quadrature of ſuch *hyperbolic* ſpaces.

2. When $m = n$, then $m - n = 0$, and the ratio of the parallelogram is to the *hyperbolic* area as *o* to *n*. In which caſe this area becomes infinite.

3. When *m* is leſs than *n*, *m*—*n* is negative; and in this caſe the parallelogram is to the *hyperbolic* ſpace as a negative number is to a poſitive; which led Dr. Wallis and others to ſay, that theſe *hyperbolic* areas were more than infinite. See L'Hopital. Sect. Coniq. art. 242.

But the truth is, this ratio of a negative number to a poſitive only ſhews, that the ſpace bounded by D B (the other ſide of the parallelogram) by the curve and aſymptote infinitely produced, is to CBDA as *m* to *n*—*m*. L'Hopital, ibid. and Maclaurin's Fluxions, art. 294.

Although the area comprehended between the Apollonian *hyperbola* and its aſymptote, be infinite, yet any ſegment, or ſector of this curve, may be ſquared by means of logarithms. For inſtance: ſuppoſe it required to find the area of the *hyperbolic* ſegment EBCF, (*Tab.* III. *Analyſis*, *fig* 61.) compriſed between the arch of the curve ERF, the lines EB, FC parallel to the aſymptote AD, and BC, the portion of the other aſymptote intercepted between them. Then if ABED, the parallelogram of the *hyperbola*, be taken as unity, the ſpace EBCF will be Napier's logarithm of the ratio of AC to AB, or of BE to FC. Hence if we had tables of ſuch logarithms, we might find the area of EBCF by ſubducting the logarithm of FC from that of BE, and the difference would expreſs the ratio of the ſegment to the parallelogram ABED or 1. But as ſuch tables are not extant, ſome farther trouble is requiſite to convert the common or Brigg's logarithm into Napier's. Take therefore from the common tables the LOGARITHM of the ratio of BE to FC, that is, the difference of their logarithms, and multiply this difference by 2.3025851, the *hyperbolic* logarithm of 10, the product will give the ratio of the ſegment to the parallelogram ABED or 1. Thus ſuppoſing BE=36, and CF=5, and the parallelogram ABED=1.

From 1 5563025=log. of 36.
Subduct 0.6989700=log. of 5.
Difference 0.8573325=log. of $\frac{36}{5}$.

Then 0 8573325 × 2.3025851 = 1.9740810 for the area of the ſegment BEFC. This multiplication may be performed in Oughtred's contracted way.

Huygens, to avoid the multiplication by 2.302, &c finds its logarithm=0.3622156887, and always adds this to the logarithm of the difference before found, and then finds the number correſponding to this ſum. See Horol. Oſcillat. and Grandi, Dem. Theor. Huygen, in fine.

If it were propoſed to find the area of the ſector AERF; as this is equal to the ſegment EBCF, the ſame method may ſerve. But it may alſo be done by ſeveral other analogies; for which ſee Cotes, Harm. Menſur. p. 10, 13. See alſo p. 25, 26, of the ſame book. See QUADRATURE.

HYPERBOLE, Ὑπερϐολη, *ſuperlatio*, formed of the verb ὑπερϐαλλειν, *to exceed*, in *Rhetoric*, a figure, whereby the truth and reality of things are exceſſively either enlarged or diminiſhed. See EXAGGERATION.

The character of an *hyperbole* is to exaggerate or extenuate the idea of the thing ſpoken of, beyond the bounds of truth, or even probability. As, He ran ſwifter than the wind; he went ſlower than a tortoiſe, *&c.*

Hyperboles, ſays Seneca, lie without deceiving; they lead the mind to truth by fictions; they convey the ſentiment intended, though by expreſſing it in terms which render it incredible. The *hyperbole* premiſes too much, in order to make you conceive enough. There is nothing faulty in an *hyperbole*, when it is *ultrà fidem*, as Quintilian ſays, provided that it be not *ultrà modum*.

Ariſtotle obſerves, that *hyperboles* are the favourite figures of young authors, who love exceſs and exaggeration; but that philoſophers ſhould not uſe them without a great deal of reſerve.

The pitch to which an *hyperbole* may be carried, is a point of great delicacy; to carry it too far, is to deſtroy it: it is of the nature of a bow-ſtring, which by immoderate tenſion, ſlackens; and frequently has an effect quite contrary to that intended. Longinus.

Thoſe *hyperboles* are beſt, which are latent, and are not taken for *hyperboles*. For this reaſon, they ſhould ſcarce ever be uſed but in a paſſion, and in the middle of ſome important incident: ſuch is the *hyperbole* of Herodotus, ſpeaking of the Lacedæmonians, who fought at Thermopylæ: 'They defended themſelves, for ſome time, with 'the arms that were left them, and at laſt with their 'hands and teeth; till the Barbarians, continually 'ſhooting, buried them, as it were, with their ar-'rows.' Now what likelihood is there, that naked men ſhould defend themſelves with their hands and teeth againſt armed men; and that ſo many perſons ſhould be buried under their enemies' arrows? Yet does there appear ſome probability in the thing, by reaſon it is not fought for the ſake of the figure; but the *hyperbole* ſeems to ariſe out of the ſubject itſelf. Id.

Of the like kind is that paſſage of a comic poet, mentioned by Longinus: 'He had lands in the country no larger than a Lacedæmonian epiſtle.'

There are certain manners of tempering the harſhneſs of *hyperboles*, and giving them an air of probability. Virgil ſays, that to ſee the fleets of Antony and Auguſtus at the battle of Actium, one would have taken them for the Cyclades floating on the water: and Florus, ſpeaking of the expedition wherewith the Romans built a number of veſſels in the firſt Punic war, ſays, 'It ſeemed 'not that the ſhips were built by workmen, but that the 'trees were transformed into ſhips by the gods.' They do not ſay, that the ſhips were floating iſlands; nor that the trees were metamorphoſed into ſhips; but only that one might have taken them to be ſo. This precaution ſerves as a kind of paſſport to the *hyperbole*, if we may be allowed the phraſe, and makes it go down even in proſe; for what is excuſed before it is ſaid, is always heard favourably, how incredible ſoever it be. Bouhours. The exceſs in this trope is called AUXESIS; as when we ſay of any thing that is very high, *it reaches to the ſkies*: the defect or contrary extreme is termed MEIOSIS; as when we ſay of a very lean perſon, *he is nothing but ſkin and bones*, or *a mere ſkeleton*.

HYPERBOLEON, in *Ancient Muſic*, is a name which the Greeks gave to the fifth or the moſt acute of their *tetrachords*; imagining this to be ὑπερϐολαιος, *ſuperexcellent*.

HYPERBOLIC, or HYPERBOLICAL, ſomething relating either to an HYPERBOLE, or an HYPERBOLA.

HYPERBOLIC *Conoid*. See CONOID.

HYPERBOLIC *Cylindroid*, is a ſolid figure, whoſe generation is given by Sir Chriſtopher Wren, in the Philoſophical Tranſactions.

Two oppoſite *hyperbolas* being joined by the tranſverſe axis, and through the centre, a right line being drawn at right angles to that axis; and above that, as an axis, the *hyperbolas* being ſuppoſed to revolve; by ſuch revolution, a body will be generated, which is called the *hyperbolic cylindroid*, whoſe baſes, and all ſections parallel to them, will be circles. In a ſubſequent Tranſaction, the ſame author applies the new figure to the grinding of *hyperbolical* glaſſes; affirming, that they muſt be formed this way, or not at all.

HYPERBOLIC *Leg* of a curve, is that which approaches infinitely nearer to ſome aſymptote.

Sir Iſaac Newton reduces all curves, both of the firſt and of the higher kinds, into thoſe with *hyperbolic legs*, and thoſe with parabolic ones. See CURVE.

HYPERBOLIC *Line* is uſed by ſome authors for what we call the *hyperbola* itſelf.

In this ſenſe, the plane ſurface, terminated by the curve line, is called the *hyperbola*; and the curve line that terminates it, the *hyperbolic line*.

HYPERBOLIC *Logarithm*. See LOGARITHM.

HYPERBOLIC *Mirror*. See MIRROR.

HYPERBOLIC *Space*, in the *Higher Geometry*, the area or ſpace contained between the curve of the hyperbola, the aſymptote, and the ordinate.

HYPERBOLICUM *acutum*, a ſolid made by the revolution of the infinite area of the ſpace contained between the curve of the *hyperbola* and its aſymptote. This produces a ſolid infinitely long, and yet is demonſtrated to be equal to a finite ſolid or body. See *Logarithmic* CURVE.

HYPERBOLIFORM *Figures*, are ſuch curves as approach, in their properties, to the nature of the *hyperbola*; called alſo *hyperboloides*.

HYPERBOLOIDES, are *hyperbolas* of the higher kind, whoſe nature is expreſſed by this equation: $a y^{m+n} = b x^m (a+x)^n$. See HYPERBOLA.

HYPERBOREAN, Ὑπερϐορεος, in the *Ancient Geography*.—The ancients denominated thoſe people and places *Hyperborean*, which were to the northward of the Scythians. They had but very little acquaintance with theſe *Hyperborean* regions; and all they tell us of them is very precarious, and much of it falſe.

Diodorus Siculus ſays, the *Hyperboreans* were thus called becauſe they dwelt beyond the wind *Boreas*; ὑπερ, ſignifying *above* or *beyond*; and Βορεας, *Boreas*, the north wind. This etymology is very natural and plauſible; notwithſtanding all that Rudbecks has ſaid againſt it, who would have the word to be generally Gothic, and to ſignify *nobility*.

Herodotus doubts, whether or no there were any ſuch thing as *Hyperborean* nations: Strabo, who profeſſed that he believed there were, does not take *Hyperborean* to ſignify *beyond Boreas*, or the north, as Herodotus underſtood it: the prepoſition ὑπερ, in this caſe, he ſuppoſes only to help in forming a ſuperlative; ſo that *hyperborean*, on his principle, means no more than *moſt northern*: by which it appears the ancients ſcarce knew themſelves what the name meant by it. Moſt of our modern geographers, as Hoffman, Cellarius, &c. have placed the *Hyperboreans* in the northern parts of the European continent, among the Siberians and Samoieds: according to them the *Hyperboreans* of the ancients were thoſe, in general, who lived fartheſt to the north. The *Hyperboreans* of our days are thoſe Ruſſians who inhabit between the Volga and the White Sea. According to Cluvier, the name Celtes was ſynonymous with that of *Hyperboreans*.

HYPERCATALECTIC, Ὑπερκαταληκτικος, compoſed of ὑπερ, *over*, *beyond*, and καταληγω, *I put to the number*, *I add*; ſo that *hypercatalectic* denotes as much as *ſuperadded*; in the *Greek and Latin Poetry*, is applied to verſes which have one or two ſyllables too much; or beyond the regular meaſure. See VERSE.

The Greek and Latin verſes are diſtinguiſhed, with reſpect to their meaſure, into four kinds: *acatalectic* verſes, where nothing is wanting at the end; *catalectic*, which want a ſyllable at the end; *brachycatalectic*, which want a whole foot at the end; and laſtly, *hypercatalectic*, which have one or two ſyllables too many. Theſe laſt are alſo called *hypermeters*.

HYPERCATHARSIS, 'Υπερκαθαρσις, compounded of the Greek υπερ, *ſupra*, and καθαριζω, *I purge*, in *Medicine*, *ſuper-purgation*; a too violent, and exceſſive PURGATION.

HYPERCHIRIA, in *Mythology*, a title of Juno, under which ſhe was worſhipped in Laconia.

HYPERCRISIS, 'Υπερκρισις, compound of ὑπερ, *ſupra*, and κρισις, *criſis*, *judgment*, in *Medicine*, any immoderate critical excretion.

Thus, when a fever terminates in a looſeneſs, the humours ſometimes flow off faſter than the ſtrength can bear, and are therefore to be checked. This is a *hypercryſis*.

HYPERCRITIC, compounded of ὑπερ, *ſupra*, and κριτικος of κριτης, *judex*, of κρινω, *I judge*; an over-rigid cenſor, or critic; one who will let nothing paſs, but animadverts ſeverely on the ſlighteſt fault.

HYPERDIAZEUXIS, in *Ancient Muſic*, denotes the entire interval of the DIAPASON between two tetrachords; as between the *hyperbaton* and *hyperboleon*.

HYPER-DORIC, in *Ancient Muſic*, was the name of one of their modes, called alſo *Mixolydian*: it obtained this appellation, becauſe its fundamental was one fourth above that of the Doric. See MODE.

HYPERDULIA, 'Υπερδουλεια, compoſed of ὑπερ, *above*, and δουλεια, *worſhip*, in the *Romiſh Theology*, is the worſhip rendered to the holy VIRGIN.

The worſhip offered to ſaints is called *dulia*; and that to the mother of God, *hyperdulia*; as being ſuperior to the former.

HYPER-ÆOLIAN, in *Ancient Muſic*, is one of the names of the Greek modes; ſo called, becauſe its fundamental was one fourth above that of the Æolian, from which it derived its origin.

HYPERICOIDES, in *Botany*. See St. PETER's *wort*.

HYPERICUM, in *Botany*. See JOHN's *wort*.

HYPERINESIS, of ὑπερ, and ινησις, *purgation*, a word uſed by Hippocrates for any exceſſive evacuation, but moſt frequently in the ſame ſenſe as hypercatharſis, an over-purging.

HYPER-IONIAN, in *Ancient Muſic*, one of the Greek modes, whoſe fundamental was one fourth above the Ionian: It is the 12th mode aſcending in the ſcale.

HYPER-LYDIAN, was the moſt acute of the fifteen Greek modes. Its fundamental was a fourth above the Lydian.

HYPERMETER, compoſed of υπερ *ſupra*, and μετρον, *meaſure*, in the *Ancient poetry*, the ſame with HYPERCATALECTIC.

HYPEROA, a word applied by authors to the upper part, or palate of the mouth, and the baſis cerebri. It properly ſignifies any upper place.

HYPEROCHE, in *Muſic*, is the difference between the enharmonic and chromatic dieſes. It is expreſſed by the proportion of 3125 to 3072: for, $\frac{3125}{3072}=\frac{25}{24}:\frac{128}{125}$. Mr. Henfling has made uſe of this term. Miſc. Berol. vol. i. p. 279, 280.

HYPERO-PHARYNGÆI, in *Anatomy*, a name given by M. Santorini to the PERYSTAPHYLO-PHARYNGÆI muſcles.

HYPER-PHRYGIAN, in *Ancient Muſic*, called by Euclid *Hypermixolydian*, was the moſt acute of the thirteen modes of Ariſtoxenus.

HYPERSARCOSIS, 'Υπερσαρκωσις, in *Medicine* and *Surgery*, an exceſs of fleſh; or rather, a fleſhy excreſcence, ſuch as thoſe generally ariſing on the lips of wounds, &c.

HYPERTHYRON, formed of ὑπερ, *over*, and θυρα, *gate*, in the *Ancient Architecture*, a ſort of table uſed after the manner of a frieze, over the jambs of Doric doors and gates, and the lintels of windows. It lies immediately under the corona; and is by our workmen uſually called the *king piece*.

HYPETHRE, in *Ancient Architecture*, two rows of pillars ſurrounding, and ten at each face of any temple, &c. with a periſtyle within of ſix columns. See HYPÆTHROS.

HYPHEN, 'Υφεν, *in Grammar*, an accent or character, which implies, that two words are to be joined, or connected into one compound word.—As, *male-adminiſtration*, &c.

Hyphens ſerve alſo to connect the ſyllables of ſuch words as are divided by the end of the line.

HYPHIALTES, EPHIALTES, in *Mythology*, names given by the Greeks to certain rural divinities anſwering to the INCUBI of the Romans.

HYPNOTIC, 'Υπνωτικος, derived from ὑπνος, *ſleep*, in *Medicine*, a remedy which promotes or induces ſleep; called alſo *ſoporific* and *opiate*. See alſo NARCOTICS.

HYPNOTICUS *ſerpens*, the *ſleep-ſnake*, in *Zoology*, the name of an Eaſt Indian ſpecies of ſerpent, called by the Ceyloneſe *nintipolong*, a word importing the ſame ſenſe. It is of a deep blackiſh brown, variegated with ſpots of white, and is a very fatal kind in its poiſon, its bite always bringing on a ſleep which ends in death.

HYPNUM, in *Botany*, the name of a genus of moſſes of the *cryptogamia* claſs, the characters of which are theſe: the capſules or heads are uniform, and covered with a calyptra and operculum; they are uſually of an oval or oblong figure, and commonly ſtand on long pedicles which ariſe from the alæ of the leaves, and are ſurrounded at the bottom with a foliaceous or lanuginous bed different from the leaves; this covering of the bottom of the ſtalk, is called by authors perichætium, and is itſelf a ſufficient diſtinction of the *hypna* from all other moſſes, the brya, mnia, ſphagna, &c. having none of them any ſuch thing. To this is to be added, that the branches of the *hypnums* are uſually ſpread about upon the ground, and are perennial; and that there is what botaniſts call a *facies propria*, or peculiar look of the plant, which at firſt ſight diſtinguiſhes the genus to an obſerver uſed to ſuch things. Dillon. Hiſt. Muſc. p. 270.

As the family of the *hypna* is very numerous, they are uſually divided into ſeveral orders. Of the firſt order are thoſe *hypna* which have erect heads, or at leaſt ſuch as are but a little bent; and of this order the firſt ſeries comprehends ſuch as are pennated, or whoſe pinnæ are placed in two, ſometimes in three rows on each ſtalk, or in the ſame plane. The firſt diviſion of this ſeries comprehends thoſe which have flat and ſmooth pinnæ.

The ſecond diviſion of this ſeries of the *hypnums*, contains thoſe which have undulated and curled leaves.

The ſecond ſeries of the *hypnums* is that of the fern-like kinds, called by many fern-moſſes; theſe have their ſtalks every way ſurrounded with leaves, and their ramifications all placed in the ſame plane, ſo that they reſemble the ferns.

The third ſeries comprehends the ſquamoſe *hypnums*; that is, ſuch as have their leaves every way ſurrounding the ſtalks in the manner of ſcales. Of theſe the firſt diviſion contains ſuch as have their leaves and the ends of the branches bent downwards.

The ſecond diviſion of this ſeries of the *hypnums*, takes in thoſe which are ſquamoſe and dentated; a firſt ſubdiviſion of theſe alſo is eſtabliſhed, to comprehend ſuch as have their leaves ſtanding out, whether broad or narrow.

The ſecond ſubdiviſion of theſe *hypnums*, comprehends thoſe whoſe leaves being cloſely applied to the ſtalks, give them a cylindric figure.

The third diviſion of this order of *hypna*, comprehends thoſe called the *trichoide* and ſilky ones; theſe have extremely fine and ſmall leaves, placed in the manner of ſcales, one over another.

The ſecond order of the *hypnums* contains thoſe with pendulous heads.

The third order of the *hypna* contains a number of ſpecies leſs known than the others, and about which there is ſome doubt among authors, whether they are truly *hypna*, and regularly diſtinct from the others.

All theſe laſt are deſcribed by Pontedera, but imperfectly; and both they, and many of Micheli's, probably belong to ſome of the before mentioned ſpecies; but as they want in the deſcriptions and figures the diſtinguiſhing characters of the ſpecies, Dillenius has prudently avoided determining any thing about them. Ibid. p. 342.

HYPO, 'Υπο, a Greek particle, retained in the compoſition of divers words borrowed from that language; literally denoting *under*, *beneath*.—In which ſenſe it ſtands oppoſed to ὑπερ, *ſupra*, above.

HYPOBOLE, from υπο, and βαλλω, I *caſt*, or SUBJECTION, in *Rhetoric*, a figure, ſo called, when ſeveral things are mentioned, that ſeem to make for the contrary ſide, and each of them refuted in order. This figure, when complete, conſiſts of three parts; a propoſition, an enumeration of particulars with their anſwer, and a concluſion. Thus Cicero, upon his return from baniſhment, vindicates his conduct in withdrawing ſo quietly and not oppoſing the faction that ejected him. Pro. Dom. cap. 35.

HYPOCATHARSIS, 'Υποκαθαρσις, compounded of ὑπο, *under*, and καθαιρω, *I purge*, in *Medicine*, a too faint or feeble PURGATION.

HYPOCAUSTUM, Υποκαυστον, formed of the prepoſition

tion ὑπο, *under*, and the verb καιω, *I burn*, among the Greeks and Romans, was a ſubterraneous place, wherein was a furnace that ſerved to heat the baths.—Vitruvius calls it CALDARIUM.

The ancients had properly two ſorts of *hypocauſta*; the one called by Cicero *vaporarium*, and by others *laconicum* or *ſudatio*; which was a large ſweating bath, in which were three brazen veſſels called *caldarium*, *tepidarium*, and *frigidarium*, according to the water contained therein.

The other *hypocauſtum* was a ſort of *fornax* or oven to heat their winter parlours, or *cœnatiunculæ hybernæ*.

The latter *hypocauſtum* was called *alveus* and *fornax*; and the man that tended the fire, *fornacator*. See BATHS.

The remains of a Roman *hypocauſtum*, or ſweating-room, were diſcovered under ground at Lincoln, in 1739. We have an account of theſe remains in the Phil. Tranſ. N° 461. ſect. 29. See Abr. vol. ix. p. 455.

HYPOCAUSTUM, among the moderns is that part or place where the fire is kept that warms a STOVE, or HOT *houſe*.

HYPOCHÆRIS, in *Botany*, the name of a genus of plants of the *ſyngeneſia polygamia æqualis* claſs; the characters of which are theſe: the common cup is of an imbricated figure, and is ſwelled at the baſe, and compoſed of ſharp-pointed ſcales; the flower is of the compound kind, it is imbricated and uniform; the ſeparate flowers of which this is compoſed are numerous, and equal in ſize; each is compoſed of one leaf, and is narrow, of a ligulated ſhape, truncated, and divided into five ſegments at the edge; the ſtamina are five very ſhort and capillary filaments; the antheræ are cylindric and tubular; the germen of the piſtil ſtands under the flower; the ſtyle is capillary, and of the length of the ſtamina; the ſtigmata are two in number, and are reflex; the cup, after the flower is fallen, ſerves as a ſeed veſſel; its ſcales cloſe at the top, and it becomes of a roundiſh but pointed figure; the ſeeds are ſingle and oblong, and terminate in a ſubulated and pappoſe ſtalk; the receptacle is beſet all over with little chaffy ſubſtances; theſe are of the length of the ſeeds, and are placed between them. Linnæus makes this genus comprehend the *hypochæris* and the achyrophorus of Vaillant: the only difference between which is, that the *hypochæris* has a roundiſh cup all over imbricated, and a plumoſe down upon the ſeeds; whereas the achyrophorus has an oblong cup, which is imbricated only at the baſe, and a ſimple down on the ſeed.

HYPOCHONDRIA, Ὑποκονδρια, compoſed of the prepoſition ὑπο, under, and χονδρος, *cartilage*; q. d. *cartilagini ſubjacens*, or under the cartilages of the ribs, &c. in *Anatomy*, a ſpace on each ſide the epigaſtric region, or upper part of the lower belly. See ABDOMEN, and EPIGASTRIC.

The *hypochondria* compoſe the upper part of the epigaſtrium. They are ſituate on each ſide, between the cartilago enſiformis, the cartilages of the ribs, and the tip of the breaſt; and are divided, with reſpect to their ſituation, into *right* and *left*.

In the *right hypochondrium* the liver is found; and in the *left* the ſpleen, and a great part of the ſtomach.

Hippocrates ſometimes uſes the word *hypochondrium* for the whole lower venter or belly.

The *hypochondria* are ſubject to divers diſorders.

HYPOCHONDRIAC *affection*, or *paſſion*, in *Medicine*, a popular diſeaſe, otherwiſe called the *ſpleen*, *vapours*, &c. is a ſpaſmodico-flatulent affection of the ſtomach and inteſtines, ariſing from an irregularity of the periſtaltic motion, cauſed by the ſtagnation of the blood and vital fluids, between the nervous and muſcular coats of the inteſtines.

The *hypochondriac* is a very comprehenſive diſeaſe: it is variouſly denominated, according to the various ſymptoms it is attended with, and the various parts where it is ſuppoſed to be ſeated, or in which it ariſes.

When conceived as ſituate in the *hypochondriac* regions, or ariſing from ſome diſorder of the parts contained therein, *viz.* the ſpleen, liver, *&c.* it is properly called the *hypochondriacal diſeaſe*, *ſpleen*, &c.

When conceived as owing to ſome diſorder of the womb, it is called the HYSTERIC *affection*, &c.

And laſtly, when the flatulent rumblings in the inteſtines, belchings, *&c.* are conſidered, it is called the VAPOURS.

The *hypochondriac* is a very common and very obſtinate diſeaſe: few men of a ſedentary life, and fewer women, are free from it. It becomes daily more common in this country, owing, without doubt, to the increaſe of luxury, and ſedentary employments. Its ſymptoms are very numerous: the moſt uſual are, a pain in the ſtomach, windineſs, coſtiveneſs, vomitings, a ſwelling or diſtention of the *hypochondrium*, or upper part of the belly, noiſes and rumblings in the lower venter, wandering pains, a conſtriction of the breaſt, difficulty of breathing, palpitation of the heart, faintings, vigiliæ, inquietudes, ſwimming of the head, fear, ſuſpicions, melancholy, deliriums, &c. Not that all theſe accidents befal every perſon ſeized with this diſeaſe; but ſometimes ſome of them, and at other times others, according to the conſtitution, &c. of the patient.

In effect, the *hypochondriacal* is a very vague indeterminate ſort of diſorder. Dr. Sydenham obſerves, that its ſymptoms ape or emulate thoſe of moſt other diſeaſes; and that whatever part it is in, it produces ſomething like the common diſeaſes of that part.—Thus, in the head, it produces a ſort of apoplexy; fits like the epilepſy, called *hyſteric* fits; intolerable head-ach, &c. In perſons affected with the chloroſis, it produces a palpitation of the heart: ſometimes, though rarely, it ſeizes the lungs, and cauſes a continual dry cough: it alſo imitates the colic, and iliac paſſion, and ſometimes the ſtone, jaundice, &c. In the inteſtines it produces a diarrhœa; in the ſtomach, nauſeas: ſometimes it ſeizes the external parts, and particularly the back, which it renders chilly and painful; and the legs and thighs, which it ſwells ſo as to reſemble the dropſy: ſeizing the teeth, it reſembles the ſcurvy (indeed, Etmuller makes the ſcurvy itſelf to be only a great degree of this diſeaſe.) Laſtly, which is the moſt unhappy circumſtance of all, the patient is ſometimes more affected in mind than in body.

The primary ſeat of this diſeaſe is in the ſtomach and bowels, though it ſenſibly affects the animal ſpirits, and the nervous ſyſtem. To this purpoſe Hoffman ſays, that the periſtaltic motion in the bowels is retarded by ſpaſms. By ſome its cauſe is referred to an acid ſalt abounding in the maſs of blood; to which the ill diſpoſition of the ſtomach, and the other parts contained in the epigaſtrium, may greatly contribute. Purcel aſſigns crudities and indigeſtions as the prime cauſe. According to Sydenham, vehement motions of the body, or more uſually violent perturbations of the mind, as grief, anger, fear, &c. are its procatarctic cauſes. It is uſually brought on by long and ſerious attention to abſtruſe ſubjects, grief, the ſuppreſſion of cuſtomary evacuations, exceſs of venery, the repulſion of cutaneous eruptions, long continued evacuations, obſtructions in ſome of the viſcera, as the liver, ſpleen, &c. In ſome there is an habitual diſpoſition to this diſorder, and ſuch people have generally a ſallow or brown complexion, and a downcaſt look. Whatever may give riſe to *nervous diſorders* in general, may be a cauſe of this in particular. Thoſe will be always more or leſs ſubject to this diſorder, whoſe ſtomachs generate acidities from fermentation, or where there is a putrefactive diſpoſition in the alimentary ſolids and fluids, the gas, ſeparated by either of theſe cauſes, is ſuddenly diffuſed, and contributes to repel the vital heat, wherever it is preſent in any conſiderable degree.

It is obſervable, that perſons ſubject to this diſorder very rarely fall into continued, epidemic, or contagious fevers, and even eſcape the plague, and remain free from any other diſorders. Hoff. Oper. tom. iii. p. 65.

This diſorder is confounded by Sydenham and others, with HYSTERICS; but Hoffman inſiſts that the difference is conſiderable, and deſerves to be attended to in practice.

For the cure, the principal indications are to correct the vicious cauſe in the ſtomach, to ſtrengthen the alimentary canal, to increaſe the vital heat, and to promote the ſecretions, which is to be effected, after proper evacuations, by occaſional emetics and purges, by chalybeates, bitters, ſtrengtheners, and volatile ſpirits. The different preparations of iron, and the Peruvian bark, have conſiderable virtues in this diſeaſe. When the patient is coſtive, two, three, or four pills, compoſed of equal parts of aloes, rhubarb, and aſa fœtida, with a ſufficient quantity of the elixir proprietatis, may be taken occaſionally, to keep the body gently open. Thoſe who cannot bear the aſa fœtida may uſe Spaniſh ſoap.

Hypochondriac perſons ought never to faſt long, and their food ſhould be ſolid and nouriſhing: they ſhould avoid all aceſcent and windy vegetables. Fleſh meats are moſt proper, and their drinks ſhould be old claret or Madeira, or water with a little brandy or rum; but every kind of exceſs is hurtful. They ſhould be careful to uſe every method for preſerving chearfulneſs and ſerenity of mind. Exerciſe of every kind, particularly riding, is uſeful. The cold bath is likewiſe beneficial; and where this does not agree with the patient, friction with a fleſh-bruſh, or a coarſe cloth, may be tried. A voyage, or a long journey, eſpecially towards a warmer climate, will be of greater ſervice than any medicine. Buchan's Dom. Med p. 491, &c. ed. 1776. See NERVOUS *Diſeaſes*.

HYPOCHONDRIACAL *medicines*, are remedies proper in the *hypochondriacal* diſeaſe.

Such are all thoſe which tend to purify the blood, humours, and ſpirits; as chervil, baum, agrimony, St. John's wort, and the other cephalic and cardiac herbs: ſuch alſo are thoſe which purge melancholy, or atrabilis, according to the old authors, and thoſe which diſpel wind and vapours; and all medicines good for diſorders of the nerves, particularly vervain, both male and female; but above all, frequent, gentle, anodyne purges are excellent. See the preceding article.

Hypochondriacal *regions*. See Hypochondria.

HYPOCHYMA, or Hypochysis, ὑποχυμα, literally denoting *ſhedding*, *effuſion*, or *pouring out*, the diſeaſe having formerly been ſuppoſed to ariſe from an effuſion of ſome viſcid humour upon the pupil, in *Medicine*, a diſeaſe of the eyes, more uſually called a CATARACT.

HYPOCISTIS, Ὑποκιϛις, formed of ὑπο, *under*, and κιϛος, *ciſtus*, in *Medicine*, a juice uſed in the compoſition of theriaca, &c.

The *hypociſtis* is the juice of a ſhoot or excreſcence of the ſame name, ſprouting out from the foot of a kind of ciſtus, or rock-roſe, which is called *ledon* or *ladanifera*; common enough in the hot countries.

The ſhoot grows about three or four inches high; and one, two, or three inches thick; and is ſomewhat bigger at top than at bottom; and is ſoft, ſucculent, of a yellowiſh colour, and ſurrounded from ſpace to ſpace with a ſort of rings, or browniſh knots. It bears a number of little bell-ſhaped flowers, but no leaves.

When gathered, they pound it in a mortar, and expreſs the juice: that done, they evaporate it on the fire till it come to the conſiſtence of a hard blackiſh extract, much like Spaniſh liquorice: then they make it up into little maſſes for carriage. It is a mild aſtringent, of no particular ſmell or flavour, and recommended for ſtopping fluxes of the belly, vomitings, and hæmorrhages; though anciently much more than at preſent. It is alſo an ingredient in ſome unguents.

It is ſometimes uſed as a ſubſtitute to acacia.—Dr. Quincy ſays, it is the more powerful aſtringent of the two.

HYPOCRAS. See Hippocras.

HYPOCRATERIFORMIS, *ſaucer-ſhaped*, in *Botany*, the name given by Mr. Tournefort to a peculiar ſort of flowers of plants, of the general order of the INFUNDIBULIFORM, but not ſo deep and narrow at the mouth as thoſe ſimply ſo called, but expanded into the figure of a ſaucer.

HYPOCRINE, or Hippocrene. See Helicon.

HYPOCRISY, ὑποκρισις, in *Ethics*, denotes diſſimulation with regard to the moral or religious character.

HYPODIACONORUM *feſtum*. See Calendarium *feſtum*.

HYPO-DORIAN, in *Ancient Muſic*, is the graveſt of all the modes. Its fundamental is a fourth below the Dorian mode.

HYPODROME. See Hippodrome.

HYPO-ÆOLIAN, in *Ancient Muſic* one of the Greek modes, called by Euclid the grave hypolydian. Its fundamental is a fourth above the Æolian.

HYPOGÆUM, ὑπογειον, formed of ὑπο *under*, and γαια, *earth*, in the *Ancient Architecture*, is a name common to all the parts of a building that are under ground; as the cellar, butteries, and the like places.

The term *hypogæum* was uſed by the Greeks and Romans for ſubterraneous tombs in which they buried their dead.

Hypogeum, Ὑπογαιον, in *Aſtrology*, is a name given to the celeſtial houſes which are below the horizon; and eſpecially the *imum cœli*, or bottom of heaven.

HYPOGASTRIC *region*. See Hypogastrium.

Hypogastric *artery*, is an artery ariſing from the iliaca interna, and diſtributed to the bladder, the rectum, and the genital parts, particularly in women.

Hypogastric *vein*, ariſes in the ſame parts, and diſcharges itſelf into the iliaca interna.

HYPOGASTRIUM, formed of ὑπο, *under*, and γαϛηρ, *belly*, in *Anatomy*, the lower part of the abdomen, or lower venter; commencing from two or three inches below the navel, and extending to the os pubis.

HYPOGLOSSI *externi*, or *majores*, are the ninth pair of nerves, called alſo *linguales & guſtatorii*. They have their origin juſt above the foramen magnum, and go out at the ſides of the ſame great hole, above the condyles of the os occipitis. As ſoon as they are paſſed out of the cranium, they run betwixt the carotid artery and the internal jugular vein, to the tongue, on the ſide of the digaſtric muſcle.

HYPOGLOTTIS, or Hypoglossis, compoſed of ὑπο, *under*, and γλωττα, *tongue*, in *Anatomy*, is a name given to two glands of the tongue.

There are four large glands of the tongue; two of them called *hypoglottides*, ſituated under it, near the venæ ranulares; one on each ſide of the tongue. They ſerve to filtrate a kind of ſerous matter, of the nature of ſaliva, which they diſcharge into the mouth by little ducts near the gums.

Hypoglottis, or Hypoglossis, in *Medicine*, denotes an inflammation or ulceration under the tongue; called alſo RANULA.

HYPO-IONIAN, in *Ancient Muſic*, the ſecond of the Greek modes, called by Euclid *hypoiaſtean*, and *gravehypophrygian*. Its fundamental is a fourth below the Ionian.

HYPO-LYDIAN, in *Ancient Muſic*, a mode which is a fourth below the Lydian.

HYPO-MIXOLYDIAN, in *Ancient Muſic*, a mode ſaid to be added by Guy d'Arezzo. Its fundamental is a fourth above the Mixolydian or Dorian.

HYPOMNEMATOGRAPHUS, Ὑπομνηματογραφος, derived from ὑπο, μνημη, *regiſter* and γραφω, *I write*, in the *Primitive Church*, an officer who attended on the biſhop, and kept a regiſter of his conſecrations.

HYPOMOCHLION, Ὑπομοχλιον, formed of ὑπο, *under*, and μοχλος, *lever*, in *Mechanics*, the fulcrum of a LEVER; or the point which ſuſtains its preſſure, when employed either in raiſing or lowering bodies.

The *hypomochlion* is frequently a roller ſet under the lever; or under ſtones, pieces of timber, &c. that they may be the more eaſily lifted up, or removed.

HYPONITIS, in *Botany*, a name given by Dillenius to a genus of plants, called by Tournefort *orobanchoides*. See Monotrapa.

HYPOPHORA, Ὑποφορα, in *Rhetoric*, the firſt part of the PROLEPSIS: thus, in the following inſtance: *But ſome men will ſay, how are the dead raiſed, or with what body do they come?* is the *hypophora*; and, *thou fool, that which thou ſoweſt*, &c. is the *anthypophora*, or ſolution of the objection.

Hypophora, from Ὑποφερομαι, *I am conveyed away*, in *Surgery*, is uſed for a deep fiſtulous ulcer.

HYPO-PHRYGIAN, in *Ancient Muſic*, the ſixth ſpecies of the *diapaſon*.

HYPOPHTHALMION, denotes that part under the eye which is ſubject to ſwell in a cachexy or dropſy.

HYPOPHTHALMUM, in *Botany*, a name uſed by ſome authors for the *aſter atticus*.

HYPOPHYLLOSPERMOUS *plants*, formed of ὑπο, *under*, φυλλον, *leaf*, and σπερμα, *ſeed*, are ſuch plants as bear their ſeeds on the back-ſides of their leaves.

HYPOPODIUM, in *Antiquity*, a piece of furniture belonging to the baths; its uſe was to ſet or reſt the feet on, as the name imports.

HYPOPROSLAMBANOMENOS, in *Muſic*, the name of the chord added by Guido Aretine, below the *proſlambanomenos* of the Grecian ſcale, anſwering to our 6. See Diagram.

HYPOPYON, Ὑποπυον, formed of ὑπο, *under*, and πυον, *pus*, in *Medicine*, a diſeaſe of the eyes. It conſiſts in a collection of pus under or behind the cornea, which ſometimes covers the whole pupil, and obſtructs the light.

Some will have this diſorder the ſame with *unguis*; but the more accurate make a difference.

The *hypopyon* ariſes from a rupture of the veſſels in the cornea, occaſioned either by ſome external violence, or the acrimony of the blood therein.

In the beginning, it is attended with acute pain in the head and eye; and according to the degree of the diſorder, it is followed by dimneſs of ſight, blindneſs, or death. It is very difficult of cure.—The ſuppuration is to be prevented by proper cataplaſms; or, if theſe will not take effect, it is to be promoted.

The cure of this diſtemperature of the eyes is ſometimes effected by violently ſhaking the head. The ancients uſed this practice as an approved remedy; and accident has ſhewn it to be often ſucceſsful ſtill: the jolting of a chariot, in a long journey, having been known to remove the diſorder, by making the purulent matter ſubſide behind the uvea. This method of ſhaking ought, therefore, always to be made the firſt attempt, to give relief in this caſe, diſpoſing the patient's head in a ſupine poſture, and preſſing the eye before-hand with the fingers, in order to remove, or at leaſt looſen the matter. In the beginning of the diſorder the cure may be attempted by reſolvent medicines, ſuch as a frequent application of a decoction of ſage in wine, with bleeding and purging. But if theſe attempts prove unſucceſsful, the neceſſary operation muſt be performed. The patient muſt be ſeated againſt the light, with his head and hands firmly ſecured by an aſſiſtant. The ſurgeon is then to depreſs the lower eyelid, while the aſſiſtant elevates the upper; and the ſurgeon is then with a lancet to incide cautiouſly through the cornea, below the pupil, making the opening large enough to diſcharge the matter, with the aqueous humour; but taking great care not to wound the uvea behind the matter. About three or four hours afterward the eye muſt be dreſſed with a compreſs, dipped in a collyrium of roſe-water, white of eggs, mucilage of quince ſeeds, and a little camphor; and by this means the wound in the cornea will be healed, the aqueous humour will be reſtored, and if none of the internal parts are injured, the patient will recover his ſight. Heiſter.

HYPORCHEMA, formed of ὑπορχεομαι, *I accommodate my dancing to a ſinging chorus*, of ὑπο and ορχεομαι, *I dance*, in the *Greek Poetry*, a poem compoſed of divers kinds of verſes, and of different lengths; but always very ſhort, and full of Pyrrhic feet. This poem was compoſed either to be ſung or played with the flute or cithara, but to regulate a dance according to the ſound of voices and inſtruments. Proclus ſays, it was a dance accompanied with a ſong.

HYPOSCENIUM, Ὑϖοσκηνιον, in *Antiquity*, a partition under the pulpit or logeum of the Greek theatre, appointed for the muſic.

HYPOSCHESIS, Ὑϖοσχεσις, in *Rhetoric*, the ſame with DIVISION.

HYPOSPADIAS, in *Surgery*, from ὑπο, *under* and σϖαω, *I draw*, a Greek name anciently given to a perſon, who had the orifice of the canal of the ureter not directly, at the extremity of the gland. Galen applies the ſame name to thoſe the frenum of whoſe penis is too ſhott, on which account it is bent in erection; this is eaſily remedied by cutting the ligament, and waſhing the wound with warm wine.

HYPOSPATHISMUS, in the *Ancient Surgery*, an operation practiſed, by making three inciſions in the forehead, to the very bone, about two inches long; in order to cut or divide all the veſſels between thoſe inciſions. The deſign of the operation was to prevent defluxions on the eyes.

The word is ὑϖοσπαθισμος, formed of ὑϖο, *under*, and ϛπαθη, *ſpatula*; by reaſon after inciſions were made they thruſt a ſpatula all along between the pericranium and the fleſh.

HYPOSTASIS, Ὑποϛασις, compounded of ὑπο, *under*, and ἱϛημι, *I ſtand, I exiſt*, q. d. *ſubſiſtentia*; a Greek term, literally ſignifying *ſubſtance*, or *ſubſiſtence*; it is uſed in theology for *perſon*.

Thus ſome have held, that there is but one nature or eſſence in God, but three *hypoſtaſes*, or perſons.

The term *hypoſtaſis* is of a very ancient ſtanding in the church. St. Cyril repeats it divers times, as alſo the phraſe *union according to hypoſtaſis*. The firſt time it occurs in all Chriſtian antiquity, is in a letter of that father to Neſtorius, where he uſes it inſtead of προσωπον, the word we commonly render *perſon*, which did not ſeem expreſſive enough. 'The philoſophers, ſays St. Cyril, have 'allowed three *hypoſtaſes*: they have extended the divi'nity to three *hypoſtaſes*: they have even ſometimes uſed 'the word *trinity*: and nothing was wanting but to have 'admitted the conſubſtantiality of the three *hypoſtaſes*, to 'ſhew the unity of the divine nature, excluſive of all 'triplicity in reſpect of diſtinction of nature, and not to 'hold it neceſſary to conceive any reſpective inferiority 'of *hypoſtaſes*.'

This term has occaſioned great diſſenſions in the ancient church; firſt among the Greeks, and afterwards alſo among the Latins.

In the council of Nice, *hypoſtaſis* was defined to denote the ſame with *eſſence*, or *ſubſtance*; ſo that it was hereſy to ſay, that Jeſus Chriſt was of a different *hypoſtaſis* from the Father; but cuſtom altered its meaning. See TRINITY.

HYPOSTASIS, in *Medicine*, the ſediment of the urine, or that thick heavy part of the urine, which ſubſides and ſettles at bottom.

HYPOSTATICAL, in *theology*, is a term uſed in ſpeaking of the myſtery of the incarnation.

Hypoſtatical union, is a phraſe uſed by ſome divines for the union of the human nature with the divine in the perſon of Jeſus Chriſt.

HYPOSTATICAL *principles*, among the *chemiſts*, and particularly the *Paracelſiſts*, are the three chemical elements, *ſalt*, *ſulphur*, and *mercury*; called alſo the *tria prima*. See PRINCIPLE and ELEMENT.

HYPOTHECA, in the *Civil Law*, an obligation, whereby the effects of a debtor are made over to his creditor, to ſecure his debt.

The word comes from the Greek, ὑϖοθηκη, *a thing ſubject to ſome obligation*; of the verb ὑϖολιθημαι, *ſupponor, I am ſubjected*; of ὑϖο, *under*, and τιθημι, *pono, I put*.

As the *hypotheca* is an engagement procured on purpoſe for the ſecurity of the creditor, various means have been made uſe of to ſecure to him the benefit of the convention. The uſe of the pawn or pledge is the moſt ancient, which is almoſt the ſame thing with the *hypotheca*; all the difference conſiſting in this, that the pledge is put into the creditor's hands; whereas, in a ſimple *hypotheca*, the thing remained in the poſſeſſion of the debtor. It was found more eaſy and commodious to engage an eſtate by a civil covenant than by an actual delivery: accordingly, the expedient was firſt practiſed among the Greeks; and from them the Romans borrowed both the name and the thing: only the Greeks, the better to prevent frauds, uſed to fix ſome viſible mark on the thing, that the public might know it was *hypothecate*, or mortaged by the proprietor; but the Romans, looking on ſuch advertiſements as injurious to the debtor, forbad the uſe of them.

The Roman lawyers diſtinguiſhed four kinds of *hypothecas*: the *conventional*, which was with the will and conſent of both parties: the *legal*, which was appointed by law, and for that reaſon called *tacit*; the *prætor's pledge*, when by the flight or non-appearing of the debtor, the creditor was put in poſſeſſion of his effects; and the *judiciary*, when the creditor was put in poſſeſſion by virtue of a ſentence of the court.

The *conventional hypotheca* is ſubdivided into *general* and *ſpecial*. The *hypotheca* is *general*, when all the debtor's effects, both preſent and future, are engaged to the creditor. It is *ſpecial*, when limited to one or more particular things.

For the *tacit hypotheca*, the civilians reckon no leſs than twenty-ſix different ſpecies thereof.

HYPOTHECATE, from the Latin *hypotheca*, *a pledge*: to *hypothecate* a ſhip, is to pawn the ſame for neceſſaries: and a maſter may *hypothecate* either ſhip or goods, for relief, when in diſtreſs at ſea. For he repreſents the traders as well as the owners; and in whoſe hands ſoever a ſhip or goods *hypothecated* come, they are liable. 1 Salk. 34. 2 Litt. Abr. 95.

HYPOTHENAR, compounded of ὑϖο, *ſub*, and *thenar*, *the hollow of the hand*, in *Anatomy*, the ſecond muſcle of the little finger.

The *hypothenar* ariſes from the little bone of the carpus, ſituate over the others, and is inſerted externally into the firſt bone of the little finger, which it ſerves to withdraw from the reſt.

The ſixth and laſt muſcle of the toes is alſo called *hypothenar*, or abductor.

HYPOTHENUSE, or rather HYPOTENUSE, ὑϖολεινȣσα, *ſubtendens*, formed of ὑϖοτεινω, *ſubtendo, I ſubtend*, in *Geometry*, is the longeſt ſide of a right-angled triangle; or that ſide which ſubtends, or is oppoſite to, the right angle.

Thus in the triangle KML (*Tab. Geometry*, *fig.* 19.) the ſide ML, oppoſite to the right angle K, is called the *hypothenuſe*.

It is a celebrated theorem in geometry, that in every rectilinear right-angled triangle, as KML, the ſquare of the *hypothenuſe*, ML, is equal to the ſquares of both the other ſides, KL and KM. This is particularly called the Pythagorean theorem, from its inventor Pythagoras, who is ſaid to have ſacrificed a whole hecatomb to the Muſes, in gratitude for the diſcovery.

HYPOTHESIS, ὑποθεσις, formed of ὑϖο, *under*, and θεσις, *poſitio, of* τιθημι, *pono, I put*, in *Logic*, is a propoſition or principle which we ſuppoſe, or take for granted, in order to draw concluſions for the proof of a point in queſtion.

In diſputation, they frequently make falſe *hypotheſes*, in order to draw their antagoniſts into abſurdities; and even in geometry truths are often deducible from ſuch falſe *hypotheſes*.

Every conditional or hypothetical propoſition may be diſtinguiſhed into *hypotheſis* and *theſis*: the firſt rehearſes the conditions under which any thing is affirmed or denied; and the latter is the thing itſelf affirmed or denied.

Thus, in the propoſition, a triangle is half of a parallelogram, if the baſes and altitudes of the two be equal; the latter part is the *hypotheſis*, if the baſes, &c. and the former the theſis, a triangle is half a parallelogram.

In ſtrict logic, we are never to paſs from the *hypotheſis* to the theſis; that is, the principle ſuppoſed muſt be proved to be true, before we require the conſequence to be allowed.

HYPOTHESIS, in *Phyſics*, &c. denotes a kind of ſyſtem laid down from our own imagination, whereby to account for ſome phenomenon or appearance of nature.

Thus we have *hypotheſes* to account for the TIDES, for GRAVITY, for MAGNETISM, for the DELUGE, &c.

The real and ſcientific cauſes of natural things generally lie very deep: obſervation and experiment, the proper means of arriving at them, are in moſt caſes extremely ſlow; and the human mind is very impatient: hence we are frequently driven to feign or invent ſomething that may ſeem like the cauſe, and which is calculated to anſwer the ſeveral phenomena, ſo that it may poſſibly be the true cauſe.

Philoſophers are divided as to the uſe of ſuch fictions or *hypotheſes*, which are much leſs current now than they were formerly. The lateſt and beſt writers are for excluding *hypotheſes*, and ſtanding wholly on obſervation and experiment.

Whatever is not deduced from phenomena, ſays Sir Iſaac Newton, is an *hypotheſis*; and *hypotheſes*, whether metaphyſical, or phyſical, or mechanical, or of occult qualities, have no place in experimental philoſophy. Phil. Nat. Prin. Math. in Calce.

The Carteſians take upon them to ſuppoſe what affections in the primary particles of matter they pleaſe; juſt what figures, what magnitudes, what motions, and what ſituations, they find for their purpoſe. They alſo feign certain unſeen, unknown fluids, and endue them with the moſt arbitrary properties; give them a ſubtilty which enables them to pervade the pores of all bodies, and make them agitated with the moſt unaccountable motions. But is not this to ſet aſide the real conſtitution of things, and to ſubſtitute dreams in their place? Truth is ſcarce attainable even by the ſureſt obſervations; and will fanciful conjectures ever come at it? They who found their ſpeculations on *hypotheſes*, even though they argue from them regularly, according to the ſtricteſt laws of mechanics, may be ſaid to compoſe an elegant and artful fable; but it is ſtill only a fable. Cotes in Præfat. ad Newton. Princip.

HYPOTHESIS is more particularly applied, in *Aſtronomy*, to the ſeveral ſyſtems of the heavens; or the divers manners wherein different aſtronomers have ſuppoſed the heavenly bodies to be ranged, moved, &c.

The principal *hypotheſes* are the Ptolemaic, Copernican, and Tychonic.

The Copernican is now become ſo current, and is ſo well warranted by obſervation, that the retainers thereto hold it injurious to call it an *hypotheſis*.

HYPOTHETICAL *propoſition* and *ſyllogiſm*. See CONDITIONAL.

HYPOTRACHELION, from ὑπο, *under*, and τραχηλος, *neck*, in *Anatomy*, denotes the lower part of the NECK.

HYPOTRACHELION, in *Architecture*, is uſed for a little frieze in the Tuſcan and Doric capital, between the aſtragal and annulets; called alſo the *colerin* and *gorgerin*.

The word is alſo applied by ſome authors, in a more general ſenſe, to the neck of any column; or that part of the capital thereof below the aſtragal.

HYPOTYPOSIS, or *Imagery*, Ὑπολυπωσις, formed of the verb ὑπολυποω, *per figuram demonſtro, I ſhow, repreſent, or make any thing be ſeen*; of ὑπο, *under*, and τυπος, *type, image, reſemblance*, in *Rhetoric*, a figure whereby a thing is deſcribed or painted in ſuch ſtrong and bright colours, that it does not ſeem to be read, or heard, but actually ſeen, or preſented before the eyes.

Such is that elegant one of Cicero, wherein he paints the barbarity of Verres: *Ipſe inflammatus ſcelere & furore, in forum venit. Ardebant oculi; toto ex ore crudelitas emanabat. Expectabant omnes quo tandem progreſſurus, aut quidnam acturus eſſet; cum repente hominem corripit, atque in foro medio nudari ac deligari, & virgas expedire jubet. Clamabat ille miſer ſe civem eſſe Romanum*, &c. Such is alſo the picture which he has drawn of Cataline, conſiſting of an unaccountable mixture of contrary qualities. Pro Cœl. c. 5.

The *hypotypoſis* is frequently uſed by the poets, and particularly Virgil, who abounds in paintings.

This figure is peculiarly ſuited for drawing characters, and often affords the fineſt ornaments in poetry and hiſtory, as well as oratory. It is alſo adapted to move and intereſt different paſſions, according to the nature of the ſubject, and the artful management of the ſpeaker.

HYPOXIS, in *Botany*, a genus of the *hexandria monogynia* claſs: the corolla is permanent, and divided into ſix ſegments; the capſule is narrow at the baſe; and the calyx is a double-valved glume.

HYPOZOMA, in *Anatomy*, a name given to ſuch membranes as ſeparate two cavities.

In this ſenſe the mediaſtinum is an *hypozoma*.

HYPSILOGLOSSUS, in *Anatomy*, the ſame with *baſiogloſſus*. See alſo HYOGLOSSUS.

HYPSILOIDES, in *Anatomy*. See HYOIDES.

HYPSISTARII, HYPSISTARIANS, ὑψιςαριοι, formed from ὑψιςος, *higheſt*, a ſect of heretics in the fourth century; thus called from the profeſſion they made of worſhipping the moſt High God.

The doctrine of the *Hypſiſtarians* was an aſſemblage of Paganiſm, Judaiſm, and Chriſtianity. They adored the moſt High God with the Chriſtians; but they alſo revered fire and lamps with the Heathens; and obſerved the ſabbath, and the diſtinction of clean and unclean things, with the Jews.

The *Hypſiſtarii* bore a near reſemblance to the EUCHITES, or MASSALIANS.

HYSSOP, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the empalement of the flower is cylindrical and permanent; the flower is of one petal of the grinning kind, with a narrow cylindrical tube; the chaps are inclining, the upper lip is ſhort, plain, roundiſh, erect, and indented at the top; the lower lip is trifid; it has four ſtamina, which ſtand apart, two of which are longer than the petal, and the other two ſhorter; and four germina, which afterwards become ſo many oval ſeeds ſitting in the empalement. Miller enumerates five ſpecies. The name *hyſſop* is derived from the Hebrew אזוב, ſignifying *a holy herb*, or for purifying holy places; though it is generally thought that the *hyſſop* of ſcripture is our winter ſavory, which is moſt uſed in Eaſtern countries for outward waſhings or purification.

The ſeveral ſpecies of *hyſſop*, when not in flower, may be known by their long narrow leaves, and their peculiar agreeable ſmell.

All the ſorts of this plant, the common as well as the more ſcarce, are propagated by ſeeds or by cuttings. The ſeeds muſt be ſown in March, on beds of a light ſandy ſoil, and when the plants are come up, they muſt be tranſplanted to the place where they are to remain at the diſtance of a foot aſunder every way; or if they are intended to remain many years, they ſhould be left at two feet diſtance, for they grow quick, and ſpread very much. They thrive beſt on a poor dry ſoil, and will bear the ſeverities of winter much better on ſuch a ſoil than on a richer. When they are to be propagated from cuttings, it is to be done in April or May, in a border where they may be defended from the violent heat of the ſun, and being frequently watered, they will take root in two months, after which they may be tranſplanted to the places where they are to remain, managing them as the ſeedling plants.

The common *hyſſop* of the ſhops with blue ſpikes, is of a detergent cleanſing quality, and chiefly uſed as an attenuant, corroborant, and expectorant, in diſeaſes of the breaſt and lungs. In theſe caſes, infuſions of the leaves, which are not unpalatable, may be ſweetened with honey or ſugar, and drank as tea. It is a ſtanding ingredient in pectoral apozems. There are alſo a ſyrup and a ſimple diſtilled water from it, uſed in the ſhops. The leaves give out their active matter both to water and rectified ſpirit; the watery infuſions are of a browniſh or greeniſh yellow, and the ſpirituous tinctures of a blackiſh green colour. On inſpiſſating the latter, the remaining extract retains its flavour, is bitteriſh, and very warm, and diſcovers a penetrating pungency reſembling that of camphor. An eſſential oil is obtained from diſtillation of the freſh herb, which riſes to the ſurface, to the quantity of about an ounce from ſix pounds of the leaves.

It has alſo a faculty to comfort and ſtrengthen; and is prevalent againſt melancholy and phlegm.

Its tops and flowers, reduced to powder, are by ſome reſerved to ſtrew upon the colder ſallad herbs.

Hyſſop is greatly commended in caſes of bruiſes from falls, blows, &c. uſed externally by way of cataplaſm, or only a little bundle of the plant ſewed up in a linen rag, and applied to the part. Ray gives an account from Mr. Boyle, of a violent contuſion of the thigh, from a kick of a horſe, which was happily cured by this herb, boiled and applied as a cataplaſm. He tells us, the violent pain was almoſt inſtantly removed, and the very mark and blackneſs taken off in a few hours.

Among the Jews, a bunch of *hyſſop* could only be uſed to ſprinkle the door-poſts and threſholds of their houſes with the blood of the paſſover-lamb. See PASSOVER.

Hedge-HYSSOP, *gratiola*, in *botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement cut into five parts; it hath one petal of the grinning kind, cut at the top into four ſmall ſegments; it has five awl-ſhaped ſtamina, and two others which are longer, and adhere to the tube of the petal; in the centre is ſituated a conical germen, which becomes an oval capſule ending in a point, having two cells filled with ſmall ſeeds. There are three ſpecies.

Mr. Geoffroy has obſerved, that the leaves of this plant are a very ſtrong purge, and that in the dry extract, a method he is very fond of, for extracting the virtues of many medicines, a briſk purge may be prepared from the *gratiola*, which operates in a ſmall doſe, and without any diſagreeable taſte. The manner of preparing it is this: the leaves are to be infuſed in water, till they have communicated their virtue to it by the means of heat, and this liquor is to be evaporated over a balneum Mariæ to a perfect drineſs; when it leaves a dry pulveriſable extract, that operates in a doſe of eight or ten grains.

This is a very rough purgative; it often operates by vomits as well as by ſtool, and carries off a great quantity of water in dropſical caſes. It alſo deſtroys worms, and opens obſtructions of the viſcera. Its operation, however, is ſo violent as to be only fit for perſons of robuſt conſtitutions. The *gratiola* is uſually given in decoction in water or ale, half a handful being a ſufficient doſe for a very ſtrong man. Its operation is rendered more mild by being boiled in milk, and the decoction drank. It purges very well in the form of glyſters, but care muſt be taken not to give it when the bowels are in an inflamed ſtate.

Externally it is ſaid to be a vulnerary, a cataplaſm of the bruiſed herb being ſometimes applied to wounds with ſucceſs.

Mountai

Hyssop, *Mountain.* See Thymbra.

HYSSOPIC *Art*, a name which Paracelſus gave to chemiſtry, conſidered as that art purifies metals, minerals, &c. in alluſion to that text in the Pſalms, "Purge me "with *hyſſop*, and I ſhall be clean."

HYSTERA, a term uſed by ſome of the old writers in medicine to expreſs the SECUNDINES.

HYSTERALGY, compounded of the Greek *υστερα*, *womb*, and *αλγος*, *pain*, in *Medicine*, a pain in the matrix or womb, occaſioned by ſome inflammation; or other diſorder therein.

HYSTERIC *affection*, or *paſſion*, formed of *υστερα*, *womb*, a diſeaſe in women, called alſo *ſuffocation of the womb*, and vulgarly *fits of the mother.* It is a ſpaſmodico-convulſive affection of the nervous ſyſtem, proceeding from the womb, and cauſed by the retention or corruption of the blood and lymph in its veſſels; and more or leſs infeſting the nervous parts of the whole body by means of the nerves of the os ſacrum, the loins, and the whole ſpinal marrow.

Hyſteric affection is generally uſed by authors promiſcuouſly with *hypochondriac affection*; the two diſeaſes being ſuppoſed to be in reality the ſame. They only differ indeed in point of relation and circumſtance.

The *hyſteric* is properly a ſpecies or branch of the hypochondriac, peculiar to women, and ſuppoſed to ariſe from ſome diſorder of the womb.

One of the ſymptoms, or effects of hypochondriac diſeaſes is, convulſions, or fits, not unlike thoſe of the epilepſy; theſe we call *hyſteric fits*; and the diſeaſe that produces them *hyſteric affection.*

It is alſo particularly denominated *hyſteric ſuffocation*, from one of its principal ſymptoms, which is a contraction of the breaſt, and a difficulty of breathing.

Some women under this diſorder fancy a rope tied about their necks ready to ſtrangle them; and others think a piece of ſomething is got into their throats, which they cannot ſwallow, but which ſtops their breath; and ſome will even remain a good while as if really ſtrangled without any ſenſe or motion. At other times the patient is affected with catchings and convulſions. Sometimes the fits come on with coldneſs of the extremities, yawning and ſtretching, lowneſs of ſpirits, oppreſſion and anxiety. At other times the approach of the fit is foretold by the navel being drawn inwards, and feeling as if there were a ball at the lower part of the belly, which gradually riſes towards the ſtomach, where it occaſions inflation, ſickneſs, and ſometimes vomiting; and afterwards it ariſes into the gullet, and occaſions a degree of ſuffocation already deſcribed, to which quick breathing, palpitation of the heart, giddineſs of the head, dimneſs of the ſight, loſs of hearing, with convulſive motions of the extremities and other parts of the body, and alternate laughing and crying, coſtiveneſs, and the frequent diſcharge of a pale limpid urine ſucceed.

It is not always attended with all thoſe ſymptoms, but ſometimes with more, and ſometimes with fewer of them, and thoſe more or leſs violent.

This diſtemper ſeems to ariſe from congeſtions of blood in the abdomen, and in the viſcera, ſituated there, which ſhould find paſſage by the uterus, or the hæmorrhoidal veins, but is impeded. And as this is alſo the cauſe of the hypochondriac affections in men, it is no wonder that the generality of ſymptoms are the ſame in both, and that the method of cure muſt be nearly the ſame. It is to be obſerved, however, that though obſtructions are the common cauſe of theſe diſeaſes in both ſexes, yet women are ſometimes found afflicted with this while the menſes flow properly, in due quantity, and at their regular periods. In this caſe, the diſorder ſeems owing to acrid humours in the primæ viæ, exciting ſpaſms wherever they come.

Dr. Purcel deſcribes an *hyſteric* paroxyſm, as beginning with a ſenſe of coldneſs creeping up the back, and afterwards ſpreading over the whole body; then enſues a head-ach, and ſometimes a palpitation of the heart, with a fainting, from which the patient ſoon recovers. Sometimes after the coldneſs, there ſucceeds a remarkable heat which begins on the forementioned ſymptoms. Baglivi adds, that *hyſteric* women feel a ſenſe of cold in the crown of the head; and this he takes to be the chief diagnoſtic of the diſeaſe.

The ordinary cauſes of this diſorder are violent paſſions, fear, rage, love, grief, ill news, ſweet ſmells, &c. Women of a delicate habit, whoſe ſtomach and inteſtines are relaxed, and whoſe nervous ſyſtem is extremely ſenſible, are moſt ſubject to *hyſteric* complaints. In ſuch perſons an *hyſteric* fit may be brought on by an irritation of the nerves of the ſtomach or inteſtines by wind, acrid humour, &c. A ſudden ſuppreſſion of the menſes often occaſions *hyſteric* fits. As for the popular notion of malignant vapours ariſing from the womb, and occaſioning all theſe ſymptoms, all the learned diſcard it, and hold men as ſubject to the diſeaſe as women. The real cauſe they affirm is in the animal ſpirits, and the nervous ſyſtem; and the affection does not differ from the hypochondriac.

For the cure: as many of the ſymptoms are convulſive, antiſpaſmodics are indicated. The beſt of theſe are muſk, opium, and caſtor. Opium, when it diſagrees with the ſtomach, may be applied externally, or given in clyſters; and it has often been found ſerviceable in removing thoſe periodical head-achs to which *hyſteric* and hypochondriac patients are ſubject. See *Hyſtericus* Clavus. Caſtor has in ſome caſes been found to procure ſleep, where opium failed; and, therefore, Dr. Whytt adviſes to join them together: he likewiſe recommends the antihyſteric plaſter to be applied to the abdomen.

In the time of the fit, when the ſenſation of ſtrangulation is violent, or there are convulſive motions or faintings, the fœtid and volatile medicines ſerve to recover the patient: ſuch are ſpirit of hartſhorn, aſa fœtida, oil of amber, tincture of caſtor, and the volatile ſalts held to the noſe, or taken internally, as alſo the burning of feathers, horn, or leather, or any other ſubſtance, which has a very diſagreeable ſmell while in the fire; rubbing the hands and feet alſo are of great ſervice, and ſome recommend the pulling off of the hairs ſingly, and other methods, which give pain, to bring the patients to themſelves. Hot bricks may alſo be applied to the ſoles of the feet, and the legs, arms, and belly, may be ſtrongly rubbed with a warm cloth. But the beſt application is to put the feet and legs into warm water. This is peculiarly proper, when the fits precede the flow of the menſes.

Some have adviſed to bleed the patient during the fit: this may be proper, if the habit be plethoric, and the pulſe full; but in weak and delicate conſtitutions, or where the diſeaſe has been of long ſtanding, or ariſes from inanition, it is not ſafe. In caſe of coſtiveneſs, a laxative clyſter, with aſa fœtida, ſhould be adminiſtered; and as ſoon as the patient can ſwallow, two table ſpoonfuls of a ſolution of aſa fœtida, or of ſome cordial julep, may be given.

Theſe are the methods to be uſed in the time of the fit; but when the patient is reſtored from that, the ſame method is to be uſed as in the hypochondriac paſſion; only that, in this caſe, a little caſtor is to be added to the ſaline and cinnabarine medicines. After this, care is to be taken to reſtore the menſes to their proper order, if the patient be at a time of life when they ought to flow; but if that period is paſt, the evacuation muſt be, in ſome meaſure, ſupplied by bleeding in the foot, and repeating this every year at the ſpring and fall, and with this ſome doſes of a gentle purge, with a proper regimen. Vomits are always found hurtful in theſe caſes, unleſs the ſtomach be loaded with phlegm, and when violent, are dangerous in the higheſt degree. Strong purges are alſo liable to the ſame objections, and are never to be meddled with; but if there be a tendency to coſtiveneſs, it muſt be removed either by diet, or by taking an opening pill, as often as neceſſary. All hot medicines are alſo prejudicial, and the common uterine elixirs, with the diſtilled oils, and volatile ſalts, are liable to the ſame objections. Some give the common terreſtrial alkalies and abſorbents, but they give no relief in theſe caſes; becauſe an acid either is no cauſe, or, at the utmoſt, is not the eſſential cauſe of theſe diſorders.

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The moſt proper medicines are thoſe which ſtrengthen the alimentary canal, and the whole nervous ſyſtem; as the preparations of iron, the Peruvian bark, and other bitters. Twenty drops of the elixir of vitriol in a cup of the infuſion of the bark, may be taken twice or thrice a day. The bark and iron may likewiſe be taken in ſubſtance, in conſiderable doſes.

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A courſe of milk and vegetable diet will often perform a cure. The moſt proper drink is water, with a ſmall quantity of ſpirits. A cool dry air is the beſt. Cold bathing, and every thing that braces the nerves, and invigorates the ſyſtem, is beneficial; but lying too long in bed, or whatever relaxes the body, is injurious. The mind what figures, what magnitudes, what motions, and what ſituations, they find for their purpoſe. They alſo feign certain unſeen, unknown fluids, and endue them with the moſt arbitrary properties; give them a ſubtilty which enables them to pervade the pores of all bodies, and make them agitated with the moſt unaccountable motions. But is not this to ſet aſide the real conſtitution of things, and to ſubſtitute dreams in their place? Truth is ſcarce attainable even by the ſureſt obſervations; and will fanciful conjectures ever come at it? They who found their ſpeculations on *hypotheſes*, even though they argue from them regularly, according to the ſtricteſt laws of mechanics, may be ſaid to compoſe an elegant and artful fable; but it is ſtill only a fable. Cotes in Præfat. ad Newton. Princip.

HYPOTHESIS is more particularly applied, in *Aſtronomy*, to the ſeveral ſyſtems of the heavens; or the divers manners wherein different aſtronomers have ſuppoſed the heavenly bodies to be ranged, moved, &c.

The principal *hypotheſes* are the Ptolemaic, Copernican, and Tychonic.

The Copernican is now become ſo current, and is ſo well warranted by obſervation, that the retainers thereto hold it injurious to call it an *hypotheſis*.

HYPOTHETICAL *propoſition* and *ſyllogiſm*. See CONDITIONAL.

HYPOTRACHELION, from *ὑπο*, *under*, and *τραχηλος*, *neck*, in *Anatomy*, denotes the lower part of the NECK.

HYPOTRACHELION, in *Architecture*, is uſed for a little frieze in the Tuſcan and Doric capital, between the aſtragal and annulets; called alſo the *colerin* and *gorgerin*.

The word is alſo applied by ſome authors, in a more general ſenſe, to the neck of any column; or that part of the capital thereof below the aſtragal.

HYPOTYPOSIS, or *Imagery*, Ὑποτυπωσις, formed of the verb *ὑποτυποω*, *per figuram demonſtro*, *I ſhow*, *repreſent*, *or make any thing be ſeen*; of *ὑπο*, *under*, and *τυπος*, *type*, *image*, *reſemblance*, in *Rhetoric*, a figure whereby a thing is deſcribed or painted in ſuch ſtrong and bright colours, that it does not ſeem to be read, or heard, but actually ſeen, or preſented before the eyes.

Such is that elegant one of Cicero, wherein he paints the barbarity of Verres: *Ipſe inflammatus ſcelere & furore, in forum venit. Ardebant oculi; toto ex ore crudelitas emanabat. Expectabant omnes quo tandem progreſſurus, aut quidnam acturus eſſet; cum repente hominem corripit, atque in foro medio nudari ac deligari, & virgas expedire jubet. Clamabat ille miſer ſe civem eſſe Romanum*, &c. Such is alſo the picture which he has drawn of Cataline, conſiſting of an unaccountable mixture of contrary qualities. Pro Cœl. c. 5.

The *hypotypoſis* is frequently uſed by the poets, and particularly Virgil, who abounds in paintings.

This figure is peculiarly ſuited for drawing characters, and often affords the fineſt ornaments in poetry and hiſtory, as well as oratory. It is alſo adapted to move and intereſt different paſſions, according to the nature of the ſubject, and the artful management of the ſpeaker.

HYPOXIS, in *Botany*, a genus of the *hexandria monogynia* claſs: the corolla is permanent, and divided into ſix ſegments; the capſule is narrow at the baſe; and the calyx is a double-valved glume.

HYPOZOMA, in *Anatomy*, a name given to ſuch membranes as ſeparate two cavities.

In this ſenſe the mediaſtinum is an *hypozoma*.

HYPSILOGLOSSUS, in *Anatomy*, the ſame with *baſioglоſſus*. See alſo HYOGLOSSUS.

HYPSILOIDES, in *Anatomy*. See HYOIDES.

HYPSISTARII, HYPSISTARIANS, *ὑψιςαριοι*, formed from *ὑψιςος*, *higheſt*, a ſect of heretics in the fourth century; thus called from the profeſſion they made of worſhipping the moſt High God.

The doctrine of the *Hypſiſtarians* was an aſſemblage of Paganiſm, Judaiſm, and Chriſtianity. They adored the moſt High God with the Chriſtians; but they alſo revered fire and lamps with the Heathens; and obſerved the ſabbath, and the diſtinction of clean and unclean things, with the Jews.

The *Hypſiſtarii* bore a near reſemblance to the EUCHITES, or MASSALIANS.

HYSSOP, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the empalement of the flower is cylindrical and permanent; the flower is of one petal of the grinning kind, with a narrow cylindrical tube; the chaps are inclining, the upper lip is ſhort, plain, roundiſh, erect, and indented at the top; the lower lip is trifid; it has four ſtamina, which ſtand apart, two of which are longer than the petal, and the other two ſhorter; and four germina, which afterwards become ſo many oval ſeeds ſitting in the empalement. Miller enumerates five ſpecies. The name *hyſſop* is derived from the Hebrew אזוב, ſignifying *a holy herb*, or for purifying holy places; though it is generally thought that the *hyſſop* of ſcripture is our winter ſavory, which is moſt uſed in Eaſtern countries for outward waſhings or purification.

The ſeveral ſpecies of *hyſſop*, when not in flower, may be known by their long narrow leaves, and their peculiar agreeable ſmell.

All the ſorts of this plant, the common as well as the more ſcarce, are propagated by ſeeds or by cuttings. The ſeeds muſt be ſown in March, on beds of a light ſandy ſoil, and when the plants are come up, they muſt be tranſplanted to the place where they are to remain at the diſtance of a foot aſunder every way; or if they are intended to remain many years, they ſhould be left at two feet diſtance, for they grow quick, and ſpread very much. They thrive beſt on a poor dry ſoil, and will bear the ſeverities of winter much better on ſuch a ſoil than on a richer. When they are to be propagated from cuttings, it is to be done in April or May, in a border where they may be defended from the violent heat of the ſun, and being frequently watered, they will take root in two months, after which they may be tranſplanted to the places where they are to remain, managing them as the ſeedling plants.

The common *hyſſop* of the ſhops with blue ſpikes, is of a detergent cleanſing quality, and chiefly uſed as an attenuant, corroborant, and expectorant, in diſeaſes of the breaſt and lungs. In theſe caſes, infuſions of the leaves, which are not unpalatable, may be ſweetened with honey or ſugar, and drank as tea. It is a ſtanding ingredient in pectoral apozems. There are alſo a ſyrup and a ſimple diſtilled water from it, uſed in the ſhops. The leaves give out their active matter both to water and rectified ſpirit; the watery infuſions are of a browniſh or greeniſh yellow, and the ſpirituous tinctures of a blackiſh green colour. On inſpiſſating the latter, the remaining extract retains its flavour, is bitteriſh, and very warm, and diſcovers a penetrating pungency reſembling that of camphor. An eſſential oil is obtained from diſtillation of the freſh herb, which riſes to the ſurface, to the quantity of about an ounce from ſix pounds of the leaves.

It has alſo a faculty to comfort and ſtrengthen; and is prevalent againſt melancholy and phlegm.

Its tops and flowers, reduced to powder, are by ſome reſerved to ſtrew upon the colder ſallad herbs.

Hyſſop is greatly commended in caſes of bruiſes from falls, blows, &c. uſed externally by way of cataplaſm, or only a little bundle of the plant ſewed up in a linen rag, and applied to the part. Ray gives an account from Mr. Boyle, of a violent contuſion of the thigh, from a kick of a horſe, which was happily cured by this herb, boiled and applied as a cataplaſm. He tells us, the violent pain was almoſt inſtantly removed, and the very mark and blackneſs taken off in a few hours.

Among the Jews, a bunch of *hyſſop* could only be uſed to ſprinkle the door-poſts and threſholds of their houſes with the blood of the paſſover-lamb. See PASSOVER.

Hedge-HYSSOP, *gratiola*, in *botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement cut into five parts; it hath one petal of the grinning kind, cut at the top into four ſmall ſegments; it has five awl-ſhaped ſtamina, and two others which are longer, and adhere to the tube of the petal; in the centre is ſituated a conical germen, which becomes an oval capſule ending in a point, having two cells filled with ſmall ſeeds. There are three ſpecies.

Mr. Geoffroy has obſerved, that the leaves of this plant are a very ſtrong purge, and that in the dry extract, a method he is very fond of, for extracting the virtues of many medicines, a briſk purge may be prepared from the *gratiola*, which operates in a ſmall doſe, and without any diſagreeable taſte. The manner of preparing it is this: the leaves are to be infuſed in water, till they have communicated their virtue to it by the means of heat, and this liquor is to be evaporated over a balneum Mariæ to a perfect drineſs; when it leaves a dry pulveriſable extract, that operates in a doſe of eight or ten grains.

This is a very rough purgative; it often operates by vomits as well as by ſtool, and carries off a great quantity of water in dropſical caſes. It alſo deſtroys worms, and opens obſtructions of the viſcera. Its operation, however, is ſo violent as to be only fit for perſons of robuſt conſtitutions. The *gratiola* is uſually given in decoction in water or ale, half a handful being a ſufficient doſe for a very ſtrong man. Its operation is rendered more mild by being boiled in milk, and the decoction drank. It purges very well in the form of glyſters, but care muſt be taken not to give it when the bowels are in an inflamed ſtate.

Externally it is ſaid to be a vulnerary, a cataplaſm of the bruiſed herb being ſometimes applied to wounds with ſucceſs.

Hyssop, *Mountain.* See Thymbra.

HYSSOPIC *Art*, a name which Paracelſus gave to chemiſtry, conſidered as that art purifies metals, minerals, &c. in alluſion to that text in the Pſalms, "Purge me "with *hyſſop*, and I ſhall be clean."

HYSTERA, a term uſed by ſome of the old writers in medicine to expreſs the SECUNDINES.

HYSTERALGY, compounded of the Greek ὑστερα, *womb*, and αλγος, *pain*, in *Medicine*, a pain in the matrix or womb, occaſioned by ſome inflammation, or other diſorder therein.

HYSTERIC *affection*, or *paſſion*, formed of ὑστερα, *womb*, a diſeaſe in women, called alſo *ſuffocation of the womb*, and vulgarly *fits of the mother*. It is a ſpaſmodico-convulſive affection of the nervous ſyſtem, proceeding from the womb, and cauſed by the retention or corruption of the blood and lymph in its veſſels; and more or leſs infeſting the nervous parts of the whole body, by means of the nerves of the os ſacrum, the loins, and the whole ſpinal marrow.

Hyſteric affection is generally uſed by authors promiſcuouſly with *hypochondriac affection*; the two diſeaſes being ſuppoſed to be in reality the ſame. They only differ indeed in point of relation and circumſtance.

The *hyſteric* is properly a ſpecies or branch of the hypochondriac, peculiar to women, and ſuppoſed to ariſe from ſome diſorder of the womb.

One of the ſymptoms, or effects of hypochondriac diſeaſes is, convulſions, or fits, not unlike thoſe of the epilepſy; theſe we call *hyſteric fits*; and the diſeaſe that produces them *hyſteric affection*.

It is alſo particularly denominated *hyſteric ſuffocation*, from one of its principal ſymptoms, which is a contraction of the breaſt, and a difficulty of breathing.

Some women under this diſorder fancy a rope tied about their necks ready to ſtrangle them; and others think a piece of ſomething is got into their throats, which they cannot ſwallow, but which ſtops their breath; and ſome will even remain a good while as if really ſtrangled without any ſenſe or motion. At other times the patient is affected with catchings and convulſions. Sometimes the fits come on with coldneſs of the extremities, yawning and ſtretching, lowneſs of ſpirits, oppreſſion and anxiety. At other times the approach of the fit is foretold by the navel being drawn inwards, and feeling as if there were a ball at the lower part of the belly, which gradually riſes towards the ſtomach, where it occaſions inflation, ſickneſs, and ſometimes vomiting; and afterwards it ariſes into the gullet, and occaſions a degree of ſuffocation already deſcribed, to which quick breathing, palpitation of the heart, giddineſs of the head, dimneſs of the ſight, loſs of hearing, with convulſive motions of the extremities and other parts of the body, and alternate laughing and crying, coſtiveneſs, and the frequent diſcharge of a pale limpid urine ſucceed.

It is not always attended with all thoſe ſymptoms, but ſometimes with more, and ſometimes with fewer of them, and thoſe more or leſs violent.

This diſtemper ſeems to ariſe from congeſtions of blood in the abdomen, and in the viſcera, ſituated there, which ſhould find paſſage by the uterus, or the hæmorrhoidal veins, but is impeded. And as this is alſo the cauſe of the hypochondriac affections in men, it is no wonder that the generality of ſymptoms are the ſame in both, and that the method of cure muſt be nearly the ſame. It is to be obſerved, however, that though obſtructions are the common cauſe of theſe diſeaſes in both ſexes, yet women are ſometimes found afflicted with this while the menſes flow properly, in due quantity, and at their regular periods. In this caſe, the diſorder ſeems owing to acrid humours in the primæ viæ, exciting ſpaſms wherever they come.

Dr. Purcel deſcribes an *hyſteric* paroxyſm, as beginning with a ſenſe of coldneſs creeping up the back, and afterwards ſpreading over the whole body; then enſues a head-ach, and ſometimes a palpitation of the heart, with a fainting, from which the patient ſoon recovers. Sometimes after the coldneſs, there ſucceeds a remarkable heat which begins on the forementioned ſymptoms. Baglivi adds, that *hyſteric* women feel a ſenſe of cold in the crown of the head; and this he takes to be the chief diagnoſtic of the diſeaſe.

The ordinary cauſes of this diſorder are violent paſſions, fear, rage, love, grief, ill news, ſweet ſmells, &c. Women of a delicate habit, whoſe ſtomach and inteſtines are relaxed, and whoſe nervous ſyſtem is extremely ſenſible, are moſt ſubject to *hyſteric* complaints. In ſuch perſons an *hyſteric* fit may be brought on by an irritation of the nerves of the ſtomach or inteſtines by wind, acrid humour, &c. A ſudden ſuppreſſion of the menſes often occaſions *hyſteric* fits. As for the popular notion of malignant vapours ariſing from the womb, and occaſioning all theſe ſymptoms, all the learned diſcard it, and hold men as ſubject to the diſeaſe as women. The real cauſe they affirm is in the animal ſpirits, and the nervous ſyſtem; and the affection does not differ from the hypochondriac.

For the cure: as many of the ſymptoms are convulſive, antiſpaſmodics are indicated. The beſt of theſe are muſk, opium, and caſtor. Opium, when it diſagrees with the ſtomach, may be applied externally, or given in clyſters; and it has often been found ſerviceable in removing thoſe periodical head-achs to which *hyſteric* and hypochondriac patients are ſubject. See *Hyſtericus* Clavus. Caſtor has in ſome caſes been found to procure ſleep, where opium failed; and, therefore, Dr. Whytt adviſes to join them together: he likewiſe recommends the antihyſteric plaſter to be applied to the abdomen.

In the time of the fit, when the ſenſation of ſtrangulation is violent, or there are convulſive motions or faintings, the fœtid and volatile medicines ſerve to recover the patient: ſuch are ſpirit of hartſhorn, aſa fœtida, oil of amber, tincture of caſtor, and the volatile ſalts held to the noſe, or taken internally, as alſo the burning of feathers, horn, or leather, or any other ſubſtance, which has a very diſagreeable ſmell while in the fire; rubbing the hands and feet alſo are of great ſervice, and ſome recommend the pulling off of the hairs ſingly, and other methods, which give pain, to bring the patients to themſelves. Hot bricks may alſo be applied to the ſoles of the feet, and the legs, arms, and belly, may be ſtrongly rubbed with a warm cloth. But the beſt application is to put the feet and legs into warm water. This is peculiarly proper, when the fits precede the flow of the menſes. Some have adviſed to bleed the patient during the fit: this may be proper, if the habit be plethoric, and the pulſe full; but in weak and delicate conſtitutions, or where the diſeaſe has been of long ſtanding, or ariſes from inanition, it is not ſafe. In caſe of coſtiveneſs, a laxative clyſter, with aſa fœtida, ſhould be adminiſtered; and as ſoon as the patient can ſwallow, two table ſpoonfuls of a ſolution of aſa fœtida, or of ſome cordial julep, may be given.

Theſe are the methods to be uſed in the time of the fit; but when the patient is reſtored from that, the ſame method is to be uſed as in the hypochondriac paſſion; only that, in this caſe, a little caſtor is to be added to the ſaline and cinnabarine medicines. After this, care is to be taken to reſtore the menſes to their proper order, if the patient be at a time of life when they ought to flow; but if that period is paſt, the evacuation muſt be, in ſome meaſure, ſupplied by bleeding in the foot, and repeating this every year at the ſpring and fall, and with this ſome doſes of a gentle purge, with a proper regimen. Vomits are always found hurtful in theſe caſes, unleſs the ſtomach be loaded with phlegm, and when violent, are dangerous in the higheſt degree. Strong purges are alſo liable to the ſame objections, and are never to be meddled with; but if there be a tendency to coſtiveneſs, it muſt be removed either by diet, or by taking an opening pill, as often as neceſſary. All hot medicines are alſo prejudicial, and the common uterine elixirs, with the diſtilled oils, and volatile ſalts, are liable to the ſame objections. Some give the common terreſtrial alkalies and abſorbents, but they give no relief in theſe caſes; becauſe an acid either is no cauſe, or, at the utmoſt, is not the eſſential cauſe of theſe diſorders.

Steel medicines are alſo given by many; but they are to be uſed with great caution; and, in general, they ſeldom do any good, but very often a great deal of harm. As there are, however, ſome caſes of this kind in which they excel all other medicines, it is always proper to give them a fair trial, under the proper regulations.

The moſt proper medicines are thoſe which ſtrengthen the alimentary canal, and the whole nervous ſyſtem; as the preparations of iron, the Peruvian bark, and other bitters. Twenty drops of the elixir of vitriol in a cup of the infuſion of the bark, may be taken twice or thrice a day. The bark and iron may likewiſe be taken in ſubſtance, in conſiderable doſes.

The common chalybeate waters often prove of more ſervice in this diſeaſe than all the medicines in the world; but they are to be taken with the proper cautions, and a due regimen. It is neceſſary to bleed in the foot before entering on a courſe of them, and then they are to be drank in moderate quantities, and always a little warmed, uſing a moderate exerciſe during the time of drinking them. See Mineral-*waters*.

A courſe of milk and vegetable diet will often perform a cure. The moſt proper drink is water, with a ſmall quantity of ſpirits. A cool dry air is the beſt. Cold bathing, and every thing that braces the nerves, and invigorates the ſyſtem, is beneficial; but lying too long in bed, or whatever relaxes the body, is injurious. The mind ſhould be kept conſtantly eaſy and chearful. *Hyſteric* patients are often afflicted with cramps, for the relief of which the moſt efficacious medicines are opium, bliſtering plaſters, and warm bathing or fomentations. In milder caſes, immerſing the feet and legs in warm water, or applying a bliſtering plaſter to the part affected, has removed the complaint. Patients, whoſe nerves are uncommonly delicate and ſenſible, and for whom the bliſtering plaſter is not ſo proper, may attempt the cure by opiates, muſk, camphor, and the warm bath. Cramps in the legs have been ſometimes removed by tight bandages; and convulſions ariſing from a flatulent diſtention of the inteſtines, or from ſpaſms beginning in them, may be diminiſhed or cured by making a ſtrong compreſſion upon the abdomen with a broad belt. See CRAMP. Buchan's Dom. Med. p. 490.

HYSTERIC *colic*. See COLIC.

HYSTERICS, or HYSTERIC *medicines*, are remedies proper to remove *hyſteric* affections; and to remedy diſorders of the womb.

There are divers ſpecies of *hyſterics*: ſome evacuate or cleanſe the womb, by expelling any impurities lodged therein; others tend to ſtop immoderate fluxes thereof, and others ſtrengthen the tone of the part.

According to Dr. Quincy, *hyſteric* affections ariſe either from too titillating, or too uneaſy ſenſations: the former proceed from that irritation of the nerves, which the make and ſecretion of thoſe parts have naturally ſubjected them to, and which, in ſome ſorts of conſtitutions, ariſe to that degree, as to draw the whole ſyſtem into diſorder, and occaſion a ſurpriſing variety of ſymptoms; e. g. ſeveral ſorts of convulſions, and ſpecies of madneſs; which therefore are by ſome termed *furores uterini*.

Theſe diſorders are moſt effectually allayed by ſuch things as are in a manner the reverſe of cordials, and are both in ſmell and taſte very offenſive and diſagreeable: they ſeem to anſwer this end by ſuffocating, as it were, the ſpirits, and damping their inordinate ſallies, ſo that ſuch ſtimulation ceaſes, and the fibres return to their natural tone and motions; for, as what is grateful to the ſenſes gives an inexpreſſible emotion to the fine nervous filaments, ſo does what is fœtid and diſagreeable quite deſtroy that emotion, and deaden it; and as the former kind conſiſt chiefly of fine ſubtile volatile parts, by which, as before explained under CEPHALICS, they are fitter to enter the nerves; ſo theſe are generally of a clammy viſcous contexture, and therefore the fitter to envelope and entangle that ſubtile juice, whereby its motion is much retarded.

HYSTERICUS *lapis*, in *Natural Hiſtory*, a name given to an American ſtone, called alſo *lapis uterinus*, famous for its virtues againſt diſorders of the womb, externally applied. It is black, and capable of a fine poliſh.

HYSTERICUS *clavus*. See CLAVUS.

HYSTEROCELE, formed of *ὑστερα*, *womb*, and *κηλη*, *tumor*, in *Medicine*, an HERNIA cauſed by the uterus paſſing through the peritonæum.

HYSTEROLITHUS, formed of *ὑστερα*, *womb*, and *λιθος*, *ſtone*, or CUNNOLITHUS, in *Natural Hiſtory*, a ſtone thus called, from its reſemblance to the external parts of generation of the female ſex. It is very hard, of a grey or blackiſh brown colour, about the ſize of half a walnut, which it reſembles, being convex, and ſomewhat ſmooth on one ſide, and on the other ſide reſembling the labia pudendi. This is a ſpecies of the HELMINTHOLITHUS, in the Linnæan ſyſtem. Theſe ſtones are found in great abundance near the caſtle of Braubach, upon the Rhine, on the confines of the landgravate of Heſſe.

HYSTEROLOGY, Ὑστερολογια, ſignifying a *diſcourſe inverted*, in *Rhetoric*, a ſpecies of HYPERBATON, or a vicious manner of ſpeaking, wherein the natural order of things is inverted; called alſo by the Greeks ὑστερον ϖροτερον; q. d. putting the firſt thing where the laſt ſhould be.

Thus Terence uſes *valet & vivit*, for *vivit & valet*. And Virgil *moriamur & in media arma ruamus*, for *in media arma ruamus & moriamur*. Quintilian expoſes this fault, lib. xi. cap. 2. where he ſays, *quædam——turpiter convertuntur*, *ut* ſi peperiſſe *narres*, *deinde* concepiſſe; *in quibus*, *ſi id quod poſterius eſt dixeris de priore tacere* optimum *eſt*.

HYSTERON-PROTERON, Ὑστερον ϖροτερον. See HYSTEROLOGY.

HYSTEROPHORUS, in *Botany*, the name of a genus of plants, deſcribed by Vaillant in the Acta Germanica, the characters of which are the ſame with thoſe of the common PARTHENIUM.

HYSTEROPOTMI, Ὑστεροποτμοι, in *Antiquity*, the ſame with DEUTEROPOTMI.

HYSTEROTOMIA, Ὑστεροτομια, formed of *ὑστερα*, *womb*, and *τεμνω*, *I diſſect*, in *Anatomy*, an anatomical diſſection of the uterus, or WOMB.

HYSTEROTOMOTOCY, Ὑστεροτομοτοκεια, in *Surgery*, an operation more uſually called the CÆSARIAN *ſection*.

HYSTRIX. See PORCUPINE.

HYTH, or HITH, a port, wharf, or little haven, to embark or land wares at. Such is *Queen-hith*, &c.

I.

I, The ninth letter of the Engliſh alphabet: it is both a vowel and a conſonant; agreeable to which two different powers, it has two different forms; though, ſince the vowel and conſonant differ in their form as well as ſound, they may, as Dr. Johnſon obſerves, be more properly accounted two letters.

The Hebrews called the *j* conſonant *jod*, יוד, from יד, *hand* and *ſpace*; becauſe it is ſuppoſed to repreſent the hand clenched, ſo as to leave the ſpace underneath void. With them it was pronounced as the conſonant *y*, as it ſtill is among the Germans, and ſome other people. The Greeks had no *j* conſonant, and for that reaſon uſed their vowel *i* inſtead of it, as coming the neareſt in ſound. The letter *i* was uſed as a conſonant among the Latins. In Engliſh *j* conſonant has invariably the ſame ſound with that of *g* in *giant*; and ſerves to mollify that of the vowels; as in *Jew*, *juſt*, *jovial*. *I* vowel varies in its ſound: in ſome words it is long, as *fine*, *thine*, &c. In others ſhort, as *fin*, *thin*. Prefixed to *e*, it makes a diphthong of the ſame ſound with the ſoft *i*, or double *ee*, as in *field*, *yield*, except in *friend*, which is pronounced *frend*. Subjoined to *a* or *e*, it makes them long, as *fail*, *neigh*; and to *o* makes a mingled ſound, which approaches more nearly to the true notion of a diphthong, or ſound compoſed of the ſounds of two vowels, than any other combination of vowels in the Engliſh language, as *oil*, *coin*. The ſound of *i* before another *i*, and at the end of a word, is always expreſſed by *y*. Johnſon.

The vowel *i*, according to Plato, is proper for expreſſing fine and delicate, but humble things: on which account that verſe in Virgil,

Accipiunt inimicum imbrem, remiſque fatiſcunt,

which abounds in *i*'s, is generally admired.

The vowel *i* was the only vowel which the Romans did not mark with the daſh of a pen, to ſhew when it was long; inſtead of which, to denote it long, they uſed to make it bigger than ordinary, as in *PIſo*, *VIvus*, &c. According to Lipſius, they often repeated it when it was to be long, as in *dii*. They ſometimes alſo denoted the length of this letter by adding *e* to it, and turning it into a diphthong, as *divei* for *divi*, *omneis* for *omnis*, &c.

I, in *Logic*, denotes a particular affirmative propoſition.

I was anciently a numeral letter, and ſignified a hundred, according to the verſe,

I. C. *compar erit, & centum ſignificabit.*

I, in the ordinary way of numbering, ſignifies one; and when repeated, it ſignifies as many units as it is repeated times. When put before a higher numeral, it ſubtracts itſelf, as IV, IX, &c. but when ſet after it, it is added as often as it is repeated; as VI, XI, VIII, XIII, &c.

In abbreviatures and ciphers, *I* frequently repreſents the whole word Jeſus, whereof it is the firſt letter.

I, in the *French Coinage*, characteriſes the money of Limoges.

JABAJAHITES, a ſect among the muſſulmen, who, according to Ricaut, teach, that God is not perfectly wiſe; that his knowlege does not extend to every thing; and that time and experience have furniſhed him with the knowlege of many things whereof he was before ignorant. Thus, ſay they, not being appriſed from all eternity of every event that ſhall happen in the world, he is now obliged to govern it according to the chance and occurrence of thoſe events.

JABIRU, in *Crnithology*, the name of a large water bird approaching to the crane-kind, and called by ſome the *negro*. It is larger than our ſwan, its neck is as thick as a man's arm, and its head very large; its beak is ſtraight, eleven fingers breadth long, pointed and a little hooked at the end; its legs are two feet long, and thick, and, as it were, ſcaly; it is all over on the body white, as the ſwan or gooſe; its neck is naked, and for a long way below the head is covered, as is alſo the head, with a tough black ſkin: it is poſſible, however, that there naturally may be feathers on this part; but that only dead birds having been ſeen of this ſpecies, the feathers may have fallen off; its tail is broad and ſhort. Margrave.

JABIRUGUACU, in *Ornithology*, the name of a Braſilian bird, called by others nanduapoa, and by the Dutch SCURVOGEL.

JABOTAPITA, in *Botany*. See OCHNA.

JABOTI, in *Zoology*, the name of a remarkable ſpecies of tortoiſe found in America. The ſhell of this ſpecies is black, and has many hexangular figures marked upon it; the head and legs are brown, variegated with ſpots of a duſky greeniſh hue. The liver of this ſpecies is accounted a very delicate food.

JACA, in *Natural Hiſtory*, the name of a kind of nut, very common in China, which is reckoned the largeſt of all yet known. It is produced from the trunk of the tree, as if the branches, however large and ſtrong, were not able to bear it; its ſhell is ſo ſtrong, that there is occaſion for an ax or hatchet to open it; and within are innumerable cells or veſicles containing a pulp of a yellow colour, which ſurrounds a kernel like the cheſnut, that is exceeding ſweet when ripe.

JACAMACIRI, in *Ornithology*, the name of a very remarkable Braſilian bird, approaching to the nature of the woodpecker, and having feet of the ſame ſort with the birds of that genus, the toes ſtanding two before and two behind; it is of the ſize of a lark; its feet are yellow; its head, back, and wings, are all of a very lively green, variegated with yellow and red, and its breaſt and belly of a duſky yellow; it is a very ſplendid and beautiful bird, its colours glowing very brightly in the ſun. Margrave.

JACANA, in *Ornithology*, the name of a Braſilian bird, a ſpecies of moor-hen. It is a very elegant and beautiful kind; it is of the ſize of a pigeon, but its legs are much longer, and are of a greeniſh yellow, and all its toes, eſpecially the hinder one, are of a very remarkable length; its tail is ſhort, its colour on the back, belly, and wings, is a mixt green and black; its neck and breaſt are of the changeable colours they are in the peacock, and in ſome pigeons; its head is ſmall, and is covered with a membrane of the colour of the oriental turquoiſe ſtone; the beak is ſhaped like that of the gallinaceous kind, and is about a finger's breadth long, and is partly of a greeniſh yellow, partly of a very elegant red; it is very common in watery places in Braſil, and is eaten, but not eſteemed a fine fowl. Margrave.

JACAPU, in *Ornithology*, the name of a bird of the merula or blackbird-kind, and of the ſize and ſhape of the common blackbird; its upper part is all of a deep black, except that the tips of the feathers on the rump are ſlightly greyiſh; its breaſt is of a very fine red, and its tail long and like that of the common blackbird; as are alſo its beak and feet. Ray.

JACARE, in *Zoology*, the name of an animal found in the Braſils, and very little differing from the crocodile of the other parts of the world, if at all ſpecifically, which Mr. Ray doubts. It has no tongue, but only a ſort of membrane, which reſembles the ſhape of one, and which it cannot lift up or move; its eyes are large, round, clear, and very bright, the iris blue, and the pupil of a fine black; the fore-legs are very ſlender and weak; the hinder ones longer, and more robuſt; the fore-feet have each five toes; three in the middle, which are long, and armed with very ſharp claws; and two at the ſides, which have none; the hinder feet have only four toes each; one

one of which only on each foot wants a claw, and is the outer one; the farther half of the tail has a ſtrong erect fin upon it, which is of great uſe to the creature when in the water, ſerving as the fins of fiſhes to aſſiſt it in ſwimming. Ray.

JACARINI, in *Ornithology*, the name of a Braſilian bird of the goldfinch-kind, and of the ſize of our common goldfinch. Its beak is thick and grey, as are alſo its legs and feet; it is all over of a fine ſhining black, like poliſhed ſteel; its wings are white underneath. Margrave.

JACCHAGOGI, Ιακχαγωγοι, in *Antiquity*, thoſe who carried the ſtatue of the hero Jacchus in proceſſion, at the celebration of the Athenian feſtival called ELEUSINIA. They had their heads crowned with myrtle.

JACEA, in *Botany*. See CENTAURY.

JACINTH, in *Botany*. See HYACINTH.

JACK, in *Falconry*, ſignifies the male of birds of ſport. See FALCON and HAWK.

JACK, in *Ichthyology*. See PIKE.

JACK, in *Mechanics*, is an inſtrument in common uſe for raiſing heavy timber, or very great weights of any kind. See *Tab.* IV. *Mechanics*, *fig.* 45.

But as the wheel-work of this engine is incloſed in the ſtrong piece of timber CB, the inſide of it is repreſented in *fig.* 46. where the rack AB muſt be ſuppoſed at leaſt four times as long in proportion to the wheel Q, as the figure repreſents it; and the teeth, which will be then four times more in number, to be contained about three in an inch. Then if the handle HP be ſeven inches long, five turns of it, i. e. 5 times 22 inches, or 110 inches, will be the velocity of the power, whilſt the weight raiſed by the claw A, or depreſſed by the claw B, moves one inch: for as the pinion of the handle has but four leaves, and the wheel Q twenty teeth, there muſt be five revolutions of the handle to turn the wheel once round, whoſe three-leaved pinion R will, in that revolution, juſt move the rack three teeth, or one inch. This might have been alſo known without ſeeing, or even knowing the number of the teeth of the wheel and pinions, by meaſuring a revolution of the handle in *fig.* 45. and comparing the ſpace gone through by it with the ſpace gone through by the end A or B. This machine is ſometimes open behind from the bottom almoſt up to the wheel Q, to let the lower claw, which in that caſe is turned up as at B, draw up any weight. When the weight is drawn, or puſhed ſufficiently high, it is kept from going back by hanging the end of the hook S, fixed to a ſtaple, over the curved part of the handle at *h*.

JACK is alſo the name of a well known engine uſed for turning a ſpit: the weight is the power applied; the friction of the parts, and the weight with which the ſpit is charged, are the force to be overcome; and a ſteady uniform motion is maintained by means of the FLY. See the conſtruction of this engine more particularly explained and illuſtrated by a figure, under the article MECHANICAL *powers*.

JACK, *ſmoke*, is an engine uſed for the ſame purpoſe with the common *jack*, and is ſo called from its being moved by means of the ſmoke or rarefied air, aſcending the chimney, and ſtriking againſt the tail of the horizontal wheel AB, (*fig.* 47.) which, being inclined to the horizon, is moved about the axis of the wheel, together with the pinion C, which carries the wheels D and E; and E carries the chain F, which turns the ſpit. The wheel AB ſhould be placed in the narrow part of the chimney, where the motion of the ſmoke is ſwifteſt, and then the greateſt part of it muſt ſtrike upon the ſails. The force of this machine depends on the draught of the chimney, and the vehemence of the fire.

JACK, in a *Ship*, is a ſort of flag or colours, diſplayed from a maſt erected on the outer end of a ſhip's bowſprit. In the Britiſh navy the *jack* is nothing more than a ſmall union FLAG, compoſed of the interſection of the red and white croſſes; but in merchant-ſhips this union is bordered with a red field. See *Tab. of Flags* and *Ship. fig.* 1. N° 146.

JACK *in a box*, *Hernandia*, in *Botany*, a genus of the *monœcia triandria* claſs. Its characters are theſe: it has male and female flowers on the ſame plant; the male flowers have a partial involucrum, compoſed of four oval ſmall leaves, which incloſe three flowers, each of which has a proper bell-ſhaped empalement of one leaf; the petal is funnel-ſhaped, cut into ſix parts at the brim; and it has three ſhort ſtamina inſerted in the empalement; the female flowers are ſhaped like the male, but want ſtamina, and have a roundiſh germen; the empalement becomes a large ſwollen, oblong fruit, perforated at each end, incloſing one hard globular nut. There is one ſpecies, according to Miller, but Linnæus reckons two, growing naturally in the Weſt Indies.

As the fruit of this plant is perforated, and the nut within becomes hard; ſo when the wind blows through the fruit, it makes a whiſtling noiſe, to be heard at ſome diſtance. It is propagated among us in the gardens of the curious, by only ſowing the ſeed in a hot-bed in the ſpring. They muſt be conſtantly kept in the back ſtove.

JACK *by the hedge*, in *Botany*. See *Hedge* MUSTARD, and *Dame's* VIOLET.

JACK-*daw*, in *Ornithology*, a ſpecies of the CORVUS or crow; being the *corvus monedula* of Linnæus. The head of this bird is large in proportion to its body; the irides are white; the forehead is black; the hind-part of the head a fine light grey; the breaſt and belly of a duſky hue, inclining to aſh-colour; the reſt of the plumage is black, ſlightly gloſſed with blue; the feet and bill black; the claws very ſtrong and hooked. This is a docile and loquacious bird. *Jack-daws* breed in ſteeples, old caſtles, and high rocks, laying five or ſix eggs: they feed on inſects, grain, and ſeeds. Pennant.

This bird is very miſchievous to the farmer and gardener, and is of ſuch a thieviſh diſpoſition, that he will carry away much more than he can make any uſe of. There is a method of deſtroying this bird by a particular ſort of ſpringe, which is much practiſed in ſome parts of England, and is ſo uſeful, that it ought to be made univerſal. The method is this: a ſtake of about five foot long is to be driven firmly into the ground, and made ſo faſt that it cannot move, and ſo ſharp pointed at the top, that the *jack-daw* cannot reſt upon it. Within a foot of the top there muſt be a hole bored through it, of three quarters of an inch in diameter; through this hole is to be put a ſtick of about eight inches long, then a horſe-hair ſpringe or nooſe is to be faſtened to a thin hazel-wand, and this brought up to the place where the ſhort ſtick is placed, and carried with it through the hole; the remainder being left open under that ſtick. The other end of the hazel-rod is to be put through a hole in the ſtake near the ground, and faſtened there; the ſtake is to be planted among the *jack-daws* food, and he will naturally be led to ſettle on it; but finding the point too ſharp, he will deſcend to the little croſs ſtick; this will ſink with his weight, and the ſpringe will receive his leg, and hold him faſt.

JACK-*arch*, in *Architecture*, is an arch one brick thick.

JACK-*head*, in *Hydraulics*, a part ſometimes annexed to the *forcing*-PUMP.

JACK-*Ketch* is a name given by the populace to the common hangman.

JACK-*in-a-lantern*. See IGNIS *fatuus*.

JACK-*ſnipe*, in *Ornithology*, the *ſcolopax gallinula* of Linnæus, is about half the ſize of the common SNIPE; and, therefore, ſometimes called the *half-ſnipe*. The crown of the head is black, tinged with ruſt-colour; over each eye is a yellow ſtroke; the neck is varied with white, brown, and pale red; the ſcapular feathers are narrow, very long, and brown, bordered with yellow; the rump is of a gloſſy bluiſh purple; the belly and vent white; the tail brown, edged with tawny, and conſiſting of twelve pointed feathers; the legs are of a cinereous green. The haunts and food of this ſpecies are the ſame with thoſe of the common ſnipe; but it is much leſs frequent, and will not riſe till it is almoſt trod upon. Its motion is ſluggiſh, and flight never diſtant. Pennant.

JACK *wambaſium*, in our *Old Writers*, a kind of defenſive coat-armour, worn by horſemen in war, not made of ſolid iron, but of many plates faſtened together; which ſome perſons by tenure were bound to find upon any invaſion.

JACK is uſed alſo for a horſe or wooden frame to ſaw timber upon; for an inſtrument to pull off a pair of boots; for a great leathern pitcher to carry drink in; for a ſmall bowl that ſerves as a mark at the exerciſe of bowling; and for a young pike.

JACKALL, in *Zoology*, the name of a creature of the dog-kind, the CANIS *aureus* of Linnæus, called by authors *lupus aureus*, the *gold-coloured wolf*, and by the modern Greeks *ſquilachi*. It is ſmaller than the wolf, and of a very beautiful yellow colour. Theſe animals are always ſeen in large flocks together, not unfrequently to the number of two hundred in a flock; and hunt like hounds in full cry from evening till morning. It is a very thieviſh animal, and will ſteal peoples things away while they ſleep, not ſparing ſuch as can be of no uſe to it, as their hats, ſhoes, or the like. There is ſcarce an animal which the *jackall* will leave unmoleſted: in want of living prey, it will feed on roots, fruits, and carrion; greedily diſinter the dead, and feed on the putrid corpſes. Their howls in the purſuit of caravans and armies are dreadful. It is a very common creature in Cilicia, and is heard barking all night long. They may be ſometimes robbed of their prey by the lion; but the vulgar notion of their attendance on that animal is fabulous. The *jackall* is vulgarly called the lion's provider, from an opinion, that it rouzes the prey for it; but this is merely an accidental benefit, which the lion derives from its terrifying cries, by which it rouzes almoſt every creature in the foreſt. Shaw's Travels, p. 247.

JACOBÆA, in *Botany*. See RAGWORT, and GROUNDSELL.

JACOBÆOIDES, in *Botany*. See GOLDEN *rod*.

JACOB's *ladder*, in *Botany*. See *Greek* VALERIAN.

JACOB's-*ſtaff*, a mathematical inſtrument for taking heights and diſtances; the ſame with the CROSS-STAFF.

JACOBINE, the name of a particular ſpecies of pigeon, called by Moore the *columba cypria cucullata*. It is generally called the jack, for ſhortneſs. It is, when genuine and of the true breed, the ſmalleſt of all pigeons. It has a range of feathers inverted quite over the hinder part of its head, and reaching down on each ſide of the neck to the ſhoulders of the wings, which forms a kind of friars hood, from whence the bird has its name. This ſpecies has alſo a ſhort bill, and a pearly eye. The colour is various in the feathers; there are reds, yellows, blues, blacks, and mottles; but whatever is the general colour, the head, tail, and flight, are white. Some pigeons of this ſpecies are feather-legged, others are not.

JACOBINS, a name given in France to the religious who follow the rule of St. Dominic, on account of their principal convent, which is near the gate of St. James, in Latin Jacobus, at Paris; and which, before they came poſſeſſed of it in the year 1218, was an hoſpital of pilgrims, dedicated to the ſaid ſaint. See DOMINICANS.

Others maintain, that they have been called *Jacobins* ever ſince they were eſtabliſhed in Italy, becauſe they pretended to imitate the lives of the apoſtles.

They are alſo called *friers predicants*, or *preaching friers*.

JACOBITES, a ſect of heretics, who were anciently a branch of the Eutychians, and are ſtill ſubſiſting in the Levant.

They were ſo called from Jacobus, James, of Syria, called Baradæus, who was one of the heads of the Monophyſites, or ſectaries who owned but one nature in Jeſus Chriſt.

This poor monk revived the cauſe of the Monophyſites by his activity and diligence; and when he died biſhop of Edeſſa, A. D. 588, he left his ſect in a moſt flouriſhing ſtate in Syria, Meſopotamia, Armenia, Egypt, Nubia, Abyſſinia, and other countries.

The Monophyſites were a ſect of vaſt extent, comprehending the Armenians, Cophts, and Abyſſinians; but thoſe among them who are properly *Jacobites*, were but few; and among thoſe, too, there is now a diviſion, ſome being Romanized, and others perfectly averſe to the Romiſh church; each of which parties have their ſeveral patriarchs.

As to their faith, all the MONOPHYSITES, both Jacobites and others, follow the doctrine of Dioſcorus touching the unity of nature and perſon in Jeſus Chriſt.

JACOBITES, in England, is a term of reproach beſtowed on ſuch perſons as diſallow of the revolution by king William, and ſtill aſſert the rights, and adhere to the intereſts of the abdicated king James, and his line.

JACOBUS, a gold coin, worth twenty-five ſhillings; ſo called from king James the firſt of England, in whoſe reign it was ſtruck. We uſually diſtinguiſh two kinds of *Jacobus*, the *old* and the *new*; the former valued at twenty-five ſhillings, weighing ſix penny-weights ten grains; the latter, called alſo Carolus, valued at twenty-three ſhillings; in weight five penny-weights twenty grains.

JACTITATION *of marriage*. See MARRIAGE.

JACQUINIA, in *Botany*, a genus of the *pentandria monogynia* claſs; the characters of which are, that the corolla is divided into ten ſegments; the ſtamina are inſerted in the receptacle; and the fruit is a ſingle-ſeeded berry.

JACULATOR, or *ſhooting-fiſh*, in *Ichthyology*, is a ſpecies of the *chætodon* in the Linnæan ſyſtem, or the *chætodon roſtratus*, with an entire tail, nine ſpines in the dorſal fin, and a brown circular ſpot, reſembling an eye, and cylindric ſnout. This fiſh is found in India, and derives its name from the manner in which it collects its food. For this purpoſe it frequents the ſhores and ſides of the ſea and rivers; and when it ſpies a fly on the plants, that grow in ſhallow water, it ſwims on to the diſtance of four, five, or ſix feet, and then, with a ſurpriſing dexterity, ejects out of its tubular mouth a ſingle drop of water, which never fails to ſtrike the fly into the ſea or river, where it ſoon becomes a prey. Phil. Tranſ. vol. liv. art. 14. and vol. lvi. art. 21. See *Tab.* II. *of Fiſh*, *fig.* 15.

JACULUM, in *Zoology*, the name of a ſpecies of ſerpent found in Rhodes, and ſome other places, and more uſually called ACONTIAS.

JACUPEMA, in *Ornithology*, the name of a Braſilian bird of the pheaſant-kind, nearly as large as the common European hens. Its feet are of a fine red; it is a very well taſted fowl, and is eaſily kept tame. It has its name from the noiſe it makes, which is *jacu, jacu, jacu*. Margrave.

JACUT, in the *Natural Hiſtory of the Arabians*, is generally ſuppoſed to be the name of the ruby only; and it is owing to this, that among the gems uſed by the Arabian phyſicians in medicine, the ruby is ſuppoſed to have been moſt of all in eſteem, as the name *jacut* oftener occurs in their writings than that of any other of the gems.

JACUT-AGA, is the name of an officer in the court of the grand ſeignior. He is one of two eunuchs who have the care of the treaſure.

JADDESSES is the name of an inferior order of prieſts in Ceylon, who have the care of the chapels appropriated to the genii, who form a third order of gods among theſe idolaters. Theſe prieſts are applied to by the people in a time of diſeaſe or calamity, who offer a cock on their behalf to appeaſe the anger of the dæmons.

JADE, a greeniſh ſtone, bordering on olive-colour, much eſteemed for its hardneſs, which exceeds that of porphyry, agate, or jaſper; and is only to be cut with diamond-duſt.

It is in great eſteem among the Turks and Poles, who adorn all their fine works with it, and eſpecially the handles of their ſabres.

This ſtone, applied to the reins, is ſaid to be a preſervative from the nephritic colic. M. Bernier tells us, that the caravans of Tibet carry it to Cachemire, and that the Galibis prize it as highly as the diamond. The natives of South America value it on account of the virtues they attribute to it in the epilepſy, ſtone, and gravel. In a treatiſe on it, printed at Paris, it is called the *divine ſtone*. See LAPIS *divinus*, and NEPHRITIC *ſtone*.

JAGRA, a name given to a peculiar ſpecies of ſugar, prepared from the cocoa-nut.

JAGUACATI-*guacu*, in *Ornithology*, the name of a Braſilian bird of the kingfiſher-kind, called by the Portugueſe *papa peixe*. It is of the ſize of a thruſh, and in ſhape much reſembles the European kingfiſher. Margrave.

JAGUARA, in *Natural Hiſtory*, the name of a Braſilian animal, accounted by Margrave a ſpecies of tyger, but differing from that creature, and approaching to the leopard in the ſhape of its variegations, which are ſo many round ſpots; it is all over of a yellowiſh colour, beautifully variegated with black ſpots differently diſpoſed; it is a very fierce animal, and as ravenous of human fleſh as of that of beaſts. Ray. See *Tab.* III. *Quadrupeds*, N° 23.

JAGUARACA, in *Ichthyology*, the name of a Braſilian fiſh in many things reſembling the ſcorpius of the Mediterranean. It is of the ſize of the freſh water perch, and its mouth is very large, but without teeth. It is caught among the rocks, and is a very well taſted fiſh. Margrave.

JAGUARETE, in *Natural Hiſtory*, the name of a Braſilian beaſt of prey, accounted by Margrave a ſpecies of tyger, but improperly; its roundiſh ſpots arguing it of the lynx or leopard kind. It is of the ſize of a young heifer, of a yellowiſh colour, variegated with black and brown ſpots, and is a very fierce and deſtructive animal. It much reſembles the creature called jaguara, but is larger; and the ſpots which in that are all round, are in this ſome round, and ſome of other figures. The Portugueſe call both by the ſame name, *onça*.

JAIL. See GAOL.

JAIL *fever*. See FEVER, and HOSPITAL *fever*.

JALAP, in *Medicine*, ſo called from the name of the country, viz. Chalapa, or Xalapa, a province in New Spain, between La Vera Cruz and Mexico, whence it is brought, the root of a ſpecies of the CONVOLVULUS, or the *convolvulus* with variable leaves, foot-ſtalks with ſingle flowers, and a tuberous root.

The mechoacan and this are reckoned of a ſpecies; and therefore as this is ſometimes called *mecoacana nigra*, that goes as often by the name of *jalapium album*.

As *jalap* does not appear to have been known to the ancients, it has its place in medicine only ſince thoſe parts of America, which produce it, have been traded to by the Europeans.

The *jalap* roots are brought over in thin tranſverſe ſlices, ſolid, hard, and heavy; of a blackiſh colour on the outſide or cortical part, and internally of a dark greyiſh, with ſeveral black circular ſtriæ; the hardeſt, darkeſt coloured, and thoſe which have moſt of theſe reſinous veins, are the beſt. This root has ſcarcely any ſmell or taſte. In doſes of a ſcruple, or half a dram, it is an effectual and ſafe purgative, very rarely occaſioning any ſevere gripes or nauſea. *Jalap* is an excellent purgative in dropſical and other caſes, in which ſerous humours are to be evacuated. But it ſhould not be adminiſtered in acute fevers, nor to perſons of dry and hot conſtitutions; for in ſuch caſes, it is liable to the ſame miſchiefs as other acrid purgatives, and will ſometimes bring on heat and inflammations in the viſcera.

The preparations of *jalap* in uſe with us are a tincture, an extract, and a reſin. The tincture is made by digeſting three or four ounces of *jalap* in a pint of proof ſpirit. The extract is prepared by firſt drawing a tincture from the powdered root with rectified ſpirit, then boiling the reſiduum in freſh quantities of water, evaporating the decoctions till they begin to grow thick, mixing in by degrees the tincture inſpiſſated to a like thickneſs, and continuing a gentle heat till the whole is reduced to a due conſiſtence. This extract may be taken by itſelf in doſes of twelve grains, or more. *Jalap* root, digeſted in as much rectified ſpirit as will cover it to the height of about four fingers, gives out the greateſt part of the reſinous manner in which its activity reſides, and tinges the menſtruum of a yellowiſh brown colour. On inſpiſſating the filtered tincture to about one half, and adding to the remainder a proper quantity of water, the liquor becomes milky, and on ſtanding depoſits the pure reſin. This preparation, by itſelf, irritates and gripes much, without proving conſiderably purgative; but thoroughly triturated with teſtaceous or other powders, or with ſoap, or ground with almonds, or powdered gum arabic, and made into an emulſion with water, or diſſolved in rectified ſpirit, and mixed with a proper quantity of ſyrup, that the ſolution may bear being diluted with watery liquors without precipitation, it purges, in doſes of eight or ten grains, as effectually, and, for the moſt part, as mildly as the *jalap* in ſubſtance. Lewis's Mat. Med.

After all the preparations the chemiſts have invented for this root, the beſt way of giving it is in ſubſtance. Mr. Bolduc, in his analyſis of it, found, that when he ſeparated its ſaline and its reſinous parts, by making extracts of it firſt with ſpirits of wine, and then with water, that the ſaline or watery extract was much larger in quantity than the other, but that it purged weakly; and that the reſinous extract, though it operated in a ſmall doſe, was yet a very rough medicine; ſo that the beſt way of uſing them was together, and that nature gave us the medicine ready prepared. Mem. Acad. Par. 1701.

However, others have obſerved, that the extracts of *jalap* appear preferable to the root in ſubſtance, not only on account of the doſe being rendered ſmaller by the rejection of the woody parts, but likewiſe as being more uniform and certain in ſtrength. Lewis.

Many fraudulent chemiſts, when *jalap* is dear, have a trick of putting ſcammony, which is of itſelf almoſt all reſin, among it, and ſometimes gamboge; by which means they can afford to ſell it cheaper than the price it can be honeſtly made for. But their moſt curious cheat is in mixing it with common black reſin; two parts of the latter to one of the former. But this may be known by putting it into rectified ſpirit, which will again diſſolve the reſin of *jalap*, but not touch the other. The virtues are the ſame with thoſe of the root, but it works rougher, becauſe all ſubſtances ſtick to the coats of the inteſtines, ſo as to occaſion much pain and uneaſineſs; for which reaſon this is corrected with ſugar, cream of tartar, or the like; by which means it is brought into the ſame ſtate as nature preſents it in the root. For ſome purpoſes, indeed, where the form is required to be ſmall, as often in adminiſtration to children, this is moſt convenient. Its doſe is from three grains to one ſcruple.

Jalap poſſeſſes a fermenting power in a conſiderable degree, and is ſaid to be uſed with this intention by brewers and diſtillers.

JALAPA, in *Botany*. See MIRABILIS.

JALEMUS, Ιαλεμος, in *Antiquity*, a kind of mournful ſong, uſed upon occaſion of death, or any other affecting accident. Hence the Greek proverbs had their original, ιαλεμου οικροτερος, or ψυκροτερος, i. e. *more ſad or colder than a* jalemus, εις τους ιαμελους εγγραπτεος, *worthy to be ranked among* jalemuſes. Mem. Acad. Inſcript. tom. xiii. p. 554.

JAM, or JAMB, in the language of our lead-miners in Mendip, a thick bed of ſtone, which hinders their work when they are purſuing the veins of ore.

JAMACAII, in *Ornithology*, the name of a Braſilian bird, of the ſize of a lark; its head is ſmall, its beak a little bent downwards; its head is black, its throat alſo black, but the upper part of its neck yellow; its back, breaſt, and belly, are alſo yellow; its wings are black, but have each one white ſpot; its tail alſo is black, and its legs and feet brown; it is an extremely beautiful bird, and has ſo long a tail, that it ſeems to belong to the wagtail, or motacilla kind. Margrave.

JAMAICA *pepper*. See PIMENTO.

JAMAICA *wood*. See BRAZIL.

JAMBEAUX, among our *Old Writers*, armour for the legs.

The word is French, from *jambe*, the *leg*.

IAMBIC, in *Ancient Poetry*, a kind of verſe, found in the Greek and Latin poets; conſiſting wholly, or at leaſt in great part, of *iambuſes*, or feet ſo called.

Iambic verſes may be conſidered, either with regard to the diverſity, or the number of their feet: under each of which heads there are diſtinct kinds, which have different names. 1. *Pure iambics* are thoſe which conſiſt entirely of *iambuſes*; as the fourth piece of Catullus made in praiſe of a ſhip:

Phaſelus ille, quem videtis hoſpites.

The ſecond kind are thoſe called ſimply *iambics*. Theſe have no *iambuſes* but in the even feet, though there are ſometimes tribrachys added to them, excepting to the laſt, which is always an *iambus*; and in the uneven feet they have ſpondees, anapæſt, and even a dactyl, in the firſt: ſuch is that of Medea in Ovid.

Servare potui: perdere an poſſim rogas?

The third kind are the *free iambic* verſes, in which it is not abſolutely neceſſary there ſhould be any *iambus*, excepting the laſt foot; of which kind are all thoſe of Phædrus:

Amittit merito proprium, qui alienum appetit.

In comedies, the ancient authors ſeldom confine themſelves more, frequently leſs, as we may obſerve in Plautus and Terence; but the ſixth is always indiſpenſibly an *iambus*.

As to the varieties, occaſioned by the number of ſyllables, *dimeter iambic* is that which has but four feet:

Queruntur in ſilvis aves.

Thoſe which have ſix are called *trimeters*: theſe are the moſt beautiful, and are uſed principally for the theatre, particularly in tragedy; wherein they are vaſtly preferable to the verſes of ten or twelve feet, uſed in our modern drama; becauſe they come nearer to the nature of proſe, and ſavour leſs of art and affectation:

Dii conjugales, tuque genialis tori
Lucina cuſtos, &c.

Thoſe with eight are called *tetrameters*, and are only uſed in comedies:

Pecuniam in loco negligere maximum interdum eſt lucrum.
Terent.

Some add an *iambic* monometer, with two feet:

Virtus beat.

They are called *monometers*, *dimeters*, *trimeters*, and *tetrameters*; that is, of one, two, three, and four meaſures, becauſe a meaſure conſiſted of two feet; the Greeks meaſuring their verſes two feet by two feet, or by dipodys, or epitrites, joining the iambus and ſpondee together.

All the *iambics* hitherto mentioned are *perfect*; they have their juſt number of feet, without any thing either deficient or redundant. The *imperfect iambics* are of three kinds; the *catalectic*, which want a ſyllable:

Muſæ Jovem canebant.

The *brachycatalectic*, which want an entire foot:

Muſæ Jovis gnatæ.

The *hypercatalectic*, which have either a foot or a ſyllable too much:

Muſæ ſorores ſunt Minervæ,
Muſæ ſorores Palladis lugent.

Many of the hymns and anthems uſed in the Romiſh church, are *dimeter iambics*, that is, conſiſting of four feet.

JAMBLICI *ſal*, in *Medicine*, a kind of ſalt prepared with ſal ammoniac, and ſeveral aromatic ingredients, ſuch as pepper, ginger, thyme, origanum, and the like; it has its name from its reputed author Jamblichus, and is ſuppoſed by many old writers to be an excellent medicine for concocting the crude humours, and gently producing ſtools. It was taken faſting in the quantity of half a ſpoonful, either alone or in a poached egg, or mixed with any liquor.

JAMBOLIFERA, in *Botany*, a genus of the *octandria monogynia* claſs; the characters of which are, that the calyx is quadridentated, and the corolla has four petals, and is funnel-ſhaped.

JAMBON, in *Natural Hiſtory*, a name given by authors to a kind of ſea-ſhell, reſembling a ham of bacon. It is a ſpecies of PINNA *marina*.

JAMBS, among *Carpenters* and *Bricklayers*. See JAUMS.

JAMBU, in *Ornithology*, the name of a Braſilian ſpecies of partridge, of which there are two ſpecies. They are of a duſky yellow colour, and are equal to the European partridges in the delicacy of their taſte. Margrave.

IAMBUS, Ιαμβος, in the *Greek* and *Latin Proſody*, a poetical foot, conſiſting of a ſhort ſyllable followed by a long one; as in

˘– ˘– ˘– ˘–
Θεου, λεγω, *Dei*, *meas*.

Syllaba longa brevi ſubjecta vocatur iambus, as Horace expreſſes it; who alſo calls the *iambus* a ſwift, rapid foot, *pes citus*.

The word, according to ſome, took its riſe from Iambus, the ſon of Pan and Echo, who invented this foot; or, perhaps, who only uſed ſharp biting expreſſions to Ceres, when afflicted for the death of Proſerpine. Some rather derive it from the Greek ιος, *venenum*, *poiſon*; or from ιαμβιζω, *maledico*, *I rail*, or *revile*; becauſe the verſes compoſed of *iambuſes* were at firſt only uſed in ſatire.

The invention of this kind of verſe is aſcribed by Horace to Archilochus:

> *Archilochum proprio rabies armavit* iambo.
>
> Art. Poet.

JAMES. St. James *of the Sword*, *San* Jago *del Eſpada*, a military order in Spain, inſtituted in 1170, under the reign of Ferdinand II. king of Leon and Gallicia.

Its end was, to put a ſtop to the incurſions of the Moors; three knights obliging themſelves by a vow to ſecure the roads.

An union was propoſed and agreed to in 1170 between theſe and the canons of St. Eloy; and the order was confirmed by the pope in 1175.

The higheſt dignity in that order is that of grand maſter, which has been united to the crown of Spain. The knights are obliged to make proof of their deſcent from families that have been noble for four generations on both ſides; they muſt alſo make it appear, that their ſaid anceſtors have neither been Jews, Saracens, nor heretics; nor even to have been called in queſtion by the inquiſition.

The novices are obliged to ſerve ſix months in the galleys, and to live a month in a monaſtery. Heretofore they were truly religious, and took a vow of celibacy; but Alexander III. gave them a permiſſion to marry. They now make no vows but of poverty, obedience, and conjugal fidelity; to which, ſince the year 1652, they have added that of defending the immaculate conception of the holy Virgin. Their habit is a white cloke, with a red croſs on the breaſt. This is eſteemed the moſt conſiderable of all the military orders in Spain: the king carefully preſerves the office of grand maſter in his own family; on account of the rich revenues and offices, whereof it gives him the diſpoſal. The number of knights is much greater now than formerly, all the grandees chooſing rather to be received into this, than into the order of the golden fleece; inaſmuch as this puts them in a fair way of attaining to commands, and gives them many conſiderable privileges in all the provinces of Spain, but eſpecially in Catalonia.

There was an order of the ſame name and kind inſtituted in Portugal by king don Denys VI. in 1310.

St. James*'s Day*, a feſtival in the calendar, obſerved on the twenty-fifth of July, in honour of St. James.

Epiſtle of St. James, is a canonical book of the New Teſtament, being the firſt of the catholic epiſtles. See Epistle.

JAMMING, in general, denotes the act of incloſing any object between two bodies, ſo as to render it immoveable.

In *Sea-Language*, this expreſſion is applied to the ſituation of ſome running rope, when it happens to be ſqueezed by the compreſſion of the ſtanding-rigging, &c. and conſequently incapable of performing its office, by traverſing in the blocks, till it is releaſed. In this ſenſe *jamming* is oppoſed to rendering.

JAMPNUM, in our *Old Writers*, furze, or gorſe, and gorſy ground. This word is uſed in fines of lands, &c. and ſeems to come from the French *jaune*, i. e. *yellow*; becauſe the bloſſoms of furze or gorse are of that colour. 1 Croke 179.

JANA, among the *Romans*, a name given to Diana, or the moon.

JANITORES, door-keepers, among the Romans, the meaneſt of their ſlaves, who were commonly chained to their poſts.

JANIZARIES, an order of infantry in the Turkiſh armies; reputed the grand ſeignior's foot-guards.

Voſſius derives the word from *genizers*, which, in the Turkiſh language, ſignifies *novi homines*, or *milites*. D'Herbelot tells us, that *jenitcheri* ſignifies a *new band*, or *troop*; and that the name was originally given by Amurath I. called the Conqueror, who chooſing out one-fifth part of the Chriſtian priſoners, whom he had taken from the Greeks, and inſtructing them in the diſcipline of war, and the doctrines of their religion, ſent them to Hagi Bektaſche (a perſon whoſe pretended piety rendered him extremely revered among the Turks), to the end that he might confer his bleſſing on them, and at the ſame time give them ſome mark to diſtinguiſh them from the reſt of the troops. Bektaſche, after bleſſing them in his manner, cut off one of the ſleeves of the fur gown which he had on, and put it on the head of the leader of this new militia; from which time, viz. the year of Chriſt 1361, they have ſtill retained the name *jenitcheri*, and the fur cap. Others aſcribe their origin to ſultan Amurath II. in the year 1372.

The *janizaries* are children of tribute, levied by the Turks among the Chriſtians, and bred up to the military life. They are taken at the age of twelve years, to the end, that forgetting their country and religion, they may know no other parent but the ſultan. However, generally ſpeaking, they are not now-a-days raiſed by way of tribute; for the carach, or tax, which the Turks impoſe on the Chriſtians, for allowing them the liberty of their religion, is now paid in money; excepting in ſome places, where money being ſcarce, the people are unable to pay in ſpecie, as in Mingrelia, and other provinces near the Black Sea.

As in the Turkiſh army, the European troops are diſtinguiſhed from thoſe of Aſia, the *janizaries* are alſo diſtinguiſhed into *janizaries* of Conſtantinople, and of Damaſcus.

Their pay is from two aſpers to twelve per diem; for when they have a child, or do any ſignal piece of ſervice, their pay is augmented.

Their dreſs conſiſts of a dolyman, or long gown, with ſhort ſleeves, which is given them annually by the grand ſeignior, on the firſt day of Ramazan. They wear no turban, but in lieu of that a kind of cap, which they call *zarcola*, and a long hood of the ſame ſtuff hanging on their ſhoulders. On ſolemn days they are adorned with feathers, which are ſtuck in a little caſe in the fore-part of the bonnet.

Their arms in Europe, in a time of war, are a ſabre, a carabine, or muſquet, and a cartouch-box hanging on the left ſide. At Conſtantinople, in time of peace, they only carry a long ſtaff in their hand. In Aſia, where powder and fire-arms are more uncommon, they wear a bow and arrows, with a poignard, which they call *haniare*.

The officer who commands the whole body of *janizaries* is called the *janizar agaſi*; in Engliſh, aga of the *janizaries*. He is one of the chief officers of the empire.

Though the *janizaries* are not prohibited marriage, yet they rarely marry, nor then, but with the conſent of their officers; as imagining a married man to make a worſe ſoldier than a bachelor.

The *janizaries* were at firſt called *jaja*, that is, footmen, to diſtinguiſh them from the other Turks, the troops whereof conſiſted moſtly of cavalry.

Vigenere tells us, that the diſcipline obſerved among the *janizaries*, is extremely conformable, in a great many things, to that uſed in the Roman legions.

The *janizaries* were heretofore a body formidable even to their maſters, the grand ſeigniors. They depoſed Bajazet II. in 1512; they procured the death of Amurath III. in 1595. Oſman II. they firſt ſtripped of his empire, and afterwards of his life, in 1622; and in about two months dethroned Muſtapha, whom they had made his ſucceſſor; and in 1649 they depoſed ſultan Ibrahim, and at laſt ſtrangled him in the caſtle of the Seven Towers; and in 1730 they obtained the ſacrifice of the grand viſir, the rei effendi, and the captain baſhaw, and depoſed and impriſoned Achmet III. and advanced the ſultan Mahomet, ſon of Muſtapha II. from priſon, to the throne, in his ſtead. The number of real *janizaries* is only twenty-five thouſand; but the privileges belonging to their order, ſuch as exemption from taxes, and the performance of public duties, have induced many perſons to bribe the officers, in order for their being admitted into the number of *janizaries* without pay.

Janizaries, at Rome, are officers or penſioners of the pope, called alſo *participantes*, on account of certain rites or duties which they enjoy in the annates, bulls, or expeditions, and the Roman chancery.

Moſt authors are miſtaken in the nature of their office: the truth is, they are officers of the third bench, or college of the Roman chancery. The firſt bench conſiſts of writers, the ſecond of abbreviators, and the third of *janizaries*; who are a kind of correctors and reviſors of the pope's bulls.

JANNANINS, in *Modern Hiſtory*, the name which the Negroes, in ſome of the interior parts of Africa, give to ſpirits which they apprehend to be the ghoſts or ſouls of their anceſtors, and which they go to the tombs to conſult and worſhip. Every Negro has his tutelary *jannanin*, and ſo has likewiſe every village, to whom private and public worſhip is reſpectively addreſſed. The women, children, and ſlaves, are forbid to attend their public worſhip.

JANNOCK, a kind of oaten bread, much uſed in the northern parts of England, and made of ſour leaven.

JANSENISM, in *Eccleſiaſtical Hiſtory*, the doctrine of Cornelius Janſen, commonly called *Janſenius*, biſhop of

Ypres, in Flanders, chiefly with relation to grace and free-will.

Janſenius was born of catholic parents in Holland, and ſtudied at Utrecht, Louvain, and Paris.

Janſeniſm made no great noiſe in the world, till after the death of its author, in 1638, when Fromond and Calenus, his executors, publiſhed his book, intitled *Auguſtinus*. This book had been the labour of twenty years, was juſt finiſhed before the author's death, and publiſhed at Louvain in 1640. Janſenius was led to engage in this work by the controverſy that was carried on, in the beginning of the ſeventeenth century, between the JESUITS and DOMINICANS, concerning the nature and neceſſity of divine grace; the deciſion of which had, towards the concluſion of the preceding century, been committed by Clement VIII. to a ſelect aſſembly of learned divines. Theſe arbiters, after much examination, delivered their opinion to the pontiff, that the ſentiments of the Dominicans, concerning grace, predeſtination, human liberty, and original ſin, were more conformable to the doctrine of ſcripture, and the deciſions of the ancient fathers, than the opinions of Molina, which were patronized by the Jeſuits. The former, they obſerved, inclined to the tenets of Auguſtine, and the latter bore a ſtriking reſemblance to the Pelagian hereſy. In conſequence of this declaration, Clement ſeemed reſolved to condemn the Jeſuits, and to determine the controverſy in favour of the Dominicans. In 1602 the Jeſuits prevailed on the old pontiff, by intreaties, menaces, arguments, and complaints, to re-examine this intricate controverſy, and to undertake the office of principal arbitrator. For this purpoſe he choſe a council, called the congregation *de auxiliis*, or the congregation of AIDS, compoſed of fifteen cardinals, nine profeſſors of divinity, and five biſhops, which, in the ſpace of three years, aſſembled ſeventy-eight times. The death of Clement, in 1605, prevented his pronouncing a deciſive ſentence with regard to this controverſy; nor are his ſentiments certainly known, though the Jeſuiſts and Dominicans contend, that his deciſion would have been favourable to their reſpective party. The proceedings of this congregation were reſumed, in 1605, by order of Paul V. the ſucceſſor of Clement. The reſult of many ſolemn deliberations was, that the whole controverſy, inſtead of being decided, ſhould be ſuppreſſed; and that each of the contending parties ſhould have the liberty of following their reſpective opinions. Paul V. declined a public determination of the controverſy, through apprehenſion of offending either the king of France, who protected the Jeſuits, or the king of Spain, who warmly maintained the cauſe of the Dominicans. The flame of controverſy broke out again with new violence in the year 1640, on the publication of Janſenius's book, which was divided into three parts: the firſt being hiſtorical, and containing a relation of the Pelagian controverſy, which aroſe in the fifth century: in the ſecond the author gives an accurate account and illuſtration of the doctrine of Auguſtine, relating to the conſtitution and powers of the human nature, in its original, fallen, and renewed ſtate: and the third part contains his doctrine, relating to the aids of ſanctifying grace procured by Chriſt, and to the eternal predeſtination of men and angels. The deſign of Janſenius in this work was, to ſhew in what manner the important points in debate had been underſtood and explained by Auguſtine, whoſe name and authority were univerſally revered in all parts of the Roman catholic world. The Dominicans, who followed the ſentiments of Thomas Aquinas, concerning the nature and efficacy of divine grace, derived very conſiderable advantage from this publication; whilſt the Jeſuits conſidered it as not only a tacit but formidable refutation of their opinions concerning human liberty and divine grace. They therefore exerted their moſt zealous endeavours to obtain a public condemnation of it from Rome; and they ſucceeded ſo far as to procure a prohibition of the peruſal of it, by the Roman inquiſitors, in the year 1641; and in 1642 a ſolemn bull of Urban VIII. condemning it, as fraught with ſeveral errors, that had been long baniſhed from the church. However, the deciſions of the inquiſition, and the bull of the pontiff, were diſregarded in many parts of the Roman church. The doctors of Louvain, the followers of Auguſtine in the Netherlands, and the abbot of St. Cyran, and other famous and learned men, known under the denomination of the Authors of Port-royal, in France, oppoſed the proceedings of the Jeſuits, and ſtrenuouſly ſupported the cauſe of *Janſeniſm*: though the greateſt part of the French theologiſts engaged in behalf of the Jeſuiſts. The diſpute was now become very general and violent; and both parties exerted all their learning, art, intereſt, and power, to vindicate their reſpective cauſe. The *Janſeniſts* recurred to miracles in confirmation of their doctrine; and the hiſtory of the controverſy furniſhes many legendary tales of miraculous cures wrought in its favour; the firſt of theſe miracles occurs in 1656, when a pretended thorn of that deriſive crown that was put upon our Saviour's head by the Roman ſoldiers, is reported to have performed ſeveral wonderful cures in the convent of Port-Royal: theſe were ſucceeded by other prodigies in the years 1661 and 1664. The ſame pious frauds were revived in 1725, 1727, and 1731, when the bones of the Abbé de Paris, which were interred at St. Medard, are ſaid to have been inſtrumental in performing innumerable miracles. However, the oppoſers of the doctrine of St. Auguſtine ſelected five propoſitions out of Janſenius's book, which, by the intereſt and importunities of the Jeſuits, were condemned by a public bull of Innocent X. in 1653. Theſe propoſitions contained the following doctrines:

I. Some commands of God are impoſſible to righteous men, even though they endeavour, with all their powers, to accompliſh them; the grace being wanting, by which they ſhould be enabled to perform them. II. In the ſtate of corrupted nature, a man never reſiſts inward grace. III. To merit and demerit in the preſent ſtate of corrupt nature, it is not requiſite a man ſhould have that liberty which excludes neceſſity: that which excludes conſtraint is ſufficient. IV. The Semipelagians admitted the neceſſity of inward preventing grace to each act in particular, and even to the beginning of faith; but they were heretics, in regard they aſſerted, that this grace was ſuch, as that the will of man might either reſiſt or obey it. V. It is Semipelagianiſm to ſay, that Jeſus Chriſt died, or ſhed his blood, for all men in general.

Of theſe propoſitions the pontiff declared the firſt four only heretical; but he pronounced the fifth raſh, impious, and injurious to the Supreme Being. The *Janſeniſts*, availing themſelves of a ſubtile diſtinction invented by Arnaud, conſidered ſeparately in this controverſy the matter of doctrine, and the matter of fact, i. e. they acknowledged themſelves bound to believe that the five propoſitions above mentioned were juſtly condemned by the Roman pontiff; but they maintained, that the Pope had not declared, and conſequently, that they were not bound to believe, that theſe propoſitions were to be found in Janſenius's book, in the ſenſe in which they had been condemned. But this artful diſtinction was of no long ſervice to them; for Alexander VII. iſſued out a ſolemn bull in 1656, declaring, that the five propoſitions that had been condemned, were the tenets of Janſenius, and were contained in his book; and in 1665 he ſent into France the form of a declaration, that was to be ſubſcribed by all who ſought preferment in the church, affirming, that the five propoſitions were to be found in the book of Janſenius, in the ſame ſenſe in which they had been condemned by the church. This declaration produced the moſt deplorable tumults; the *Janſeniſts* maintained that the deciſions of the pope, ſo far as they were not confirmed by a general council, with regard to matters of fact, were fallible; and the Jeſuits, on the contrary, that unlimited confidence in the papal deciſions, both with reſpect to matter of fact, and of opinion, was an eſſential character of a well grounded and divine faith. The Jeſuits prevailed, and the *Janſeniſts* ſuffered exile, impriſonment, and various kinds of proſecution. Clement IX. in conſequence of the ſpirited remonſtrance of ſeveral biſhops, and the earneſt application of Anne Genevieve de Bourbon, ducheſs of Longueville, accepted a conditional ſubſcription to the declaration of his predeceſſor, allowing the *Janſeniſts* the privilege of interpreting it in their own ſenſe. This indulgence reſtored tranquility, and produced a period in this controverſy, commonly called the peace of Clement; but it was ſoon diſturbed again by a public edict of Lewis XIV. and totally aboliſhed after the death of the ducheſs of Longueville, in the year 1679. The famous Arnaud retreated on this occaſion into Holland, where he gained over the Romiſh congregations to the *Janſeniſt* party: and this party, ſecured under the protection of the Dutch government, has ſince prevailed in that country. The *Janſeniſts* were particularly offenſive to the Jeſuits, on account of the auſterity of their party, and the ſeverity that reigned in their ſyſtem of moral diſcipline and practical religion: for they have exclaimed againſt the corruptions of the church of Rome, both with regard to its doctrines and morals; and urged the neceſſity of inſtructing the people in the doctrines and precepts of Chriſtianity: with this view they have maintained that the holy ſcriptures and public liturgies ſhould be peruſed by the people in their mother-tongue; and taught, that true piety does not conſiſt in the obſervance of pompous rites, or in the performance of external acts of devotion, but in inward holineſs and divine love. This apparent piety of the *Janſeniſts* has, however, been unhappily blended with ſuperſtition and fanaticiſm; and they have been branded, not altogether without reaſon, with the denomination of MYSTICS and *Rigouriſts*. See QUIETISM. The controtroverſy relating to *Janſeniſm*, which was one of the principal ſources of that diviſion, which reigned within the papal juriſdiction, has been caried on with great animoſity in France and in the Netherlands; and the *Janſeniſts* were for a conſiderable time much inferior to the Jeſuits in number, power, and influence; though they equalled their adverſaries in reſolution, prudence, and learning, and ſurpaſs them in ſanctity of manners and ſuperſtition, by which they excite the reſpect of the people. The United Provinces, particularly the Netherlands, have afforded them an aſylum on many occaſions: nevertheleſs the Jeſuits, though they have no legal toleration in that republic, have been lately gaining ground among the Dutch papiſts. They have a flouriſhing chapel in the city of Utrecht, and places of worſhip in ſeveral other cities, and in a great number of villages. Towards the cloſe of the laſt and the commencement of the preſent century, the cauſe of the *Janſeniſts* acquired reputation, by a French tranſlation of the New Teſtament, made by the learned and pious Paſchaſius Quenel, a prieſt of the Oratory; in the annotations to which he has artfully blended the quinteſſence of *Janſeniſm*. This work, at the inſtigation of the Jeſuits, and particular application of Lewis XIV. to the court of Rome, was condemned by Clement XI. who, in 1713, iſſued out the famous bull UNIGENITUS, in which Quenel's New Teſtament was condemned, and one hundred and one propoſitions contained in it pronounced heretical. The controverſy relating to *Janſeniſm* was much heated and increaſed, inſtead of being mitigated or ſuſpended, by this deſpotic and ill-judged edict. The *Janſeniſts* were again obliged to recur to writing, and even to miracles and viſions and pretended revelations for the ſupport of their declining cauſe. However, the ſtorm of reſentment that has lately ariſen againſt the JESUITS, and that has been attended with the extinction of their order in Portugal, France, and in all the Spaniſh dominions, has diſarmed the moſt formidable adverſaries of *Janſeniſm*, and muſt be conſidered as an event highly favourable to the *Janſeniſts*. Moſheim's Eccl. Hiſt. vol. iv. p. 366, &c. vol. v. p. 77, &c. Eng. ed. 1768, 8vo.

JANUARY, the name of the firſt month of the year, according to the computation now uſed in the Weſt.

The word is derived from the Latin *Januarius*, a name given it by the Romans, from *Janus*, one of their divinities, to whom they attributed two faces; becauſe on the one ſide, the firſt day of January looked towards the new year, and, on the other, towards the old one.—The word *Januarius* may alſo be derived from *janua*, gate; in regard this month being the firſt, is, as it were, the gate of the year.

January and *February* were introduced into the year by Numa Pompilius; Romulus's year beginning in the month of March.

The Chriſtians heretofore faſted on the firſt day of *January*, by way of oppoſition to the ſuperſtition of the Heathens, who in honour of Janus, obſerved this day with feaſtings, dancings, maſquerades, &c.

ANUARIUS's *Blood*. See *Religious uſes* of BLOOD. The head of this ſaint is occaſionally carried in proceſſion at Naples, in order to ſtay the eruption of Veſuvius.

JANUS, *Temple of*, in *Ancient Hiſtory*, a ſquare building at Rome (as ſome ſay) of entire braſs, erected by Romulus, and ſo large as to contain a ſtatue of Janus five feet high, with brazen gates on each ſide, which were always kept open in time of war and ſhut in time of peace. But the Romans were ſo much engaged in war, that this temple was ſhut only twice from the foundation of Rome till the reign of Auguſtus, and ſix times afterwards. It was *firſt* ſhut during the long reign of Numa, who inſtituted this ceremony. 2. In the year of the city 519, after the end of the firſt Punic war. 3. By Auguſtus after the battle of Actium, in the year of Rome 725. 4. On Auguſtus's return from the war which he had againſt the Cantabrians in Spain, A. U. C. 729. 5. Under the ſame emperor, in the year of Rome 744, about five years before the birth of Chriſt, when there was a general peace throughout the whole Roman empire, which laſted twelve years. 6. Under Nero, A. U. C. 811. 7. Under Veſpaſian, A. U. C. 824. 8. Under Conſtantius, when upon Magnentius's death he was left ſole poſſeſſor of the empire, A. U. C. 1105. Some diſpute the authority in which it is ſaid to have been ſhut by Conſtantius, and ſay that the laſt time of its being ſhut was under Gordian, about the year of Rome 994. Virgil gives us a noble deſcription of this cuſtom:

> *Sunt geminæ Belli portæ, ſic nomine dicunt*, &c.
> Æn. lib. vii. ver. 607, &c.

The origin of this cuſtom is not certainly known. See Macrob. Saturn. lib. i. cap. 9. and Virgil Æn. lib. vii. v. 601—622.

JAPACANI, in *Ornithology*, the name of a Braſilian bird of the ſmaller ſort: its beak is black, long, and pointed, and a little bent downward; its head is black, and its back, neck, and wings, are of a greeniſh brown, mixed with black; the tail is black above, and is ſpotted with white underneath; its breaſt is of a mixture of white and yellow, as are alſo its belly and thighs; and theſe are variegated with tranſverſe black ſtreaks. Margrave.

JAPAN *Earth*, ſee CATECHU. The tree or plant from which the *Japan earth* is extracted is a ſpecies of the MIMOSA of Linnæus, and is very common on the uncultivated mountains of Hindoſtan, in the province of Bahar, weſtward of Bengal. The ſubſtance is extracted from the interior coloured wood, which is cut into chips, and put into a narrow-mouthed unglazed earthen pot: a quantity of water almoſt ſufficient to cover the chips is poured upon them, which is half evaporated by boiling, and then the decoction, without being ſtrained, is poured into a flat earthen pot and boiled to one third part: this is ſet by in a cool place for one day, and afterwards evaporated by the heat of the ſun, ſtirring it ſeveral times in a day: when it is reduced to a conſiderable thickneſs, it is ſpread upon a mat or cloth, which has been previouſly covered with the aſhes of cow-dung, divided into ſquare or quadrangular pieces by a ſtring, and completely dried by turning theſe frequently in the ſun till they are fit for ſale. The extract thus prepared is bought of the manufacturer for twelve or fifteen ſhillings the 80 lb. weight. It is much uſed by the natives in dying and painting chintz and other cloths: combined with the vitriolic ſalts, a black colour is produced; mixed with oil they paint the beams and walls of houſes to preſerve them, and to defend them from the deſtructive white ants; and it is ſometimes mixed with their wall plaiſter. This extract is uſed alſo medicinally as a cooling medicine, and when too profuſely uſed it is ſaid to be a deſtroyer of venereal pleaſures. It is alſo given at the rate of two ounces a day to tame vicious horſes. This extract is likewiſe a principal ingredient in one of their ointments: of great repute, compoſed of blue vitriol, four drams; *Japan earth*, four ounces; alum, nine drams; white reſin, four ounces; which are reduced to a fine powder and mixed with the hand, adding of olive oil ten ounces, and water ſufficient to bring the maſs to the proper conſiſtence of an ointment: this ointment is uſed in every ſore from a freſh wound to a venereal ulcer. Med. Obſ. Inq. vol. v. art. 16.

The London college directs *Japan earth* to be made into troches by beating it with an equal weight of gum arabic, and four times the weight of both, of ſugar of roſes, and a ſufficient quantity of water: but the college of Edinburgh orders one part of the *Japan earth*, four of gum tragacanth, and twenty-four of fine ſugar, with roſe-water. The *tinctura Japonica* is prepared by digeſting three ounces of the *Japan earth* and two of cinnamon in a quart of proof ſpirit; and this tincture may be given in doſes of two or three ſpoonfuls. For the method of preparing *Japonic confection*, ſee CONFECTION. *Japan earth* diſſolved in water is of a full brown colour, a little inclining to red. It is ſometimes uſed in water-painting, where it has a good effect; but its gummy texture renders its uſe improper in oil.

JAPANNERS *Gilding*, ſee GILDING.

JAPANNING, the art of varniſhing, and drawing figures on wood, &c. after the ſame manner as the workmen do who are natives of Japan, a famous iſland not far from the coaſt of China.

The varniſh made and uſed in China and Japan is compoſed of turpentine, and a curious ſort of oil they have. This they mix and boil up to a proper conſiſtence, and this never cauſes any ſwelling in the hands or face of the people who uſe it. The ſwellings in theſe parts, which often happen to thoſe who work the lacquered ware, and ſometimes to thoſe who only paſs by the ſhops of theſe people, is from the lack, and not the varniſh. This lack is the ſap or juice of a tree, which runs ſlowly out on cutting the lower part of the trunk of the tree, and is received in pots ſet on purpoſe under the inciſions. The juice as it flows from the tree is of the colour and conſiſtence of cream; and as it comes in contact with the external air, its ſurface becomes black. As they only uſe it when black, their method of preparing it is to ſet it out in the open air, in large flat bowls, in which it looks all ſurface; but that the whole may be of the ſame uniform colour, they continually ſtir it for twenty-four hours together, with a ſmooth piece of iron. By this means the whole becomes thicker than it was before, and of a fine deep black. When it is in this ſtate they powder ſome burnt boughs of trees, and mix them thoroughly with it; and then ſpreading it thin over any board which they intend to japan, it is ſoon dried in the ſun, and is then abſolutely harder than the board it is laid on. When this is thoroughly dry they poliſh it over with a ſmooth ſtone and water, till it is as ſmooth as glaſs; and then wiping it very dry, they lay on the varniſh, made of oil and turpentine, and boiled to a proper conſiſtence for this kind of work.

If the work is to be of any other colour than black, that colour is to be mixed with the varniſh, and then the whole ſpread on very thinly and evenly; for in this laying it on depends the principal art of varniſhing. When there are to be figures in gold and ſilver, theſe muſt be traced out with a pencil in the varniſh over the reſt of the work; and when this varniſh is almoſt dry, the leaf-gold or leaf-ſilver is to be laid on, and poliſhed afterwards with any ſmooth ſubſtance.

The ſubſtances which admit of being *japanned* are almoſt thoſe of every kind that are dry, and not too flexible; as wood, metals, leather, and paper prepared. Wood and metals require no other preparation, except that of cleaning their ſurfaces, and rendering them perfectly even. But leather ſhould be ſecurely ſtrained either on frames or on boards; and paper ſhould be treated in the ſame manner, and have a previous ſtrong coat of ſome kind of ſize; but it is rarely made the ſubject of *japanning*, till it is converted into PAPIER *maché*, or wrought, by other means, into an inflexible form.

One principal variation in the manner of *japanning* is the uſing or omitting any priming or under-coat on the work to be japanned. In the older practice, ſuch priming was always uſed; and is at preſent retained in the French manner of *japanning* coaches and ſnuff-boxes of the *papier maché*. But in the Birmingham manufacture it has always been rejected. The advantages attending the uſe of ſuch priming are, that it makes a ſaving in the quantity of varniſh neceſſary to be uſed, and that it helps to form, by means of rubbing and water-poliſhing, an even ſurface for the varniſh. However, when an under-coat of ſize is uſed, the japan coats of varniſh and colour will be always liable to crack and peel off, and are leſs durable than thoſe which are formed without ſuch priming. This difference is obſervable in comparing the wear of the Paris and Birmingham ſnuff-boxes.

The laying in of the colours in varniſh or oil inſtead of gum-water, is another variation from the method of *japaning* formerly practiſed. But if the colours are tempered with the ſtrongeſt iſinglaſs ſize and honey, inſtead of gum-water, and laid on very flat and even, the work will not be much inferior in appearance to that done by the other method, and will laſt as long as the common old *japan* work, the beſt kinds of the true *japan* excepted.

The proper *japan* grounds are either ſuch as are formed by the varniſh and colour, where the whole is to remain of one ſimple colour; or, by the varniſh either coloured, or without colour, on which ſome painting or other decoration, is afterwards to be laid. The priming, or undercoat, which is ſometimes uſed in *japanning*, is of the ſame nature with that called clear coating, practiſed by the houſe-painters; and conſiſts in laying on and drying in the moſt even manner a compoſition of ſize and whiting. The common SIZE has been generally uſed; but in nicer works, the glovers or the parchment ſize, improved by adding a third of iſinglaſs, will be preferable. The work ſhould be prepared for this priming, by being well ſmoothed with fiſh-ſkin, or the glaſs-ſhaver; and by being bruſhed over once or twice with hot ſize diluted, when it is of the common ſtrength, with two thirds of water. The priming, formed of a ſize whoſe conſiſtence is between that of the common kind and glue, mixed with as much whiting as will give it a ſufficient body of colour to hide the ſurface on which it is laid, ſhould be laid on evenly with a bruſh. Two coats of this priming will generally be ſufficient; but if, upon trial with a fine wet rag, it will not receive a proper water-poliſh, another coat or more muſt be given it. And after the laſt coat but one is dry, the work ſhould be ſmoothed by rubbing it with the Dutch ruſhes. When the laſt coat is dry, the water-poliſh ſhould be given, by paſſing over every part of it with a fine rag, a little moiſtened, till the whole appears perfectly plain and even. The work is then ready to receive the painting or coloured varniſh.

When wood or leather is to be *japanned*, without priming, it may be prepared by laying on two or three coats of coarſe varniſh, made by diſſolving two ounces of ſeed-lac, and as much roſin in one pint of rectified ſpirit of wine: and then the proper *japan-ground* muſt be laid on. As metals never require to be under-coated with whiting, they muſt generally be treated in the ſame manner as wood or leather.

For white japan-grounds. Prepare a white varniſh, by working and grinding flake white, or white lead, with a ſixth part of its weight of ſtarch, and drying the mixture; then temper it into a conſiſtence fit for ſpreading with *maſtic* VARNISH, or compound it with gum anime; lay this on the body to be *japanned*, previouſly prepared with or without the under-coat of whiting: and varniſh it over with five or ſix coats of the following varniſh, formed by diſſolving two ounces of the cleareſt and whiteſt grains of ſeed-lac, and three ounces of gum anime, pulveriſed, in about a quart of ſpirit of wine, and ſtraining off the clear varniſh.

A very good varniſh, free from brittleneſs, may be obtained by diſſolving as much gum anime as the oil will take in old nut or poppy oil, boiled gently when the gum is put into it. The ground of white colour may be laid on in this varniſh, and then a coat or two of it may be put over the ground; but it muſt be well diluted with oil of turpentine when it is uſed.

Blue japan grounds may be formed of bright Pruſſian blue; or of verditer glazed over with Pruſſian blue; or of ſmalt. The colour may be beſt mixed with ſhell-lac varniſh, and brought to a poliſhing ſtate by five or ſix coats of varniſh of ſeed-lac. But when a bright blue is required, and a leſs degree of hardneſs can be diſpenſed with, the method before directed, in the caſe of white grounds, muſt be purſued.

Red japan grounds. For a ſcarlet ground, vermilion may be uſed: but this is leſs beautiful than the crimſon produced by glazing it over with carmine or fine lake, or roſe-pink. For a very bright crimſon; inſtead of glazing with carmine, the Indian lake, called ſafflower, ſhould be uſed, diſſolved in the ſpirit of which the varniſh is compounded. But in this caſe, inſtead of glazing with the ſhell-lac varniſh, the upper or poliſhing coats need only be uſed; which will render this a cheaper method than the uſing carmine. If the higheſt degree of brightneſs be required, the white varniſhes muſt be uſed.

Yellow japan grounds. For bright yellow grounds, king's yellow, or turpeth mineral ſhould be uſed, either by themſelves or mixed with fine Dutch pink. The effect may be ſtill more heightened by diſſolving powdered turmeric root in the ſpirit of wine, of which the upper or poliſhing coat is made; which ſpirit of wine muſt be ſtrained off from the dregs, before the ſeed-lac be added to it for forming the varniſh.

Yellow grounds may likewiſe be formed of the Dutch pink only.

Green japan grounds may be produced by mixing king's yellow and bright Pruſſian blue; or turpeth mineral and Pruſſian blue. A cheap, but fouler kind may be had from verdigris with a little of the fore-mentioned yellows, or Dutch pink. But if a very bright green be wanted, the cryſtals of verdigris, called diſtilled verdigris, ſhould be uſed, and their effect will be heightened by laying them on a ground of leaf-gold. Any of theſe may be uſed with good ſeed-lac varniſh, but will be brighter with the white varniſh.

Orange coloured japan grounds may be formed by mixing vermilion or red lead with king's yellow, or Dutch pink: or orange lake, or red orpiment will make a brighter orange ground than can be produced by any mixture.

Purple japan grounds may be produced by the mixture of lake and Pruſſian blue; or a fouler kind, by vermilion and Pruſſian blue.

Black japan grounds may be formed, without heat, by either ivory-black, or lamp-black, which may be laid on with the ſhell-lac varniſh: and the upper or poliſhing coat may be common ſeed-lac varniſh.

For forming the common *black japan grounds* on iron or copper by means of heat, the work muſt be firſt painted over with drying oil; and when it is moderately dry, put into a ſtove of ſuch a degree of heat, as will change the oil black, without burning it. The heat ſhould be ſlowly augmented and continued for a long time, in order to harden the coat of *japan*. This kind of varniſh requires no poliſh.

Tortoiſe-ſhell japan ground. The beſt is made by means of the following varniſh; prepared by boiling together one gallon of good linſeed oil and half a pound of umbre, till the oil becomes very brown and thick; by ſtraining the mixture through a coarſe cloth, and ſetting it again to boil, till it acquires the conſiſtence of pitch. On the piece of work to be *japanned*, well-cleaned, let vermilion, tempered with ſhell-lac varniſh, or with drying oil diluted with oil of turpentine, be laid thinly on the places deſigned to imitate the more tranſparent parts of the tortoiſe-ſhell.

When the vermilion is dry, bruſh over the whole with the black varniſh, tempered to a due conſiſtence with oil of turpentine; and when it is ſet and firm, put the work into a ſtove, where it may undergo a very ſtrong heat, and be continued for a conſiderable time. This method propoſed in one of Kunkel's recipes, has been revived in the Birmingham manufactures, where it is purſued in forming the ground of ſnuff-boxes, dreſſing-boxes, tea-waiters, &c. this ground may be decorated with painting and gilding in the ſame manner as any other varniſhed ſurface.

Japan-work ought properly to be painted with colours in varniſh. See PAINTING *in varniſh* and VARNISH. The colours are now moſt frequently tempered in oil, having a fourth part of its weight of gum anime previouſly diſſolved in it. This oil ſhould be well diluted with ſpirit of turpentine when it is uſed, that the colours may be laid more evenly and thin, and thus fewer of the poliſhing coats of varniſh will be neceſſary. When water-colours are laid on grounds of gold, ſo as to have the effect of emboſſed work, they are beſt prepared by means of iſinglaſs ſize corrected with honey or ſugar candy. The body of which the emboſſed work is raiſed may be formed of a very ſtrong gum water, thickened to a proper conſiſtence by bole armoniac and whiting, in equal parts, which being laid on in the proper figure, and repaired when dry, may be then painted with the proper colours tempered in the iſinglaſs ſize, or in the general way with ſhell-lac varniſh.

The finiſhing part of *japanning* conſiſts of laying on and poliſhing the outer coats of varniſh. This is in general beſt done with common *ſeed-lac* VARNISH. But where brightneſs is principally regarded the ſeed-lac muſt give way to the whiter gums. When hardneſs, tenacity, and brightneſs are deſired, the mixed varniſh made of the picked ſeed-lac, already propoſed under *white Japan grounds*, ſhould be adopted. The pieces of work to be varniſhed ſhould be placed near a fire, and made perfectly dry: the varniſh ſhould then be rubbed over them with proper bruſhes; firſt one coat, and when this is dry another ſhould be laid over it; and this operation muſt be continued at leaſt five or ſix times. When a ſufficient number of coats is thus laid on, the work is fit to be poliſhed, which muſt be done, in common caſes, by rubbing it with a rag dipped in tripoli, commonly called rotten ſtone, finely powdered: but towards the end of the rubbing, a little oil of any kind ſhould be uſed with the powder: and when the work appears ſufficiently bright and gloſſy, the oil alone ſhould be uſed to clear it from the powder, and to give it a brighter luſtre. For white grounds, fine putty or whiting ſhould be uſed inſtead of the tripoli. For gilding of *Japan* work, ſee *Japanners* GILDING. Handmaid to the Arts, vol. ii. p. 479, &c.

JAPONIC *Confection*, ſee CONFECTION.

JAPU, in *Ornithology*, the name of a Braſilian bird, of the woodpecker kind, called alſo *jupujuba*. It is wholly of a fine ſhining black colour, except that it has a large yellow ſpot on the middle of each wing, and a broad yellow ſtreak near the rump. This bird hangs its neſt very nicely from the extreme boughs of trees; and from the ſeeing theſe neſts, and not knowing to what bird they belonged, has ariſen the error of ſuppoſing that the parrots hang their neſts in this manner. Ray.

JAR, or JARR, from the Spaniſh, *jarra* or *jarro*, which ſignify the ſame, an earthen pot or pitcher, with a big belly, and two handles.

JAR is uſed for a ſort of meaſure, or fixed quantity of divers things.—The *jar* of oil is from eighteen to twenty-ſix gallons: the *jar* of green ginger is about a hundred pounds weight.

JAR or JIAR, in *Chronology*, one of the Hebrew months, anſwering to our April. It was the eighth month of the civil year, and the ſecond of the ſacred, and had only twenty-nine days.

JARARA-COAYPITINGA, in *Zoology*, the name of a ſpecies of ſerpent found in America, not much unlike the common viper, and equally venomous. Its tail is of a paler colour than the reſt of the body, and thence it has its name; which, in the language of the natives, expreſſes this property.

JARARA-EPEBA, in *Zoology*, the name of a ſpecies of American ſerpent, of a brown colour, but variegated by a very beautiful undulated red line, running all along the back like a chain. Ray.

JARARACA, in *Zoology*, the name of a ſpecies of ſerpent, common in America. It is a very ſhort ſerpent, ſeldom exceeding a foot and a half in length. It has ſome prominent veins on its head, and is of a duſky browniſh colour, variegated with red and black ſpots. It is a very poiſonous ſpecies. The natives uſe for a remedy the root of a plant called caatia, and by the Portugueſe herva de cobros. Ray.

De Laet has deſcribed four different ſpecies of this ſerpent.

JARARACUCU, in *Zoology*, the name of an American ſpecies of ſerpent. It is of the viviparous kind, and produces a great number of young; thirteen having been found perfectly formed in the body of a female of this kind; it grows to between two and three feet long, and has like the other poiſonous ſerpents very large and long teeth, which are hid in the gums, and contain a yellow poiſonous liquor. Theſe it only exerts at the time of biting, and its poiſon is ſo fatal, that it will deſtroy a man within four and twenty hours. Ray.

JARDES, or JARDONS, in the *Manege*, are callous and hard ſwellings in the hinder legs of a horſe, ſeated on the outſide of the hough, as the ſpavin is on the inſide. *Jardons* lame a horſe, unleſs you give the fire dexterouſly and betimes.

JARIBOLUS, Ιαριβωλος, in *Antiquity*, one of the Palmyrenian gods. This deity, in all appearance, had the ſame attributes with the god Lunus; for *Jari* ſignifies the month over which the moon preſides. Mem. Acad. Inſcrip. tom. iii. p. 177.

JARRETIER, in the *Manege*, an obſolete French word, ſignifying a horſe whoſe houghs are too cloſe together; which is now expreſſed in French by *crochu*, i. e. crooked or hooked.

JARUS, in *Botany*, a name by which ſome authors have called the *arum*, or *wake-robin*.

JASIDÆANS, in the *Hiſtory of Religion*. See JEZIDES.

JASINE, in *Botany*, a name uſed by the ancients to expreſs a ſmall kind of climbing plant, much reſembling that from which they obtained the drug called *ſcammony*. They therefore called this ſometimes the ſmall *ſcammony*, or *ſcammonia parva*. It climbed upon trees, and had ſmall ivy-like leaves. Pliny has deſcribed ſuch a plant as this under the name of *langini*; and it ſeems very probable that this was only a corruption of the word *jaſine*, that author having taken moſt of his accounts from the Greeks, and having frequently miſtaken their names.

JASIONE, in *Botany*, *rampions with ſcabious heads*, a genus of the *ſyngeneſia monogamia* claſs: the characters of which are, that it has a common ten-leaved calyx; that the corolla is regular, and has five petals; and that the fruit is a bilocular capſule. This plant grows naturally on ſterile grounds in moſt parts of England; and is rarely admitted into gardens.

JASMELÆUM, a medicinal oil, called alſo by the Perſians *jaſme*: it is made by putting two ounces of the white flowers of violets into a pint of oil of ſeſamum. It is uſed to anoint the body after bathing, and is in great eſteem among the Perſians for its fragrancy, though it is a ſort of ſmell which many would rather think offenſive.

JASMINE or JESSAMINE *tree*, *jaſminum*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are as follow: the flower has a tubulous empalement, which is permanent, cut into five ſegments at the brim; the flower is of one petal, cut into five ſegments at the top, which ſpread open; it has two ſhort ſtamina, ſituated within the tube of the petal; in the centre is ſituated a roundiſh germen, which afterward turns to an oval berry, with a ſoft ſkin incloſing two ſeeds, which are flat on thoſe ſides which join, and convex on the other. Miller reckons ſeven ſpecies.

The common white *jaſmine* grows naturally at Malabar, and in ſeveral parts of India: it has, however, been long inured to our climate, ſo as to thrive and flower extremely well, but never produces fruit in England. It is propagated by laying down the branches, which will take root in a year, and may then be cut from the old plant, and planted where they are to remain. It may alſo be propagated by cuttings, which ſhould be planted early in the autumn, and in a ſevere winter preſerved by tan, ſaw-duſt, or peas-haulm, &c. and when they are removed, they ſhould be planted againſt a wall, pale, or fence, that may ſerve to ſupport their flexible branches. Theſe plants ſhould be permitted to grow rude in ſummer, otherwiſe they will not flower; but after they are paſt, the branches ſhould be pruned and nailed up about the middle or latter end of March, when the froſt is paſt. Miller.

JASMINE, *Arabian*, *nyctanthes*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the empalement of the flower is cylindrical, of one leaf, cut into eight acute ſegments; the flower is of the ſalver-ſhape, of one leaf, with a cylindrical tube longer than the empalement, cut into eight ſegments at the top; it hath two ſmall awl-ſhaped ſtamina, ſituated in the bottom of the tube; and one roundiſh depreſſed germen, ſupporting a ſingle ſtyle the length of the tube, crowned by a bifid erect ſtigma; the germen afterward becomes a roundiſh berry with two cells, each containing a large roundiſh ſeed. Miller reckons only two ſpecies, natives of India.

JASMINE, *Baſtard*, *ceſtrum*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: it hath a ſhort tubular empalement of one leaf, indented at the top into five parts; the flower is funnel-ſhaped, of one petal, having a long cylindrical tube, which ſpreads open at the top, and is cut into five equal ſegments; and it has five ſlender ſtamina; the oval cylindrical germen is ſituated in the empalement, which becomes an oval oblong berry with one cell, incloſing ſeveral roundiſh ſeeds. Miller enumerates ſix ſpecies, natives of the Weſt Indies; they cannot thereſore be preſerved in England without the heat of a ſtove, eſpecially in winter.

JASMINE, *Baſtard.* See LYCIUM and BOX-THORN.

JASMINE, *Cape.* See GARDENIA.

JASMINE, *Fennel-leaved*, a name ſometimes given to *quamoclit.* See *Scarlet* CONVOLVULUS.

JASMINE, *Ilex-leaved.* See LANTANA.

JASMINE, *Perſian*, the name by which ſome call LILAC.

JASMINE, *Red*, *Plumeria*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a ſmall empalement, divided into five parts; it hath one funnel-ſhaped petal, with a long tube, cut into five oblong oval ſegments at the top, which ſpread open; and five awl-ſhaped ſtamina, ſituated in the center of the tube, terminated by ſummits which cloſe together; alſo an oblong bifid germen, with ſcarce any ſtyle, crowned by a double acute ſtigma; the germen afterward becomes a long, ſwelling, acute-pointed capſule, with one cell, filled with winged ſeeds, placed over each other like ſcales of fiſh. Miller enumerates five ſpecies.

All theſe ſorts are too tender to thrive in the open air of this country in the ſummer ſeaſon, therefore ſhould be conſtantly preſerved in the ſtove, where, in warm weather, they muſt have a large ſhare of free air, but in cold weather muſt be kept very warm. The milky juice of thoſe plants is very cauſtic, and reckoned poiſonous. In cutting off any branches of the plants, if the knife be not immediately cleaned, the juice will corrode it, and turn the blade almoſt black in a little time ſo as not to be cleaned off again; and if dropped on linen, it will cauſe it to waſh in holes, like aqua fortis. Miller.

JASMINE, *Scarlet and yellow.* See TRUMPET-*flower.*

JASMINOIDES, in *Botany*; ſee BOX-THORN, AVIGNON-BERRY, and LYCIUM.

JASPACHATES, in the *Natural Hiſtory of the Ancients*, a name given to a ſpecies of agate, variegated with the matter of the jaſper, and therefore being properly diſtinguiſhed by this name. It is found at this time very plentifully both in the Eaſt and Weſt Indies, and in many parts of Italy, Germany, and other parts of Europe; and is a very elegant ſtone. Its colour is always compoſed of a brown and green, but it is very irregular in the admixture of theſe. Sometimes it is one equally coloured maſs, and is only diſtinguiſhable from the green jaſpers by its ſuperior hardneſs and brightneſs; but it is much more frequently found of a browniſh green ground, variegated with irregular concentric circles of a fairer green; and often with ſome of a beautiful red, or with a browniſh green ground, irregularly clouded and ſpotted with thoſe colours; it often has alſo an admixture of white and yellow.

Our lapidaries eſteem the oriental pieces of this ſtone very valuable, and work them into many ſorts of toys. The German are ſofter, and of little value. Hill's Hiſt. of Foſſils, p. 489.

JASPER, (the word is Hebrew, and has neither been changed by the Greeks, Latins, nor us; ſome Greek verſions give it the name of *beryl*; Onkelos calls it *panther*, in regard of its being ſpotted like that animal) *jaſpis*, in *Natural Hiſtory*, a genus of ſtones of the ſcrupi-kind, according to the arrangement of Dr. Hill, greatly reſembling the finer marbles, or ſemi-pellucid gems. According to others, it belongs to the genus of the ſiliceous or flint ſtones; differing from FLINTS and CHERTZ, in being opake, more eaſily fuſible by fire, in having a granulated texture, and in frequently compoſing large maſſes or rocks; whereas flints and chertz are generally in form of nodules or lumps.

Jaſpers, though commonly reckoned among the precious ſtones, undoubtedly belong (ſays Dr. Hill), to the claſs of foſſils above referred to; being only detached opake maſſes of various forms and ſizes, and compoſed of a cryſtalline matter, debaſed with an earthy admixture. It is to this laſt ingredient of their compoſition, that they owe all that variety of colours, and difference of opacity, whence naturaliſts have ſubdivided them into no leſs than ſeven orders, containing the white, the green, the red, &c. *jaſpers.*

Of the white *jaſpers*, there is only one known ſpecies, the hard, ſhining, white, marbly *jaſper*, commonly called the NEPHRITIC *ſtone*, on account of its ſuppoſed virtue in caſes of the ſtone and gravel. It is found in many parts of America, particularly the great river of the Amazons, and worn by the natives as an amulet. As to its medical virtues, they are too ridiculous to deſerve a ſerious refutation; but its other uſes merit the attention of lapidaries, ſince it is capable of being faſhioned into cups and vaſes of a beautiful poliſh, and great brightneſs.

Of the green and greeniſh *jaſpers*, we have the following ſpecies: 1. The hard, fine green *jaſper.* This is found in many parts of the world, as Egypt, Tartary, China, &c. and worn as an amulet againſt fluxes, hæmorrhages, &c. 2. The ſoft duſky-green *jaſper.* This ſtone, which is of much leſs beauty and value than the foregoing ſpecies, is very common in Germany, Italy, France, England, &c. 3. The hard bluiſh-green *jaſper*, with red variegations: this is the HELIOTROPE of the ancients, and BLOOD-*ſtone* of the moderns. It is common in Africa, Egypt, and the Eaſt Indies; and is worked into cups, vaſes, and ſnuff-boxes. 4. The hard whitiſh-green *jaſper*, which is the nephritic ſtone of authors. It is found in many parts of America, where the natives faſhion it into figures of birds, beaſts, fiſhes, and other forms; and formerly uſed to wear it hung to their lower lips. A thouſand amazing ſtories are told, by very grave authors, of the nephritic qualities of this ſtone. 5. The hard yellowiſh-green *jaſper*, celebrated likewiſe for its nephritic virtues. It is found in ſeveral parts of America, as alſo in Germany, Bohemia, and ſome other countries of Europe. 6. The bluiſh-green marbly *jaſper*, variegated with grey and black. 7. The hard, greyiſh-green *jaſper*, called by authors the JADE, or LAPIS *divinus*, the divine ſtone. 8. The dull deep-green *jaſper*, called by different authors *molochite*, *molochites*, and *malachites.* 9 The bluiſh-green, ſofter, dull *jaſper.* This is the *borea* or ſky-coloured *jaſper*, of the ancients, and makes a very beautiful appearance in cups, vaſes, and other ornamental things. 10. The duſky-green *jaſper*, variegated with white and fleſh-colour; this, though a coarſer ſpecies than the preceding one, is not without its beauty.

Of the red *jaſpers*, we know only four ſpecies: 1. The hard, variegated, purple *jaſper*: this is the roſe-coloured *jaſper* of authors. It is a very beautiful ſtone, and capable of a high poliſh. It is found in the Eaſt and Weſt Indies, as alſo in Germany, Bohemia, and Spain, but of a coarſer kind. 2. The bright red *jaſper*, variegated with white. America and Europe both afford this ſpecies; but thoſe from the former are the fineſt. 3. The dull purple and white *jaſper.* This, though of a coarſe and irregular ſtructure, is not unfrequently found manufactured into handles of knives, and other toys, both in England, Italy, and Germany. 4. The hard, dull, fleſh-coloured *jaſper.* It is of an extremely pale whitiſh red, generally throughout.

The fourth order of *jaſpers* contains thoſe of a brown colour, of which we have only one ſpecies, the pale-brown, hard *jaſper*, with purple veins. It is common on the Yorkſhire and Suſſex ſhores, and alſo in many of our gravel-pits.

The fifth order contains the yellowiſh *jaſpers*, of which there is only one known ſpecies, the yellowiſh, hard, variegated *jaſper.* This is the turpentine-coloured *jaſper* of the ancients. It is very common in the Eaſt Indies; and we have it alſo in Germany, Bohemia, and other parts of Europe, but inferior to the oriental ones.

The bluiſh *jaſpers* conſtitute a ſixth order; and of theſe there are only two ſpecies: 1. The pale bluiſh *jaſper*, with black veins and clouds; called by the ancients the ſmoaky *jaſper.* 2. The bluiſh marbly *jaſper*, variegated with white.

The ſeventh and laſt order of *jaſpers* contains the black ones, whereof there are only two ſpecies: 1. The black marbly *jaſper*, variegated with white. 2. The black marbly *jaſper*, variegated with yellow. Hill's Hiſt. Foſſ. p. 573—592.

In ſome of theſe ſtones, as alſo in the agates, nature has amuſed herſelf, in repreſenting rivers, trees, animals, landſcapes, &c. as if they were painted. The *jaſper*, found in the Pyreneans, is uſually ſtained with various colours; though there are ſome that have but one colour, as red, or green; but theſe are the leaſt valuable: the moſt beautiful is that bordering on the colour of lacca, or purple; next to that, the carnation; but what is now moſt valued, is the green ſpotted with red.

The curious Becher having a mind to melt a *jaſper*, powdered it, and putting it into a crucible, luted down the lid on it, and giving it an intenſe fire melted it, and found this very remarkable truth, that the colour of this ſtone, though no more permanent in the fire than that of other gems, yet may be ſaved after its being raiſed in vapour as other ſublimed ſubſtances are; accident, and not any plan of operation, afforded this; but the fact is worth farther conſideration.

On unluting the crucible and opening it, the *jaſper* was found melted into one lump, nearly as hard as before; but milk-white and ſemiopake, reſembling in all reſpects a natural white agate. The cover and the upper parts of the crucible which were unfilled, and which could not be touched by the *jaſper* in ſubſtance, were tinged with the colours that the *jaſper* had loſt. Theſe had the appearance of the fineſt *jaſpers*, but the colours were ſuperficial only, not penetrating into the ſubſtance of the matter. The ground was green, as in the natural *jaſper*, and the variegations red and yellow, and as beautifully diſpoſed as in the ſtone itſelf; the colours were ſo evenly laid alſo that they had a fine poliſh, and might have paſſed for wrought *jaſpers* of the ſame ſpecies with the melted one, if cunningly ſet, and not ſuffered to be handled.

Dr. Brown, in his travels through Germany, gives an account of a maſs of *jaſper* dug out of a quarry at Saltſburg, and now making a part of the pavement of one of the emperor's courts at his palace at Vienna, which is of nine foot diameter.

From ſome *jaſpers*, iron may be obtained: when *jaſpers* are ſpotted with ſpecks of onyxes, or agates, they are called JASPONYXES.

JASPICAMEO, in *Natural Hiſtory*, the name of one of the ſemipellucid gems of the CAMÆA kind, very well known among the Italian lapidaries, but very ſeldom ſeen among us. It is ſeldom found of any conſiderable ſize, and is compoſed of broad zones of a pure and elegant white, and a very delicate green, much reſembling the matter of ſome of the green jaſpers. It is found in the Eaſt Indies, and in ſome parts of America. The Italians are very fond of it, and uſe it as the common camea for cutting heads and other figures on, either in relief or creux.

JASPONYX, in *Natural Hiſtory*, the name of the pureſt horn-coloured ONYX with green zones; an extremely beautiful ſtone. It is uſually found in the ſhape of a ſmall pebble, compoſed of a nucleus of a ſhattered or flawed cryſtal, of an irregularly angular figure, round which are alternately diſpoſed zones of a fine pure cryſtalline matter lightly tinged to a horn-colour, and green ones little inferior to the emerald in beauty, being truly compoſed of the matter of the fineſt oriental JASPER; and ſometimes between and among theſe there are fine ſlender zones of a pure white, which add greatly to the beauty of the ſtone. It is found in the Eaſt Indies and in New Spain; but in neither of thoſe places very frequently. It is greatly eſteemed among all the European nations, and cut into toys; but its ſcarcity has given occaſion to our jewellers very frequently to put off a green veined German agate under its name. Hill's Hiſt. of Foſſ. p. 492.

JASSENES *Marmor*. See MARBLE.

JATRALIPTES, ιατραλιπτης, of ιατρος, *Phyſician*, and αλειφω, *I anoint*, in *Antiquity*, in its original ſignification, was uſed for an officer in the gymnaſia, whoſe employment was to anoint the athletæ. The *jatraliptes* was alſo called *aliptes*; both which terms were ſometimes alſo uſed to denote the maſters of the exerciſe, ſuch as the *gymnaſtes* and *pædotriba*.

IATRALIPTES is alſo a term uſed by the *Ancient Writers in Medicine*, to denote ſuch phyſicians as pretended to cure all diſeaſes by external unctions. This method of cure was called *jatroliptice*, and was firſt introduced into practice among the ancients by Prodicus, a native of Selymbria, and diſciple of Æſculapius.

IATRALIPTIC, Ιατραλειπτικη, that part of phyſic which cures by unguents and frictions; and the application of fomentations, plaiſters, &c.

JATROCHEMIA, a term uſed by ſome writers, to expreſs the method of curing diſeaſes by chemical remedies.

JATROPHA, in *Botany*. See CASSADA.

JAVELIN, a kind of ſpear, or half-ſpike, uſed by the ancients both on horſeback and on foot.

It was five feet and a half long; and the ſteel wherewith it was headed, had three ſides, or faces, which all terminated in a point.

JAUMS, among *Carpenters*, denote the door-poſts, as alſo the upright poſts at the ends of window-frames.

JAUMS, among *Bricklayers*, &c. the upright ſides of CHIMNIES, from the hearth to the mantle-tree.

JAUNDICE, derived from the French, *jauniſſe*, yellowneſs, of *jaune*, yellow, in *Medicine*, a diſeaſe conſiſting in a ſuffuſion of the bile, and a rejection thereof to the ſurface of the body, whereby the whole exterior habit is diſcoloured. Dr. Maclurg is of opinion that the bile returns into the circulation in this diſorder by the courſe of the lymphatics.

Of this there are three kinds; the firſt, properly called the *jaundice*, or *yellow-jaundice*, is owing to the yellow bile, which, in this caſe, is too exalted, or too abundant in the maſs of blood; or perhaps to an obſtruction of the glands of the liver, which prevents the gall's being duly ſeparated from the blood: or finally, to a ſtoppage of the porus bilarius, or the like means, whereby the mixture of that fluid with the aliment in the inteſtines is prevented.

The ſecond, called the *black jaundice*, is owing to the ſame bile's being mingled with acids.

The third, bordering on *green*, takes its riſe alſo from a different mixture of bile with an acid. This is uſually called the *chloroſis*, or green ſickneſs; and is a diſtemper pretty common in young women.

In the *yellow jaundice*, the albuginea, or white of the eye, and the ſkin, are chiefly yellow; and, beſides, they are troubled with an itching. In the *black jaundice*, the natural colour is loſt, by reaſon of an atrabilary humour ſpread underneath the ſkin: it appears browniſh, and afterwards of a lead colour.

The *jaundice* often proves a forerunner of the dropſy. A doctor of the faculty of Montpelier calls the *yellow jaundice*, attended with periodical pains, a *rheumatiſm of the liver*: and another of the ſame place calls it, a *quartan ague of the liver*. The acid ſpirit of ſal ammoniac is ſaid to be an excellent remedy againſt the *jaundice*.

Medical writers diſtinguiſh the *jaundice* into idiopathic and ſymptomatic. The idiopathic *jaundice* is that which ariſes of itſelf, and has no dependence on any other diſeaſe; the ſymptomatic is that which ariſes in the courſe of fevers and other diſtempers, in which the gall is affected.

The yellowneſs of the ſkin in ſome infants as ſoon as born, is by no means to be ſuppoſed a *jaundice*, as it is a thing of no conſequence, and uſually goes off of itſelf after voiding of the firſt ſtools: being commonly occaſioned by the meconium not being ſufficiently purged off.

JAUNDICE, *Signs of the*. This diſeaſe always attacks people with a remarkable laſſitude, which laſts for ſome time; and this is more particularly the caſe, where violent paſſions of the mind have given riſe to the diſeaſe: this ſymptom is ſucceeded by a ſenſe of a ſtricture and compreſſion at the pit of the ſtomach; hence ariſe anxieties and ſtreightneſs of the præcordia, with difficulty of breathing, which is often ſo violent as to threaten ſuffocation; and uſually there is a ſenſe of weight and uneaſineſs in the right hypochondrium. The patient is always eaſier while ſitting than while lying or walking. There is a ſlight fever joined with the other ſymptoms, the patient being hotter than at other times, and uſually feeling a ſlight chilneſs or ſhivering before this. The bowels are ſometimes coſtive, but ſometimes more lax than uſual, and the ſtools are always whitiſh. Theſe ſymptoms are very ſoon ſucceeded by a yellowneſs beginning in and about the eyes, and by degrees ſpreading itſelf over the whole ſurface of the body. The urine is of a fine yellow colour, tinging the veſſels in which it ſtands; and if only a few drops of it are poured over a linen cloth, they immediately tinge it like ſaffron. The appetite is always bad; and when any thing is eaten, the uneaſy ſenſation always returns with more violence at the pit of the ſtomach. The ſkin is dry, and the patient generally feels a kind of itching or pricking pain over the whole body. There is a heat in the noſtrils, a bitter taſte in the mouth, loathing of food, ſickneſs at the ſtomach, vomiting and flatulency. The ſleep is uſually troubled, and there is ever a great languor of the mind attending the diſeaſe through all its periods. Theſe are the ſymptoms of the yellow *jaundice*.

The black *jaundice* is diſtinguiſhed by a more violent and uneaſy dejection and languor of the mind, and the colour brought on by the diſeaſe is blackiſh; and this is not only in the eyes and ſkin of the whole body, but alſo in the urine and ſpittle, or at leaſt the laſt is of a duſky and deep yellow. To theſe ſymptoms there is joined in this caſe a hectic heat, with great reſtleſſneſs, waſting of the fleſh, and a ſingular and terrible dejection of the ſtrength; and as there is uſually a ſenſation of a preſſure and weight in the right ſide in the yellow *jaundice*, the ſame ſenſation is felt in the left. Perſons of all ages, and of both ſexes, are ſubject to this diſeaſe, but particularly ſuch as are of a choleric habit; and the extremes of life, youth and old age, are more frequently ſubject to it than the middle ſtage.

Cauſes of it. The immediate cauſe of the *jaundice* is an obſtruction of the bile, in its paſſage into the duodenum, by gall-ſtones, ſpaſms, a ſchirrus, whereby it regurgitates, is abſorbed by the blood and mixed with it. The remote or occaſional cauſes are a coarſe and thick diet, and an immoderate ſtomach for food, a ſudden obſtruction or repreſſion of hæmorrhages, particularly of the diſcharges of the menſes and hæmorrhoidal veins. In theſe caſes this diſeaſe is alſo too often either the forerunner, or the attendant of an HEPATITIS. It is alſo ſometimes brought on by a ſuppreſſion of intermittent fevers, particularly of quartans by aſtringents, and by violent paſſions of the mind, eſpecially when they are ſuppreſſed. Violent emetics or purges will ſometimes alſo bring on this diſeaſe, as will alſo a ſudden draught of cold water when the body is very hot. It may be alſo occaſioned by the bites of poiſonous animals, and by the bilious or hyſteric colic. A ſchirrus in the liver, or a ſtone in the gall-bladder, are alſo known too often to occaſion it. Theſe are the cauſes of the yellow *jaundice*; but the black uſually takes its riſe from obſtinate and habitual obſtructions of the ſpleen, which is properly the ſeat of this diſorder,

Prognoſtics. Young people are ſeldom ſo violently attacked with the *jaundice* as thoſe advanced in years, and are always more eaſily cured of it. When this diſeaſe comes on with more than ordinary violence, there is reaſon to ſuſpect a hectic or ſlow fever at the bottom, or ſometimes an acute one. And when a *jaundice* attacks perſons on the fourth day of an acute fever, or before that time, and comes on with great violence, there is always danger of the death of the patient. The greater the obſtructions of the viſcera are from the ſuppreſſion of intermittent fevers, the greater is the danger that attends the *jaundice* ariſing from ſuch obſtructions. People who have had the *jaundice* two or three times fall into a ſort of habitual tendency to it on different occaſions, and are uſually ſubject afterwards to frequent returns of it. When the *jaundice* is attended with great difficulty of reſpiration, anxiety, and oppreſſion about the præcordia, and with a ſort of aſthmatic oppletion of the breaſt, a hectic or aſcites, and an atrophy, too frequently follow. If at any time the yellow colour of the ſkin in this diſeaſe changes ſuddenly to white, it is a very fatal preſage; ſhewing that there is a ſchirrous conſtitution in the liver. A diſcharge of blood by the hæmorrhoidal veins happening in the time of this diſeaſe, is a preſage of a ſpeedy cure, and copious yellow ſweats which ſtain the linen, are alſo a very favourable ſymptom. A *jaundice* which happens to perſons advanced in years, from the too free uſe of ſpirituous liquors, is a much more difficult one to cure than the common kind, as there is always in this caſe a remarkable drineſs of the liver. A *jaundice* not unfrequently ariſes from a ſuppreſſion of a quartan by the bark alone, or given in an injudicious manner; and when this proves obſtinate and difficult of cure, it gives a very bad preſage of a hectic, and obſtruction of the liver. On the whole, a ſimple *jaundice* of the common ſlighter kind is eaſily cured, and is of no danger; but when this diſeaſe is complicated with others, and is obſtinate of cure, it uſually proves fatal either in itſelf, or its conſequences.

The black *jaundice* is always more difficult of cure than the yellow; and where it attacks old people, and is of long ſtanding, it generally proves fatal either in itſelf, or by bringing on hectics and other incurable diſorders.

Method of cure. When the diſeaſe is recent, the patient ſhould take three or four times a day powders of nitre and tartar vitriolated; and in caſes where violent paſſions have been the cauſe of it, the abſordent powders are to be added, as crabs-eyes, and the like. At times there muſt be given with theſe, ſmall doſes of rhubarb or other gentle purgatives, and decoctions of turmeric, celandine, and a little ſaffron. By theſe means a recent *jaundice* is often happily taken off in a very little time, or as it were nipped in the very bud. A few grains of diaphoretic antimony may be added to that powder, which is to be taken going to reſt; and this will be very efficacious in carrying off the yellowneſs of the ſkin. When the diſeaſe is going off by theſe gentle means, ſome gentle chalybeate is to be given twice a day, and after this the purging by rhubarb is to be repeated. If the patient be young, of a full ſanguine habit, and complains of pain in the right ſide, about the region of the liver, bleeding will be neceſſary, and a vomit muſt be adminiſtred; half a dram of ipecacuhana in powder, will be a ſufficient doſe for an adult, which may be worked off with camomile-tea, or lukewarm water. The body muſt likewiſe be kept open by taking a ſufficient quantity of Caſtile ſoap, or of the PILLS for the *jaundice*: the ſal diureticus is an excellent attenuant and deobſtruent, and may be given from a dram to a dram and a half, three times a-day. Fomenting the parts about the region of the ſtomach and liver, and rubbing them with a warm hand or fleſh-bruſh are likewiſe beneficial; and the patient may derive great benefit from ſitting up to the breaſt in a veſſel of warm water.

When the diſeaſe is more ſtubborn, a gentle ſweat is to be kept up continually, and powder of turmeric to be given at a ſcruple for a doſe, and powders of diaphoretic antimony and the digeſtive ſalts, ſuch as tartar vitriolated, are to be given frequently. Vomits may be alſo repeated, if there be no ſign of inflammation. A dram of ſoluble tartar may be taken every night and morning, in a cup of tea or water-gruel, and if it does not open the body, the doſe may be increaſed.

Lice, Millepedes, &c. have been recommended for the cure of the *jaundice*; but theſe confided in to the neglect of more valuable medicines, do more harm than good: and they are ſeldom perſiſted in long enough, becauſe they are expected to operate as charms. Conſiderable benefit has been received in a very obſtinate *jaundice* from a decoction of hemp-ſeed. Four ounces of the ſeed may be boiled in two quarts of ale, and ſweetened with coarſe ſugar. The doſe is half a pint every morning, which may be continued for eight or nine days. The waters of Bath and Harrowgate are very ſerviceable in this diſeaſe. The diet of a perſon in this diſeaſe ſhould be cool, light, and diluting, conſiſting chiefly of ripe fruits and mild vegetables. Many have been cured by living almoſt wholly for ſome days on raw eggs. The drink ſhould be butter-milk whey ſweetened with honey, or decoctions of cool opening vegetables, as marſhmallow roots, with liquorice, &c. the patient ſhould uſe as much exerciſe as he can bear, take long journeys, purſue diverting amuſements, and uſe every means of promoting the circulation and chearing the ſpirits. In young people, there needs little more to cure the *jaundice* than the keeping up a gentle perſpiration, and a few doſes of rhubarb. Vomits, purges, fomentations, and exerciſe will ſeldom fail to cure the *jaundice*, when it is a ſimple diſeaſe; and when complicated with the dropſy, and a ſchirrous liver, or other chronic complaints, it is hardly to be cured by any means. In caſe of a ſchirrus, the extract of hemlock is reckoned the beſt palliative. And, in general, as the *jaundice* is a diſeaſe very ſubject to return upon perſons who have once had it, gentle evacuations ſhould be uſed at times to keep it off, and a medicated drink with rhubarb, ſenna, and the like, ſhould be taken for ſome days once in a quarter of a year. The *jaundice* is a diſeaſe which will not bear any rough methods; ſtrong purges always do harm, and ſweats forced by the hot medicines make the diſeaſe worſe, inſtead of giving the relief in it which is always had from perſpiration brought on by gentler means.

Perſons ſubject to the *jaundice* ought to uſe as much exerciſe as poſſible, and avoid all heating and aſtringent aliments. Junker Conſp. Med. p. 440—445, &c. Buchan's Dom. Med. p. 403, &c.

Horſes are ſubject to this diſtemper, as well as men. The farriers commonly call it the *yellows*, and divide it as we do the *jaundice* into two kinds, the yellow and the black. The yellow kind is known by the creature's white of his eyes turning to a yellowiſh colour, and his tongue and lips alſo partaking of the ſame tinge, but in a ſmaller degree In the black kind all theſe parts are tinged with a duſkiſh or blackiſh colour. The common cure among the farriers is by means of an ounce of mithridate diſſolved in two quarts of ſtrong beer, and given to the horſe warm; and repeating this doſe once in twelve hours, as long as the diſtemper continues.

JAUNDICE-*bird*, *icterus*, in *Ornithology*, a name by which ſeveral of the old authors have called the GALBULA, a bird of the turdus kind, very beautifully coloured all over with a gold yellow, but with black wings.

JAU-RAIA, in *Botany*, a name given by Plumier to a genus of plants; another ſpecies of which he afterwards deſcribes under the name of *bryoniæ* ſpecies. Theſe are included by Linnæus under one genus; the characters of which are delivered in his Genera Plantarum, p. 479. under the name RAIANIA.

JAW, in *Anatomy*. See MAXILLA.

JAW *Diſlocated*. The lower *jaw* is ſeldom luxated, becauſe it is held very firmly by ſtrong ligaments and muſcles in two ſinuſes in the baſis of the cranium; but when it is by accident forced from thence, whether it be on one ſide only, or on both; it is in this caſe thruſt directly forward. This accident is ſometimes brought on by a blow, or fall, but moſt frequently it happens from the opening the mouth too wide in yawning. If it be luxated on both ſides, the chin will incline downward, and the *jaw* will be thruſt very forward; but if only on one ſide, the chin will be inclined towards the oppoſite ſide; the elapſed little head of the *jaw* not being capable of diſlocation otherwiſe than forward, and inward. When the *jaw* is out only on one ſide, the cure is uſually not very difficult; but when both heads are diſlocated, and not preſently reſtored to their place, it always occaſions the worſt of ſymptoms, as pains, inflammations, convulſions, fevers, vomitings, and even death at length; and theſe ſymptoms are the more violent, as the adjacent nerves, tendons, and ligaments ſuffer a greater extenſion; but if an expert ſurgeon is applied to in time, all theſe are prevented by the ends being reduced.

The patient is to be ſeated on a low ſtool, ſo that an aſſiſtant may hold his head firm back againſt his breaſt; then the ſurgeon is to thruſt his two thumbs as far back into the patient's mouth as he well can, but they are to be firſt wrapt round in a handkerchief, to prevent them either from ſlipping, or from being hurt; his other fingers are at the ſame time to be applied to the *jaw*, externally.

ternally. When he has thus got firmly hold of the *jaw*, it is to be ſtrongly preſſed firſt downwards, and then backwards, and laſtly upwards. Theſe different directions of the force are however to be given all in one inſtant; and by theſe means the clapſed heads of the *jaw*, are at once reſtored into their former cavities; but the ſurgeon muſt alſo be very careful always to ſnatch his thumbs very ſwiftly out of the patient's mouth, leſt they ſhould be compreſſed, bruiſed, or bit by reducing the *jaw*.

If the *jaw* be out on one ſide only, the method of reducing it muſt be exactly the ſame, only that the luxated ſide muſt be forced more ſtrongly downward and backward, than the ſound one. As to bandages, there is no occaſion for them in this caſe, unleſs the luxation has remained ſome time before it was reduced; for in that caſe, it may not be improper to apply for ſeveral days, the four-headed bandage, with ſome ſtrengthening ſpirit; which may be taken off, when the patient intends to eat. Heiſter's Surg. p. 152.

We have a method, by Mr. Monro, of reducing the *jaw*-bone when luxated: who ſays, he has more than once found Mr. Petit's method of reducing the luxated *jaw*-bone ineffectual, after the muſcles have been ſwelled by unartful attempts of reduction, but that he ſucceeded by a ſmall improvement; which was to wrap linen ſo thick round his two thumbs, that he could ſcarce introduce them betwixt the poſterior grinders; then taking hold of the baſe of the *jaw*, with his fingers, and applying his palms under the chin, he preſſed down and pulled forward the poſterior part of the *jaw* with his fingers and the points of his thumbs, which is the whole of M. Petit's method; and at the ſame time he thruſt the anterior part of the *jaw* upwards with his palms, ſo that the *jaw* being made uſe of as a lever to which the laſt joint of the thumbs ſerved as a prop, he acquired a conſiderable force, to which the muſcles were obliged to yield, and the condyles were entirely diſengaged from the zygoma, and brought down; after which they ſlide backwards with the leaſt aſſiſtance, and the reduction is fully made.

When the thumbs have not force enough to make the reduction, Dr. Simpſon, profeſſor of medicine at St. Andrew's, made uſe of a round piece of wood, eight or nine inches long, one end of which is cut into the form of a wedge, to introduce it between the teeth of the luxated ſide with the thinneſt part, as far back as the poſterior grinders; when, having the head ſecured and raiſing the chin, he puſhes the other end of the wood upwards, to depreſs the back part of the *jaw* with the thin end, by which the force is much greater than the thumbs can exert.

This learned profeſſor thinks the common opinion, that the *jaw* is brought down by the force of the digaſtric muſcles ſolely, not ſufficiently ſounded. Med. Eſſ. vol. i art. 11. and vol. iii. art. 13.

Fractures of the JAW. The lower *jaw* is not ſo liable to fractures as the reſt of the bones; but when it is broke, whether it be on one ſide or both, the divided parts do not recede to any diſtance from one another. For the reſtoring the bones in a fractured *jaw* to their proper ſituation, the patient muſt be commodiouſly ſeated over againſt the light, and his head held firm by an aſſiſtant. The ſurgeon is then to introduce the thumb or fore-finger of one hand into the mouth, applying the other externally; and by this means he is to preſs the fragments of the *jaw* on each ſide, till they have regained their former ſituation; which may be always known by the regular diſpoſition of the teeth. And if any of the teeth be found looſe or ſlipped out, it may not be improper, if nothing hinders, to reſtore them afterwards to their proper places; faſtening them by a ſilver wire to ſuch as are next them. After the bones are thus properly reduced, they muſt be covered firſt with a plaſter, and then a compreſs dipt in ſpirit of wine, and applied internally; and another compreſs ſewed to a piece of paſteboard of the form of a half *jaw*, is to be laid on externally; theſe are to be kept on by a four-headed bandage, perforated in the middle to let in the chin. But when the *jaw* is found to be fractured on both ſides, it is uſual to introduce and apply internally, after the compreſs dipt in ſpirit of wine, another made of thin paſteboard; perforated in its middle, and accommodated to the figure of the chin in this manner. Its middle that is perforated, is to be applied to the chin, and its two extremities towards the ears. But fractures of this part may often be well enough cured without plaſters and ſplints, where we can conveniently apply a proper bandage; for theſe bones are not eaſily diſplaced again, when they are once reduced. The patient muſt for ſome days live upon liquids, avoiding chewing and talking; and the fracture is generally well in twenty or thirty days. Heiſter's Surg. p. 119.

Locked JAW is a ſpaſmodic contraction of the lower *jaw*, commonly produced by ſome external injury affecting the tendons or ligaments, and belonging to the claſs of diſtempers called EMPROSTHOTONOS, OPISTHOTONOS and TETANUS. Opiates adminiſtered in large doſes, and for a conſiderable time, are the only medicines that inſure relief in this diſorder. The warm bath and muſk have alſo been found of ſervice. See an account of a variety of caſes, with the method of treatment in the London Med. Obſ. &c. vol. i. art. 1. art. 7. vol. ii. art. 8. art. 34. vol. iii. art. 31. vol. iv. art. 7.

JAY, in *Ornithology*, is the Engliſh name of the CORVUS *glandarius* of Linnæus, with the upper feathers of the wings blue, variegated with black and white; the chin is white, and at the angle of the mouth are two large black ſpots; the forehead is white, ſtreaked with black; the head is covered with very long feathers, which the bird can erect at pleaſure into the form of a creſt; the whole neck, back, breaſt, and belly, are of a faint purple daſhed with grey; the rump is white; the tail conſiſts of twelve black feathers; the feet are of a pale brown; the claws large and hooked. The *jay* lays five or ſix eggs, in a neſt formed of the fibres of roots of trees placed on coarſe ſticks. The young follow their parents till the ſpring; in ſummer theſe birds are very injurious to gardens, and in autumn and winter feed on acorns. The *jay* is one of the moſt beautiful of the Britiſh birds; it is very docile, and may be taught to imitate the human voice. When it is enticing its fledged young to follow it, the noiſe it makes is like the mewing of a cat. Pennant. See *Tab.* III. *Birds*, Nº. 24.

IBERIA, in *Ancient Geography*, the name by which Spain was anciently known, as well as Georgia in Aſia.

IBERIS, in *Botany*. See *Sciatica* CRESSES and DITTANDER.

IBEX, in *Zoology*, the name of an animal of the GOAT kind. It is found in the mountains, and is extremely ſwift; but carries on its head a pair of large knotted horns, reclining backwards. Bellonius obſerves, that he ſaw ſome whoſe horns were four cubits long: they are bent down upon the back, and are wreathed and knotty, one knot growing every year. The head is ſmall, and the legs very ſlender; ſo that this creature, though properly of the goat kind, much reſembles a ſtag: the male has a very long black beard. It is not uncommon in ſome parts of Germany. It inhabits the higheſt Alps of the Griſons country, and is alſo found in Crete, The chace of this animal is very dangerous: its blood has been much eſteemed in pleuriſies. The tame ſpecies ſprung from this ſtock.

IBIBIBOCA, in *Zoology*, the name of a ſpecies of ſerpent called by the Portugueſe COBRA *de coral*. It is about two foot in length, and of the thickneſs of a man's thumb; and tapers off at the tail to a thinneſs, till at laſt it ends in a ſharp point. Its belly is all over white, and very bright and gloſſy; and its head is covered with white ſcales of a cubic figure, and with ſome black ones towards the edges, Its body is variegated with black, white, and red. It is a very ſlow mover; but is of a very terrible and poiſonous kind. Ray.

IBIGA, in *Botany*, a name uſed by ſome authors for the chamæpitys, or ground-pine.

IBIJARA, in *Zoology*, the name of an American ſpecies of ſerpent, called alſo, *bodty*, and by the Portugueſe, *cega*, *cobre vega*, and COBRA *de las cabeças*. It is of the amphiſbena kind, and is generally ſaid to have two heads, one at each end; but that is wholly erroneous. The head and tail are of the ſame ſhape, and of equal thickneſs, and the creature will ſtrike equally with either; and as it is ſaid its poiſon is equally contained at both. It is a ſnake of the ſmaller kind, being of about a foot long, and as thick as one's finger. It is white in colour, and as ſhining and gloſſy as glaſs; and is very elegantly marked with rings and ſtreaks of a brown or copper colour. Its eyes are ſmall, and ſcarce conſpicuous, looking only like dots made by the point of a needle; it lives under ground, and feeds on ants and other ſmall inſects. It is often thrown up in digging; and the Portugueſe ſay, it is a creature whoſe poiſon is beyond the reach of all the known remedies. Ray.

IBIJAU, in *Ornithology*, the name of a Braſilian bird, of the caprimulgus, or goat-ſucker kind. It is a very beautiful little owl, not larger than a ſwallow. Its head is large, broad, and flat, and its eyes black and very lively; its beak is extremely ſmall, not exceeding the ſize of the large fang of a ſpider; but at the top of this, the noſtrils are very diſtinguiſhable. Its mouth is monſtrouſly large; when ſhut this is not perceived, but when it is open, it reaches each way to the eyes. Its legs are very ſhort, and its tail broad. It is all over of a blackiſh colour, ſpotted and variegated with white and yellow. Margrave.

IBIRA, in *Botany*, a name given by ſome authors to the tree which produces the cubebæ, or CUBEBS of the ſhops.

IBIRACOA, in *Zoology*, the name of a ſpecies of ſerpent, found in the Weſt-Indies; whoſe bite is always attended with very terrible effects. It is of a variegated colour, mottled with black, white, and red.

IBIS, in *Ornithology*, the name of an Egyptian bird, approaching to the ſtork-kind; and by ſome confounded very eroneouſly with the hæmatopus, or red-legged heron. It is all over of a fine ſhining black; its beak is long, ſomewhat hooked, and all over of a fine red, as are alſo its legs, which are as long as thoſe of the bittern; its neck is as long as that of the common heron. It is ſaid to be peculiar to Egypt, and is there very ſerviceable in deſtroying the ſerpents, locuſts, and other devouring inſects; and hence it was, that, in early ages, they had divine honours paid them.

It is remarkable with regard to this bird, that although it lives principally about the Nile, yet it never enters the water, nor can it ſwim. The uſe of gliſters is ſaid to have been learned from the *ibis*, and not from the ſtork. It generally builds its neſt upon palm-trees, to avoid the cats. Aldrovandus relates, that the fleſh of the *ibis* is red, like a ſalmon's; that it is ſweet; that its ſkin is very hard, and ſmells like wild-fowl.

IBITIN, in *Zoology*, the name of a very large and dangerous ſerpent in the Philippine iſles. This animal twiſts its tail round the trunk of a tree, and ſtrikes its prey, as men, deer, &c. which it entirely devours, and then ſqueezes itſelf againſt the tree, in order to digeſt what it has eaten.

IBUM. The Rabbins give this name to the ceremony of a brother's marrying his ſiſter-in-law, the widow of his brother, deceaſed without children, by virtue of the Moſaic law mentioned in Deut. xxv.

ICADES, the name of an ancient feaſt, celebrated every month by the Epicurean philoſophers, in memory of their maſter Epicurus.

The day on which it was held, was the twentieth day of the moon, or month, which was that whereon Epicurus was born, and hence came the name *icades*, from εικας, of εικοσι, *twenty*.

They adorned their chambers on this day, and bore his image in ſtate about their houſes, making ſacrifices, &c.

ICE, a brittle tranſparent body, formed of ſome fluid, frozen or fixed by COLD. See FREEZING and FROST.

The ſpecific gravity of *ice* to water, is as eight to nine; hence, being lighter than water, it floats upon it. The ſpecific gravity of *ice* was tried by Dr. Irving, in Phipps's voyage to the north pole; who found, that when a piece of the moſt denſe *ice* which he could meet with, was immerſed in ſnow-water, the thermoter 34°, fourteen fifteenth parts ſunk under the ſurface of the water: in brandy juſt proof, it barely floated; in rectified ſpirits of wine, it fell to the bottom at once and diſſolved immediately. This rarefaction of *ice* is owing to the air-bubbles produced in *ice* while freezing; theſe, being conſiderably large in proportion to the water frozen, render the *ice* ſo much ſpecifically lighter. It is well known, that a conſiderable quantity of air is lodged in the interſtices of water, though it has not there any elaſtic property, on account of the diſunion of its particles; but theſe particles coming cloſer together, and uniting as the water freezes, light, expanſive, and elaſtic air-bubbles are thus generated, and increaſe in bulk as the cold grows ſtronger; whence of courſe the *ice* grows lighter, and theſe air-bubles acquiring an elaſtic force burſt to pieces any veſſel in which the water is cloſely contained. But ſnow-water, or any water long boiled over the fire, affords an *ice* more ſolid than ordinary, and with fewer bubbles. Pure water long kept in vacuo and frozen afterwards there, freezes much ſooner, on being expoſed to the ſame degree of cold, than water unpurged of its air and ſet in the open atmoſphere. And the *ice* made of water thus diveſted of its air, is much harder, more ſolid and tranſparent, and more ponderous than common *ice*. See FREEZING and FREEZING-*mixture*.

Mr. de Mairan, in a diſſertation on *ice*, attributes the increaſe of the bulk of the water under this form, principally to a different arrangement of its parts: the *icy* ſkin on water, being compoſed of filaments which are found to be joined conſtantly and regularly at an angle of 60°, and which, by this diſpoſition, occupy a greater volume than if they were parallel. He found the augmentation of the volume of water by freezing, and in different trials a 14th, an 18th, a 19th; and when the water was previouſly purged of air, only a 22d part. Beſides, *ice* after its formation continues to expand by cold; a piece of *ice*, which was at firſt only a fourth part ſpecifically lighter than water, on being expoſed ſome days to the froſt, became a 12th part lighter; and thus he accounts for the burſting of *ice* in ponds.

To make the moſt perfect *ice* we ſhould take the pureſt water, and perfectly purge it of its air by the air-pump; then freeze it in the ſevereſt froſt, by means of Mr. Farenheit's contrivance. Thus we obtain an *ice* of the greateſt hardneſs, denſity, purity, tranſparence, and gravity.

It appears by an experiment of Dr. Hooke in 1663, that *ice* refracts the light leſs than water; whence he infers, that the lightneſs of *ice*, which cauſes it to ſwim in water, is not produced merely by the ſmall bubbles which are viſible in it, but that it ariſes from the uniform conſtitution or general texture of the whole maſs. This fact was afterwards confirmed by M. de la Hire. Hooke's Exper. by Derham, p. 26. Acad. Par. 1693. Mem. p. 25.

Ice is known to evaporate as well as water, and, ſome ſay, in a greater degree.

In the mountains of Swiſſerland there are immenſe maſſes of *ice*, which, by the tradition and hiſtories of the country, muſt have lain there many centuries. At certain times there happen cracks in theſe, and by theſe cracks the vaſt thickneſs of the maſſes may in ſome meaſure be gueſſed at; ſome of them being three or four hundred ells deep, and yet none of them ever having gone through the whole thickneſs.

The vaſt bodies of *ice* met with in the northern ſeas near Hudſon's Bay, are ſurpriſing; ſome of them being immerſed a hundred fathoms or more under the ſurface of the ocean, and a fifth or ſixth part above, and three or four miles in circumference. See Phil. Tranſ. Nº 465. ſect. 2.

Theſe floating mountains of *ice* owe their vaſt bigneſs and durable nature to a cauſe not conſidered by many; that is, to their not being common *ice*, but the *ice* of ſea-water; many experiments proving, that in acid and ſpiritous liquors, when the froſt has power over them, the watery parts only are affected, and the *ice* is taſteleſs, while the liquor remains concentrated, and much ſtronger than before at the bottom, or in the center. It was generally ſuppoſed that the ſaline liquors, and conſequently ſea-water, were affected by freezing in the ſame manner; that is, its watery part alone was frozen, and the ſalt ſeparated from the part ſo congealed; but Dr. Liſter has proved, that the *ice* formed of SEA-WATER is really ſalt, and does contain ſea-ſalt, and finally that it is, by means of this ſalt contained in it, rendered more durable than common *ice*. If a vial of ſalt-water be expoſed to the air in froſty weather till flakes of *ice* are found in it, and then brought into a warm room, thoſe flakes will remain even in that place a long time undiſſolved; and if they are taken out and expoſed at a ſmall diſtance to the fire, they will not run into water as common *ice* would, but they will by degrees evaporate, and there will be left only a little white ſalt.

Since ſea-water, when frozen, thus forms a very durable *ice*, it appears eaſy to conceive, that the immenſe maſſes of ſuch *ice* found in the northern ſeas ſhould continue undiſſolved through the whole year, and at the return of the freezing ſeaſon remaining of the ſame bigneſs as at firſt, they muſt of conſequence then become much bigger by the freezing of more *ice* about them; and thus continuing to loſe very little, and that only by accidents, and annually to increaſe a great deal, it is not wonderful that they become ſo large. Phil. Tranſ. Nº 167. p. 836. See *Sea*-WATER.

But there have been different opinions with regard to the origin of thoſe vaſt piles of *ice*, reſembling whole iſlands, in the northern regions. Some aſcribe them to ſnow, which, falling in great abundance, in theſe cold climates, and melting in the ſea, accumulates gradually, till thoſe huge heaps are at length formed: but the more common opinion is, that this *ice* is formed from the freſh waters which flow from the neighbouring lands. It is certain that great quantities of floating *ice* are diſcharged by the river Oby, and kept in a ſtate of conſtant agitation by it. Bartoli has written an Italian treatiſe expreſly on *ice* and *coagulation*. And the Acta Eruditorum furniſh us with an account of a French author on the ſame ſubject. See COAGULATION, and COLD and CRYSTALLIZATION.

Sir Robert Barker has particularly deſcribed the proceſs of making *ice* in the Eaſt Indies, where, during his time, he has never ſeen any natural *ice*. For this purpoſe they dig, on a large open plain, three or four pits, about thirty feet ſquare, and two deep each; the bottoms of which they cover about eight inches or a foot thick with ſugar-cane or the ſtems of the large Indian corn, dried. On this bed are placed in rows a number of ſmall ſhallow unglazed earthen pans, formed of a very porous earth; a quarter of an inch thick, and about an inch and a quarter deep; which, at the duſk of the evening, they fill with ſoft water that had been boiled. In the morning before ſun-riſe, the *ice*-makers attend at the pits and collect what was frozen in baſkets, which they convey to the place of preſervation. This is generally prepared on ſome high dry ſituation, by ſinking a pit fourteen or fifteen feet deep, lining it firſt with ſtraw and then with a coarſe kind of blanketing. The *ice* is depoſited in this pit and beat down with rammers, till at length its own accumulated cold again freezes it and forms one ſolid maſs. The mouth of the pit is well ſecured from the exterior air with ſtraw and blankets, and a thatched roof is thrown over the whole. The quantity of *ice* formed by the method above deſcribed depends on a light atmoſphere, and clear ſerene weather. Phil Tranſ. vol. lxv. p. 2. art. 22.

Ice-*bergs* are large bodies of *ice* filling the valleys between the high mountains in northern latitudes; the face of which towards the ſea is nearly perpendicular and of a very lively light green colour. Some of theſe are at leaſt three hundred feet high.

Ice, *Blink of the*, is a name given by the pilots to a bright appearance near the horizon occaſioned by the *ice*, and obſerved before the *ice* itſelf is ſeen.

Ice-*cream, method of making.* Take a ſufficient quantity of cream, and, when it is to be mixed with raſpberry, or currant, or pine, a quarter part as much of the juice or jam as of the cream: after beating and ſtraining the mixture through a cloth, put it with a little juice of lemon into the mould, which is a pewter veſſel, and varying in ſize and ſhape at pleaſure; cover the mould and place it in a pail about two thirds full of *ice*, into which two handfuls of ſalt have been thrown; turn the mould by the hand-hold with a quick motion to and fro, in the manner uſed for milling chocolate, for eight or ten minutes; then let it reſt as long, and turn it again for the ſame time; and having left it to ſtand half an hour, it is fit to be turned out of the mould and to be ſent to table.

Lemon juice and ſugar, and the juices of various kinds of fruits are frozen without cream, and when cream is uſed, it ſhould be well mixed.

Ice-*houſe*, a repoſitory for ice during the ſummer months. The aſpect of *ice-houſes* ſhould be towards the eaſt or ſouth-eaſt, for the advantage of the morning ſun to expel the damp air, as that is more pernicious than warmth; for which reaſon, trees in the vicinity of an *ice-houſe* tend to its diſadvantage.

The beſt ſoil for an *ice-houſe* to be made in is chalk, as it conveys away the waſte water without any artificial drain; next to that, looſe ſtony earth, or gravelly ſoil. Its ſituation ſhould be on the ſide of a hill, for the advantage of entering the cell upon a level, as in the drawing, *Tab.* II. *fig.* 23.

To conſtruct an *ice-houſe*, firſt chooſe a proper place at a convenient diſtance from the dwelling-houſe or houſes it is to ſerve: dig a cavity, (if for one family, of the dimenſions ſpecified in the deſign) of the figure of an inverted cone, ſinking the bottom, concave, to form a reſervoir for the waſte water till it can drain off; if the ſoil requires it, cut a drain to a conſiderable diſtance, or ſo far as will come out at the ſide of the hill, or into a well, to make it communicate with the ſprings, and in that drain form a *ſtink* or *air-trap*, marked *l*, by ſinking the drain ſo much lower in that place as it is high, and bring a partition from the top an inch or more into the water, which will conſequently be in the trap; and will keep the well air-tight. Work up a ſufficient number of brick piers to receive a cart wheel, to be laid with its convex ſide upwards to receive the *ice*; lay hurdles and ſtraw upon the wheel, which will let the melted *ice* drain through, and ſerve as a floor. The ſides and dome of the cone, are to be nine inches thick—the ſides to be done in ſteened brickwork, *i. e.* without mortar, and wrought at right angles to the face of the *work*: the filling in behind, ſhould be with gravel, looſe ſtones, or brick bats, that, the water which drains through the ſides, may the more eaſily eſcape into the well. The doors of the *ice-houſe* ſhould be made as cloſe as poſſible, and bundles of ſtraw placed always before the inner door to keep out the air.

Deſcription of the parts referred to by the letters.

a The line firſt dug out.
b The brick circumference of the cell.
c The diminution of the cell downwards.
d The leſſer diameter of the cell.
e The cart wheel, or joiſts and hurdles.
f The piers to receive the wheel or floor.
g The principal receptacle for ſtraw.
h The inner paſſage, } each of theſe paſſages have a *ſeparate* door.
i The firſt entrance, }
k The outer door, }
l An air trap.
m The well.
n The profile of the piers.
o The *ice* filled in.
p The height of the cone.
q The dome worked in two half-brick arches.
r The arched paſſage.
s The door-ways inſerted in the walls.
t The floor of the paſſage.
u An aperture through which the *ice* may be put into the cell; this muſt be covered next the crown of the dome, and then filled in with earth.
r The ſloping door, againſt which the ſtraw ſhould be laid.

The *ice* when to be put in, ſhould be collected during the froſt, broken into ſmall pieces, and rammed down hard in ſtrata of not more than a foot, in order to make it one complete body; the care in putting it in, and well ramming it, tends much to its preſervation.

In a ſeaſon when *ice* is not to be had in ſufficient quantities ſnow may be ſubſtituted.

The editor is indebted for this deſcription and drawing of an *ice-houſe* to the friendly communication of Mr. Blackburn, an ingenious architect.

Ice may be preſerved in a dry place under ground, by covering it well with chaff, ſtraw, or reeds. Phil. Tranſ. Nº 84. p. 140. See Snow.

Great uſe is made of chaff in ſome places of Italy to preſerve *ice*: the *ice-houſe* for this purpoſe need only be a deep hole dug in the ground on the ſide of a hill, from the bottom of which they can eaſily carry out a drain, to let out the water which is ſeparated at any time from the *ice*, that it may not melt and ſpoil the reſt. If the ground is tolerably dry, they do not line the ſides with any thing, but leave them naked, and only make a covering of thatch over the top of the hole: this pit they fill either with pure ſnow, or elſe with ice taken from the pureſt and cleareſt water; becauſe they do not uſe it as we do in England, to ſet the bottles in, but really mix it with the wine. They firſt cover the bottom of the hole with chaff, and then lay in the *ice*, not letting it any where touch the ſides, but ramming in a large bed of chaff all the way between: they thus carry on the filling to the top, and then cover the ſurface with chaff, and in this manner it will keep as long as they pleaſe.

When they take any of it out for uſe, they wrap the lump up in chaff, and it may then be carried to any diſtant place, without waſte or running. Phil. Tranſ. No 8. See Ice.

Ice-*plant*, a very ſingular and beautiful plant of the *ficoides* kind, called by Mr. Tournefort, *ficoides Africana folio plantagenis undulato micis argenteis adſperſo*, or the African ficoides with a waved plantain-like leaf, and covered with ſilver drops. It is alſo commonly called with us the diamond-plant, and the froſt-plant, from its leaves and ſtalks being all over beſet with tranſparent cryſtal-like drops, as if covered over with ſmall icicles. This is a ſpecies of the *fig marygold*, or Messembryanthemum. The ſeeds of this plant are to be ſown very early in the ſpring upon a good hot-bed; when the plants are come up they are to be tranſplanted into ſmall pots, filled with freſh light ſandy earth, and plunged into another hot-bed; as that hot bed declines in heat they ſhould be moved into a third, and this will bring them forward toward flowering. In July theſe plants may be expoſed by degrees to the open air, and ſoon after this their flowers will appear. If it is deſired to have theſe plants very large, they ſhould be ſhook out of their pots into an old hot-bed of tanners bark, in which their roots will extend every way, and the branches in proportion; ſo that a ſingle plant will ſometimes ſpread to a yard ſquare, and its leaves and branches grow to a very ſurpriſing ſize. The flowers of this ſpecies are of no great beauty, but its *ice*-like appearance in the midſt of ſummer is ſo ſingular, as to make it very univerſally admired.

ICELE, in *Mythology*, the ſon of Sleep, according to the fable, and brother of Morpheus, who is ſaid to have the power of changing himſelf into a variety of forms; *varias imitantia formas ſomnia, deluſæ mentis imago.* Ovid. Met. lib. ii. c. 639.

ICH-DIEN, the motto of the arms of the prince of Wales, ſignifying in High Dutch, *I ſerve*.

Sir Henry Spelman judges it to be Saxon, *Ic thien*; the Saxon *d*, with a tranſverſe ſtroke, being the ſame with *th*; and ſignifying, *I ſerve*, or *am a ſervant*, as the miniſters of the Saxon kings were called *thiens*, or *thanes*. See Crowns of *Britiſh Princes*.

ICHNEUMON, in *Zoology*, the name of an animal of which there have been a multitude of idle and fabulous things aſſerted. It is a creature of the viverra kind in the Linnæan ſyſtem with a longer and narrower body than a cat, and ſomething approaching both in ſhape and colour to the badger. Its noſe is black and ſharp, like that of a ferret. It has no beard or whiſker; its noſe is prominent; its ears ſhort and round; and its eyes flame-coloured; its colour is a yellowiſh grey, much like that of ſome of the monkey claſs. This is its appearance when in a good humour; but when frighted or provoked, it raiſes its hairs upright, and ſhews them variegated at intervals with grey and yellow in diſtinct portions; its legs are ſhort, and its feet have all five toes; its tail is very long, and thick at the inſertion; its teeth and its tongue like thoſe of the cat; and what is very ſingular is, that in both ſexes it has a large aperture ſituated below the anus, which it dilates and contracts at pleaſure. Hence came the old opinion, that both male and female conceived, and brought forth young in this animal. Its ſize is from twenty-four to forty-two inches long, from the tip of the noſe to the end of the tail. When it ſleeps, it brings its head and tail under its belly, appearing like a round ball, with two legs ſticking out. It is naturally a very cleanly animal, and is very briſk and nimble, and of great courage. It will engage a large dog; and if it have a quarrel with a cat, will deſtroy that creature by three bites on the throat. Its noſe is ſo ſharp and narrow, that it can very hardly lay hold of any thing large with its teeth, and ſcarce can bite a man's clenched fiſt. It is very expert in ſeizing its prey; it ſtands erect on its hinder legs to deſcry where it is, then throwing itſelf flat on its belly, crawls very ſlily towards it, and when within reach, darts violently upon it. It feeds indifferently on all animals that it can get at. Its common food are the ſnail, the lizard, the chameleon, ſuch ſerpents as it can manage, frogs, rats, and mice; it is alſo very fond of birds, and of none ſo much as the hen and chicken, and will feign itſelf dead till they come within reach.

It is much valued in Egypt for deſtroying ſerpents, which it ſeizes very ſkilfully by the throat, and is kept tame in the houſes, as the cat with us. The people call it Pharaoh's rat, and the peaſants frequently bring its young to market. It is a great deſtroyer of the eggs of crocodiles, which it digs out of the ſand, and even kills multitudes of the young of thoſe terrible reptiles; ſo that it was not without reaſon that it was ranked by the Egyptians in the claſs of their deities. *Tab.* III. *Quadrupeds*, N° 24.

ICHNEUMON-*waſp*, the name given by the old writers on inſects to the ſmall ſlender-bodied waſp, which is frequently found about mud walls, and dry banks of earth. It is very different from the fly ſimply called the *ichneumon*; of which there are numerous ſpecies. This is a true waſp, and is mottled with black and yellow in the manner of the common waſp.

ICHNEUMON-*fly*, in the Linnæan *Syſtem*, is a genus of the *hymenoptera* claſs of inſects; comprehending no leſs than ſeventy-ſeven ſpecies.

The characters of this genus are, that the mouth has jaws without a tongue; the joints of the antennæ are more than thirty; the abdomen is for the moſt part petiolated, and the ſting is thruſt out of a cylindric bivalve ſheath. Some of the ſpecies of this genus have a whitiſh SCUTELLUM, and the antennæ are annulated with a whitiſh belt. Others have a whitiſh *ſcutellum*, with the antennæ wholly black; and others again have the *ſcutellum* of the ſame colour with the thorax, and the antennæ either annulated with a belt, or black and briſtly. The ſpecies of *ichneumon* live chiefly in their caterpillar ſtate, in the bodies of other inſects, particularly of the CATERPILLARS of moths and butterflies, in which they depoſit their eggs. See CATERPILLAR *eaters*, and Phil. Tranſ. N° 76.

ICHNOGRAPHY, in *Perſpective*, the view of any thing cut off by a plane parallel to the horizon, juſt at the baſe or bottom of it.

The word is derived from the Greek ιχνος, *veſtigium*, *footſtep*, and γραφω, *ſcribo*, *I deſcribe*; as being a deſcription of the footſteps or traces of a work.

Ichnography is the ſame with what is otherwiſe called the *plan*, *geometrical plan*, or *ground-plot*, of any thing, and is oppoſed to ORTHOGRAPHY or ELEVATION. See alſo SCENOGRAPHY and STEREOGRAPHY.

ICHNOGRAPHY, in *Architecture*, is a tranſverſe ſection of a building, exhibiting the circumference of the whole edifice, and of the ſeveral rooms and apartments in the given ſtory; together with the thickneſs of the walls and partitions; the dimenſions of the doors, windows, and chimneys; the projectures of the columns and piers, with every thing viſible in ſuch a ſection.

The drawing or deſigning of this is properly the work of the maſter-architect, or ſurveyor; it being, indeed, the moſt difficult of any.

ICHNOGRAPHY, in *Fortification*, denotes the plan or repreſentation of the length and breadth of a fortreſs; the diſtinct parts of which are marked out, either on the ground itſelf, or upon paper.

ICHOGLANS, the grand ſeignior's pages, ſerving in the ſeraglio.

The word, according to ſome authors, is compoſed of the two Turkiſh words *ich*, or *itch*, which ſignifies *within*, and *oglan*, *page*. In which ſenſe *ichoglan* is a page ſerving within ſide the palace, or ſeraglio. Others derive it from the barbarous Greek ιγκολας, or ιγκολος; which was formed from the Latin *incola*. Theſe two etymologies give nearly the ſame ſenſe to *ichoglan*, taking *incola* for *domus incola*.

Theſe are the children of Chriſtians, and bred up in an auſterity ſcarce to be conceived. The ſultan prefers them to offices more or leſs conſiderable, as they appear more or leſs capable, and devoted to his ſervice; but it is to be obſerved, they are incapable of offices till forty years of age, unleſs they have ſome particular diſpenſation from the grand ſeignior. They are educated with a great deal of care in the ſeraglios of Perſia, Adrianople, and Conſtantinople. They are under the direction of a capi aga, who preſides over their exerciſes, and treats them with great ſeverity. They are divided into four odas, or chambers, where, according to their ſeveral talents or inclinations, they are inſtructed either in the languages, religion, or exerciſes of the body.

ICHOR, Ιχωρ, ſignifying any *humour*, or *humidity*, properly denotes a thin, watery humour, like ſerum; but is ſometimes alſo uſed for a thicker kind, flowing from ulcers; called alſo SANIES.

ICHTHYOCOLLA, Ιχθυοκολλα, formed of ιχθυς, *fiſh*, and κολλα, *glue*, popularly called *iſinglaſs*, or *fiſh-glue*, is a ſolid glutinous ſubſtance, prepared from a fiſh of the STURGEON kind, caught in the rivers of Ruſſia and Hungary. The *beluga* affords the beſt; but the ſounds of all freſh-water fiſh yield, more or leſs, fine iſinglaſs; particularly the ſmaller ſorts, found in prodigious quantities in the Caſpian ſea, and ſeveral hundred miles beyond Aſtracan, in the Wolga, Yaik, Don, and even as far as Siberia. It is alſo well known, that our lakes and rivers in North America are ſtocked with immenſe quantities of fiſh, ſaid to be of the ſame ſpecies with thoſe in Muſcovy, and yielding the fineſt iſinglaſs. The production of iſinglaſs requires no artificial heat, neither is the matter diſſolved for this purpoſe, as it has been generally imagined: for, as the continuity of its fibres would be deſtroyed by ſolution, the maſs would become brittle in drying, and ſnap ſhort aſunder, which is always the caſe with glue, but never with iſinglaſs. The latter, indeed, may be reſolved into glue with boiling water, but its fibrous recompoſition would be found impracticable afterwards, and a fibrous texture is one of the moſt diſtinguiſhing characteriſtics of genuine iſinglaſs. Iſinglaſs is nothing more than certain membranous parts of fiſhes, diveſted of their native mucoſity, rolled and twiſted into different forms, and dried in the open air. The ſounds or air-bladders of freſh-water fiſh, in general, are preferred for this purpoſe; as being the moſt tranſparent, delicate, flexible ſubſtances. Theſe conſtitute the fineſt ſorts of iſinglaſs; thoſe called book and ordinary ſtaple are made of the inteſtines, and probably the peritonæum, of the fiſh. The ſounds, which yield the finer iſinglaſs, conſiſt of parallel fibres, and are eaſily rent longitudinally; but the ordinary ſorts are found compoſed of double membranes, whoſe fibres croſs each other obliquely, reſembling the coats of a bladder. Iſinglaſs receives its different ſhapes in the following manner: the parts of which it is compoſed, particularly the ſounds, are taken from the fiſh while ſweet and freſh, ſlit open, waſhed from their ſlimy ſordes, diveſted of every thin membrane which invelopes the ſound, and then expoſed to ſtiffen a little in the air. In this ſtate they are formed into rolls about the thickneſs of a finger, and in length according to the intended ſize of the ſtaple; a thin membrane is generally ſelected for the center of the roll, round which the reſt are folded alternately, and about half an inch of each extremity of the roll is turned inwards. Having thus ſettled the proper dimenſions, the two ends of what is called the ſhort ſtaple are pinned together with a ſmall wooden peg; the middle of the roll is then preſſed a little downwards, which gives it the reſemblance of a heart, and thus it is laid on boards, or hung up in the air to dry. The ſounds, which compoſe the long ſtaple, are larger than the former; but the operator lengthens this ſort at pleaſure, by interfolding the ends of one or more pieces of the ſound with each other. The extremities are faſtened with a peg like the former; but the middle part of the roll is bent more conſiderably downwards; and, in order to preſerve the ſhape of the three obtuſe angles thus formed, a piece of round ſtick is faſtened in each angle with ſmall wooden pegs, in the ſame manner as the ends. In this ſtate it is permitted to dry long enough, to retain its form, when the pegs and ſticks are taken out, and the drying completed. Laſtly, the pieces of iſinglaſs are joined together in rows, by running packthread through the peg-holes, for the convenience of package and exportation.

The membranes of the book ſort, being thick and refractory, will not admit the ſame formation; and, therefore, the pieces, after their ſides are folded inwardly, are bent in the center, in ſuch manner, that the oppoſite ſides reſemble the cover of a book, whence its name; a peg, run acroſs the middle, faſtens the ſides together, and thus it is dried like the former. The cake iſinglaſs is formed of the bits and fragments of the ſtaple ſorts, put into a flat metalline pan, with a very little water, and heated juſt enough to make the parts cohere like a pan-cake when it is dried: but this is of little value. Iſinglaſs is beſt made in the ſummer, as froſt gives it a diſagreeable colour, deprives it of its weight, and impairs its gelatinous principle.

The ſounds of cod and ling bear a general likeneſs to thoſe of the ſturgeon kind of Linnæus, and are uſed for the ſame purpoſe. The Newfoundland and Iceland fiſhermen ſplit open the fiſh as ſoon as taken, and throw the back-bones, with the ſounds annexed, in a heap; but previous to putrefaction, the ſounds are cut out, waſhed from their ſlime, and ſalted for uſe. In cutting out the ſounds, the parts between the ribs are left behind, which are much the beſt; the Iceland fiſhermen are ſo ſenſible of this, that they beat the bones upon a block with a thick ſtick, till the *pockets*, as they term them, come out eaſily, and thus preſerve the ſound entire. If the ſounds have been cured with ſalt, that muſt be diſſolved by ſteeping them in water, before they are prepared for iſinglaſs. The freſh ſound muſt then be laid on a block of wood, whoſe ſurface is a little elliptical, to the end of which a ſmall hair-bruſh is nailed, and with a ſaw-knife the membranes on each ſide of the ſound muſt be ſcraped off The knife is rubbed upon the bruſh occaſionally, to clear its teeth; the pockets are cut open with ſciſſars, and perfectly cleanſed of the mucous matter with a coarſe cloth; the ſounds are afterwards waſhed a few minutes in lime-water, in order to abſorb their oily principle; and laſtly, in clear water. They are then laid upon nets to dry in the air; but, if intended to reſemble foreign iſinglaſs, the ſounds of cod will only admit of that called book; but thoſe of ling of both ſhapes. The thicker the ſounds are, the better the iſinglaſs, excepting its colour; but that is immaterial to the brewer, who is its chief conſumer. See Mr. Jackſon's Account of the Diſcovery of the Manufacture of Iſinglaſs, in Phil. Tranſ. vol. lxiii. part i. p. 1, &c.

Ichthyocolla, or iſinglaſs, is one of the pureſt and fineſt of the animal glues, of no particular ſmell or taſte. Beaten into ſhreds, it diſſolves pretty readily in boiling water or milk, and forms a gelatinous ſubſtance, which yields a mild nutriment, and proves uſeful medicinally in ſome diſorders ariſing from a ſharpneſs and colliquation of the humours. A ſolution of it in water, curiouſly ſpread, whilſt hot, upon ſilk, affords an elegant ſticking plaſter for ſlight injuries of the ſkin, not eaſily ſeparable from the part by water, and ſcarcely inferior to the more compounded one ſold under the name of the ladies black ſticking-plaſter, in which different balſams and reſins are joined to the *ichthyocolla*. See EMPLASTRUM *adhæſivum*. Lewis's Mat. Med.

Iſinglaſs is uſed in miniature painting, in the ſame manner as the gum Arabic or Senegal, for rendering water a proper vehicle, by giving it a due viſcidity for ſpreading and binding the pigments of an earthy texture. But the greateſt quantities of it are conſumed by brewers, wine-coopers, &c. for FINING their liquors.

A ſize may be made of iſinglaſs, by boiling half an ounce of the beaten iſinglaſs in a pint and a half of water, till the whole be diſſolved, and then ſtraining the hot fluid through a linen rag. This ſize may be reduced by taking half the above quantity, and adding to it an equal meaſure of hot water.

A very valuable GLUE is to be made of this drug.

It is valuable, in that it will keep alſo, and is a very proper form to keep iſinglaſs in, for readineſs for the wine-cooper's uſe; beſides this it ſerves alſo very elegantly for the taking off the impreſſions of medals, coins, &c. See MEDAL.

ICHTHYOCOLLA *piſcis*, in *Ichthyology*, the name of a large fiſh, of the STURGEON kind; from which, as alſo from the *huſo Germanorum*, the drug called iſinglaſs or *ichthyocolla* is made. It is a fiſh of very great ſize, and is cartilaginous, having no bones nor ſcales; its head is large and thick, and its mouth ſtands very forward; the upper jaw has four fleſhy apophyſes hanging from it; its eyes are ſmall; its fleſh is very well taſted, but glutinous; it is of a yellowiſh colour, and its tail is large and forked. See BELLUGA-*ſtone*.

ICHTHYOLOGISTS, authors who have written concerning fiſhes. The authors who have left us treatiſes on this ſubject are very numerous; and are ranged by Artedi into their ſeveral proper claſſes, with great care and candor.

The ſyſtematical *ichthyologiſts* are Ariſtotle, Pliny, Iſidore, Albertus Magnus, Gaza, the interpreter of Ariſtotle, Marſchall, Wootton, Bellonius, Rondeletius, Salvian, Geſner, Aldrovand, Johnſton, Charlton, Willughby, Ray, Artedi, and Linnæus.

The *ichthyologiſts* who have written of the fiſhes only of ſome particular places, are theſe. Ovid; of the fiſhes of the Euxine; Oppian, of thoſe of the Adriatic; Auſonius, of thoſe of the Moſelle; Mangolt, of thoſe of the Podamic lake; Paulus Jovius, of thoſe of the Tyrrhene ſea; Bened. Jovius, of thoſe of the lake Larius; Petrus Gilius, of thoſe of the Maſſilian ſea; Figulus, of thoſe of the Moſelle; Salvian, of thoſe of the Tyrrhene ſea; Schwenkſeldt, of thoſe of Sileſia; Schonefeldt, of thoſe of Hamburgh; Margrave, of the Braſilian fiſhes; Ruyſel, of thoſe of Amboyna; and Francis Valentine, of thoſe of the ſame place. Of theſe authors, Ovid, Auſonius, Oppian, and Bened. Jovius, wrote in verſe, the reſt in proſe.

The *ichthyologiſts*, who have copied all they have written from the works of other writers, and therefore leaſt deſerve the name, are the following. Pliny, Ælian, Athæneus, Iſidore, the author of the Libri De Natura Rerum, Albertus Magnus, Joannes Cuba, Marſchall, Geſner in great part, Aldrovand in great part, Johnſton, Charlton, and perhaps ſome others.

In regard to method, ſome have written of fiſhes without any method at all; ſome have treated of them in the alphabetical order of their names, and ſome have followed a method more or leſs perfect throughout their works.

Thoſe *ichthyologiſts* who have attended to no method at all, are Ovid, Ælian, Athæneus, Auſonius, Hildegarde, De Pinguia, Paulus and Bened. Jovius, Figulus, Salvian in his Hiſtory of the Roman Fiſhes, and Ruyſch.

Thoſe who have written alphabetically, are Cuba, Marſchall, Salvian in his Tabula Piſcatoria, Geſner, Schonefeldt, Johnſton.

Among the authors who have uſed ſome ſort of method, thoſe come firſt who have treated of fiſhes, according to the places where they are uſually caught. Of theſe are Oppian, Rondeletius, Aldrovand, Johnſton, and Charlton.

Thoſe who have treated of fiſhes, according to the general diviſion of them into cetaceous, ſpinoſe, and cartilaginous, are Ariſtotle, who was author of the method, Wootton, Willughby, Ray; the laſt two authors have added to this the numbering the rays of the fins on the back, which is one ſtep toward the Artedian method.

The principal and beſt authors in this ſtudy, and who have reformed and amended it, are Ariſtotle, Bellonius, Rondeletius, Salvian, Geſner, Willughby, and Ray. To theſe are to be added ſuch as have deſcribed only new or particular fiſhes, who have merited greatly of the world by the new lights they have thrown in upon this part of natural hiſtory. Theſe are Paulus Jovius, Petrus Gillius, Schonefeldt, Sibbald, Marſigli, Hebenſtreit, and our countryman Mark Cateſby: all the reſt, except Pliny, Athæneus, Aldrovand, and Johnſton, are of no uſe or value. Willughby is allowed by Artedi to be by far the beſt author on the ſubject; but the world will now give that character to Artedi himſelf. Artedi, De Script. Ichthyol.

ICHTHYOLOGY, of ιχθυς, *fiſh*, and λογος, *diſcourſe* or *art*, the ſcience which treats of fiſh. The proper objects of this ſtudy are aquatic animals, which have fins, and have no feet. The buſineſs of *ichthyology* is, firſt, to diſtinguiſh all the parts of fiſh by their ſeveral proper names; then to adapt to each fiſh its proper generical and ſpecific names; and finally to commemorate ſome of its peculiar qualities. See FISH, and GENERICAL *name*.

ICHTHYOMANTIA, Ιχθυομαντεια, in *Antiquity*, a ſpecies of divination by means of the entrails of fiſhes.

ICHTHYOPHAGI, Ιχθυοφαγοι, compounded of ιχθυς, *fiſh*, and φαγειν, *to eat*, *fiſh-eaters*, a name given to a people, or rather to ſeveral different people, who lived wholly on fiſh.

The *Ichthyophagi*, ſpoken of by Ptolemy, are placed by Sanſon in the provinces of Nanquin and Yantong. Agatharchides calls all the inhabitants between Carmania and Gedroſia, by the name *Ichthyophagi*.

From the accounts given us of the *Ichthyophagi*, by Herodotus, Strabo, Solinus, Plutarch, &c. it appears, indeed, that they had cattle, but that they made no uſe of them, excepting, as they ſay, to feed their fiſh. They made their houſes of large fiſh-bones, the ribs of whales ſerving them for their beams. The jaws of theſe animals ſerved them for doors, and the mortars wherein they pounded their fiſh, and baked it in the ſun, were nothing elſe but their vertebræ.

ICHTHYPERIA, in *Natural Hiſtory*, the name given by Dr. Hill to the bony palates of fiſhes, which are frequently found foſſile at great depths in the earth, and uſually immerſed in the ſtrata of ſtone; and in this ſtate had been named by Mr. Lhuyd, from their reſemblance in ſhape to the pods of lupines, and ſome of the other leguminous plants, *ſiliquaſtra*.

Many from this name, and this caſual reſemblance to the pods of plants, have been miſled into the believing them foſſils of vegetable origin. But they have plainly all of them been the bony coverings of different parts of the mouths of certain fiſh of the cartilaginous, and perhaps other kinds, whoſe principal food being ſhell-fiſh, theſe bony palates were neceſſary to the eating of them. Many of the *ichthyperia* are found indeed plainly worn and rounded by uſe.

They are ſometimes found in their foſſile ſtate joined to one another; but commonly in ſingle pieces or joints, or in fragments of ſuch. They are of the ſame ſubſtance with the BUFONITÆ, and their ſhape depends on the ſpecies of fiſh, or part of the mouth, to which they belonged. But their moſt uſual figure is that of half the ſhell of the pod of a lupine. Their ſizes are various, from the tenth of an inch to two inches in length, and an inch in breadth. Their ſurface is ſometimes ſmooth and poliſhed; ſometimes finely ſtriated or ſinuated, and ſometimes wholly covered with tubercles. They are alſo found of very different colours; but moſt frequently either black, or of a dark cheſtnut colour.

They are found lodged and bedded in the ſtrata of ſtone, in Germany, Italy, and France, and in the iſlands of the Archipelago, and in Syria among the ſpines of the echini; but they are no where ſo frequent as in England, there being with us very few quarries of ſtone which do not afford more or leſs of them. See *Tab. of Foſſils, Claſs* 8. Hill's Hiſt. of Foſſils, p. 645.

ICHTHYS, Ιχθυς, in *Antiquity*, a famous acroſtic of the Erythræan ſibyl, mentioned by Euſebius and St. Auſtin; the firſt words of every verſe of which make up Ιησους Χριϛὸς Θεȣ̃ ὑιὸς σωτηρ, *Jeſus Chriſtus Dei filius, ſervator.* The initial letters of which compoſe the word *ichthys*, ιχθυς.

ICICA, in the *Materia Medica*, a name given by ſome to the GUM *elemi*.

ICICARIBA, in *Botany*, a name uſed by ſome authors for the tree which affords us the GUM *elemi*, uſed in medicine.

ICOCA, in *Botany*, the name of a genus of plants, deſcribed by Plumier; ſince called by Linnæus *chryſobalanus*. See *Cocoa* PLUM.

ICON, Εικων, in *Rhetoric*, the ſame with IMAGE.

ICONOCLASTS, or ICONOCLASTÆ, formed from εικων, *image*, and κλαειν, *to break*, in *Eccleſiaſtical Hiſtory*, breakers of images; a name which the church of Rome gives to all who reject the uſe of images in religious matters.

In this ſenſe, not only the reformed, but ſome of the eaſtern churches, are called *iconoclaſts*, and are all eſteemed by them heretics, as oppoſing the worſhip of the images of God, and the ſaints, and breaking their figures and repreſentations in churches.

The oppoſition to images began in Greece under the reign of Bardanes, who was created emperor of the Greeks a little after the commencement of the eighth century, when the worſhip of them became common. See IMAGE. But the tumults occaſioned by it were quelled by a revolution, which, in 713, deprived Bardanes of the imperial throne. The diſpute, however, broke out with redoubled fury under Leo the Iſaurian, who iſſued out an edict in the year 726, abrogating, as ſome ſay, the worſhip of images, and ordering all the images, except that of Chriſt's crucifixion, to be removed out of the churches; but according to others, this edict only prohibited the paying to them any kind of adoration or worſhip. This edict occaſioned a civil war, which broke out in the iſlands of the Archipelago, and by the ſuggeſtions of the prieſts and monks, ravaged a part of Aſia, and afterwards reached Italy. The civil commotions and inſurrections in Italy were chiefly promoted by the Roman pontiffs, Gregory I. and II. Leo was excommunicated, and his ſubjects, in the Italian provinces, violated their allegiance, and riſing in arms either maſſacred or baniſhed all the emperor's deputies and officers. In conſequence of theſe proceedings, Leo aſſembled a council at Conſtantinople in 730, which degraded Germanus, the biſhop of that city, who was a patron of images; and he ordered all the images to be publicly burnt, and inflicted a variety of ſevere puniſhments upon ſuch as were attached to that idolatrous worſhip. Hence aroſe two factions; one of which adopted the adoration and worſhip of images, and on that account called *iconoduli* or ICONOLATRÆ; and the other maintained that ſuch worſhip was unlawful, and that nothing was more worthy the zeal of Chriſtians than to demoliſh and deſtroy thoſe ſtatues and pictures, which were the occaſions of this groſs idolatry; and hence they were diſtinguiſhed by the titles of *iconomachi*, from εικων, *image*, and μαχω, *I contend*, and *iconoclaſtæ*. The zeal of Gregory II. in favour of image-worſhip, was not only imitated, but even ſurpaſſed by his ſucceſſor Gregory III. in conſequence of which the Italian provinces were torn from the Grecian empire.

Conſtantine, called Copronymus, from κοπρος, *ſtercus*, and ονομα, *name*, becauſe he was ſaid to have defiled the ſacred font at his baptiſm, ſucceeded his father Leo in 741, and in 754 convened a council at Conſtantinople, regarded by the Greeks as the ſeventh oecumenical council, which ſolemnly condemned the worſhip and uſe of images. Thoſe who, notwithſtanding this decree of the council, raiſed commotions in the ſtate, were ſeverely puniſhed; and new laws were enacted, to ſet bounds to the violence of monaſtic rage. Leo IV. who was declared emperor in 775, purſued the ſame meaſures, and had recourſe to the coercive influence of penal laws, in order to extirpate idolatry out of the Chriſtian church. Irene, the wife of Leo, poiſoned her huſband in 780; aſſumed the reins of empire during the minority of her ſon Conſtantine, and in 786 ſummoned a council at Nice in Bithynia, known by the name of the ſecond Nicene council, which abrogated the laws and decrees againſt the new idolatry, reſtored the worſhip of images and of the croſs, and denounced ſevere puniſhments againſt thoſe who maintained that God was the only object of religious adoration. In this conteſt, the Britons, Germans, and Gauls, were of opinion, that images might be lawfully continued in churches, but they conſidered the worſhip of them as highly injurious and offenſive to the Supreme Being. Charlemagne diſtinguiſhed himſelf as a mediator in this controverſy: he ordered four books concerning images to be compoſed, refuting the reaſons urged by the Nicene biſhops to juſtify the worſhip of images, which he ſent to Adrian, the Roman pontiff, in 790, in order to engage him to withdraw his approbation of the decrees of the laſt council of Nice. Adrian wrote an anſwer; and in 794, a council of three hundred biſhops, aſſembled by Charlemagne at Francfort on the Maine, confirmed the opinion contained in the four books, and ſolemnly condemned the worſhip of images. In the Greek church, after the baniſhment of Irene, the controverſy concerning images broke out anew, and was carried on by the contending parties, during the half of the ninth century, with various and uncertain ſucceſs. The emperor Nicephorus appears, upon the whole, to have been an enemy to this idolatrous worſhip. His ſucceſſor, Michael Curopalates, ſurnamed Rhangabe, patronized and encouraged it. But the ſcene changed on the acceſſion of Leo the Armenian to the empire; who aſſembled a council at Conſtantinople in 814, that aboliſhed the decrees of the Nicene council. His ſucceſſor Michael, ſurnamed Balbus, diſapproved the worſhip of images, and his ſon Theophilus treated them with great ſeverity. However, the empreſs Theodora, after his death, and during the minority of her ſon, aſſembled a council at Conſtantinople in 842, which reinſtated the decrees of the ſecond Nicene council, and encouraged image worſhip by a law. The council held at the ſame place under Photius, in 879, and reckoned by the Greeks the eighth general council, confirmed and renewed the Nicene decrees. In commemoration of this council, a feſtival was inſtituted by the ſuperſtitious Greeks, called the Feaſt of Orthodoxy. The Latins were generally of opinion, that images might be ſuffered as the means of aiding the memory of the faithful, and of calling to their remembrance the pious exploits and virtuous actions of the perſons whom they repreſented; but they deteſted all thoughts of paying them the leaſt marks of religious homage or adoration. The council of Paris, aſſembled in 824 by Lewis the Meek, reſolved to allow the uſe of images in the churches, but ſeverely prohibited rendering them religious worſhip. Neverthelefs, towards the concluſion of this century, the Gallican clergy began to pay a kind of religious homage to the images of ſaints, and their example was followed by the Germans, and other nations. However, the *iconoclaſts* ſtill had their adherents among the Latins; the moſt eminent of whom was Claudius, biſhop of Turin, who, in 823, ordered all images, and even the croſs, to be caſt out of the churches, and committed to the flames; and he wrote a treatiſe, in which he declared both againſt the uſe and worſhip of them. He condemned relics, pilgrimages to the Holy Land, and all voyages to the tombs of ſaints; and to his writings and labours it was owing, that the city of Turin, and the adjacent country, was, for a long time after his death, much leſs infected with ſuperſtition than the other parts of Europe. The controverſy concerning the ſanctity of images was again revived by Leo, biſhop of Chalcedon, in the eleventh century, on occaſion of the emperor Alexius's converting the figures of ſilver, that adorned the portals of the churches, into money, in order to ſupply the exigencies of the ſtate. The biſhop obſtinately maintained, that he had been guilty of ſacrilege; and publiſhed a treatiſe, in which he affirmed, that in theſe images there reſided an inherent ſanctity, and that the adoration of Chriſtians ought not to be confined to the perſons repreſented by theſe images, but extended to the images themſelves. The emperor aſſembled a council at Conſtantinople, which determined, that the images of Chriſt and of the ſaints were to be honoured only with a relative worſhip; and that invocation and worſhip were to be addreſſed to the ſaints only as the ſervants of Chriſt, and on account of their relation to him, as their maſter. Leo, diſſatiſfied even with theſe abſurd and ſuperſtitious deciſions, was ſent into baniſhment. In the weſtern church, the worſhip of images was diſapproved and oppoſed by ſeveral conſiderable parties, as the Petrobruſſians, Albigenſes, Waldenſes, &c. till at length this idolatrous practice was entirely aboliſhed in many parts of the Chriſtian world by the Reformation. Moſheim's Eccl. Hiſt. vol. ii. p. 91. 148, &c. 238, &c. See IMAGE.

ICONOGRAPHIA, Εικονογραφια, derived from εικων, *image*, and γραφω, *I deſcribe*, the deſcription of images, or ancient ſtatues of marble and copper; alſo of buſts and ſemi-buſts, penates, paintings in freſco, moſaic works, and ancient pieces of miniature.

ICONOLATRÆ, or ICONOLATERS, from εικων, and λατρευω, *I worſhip*, or ICONODULI, from εικων and δουλοω, *I ſerve*, thoſe who worſhip images; a name which the *iconoclaſtes* give to thoſe of the Romiſh communion, on account of their adoring images, and of rendering to them the worſhip only due to God. See ICONOCLASTS and IMAGE.

ICONOLOGIA, formed from εικων and λεγω, *I ſpeak*, the interpretation of ancient images, monuments, and emblems.

ICONOMACHI. See ICONOCLASTS.

ICOSAHEDRON, in *Geometry*, a regular body, or ſolid, terminated by twenty equilateral and equal angles.

The *icoſahedron* may be conſidered as conſiſting of twenty triangular pyramids, whoſe vertices meet in the center of a ſphere, imagined to circumſcribe it; and therefore they all have their heights and baſes equal; wherefore the ſolidity of one of thoſe pyramids, multiplied by 20, the number of baſes, gives the ſolid content of the *icoſahedron*.

ICOSANDRIA, in *Botany*, the twelfth claſs of plants with hermaphrodite flowers, and a large number of ſtamina or male parts in each, comprehending five orders.

The word is derived from the Greek εικοσι, *twenty*, and ανηρ, *male*. See *Tab.* I. *of Botany*, *Claſs* 12. and *Tab.* IV. *Claſs* 12.

It ſhould therefore ſtrictly ſignify a flower with twenty ſtamina, but it is only underſtood in an indefinite ſenſe, and made to expreſs ſuch plants as have any larger number, commonly twenty, often more, and thoſe growing to the inner ſide of the cup of the flower, not to the receptacle of the future ſeeds. See FRUCTIFICATION.

ICTERIC, derived from the Greek ικτερ[illegible] which ſignifies the ſame; and ſome derive it farther from ικτρις, a kind of weaſel with yellow eyes, a term in *Phyſic*, applied to ſuch perſons as have the JAUNDICE; which the Latins call *icterus*, *aurigo*, or *morbus regius*.

Icteric medicines are thoſe remedies preſcribed in caſes of the jaundice.

ICTERIC *decoction*. See MADDER.

ICTERUS *lapis*, in *Natural Hiſtory*, a name given by the ancients to a ſtone, famous for the cure of the jaundice. Pliny deſcribes four ſpecies of this ſtone. But theſe deſcriptions are ſo ſhort, that we cannot determine from them which of the ſtones of thoſe known at preſent, were intended.

ICTIAR, in the *Eaſtern Military Orders*, an officer who has gone through all the degrees or poſts in his reſpective body; and has a right to be a member of the divan.

ICTIS, in *Zoology*, a name originally Greek, by which ſome authors call the FERRET.

IDÆÆ *radix*, in *Botany*, a name uſed by Columna and ſome other authors for the large narrow-leaved kind of ruſcus, or butcher's broom; called by others *biſlingua*.

IDEA, Ιδεα, the IMAGE or reſemblance of a thing, which, though not ſeen, is conceived by the mind.

The word is Greek; Cicero renders it into Latin by *exemplar*, and *exemplum*; and Plato himſelf, in ſome places, by ϖαραδειγμα. Cicero, in his Topics, alſo expreſſes it by *forma* and *ſpecies*.

IDEA, in *Phyſiology*, denotes the immediate object of the mind about which we are employed, when we perceive or think of any thing; and this definition of Mr. Locke's is much leſs exceptionable than that of ſome other logicians, who define an *idea* to be a pattern or copy of a thing in the mind.

Thus, when we look at the ſun, we do not ſee that luminary itſelf, but its image, or appearance, conveyed to the ſoul by the organ of ſight; and this image we call *idea*.

The origin of *ideas* has been a long time diſputed among philoſophers. The Peripatetics maintain, that external objects emit ſpecies which reſemble them all around; and that theſe ſpecies, ſtriking on our ſenſes, are by them tranſmitted to the underſtanding; and that, being material and ſenſible, they are rendered intelligible by the active intellect; and are at length received by the paſſive.

Others are of opinion, that our ſouls have of themſelves the power of producing *ideas* of things we would think upon; and that they are excited to produce them by the impreſſions which objects make on the body, though theſe impreſſions are not images in any reſpect like the objects that occaſioned them. And in this, ſay they, it is, that man is made after the image of God, and that he partakes of his power; for as God made all things out of nothing, and can reduce them to nothing when he pleaſes, ſo man can create as many *ideas* as he pleaſes, and annihilate them when he has done.

Others maintain, that the mind has no occaſion for any thing beſide itſelf to perceive objects; and that, by conſidering itſelf, and its own perfections, it is able to diſcover all things that are without. Others, with Deſcartes, hold, that our *ideas* were created and born along with us.

Malebranche, and his followers, aſſert, that God has in himſelf the *ideas* of all the beings he has created; that thus he ſees all things, in conſidering his own perfections, to which they correſpond; and that, as he is intimately united to our ſouls, by his preſence, our mind ſees and perceives things in him which repreſent created beings; and that it is thus we come by all our *ideas*. He adds, that though we ſee all ſenſible and material things in God, yet that we have not our ſenſations in him. When we perceive any ſenſible object, in our perception is included both a ſenſation, and a pure *idea*. The ſenſation is a modification of the ſoul, and it is God who cauſes it in us; but for the *idea* joined with the ſenſation, it is in God; and it is in him that we ſee it.

The Carteſians diſtinguiſh three kinds of *ideas*. The firſt, *innate*; ſuch, they ſay, is that we have of God, as of a being infinitely perfect. The ſecond, *adventitious*, which the mind receives in proportion as bodily objects preſent themſelves to our ſenſes: ſuch is the idea of body, ſound, figure, light, &c. The third, according to theſe philoſophers, are *factitious*, which are thoſe which the mind forms, by uniting and aſſembling the *ideas* which it already had; and theſe are called *complex*. But Mr. Locke ſeems to have put this matter out of diſpute; having made it appear, that all our *ideas* are owing to our ſenſes; and that all innate, created, and factitious *ideas*, are mere chimeras.

Our mind, he ſhews, has not abſolutely any *ideas* beſides thoſe preſented to it by the ſenſes, and thoſe which it forms by its own operations on thoſe others which the ſenſes furniſh; ſo that a man, deſtitute of one of his ſenſes, would never have any *idea* belonging to that ſenſe; and, ſuppoſing him deſtitute of all the ſenſes, he would never have any *idea* at all; external objects having no other way of producing *ideas* in him, but by means of ſenſation, he would have no *idea*, not even of reflection; becauſe, in wanting all ſenſation, he wants that which would excite in him the operations of his mind, which are the objects of his reflection.

It is plain, therefore, there is no innate *idea*; no general truth, or firſt principle, inherent in the ſoul, and created with it; no immediate object of the mind, before it had perceived external objects by means of the ſenſes, and reflected on that perception. Thoſe *ideas* only ſeem to be innate, becauſe we find we have them as ſoon as we come to the uſe of reaſon; but they are, in effect, what we formed from the *ideas* wherewith the mind was inſenſibly filled by the ſenſes. Thus, when the mind is employed about ſenſible objects, it comes by the *ideas* of bitter, ſweet, yellow, hard, &c. which we call *ſenſation*; and, when employed about its own operations, perceiving and reflecting on them, as employed about the *ideas* before got by ſenſation, we get the *ideas* of perception, thinking, doubting, willing, &c. which we call *inward ſenſation*, or *reflection*; and theſe two, viz. external material things, as the objects of ſenſation, and the operations of our own minds, as the objects of reflection, are the only originals whence all our *ideas* have their riſe. When we have conſidered theſe, and their ſeveral modes and combinations, we ſhall find, that they contain our whole ſtock of *ideas*, inſomuch that the underſtanding does not ſeem to have the leaſt glimmering of any *ideas*, that it did not receive from one of thoſe ſources.

And thus far the mind appears merely paſſive, as not having it in its power to chooſe whether it will have theſe firſt beginnings, or materials of knowlege, or not. For the objects of ſenſe will obtrude their *ideas* upon the mind; and the operations of the mind will not let us be without ſome (however obſcure) notion of them.

The origin of our *ideas* and notions is a perplexed queſtions, and not at all cleared up by the labours of metaphyſicians. As to *ideas* of ſenſe, ſome philoſophers have pretended, that bodies acting or preſſing upon our nerves, or putting the animal ſpirits in motion, produce ſenſations; but as the motion communicated to the nerves or ſpirits has nothing in common either with the thing or body moving, or with the *idea* excited in the mind, and that we do not conceive the leaſt relation between the motion of the nerves or ſpirits, and the production of an *idea*, to ſay that the motion of, or impreſſion upon the nerves or animal ſpirits is the cauſe of *ideas*, is explaining nothing at all.

The ſpecies emitted by objects, and the formation of *ideas* by the ſoul itſelf, are not more clear. As to innate *ideas*, it is true indeed, that the arguments of thoſe who maintain them, have been refuted by Mr. Locke; but when he goes farther, and denies innate *ideas*, his arguments have been thought by ſome not to be concluſive.

The opinion of Leibnitz concerning the origin of *ideas*, ſeems to have ſome affinity with innate *ideas*. He aſſerts the ſoul to be ſimple, and without parts or compoſition; hence he concludes, that no created thing can act internally upon it, but that all the changes it undergoes depend upon ſome internal principle.

God has formed every ſoul, ſo as to have different perceptions; ſome diſtinct, many confuſed; and a great number ſo obſcure, as hardly to be perceived. All theſe *ideas* together repreſent the univerſe; underſtanding by this term every thing that has been, is, or ſhall be. According to the different relations that each particular ſoul has with the univerſe, ſome of its *ideas* are diſtinct, and diſtinctly repreſent a certain part of the univerſe. The foundation of this opinion is, that as each part of the univerſe diſtinctly repreſented, has a neceſſary relation with every thing that exiſts, with every thing that has been, or ſhall be, all things being connected, ſo that the one is the conſequence of another; in like manner, the repreſentation of a certain part of the univerſe has a neceſſary and inſeparable relation to the repreſentation of the whole.

From whence it follows, that all diſtinct perceptions of the ſoul being connected with the *ideas* of all other things, theſe muſt likewiſe be in the ſoul, though obſcurely. In this ſenſe Mr. Leibnitz aſſerted, that the ſoul is the mirror of the univerſe. Now all things that happen in the univerſe, ſucceed each other according to certain laws. In like manner in the ſoul, *ideas* become ſucceſſively diſtinct according to other laws; which, though they have a relation to the former, are yet conſiſtent with the nature of intelligence.

All human ſouls have the ſame *ideas*, taking the *ideas* of each individual collectively. But diſtinct *ideas* are not the ſame in each; theſe depending upon the relation which each ſoul has to the univerſe; and this relation is different, according to the ſtation which God has pleaſed to aſſign to each. This ſeems a fair repreſentation of Mr. Leibnitz's ſyſtem, relating to the origin of *ideas*; upon which we may remark, that the foundation of this ſyſtem is, that all the parts of the univerſe have a neceſſary connection: but to make juſt concluſions from this propoſition, the connection muſt be ſuch, that things being conſidered in themſelves, no one thing can be ſuppoſed, without all others being ſo neceſſary a conſequence thereof, that the *idea* of another univerſe, in which there ſhould be any thing belonging to our actual univerſe, muſt be contradictory.

If ſuch a connection took place, what is ſuppoſed concerning obſcure *ideas*, would be true in a certain ſenſe; to wit, that it might be ſaid, that a man who has a diſtinct *idea* of a triangle, has thereby obſcure *ideas* of all the properties of this figure, becauſe of the neceſſary connection between theſe laſt *ideas* and the former.

But no ſuch connection between *ideas* ſucceeding each other in the ſoul is perceivable. For if paſſing from a dark place to one that is enlightened, I thereby ſuddenly acquire the *ideas* of ſeveral objects, never before ſeen, it does not appear that the previous perception of darkneſs muſt neceſſarily lead me to theſe new *ideas*.

Theſe and other difficulties may be urged againſt Mr. Leibnitz's ſyſtem; nor is Malebranche's more fortunate. This philoſopher ſuppoſes there can be no cauſe of an *idea*, but this *idea* itſelf in another intelligent being; and from hence he concludes, that we acquire our *ideas* while our ſoul perceives them in God.

To prove his opinion, he enumerates all the ways in which the origin of *ideas* is explicable; and concludes, after having refuted all others, that his own is the only true one. But his reaſoning labours under two defects. Firſt, who can pretend, in a ſubject ſo obſcure, to enumerate all the poſſible ways of the ſoul's acquiring its *ideas?* He did not know Leibnitz's opinion, very different from that of the Carteſians; and other ſolutions might perhaps be found out. Secondly, the falſity of other opinions is not ſufficiently demonſtrated; ſo that, upon the whole, nothing is yet clear about the origin of *ideas*.

The conſideration of the memory does not a little increaſe the difficulties concerning our *ideas*. Many *ideas* not preſent may be recalled to mind. Theſe *ideas* are certainly ſomehow differently related to the ſoul, than thoſe it never did perceive, or thoſe which it cannot recollect. But what is an *idea* in the ſoul, which the ſoul does not yet perceive? Yet ſuch there are. If to explain this we recur to the conſtitution of the brain, new diſcoveries ariſe. What memory can ſpirits ſeparated from bodies have? If no memory, what intelligence? See s'Graveſande's Introduct. à la Philoſophie, p. 134.

As to Malebranche's notion, ſee alſo Locke's Poſthumous Works, where this opinion is particularly examined; and Berkeley's Dialogues, 2d edit. p. 257, 258, &c.

The ingenious Mr. Harris ſeems to conſider all our *ideas* as innate; originally impreſſed on our minds by the Deity, and only awakened or called forth by the preſence of external objects. *Ideas*, he ſays, are of the eſſence of mind, and, therefore, having no relation to corporeal things, cannot be produced by them. But this takes for granted a principle which is contrary to all appearance; viz. that the mind is of ſuch a nature as that it can have no poſſible connection with matter, or be properly affected by it. Whatever be the nature of the thinking principle, it ſeems agreeable to fact and univerſal experience to conclude, that it is capable of being affected, either by natural operation, or in conſequence of an eſtabliſhed law, by external objects; and that its perceptions correſpond to the ſtate of the corporeal ſyſtem. Beſides, Mr. Harris allows that ſenſible objects have a natural power of awakening *ideas*; and why may they not have a natural power of originally exciting them in the ſame mind? Mr. Harris farther argues, that his hypotheſis is neceſſary to account for the identity of the *ideas* of different minds, which could not be explained, if they were only generated from ſenſible objects, which are fluctuating and variable. But it may be replied, that there is an equal identity or diverſity in external objects, as there is in our *ideas* of them; and the correſpondence between both is ſo ſtrict, as to afford a ſufficient proof, that our *ideas* have this origin, and no other. This ingenious writer ſuppoſes alſo, that the mental origin of our *ideas* is neceſſary to account for the correſpondence ſubſiſting between the *ideas* of the divine mind, and thoſe of our's, and conſequently to the communication between him and us. If ſenſation were the only ſource of our *ideas*, this argument would have conſiderable force; but the contrary appears to be the fact, even upon the ſyſtem of Mr. Locke, and will be more particularly illuſtrated in the ſequel of this article. See Hermes, p. 380. 394, &c. 399, &c. and Prieſtley's Examination of Dr. Reid's Inquiry, &c. p. 334, &c.

Dr. Price, in his Inquiry into the Original of our *Ideas*, has taken occaſion to remark, that the ſyſtem of Mr. Locke, which aſcribes all our *ideas* to ſenſation and reflection, is materially defective; for, if by ſenſation we underſtand the effects ariſing from the impreſſions made on our minds by external objects, and by reflection the notice which the mind takes of its own operations, it will be impoſſible to derive ſome of the moſt important of our *ideas* from them. This excellent reaſoner obſerves, that the power within us that underſtands, the INTUITION of the mind, or the faculty in it that diſcerns truth, that views, compares, and judges of all *ideas* and things, is a ſpring of new ſimple *ideas*, or original, primary, and uncompounded perceptions of the mind. To this ſource he refers our *ideas* of the impenetrability and *vis inertiæ* of matter, ſubſtance, duration, ſpace, infinity, neceſſity, contingency, poſſibility, impoſſibility, power, cauſation, &c. all our abſtract *ideas*, (ſee ABSTRACTION) and alſo our *ideas* of moral right and wrong, and of moral obligation. It is, he ſays, of the eſſence of theſe *ideas* to imply ſomething true or falſe of an object, and that they by no means denote the manner in which we are affected by it; ſo that they cannot with any propriety be referred to that part of our conſtitution, which has been diſtinguiſhed by the appellation of ſenſe. Accordingly, our *ideas* may be divided, firſt, into thoſe implying nothing real without the mind, or nothing real and true, beſides its own affections and paſſions; to which claſs we may refer the immediate effects of impreſſions on the bodily ſenſes, without ſuppoſing any previous ideas, as all taſtes, ſmells, colours, &c. and thoſe that ariſe upon occaſion only of other *ideas*; as the effects in us of conſidering order, happineſs, the beauties of poetry, painting, &c. Secondly, into thoſe which are images of ſomething diſtinct from ſenſation, or which imply real, independent exiſtence and truth; which may be ſubdivided into ſuch as denote the real properties of external objects, and the actions and paſſions of the mind; and thoſe which are derived immediately from intelligence. By the notices conveyed to the mind through the organs of the body, or its obſervation of the neceſſary attendants and concomitants of certain ſenſations and impreſſions, it perceives the figure, extenſion, motion, and other primary qualities of material ſubſtances; by contemplating itſelf, it perceives the properties of ſpiritual ſubſtances, volition, conſciouſneſs, memory, &c. To all theſe *ideas* it is eſſential that they have real, certain, invariable archetypes, actually exiſting, to which they are referred, and to which they are conformable. Theſe *ideas* again become objects or archetypes to the intellective faculty; from whence ariſes a new ſet of *ideas*, which are the perceptions of this faculty, and repreſent not the mind's own affections, but neceſſary truth. Antecedently to theſe, whatever other *ideas* we may be furniſhed with, nothing is underſtood; whatever ſeeds or ſubjects of knowlege may be in the mind, nothing is known. Price's Review, &c. of Morals, ſect. 2. and 3.

The ſyſtem of Mr. Locke, with regard to the origin of our *ideas*, has lately been attacked with conſiderable confidence by Dr. Reid and others; and it has been charged as the foundation of univerſal ſcepticiſm. Dr. Reid objects to every ſyſtem which ſuppoſes that the mind receives images of things from without by means of the ſenſes, becauſe ſenſations bear no reſemblance to bodies, or any of their qualities. With regard to extenſion, figure, motion, &c. he ſays, if they are not *ideas* of ſenſation, nor like to any ſenſation, then the ideal ſyſtem is a rope of ſand, and all the laboured arguments of the ſceptical philoſophy againſt a material world, and againſt the exiſtence of every thing but impreſſions and *ideas*, proceed upon a falſe hypotheſis. To this objection it has been replied, that *ideas* are only, in a figurative ſenſe, the images of external things; that certain impreſſions are conveyed to the mind by means of the organs of ſenſe, and their correſponding nerves, between which, and the ſenſations exiſting in the mind, there is a real and neceſſary, though at preſent an unknown connection; and that the ſame reaſoning would lead him to deny that ſounds are produced by bodies ſtriking againſt one another, becauſe he can perceive no proper reſemblance between the cauſe and the effect.

Dr. Reid farther objects to the notion generally received among philoſophers, that the images of external objects are conveyed by the organs of ſenſe to the brain, and there perceived by the mind. But from this objection it might be inferred, that the whole ſyſtem of our ſenſes, nerves, and brain, is of no real uſe whatever; becauſe it is impoſſible to ſay how they act upon the mind, or the mind upon them.

It is alſo objected, that Mr. Locke's diviſion of *ideas* into thoſe of ſenſation, and thoſe of reflection, is contrary to all the rules of logic; becauſe the ſecond member of the diviſion includes the firſt. For can we, ſays he, form clear and juſt notions of our ſenſations any other way than by reflection? Senſation is an operation of the mind, of which we are conſcious, and we get the notion of it by reflecting upon that which we are conſcious of. In like manner, doubting and believing are operations of the mind, whereof we are conſcious, and we get the notion of them by reflecting upon what we are conſcious of. The *ideas* of ſenſation, therefore, are *ideas* of reflection, as much as the *ideas* of doubting or believing, or any other *idea* whatſoever. But it has been alleged, that the author confounds the *ideas of ſenſation* with the *idea* of *ſenſation itſelf*, which is, without doubt, of the ſame claſs with the *ideas* of doubting, &c. as Mr. Locke would have allowed. But the *ideas* belonging to the claſs of ſenſation do not require any ſcientifical knowlege of that power, or any reflection upon it. If this were the caſe, brute animals, having no proper *ideas* of reflection, could have no *ideas* of ſenſation; and the caſe would be the ſame with the bulk of mankind. In another place, Dr. Reid acknowleges, that human beings may have *ideas* of mere ſenſation ſome time before they diſcover any power of reflection, and that this power may diſcover itſelf, and come into exerciſe afterwards. Dr. Beattie, Dr. Oſwald, and others, have purſued and extended the ſame kind of reaſoning againſt the principles of Mr. Locke; and alleged, that Berkeley's reaſoning againſt the exiſtence of a material world, and Hume's reaſoning againſt the exiſtence both of ſoul and body, are deduced from Locke's Eſſay, and the Principia of Des Cartes. For an account of Berkeley's ſyſtem, ſee ABSTRACTION, BODY, and EXISTENCE.

In oppoſition to this ſyſtem, Dr. Reid, and thoſe who have adopted his theory, have recurred to certain inſtinctive principles; alleging, that our perceptions neceſſarily imply the belief of the preſent exiſtence of external objects; and that the real, ſeparate, and independent exiſtence of matter, is believed, not becauſe it can be proved by argument, but becauſe the conſtitution of our nature is ſuch, that we muſt believe it; and that we cannot, in our own minds, ſeparate the belief of external objects from our ſenſations. However, it has been urged by an ingenious writer, that Mr. Locke's doctrine is not ſo favourable to Mr. Berkeley's theory as Dr. Reid's; and that a ſyſtem which aſcribes our primary mental operations to mere conſtitution and feeling, is more favourable to ſcepticiſm than that in the room of which it is ſubſtituted. According to Mr. Hume's ſyſtem, all perceptions are either impreſſions or ideas, and it is not poſſible for us ſo much as to conceive any thing ſpecifically different from *ideas* and impreſſions; and ſince all *ideas* are copied from impreſſions, we can, therefore, have no *idea* or conception of any thing of which we have not received an impreſſion. No man can have any *idea* of power or energy, becauſe he has never received any impreſſion of it; and for the ſame reaſon no man can have any *idea* of ſelf. What we call a mind is nothing but a bundle or collection of different perceptions, which ſucceed each other with inconceivable rapidity, and are in a perpetual flux and movement. There is properly, ſays Mr. Hume, no ſimplicity in the mind at one time, nor identity at different times, whatever natural propenſion we may have to imagine that ſimplicity and identity. They are the ſucceſſive perceptions only that conſtitute the mind: ſo that there is nothing in the univerſe but impreſſions and ideas; all poſſible perceptions being comprehended in thoſe two claſſes. Conſequently, this philoſophy, excluding body and mind, admits of no exiſtence whatſoever, not even of a percipient being to be the ſubject of theſe perceptions. To the ſame purpoſe Dr. Reid obſerves, that, according to Mr. Locke's ſyſtem, *ideas* being the only objects of thought, and having no exiſtence but when we are conſcious of them, it neceſſarily follows, that there is no object of our thought which can have a continued and permanent exiſtence. Body and ſpirit, cauſe and effect, time and ſpace, to which we were wont to aſcribe an exiſtence independent of our thought, are all turned out of exiſtence by this ſhort dilemma. Either theſe things are *ideas* of ſenſation or reflection, or they are not: if they are *ideas* of ſenſation or reflection, they can have no exiſtence but when we are conſcious of them: if they are not *ideas* of ſenſation or reflection, they are words without any meaning. To which we ſhall only reply, that we have the ſame reaſon to believe, that mind exiſts as that body exiſts; ſince it is only by that name that we diſtinguiſh the ſubject of certain powers or properties, of which we are conſcious, as perception, memory, will, &c. and we have juſt the ſame reaſon to believe the identity of an *idea* as that of any external body, or that of our own minds.

Thoſe who wiſh to be farther acquainted with the controverſy relating to the nature and origin of our *ideas*, muſt be referred to Hume's Treatiſe of Human Nature, vol. i. p. 123, &c. 282, &c. 434, &c. Reid's Inquiry into the Human Mind, paſſim. Beattie's Eſſay on Truth, part ii. chap. 2. Prieſtley's Examination of Reid, Beattie, &c. paſſim. See *Common* SENSE.

For an account of Dr. Hartley's ſyſtem of the generation of our *ideas*, ſee ASSOCIATION, VIBRATION, and VIBRATIUNCLE.

The term *idea* has, by Mr. Locke, been extended to every thing we know or have any notion of, any thing about which the mind is employed in thinking. But this extenſive uſe of the term *idea* is thought improper by a very ingenious and acute writer, who obſerves, that we may be ſaid to have ſome knowlege or notion of our own minds, of ſpirits and active beings, whereof in a ſtrict ſenſe we have not *ideas*. In like manner, we know and have a notion of relations between things or *ideas*, which relations are diſtinct from the *ideas* or things related, inaſmuch as the latter may be perceived by us, without our perceiving the former. The ſame author elſewhere obſerves, that by *mind*, *ſpirit*, *ſoul*, or *ſelf*, he does not denote any one of his *ideas*, but a thing entirely diſtinct from them; wherein they exiſt, or which is the ſame thing, whereby they are perceived; for the exiſtence of an *idea* conſiſts, as he ſays, in being perceived. He alſo obſerves, the word *thing* or *being*, is the moſt general name of all, and comprehends under it two kinds entirely diſtinct and heterogeneous; having nothing common but the name, to wit, *ſpirits* and *ideas*. And in another part of his treatiſe, he expreſly affirms, there can be no *idea* formed of a ſoul or ſpirit. Berkeley's Princ. of Human Knowlege, § 2. 27. 89. 142.

Another author has alſo blamed Mr. Locke for confounding *ideas* and notions. He obſerves, that by *idea*, according to the common and moſt uſual ſignification of the word, is meant the image, picture, or repreſentation in the mind of a ſenſible appearance, or of an object which hath before been perceived by ſenſe. To which ſenſible appearance therefore the *idea* neceſſarily refers, for whatever is in it, or upon any account can be aſcribed to it; and it ſerves, or is made uſe of in its ſtead, for the mind to contemplate or employ itſelf about in thinking, at ſuch time when the object it repreſents is not immediately perceived, as in the act of ſenſe. Vide p. 105 & 106. of a book, intitled, Two Diſſertations concerning Senſe and the Imagination, with an Eſſay on Conſciouſneſs. Lond. 1728. 8vo.

This author farther aſſerts, in oppoſition to Mr. Locke, that the perception of an *idea* is not an act of underſtanding. He urges, that an *idea*, by Mr. Locke's own account of it, is an object, or ſomething perceived, and about which the mind is employed in thinking. Wherefore if perception, (ſuppoſe) which is an operation or act of the mind, ſhould itſelf be conſidered as an *idea*, (and under this very title Mr. Locke treats of perception) then one *idea* would be the object of another *idea*, and ſo there would be an *idea* of an *idea*, or an object of an object; and one *idea* would perceive another *idea*, which there is no making any tolerable ſenſe of. And indeed in explaining or declaring the operation of any faculty, to give it the ſame name and appellation with the object itſelf about which it is employed, and which there is a neceſſity of conſidering, in order to ſet forth the particular quality and nature of the operation, and the preciſe manner of its concerning and having to do with the object, ſeems very inconſiſtent with ſuch a purpoſe or deſign.

This author has been very elaborate in proving and enforcing the diſtinction between notions and *ideas*. In another treatiſe he obſerves, that Mr. Locke, in his Eſſay on Human Underſtanding, takes no notice of rational notions, and thereby has not only given a partial and imperfect account of his ſubject, but made an unjuſt and unfair repreſentation of it. Vide An Eſſay concerning Rational Notions, printed at London, 1723.

That ſome confuſion may have ariſen from giving the ſame name to theſe heterogeneous things, cannot be queſtioned. However, Mr. Locke is in this reſpect no more guilty than Malebranche and the Carteſians, who uſe the term *idea* in the ſame extenſive ſenſe with him, and from whom indeed he ſeems to have taken it. But then the Carteſians ſeem to have been more ſolicitous to diſtinguiſh between the *ideas* of the imagination, and thoſe of the intellect, underſtanding or *de l'eſprit pur*, as they ſometimes expreſs themſelves, and have thereby guarded againſt the inconveniences ariſing from the too general ſignification of the term *idea*. See NOTION.

Ideas, according to Mr. Locke, are divided into *ſimple* and *complex*.

IDEAS, *ſimple*, include all thoſe which come into the mind by ſenſation; and though the qualities of bodies that affect our ſenſes, are in the things themſelves ſo mixed and united, that there is no ſeparation between them, yet the *ideas* they produce in the mind are ſimple and unmixed. Again, ſome of theſe *ideas* we acquire purely by means of one ſenſe; as the *ideas* of colours, only by the eye; of ſounds, by the ear; of heat, by the touch, &c. Other *ideas* we gain by ſeveral ſenſes, as of ſpace, extenſion, figure, reſt, motion, &c. for theſe have their effect, both on the ſight and the touch. Others, again, are had from reflection only; ſuch as thoſe of perception and willing. There are other ſimple *ideas*, again, formed in the mind, both by ſenſation and reflection, jointly; as thoſe of pleaſure, pain, power, exiſtence, unity, ſucceſſion, &c. And ſome of theſe kinds of *ideas* are all, or at leaſt the moſt conſiderable, of thoſe ſimple *ideas* which the mind hath, and out of which is made all its other knowlege.

The better to comprehend the nature of ſimple *ideas*, it will be convenient to diſtinguiſh between them, as they are *ideas* of perceptions in our minds, and as they are modifications of the bodies that cauſe ſuch perceptions in us, that we may not think, as is uſually done, that they are exactly the images and reſemblances of ſomething inherent in the object; for moſt of thoſe of ſenſation are in the mind no more the likeneſs of any thing exiſting without us, than the names that ſtand for them are the likeneſs of the *ideas*.

But here the qualities of bodies which produce thoſe *ideas* in our minds, are to be diſtinguiſhed into *primary* and *ſecondary*. *Primary qualities* are ſuch as are utterly inſeparable from the body, in what ſtate ſoever it be, and ſuch as our ſenſes conſtantly find in every particle of matter; which are ſolidity, extenſion, figure, mobility, and the like. *Secondary qualities* are, ſuch as are, in reality, nothing in the objects themſelves, but only powers to produce various ſenſations in us, by means of their primary qualities; that is, by the figure, bulk, texture, &c. of their particles, as colours, ſounds, taſte, &c.

Now the *ideas* of primary qualities are, in ſome ſenſe, reſemblances of them, and their patterns do really exiſt in the bodies themſelves; but the *ideas* produced in us by thoſe ſecondary qualities have no reſemblance of them at all. There is nothing like our *ideas* exiſting in the bodies themſelves, that occaſion them: they are, in the bodies we denominate from them, only a power to produce thoſe ſenſations in us; and what is ſweet, warm, blue, &c. in the *idea*, is no more than the bulk, figure, and motion, of the particles of the bodies themſelves, which we call ſo.

The mind has ſeveral faculties of managing theſe ſimple *ideas*, which are worthy of notice: as, 1. That of diſcerning juſtly, and diſtinguiſhing rightly, between one and another; in which conſiſts the accuracy of judgment.

2. That of comparing them one with another, in reſpect of extent, degree, time, place, or any other circumſtances of relation or dependence, one on another.

3. That of compounding, or putting together, the ſimple *ideas* received by ſenſation and reflection, in order to make complex ones.

4. Children, by repeated ſenſations, having got ſome *ideas* fixed in their memories, by degrees learn the uſe of ſigns; and when they can ſpeak articulately, they make uſe of words, to ſignify their *ideas* to others.

Hence, the uſe of words being, to ſtand as outward marks of our internal *ideas*, and thoſe *ideas* being taken from particular things, if every particular *idea* that we take in ſhould have a particular name affixed to it, names would become endleſs. To prevent this inconvenience, the mind has another faculty, whereby it can make the particular *ideas* received from ſuch objects, become general; which is done by conſidering them as they are in the mind, ſuch appearances, ſeparate from all other exiſtences, and circumſtances of exiſtence, as time, place, and other concomitant *ideas*; and this is called ABSTRACTION, whereby *ideas*, taken from particular things, become general repreſentatives of all of that kind, and their names, general names, applicable to whatever exiſts conformable to ſuch abſtract *ideas*. Thus, the ſame colour being obſerved to-day in chalk, or ſnow, which we obſerved yeſterday, in paper, or milk, we conſider that appearance alone make it a repreſentative of all of the ſame kind, and give it the name of *whiteneſs*; by which ſound we always ſignify the ſame quality, whereſoever to be met with, or imagined.

From the powers of combining, comparing, and ſeparating, or abſtracting ſimple *ideas*, acquired by ſenſation and reflection, all our complex *ideas* are formed; and, as before, in the perception of *ideas*, the underſtanding was paſſive, ſo here it is active, exerting the power it hath in the ſeveral acts and faculties above mentioned, in order to frame compound *ideas*.

IDEAS, *complex*, though their number be infinite, and their variety endleſs, yet may all be reduced to theſe three heads; viz. *modes*, *ſubſtances*, and *relations*. *Modes* are ſuch complex *ideas*, as, however compounded, are not ſuppoſed to exiſt by themſelves, but are conſidered as dependences on, or affections of, ſubſtances: ſuch are the *ideas* ſignified by the words *triangle*, *gratitude*, *murder*, &c.

Theſe are of two kinds: 1. Such as are only variations, or different combinations, of the ſame ſimple *idea*, without the mixture of any other; as a dozen, a ſcore, &c. which may be called *ſimple modes*. 2. There are others, compounded of ſimple *ideas*, of ſeveral ſorts put together, to make one complex one; as *beauty*, *theft*, &c.

Subſtances have their *ideas* from ſuch combinations of ſimple *ideas*, as are taken to repreſent diſtinct particular things, ſubſiſting by themſelves; in which the ſuppoſed or confuſed *idea* of ſubſtance, ſuch as it is, is always the firſt and chief.

Relations are a kind of complex *ideas*, ariſing from the conſideration or compariſon of one *idea* with another. Of theſe, ſome only depend on the equality or exceſs of the ſame ſimple *idea* in ſeveral ſubjects; and theſe may be called *proportional relations*; ſuch as *equal*, *more*, *bigger*, *ſweeter.* Another occaſion of comparing things together is owing to the circumſtances of their origin and beginning; which not being afterwards to be altered, make the relations depend thereon as laſting as the ſubjects to which they belong. Thus it is with natural relations, as *father, mother, uncle, couſin,* &c. Thus alſo it is with relations by inſtitution, as *prince* and *people, general* and *army,* &c. As to moral relations, they are the conformity or diſagreement of men's free actions to laws and rules, whether human or divine. Farther, *ideas* may be divided into *clear,* or *diſtinct;* and *obſcure,* or *confuſed.*

Ideas, *ſimple,* are *clear,* when they continue ſuch as the objects preſent them to us when our organs of ſenſations are in good tone and order; when our memories retain them, and can produce and preſent them to the mind whenever it has occaſion to conſider them; and when, with this, the mind ſees that theſe ſimple *ideas* are ſeverally different one from another. The contrary to which is what we call obſcurity and *confuſion* of *ideas.*

A *diſtinct idea* is that wherein the mind perceives a difference from all others; and a *confuſed idea* is ſuch a one as is not ſufficiently diſtinguiſhable from another, with regard to which it ought to be different.

Again, *ideas,* with reſpect to the objects whence they are taken, or which they are ſuppoſed to repreſent, come under a threefold diſtinction; being either *real,* or *fantaſtical; true,* or *falſe; adequate,* or *inadequate.*

By real **Ideas** are meant, ſuch as have a foundation in nature; ſuch as have a conformity with the real being or exiſtence of things, or with their archetypes.

Ideas, *fantaſtical* or *chimerical,* are ſuch as have no foundation in nature, nor any conformity with that being to which they are referred, as their archetypes.

All our ſimple *ideas* are real; not that they are images or repreſentations of what does exiſt, but as they are the certain effects of powers in things without us, ordained by our Maker to produce in us ſuch ſenſations. They are real *ideas* in us, becauſe, that by them we diſtinguiſh the qualities that are really in the bodies themſelves; their reality lies in the ſteady correſpondence they have with the diſtinct conſtitutions of real being; but whether with thoſe conſtitutions as cauſes of patterns, it matters not, ſo long as they are conſtantly produced by them.

As to complex *ideas;* in regard they are arbitrary combinations of ſimple *ideas* put together, and united under one general name, in forming whereof the mind uſes its own liberty, ſome are found *real,* and ſome *imaginary.* 1. Mixed modes and relations, having no other reality than what they have in the minds of men, are real; nothing more being required to their reality, but a poſſibility of exiſting conformable to them. Theſe *ideas,* being themſelves archetypes, cannot differ from their archetypes, and ſo they cannot be chimerical, unleſs any one jumbles inconſiſtent *ideas* in them: indeed, thoſe that have names aſſigned to them, ought to have a conformity to the ordinary ſignification of thoſe names, to prevent their appearing fantaſtical. 2. Our complex *ideas* of ſubſtances being made in reference to things exiſting without us, whoſe repreſentations they are thought, are no farther real, than as they are combinations of ſimple *ideas* really united and coexiſting in things without us. Thoſe are fantaſtical that are made up of ſeveral *ideas* that never were found united; as *centaur,* &c.

Real ideas are divided into *adequate,* and *inadequate.*

Ideas, *adequate,* are thoſe which perfectly repreſent thoſe archetypes which the mind ſuppoſes them taken from, and which it makes them ſtand for.

Ideas, *inadequate,* are ſuch as do but partially, or incompletely, repreſent thoſe archetypes to which they are referred.

Ideas, *as to true and falſe,* it may be obſerved, that truth and falſhood, in propriety of ſpeech, belong only to propoſitions; and that when *ideas* are termed *true* or *falſe,* there is ſome tacit propoſition, which is the foundation of that denomination. Our *ideas* being nothing elſe but appearances or perceptions in the mind, can no more be ſaid to be true or falſe, than ſingle names of things can be ſaid to be ſo: for truth and falſhood lying always in ſome affirmation or negation, our *ideas* are not capable of them, till the mind paſſes ſome judgment of them. In a metaphyſical ſenſe they may be ſaid to be true, i. e. to be really as they exiſt; though in things called *true,* even in that ſenſe, there ſeems to be a ſecret reference to our *ideas,* looked upon as the ſtandards of that truth; which amounts to a mental propoſition. When the mind refers its *ideas* to any thing extraneous to it, they are then capable of being true or falſe; becauſe, in ſuch a reference, the mind makes a tacit ſuppoſition of their conformity to that thing; and as this ſuppoſition is true or falſe, ſo the *ideas* themſelves come to be denominated. Locke's Eſſay, 8vo. vol. i. paſſim.

IDENTITATE *nominis,* a writ which lies for him who, upon a capias or exigent, is arreſted, and committed to priſon, for another man of the ſame name.

IDENTITY, *ſameneſs;* that by which a thing is itſelf, and not any thing elſe. In which ſenſe, *identity* differs from *ſimilitude,* as well as *diverſity.*

Our idea of *identity* we owe to that power which the mind has of comparing the very being of things; whereby, conſidering any thing as exiſting at any certain time and place, and comparing it with itſelf as exiſting at any other time, &c. we accordingly pronounce it the ſame.

When we ſee any thing in any certain time and place, we are ſure it is that very thing, and can be no other, how like ſoever it may be to ſomething elſe in all other reſpects; becauſe we conceive it impoſſible, that two things of the ſame kind ſhould exiſt together in the ſame place, we conclude, that whatever exiſts any where at the ſame time, excludes all of the ſame kind, and is there itſelf alone. When, therefore, we demand, whether any thing be the ſame or no, it refers always to ſomething that exiſted at ſuch a time, in ſuch a place; which it was certain, at that inſtant, was the ſame with itſelf, and no other.

We have ideas of three ſorts of ſubſtances: of God; of finite intelligences; and of bodies. God being eternal, unalterable, and every where, concerning his *identity* there can be no doubt. Finite ſpirits having had their determinate place, and time of beginning to exiſt, the relation to that time and place will always determine to each its *identity* as long as it exiſts. And the ſame will hold of every particle of matter to which no addition, or from which no ſubtraction, is made. Theſe three exclude not one another out of the ſame place; yet each exclude thoſe of the ſame kind out of the ſame place. The *identity* and diverſity of modes and relations is determined after the ſame manner that thoſe of ſubſtances are; only the actions of finite beings, as motion and thought, conſiſting in ſucceſſion, cannot exiſt in different times and places as permanent beings: for no motion or thought, conſidered as at different times, can be the ſame; each part thereof having a different beginning of exiſtence. From whence it is plain, that exiſtence itſelf is the *principium individuationis,* which determines a being to a particular time and place incommunicable to two beings of the ſame kind.

Thus, ſuppoſe an atom exiſting in a determined time and place, it is evident, that, conſidered in any inſtant, it is the ſame with itſelf, and will be ſo, as long as its exiſtence continues. The ſame may be ſaid of two, or more, or any number of particles, whilſt they continue together, the maſs will be the ſame, however jumbled; but if one atom be taken away, it is then not the ſame maſs. But in vegetables the *identity* depends not on the ſame maſs, and is not applied to the ſame thing: the reaſon of this is, the difference between an inanimate body, and a crude maſs of matter; this latter being only the coheſion of particles any how united, the other ſuch a diſpoſition or organization of parts, as is fit to receive and diſtribute nouriſhment, ſo as to continue and frame the wood, bark, leaves, &c. (of an oak, for inſtance) in which conſiſts the vegetable life. That, therefore, which hath ſuch an organization of parts, partaking of one common life, continues to be the ſame plant, though that life be communicated to new particles of matter vitally united to the living plant. The caſe is not ſo much different in brutes, but that any one may hence ſee what makes an animal, and continues it the ſame. The *identity* of the ſame man likewiſe conſiſts in a participation of the ſame continued life, in ſucceeding particles of matter vitally united to the ſame organized body.

To underſtand *identity* aright, we muſt conſider what idea the word ſtands for; it being one thing to be the ſame ſubſtance; another, the ſame man; and a third, the ſame perſon. An animal is a living organized body; and the ſame animal is the ſame continued life communicated to different particles of matter, as they happen ſucceſſively to be united to that organized living body; and our notion of man is but of a particular ſort of animal. Perſon ſtands for an intelligent being, that reaſons and reflects, and can conſider itſelf the ſame thing in different times and places which it doth by that conſciouſneſs that is inſeparable from thinking. By this every one is to himſelf, what he calls *ſelf,* without conſidering whether that ſelf be continued in the ſame, or in diverſe ſubſtances. In this conſiſts perſonal *identity,* or the ſameneſs of a rational being; and ſo far as this conſciouſneſs extends backward to any paſt action, or thought, ſo far reaches the *identity* of that perſon. It is the ſelf ſame now it was then; and it is by the ſame ſelf, with this preſent one, that now reflects on it, that that action was done. Self is that conſcious thinking thing, whatever ſubſtance it matters not, which is conſcious of pleaſure and pain, capable of happineſs or miſery; and ſo is concerned for itſelf as far as that conſciouſneſs extends. That with which the conſciouſneſs of this preſent thinking can join itſelf, makes the *ſame* perſon, and is one ſelf with it; and ſo attributes to itſelf, and owns all the actions of that thing as its own, as far as that conſciouſneſs reaches.

Conſciouſneſs, ſays the excellent biſhop Butler, of what is paſt, aſcertains our perſonal *identity* to ourſelves; yet to ſay that it makes perſonal *identity*, or is neceſſary to our being the ſame perſons, is to ſay, that a perſon has not exiſted a ſingle moment, nor done one action, but what he can remember: indeed, none but what he reflects upon. And one ſhould really think it ſelf-evident, that conſciouſneſs of perſonal *identity* preſuppoſes, and, therefore, cannot conſtitute, perſonal *identity*; any more than knowlege, in any other caſe, can conſtitute truth, which it preſuppoſes. Though preſent conſciouſneſs of what we at preſent do and feel is neceſſary to our being the perſons we now are; yet preſent conſciouſneſs of paſt actions or feelings is not neceſſary to our being the ſame perſons who performed thoſe actions, or had thoſe feelings. The *identity* of perſons cannot ſubſiſt with diverſity of ſubſtance: perſonal *identity* is, therefore, as Mr. Locke expreſſes it, the ſameneſs of a rational being; and the queſtion, whether the ſame rational being is the ſame ſubſtance, needs no anſwer; becauſe being and ſubſtance, in this caſe, ſtand for the ſame idea. Conſequently, though the ſucceſſive conſciouſneſſes which we have of our own exiſtence are not the ſame, yet they are conſciouſneſſes of one and the ſame thing or object; of the ſame perſon, ſelf, or living agent. The perſon, of whoſe exiſtence the conſciouſneſs is felt now, and was felt an hour or a year ago, is diſcerned to be, not two perſons, but one and the ſame perſon, and, therefore, is one and the ſame. Butler's Analogy, Append. Diſſ. 1.

This perſonal *identity* is the object of reward and puniſhment, being that by which every one is concerned for himſelf. If the conſciouſneſs went along with the little finger; when that was cut off, it would be the ſame ſelf, that was juſt before concerned for the whole body. If the ſame Socrates, waking and ſleeping, did not partake of the ſame conſciouſneſs, he would not be the ſame perſon: Socrates waking could not be, in juſtice, accountable for what Socrates ſleeping did; no more than one twin, for what his brother-twin did; becauſe their outſides were ſo like, that they could not be diſtinguiſhed.

But ſuppoſe I wholly loſe the memory of ſome parts of my life, beyond a poſſibility of retrieving them, ſo that I ſhall never be conſcious of them again; am I not again the ſame perſon that did thoſe actions, though I have forgot them? I anſwer, we muſt here take notice what the word *I* is applied to, which in this caſe is the man only; and the ſame man being preſumed to be the ſame perſon, *I* is eaſily here ſuppoſed to ſtand alſo for the ſame perſon. But if it be poſſible for the ſame man to have a diſtinct, incommunicable conſciouſneſs at different times, it is paſt doubt the ſame man would, at different times, make different perſons; which we ſee is the ſenſe of mankind in the ſolemneſt declaration of their opinions; human laws not puniſhing the madman for the ſober man's actions, nor the ſober man for what the madman did; thereby making them two perſons.

Thus we ſay, in Engliſh, ſuch a one is not himſelf, or is beſide himſelf; in which phraſes it is inſinuated, that ſelf is changed, and the ſelf ſame perſon is no longer in that man. But is not a man, drunk or ſober, the ſame perſon? Why elſe is he puniſhed for the ſame fact he commits when drunk, though he be never afterwards conſcious of it? Juſt as much the ſame perſon, as a man that walks, and does other things in his ſleep, is the ſame perſon, and is anſwerable for any miſchief he ſhall do in it. Human laws puniſh with a juſtice ſuitable to their way of knowledge; becauſe in theſe caſes they cannot diſtinguiſh certainly what is real, and what is counterfeit; and ſo the ignorance in drunkenneſs, or ſleep, is not admitted as a plea. For though puniſhment be annexed to perſonality, and perſonality to conſciouſneſs, and the drunkard is not conſcious, perhaps, of what he did, yet human judicatures juſtly puniſh him, becauſe the fact is proved againſt him; but want of conſciouſneſs cannot be proved for him. But in the great day, wherein the ſecrets of all hearts ſhall be laid open, it may be reaſonable to think no one ſhall be made to anſwer for what he knows nothing of, but ſhall receive his doom; his own conſcience accuſing, or elſe excuſing him.

To conclude this article: whatever ſubſtance begins to exiſt, it muſt, during its exiſtence, be the ſame; whatever compoſition of ſubſtances begin to exiſt, during the union of thoſe ſubſtances, the concrete muſt be the ſame. Whatſoever mode begins to exiſt, during its exiſtence it is the ſame; and ſo if the compoſition be of diſtinct ſubſtances, and different modes, the ſame rule holds. Whence it appears, that the difficulty or obſcurity that has been about this matter, rather ariſes from names ill uſed, than from any obſcurity in the things themſelves. For whatever makes the ſpecific idea, to which the name is applied, if that idea be ſteadily kept to, the diſtinction of any thing into the ſame and diverſe, will eaſily be conceived. Locke's Eſſays, vol. i. chap. 27.

IDEOT. See Idiot, and Lunatic.

IDES, Idus, in the *Roman Calendar*, a denomination given to eight days in each month; commencing in the months of March, May, July, and October, on the fifteenth day; and in the other months on the thirteenth day; and reckoned backward, ſo as in the four months above ſpecified to terminate on the eighth day, and in the reſt on the ſixth.

The origin of the word is conteſted. Some will have it formed from ιδειν, *to ſee*; becauſe the full moon was commonly ſeen on the day of the *ides*; others from ειδος, *ſpecies*, *figure*, on account of the image of the full moon then viſible; others from *idulium*, or *ovis idulis*, a name given by the Hetrurians to a victim offered on that day to Jupiter; others from the Hetrurian word *iduo*, i. e. *divido*; becauſe the *ides* divided the moon into two nearly equal parts.

The *ides* came between the calends and the nones.

The 15th day in March, May, July, and October, and the 13th in the other months, being called the *ides* of thoſe months; *idus Martii*, *Maii*, &c. the fourteenth day of the ſame four months, and the 12th of the other eight, were *pridie idus*, or the eve of the *ides* of March, &c. the 13th day in the four months, and the 11th in the eight, was called the third of the *ides* of ſuch months, 3 *idus Martii*, &c. ſo the 12th day in the four, and the 10th in the eight months, were the 4th of the *ides*, 4 *idus Martii*, &c and thus of the reſt, to the 8th and 6th days, which made the 8th of the *ides*, 8 *idus Martii*, &c.

This way of accounting is ſtill in uſe in the Roman chancery, and in the calendar of the breviary. The *ides* of May were conſecrated to Mercury; the *ides* of March were always eſteemed unhappy, after Cæſar's murder; the time after the *ides* of June was reckoned fortunate for thoſe who entered into matrimony; the *ides* of Auguſt were conſecrated to Diana, and were obſerved as a feaſt day by the ſlaves; on the *ides* of September, auguries were taken for appointing the magiſtrates, who formerly entered into their offices on the *ides* of May, and afterwards on thoſe of March.

IDIOM, Ιδιωμα, *propriety*, of ιδιος, *proper*, *own*, is ſometimes uſed for the peculiarities of a language; ſometimes for a dialect, or the language of ſome particular province; differing, in ſome reſpects, from the language of the nation in general, whence it is derived.

Idioms, *communication of*. See Communication.

IDIOPATHY, Ιδιοπαθεια, derived from ιδιος, *proper*, *particular*, and παθος, *paſſion*, *affection*, a diſeaſe, or indiſpoſition, peculiar to ſome member, or part, of the body, not cauſed by any other diſeaſe, or preceding affection; nor having any dependence on the reſt of the body.

In which ſenſe it ſtands oppoſed to *ſympathy*, which is when the indiſpoſition takes its riſe from ſome prior diſorder in ſome other part of the body.

Thus a cataract in the eye is an *idiopathy*; an epilepſy is either *idiopathic*, or *ſympathic*; *idiopathic*, when it happens purely through ſome fault in the brain; *ſympathic*, when it is preceded by ſome other diſorder.

IDIOSYNCRASY, from ιδιος, *proper*, συν, *with*, and κρασις, *mixture*, *temperament*, in *Phyſic*, a temperament peculiar to ſome body, in conſequence whereof, whether in ſickneſs, or in health, it has a more than ordinary averſion, or inclination, to certain things, or is more affected with them than others uſually are.

IDIOT, or Ideot, in the *Engliſh Laws*, denotes a natural fool, or a fool from his birth.

The word is originally Greek, ιδιωτης, which primarily imports a *private perſon*, or one who leads a private life, without any ſhare or concern in the government of affairs.

A perſon who has underſtanding enough to meaſure a yard of cloth, number twenty rightly, and tell the days of the week, &c. is not an *idiot* in the eye of the law. But a man who is born deaf, dumb, and blind, is conſidered by the law in the ſame ſtate as an *idiot*.

Idiot, *idiota*, is alſo uſed, by ancient writers, for a perſon ignorant, or unlearned; anſwering to *illiteratus*, or *imperitus*. In this ſenſe, Victor tells us, in his Chronicon, that, in the conſulſhip of Meſſala, the holy Goſpels, by command of the emperor Anaſtaſius, were corrected and amended, as having been written by *idiot* evangeliſts: *Tanquam ab* idiotis *evangeliſtis compoſita*.

IDIOTA *inquirendo vel examinando*, a writ iſſued out to the ſheriff of a county, where the king has notice that there is an *idiot* naturally born, ſo weak of underſtanding, that he cannot govern or manage his inheritance; directing him to call before him the party ſuſpected, and examine him, and enquire, by a jury of twelve men, whether he be an *idiot*. For the king, by his prerogative, has the government of the lands and ſubſtance of ſuch as are naturally defective in their own diſcretion.

This branch of the revenue hath been long conſidered as a hardſhip upon private families; but few inſtances occur of the oppreſſive exertion of it.

IDIOTISM, derived from ιδιος, *proper*, *peculiar*, in *Grammar*, a phraſe, or manner of ſpeaking, peculiar to a language, and which cannot be rendered word for word into any other.

Idiotiſm is defined, by ſome authors, an inflection of ſome verb, or a particular conſtruction of ſome phraſe or particle, that is anomalous, and deviates from the ordinary rule of the language of the nation, but which is in uſe in ſome particular province of it.

Several authors have written of the *idiotiſms* in the Greek and Latin languages; that is, of the particular turns in thoſe tongues which vary the moſt from each other, and from the more popular among the modern tongues; but the examples of theſe *idiotiſms* being borrowed from the beſt authors, *idiotiſm*, in this ſenſe, cannot properly be called an irregularity.

IDLENESS, in *Law*. See VAGABOND.

IDOL, from ειδωλον, which ſignifies the ſame, of ειδος, *image*, *figure*, a ſtatue or image of ſome falſe god, to whom divine honours are paid, altars and temples erected, and ſacrifices offered.

The *idol* or image, whatever materials it conſiſted of, was by certain ceremonies, called conſecration, converted into a god. While under the artificer's hands, it was only a mere ſtatue.

Three things were neceſſary in order to change it into a god; proper ornaments, conſecration, and oration. The ornaments were various, and wholly deſigned to blind the eyes of the ignorant and ſtupid multitude, who are chiefly taken with ſhow and pageantry. Then followed the conſecration and oration, which were performed with great ſolemnity among the Romans.

IDOLATRY, from ειδωλολατρεια, which ſignifies the ſame; compoſed of ειδος, *image*, and λατρευειν, *to ſerve*, the worſhip and adoration of falſe gods; or the giving thoſe honours to creatures, or the works of man's hands, which are only due to God.

Several have written of the origin and cauſes of *idolatry*: among the reſt, Voſſius, Selden, Godwyn, and Tenniſon; but it is ſtill a doubt who was the firſt author of it. It is generally allowed, however, that it had not its beginning till after the deluge; and many are of opinion, that Belus, who is ſuppoſed to be the ſame with Nimrod, was the firſt man that was deified.

But whether they had not paid divine honours to the heavenly bodies before that time, cannot be determined; our acquaintance with thoſe remote times being extremely ſlender.

All that can be ſaid with certainty is, that 426 years after the deluge, when God led Terah and his family out of Chaldea, and Abraham paſſed over Meſopotamia, Canaan, the kingdom of the Philiſtines, and Egypt, it does not appear that *idolatry* had then got any footing in any of thoſe countries; though ſome idly pretend, that Abraham himſelf was an idolater.

The firſt mention we find made of it is, in Gen. xxxi. 19. where Rachel is ſaid to have taken the idols of her father: for though the meaning of the Hebrew word THERAPHIM תרפים be diſputed, yet it is pretty evident they were idols. Laban calls them his gods, and Jacob calls them ſtrange gods, and looks on them as abominations.

The original of *idolatry* by image worſhip is by many attributed to the age of Eber, about 401 years after the deluge; though moſt of the fathers place it no higher than that of Serug; which ſeems to be the more probable opinion, conſidering that for the firſt 134 years of Eber's life all mankind dwelt in a body together; during which time it is not reaſonable to ſuppoſe, that *idolatry* broke in upon them; then ſome time muſt be allowed after the diſperſion of the ſeveral nations, which were but ſmall at the beginning, to increaſe and ſettle themſelves; ſo that if *idolatry* was introduced in Eber's time, it muſt have been towards the end of his life, and could not well have prevailed ſo univerſally, and with that obſtinacy, which ſome authors have imagined. The authors of the Univerſal Hiſtory think, that the origin and progreſs of *idolatry* is plainly pointed out to us in the account which Moſes gives of Laban's and Jacob's parting, Gen. xxxi. 44, &c. From the cuſtom once introduced of erecting monuments in memory of any ſolemn covenants, the tranſition was eaſy into the notion, that ſome deity took its reſidence in them, in order to puniſh the firſt aggreſſors; and this might be ſoon improved by an ignorant and degenerate world, till not only birds, beaſts, ſtocks, and ſtones, but ſun, moon, and ſtars, were called into the ſame office; though uſed, perhaps, at firſt, by the deſigning part of mankind, as ſcare-crows, to over-awe the ignorant. Univ. Hiſt. vol. i. part ii. p. 853. edit. fol.

Cluverius, German. Antiq. lib. i. maintains Cain to have been the firſt idolater; and the falſe gods that he worſhipped to have been the ſtars, to whom he ſuppoſed God had left the government of the lower world; but this is mere conjecture.

Sanchoniathon, who wrote his Phœnician Antiquities, apparently with a view to apologize for *idolatry*, traces its origin to the deſcendants of Cain, the elder branch, who began with the worſhip of the ſun, and afterwards added a variety of other methods of idolatrous worſhip: proceeding to deify the ſeveral parts of nature, and men after their death, and even to conſecrate plants ſhooting out of the earth, which the firſt men judged to be gods, and worſhipped, as thoſe that ſuſtained the lives of themſelves and of their poſterity. Cumberl. on Sanchon. p. 219, &c.

The Chaldæan prieſts, in proceſs of time, being by their ſituation early addicted to celeſtial obſervations, inſtead of conceiving as they ought to have done concerning the omnipotence of the Creator, and mover of the heavenly bodies, fell into the impious error of eſteeming them as gods, and the immediate governors of the world, in ſubordination, however, to the Deity, who was inviſible, except by his works, and the effects of his power. Concluding that God had created the ſtars, and great luminaries, for the government of the world, partakers with himſelf, and as his miniſters, they thought it but juſt and natural that they ſhould be honoured and extolled, and that it was the will of God they ſhould be magnified and worſhipped. Accordingly they erected temples, or *ſacella*, to the ſtars, in which they ſacrificed and bowed down before them, eſteeming them as a kind of mediators between God and man. Impoſtors afterwards aroſe, who gave out, that they had received expreſs orders from God himſelf concerning the manner in which particular heavenly bodies ſhould be repreſented, and the nature and ceremonies of the worſhip which was to be paid them. When they proceeded to worſhip wood, ſtone, or metal, formed and faſhioned by their own hands, they were led to apprehend, that theſe images had been, in ſome way or other, animated or informed with a ſupernatural power by ſupernatural means; though Dr. Prideaux imagines, that, being at a loſs to know how to addreſs themſelves to the planets when they were below the horizon, and inviſible, they recurred to the uſe of images. Dr. Prideaux's Connection, &c. book iii. p. 177. 8vo.

But it will be ſufficient to ſuppoſe, that they were perſuaded that each ſtar or planet was actuated by an intelligence; and that the virtues of the heavenly body were infuſed into the image that repreſented it. It is certain, that the ſentient nature and divinity of the ſun, moon, and ſtars, was ſtrenuouſly aſſerted by the philoſophers, particularly by Pythagoras and his followers, (Diogen. Laert. lib. viii. p. 509.) and by the Stoics (Cicero, De Nat. Deor. lib. ii. cap. 15.) as well as believed by the common people, and was indeed the very foundation of the pagan idolatry. The heavenly bodies were the firſt deities of all the idolatrous nations, were eſteemed eternal, ſovereign, and ſupreme, and diſtinguiſhed by the title of the natural gods. Thus we find, that the primary gods of the heathen in general were Saturn, Jupiter, Mars, Apollo, Mercury, Venus, and Diana; by which we can underſtand no other than the ſun and moon, and the five greateſt luminaries next to theſe. Plutarch expreſly cenſures the Epicureans for aſſerting that the ſun and moon are void of intelligence, whom all men worſhipped. Adv Colotem. p. 1123.

Sanchoniathon (apud Euſeb. Præp. Evan. lib. i. cap. 9.) repreſents the moſt ancient nations, particularly the Phœnicians and Egyptians, as acknowleging only the natural gods, the ſun, moon, planets, and elements; and Plato declares it as his opinion, that the firſt Grecians likewiſe held theſe only to be gods, as many of the barbarians in his time did. In Cratyl. p. 273. F. See alſo Herodot. lib. i. cap. 131. 138. lib. iii. cap. 16. Diod. Sic. lib. i. p. 10, 11. ed. Rhodom. Strab. Geogr. lib. xv. p. 732. Polyb. Hiſt. lib. vii. p. 699, 700. ed. Gronov. Euſeb. Præp. Ev. lib. ii. cap. 2. p. 59. Even Philo (Lib. De Somniis) and Origen (in his books Περι Αρχων) maintain, that the ſtars are ſo many ſouls incorruptible and immortal. See Farmer on Miracles, chap. iii. § 2.

Beſides theſe natural gods, the heathens believed, that there were certain ſpirits who held a middle rank between the gods and men on earth, and carried on all intercourſe between them; conveying the addreſſes of men to the gods, and the divine benefits to men. Theſe ſpirits were called DÆMONS. From this imaginary office aſcribed to them, they became the grand objects of the religious hopes and fears of the pagans, of immediate dependence and divine worſhip. In the moſt learned nations, they did not ſo properly ſhare, as ingroſs the public devotion. To theſe alone ſacrifices were offered, while the celeſtial gods were worſhipped only with a pure mind, or with hymns and praiſes. As to the nature of theſe dæmons, it has been generally believed, that they were ſpirits of a higher origin than the human race; and in ſupport of this opinion, it has been alleged, that the ſupreme deity of the pagans is called the greateſt dæmon; that dæmons are deſcribed as beings placed between the gods and men; and that dæmons are expreſly diſtinguiſhed from heroes, who were the departed ſouls of men. A late ingenious writer has with great acuteneſs and erudition combated this opinion, and maintained, on the contrary, that by dæmons, ſuch as were the more immediate objects of the eſtabliſhed worſhip amongſt the ancient nations, particularly the Egyptians, Greeks, and Romans, we are to underſtand beings of an earthly origin, or ſuch departed human ſouls as were believed to become dæmons. This, he ſays, is a fact atteſted by all antiquity, whether Pagan, Jewiſh, or Chriſtian. He appeals to the teſtimonies of the heathen hiſtorians, poets, and philoſophers, and to the nature of the worſhip paid to the heathen deities. He examines the authority of the Old Teſtament writers; of the authors of the Septuagint verſion; of Philo and Joſephus; of the New Teſtament; and of the Chriſtian fathers. For a farther view of the maſterly manner in which this argument is treated, ſee Farmer on Miracles, chap. iii. § 2. paſſim. Farmer on Dæmoniacs, § 2. See DÆMON and MIRACLES.

Voltaire, in the art. IDOLE, Encyclopedie, labours to vindicate the heathens in general from the charge of *idolatry*. He ſays, that there has not exiſted any people on earth who aſſumed the name of idolaters; and that no ſuch term is found in Homer, or Heſiod, or Herodotus, or any author of the pagan religion; and that no law was ever enacted, requiring the ultimate worſhip of idols. The Greeks and Romans, he ſays, were gentiles and polytheiſts, but not idolaters; they worſhipped the gods by means of theſe images, and not the images themſelves; and were no more chargeable with idolatrous worſhip than the votaries of the Romiſh church. He alſo extends his laboured and ſpirited vindication to the Perſians, Sabians, Egyptians, Tartars, and Turks; and obſerves, that it is an abuſe of terms to call thoſe people idolaters who worſhip the ſun and ſtars, &c.

The principal cauſes that have been aſſigned for *idolatry* are, the indelible idea which every man has of God, and the evidence which he gives of it to himſelf; an inviolable attachment to the ſenſes, and a habit of judging and deciding by them, and them only; the pride and vanity of the human mind, which is not ſatisfied with ſimple truth, but mingles and adulterates it with fables; the ignorance of antiquity, or of the firſt times, and the firſt men, whereof we have but very dark and confuſed knowlege by tradition, they having left no written monuments or books; the ignorance and change of languages; the ſtyle of the oriental writings, which is figurative and poetical, and perſonifies every thing; the ſuperſtition, ſcruples, and fears, inſpired by religion; the flattery of writers; the falſe relations of travellers; the fictions of poets; the imaginations of painters and ſculptors; a ſmattering of phyſics, that is, a ſlight acquaintance with natural bodies and appearances, and their cauſes; the eſtabliſhment of colonies, and the invention of arts, miſtaken by barbarous people; the artifices of prieſts; the pride of certain men, who have affected to paſs for gods; the love and gratitude borne by the people to certain of their great men and benefactors; and finally the Scriptures themſelves ill underſtood.

IDOLOPŒIA, Ειδολοποιïα, in *Rhetoric*, a ſpecies of PROSOPOPOEIA, where dead perſons are ſuppoſed to ſpeak.

IDOLOTHYTA, Εἰδωλοθυτα, things offered in ſacrifice to idols; concerning the uſe of which, the apoſtle Paul lays down rules in 1 Corinth. chap. viii. ver. 4. 7. and 10.

IDULIA, in *Antiquity*, certain eggs offered to Jupiter on the ides of every month. They were ſo called, from their being offered on the ides.

IDYLLION, in *Poetry*, a little poem, containing the deſcription or narration of ſome adventures.

The word is derived from the Greek ειδυλλιον, diminutive of ειδος, *figure*, *repreſentation*; becauſe this poetry conſiſts in a lively natural image, or repreſentation of things.

Theocritus is the oldeſt author who has written *idyllions*. The Italians imitate him, and have brought the *idyllion* into modern uſe.

The *idyllions* of Theocritus have a peculiar delicacy; they appear with a clowniſh, ruſtic kind of ſimplicity, but are full of the moſt exquiſite beauties; they ſeem drawn from the breaſt of nature herſelf, and to have been dictated by the graces.

The *idyllion* is a kind of poetry, which paints the objects it deſcribes; whereas the epic poem relates them, and the dramatic acts them. The modern writers of *idyllions* do not keep up to that original ſimplicity obſerved by Theocritus; the people of our days would not bear an amorous fiction, reſembling the aukward gallantries of our peaſants. Boileau obſerves, that the ſhorteſt *idyllions* are uſually the beſt.

The modern *idyllions* differ from thoſe of the ancients, by introducing none but allegorical ſhepherds or courtiers diſguiſed in their dreſs; whereas thoſe of the ancients repreſent true ſhepherds. Mr. Hardion obſerves, that the taſte of the preſent age is ſo very different from that of the ancients in this reſpect, that he would not take upon him to give a literal tranſlation of Theocritus's *idyllions*; not that he reckons them bad in themſelves, nor that he condemns the rules followed in their compoſition; but becauſe the rules that were good at the time thoſe poems were written, would, in the preſent age, be reliſhed but by very few.

The ſubject of *idyllions*, as being low of itſelf, requires the greateſt elegance of diction to ſet it off. Mr. Hardion is of opinion, that Theocritus has the advantage of Virgil in this reſpect; obſerving always the ſtructure peculiar to paſtoral poems, which conſtitutes one of its chief beauties. This ſtructure requires that the fourth foot of every verſe ſhould be a dactylus, and ſometimes alſo the firſt, when it can be done without affectation. Beſides, it is alſo neceſſary theſe dactyli ſhould be made without any cæſura following; and if poſſible there ſhould be a reſt in the ſenſe after each dactyle, which would add greatly to the regularity and perfection of each verſe. Such are the following verſes of Theocritus and Virgil:

> Ειπε μοι, ω Κορυδων, τινος αι βοες; ηρα Φιλωνδα.
>
> Theoc. Idyl. iv. ver. 1.
>
> *Dic mihi, Damæta, cujum pecus? An Melibœi?*
>
> Virg. Ecl. iii. ver. 1.

This ſtructure in paſtoral poems gives a vivacity, which is wonderfully pleaſing in the mouth of a ſhepherd. Theſe rules are obſerved by Theocritus, with all the exactneſs poſſible; but by Virgil ſeldom; which is rather to be imputed to the genius of the Latin tongue than his want of ability; it being leſs copious, bold, and pliant, than the Greek. Mem. Acad. Inſcript. tom. vi. p. 255, 256.

The invention of the *idyllion* is aſcribed to Daphnis, who by his extraordinary genius, ſays Diodorus Siculus, "invented the bucolic poem and ſong, in the form it continues to appear in at preſent, in Sicily." This paſſage is conſiderable, as it fully aſcertains the origin of the *idyllion*, ſuch as it appears in Theocritus, and thoſe that have imitated him.

After Daphnis, another Sicilian ſhepherd, called Diomus, made himſelf famous for his paſtoral poems. Next came Steſichorus, who, according to Ælian, was the firſt that made the misfortunes of Daphnis the ſubject of his ſongs. He lived, as ſome chronologers will have it, in the time of Phalaris, about 550 years before the vulgar æra; and laſtly, ſome ages after this, Theocritus appeared, who forming himſelf on theſe firſt models, ſo far excelled, as to give paſtoral poetry all the perfection it was capable of receiving. Mem. Acad. Inſcript. tom. ix. p. 101.

JEALOUSY, in *Ethics*, is that peculiar uneaſineſs which ariſes from the fear that ſome rival may rob us of the affection of one whom we greatly love, or ſuſpicion that he has already done it. The firſt ſort of *jealouſy* is inſeparable from love, before it is in poſſeſſion of its object: the latter is often unjuſt, generally miſchievous, always troubleſome.

JEALOUSY, *waters of*. See WATERS.

JEAN-CAPELLE, in *Ichthyology*, a name given by Ruyſch, and ſome others, to the fiſh called by authors the *faber Indicus*, or *Indian* DOREE; and more expreſſively named by Artedi the ZEUS with a forked tail.

JECARINUS *piſcis*, in *Ichthyology*, a name given by Gaza, and many other writers, to the fiſh more commonly called HEPATUS *piſcis*, by ſome *jecur marinum*.

JECTIGATION, in *Phyſic*, a trembling, palpitation, or diſorderly and convulſive motion of the whole body, of one ſide, or only of the heart and pulſe of a ſick perſon: this ſhews that the brain, which is the origin of the nerves, is attacked, and threatened with convulſions.

JECUR. See LIVER.

JECUR *marinum*, in *Ichthyology*, is uſed by Hermolaus and ſome other writers in the ſame ſenſe with HEPATUS.

Jecur *uterinum.* The placenta is by ſome thus called, from the ſuppoſed ſimilitude of its figure and office with that of the liver.

JEER *capſtan.* See Capstan.

JEERS, or Jears, in a *Ship*, an aſſemblage of tackles, by which the lower yards of a ſhip are hoiſted up along the maſt to their uſual ſtation, or lowered from thence as occaſion requires; the former of which operations is called *ſwaying*, and the latter *ſtriking*.

In a ſhip of war, the *jeers* are uſually compoſed of two ſtrong tackles, each of which has two blocks, viz. one faſtened to the lower maſt-head, and the other to the middle of the yard. The two blocks which are laſhed to the middle, or ſlings of the yard, are retained in this ſituation by means of two cleats, nailed on each ſide, whoſe arms incloſe the ropes by which the blocks are faſtened to the yard. The two ropes which communicate with theſe tackles lead down to the deck on the oppoſite ſide of the maſt, according to the ſituation of the upper *jeer-blocks*. The *jeers* in merchant-ſhips have uſually two large ſingle blocks on the oppoſite ſide of the maſt-head, and another of the ſame ſize in the middle of the yard. The rope, which communicates with theſe, paſſes through one of the blocks hanging at the maſt-head, then through the block on the yard, and afterwards through the other hanging-block upon the maſt. To the two lower ends of this rope, on the oppoſite ſides of the maſt, are fixed two tackles, each of which is formed of two double blocks, the lower one being hooked to a ring-bolt in the deck, and the upper one ſpliced or ſeized into the lower end of the great rope above, which is called the tye. By this contrivance the mechanical power of the tackle below is tranſmitted to the tye, which, communicating with blocks on the yard, readily ſways up or lowers it, either by the effort of both *jeers* at once, on the oppoſite ſides of the maſt, or by each of them ſeparately one after another. Falconer.

They ſay a man is brought to the *jeers*, when going to be puniſhed at the *jeer-capſtan*. This is done in the following manner: a capſtan-bar being thruſt through the hole of the barrel, the offender's arms are extended at full length croſs-wiſe, and ſo tied to the bar; having ſometimes a baſket of bullets, or ſome other like weight, hanging by his neck. In this poſture he continues till he be either brought to confeſs ſome plot or crime, whereof he is ſuſpected; or that he has ſuffered what he is cenſured to undergo, at the diſcretion of the captain.

JEHAGH. See Giagh.

JEHOVAH, in *Theology*, one of the Scripture names of God; ſignifying the Being who is ſelf-exiſtent, and who gives exiſtence to others. See God.

So great a veneration had the Jews for this name, that they left off the cuſtom of pronouncing it; whereby its true pronunciation was forgotten. They call it tetragrammaton, or the name with four letters; and believe that whoever knows the true pronunciation of it, cannot fail to be heard by God.

JEJUNE *ſtyle.* See Style.

JEJUNUM, the ſecond of the ſmall guts; thus called from the Latin *jejunus*, *hungry*; becauſe always found empty. See Intestines.

JELLALÆAN, or Gelalæan *calendar*, *epocha*, and *year*. See Calendar, Epocha, and Year.

JELLY, a form of food, or medicine prepared from the juices of ripe fruits, boiled to a proper conſiſtence with ſugar, or of the ſtrong decoctions of the horns, bones, or extremities of animals, boiled to ſuch a height as to be ſtiff and firm when cold, without the addition of any ſugar.

The *jellies* of fruits are cooling, ſaponaceous, and aceſcent, and therefore are good as medicines in all diſorders of the primæ viæ, ariſing from alcaleſcent juices, eſpecially when not given alone, but diluted with water. On the contrary, the *jellies* made from animal ſubſtances are all alcaleſcent, and are therefore good in all caſes in which an acidity of the humours prevails: the alcaleſcent quality of theſe is however in a great meaſure taken off, by the adding lemon juice and ſugar to them. There were formerly a ſort of *jellies* much in uſe, called *compound jellies*; theſe had the reſtorative medicinal drugs added to them, but they are now ſcarce ever heard of.

Jelly, *oat*, a preparation of common oats, recommended by many of the German phyſicians in all hectic diſorders, to be taken with broth of ſnails or cray-fiſh.

It is made by boiling a large quantity of oats, with the huſk taken off, with ſome hartſhorn ſhavings, and currants together, with a leg of veal cut to pieces, and with the bones all broken; theſe are to be ſet over the fire with a large quantity of water, till the whole is reduced to a ſort of *jelly*, which when ſtrained and cold will be very firm and hard. A few ſpoonfuls of this are to be taken every morning, diluted with a baſon of either of the above mentioned broths, or any other warm liquor.

JEMBUT, in the *Materia Medica*, a name uſed by Avicenna and others, to expreſs the ſeeds in the pods of the carob-tree, or ſiliqua dulcis; which they call charub or charnub, and the Greeks ceratium.

JENDAYA, in *Ornithology*, the name of a Braſilian ſpecies of peroquette. It is of the ſize of a black bird; its beak and legs are black, and its back, wings, and tail, are of a bluiſh green; the tips of its wings are blackiſh, and its head, neck, and breaſt, are of a pale yellow, with an admixture of a deeper yellow in ſome places. Margrave.

JENNET, in *Horſemanſhip*. See Horse.

JENNY *wren.* See Wren.

JENTLING, in *Ichthyology*, the name of a river fiſh caught in the Danube, and moſt of the great rivers in Germany, and called by the Germans *ſchead*, *ſcheat*, *jent*, and *koppen*; and by Geſner *capito cæruleus*, the blue chub.

JEOFAILE, or Jeofayle, in *Law*, a compound of three French words *je ay faillé*, *I have failed*. It is uſed in a legal ſenſe, when the parties to any ſuit have, in pleading, proceeded ſo far, that they have joined iſſue, which ſhall be tried, or is tried by a jury, and this pleading or iſſue is badly joined, ſo that it will be error if they proceed.

In this caſe, one of the parties might, by their counſel, ſhew it to the court, as well after verdict given, as before the jury was charged, by ſaying, *This inqueſt you ought not to take*; or, *To judgment you ought not to go.*

But this occaſioning great delays in ſuits, for the redreſs thereof ſeveral ſtatutes were made; viz. 32 Hen. VIII. cap. 30. by which it was enacted, "That if the jury "have once paſſed upon the iſſue, though afterwards "there be found a *jeofaile* in the pleading, yet ſhall "judgment be given according to the verdict of the "jury." Other ſtatutes have alſo been made relating to the ſame thing, in the time of queen Elizabeth and king James I.

The 18th Eliz. cap. 14. ordains, that after verdict given in any court of record, there ſhall be no ſtay of judgment, or reverſal, for want of form in a writ, count, &c. or for want of any writ original or judicial; or by reaſon of inſufficient returns of ſheriffs, &c. But this is not to extend to appeals of felony, indictments, &c. By 21 Jac. I. cap. 13. if a verdict ſhall be given in any court of record, the judgment ſhall not be ſtayed or reverſed for variance in form between the original writ or bill, and the declaration, &c. or for want of averment of the party's being living; or becauſe the *venire facias* is in part miſawarded; for miſnomer of jurors; want of return of writs; or becauſe the return officer's name is not ſet to the return, &c. The ſtat. 16 & 17. Car. II. cap. 8. enacts, that judgment ſhall not be ſtayed or reverſed after verdict in the courts of record at Weſtminſter, &c. for default in form; or becauſe there are not pledges to proſecute upon the return of the original writ, or becauſe the name of the ſheriff is not returned upon it; for default of alleging the bringing into court of any bond, &c. or for the omiſſion of *vi et armis*, or *contra pacem*; miſtaking the Chriſtian name or ſurname of either party, or the ſum of money, day, month, or year, &c. in any declaration or pleading, being rightly named in any record, &c. preceding, &c. &c. But all ſuch defects as are not againſt the right of the matter of the ſuit, or whereby the iſſue or trial are altered, ſhall be amended by the judges, though not in ſuits of appeal, of felony, indictments, informations on penal ſtatutes, which are excepted out of the act. The 22 & 23 Car. II. cap. 4. made this act perpetual. By 4 & 5 Ann. cap. 16. all the ſtatutes of *jeofails* ſhall extend to judgments, entered by confeſſion, *nil dicit*, or *non ſum informatus*, in any court of record; and no ſuch judgment ſhall be reverſed, nor any judgment or writ of inquiry of damages thereon ſhall be ſtayed, for any defect which would have been added by thoſe ſtatutes, if a verdict had been given; ſo as there had been an original writ filed, &c. The 5 Geo. I. cap. 13. ordains, that, after verdict given, judgment ſhall not be ſtayed or reverſed for defect in form or ſubſtance, in any bill or writ, or for variance therein, from the declaration, or any other proceedings.

JERBOA, in *Zoology*, is made a diſtinct genus of animals by Mr. Pennant, with two cutting teeth in each jaw, two very ſhort fore-legs, two very long hind-legs, reſembling thoſe of cloven-footed water-fowl, and a very long tail tufted at the end. This genus comprehends the *mus jaculus* of Linnæus, inhabiting Egypt, Barbary, Paleſtine, and the deſerts between Balſora and Aleppo; the *mus longipes*, inhabiting the torrid zone; the Siberian *jerboa*, or flying hare, called alagtaga; and the Indian *jerboa*, or *le tarſier* of Buffon, inhabiting India. The Egyptian *jerboa* is repreſented *Tab.* III. *Quadrupeds*, N° 25.

JEREMIAH, in *Scripture Hiſtory*, a canonical book of the Old Teſtament. This divine writer was of the race of the prieſts; the ſon of Hilkiah of Anathoth, in the tribe of Benjamin. He was called when very young to the prophetic office, about the thirteenth of Joſiah; and continued in the diſcharge of it above forty years. He is ſaid by St. Jerom, &c. to have been ſtoned to death by the Jews for preaching againſt their idolatry; but it is moſt likely that he died in Egypt, much advanced in years, and broken by the calamities which happened to himſelf and his country.

There were ſeveral collections of *Jeremiah's* prophecies; one made by God's command in the fourth year of Jehoiakim, chap. xxxvi. 2. This contained all the prophecies he had publiſhed to that time, as well againſt the other nations as againſt the Jews. The former of theſe in our preſent collection are put by themſelves at the end of the book, from chap. xlvi. to the end of the laſt. But in the preſent copies of the Septuagint they follow immediately after the thirteenth verſe of the twenty-fifth chapter. Another collection of theſe prophecies, mentioned chap. i. 3. comprehends all thoſe which *Jeremiah* had uttered to the time of the captivity, and were probably collected by Baruch, his amanuenſis, and are put together without any regard to the order of time. To this was added another collection of prophecies, publiſhed about the time of his going down into Egypt, contained in chap. xlii xliii. xliv. at the end of which Ezra, or ſome others, after the captivity, added thoſe prophecies which *Jeremiah* delivered againſt the Gentiles. The fifty-ſecond chapter was probably added by Ezra, and is chiefly taken out of the latter part of the ſecond book of Kings, with additions, which Ezra might ſupply out of the public records. The book of *Jeremiah* is altogether written in Hebrew, except the eleventh verſe of the tenth chapter, which is Chaldee.

St. Jerom has obſerved upon this prophet, that his ſtyle is more eaſy than that of Iſaiah and Hoſea; that he retains ſomething of the ruſticity of the village where he was born; but that he is very learned and majeſtic, and equal to thoſe two prophets in the ſenſe of his prophecy.

JERFALCON, the Engliſh name of the gyrfalco, a very fierce, bold, and large bird, the largeſt of all the falcon kind. See GYRFALCON.

JERGUER, in the *Cuſtom Houſe*, one who overſees the accounts and conduct of the waiters.

JERICHO, *roſe of*, in *Botany* See ANASTATICA.

JERKIN, a name given by ſome to the male of the jerfalcon. See GYRFALCON.

JERONYMITES, or HIERONYMITES, a denomination given to divers orders, or congregations of religious; otherwiſe called *Hermits of St. Jerom*.

The firſt, called *Hermits of St. Jerom* of Spain, owe their origin to the third order of St. Francis, whereof the firſt *Jeronymites* were members. Gregory the eleventh confirmed this order, under the name of St. Jerom, whom they had choſen for their patron, and their model; and gave them the conſtitutions of the convent of St. Mary of the Sepulchre, with the rule of St. Auguſtine; and for habit, a white tunic, with a ſcapulary, a little capuche, and a mantle, all of their natural colour, without dying, and of a mean price.

The *Jeronymites* are in poſſeſſion of the convent of St. Laurence, in the Eſcurial, where the kings of Spain are buried.

In Spain there is likewiſe an order of nuns of St. Jerom, founded by a lady towards the cloſe of the fifteenth century. Sixtus put them under the juriſdiction of the *Jeronymites*, and gave them the conſtitutions of the monaſtery of St. Martha of Cordova, which were afterwards changed by Leo X. for thoſe of the order of St. Jerom.

Hermits of St. Jerom, *of the Obſervance*, or *of Lombardy*, were founded by Lupus d'Olmedo in 1424, in the mountains of Cazalla, in the dioceſe of Seville.

The third order of *Jeronymites* was founded by Peter Gambacorti, about the year 1377; but the vows they made were only ſimple, till 1568, when Pius V. appointed them to be ſolemn. They have houſes in Tirol, Italy, and Bavaria.

The fourth congregation of *Jeronymites*, are the *Hermits of St. Jerom of Fiezoli*, begun in 1360, when Charles de Montegraneli, of the family of the count of that name, retiring into ſolitude, firſt eſtabliſhed it at Verona. It was approved by Innocent VII. under the title and conſtitutions of St. Jerom. But Eugenius IV. changed it for that of St. Auguſtine. As the founder was of the third order of St. Francis, they preſerved that habit; but, in 1460, Pius permitting ſuch as pleaſed to change it, occaſioned a diviſion among them. This order was finally ſuppreſſed by Clement XI. in 1668.

JERSEY, among *Woolcombers*, denotes the fineſt wool, taken from the reſt by dreſſing it with a *Jerſey* comb.

New JERSEY *tea*, in *Botany*. See CEANOTHUS.

JERTH, in the *Materia Medica*, a name given to a certain kind of moſs, according to Scheffer, growing very plentifully in Lapland, and other cold countries. The root of this is the part uſed in medicine, and the method of giving it is in decoction. They boil a large quantity of it in the whey made of rein deer's milk, and give the patient large draughts of it warm every hour or two; by that means keeping up a good perſpiration, which they increaſe or diminiſh according to the nature of the caſe. The principal diſeaſes to which they are ſubject are pleuriſies, and the ſmall-pox; and it is wonderful to find how well they get through theſe two dangerous complaints by this regimen alone. And upon the whole, the virtues of ſo much warm and diluting liquor ſeem the principal thing to be depended upon by them; for if they cannot readily get the *jerth* root, they ſcruple not to ſupply its place with the ſtalks of angelica, and the medicine ſeems to ſucceed as well this way as the other, both in the ſmall-pox and other caſes.

JERUSALEM *artichoke*. See ARTICHOKE.

JERUSALEM *cowſlip*. See LUNG-*wort*.

JERUSALEM *oak*, a ſpecies of *chenopodium*. See GOOSE-*foot*.

JERUSALEM *ſage*. See SAGE-*tree*.

JESEN, in *Ichthyology*. See JENTLING.

JESILBASCH, *green-head*, a name of reproach which the Perſians give to the Turks, becauſe their emirs wear a green turban.

JESSANT, formed from the obſolete French *jeſſer*, *to riſe* or *ſpring out*, in *Heraldry*, is applied to a fleur-de-lys, or the like figure, ſeeming to ſpring or ſhoot out of ſome other charge. He bears ſable; three leopards heads; *jeſſant*, fleurs-de-lys, or.

JESSAMINE, or JESSAMY. See JASMINE.

JESSE, a large braſs candleſtick, with many ſconces hanging down, in the middle of a church or choir. This invention was firſt called *jeſſe*, from the ſimilitude of the branches to thoſe of the *arbor jeſſæ*. This uſeful ornament of churches was firſt brought over into this kingdom by Hugh de Flory, abbot of St. Auſtin's in Canterbury, about the year 1100.

JESSES denote ribbons hanging down from garlands and crowns; alſo the ſhort ſtraps of leather, faſtened to a hawk's legs, and ſo to the vervels; and birds, in *Heraldry*, are ſaid to be *jeſſed*, when theſe *jeſſes* are of a different tincture from the other parts.

JESTING, or *conciſe wit*, as diſtinguiſhed from continued wit or HUMOUR, lies either in the thought, or the language, or both. In the firſt caſe it does not depend upon any particular words or turn of the expreſſion. But the greateſt fund of jeſts lies in the language, i. e. in tropes or verbal figures; thoſe afforded by tropes conſiſt in the metaphorical ſenſe of the words, and thoſe of verbal figures principally turn upon a double ſenſe of the ſame word, or a ſimilitude of ſound in different words. The third kind of jokes, which lie both in the ſenſe and language, ariſe from figures of ſentences, where the figure itſelf conſiſts in the ſenſe, but the WIT turns upon the choice of the words. Ward's Orat. vol. ii. Lect. 40.

JESUATES, JESUATÆ, an order of religious, otherwiſe called *Apoſtolical Clerks*, or *Jeſuates of S. Jerom.*

They were founded by John Colombini, in 1368, and approved of by Urban V. in 1369, at Viterbo; where he himſelf gave, to ſuch as were preſent, the habit they were to wear.—They followed the rule of St. Auguſtin, and were ranked by Pius V. among the order of Mendicants.

They were called *Jeſuates*, becauſe their firſt founders had the name of Jeſus continually in their mouths: to which they added the name of St. Jerom, becauſe they choſe that ſaint for their protector.

For two centuries the *Jeſuates* were mere lay-brothers; but in 1606, Paul V. gave them leave to enter into holy orders.—In moſt of their houſes they were employed in pharmacy, diſtributing their medicines gratis; others practiſed diſtillation, and ſold aqua vitæ; which occaſioned their being called *aqua-vitæ-mongers*.

Being very rich in the ſtate of Venice, that republic ſolicited their ſuppreſſion, and obtained it of Clement IX. in 1668, their effects being employed towards ſupporting the expences of the war in Candia.

JESUITS, an order of religious, founded by Ignatius Loyola, a Biſcayan military gentleman, of a fanatical and ambitious ſpirit, called alſo *the Society of Jeſus*.

They are alſo ſometimes called *Loyolites*, and ſometimes *Inighiſts*, from the Spaniſh name of their founder, which was *Inigo de Guipuſcoa*.

This order, which was the moſt political and beſt regulated of all the monaſtic orders, and from which mankind have derived more advantages, and received greater hurt, than from any other of theſe religious fraternities, has rendered itſelf very conſiderable by its miſſions into the Indies, and by its other employments relating to the ſtudy of the ſciences, and the education of youth. The council of Trent calls them, *Regular Clerks of the Company of Jeſus.*

In the year 1538, Ignatius, having aſſembled ten of his companions at Rome, choſen moſtly out of the univerſity of Paris, propoſed to them to make a new order. After this, he preſented the plan of his inſtitution, ſuggeſted as he gave out, and his followers ſtill teach, by the immediate inſpiration of heaven, to Paul III. who appointed a committee of cardinals to examine it; upon whoſe report, that the eſtabliſhment was unneceſſary as well as dangerous, Paul refuſed to approve it. This oppoſition was principally urged by the learned and worthy cardinal Guidiccioni.

This oppoſition was vanquiſhed by the dexterity of Ignatius, who propoſed, that beſides the three vows of poverty, chaſtity, and monaſtic obedience, the members of this ſociety ſhould take a fourth vow of obedience to the pope; binding themſelves to go whitherſoever he ſhould command, for the ſervice of religion, and without requiring any thing from the holy ſee for their ſupport. However, Ignatius and his company in the ſame charter of their order in which they declare their implicit and blind allegiance to the court of Rome, promiſe a like implicit and unlimited allegiance to the general of their ſociety. The pontiff, perceiving this inſtitution to be an object of conſequence, confirmed it, under the name of the *Company of Jeſus*, by a bull in 1540; and appointed Ignatius Loyola to be the firſt general of the order. Loyola was originally an illiterate ſoldier, and is ſuppoſed by many to have been only a flexible inſtrument in the hands of able and ingenious men, who made uſe of his fortitude and fanaticiſm to anſwer their purpoſes, and perſons much more learned were employed to compoſe the writings which bear his name. Geddes's Tracts, vol. iii. p. 429.

By this bull, their number was reſtrained to ſixty; but that reſtriction was taken away, two years afterwards, by another bull. The order has ſince been confirmed by ſeveral ſucceeding popes, who have added many new rights and privileges to it.

In leſs than half a century after its inſtitution, the ſociety obtained eſtabliſhments in every country that adhered to the Roman Catholic church; in the year 1608, the number of *Jeſuits* had increaſed to 10581. In the year 1710, the order poſſeſſed 24 profeſſed houſes; 59 houſes of probation; 340 reſidencies; 612 colleges; 200 miſſions; 150 ſeminaries and boarding-ſchools; and conſiſted of 19,998 *Jeſuits*.

The conſtitution and laws of the ſociety were perfected by Laynez, and Aquaviva, the two generals who ſucceeded Loyola, men far ſuperior to their maſter in abilities, and in the ſcience of government. Several circumſtances concurred to the rapid progreſs and extenſive influence of the *Jeſuits*. They were taught to conſider themſelves as formed for action, and bound to exert themſelves continually, as ſoldiers, in the ſervice of God and of the pope, his vicar on earth. And that they might have full leiſure for this active ſervice, they were totally exempted from thoſe functions, the performance of which is the chief buſineſs of other monks. They were required to attend to all the tranſactions of the world; to ſtudy the diſpoſitions of perſons in high rank, and to cultivate their friendſhip; and by the conſtitution as well as genius of the order, a ſpirit of action and intrigue was infuſed into all its members. Beſides, the form of government of this order was peculiar: Loyola, full of the ideas of implicit obedience, which he had derived from his military profeſſion, appointed that the government of this order ſhould be purely monarchical. A general, choſen for life by deputies from the ſeveral provinces, poſſeſſed power that was ſupreme and independent, extending to every perſon and to every caſe. He, by his ſole authority, nominated provincials, rectors, and every other officer employed in the government of the ſociety, and could remove them at pleaſure. In him was veſted the ſovereign adminiſtration of the revenues and funds of the order. Every member belonging to it was at his diſpoſal; and by his uncontrolable mandate, he could impoſe upon them any taſk, or employ them in whatſoever ſervice he pleaſed. To his commands they were required to yield not only outward obedience, but to reſign to him the inclinations of their own wills, and the ſentiments of their own underſtandings. There is not in the annals of mankind any example of ſuch a perfect deſpotiſm, exerciſed not over monks ſhut up in the cells of a convent, but over men diſperſed among all the nations of the earth. It is carefully provided, that the general ſhould be perfectly informed with reſpect to the character and abilities of his ſubjects. Every novice, who offers himſelf a candidate for entering into the order, is obliged to manifeſt his conſcience to the ſuperior, or to a perſon appointed by him every ſix months: each member is likewiſe enjoined to obſerve the words and actions of the novices, and to diſcloſe every thing of importance to the ſuperior. The provincials and heads of the ſeveral houſes are alſo obliged to tranſmit to the general, regular, frequent, and minute reports concerning the members under their inſpection. Theſe reports are digeſted and arranged in regiſters, by which the general may eaſily ſurvey the ſtate of the ſociety in every corner of the earth; obſerve the qualifications of its members; and chuſe proper inſtruments for any neceſſary ſervice. The number of theſe reports received annually by the general was 6584, which divided by 37, the number of provinces in the order gives 177 reports concerning the ſtate of each province tranſmitted annually to Rome. The general alſo receives, by the conſtitution of the order, an account of the civil affairs of the country where his ſubjects reſide; ſo that he is furniſhed with full information concerning the tranſaction of every prince and ſtate in the world.

The *Jeſuits*, from their firſt inſtitution, conſidered the education of youth as their peculiar province; and before the expiration of the 16th century, they had obtained the chief direction of this buſineſs in every catholic country in Europe. They had alſo become the confeſſors of almoſt all its monarchs; they were the ſpiritual guides of almoſt every perſon eminent for rank or power; and they poſſeſſed the higheſt degree of confidence and intereſt with the papal court, as the moſt zealous and able champions for its authority. The order, notwithſtanding the vow of poverty which they contrived to elude, acquired ample poſſeſſions in every catholic country. Beſides the ſources of wealth common to all the regular clergy, they obtained, under a pretext of promoting the ſucceſs of their miſſions, and of facilitating the ſupport of their miſſionaries, a ſpecial licence from the court of Rome to trade with the nations which they laboured to convert. In conſequence of this, they engaged in an extenſive and lucrative commerce, both in the Eaſt and Weſt Indies: they alſo aimed at obtaining ſettlements; and accordingly acquired poſſeſſion of a large and fertile province in the ſouthern continent of America, and reigned as ſovereigns over ſome hundred thouſand ſubjects.

The progreſs and influence of the *Jeſuits* have been likewiſe much promoted by their mutual union for the good of the common cauſe; by their reputation for learning and ſcience, in which they excel all the other orders, though M. d'Alembert ſays, that the order has never produced one man, whoſe mind was ſo much enlightened with ſound knowledge as to merit the name of a philoſopher; by the ſeverity of their diſcipline and regularity of their conduct and manners; by propagating a ſyſtem of relaxed and pliant morality, which accommodates itſelf to the paſſions of men, juſtifies their vices, tolerates their imperfections, and authorizes almoſt every action, which the moſt audacious or crafty politician would wiſh to perpetrate. So that abbé Boileau ſays of them, they are a people who lengthen the creed and ſhorten the decalogue; by extending the juriſdiction and abſolute power of the court of Rome; and by the zeal which they have manifeſted in combating the opinions and checking the progreſs of the proteſtants.

The end principally propoſed by this order is, to gain converts to the Romiſh church; with which view they diſperſe themſelves in every country and nation, and with amazing induſtry and addreſs purſue the end of their inſtitution. No difficulty ſo great that they cannot ſurmount, no danger ſo imminent that they will not undergo; and, as ſome ſay, no crimes ſo ſhocking that have not been perpetrated by them for the ſervice of their cauſe.

Of all the *Jeſuits*, who diſtinguiſhed themſelves by their zealous and laborious attempts to extend the limits of the church, none acquired a more ſhining reputation than Francis Xavier, commonly called the apoſtle of the Indians. He ſailed for the Portugueſe ſettlements in India in 1522, and ſoon diffuſed the knowledge and profeſſion of the popiſh religion over a great part of the continent and neighbouring iſlands. In 1529 he laid the foundations of a conſiderable church in Japan; againſt which, however, a violent perſecution was commenced in 1615, and laſted ſeveral years, and terminated in the utter extirpation of Chriſtianity, and an edict forbidding all Europeans, a few Dutch merchants excepted, to approach the Japaneſe dominions; and having embarked for China, he died in 1552, within ſight of it. Others, after his death, and particularly Ricci, an Italian, penetrated into China, and eſtabliſhed churches, ſome remains of which ſubſiſt to this day. Robert de Nobili is much celebrated by the *Jeſuits* on account of his ſucceſs in proſelyting the Brachmans; for the method he uſed ſee BRACHMANS. The *Jeſuits* are charged by the Janſeniſts and Dominicans with many fraudulent practices in their attempts to propagate Chriſtianity in China; and particularly with endeavouring to perſuade the Chineſe, that the doctrine of Confucius and that of the goſpel were not eſſentially different, and that Jeſus Chriſt had been known and worſhipped in their nation many ages ago. Ricci allowed the Chineſe converts to retain the profane cuſtoms and the abſurd rites of their pagan anceſtors; but his opinion was condemned by the Dominicans and Franciſcans. This difference laid the foundation of a long and violent conteſt. Innocent X. in 1645, pronounced ſentence in favour of the Dominicans; but, about eleven years after, Alexander VII. granted the Chineſe the indulgence propoſed by Ricci. Complaints were renewed by the Dominicans in 1661, and again in 1674, under the pontificate of Innocent XI; and the diſpute was carried on both in Europe and China, from the year 1684, till the queſtion was decided to the diſadvantage of the *Jeſuits* in the year 1704, by Clement XI. but this edict was mitigated in 1715.

It is well known, that the inquiſition erected by the *Jeſuits* at Goa, where the body of Xavier lies interred, and is worſhipped with the higheſt marks of devotion, and the penal laws, whoſe terrors they employed ſo freely in propagation of the goſpel, contributed much more than their arguments and exhortations, which were but ſparingly uſed, to engage the Indians to embrace Chriſtianity.

About the beginning of the laſt century, the *Jeſuits* obtained admiſſion into the fertile province of Paraguay, in South America, where they found the inhabitants in a barbarous and ſavage ſtate: they began with inſtructing and civilizing them; cultivating amongſt them the arts and manufactures, and accuſtoming them to the bleſſings of ſociety, ſecurity and order. By this method they ſecured their eſteem and confidence; and a few *Jeſuits* preſided over ſome hundred thouſand Indians. However, it appears from the moſt credible relations, that they ſoon changed their views from the propagating of Chriſtianity, to ſchemes of inſatiable avarice and boundleſs ambition: and they have ſent yearly to the members of their order, in Europe, immenſe quantities of gold, drawn from ſeveral American provinces where they have power and property, but chiefly from Paraguay, which belongs to them only: and it is evident, from later diſcoveries, which have proved the ruin of the *Jeſuits* in Spain and Portugal, that they had eſtabliſhed an independent empire in this province, ſubject to their ſociety alone, and which, by the ſuperior excellence of its conſtitution and police, could ſcarcely have failed to extend its dominion over all the ſouthern continent of America. They cut off every kind of communication between the Spaniards and Portugueſe in the adjacent ſettlements, and the Indians; inſpired the latter with hatred and contempt of theſe nations; induſtriouſly avoided giving the Indians any knowlege of the Spaniſh, or other European language; inſtructed them in the art of war; formed them into bodies of cavalry and infantry, and provided them with artillery and magazines ſtored with all the implements of war. Such was the ſtate of things, when in the year 1750, the courts of Madrid and Liſbon entered into a treaty for fixing the limits of their reſpective dominions in South America. In the execution of the treaty, in the year 1752, the *Jeſuits* demurred; and a war enſued between the Spaniſh and Portugueſe on one ſide, and the Indians, animated by the *Jeſuits* on the other; which was the real and original cauſe of the diſgrace of the *Jeſuits* at the court of Portugal.

The *Jeſuits* have been juſtly charged with inculcating the moſt licentious and dangerous maxims with regard to morality and religion: ſuch are the following extracted from their writings. That perſons truly wicked and void of the love of God, may expect to obtain eternal life in heaven, provided that they be impreſſed with a fear of the divine anger, and avoid all heinous and enormous crimes through the dread of future puniſhment: that thoſe perſons may tranſgreſs with ſafety, who have a probable reaſon for tranſgreſſing, *i. e.* any plauſible argument or authority in favour of the ſin they intend to commit: that actions intrinſically evil, and directly contrary to the divine laws, may be innocently performed, by thoſe who have ſo much power over their own minds, as to join, even ideally, a good end to this wicked action, or to ſpeak in their ſtyle, who are capable of directing their intention aright: that philoſophical ſin is of a very light and trivial nature, and does not deſerve the pain of hell: by philoſophical ſin they mean an action contrary to right reaſon, which is done by a perſon who is either abſolutely ignorant of God, or does not think of him during the time this action is committed: that the tranſgreſſions committed by a perſon blinded by the ſeduction of luſt, agitated by the impulſe of tumultuous paſſions, and deſtitute of all ſenſe and impreſſion of religion, however deteſtable and heinous they may be in themſelves, are not imputable to the tranſgreſſor before the tribunal of God; and that ſuch tranſgreſſions may often be as involuntary as the actions of a madman: and that the perſon who takes an oath, or enters into a contract, may, to elude the force of the one, and the obligation of the other, add to the form of words that expreſs them, certain mental additions and tacit reſervations. Some of theſe maxims were condemned by a public edict of Pope Alexander VII. in 1659; and that relating to philoſophical ſin met with the ſame fate in 1690, under the pontificate of Alexander VIII. Neither of theſe bulls are to be found in the *Bullarium Pontificum*; but they are induſtriouſly preſerved by the Janſeniſts and Dominicans. The corrupt morality of the *Jeſuits* was humorouſly and learnedly attacked by the famous Paſcal, in his work entitled, Les Provinciales, ou Lettres écrits par Louis de Montalte, à un Provincial de ſes Amis et aux *Jeſuites*, ſur la morale et la Politique de ces peres. The *Jeſuits*, however, obtained a ſentence againſt the *Provinciales*, by which they were condemned to be burnt publicly at Paris. Another excellent book by Perrault, publiſhed at Mons, in 3 volumes 8vo, in the year 1702, entitled, La Morale des *Jeſuites*, extrait fidelement de leurs Livres, imprimés avec la permiſſion et l'approbation des ſuperieurs de leur Compagnie, par un docteur de Sorbonne, was burnt at Paris, in the year 1670, at the requeſt of the *Jeſuits*. The famous Arnauld, with ſome of his Janſeniſt brethren, have undertaken to prove, that the *Jeſuits* reduced their pernicious maxims to practice, in a celebrated work, entitled, La Morale Pratique des *Jeſuites*, conſiſting of 8 volumes 8vo, the ſecond edition of which was publiſhed at Amſterdam, in the year 1742. For an account of the controverſy between the *Jeſuits* and *Janſeniſts*, ſee JANSENISTS.

The *Jeſuits* have no particular habit; but change and accommodate it to times and occaſions. The order conſiſts of five different claſſes; *profeſſed fathers*, *ſpiritual coadjutors*, *approved ſcholars*, *lay brothers*, called alſo *temporal coadjutors*, and *novices*. Some writers make only three claſſes, *viz.* the *profeſſed members*, the *ſcholars*, and the *novices*. Some add a ſixth claſs, under the title of *adjuncts*, which they ſay is numerous, and is incorporated with the other claſſes, and diſguiſed under different ſorts of apparel.

The *profeſſed fathers*, which make the body of the company, take the three ſolemn vows of religion publicly, and to theſe add a ſpecial vow of obedience to the head of the church, as to what regards miſſions among idolaters, heretics, &c.—The *ſpiritual coadjutors* alſo make public vows of chaſtity, poverty, and obedience; but omit the fourth relating to miſſions.—*Approved ſcholars* are thoſe, who, after two years noviciate, have been admitted, and have made three vows of religion; not ſolemn, indeed, but yet declared. Theſe are in the way to become profeſſed, or ſpiritual coadjutors, according as the general thinks fit. Theſe degrees, eſpecially that of profeſſed, are never conferred till after two years noviciate, and ſeven years ſtudy, ſeven of regency, a third year of noviciate, and thirty-three years of age: the age at which our Saviour is ſuppoſed to have been crucified. The vows of the ſcholars are abſolute on their ſide, but only conditional on the ſide of the order; the general having it in his power to diſpenſe with them.

The order is divided into *aſſiſtances*, the aſſiſtances into *provinces*, and the provinces into *houſes*. It is governed by a general, who is perpetual and abſolute. He reſides at Rome, and is elected by a general congregation of the order. He has with him five perſons, who are, as it were, his miniſters. They are called *aſſiſtants*, and bear the name of the kingdom or country to which they belong, and by which they are appointed; *viz.* of Italy, France, Spain, Germany, and Portugal. To theſe belongs the care of preparing the matters of their reſpective aſſiſtances, and of putting them in a method to facilitate their diſpatch.

Each province has four kinds of *houſes*, *viz.* *profeſſed houſes*, which can have no lands belonging to them; *colleges*, where the ſciences are taught; *reſidences*, where are a number of workmen employed in ſuch offices, as have any immediate relation to preaching, confeſſion, miſſions, &c. and houſes of *novices*. Among the colleges, there are ſome called ſimply *colleges*, and others called *ſeminaries*.

ſeminaries. Theſe laſt are ſet apart for the young Jeſuits to go through their courſes of philoſophy and theology in; the others are for ſtrangers.

Each province is governed by a *provincial*, and each houſe by a *ſuperior*; who is called a *rector* in the colleges, and a *ſuperior* in the other houſes. Ignatius regulated the diſcipline of theſe houſes, and eſpecially of the colleges, by what he had obſerved in the Sorbonne, while he ſtudied at Paris.

The profeſſed of this order renounce, by a ſolemn vow, all preferment, and eſpecially prelacy; and cannot receive any, unleſs injoined thereto by the pope, under pain of ſin. This the pope ſometimes does; inſomuch that they have had eight cardinals of their order.

The reader will find, in the preceding part of this article, a brief but comprehenſive account of the *Jeſuits*, as to their origin and influence, and the chief cauſes on which their influence depended, and the nature of their conſtitution: it remains to direct his views to their decline and actual ſuppreſſion, in ſome parts of Europe, where their credit, power, and opulence had at one time arrived to a prodigious height. In France, the aſſaſſination of Henry IV. by Jean Chatel, one of their ſcholars, and the writings of the *Jeſuit* Guignard, in favour of regicide, induced ſeveral of the parliaments of the provinces to expel them, as a deteſtable and diabolical ſociety, the corruptors of youth, and enemies to the king and ſtate. But they were again favoured by Louis XIII. and Cardinal Richelieu, and alſo by Louis XIV; in whoſe reign they obtained the revocation of the edict of Nantes againſt the proteſtants, and ſucceeded almoſt to their utmoſt wiſhes in ſuppreſſing the JANSENISTS, their inveterate enemies. However, at this period, their affairs ſeem to have taken a different turn. Father Tellier's violence in deſtroying the famous Port-Royal, and the univerſal commotion occaſioned by the bull UNIGENITUS raiſed clamours againſt them, which never ſubſided till their ruin. The refuſal of the ſacrament to the Janſeniſts, ſerved alſo to light up the flame which ſucceeded, and before it could be extinguiſhed, effected the diſſolution of the *Jeſuits*. About this time, they alſo refuſed, as it is ſaid, out of reſpect to the queen and dauphin, to undertake the ſpiritual guidance of La Pompadour: and whilſt they offended the court by their ſcruples, they diſpleaſed it equally by their intrigues; laying ſnares for diſgracing perſons in place, whoſe only crime was a diſregard for their ſociety. They alſo offended men of letters by their violent declamations againſt the *Encyclopedie*, and by their abuſe of Voltaire, the author of the Henriade. In this ſituation of the *Jeſuits*, the war broke out between England and France, which involved the ſociety in that famous law-ſuit, which directly brought on its deſtruction. Having carried on a conſiderable commerce in the iſland of Martinico, and ſuſtained ſome loſſes by the war, they wanted to compound their debts with their correſpondents in Lyons and Marſeilles. Theſe correſpondents, looking upon the ſociety in general to be anſwerable for their brethren in Martinico, addreſſed themſelves to a certain *Jeſuit* in France, demanding juſtice. This good father, and the *Jeſuits* in general demurred, and ſtood trial before the grand-chamber of the parliament of Paris, where they were caſt; and not only ſentenced to pay the immenſe ſums in litigation, but interdicted for the future all manner of commerce. This ſentence led into an examination of their conſtitution by their own books; which appeared to be contrary to the laws of the kingdom, the obedience due to the king, the ſafety of his perſon, and the peace of the ſtate. Beſides, the *Jeſuits* were grown rich, inſolent, and imperious; and though they profeſſed to have renounced the world, they were found to be tutors, courtiers, merchants, politicians, prieſts, and wanted nothing leſs than to be governors and rulers of the earth. Theſe were ſufficient motives for ſuppreſſing them: the attempt to aſſaſſinate the French king in 1757, was charged on the *Jeſuits*; and the actual aſſaſſination of the king of Portugal in the following year, which induced the Portugueſe miniſter to drive them all out of the kingdom, in 1759, increaſed the odium againſt them. The parliament of Paris having taken a whole year to inquire into the nature of their inſtitution, and news of the capture of Martinico in the mean while arriving, the miniſter, as M. d'Alembert ſays, in order to cauſe a diverſion, thought on the expedient of proceeding farther againſt the *Jeſuits*; and the principal of their college was commanded to obey the arrets of parliament, and to ſhut up their ſchools on the firſt of April 1762. On the 6th of Auguſt following, their inſtitution was unanimouſly condemned by the parliament, without any oppoſition on the part of the ſovereign; the ſociety was of courſe diſſolved; and their poſſeſſions alienated and ſold: the other parliaments of the kingdom following ſooner or later the example of that of Paris: nay ſome of them acted with ſtill greater ſeverity, driving them out of their provinces without ſtanding upon forms of law. In general, however, individuals were permitted to reſide in France, on renouncing the ſociety, and taking oaths of allegiance to the king. In a little while after, the king iſſued an edict, which aboliſhed the ſociety throughout all France. The parliament of Paris, on regiſtering this new edict, ordained the *Jeſuits* to reſide each in his own dioceſe, and to preſent themſelves every ſix months before the magiſtrates of the place in which they ſhall dwell. The ſame arret forbids them to come within ten leagues of Paris, and baniſhes them at leaſt ſix leagues from Verſailles, but prohibits them not from dwelling at Fontainbleau and Compiegne, where the court reſides at leaſt three months in the year. See on the ſubject of this article Moſheim's Eccl. hiſt. vol. iii. p. 406, &c. 467, &c. vol. iv. p. 206, &c. 354, &c. Engliſh ed. 8vo. Robertſon's hiſt. ch. v. vol. iii. p. 204, &c. 8vo. D'Alembert's Account of the Deſtruction of the *Jeſuits*, paſſim.

JESUIT's *bark*. See CORTEX *Peruvianus*.

Falſe **JESUIT's** *bark*, a name ſometimes given to a ſpecies of TANZY. See IVA.

JESUITISSÆ, in the *Romiſh Church*, an order of nuns which followed the rule of the Jeſuits, which was ſuppreſſed by Pope Urban VIII. in the year 1630.

JESUS, in *Ichthyology*, a name given by the people of Dantzick to the fiſh called by Geſner the blue chub, or capito cæruleus. It is called alſo *jeſe*, *jeſen*, and *jeſitz*.

JESUS, *Fathers* of the *oratory* of. See ORATORY.

JET, *gagates*, in *Natural Hiſtory*, the name of a foſſil ſubſtance, the characters of which are theſe: it is a ſolid, dry, opake, inflammable body, found in large detached maſſes of a fine and regular ſtructure, having a grain like that of wood, ſplitting more eaſily horizontally than in any other direction, very light, and moderately hard, not fuſible, but readily inflammable, and burning a long time with a fine greeniſh white flame, and bituminous ſmell.

Jet has been often confounded with the common cannel coal, though a proper conſideration of their diſtinguiſhing characters is ſufficient to eſtabliſh the difference between them.

Jet is always found in detached maſſes lodged in other ſtrata; cannel coal conſtitutes of itſelf whole ſtrata. *Jet* has the grain of wood, and ſplits horizontally much more eaſily than in any other direction; cannel coal has no peculiar grain, and ſplits with equal eaſe any way. *Jet* is but moderately hard, cannel coal not leſs ſo than many ſtones; and *jet* when ſet on fire flames a long time, cannel coal but a little while. *Jet* is found in Italy, Germany, and the Eaſt Indies, but no where ſo plentifully as in England; it is very common in Yorkſhire, and other of the northern counties, and is found in many of our clay pits about London.

By diſtillation *jet* yields firſt an acid liquor, then a thin and afterwards a thick black oil. By friction it becomes electrical, as AMBER does.

Jet, in medicine, is highly praiſed by the ancients, but the modern practice has never enquired whether juſtly or not. Dioſcorides tells us, that it is an excellent emollient and diſcutient; he recommends a fumigation of it for diſeaſes of the womb, and ſays that water, in which burnt *jet* has been quenched, is a cordial. Aetius orders it to be extinguiſhed in wine for the ſame purpoſe. It has been much uſed by the perfumers.

There is alſo a fictitious *jet*, made of glaſs, in imitation of the mineral *jet*: this is now uſually drawn out into long hollow threads, which are cut and faſhioned at pleaſure.—It is much uſed in embroideries, and in the trimmings of mourning, and may be made of any colour, though it is uſually black, and white; and of late is denominated *bugles*.

JET D'EAU, a French word, ſignifying a fountain that caſts up water to any conſiderable height in the air. See *Hydraulic laws of* FLUIDS.

It is well known, that a *jet d'eau* will never raiſe water ſo high as its reſervoir; and therefore gives leſs water than if it went to the full height. Of this phenomenon, there are ſeveral cauſes: the firſt is, that the velocity of the lower particles of the *jet* is greater than the velocity of the upper; and therefore the lower water ſtrikes that which is next above it; and as fluids move every way, by its impulſe, widens and conſequently ſhortens the column. Another cauſe is, that the water at the top of the *jet* does not immediately fall off, but forms a kind of ball or head, the weight of which depreſſes the *jet*; if the *jet* be a little inclined, it will play higher, but be leſs beautiful: beſides, the friction againſt the ſides of the hole of the ajutage, or ſpouting pipe, will make a ſmall *jet* riſe to a leſs height than a larger one from the ſame reſervoir. To remedy this inconvenience, the ſpouting holes ſhould be increaſed in proportion to the height of the ſpouting water, provided that they are not made too wide for the pipe of conduct. The fourth cauſe is the air's aſſiſtance, which is proportional to the ſquare of the velocity, with which the water of the *jets* of different heights ſtrikes it: and, therefore, the deficiency in height being in the ſame proportion, a *jet* that plays with a double velocity will have that deficiency four times as great, &c. Thus if a *jet* of five feet high loſes one inch in height, by coming from a reſervoir of five feet one inch high, a *jet* produced from a reſervoir of ten feet four inches, will riſe but ten feet; and in this manner a table might be eaſily formed ſhewing by what height of reſervoirs *jets* of a determinate height may be produced. The following table ſhews in feet and decimals of a foot, what *jets* will be produced by reſervoirs of a determinate height.

Reſ.	*Jet.*	*Reſ.*	*Jet.*	*Reſ.*	*Jet.*	*Reſ.*	*Jet.*	*Reſ.*	*Jet.*	*Reſ.*	*Jet.*
5	4,91	22	20,58	39	34,93	56	48,24	73	60,71	90	72,48
6	5,88	23	21,46	40	35,74	57	48,99	74	61,42	91	73,15
7	6,84	24	22,33	41	36,55	58	49,74	75	62,13	92	73,82
8	7,80	25	23,20	42	37,35	59	50,49	76	62,84	93	74,49
9	8,74	26	24,06	43	38,14	60	51,24	77	63,54	94	75,16
10	9,68	27	24,92	44	38,93	61	51,99	78	64,24	95	75,83
11	10,62	28	25,78	45	39,75	62	52,73	79	64,94	96	76,49
12	11,55	29	26,63	46	40,53	63	53,47	80	65,64	97	77,15
13	12,48	30	27,48	47	41,31	64	54,20	81	66,33	98	77,81
14	13,40	31	28,32	48	42,09	65	54,93	82	67,02	99	78,47
15	14,31	32	29,16	49	42,87	66	55,68	83	67,71	100	79,12
16	15,22	33	30.	50	43,65	67	56,39	84	68.40	110	85,58
17	16,13	34	30,83	51	44,42	68	57,12	85	69,08	120	91,86
18	17,03	35	31,63	52	45,19	69	57,84	86	69,76	130	97,99
19	17,93	36	32,47	53	45,96	70	58,56	87	70,47	140	103,97
20	18,82	37	33,29	54	46,72	71	59,28	88	71,14	150	107,87
21	19,70	38	34,11	55	47,48	72	60,	89	71,81		

By various experiments that have been made by Mr. Mariotte, Dr. Deſaguliers, and others, it has been found, that if the reſervoir be five feet high, a conduct-pipe 1¾ inch diameter will admit a hole in the ajutage from ¼ of an inch to ⅜ of an inch; and ſo on as in the following table.

Height of Reſervoir.	*Diameter of the Adjutage.*	*Diameter of the Pipes of Conduct.*
5 Feet —	¼ to ⅜ ———	1 ¾ inch.
10 ———	¼ to ½ inch ———	2 inches.
15 ———	½ an inch ———	2 ¼ inches.
20 ———	½ an inch ———	2 ½ inches.
25 ———	½ an inch ———	2 ¾ inches.
30 ———	½ to ¾ of an inch	3 inches, or 3½.
40 ———	¾ of an inch ———	4 ½ inches.
50 ———	¾ of an inch ———	5 inches.
60 ———	1 inch ———	5 ¾ inches or 6.
80 ———	1 ¼ inch ———	6 ½ inches or 7.
100 ———	1 ¼ or 1 ½ inch —	7 or 8 inches.

Here the *jet* is ſuppoſed to be within 100 or 150 yards of the reſervoir; but if the conduct-pipe much exceeds this length, it muſt be of a larger diameter than what is here aſſigned. Thus for *jets* from ¼ of an inch to thoſe of an inch and ¼, and from reſervoirs from 40 to 90 feet height, if the diſtance be from 150 yards to ¼ of a mile, the diameter of the pipe ſhould be of 6 inches; from ¼ of a mile to two miles, it muſt be of 7 inches; and from 2 miles to 5, it muſt be of 8 inches diameter for the ſame *jet*.

If it be required to keep any number of *jets* playing, whoſe ajutages are given in diameter, by one common conduct-pipe, we muſt find the diameter of an ajutage equal to all the given ones. Thus if there be four ajutages of $\frac{3}{4}$ of an inch diameter each, then the ſquare of $\frac{3}{4}$ is $\frac{9}{16}$, which multiplied by the number of ajutages 4, makes $\frac{36}{16}$; the ſquare root of which is $\frac{6}{4} = 1\frac{1}{2} =$ the diameter of the ajutage equal to all the four ſmall ones. A pipe of conduct of 10 inches diameter will ſupply all the *jets*, as being a little more than ſix times as great as the diameter of the one large ajutage now found. After this manner the dimenſions of a conduct-pipe may be found for any other number of ajutages.

In order to make a *jet* play to the greateſt poſſible height, the part of the conduct-pipe at the ajutage ſhould not turn up at right angles, but with a gentle eaſy curve: for the beſt ſtructure of the ajutage, ſee AJUTAGE. See alſo FOUNTAIN. Deſaguliers' Courſe of Exp. Phil. vol. 2. lect. vii. annot.

JET *rings*, annular pieces of *jet* of large dimenſions, found in many parts of England, and eſteemed Roman antiquities. They are of different kinds; ſome being plain, others wrought, but all of them are much too large for rings. The ſmalleſt of them are three inches in diameter; yet the bore is not above an inch and a half, which makes them as much too ſmall for the wriſt, as they are too large for the fingers.

JETAIBA, in *Botany*, the name given by ſome authors to the trees which afford the gum animé of the ſhops.

JETSON. See FLOTSON.

JETTY-*head*, in the *royal dock-yards*, is a name uſually given to that part of a wharf, which projects beyond the reſt; but more particularly the front of a wharf, whoſe ſide forms one of the cheeks of a *wet* or *dry* DOCK.

JEWEL-*blocks*, in a *ſhip*, are two ſmall blocks, which are ſuſpended at the extremity of the main and fore-top-ſail-yards, by means of an eye-bolt, driven from without into the middle of the yard-arm, parallel to its axis. The uſe of theſe blocks is to retain the upper part of the top-maſt-ſtudding-ſails beyond the ſheets of the top-ſails, ſo that each of theſe ſails may have its full force of action, which would be diminiſhed by the incroachment of the other over its ſurface.

JEWEL-*office*, or JEWEL-*houſe*, an office which takes care of faſhioning and weighing the king's plate; and delivering it out by warrants from the lord chamberlain.

When his majeſty makes any preſent of plate, &c. they have the charge of providing it; with ſome other things leſs material.

The principal officers are, the *maſter of the jewel-office*, whoſe patent fees are 450*l.* per ann. a *yeoman*, a *groom*, and a *clerk*; all in the king's gift.

There are alſo in this office, in the gift of the lord chamberlain, the poet-laureat, at 100*l.* per ann. ſalary: the king's hiſtoriographer, at 200*l.* per ann. the hiſtory painter, and principal painter, at 200*l.* per ann. the painter in enamel, and the ſurveyor and keeper of the pictures, at 200*l.* per ann. each.

The *goldſmith* and *jeweller* are employed by the maſter, and are uſually in his gift.

JEWS, are thoſe who profeſs obedience to the laws and religion of Moſes. See JUDAISM.

By ſtat. 1. Ann. 1. c. 30. if Jewiſh parents refuſe to allow their proteſtant children a fitting maintenance, ſuitable to the fortune of the parent, the lord chancellor, on complaint, may make ſuch an order as he ſhall ſee proper.

JEW-*bill*, in *Law*, is the famous ſtatute 26 Geo. II cap. 26, which enabled all *Jews* to prefer bills of naturalization in parliament, without receiving the ſacrament, as ordained by ſtat. 7 Jac. 1. This act was repealed by 27 Geo. II. c. 1.

JEW's *ear*. See AURICULA *Judæ*.

JEW's *frankincenſe*, in *Botany*. See STORAX-*tree*.

JEW's *mallow*. See MALLOW.

JEW's *ſtone*, in *Natural Hiſtory*. See *Lapis* JUDAICUS.

JEWISH *oeconomy*. See OECONOMY.

JEWISH *hours*. See HOUR, &c.

JEZIDES, or JEZIDEANS, a term uſed among the Mahometans, to ſignify *heretics*.

In which ſenſe *Jezidean* ſtands oppoſed to *Muſſulman*.

Leunclavius tells us, that the name is derived from an emir, called *Jezid*, who killed the two ſons of Ali, Haſan and Huſſein, two grandſons of Mahomet on their mother's ſide, and perſecuted the poſterity of the prophet. The Agarenians, whoſe emir or prince he was, looked on him as an impious and heretical perſon, and hence took occaſion to call all whom they accounted heretics, *Jezideans*.

Beauſobre conjectures, that the denomination of this ſect is derived from the name of Jeſus; but it ſeems rather to be borrowed from the Perſian *Jazid* or *Jezdan*, ſignifying the good God, in oppoſition to Arimanius, the evil principle; ſo that the term points out this ſect as the worſhippers of the good or true God. After all, this name may have been derived from the city *Jezd*.

Some authors mention the *Jezides* as a particular people, ſpeaking a language different both from the Turkiſh and Perſian, though ſomewhat akin to the laſt. They farther tell us, that there are two kinds of *Jezides*; the one *black*, the other *white*. The white have no ſlit in the boſom of their ſhirt, but barely an opening for the head to paſs through; a thing that they obſerve with a great deal of ſtrictneſs, in memory of a circle of gold and light which they ſay fell from heaven upon the neck of their grand ſcheik, or chief of their ſect. The black *Jezides* are faquirs, or religious, and go arrayed in ſable garments.

The Turks and *Jezides* bear a ſtrong averſion to each other; and the greateſt affront one can put upon a Turk, is to call him a *Jezidean*. On the contrary, the *Jezides* love the Chriſtians; being perſuaded that *Jezid*, their chief, is Jeſus Chriſt; or, rather, becauſe ſome of their traditions mention, that *Jezid* made an alliance with the Chriſtians againſt the Muſſulmen.

They drink wine, even to exceſs, when they can get it, and eat ſwine's fleſh. They never undergo circumciſion, excepting when they are forced to it by the Turks. Their ignorance is ſurpriſing; they have no books. Indeed they pretend to believe in the Goſpel, and in the ſacred books of the Jews; but they never read either one or other of them. They make vows, and go on pilgrimage; but have no moſques, temples, nor oratories, no feaſts, nor ceremonies; all their religious worſhip conſiſting in ſinging hymns to Jeſus Chriſt, the Virgin, Moſes, and Mahomet. When they pray, they look towards the eaſt, in imitation of the Chriſtians; whereas the Muſſulmen turn towards the ſouth. They believe the devil may poſſibly, one day, come into favour again with God; and that he is the executor of God's juſtice in the other world; for which reaſon, they make it a point of prudence not to ſpeak ill of him, leſt he ſhould revenge himſelf of them.

The black *Jezides* are reputed ſaints; and it is forbidden to weep at their death; inſtead whereof they make rejoicings: and yet, for the generality, they are no more than ſhepherds. They are not allowed to kill the animals they eat; that office belongs to the white *Jezides*.

The *Jezides* go in companies like the Arabs; and are an unſettled, wandering tribe, who frequent the Gordian mountains, and the deſerts of Curdiſtan, a province of Perſia. They often change their habitations, and live in black tents made of goats hair, and encompaſſed with large ruſhes and thorns interwoven. They diſpoſe their tents in a circle, placing their flocks in the middle. They buy their wives; the ſtated price whereof is two hundred crowns, be they better or worſe. They are allowed divorce, provided it be to become faquirs. It is a crime among them to ſhave their beard, though ever ſo little. They have ſome cuſtoms which intimate, that they ſprung originally out of ſome ſect of Chriſtians: for inſtance, in their feaſts one of them preſents a cup full of wine to another, bidding him take the cup of the blood of Jeſus Chriſt; which laſt kiſſes the hand of him who preſents it, and drinks.

IGASUR, in the *Materia Medica*, a name given by ſome authors to the *faba ſancti Ignatii*, or Saint Ignatius's bean.

IGNATIUS's *bean*, *faba ſancti Ignatii*, in the *Materia Medica*, the fruit of a plant growing in the Eaſt Indies and Philippine iſlands, deſcribed by Father Camilli, in the Philoſophical Tranſactions, under the name of *catalongay*, and *cantara*; and by Plukenet, under that of *cucurbitifera malabathri foliis ſcandens, cujus nuclei faba ſancti Ignatii nuncupati*. The Spaniards call it *cathalogon*. It is a dry and hard fruit, or kernel of a fruit, of the ſize of a large hazel nut; and is much celebrated for its medicinal virtues, being recommended in vertigoes, lethargies, epilepſies, aſthmas, quartan agues, and worms. It is alſo given againſt diſtemperatures of the ſtomach, and as an alexipharmic. The doſe in ſubſtance as an emetic, is ten or twelve grains; and in ſmaller doſes it ſometimes promotes a plentiful ſweat: Neumann ſays that he has known intermitting fevers cured, by drinking on the approach of a paroxyſm, an infuſion of ſome grains of the ſeed in carduus water; and Dr. Lewis has been informed, that two grains were found to have as much effect as a full doſe of bark. But it ſeems too hazardous for general uſe. See NUX *vomica*.

IGNAVUS, in *Natural Hiſtory*, a name given to the animal called in Engliſh the SLOATH.

IGNIARIUS *lapis*, in *Natural Hiſtory*, a name given by ſome to the PYRITES, or fire-ſtone, from its yielding a great quantity of ſparks, when ſtruck againſt ſteel.

IGNICOLÆ, *worſhippers of fire*. See GABRES.

IGNIS *aqua*, *fire-water*, a name by which Helmont, in ſome of his writings, calls the ALKAHEST, or univerſal diſſolvent, ſo much talked of by him and Paracelſus.

IGNIS *Fatuus*, a common meteor, chiefly ſeen in dark nights frequenting meadows, marſhes, and other moiſt places, and often ſeen in burying-grounds, and near dunghills. It is known among the people by the appellations, *Will with a wiſp*, and *Jack with a lantern*.

Sir Iſaac Newton calls it a vapour ſhining without heat; and it has been ſuppoſed to be of the ſame nature with the light iſſuing from putreſcent ſubſtances. Willughby and Ray were of opinion that it is occaſioned by ſhining inſects: but all the appearances of it obſerved by Dr. Derham, Beccaria and others ſufficiently evince, that it muſt be an ignited vapour. The form and ſize of the *ignes fatui* are very various and often variable. The late experiments on air ſerve to furniſh a rational explication of this phenomenon, to which the ignorant and ſuperſtitious have aſcribed ſo many alarming purpoſes. *Inflammable* AIR has been found to be the moſt common of all the factitious airs in nature; and to be the uſual product of the putrefaction and decompoſition of vegetable ſubſtances in water: and ſignior Volta in a letter to Dr. Prieſtley informs him, that he fires inflammable air by the electric ſpark, even when the electricity is very moderate: and he ſuppoſes, that this experiment explains the inflammation of the *ignes fatui*, provided they conſiſt of inflammable air iſſuing from marſhy ground by the help of the electricity of fogs, and by falling ſtars, which are very probably thought to have an electrical origin. Prieſtley's Obſ. on Air, vol. iii. Appendix, p. 382. The reader will find a particular account of various particulars relating to the *ignis fatuus* in the Phil. Tranſ. Abr. vol. vii. p. 147, &c.

Dr. Shaw deſcribes an *ignis fatuus*, which he ſaw in the Holy Land, that was ſometimes globular, or in the form of the flame of a candle; and immediately afterwards ſpread itſelf ſo much as to involve the whole company in a pale inoffenſive light, and then contract itſelf again, and ſuddenly diſappear. But in leſs than a minute it would become viſible as before; or, running along from one place to another, with a ſwift progreſſive motion, would expand itſelf at certain intervals, over more than two or three acres of the adjacent mountains. The atmoſphere at this time had been thick and hazy, and the dew on their bridles was unuſually clammy and unctuous.

In the ſame weather, he obſerved thoſe luminous appearances, which, at ſea, ſkip about the maſts and yards of ſhips, and which the ſailors call *corpuſanſe* by a corruption of the Spaniſh *cuerpo ſanto*. Shaw's Travels, p. 363.

IGNIS *gehennæ*, in *Chemiſtry*, a name given by Paracelſus to a certain menſtruum, capable of diſſolving all bodies, and remaining itſelf unaltered by them.

Van Helmont ſeems to make this the ſame with the ALKAHEST, ſo celebrated in his writings, and ſo ardently ſought after by all the chemiſts ſince his time.

IGNIS *judicii*. See JUDICIUM *Dei*, and ORDEAL.

IGNISPICIUM, among *the Romans*, a ſpecies of divination taken from the fire uſed in ſacrifices. See PYROMANCY.

IGNITION, in *Chemiſtry*, the application of fire to metals, till ſuch time as they become red-hot, without melting. This happens in gold and ſilver; but eſpecially in iron: but lead and tin are too ſoft and fuſible to bear *ignition*.

IGNORAMUS, q. d. *We do not know*; in *Law*, a word uſed by the grand jury, impannelled on the inquiſition of cauſes criminal, and written upon the bill, when they diſlike their evidence, as defective, or too weak to make good the preſentment.

The effect of which is, that all farther enquiry upon that party for that fault is thereby ſtopped, and he is delivered without farther anſwer. See BILLA VERA.

IGNORANCE, the privation, or want, of knowledge.

Ignorance, according to Mr. Locke, is chiefly owing to three cauſes: want of ideas; want of a diſcoverable connection between the ideas we have; and want of tracing and examining our ideas. See IDEA.

There are ſome things we are *ignorant* of for want of ideas: all the ſimple ideas we have, are confined to the obſervation of our ſenſes, and the operations of our own minds, which we are conſcious of in ourſelves. What other ideas it is poſſible other creatures may have, by the aſſiſtance of other ſenſes or faculties, more or perfecter than we have, or different from our's, is not for us to determine: but to ſay there are no ſuch, becauſe we conceive nothing of them, is no better an argument, than if a blind man ſhould be poſitive there was no ſuch thing as light and colours, becauſe he had no manner of idea of any ſuch thing.—What faculties, therefore, other ſpecies of creatures have, to penetrate into the nature and inmoſt conſtitutions of things, we know not: this we know, and certainly find, that we want other views of them, beſides thoſe we have, to make diſcoveries of them more perfect. The intellectual and ſenſible world are in this perfectly alike; that the parts which we ſee of either of them, hold no proportion with that we ſee not; and whatſoever we can reach with our eyes, or our thoughts, of either of them, is but a point, almoſt nothing, in compariſon of the reſt. Again, the want of ideas, which we yet ſeem capable of, is another great obſtacle in our way, and keeps us in *ignorance* of things, which we conceive capable of being known. Bulk, figure, and motion, we have ideas of; yet, not knowing what is the particular bulk, motion, and figure, of the greateſt part of the bodies of the univerſe, we are *ignorant* of the ſeveral powers, efficacies, and ways of operation, whereby the effects we daily ſee are produced. Theſe are hid from us in ſome things, by being too remote; and in others by being too minute.

This, at firſt ſight, ſhews us how diſproportionate our knowledge is to the whole extent, even of material beings: to which if we add the conſideration of that infinite number of ſpirits that may be, and probably are, which are yet more remote from our knowledge, and whereof we have no cognizance at all; we ſhall find, this cauſe of *ignorance* conceals from us, in an impenetrable obſcurity, almoſt the whole intellectual world; a greater, certainly a more beautiful world, than the material: for, abating ſome very few ideas of ſpirits, which we get from our own mind by reflection, and from thence the beſt we can collect of the Father of all ſpirits, the author of them, and us, and all things; we have no certain information ſo much as of the exiſtence of other ſpirits, but by revelation: much leſs have we diſtinct ideas of their different natures, ſtates, powers, and ſeveral conſtitutions, wherein they agree or differ one from another, and from us: and therefore, in what concerns their different ſpecies and properties, we are under an abſolute *ignorance*.

Another cauſe of *ignorance* is, the want of diſcoverable connexion between thoſe ideas we have: where we want that, we are utterly incapable of univerſal and certain knowledge; and are, as in the former caſe, left only to obſervation and experiment. Thus the mechanical affections of bodies having no affinity at all with the ideas they produce in us, we can have no diſtinct knowledge of ſuch operations beyond our experience; and can reaſon no otherwiſe about them, than as the effects or appointments of an infinitely wiſe agent, which perfectly ſurpaſs our comprehenſion. The operation of our minds upon our bodies is as unconceivable: how any thought ſhould produce a motion in body, is as remote from the nature of our ideas, as how any body ſhould produce any thought in the mind. That it is ſo, if experience did not convince us, the conſideration of the things themſelves would never be able, in the leaſt, to diſcover to us. In ſome of our ideas there are certain relations, habitudes, and connexions, ſo viſibly included in the nature of the ideas themſelves, that we cannot conceive them ſeparable from them by any power whatſoever: in theſe only we are capable of certain and univerſal knowledge. Thus the idea of a right-lined triangle neceſſarily carries with it an equality of its angles to two right ones; but the coherence and continuity of the parts of matter, the production of ſenſation in us, of colours and ſounds, &c. by impulſe and motion, being ſuch wherein we can diſcover no natural connexion with any ideas we have, we cannot but aſcribe them to the arbitrary will and good pleaſure of the wiſe architect. The things that we obſerve conſtantly to proceed regularly, we may conclude do act by a law ſet them; though by a law we know not, whereby though cauſes work ſteadily, and effects conſtantly flow from them; yet their connections and dependencies being not diſcoverable in our ideas, we can have but an experimental knowledge of them. Several effects come every day within the notice of our ſenſes, of which we have ſo far ſenſitive knowledge; but the cauſes, manner, and certainty of their production, we muſt, for the foregoing reaſons, be content to be *ignorant* of. In theſe we can go no farther than particular experience informs us of matter of fact; and, by analogy, we gueſs what effects the like bodies are, upon other trials, likely to produce. But as to perfect ſcience of natural bodies (not to mention ſpiritual beings), we are ſo far from being capable of any ſuch thing, that it may be reckoned loſt labour to ſeek after it.

The third cauſe of *ignorance* is, our want of tracing thoſe ideas we have, or may have; and finding out thoſe intermediate ideas, which may ſhew us what habitude of agreement or diſagreement they may have one with another: and thus many are ignorant of mathematical truths for want of application in inquiring, examining, and by due ways comparing, thoſe ideas.

IGNORANCE, in *Law*, is a want of knowledge of the laws; which will not excuſe a perſon from ſuffering the penalty annexed to the breach of them; becauſe every one is obliged, at his peril, to know the laws of the land.

IGUANA, in *Zoology*, the name of a ſpecies of lizard, very frequent in the Weſt-Indies. It is an amphibious animal, of the lizard-ſhape, and in colour partly brown and partly grey, in ſome of the animals; and in others of a beautiful green, variegated with black and white ſpots. From its neck to the extremity of its tail, it has a continued ſeries of flat-pointed and ſerrated ſcales, of a fine green colour. Theſe are largeſt at the neck.

JIB, in *a ſhip*, is the fore-maſt-ſail of it, being a large ſtay-ſail extended from the outer end of the bowſprit, prolonged by the *jib*-boom, towards the fore-top-maſt-head.

JIB-*Boom* is a boom run out from the extremity of the bowſprit, parallel to its length, and ſerving to extend the bottom of the *jib*, and the ſtay of the fore-top-gallant-maſt. It is attached to the bow-ſprit by means of two large boom-irons, or by one boom-iron, a cap on the outer end of the bowſprit; or by the cap without, and a ſtrong laſhing within.

JIBING. See GYBING.

JIG, in *Muſic*, &c. See GIGG.

JIGGER, in *Sea-language*, is a machine conſiſting of a piece of rope about five feet long, with a block at one end, and a ſheave at the other; and uſed to hold on the cable, when it is heaved into the ſhip by the revolution of the windlaſs. See HOLDING *on*.

JIGGER-*tackle* is a light ſmall tackle, conſiſting of a double and ſingle block, uſed on various occaſions by ſeamen.

JIYA, in *Zoology*, the name of an American animal, of the otter-kind, called alſo *carigueibeiu*. It is an amphibious creature, of the ſize of a middle-ſized dog. Its head is round, and like a cat's; but its noſe is ſomewhat pointed; its eyes are black; its ears roundiſh, and placed very low as in the otter; and it has a ſort of beard or whiſkers compoſed of a few ſtiff hairs; the feet have all five toes, the inner one being ſmaller than any of the others; the hair is ſoft, not long, and all black, except thoſe on the head, which are brown, and ſome which compoſe a yellowiſh ſpot under the throat. Its note is much like that of a young puppy. It feeds on fiſh, and other animals. Ray.

IKENILD *Street*, one of the four famous ways, that the Romans made in England. See WATLING-STREET.

ILATHERA *Bark*, in *Botany*. See CLUTIA.

ILEX, in *Botany*. See HOLLY.

ILIAC *paſſion*, a violent and dangerous kind of COLIC; called alſo *volvulus*, *miſerere mei*, and *chordapſus*.

It takes its name from the inteſtine *ilion*, on account of its being uſually affected in this diſtemper; or, perhaps, from the Greek verb ειλειν, *to wind*, or *twiſt*; whence alſo it is the Latins call it *volvulus*.

This diſorder is a violent pain in the ſmall inteſtines, in which the periſtaltic motion of the bowels is inverted, and all their contents are thrown up by vomit.

Medical writers diſtinguiſh this into three kinds: 1. The convolutionary. 2. The hernioſe. And, 3dly, the obſtructionary.

In the convolutionary kind, the ſituation of the inteſtines in regard to one another is altered, and very frequently has a remarkable duplicature. In the hernioſe kind, the inteſtines, diſtended with fæces and with flatulencies, are received into the ſcrotum, or ſome other part, ſo as not eaſily to be reduced into their natural places. And in the obſtructionary, there is no other cauſe but a violent coſtiveneſs.

The *miſerere* differs from the ordinary kinds of colic, in degree, as all the ſymptoms are much more violent in this caſe; and in its ſituation, as the ilion and ſmall guts are affected in this, and in the other colics uſually the larger; and it is always a much more dangerous caſe than an ordinary colic.

Signs of it. Theſe are extremely ſharp and violent pains acroſs the navel, a remarkable anxiety of mind, with frequent eructations and heartburn, and great internal heat; a violent obſtruction in the bowels, in which clyſters have very little or no effect: and as the diſeaſe increaſes, a vomiting, which, as it continues, at length brings up the ſtools by the mouth, with violent pains, and frequent faintings; after this, unleſs the medicines take place, there comes on an inflammation of the ilion, and thence a ſuppuration and mortification, on which the pains inſtantly go off, and the patient falls into cold ſweats, and dies in a very little time after. It is a very rare caſe, and though many colics are called by this name, yet in reality it is rarely met with. People, however, of all ages and ſexes, are equally ſubject to it from the following cauſes.

Cauſes of it. Theſe are either a convolution of the inteſtines, with an immediate inflammation, or a tumour in the parts of the inteſtine contained in the hernial ſack, and the uſe of violent and powerful aſtringent medicines bringing on ſuch a coſtiveneſs as never happens naturally. Violent commotions of the body in leaping, riding, or running, have been known ſometimes to bring on the diſeaſe, as alſo violent ſneezing and coughing, and the carrying of too great weights; as alſo crude foods, and ſuch as have been indurated by ſmoak, and flatulent and fermenting liquors. Sometimes alſo it has been evidently owing to worms killed in the bowels, and not voided by ſtool.

Prognoſtics in it. This is a very terrible diſeaſe, both in regard to the danger that attends it, and to the pain. In caſes where its origin is from a diſtortion and convolution of the inteſtines, there is very little hope of recovery; and when it ariſes from a hernia, it is very often fatal alſo, eſpecially when attended with an inflammation and plethora. Its mildeſt ſtate is when it ariſes only from indurated ſtools, and an obſtinate coſtiveneſs; this is uſually cured, if proper aſſiſtance be given in time.

Method of cure. When a convolution of the inteſtines is the cauſe, the whole effort is to be uſed to explicate them; but this is a thing more eaſily conceived in the mind than effected: to this purpoſe ſome recommend the ſwallowing of a muſket bullet, others a globule of antimony, and others a pound of quickſilver, taking before hand a ſpoonful or two of oil of ſweet almonds, and ordering motion by walking or riding afterwards; others adviſe the introducing the noſe of a pair of bellows into the orifice of the rectum, and blowing up into the inteſtines; but as that gut is uſually ſo conſtricted in this caſe, as ſcarce to admit the pipe of a clyſter apparatus, there is no great hope of ſucceeding in the other attempt; and others finally adviſe the throwing in the fume of tobacco. Some ancient authors have recommended to make an opening into the cavity of the abdomen, in order to diſcover and diſengage the ſtrangulated inteſtine; and ſome few hiſtories are recorded which ſeem to favour this practice. But the difficulty of aſcertaining with preciſion the true cauſe of the diſeaſe renders ſo hazardous and painful an operation as GASTROTOMY hardly ever adviſable. The diſcuſſion of the inflammation is ſcarce leſs neceſſary than the other; this is to be done by powders of nitre, cinnabar, and crabs eyes, taken four times a day, and by rubbing the abdomen with camphorated ſpirit of wine, in which ſaffron has been infuſed; bags of carminative ingredients, with camphor, may alſo be applied to the abdomen with good effect: and, finally, if there be a plethoric habit, bleeding is a very neceſſary operation.

In caſes where this is occaſioned by a hernia, the firſt thing to be done is the reducing the inteſtine into its proper place. To this purpoſe the patient muſt lie upon his back, and emollient and carminative fomentations muſt be applied to the part, made of decoctions of marſhmallows, camomile flowers, and the ſeeds of aniſe, fennel, and fœnugreek, boiled in milk; and, when there is no inflammation, fomentations of this kind may be applied in the manner of cataplaſms, by wetting a ſponge with them, and applying it to the part. An inflammation is carefully to be guarded againſt, by nitrous medicines, and by gentle diaphoretics; and as ſoon as the gut is replaced, clyſters muſt be given to bring on again a laxity of the bowels. See HERNIA *incarcerata*.

When the caſe only ariſes from an induration of the fæces, there are firſt to be given internally nitrous and cinnabarine medicines, to prevent or take off an inflammation, and at the ſame time clyſters are to be given, with the emollient decoctions, and a little nitre and camphor, with ſome oil; and if it be neceſſary for a yet farther ſtimulus, ſome Venice ſoap may be added; acrid ſuppoſitories are to be introduced into the rectum, and the ſoap plaſter to be applied to the abdomen, or elſe ſpirit of wine camphorated is to be rubbed in; bags with carminative ingredients may alſo be applied warm, and where the ſtate is plethoric, bleeding is neceſſary.

Bleeding is, indeed, of eſſential importance; it ſhould be performed as ſoon as the ſymptoms of inflammation appear, and be repeated according to the ſtrength of the patient and violence of the diſeaſe. A bliſtering plaſter ſhould likewiſe be applied over the part moſt affected with pain. Fomentations and clyſters muſt by no means be omitted. The patient's feet and legs ſhould be frequently bathed in warm water, and clothes dipped in it applied to his belly. The clyſters may be made of barley water, or thin gruel with ſalt, and ſoftened with ſweet oil or freſh butter; and they may be adminiſtered every two or three hours or oftener, if the patient continues coſtive.

Theſe are the general methods, and uſually one or other of them takes effect in the milder caſes. But it is to be obſerved, that honey, though ordered by ſome, is never to be put into theſe clyſters, for where there is an inflammation, it promotes ſuppurations. The patient is to be kept quiet and warm during the courſe of the diſeaſe, and the diet is to be very ſparing, though the drinking warm liquors, ſuch as clear whey, or barley-water, is to be indulged.

If the diſeaſe does not yield to clyſters and fomentations, recourſe muſt be had to pretty ſtrong purgatives; which ſhould be joined with opiates. Two ounces of the bitter purging ſalts may be diſſolved in a pint of warm water or thin gruel, and a tea-cup full of it taken every half hour till it operates. At the ſame time, fifteen, twenty or twenty-five drops of laudanum may be given in a glaſs of pepper-mint or ſimple cinnamon water, to appeaſe the irritation and prevent the vomiting, &c. The patient's drink may be ſharpened with cream of tartar, juice of lemon, or vinegar. When no liquid will ſtay on the ſtomach, purging pills made of powdered jalap and vitriolated tartar, of each half a dram, one grain of opium, and a ſufficient quantity of Caſtile ſoap, theſe may be taken at one doſe, and if they do not produce effect in a few hours, the doſe may be repeated. If theſe methods fail to procure a ſtool, the patient may be immerſed in warm water up to the breaſt, and continue in the water as long as he can bear it without fainting: and if neceſſary, this bathing ſhould be ſeveral times repeated. In deſperate caſes, recourſe is had to quickſilver, which is given to the quantity of ſeveral ounces, or even of a pound. Thoſe who would avoid this diſeaſe, muſt take care never to be long without a ſtool: they ſhould alſo beware of eating too freely of ſour or unripe fruit, or baked fruits, or drinking ſtale windy liquors. The diſorder has proceeded ſometimes from wet clothes and wet feet. Junker's Conſp. Med. p. 317, &c. Buchan. Dom. Med p. 317, &c. 1776.

Dr. Hunter takes notice of a diſeaſe to which children are more particularly ſubject, becauſe their meſentery, having ſcarce any fat upon it, eaſily ſlips with the gut; and of this he obſerves there are two kinds; the firſt is when a part of the gut is received into the part next above it; the other is when a part of the gut is received into the part of the gut next below it. See an account of a particular caſe of this diſorder in London Med. Obſ. vol. iv. art. 17. p. 223.

ILIAC *veſſels*, are the arteries and veins. The *iliac* arteries are formed by the bifurcation of the aorta, at the laſt vetebra of the loins. They deſcend about three fingers breadth from their origin; and then each *iliac* trunk is divided into two ſecondary arteries, one external, the other internal. The external artery runs down on the *iliac* muſcle to the ligamentum Fallopii, under which it goes out of the abdomen. In this courſe, it ſends off only a few ſmall arteries to the peritonæum and other adjacent parts; but as it paſſes out of the abdomen, it detaches two conſiderable branches, the one or internal branch called the EPIGASTRIC artery, and the other or external called INNOMINATA. The internal *iliac* or HYPOGASTRIC artery, having run a little more than a finger's breadth inward and backward, bends by ſmall degrees obliquely forward and toward the outſide; and afterwards contracting in its dimenſions, ends in the UMBILICAL artery.

The *iliac* veins are formed by the bifurcation of the vena cava, about the laſt vertebra of the loins. Preſently after their leaving the vena cava, they each divide into two principal branches; one called *iliaca externa* or *anterior*, or ſimply *iliaca*; the other *interna* or *poſterior*, called alſo *hypogaſtrica*. The external vein ſeems to be the continuation of the trunk, and the *hypogaſtrica* only a branch. They purſue the ſame courſe as the arteries of the ſame name. Winſlow.

ILIACUS *externus*, a muſcle of the thigh. See PYRIFORMIS.

ILLIACUS *internus*, a muſcle of the thigh, which ariſes fleſhy from the internal concave part of the os ilium; and, in its deſcent over the inferior part of it, joins with the pſoas magnus, and is inſerted with it under the termination of the pectineus.

This, with the pſoas magnus, moves the thigh forward in walking.

ILIAD, Ιλιας, the name of an ancient epic poem, the firſt, and fineſt, of thoſe compoſed by Homer.

The word is derived from the Greek ιλιας, of Ιλιον, *Ilium*, Troy, a famous city in Aſia, which the Greeks beſieged for the ſpace of ten years, and at laſt deſtroyed, on account of the rape of Helena, which makes the ſubject of the work.

The poet's deſign in the *Iliad* was, to ſhew the Greeks, who were divided into ſeveral little ſtates, how much it was their intereſt to preſerve a harmony and good underſtanding among them. In order to which, he ſets before their eyes the calamities that befel their anceſtors from the wrath of Achilles, and his miſunderſtanding with Agamemnon; and the advantages that afterwards accrued to them from their union. See FABLE.

The *Iliad* is divided into twenty-four books, which are marked with the letters of the alphabet.—Pliny gives us an account of an *Iliad* written on ſo very ſlender a paper, that the whole might be contained in a nut-ſhell. For the conduct of the *Iliad*, ſee father Boſſu, Madam Dacier, and M. De la Motte.

The critics maintain the *Iliad* to be the firſt, and yet the beſt, poem that ever appeared in the world: Ariſtotle's *Poetics* are almoſt taken wholly from it; the philoſopher had nothing to do, but to form precepts from the poet's practice.—Some authors tell us, that Homer invented not only poetry, but all other arts and ſciences; and that there are the viſible marks of a perfect knowledge in every one of them, to be ſeen in the *Iliad*.

The ingenious Mr. Barnes, of Cambridge, has very ſtrenuouſly attempted to prove Solomon to have been the author of the *Iliad*.

The Engliſh tranſlation of the *Iliad* by Mr. Pope, is well known.

ILISSIDES, in *Mythology*, a ſurname of the Muſes, from the river *Iliſſus* in Attica, the waters of which were reckoned ſacred.

ILITHYA, derived from ελευθειν, to *ſpring from*, in *Mythology*, the daughter of Juno, and ſiſter of Hebe, who preſided over deliveries. This goddeſs had a temple at Rome, in which were regiſtered the birth and death of every citizen: a cuſtom eſtabliſhed by Servius Tullius.

ILIVILIHU, in *Natural Hiſtory*, a name given by the inhabitants of the Philippine iſlands to a very remarkable ſpecies of bird, common in that country. It is called by ſome writers *coturnix parvula montana*, the ſmall mountain quail, and it is indeed a quail in all the characters; but it is very beautifully variegated in its colours, and is ſmaller than a ſparrow. It lives in hilly places, and is a very well taſted bird. See Quail.

ILIUM *inteſtinum*. See Intestine.

Ilium *os*. This bone was ſo called by the ancients, becauſe it ſupports the parts they called the *ilia*. It is the largeſt of the three bones of the pelvis. It is flat, very broad, unequally convex, and concave; partly round, and partly of an irregular ſquare figure. It is divided commodiouſly enough into the criſta, baſis, anterior and poſterior edge; and two ſides, one external, the other internal. The criſta is the upper part, and is a pretty thick arched border, the circumference of it is little more than a quadrant of a circle; the anterior and middle part is convex outward, the poſterior part a little convex inward. Anatomiſts, for the ſake of regularity in their deſcriptions, diſtinguiſh in it two labia and a middle ſpace or interſtice between them. It is originally an epiphyſis, of which we ſometimes ſee plain marks in a very advanced age. The poſterior portion of the criſta, which is convex inward, is much thicker than the anterior; and, for that reaſon, may be called the tuberculum of the criſta. The whole criſta appears to be covered over with a cartilage; but this in reality is no more than the dried tendinous expanſion of the muſcles. The anterior edge of this bone has two eminences or turbercles, called the anterior ſpines, one ſuperior, the other inferior; and likewiſe two notches, one between the ſpines, the other below the inferior ſpine. The poſterior edge is ſhorter and thicker than the anterior; it terminates likewiſe in two eminences or ſpines, between which there is a conſiderable notch. The baſis or inferior part of the bone, is the thickeſt and narroweſt of all; it forms anteriorly a portion of the acetabulum, and poſteriorly almoſt all the iſchiatic ſinus. The outſide is convex on the fore-part, and concave on the back-part; we obſerve on it the remains of a long ſemicircular line, which reaches from the upper anterior ſpine to the great iſchiatic ſinus, being a muſcular mark; and above, and behind this impreſſion, there are ſeveral other muſcular marks. A little above the edge of the acetabulum, we ſee likewiſe many inequalities, which ſurround part of the edge in a ſemicircular form, being a collection of muſcular and ligamentary marks. The inſide of this bone is unequally concave, and has ſeveral inequalities toward the back part. The chief of theſe is that large cartilaginous ſurface of the figure of a great S, or of a bird's head; which anſwers to the lateral ſurface of the os ſacrum, with which it is connected by a cartilaginous ſymphyſis. The other inequalities are much of the ſame kind with thoſe in the lateral part of the os ſacrum, with which they form ſeveral rough and irregular cavities. From the upper part of the cartilaginous ſurface or ſymphyſis, all the way to the oblique eminence, runs a prominent line, which bounds the concavity of the inſide of this bone, and diſtinguiſhes the margin of the pelvis from the bottom. Winſlow. See Os and *Os* Innominatum.

ILLICEBRUM, *Mountain knot-graſs*. See Whitlow-*graſs*.

ILLEGITIMATE *birth*, or *delivery*. See Delivery, and Abortion.

ILLEVIABLE, in *Law*, a debt or duty which cannot, or ought not, to be levied.

The word *nihil* is uſually ſet on a debt, or due, that is *illeviable*.

ILLICIUM, *ſtarry anniſeed tree*, in *Botany*, a genus of the *dodecandria octagynia* claſs: the characters of which are, that the calyx is four-leaved and deciduous; the petals are eight; the nectaria are eight and ſubulated; the ſtamina are ſixteen, with bifid antheræ; the fruit is an ovated, compreſſed, monoſpermous capſule. This tree is a native of Japan, China, and other parts of the Eaſt, as well as of both the Floridas in America. M. Geoffroy ſays, that it is eſteemed in China and all over the Eaſt, for curing any bad taſte in the mouth, as a preſervative againſt the effects of bad air, and alſo for the ſtone and gravel. The Indians make a vinous liquor, by ſteeping the fruit in water and fermenting the infuſion. The Dutch, as well as the natives in the Eaſt Indies, mix this fruit with their tea, and ſherbet. The Chineſe and Japaneſe eſteem it a ſacred tree, and they offer it to their idols, and burn the bark of it, as a perfume, on their altars: and lay the branches on the graves of the dead, as an offering to the ghoſts of their pious departed friends. Mr. Ellis concludes, from the diſtinguiſhing characters of this genus, that it ſhould be ranked in the *polyandria polygynia* claſs. Phil. Tranſ. vol. lx. p. 524.

ILLITERATURE, in *Law*; if an *illiterate* man be to ſeal a deed, he is not bound to do it, if none be preſent to read it, if required: and reading a deed falſe will make it void. 2 Rep. 3. 11. A man may plead *non eſt factum* to a deed read falſe; as where a releaſe of an annuity was read to an *illiterate* perſon, as a releaſe for the arrears only, &c. agreed to be releaſed. Moore, 148. If there is a time limited for a perſon to ſeal a writing; in ſuch caſe *illiterature* ſhall be no excuſe; becauſe he might provide a ſkilful man to inſtruct him: but when he is obliged to ſeal it upon requeſt, &c. there he ſhall have convenient time to be inſtructed. 2 Nelſon's Abr. 946.

ILLUMINATION, in a *general ſenſe*, denotes the act of a luminous body, or a body that emits light; ſometimes, alſo, the ſtate of an opake body that receives it.

Illumination, *circle of*. See Circle.

ILLUMINATIVE *lunar month*. See Month.

ILLUMINED, Illuminati, a *Church term*, anciently applied to ſuch perſons as had received baptiſm.

This name was occaſioned by a ceremony in the baptiſm of adults; which conſiſted in putting a lighted taper in the hand of the perſon baptized, as a ſymbol of the faith and grace he had received in the ſacrament.

Illumined, Illuminati, is alſo the name of a ſect of heretics, who ſprang up in Spain about the year 1575, and were called by the Spaniards, *Alambrados*.

Their principal doctrines were, that, by means of a ſublime manner of prayer, which they had attained to, they entered into ſo perfect a ſtate, that they had no occaſion for ordinances, ſacraments, nor good works; and that they could give way, even to the vileſt actions, without ſin.

The ſect of *Illumined* was revived in France, in the year 1634. and were ſoon after joined by the Guerinets, or diſciples of Peter Guerin, who together made but one body, called alſo *Illumined:* but they were ſo hotly purſued by Louis XIII. that they were ſoon deſtroyed.

The brothers of the *Roſy Croſs* are ſometimes alſo called *Illumined*. See Rosycrusian.

ILLUSTRIOUS, Illustris, was heretofore, in the Roman empire, a title of honour peculiar to people of a certain rank. It was firſt given to the moſt diſtinguiſhed among the knights, who had a right to bear the latus clavus: afterwards, thoſe were intitled *illuſtrious*, who held the firſt rank among thoſe called *honorati*; that is, the præfecti prætorii, præfecti urbis, treaſurers, comites, &c.

There were, however, different degrees among the *illuſtres:* as in Spain they have grandees of the firſt and ſecond claſs, ſo in Rome they had their *illuſtres*, whom they called great, *majores*; and others leſs, called *illuſtres minores*.—For inſtance; the præfectus prætorii was a degree below the maſter of the offices, though they were both *illuſtres*.

The *Novels* of Valentinian diſtinguiſh as far as five kinds of *illuſtres*; among whom, the *illuſtres adminiſtratores* bear the firſt rank.

IMAGE, Imago, in *Optics*, a natural, lively repreſentation of an object, oppoſed to a ſmooth, well-poliſhed ſurface, or mirror.

The Latin word *imago*, comes originally from the Greek μιμεισθαι, *imitari*, *to imitate* or *mimic*.

Image, taken more largely, denotes the ſpectre, or appearance, of an object, whether by reflexion or refraction.

In all plane mirors, the *image* is of the ſame magnitude as the object; and appears as far behind the mirror, as the object is before it.

In convex mirrors, the *image* appears leſs than the object; and farther diſtant from the centre of the convexity, than from the point of reflexion.

Mr. Molyneux gives the following rule for finding the diameter of an *image*, projected in the diſtinct baſe of a convex mirror: as the diſtance of the object from the mirror is to the diſtance from the *image* to the glaſs; ſo is the diameter of the object, to the diameter of the *image*. See Lens, Mirror, Reflection and Refraction.

IMAGE is alſo uſed for the trace, or mark, which outward objects impreſs on the mind, by means of the organs of ſenſe. See Idea.

IMAGE alſo ſignifies an artificial repreſentation performed by man; as in painting, ſculpture, and the like.—In which ſenſe the word is now generally uſed in ſpeaking of things holy, or imagined to be ſo.

The noble Romans preſerved the *images* of their anceſtors with a great deal of care and concern, and had them carried in proceſſion at their funerals and triumphs: theſe were commonly made of wax, or wood; though ſometimes of marble, or braſs. They placed them in the veſtibules of their houſes; and they were to ſtay there, even if the houſes happened to be ſold, it being accounted impious to diſplace them. Appius Claudius was the firſt who brought them into the temples, in the year of Rome 259, and he added inſcriptions to them, ſhewing the origin of the perſons repreſented, and their brave and virtuous atchievements.

It was not, however, allowed for all, who had the *images* of their anceſtors in their houſes, to have them carried at their funerals; this was a thing only granted to ſuch as had honourably diſcharged themſelves of their offices: for thoſe who failed in this reſpect, forfeited that privilege; and in caſe they had been guilty of any great crime, their *images* were broken in pieces.

The Jews abſolutely condemn all *images*, and do not ſo much as ſuffer any ſtatues or figures in their houſes, much leſs in their ſynagogues, or places of worſhip.

The uſe and adoration of *images*, are things that have been a long time controverted in the world.

It is plain, from the practice of the primitive church, recorded by the earlier fathers, that Chriſtians, for the firſt three centuries after Chriſt, and the greater part of the fourth, neither worſhipped *images* nor uſed them in their worſhip. However, the greater part of the Popiſh divines maintain, that the uſe and worſhip of *images* were as ancient as the Chriſtian religion itſelf: to prove this, they allege a decree, ſaid to have been made in a council held by the Apoſtles at Antioch, commanding the faithful, that they may not err about the object of their worſhip, to make *images* of Chriſt and worſhip them. Baron. ad ann. 102. But no notice is taken of this decree, till 700 years after the Apoſtolic times, after the diſpute about *images* had commenced. The firſt inſtance that occurs in any credible author of *images* among Chriſtians, is that, recorded by Tertullian de Pudicit. c. 10. of certain cups, or chalices, as Bellarmine pretends, on which was repreſented the parable of the good ſhepherd carrying the loſt ſheep on his ſhoulders: but this inſtance only proves, that the church, at that time, did not think emblematical figures unlawful ornaments of cups or chalices. Another inſtance is taken from Euſebius, Hiſt. Eccl. lib. vii. cap. 18. who ſays, that in his time there were to be ſeen two braſs ſtatues in the city of Paneas or Cæſarea Philippi; the one of a woman on her knees, with her arms ſtretched out, the other of a man over againſt her, with his hand extended to receive her: theſe ſtatues were ſaid to be the *images* of our Saviour, and the woman whom he cured of an iſſue of blood. From the foot of the ſtatue repreſenting our Saviour, ſays the hiſtorian, ſprung up an exotic plant, which as ſoon as it grew to touch the border of his garment, was ſaid to cure all ſorts of diſtempers. Euſebius, however, vouches none of theſe things; nay, he ſuppoſes that the woman who erected this ſtatue of our Saviour was a pagan, and aſcribes it to a pagan cuſtom. Farther, Philoſtorgius, Eccl. Hiſt. lib. vii. c. 3. expreſsly ſays, that this ſtatue was carefully preſerved by the Chriſtians, but that they paid no kind of worſhip to it, becauſe it is not lawful for Chriſtians to worſhip braſs or any other matter. The primitive Chriſtians abſtained from the worſhip of *images*, not, as the Papiſts pretend, from tenderneſs to heathen idolaters, but becauſe they thought it unlawful in itſelf to make any *images* of the Deity. Juſtin Mart. Apol. ii. p. 44. Clem. Alex. Strom. 5. Strom. 1. and Protr. p. 46. Aug. de Civit. Dei. lib. vii. c. 5. and lib. iv. c. 32. Id. de Fide et Symb. c. 7. Lactant. lib. ii. c. 3. Tertull. Apol. c. 12. Arnob. lib vi. p. 202 Some of the fathers, as Tertullian, Clemens Alexandrinus, and Origen, were of opinion, that, by the ſecond commandment, the arts of painting and engraving were rendered unlawful to a Chriſtian, ſtyling them evil and wicked arts. Tert. de Idol. cap. 3. Clem. Alex. Admon. ad Gent. p. 41. Orig. ontra Celſum lib. vi. p. 182. The uſe of *images* in churches as ornaments, was firſt introduced by ſome Chriſtians in Spain, in the beginning of the fourth century; but the practice was condemned as a dangerous innovation, in a council held at Eliberis in 305. Epiphanius, in a letter preſerved by Jerom, tom. ii. ep. 6. bears ſtrong teſtimony againſt *images*, and may be conſidered as one of the firſt Iconoclasts. The cuſtom of admitting pictures of ſaints and martyrs into the churches, for this was the firſt ſource of *image*-worſhip, was rare in the latter end of the fourth century; but became common in the fifth: however, they were ſtill conſidered only as ornaments; and even in this view, they met with very conſiderable oppoſition. In the following century the cuſtom of thus adorning churches became almoſt univerſal, both in the Eaſt and Weſt. Petavius expreſsly ſays, (de Incar. lib. xv. cap. 14.) that no ſtatues were yet allowed in the churches; becauſe they bore too near a reſemblance to the idols of the gentiles. Towards the cloſe of the fourth or beginning of the fifth century, *images*, which were introduced by way of ornament, and then uſed as an aid to devotion, began to be actually worſhipped. However, it continued to be the doctrine of the church, in the ſixth and in the beginning of the ſeventh century, that *images* were to be uſed only as helps to devotion; and not as objects of worſhip. The worſhip of them was condemned in the ſtrongeſt terms by Pope Gregory the Great; as appears by two letters of his written in 601. From this time to the beginning of the eighth century, there occurs no ſingle inſtance of any worſhip given or allowed to be given to *images*, by any council or aſſembly of biſhops whatever. But they were commonly worſhipped by the monks and populace in the beginning of the eighth century; inſomuch, that in the year 726, when Leo publiſhed his famous edict, it had already ſpread into all the provinces ſubject to the empire. See the hiſtory of the oppoſition to them under Iconoclasts. See Bower's Hiſt. of the Popes, vol. iii. p. 202, &c.

The Lutherans condemn the Calviniſts for breaking the *images* in the churches of the Catholics, looking on it as a kind of ſacrilege; and yet they condemn the Romaniſts (who are profeſſed *image-worſhippers*) as idolaters: nor can theſe laſt keep pace with the Greeks, who go far beyond them in this point; which has occaſioned abundance of diſputes among them. See Iconoclasts.

The Mahometans have a perfect averſion to *images*; which was what led them to deſtroy moſt of the beautiful monuments of antiquity, both ſacred and profane, at Conſtantinople.

IMAGE, in *Rhetoric*, alſo ſignifies a lively deſcription of any thing in a diſcourſe.

Images in diſcourſe are defined, by Longinus, to be, in general, any thoughts proper to produce expreſſions, and which preſent a kind of picture to the mind.

But, in the more limited ſenſe, he ſays, *images* are ſuch diſcourſes as come from us, when, by a kind of enthuſiaſm, or an extraordinary emotion of the ſoul, we ſeem to ſee the things whereof we ſpeak, and preſent them before the eyes of thoſe who hear us.

Images, in rhetoric, have a very different uſe from what they have among the poets: the end principally propoſed in poetry is, aſtoniſhment and ſurprize; whereas the thing chiefly aimed at in proſe, is to paint things naturally, and to ſhew them clearly. They have this, however, in common, that they both tend to move, each in its kind.

Theſe *images*, or *pictures*, are of vaſt uſe, to give weight, magnificence, and ſtrength, to a diſcourſe. They warm and animate it; and, when managed with art, according to Longinus, ſeem, as it were, to tame and ſubdue the hearer, and put him in the power of the ſpeaker. See Hypotyposis.

IMAGINARY *root*, in *Algebra*. See Root.

IMAGINATION, a power or faculty of the ſoul, whereby it conceives and forms ideas of things, by means of impreſſions made on the fibres of the brain, by ſenſation. This power depends on the memory. Ideas enter into the mind by the ſenſes; the memory retains them; and the *imagination* compounds them. Some writers have diſtinguiſhed two ſorts of *imagination*; the one, which conſiſts in retaining the ſimple impreſſion of objects, is called the paſſive *imagination*; the other arranges the images that are received, and combines them in a thouſand ways, and is called the active *imagination*. The organs of our ſenſes are compoſed of fibrillæ, or little fibres, which, at one end, terminate in the outward parts of the body and ſkin, and at the other in the middle of the brain. Theſe fibres may be moved two ways: either beginning at that end which terminates in the brain, or at that which terminates without. Now the agitation of theſe fibres cannot be communicated to the brain, but the ſoul will be affected, and perceive ſomething. If then the agitation begins where objects make their firſt impreſſion, viz. on the external ſurface of the fibres of our nerves, and is communicated thence to the brain; the ſoul, in that caſe, judges that what ſhe perceives is without; that is, ſhe perceives an external object as preſent: but if only the anterior fibres be moved by the courſe of the animal ſpirits, or in ſome other manner, the ſoul then imagines, and judges, that what ſhe perceives is not without, but within the brain; that is, ſhe perceives an object as abſent; and herein lies the difference between ſenſation and *imagination*.

The faculty of *imagining*, or *imagination*, only conſiſts, according to the doctrine of Malebranche, in the power which the ſoul has of forming images of objects, by producing a change in the fibres of that part of the brain, which may be called the principal part, becauſe it correſponds to all the parts of our body, and is the place where the ſoul (if it may be ſo ſaid) immediately reſides. It matters not which that part is, nor whether the opinion of Willis be true, who places the common ſenſe in the two bodies, called *corpora ſtriata*, and the *imagination* in the *corpus calloſum*; or that of Fernelius, who places ſenſation in the pia mater that encompaſſes the ſubſtance of the brain; or that of Deſcartes, who places it in the pineal gland: it ſuffices that there is ſome ſuch part.

Since then the *imagination* only conſiſts in a power which the ſoul has of forming images of objects, by impreſſing them on the fibres of the brain, it follows that the larger and more diſtinct the veſtigia or tracks of the animal ſpirits, which are the lines or ſtrokes, as it were, of thoſe images, are; the more ſtrongly and diſtinctly the ſoul *imagines* thoſe objects.—Now as the breadth, depth, and cleanneſs of the ſtrokes of a ſculpture depend on the force wherewith the graver acts, and the obedience which the copper yields, ſo the depth and cleanneſs of the tracks of the *imagination* depend on the force of the animal ſpirits, and the conſtitution of the fibres of the brain; and it is that variety which is found in thoſe two things, to which we owe almoſt all that vaſt difference which we obſerve in people's minds.—On the one ſide are abundance and ſcarcity, briſkneſs and ſlowneſs, largeneſs and ſmallneſs, of the animal ſpirits; and on the other hand, delicacy or groſſneſs, humidity or dryneſs, ſtiffneſs or flexibility of the fibres of the brain; and laſtly, a particular relation which the animal ſpirits may have with thoſe fibres: from the various combinations of which things, will reſult a ſufficiently great variety, to account for all the different characters which appear in the minds of men: and from the ſame principle flows that difference which is obſerved in the ſame perſon's mind, at different times, and under different circumſtances, as in childhood, manhood, and old age, in ſickneſs, health, &c.

It may here be obſerved, that the fibres of the brain are more agitated by the impreſſion of objects, than by the courſe of the animal ſpirits; and for this reaſon the ſoul is more affected with objects, which it perceives by ſenſation, and which it looks on as preſent, and capable of giving it pleaſure or pain, than by thoſe perceived by *imagination*, which it judges to be diſtant.—And yet it ſometimes happens, that in perſons whoſe animal ſpirits are extremely agitated by faſting, waking, drinking, a fever, or ſome violent paſſion, theſe ſpirits move the inward fibres of the brain as forcibly as inward objects do; ſo that thoſe perſons perceive things by ſenſation, which they ſhould only perceive by *imagination*; for *imagination* and *ſenſation* only differ from each other, as the greater from the leſs. See Malebranche, Recher. de la Verité, lib. ii. See MADNESS, DELIRIUM, PHRENSY, MELANCHOLY, &c. *Imagination* or fancy, ſays the ingenious Mr. Harris, though as to its origin it may be ſubſequent to ſenſe, yet is truly prior to it in dignity and uſe. It is this which retains the fleeting forms of things, when things themſelves are gone, and all ſenſation is at an end. The difference between ſenſe and *imagination* appears from hence; that we have an *imagination* of things that are gone and extinct, which cannot be made the objects of ſenſation. We have an eaſy command over the objects of our *imagination*; whereas our ſenſations are neceſſary, when their objects are preſent. *Imagination* is alſo diſtinguiſhed from memory, as the former views ſome relict of ſenſation repoſed within us, without thinking of its riſe, or referring it to any ſenſible object, whereas memory views ſuch relict, referring it at the ſame time to that ſenſible object, which in time paſt was its cauſe and original, and recollection is the road which leads to memory, through a ſeries of ideas, however connected, whether rationally or caſually. Beſides, *imagination* may exhibit, after a manner, things that are to come: but memory is confined in the ſtricteſt manner to the paſt. Hermes, p. 354, &c. ed. 2d.

The hiſtories of monſtrous births, where the imperfection or deformity is aſcribed to the *imagination* of the mother, are numberleſs; and indeed ſo well autenticated, that an advocate for the power of *imagination* in pregnant women, will triumphantly exclaim, that facts are ſtubborn things; and that all reaſoning is ſophiſtry, when oppoſed to them. But the anſwer to this kind of argument is, that experience ſhews it to be difficult to aſcertain a fact; and that when we coolly and carefully examine the truth of reputed facts, they are often diſcovered to have been advanced through haſtineſs and credulity, and to have been perpetuated through ignorance and ſervility.

The productions of nature, in the ſeveral claſſes both of living and inanimate things, are not all equally perfect: we ſee in birds, beaſts and plants, every now and then, an irregular or preternatural formation; but where the accident happens in the human ſpecies, an opinion has been adopted, that a fright, or ſome other affection of the mother, in the courſe of her pregnancy, has wrought the change. The advocates for this opinion, if they mean any thing, muſt mean, that at the inſtant the mother received the impreſſion, the child was of the natural form, but that by the power of her *imagination* the ſtructure of the parts was that moment altered, and aſſumed the appearance, either gradually or ſuddenly, with which the child was born. They muſt conceive that the infant who is born with a large diſcolouration on any part of its ſkin, had, before the diſcolouration took place, a fair ſkin: that the child who is born with ſix toes, had originally but five: and again, that the child who is born with one leg or one arm, had originally two, and ſo of every other preternatural appearance, whether it be an increaſe or decreaſe of the parts of the body.

By expoſing the abſurdity of one example, it will appear that all the other wonderful ſtories of the ſame kind are equally abſurd. It has been alleged, for inſtance, that a lady advanced five or ſix months in her pregnancy, has been ſo terrified by a beggar thruſting the ſtumps of an amputated arm into her coach, that the child of which ſhe was afterwards delivered, was born with a ſtump of arm reſembling that of the beggar. Here let us pauſe a while, and conſider what an operation muſt be performed to work this effect. A child at the term of five or ſix months, is of conſiderable bulk, and the arm itſelf not ſmall. This arm then muſt drop off by the power of *imagination*: there muſt be no blood loſt to endanger the life of the child; and the wound muſt be healed before the birth. The mere ſtating of this poſition expoſes its ridiculouſneſs.

But admitting that a limb could drop off by the force of fancy, it muſt ſtill remain with the mother until the delivery; and the bones at leaſt would not putrify and waſte away, though the fleſh would. But it never was pretended that in caſes of this nature, any part of the deficient limb was found by the midwife; and what is worth obſerving, that the ſtumps of all ſuch imperfect limbs, have a ſmooth ſkin, which plainly indicates they were from their firſt formation of the ſame figure: for had there been a wound, there would have been a ſcar, and ſcars are very diſtinguiſhable from ſound ſkin.

There is no defect more frequent than that of the hare lip, and it ſeldom happens that a woman who has a child with that deformity, does not endeavour to recollect ſhe either longed for a hare, or was frightened with a hare, or ſaw ſomebody with a hare lip; it is no matter which. A woman already prepoſſeſſed that there muſt have been ſome ſuch cauſe, is not long at a loſs; her memory, or her prejudice, ſoon furniſhes her with a fact, and the inſtance of this child is added to the long catalogue of ſuch.

It is not more than a century ſince ſome men of learning gave credit to the efficacy of ſympathetic medicines, which, like other charms, were to commnnicate their virtues to patients at a diſtance. Learning and good ſenſe have at length baniſhed this viſionary conceit; and in a century more, the notion of the *imagination* of the mother operating on the body of her unborn child, will meet with the ſame contempt After all, the whole of this ſubject is not yet ſufficiently explained. See FOETUS.

IMAGINIFER, among the *Romans*, an enſign-bearer, who carried the ſtandard on which was repreſented the image of the reigning emperor. See SIGNA.

IMAGO, in *Natural Hiſtory*, is a name given by Linnæus to the third ſtate of inſects, when they appear in their proper ſhape and colours, and under no more tranſformation.

IMAM, or IMAN, a miniſter in the Mahometan church, anſwering to a pariſh prieſt among us.

The word properly ſignifies what we call a prelate, *antiſtes*, one who preſides over others; but the Muſſulmen frequently apply it to a perſon who has the care and intendancy of a moſque, who is always there at firſt, and reads prayers to the people, which they repeat after him.

IMAM is alſo applied, by way of excellence, to the four chiefs or founders of the four principal ſects in the Mahometan religion.

Thus Ali is the *imam* of the Perſian, or of the ſect of the Schiaites; Abu-beker the *imam* of the Sunnites, which is the ſect followed by the Turks; Saphii, or Safi-y, the *imam* of aaother ſect, &c.

The Mahometans do not agree among themſelves abont this *imamate* or dignity of the *imam*. Some think it of divine right, and attached to a ſingle family, as the pontificate of Aaron.—Others hold, that it is, indeed, of divine right, but deny it to be ſo attached to any ſingle family, as that it may not be transferred to another. They add, that the *imam* is to be clear of all groſs ſins; and that otherwiſe he may be depoſed, and his dignity may be conferred on another. However this be, it is certain, that after an *imam* has once been owned as ſuch, by the Muſſulmen, he who denies that his authority comes immediately from God, is accounted impious; he who does not obey him, is a rebel; and he who pretends to contradict what he ſays, is eſteemed a fool, among the orthodox of that religion. The *Imams* have no outward mark of diſtinction; their habit is the ſame with that of the Turks in common, except that the turban is a little larger, and folded ſomewhat differently.

IMAMIA, a name given to that ſect of the Mahometans, to which the Perſians adhere. See IMAM.

IMBANKING, ſee BANKING.

IMBARGO, or EMBARGO, a ſtop or ſtay put upon ſhips, or merchandize, uſually by public authority. See EMBARGO.

IMBATTLED, ſee EMBATTLED.

IMBECILITY, a ſtate of languor, or decay; wherein the body is not able to perform its uſual exerciſes or functions.

IMBER, in *Ornithology*, ſee EMBER *Gooſe*, and FLUDER.

IMBEZLE, or IMBEZZLE, is probably from the old Engliſh word to waſte, pilfer, or purloin.

As where a perſon intruſted with goods, waſtes, conſumes, and diminiſhes them, he is ſaid to *imbezle* them.

Perſons that *imbezzle*, or illegally diſpoſe of any woollen, linen, fuſtian, cotton, or iron materials; or gloves, leather, ſhoes, &c. with which they are intruſted for manufacture, ſhall forfeit double the value, or be ſent to the houſe of correction, and there whipped, and kept to hard labour fourteen days: and for the ſecond offence, forfeit four times the value, &c. Buyers and receivers are liable to the ſame penalties. 13 Geo. II. c. 8.

If any ſervant *imbezzles*, purloins, or makes away his maſter's goods, to 40 ſhillings value, it is made felony without benefit of clergy, 12 Ann. c. 7. *Imbezzling* the king's armour, or ſtores, is felony, by 31 Eliz. c. 4. other inferior imbezzlements and miſdemeanours of the ſame kind are puniſhed with fine and impriſonment, by 1 Geo. 1. c. 25. The uſual method of proceeding againſt high officers who *imbezzle* the public money is by impeachment in parliament. At common law the offender is ſubject to a diſcretionary fine and impriſonment. *Imbezzling*, or vacating records, is a felonious offence againſt public juſtice, 8 Hen. VI. c. 12.

IMBIBE, is commonly uſed in the ſame ſenſe as *abſorb*, viz. where a dry porous body takes up another that is moiſt.

IMBLOCATION, in *Middle Age Writers*, a particular method of diſpoſing of the dead bodies of excommunicated perſons, by raiſing over them a heap of ſtones, or earth. This was done in the fields, or near high-ways; it being unlawful to bury them in holy ground, or even to interr them at all. See BURIAL.

The word is derived from *bloc*, tumulus.

IMBRICATED, is uſed by ſome botaniſts, to expreſs the figure of the leaves of ſome plants, which are hollowed like an *imbrex*, or gutter-tile; or are laid in cloſe ſeries over one another like the tiles of an houſe.

IMBRICATED-*cup*, *imbricatus calyx*, in *Botany*, a term uſed by authors to expreſs the cups of ſome of the plants which have compound flowers; in which the common perianthium, ſurrounding the whole cluſter of flowers, is compoſed of ſeveral ſeries of ſquamæ, the exterior of which is ſhort, and the interior longer, but in great part hid under theſe upper ones.

IMBRICATED-*ſhell*, *imbricata concha*, in *Natural Hiſtory*, a term uſed in general to expreſs any ſpecies of ſhell-fiſh, whoſe ſhells are elevated into tranſverſe ridges, lying over one another at the baſe, in the manner of the tiles on a houſe-top. It has alſo been uſed as the name of a peculiar ſpecies of ſhell: this is a *cordiformis* or heart-ſhell, whoſe ſides are remarkably ridged in this tranſverſe manner, and at the ſame time ſo divided longitudinally by ſeven high ribs running from the apex to the edge, that the whole repreſents the roof of a houſe with the beams and raſters, before covered by the tiling. Hence the French call it *faitiere*.

IMITATION, in *Muſic*, a kind of compoſition wherein one part is made to imitate another, either throughout the whole piece, which is one of the kinds of canon, or only during ſome meaſures, which is a *ſimple imitation*.

Sometimes the movement, or the figure of the notes, alone, is *imitated*; and that, ſometimes, even by a contrary motion, which makes what they call a *retrograde imitation*.

Imitation differs from *fugue*, becauſe in the former the repetition muſt be a ſecond, a third, a ſixth, ſeventh, or ninth, either above or below the firſt voice; whereas if the repetition were in uniſon, a fourth, fifth, or eighth, higher or lower, it would be a *fugue*.

IMITATION, in *Oratory*, is an endeavour to reſemble a ſpeaker or writer in thoſe qualities, with regard to which we propoſe them to ourſelves as patterns. The firſt hiſtorians among the Romans, ſays Cicero, were very dry and jejune, till they began to imitate the Greeks, and then they became their rivals. It is well known how cloſely Virgil has imitated Homer in his Æneid, Heſiod in his Georgics, and Theocritus in his Eclogues. Terence copied after Menander; and Plautus after Epicarmus, as we learn from Horace, lib. ii. ep. ad Auguſt who himſelf owes many of his beauties to the Greek lyric poets. Cicero appears, from many paſſages in his writings, to have imitated the Greek orators. Thus Quintilian ſays of him, that he has expreſſed the ſtrength and ſublimity of Demoſthenes, the copiouſneſs of Plato, and the delicacy of Iſocrates. Inſt. Or. lib. x. cap. 1.

Writers on rhetoric have propoſed three enquiries under the head of *imitation*, viz. Who are to be imitated? What we are to imitate? and In what manner? With reſpect to the firſt we ſhall only obſerve, that in common caſes it is not always what is abſolutely beſt, but comparatively ſo in its own kind, and beſt ſuits their own taſte, that ſhould determine perſons in the choice of their patterns for *imitation*: however, only the beſt writers, and thoſe whom we may moſt ſafely truſt, ſays Quintilian, are to be read long. With reſpect to the ſecond enquiry, the things to be imitated are the perfections of the beſt maſters in their ſeveral kinds; and theſe are different, according to the various ſubjects in which they excel. As to the manner of *imitation*, it ought to be conſidered, that he who only copies or tranſlates from another, and endeavours to paſs it off for his own, is not an *imitator*, but a plagiary. The true art of *imitation* conſiſts in ſo diverſifying what we take from others, as if we can, to improve it, or at leaſt not ſuffer it to receive any detriment by our alteration. And this may be done, by ſo enlarging a thought, or expreſſion taken from another, as in a good meaſure to render it our own: by either abridging, or only taking a part of what another has ſaid before us; by keeping the thought, and applying it to a different ſubject; and finally, by preſerving the thoughts, and applying them to the ſame ſubject, but changing their order, and repreſenting them in a different dreſs. See Ward's Orat. vol ii. ſect. 53 and 54.

IMMACULATE, *without ſtain*.—A term much uſed among the Romaniſts; when, ſpeaking of the conception of the bleſſed Virgin, they call it *immaculate*.

When the cap is given to a doctor of the Sorbonne, he is obliged to ſwear, that he will defend the *immaculate* conception. This was decreed by an act of the Sorbonne in the fourteenth century; in imitation of which, eighty other univerſities made the ſame order.

The military orders in Spain are all ſolemnly obliged to defend this prerogative of the Virgin. See CONCEPTION.

There is alſo a Congregation of the IMMACULATE *Conception*; in moſt nunneries whereof is a ſociety of ſecular maids, whoſe end is to honour the *immaculate conception*: of which they make a public proteſtation every year, and a private one every day. See THEATINES.

IMMANENT, in *Logic*.—The ſchoolmen diſtinguiſh two kinds of ACTIONS; the one *tranſient*, which paſs from the agent to the patient; the other *immanent*, which continue in the agent.

IMMATERIALITY, abſtraction from matter; or what we underſtand by pure ſpirit.

Plato proves the *immateriality* of the ſoul from theſe ſix topics. 1. Its ſimplicity. 2. Its independency on the body, which is twofold; in its *eſſe*, and in its *operari*, in exiſting, and in acting or operating ſeparately. 3. Its rule and authority over the body. 4. Its likeneſs and ſimilitude to God, which diſcovers itſelf in the pleaſure it enjoys in ſpiritual things, in its aiming at ſpiritual objects, &c. 5. Its ſpiritual manner of perceiving material objects. And, laſtly, its indiviſibility, capacity, activity, and immortality. See SOUL.

IMMEDIATE, that which precedes or follows ſome other thing, without any interpoſition.

IMMEDIATE, alſo, ſignifies ſomething that acts without means, or without medium. In which ſenſe we ſay, *immediate* GRACE, and *immediate* cauſe, &c.

IMMEDIATE *Mode*. } See { MODE.
IMMEDIATE *Fire*. } { FIRE.

IMMEMORIAL, an epithet given to the time or duration of any thing whoſe beginning we know nothing of.

In a legal ſenſe, a thing is ſaid to be of time *immemorial*, or time out of mind, that was before the reign of our king Edward II.

IMMENSE, that whoſe amplitude, or extenſion, no finite meaſure whatſoever, or how oft ſoever repeated, can equal.

IMMERSION, an act by which any thing is plunged into water, or ſome other fluid.

In the firſt ages of Chriſtianity, baptiſm was performed by *immerſion*; by three *immerſions*.—The cuſtom of *immerſion* is ſaid to be ſtill preſerved in Portugal, and among the Anabaptiſts in other parts.

Immersion, in *Pharmacy*, is the preparation of ſome medicine, by letting it ſteep for ſome time in water, in order to take ſome ill quality or taſte from it.

This is done in rhubarb, to moderate its force; in lime to take away its ſalt; and in olives, which are preſerved in brine.

Immersion, in *Aſtronomy*, is when a ſtar or planet comes ſo near the ſun, that we cannot diſcern it; being as it were enveloped, and hid in the rays of that luminary.

Immersion alſo denotes the beginning of an eclipſe of the moon; that is, the moment when the moon begins to be darkened, and to enter into the ſhadow of the earth.

The ſame term is alſo uſed with regard to an eclipſe of the ſun, when the diſk of the moon begins to cover it.

In this ſenſe, *immerſion* ſtands oppoſed to *emerſion*, which ſignifies the moment wherein the moon begins to come out of the ſhadow of the earth; or the ſun begins to ſhew the parts of his diſk which were hid before.

Immersion is frequently applied to the ſatellites of Jupiter, and eſpecially to the firſt ſatellite; the obſervation whereof is of ſo much uſe for diſcovering the longitude.

The *immerſion* of that ſatellite is the moment in which it appears to enter within the diſk of Jupiter; and its emerſion the moment wherein it appears to come out.

The *immerſions* are obſerved from the time of the conjunction of Jupiter with the ſun, to the time of his oppoſition: and the emerſions from the time of his oppoſition to his conjunction.—The peculiar advantage of theſe obſervations is, that during eleven months of the year, they may be made, at leaſt, every other day.—The perfection of this theory, and the praxis thereon, we owe to M. Caſſini.

Scruples of Immersion. See Scruple.

IMMERSUS *ſcapulæ*, in *Anatomy*, a name given by Riolanus and ſome other authors, to a muſcle ſince called the subscapularis.

IMMORTAL, that which will laſt to all eternity, as having in itſelf no principle of alteration, or corruption.

Plato defines *immortality*, ȣσια εμψυχος και αιδιος μονη, *animated eſſence and eternal manſion*; and proves the *immortality* of the ſoul from two kinds of arguments; the one *artificial*, and the other *inartificial*.

The *inartificial* arguments for the ſoul's *immortality* are teſtimonies and authorities, whereof he cites ſeveral; and adds, in general, that all the great men and poets, who had any thing divine in them, have at all times aſſerted the *immortality* of the ſoul.

Artificial or proper arguments for the *immortality* are either *ſpeculative* or *practical*: of the firſt kind are thoſe drawn from, 1. The ſimple, uniform, ſpiritual, and divine nature of the ſoul. 2. From its infinite capacity. 3. Its deſiring and longing after *immortality*, and its inward horror of falling into nothing; proving it abſurd that the ſoul ſhould die, when life is its proper and adequate object. 4. Its rational activity; proving that whatever has in itſelf a principle of rational and ſpontaneous motion, by which it tends towards ſome ſupreme good, is *immortal*. 5. The various ideas which it has of ſpiritual things; particularly the idea it has of *immortality*: and, 6. Its immateriality.

His *practical* or moral arguments for the *immortality* of the ſoul, are drawn from, 1. The juſtice of God, which can never ſuffer the wicked to eſcape unpuniſhed, nor the good unrewarded after death. 2. The dependence which religion has on this opinion, becauſe, without this perſuaſion, there would be no religion in the world. 3. The opinion which men have, that juſtice and every kind of virtue are to be cultivated, that they may at laſt live with God. 4. The ſtings of conſcience, and anxious ſolicitude we are under about a future ſtate.

Immortal *flower*, in *Botany*. See Gomphrena.

IMMUNITY, a privilege or exemption from ſome office, duty, or impoſition.

Immunity is more particularly underſtood of the liberties granted to cities and communities.

The princes heretofore granted all kinds of *immunities* to eccleſiaſtics, exempting them from all impoſitions; but the eccleſiaſtics of thoſe days were not ſo rich as thoſe of ours: they gave all they had to the poor.

There is ſtill a privilege of *immunity* in ſome places, and eſpecially in Italy, belonging to eccleſiaſtical things, and perſons; who are exempted from certain dues, and are ſheltered from the purſuits of juſtice. Though there are ſome crimes for which they cannot plead the privileges of their *immunity*, as premeditated murder, &c.

IMMUTABILITY, the condition of a thing that cannot change.

Immutability is one of the divine attributes. See God.

IMPALED, in *Heraldry*, is underſtood of a ſhield party per pale, or divided into two halves by a line drawn palewiſe through the middle, from the top to the bottom.

When the coats of arms of a man and his wife, who is not an heireſs, are borne in the ſame eſcutcheon, they muſt be *impaled*, or marſhaled in pale, *i. e.* the huſband's on the right ſide, and the wife's on the left; and this the heralds call *baron and feme*, two coats *impaled*.

If a man have had two wives, he may *impale* his coat in the middle between theirs; and if he have had more than two, they are to be marſhaled on each ſide of his, in their proper order.

IMPALEMENT, in a *penal* ſenſe, } See Empalement.
Impalement, in *Phytology*, }

IMPALPABLE, that whoſe parts are ſo extremely minute, that they cannot be diſtinguiſhed by the ſenſes, particularly by that of feeling.

IMPANATION, formed of *in* and *panis*, *bread*, a term uſed among divines to ſignify the opinion of the Lutherans with regard to the euchariſt; who believe that the ſpecies of bread and wine remain, together with the body of our Saviour, after conſecration. See Consubstantiation.

IMPANATORES. See Adessenarii.

IMPANNELING, in *Law*. See Empanelling.

IMPARES *Scamilli*. See Scamilli.

IMPARLANCE. See Emparlance.

IMPARSONEE, in *Law*, is applied to a parſon that is inducted, and in poſſeſſion of a benefice.

IMPASSIBLE, that which is exempt from ſuffering; or which cannot undergo pain, or alteration.

The Stoics place the ſoul of their wiſe man in an *impaſſible*, imperturbable ſtate. See Apathy.

IMPASTATION, the mixture of divers materials of different colours, and conſiſtencies, baked or bound together with ſome cement, and hardened either by the air, or fire.

Impastation is ſometimes uſed for a ſort of maſon's-work, made of ſtucco, or ſtone ground ſmall, and wrought up again in manner of a paſte.

Authors are of opinion that the obeliſks, and the huge antique columns ſtill remaining, were made, ſome by *impaſtation*, and others by fuſion; but this is wholly erroneous: they are all cut out of quarries, yet open in Egypt, Arabia, &c.

IMPASTING, in *Painting*. See Empasting.

IMPATIENS, in *Botany*. See Balsamina.

IMPEACHMENT, from the Latin, *impetere*, to *ſet upon* or *attack*; or rather from the French, *empecher*, to *hinder*, in *Law*, is the accuſation and proſecution of a perſon for treaſon, or other crimes and miſdemeanors. Any member of the lower houſe of parliament may impeach any one belonging either to that body, or the houſe of lords. The method of proceeding is to exhibit articles on the behalf of the commons, by whom managers are appointed to make good their charge. Theſe articles are carried to the lords, by whom every perſon impeached by the commons is tried; and if they find him guilty, no pardon under the great ſeal can be pleaded to ſuch an *impeachment*. 12 and 13 Will. III. c. 2. A commoner cannot, however, be impeached before the lords for any capital offence, but only for high miſdemeanors. A peer may be impeached for any crime; the articles of *impeachment* are a kind of bills of indictment, found by the houſe of commons, and afterwards tried by the lords, who, in caſes of miſdemeanors, are conſidered not only as their own peers, but as the peers of the whole nation. This cuſtom is derived from the conſtitution of the ancient Germans, who, in their great councils, ſometimes tried capital accuſations relating to the public: *licet apud concilium accuſare quoque, et diſcrimen capitis intendere.* Tacit. de Mor. Germ. 12. Blackſt. Com. vol. iv. p. 256, &c.

Impeachment *of Waſte*, a reſtraint from committing of waſte upon lands and tenements; or a demand of recompence for waſte made by a tenant who has but a limited eſtate in the land granted.

He that hath a leaſe without *impeachment of waſte*, hath by that a property or intereſt given him in the houſes and trees, and may make waſte in them without being called to an account for it.

IMPECCABILES, in *Church Hiſtory*, a name given to thoſe heretics, who boaſted that they were *impeccable*, and that there was no need of repentance: ſuch were the Gnoſtics, Priſcillianiſts, &c.

IMPECCABILITY, the ſtate of a perſon who cannot ſin: or a grace, privilege, or principle, which puts him out of a poſſibility of ſinning.

The ſchoolmen diſtinguiſh ſeveral kinds and degrees of *impeccability*: that of God, belongs to him by nature: that of Jeſus Chriſt, conſidered as man, belongs to him by the hypoſtatical union: that of the bleſſed, is a conſequence of their condition: that of men, is the effect of a confirmation in grace, and is rather called *impeccance* than *impeccability*; accordingly divines diſtinguiſh between theſe two: this diſtinction is found neceſſary in the diſputes againſt the Pelagians, in order to explain certain terms in the Greek and Latin fathers, which without this diſtinction are eaſily confounded.

IMPEDIMENTS, in *Law*, are ſuch hindrances as put a ſtop or ſtay to a perſon's ſeeking for his right by a due courſe of law. Perſons under *impediments* are thoſe under age, or coverture, *non compos mentis*, in priſon, beyond ſea, &c. who, by a ſaving in our laws, have time to claim, and proſecute their rights, after the impediments are removed, in caſe of fines levied, &c.

IMPEDIMENTS of *marriage*, ſee MARRIAGE.

IMPEDIT, in *Law*. See QUARE *Impedit*.

IMPENETRABILITY, a quality whereby a thing becomes unable to be pierced or penetrated; or a property of body whereby it fills up certain ſpaces, ſo that there is no room in them for any other body.

Dr. Harris defines *impenetrability*, the diſtinction of one extended ſubſtance from another, by means whereof the extenſion of one thing is different from that of another: ſo that two extended things cannot be in the ſame place, but muſt neceſſarily exclude each other. See SOLIDITY.

IMPENITENCE, or IMPENITENCY, an hardneſs of heart, which makes a perſon perſevere in vice, and prevents his repentance.

IMPERATIVE, in *Grammar*, is one of the moods or manners of conjugating a verb, ſerving to expreſs a commandment; as, *go*, *come*, &c. The *imperative*, according to biſhop Wilkins, is one of the primary modes or moods, the indicative being the other: by this the ſpeaker expreſſes his will to him that has the thing in his power; namely, to his ſuperior by petition, to his equal by perſuaſion, and to his inferior by command; and the manner in which theſe affect the copula (be it ſo, or let it be ſo) is called the *imperative* mood, of which there are theſe three varieties. Wilkins's Real Character, part iii. c. 5. The ſame diſtinction is obſerved by Mr. Harris, who makes the *imperative* mood a ſpecies of the requiſitive when applied to inferiors; but when pertaining to equals, or ſuperiors, it is a precative or optative. Hermes, p. 144, ed. 2d. See MOOD.

In Hebrew, and other oriental languages, the future tenſe has frequently an *imperative* ſignification.

IMPERATOR, among the *Romans*, a title of honour given to generals after a victory; firſt by the ACCLAMATIONS of the ſoldiers, and afterwards confirmed by the ſenate. See EMPEROR.

IMPERATORIA, in *Botany*, ſee MASTERWORT.

IMPERATRIX, in *Botany*, a name given by ſome authors to the meum or SPIGNEL.

IMPERFECT *Plants*, among *Botaniſts*, are ſuch as either really want flower and ſeed, or are ſuppoſed to want them; no flower or ſeed having been diſcovered in the greater part of thoſe plants included in this claſs by the botanical writers, at the time when they were thus denominated. See *Imperfect* PLANTS.

IMPERFECT *concord*, in *Muſic*, See CONCORD.

IMPERFECT *flowers*. See FLOWERS and STAMINEOUS.

IMPERFECT *mixts*. See MIXT.

IMPERFECT *numbers*, in *Arithmetic*, See NUMBERS.

IMPERFECT *tenſe*, in *Grammar*, ſignifies an indefinite time between the preſent and the paſt; as, *I taught*, *I heard*. The *imperfect* was ſometimes employed by the ancients to denote what is uſual and cuſtomary: thus *ſurgebat* and *ſcribebat* ſignify not only *he* WAS *riſing*, *he* WAS *writing*, but upon occaſion they ſignify, *he* USED *to riſe*, *he* USED *to write*. The reaſon of this is, that whatever is cuſtomary, muſt be ſomething which has been frequently repeated; but what has been frequently repeated muſt require an extenſion of time paſt. It was alſo uſed by the ancients, in which they have been followed by the moderns, in a ſuſpenſive kind of inſcription; as Απελλῆς εποίει, *Apelles faciebat*, but not εποίησε or *fecit*; by which uſe of the *imperfect* they avoided the ſhew of ignorance, and had prepared an apology in caſe of cenſure, by ſaying that the work was *once indeed in hand*, without pretending that *it was ever finiſhed*. Harris's Hermes, p. 136, &c. See TENSE.

IMPERFORATE *anus*. See ANUS and INFANT.

IMPERIAL, ſomething belonging to an emperor, or empire.

Thus we ſay, his *imperial* MAJESTY, the *imperial* CROWN, *imperial* MEDALS, the *imperial* CHAMBER.

IMPERIAL *cities*, in Germany, are thoſe which own no other head but the emperor.

Theſe are a kind of little commonwealths; the chief magiſtrate whereof does homage to the emperor, and pays him the Roman month; but in other reſpects, and in the adminiſtration of juſtice, the magiſtrate is ſovereign.

The *imperial cities* have a right of coining money, and of keeping forces, and fortified places: their deputies aſſiſt at the *imperial* diets, where they are divided into two branches; that of the Rhine, and that of Suabia. There were formerly twenty-two in the former, and thirty-ſeven in the latter; but there are now only forty-nine in all; thirteen belonging to the former, and thirty-ſix to the latter.

IMPERIAL *diet*, is an aſſembly or convention of all the ſtates of the empire. See DIET.

The *diet* is divided into three *colleges*, and each college has its *director*, who preſides in the conſultations: the elector of Mentz, in the college of electors; the archbiſhop of Saltzburg, and archduke of Auſtria, in that of the princes, and the deputy of the city of Cologne, or of any other, in that of the cities.

In the *diet*, each principality has a voice; but all the prelates (ſo they call the abbots and provoſts of the empire) have but two voices, and all the counts but four.

Though the three colleges agree, yet the emperor has a negative voice: when he alſo conſents, the reſolutions paſs into a law, which obliges all the ſtates of the EMPIRE, both mediate and immediate.

IMPERIAL *ſalt*, *imperiale ſal*, a term uſed by ſome of the old writers to expreſs the common ſal gemmæ; and uſed, by others, for the *ſal ammoniacum*.

IMPERIAL *table*, in *Surveying*, an inſtrument made of braſs, with a box and needle, ſtaff, &c. uſed in meaſuring land.

IMPERII *receſſus*. See RECESSUS *imperii*.

IMPERSONAL *verb*, in *Grammar*, is ſuch an one, as is only uſed in the third perſon ſingular; as *oportet*, *licet*, &c Every verb, ſays the ingenious Mr. Harris, whether active or paſſive, has in language a neceſſary reference to ſome noun for its nominative caſe; and the doctrine of *imperſonal* verbs has been juſtly rejected by the beſt grammarians, both ancient and modern. Hermes, p. 175.

IMPERVIOUS, a thing not to be pervaded, or paſſed through; either by reaſon of the cloſeneſs of its pores, or the particular configuration of its parts.

IMPETIGO, in *Medicine*, an extreme roughneſs, and foulneſs of the ſkin, attended with an itching, and plentiful ſcurf.

In which ſenſe it amounts to the ſame with *lichen*, *volatica*, and *mentagra*.

The *impetigo* is a ſpecies of dry, pruriginous itch, wherein ſcales or ſcurf ſucceed apace; ariſing from ſaline corroſive humours thrown out upon the exterior habit of the body, by which means the internal parts are uſually relieved.

It is divided into *mitis*, mild, not accompanied with any malignity; and *fera*, ſevere, which comes near to a leproſy. See ITCH and LEPROSY.

IMPETRATION, the act of obtaining any thing by requeſt or prayer.

IMPETRATION was more particularly uſed in our ſtatutes for the pre-obtaining of benefices and church-offices in England from the court of Rome, which did belong to the diſpoſal of the king, and other lay patrons of the realm; the penalty whereof is the ſame with that of proviſors, 25 E. III. See PROVISOR.

IMPETUS, in *Mechanics*. See FORCE, MOMENTUM, and MOTION.

Paracentric IMPETUS. See PARACENTRIC.

IMPING, in *Falconry*, the inſerting a feather in the wing of a hawk, in the place of one that is broken.

IMPLANTATION. See TRANSPLANTATION.

IMPLEAD, to ſue, or proſecute by courſe of law. See PLEADING.

IMPLEMENTS, formed either from the Latin *implere*, *to fill up*; or from the French *imployer*, to *employ*; is uſed for all things neceſſary for a trade, or the furniture of an houſehold.

In this ſenſe we frequently find it uſed in wills, and conveyances of moveables.

IMPLEX *action*. See ACTION.

IMPLICATION, in *Law*, is where the law doth imply ſomething, that is not declared between parties, in their deeds and agreement: and when our law giveth any thing to a man, it giveth *implicitly* whatever is neceſſary for the enjoying the ſame. The want of words may be helped in ſome caſes by *implication*; and ſo one word or thing, or one eſtate given, ſhall be implied by another: and there is an *implication* in wills and deviſes of lands, whereby eſtates are gained.

IMPLICIT, derived from *in*, and *plico*, *I fold*; ſomething tacitly compriſed, or underſtood: that is, contained in a diſcourſe, clauſe, or propoſition, not in expreſs terms, but only by induction and conſequence.

IMPLICIT *faith*. See FAITH.

IMPLICIT *condition*. See CONDITION.

IMPLY *a contradiction*, a phraſe uſed among philoſophers, in ſpeaking of the object of divine omnipotence.

God can do every thing that does not *imply a contradiction* proceeding from God: by which is not meant a relation of the action to the executive power of God, but a relation to the other attributes and ſimple perfections of God.

IMPORTATION, the act of *importing* or bringing merchandize from foreign countries, in contradiſtinction to EXPORTATION.

Some of the principal ſtatutes relating to the *importation* of merchandize, are 12 Car. II. c. 4.—12 Car. II. c. 19. 14 Car. II. c. 11.—4 and 5 W. and M. c. 5.—6 W. and M. c. 1.—7 and 8 W. and M. c. 28.

Concerning goods prohibited from being *imported*, ſee ſtat. 3. Edw. IV. c. 4.—1 Rich. III. c. 12.—13 and 14 Car. II. c. 13.—18 Car. II. c. 32—9 and 10 W. III.—21 Geo. II.—1 Ann. c. 27.

IMPOSITION *of hands*, an eccleſiaſtical action, by which a biſhop lays his hand on the head of a perſon, in ordination, confirmation, or in uttering a bleſſing. This practice is alſo frequently obſerved by the Diſſenters at the ordination of their miniſters, when all the miniſters preſent place their hands on the head of him whom they are ordaining, while one of them prays for a bleſſing on him and his future labours. This ſome of them retain as an ancient practice, juſtified by the example of the apoſtles, when no extraordinary gifts are conveyed. However, they are not agreed as to the propriety of this ceremony; nor do they conſider it as an eſſential part of ordination.

Impoſition of hands was a Jewiſh ceremony, introduced, not by any divine authority, but by cuſtom: it being the practice among thoſe people, whenever they prayed to God for any perſon, to lay their hands on his head.

Our Saviour obſerved the ſame cuſtom, both when he conferred his bleſſing on children, and when he cured the ſick; adding prayer to the ceremony. The apoſtles likewiſe *laid hands* on thoſe upon whom they beſtowed the Holy Ghoſt.—The prieſts obſerved the ſame cuſtom when any one was received into their body.—And the apoſtles themſelves underwent the *impoſition of hands* afreſh, every time they entered upon* any new deſign. In the ancient church, *impoſition of hands* was even practiſed on perſons when they married; which cuſtom the Abyſſinians ſtill obſerve.

But this term, which, in its original ſignification, is general, is now reſtrained, by cuſtom, to that *impoſition* which is practiſed at ordination. Spanheim has written a treatiſe *De impoſitione manuum*; and Tribenhorius and Braunius have done the ſame. See *Impoſition of* HANDS, and ORDINATION.

IMPOSITION *of tonnage*, &c. See DUTY, &c.

IMPOSSIBLE, that which is not poſſible, or which cannot be done or effected. A propoſition is ſaid to be *impoſſible*, when it contains two ideas which mutually deſtroy each other, and which can neither be conceived, nor united together in the mind.

Thus it is *impoſſible*, that a circle ſhould be a ſquare; becauſe we conceive clearly, that ſquareneſs and roundneſs deſtroy each other by the contrariety of their figure.

There are two kinds of *impoſſibilities*, *phyſical* and *moral*.

Phyſical IMPOSSIBILITY, is that which is contrary to the laws of nature.

A thing is *morally* IMPOSSIBLE, when of its own nature it is poſſible, but yet is attended with ſuch difficulties, as that, all things conſidered, it appears *impoſſible*.

Thus it is *morally impoſſible*, that all men ſhould be virtuous; or that a man ſhould throw the ſame number with three dice a hundred times ſucceſſively.

A thing which is *impoſſible* in law, is the ſame with a thing *impoſſible* in nature: and if any thing in a bond or deed be *impoſſible* to be done, ſuch deed, &c. is void. 21 Car. I. B. R.

IMPOSSIBLE *quantity*, in *Algebra*. See ROOT.

IMPOST, from *impono*, *I impoſe*, in *Law*, properly denotes the tribute or tax appointed by a ſovereign to be paid for ſuch merchandize as is brought into any haven in his dominions from foreign nations. See DUTY.

Impoſt is diſtinguiſhed from CUSTOM, in that cuſtom more properly ſignifies the duties paid to the king for goods ſhipped off or exported. But the two are frequently confounded together.

IMPOSTHUME, by corruption from *impoſtem* and *apoſtem*, *abſceſs*, a collection of matter, or pus, in any part of the body, either owing to an obſtruction of the fluids in that part, which makes them change into ſuch matter; or to a tranſlation of it from ſome other part where it was generated. See ABSCESS.

IMPOSTORS, *religious*, are ſuch as falſely pretend to an extraordinary commiſſion from Heaven; and who terrify and abuſe the people with falſe denunciations of judgments. Theſe are puniſhable in the temporal courts with fine, impriſonment, and infamous corporal puniſhment.

IMPOSTS, in *Architecture*, the capitals of pillars, or pilaſters, which ſupport arches. See. *Tab. Archit. Fig.* 40, E.

An *impoſt*, ſometimes alſo called *chaptrel*, is a ſort of little cornice, which crowns a pier, and ſupports the firſt ſtone whence an arch or vault commences.

Impoſts conform to their proper orders.—The Tuſcan is a plinth only; the Doric has two faces crowned; the Ionic has a larmier over the two faces, and its mouldings may be carved; the Corinthian and Compoſite have a larmier, freeze, and other mouldings.

The projecture of the *impoſt* muſt not exceed the naked of the pilaſter. Sometimes the entablature of the order ſerves fot the *impoſt* of the arch; and this looks very grand and ſtately.

The *impoſt* is a thing eſſential to an ordonnance; inaſmuch as without it, in the place where the curve line of the arch meets with the perpendicular line of the pillar, there always ſeems a kind of elbow.

P in *fig.* 40, repreſents an *impoſt* made open or flat in the middle, and bounded by fillets or ogee. This kind of *impoſt* is ſaid to be the invention of lord Burlington, and is by many called a *Burlington impoſt*. It is enriched with a *guloic*, or bands forming circles and interſecting each other: when there are two rows, it is called a double *guloic*.

The following rules are given by ſome modern authors for dividing the *impoſts* of arches: in the Tuſcan *impoſts*, the facia hath 3 parts, the ogee 1, the fillet $\frac{1}{2}$, the corona 3, and the band $1\frac{1}{2}$. For the projections, the facia $\frac{1}{2}$, the ogee 2 parts, corona 3, and the whole $3\frac{1}{2}$.

In the Doric, the frieze 2, fillet $\frac{1}{4}$, aſtragal $\frac{3}{4}$, cyma recta $2\frac{1}{4}$, fillet $\frac{1}{4}$, corona 2, ogee 1. For the projections, fillet $\frac{1}{2}$, aſtragal 1, corona $2\frac{1}{2}$, and the whole $3\frac{1}{2}$.

In the Ionic, fillet $\frac{1}{2}$, cyma 4, ovolo $1\frac{1}{4}$, corona $1\frac{1}{2}$, ogee 1. For the projections, cyma $1\frac{3}{4}$, corona $2\frac{1}{2}$, the whole $3\frac{1}{2}$.

In the Corinthian, the frieze $1\frac{3}{4}$, fillet $\frac{1}{4}$, aſtragal $\frac{1}{2}$, cyma $2\frac{1}{4}$, ovolo 1, corona $1\frac{1}{2}$, ogee 1. For the projections, fillet $\frac{1}{4}$, aſtragal $\frac{3}{4}$, cyma $1\frac{3}{4}$, corona $2\frac{1}{2}$, the whole $3\frac{1}{2}$.

In the Compoſite, frieze 2, fillet $\frac{1}{4}$, aſtragal $\frac{3}{4}$, ovolo 1, cyma $1\frac{1}{2}$, corona $1\frac{1}{2}$, ogee 1. For the projections, fillet $\frac{1}{4}$, aſtragal $\frac{3}{4}$, ovolo $1\frac{1}{2}$, cyma $2\frac{1}{4}$, corona $2\frac{1}{2}$, the whole $3\frac{1}{2}$.

IMPOTENCE, or IMPOTENCY, derived from the prepoſition *in*, taken privatively, and *potentia*, *power*, a want of ſtrength, power, or means, to perform any thing.

Divines and philoſophers diſtinguiſh two kinds of *impotency*, *natural* and *moral*.—The firſt is want of ſome phyſical principle neceſſary to an action; or it is where a being is abſolutely defective, or not free, and at liberty to act: the ſecond only imports a great difficulty; as a ſtrong habit to the contrary; a violent paſſion, inclination, or the like.—*Impotency* is more particularly uſed for a natural inability to coition.

In this ſenſe, *impotency* is defined an inability or inſufficiency in the male to impregnate the female.

We have inſtances of unfitneſs for generation in men, by an impediment to the ejection of the ſemen in coition, from a wrong direction, which the orifices of the verumontanum got, whereby the ſeed was thrown into the bladder. Mr. Petit cured one patient under ſuch a difficulty of emiſſion, by making an inciſion like to that commonly made in the great operation for the ſtone. See Mem. de l'Acad. de Chirurg. tom. I.

Impotence may be cauſed by various accidents, but moſt frequently takes its riſe from early and immoderate venery; and often from the venereal diſeaſe.

Impotency is a canonical diſability, to avoid marriage in the ſpiritual court. The marriage is not void *ab initio*, but voidable only by ſentence of ſeparation, during the life of the parties.

IMPRACTICABLE *caſe*, in *Algebra*. See IRREDUCIBLE.

IMPRECATION, derived from *in*, and *precor*, *I pray*; a curſe, or wiſh that ſome evil may befal any one.

The ancients had their goddeſſes called *Imprecations*, in Latin *Diræ*, i. e. *Deorum iræ*, who were ſuppoſed to be the executioners of evil conſciences. They were called *Diræ* in heaven, *Furies* on earth, and *Eumenides* in hell. The Romans owned but three of theſe *Imprecations*, and the Greeks only two. They invoked them with prayers, and pieces of verſes, to deſtroy their enemies.

IMPREGNATION, derived from *impregnare*, of *prægnans*, a *woman with child*; the emiſſion of the ſeed of the male in coition, by which the female conceives, or becomes with young. See GENERATION.

IMPREGNATION is alſo figuratively uſed in pharmacy, when a liquor imbibes the particles of ſome other body.

Thus a menſtruum is ſaid to be *impregnated* with a body diſſolved in it, as much as its pores are able to receive.

IMPRESSED *ſpecies*. See SPECIES.

IMPRESSING, in the *Sea Language.* See MANNING *the fleet.*

IMPRESSION, in *Philoſophy*, is applied to the SPECIES of objects which are ſuppoſed to make ſome mark or *impreſſion* on the ſenſes, the mind, and the memory.

The Peripatetics tell us, that bodies emit ſpecies reſembling them, which ſpecies are conveyed by the exterior ſenſes to the common ſenſory: theſe *impreſſed* ſpecies, being material and ſenſible, they ſay, are rendered intelligible by the active intellect; and, when thus ſpiritualized, are called *expreſſions*, or *expreſs ſpecies*, as being expreſſed from the others.

IMPRESSION is alſo frequently uſed in ſpeaking of the editions of a book, or of the number of times it has been printed.

Impreſſion, however, differs from *edition*: the former, properly ſpeaking, takes in no more than what belongs to the printing, the letter, paper, margin, page, diſtances of words and lines, and the diſpoſition of every thing that may have a good or bad effect upon the eye: the latter, beſides all this, takes in the care of the editor, who has reviſed the copy, corrected or augmented it, adding notes, tables, and other like things, which he judged might contribute towards making the book more uſeful and correct.

Indeed very frequently the word *edition* only refers to this latter part; as when, in ſpeaking of the works of S. Auguſtine, we quote the edition of Eraſmus, the Lovaniſts, Benedictines, &c. where we have no regard to the printing part, but only to the care and pains of the editors.

Privilege for IMPRESSION. See PRIVILEGE.

IMPRESSIONS on *gems* and *medals*. See GEMS and MEDALS.

IMPREST, *Auditors of*. See AUDITORS.

IMPRISONMENT, the ſtate of a perſon reſtrained of his liberty, and detained under the cuſtody of another; and extends not only to a GAOL, but to a houſe, ſtocks, or a man's being held in the ſtreet, &c. None ſhall be impriſoned but by the lawful judgment of his peers, or by the law of the land. Mag. Ch. 9 Hen. III. c. 2. 25 Edw. III. ſt. 5. c. 4.

No perſon is to be impriſoned but as the law directs, either by the command or order of a court of record, or by lawful warrant; or the king's proceſs, on which one may be lawfully detained. And at common law, a perſon could not be impriſoned unleſs he were guilty of ſome force and violence, for which his body was ſubject to impriſonment, as one of the higheſt executions. Where the law gives power to impriſon, in ſuch caſe it is juſtifiable, provided he that does it in purſuance of a ſtatute, exactly purſues the ſtatute in the manner of doing it, for otherwiſe it will be deemed falſe impriſonment, and in conſequence it is unjuſtifiable. Every warrant of commitment for impriſoning a perſon, ought to run, "Till delivered by due courſe of law," and not "Until farther order;" which has been held ill, and thus it alſo is, where one is impriſoned on a warrant not mentioning any cauſe for which he is committed.

A perſon being ſent to priſon by a warrant from a ſecretary of ſtate, without aſſigning any cauſe, &c. it was adjudged, that he ought to be diſcharged for that reaſon. Perſons may alſo, by bail or habeas corpus, be diſcharged from their impriſonment in any caſe bailable. See the articles HABEAS CORPUS, BAIL, PRISON, PRISONER, and GAOL.

Falſe IMPRISONMENT. See FALSE, and APPEAL.

IMPROMPTU. See INPROMPTU.

IMPROPER *fractions*. See FRACTIONS.

IMPROPRIATION, is a term uſed where the profits of an eccleſiaſtical benefice are in the hands of a layman.

In which ſenſe it ſtands diſtinguiſhed from APPROPRIATION, which is where the profits of a benefice are in the hands of a biſhop, college, &c. though the two are now often uſed promiſcuouſly.—There are ſaid to be 3845 *impropriations* in England.

IMPROPRIETY, the quality of ſomething that is not fit, or proper. See PROPER, and PROPRIETY.

Grammarians obſerve three kinds of faults in language; a SOLECISM, BARBARISM, and *impropriety*: an *impropriety* is committed when a word is uſed that has not a *proper* ſignification.

IMPROVIDE', in *Law*. See QUIA *improvidè*.

IMPULSIVE, a term in philoſophy, applied to the action of the body which impels or puſhes another.

Thus the arm is ſaid to give an *impulſive* motion to the ſtone that it throws. See PROJECTILE.

In this ſenſe, *impulſive* ſtands contradiſtinguiſhed from *attractive* and *repulſive*.

Sir Iſaac Newton ſuggeſts, that attraction itſelf may poſſibly be effected by an *impulſive* power.

IMPURITY, in the *Moſaic* law. There were ſeveral ſorts of *impurity* contracted under the law of *Moſes*. Some were voluntary, as the touching of a dead body, or of any animal that died of itſelf, or of any creeping things, or unclean creature; or the touching things holy by one who was not clean, or was not a prieſt; or touching perſons under *impure* circumſtances. Other kinds of *impurity* there were, of an involuntary nature; for which we muſt refer the reader to Calmet, who ſhews what kind of purification was preſcribed for each ſpecies of pollution. See Numb. xix. 11, 14. Levit. xi. 24, 43. Levit. xii. 23, 45. Id. xv. 25. Calm. Dict. Bibl. in voc.

IMPUTATION, a term much uſed among divines, ſometimes in a good, and ſometimes in an ill ſenſe: in the latter it is uſed to ſignify the charging the ſin to the account of one, which was committed by another. The word, however, is generally uſed in an ill ſenſe; for when we place any good to the account of another, we uſe the word attribute.

Thus Adam's ſin is ſaid by ſome divines to be *imputed* to all his poſterity; all his deſcendants, by his fall, becoming as criminal in the ſight of God, as if they had fallen themſelves; and bearing the juſt puniſhment of his firſt crime. See *Original* SIN.

Imputation, uſed in a good ſenſe, ſignifies the charging of another's juſtice, or merit.

Thus the juſtice of Jeſus Chriſt is ſaid to be imputed to us; his merits, and the price of his ſufferings, being applied to us.

IN, in the *Manege*,—*To put a horſe* IN, is an expreſſion that ſignifies to breed and dreſs him, by putting him right upon the hand and the heels.

IN, in the *Sea language*, denotes the ſtate of any of a ſhip's ſails, when they are furled or ſtowed: it is uſed in oppoſition to *out*, which implies that they are ſet, or extended to aſſiſt the ſhip's courſe.

IN-*penny and out-penny*, in *Our Old Writers*, money paid by the cuſtom of ſome manors on the alienation of tenants, &c.—In-penny and out-penny *conſuetudo talis eſt in villa de Eaſt Radham, de omnibus terris quæ infra Burgagium tenentur, viz. quod ipſe, qui vendiderit vel dederit dictam tenuram alicui, dabit pro exitu ſuo de eadem tenura unum denarium, & ſimile de ingreſſu alterius; et ſi prædicti denarii a retro fuerint, ballivus domini diſtringet pro eiſdem denariis in eadem tenura.* Regiſt. Prior. de Cokesford, p. 25.

INACCESSIBLE *height*, or *diſtance*. See ALTITUDE, DISTANCE, &c.

INACHIA, Ιναχια, in *Antiquity*, a feſtival in Crete celebrated in honour of Leucothea, or Ino.

The word is compounded of Ino, and ἄχος, *i. e.* grief; being perhaps a commemoration of Ino's misfortunes.

INACTION, *ceſſation of action*, a term much uſed in the myſtical divinity; by which is underſtood a privation, or annihilation, of all the faculties; whereby the door is, as it were, ſhut to all external objects, and a kind of ecſtaſy is procured, during which God ſpeaks immediately to the heart. It is the ſtate of *inaction* that is held the moſt proper for receiving the Holy Spirit; and in this fit of dozing, they ſay, it is that God communicates ſublime and ineffable ſentiments and graces to the ſoul.

Some do not make it conſiſt in this ſtupid kind of indolence, or general ſuſpenſion of all ſenſation: but by *inaction* only mean a ceſſation of deſires, in which, as the ſoul does not determine itſelf to any poſitive acts, neither does it abandon itſelf to uſeleſs meditations, or the vain ſpeculations of reaſon; but demands in general every thing that may be agreeable to God, without preſcribing any thing to him.

This latter is the doctrine of the ancient myſtics, and the former that of the modern ones, or the quietiſts.

In general, however, it may be ſaid, that *inaction* is not the moſt likely way of pleaſing God; by our actions chiefly we are to gain his favour; he will have us to act; ſo that *inaction* cannot be agreeable to him.

INACTIVITY *of matter*. See VIS *inertiæ*.

INADEQUATE *idea*, or *notion*, is a partial or incomplete repreſentation of any thing to the mind. See IDEA.

INAJA *guacuiba*, in *Botany*, a name by which ſome authors have called the cocoa-nut tree, or *palma indica nucifera* of other writers.

INALIENABLE, that which cannot be validly alienated, or made over to another. See ALIENATION.

Thus the dominions of the king, the church, minors, &c. are *inalienable*, otherwiſe than with a reſerve of the right of redemption for ever.

INAMBLUCIA, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the ſelenitæ; but of the number of the columnar, not the rhomboidal kinds, and compoſed merely of parallel fibres. See SELENITES.

INAMELLING, or ENAMELLING. See ENAMELLING.

INANIMATE, derived from *in*, taken privatively, and *anima*, *ſoul*, denotes a body that has either loſt its ſoul, or that is not of a nature capable of having any.

Thus, a dead man is an *inanimate* lump, and metals are *inanimate* bodies.

INANITION, a term in *Phyſic*, ſignifying emptineſs; or the ſtate of the ſtomach, when it is empty, and needs food.

There are flatulencies which proceed from repletion, and others from *inanition*, which laſt are the more dangerous.

INANITY, the ſchool term for emptineſs or abſolute vacuity, and implies the abſence of all body and matter whatſoever, ſo that nothing remains but mere ſpace.

INARCHING, in *Gardening*, a particular ſort of grafting, called alſo by ſome grafting by approach. It is uſed when the ſtock intended to be grafted on, and the tree from which the graft is to be taken, ſtand ſo near one another, that they may be brought to touch. The branch to be *inarched* is to be fitted to that part of the ſtock where it is to be joined, the rind and wood are to be pared away on one ſide for the length of three inches, and the ſtock or branch where the graft is to be united is to be ſerved in the ſame manner, ſo that the two may join equally together, and the ſap meet; a little tongue is then to be cut upwards in the graft, and a notch made in the ſtock to admit it, ſo that when they are joined, the tongue will prevent their ſlipping, and the graft will more cloſely unite to the ſtock. Having thus brought them exactly together, they muſt be tied with ſome baſs or worſted, or other ſoft tying, and then the place muſt be covered with ſome grafting clay, to prevent the air from drying the wound, and the wet from rotting the ſtock; a ſtake muſt be fixed in the ground, to which both the ſtock and the graft muſt be tied, to prevent the winds diſplacing them. When they have remained in this ſtate four months, they will be ſufficiently united, and the graft may then be cut off from the mother-tree, obſerving to ſlope it cloſe to the ſtock, and at this time there ſhould be freſh clay laid all round the part. This operation ſhould be performed in April or May, that the graft may be perfectly united to the ſtock, before the enſuing winter. It is principally practiſed upon oranges, myrtles, jeſſamines, walnuts, and firs, and ſome other trees, which do not ſucceed well in the common way of grafting. But it is a wrong practice when orange trees are deſigned to grow large, for theſe are ſeldom long-lived after the operation. See ABLACTATION and ENGRAFTING.

INARTICULATE, an epithet applied to ſuch ſounds, ſyllables, or words, as are not pronounced diſtinctly. See ARTICULATION.

INAUGURATION, the coronation of an emperor, or king; or the CONSECRATION of a prelate, ſo called in imitation of the ceremonies uſed by the Romans, when they were received into the college of augurs. See CROWN, KING, and BISHOP.

The word comes from the Latin *inaugurare*, which ſignifies to dedicate a temple, or to raiſe any one to the prieſthood, having, in order to that, firſt taken auguries. See AUGUR, and AUGURY.

INCA, or YNCA, an appellation which the natives of Peru give to their kings, and princes of the blood.

The chronicle of Peru relates the origin of the *incas*: this country had been a long time the theatre of all ſorts of wars, horrible crimes, and diſſenſions, till at length there appeared two brothers, the one of whom was called Mancocapac: of this perſon the Indians uſe to tell wonders; they ſay he built the city of Cuzco, ſettled laws and policy, and taught them to adore the ſun: and he and his deſcendants took the name of *inca*, which, in the language of Peru, ſignifies *king*, or *great lord*. Theſe *incas* grew ſo powerful, that they made themſelves maſters of the whole country, from Chili, to Quito, eſtabliſhing in every province their peculiar policy and religious inſtitutions, and held it till the diviſions between the brothers Huaſcar, and Atahualpa; which the Spaniards under Pizarro laying hold of, made themſelves maſters of Peru, and put an end to the empire of the *incas*, in 1533. They number only twelve of theſe *incas*. It is ſaid, the moſt conſiderable among the nobles of the country ſtill bear the name of *inca*.

INCALESCENCE, compounded of *in*, and *caleo*, or *caleſco*, *I grow warm*, the growing hot of any thing, either by motion and friction, or as quick-lime does by pouring water on it.

INCALESCENT *mercury*, a name given by Mr. Boyle to ſome mercuries of an uncommon preparation; which, by being mingled with a due proportion of gold-leaves, or ſmall filings, would amalgamate and grow hot with the gold.

INCAMERATION, derived from *in*, and *camera*, *chamber*, in the *apoſtolic chancery*, the union of ſome land, right, or revenue, to the domains of the pope. See CHAMBER.

INCANTATION, derived from the Latin *in*, and *canto*, *I ſing*, (ſee CHARM, and CARMEN), *inchantment*; words and ceremonies uſed by magicians to raiſe devils; or rather to impoſe on the credulity of the people. See CONJURATION, FASCINATION, MAGIC, WITCHCRAFT, &c.

INCAPACITY, in matters of benefices among the canoniſts, is of two kinds: the one renders the proviſion of a benefice null in its original; the other is acceſſary, and annuls the proviſions which at firſt were valid.

Incapacities of the firſt kind, are the want of a diſpenſation for age in a minor, for legitimation in a baſtard, for naturalization in a foreigner, &c.

Of the latter kind, are grievous offences and crimes: as being concerned in ſeeing a ſentence of death executed, &c. which they decree, vacate the benefice to all intents, or render the holding it irregular.

INCARNATION, in *Theology*, ſignifies the act whereby the Son of God aſſumed the human nature; or the myſtery by which Jeſus Chriſt, the eternal word, was made man, in order to accompliſh the work of our ſalvation. The æra uſed among Chriſtians, whence they number their years, is the time of the *incarnation*, that is, of Chriſt's conception in the virgin's womb.

This æra was firſt eſtabliſhed by Dionyſius Exiguus, about the beginning of the ſixth century, till which time the æra of Diocleſian had been in uſe.

Some time after this, it was conſidered, that the years of a man's life were not numbered from the time of his conception, but from that of his birth: which occaſioned them to poſtpone, the beginning of this æra, for the ſpace of one year, retaining the cycle of Dionyſius entire, in every thing elſe.

At Rome they reckon their years from the *incarnation*, or birth of Chriſt, that is, from the 25th of December, which cuſtom has obtained from year 1431. In France, and ſeveral other countries, they alſo reckon from the *incarnation*: but then they differ from each other in the day of the *incarnation*, fixing it, after the primitive manner, not to the day of the birth, but conception of our Saviour. Though the Florentines retain the day of the birth, and begin their year from Chriſtmas. See Petav. de Doct, Temp. Grandamicus de Dei Nat. See ÆRA and EPOCHA.

INCARNATION, formed from *in*, and *caro*, *fleſh*, in *Surgery*, ſignifies the healing and filling up ulcers and wounds with new fleſh.

INCARNATIVE, in *Medicine* and *Surgery*, is applied to medicines, bandages, and ſutures, which diſpoſe a wound or ulcer to fill up with fleſh. Whence they are alſo called *anaplerotics*, from *ανα*, *again*; and *πληροω*, *to fill.*

INCARNATIVE *medicine*, is ſuch an one as makes the fleſh heal and unite.

INCARNATIVE *bandage*. See BANDAGE.

INCARNATIVE *ſuture*. See SUTURE.

INCARTATION, in *Chemiſtry*, the refining of gold, by means of ſilver, and aqua fortis.

This is the ſame with what is otherwiſe called *departing*. See DEPART.

INCENDIARY, *incendiarius*, in *Law*, is applied to one who is guilty of maliciouſly ſetting fire to another's dwelling-houſe, and all outhouſes that are parcel thereof, though not contiguous to it nor under the ſame roof, as barns and ſtables. A bare intent, or attempt to do this, by actually ſetting fire to a houſe, unleſs it abſolutely burns, does not fall within the deſcription of *incendit et combuſſit*. But the burning and conſuming of any part is ſufficient; though the fire be afterwards extinguiſhed. It muſt alſo be a malicious burning; otherwiſe it is only a treſpaſs. This offence is called ARSON in our law.

Among the ancients, criminals of this kind were to be burnt. *Qui ædes, acervumque frumenti juxta domum poſitum ſciens, prudenſque dolo malo combuſſerit, vinctus igni necatur.*

The puniſhment of *arſon* was death by our ancient Saxon laws and by the Gothic conſtitutions; and in the reign of Edward the Firſt, *incendiaries* were burnt to death. The ſtat. 8 Hen. VI. c. 6. made the wilful burning of houſes, under ſpecial circumſtances, high treaſon; but it was reduced to felony by the general acts of Edward VI. and queen Mary. This offence was denied the benefit of clergy by 21 Hen. VIII. c. 1. which ſtatute was repealed by 1 Edw. VI. c. 12; and arſon was held to be ouſted of clergy, with reſpect to the principal, by inference from the ſtat. 4 and 5 P. and M. c. 4. which expreſsly denied it to the acceſſory; though now it is expreſsly denied to the principal alſo, by 9 Geo. I. c. 22. See BLACK-*act*. See alſo FIRE-*cocks*.

INCENSE, from *incenſum*, q. d. *burnt*; as taking the effect for the thing itſelf; an aromatic, odoriferous reſin; otherwiſe called FRANKINCENSE.

INCEPTIVE, a word uſed by Dr. Wallis to expreſs ſuch moments, or firſt principles, which, though of no magnitude themſelves, are yet capable of producing ſuch as are. See INFINITE, and INDIVISIBLE.

Thus a point has no magnitude itſelf, but is inceptive of a line which it produces by its motion. So a line, though it have no breadth, is yet *inceptive* of breadth; that is, it is capable, by its motion, of producing a ſurface which has breadth, &c.

INCERATION, among *Apothecaries*, the mixing of liquids with ſomething that is dry, by a gentle ſoaking, till the compoſition be brought to a ſubſtance of the conſiſtence of ſoft wax.

INCERTAINTY, in *Law*, is that which oppoſeth certainty; where a thing is ſo ambiguouſly ſet down, that the plain meaning cannot be underſtood: and this is ſaid to be the mother of contention. The queſtions of *uncertainty* ariſe ſometimes on matter of record, as writs, counts, pleas, verdicts, &c. and ſometimes on deeds or writings, or upon contracts, &c. 5 *Rep.* 121. *Plowd.* 25. In law proceedings, *incertainty* will make them void; for all proceedings in law are to be certain and affirmative; but the defendant may be at a certainty as to what he ſhould anſwer, &c. *Plowd.* 84. If the court and verdict in an appeal be uncertain, there can be no judgment given thereon; and it is the ſame on an indictment, 3 *Mod.* 121. *Incertainty* in deeds renders them void; but ſometimes a term for years granted by leaſe, may be made certain by reference to certainty: and *incertainty* may be reduced to certainty by matter, *ex poſt facto*, implication, &c. *Plowd.* 6. 273. 6 Rep. 20. If there are two men of one name, and a deviſe of lands, &c. is to one of that name, without any diſtinction, it will be void for *incertainty*; though perhaps an averment may make it good. 2 *Bulſtrode*, 180. *Incertainty* in declarations of uſes, of fines, of lands, &c. is rejected in law; for otherwiſe there would be no certain inheritances. 9 *Rep.*

INCEST, the crime of venereal commerce between perſons who are related in a degree prohibited marriage by the laws of the country.

Some are of opinion, that marriage ought to be permitted between kinsfolks, to the end that the affection, ſo neceſſary in marriage, might be heightened by this double tie; and yet the rules of the church have formerly extended this prohibition even to the ſeventh degree, but time has now brought it down to the third or fourth degree. See Marriage.

Moſt nations look on *inceſt* with horror, Perſia and Egypt alone excepted. In the hiſtory of the ancient kings of thoſe countries we meet with inſtances of the brother's marrying the ſiſter: the reaſon was, becauſe they thought it too mean to join in alliance with their own ſubjects: and ſtill more ſo, to have married into the families of any foreign princes.

As to the Perſians, there was a ſtill more abominable ſort of *inceſt* practiſed by their magi: if we may truſt Catullus, *carm.* 91.

> *Nam magus ex matre & gnato gignatur oportet,*
> *Si vera eſt Perſarum impia religio.*

In 1650, *inceſt* and wilful Adultery were made capital crimes; but at the Reſtoration it was not thought proper to renew a law of ſuch unfaſhionable rigour: and theſe offences have been ever ſince left to the feeble coercion of the ſpiritual court, according to the rules of the canon law.

Spiritual Incest, is the like crime committed between two perſons who have a ſpiritual alliance, by means of baptiſm, or confirmation.

Spiritual Incest is alſo underſtood of a vicar, or other beneficiary, who enjoys both the mother and the daughter; that is, holds two benefices, the one whereof depends on the collation of the other.

Such a *ſpiritual inceſt* renders both the one and the other of thoſe benefices void.

INCESTUOUS, the name of a ſect or hereſy, which aroſe in Italy about the year 1065.

The hereſy of the *Inceſtuous* had its beginning at Ravenna; the learned of which place, being conſulted by the Florentines about the degrees of affinity which prohibit marriage, made anſwer, that the ſeventh generation, mentioned in the canons, was to be taken on both ſides together; ſo that four generations were to be reckoned on one ſide, and three on the other.

They proved this their opinion by a paſſage in Juſtinian's Inſtitutes, where it is ſaid, that a man may marry his brother's or ſiſter's grand-daughter, though ſhe be but in the fourth degree: whence they concluded, that if my brother's grand-child be in the fourth degree with reſpect to me, ſhe is in the fifth with reſpect to my ſon, in the ſixth with reſpect to my grandſon, and in the ſeventh with reſpect to my great grandſon.

Peter Damian wrote againſt this opinion, and pope Alexander II. condemned it in a council held at Rome.

INCH, a known Engliſh meaſure, the twelfth part of a Foot.

Inch *of candle*, a manner of ſelling goods among merchants. The method of it is thus.—Notice is uſually given upon the Exchange in writing and elſewhere, when the ſale is to begin: againſt which time the goods are divided into ſeveral parcels, called *lots*, and papers printed of the quantity of each, and of the conditions of ſale; as, that none ſhould bid leſs than a certain ſum more than another had bid before. During the time of the bidding, a ſmall piece, of about an *inch*, of wax-candle, is burning; and the laſt bidder, when the candle goes out, has the lot or parcel expoſed to ſale.

INCHASING, in *Sculpture*. See Enchasing.

INCHOATIVE, a term ſignifying the beginning of a thing, or action; the ſame with what is otherwiſe called, *inceptive*.

Inchoative *verbs*, denote, according to Priſcian and other grammarians, verbs that are characteriſed by the termination *ſco* or *ſcor*, added to their primitives: as *augeſco* from *augeo*, *caleſco* from *caleo*, *dulceſco* from *dulcis*, *iraſcor* from *ira*, &c.

INCIDE, *cut*.—Thoſe medicines are ſaid to *incide*, which conſiſt of pointed, and ſharp particles; as acids, and moſt ſalts; by the force or inſinuation of which the particles of other bodies, which before cohered, are divided from one another.

And thus ſome expectorating medicines are ſaid to *incide*, or cut the phlegm, when they break it, ſo as to occaſion its diſcharge. See Expectoration.

INCIDENCE, in *Mechanics*, expreſſes the direction in which one body ſtrikes on another; otherwiſe called Inclination.

In the incurſions of two moving bodies, their *incidence* is ſaid to be *perpendicular* or *oblique*, as their directions or lines of motion make a ſtrait line, or an oblique angle at the point of contact.

Angle of Incidence, commonly denotes the angle comprehended between an *incident* ray, or other body, and a perpendicular to the plane in the point of *incidence*.

Thus ſuppoſing AB (*Tab.* II. *Optics*, *fig.* 26.) an incident ray proceeding from the radiant point A, to B the point of *incidence*, and HB a perpendicular to DE in the point of *incidence*: the angle ABH, comprehended between AB and HB, is the *angle of incidence*, by others called the *angle of inclination*.

Angle of Incidence is alſo uſed by Dr. Barrow, and ſome others, for the complement of the above angle, or of the angle of inclination.

Thus, ſuppoſing AB an *incident* ray, and HB a perpendicular, as before; the angle ABD comprehended between it and the reflecting or refracting plane DE, is the *angle of incidence*; and the angle ABH, the angle of inclination.

Others, with Wolfius, make another diſtinction; which ſee under the articles Angle, Reflection, and Refraction.

It is demonſtrated by optical writers, 1°, That the *angle of incidence*, ABH, *fig.* 26. is always equal to the angle of reflection HBC, or the angle ABD to the angle CBE, and they lie in the ſame plane. See Reflection.

2°, That the ſines of the *angles of incidence* and refraction are to each other accurately, or very nearly in a given ratio. See Refraction.

3°, That from air to glaſs the ſine of the *angle of incidence* is to the ſine of the refracted angle as 300 to 193, or nearly as 14 to 9: on the contrary, that from glaſs to air, the ſine of the *angle of incidence*, is to the ſine of the refracted angle as 193 to 300, or as 9 to 14. See Refraction.

It is true, Sir Iſaac Newton having ſhewn, that the rays of light are not all equally refrangible, there can be no preciſe ratio fixed between the ſines of the angles of refraction and *incidence*: but the proportion which comes neareſt, is that above ſpecified. See Light, Colour, Refrangibility, &c.

Incidence *of eclipſe*. See Eclipse and Immersion.

Axis of Incidence. See Axis *of incidence*. Such is the line BH, *fig.* 26.

Cathetus of Incidence See Cathetus *of incidence*; ſee alſo Reflection.

Line of Incidence, in *Catoptrics*, denotes a right line, as AB, *Tab.* II. *Optics*, *fig.* 26. whereby light is propagated from a radiant point A, to a point B, in in the ſurface of a ſpeculum.—This is alſo called an *incident ray*.

Line of Incidence, in *Dioptrics*, is a *right line*, as AB, *Tab.* IV. *fig.* 50. whereby light is propagated unrefracted, in the ſame medium, from the radiant point to the ſurface of the refracting body HKLI.

Point of Incidence, is the point B on the ſurface of the reflecting or refracting medium, in *fig.* 26. and *fig.* 56. on which the incident ray falls.

Scruples of Incidence. See Scruples.

INCIDENT, in a general ſenſe, denotes an event, or a particular circumſtance of ſome event.

Incident, in *Law*, is a thing appertaining to, or following

ing another, that is more worthy or principal. A court-baron is inſeparably *incident* to a manor; and a court of pie-powders to a fair.

INCIDENTS, in the *Materia Medica*. See ATTENUANTS.

INCIDENT, in a *Poem*, is an epiſode, or particular action, joined to the principal action, or depending on it.

A good comedy is to be full of agreeable *incidents*, which divert the ſpectators, and form the intrigue. The poet ought always to make choice of ſuch *incidents* as are ſuſceptible of ornament ſuitable to the nature of his poem.

The variety of *incidents* well conducted makes the beauty of an heroic poem, which ought always to take in a certain number of *incidents* to ſuſpend the cataſtrophe, that would otherwiſe break out too ſoon.

INCIDENT *ray*. See RAY, INCIDENCE, and INCLINATION.

INCINERATED *ſalts*, the ſame with lixivial ſalts. See the following article, and LIXIVIAL.

INCINERATION, derived from *in*, and *cinis*, *aſhes*, in *Chemiſtry*, the reduction of vegetables into aſhes, by burning them gently.

Thus fern is *incinerated* for the making of glaſs.

INCISION *crucial*. See CRUCIAL.

INCISION, *grafting by double*. See ENGRAFTING.

INCISIVE, INCISIVUS, in *Anatomy*, is applied to ſeveral teeth, a double muſcle, and certain orifices ſituated near thoſe teeth.

INCISIVI *dentes*. See *Cutting* TEETH.

INCISIVUS is alſo an appellation given to the firſt proper muſcle of the upper lip; becauſe it has its origin in the bone of the upper jaw, near the place of the *inciſive* teeth: hence it paſſes, and is inſerted, into the upper lip, which it ſerves to draw up. The maxillary bones have four internal orifices, two whereof are called INCISIVA, as being directly under the *dentes inciſivi*.

INCISORIUS *muſculus*, in *Anatomy*, a name given by Santorini to the muſcle called by Albinus *levator labii ſuperioris*; and *elevator labii ſuperioris*, by Cowper. See the preceding article. Of theſe muſcles, called *inciſivi*, or *inciſorii*, there are the *inferiores Cowperi*, which ariſe from the alveoli of the lateral *inciſores* of the lower jaw, and are inſerted into the middle of the *ſemiorbicularis* of the lower lip. There are alſo the *inciſorii laterales*, which are a ſort of *biceps* muſcles, uniting into one at their lower end: they ariſe from the os maxillare, below the middle tendon of the orbicularis palpebrarum, and below the edge of the orbit in the os maxillare, near the union of this bone with the os malæ. Theſe two portions, on each ſide, unite about the lateral cutting teeth. The *inciſorii medii*, called alſo the *inciſorii minores* of Cowper, or leſſer upper *inciſorii*, are two ſmall ſhort muſcles, ſituated near each other, below the ſeptum narium; they riſe from the os maxillare, on the alveoli of the firſt inciſores, and are inſerted into the middle and upper part of the upper lip.

INCLAVE, in *Heraldry*, a term uſed by Morgan, to expreſs an irregular line in heraldry, differing from the indented, invected, and all the others. It is called by ſome patee, and by others the dove-tail line, from its reſemblance to that joint, known among our joiners by this name. It is alſo called by ſome the labelled line. It has theſe names from the figure of the points, as they proceed from the ordinary, ſuch as a chef or ſeſs reſembling the ends of labels.

INCLINATION, in *Medicine* and *Chemiſtry*, the operation of pouring off a clear liquor from ſome fæces, or ſediment, by only gently ſtooping the veſſel.

This amounts to the ſame with what is otherwiſe called DECANTATION.

INCLINATION, in *Phyſics*, expreſſes the mutual approach or tendency of two bodies, lines, or planes, towards one another; ſo that their directions make at the point of contact an angle of a greater or leſſer magnitude.

INCLINATION *of a right line to a plane*, is the acute angle, which ſuch a right line makes with another right line drawn in the plane through the point where the inclined line interſects it, and through the point where it is alſo cut by a perpendicular drawn from any point of the inclined lines.

INCLINATION *of meridians*, in *Dialling*, the angle that the hour-line on the globe, which is perpendicular to the dial-plane, makes with the meridian.

INCLINATION *of an incident ray*, otherwiſe called the *angle of inclination*. See *Angle of* INCIDENCE.

INCLINATION *of a reflected ray*, is the angle which a ray after reflection makes with the axis of *inclination*.

Thus, if AB, *Tab.* II. *Opt. fig.* 26. be the incident ray, HB a perpendicular to DE in the point B, and BC the reflected ray, CBH will be the *inclination of the reflected ray*, and ABH the *inclination* of the incident ray.

INCLINATION *of the axis of the earth*, is the angle which it makes with the plane of the ecliptic; or the angle between the planes of the equator and ECLIPTIC.

INCLINATION *of the magnetical needle*. See DIPPING *needle*.

INCLINATION *of a planet*, is an arch or angle comprehended between the ecliptic, and the place of a planet in his orbit.

The greateſt *inclination* of Saturn, according to Kepler, is 2° 32′; of Jupiter 1° 20′; of Mars 1° 50′ 20″; of Venus 3° 22′; of Mercury 6° 54′. According to de la Hire, the greateſt declination of Saturn is 2° 33′ 30″; of Jupiter 1° 19′ 20″; of Mars 1° 51′ 0″; of Venus 3° 23′ 5″; of Mercury 6° 52′ 0″. See JUPITER, MARS, MERCURY, &c.

INCLINATION *of a plane*, in *Dialling*, is the arch of a vertical circle, perpendicular both to the plane and the horizon, and intercepted between them.

To find this, take a quadrant, and apply its ſide to the ſide of a ſquare, and apply the other ſide of your ſquare to your plane: if the plumbet fall parallel to the ſide of the ſquare, then the lower ſide of the ſquare ſtands level; by which draw an horizontal line, whereon erect a perpendicular, and apply your ſquare to that perpendicular; and if the plumbet falls parallel to the ſide of the ſquare, then that is alſo a level line, and your plane ſtands horizontally: if the plumbet falls not parallel to the ſide of the ſquare, then turn your ſquare, until it does; and draw an horizontal line, on which erect a perpendicular, to which apply your ſquare, and obſerve what angle your plumbet makes on the quadrant, with the ſide of the ſquare: that is the angle of the *inclination of the plane*. See DECLINATOR.

INCLINATION *of two planes*, is the acute angle made by two lines drawn one in each plane, through a common point of ſection, and perpendicular to the ſame common ſection.

Thus, in *Tab.* III. *Geometry*, *fig.* 51. the *inclination* of the plane KEGL to the plane ACDB, is the angle HFI, made by the right lines HF and FI in the point F, perpendicular to the line of ſection EG.

INCLINATION, *angle of*, in *Optics*, is the ſame with what is otherwiſe called the *angle of* INCIDENCE.

INCLINATION, *argument of*. See ARGUMENT.

INCLINATION, in a moral ſenſe. See APPETITE.

INCLINED *plane*, in *Mechanics*. See *Inclined* PLANE. See alſo MECHANICS, and MECHANICAL *powers*.

INCLINED *towers*. See TOWERS.

INCLINERS, in *Dialling*. See DIAL, and DEINCLINERS.

INCLOSING *of land*. See LAND.

INCOGNITO, a term borrowed from the Italians, uſed when a perſon is in any place where he would not be known; but it is more particularly applied to princes, or great men, who enter towns, or walk the ſtreets, without their ordinary train, or the uſual marks of their diſtinction and quality; or when they travel without their proper titles.

The grandees in Italy make a common cuſtom of walking the ſtreets *incognito*; and always take it amiſs, on ſuch occaſion, when people pay their compliments to them. It is not barely to prevent their being known, that they take theſe meaſures; but becauſe they would not be treated with ceremony, nor receive the honours due to their rank.

When the horſes in princes, cardinals, and ambaſſadors coaches have no taſſels, which they call *fiocchi*, and the curtains, which they call *bandinelle*, are drawn, they are reputed to be *incognito*; and nobody that meets them is obliged to ſtop, or make his honours to them.

The cardinals alſo, when they would be *incognito*, leave off the red hat.

INCOMBUSTIBLE, that which cannot be burnt or conſumed by fire.

Metals melt, ſtones calcine, and are yet *incombuſtible*. Cloth made of *lapis* AMIANTHUS has been deemed *incombuſtible*: it is cleaned by fire, but not burnt. See ASBESTOS, and LINUM *incombuſtibile*.

INCOMBUSTIBLE *lint*, a name given by authors to a peculiar kind of aſbeſtos, or earth flax, which never is formed into compact maſſes as the other ſpecies are, but is always found in looſe filaments, and thoſe of a very flexible nature, and extremely fit to work.

This is a kind of aſbeſtos, wholly different from the ſpecies known to the ancients, and is found, ſo far as is yet known, only in the county of Aberdeen in Scotland, in the neighbourhood of Achintore, near the Highlands. See ASBESTOS, and LINUM *incombuſtibile*.

The fabricating a cloth of this ſubſtance has not yet been attempted; but Mr. Wilſon, who firſt diſcovered it, had ſome of it ſpun into yarn, which gives proof that the other is practicable. Phil. Tranſ. Nº 276. p. 1005.

INCOMMENSURABLE, a term in geometry, uſed where two lines, when compared to each other, have no COMMON *meaſure*, how ſmall ſoever, that will exactly meaſure them both.

In the general, two quantities are ſaid to be *incommenſurable*, when no third quantity can be found that is an aliquot part of both; or, when thoſe quantities are not to one another as unity to a rational number; or as one rational number to another. See COMMENSURABLE.

The ſide of a ſquare is *incommenſurable* to the diagonal, as is demonſtrated by Euclid; but it is commenſurable in power, the ſquare of the diagonal being equal to twice the ſquare of the ſide.

Pappus, lib. iv. prob. 17. ſpeaks alſo of *incommenſurable* angles. Surfaces which cannot be meaſured by a common ſurface, are alſo ſaid to be *incommenſurable* in power. See DIOPHANTINE *problems*.

INCOMPATIBLE, that which cannot ſubſiſt with another without deſtroying it.

Thus cold and heat are *incompatible* in the ſame ſubject; the ſtrongeſt overcoming and expelling the weakeſt.

INCOMPATIBLE *benefices*, in *Law*, are thoſe which cannot be retained together, if they be with cure, and of a particular value in the king's books. See CHAPLAIN.

INCOMPLEX *oppoſition*. See OPPOSITION.

INCOMPOSITE *numbers* are the ſame with what Euclid calls *prime numbers*. See PRIME and NUMBER.

INCONCINNOUS *diſcords*. See DISCORDS.

INCONCINNOUS *ſyſtem*. See SYSTEM.

INCONTINENCE. Beſide the moral ſenſe of this word, it ſignifies in medicine an inability in any of the organs to retain what ſhould not be diſcharged without the concurrence of the will. But *incontinence* is moſt frequently uſed with regard to an involuntary diſcharge of urine.

The bladder is ſometimes ſo debilitated in men, that their urine flows from them involuntarily, by drops, not exceeding the uſual quantity; which may proceed either from a ſtone in the bladder, or a palſy of the ſphincter, or injuries occaſioned by blows, bruiſes, &c. Sometimes this is the effect of a fever; and it may be likewiſe occaſioned by a long uſe of ſtrong diuretics, or of ſtimulating medicines, injected into the bladder. In the firſt caſe the only remedy is lithotomy, or an extraction of the ſtone: nor is lithotomy infallible; for that operation frequently occaſions the diſorder. But if it proceeds from a weakneſs in the neck of the bladder, aſtringent and corroborating medicines are moſt likely to remove or to diminiſh it. See DIABETES.

But as this diſorder often baffles the utmoſt power of medicines, the ſurgeons have contrived inſtruments to retain the urine. Some recommend a leathern bag lined with pitch, to be worn in the breeches between the thighs, large enough to contain half a pint; others prefer a braſs or a ſteel pipe, faſtened to the penis, to be emptied when near full. But as theſe are very inconvenient, the moderns have contrived more light and eaſy inſtruments, whereby the penis and urethra are gently compreſſed, ſo as to retain the urine in the bladder, and diſcharge it at pleaſure, by opening and ſhutting this light inſtrument, which is lined with leather, and taken from Nuck. Another ſtill more convenient may be tightened or relaxed, according to the different ſize of the penis. This Heiſter ſays he has often uſed with ſucceſs; nor was it ever before delineated by any one.

An inſtrument was formerly recommended by Nuck, and lately by Winſlow, for this diſorder; not unlike that uſed for ruptures. It is to be faſtened round the body in the manner directed for compreſſing fiſtulas in the perinæum; ſo that the bolſter may be fixed tight upon the perinæum. Thus, by turning a ſcrew, the urethra may be compreſſed or relaxed, and the urine diſcharged or retained at pleaſure.

An *incontinence* of urine in women frequently proceeds from a difficult labour, or from a weakneſs of the ſphincter, by the violent extraction of a large ſtone; though it ſometimes happens from a natural weakneſs or palſy, as in men. But whatever the cauſe may be, when it is inveterate, or proceeds from the palſy, it will neither ſubmit to internal medicines, nor external machines.

If however it ariſes from the extraction of a ſtone, eſpecially in girls or in young women, it often goes off ſpontaneouſly, or by the external and internal uſe of aſtringents: if theſe fail, it is generally looked upon as incurable. Hiſcherus affirms, however, in a treatiſe upon this ſubject, that the beſt method is to introduce a peſſary, or ring of a proper ſize, into the vagina; as for a prolapſus uteri: for the introduction of this into the vagina, under the urethra, compreſſes the latter ſo firmly, that the urine may be retained or diſcharged at pleaſure James.

INCONTINENCY, in a moral ſenſe, is of divers kinds; as in caſes of bigamy, rapes, ſodomy, or buggery, getting baſtards; all which are puniſhed by ſtatute. See 25 Hen. VIII. cap. 6. 18 Eliz. cap. 7. 1 Jac. I. cap. 11. *Incontinency* of prieſts is puniſhable by the ordinary, by impriſonment, &c. 1 Hen. VII. cap. 4.

INCORPORATION, formed from *in*, and *corpus*, *body*, the mixing the particles of different bodies ſo together, as to make an uniform ſubſtance or compoſition of the whole, without leaving any poſſibility of diſcerning the ingredients or bodies mixed, in any of their particular qualities.

INCORPORATION, in *Law*. See CORPORATION.

INCORPOREAL, *ſpiritual*; a thing, or ſubſtance, which has no body. See SPIRIT, and BODY.

Thus the ſoul of man is *incorporeal*, and may ſubſiſt independent of the body. See SOUL.

Thoſe ideas which are independent of bodies, can neither be corporeal themſelves, nor be received within a corporeal ſubject: they diſcover to us the nature of the ſoul, which receives within itſelf what is *incorporeal*, and receives it in a corporeal manner too; whence it is, that we have *incorporeal* ideas even of bodies themſelves. Fenelon.

INCORPOREAL *inheritance*, in *Law*. See INHERITANCE.

INCORRUPTIBLE, that which cannot be corrupted. See CORRUPTION.

Thus ſpiritual ſubſtances, as angels, human ſouls, &c. and thus alſo glaſs, gold, mercury, &c. may be called *incorruptible*.

INCORRUPTIBLES, INCORRUPTIBILES, the name of a ſect which ſprang out of the Eutychians.

Their diſtinguiſhing tenet was, that the body of Jeſus Chriſt was *incorruptible*; by which they meant, that after and from the time wherein he was formed in the womb of his holy mother, he was not ſuſceptible of any change or alteration; not even of any natural and innocent paſſions, as of hunger, thirſt, &c. ſo that he eat without any occaſion, before his death, as well as after his reſurrection. And hence it was that they took their name.

INCRASSATING, the act of condenſing, or rendering fluids thicker, by the mixture of other leſs fluid particles; or by expelling the finer particles, and compinging and bringing the groſſer nearer together.

Incraſſating medicines are ſuch as reduce the too fluid blood and juices to a proper conſiſtence.

INCREMENT, *Incrementum*, in *Rhetoric*, a ſpecies of climax, gradually riſing from the loweſt to the higheſt. Such is that of Seneca: *Turpiſſima tamen eſt jactura, quæ per negligentiam venit: et, ſi volueris attendere*, magna *vitæ pars elabitur male agentibus, maxima nihil agentibus*, tota *aliud agentibus*. See CLIMAX.

INCROACHMENT, in *Law*. See ACCROCHING.

INCRUSTATION, the lining or coating of a wall, either with gloſſy ſtones, ruſtics, marble, pottery, or ſtucco-work; and that either equally, or in panels and compartments.

INCRUSTED, or INCRUSTATED *column*. See *Incruſtated* COLUMN.

INCUBATION, the action of a hen, or other fowl, brooding on her eggs.

INCUBUS, *night-mare*, in *Medicine*, a diſeaſe conſiſting in the ſpaſmodic contraction of the muſcles of the breaſt, ſo very violent, that the patient cannot ſpeak or even breathe.

The word is derived from the Latin *incubare*, *to lie down on any thing*, and *preſs it*. The Greeks called it εφιαλτης, q. d. *ſaltator*, *leaper*, or ſomething that ruſheth on a perſon.

In this diſeaſe the ſenſes are not quite loſt, but they are drowned and aſtoniſhed, as is alſo the underſtanding and imagination; ſo that the patient ſeems to think ſome huge weight thrown on him, and ready to ſtrangle him.

Children are very liable to this diſtemper; ſo are fat people, and men of much ſtudy and application of mind; becauſe the ſtomach, in all theſe, finds ſome difficulty in digeſtion.

The *incubus* ſeems to be nearly allied to the epilepſy and apoplexy; for, if it laſts long, it degenerates into one or other of thoſe diſtempers. Others reckon it a kind of aſthma, and call it *aſthma nocturnum*; and ſay it proceeds from the ſame cauſes, and is helped by the ſame means as the common aſthma.

Signs of it. The moſt obvious ſymptom of this diſeaſe is a ſenſation like that of ſome great weight laid upon the breaſt; this is attended with ſo violent a cohibition of reſpiration, that the perſon becomes unable to move any part of his body, or to utter any diſtinct or articulate ſound; though he ſometimes groans and cries out. He ſometimes imagines that he is in imminent danger of various kinds, and unable to eſcape. This whole complaint goes off as ſoon as any one limb is moved, but there is often an univerſal laſſitude of the whole body left behind it, which remains for ſome ſpace of time. This diſeaſe generally attacks people in the night-time, in a ſort of middle ſtate between ſleep and waking.

Perſons ſubject to it. Thoſe of plethoric habits are moſt ſubject to fall into this diſeaſe, and among them ſuch particularly as have a great thickneſs of the blood. Perſons who are ſubject to hypochondriac complaints, and to diſorders of the ſpleen, are alſo much affected with it; and it is uſually brought on by eating large ſuppers, going to bed ſoon after, and then ſleeping upon the back.

Cauſes of it. Theſe are a ſtagnation of the blood in plethoric habits, where it is thick about the vena portæ, which nature is endeavouring to throw off by means of thoſe ſpaſmodic motions, which conſtitute this diſeaſe; and very often crudities in the primæ viæ become additional cauſes, and exaſperate the complaint. Some have ſuppoſed that this diſorder proceeds from a ſtagnation of the blood in the brain, lungs, &c. but it is rather a nervous affection, and ariſes chiefly from indigeſtion. Accordingly, perſons of weak nerves, who lead a ſedentary life, and live full, are moſt commonly afflicted with it. The *incubus* is often cauſed by wind, and by any kind of mental oppreſſion.

Prognoſtics in it. This is uſually eſteemed a trifling complaint, and at the utmoſt, if it does not go off of itſelf, to be cured by bleeding. Phyſicians eſteem it a diſeaſe of no danger; but it is much to be ſuſpected, that many of thoſe people who are found dead in their beds periſh by it.

Method of cure. When this diſtemper returns frequently, the method is to give gentle purges three or four times, with the digeſtive medicines, ſuch as gum ammoniacum, or the tartarum vitriolatum, on the intermediate days; after this, bleeding in the foot is proper; and when this has been done, powders of nitre and cinnabar uſually complete the cure: if they fail, the common method in hypochondriac caſes is to be uſed. When there are crudities in the primæ viæ, which exaſperate this diſeaſe, then after the purges, gentle bitters, and other medicines which will reſtore the tone of the ſtomach, are to be given. Gentian and orange-peel in infuſion, are very good for this purpoſe. When it happens almoſt wholly from a load on the ſtomach, a gentle vomit alone will perform a cure. To prevent returns, the patients muſt accuſtom themſelves to lie on one or the other ſide, never on the back.

Dr. Whytt recommends a glaſs of brandy at bed-time, as a preventive: this, however, will gradually loſe its effect, and is by no means adviſable. The patient ſhould rather depend on the uſe of food of eaſy digeſtion, chearfulneſs, exerciſe in the day, and a light early ſupper. Perſons who are young, and full of blood, if troubled with this diſorder, ſhould take a purge often, and uſe a ſpare diet. Junker and Buchan.

INCUMBENT, in *Law*, a clerk reſident in his benefice, with cure.

He is called *incumbent* of ſuch church, becauſe he ought to bend his whole ſtudy to diſcharge his cure. See RECTOR.

INCUMBRAVIT, in *Law*. See QUARE *incumbravit*.

INCURVATION, the act of bending a bone, or other body, from its natural ſhape.

INCURVATION *of the rays of light.* See LIGHT, and REFRACTION.

INCUS, in *Anatomy*, the ſecond of the oſſicles, or little bones of the ear.

The *incus* or anvil contained in the barrel of the ear, reſembles in ſome meaſure one of the anterior grinders, with its roots at a great diſtance from each other; at leaſt it comes nearer to this than to the ſhape of an anvil. Anatomiſts divide it into the body, and the branches: the body is a ſomewhat large ſubſtance; the branches or legs are two, one long and one ſhort; the body is turned forward, the ſhort leg backward, and the long leg downward. The body of the *incus* is broader than it is thick; it has two eminences, and two cavities between them, much as we ſee in the crown of the firſt grinders. The ſhort leg is thick at its origin, and from thence decreaſing gradually it ends in a point; it is ſituated horizontally, its point being turned backward, and joined to the edge of the maſtoide opening of the tympanum. The long leg viewed through the external auditory paſſage appears to be ſituated vertically; but if we look upon it either on the fore or back-ſide we ſee it is inclined, the extremity of it being turned much more inward than the root or origin. The point of the extremity is a little flatted, and bent back like a hook, and ſometimes a little hollowed like a kind of ear-picker. By this the *incus* of one ear may be diſtinguiſhed from that of the other, when out of their places; for turning the ſhort leg backward and the long leg downward, if the curvature of this long leg be toward the left hand, the bone belongs to the right ear; if toward the right it belongs to the left ear. Winſlow. See EAR.

INDECIMABLE, *Indecimabilis*, in *Law*, is applied to things not tythable, or which by law ought not to pay TITHE.

INDEFEISIBLE, or INDEFEAZABLE, in our *Law*, ſignifies what cannot be defeated, or made void. As, a good and *indefeiſible* eſtate.

INDEFINITE, *indeterminate*, that which has no certain bounds, or to which the human mind cannot affix any. Deſcartes uſes the word, in his philoſophy, inſtead of *infinite*, both in numbers and quantities, to ſignify an *inconceivable* number, or number ſo great, that an unit cannot be added to it; and a quantity ſo great, as not to be capable of any addition.

Thus, he ſays, the ſtars, viſible and inviſible, are in number *indefinite*; and not, as the ancients held, infinite; and that quantity may be divided into an *indefinite* number of parts, not an infinite number.

INDEFINITE is alſo uſed, in the *Schools*, to ſignify a thing that has but one extreme: for inſtance, a line drawn from any point, and extended infinitely.

Thus what they call *eternity a parte ante*, or *eternity a parte poſt*, are *indefinite* durations.

INDEFINITE, in *Grammar*, is underſtood of nouns, pronouns, verbs, participles, articles, &c. which are left in an uncertain indeterminate ſenſe, and not fixed to any particular time, thing, or other circumſtance.

INDEFINITE *propoſition*, in *Logic*. See PROPOSITION.

INDELIBLE, formed from *delere*, *to blot*, with the prepoſition *in*, taken negatively, that which cannot be blotted out, or effaced.

Thus baptiſm, and the order of the prieſthood, are ſaid to convey *indelible* characters.

INDEMNITY, formed from the negative *in*, and *damnum*, *loſs*, in *Law*, an act by which one promiſes to guarantee, or ſave harmleſs, ſome other perſon from any loſs or damage that might accrue to him on any particular account.

When a church is appropriated to an abbey, or college, the archdeacon loſeth his induction money for ever; in recompence whereof he ſhall have yearly, out of the church ſo appropriate, one or two ſhillings, more or leſs, for a penſion, as was agreed at the time of the impropriation; and this penſion is called an *indemnity*.

INDEMNITY, with regard to eſtates. See WARRANTY.

INDEMNITY. See *Act of* GRACE.

INDENTED, INDENTEE, in *Heraldry*, is when the outline of a bordure, ordinary, &c. is notched, in form of the teeth of a ſaw. *Tab.* II. *Heraldry*, *fig.* 69.

INDENTED *leaf*. See *Serrated* LEAF.

INDENTED *line*, in *Fortification*. See REDENS.

INDENTED *verge*. See DENTED.

INDENTED *medals and wheel*. See MEDALS and WHEEL.

INDENTURE, in *Law*, a writing which compriſes ſome contract between two, at leaſt; being indented at top anſwerable to another part, which has the ſame contents. See DEED.

INDEPENDENT *company and troop*. See COMPANY and TROOP.

INDEPENDENTS, a ſect of proteſtants in England and Holland; ſo called, as denying not only any ſubordination among their clergy, but alſo all *dependency* on any other aſſembly.

They maintain, that every ſeparate church, or particular congregation, has in itſelf radically and eſſentially every thing neceſſary for its own government; that it has all eccleſiaſtical power and juriſdiction; and is not at all ſubject to other churches, or their deputies, nor to their aſſemblies, or ſynods.

Robinſon, the founder of the ſect, makes expreſs uſe of this term in explaining his doctrine relating to eccleſiaſtical government: *Cœtum quemlibet particularem* (ſays he, in his Apologia, cap. 5. p. 22.) *eſſe totam, integram et perfectam eccleſiam ex ſuis partibus conſtantem, immediate et* independenter *(quoad alias eccleſias) ſub ipſo Chriſto.* It may probably have been from this very paſſage that the title of *Independents* was originally derived. The diſciples of Robinſon, originally called BROWNISTS, becauſe John Robinſon, the founder of this ſect, was paſtor of a congregation of Browniſts that had ſettled at Leyden, did not reject the appellation of *Independents*. It was certainly utterly unknown in England before the year 1640; at leaſt it is not once mentioned in the eccleſiaſtical canons and conſtitutions that were drawn up, during that year, in the ſynods or viſitations held by the archbiſhops of Canterbury, York, and other prelates, in which canons all the various ſects, that then ſubſiſted in England, are particularly mentioned. See Wilkins's Concilia Magnæ Britanniæ et Hiberniæ, vol. iv. cap. 5. p. 548.

It is true, that not long after this period, and more particularly from the year 1642, we find this denomination very frequently in the Engliſh annals. The Engliſh *Independents* were ſo far from being diſpleaſed with it, that they aſſumed it publicly in a piece, which they publiſhed in their own defence at London, in the year 1644, entitled,

titled, Apologetical Narration of the *Independents*. But in proceſs of time, in order to avoid the odium of ſedition and anarchy charged on this ſect, the true and genuine *Independents* renounced this title, and called themſelves *Congregational Brethren*, and their religious aſſemblies *congregational churches*. The firſt *Independent*, or congregational church in England, was ſet up in the year 1616, by Mr. Jacob, who had adopted the religious ſentiments of Robinſon. The *Independents*, though ſprung originally from a congregation of Browniſts, were much more commendable than the latter, both in the moderation of their ſentiments, and the order of their diſcipline. The Browniſts, as we have already mentioned under that article, allowed all ranks and orders of men promiſcuouſly to teach in public, and to perform the other paſtoral functions; whereas the *Independents* had, and ſtill have, a certain number of miniſters, for the moſt part regularly educated, choſen reſpectively by the congregations where they are fixed; nor is any perſon among them permitted to ſpeak in public, before he has ſubmitted to a proper examination of his capacity and talents, and been approved of by the congregation to which he miniſters. The charge alleged againſt them by our hiſtorian Rapin, (Hiſt. of England, vol. ii. p. 514. fol. ed.) who ſays, that they could not ſo much as endure ordinary miniſters in the church, &c. is, therefore, evidently falſe and groundleſs. He was led into his miſtake by confounding the *Independents* and Browniſts. There are other charges, no leſs unjuſtifiable, that have been urged againſt the *Independents*, by this celebrated hiſtorian, and by others of leſs note. Rapin ſays, that, with regard to the ſtate, they abhorred monarchy, and approved only a republican government. This might have been true with regard to ſeveral perſons among the *Independents*, in common with thoſe of other ſects; but it does not appear from any of their public writings, that republican principles formed the diſtinguiſhing characteriſtic of this ſect. On the contrary, in a public memorial drawn up by them in 1647, they declare, that they do not diſapprove of any form of civil government, but do freely acknowlege, that a kingly government, bounded by juſt and wholeſome laws, is both allowed by God, and alſo a good accommodation unto men. The *Independents*, however, have been generally diſtinguiſhed by the denomination of regicides; under a notion, that they were chargeable with the death of Charles I. Whether this fact be admitted or denied, and this is not a place proper for the inveſtigation of it, no concluſion can be fairly drawn from the greater prevalence of republican principles, or from violent proceedings at that period, that can affect the diſtinguiſhing tenets and conduct of the *Independents* in general; and eſpecially of the ſect that bears this denomination in our times. It is certain, that our *Independents* are ſteady friends to a limited monarchy. Rapin is farther miſtaken, when he repreſents the religious principles of the *Independents* as contrary to thoſe of all the reſt of the world. It appears from two confeſſions of faith, one compoſed by Robinſon, on behalf of the Engliſh *Independents* in Holland, and publiſhed at Leyden in 1619, entitled, Apologia pro exulibus Anglis, qui Browniſtæ vulgo appellantur, and another drawn up in London in the year 1658, by the principal members of this community in England, entitled, A Declaration of the Faith and Order owned and practiſed in the congregational Churches in England, agreed upon and conſented unto by their Elders and Meſſengers, in their Meeting at the Savoy, Oct. 12, 1658; as well as from other writings of the *Independents*, that they differed from the reſt of the reformed in no ſingle point of any conſequence, except that of eccleſiaſtical government; and their religious doctrines were almoſt entirely the ſame with thoſe that are adopted by the church of Geneva. During the adminiſtration of Cromwell, the *Independents* acquired very conſiderable reputation and influence; and he made uſe of them as a check to the ambition of the preſbyterians, who aimed at a very high degree of eccleſiaſtical power, and who had ſucceeded, ſoon after the elevation of Cromwell, in obtaining a parliamentary eſtabliſhment of their own church government. But after the reſtoration of Charles II. their cauſe declined; and in the year 1691, under the reign of king William, they entered into an aſſociation with the preſbyterians reſiding in and about London, under certain heads of agreement, comprized in nine articles, that tended to the maintenance of their reſpective inſtitutions. Theſe may be found in the ſecond volume of Whiſton's Memoirs of his Life and Writings; and the ſubſtance of them in Moſheim, ubi infra.

At this time the *Independents* and preſbyterians, called from this aſſociation the United Brethren, were agreed with regard to doctrines, being generally Calviniſts, and differed only with reſpect to eccleſiaſtical diſcipline. But at preſent, though the Engliſh *Independents* and preſbyterians form two diſtinct parties of proteſtant diſſenters; they are diſtinguiſhed by very trifling differences with regard to church government; and the denominations are more arbitrarily uſed to comprehend thoſe who differ in theological opinions. The *Independents* are generally more attached to the tenets diſtinguiſhed by the term ORTHODOXY or CALVINISM, than the PRESBYTERIANS.

Independentiſm is peculiar to Great Britain, the Britiſh colonies of America, whither it was carried firſt in 1620, and by ſucceſſive Puritan emigrants in 1629 and 1633, from England, and the United Provinces. One Morel, in the ſixteenth century, endeavoured to introduce it into France; but it was condemned at the ſynod of Rochel, where Beza preſided, and again at the ſynod of Rochel in 1644.

On the ſubject of this article, ſee Moſheim's Eccl. Hiſt. by Macleane, vol. iv. p. 522, &c. 8vo. Neal's Hiſt. of the Puritans, vol. ii. p. 107, &c. vol. iii. p. 547, &c. vol. iv. p. 187, &c. Burnet's Hiſt. of his own Times, vol. i. p. 46, &c.

INDETERMINATE, in *Geometry*, is underſtood of a quantity either of time or place, which has no certain or definite bounds. See INDEFINITE.

INDETERMINATE *problem*, is that, whereof there may be infinite different ſolutions.

For inſtance, if a number be required that may be a multiple of 4 and 5; where the anſwer may be 20, 40, 60, &c. to infinity. Thus alſo, in a queſtion of ALLIGATION, if a refiner, having three ingots of ſilver of different fineneſs, viz. of 4, 6, and 10 ounces, were required to mix a maſs of 20℔ weight, ſo as to make it 8 ounces fine; how much muſt he take of each ſort? The beſt way, in this, is to determine algebraically the limits of any one of the unknown quantities: ſuppoſe them x, y, z. Then, from the premiſed conditions, $x+y+z=20$. And, $4x+6y+10z=160$. Therefore, $x=20-y-z=\frac{160-6y-10z}{4}$. And $y=40-3z$. Conſequently z leſs than 14.

Alſo, $x=20-40-3z-z=2z-20$: therefore z greater than 10. Whence the limits of z are 14 and 10, and we ſhall have the following anſwers in whole numbers.

z	y	x
11	7	2
12	4	4
13	1	6

Or, if it were required to find two numbers whoſe ſum together with their product may be equal to a given number, or to make a rhomboides, wherein the rectangle under the two ſides may be equal to a given ſquare; both of which problems admit of infinite ſolutions. See DIOPHANTINE *problems*.

INDEX, in *Anatomy*, denotes the *fore*-FINGER.

It is thus called from *indico*, *I point* or *direct*; becauſe that finger is generally ſo uſed: whence alſo the extenſor indicis is called *indicator*.

The Greeks call it λιχανος, *licker*.

INDEX, in *Arithmetic*, is the ſame with what is otherwiſe called the characteriſtic, or EXPONENT of a LOGARITHM.

The *index* is that which ſhews of how many places the abſolute number belonging to the logarithm conſiſts, and of what nature it is, whether an integer, or a fraction.

Thus, in this logarithm 2,521293, the number ſtanding on the left hand of the point is called the *index*; and becauſe it is 2, it ſhews you that the abſolute number anſwering to it conſiſts of three places; for it is always one more than the *index*, becauſe the *index* of 1 is 0; of 10 is 1; and of 100 is 2, &c. And, therefore, in thoſe ſmall tables of Briggs's Logarithms, where the *index* is omitted, it muſt be always ſupplied, before you can work by them.

If the abſolute number be a fraction, the *index* of the logarithm has a negative ſign, and is marked thus, $\bar{2}$,562293; which ſhews the correſponding number to be a decimal fraction of three places; viz. 1,365.

Mr. Townly has a peculiar way of noting theſe *indices*, when they expreſs fractions, now much in uſe, viz. by taking, inſtead of the true *index*, its arithmetical complement to 10; ſo that he would write the logarithm now mentioned thus: $\bar{8}$.562293.

How *indices* are to be added and ſubtracted, ſee under the article LOGARITHM.

INDEX *of a book*, is that part annexed to a book, referring to the particular matters or paſſages therein contained.

INDEX *of a globe*, is a little ſtyle fitted on to the north-pole, and turning round with it, pointing to certain diviſions in the hour-circle.

It is ſometimes alſo called *gnomon*. See GLOBE.

INDEX *of relation*, in *Algebra*, the ſame with ſcale of relation. See SCALE.

INDEX, or **INDICE**, is alſo the denomination of a congregation at Rome, whoſe buſineſs is to examine books, and to put ſuch as they think fit to prohibit the reading and ſelling of, into an *index*.

Indices, or *Expurgatory Indices*, is the name by which the catalogues of prohibited books are called; among which, however, there is this difference, that ſome are condemned purely and abſolutely, and others only *donec corrigantur*, till they be corrected,

Father Paul ſays, that Philip of Spain was the firſt who, by a law made in 1588, procured an *index* to be publiſhed of the books condemned by the inquiſition of Spain. Pope Paul IV. took the hint, and in 1559 ordered the congregation of the holy office at Rome to print a ſecond. But Gretſer, De Jure Prohib. lib. li. cap. 19, ſays, that the *index* of prohibited books was printed in Italy, by the papal authority, in 1548; and a larger one, in 1552; and another larger in 1554. Pius IV. recommended the matter to the council of Trent; the fathers at Trent, after ſeveral debates, not being able to agree, thought fit to refer the whole affair to the pope, who, with the advice of certain learned prelates, publiſhed an *index* of the prohibited books, and certain rules, by his letters, in form of a brief. The ſame Pius IV. in a bull of March 24, 1564, ſays, that the *index* was preſented to him by order of the ſynod, that it ſhould not be publiſhed before it was approved by him. It was accordingly publiſhed by him, with a ſtrict charge that it ſhould be received by all, and the rules prefixed to it obſerved. Clement VIII. enlarged and confirmed it, together with the rules, and commanded it to be publiſhed in 1595. This was called by the name of the Roman *Index*. By the fourth rule, the common reading of the Holy Scriptures is forbid in theſe words. "Since it is plain by experience, that if the ſacred writings are permitted every where, and without difference, to be read in the vulgar tongue, men, through their raſhneſs, will receive more harm than good; let the biſhop or inquiſitor determine, with the advice of the pariſh prieſt or confeſſor, to whom to permit the reading of the Bible, tranſlated by catholic authors, in the vulgar tongue, according as they ſhall judge whether it be moſt likely that ſuch reading the Scripture may do harm, or tend to the increaſe of faith and piety. Let them alſo have the ſame power as to all other writings. But if any, without ſuch leave, ſhall preſume to read or have them, without firſt ſhewing the Bible to the ordinaries, he ſhall not receive the abſolution of his ſins. And as to all bookſellers, who ſhall ſell the Bible tranſlated into the vulgar tongue, without ſuch leave, or by any other method ſhall publiſh them, let them forfeit the price of the books, and let the money be given to pious uſes by the biſhop; and let them be ſubject to other puniſhments, at the pleaſure of the ſaid biſhop, according to the nature of the offence. As to regulars, they ſhall not read or buy them, without leave firſt obtained from their prelates." The tenth rule enjoins ſeveral reſtrictive regulations concerning the printing and publication of books. Hardouin's Concil. tom. x p. 207, &c.

After this, the duke of Alva procured another to be printed at Antwerp, in 1571, which was publiſhed by Francis Junius about the year 1586. There were two others publiſhed in 1584, and 1612, by the cardinals Quiroga and Sandoval, and ſeveral others by the inquiſitors and maſters of the ſacred palace. The moſt conſiderable of all the *indices* is that of Anthony a Sotomayor, ſupreme preſident and inquiſitor-general in the kingdom of Spain, which was made for all the ſtates ſubject to the king of Spain, and comprehends all the others. This was publiſhed, with the advice of the ſupreme ſenate of the general inquiſition, in 1640, and reprinted at Geneva in 1667. To this there were many rules prefixed; and to the Geneva edition was added the *index* of the decrees which were made by the maſter of the holy palace, by virtue of his office, or by the command of the holy congregation, or by the holy congregations for the *indexes* and holy office, after the before mentioned *index* of the council of Trent. The rules of the former *indices* are explained and confirmed by theſe; and the fifth rule, which enlarges the fourth of the *index* of Trent, prohibits not only all Bibles in the vulgar tongue, comprehending all except thoſe that are Hebrew, Greek, Latin, Chaldee, Syriac, Ethiopic, Perſic, and Arabic; but all parts of them, either printed or manuſcript, with all ſummaries and abridgments in the vulgar language or tongue. Limborch's Hiſt. of the Inquiſition by Chandler, book ii. cap. 16.

Of the operation of theſe *indices*, the authors of the Encyclopædia obſerve, that there has been hardly any good book of piety or morality in their language which has not been proſcribed. Art. *Index*.

INDEX *of the variation and of the inequability of curvature*. See VARIATION *of curvature*.

Eaſt **INDIA** *Company, Coins, Silk*, &c. See COMPANY, COIN, SILK, &c.

INDIAN, in a general ſenſe, denotes any thing belonging to the Indies, Eaſt or Weſt.

INDIAN *arrow root*. See ARROW *root*.

INDIAN *bread*. See CASSADA.

INDIAN *corn*. See MAIZE.

INDIAN *Creſſes, Gem, Ink, Ocean, Red*. See the reſpective ſubſtantives.

INDIAN *fig*, in *Botany*. See *Prickly* PEAR.

INDIAN *god tree*, the name of a ſpecies of FIG.

INDIAN *leaf, Malabathrum*. See TAMALAPATRA.

INDIAN *reed*. See CANE and REED.

INDIAN *wood*, called alſo *Jamaica* and *Campeachy wood*, is taken out of the heart of a large tree growing plentifully in the iſles of Jamaica, Campeachy, &c. uſed in dying, its decoction being very red.

It has been obſerved, that putting ſome of this decoction into two bottles, and mixing a little powder of alum with the one, it will become of a very beautiful red, which will hold; the other in a day's time becoming yellow, though both bottles were ſtopped from the air alike; and that if a little of the ſame decoction be expoſed to the air, it will become as black as ink in the ſame ſpace of time. See CAMPEACHY *wood*, BRASIL, and LOGWOOD.

INDICATION, in *Phyſic*, ſignifies the pointing out or diſcovering what is fit to be done, and what means applied in any caſe, from a knowlege of the nature of the diſeaſe, and the virtue of medicines.

Indications are of four kinds: *preſervative*, or *prophylactic*, which direct how to cut off the cauſe of an approaching diſeaſe; *curative*, which ſhew how to remove a diſeaſe actually formed; *palliative*, which direct how to leſſen its effects, or take off ſome of its ſymptoms, before it can be wholly removed; and *vital*, which relate to the ſtrength of the body.

That part of phyſic which treats of *indications* is called SEMEIOTICA.

INDICATIVE, in *Grammar*, the firſt mood or manner of conjugating verbs, ſhewing either the time preſent, paſt, or future, and aſſerting what we think certain; and, therefore, ſometimes called the *declarative* mood.

I love, is the preſent tenſe; *I loved*, the paſt; and *I will love*, is the future of the *indicative* MOOD.

INDICATIVE *column*. See COLUMN.

INDICATOR, in *Anatomy*, a muſcle of the INDEX, or finger, next following the thumb.

The *indicator* is the firſt proper muſcle of the index; and is ſo called, becauſe it ſerves to extend that finger to point at any thing.

It has its origin in the middle and hind part of the cubitus, and is inſerted by a double tendon into the ſecond phalanx of the index, and to the tendon of the great extenſor, with which it acts in conjunction in ſtretching out the finger. See *Tab Anat. (Myol.) fig.* 7. *n.* 10. 49. See EXTENSOR.

INDICAVIT, in *Law*, a writ or prohibition that lies for a patron of a church, whoſe clerk is ſued in the ſpiritual court by another clerk for tythes, which do amount to a fourth part of the profits of the advowſon; then the ſuit belongs to the king's court, by the ſtat. Weſt. 2. cap. 5. And the patron of the defendant being likely to be prejudiced in his church and advowſon, if the plaintiff recovers in the ſpiritual court, hath this means to remove it to the king's court. Reg. Orig. 35. Old Nat. Br. 31.

INDICTION, ſignifies the convoking of an eccleſiaſtical aſſembly; as a ſynod, or council, and even a diet.

INDICTION is applied to the ſeveral ſeſſions of the ſame councils.

Hence it is, that at the end of the ſeſſions of the council of Trent, the decree by which the council appoints the day of the future ſeſſion, is called the *indiction* of that ſeſſion.

INDICTION, in *Chronology*, a term uſed for a kind of epocha, or manner of accounting time among the Romans; containing a cycle or revolution of fifteen years, which, when expired, begins anew, and goes round again without intermiſſion.

This method of computation has no dependence on the heavenly motions. Petavius ſays, there is nothing in chronology leſs known than the Roman *indiction*; he means, than its original and commencement. It is the general opinion, that it was inſtituted in the time of Conſtantine, about the year 312; but this is a mere gueſs. There were *indictions* in the time of the emperor Conſtantius, as appears from the Theodoſian Code. The learned hold, that *indictions* were originally no other than certain annual taxes, the tariffs whereof were publiſhed every year; but why they were ſo called, why confined to a cycle of fifteen years, when, and on what occaſion, inſtituted, is not known.

We find three kinds of *indictions* mentioned in authors; the *indiction* of Conſtantinople, beginning on the firſt of September; the Imperial or Cæſarean *indiction*, on the fourteenth of September; and the Roman or papal *indiction*, which is that uſed in the pope's bulls, and which begins on the firſt of January.

The popes have dated their acts by the year of the *indiction*, which was fixed to the firſt of January, A. D. 313, ever ſince Charlemagne made them ſovereign; before which time they dated them by the years of the emperors.

At the time of the reformation of the calendar, the year 1582 was reckoned the tenth year of the *indiction*; ſo that beginning to reckon hence, and dividing the number of years elapſed between that time and this by 15, the remainder, with the addition of 10, will be the year of *indiction*, correſponding to the year of our Lord 1780. The *indiction* may alſo be found by adding 3 to the year of our Lord, and dividing the ſum by 15, the remainder is then the year of the *indiction*: if there be no remainder, the *indiction* is 15. In either of theſe ways the year of *indiction* for 1780 is 13.

The word *indiction* comes from *indictio*, which ſignifies *eſtabliſhment*, *order*, or *denunciation*. The time of the *indiction*, among the Romans, was that wherein the people were ſummoned to pay a certain tribute; and it is for this reaſon, that the imperial *indiction* began towards the end of September; becauſe the harveſt being then got in, it was ſuppoſed the people could more eaſily pay their tax.

INDICTIVE, Indictivus, an epithet given to certain feaſt-days appointed by the Roman magiſtrates, viz. the conſul, or prætor.

INDICTMENT, derived from the French *enditer*, *indicare*, or, according to M. Lambard, from ενδεικνυμι, *I charge*, *I inform againſt*, in *Law*, a bill, or declaration, of complaint, drawn up, in form of law, for the benefit of the commonwealth; exhibited as an accuſation of one for ſome offence, criminal or penal, and preferred to a grand jury, and by their verdict found to be true. and preſented before a judge or officer, who has power to puniſh or certify the ſame offence,

Indictment, in *Common Law*, ſignifies as much as *accuſatio* among the civilians; though in ſome points it differs. See Accusation.

Lambard ſays, an *indictment* is an accuſation at the ſuit of the king, by the oaths of twelve men of the ſame county where the offence was committed; returned to inquire of all offences in general in the county, determinable by the court into which they are returned, and their finding a bill brought before them to be true. But when ſuch accuſation is found by a grand jury, without any bill brought before them, and afterward reduced to a formed *indictment*, it is called a preſentment; and when it is found by jurors returned to enquire of that particular offence only, which is indicted, it is properly called an inquiſition.

Although a bill of *indictment* may be preferred to a grand jury upon oath, they are not bound to find the bill, if they find cauſe to the contrary; and though a bill of *indictment* be brought to them without oath made, they may find the bill if they ſee cauſe. But it is not uſual to prefer a bill unto them, before oath be firſt made in court, that the evidence they are to give unto the grand inqueſt to prove the bill, is true.

The grand JURY are to find the whole of a bill, or to reject it; and not to find it ſpecially in part, &c. If they are ſatisfied of the truth of the accuſation, they then indorſe upon the bill of *indictment* "a true bill," anciently BILLA *vera*. But to find a bill, there muſt at leaſt twelve of the jury agree. The *indictment*, when ſo found, is publicly delivered into court.

As *indictments* are purely for the good and quiet of the commonwealth, they are to be preferred for criminal, not civil matters. They are uſed in caſes of high treaſon, and petit treaſon, felony, and treſpaſſes of all kinds, and in all pleas of the crown; though they cannot be uſed for injuries of a private nature, that neither concern the king nor the public; and therefore all *indictments* ought to be brought for offences committed againſt the common law, or againſt ſtatutes; and not for every ſlight miſdemeanor. A perſon cannot be *indicted* of ſuſpicion of felony, but of the very crime itſelf; and then if he be not in cuſtody, the ſheriff is commanded to attach his body by a capias, &c. A perſon *indicted* for felony may have counſel allowed to ſpeak for him, as to matter of law only; but ſuch as are *indicted* for treaſon may have a copy of their *indictment* before trial, in order to adviſe with counſel; and ſuch *indictments* are to be found within three years after the offence committed, unleſs the treaſon be directly againſt the king's perſon. 7 & 8 W. III. cap. 3. which is extended to trials on impeachments by 20 Geo. II. cap. 30. Perſons *indicted* of treaſon muſt be by the oaths of two witneſſes; but in other caſes one witneſs is ſufficient. The priſoner, in this caſe, ſhall alſo have a copy of the *indictment*, but not the names of the witneſſes, five days at leaſt before the trial, i. e. upon the true conſtruction of the act 7 W. III. cap. 3. before his arraignment; he ſhall alſo have a copy of the panel of jurors two days before his trial; and he ſhall have the ſame compulſive proceſs to bring in his witneſſes for him, as was uſual to compel their appearance againſt him. By 7 Ann. cap. 21. every perſon, *indicted* for high treaſon or miſpriſion of treaſon, ſhall have not only a copy of the *indictment*, but a liſt of all the witneſſes to be produced, and of the jurors impanelled, with their profeſſions and places of abode, delivered to him ten days before the trial, and in the preſence of two witneſſes. But this laſt act, ſo far as it affected *indictments* for the inferior ſpecies of high treaſon, reſpecting the coin and royal ſeals, is repealed by the ſtatute 6 Geo. III. cap. 53. But no perſon *indicted* for felony is, or (as the law ſtands) can be, entitled to ſuch copies, before the time of his trial.

Indictments muſt be certain in every point, and charge ſome particular offence; alſo goods ſtolen muſt be particularly ſet down, and the offence laid poſitively, and not by way of recital. There muſt alſo be expreſſed the Chriſtian name, ſurname, and addition of the offender, with the day, year, and place in which the offence was committed, as alſo the nature of the offence. 1 Hen. V. cap. 5. In an *indictment* for murder, the length, depth, or other dimenſion of the wound, muſt be expreſſed, that a judgment may be formed whether it was mortal; and in this caſe, the time of the death muſt be laid within a year and a day after the mortal ſtroke was given. See Appeal. And in felony, the value of the things ſtolen is to be particularly mentioned, in order that it may appear whether the offender has been guilty of grand or petit larceny. A miſtake in ſpelling the defendant's ſurname is not a ſufficient cauſe for abating the *indictment*, provided it ſounds like it. If a word of conſequence be omitted in an *indictment*, it renders the whole naught; but the caſe is not the ſame, where a word of form is omitted, or where there is an omiſſion of a ſynonymous word, if the ſenſe is not injured. In caſe one part of an *indictment* is inconſiſtent with another part of it, the *indictment* becomes void; though where the ſenſe is plain, the court will diſpenſe with a ſmall inconſiſtency. *Indictments* are amendable the ſame term they are brought into court, but not afterwards; and in criminal proſecutions, the amendment muſt be only ſuch as is permitted by the common law. *Indictments* for crimes committed, ought to be laid in the county where they were done; for otherwiſe, upon pleading the general iſſue, not guilty, if it appears that the offence was committed in another county or place different from that in the *indictment*, the defendant will be acquitted. An offender is ſubject to *indictment*, for a felony committed againſt a perſon unknown; yet ſome body muſt be proved to be the proprietor upon the trial, or elſe the property will be preſumed to be in the priſoner, he having pleaded not guilty. An *indictment* being at the king's ſuit, the proſecutor is a good witneſs to prove the charge contained in it; and no damage can be given to the party aggrieved, except it be particularly grounded on ſome ſtatute. *Indictments* before juſtices of the peace may be removed by certiorari into the king's bench.

A bill of *indictment* is ſaid to be an accuſation, becauſe the jury, who inquire of the offence, do not receive it till the party that offered the bill, appearing, ſubſcribes his name, and offers his oath for the truth of it.

It is always at the ſuit of the king, and differs from an *accuſation* in this, that the preferrer is no-way tied to the proof thereof upon any penalty, if it be not proved, except there appear a conſpiracy. But if any one prefer an *indictment* to the grand jury for any criminal offence, without probable cauſe, and the bill is not found, or the party is acquitted, action lies for a malicious proſecution. In order to which it is neceſſary that the plaintiff ſhould obtain a copy of the record of his *indictment* and acquittal; but, in proſecutions for felony, it is uſual to deny a copy of the *indictment*, where there is any the leaſt probable cauſe to found ſuch proſecution upon. But an action for a malicious proſecution may be founded on ſuch an *indictment* whereon no acquittal can be; as if it be rejected by the grand jury, or be *coram non judice*, or be inſufficiently drawn.

Indictments, *demurrer to*. See Demurrer.

INDICTOR, in *Law*, he that indicteth another for an offence;

fence; and *indictee* is the party who is indicted. 1 Ed. III. cap. 11. 21 Jac. I. cap. 8.

INDICUM. In the writings of the ancients we find this word very frequently uſed, as the name of a blue colour, or pigment, uſed in dying, and imported to Rome, Greece, and other parts of the world, from the Eaſt Indies. The greater number of writers make this the ſame with our indigo, or anil feculæ; and ſome ſay it was the ſame with our woad; but the former opinion ſeems moſt probable.

This ſubſtance, which the Greeks called *indicum*, the Arabian writers, Avicenna, Serapion, and others, have called *nil*; though the ſame word is alſo ſometimes uſed by them for the pigment made from woad.

INDICUM *folium*. See FOLIUM and TAMALAPATRA.

INDICUS *cocculus*. See COCCULUS.

INDICUS *color*, a term uſed by ſeveral of the ancient writers to expreſs black. The generality of the Greek and Roman phyſicians of old times have called the black lignum aloes, *agallochum indicum*; and the only black kind of myrobalan they were acquainted with was in the ſame manner called the *indicum*; not that theſe were ſuppoſed peculiarly the product of the Indies, in diſtinction from the paler lignum aloes, or the other myrobalan; but that they were of that colour which they called *indicus color*.

INDICUS *coſtus*. See COSTUS.

INDIGENOUS, of *indigena*, denotes a native of a country; or that which was originally born or produced in the country where it is found. In this ſenſe, particular ſpecies of animals and plants are ſaid to be *indigenous* in the country where they are native, in oppoſition to EXOTIC.

INDIGESTION, a crudity, or want of due coction, either in a food, a humour of the body, or an excrement.

In the ſyſtem of trituration, *indigeſtion*, which is a crudity, may be very naturally accounted for, from the relaxation of the fibres of the ſtomach. A bilious *indigeſtion*, in the opinion of Hacquet, a great advocate for trituration, is owing to too much force in the ſtomach, or too much vivacity in its oſcillations, which ſpoil the digeſtion, by rendering the trituration imperfect. But this is hardly ſatisfactory: for it ſhould ſeem that digeſtion would be the more perfect, in proportion as the force of the ſtomach is increaſed. See DIGESTION, and TRITURATION.

INDIGETES, a name which the ancients gave to ſome of their gods.

There are various opinions about the origin and ſignification of this word; ſome pretending, it was given to all the gods in general; and others, only to the ſemi-gods, or great men deified. Others ſay, it was given to ſuch gods as were originally of the country, or rather ſuch as were the gods of the country that bore this name; and others again hold, it was aſcribed to ſuch gods as were patrons and protectors of particular cities.

Laſtly, others hold *indigetes* to be derived from *inde genitus*, or *in loco degens*, or from *inde* and *ago*, for *dego*, *I live*, *I inhabit*; which laſt opinion ſeems the moſt probable.

In effect it appears, 1. That theſe *indigetes* were alſo called *local gods*, *dii locales*, or *topical gods*, which is the ſame thing. 2. The *indigetes* were ordinarily men deified, who indeed were, in effect, local gods, being eſteemed the protectors of thoſe places where they were deified; ſo that the ſecond and third opinion are very conſiſtent. 3. Virgil joins *patrii* with *indigetes*, as being the ſame thing, Georg. i. ver. 498. *Dii patrii, indigetes.* 4. The gods to whom the Romans gave the name *indigetes* were, Faunus, Veſta, Æneas, Romulus, all the gods of Italy; and at Athens, Minerva, ſays Servius; and at Carthage, Dido. It is true, we meet with Jupiter *indiges*; but that Jupiter *indiges* is Æneas, not the great Jupiter; as we may ſee in Livy, lib. i. cap. 3. in which laſt ſenſe Servius aſſures us, *indiges* comes from the Latin *in diis ago*, *I am among the gods*.

Among theſe *indigetes* gods, there is none more celebrated, nor more extenſively worſhipped, than Hercules.

INDIGNATORIUS, a muſcle thus called, as being ſuppoſed to draw the eye from its inner corner outwards, which gives an appearance of ſcorn and anger.

But this is properly a compound motion of two muſcles; for which, ſee EYE.

This muſcle is called by others the *rectus exterior*, and *abducens*; and by Albinus, the ABDUCTOR. It is one of his *quatuor recti oculi*.

INDIGO, *Anil*, or *Indigofera*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower is of the butterfly kind; the ſtandard open, bordered, and reflexed; the wings are oblong, blunt, and ſpread open, as is alſo the keel, which turns backward; in the center is ſituated a cylindrical germen, which becomes a taper pod, filled with kidney-ſhaped ſeeds. Miller enumerates five ſpecies, and Linnæus ſix.

The ſpecies commonly cultivated for uſe is the Guatimala *indigo*, with ſmooth arched pods, growing cloſe to the branches, unequal winged leaves, whoſe lobes are blunt and oval. This is chiefly cultivated in the Engliſh plantations in America, and by the French; though the Jamaica wild *indigo*, and the Carolina *indigo*, have been uſed with advantage.

From this plant is extracted a dyer's drug, of a deep blue colour, brought hither from the Weſt Indies and America. It is alſo made in the Eaſt Indies, particularly in the dominions of the Great Mogul, the kingdom of Golconda, &c.

Labat has given a particular account of the culture of the plant, and the preparation of the *indigo*. The ground being thoroughly cleared from weeds (one of the principal points in the culture) a number of ſlaves, ranged in a line, march acroſs, making little trenches of the width of their hoes, and two or three inches deep, about a foot diſtance from one another every way: then, returning, they drop ſome ſeeds in each trench, and afterwards cover them with the earth taken out. In moiſt weather, the plant comes up in three or four days; and in about two months after, it is fit for cutting: if ſuffered to ſtand till it runs into flower, the leaves become too dry and hard, and the *indigo* obtained from them proves leſs in quantity, and leſs beautiful; the due point of maturity is known, by the leaves beginning to grow leſs ſupple, or more brittle. In rainy ſeaſons, the cutting may be repeated every ſix weeks: cutting in dry weather kills the plant, which, if that is avoided, continues to afford freſh crops for two years.

A large quantity of the herb is put into a vat or ciſtern of ſtrong maſon work, with ſo much water as is ſufficient to cover it; and ſome wood laid above, to prevent its riſing up. The matter begins to ferment, ſooner or later, according to the warmth of the weather, and the maturity of the plant, ſometimes in ſix or eight hours, and ſometimes not in leſs than twenty. The liquor grows hot, throws up a plentiful froth, thickens by degrees, and acquires a blue colour inclining to violet. At this time, without touching the herb, the liquor impregnated with its tincture is let out, by cocks in the bottom, into another vat placed for that purpoſe, ſo as to be commanded by the firſt.

In the ſecond vat, the liquor is ſtrongly and inceſſantly beat and agitated, with a kind of buckets fixed to poles, till the colouring matter is united into a body. A good deal of nicety is requiſite in hitting this point: if the beating is ceaſed too ſoon, a part of the tinging matter remains diſſolved in the liquor; if continued a little too long, a part of that which had ſeparated is diſſolved afreſh. The exact time for diſcontinuing the proceſs is determined, by taking up ſome of the liquor occaſionally in a little cup, and obſerving whether the blue fecula is diſpoſed to ſeparate and ſubſide.

The whole being now ſuffered to reſt till the blue matter has ſettled, the clear water is let off, by cocks in the ſides at different heights; and the blue part diſcharged by a cock in the bottom, into another vat. Here it is ſuffered to ſettle for ſome time longer, then further drained in cloth bags, and expoſed in ſhallow wooden boxes to the air, without expoſing it to the ſun, and carefully keeping it from the rain, till thoroughly dry.

The author above mentioned, from whom the whole of the foregoing account is extracted, obſerves farther, that the goodneſs of the *indigo* depends greatly upon the age of the plant; that before it has grown fully ripe, the quantity it yields is leſs, but the colour proportionably more beautiful; that probably the ſecret of thoſe, whoſe *indigo* has been moſt eſteemed, is no other than cutting the herb at the time when it yields the fineſt colour; that the ſuperiority of ſome of the *indigoes* of the Eaſt Indies to thoſe of America, is perhaps owing to the former being prepared more curiouſly from only the leaves of the plant; and that by beating the herb in the ſteeping-vat, which has been practiſed by ſome with a view to increaſe the quantity, great part of the ſubſtance of the leaves and bark is blended with the water along with the colouring matter, and the *indigo* extremely debaſed.

It is ſaid that lime or lime-water is ſometimes employed in the beating-vat, to promote the ſeparation of the tinging particles from the water; and that the hardneſs or flintineſs of ſome ſorts of *indigo* is owing to an over proportion of this addition.

Pomet ſays, that the Indians of the village of Sarqueſſe, near Amadabat, uſe only the leaves of the *indigo*, and throw away the plant and branches; and from thence the moſt eſteemed *indigo* is brought.

Indigo is commonly divided, from the colour which it exhibits upon breaking, into three kinds, copper-coloured, purple, and blue. It is ſaid that the dyers uſe chiefly the firſt; and the callico-printers (for this drug gives a durable ſtain to linen as well as woollen) the laſt. On what particular circumſtances theſe different appearances depend, we know not; nor is it certainly known, whether the real quality of the *indigo* has any connexion with them. The deepeſt and livelieſt blue *indigo*, rubbed with the nail, looks like poliſhed copper; and ſolutions of all the ſorts, made in alcaline lixivia, aſſume alike a copper-coloured ſkin upon the ſurface.

Good *indigo* is moderately light, breaks of a ſhining ſurface, and burns almoſt wholly away upon a red-hot iron. It is quickly penetrated by water, and reduced into a kind of paſte; a conſiderable part is at the ſame time diffuſed through the liquor, and very ſlowly ſubſides. This is probably what Labat and Hellot mean by its diſſolving in water; for no part of the *indigo* really diſſolves; it cannot indeed be expected that it ſhould, from the proceſs by which it is obtained.

Indigo requires an equal quantity or more of fixed alcaline ſalt, to render it totally ſoluble in water. On digeſting the *indigo*, with a gentle heat, in the ſolution of the alcaline ſalt, a ſhining copper-coloured ſkin begins to appear, and gradually covers the whole ſurface: on agitating the matter, a large blue flower or froth ariſes, and the liquor underneath appears of a deep green. If woollen cloth, without any other preparation than moiſtening it with warm water, be dipt in this hot liquor, it comes out perfectly green, and changes almoſt inſtantly in the air to a fine blue. This is the common proceſs of dying blue.

Mr. Hellot deſcribes two *indigo* vats with urine; one of which is uſed hot like the foregoing, and the other cold. The hot vat conſiſts of equal parts of *indigo*, alum, and tartar, digeſted in urine till the liquor becomes green. The cold one is prepared, by digeſting powdered *indigo* with vinegar for twenty-four hours, in the proportion of four pounds to about three quarts; then mixing the matter with about fifty gallons of urine, and ſtirring the whole together every night and morning till the liquor turns green, and gathers a head like the common vat.

Indigo is fitted for printing on linen, by diluting it with water into the conſiſtence of a ſyrup; then adding ſome powdered pearl-aſhes, green vitriol, and lime newly ſlaked; with ſo much water, occaſionally, as will reduce them into the conſiſtence of thin paint; mixing the whole thoroughly together, and ſtirring the matter every now and then, till it gains a copper colour on the ſurface. The proportions uſed by the workmen are, two parts of *indigo*, one of pearl-aſhes, three of vitriol, and two of lime. The ſame compoſition, diluted with a ſufficient quantity of water (about ſix gallons to a pound of *indigo)* and boiled, gives a durable blue to tanned ſkins, whether dipt in hot or cold.

Indigo digeſted in a moderate heat with different volatile alcaline ſpirits, gave only yellowiſh and browniſh red tinctures; with rectified ſpirit of wine, a reddiſh one; to lime-water, and to water acidulated with the vitriolic, nitrous, and marine acids, it gave no tincture at all.

The concentrated vitriolic acid unites with it into a ſmooth paſte, eſpecially if the *indigo* is previouſly well ground with powdered glaſs, ſand, or other like ſubſtances. The *indigo* is thus rendered ſoluble in boiling water along with the acid, ſo as to paſs through the pores of a filter; the ſolution, whilſt hot, appears of a deep bright green colour, like that made by fixed alcalies, but fades as it grows cold, and changes at laſt to a browniſh. Theſe experiments, which were many times repeated with the ſame event, ſeem to overturn Mr. Hellot's ingenious theory; which deduces the green colour of ſolutions of *indigo* from the common property of blue juices being turned green by alcalies; and the blue colour which the cloth acquires ſoon after it is taken out of the vat, from a ſeparation of the alcali. We here find, that a green ſolution of this concrete is obtainable by the ſtrongeſt of the acids, and that with volatile alcalies it diſcovers no tendency to greenneſs.

For the method of preparing *Saxon* BLUE and *Saxon* GREEN from *indigo*, ſee thoſe articles.

Indigo is ſometimes uſed among the painters, for paper-hangings, and ſuch groſs uſes, who grind and mix it with white to make a blue colour; for without that mixture it would paint blackiſh.

They alſo mix it with yellow, to make a green colour. It is alſo uſed in dying, and by the laundreſſes, to give a bluiſh caſt to their linen.

In the Hortus Indus Malabaricus is an account of the plant whence *indigo* is drawn; the decoction of whoſe root is ſaid to be excellent againſt nephritic colics; its leaves, applied to the abdomen, good to promote urine; and the *indigo* itſelf is ſaid to be of good uſe in drying of tumors.

Some phyſicians have recommended *indigo* in the quantity of a dram, while others look upon it as a poiſon; and in Saxony the internal uſe of it is prohibited.

INDIGO, *baſtard*. See AMORPHA.

INDIRECT *modes of ſyllogiſms*, in *Logic*, are the five laſt modes, or MOODS, of the firſt figure, expreſſed by the barbarous words *baralipton, celantes, dabitis, feſpamo, freſiſom*.

It is the converſion of the concluſion which renders the *moods indirect*: for inſtance, a ſyllogiſm in darii, and another in dabitis, would be perfectly alike, were it not for that converſion; the propoſitions having the ſame quantity, and the ſame quality, and the middle term being the ſubject in the major, and the attribute in the minor, in both. It remains then, that, to make a diſtinction, that which is the ſubject of the concluſion in darii, be the attribute in the concluſion of dabitis; and that which is the attribute in the firſt, the ſubject in the laſt. See SYLLOGISM.

DA- Every thing that promotes ſalvation is advantageous:
RI- They are afflictions which promote ſalvation:
I. Therefore there are afflictions which are advantageous.

DA- Every thing that promotes ſalvation is advantageous:
BI- There are afflictions which promote ſalvation:
TIS. Therefore ſome things promoting ſalvation are afflictions.

INDIRECT *confirmation*. See CONFIRMATION.

INDISCERNIBLES, in the *Philoſophy of Leibnitz*. See LEIBNITZIAN *philoſophy*.

INDIVIDUAL, INDIVIDUUM, in *Logic*, a particular being of any ſpecies; or that which cannot be divided into two or more beings, equal or alike.

The uſual diviſion in logic is made into genera or genuſes, thoſe genera into ſpecies, and thoſe ſpecies into *individuals*. See GENUS, SPECIES, and DIVISION.

The ſchoolmen make a fourfold diſtinction of *individuals*; viz.

INDIVIDUUM *vagum*, that, which though it ſignifies but one thing, yet may be any of that kind; as when we ſay a man, a certain perſon, or one, ſaid ſo and ſo; though but one perſon is meant, yet that perſon, for aught that appears to the contrary, may be any body.

INDIVIDUUM *determinatum* is, when the thing is named and determined; as, Alexander, the river Nile, &c. this is alſo called *individuum ſignatum*.

INDIVIDUUM *demonſtrativum* is, when ſome demonſtrative pronoun is uſed in the expreſſion; as, this man, tha woman.

INDIVIDUUM *ex hypotheſi*, or by ſuppoſition, when an univerſal name or term is reſtrained, by the ſuppoſition, to a particular thing: as when we ſay, the ſon of ſuch a one, and it be known that he had but one ſon.

INDIVISIBLES, in *Geometry*, thoſe indefinitely ſmall elements, or principles, into which any body or figure may be ultimately reſolved.

A line is ſaid to conſiſt of points, a ſurface, of parallel lines, and a ſolid of parallel and ſimilar ſurfaces; and becauſe each of theſe elements is ſuppoſed *indiviſible*, if in any figure a line be drawn through the elements perpendicularly, the number of points in that line will be the ſame as the number of the elements.

Whence it appears, that a parallelogram, priſm, or cylinder, is reſolvable into elements, as *indiviſibles*, all equal to each other, parallel, and like to the baſe; and a triangle into lines parallel to the baſe, but decreaſing in arithmetical proportion; ſo alſo are the circles, which conſtitute the parabolic conoid, and thoſe which conſtitute the plane of a circle, or the ſurface of an iſoſceles cone.

A cylinder may be reſolved into cylindrical curve ſurfaces, having all the ſame height, and continually decreaſing inwards, as the circles of the baſe do; on which they inſiſt.

This way of conſidering magnitudes, is called the method of *indiviſibles*, which is only the ancient method of exhauſtions, a little diſguiſed and contracted.

It is found of good uſe in ſhortening mathematical demonſtrations; of which we may give an inſtance in that famous propoſition of Archimedes, that a ſphere is two thirds of a cylinder circumſcribing it.

Suppoſe a cylinder, an hemiſphere, and an inverted cone (*Tab.* III. *Geometry*, *fig.* 52) to have the ſame baſe and altitude, and to be cut by infinite planes all parallel to the baſe, of which dg is one; it is plain, the ſquare of dh will every where be equal to the ſquare of kc (the radius of the ſphere) the ſquare $hc = eh$ ſquare; and, conſequently, ſince circles are to one another as the ſquares of the radii, all the circles of the hemiſphere will be equal to all thoſe of the cylinder, deducting thence all thoſe of the cone; wherefore the cylinder, deducting the cone, is equal to the hemiſphere; but it is known, that the cone is one third of the cylinder, and conſequently the ſphere muſt be two thirds of it.

Cavalleri was the firſt perſon who introduced this method of *indiviſibles* into one of his works, entitled Geometria Indiviſibilium, printed in 1635; which he alſo made uſe of in another tract publiſhed in 1647.

INDIVISO.—*Pro* INDIVISO. See PRO.

INDIVISUM *folium*. See LEAF.

INDOCTORUM *parliamentum*. See PARLIAMENTUM.

INDORSEMENT, any thing written on the back of a deed, or inſtrument. See ENDORSING.

A condition written on the back of an obligation is commonly called an *indorſement*: from *in*, and *dorſum*, back.

INDORSEMENT *of a bill of Exchange*. See ENDORSEMENT.

INDUCEMENT, in *Law*, is what is alledged as a motive or incitement to a thing; and it is uſed ſpecially in ſeveral caſes: viz. there is *inducement* to actions, to a traverſe in pleading, a fact or offence committed, &c. *Inducements* to actions need not have ſo much certainty as in other caſes: a general *indebitatus* is not ſufficient, where it is the ground of the action; but where it is only the *inducement* to the action, as in conſideration of forbearing a debt until ſuch a day; (for that the parties are agreed upon the debt) this being but a collateral promiſe is good without ſhewing how due.

INDUCIARUM *petitio*. See PETITIO, and EMPARLANCE.

INDUCTION, in *Logic* and *Rhetoric*, a conſequence drawn from ſeveral propoſitions, or principles, firſt laid down.

Thus, the concluſion of a ſyllogiſm is an *induction* made from the premiſes. See SYLLOGISM.

INDUCTION is alſo uſed for a kind of ſyllogiſm itſelf; being a medium between an ENTHYMEME and a GRADATION, in regard it wants a propoſition (which, however, is underſtood), as in the enthymeme; and abounds in aſſumptions (which yet are collateral, or of the ſame degree), which is the caſe in a gradation.

For inſtance; every terreſtrial animal lives, every aerial animal lives, every aquatic animal lives, and every reptile animal alſo lives; therefore every animal lives.

Here, it may be obſerved, are various aſſumptions, from the more general ſpecies of the animal kind collected into one; which this propoſition is ſuppoſed to precede; *e. g.* that every animal is either terreſtrial, aerial, aquatic, or reptile.

Suidas reckons three kinds of *induction*: that juſt mentioned, which concludes or infers ſome general propoſition from an enumeration of all the particulars of a kind he calls the *dialectic induction*.

The ſecond proceeds by interrogation, and concludes probably, or with a veriſimilitude; this is what the Greeks called παραγογη, and was that which Socrates ordinarily made uſe of, as Cicero in his Topics, and Quintilian have obſerved: and, therefore, called the *Socratic induction*. This, however, is a captious way of reaſoning, for while the reſpondent is not aware of what is deſigned to be inferred, he is eaſily induced to make thoſe conceſſions, which otherwiſe he would not. Beſides, it is not ſo well ſuited to continued as to interlocutory diſcourſes.

The third kind of *induction* is properly rhetorical; being a concluſion drawn from ſome example, or authority.

This is a very imperfect *induction*, all its force lying in a propoſition which is concealed, and which will hardly bear being expreſſed. Thus, he that ſays, Codrus died bravely for his country, therefore I muſt die bravely for my country; proves nothing, unleſs this propoſition be carried in mind, that I muſt do the ſame with Codrus. Again, Archimedes, and the other mathematicians, ſay, the ſun is much bigger than the earth; therefore, it muſt be owned, the ſun is much bigger than the earth. Where this propoſition is underſtood, viz. whatever Archimedes, and the other mathematicians, ſay, is true.

Induction is one of the four forms of reaſoning uſed by orators in CONFIRMATION; the other three are SYLLOGISM, ENTHYMEME, and EXAMPLE, which laſt coincides with the third ſpecies of *induction* above enumerated.

INDUCTION, in the *Engliſh Laws*, is uſually taken for the giving poſſeſſion to an incumbent of his church, by leading him into it, and delivering him the keys, by the commiſſary, or biſhop's deputy, and by his ringing one of the bells.

When a clerk is inſtituted into a benefice, he is to exhibit his mandate from the biſhop to the archdeacon, or other perſon to whom it is directed, and hath a right thereby to be *inducted* into his living; and if he be refuſed *induction*, he hath a remedy both in the eccleſiaſtical court, and alſo an action of the caſe in common law, againſt the archdeacon. If the *inductor*, or perſon to be *inducted*, be kept out of the church, or houſe, by laymen, the writ *de vi laica* lies for the clerk, which is directed out of the chancery to the ſheriff of the county, to remove the force, *&c.* If another clergyman, preſented by the ſame patron, keep poſſeſſion, a ſpoliation is grantable out of the ſpiritual court, whereby the tythes, &c. ſhall be ſequeſtered, till the right be determined.

The archdeacon rarely *inducts* a clerk in perſon, but uſually iſſues out a warrant to the clerks and lettered perſons within the archdeaconry, impowering any of them to do it in his ſtead.

An *induction* made by the patron of the church is void: but biſhops and archdeacons may *induct* a clerk to the benefices of which they are patrons, by preſcription. No *induction* is neceſſary to a donative, where the patron, by donation in writing, puts the clerk in poſſeſſion without preſentation. 11 Hen. IV. cap. 7.

The uſual form and manner of *induction* is, for the *inductor* to take the clerk by the hand, and then to lay it on the key of the church, which muſt be then in the door, and to ſay, "By virtue of this inſtrument, I *induct* "you into the real, actual, and corporal poſſeſſion of "the rectory or vicarage of——, with all its fruits, pro- "fits, members, and appurtenances."—This done, he opens the door, and puts the clerk in poſſeſſion of the church, and ſhuts the door upon him; who, after he hath tolled a bell (if there be any) to give the pariſhioners due notice and ſufficient certainty of their new miniſter, comes out, and deſires the *inductor* to indorſe a certificate of his *induction* on the archdeacon's warrant, and that all preſent will ſignify it under their hands. If the church-key cannot be had, it is ſufficient that the clerk lays hold of the ring of the door, the latch of the church gate, &c. and, within two months after this, the clerk muſt read the thirty-nine articles, and all the ſervice of the day, both at morning and evening-prayers, in the pariſh church of his benefice, and in the time of common prayer, and declare his aſſent and conſent; he muſt alſo then read the ordinary's certificate, in which is the declaration of his conformity, together with the ſame declaration, and of all this he muſt have two or three good witneſſes, who muſt ſign that they heard him do it, and be ready to atteſt it, *viva voce*, if required; and, within ſix months after *induction*, he muſt alſo take the oaths of allegiance, ſupremacy, and abjuration, at the quarter-ſeſſions, or in ſome one of the courts at Weſtminſter-hall.

Induction makes the parſon complete incumbent, and fixes the freehold in him. When a clerk is thus preſented, inſtituted, and *inducted* into a rectory, he is then, and not before, called in law *perſona imperſonata*, or parſon imparſonee. 13 Eliz. c. 12. 13 and 14. C. II. c. 4. 1 Geo. ſtat. ii. c. 13. 9 Geo. II. c. 26. 23 Geo. II. c. 28.

INDULGENCE, in the *Romiſh Theology*, the remiſſion of a puniſhment due to a ſin, granted by the church, and ſuppoſed to ſave the ſinner from purgatory.

The Romaniſts found their *indulgences* on the infinite treaſure of the merits of Jeſus Chriſt, the Holy Virgin, and all the ſaints; which they ſuppoſe the church has a right of diſtributing, by virtue of the communion of ſaints. See SUPEREROGATION.

Theſe indulgences were firſt invented in the eleventh century by popes Gregory VII. Victor, and Urban II as a recompence for thoſe who went in perſon upon the wild enterpriſe of conquering the Holy Land. See CROISADE. They were afterwards granted to thoſe who hired a ſoldier for that purpoſe, and in proceſs of time were beſtowed on ſuch as gave money for accompliſhing any pious work injoined by the pope. In the beginning of the twelfth century, the biſhops, whenever they wanted a ſupply of money for their private pleaſures, or the exigences of the church, recurred to the ſcandalous traffic of *indulgences*; and when the Roman pontiffs ſaw that immenſe treaſures were thus accumulated by the inferior rulers of the church, they thought proper to limit the power of the biſhops in remitting the penalties impoſed upon tranſgreſſors, and aſſumed it, almoſt entirely, as a profitable traffic to themſelves. They began with granting a plenary remiſſion of all the temporal pains and penalties, which the church had annexed to certain tranſgreſſions, and then proceeded to aboliſh even the puniſhments which are reſerved in a future ſtate for the workers of iniquity.

The Roman JUBILEE, firſt inſtituted by Boniface VIII. A. D. 1300, carries with it a plenary, or full *indulgence*, for all the crimes committed therein.

The pope alſo grants bulls of plenary *indulgence* to ſeveral churches, monaſteries, and even to private perſons; and it is a frequent thing to have general *indulgences* for the time of the principal feaſts of a year. Their caſuiſts ſay, that a plenary *indulgence* does not always prove effectual, for want of complying with the conditions whereon it was granted.

For the extirpation of heretics it has been a common practice with the popes to grant *indulgences*. Thus Clement XII. "That we may ſtir up and encourage the "faithful to exterminate this ungracious crew of for- "lorn wretches, [the Cevenois, when in arms againſt

“ Lewis XIV.] we fully grant and indulge the full re- “ miſſion of all ſins, whatever they may be (relying upon “ that power of binding and looſing, which our Lord “ conferred upon his chief apoſtle), to all thoſe that ſhall “ liſt themſelves in this ſacred militia, if they ſhall hap- “ pen to fall in battle.” See Absolution.

Julius II. had beſtowed *indulgences* on all who contributed towards building the church of St. Peter at Rome, and pope Leo X. in order to carry on this magnificent ſtructure, publiſhed *indulgences*, and a plenary remiſſion on the ſame pretence. Finding the project take, he granted the right of promulgating theſe *indulgences* in Germany, together with a ſhare in the profits ariſing from the ſale of them, to Albert, elector of Mentz, and archbiſhop of Magdeburg, who employed Tetzel, a Dominican friar, as his chief agent for retailing them; and he farmed out thoſe of other countries to the higheſt bidders, who, to make the beſt of their bargains, procured the ableſt of their preachers to extol the value of the ware: “ Happy times for ſinners, ſays a modern “ writer, their crimes were rated, and the remiſſion of “ them ſet up by auction. The apoſtolic chamber taxed “ ſins at a pretty reaſonable rate; it coſt but ninety livres “ and a few ducats, for crimes which people on this ſide “ the Alps puniſhed with death.”

Theſe are ſpecified in a book of rates, called the Tax-Book of the holy Apoſtolic Chancery, firſt printed at Rome in the year 1514, and aſcribed by ſome to pope Innocent VIII. From a correct edition of this book, printed by L. Banck, profeſſor at Norkopin, in Gothland, in 1651, it appears that the price of abſolution for fornication, attended with the moſt heinous circumſtances, was ſix groſſi or groats; for a layman's murdering a layman, five groats; for laying violent hands on a prieſt, without ſhedding blood, nine groats; for committing inceſt, five groats; for a prieſt's keeping a concubine, ſeven groats; for forging the pope's hand-writing, ſeventeen or eighteen groats. See the Taxa S. Cancellariæ Apoſtolicæ, a L. Banck. Franequeræ, 1651, p. 126, &c.

It was this great abuſe of *indulgences*, that contributed not a little to the firſt reformation of religion in Germany; where Martin Luther began firſt to declaim againſt the preachers of *indulgences*, and afterwards againſt *indulgences* themſelves: but ſince that time, the popes have been more ſparing in the exerciſe of this power; however, they ſtill carry on a great trade with them in the Indies, where they are purchaſed at two reals a piece, and ſometimes more. See Reformation.

Indulgence, or **Indulto**, ſignifies alſo a ſpecial favour, or privilege, conferred either on a community, or a particular perſon, by the pope's bulls; in virtue whereof the party is licenſed to do or to obtain ſomething contrary to the intention and diſpoſition of the common laws.

There are two kinds of *indultos:* the one *active*, which conſiſts in a power of nominating and preſenting freely, and without reſerve, to benefices that are otherwiſe limited, and reſtrained by the laws of the apoſtolical chancery; ſuch are thoſe ordinarily granted to ſecular princes, cardinals, biſhops, &c.

Paſſive indultos conſiſt in a power of receiving benefices, and expectative graces; of which kind are thoſe of a parliament, of graduates, and mandataries.

The *indulto* of kings is the power given them of preſenting to conſiſtorial benefices, either by treaty, by favour, or ſpecial privilege.

The *indulto* of cardinals is a licence for holding regular as well as ſecular benefices, and for diſpoſing of benefices *in commendam*, or continuing them, &c.

Indulto of parliament is a right of privilege granted to the chancellor, preſidents, counſellors, and other officers in the parliaments of France, to obtain a benefice of the collator, upon the king's nomination directed to him. This is a kind of advowſon, or patronage, belonging to the French king; the *indulto* being a mandate, or grace, by which he is permitted to name to any collator he pleaſes, a counſellor, or other officer of parliament, on whom the collator ſhall be obliged to beſtow a benefice: ſo that the right of the *indulto* reſides radically in the king, the officers being only the objects thereof.

Indulto, in *Commerce*, denotes a duty, tax or cuſtom paid to the king of Spain for all ſuch commodities as are imported from the Weſt Indies in the galleons.

INDURATING, a term applied to ſuch things as give a harder or firmer conſiſtence to others, either by the greater ſolidity of their particles, or by diſſipating the thinner parts of any matter, ſo as to leave the remainder harder.

Thus a tumour is *indurated*, either by the addition of earthy and ſolid particles, as in the ſchirri, and knotty ſwellings; or by tranſpiring the thinner parts through the ſkin, whereby the remainder grows more fixed, as in an œdema.

INDUSIUM, in the *Healing Art*, a ſhirt or ſhift. It has been a controverted point, among ſome phyſicians, whether it is proper to change the linen in ſome diſtempers or not? the whole of which may be reduced to this: if a perſon does not ſweat, there ſeems to be but very little danger of taking cold; and then clean and freſh linen is not only agreeable but of uſe, as it contributes to promote perſpiration. If the patient ſweats, provided theſe ſweats are ſymptomatical, it does no injury to check them; if critical, it may not be ſo prudent to change the linen while they flow plentifully: but if they remit, there is more danger of taking cold from the wet linen, than there is from changing it, provided it is previouſly well aired. In all caſes, the perſpirable matter, or that of ſweat, impregnates the linen, and becomes in ſome degree acrimonious; which muſt have a very bad influence, in acute diſtempers particularly. And that the acrimony contained in linen, may have a very bad effect in the body, Dimerbroek confirms by a memorable inſtance of ſome perſon or perſons, who upon recovery from the plague, relapſed immediately and died, upon putting on linen waſhed with ſoap.

As many perſons contract a habit of wearing flannel ſhirts or ſhifts; in order to ſet them right, we ſhall give the judgment of Wainwright thereon.

The moſt certain and conſtant effect of wearing flannel, is to make a more free and plentiful perſpiration; which, though it be attended with great advantages (according to Sanctorius) when moderate; yet when exceſſive, nothing is more pernicious. But ſince the increaſing one evacuation, is the leſſening of another; therefore, whenever too much is thrown off from the blood, either by ſtool, urine, or ſaliva; then indeed it may be proper to wear flannel.

That it may appear how prejudicial flannel is to thoſe who perſpire too much, as moſt weak people do, and to whom the wearing of flannel is generally preſcribed, it may be obſerved from Sanctorius, that inſenſible perſpiration is double to the ſenſible evacuations, made by urine and ſtool put together: and that it is to that made by ſtool, as forty to four; ſo that it is ten times more than that by ſtool. Therefore a man will be made no weaker by having ten times as many ſtools as he uſed to have, than he will by perſpiring only double the quantity he uſually does. Farther, if we conſider, that the greateſt part of our ſtools are the remains of our food that could not enter the lacteals, we ſhall find the difference much greater: for it cannot be imagined, that above one tenth of what we void by ſtool is evacuated from the maſs of blood by the liver and inteſtinal glands; ſo that upon this account there is as much derived from the maſs of blood in one day by perſpiration, as by ſtool in an hundred. Therefore, if perſpiration by any means be doubled, in twenty-four hours it will make a man as faint, as if he had an hundred times more ſtools than uſual: and there are none but who expect a weakneſs from an unuſual purging; and we daily experience the ſudden danger of a diabetes wherein the quantity of urine is increaſed; but take little notice of an increaſed perſpiration, becauſe inſenſible: for which reaſon we aſcribe the miſchief it occaſions to ſome other cauſe.

If what has been ſaid is of force ſufficient to perſuade any to leave off wearing flannel; it ſhould be forborne in a warmer ſeaſon; and at the ſame time uſe ſhould be made of a cold bath or a fleſh bruſh, which will prevent the inconveniences that might otherwiſe attend it.

INDUSTRY, *fruits of*. See Fruits.

INEQUALITY *of natural days*. See Equation.

Inequality, *optical*. See Optical.

INERTIÆ *vis*. See Vis *Inertiæ*.

INESCUTCHEON, in *Heraldry*, a ſmall *eſcutcheon* borne in a larger one, as part of ſome other coat. *Tab.* II. *Heraldry*, *fig*. 64. See Escutcheon.

Guillim confines the name to an *eſcutcheon* borne ſingle in the feſs point or center.

This is alſo ſometimes called an eſcutcheon *of pretence*.

He who marries an heireſs, bears her coat of arms on an *ineſcutcheon*, or *eſcutcheon of pretence*, in the middle of his own coat.

Modern heralds apply the name *ineſcutcheon* to thoſe ſmall eſcutcheons, ſeveral of which are borne in a large one.

IN ESSE is applied to things which are actually exiſting.

Authors make a difference between a thing *in eſſe*, and a thing *in poſſe*. A thing that is not, but may be, they ſay, is *in poſſe*, or *potentia*; but a thing apparent and viſible, they ſay, is *in eſſe*, that is, it has a real being *eo inſtanti*; whereas the other is caſual, and at beſt but a poſſibility.

INFALISTATIO, an ancient puniſhment of felons, by throwing them among the rocks and ſands, cuſtomarily uſed in port-towns. It is the opinion of ſome writers, that *infaliſtatus* did imply ſome capital puniſhment, by expoſing the malefactor upon the ſands till the next tide carried him away; of which cuſtom, it is ſaid, there is an old tradition. However the penalty ſeems to take its name from the Norman *faleſe*, or *faleſia*, which ſignified not the ſands, but the rocks and cliffs adjoining, or impending on the ſea-ſhore. *Commiſit feloniam ob quam fuit ſuſpenſus, utlagatus, vel alio modo morti damnatus,* &c. *vel apud Dover* infaliſtatus, *apud Southampton ſubmerſus,* &c.

INFALLIBLE, from *in*, taken privatively; and *fallo*, *I deceive*, that which cannot deceive, or be deceived.

Upon this term ſtands one of the principal heads of controverſy between the Reformed and the Catholics; the latter of whom maintain, that the church, aſſembled in general council, is *infallible*; which the former deny.

The JESUITS, in their diſputes with the JANSENISTS, have expreſsly aſſerted that Jeſus Chriſt hath given to all popes, whenever they ſhall ſpeak *è cathedra*, the ſame *infallibity* which he had, both in matters of right and fact.

The principal reaſons alledged for the *infallibility*, are drawn from the promiſes of Chriſt, from the obſcurity of the Scriptures, the inſufficiency of private judgment, and the neceſſity there is of ſome *infallible* judge for the deciſion of controverſies.

The *infallibility* of the POPE is a doctrine of a late ſtanding, and is not entirely acquieſced in, even in their own communion, and altogether rejected by the Gallican church.

INFAMOUS, derived from *in*, and *fama*, *fame*, *report*, in the ordinary uſe of the word, ſignifies ſomething notoriouſly contrary to virtue, or honour.

Aulus Gellius uſes the word *infames materias*, for what we ordinarily call *paradoxes*, i. e. diſcourſes remote from the common opinion; propoſitions that appear oppoſite to truth, &c. as the elogy of Therſites, the praiſe of a quartan ague, &c.

INFAMOUS, in *Law*, denotes a perſon, or thing, which is of no repute, or eſteem, in the world.

There are two kinds of *infamy*: ſome perſons being *infamous* as having been noted by the laws, or ſtigmatized by public judgment.

Infamy, which extends to forgery, perjury, groſs cheats, &c. diſables a man to be a witneſs or juror; but a pardon of crimes reſtores a perſon's credit to make him a good evidence. Judgment of the pillory makes *infamy* by the common law, but by the civil and canon law, if the cauſe for which the perſon was convicted was not *infamous*, it infers no *infamy*.

Others are held *infamous*, by the exerciſe of ſome ſcandalous profeſſion; as a catchpole, a merry andrew, a hangman, an informer, &c.

Heretofore there were crowns of *infamy* given, by way of puniſhment, to criminals; they were made of wool.

INFANCY. See INFANT.

INFANT, in a *Law ſenſe*, a perſon under the age of one-and-twenty years, whoſe acts are in many caſes either void or voidable. All gifts, grants, &c. of an *infant*, which do not take effect by delivery of his hand, are void; and if made to take effect by delivery of his own hand, are voidable by himſelf and his heirs; and thoſe who ſhall have his eſtate. An *infant* may bind himſelf to pay for neceſſaries, as meat, drink, apparel, and learning, but not by bond with penalty: though a bill for neceſſaries, without a penalty for the very ſum due, it is ſaid, will bind him. *Infants* are not obliged to pay for clothes, unleſs it be averred for their own wearing; and that they were convenient and neceſſary for them to wear, according to their degree and eſtate. An *infant* may buy, but cannot borrow money to buy neceſſaries; for the law will not truſt him with neceſſaries, but at the peril of the lender, who muſt lay it out for him in neceſſaries, or ſee it thus laid out.

An infant has been adjudged of age the day before his birth-day; for the law will not make a fraction of a day; therefore where a perſon was born the third of September, and the ſecond of September twenty-one years after, he made his will, it was held good, and that he was then of age to deviſe his lands. And it is ſaid ſuch will ſhall take effect, though the deviſor dies by ſix at night of that day.

An *infant* eight years of age, or upwards, may commit homicide, and be hanged for it, if it appear, by any other act, that he had knowledge of good and evil; for here *malitia ſupplebit ætatem*: yet Coke on Littleton, ſect. 405. ſays, "An *infant* ſhall not be puniſhed till the age "of fourteen;" which, according to him, is the age of diſcretion.

But this depends on the degree of judgment which he poſſeſſes. If an *infant* be *infra annos infantiæ*, viz. ſeven years old, he cannot be guilty of felony, whatever circumſtances proving diſcretion may appear. See AGE, in *Law*, EXECUTOR, GUARDIAN, &c.

By the cuſtom of GAVEL-*kind*, an *infant*, at the age of fifteen, is reckoned at full age to ſell his lands; and by cuſtom in ſome places, an *infant* ſeiſed of land in soc-AGE, may, at the ſame age, make a leaſe of years, that ſhall bind him after he comes of age. By the cuſtom of London, an *infant*, unmarried, and above the age of fourteen, may bind himſelf apprentice to a freeman of London, by indenture, with proper covenants, which ſhall be binding.

An *infant in ventre ſa mere*, or in the mother's womb, is capable of having a legacy, or a ſurrender of a copy-hold eſtate made to it. It may have a guardian aſſigned to it; and is enabled to have an eſtate limited to its uſe, and to take afterwards by ſuch limitation, as if it were then actually born; and in this point the civil law agrees with our's. Though *infants* cannot alien their eſtates, yet *infant* truſtees or mortgages are enabled to convey, under the direction of the court of chancery or exchequer, or other courts of equity, the eſtates they hold in truſt or mortgage, to ſuch perſon as the court ſhall appoint. An *infant*, who has an ADVOWSON, may preſent to the benefice when it becomes void. An *infant* is capable of inheriting, and may alſo purchaſe lands, but his purchaſe is incomplete; for, when he comes to age, he may either agree or diſagree to it, without alleging any reaſon; and ſo may his heirs after him, if he dies without having completed his agreement. And in caſe any *infant* bargain and ſell his land by deed, indented and inrolled, yet he may plead non-age.

If an *infant* grants leaſes for a term of years, he may, at his full age, either confirm the leaſe, or bring treſpaſs againſt the leſſee for the occupation. Alſo a leaſe granted to an *infant* may be avoided by waiving the land before the rent-day expreſſed therein. However, *infants* are bound in all acts of neceſſity; as preſentations to benefices, admittances and grants of copy-hold eſtates, aſſenting to legacies, and conditions annexed to lands, whether the eſtate comes by grant or deſcent. If an *infant* be the defendant in an action, the plaintiff ſhall have ſix years for commencing his action, after the defendant comes of age; and an *infant*, who is a plaintiff, has alſo ſix years after he comes of age, to ſue by the ſtatute of limitations.

INFANT, *Diſtemperatures of* INFANTS. It is to be obſerved in general, that all *infants* are not equally expoſed to diſtemperatures of many kinds, but that the children of perſons of tender conſtitutions and idle lives are moſt ſubject to them. The children of poorer people, which are uſually hardily brought up from the firſt, are alſo leſs troubled with diſorders, in general, than thoſe which are taken more care of; and all their lives afterwards are much abler to bear external injuries, and are much leſs affected by them.

The ſeveral diſtempers of *infants* are theſe: *immobility at the birth*, called by authors *anaiſtheſia*. In this caſe, the *infant*, as ſoon as born, remains immoveable in its poſition, as if dead. It is to be brought to life and motion in this caſe, by breathing into its mouth, and burning ſaffron under its noſtrils, letting it receive the fume of it, and ſprinkling cold water or wine upon it. When the caſe is leſs violent, the *infant* is often brought to itſelf by applying it immediately to the breaſt and letting it ſuck; and in the other caſes, this is very proper, after the before mentioned means have been uſed.

A yellow colour of the ſkin is another very common complaint in new-born *infants*, ſo that they look as if they had the JAUNDICE. This is an accident of no ill conſequence. It often goes off of itſelf, after voiding the firſt ſtools; and if it does not, is eaſily removed by giving the *infant* a ſmall quantity of ſyrup of rhubarb, and of the common abſorbent powders, with antimonium diaphoreticum. In this caſe the child is to be kept warm, ſo that it may ſweat moderately while it takes theſe medicines.

Difficulting of ſwallowing is alſo a common complaint in *infants*. If this happens from that fault of the frenulum of the tongue, which renders the child TONGUE-*tied*, as the good women expreſs it; this is to be removed by cutting it. If it be cauſed by aphthæ, or little ulcers in the mouth; theſe are to be treated as below. If it proceed from a tumour of the tongue, the diſcutient waters are to be put in ſmall quantities into the mouth every two or three hours; and if there be ulcerations upon the tongue, the beſt of all applications is the oil of eggs. But before any thing is done for the child, it is neceſſary to ſee whether the fault be not in the mother from her having no milk, or from the nipples being ſo depreſſed that the child cannot uſe them.

Imperforations of the neceſſary parts. Theſe ſometimes happen in *infants*, ſo that there is either no paſſage for the ſtools, or for the urine; ſometimes for neither. This caſe is rare; but when it happens, ſpeedy help muſt be had, or the *infant* periſhes. In caſes where the paſſage is regularly formed, but is only ſtopt up by mucous matter, which ſometimes happens; the gentle abſtergents are to be given, as the crabs-eyes or ſome other abſorbent, half ſated with an acid; and recourſe muſt be had to the uſe of a ſmall catheter or glyſter-pipe. But when there is a preternatural membrane formed, which ſtops the paſſages, this muſt be cut through by a ſurgeon.

The noſtrils of *infants* are often plugged up with a groſs mucus, which prevents their breathing freely, and likewiſe renders it difficult for them to ſuck or ſwallow. In obſtinate caſes, after a ſuitable purge, two or three grains of white vitriol, to which ſome add the ſame quantity of *elaterium*, diſſolved in half an ounce of marjoram water, and filtered, may be applied now and then to the noſtrils with a linen rag. But in common it will be ſufficient to rub the noſe at bed-time with a little ſweet oil, or freſh butter.

Retention of the firſt ſtools, or MECONIUM, which is in the bowels at the time of the birth. This diſtemperature in the body occaſions the *infant* many ſevere pains, and throws it into great danger; difficulty of breathing, pains in the abdomen, inquietude and convulſions, are the conſequences of it. Nature often cures theſe by a diſcharge of bilious acrid ſtools, which are ſometimes green, ſometimes yellow like the yolk of an egg. When nature is not able to do this in time, ſhe is to be aſſiſted by a little manna or magneſia alba; or a common ſpoonful of whey, ſweetened with a little honey, will anſwer the purpoſe. The moſt proper medicine for expelling the meconium is the mother's milk, which is always, at firſt, of a purgative quality. Were children allowed to ſuck as ſoon as they ſhew an inclination for the breaſt, they would ſeldom have occaſion for medicines to diſcharge the meconium; but even where this is not allowed, they ought never to have daubs of ſyrup, oils, and other indigeſtible ſtuff crammed down their throats.

Stuffings of the breaſt attend ſome *infants* in ſuch a degree, that they ſeem aſthmatic. In theſe caſes the ſolutive ſyrups of rhubarb and roſes are to be given; and afterwards the pectorals, as the ſyrup of eryſimum and maidenhair, or ſyrup of liquorice. An emetic may alſo be given of the ſyrup or conſerve of peach-bloſſoms, and a ſingle grain of calomel or two at the utmoſt may be given, and often have great ſucceſs. If theſe fail, ſmall doſes may be given of powders prepared of diaphoretic antimony with twice its weight of detonated nitre; and the common reſolvents, ſuch as the orrice-root and ſperma-ceti, may be added; and ſometimes it is neceſſary to add a ſmall doſe of tartarum vitriolatum, with ſome of the common abſorbent powders. See CROUP.

Coughs ſometimes attend *infants*, but they are ſeldom obſtinate, uſually giving way to the common pectoral ſyrups, or a little ſperma-ceti, after the bowels have been unloaded by the laxative ſyrups, or other gentle cathartics. See CHIN-*cough*.

Coryzas and gravedos happen alſo ſometimes to *infants*; in theſe caſes the common ſyrups before preſcribed are to be given; and if they fail of effect, the nurſe muſt take the medicines proper in theſe caſes; which, ſee under their proper heads.

Running of the eyes and ears. This is a very common complaint, and is to be cured by ſmall doſes of decoctions of pimpernel root, ſaſſafras, and the other ſweetening woods, and by gentle laxatives on the intermediate days, in which calomel in ſmall doſes of a grain or two ought always to have its part; and the more acrid the matter diſcharged is, the more neceſſary is it to add to theſe things the mucilaginous medicines, ſuch as ſolutions of gum arabic and tragacanth in water, and mucilage of the ſeeds of quinces made by gently boiling them.

Chafings of the fleſh are very common in *infants*, and uſually ariſe from the ſweats, urine, or acrid ſtools diſcharged upon the parts, eſpecially when their nurſes are ſo careleſs as to keep them dirty, and ſuffer thoſe things to remain long on the parts. In this caſe common flour, or powder, will often prove a cure; or, when that fails, a little camphor and ceruſs mixed among it, uſually prove effectual. One of the beſt applications for this purpoſe is a ſolution of fuller's earth in a ſufficient quantity of hot-water, which ſhould be gently rubbed, when cold, upon the galled parts once or twice a day. See EXCORIATION and GALLING.

But if internal cauſes concur, ſuch as ſharpneſs of the blood, and humours in the child, then the common abſorbent and ſweetening powders are to be given internally, at the ſame time that the others are applied externally to the parts.

The moſt effectual means for preventing theſe chafings are to waſh the parts frequently with cold water, to change the linen often, and to keep the child in all reſpects thoroughly clean.

Vomitings, in *infants*, are rather ſalutary than hurtful, provided they are moderate; but when they are violent, they are to be remedied by giving gentle glyſters, to give a derivation to the mucous matter downward, and at the ſame time applying externally the common ſtrengthening and ſtomachic plaſters, as oil of mace, and the like, and repeating theſe applications as often as found neceſſary.

When vomiting is occaſioned by too much food, it ought to be promoted by a few grains of ipecacuanha, or by making the child drink freely of lukewarm-water, or weak infuſion of camomile flowers. When the food has been of an acrid or irritating quality, a milder aliment ſhould be ſubſtituted in its ſtead. When vomiting proceeds from an increaſed degree of ſenſibility, or too great an irritability of the nerves of the ſtomach, ſuch medicines as have a tendency to brace that organ and abate its ſenſibility, muſt be uſed. The firſt intention may be anſwered by a ſlight infuſion of the Peruvian bark, with the addition of a little rhubarb and orange-peel; and the ſecond by the ſaline draughts, to which a few drops of liquid laudanum may be occaſionally added.

Diarrhœas in *infants* are uſually attended with pain, and the ſtools are ſour, ſlimy, green, or curdled; it is not ſafe to uſe aſtringents to them, but they may generally be cured by a gentle vomit of ipecacuanha, and afterwards ſmall and frequent doſes of rhubarb, interpoſing abſorbent medicines to mitigate the acrimony of the humours. The beſt purge in this caſe is magneſia alba, which is abſorbent and laxative, and operates without exciting gripes. The antimonial wine, acting both as an emetic and purge, is an excellent medicine in this caſe: and it may be diluted with water to ſuit the weakeſt conſtitution. If any gripings ſhould remain, after the ſtomach and bowels have been cleanſed, a tea-ſpoonful of ſyrup of poppies may be given in a little ſimple cinnamon water, three or four times a day, till theſe ſymptoms have ceaſed. See DIARRHOEA.

Coſtiveneſs in infants is a much more dangerous complaint, ſubjecting them to many diſorders. The common purgative ſyrups of roſes and peach-flowers are to be given in this caſe, as alſo emollient clyſters; and ſuppoſitories are to be applied, for which purpoſe nothing is ſo proper as a piece of parſley-root cut into a proper ſhape, and introduced after rubbing it over with butter. Heiſter recommendt two or three grains of rhubarb in ſolutive ſyrup of roſes, or a ſolution of manna, till the child's belly is opened, and afterwards the teſtaceous powders. It is neceſſary, however, to diſtinguiſh this coſtiveneſs from a natural firmneſs of the ſtools when they are voided at moderate diſtances of time, and without pain; for this is a very ſalutary habit in children, after the meconium is voided in the firſt ſtools: it ſhews a ſtrength in the child, and is to be accounted a good ſymptom. See COSTIVENESS.

Acidities accompany moſt diſeaſes of children, and are oftener the effect than the cauſe of thoſe diſeaſes. When green ſtools, gripes, purgings, ſour ſmells, &c. ſhew, that the bowels abound with an acid, the child ſhould have a little ſmall broth, with light white bread in it, and ſufficient exerciſe to promote the digeſtion. The teſtaceous powders which have been cuſtomarily adminiſtered in this caſe, ſhould never be given unleſs mixed with purgative medicines, as rhubarb, manna, or ſuch like. The beſt medicine is the magneſia alba, which purges, and, at the ſame time, corrects the acidity. It may be given in any kind of food, or in the *laxative abſorbent* MIXTURE. When an *infant* is troubled with gripes, its body ſhould be opened with an emollient clyſter, or the medicine juſt mentioned; and at the ſame time a little brandy may be rubbed on its belly with a warm hand before the fire: but brandy, ſpices, and other hot things ſhould be avoided; except in caſes where the above method fails; in which a little brandy or other ſpirits may be mixed with twice the quantity of warm water, and a tea-ſpoonful of it given frequently till the *infant* be eaſier. Sometimes a little peppermint water will anſwer the purpoſe very well.

Cutaneous eruptions. Theſe attend children in various forms, and are of very different kinds; they are chiefly owing to improper food and neglect of cleanlineſs: a proper attention to theſe will generally be ſufficient to remove them; but if this fails, ſome drying medicines will be neceſſary. Whilſt they are applied, the body ſhould be kept open, and cold carefully avoided. For this purpoſe, a little of the flowers of ſulphur may be mixed with freſh butter, oil, or hog's lard, and the parts affected frequently touched with it. See ACHOR, CRUSTA *lactea*, TINEA, and CHILBLAINS.

Aphthæ. In this complaint *infants* are found to have their tongues covered over with little whitiſh ulcers, affecting alſo the whole inſide of the mouth, throat, and ſtomach; and ſometimes reaching through the whole inteſtinal canal, in which caſe they are very dangerous. See APHTHÆ.

This diſorder ſometimes ariſes from internal heat, ſometimes from the frequency and eagerneſs of the child's ſucking. The mouth in this caſe is to be wiped and cleanſed frequently with a rag dipped in wine and honey, or with a coarſer cloth dipped in ſyrup of mulberries; or, with the following mixture, made of fine honey an ounce, borax a dram, burnt alum half a dram, and roſe-water two drams. A very proper application in this caſe is a ſolution of ten or twelve grains of white vitriol in eight ounces of barley water. The moſt proper medicines for the aphthæ or thruſh, are vomits of ipecacuanha, emetic tartar, or antimonial wine, and gentle laxatives. Five grains of rhubarb, and half a dram of magneſia alba may be rubbed together, and divided into ſix doſes, one of which may be given every four or five hours, till they operate. Calomel has been ſometimes uſed; but it often occaſions gripes and ſometimes convulſions, and, therefore, ſhould be given to *infants* with the greateſt caution.

Convulſions. Theſe are cauſed in children by ſeveral different means, and therefore require a different treatment. Whatever greatly irritates or ſtimulates the nerves may occaſion convulſions. Hence *infants* whoſe nerves are eaſily affected, are often thrown into convulſions, by any thing that irritates the alimentary canal; by teething; ſtrait cloaths; and the approach of the ſmall pox, meaſles, or other eruptive diſeaſes. If they ariſe from a repreſſion of ſweats, the common alexipharmics are to be given, and in the intermediate times ſmall doſes of mercurius dulcis. If they are owing to acrimonious humours in the bowels, the cure may be begun with a clyſter, and afterwards a gentle vomit, which may be repeated occaſionally; and the body in the mean time kept open by gentle doſes of magneſia alba, or ſmall quantities of rhubarb mixed with the powder of crab's claws. When they are cauſed by abundant ſeroſities, valerian root and aurum fulminans, are greatly recommended. When they are epileptic, and return very frequently, cinnabar is to be given freely in powders; and when they are owing to worms, mercurius dulcis is the beſt of all remedies.

Convulſions which precede the eruption of the ſmall-pox or meaſles generally go off when theſe make their appearance. And, therefore, a little time, bathing the feet, and throwing in a mild clyſter will ſet all to rights.

When convulſion fits attend DENTITION, beſides gentle evacuations, bliſtering may be proper, and the uſe of antiſpaſmodic medicines, as the tincture of ſoot, aſa fœtida, or caſtor. When convulſions proceed from any external cauſe, as ſtrait cloaths and bandages, theſe ought to be immediately removed. Convulſions that are not owing to any of the complaints already recited, moſt probably proceed immediately from the brain: but theſe ſeldom happen. In endeavouring to remove theſe, the chief intention is to make ſome derivation from the head, by bliſtering, purging, &c. If theſe fail, iſſues or ſetons may be put in the neck or between the ſhoulders.

For other diſeaſes of *infants*; ſee DENTITION, HYDROCEPHALUS, RICKETS, and WORMS.

It is to be obſerved in general, that of the diſeaſes of children the far greater number are wholly owing to external cauſes, very few of them to any internal fault in the conſtitution. The principal of theſe external cauſes, are the following:

1. Changes of the temperature of the air. Theſe are brought on in regard to *infants* at the nurſe's pleaſure, and it is often thrown into too profuſe ſweats by a cloſe room and too warm covering, and perhaps in the midſt of this ſweat is immediately taken from under that covering, and expoſed to the open air. To this are owing moſt of the catarrhal affections to which *infants* are ſubject, and their fevers and cutaneous eruptions of the ſeveral kinds.

2. Improper food and drink are another great ſource of the diſeaſes of *infants*. Nurſes frequently ſtarve children, and more frequently cram them with much more food than is neceſſary; and beſides theſe irregularities in regard to quantity, errors in the quality are not leſs fatal. A thin and bilious milk throws them into gripings of the bowels, and bilious diarrhœas; and milk when too thick gives them ſtuffings or ſtoppages at the breaſt, and ſometimes ſuffocative catarrhs. And finally, the milk of a perſon, who has a remaining taint of the venereal diſeaſe, ſubjects the child to breakings-out, and ulcers of many kinds.

3. Motion and reſt improperly managed are alſo the ſources of many of the complaints of children. Nothing is more prejudicial to the health of a child, than that frequent cuſtom of idle nurſes of rocking a child to ſleep, whether it will or not; the violent and continual motion in this caſe often gives the child a vertigo, which it never afterwards gets rid of.

The binding children too tight in their dreſs, is alſo another great cauſe of diſorders, by obſtructing the due motions of nature in the circulation of the blood. The ſetting children too early on their feet, and compelling them to walk too early, is alſo the cauſe of many miſchiefs. And nothing is more miſchievous than the frequent diſturbing them out of their ſleep: this makes them peeviſh, and torpid, and ſleepy at other times.

4. The ſuppreſſion of the natural excretions is alſo the origin of many diſorders; and though this may ſometimes happen from an innate cauſe in the *infant*, it much oftener is owing to the perverſeneſs of the nurſe in feeding on acid foods, or ſuch as are hard of digeſtion; and expoſing the child, as well as her own breaſts to the cold air, when they are hot.

Infants, from the great tenderneſs of their parts, are much more ſubject to the ſeverity of diſeaſes than grown perſons; yet experience ſhews us, that they uſually get through them with leſs danger. An inſtance of this is evident in the ſmall-pox, from which people in general eſcape much better when young than at any other time. Convulſions, violent hiccoughs, and ſevere and almoſt continual crying, are obſerved very often to be fatal to children in the firſt ſix weeks; but are much leſs dangerous afterwards: and convulſions become habitual to children, though they are often very frequent in their returns upon every ſlight occaſion, yet are found much leſs dangerous than in other caſes. In general, all diſeaſes come to a ſhorter period in *infants* than in grown perſons.

Moſt of the diſtemperatures of children, in the firſt ſtage of infancy, ariſe chiefly from their bowels, and are to be curred by gentle correctives and evacuants; and of theſe the very mildeſt in their operation are always to be choſen. The uſe of gentle vomits is ſafe and proper. Five or ſix grains of the powder of ipecacuanha may be mixed in two table-ſpoonfuls of water, and ſweetened with a little ſugar: a tea-ſpoonful of this may be given every quarter of an hour till it operates. Or, a grain of emetic tartar may be diſſolved in three ounces of water, ſweetened with a little ſyrup, and given in the ſame manner. Or, ſix or ſeven drops of the antimonial wine may be adminiſtered in a tea-ſpoonful of water or thin gruel. Theſe medicines will cleanſe the ſtomach, and, generally, open the belly; but if the child be coſtive, manna and pulp of caſſia may be diſſolved in boiling water, and given in ſmall quantities till it operates; or a few grains of magneſia alba may be mixed in any kind of food, that is given to the child, and continued till it has the deſired effect. Some have highly extolled the uſe of mercurius dulcis or calomel, given from one grain to three or four, as a purge for children, which have no fever, eſpecially in caſes of diſorder ariſing from the retropulſion of cutaneous humours: but others think this medicine ſhould be uſed with great caution.

Manna, infuſions of ſena, and ſmall doſes of ſyrup of buck-thorn, may alſo be given as purges to children, where there is no fever joined with their complaints; but where there is a feveriſh diſpoſition, rhubarb is to be preferred. In violent gripings, and pains attended with crying out, terrors and tremblings, and acrid ſtools, mucilaginous medicines often prove of more ſervice than the abſorbents. Worms in *infants*, when alive in the bowels, often bring on atrophies and convulſions; and when dead and putrified, they occaſion many malignant effects, with convulſions, and often unaccountable ſymptoms. When alexipharmic or diuretic medicines are found neceſſary, it is always much better to give them to the nurſe than to the child; but antimony-diaphoretic, when faithfully prepared, is a medicine of great power, and yet ſo ſafe that it may be given to the *infant*. Narcotic medicines are to be given with the utmoſt caution; a ſingle grain of theriaca ſeems as proper as any thing for this purpoſe. Cinnabar in ſmall doſes is found to be an excellent remedy in convulſions; but if it be given too freely, it generally loads the ſtomach. Junker and Buchan.

INFANTE and INFANTA, are titles of honour given to the children of ſome princes; particularly thoſe of the houſes of Spain and Portugal.

It is uſually ſaid, that the appellation *infante* was introduced into Spain, on occaſion of the marriage of Eleanor of England with king Ferdinand of Caſtile; and that their ſon Sancho was the firſt that bore it.—But this is contradicted by Pelagius biſhop of Oviedo, who lived in the year 1100, and who informs us, that the titles *infante* and *infanta* were uſed in Spain ever ſince the reign of king Evremond II.

INFANTRY, the body of foot-ſoldiers in an army, or other corps.

The *infantry* ſtand contradiſtinguiſhed from the *cavalry*, or horſe.

INFANTRY *exerciſe*. See EXERCISE.

INFARCTION *of the liver*. See HEPATIS *infarctus*.

INFARCTION *of the ſpleen*. See SPLEEN.

INFATUATE, to prepoſſeſs any one in favour of ſome perſon or thing that does not deſerve it, ſo far as that he cannot eaſily be diſabuſed.

The word *infatuate* comes from the Latin *fatuus*, fool: of *fari*, to ſpeak out; which is borrowed from the Greek *φαω*, whence *φατης*, which ſignifies the ſame with *vates* in Latin, or *prophet* in Engliſh: and the reaſon is, becauſe their prophets or prieſts uſed to be ſeized with a kind of madneſs, or folly, when they began to make their predictions, or deliver oracles.

The Romans called thoſe perſons *infatuated*, *infatuati*, who fancied they had ſeen viſions, or imagined the god Faunus, whom they called *Fatuus*, had appeared to them.

INFECTION, the catching a diſeaſe, by ſome effluvia, or fine particles, which fly off from diſtempered bodies, and, mixing with the juices of others, occaſion the ſame diſorders as were in the bodies they came from.

The word comes from the Latin verb *inficere*, which properly ſignifies to dye of ſome other colour; *inficere*, i. e. *facere, ut aliquid intus ſit*, to occaſion ſomething to be imbibed. See CONTAGION.

INFERIÆ, in *Antiquity*, ſacrifices offered to the dii manes, or the ſouls of deceaſed heroes and illuſtrious perſons; or even of any relation or perſon whoſe memory was held in veneration.

INFERIOR, ſtands oppoſed to SUPERIOR.

INFERIOR *courts of record*, in *Engliſh Law-writers*, is uſed as a general name for corporation-courts, courts-leet, and ſheriffs-torns. See COURTS.

Moſt courts are ſubordinate to ſome other; but for diſtinction ſake the term *inferior-court* is by Sir Matthew Hale, and others, applied in the manner here mentioned.

INFERIOR *maxilla, ocean, planet*. See the ſubſtantives.

INFERIOR *penis*, in *Anatomy*, a name given by Spigelius to one of the muſcles of the penis, generally called the accelerator by the moderns; and by Veſalius, and others of his time, *primus penis*.

INFERIOR *obliquus, ſerratus, ſubſcapularis*. See the ſeveral articles.

INFERIORIS *labii depreſſor, labii elevator*. See DEPRESSOR, and ELEVATOR.

INFERNAL *glaſs*, in *Chemiſtry*, is a name given to the BOLT-*head*, when its ſtem is continued downward into the body of the glaſs veſſel, and left open only by a very ſmall orifice.

INFERNAL-*ſalt*, a name given by Hoffman, and ſome other of the chemical writers, to nitre; they have alſo called it *cerberus chemicus*.

INFERNAL *ſtone*. See LAPIS *infernalis*, CAUSTIC and CRYSTALS of *ſilver*.

INFERTILITY. See FERTILITY.

INFIBULATION, in *Antiquity*. It was a cuſtom among the Romans, to *infibulate* their ſinging boys, in order to preſerve their voices: for this operation which prevented their retracting the prepuce over the glans, and is the very reverſe to circumciſion, kept them from injuring their voices by premature and prepoſterous venery: ſerving as a kind of padlock, if not to their inclinations, at leaſt to their abilities. It appears by ſome paſſages in Martial, that a leſs decent uſe was made of *infibulation* among the luxurious Romans: for ſome ladies of diſtinction, it ſeems, took this method of confining their paramours to their own embraces. Juvenal alſo hints at ſome ſuch practice. Celſus, a chaſte author, ſays, *infibulation* was ſometimes practiſed for the ſake of health; and nothing deſtroys it more, than the ſilly practice this operation ſeems intended to prevent. This practice is not perhaps likely to be revived; if however any one who has ſuffered in his conſtitution by prepoſterous venery, ſhould be able to get children, and ſhould be inclined to prevent the ſame misfortune in them, by *infibulation*; the method of doing it is thus:

The ſkin which is above the glans is to be extended, and marked on both ſides with ink, where it is perforated, and then ſuffered to retract itſelf. If the marks recur upon the glans, too much of the ſkin has been taken up, and we muſt make the marks farther; if the glans remain free from them, they ſhew the proper place for affixing a *fibula*: then paſs a needle and thread through the ſkin where the marks are, and tie the threads together; taking care to move it every day, until the parts about the perforations are cicatriſed: this being effected take out the thread, and put in the *fibula*; which the lighter it is the better. Celſus, lib. vii. cap. 25.

Authors have not determined what the FIBULA of the ancient ſurgeon was, though no doubt they were for different purpoſes. In the preſent caſe, the *fibula* ſeems to mean a ring of metal, not unlike what the country people put through the noſes of ſwine.

INFIDEL, a term applied to ſuch perſons as are not baptized and that do not believe the truths of the Chriſtian religion. See DEIST.

INFINITE, that which has neither beginning, nor end: in which ſenſe God alone is *infinite*.

INFINITE is alſo uſed to ſignify that which has had a beginning, but will have no end: as angels, and human ſouls.

This makes what the ſchoolmen call *infinitum a parte poſt*; as, on the contrary, by *infinitum a parte ante*, they mean that which has an end, but had no beginning. See INDEFINITE, and FINITE.

INFINITE, in *Mathematics*, is applied to quantities which are either greater, or ſmaller, than any aſſignable ones. In which ſenſe it differs not much from what we otherwiſe call *indefinite*, or *indeterminate*. Thus, an

INFINITE, or INFINITELY *great line*, in geometry, denotes only an indefinite or indeterminate line; to which no certain bounds, or limits, are preſcribed.

INFINITE *quantities*. Though the idea of magnitude infinitely great, or ſuch as exceeds any aſſignable *Quantity*, does include a negation of limits; yet all ſuch magnitudes are not equal amongſt themſelves; but beſides *infinite* length, and *infinite* area, there are no leſs than three ſeveral ſorts of *infinite* ſolidity; all of which are quantities *ſui generis*; and thoſe of each ſpecies are in given proportions.

Infinite length, or a line infinitely long, is to be conſidered, either as beginning at a point, and ſo infinitely extended one way; or elſe both ways from the ſame point: in which caſe the one, which is a beginning of infinity, is one half of the whole, which is the ſum of the beginning and ceaſing *infinity*, or *infinity à parte ante*, and *à parte poſt*, which is analogous to eternity in time or duration; in which there is always as much to follow, as is paſt any point or moment of time.

Nor does the addition or ſubtraction of time, length or ſpace of time, alter the caſe, either as to infinity or eternity; ſince neither the one nor the other can be any part of the whole.

As to infinite ſurface or area, any right line infinitely extended both ways on an *infinite* plane, divides that plane into equal parts, the one to the right, and the other to the left of the ſaid line; but if from any point in ſuch a plane, two right lines be infinitely extended, ſo as to make an angle; the *infinite* area, intercepted between theſe *infinite* right lines, is to the whole *infinite* plane, as the arch of a circle drawn on the point of concourſe of thoſe lines as a centre, intercepted between the ſaid lines, is to the circumference of the circle; or as the degrees of the angle to the 360 degrees of a circle.

For an example—Two *infinite* right lines meeting at a right angle on an *infinite* plane, do include a quarter part of the whole *infinite* area of ſuch a plane: if two parallel *infinite* lines be ſuppoſed drawn on ſuch an *infinite* plane, the area intercepted between them will be likewiſe *infinite*; but at the ſame time time it will be infinitely leſs than the ſpace intercepted between two *infinite* lines, that are inclined, though with never ſo ſmall an angle, becauſe in the one caſe the given *finite* diſtance of the parallel lines diminiſhes the infinity in one degree of dimenſion; whereas in a ſector, there is infinity in both dimenſions; and conſequently the quantities are one infinitely greater than the other, and there is no proportion between them.

From the ſame conſideration ariſe three ſeveral ſpecies of infinite ſpace or ſolidity; for a parallelepiped, or a cylinder infinitely long, is greater than any *finite* magnitude, how great ſoever; all ſuch ſolids ſuppoſed to be formed on a given baſis, are in proportion to one another, as thoſe baſes. But if two of thoſe three dimenſions are wanting, as in the ſpace intercepted between two parallel planes infinitely extended, and at a finite diſtance; or with *infinite* length and breadth, it have a finite thickneſs; all ſuch ſolids ſhall be as the given finite diſtances one to another.

But theſe quantities, though infinitely greater than the other, are yet infinitely leſs than any of thoſe wherein all the three dimenſions are *infinite*—Such are the ſpaces intercepted between two inclined planes infinitely extended; the ſpace intercepted by the ſurface of a cone, or the ſides of a pyramid, likewiſe infinitely continued, &c. of all which, notwithſtanding the proportions of one to another, and to the το παν, or vaſt abyſs of *infinite* ſpace (wherein is the locus of all things that are, or can be) or to the ſolid of *infinite* length, breadth, and thickneſs taken all manner of ways) are eaſily aſſignable—For the ſpace between two planes is to the whole, as the angle of thoſe planes to the 360 degrees of the circle. As for cones and pyramids, they are as the ſpherical ſurface intercepted by them, is to the ſurface of the ſphere; and therefore cones are as the verſed ſines of half their angles, to the diameter of the circle: theſe three ſorts of *infinite* quantity are analogous to a line, ſurface and ſolid; and, like them, cannot be compared or have any proportion one to another.

Infinites, *Arithmetic of.* See Arithmetic.

Infinites, *Characters in arithmetic of.* See Character.

Infinite *Decimals.* See Repetend.

Infinite *Propoſition,* in *Logic.* See Proposition.

Infinite *Diſtreſs,* in *Law.* See Distress.

Infinitely *ſmall quantity,* called alſo an *infiniteſimal,* is that which is ſo very minute, as to be incomparable to any finite quantity; or it is that which is leſs than any aſſignable quantity.

An *infinite* quantity cannot be either augmented, or leſſened, by adding or taking from it any finite quantity; neither can a finite quantity be either augmented, or leſſened, by adding to, or taking from it an *infinitely ſmall quantity.*

If there be four proportionals, and the firſt be *infinitely* greater than the ſecond; the third will be *infinitely* greater than the fourth.

If a finite quantity be divided by an *infinitely* ſmall one, the quotient will be an *infinitely* great one; and if a finite quantity be multiplied by an *infinitely* ſmall one, the product will be an *infinitely* ſmall one; if by an *infinitely* great one, the product will be a finite quantity.

If an *infinitely* ſmall quantity be multiplied into an *infinitely* great one, the product will be a finite quantity.

In the method of infiniteſimals, or of *infinitely* ſmall quantities, the element by which any quantity increaſes or decreaſes is ſuppoſed to be *infinitely* ſmall, and is generally expreſſed by two or more terms; ſome of which are *infinitely* leſs than the reſt, which being neglected as of no importance, the remaining terms form what is called the difference of the propoſed quantity. The terms that are neglected in this manner, as *infinitely* leſs than the other terms of the element, are the very ſame which ariſe in conſequence of the acceleration, or retardation, of the generating motion, during the *infinitely* ſmall time in which the element is generated; ſo that the remaining terms expreſs the element that would have been produced in that time, if the generating motion had continued uniform, as is farther explained under Fluxion.

Therefore thoſe differences are accurately in the ſame ratio to each other, as the generating motions or fluxions. And hence, though infiniteſimal parts of the elements are neglected, the concluſions are accurately true, without even an *infinitely* ſmall error, and agree preciſely with thoſe that are deduced by the method of fluxions.

In order to render the application of this method eaſy, ſome analogous principles are admitted, as that the *infinitely* ſmall elements of a curve are right lines, or that a circle is a polygon of an infinite number of ſides, which being produced give the tangents of the curve, and by their inclination to each other meaſure the curvature. This is as if we ſhould ſuppoſe that when the baſe flows uniformly, the ordinate flows with a motion which is uniform for every *infinitely* ſmall part of time; and increaſes, or decreaſes, by *infinitely* ſmall differences at the end of every ſuch time.

But however convenient this principle may be, it muſt be applied with caution and art, on various occaſions. It is uſual therefore, in many caſes, to reſolve the element of the curve into two or more *infinitely* ſmall right-lines; and ſometimes it is neceſſary (if we would avoid error) to reſolve it into an infinite number of ſuch right-lines, which are infiniteſimals of the ſecond order. In general, it is a *poſtulatum* in this method, that we may deſcend to infiniteſimals of any order whatever, as we find it neceſſary; by which means any error that might ariſe in the application of it, may be diſcovered and corrected by a proper uſe of this method itſelf.

It is alſo to be obſerved, that when the value of a quantity that is required in a philoſophical problem becomes in certain particular caſes *infinitely* great, or *infinitely* little, the ſolution would not be always juſt, though ſuch magnitudes were admitted. As when it is required, to find by what centripetal force a curve could be deſcribed about a fixed point that is either in the curve, or is ſo ſituated that a tangent may be drawn from it to the curve. The value of the force is found *infinite* at the center of the forces in the former caſe, and at the point of contact in the latter; yet it is obvious, than an *infinite* force could not inflect the line deſcribed by a body that ſhould proceed from either of theſe points, into a curve; becauſe the direction of its motion in either caſe paſſes through the center of the forces, and no force how great ſoever that tends towards the center could cauſe it to change that direction. But it is to be obſerved, that the geometrical magnitude by which the force is meaſured is no more imaginary in this than in other caſes, where it becomes *infinite*; and philoſophical problems have limitations that enter not always into the general ſolution given by geometry.

But although by proper care errors may be avoided in the method of infiniteſimals, yet it muſt be owned that to ſuch who have been accuſtomed to a more ſtrict and rigid kind of demonſtration in the elementary parts of geometry, it may not ſeem to be conſiſtent with perfect accuracy, that, in determining the firſt differences, any part of the element of the variable quantity ſhould be rejected, merely becauſe it is *infinitely* leſs than the reſt; and that the ſame part ſhould be afterwards employed for determining the ſecond and higher differences, and reſolving ſome of the moſt important problems. Nor can we ſuppoſe, that their ſcruples will be removed, but rather confirmed, when they come to conſider what has been advanced by ſome of the moſt celebrated writers on this method, who have expreſſed their ſentiments concerning *infinitely* ſmall quantities in the preciſeſt terms; while ſome of them deny their reality, and conſider them only as incomparably leſs than finite quantities, in the ſame manner as a grain of ſand is incomparably leſs than the whole earth; and others repreſent them, in all their orders, as no leſs real than finite quantities. And although it appears from what has been ſaid in this article, that a ſatisfactory account may be given for the brief way of reaſoning that is uſed in the method of infiniteſimals; while nothing is neglected without accounting for it; and that the harmony between the method of fluxions and that of infiniteſimals thus appears more perfect.

And however ſafe and convenient this method may be, yet ſome will always ſcruple to admit *infinitely* little quantities, and *infinite* orders of infiniteſimals, into a ſcience that boaſts of the moſt evident and accurate principles, as well as of the moſt rigid demonſtrations. It is therefore proper, that this extenſive and uſeful doctrine ſhould be eſtabliſhed on unexceptionable principles. See the articles Fluxion, and Limit. See alſo Mr. Maclaurin's Treat. of Fluxions in the introduction, p. 39, 40, &c. and book 1. art. 495, to 502.

Infinitely *Infinite Fractions,* or all the powers of all the fractions whoſe numerator is one, are together equal to an unit. See the demonſtration hereof given by Dr. Wood, in Hooke, Phil. Coll. N° 3. p. 45, ſeq.

Hence, it is deduced, 1°, That there are not only *infinite* progreſſions, or progreſſions *in infinitum*; but alſo *infinitely* farther than one kind of infinity. 2°, That the *infinitely* infinite progreſſions are notwithſtanding computable, and to be brought into one ſum; and that not only finite, but ſo ſmall as to be leſs than any aſſignable number. 3°, That of *infinite* quantities, ſome are equal, others unequal. 4°, That one *infinite* quantity may be equal to two, three, or more other quantities, whether *infinite* or finite.

Infinite *Series.* See Series.

INFINITIVE, in *Grammar,* the name of one of the moods, which ſerve for the conjugating of verbs.

The *infinitive* does not denote any preciſe time, nor does it determine the number, or perſons, but expreſſes things in a looſe indefinite manner; as, *to teach,* &c. Hence the Latin and modern gramarians have called verbs under this mode, from this their indefinite nature, *infinitives.* Sanctius has given them the name of impersonals; and the Greeks that of ἀπαρεμφατα from the ſame reaſon of their not diſcovering either perſon or number.

Infinitives, ſays Mr. Harris, not only lay aſide the character of attributives, but they alſo aſſume that of substantives, and are diſtinguiſhed with their ſeveral attributes: e. g. *Dulce & decorum* eſt pro patria mori scire *tuum* nihil eſt, &c.

Hence the *infinitive* has been ſometimes called ονομα ῥηματικον, a verbal noun; ſometimes ονομα ῥηματος, the verb's noun. The reaſon of the appellation is evident in Greek, by its taking the prepoſitive article before it in all caſes; thus, το γραφειν, τȣ γραφειν, τω γραφειν. The ſame conſtruction is not unknown in Engliſh. Thus Spencer,

> *For not to have been dipt in Lethe lake*
> *Could ſave the ſon of Thetis* from to die: i. e.

απο τȣ θανειν.

The ſtoics held the *infinitive* as the genuine ῥημα or verb, a name which they denied to all other modes; becauſe the true verbal character was conceived to be contained ſimple and unmixed in the *infinitive* only: thus, *to walk,* means ſimply that energy, and nothing more: the other modes, beſides expreſſing this energy, ſuperadd certain affections, which reſpect perſons and circumſtances. The *infinitive*, ſays Priſcian, *ſignificat ipſam rem, quam continet verbum.* The *infinitive*, in the application of it, naturally coaleſces with all thoſe verbs, that denote any tendency, deſire, or volition of the ſoul, but not readily with others. See Harris's Hermes, p. 163, &c.

In moſt languages, both ancient and modern, the *infinitive* is diſtinguiſhed by a termination peculiar to it; as *τυπτειν* in the Greek, *ſcribere* in the Latin, *ecrire* in the French, *ſcrivere*, in the Italian, &c. but the Engliſh is defective in this point; ſo that to denote the *infinitive*, we are obliged to have recourſe to the article *to*: excepting ſometimes when two or more *infinitives* follow each other.

The practice of uſing a number of *infinitives* ſucceſſively, is a great but a common fault in language; as, *he offered to go to teach to write* Engliſh—Indeed, where the *infinitives* have no dependence on each other, they may be uſed elegantly enough; as *to mourn, to ſigh, to ſink, to ſwoon, to die.*

INFINITO, in the *Italian Muſic*, is uſed for ſuch canons or fugues, as may be begun again and again: whence they are alſo called *perpetual fugues.* See Fugue.

INFINITY, the quality which denominates a thing *infinite.* The idea ſignified by the name *infinity* is beſt examined by conſidering to what things *infinity* is by the mind attributed, and how the idea itſelf is framed: finite and infinite are looked upon as the modes of quantity, and are attributed primarily to things that have parts, and are capable of increaſe or diminution, by the addition or ſubtraction of any the leaſt part. Such are the ideas of ſpace, duration, and number. When we apply this idea to the Supreme Being, we do it primarily in reſpect of his duration and ubiquity; and more figuratively, when to his wiſdom, power, goodneſs, and other attributes, which are properly inexhauſtible and incomprehenſible: for when we call them *infinite*, we have no other idea of this *infinity*, but what carries with it ſome reflection on the number, or the extent, of the acts or objects of God's power and wiſdom, which can never be ſuppoſed ſo great, or ſo many, that theſe attributes will not always ſurmount and exceed, though we multiply them in our thoughts with the *infinity* of endleſs number. We do not pretend to ſay, how theſe attributes are in God, who is infinitely beyond the reach of our narrow capacities; but this is our way of conceiving them, and theſe are our ideas of their *infinity.*

We come by the idea of *infinity* thus: every one that has any idea of any ſtated length of ſpace, as a foot, yard, &c. finds that he can repeat that idea, and join it to another, to a third, and ſo on, without ever coming to an end of his additions. From this power of enlarging his idea of ſpace, he takes the idea of infinite ſpace, or immenſity. By the ſame power of repeating the idea of any length or duration we have in our minds, with all the endleſs addition of number, we alſo come by the idea of eternity.

If our idea of *infinity* be got by repeating without end our own ideas, it may be aſked, why do we not attribute it to other ideas, as well as thoſe of ſpace and duration; ſince they may be as eaſily, and as often repeated in our minds, as the other? yet nobody ever thinks of infinite ſweetneſs, or whiteneſs, though he can repeat the idea of ſweet or white, as frequently as thoſe of yard or day? To this it is anſwered, that thoſe ideas which have parts, and are capable of increaſe by the addition of any parts, afford us by their repetition an idea of *infinity*; becauſe with the endleſs repetition there is connected an enlargement, of which there is no end: but it is not ſo in other ideas; for if to the perfecteſt idea I have of white, I add another of equal whiteneſs, it enlarges not my idea at all. Thoſe ideas, which conſiſt not of parts, cannot be augmented to what proportion men pleaſe, or be ſtretched beyond what they have received by their ſenſes; but ſpace, duration, and number, being capable of increaſe by repetition, leave in the mind an idea of an endleſs room for more; and ſo thoſe ideas alone lead the mind towards the thought of *infinity.*

We are carefully to diſtinguiſh between the idea of the *infinity* of ſpace, and the idea of a ſpace infinite. The firſt is nothing but a ſuppoſed endleſs progreſſion of the mind over any repeated idea of ſpace: but to have actually in the mind the idea of a ſpace infinite,—is to ſuppoſe the mind already paſſed over all thoſe repeated ideas of ſpace, which an endleſs repetition can never totally repreſent to it; which carries in it a plain contradiction. See Space.

This will be plainer, if we conſider *infinity* in numbers: the *infinity* of numbers, to the end of whoſe addition every one perceives there is no approach, eaſily appears to any one that reflects on it: but how clear ſoever this idea of the *infinity* of numbers be, there is nothing yet more evident than the abſurdity of the idea of an actual infinite number. Locke's Eſſay, vol. i. chap xvii.

Infinity *of actions*, in *Law*; the lord of the ſoil may have a ſpecial action againſt him who ſhall dig ſoil in the king's highway: but one ſubject may not have his action againſt another for common nuiſances; for if he might, then every man might have it, and ſo the *actions* would be *infinite*, &c. 1 Co. Inſt. 56. 9 Rep. 113.

INFIRMARY, a place where the ſick and weak belonging to any ſociety, or community, are diſpoſed, either for nurſing or cure. See Hospital.

INFLAMMABILITY is that property of bodies which diſpoſes them to kindle, or catch fire. See Flame, Heat, and Phlogiston.

Inflammability *of oils with acids.* Among the many ſurpriſing phenomena which the world owes to the late improvements in chemiſtry, there is none which has more attracted the admiration of the generality of mankind than that remarkable one of producing actual flame, by mixing two liquors, both cold to the touch; the acid ſpirits of minerals, and the chemical oil of vegetables. See Coruscation.

Becher is the firſt author who has publiſhed an account of this phenomenon. He obſerves, in his Phyſica Subterranea, that oil of vitriol which is a very ſtrong acid liquor, with oil of turpentine which is a very ſulphureous one, produces a violent heat, and actual fire or flame. Becher giving no farther account of the proceſs than this, ſeveral of the ſucceeding chemiſts tried the experiment, but all without ſucceſs. At length Borrichius (ſee Copenhagen Tranſactions for the year 1671) explained it, with all the neceſſary particulars, and the effect according to his directions has been ſometimes produced; though the great uncertainty of a thouſand little accidents, all of which muſt neceſſarily concur to the producing the flame, has made it often miſs even in the moſt careful hands. The method of Borrichius is this, mix in a glaſs veſſel four ounces of freſh drawn and highly rectified oil of turpentine, with ſix ounces of aqua fortis newly made and carefully prepared; cover the veſſel, and ſhake the two liquors well together. After they have ſtood together half an hour, open the veſſel, and there will proceed out of the mouth of it large quantities of flame mixed with great clouds of ſmoak. The experiment will not ſucceed however unleſs the liquors are freſh made, and the veſſel be expoſed to the heat of the ſun. And many who have failed in trying the experiment, from their neglect of certain circumſtances which appeared trifling to them, have cenſured both authors as relating untruths. Tournefort, in the year 1700, inflamed by this method the oil of ſaſſafras. Homberg, in the year 1701, ſays, in the Memoirs of the Academy, that he inflamed oil of turpentine by mixing it with nitrous acid; but he ſays, that the oil muſt be thick. Rouviere, in the year 1706, inflamed the empyreumatic oil of guyac; and his experiment was much talked of, becauſe it ſucceeded more eaſily than the others, becauſe this inflammation is very vivid, and becauſe it is attended by a ſurpriſing circumſtance, namely, that from amidſt the flames ariſes a black, thin, ſpongy body, of a conſiderable height, which is, as we ſhall ſee, only the thickeſt part of the oil rarefied and burnt during the inflammation. This inflammation of oil of guyac was ſolely attended to, and was ſhewn to ſtudents in courſes of chemiſtry and experimental philoſophy; till Hoffman, a German chemiſt, and Geoffroy, a French chemiſt, having made many experiments on this matter, diſcovered at the ſame time, that ſmoking nitrous acid, mixed with concentrated vitriolic acid, ſucceeded much better for the inflammation of oils, and particularly of the oil of turpentine, which had been almoſt relinquiſhed. Mem. Acad. Paris, 1702, and 1726.

Mr. Rouelle then reſumed this ſubject, and publiſhed, in the year 1747, a memoir filled with many experiments, which ſhewed, that by nitrous acid may be inflamed all eſſential oils, including oil of turpentine, and even thoſe ſweet expreſſed oils which are capable of quickly thickening and drying, ſuch as oils of nuts, linſeed, hemp, provided that the acid be ſufficiently concentrated. Laſtly, the ſame chemiſt diſcovered, that even the ſweet oils leaſt diſpoſed to dry, that is, thoſe called *fat oils*, may alſo be inflamed. But to make their inflammation ſucceed, the method mentioned by Hoffman and Geoffroy was neceſſary; that is to ſay, ſome concentrated vitriolic acid muſt be previouſly mixed with the nitrous acid. As theſe laſt mentioned oils are of all oils the leaſt inflammable, we have reaſon to believe that every oil may be inflamed by a mixture of theſe two acids.

Mr. Rouelle farther remarks, in the above quoted memoir, that flame is more certainly produced in all theſe experiments, when the nitrous acid is poured on at intervals, and when it is applied to that part of the oil which the portions of acid firſt poured on had thickened, heated, and dried. The inflammation of oils by acids is now become an experiment eaſily performed. The following circumſtances are remarked to be peculiar to the inflammation of the ſeveral kinds of oil.

All eſſential oils, and even the ſweet drying oils, may be inflamed by the nitrous acid alone, provided that the veſſel in which the inflammation is to be made be of a convenient ſize and form, that the nitrous acid be ſufficiently concentrated, and that a ſufficient quantity of acid and oil be employed. The veſſel ought to be ſufficiently wide-mouthed; and the nitrous acid, for greater certainty, ought to be ſo concentrated that a phial capable of containing exactly an ounce of pure water, ſhall be capable of containing one ounce, four gros, and two ſcruples of this acid. Laſtly, an ounce of this acid, and as much of the oil to be inflamed, ought to be employed, although leſs quantities may ſucceed, but leſs certainly. The oil is firſt put into the veſſel in which the inflammation is intended to be. Then the veſſel containing the nitrous acid is to be tied to one end of a rod, that the operator may not be hurt by the part of the mixture which is generally thrown out of the veſſel, and ſometimes to a conſiderable diſtance. One half or two-thirds of the acid is poured at once. A conſiderable ebullition is excited by the reaction of theſe two liquors. The oil becomes black, thick, and ſometimes inflames. If it does not inflame within four or five ſeconds, more nitrous acid muſt be poured upon the part which appears thickeſt and drieſt, and then the mixture never fails to be inflamed.

The oils of almonds, olives, rapes, and other fat oils, have not been hitherto inflamed by the nitrous acid alone. But their inflammation is effected, as Mr. Rouelle practiſes, by mixing with them firſt equal quantities of the concentrated vitriolic and nitrous acids, which occaſion leſs quick and violent ebullition than in the preceding inſtances; but when this ebullition is at its height, ſome pure nitrous acid muſt be poured on the thickeſt part of the mixture. Then the inflammation generally happens, but is leſs ſtrong than when any other kind of oil is uſed. Although theſe phenomena be ſurpriſing, their theory is eaſy. All oils contain phlogiſton as a conſtituent part. Nitrous acid alſo contains phlogiſton. Hence we may underſtand the cauſe of the powerful action of theſe two ſubſtances upon each other. The heat reſulting from their reaction is equal to that of ignition; and hence the oil and even the nitrous acid being capable of inflammation, muſt conſequently be inflamed. Chemical Dict. vol. ii. art. *Inflammation*.

INFLAMMABLE *principle*. See PHLOGISTON.

INFLAMMATION, from *in*, and *flamma*, *flame*, in *Surgery* and *Phyſic*, a tumor attended with a preternatural heat, and redneſs, and a continual pulſation and pricking; frequently ariſing from ſome obſtruction or ſtagnation in the ſmall arterial blood-veſſels or lymphatics; by means whereof the blood flowing into ſome part faſter than it can run off again, ſwells up, and cauſes a tenſion, with an unuſual ſoreneſs, redneſs, and heat.

Others have defined *inflammation*, in relation to the cauſe that produces it, to be an increaſed circulation in any part, from irritation, external or internal, local or univerſal: in conſequence of which irritation, a greater quantity of fluid circulates through, and is ſecreted in a part that is inflamed, than when it is in its natural ſtate. However, nothing has been more variouſly accounted for than the proximate cauſe of *inflammation*; and in all probability, ſays an ingenious writer, it is intimately connected with thoſe operations of the minuteſt parts of the body which we are at preſent, and perhaps ſhall ever remain, ignorant of. The ſymptoms of every *inflammation*, which are a painful tumor, with increaſed heat, redneſs and ſenſibility, plainly ſhew a congeſtion of fluids, a more frequent action of the moving powers, and a violent ſtate of the nerves diſpoſing them to communicate ſenſation in too great a degree. The remote cauſes of *inflammation* are wounds, bruiſes, ſudden and exceſſive cold; luxations, aromatic aliments, &c Phyſicians have given diſtinct names to the *inflammations* of ſeveral parts; ſee the ſubſequent articles. All the *inflammations* that are denominated phlegmonous are ſeated in the ſanguine arteries of the part inflamed; and the mucous membrane is the ſeat of thoſe *inflammations* which are diſtinguiſhed by the name of *inflammations* of the mucous membrane; in which caſe, the irritation being in the ſurface of the membranes, ſtimulates the ſecretory mucous glands to accumulate and diſcharge more than they do in a natural ſtate. If there are tumors, the *inflammation* is phlegmonous; and theſe are diſtinguiſhed into phlegmonous which are ſeated in the ſanguine arteries and cellular membrane (ſee PHLEGMON); and eryſipelatous, whoſe ſeat is in the ſkin, or other internal membranes not cellular. See ERYSIPELAS.

Inflammations terminate variouſly according to their different degrees of violence, the cauſes from which they ariſe, the parts which they affect, and the particular conſtitution of the patient, with ſeveral other circumſtances that preſage what will be the end of the *inflammation*. But the ſeveral ways wherein an *inflammation* terminates have been uſually reckoned four. The firſt is reſolution; when, upon removing the cauſe, the ſymptoms go off gradually, and leave the parts in the ſame ſtate in which it was before the diſeaſe took place. This is the termination which is always to be preferred, unleſs the *inflammation* has been produced by morbific matter, which is to be diſcharged externally.

The grand intention of the treatment of all *inflammations* ſhould be to open ſuch ſmall veſſels as are obſtructed, and to reſtore the blood to its natural conſiſtence and free circulation; and this is commonly termed in ſurgery the reſolution or diſperſion of tumors. When in caſes of this kind the *inflammatory* ſigns are but gentle, it is always beſt immediately to ſet about the diſperſing the tumor. If the cauſe of the *inflammation* is external and obvious, as thorns, ſplinters, bullets, or any other foreign body ſtuck in the part, this is to be immediately removed, if that can be done with ſafety. So when the *inflammation* proceeds from too tight a bandage in wounds, &c. or from a luxation or fracture, the firſt thing to be done is to looſen the bandage, to ſet the fracture, or to reduce the luxation. It is after this very proper to open a vein in the arm, and after that to give a briſk but not heating purge; and if the ſymptoms do not abate, this method is to be repeated at proper intervals. Internal medicines which are watery, diluting, cooling, and attenuating, do great ſervice on theſe occaſions.

A proper regimen is alſo to be obſerved in regard to diet: all aliments that are of difficult digeſtion, all pickled or ſalted meats, and all ſpices and fermented liquors, with every thing elſe that may tend to heat and inflame the blood, are to be carefully avoided. The moſt proper aliments are broths, and drinks made of pearl-barley, oats, or flour. Decoctions of all the cooling plants, as ſorrel, endive, &c. mixed with ſmall quantities of lemon juice, or any other of the vegetable acids; and when the *inflammation* is great, a little nitre ſhould be added to the drinks. Nor is there leſs care required about the external applications; for though ſome to appeaſe *inflammations* uſe only heating medicines, and others only cooling ones, yet either ſort, if applied at random, and in all caſes, may prove pernicious; for one medicine can never in theſe caſes ſerve for all conſtitutions. To perſons of a hot temperament the cooling external remedies are in theſe caſes to be applied. Of this kind are the litharge-vinegar, applied warm on linen rags folded together, or hot vinegar mixed with red-lead, or with bole armoniac, and applied in the ſame manner; or oxycrate, or vinegar, and water mixed in equal quantities; or of any of theſe liquors may be taken ſix ounces, and to this an ounce of common ſalt, and two ounces of either nitre or ſal ammoniac being added, and with this mixture linen rags many times doubled, and applied wet to the part, will be of great ſervice. In the night-time alſo, when theſe applications cannot ſo conveniently be renewed, a plaſter of the red-lead, or other cooling one, may be of no ſmall uſe. This is the proper method in hot conſtitutions; but, on the contrary, in cold and phlegmatic ones, ſpirit of wine alone, or camphorated ſpirit, or either of theſe with an admixture of a ſmall quantity of Venice treacle, are very ſucceſsful remedies for the diſperſion of *inflammations*, being applied on linen cloths doubled in the ſame manner; ſo alſo is ſpirit of wine mixed with lime-water, or even lime-water alone, or Hungary-water with lapis calaminaris, ceruſs, ſal ammoniac, or bol-armoniac, or a mixture of a pint of rectified ſpirit of wine with two ounces of Caſtile ſoap. This laſt applied warm is hardly ſecond to any medicine in theſe intentions. Decoctions of wormwood, mint, ſavin, ſouthernwood, and other ſuch herbs, made with ſalt-water or lime-water, are alſo very good external applications; and to theſe may be added, when neceſſary, either camphorated ſpirit of wine, or Caſtile ſoap: and not only the decoction of theſe herbs, but the herbs themſelves when boiled may be applied as a cataplaſm, with great ſucceſs.

Mr. Goulard obſerves, that emollient topics are in great meaſure contrary to the indications that are to be fulfilled in reſolving an *inflammation*: they increaſe every degree of tumor, by adding to the quantity of accumulated matter, and rendering the veſſels more yielding to its impulſe and leſs able to carry it off. Saturnine topics, on the other hand, ſeem peculiarly calculated to anſwer every indication of a reſolvable *inflammation*. The aſtringent and ſedative properties combined, tend to give a tone to the fibres, and make the veſſels capable of emptying themſelves, and at the ſame time to moderate the increaſed motion and ſenſation. Other aſtringents and ſtimulants, ſuch as the uſual mixture of vinous ſpirit with vinegar, will likewiſe prove ſedative. The ſaturnine water, by its mild aſtringency, its ſedative and antiſeptic quality, ſeems peculiarly adapted to that ſpecies of *inflammation* called the ERYSIPELAS. However, there are various caſes in which the reſolution of an *inflammation* cannot poſſibly be effected: and, therefore, in ſuch caſes, recourſe muſt be had to ſuch means as are moſt likely to promote a ſpeedy and favourable SUPPURATION, which is the ſecond mode in which an *inflammation* terminates, or rather the conſequence of it. 3. An *inflammation* ſometimes terminates in a SPHACELUS or GANGRENE, which is produced by a putrefaction generated in the mortified fleſh, and communicating its ferment to the ſurrounding part. This ſhould never be promoted by art, but its progreſs prevented or limited by ſeparation of the dead fleſh, or checking the putrefactive fermentation in it. For this purpoſe, emollients, with a proper mixture of antiſeptics, ſhould be uſed; practice has, therefore, rightly introduced the application of warm poultices, compoſed of farinaceous ſubſtances and vinegar, ſtrong beer grounds and the like; and the cataplaſm made of ſaturnine water appears very well calculated for this purpoſe. But when a ſpreading gangrene proceeds from an internal cauſe, which uſually happens in dropſical and lecuophlegmatic habits, or in extreme old age, emollients of every kind are to be avoided, and the warmeſt ſtimulants and moſt powerful antiſeptics are indicated. The fourth mode in which an *inflammation* terminates, according to ſome writers, is a SCHIRRUS, which grows more compact in the part affected, as the *inflammation* remits or goes off. But this is juſtly conſidered by ſome late writers as a peculiar diſeaſe; ſince it ſeldom or never occurs but in venereal, ſcrophulous, or cancerous caſes, when it is the forerunner, and not the conſequence of an *inflammation*; the tumor generally appearing before the diſcolouration.

It may be obſerved, in general, that in all phlegmonous *inflammations*, there are two indications, viz. to leſſen or remove the irritation, and to abate the increaſed afflux of the humours. With reſpect to the firſt, endeavours muſt be uſed to remove every thing that occaſions the morbid irritation: when ſpaſms are the cauſe, opium is the moſt proper remedy; when a ſtimulating fluid is ſecreted on a ſenſible membrane, its action may be hindered by the application of oily, unctuous, or mucilaginous matter: the morbid acrimony may be deſtroyed by proper alteratives, as mercury, &c. the irritability of the part may be deſtroyed or diminiſhed by means of the bark, preparations of lead, &c. The diſtenſion of the internal veſſels may be rectified, by reſtoring the circulation on the external ſurface of the body, or giving internal medicines to relax the ſmall veſſels, through the ſyſtem, by their action on the ſtomach, ſuch as nitre, ſal ammoniac, all the neutral ſalts, ipecacuanha, ſeneca root, antimonial preparations, cold water, by external applications, as ſinapiſms, bliſters, &c. The ſecond indication may be anſwered by bleeding, purging with neutral ſalts, internal ſedative medicines, as acids and narcotics, and the external application of ſedatives, as the preparations of lead, &c. An *inflammation* may alſo be excited on the ſkin, if this be not the part inflamed, near the part primarily affected, by means of friction, the volatile liniment or bliſter: the diet ſhould be cooling and attenuating, as already directed; and the drink barley water, in which gum arabic has been diſſolved, with the addition of nitre. The belly ſhould be kept lax in all kinds of *inflammation*; and internal ones are much relieved by a frequent uſe of clyſters. Vapours and warm baths ſerve to leſſen the irritation of the fibres and to retard the motion of the blood. When the *inflammation* abates, attenuants and aperients, ſuch as guaiacum, ſaſſafras, &c. are uſed with ſome advantage. Heiſter's Surgery, part i. p. 194, &c. Aikin on Lead, &c. p. 39. Motherby's Dict. art. *Inflammation*.

A late author is of opinion, that the ophthalmia, angina, phrenitis, peripneumonia, pleuritis, hepatitis, nephritis, and rheumatiſmus, have all the ſame characteriſtic, and differ in nothing but the part affected; ſo that if one has a right knowlege of an *inflammation* on an external part, its progreſs and proper remedies, and at the ſame time is thoroughly acquainted with anatomy and the animal œconomy, he cannot be at a loſs to diſtinguiſh and treat any of the diſeaſes belonging to this claſs. Medic. Eſſ. Edinb. vol. i.

INFLAMMATION of the *bladder* proceeds, in a great meaſure, from the ſame cauſes as that of the *kidneys*, and requires a ſimilar treatment. It is known by an acute pain towards the bottom of the belly, and difficulty of paſſing urine, with ſome degree of fever, a conſtant inclination to go to ſtool, and a perpetual deſire to make water. The diet muſt be light and thin, and the drink of a cooling nature. Bleeding is very proper at the beginning, and in robuſt conſtitutions it will often be neceſſary to repeat it. The lower part of the belly ſhould be fomented with warm water, or a decoction of mild vegetables, and emollient clyſters ought frequently to be adminiſtered, &c. the patient ſhould abſtain from every thing that is of a hot, acrid, and ſtimulating quality, and live entirely upon ſmall broths, gruels and mild vegetables. Buchan.

INFLAMMATION *of the brain.* See PHRENSY.

INFLAMMATION of the *breaſts.* See TUMORS *of the breaſts* and *women's* MILK.

INFLAMMATION *of the diaphragm.* See PARAPHRENITIS.

INFLAMMATION *of the ear.* See OTALGIA.

INFLAMMATION *of the eye.* See OPHTHALMIA.

INFLAMMATION *of the fauces*, &c. See ANGINA and QUINZY.

INFLAMMATION *of the inteſtines.* See ILIAC *paſſion*.

INFLAMMATION *of a joint.* See RHEUMATISM.

INFLAMMATION *of the kidneys.* See NEPHRITIS.

INFLAMMATION *of the liver.* See HEPATITIS and LIVER.

INFLAMMATION *of the lungs.* See PERIPNEUMONY.

INFLAMMATION *of the mediaſtinum*, *meſentery*, *oeſophagus*, *pericardium*, and *perioſteum*. See theſe articles.

INFLAMMATION *of the pleura.* See PLEURISY.

INFLAMMATION *of the ſpleen.* See SPLENITIS.

INFLAMMATION *of the ſtomach*, called alſo, *gaſtritis* and inflammatory COLIC, proceeds from any of the cauſes which produce an inflammatory fever, as cold liquor drank when the body is warm, obſtructed perſpiration, or the ſudden ſtriking in of any erruption: or, from the acrimony of the bile, and acrid ſubſtances taken into the ſtomach, as ſtrong vomits or purges, corroſive poiſons, &c. It is alſo occaſioned by repelling the gout from the extremities; and by hard indigeſtible ſubſtances, as bones, the ſtones of fruit, &c. ſwallowed into the ſtomach. This diſeaſe is attended with a fixed pain and burning heat in the ſtomach; great reſtleſſneſs and anxiety; a ſmall, quick, hard pulſe; vomiting, or at leaſt a nauſea and ſickneſs; exceſſive thirſt; coldneſs of the extremities; difficulty of breathing; cold clammy ſweats; and ſometimes convulſions and fainting fits. The ſtomach is ſwelled and feels hard to the touch; and the patient has a ſenſe of pain, when he takes any kind of food or drink, eſpecially if it be either too hot or cold. When he vomits every thing he eats or drinks, is extremely reſtleſs, has a hiccup, with an intermitting pulſe and frequent fainting fits, the danger is very great.

In this diſorder all acrimonious, heating and irritating food and drink are to be carefully avoided; and a vomit is very hurtful. The food ſhould be light, thin, cool and eaſy of digeſtion; the drink ſhould be clear whey, barley-water, or decoctions of emollient vegetables, as liquorice and marſh-mallow roots, ſarſaparilla, &c. Bleeding is almoſt the only dependence, and it muſt be freely uſed, notwithſtanding the lowneſs of the pulſe, and repeated till the pulſe riſes. Flannel cloths dipped in lukewarm water, or a decoction of emollient vegetables, ſhould be applied to the region of the ſtomach. The feet and legs ought to be frequently bathed in lukewarm water, and warm bricks or poultices applied to the ſoles of the feet. The warm bath is alſo very beneficial. In this, and all other *inflammations* of the bowels, an epiſpaſtic, or bliſtering plaſter, applied over the part affected, is an excellent remedy, and ſeldom fails of giving relief. Mild clyſters of warm water, or thin water gruel, with the addition of a little ſweet oil, honey, or manna, when the patient is coſtive, ſhould be frequently adminiſtered; and are of very great importance. Buchan's Dom. Med. p. 314, &c.

INFLAMMATION *of the teſticles.* See HERNIA *Humoralis* and *Tumors of the* TESTICLES.

INFLAMMATION *of the throat.* See ANGINA and QUINZY.

INFLAMMATION *of the tonſils.* See TONSILS.

INFLAMMATION *of the vagina.* See VAGINA.

INFLAMMATION *of the womb* is a diſorder to which women after child-birth, when the LOCHIA are impeded, are moſt frequently ſubject: the common cauſes of this complaint, beſides thoſe of internal *inflammations* in general, are tearing, bruiſes, external ſtimuli, and obſtructed menſtrua or lochia. When it happens after abortion and child-birth, it is attended with a pain at the bottom of the belly, which is neither throbbing nor conſtantly acute; a frequent pulſe, often ſmall, ſometimes irregular, and in ſtrong habits and after early abortions, hard; a delirium a delirium, ſubſultus tendinum, and other ſymptoms of irritation: the womb gangrenes and mortifies, and the patient ſinks. But if the uterus has not been lately impregnated, the pain is more conſtant, bounded and throbbing; the pulſe is hard, full, and ſtrong, and accompanied with other ſymptoms of general *inflammation*; and if the diſeaſe increaſes, the pulſe is ſmall and frequent, the ſymptoms of irritation attend, and ſuppuration is more likely to happen. In both, as different parts of the womb are affected, there is a ſtrangury or a ſuppreſſion of urine; the ſmall quantity diſcharged is fetid and hot; a teneſmus attends with a pain in going to ſtool: or, there is pain in moving the lower extremities, or ſwelling, with heat, to be felt by introducing a finger up the vagina, the os tincæ being ſhut; univerſal reſtleſſneſs, thick urine, pain upon external preſſure; the belly is tenſe; a red ſtain extends up to the navel and turns black when fatal; and if it happens in an impregnated uterus, an abortion follows. It often happens that the woman can only lie on her back, and on turning to either ſide, ſhe feels a painful heavy maſs fall to that ſide, and at the ſame time an exceſſive pain in the loins, kidneys, and groin of the oppoſite ſide. This diſorder may be removed by a ſpontaneous eruption of the menſes, or of the lochia; or, after an abortion or childbirth, by a conſtant, gentle, and long continued ſweat: or, it may terminate in an abſceſs or a mortification, both which are almoſt always fatal. When an *inflammation* attacks a womb not lately impregnated, the common remedies uſed in caſes of internal *inflammation* are to be employed. In abortions and labours, when the patient hath not been much weakened, and the pulſe is hard and not very frequent, bleeding in the arm may be beneficial, but can rarely be repeated; therefore the general method of cure will depend on relaxants, ſuch as the antimonial powder and ſaline draught, moderately uſed. To which may be added anodyne and antiſpaſmodic fomentations and poultices. Perſpiration may be free; the other uſual evacuations by urine and ſtool may be moderately promoted; but all extraordinary ones are dangerous. If the pain continues, notwithſtanding the uſual treatment, opiates may be ſometimes given with ſucceſs. If a ſuppuration comes on, an exit for the pus ſhould be procured as ſoon as poſſible, which, when it points to the perinæum, may be ſometimes obtained. Motherby.

INFLAMMATORY *diſeaſes*. To theſe are to be referred coughs, pleuriſies, peripneumonies, acute rheumatiſms, inflammations of the brain, bowels, and other parts, attended with a fever; alſo leſſer inflammations without a fever, and fevers of an *inflammatory* kind, where no part is ſo peculiarly affected as to give name to the diſeaſe. And, laſtly, all chronic diſorders ariſing from inflammations, whereof the chief are old coughs, conſumptions, and the rheumatiſm without a fever. See the preceding articles and references.

All theſe diſeaſes are the conſequences of catching colds, and are prevented by the ſame means as colds. See Cold.

Bleeding is the moſt indiſpenſable remedy in the cure of all *inflammatory* diſeaſes, and therefore to the delaying this too long, or not repeating it, it is owing, that colds end in dangerous fevers, rheumatiſms, or conſumptions. See Bleeding.

In all *inflammatory* diſorders, the principal intention of cure is to diminiſh the force of the blood, to thin it, and to relax the fibres; on which account, bleeding, attenuants, and diaphoretics, are the chief remedies. Phyſicians have generally ſuppoſed, that the increaſed action of the blood-veſſels in *inflammatory* diſeaſes increaſes the tendency of concretion in the craſſamentum. But Mr. Hewſon has advanced a new doctrine, which has alſo been adopted by Dr. George Fordyce, in his Elements of the Practice of Phyſic, viz. that inflammation inſtead of increaſing, leſſens the diſpoſition of the blood to coagulate, and inſtead of thickening, thins it, at leaſt its coagulable part; the ſurface of blood which is about to form a cruſt or ſize, remaining much longer fluid than that of blood in different circumſtances: and he ſuppoſes that what floats on the ſurface of ſuch blood is coagulable lymph, attenuated by the increaſed action of the blood-veſſels. Phil. Tranſ. vol. lx. p. 390.

An early ſweat tends alſo to prevent an *inflammatory* fever; for which purpoſe, the diaphoretic draught of the Edinburgh diſpenſatory is recommended; or, inſtead of it, a ſpoonful of the plain ſpiritus Mindereri may be given every two hours, till a ſweat breaks out; or two ſcruples of the ſalt of hartſhorn, ſaturated with about three ſpoonfuls of common vinegar, may be given in one draught at bed-time. Pringle, Obſerv. on the Diſeaſes of the Army, p. 73. 77. 127, ſeq.

Inflammatory *fevers*. See *ardent* or *inflammatory* Fever.

INFLATION, formed from *in*, and *flatus*; of *flo*, *I blow*; *blowing up*, the act of ſtretching or filling any flaccid, or diſtenſible body, with a flatulent or windy ſubſtance.

INFLECTION, called alſo *diffraction*, and *deflection*, in *Optics*, is a property of light, by reaſon of which, when it comes within a certain diſtance of any body, it will either be bent from it, or towards it; which is a kind of imperfect reflection or refraction.

This property was firſt taken notice of by Dr. Hooke; who ſhews that it differs both from *reflection* and *refraction*; and ſeems to depend on the unequal denſity of the conſtituent parts of the ray, whereby the light is diſperſed from the place of condenſation, and rarefied or gradually diverged into a quadrant: and this deflection, he ſays, is made towards the ſuperficies of the opake body perpendicularly. Some writers aſcribe the firſt diſcovery of it to Grimaldi, the Jeſuit. He firſt publiſhed an account of it, in his treatiſe, De Lumine, Coloribus, & Iride, printed in 1666; nor did any other perſon lay claim to the diſcovery, except Dr. Hooke, who communicated his obſervations on this ſubject to the Royal Society, in 1672. It appears, however, that Dr. Hooke had not heard of the diſcoveries of Grimaldi; for he ſpeaks of his own, as a diſcovery of a new property of light, not mentioned by any optical writer before him. See Diffraction.

Sir Iſaac Newton diſcovered alſo, by plain experiment, this *inflection* of the rays of light; and M. de la Hire aſſures us he found, that the beams of the ſtars being obſerved, in a deep valley, to paſs near the brow of a hill, are always more refracted than if there were no ſuch hill, or the obſervations were made on the top thereof; as if the rays of light were bent down into a curve, by paſſing near the ſurface of the mountain.

Sir Iſaac Newton, in his Optics, makes ſeveral experiments and obſervations on the *inflection* of the rays of light; which ſee under Light, and Rays.

M. de la Hire obſerved, that when we look at a candle, or any luminous body, with our eyes nearly ſhut, rays of light are extended from it, in ſeveral directions, to a conſiderable diſtance, like the tails of comets. The true occaſion of this phenomenon, which has exerciſed the ſagacity of Des Cartes, Rohault, and others, ſeems to be, that the light paſſing among the eye laſhes, in this ſituation of the eye, is inflected by its near approach to them, and therefore enters the eye in a great variety of directions.

Inflection, in *Grammar*, the variation of nouns and verbs, in their ſeveral caſes, tenſes, and declenſions.

Inflection is a general name, under which are comprehended both conjugation and declension.

Inflection, *point of*, of a curve, in *Geometry*, is a point or place where the curve begins to bend, or turn a contrary way.

If a curve line, as A F K (*Tab.* III *Geometry*, *fig.* 53), be partly concave, and partly convex towards any right line, as AB, or towards a fixed point; the point F, which divides the concave from the convex part, and conſequently is at the beginning of the one and end of the other, is called the *point of inflection*, as long as the curve, being continued beyond F, keeps its courſe the ſame: when it returns back again towards that part or ſide, from whence it took its original, is called the *point of retrogreſſion*. See the article Retrogression.

To conceive this, it is to be conſidered, that any quantity which goes on continually increaſing or decreaſing, it cannot change from a poſitive to a negative expreſſion, or from a negative to a poſitive one, without firſt becoming equal to an infinite, or nothing. It becomes equal to nothing, if it continually decreaſe; and equal to an infinite, if it continually increaſe.

Now, if through the point F be drawn the ordinate E F, and the tangent F L, and from any point, as M, on the ſame ſide of A F, be drawn the ordinate M P, and the tangent M T; then in curves which have a *point of inflection*, the abſciſs A P continually increaſes, and the part A T of the diameter, intercepted between the vertex of the diameter and the tangent M T, increaſes alſo, till the point P fall into E; after which it again begins to diminiſh: whence the line A T muſt become a maximum A L, when the point P falls into the point E.

In thoſe curves which have a point of retrogreſſion, the part A T increaſes continually, and the abſciſs increaſes, till the point T falls into L; after which it again diminiſhes: whence A P muſt become a maximum, when the point T falls into L.

If $AE = x$, $EF = y$, then will $AL = \frac{y\dot{x}}{\dot{y}} - x$ (ſee Tangent) whoſe fluxion, which is $\frac{\dot{y}^2\dot{x} - \ddot{y}\dot{x}y}{\dot{y}^2} - \dot{x} = \frac{\dot{y}^2\dot{x} - \ddot{y}\dot{x}y - \dot{y}^2\dot{x}}{\dot{y}^2} = -\frac{\ddot{y}\dot{x}y}{\dot{y}^2}$ ſuppoſing $\dot{x}$ conſtant, being divided by $\dot{x}$, the fluxion of A L muſt become nothing; i. e.

i. e. $\frac{-\ddot{y}y}{\dot{y}^2}=0$: ſo that multiplying by $\dot{y}^2$, and dividing by $-y$, $\ddot{y}=0$; which is a general form for finding F, the *point of inflection*, or retrogreſſion, in thoſe curves whoſe ordinates are parallel to one another. For the nature of the curve A F K being given, put the equation of the curve into fluxions; from which, or from other properties of the curve, find the value of $\dot{x}$ or $\dot{y}$, and put this $\dot{x}$ or $\dot{y}$ and its value into fluxions, making both $\ddot{x}$ and $\ddot{y}=0$: then by expunging the reſt of the fluxional quantities, we ſhall determine the value of x, i. e. A E or y, i. e. EF, at the point of *inflection* ſought.

E. g. To find the point of *inflection* B in the curve A B Y (*fig.* 54.) whoſe equation (putting the abſciſs A C $=x$, ordinate C B $=y$, and the perpendicular A E $=a$) is $a\,x^2=a^2y+x^2y$. From the fluxion of this equation, viz. $2ax\dot{x}=a^2\dot{y}+2x\dot{x}y+x^2\dot{y}$ we deduce $\dot{y}=\frac{2ax\dot{x}-2x\dot{x}y}{a^2+x^2}$ i. e. by ſubſtituting for y its value $\frac{a\,x^2}{a^2+x^2}$, $\dot{y}=\frac{2a^3x\dot{x}}{\overline{a^2+x^2}|^2}$; and the fluxion of this equation, making both $\ddot{x}$ and $\ddot{y}=0$,

is $0=\frac{2a^3\dot{x}^2\times\overline{a^2+x^2}|^2-\overline{4a^2x\dot{x}+4x^3\dot{x}}\times 2a^3x\dot{x}}{\overline{a^2+x^2}|^4}$

which multiplied by $\overline{a^2+x^2}|^4$ and divided by $2a^3\dot{x}^2$, gives $0=\overline{a^2+x^2}|^2-4a^2x^2-4x^4$; therefore, $4x^4+4a^2x^2=\overline{a^2+x^2}|^2$; which equation divided by x^2+a^2 makes $4x^2=a^2+x^2$; therefore $3x^2=a^2$, and $x=a\sqrt{\tfrac{1}{3}}$; and if this value be ſubſtituted for it in the given equation of the curve, we ſhall have y, or the ordinate at

$$\text{the point of inflection}=\frac{a\,x^2}{a^2+x^2}=\frac{a\times\frac{a^2}{3}}{a^2+\frac{a^2}{3}}=\frac{a^3}{3}\div$$

$\frac{3a^2+a^2}{3}=\frac{3a^3}{12a^2}=\frac{1}{4}a$. Let A C be equal to $\frac{1}{3}$ A E, and with the radius e E, deſcribe the arc E C; then will C be the point from which the ordinate to the point of *inflection* muſt be drawn: for $e\,\mathrm{C}=\frac{2}{3}a$; and $\mathrm{C}e^2-e\mathrm{A}^2=\mathrm{AC}^2$, i. e. $\frac{4}{9}a^2-\frac{1}{9}a^2=\frac{1}{3}a^2=\mathrm{AC}^2=x^2$; or $x=a\sqrt{\tfrac{1}{3}}$.

In order to know whether any curve be concave or convex towards any point aſſigned in the axis, find the value of $\ddot{y}$ at that point; then if this value be poſitive, the curve will be convex towards the axis, and if it be negative, it will be concave. For other methods of determining the point of *inflection* in different curves, ſee Simpſon's Fluxions, vol. i. p. 65. Rowe's Introduction, &c. part i. chap. 5 The rule for determining the points of contrary flexure and retrogreſſion of curves, which ſuppoſes the ſecond fluxion of the ordinate to be nothing or infinite, i. e. $\ddot{y}=0$, or ∞, is liable to ſeveral exceptions, as is ſhewn very fully and clearly by Mr. Maclaurin, in his Treatiſe of Fluxions, book i. chap. 9. book ii. chap. 5. art 866 and 867.

The ordinate y paſſes through a point of contrary flexure, when, the curve being continued on both ſides of the ordinate, $\dot{y}$ is a maximum, or minimum. But this does not always happen when $\ddot{y}=0$, or ∞. Mr. Mac Laurin obſerves, in general, that if $\ddot{y}$, $\dddot{y}$, $\ddddot{y}$, &c. vaniſh, the number of theſe fluxions being odd, and the fluxion of the next order to them having a real and finite value; then y paſſes through a point of contrary flexure; but if the number of theſe fluxions that vaniſh be even, it cannot be ſaid to paſs through ſuch a point; unleſs it ſhould be allowed that a double infinitely ſmall flexure can be formed at one point.

The curve being ſuppoſed to be continued from the ordinate y, on both ſides, if $\ddot{y}$ be infinite, the extremity of the ordinate is not therefore always a point of contrary flexure, as $\dot{y}$ is not always, in this caſe, a maximum, or minimum; and the curve may have its concavity turned the ſame way on both ſides of the ordinate. But theſe caſes may be diſtinguiſhed by comparing the ſigns of $\ddot{y}$ on the different ſides of the ordinate; for when theſe ſigns are different, the extremity of y meeting the curve is a point of contrary flexure.

The ſuppoſitions $\dot{y}=0$, or ∞, and of $\ddot{y}=0$, or ∞, ſerve to direct us where we are to ſearch for the maxima and minima, and for points of contrary flexure; but we are not always ſure of finding them. For though an ordinate or fluxion that is poſitive, never becomes negative at once, but by increaſing and decreaſing gradually, yet after it has decreaſed till it vaniſh, it may thereafter increaſe, continuing ſtill poſitive; or after increaſing till it becomes infinite, it may thereafter decreaſe without changing its ſign.

INFLUENCE, a quality ſuppoſed to flow from the bodies of the ſtars, either with their heat, or light, to which aſtrologers vainly attribute all the events which happen on the earth.

Alchemiſts, alſo, who to this aſcribe the philoſophers ſtone, tell us, that every thing in nature is produced by the *influences* of the ſtars, which, in their paſſage through the atmoſphere, imbibe many of its moiſt parts, the groſſeſt whereof they depoſit in the ſands and earths where they fall; that theſe, filtrating through the pores of the earth, deſcend even to the centre, whence they are driven, by the central fire, back again to the ſurface; and in their aſcent, by a natural kind of ſublimation, as they find earths duly diſpoſed, they form natural bodies, as metals, minerals, and vegetables, &c. Thus, it is pretended, that chemiſtry, conſiſting of an artificial imitation of theſe natural operations, and in applying active principles to paſſive principles, can form natural bodies, make gold, &c. See TRANSMUTATION, and PHILOSOPHERS STONE.

INFLUENT, a term uſed where a liquor or juice, by the contrivance of nature, and the laws of circulation, falls into any current or receptacle.

Thus with reſpect to the common receptacle, the chyle is its *influent* juice; and ſo is the bile to the gall-bladder; the venal blood to the heart in its diaſtole; and the like.

INFLUENT *fever* is ſometimes uſed for a *nervous* FEVER. In this the warm regimen is thought uſeful by ſome, as low cooling drinks are in the effluent or inflammatory fever.

INFORCED. } See { REINFORCED.
INFORCEMENT. } See { REINFORCEMENT.

IN FORMA PAUPERIS, in *Law*. See FORMA *Pauperis*.

INFORMATION, in *Law*, for the king, is much the ſame with what is called DECLARATION for a common perſon: it is not always done directly by the king, or his attorney, or the clerk of the crown-office; but ſometimes by another, who ſues as well for the king as himſelf, on a breach of ſome penal law or ſtatute, wherein a penalty is given, one part to the uſe of the king, and another to the uſe of the informer. And it differs from an indictment, which is found by the oaths of twelve men; and is only the allegation of the officer who exhibits it. The latter ſort of *informations*, which are partly at the ſuit of the king, and partly at that of a ſubject, is a ſpecies of *qui tam* actions, ſo called becauſe they are brought by a perſon, *qui tam pro domino rege*, &c. *quam pro ſeipſo in hac parte ſequitur*, and carried on by a criminal inſtead of a civil proceſs. By 31 Eliz. c. 5. no proſecution of this kind can be brought by any common informer, after one year is expired ſince the commiſſion of the offence; nor out of the county where the offence was committed; nor on behalf of the crown after the lapſe of two years longer; nor, where the forfeiture is originally given to the king alone, can ſuch proſecution be had after the expiration of two years from the commiſſion of the offence. It is alſo enacted by 18 Eliz. c. 5. that if any perſon, informing under pretence of any penal law, makes any compoſition without leave of the court, or takes any money or promiſe from the defendant to excuſe him, he ſhall forfeit ten pounds, ſtand two hours on the pillory, and be for ever diſabled to ſue on any popular or penal ſtatute. And by the ſame ſtatute, if a perſon exhibits his *information* only for vexation, the defendant may bring *information* againſt the informer.

Informations that are exhibited in the name of the king alone are of two kinds; thoſe which are truly and properly his own ſuits, and filed *ex officio* by his own immediate officer, the attorney-general; and thoſe, in which, though the king is the nominal proſecutor, yet it is at the relation of ſome private perſon or common informer; and they are filed by the king's coroner and attorney in the court of king's bench, uſually called the maſter of the crown-office, who, for this purpoſe, is the ſtanding officer of the public. The objects of the king's own proſecutions, filed *ex officio* by his own attorney-general, are properly ſuch enormous miſdemeanors as particularly tend to diſturb or endanger his government, or to moleſt or affront him in the regular diſcharge of his royal functions. The object of the other ſpecies of *information* are any groſs and notorious miſdemeanors, riots, batteries, libels, and other immoralities of an atrocious kind. And when an *information* is filed, in either of theſe ways, it muſt be tried by a petit jury of the county where the offence ariſes; after which, if the defendant be found guilty, he muſt reſort to the court for his puniſhment. Theſe *informations* of every kind are confined by the conſtitutional law to mere miſdemeanors only, without extending to any capital offence. The oppreſſive uſe of *informations* by the court of Star-chamber, &c. in the times preceding the Revolution, occaſioned a ſtruggle ſoon after the acceſſion of king William, to procure a declaration of their illegality by the judgment of the court of king's bench. But Sir John Holt, who then preſided there, and all the judges, were clearly of opinion, that this proceeding was grounded on the common law, and could not then be impeached. However, in a few years afterwards, it was enacted by 4 and 5 W. and M. c. 18, that the clerk of the crown ſhall not file any information without expreſs direction from the court of king's bench; and that every proſecutor, permitted to promote ſuch *information*, ſhall give ſecurity by a recognizance of twenty pounds, to proſecute the ſame with effect; and to pay coſts to the defendant, in caſe of his acquittal, unleſs the judge, who tries the *information*, ſhall certify there was reaſonable cauſe for filing it: and at all events, to pay coſts, unleſs the *information* ſhall be tried within a year after iſſue joined. But there is a proviſo in this act, that it ſhall not extend to any other *informations*, than thoſe which are exhibited by the maſter of the crown-office: and, conſequently, *informations* at the king's own ſuit, filed by his attorney-general, are no way reſtrained thereby.

There is one ſpecies of *informations*, ſtill farther regulated by 9 Ann. c. 20. viz. thoſe in the nature of a writ of QUO *warranto*, which is a remedy given to the crown againſt ſuch as had uſurped or intruded into any office or franchiſe. The modern *information* tends to the ſame purpoſe as the ancient writ, being generally made uſe of to try the civil rights of ſuch franchiſes; though it is commenced in the ſame manner as other *informations* are, by leave of the court or at the will of the attorney-general; being properly a criminal proſecution, in order to fine the defendant for his uſurpation, as well as to ouſt him from his office; yet uſually conſidered at preſent as merely a civil proceeding.

An *information* on behalf of the crown, filed in the exchequer by the king's attorney-general, is a method of ſuit for recovering money or other chattels, or for obtaining ſatisfaction in damages for any perſonal wrong committed in the lands or poſſeſſions of the crown. The moſt uſual *informations* are thoſe of *intruſion* and *debt*; the former being for any treſpaſs committed on the lands of the crown, as by entering thereon without title, holding over after a leaſe is determined, taking the profits, cutting down timber, or the like; and the latter, upon any contract for monies due to the king, or for any forfeiture due to the crown upon the breach of a penal ſtatute. There is alſo an *information in rem*, uſually filed in the exchequer, where any goods are ſuppoſed to become the property of the crown, if no man appears to claim them, or to diſpute the title of the king. There is alſo another *information*, filed *ex officio* by the attorney-general, in the court of chancery, at the relation of ſome informant, called the relator, for the proper eſtabliſhment of charities, of which the king has the general ſuperintendance. Blackſt. Com. b. iii. p. 261. 427. b. iv. p. 135. 403, &c.

INFORMATUS *non ſum*, or *Non ſum* INFORMATUS, a formal anſwer made of courſe by an attorney, who is commanded by the court to ſay any thing he thinks good in behalf of his client; who having nothing material to urge, makes anſwer, he is not informed: on which judgment paſſes for the other party.

INFORMER, *informator*, in *Law*, a perſon that informs againſt, or proſecutes in any of the king's courts thoſe that offend againſt any law or penal ſtatute. See INFORMATION.

INFORMIS, *unformed*, that which has not the form or perfection it ſhould have.

INFORMES *Stellæ*, in *Aſtronomy*, are ſuch ſtars as have not yet been reduced into any conſtellation; otherwiſe called *ſporades*.

Of this kind there was a great number left by the ancient aſtronomers; but Hevelius and ſome others of the moderns, have provided for the greater part of them, by making new conſtellations.

INFRACTION, formed from *in*, and the ſupine of *frango*, *I break*, a rupture, or violation of a treaty, law, ordinance, or the like.

INFRALAPSARII, the name of a ſect of Predeſtinarians, who maintain, that God has created a certain number of men only to be damned, without allowing them the means neceſſary to ſave themſelves, if they would; and they are thus called, becauſe they hold that God's decrees were formed *infra lapſum*, after his knowlege of the fall, and in conſequence thereof; in contradiſtinction to the SUPRALAPSARIANS.

INFRASPINATUS, called alſo *Infraſcapularis*, a muſcle which ariſes from the inferior parts of the baſis, ſpine, and under-coſta of the ſcapula, and which, filling the lower interſcapulum, paſſes on between the ſpine and teres minor, in a triangular form; and, growing tendinous at the cone, is inſerted into the head of the humerus, and draws directly backwards.—See *Tab. Anat*, (*Myol.*) *fig.* 7. *n.* 33.

INFRIGIDANS, a term uſed by ſome of the writers in medicine, to expreſs the cerate of roſes.

INFULA, a name anciently given to one of the pontifical ornaments worn on the head. Feſtus tells us, that the *infulæ* were filaments or fringes of wool, covering that part of the head where the hair grows as far at the temples, whence, on each ſide, hung down two ſtrings called *vittæ*, for binding it, wherewith the ancients uſed to adorn their prieſts, their victims, and even their temples. The *infula* was the ſame thing to prieſts that the diadem was to kings; viz. the badge of their dignity and authority. The difference in ſhape between the diadem and the *infula* conſiſted in this, that the diadem was flat and broad, and the *infula* was rounded and twiſted.

INFUNDIBULIFORM *Flowers*. See FLOWERS.

INFUNDIBULUM, a Latin word, ſignifying *a funnel*; whence divers parts in the human body, having a reſemblance thereto in ſhape, are called by the ſame name. Such e. g. are, the *infundibulum cerebri*, and *infundibulum renum*. See BRAIN, and KIDNEYS.—See alſo *Tab. Anat.* (*Oſteol.*) *fig.* 5. *lit. e.*

Hence alſo certain parts of plants are called *infundibuliformes*.

The word *infundibulum* is alſo uſed by the metallurgic writers to ſignify a veſſel of a conic ſhape, uſed to pour a melted metal out of the crucible into.

INFUSION, in *Pharmacy*, an operation whereby the virtues of plants, roots, and the like, are drawn out, by letting them ſteep in ſome convenient fluid menſtruum, without boiling them therein; ſince boiling is found to diſſipate the finer parts of many bitter and aromatic ſubſtances, without carefully extracting their medicinal principles.

Infuſion is uſed in bodies of a lax texture, whoſe parts are ſo light as not to admit of a greater motion without hazard of flying away in vapour.

Its chief uſe is to communicate the virtues of bodies to liquors, either in order to regulate their force, or correct their ill qualities.

Some *infuſions* are made in common water, others in wine, vinegar, milk, ſpirit of wine, &c.

The *bitter infuſion* is prepared by cutting the tops of the leſſer centaury and camomile flowers, of each half an ounce, and the yellow rind of lemon and orange peel, of each two drams, in ſmall pieces, and infuſing them in a quart of boiling water. A tea-cup-full of this *infuſion* may be taken twice or thrice a day for indigeſtion, weakneſs of the ſtomach, or want of appetite.

Infuſion of the bark, is made by infuſing an ounce of the powder in a pint of boiling water, with the addition of four or five table-ſpoonfuls of brandy, for two or three days. In diſorders which require the bark, a tea-cupful of this may be taken two or three times a day.

Infuſion of carduus, is made by infuſing an ounce of the dried leaves of carduus benedictus in a pint of common water, for ſix hours, without heat, and then filtering the liquor through paper. This *infuſion*, which may be flavoured at pleaſure, with cinnamon, or other aromatics, may be beneficially uſed in weakneſſes of the ſtomach, where the common bitters do not agree.

Infuſion of linſeed, is prepared by infuſing two ſpoonfuls of linſeed, and half an ounce of liquorice root ſliced in three pints of boiling water by the fire for ſome hours, and then ſtraining off the liquor. The pectoral *infuſion* is made by adding to theſe ingredients an ounce of the leaves of colts-foot. Theſe emollient liquors may be taken in difficulty of making water, and in coughs, and other complaints of the breaſt.

Infuſion of roſes, is made by infuſing half an ounce of red roſes, dried, for four hours in a quart of boiling water, in an unglazed earthen veſſel; afterwards pouring in half a dram of the vitriolic acid, called oil of vitriol, ſtraining the liquor, and adding to it an ounce of loaf ſugar. A tea-cupful of this aſtringent *infuſion* may be taken every three or four hours, in an exceſſive flow of the menſes, vomiting of blood, and other hæmorrhages. It will likewiſe ſerve as a very good gargle.

Infuſion of tamarinds and ſena, is prepared by infuſing for four or five hours one ounce of tamarinds, and ſena and cryſtals of tartar, of each two drams, in a pint of boiling water; ſtraining the liquor, and adding to it an ounce or two of the aromatic tincture. Perſons who are eaſily purged, may leave out either the tamarinds or the cryſtals of tartar. A tea-cupful of this agreeable cooling purge may be taken every half hour till it operates.

Spaniſh *infuſion*, is made by infuſing an ounce of Spaniſh juice cut into ſmall pieces, and three drams of ſalt of tartar in a quart of boiling water for a night; and adding to the ſtrained liquor an ounce and a half of the ſyrup of poppies. In recent colds, coughs and obſtructions of the breaſt, a tea-cupful of this *infuſion* may be taken with advantage three or four times a day. See Liquorice.

An *infuſion* for the palſy may be made by infuſing horſe-radiſh root ſhaved, muſtard-ſeed bruiſed, of each four ounces; and one ounce of the outer rind of orange-peel, in two quarts of boiling water, in a cloſe veſſel, for twenty-four hours. A tea cupful of this warm ſtimulating medicine may be taken three or four times a day, in paralytic complaints. It excites the action of the ſolids, proves diuretic, and, with warmth, promotes perſpiration. If two or three ounces of the dried leaves of marſh trefoil be uſed inſtead of the muſtard, we ſhall have the anti-ſcorbutic *infuſion*. Buchan's Dom. Med. Appendix.

Infusion is alſo uſed to ſignify the action of conveying liquor into the body by the veins. See Injection.

Some phyſicians have found out a new method of purging, by *infuſing* a cathartic into the veins, which operates pretty much after the manner of a clyſter.

INGA, in *Botany*. Its characters are theſe: the flower has a permanent empalement divided into five parts at the top; it has one petal, is funnel-ſhaped, and cut into five fringed ſegments at the brim, out of which ariſe a great number of ſtamina, which are three times the length of the tube; at the bottom of the tube is ſituated an oblong germen, which becomes a fleſhy pod, including ſeveral irregular ſeeds. There are two ſpecies, natives of the Weſt Indies. Miller.

Linnæus has joined this genus to the Mimosa.

INGANNO, in the *Italian Muſic*, is uſed when the compoſer, after having done every thing proper for making a cloſe or cadence, inſtead of ſo doing places a mark of ſilence in the place of the final note. This word is Italian, ſignifying *deceit*.

INGEMINATED *Flowers*, are thoſe where one flower ſtands on, or naturally grows out of, another; called alſo proliferous flowers.

INGENDRING. See Engendering.

INGENITE, *Inborn*, ſignifies any diſeaſe, or habit, which comes into the world with a perſon: nearly the ſame with HEREDITARY.

INGENUITAS *regni*, anciently ſignified the freeholders and commonalty of the kingdom: the title was alſo ſometimes given to the barons and lords of the king's council.

INGENUOUS, *Ingenuus*, among the Romans, a title applicable to a perſon born FREE, or of free parents.

Iſidore ſays, they are called *ingenui, qui libertatem habent in genere non in facto*; thoſe who are born free, not thoſe who acquire their freedom.

A perſon was accounted *ingenuous*, if only the mother were free, and the father a ſlave.

Theſe could give their votes, and enjoy offices, from which the *liberti*, or freedmen, *&c.* were debarred.

Ingenuous is ſometimes alſo uſed to ſignify a NATIVE of a country in contradiſtinction to a foreigner.

INGESTA is uſed by ſome authors to expreſs all ſorts of aliment taken into the body.

INGINEER, or Engineer. See Engineer.

INGLUVIES. See Craw.

INGOT, a maſs, or lump of GOLD or SILVER, from the mines, melted down and caſt in a ſort of mould, but not coined, or wrought.

The word ſeems formed from the French *lingot*, which ſignifies the ſame.

Ingot is alſo a name given to the moulds or cavities, wherein they caſt melted metals, or regulus of ſemi-metals.

INGRAFTING, or Engrafting. See Engrafting.

INGRAILED. See Engrailed.

INGRAVING, or Engraving. See Engraving.

INGREDIENTS, all the ſimples which go into the compoſition of any medicine, ointment, ſauce, or the like.

INGRESS, in *Aſtronomy*, the ſun's entering the firſt ſcruple of one of the four cardinal ſigns, eſpecially Aries.

Ingress, Egress, and Regress, in *Law*, are words in leaſes of land, ſignifying a free entry into, a going out of, and returning from ſome part of the premiſes leaſed to another; as to get in a crop of corn, &c. after the term expired.

INGRESSU, in *Law*, a writ of ENTRY, whereby a perſon ſeeks entry into lands or tenements. It lies in various caſes, and has various forms. It is alſo called PRECIPE *quod reddat*.

INGROSSATOR *magni rotuli*, is the ſame as CLERK *of the pipe*.

INGROSSER, or Engrosser, in *Common Law*, is one who buys up corn growing, or any proviſions by wholeſale, before the market, to ſell again. See Forestalling.

It alſo ſignifies a clerk, who writes records, or inſtruments of law, on ſkins of parchment. See Engrossing.

INGROSSING *of a fine*, is the making the indentures by the CHIROGRAPHER, for delivery of them to the party to whom the fine is levied.

INGUEN, that part of the body, reaching from the head of the thigh to above the ſecret parts; commonly alſo called the groin, and by anatomiſts pubes.

The word is pure Latin, and is derived, according to ſome, from *unguen, ointment*; becauſe theſe parts are frequently anointed. Others derive it from *ango*, becauſe pains happen frequently there; and others again from *ingenero*, becauſe the genital parts are here.

INGUINAL *glands*. See Glands.

Inguinal *ligament*. This, which has been alſo called from its diſcoverer *ligamentum* Fallofii, is an aponeurotic, or ligamentary band, faſtened by one end to the anterior and ſuperior part of the os ilium, and by the other to the ſpine of the os pubis. The middle portion of it is very narrow, but it expands conſiderably towards both its extremities. It is cloſely joined to the muſcles of the abdomen, and to the aponeurotic faſcia of the thigh, but ſeems to be often wanting.

INGUINALIS, an appellation given to any ſubdiviſions made of the *inguen*; or any thing therein contained, or applied thereto by way of medicine, or the like.

Inguinalis, *hernia*. See Hernia and Bubonocele.

INHARMONICAL *relation*, in *Muſic*. See Relation *inharmonical*.

INHERENCE, in *Philoſophy*, is applied to the juncture or connexion of an accident with its ſubſtance.

Thus quantity has a neceſſary *inherence* in a natural body.

INHERITANCE, *Hæreditas*, a property in lands and tenements, to a man and his heirs.

Inheritance is not only underſtood where a man hath *inheritance* of lands and tenements by deſcent or heritage; but every fee-ſimple or fee-tail, that a man hath by his purchaſe, may be ſaid to be an *inheritance*, for that his heirs may inherit it after him. The *inheritances* mentioned in our law are either corporeal or incorporeal; the corporeal relate to houſes, lands, &c. that may be touched or handled; and the incorporeal are rights iſſuing out of, annexed to, or exerciſed with corporeal *inheritances*, as advowſons, tithes, annuities, offices, commons, franchiſes, &c. There is likewiſe another *inheritance* denominated ſeveral, that is, where two or more hold lands ſeverally; as when two perſons hold to them and the heirs of their two bodies, in which caſe theſe two have joint eſtate during their lives, but their heirs have ſeveral *inheritances*. Goods and chattels cannot be turned into an *inheritance*. For the rules of *inheritance*, ſee Descent *collateral*.

INHIBITION, a writ to inhibit or forbid a judge from farther proceeding in a cauſe depending before him.

Sometimes *prohibition* and *inhibition* are put together, as of the ſame import; but *inhibition* is moſt commonly a writ iſſuing out of a higher court-chriſtian to a lower; and PROHIBITION out of the king's court to an inferior court.

INHOC, or Inhoke, in our *Old Writers*, is uſed for any corner or part of a common field ploughed up and ſowed with oats, &c. and ſometimes fenced in with a dry hedge, in that year wherein the reſt of the ſame field lies fallow and common. It is called in the north of England an *intock*, and in Oxfordſhire a *hitchin*. And no ſuch *inhoke* is now made without the joint conſent of all the commoners, who in moſt places have their ſhare by lot in the benefit of it, except in ſome manors where the lord has a ſpecial privilege of ſo doing. Kennet's Paroch. Antiq. 297, &c. and his Gloſſary.

The word is Saxon, compounded of *in, within*, and *hoke, a corner*.

INHUMATION. See Burial, and Interment.

Inhumation, in *Chemiſtry*, a method of digeſting ſubſtances together, by burying the veſſel, in which they are put, in horſe-dung, or in a dry ſandy earth expoſed to the ſun. See Digestion.

INJECTION, in *Pharmacy*, any liquid medicine made to be injected or thrown into the body, or any of its parts, by a ſyringe, clyſter-pipe, or other inſtrument.

Injection, or Injecting, in *Surgery*, the throwing in ſome liquor or medicine into a vein opened by inciſion. This practice, and that of TRANSFUSION, or the conveying the arterial blood of one man, or other animal, into another, were once greatly practiſed, but are now laid aſide.

The method of *injecting* is this: a vein is to be opened in the arm with a lancet as in bleeding, and the ſmall pipe of a ſyringe being introduced at the orifice, the liquor intended to be mixed with the blood, and contained for that purpoſe in the body of the ſyringe, is to be forcibly *injected*, or thrown into the vein upwards, or toward the heart; which done, the orifice is to be ſecured with compreſſes and bandage, as in bleeding.

Whether this practice of *injecting* proper medicines into the blood may not be found of uſe in apoplexies, quinſies, hydrophobia, &c. is worthy to be tried by repeated experiments. The method of *injecting* liquors into the blood of living animals, is ſaid to be the invention of Sir Chriſtopher Wren. His method was by making ligatures on the veins, and opening them on the ſide of the ligature towards the heart; then putting into them ſmall ſyringes or quills faſtened to bladders, in the manner of clyſter-pipes, containing the matter to be *injected*. Mr. Boyle ſoon made the experiment upon dogs, with infuſions of opium and crocus metallorum; all which he circumſtantially deſcribed, in his Uſefulneſs of Experimental Philoſophy, part ii. eſſ. 2. Phil. Tranſ. N° 7. p. 128.

The ingenious Dr. Hales made a variety of experiments of this kind, on different animals. See his Statical Eſſays, vol. ii. paſſim.

Many diſorders of particular parts are no way curable, unleſs the parts affected are *injected* with a proper liquor, by means of a ſyringe and proper tube. The method of performing this is too obvious to need any directions; but theſe general cautions are neceſſary in regard to it, that the ſyringe or tube be applied tenderly and carefully to the parts, eſpecially in very ſenſible or nervous parts, to avoid giving the patient any pain; and that the liquor to be *injected* be neither too hot nor too cold.

In ulcerations and inflammations of the uvula, tonſils, and fauces, *injections* are generally uſeful; but care muſt be taken to preſs down the tongue with a ſpatula, or with the flat end of a ſpoon, and having introduced the ſyringe two or three fingers breadth into the mouth, the *injection* is to be carefully and gently thrown in at ſeveral times. In gonorrhœas, *injections* are often neceſſary, to allay the heat and ſoreneſs of the urethra, and to waſh out the matter. The ſafeſt and beſt *injections* on this occaſion, are warm milk, and barley-water, ſweetened with ſugar, honey, or ſyrup of marſhmallows; and towards the end a little ſaccharum ſaturni, diſſolved in plantane water. Heiſter's Surgery, p. 317.

Injection, *anatomical*, is uſed for the operation of filling the veſſels with coloured wax, or any other proper matter, to ſhew their figures and ramifications. Theſe are coloured, in order to make the parts more conſpicuous. Mr. Monro uſes red and green chiefly. For the red, vermilion finely levigated muſt be got. For the green, diſtilled verdegris is beſt; becauſe its colour is brighter than that of the common ſort, and it never runs into knots, and alſo diſſolves in oily liquors.

To make the fine *injection*, pour a pint of the oil of turpentine on three ounces of vermilion, or verdegris; ſtir them well with a wooden ſpatula till they be thoroughly mixed, and then ſtrain all through a fine linen rag.

The coarſer *injection* is thus made: take tallow 1 ℔; white wax ℥ v. oil of olives ℥ iii; melt them over a gentle fire; then add of Venice turpentine ℥ ij. When this is diſſolved, ſprinkle in of vermilion or verdegris ℥ iii. then paſs all through a warm linen cloth. When you deſign to make it run far in the veſſels, add ſome oil of turpentine immediately before you uſe it.

As to the practice of *injections*, we refer to the Medic. Eſſ. Edinb. vol. i. art. 9.

INIMBOY, in *Botany*, a name by which ſome authors have called the acacia glorioſa, the tree which produces the bonduch or bezoar nuts.

INITIALIA, a name anciently given to the myſteries of Ceres. See Cerealia.

INITIANS *punctum*. See Punctum.

INITIATED, a term properly uſed in ſpeaking of the religion of the ancient heathens; where it ſignifies being admitted to the participation of the ſacred myſteries.

The word comes from the Latin *initiatus*, of *initiare*, *initiari*; which properly ſignifies to begin ſacrificing, or to receive or admit a perſon to the beginning of the myſteries, or of ceremonies of leſs importance.

The ancients never diſcovered the deeper myſteries of their religion, nor even permitted ſome of their temples to be open to any but thoſe who had been *initiated*. See Mystery.

INJUNCTION, in **Law**, a writ generally grounded upon an interlocutory order or decree out of the court of chancery or exchequer, ſometimes to give poſſeſſion to the plaintiff, for want of the defendant's appearance; ſometimes to the king's ordinary court, and ſometimes to the court-chriſtian, to ſtop proceedings in a cauſe, upon ſuggeſtion made, that the rigour of the law, if it take place, is againſt equity and conſcience in that caſe, that the complainant is not able to make his defence in theſe courts, for want of witneſſes, &c. or that they act erroneouſly, denying him ſome juſt advantage. The writ of *injunction* is directed not only to the party himſelf, but to all and ſingular his counſellors, attornies, and ſolicitors; and if any attorney, after having been ſerved with an *injunction*, proceeds afterward contrary to it, the court of chancery will commit the attorney to the Fleet for contempt. But if an *injunction* be granted by the court of chancery in a criminal matter, the court of king's bench may break it, and protect any that proceed in contempt of it.

INJURY, *Injuria*, in a general ſenſe, ſignifies any thing contrary to juſtice and equity; that is, any wrong or damage done to a man's perſon, reputation, or goods.

The word is derived from the Latin prepoſition *in*, which here has a negative power; and *jus*, *law*, *right*: *injuria dicitur omne quod non jure fit*. The ancients made a goddeſs of *injury*, and called her Ate. Homer makes her the daughter of Jupiter, and ſays, ſhe did miſchief to every body, even to her father; that ſhe was very nimble and tender-footed, and walked altogether on men's heads, without ever touching the ground.

Civilians define *injury* a private offence, committed deſignedly, and with an evil intention to any man's prejudice, with regard to his perſon or his property. All civil *injuries* are of two kinds; the one without force or violence, as ſlander, or breach of contract; the other joined with force and violence, as batteries, and falſe impriſonment. The author of the Rhetorics to Herennius ſays, *Injuria eſt quæ aut pulſatione, aut convitio, aut turpitudine, corpus, aures, aut vitam alicujus violavit.*

By the Roman law, the action for an injury was annual; that is, no reparation could be required after the expiration of a year. By the law of the Twelve Tables, where the *injury* was the breaking of a limb, the injured perſon might demand talionem, that is, that he might break the ſame limb of the criminal.

For the breaking of a bone there were alſo conſiderable pecuniary puniſhments aſſigned: for other *injuries* only twenty aſſes were decreed, which the poverty of thoſe times thought a ſufficient penalty; but the prætors afterwards finding this too ſlender a ſatisfaction, in lieu thereof appointed the injured perſon to ſet a rate on the *injury*, which they afterwards increaſed or leſſened as they thought good.

Some of our lawyers make a diſtinction between a *damage* and an *injury*; and indeed there are many acts which may be done to the prejudice of a third perſon, which may be properly ſaid to be *damnum ſine injuria*.

INK, a liquor wherewith to write on paper or parchment.

Ink, *printing*. See Printing.

Ink, *writing*, is commonly made of copperas and galls, and gum arabic; but other aſtringent plants may ſerve the ſame purpoſe; ſuch as oak-bark, red roſes, log-wood, or ſumach. Mr. Boyle ſeems to doubt whether all aſtringent vegetables will do the ſame.

Many are the propoſitions, and methods of compounding the materials, for making of writing *ink*. The author of the Chemical Dictionary gives the following receipt for making good *ink*. In four French pints of common water or beer, let a pound of bruiſed galls be infuſed twenty-four hours without boiling; to this add ſix ounces of gum arabic; and when the gum is diſſolved, ſix ounces of green vitriol, which will ſoon give it the black colour; the liquor is then to be ſtrained through a hair ſieve.

The following method has been recommended by experience, and is eaſily and ſpeedily practiſed. To a gallon of boiling water, put ſix ounces of blue galls, groſly pounded, and three ounces of copperas; ſtir the mixture well together, and then add ſix ounces of gum arabic pounded. After ſtirring the whole thoroughly, leave it to ſettle, and the next day ſtrain it off from the dregs for uſe. See Iris *lutea paluſtris*.

The following compoſition will make a very good black writing *ink*. Take a gallon of ſoft water, and boil in it a pound of chips of logwood for about half an hour; pour the decoction boiling hot on a pound of the beſt Aleppo galls powdered, and two ounces of pomegranate peels, put into a proper veſſel. After having ſtirred them well together with a wooden ſpatula, place them in the ſun-ſhine in ſummer, or within the warmth of any fire in winter, for three or four days, ſtirring the mixture occaſionally; then add half a pound of green vitriol powdered, and let the mixture remain four or five days more, occaſionally ſtirring it; and then add four ounces of gum arabic diſſolved in a quart of boiling water; and after the *ink* has ſettled, ſtrain it off through a coarſe linen cloth, and keep it well ſtopt for uſe.

As the duration of records and other valuable writings depends much on the goodneſs of the *ink* employed, Dr. Lewis has thought this ſubject worthy of his attention. The chief imperfection of common *inks* is, that they decay in time, and at laſt the writing becomes inviſible.

From experiments made by that author, he infers, that the decay of *inks* is chiefly owing to a deficiency of galls; that the galls are the moſt periſhable ingredient, the quantity of theſe, which gives the greateſt blackneſs at firſt, (which is about equal parts with the vitriol) being inſufficient to maintain the colour; that for a durable *ink*, the quantity of galls cannot be much leſs than three times that of the vitriol; that it cannot be much greater without leſſening the blackneſs of the *ink*; that by diminiſhing the quantity of water, the *ink* was rendered blacker and more durable; that diſtilled water, rain water, and hard ſpring water, had the ſame effects; that white wine produced a deeper black colour than water; that the colour produced by vinegar was deeper than that by wine; that proof ſpirit extracted only a reddiſh-brown tinge, and rectified ſpirit a paler brown; that the laſt mentioned tinctures ſunk into, and ſpread upon the paper; and hence the impropriety of adding ſpirit of wine to *ink*, as is frequently directed, to prevent mouldineſs or freezing; that other aſtringents, as oak-bark, biſtort, ſloe-bark, &c. were not ſo effectual as galls, nor gave ſo good a black, the colour produced by moſt of theſe, excepting oak-bark, being greeniſh; that the juice of ſloes did not produce a black colour with martial vitriol; but that, nevertheleſs, the writing made with it became black, and was found to be more durable than common *ink*; that *inks* made with ſaturated ſolutions of iron in nitrous, marine, acetous acids, in tartar, or in lemon juice, were much inferior to the *ink* made with martial vitriol; that the colour of *ink* was depraved by adding quicklime, which was done with an intention of deſtroying any ſuperabundant acid which might bé ſuppoſed to be the cauſe of the loſs of the colour of the *ink*; that the beſt method of preventing the effects of this ſuperabundant acid is probably by adding pieces of iron to engage it, and that this conjecture was confirmed by an inſtance the author had heard, of the great durability of the colour of an *ink* in which pieces of iron had been long immerſed; and laſtly, that a decoction of logwood uſed inſtead of water, ſenſibly improved both the beauty and deepneſs of the black, without diſpoſing it to fade. The ſame author obſerves, that the addition of gum arabic is not only uſeful, by keeping the colouring matter ſuſpended in the fluid, but alſo by preventing the *ink* from ſpreading, by which means a greater quantity of it is collected on each ſtroke of the pen. Sugar, which is ſometimes added to *inks*, was found to be much leſs effectual than gums, and to have the inconvenience of preventing the drying of the *ink*. The colour of *ink* is found to be greatly injured, by keeping the *ink* in veſſels made of copper, or of lead, and probably of any other metal, excepting iron, which the vitriolic acid can diſſolve. The foregoing experiments point out for the beſt proportions of the ingredients for *ink*; one part of green vitriol, one part of powdered logwood, and three parts of powdered Aleppo, or blue galls. The beſt menſtruum appears to be vinegar or white wine, though for common uſe water is ſufficient. If the *ink* be required to be of a full colour, a quart, or, at moſt, three pints, of liquor may be allowed to three ounces of galls, and to one ounce of each of the other two ingredients. Half an ounce of gum may be added to each pint of the liquor; though the more gum we can employ, conſiſtently with due freedom of writing, it is probable that the *ink* will be the more durable. The ingredients may be all put together at once in a convenient veſſel, and well ſhaken four or five times each day. In ten or twelve days the *ink* will be fit for uſe, though it will improve by remaining longer on the ingredients; or it may be made more expeditiouſly, by adding the gum and vitriol to a decoction of galls and logwood in the menſtruum. To the *ink*, after it has been ſeparated from the feculencies, ſome coarſe powder of galls, from which the fine duſt has been ſifted, together with one or two pieces of iron, may be added, by which its durability will be ſecured.

It has been often remarked, ſays the ſame ingenious writer, that the *inks* uſed in former times were far more durable than thoſe of later years; many modern records being more decayed than manuſcripts of much greater antiquity, of which we have inſtances in the Letters of Camillo Paderni, publiſhed in the Philoſophical Tranſactions for 1753 and 1754. Dr. Lewis made ſeveral experiments, in order to recover the compoſition of this durable *ink*. Inſtead of oil, which is uſed in the *printers ink*, he mixed both lamp-black and ivory-black with a ſolution of gum arabic; this liquor wrote of a fine black colour, but when dry, it rubbed off entirely by moiſture. Concluding, therefore, that the colour could not be ſufficiently fixed on paper without an oily cement, and as oils are made miſcible with watery fluids by the intervention of gum, he mixed ſome of the ſofter printers varniſh with about half its weight of a thick mucilage of gum arabic, working them well together in a mortar, and beat this maſs with lamp-black, adding water by little and little, and continuing the rubbing, till the mixture became of a due conſiſtence for writing. This produced characters of a full browniſh black colour, which could not be diſcharged by rubbing, nor waſhed out ſo readily as the foregoing. Inſtead of the printers varniſh, or boiled oil, linſeed oil was mixed in the ſame manner with mucilage and lamp-black, and the mixture diluted with water; and the *ink* thus obtained was much the ſame as the other. To prevent the diſcharge by water, ſome of the more ſinking kinds of paper, or common paper made damp as for printing, muſt be uſed, which will admit the *ink* to ſink a little into its ſubſtance; and thus the characters will be as fixed as can be deſired. Such Dr. Lewis found to be the ancient *inks*, that were ſo durable. Pliny and Vitruvius expreſly mention the preparation of ſoot, or lamp-black, and the compoſition of writing *ink* from lamp-black and gum. Dioſcorides ſets down the proportion of three ounces of the ſoot to one of gum. This mixture was formed into cakes or rolls, and dried in the ſun, which were occaſionally tempered with water, as the Indian *ink* is with us for painting. The ancients were ſenſible that theſe *inks* were liable to be diſcharged by water, and endeavoured to obviate this imperfection, according to Pliny, by uſing vinegar, inſtead of water, for tempering the mixture of lamp-black and gum, which promotes the ſinking into the paper. After all, none of theſe *inks* can be diſcharged otherwiſe than by deſign; which is the caſe, with reſpect to the vitriolic *inks*, and thoſe of printed books and copper-plates.

In the courſe of Dr. Lewis's experiments, a farther improvement occurred to him, which was that of uſing the common vitriolic *ink*, inſtead of water, for tempering the ancient mixture of gum and lamp-black. By this method the writings will have the durability of thoſe of former times, with all the advantage that reſults from the vitriolic *ink* fixing itſelf in the paper. Common writing *ink* may, in many caſes, be improved by a ſmall addition of the ancient compoſition, or of the common *Indian* INK. Lewis's Commerce of Arts, &c. § 16.

Ink *powder* may be prepared, by infuſing a pound of galls powdered, and three ounces of pomegranate peels, in a gallon of ſoft water for a week, in a gentle heat; and then ſtraining off the fluid through a coarſe linen cloth. Add to it eight ounces of vitriol diſſolved in a quart of water, and let them remain for a day or two; preparing in the mean time a decoction of logwood, by boiling a pound of the chips in a gallon of water, till one third be waſted, and then ſtraining the remaining fluid while it is hot. Mix this decoction and the ſolution of galls and vitriol together, and add five ounces of gum arabic, and then evaporate the mixture over a common fire to about two quarts; when the remainder muſt be put into a veſſel proper for that purpoſe, and reduced to drineſs in *balneo Mariæ*, i. e. by hanging the veſſel in boiling water. The remaining maſs, after the fluid is wholly exhaled, muſt be well powdered; and when it is wanted for uſe, may be converted into *ink* by the addition of water.

A portable or extemporaneous *ink* may be made without galls or vitriol, by mixing half a pound of honey and the yolk of an egg, adding two drams of gum arabic finely levigated, and thickening the whole with lamp-black to the conſiſtence of a ſtiff paſte; which being put to a proper quantity of water, may be uſed as an *ink*.

Ink, *Indian*, or *Chineſe*, is an admirable compoſition, in vain attempted to be imitated in Europe. It is not fluid, like our writing *inks*, but ſolid, like our mineral colours, though much lighter. They make it of all figures, but the moſt uſual is rectangular, about a quarter of an inch thick. Some of the ſticks are gilt with figures of dragons, birds, flowers, &c. In order to do this, they have little wooden moulds, ſo curiouſly wrought, that we could hardly equal them in metals.

To uſe this *ink*, there muſt be a little hollow marble, or other ſtone, with water in it, on which the ſtick of *ink* muſt be ground, till the water becomes of a ſufficient blackneſs. It makes a very black ſhining *ink*; and though it be apt to ſink when the paper is thin, yet it never runs or ſpreads; ſo that the letters are always ſmooth, and evenly terminated, how big ſoever they be. It is of great uſe in deſigning, becauſe it may be weakened or diminiſhed to any degree; and there are abundance of things which cannot be repreſented to the life without it.

From an analyſis of this *ink*, Dr. Lewis concludes that it contains an animal ſubſtance ſoluble in water, and conſiſts of a black powder, mixed with ſome animal glue. He tried to imitate it, by mixing ſome lamp-black, prepared from linſeed oil, by hanging a large copper pan over the flame of a lamp to receive its ſmoke, with as much melted glue as gave it ſufficient tenacity for being formed into cakes. Theſe cakes, when dry, anſwered as well as the genuine Indian *ink*, in regard both to the colour, and the freedom and ſmoothneſs of working. Ivory black, and other charcoal blacks, levigated very fine, had the ſame effect with the lamp-black. It appears from three receipts for the preparation of Indian *ink*, in Du Halde's Hiſtory of China, that the colouring material is lamp-black, to which is added, in one of them, a quantity of horſe-cheſnuts, burnt till the ſmoke ceaſes. The conglutinating matter, in one of the preſcriptions, is a thin ſize of neat's leather; in another, a ſolution of gum tragacanth, and in the other, a mixture of ſize, with a decoction of certain vegetables, unknown to us. Du Halde obſerves, that the Chineſe have *inks* of different goodneſs and price; that the moſt eſſential difference proceeds from the quality of the lamp-black, and that the beſt is the ſoot of oil, burnt in lamps, in apartments fitted up for this purpoſe.

The Chineſe have often attempted to uſe this in their porcelain, to give the colour of black to the figures traced on white veſſels, but it has been a vain attempt; for however beautiful and ſtrong the figures might appear when firſt laid on, and even when the veſſels were dried, it all diſappeared on the baking, and they came out quite white as they were put in. The colours for this uſe muſt be ſuch as can penetrate the varniſh, and endure the fire. Mineral colours are found to have theſe qualities, and theſe alone thereſore are to be employed; ſuch light ones as this black burning off from the ſurface, and wholly diſappearing. Obſ ſur les Coûtumes de l'Aſie, p. 329.

INK is alſo an appellation given to any coloured liquor uſed in the ſame manner as black *ink*; as red, green, blue, yellow, &c. *inks*. Red writing *ink* is prepared by infuſing a quarter of a pound of the raſpings of Braſil wood for two or three days in vinegar; boiling the infuſion for an hour over a gentle fire, and afterwards filtering it, while hot, through paper laid in an earthen cullender; then put it again over the fire, and diſſolve in it, firſt, half an ounce of gum arabic, and afterwards alum, and white ſugar, of each half an ounce. Red *ink* may be alſo made of vermilion, by beating together the glair of four eggs, a tea-ſpoonful of white ſugar, or ſugar-candy, powdered, and as much ſpirit of wine, till they be of the conſiſtence of oil; then adding ſuch a proportion of vermilion as will produce a red colour of ſufficient ſtrength; the mixture ſhould be kept in a ſmall phial, or well-ſtopt *ink* bottle, and well ſhook before it be uſed. Gum-water is often uſed inſtead of the glair of eggs; but thin ſize made of iſinglaſs, with a little honey, is much better for the purpoſe.

For red printing *ink*, ſee PRINTING.

Green *ink* may be made, by putting an ounce of powdered verdegris to a quart of vinegar, and ſtraining the fluid, after it has ſtood two or three days: or, inſtead of this, the cryſtals of verdegris diſſolved in water will anſwer the purpoſe; then diſſolve, in a pint of either of theſe ſolutions, five drams of gum arabic, and two drams of white ſugar.

Blue *ink* is made by grinding indigo with honey and the white of eggs, and making it fluid with water.

Yellow *ink* is made by an infuſion of ſaffron in water, with a little alum and gum arabic: or, by boiling two ounces of AVIGNON, or French berries, in a quart of water, with half an ounce of alum, till one third of the fluid be evaporated, and then diſſolving in it two drams of gum arabic, and one dram of ſugar, and afterwards a dram of powdered alum.

In general, *inks* of all colours may be made by uſing a ſtrong decoction of the ingredients uſed for DYING, mixed with a little alum and gum arabic. See the ſeveral colours, BLUE, GREEN, &c.

INKS, *ſympathetic*, or *ſecret*. Every ſort of liquor with which a perſon may write, ſo that the letters do not appear till there is ſome particular means uſed to give them a colour different from that of the paper, are called by the name of *ſympathetic inks*; and of theſe there a great many kinds deſcribed in the writings of Baptiſta Porta, Lemery, and other authors.

All theſe *inks* may be regularly diſtributed into different claſſes, according to the different means which are to be uſed to make them appear; and theſe are in general the four following. 1. By giving a new liquor, or the vapour of a new liquor, a place on the paper, on which the letters are written with the naturally inviſible *ink*. 2. By expoſing the paper to the air, by which means the letters at firſt inviſible will appear. 3. By paſſing gently over the letters a matter of ſome remarkable colour reduced to fine powder. And, 4. By expoſing the paper to the fire.

This laſt is by much the beſt method, and is ſo general, that it may be prudently uſed to all papers ſuſpected of containing any ſecret writing, as it ſeldom fails to diſcover it. All the common *inks* of this kind however, when they have been once made to appear, either by fire or by any other method, can never be made to diſappear again; but there is one kind deſcribed by Mr. Hellot, in the Memoirs of the Academy of Sciences at Paris, and ſince tried many times with us, and elſewhere, which, though the letters it gives are in themſelves inviſible, and appear like thoſe of ſome other of theſe *inks*, on their being held to the fire, yet they after that will fade and diſappear on the paper again, and may be reproduced in this manner ſeveral times. This therefore is the firſt known *ink* of a fifth general claſs, of which future reſearches may diſcover perhaps more.

Of the firſt claſs of *ſympathetic inks*, or thoſe which do not appear till the paper on which they are written be made to imbibe another liquor, or the vapour of another liquor, are the following kinds.

To two or three parts of unſlaked lime put one of yellow orpiment; powder and mix the two, adding fifteen or ſixteen times as much water as there was orpiment; ſtop up the phial with a cork and bladder, and ſet it in warm embers; ſhake the phial now and then for five hours, and warily decant the clear part, or rather filtrate it. In the room of this preparation may be uſed a ſaturated ſolution of common brimſtone, made by boiling the brimſtone either with quicklime, or in ſtrong alcaline ley. In the mean time, burn a piece of cork thoroughly, and when well inflamed, quench it in common water, or rather in brandy. Being thus reduced into a friable coal, grind it with fair water, wherein gum arabic has been diſſolved; and it will make a liquor as black as the common ink.

While theſe are doing, diſſolve in three times as much diſtilled or ſtrong vinegar, over warm embers, a quantity of red lead, or of ſaccharum ſaturni, in thrice the quantity of water, for three or four hours, or till the liquor have a ſweet taſte. This liquor will be as clear as common water. Solutions of lead in aqua fortis anſwer the ſame end, except that, when written with, they are apt to corrode the paper.

The liquors thus prepared, write any thing on paper with this laſt ſort, dry it, and nothing will appear. Over the place, write what you pleaſe with the ſecond liquor; it will appear as if written with common ink: when dry, dip a ſmall piece of rag or ſpunge in the firſt liquor, rub it over the written place, and the black writing will vaniſh; and that wrote with the inviſible ink will appear black and legible. Again, take a book four or five inches thick, and on the firſt leaf write any thing with the laſt liquor; turn to the other end of the book, and rub there with a rag, dipt in the firſt liquor, on that part, as near as you can gueſs, oppoſite to the writing, and leave alſo the rag there, clapping a paper over it; then nimbly ſhutting the book, ſtrike four or five ſmart ſtrokes thereon with your hand, and turning the other ſide uppermoſt, clap it into a preſs, or lay it under a good weight for a quarter of an hour, or even half that time; then will the writing done with the inviſible *ink* be found legible there. The above operation may be varied, by writing the inviſible characters with the ſolution of biſmuth in nitrous acid, and expoſing them to the vapours of liver of ſulphur, or moiſtening them with a ſolution of liver of ſulphur.

Diſſolve white or green vitriol in water, and writing with the ſolution, nothing will appear. Boil galls in water, and dip a linen rag in the decoction, and with it rub the place before writ, and it will appear black and legible. Rub it over again with ſpirit of vitriol, or its oil, and the writing will diſappear again; rub it over again with oil of tartar per deliquium, the letters will appear again, but of a yellow colour. If the blackneſs of ordinary *ink* be deſtroyed by a ſufficient quantity of nitrous acid, the writing made by it will remain inviſible, till it be moiſtened with liquid fixed alkali.

The golden *ſympathetic ink*. This is made by diſſolving in aqua regia as much gold as that menſtruum can take up, and then adding to the liquor five or ſix times as much water; in another veſſel there muſt be ſome tin diſſolved in aqua regia; and when that menſtruum has alſo taken up as much of the metal as it can, there is to be added to it an equal quantity of common water. The letters muſt be written on white paper with the ſolution of gold, and the writing being dried in the ſhade, the letters will not appear, at leaſt not for ſeven or eight hours afterwards; dip a pencil in the ſolution of tin, and rub that over the ſolution of gold with which the letters were written, and they will appear of a beautiful purple. It might be ſuppoſed, that any other metals which were ſoluble in the ſame acid menſtruum would equally produce this effect; but experiment ſhews, that this is not the caſe; and ſilver and copper, though both ſoluble in aqua fortis, yet produce no change of colour by theſe precipitations made by mixing the ſolutions of them on paper; and this example of ſuch an effect in the ſolutions of gold and tin, is an exception to the general rules in the ſolutions of metals, and their effects on one another.

The purple colour of theſe letters may be again effaced by rubbing ſome ſimple aqua regia over the paper, and may be made to appear again by rubbing over that the ſolution of tin. Kunkel, Caſſius, and Orſchal, with ſome other writers, made the firſt ſteps towards this diſcovery, by their attempt to give cryſtal, by means of gold, the colour of the oriental rubies. There are beſide theſe mineral preparatiens ſome vegetable ones, which give the ſame phenomena, but theſe are the more certain.

Of the ſecond kind of *ſympathetic inks*, or thoſe which appear on being expoſed only to the air, is the golden *ink* made by adding to a ſolution of gold in aqua regia, ſo much water that the liquor ſhall not ſtain a white paper; letters written with this will not appear till the paper has been expoſed ſome hours to the open air, and they will then begin to acquire a colour by degrees, till they at length become of a deep violet colour, tending to black. If, inſtead of expoſing the paper to the air, it be kept in a box cloſe ſhut up, or cloſely folded in other paper, it will remain inviſible two or three months; but at the end of that time it will begin to appear, and will by degrees become of a deep violet colour. So long as the gold remains united to its diſſolvent, it is yellow; but the acid that diſſolves it being of a volatile nature, the greater part of it evaporates, and leaves no more than is juſt neceſſary to colour the calx of gold which remains upon the paper.

The ſecond of theſe is the ſilver *ink*, made by a ſolution of ſilver in aqua fortis, weakened by diſtilled water, till it will not ſtain the paper. Letters written with this will be inviſible for three or four months, if ſhut up in a box; but if they be expoſed to the ſun they become legible in about an hour, becauſe by this means the evaporation of the acid is accelerated. The letters written with this *ink* are of a ſlate colour; and that from the ſulphureous nature of the aqua fortis, every thing that is ſulphureous blackening ſilver. This blackiſh colour, however, is not permanent; for the ſulphureous part finally evaporating, the letters are left to their natural appearance, and are of a true ſilver colour, if the ſilver that was uſed was fine, and the place open.

In this claſs there may alſo be placed ſeveral metallic diſſolutions; as that of lead in vinegar, and of copper in aqua fortis, which give at length a browniſh colour upon the paper; as alſo the ſolution of tin in aqua regia, of mercury in aqua fortis, of iron in vinegar, of emery and ſeveral of the pyritæ in ſpirit of ſalt. But all theſe, though they give letters which are after ſome time legible, on being expoſed to the air, are alſo made to appear inſtantly on the paper, on holding them to the fire. Each of theſe ſolutions gives its own particular colour; but they have all this diſadvantage, that in time they eat away the paper, and the letters are ſeen in the ſhape of ſo many holes.

Of the third claſs of *ink*, or that which appears on rubbing over the paper with a brown or black powder, are almoſt all the glutinous expreſſed juices of plants, which are themſelves of no remarkable colours, the milk of animals, or any other thick and viſcous fluids. To uſe theſe, the letters muſt be written on a white paper, and when dry, there is to be thrown over them the fine powder of any coloured earth, or other ſuch ſubſtance; and the writing will afterwards appear coloured, becauſe its viſcous quality remains ſufficiently in it for the entangling and retaining this fine powder, though it falls eaſily off from every other part of the paper. Mem. Acad. Scienc Par. 1737.

Of the fourth claſs, or thoſe *inks* which become viſible on holding them to the fire, there are a vaſt number; and indeed all infuſions, the matter of which is readily burnt to a ſort of charcoal by a little fire, will anſwer this purpoſe. The niceſt of this kind is the ſal ammoniac *ink*, made by diſſolving a ſcruple of ſal ammoniac in two ounces of fair water. Letters written with this ſolution are inviſible on the paper, till it is held before the fire, or has an iron a little heated paſſed over it. The rationale of this is, that the inflammable part of the ſal ammoniac is burnt to a charcoal by a heat which is not ſufficient to ſcorch the paper; and this is the caſe with all the reſt of this claſs. The letters written with this ſolution are, however, of no great duration; for the ſalt being apt to moiſten in the air, the letters ſoon ſpread, and run together in a confuſed manner.

Dr. Lewis ſays, that all the ſalts which he has tried produce this effect in a greater or leſs degree; nitre, alum, tartar, very weakly; ſea-ſalt more ſtrongly; fixed alcaline ſalts ſtill more ſo; but ſal ammoniac the ſtrongeſt of all. Metallic ſolutions, made in acids, and diluted ſo as not to corrode the paper, act in the ſame manner. The juice of lemons and milk have alſo been uſed as *ſympathetic inks*, the writing with which appears upon the application of heat ſufficient to decompoſe the oily and mucilaginous parts of theſe liquors.

The fifth claſs of *ſympathetic ink* contains only one yet known kind.

This, though in itſelf inviſible, becomes of a bluiſh green when held to the fire; and this colour diſappears again as the paper cools, and is to be produced again on holding it again to the fire; and this for a long time, and a repeated ſeries of trying. It may alſo, according to the different manner of treating it, be made to appear blue, green, yellow, red, and of ſome other colours. This property of the tinging matter of biſmuth ore was publiſhed at full length by a German lady, in 1705.

A certain German chemiſt ſhewed the academy at Paris a ſalt of roſe-water, which became blue on holding it to the fire, and at the ſame time ſhewed the ore from which he procured the ſalt, which he called an ore of marcaſite, a name given by many to the biſmuth ore. He added, that this was the mineral from which the fine blue ſmalt of Sneeberg was prepared, and that no other ore but this afforded it, and that he made the tincture from this mineral with aqua fortis, which he fixed with ſea-ſalt.

This was the ſubſtance of what the German declared, and from which Mr. Hellot, in 1736, took the hint for his diſcovery of this remarkable *ink*. The ſalt was, after many experiments, at length found to be produced from an arſenic ore; and it was found, that all the cobalts and ores of biſmuth afford a tincture capable of theſe changes by fire.

The method of preparing it is this: pour upon two ounces of arſenic ore, groſly powdered, a mixture of five ounces of aqua fortis, and five ounces of common water. After the firſt ebullition is over, place the veſſel in a gentle ſand-heat, and let it ſtand there till no more air-bubbles ſeem to aſcend; after this increaſe the fire, ſo as to make the liquor boil for about a quarter of an hour; after this the liquor will become of a reddiſh colour, and when cold it is to be decanted clear off from the ſediment into a phial; and after ſtanding in that ſome time, is to be again decanted off from what is precipitated there; and ſo on for three or four times, till it is quite clear; for it muſt not be filtered, leſt the acid ſhould take ſomething from the paper that might ſpoil the effects. When the liquor is clear, there muſt be added to it two ounces of white ſea-ſalt; this mixture is to be evaporated over a gentle ſand-heat, till there remains only a dry ſaline maſs. When the liquor is grown hot, it changes from its orange-colour to a fair red; and when the aqueous humidity is evaporated, it becomes of a beautiful emerald colour, and from this, as it dries up, it changes by degrees to a dirty green, like that of verdegris in the cake. As it becomes nearly dry, it muſt be ſtirred about with a glaſs rod or peſtle, to keep it from uniting into a maſs; and it muſt not be kept over the fire till perfectly dry, becauſe by that means the colour is often loſt, and the ſalt from green becomes of a duſky yellow; but if it be taken from the fire while it is green, it gradually becomes reddiſh as it cools, and finally is of a roſe-colour.

The manner of uſing this *ſympathetic ink*, is this: write with it on a fine and ſmooth paper, or draw with a black-lead pencil the figure of a plant or tree on the paper; then trace over the ſame lines with this liquor; let it dry in the open air, and then rub off the black lines with bread, and the paper will appear altogether fair, though the lines made by the *ink* are in reality ſunk deep into it. On holding this paper to the fire the lines will all appear, and the figure of the plant or the letters will be painted in a beautiful bluiſh green, which will continue ſo long as the paper is warm; but when it is cold again, they will wholly diſappear. The lines therefore diſappear much ſooner in winter than in ſummer; and in very hot weather it is often neceſſary to lay the paper on a marble, or other very cold body, in order to produce this effect. At any time, if the paper be ſcorched in the experiment, the colour of the lines will not diſappear again, even if ice be laid upon them. If the writing be expoſed for three or four days to a humid air, the lines will appear of a fine pale red. If the impregnation of the ore of biſmuth, inſtead of ſea-ſalt, have alum added to it, and the whole proceſs be continued as before deſcribed; and if letters be written with the red liquor as it is taken out of the veſſel, the letters will not appear even on holding it to the fire; but if the paper be wetted over with a clear ſolution of marine ſalt, and then left to dry, and afterwards held to the fire, the letters will appear blue. The ſame alſo will be the effect, if the writing be expoſed to the vapour of hot ſpirit of ſalt. When this preparation is thus made with alum, inſtead of common ſalt, the liquor never becomes green, but continues red, and never changes colour in the drying, or afterwards. The green colour ſeems to be wholly the effect of the ſea-ſalt; for not only this aluminate impregnation, but others in which other ſalts had been employed, were always found to be of a different colour.

Glauber's ſalt uſed inſtead of common ſea-ſalt, left the maſs red in the ſame manner as alum did. Nitre added, inſtead of ſea-ſalt, gave the precipitate, or dried ſalt, a beautiful purple colour, which became white on the inſtant that water was poured upon it, and a roſe-coloured tincture was drawn from it, which gave lines or letters on paper, which continued inviſible as long as they were cold, but aſſumed a beautiful red on holding the paper to the fire; which colour they retained no longer than while the paper continued warm, diſappearing afterwards in the ſame manner with the green colours made by the ſea-ſalt; and if a ſimple ſolution of ſea-ſalt be rubbed over the paper, and ſuffered to dry, and the paper be afterwards heated, the lines appear blue. Borax has the ſame effect in this preparation with the nitre. All theſe experiments were made with the neutral ſalts; but in order to try what would be the effects of alkalies in the mixture, Mr. Hellot added to three ounces of the impregnation of the ore in aqua fortis, pure ſalt of tartar, till the ebullition ceaſed; but the conſequence of this was no great precipitation, but merely the ſubſiding of a ſmall white ſediment; this mixture being evaporated nearly to a drineſs, the remaining maſs, ſo long as it was warm, appeared of a beautiful purple; but this became paler as it dried, and turned white in an inſtant on pouring water upon it. This, diſſolved in water in the manner of the others, gave lines on paper of a faint roſe-colour, which appeared or diſappeared in the manner of thoſe made by the other ſolutions, according as the paper was hot or cold; and the wetting the paper with a ſolution of ſea-ſalt, had the ſame effects on this as on the others, making the lines appear blue on holding to the fire. Mem. Acad. Par. 1737. See *Colours from* METALS.

This *ink* may be eaſily made by digeſting zaffre, commonly ſold by druggiſts, in aqua regia; and thus is obtained the ſoluble part of zaffre, which is the calx of cobalt. This ſolution is then to be diluted with a little common water. In expoſing the paper written with this ſolution to the fire, care muſt be taken not to heat it too much; for in this caſe, the writing will not again diſappear by expoſure to cold. This *ink*, ſays the author of the Chemical Dictionary, may be applied to the drawing of landſcapes, in which the earth and trees, deſtitute of verdure, being drawn with common *ink*, give a proſpect of winter; and which may be made to aſſume the appearance of ſpring, by expoſure to a gentle heat, which covers the trees with leaves, and the earth with graſs, by rendering viſible thoſe parts of the landſcapes which are drawn with this ſympathetic *ink*; and, as the ſolution of regulus of cobalt or zaffre in ſpirit of nitre acquires a reddiſh colour by the application of heat, the red ſolution might be contrived to repreſent the fruits and flowers.

INK *fiſh*, in *Ichthyology*. See CUTTLE-*fiſh* and SEPIA.

INLAGATION, *Inlagatio*, a reſtoring of one out lawed to the protection of the law, and benefit of a ſubject.

The word comes from the Saxon *inlagiam*, i. e. *inlagare*. Terms of Law.

INLAGH, *Inlagatus*, he that is of ſome *frank-pledge*, and not out-lawed. It ſeems to be the contrary to *utlagh*.

INLAND implies any thing ſituate in the main land, or heart of a country, far from the ſea-coaſts.

Hence *inland* bills, in traffick, are ſuch bills as are payable in the ſame land wherein they are drawn. See BILL.

INLAYING. See VENEERING, MOSAIC, and MARQUETRY.

INLEASED, in our *Old Writers*, ſignifies entangled or enſnared. It is uſed in the champion's oath. 2 Inſt. 247. Blount.

INLISTING, in a military ſenſe. See LISTING.

INMATES, ſuch perſons as are admitted, for their money, to live in the ſame houſe or cottage with another man, in different rooms, but going in at the ſame door; being uſually ſuppoſed to be poor, and not able to maintain a whole houſe themſelves. Theſe are inquirable in a court-leet.

No owner or occupier of a COTTAGE ſhall ſuffer any *inmates* therein, or more families than one to inhabit there, on pain of forfeiting 10*s.* per month to the lord of the leet.

INN, a place appointed for the entertainment and relief of travellers.

Inns are licenſed and regulated by juſtices of the peace, who oblige the landlord to enter into recognizances for keeping good order. See ALEHOUSES.

If a perſon who keeps a common *inn*, refuſes to receive a traveller into his houſe as a gueſt, or to find him victuals and lodging, on his tendering him a reaſonable price for them, he is liable to an action of damages, and may be indicted and fined at the king's ſuit. By the yearly acts againſt mutiny and deſertion, the conſtable, and in his default a juſtice of the peace, may quarter ſoldiers in *inns*, livery-ſtables, ale-houſes, and victualling houſes. The rates of all commodities ſold by *inn-keepers*, according to our ancient laws, may be aſſeſſed; and *inn-keepers* not ſelling their hay, oats, beans, &c. and all manner of victuals, at reaſonable prices, without taking any thing for litter, may be fined and impriſoned, &c. by 21 Jac. I. cap. 21. Where an *inn-keeper* harbours thieves, perſons of infamous character, or ſuffers any diſorders in his houſe, or ſets up a new *inn* where there is no need of one, to the hindrance of ancient well governed *inns*, he is indictable and finable; and by ſtatutes ſuch *inn* may be ſuppreſſed. Action upon the caſe lies againſt any *inn-keeper*, if a theft be committed upon his gueſt by a ſervant of the *inn*, or any other perſon not belonging to the gueſt; though it is otherwiſe where the gueſt is not a traveller, but one of the ſame town or village; for in that caſe the *inn-keeper* is not chargeable; nor is the maſter of a private tavern anſwerable for a robbery committed on his gueſt. It is ſaid that even though the travelling gueſt does not deliver his goods, &c. into the *inn-keeper's* poſſeſſion, yet if they are ſtolen he is chargeable. An *inn-keeper* is not chargeable for any thing out of his *inn*, but only for what is within it; yet where he of his own accord puts the gueſt's horſe to graſs and the horſe is ſtolen, he is anſwerable; he not having the gueſt's orders for putting ſuch horſe to graſs. The *inn-keeper* may juſtify ſtopping the horſe, or other thing of his gueſt, for his reckoning; and may detain the ſame until it be paid. Where a perſon brings his horſe to an *inn*, and leaves him in the ſtable, the *inn-keeper* may detain him until ſuch time as the owner pays for his keeping; and if the horſe eats out as much as he is worth, after a reaſonable appraiſement made, he may ſell the horſe, and pay himſelf. But when a gueſt brings ſeveral horſes to an *inn*, and afterwards takes them all away, excepting one, this horſe ſo left may not be ſold for payment of the debt of others; for every horſe is to be ſold, only to make ſatisfaction for what is due for his own meat.

Any perſon found tipling in an *inn*, is adjudged within the ſtatutes againſt DRUNKENNESS; and *inn-keepers*, or alehouſe-keepers, permitting tipling in their houſes, are liable to the penalty of 10*s.* &c. by 1 Jac. c. 9. 1 Car. c. 4. 21 Jac. c. 7.

INNS. Our colleges of municipal or common law profeſſors and ſtudents, are called *inns*: the old Engliſh word for houſes of noblemen, biſhops, and others of extraordinary note, being of the ſame ſignification with the French word *hotel*.

INNS *of court* are ſo called, as ſome think, becauſe the ſtudents there are to ſerve and attend the courts of judicature; or elſe, becauſe anciently theſe colleges received none but the ſons of noblemen, and better ſort of gentlemen, who were here to be qualified to ſerve the king in his court; as Forteſcue affirms. And in his time he ſays, there were about two thouſand ſtudents in the *inns* of court and chancery, all of whom were *filii nobilium*, or gentlemen born. But this cuſtom has gradually fallen into diſuſe; ſo that in the reign of queen Elizabeth, Sir Edward Coke does not reckon above a thouſand ſtudents, and the number at preſent is very conſiderably leſs; for which judge Blackſtone aſſigns the following reaſons. 1. Becauſe the *inns* of chancery being now almoſt totally filled by the inferior branches of the profeſſion, are neither commodious nor proper for the reſort of gentlemen of any rank or figure; ſo that there are very rarely any young ſtudents entered at the *inns* of chancery. 2 Becauſe in the *inns* of court all ſorts of regimen and academical ſuperintendence, either with regard to morals or ſtudies, are found impracticable, and therefore entirely neglected. Laſtly, becauſe perſons of birth and fortune, after having finiſhed their uſual courſes at the univerſities, have ſeldom leiſure or reſolution ſufficient to enter upon a new ſcheme of ſtudy at a new place of inſtruction; wherefore few gentlemen now reſort to the *inns* of court, but ſuch for whom the knowlege of practice is abſolutely neceſſary in ſuch as are intended for the profeſſion. Comm. book i. p. 25.

Our *inns of court*, juſtly famed for the production of men of learning in the law, are governed by maſters, principals, benchers, ſtewards, and other officers; and have public halls for exerciſes, readings, &c. which the ſtudents are obliged to attend, and perform for a certain number of years, before they can be admitted to plead at the bar. Theſe ſocieties have not, however, any judicial authority over their members; but inſtead of this they have certain orders among themſelves, which have by conſent the force of laws. For lighter offences perſons are only excommoned, or put out of commons; for greater, they loſe their chambers, and are expelled the college; and when once expelled out of one ſociety, they are never received by any of the others. The gentlemen in theſe ſocieties may be divided into benchers, utter-barriſters, inner-barriſters, and ſtudents.

The four principal *inns* of court, are the Inner Temple and Middle Temple, heretofore the dwelling of the Knights Templars, purchaſed by ſome profeſſors of the common law about three hundred years ago; Lincoln's *Inn*, and Gray's *Inn*, anciently belonging to the earls of Lincoln and Gray. The other *inns* are the two Serjeants *Inns*.

INNS *of chancery* were probably ſo called, becauſe anciently inhabited by ſuch clerks as chiefly ſtudied the forming of writs, which regularly belonged to the curſitors, who are officers of CHANCERY.

The firſt of theſe is Thavies *Inn*, begun in the reign of Edward III. and ſince purchaſed by the ſociety of Lincoln's *Inn*. Beſide this we have New *Inn*, Symond's *Inn*, Clement's *Inn*; Clifford's *Inn*, anciently the houſe of the lord Clifford; Staple *Inn*, belonging to the merchants of the ſtaple; Lion's *Inn*, anciently a common *inn* with the ſign of the lion; Furnival's *Inn*, and Bernard's *Inn*.

Theſe were heretofore preparatory colleges for younger ſtudents; and many were entered here, before they were admitted into the *inns* of court. Now they are moſtly taken up by attornies, ſolicitors, &c.

They all belong to ſome of the *inns* of court, who formerly uſed to ſend yearly ſome of their barriſters to read to them.

INN, or INNER, in the *Manege*, is applied differently, accordingly as the horſe works to the right or left upon the volts, or as he works along by a wall, a hedge, or the like. For along or by a wall, the leg that is of a ſide with, or next the wall, is the outer, and the other the *in* or *inner* leg. And if upon volts, the horſe works to the right, the right heel is the *inner*, and the left the outer heel, and ſo of the other parts of the body, furniture, &c. The direct contrary of this will happen, if the horſe works to the left.

INNATE *air*. See AIR.

INNATE *force*. See VIS *inſita*.

INNATE *heat*. See HEAT.

INNATE *ideas*, or *principles*, are certain primary notes or characters, by many ſuppoſed to be ſtamped on the mind of man when it firſt receives its being, and which it brings into the world with it.

But the doctrine of *innate ideas* is abundantly confuted by Mr. Locke. See IDEA.

INNER *barriſters*. See BARRISTER.

INNINGS, lands recovered from the ſea, by draining and banking.

INNOCENTS *day*, the name of a feaſt celebrated on the twenty-eighth day of December, in commemoration of the infants murdered by Herod.

Heretofore it was the cuſtom to have dances in the churches on this day, wherein were perſons who repreſented biſhops, by way of deriſion, as ſome ſuggeſt, of the epiſcopal dignity; though others, with more probability, ſuppoſe it done in honour of the innocence of childhood. See EPISCOPUS *puerorum*.

By a canon of the council of Cognac, held in 1260, theſe were expreſly forbid; but they were not wholly ſuppreſſed, at leaſt in France, before the year 1444, when the doctors of the Sorbonne addreſſed a ſpirited letter on this ſubject to all the biſhops of the kingdom.

INNOMINATA *arteria*, is the external branch of the external iliac artery, at its diviſion about the hole in the ligamentum Poupartii. It aſcends outwardly to the inſide of the ſpine of the ilium; it is loſt in the muſcles of the belly, and it ſends branches to the iliæus internus. See ILIAC *veſſels*.

INNOMINATA *oſſa*. See OSSA *innominata*, under OS.

INNOMINATI, *Gli* INNOMINATI, *Anonymi*, perſons who have no names; a title by which the academiſts of Parma diſtinguiſh themſelves.

Moſt cities in Italy have an academy, and each has its proper name. Thus, thoſe at Parma entitle themſelves *Gli innominati*, as if it was their character to have no name at all.

INNOMINATUM, in general, ſignifies any thing without a name.

Many parts of the body are left under this indiſtinct term; as the *innominata glandula oculi*, now called *caruncula oculi*: *innominata tunica oculi*, &c. See EYE.

Os INNOMINATUM is that otherwiſe called *os coxæ*, or *coxendix*; being compoſed of three bones, viz. the ILIUM, the PUBIS, and ISCHIUM, only connected by cartilages. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. *n.* 16, 17, 18, 19. See OS.

INNOVATION, in *Law*. See NOVATION.

INNUENDO, of *innuo*, *I nod*, or *beckon*, is a word frequently uſed in writs, declarations, and pleadings, to aſcertain a perſon or thing which was named, but left doubtful, before: as, he (*innuendo* the plaintiff) did ſo and ſo; mention being before made of another perſon.

In common converſation or writing, an *innuendo* denotes an oblique hint, or diſtant reference, in contradiſtinction to a direct and poſitive charge.

INOCULATION, or BUDDING, in *Agriculture* and *Gardening*, a kind of grafting; or an artificial operation, by which the bud of one fruit-tree is ſet into the ſtock or branch of another, ſo as ſometimes to make different ſorts of fruit grow in the ſame trees. See ENGRAFTING.

There are various ways of performing this: the ancient method was, by making a ſhallow inciſion in the bark, where the knot of a ſhoot or eye, *oculus* (whence the operation takes its name), begins to bud forth; into this a promiſing ſhoot of another kind was inſerted, and the inciſion cloſed up with fat earth or clay.

Peaches, nectarines, cherries, plums, &c. as alſo oranges and jeſſamines, ſucceed very well this way, and it is indeed preferable to any other for fruit-trees in general.

The method of performing it is this: the operator muſt be provided with a ſharp pen-knife, having a flat haft, the uſe of which is to raiſe the bark of the ſtock, to admit the bud, and ſome ſound baſs mat, which ſhould be ſoaked in water to increaſe its ſtrength, and make it more pliable; then having taken off cuttings from the trees to be propagated, a ſmooth part of the ſtock muſt be choſen, which, if intended for dwarfs, muſt be about five or ſix inches above the ground; but if for ſtandard, it ſhould be as many feet high. A horizontal cut is then to be made acroſs the rind of the ſtock, and from the middle of that another ſlit muſt be made ſtraight downward of two inches in length, that the whole may have the figure of the letter T, but theſe muſt not be cut too deep. Then cutting off the leaf from the bud, but leaving its footſtalk remaining, a croſs cut is to be made on it about half an inch below the eye, and the bud is to be ſlit off with part of the bark to it, in form of an eſcutcheon. The wood then muſt be taken out of the ſlip of the bud, without pulling the eye of the bud out with it; for if this happens, the bud muſt be thrown away as incapable of ſucceeding. When the bud is thus prepared, the bark of the ſtock is to be gently raiſed with the flat haft of the penknife, and the eſcutcheon of the bud muſt be ſlipped in, and placed very evenly between the bark and the wood, cutting off any part of the rind of the bud which may be too long for the ſlit made in the ſtock. The whole is then to be gently tied up with the baſs mat, beginning at the lower part of the ſlit, and taking great care not to injure the eye of the bud, which is to be left out at the ſlit. In three weeks or a month the bud will ſhew that it is joined; and then the tying round the ſtock muſt be looſened; and in the March following, the ſtock muſt be cut off about three inches above the bud, ſloping it that the wet may run off. To this part of the ſtock the ſhoot proceeding from the bud is to be tied, leſt the winds ſhould looſen or diſplace it; and when the tree has ſtood one year in this ſtate, the ſtock muſt be cut down cloſe to the bud.

The ſeaſon for *inoculating* is from the middle of June to the middle of Auguſt, according to the forwardneſs of the trees. When the buds are formed at the ends of the ſhoots of the ſame year, it is a proof that the tree is fit for the purpoſe; the firſt tree that comes in ſeaſon to be *inoculated* is the apricot, and the laſt the orange-tree; and in doing this, choice ſhould always be made of a cloudy day, that the ſun may not dry up the buds too quick; and in ſome very tender plants, a part of the wood in the ſcutcheon of the bud ſhould be left in. Miller.

This practice has the advantage of engrafting in many reſpects, both as it is more ſecure, it ſeldom failing of having effect, eſpecially if two or three buds are put into the ſame ſtock, and as its ſucceſs is more readily diſcovered. Indeed, when large ſtocks are to be practiſed on, *inoculation* is not proper, and they are then obliged to have recourſe to grafting.

This one rule is obſerved to hold univerſally, viz. that no ſucceſs is to be expected in *inoculation*, if the ſap does not run well; that is, if the bark will not part readily from the wood of the ſtock.

It is ſaid by many, that ſuch trees as are *inoculated* in the month of February, will continue always free from worms, both themſelves and their fruit; but this is a thing not confirmed by experience. Another error in theſe things is, the opinion that a cyon taken from a young tree which has never yet bloſſomed, will never bear fruit; experience proves that it will: but our gardeners chooſe rather to take their cyons from ſuch trees as have already borne. Phil. Tranſ. Nº 2.

In the *inoculations* made upon fruit-trees, it is obſervable, that a little vegetable bud, often not ſo big as a pea, is able ſo to tranſmute all the ſap which arrives at it, that though this ſap be already in the root, and in its paſſage upwards, determined by nature's intention, as is ſaid, to the production of fruit natural to the ſtock, it ſhould yet, by ſo ſmall a vegetable ſubſtance, be ſo far changed, as to conſtitute a fruit quite otherwiſe qualified than the genuine product of the tree; which at the ſame time is actually produced by thoſe other portions of the like ſap, that happened to nouriſh ſuch prolific buds as are the genuine offspring of the ſtock; ſo that the ſame ſap, which in one part of a branch conſtitutes a cluſter of haws, in another part of the ſame branch may conſtitute a pear. And what is farther remarkable, not only the fruits made of the ſame ſap often differ from one another in ſhape, bigneſs, colour, odour, taſte, and other obvious qualities, but though the ſap itſelf be a wateriſh and almoſt inſipid liquor, yet it is not only convertible by buds of ſeveral natures into different fruits, but in one and the ſame fruit, the tranſmuted ſap ſhall by different textures be made to exhibit very different, and ſometimes contrary, qualities. As when a peach-bud not only changes the ſap which comes to it, into a fruit very different from that which the ſtock naturally produces, but into parts very different from one another in the ſame fruit.

From *inoculations* therefore we learn, that a liquor ſeemingly homogeneous, may, by being variouſly ſtrained, be tranſmuted into bodies endowed with new ſcents, colours, taſtes, ſolidity, medicinal virtues, and many other qualities, manifeſt and occult. Boyle's Works abr. vol. i. p. 250.

Inoculation, in a phyſical ſenſe, is uſed for the tranſplantation of diſtempers from one ſubject to another, particularly for the engraftment of the ſmall-pox; which is a new practice among us, but of ancient uſe in the eaſtern countries.

Inoculation, *the hiſtory of.* It is well obſerved by the baron Dimſdale, that accident hath furniſhed the art of medicine with many valuable hints; and ſome of its greateſt improvements have been received from the hands of ignorance and barbariſm. This truth is remarkably exemplified in the practice of *inoculation* of the ſmall-pox; but to the honour of the Engliſh phyſicians, they meaſured not the value of this practice by the meanneſs of its origin, but by its real importance and utility; they patronized a barbarous diſcovery with no leſs zeal and affection than if it had been their own. Indeed, the whole nation might be ſaid to have adopted the practice, for the greateſt encouraged it, by becoming examples; and the wiſeſt were determined by the general event of the method.

As to the origin of the art of *inoculating* the ſmall-pox, as well as the time and place in which it was performed, they are equally unknown to all by whom the practice is adopted. Accident probably gave riſe to it: Pylarini ſays, that among the Turks it was not attended to, except amongſt the meaner ſort. Dr. Ruſſel informs us in the Philoſophical Tranſactions, vol. lviii. p. 142. that no mention is made of it by any of the ancient Arabian medical writers that are known in Europe; and the phyſicians who are natives in and about Arabia, aſſert, that nothing is to be found regarding it in any of thoſe of a more modern date. He farther ſays, that he engaged ſome of his learned Turkiſh friends to make enquiry; but they did not diſcover any thing on this ſubject of *inoculation* either in the writings of phyſicians, hiſtorians, or poets. Until the beginning of the eighteenth century, all the accounts we have of *inoculating* the ſmall-pox are merely traditional. The ſilence on this ſubject, obſerved amongſt writers in the countries where the practice obtained, Dr. Ruſſel ſuppoſes, with great probability, to be owing to the phyſicians there never countenancing or engaging in it. It is alſo remarkable, that before Pylarini's letter to the Royal Society in 1701, nor yet for ſeveral years after, this practice is not noticed by any of the moſt inquiſitive travellers. On this Dr. Ruſſel very juſtly obſerves, that cuſtoms the moſt common in diſtant countries, are often the leaſt apt to attract the obſervation of travellers, who, engaged in other purſuits, muſt be indebted to accident for the knowlege of ſuch things as the natives ſeldom talk of, upon the belief that they are known to all the world.

The firſt accounts we have in the learned world concerning *inoculation*, are from two Italian phyſicians, viz. Pylarini and Timoni, whoſe letters on the ſubject may be ſeen in the Philoſoph. Tranſact. abr. vol. v. p. 370, &c. The firſt is dated A. D. 1701; the next is dated A. D. 1713. Whether our enquiries are extended abroad, or confined to our own country, *inoculation* hath been practiſed under one mode or other, time immemorial; in Great Britain, and its adjacent iſles, we have well authenticated accounts, extending farther backward than any from the continent. Dr. Williams of Haverfordweſt, who wrote upon *inoculation* in 1725, proves, that it had been practiſed in Wales, though in a form ſomewhat different, time out of mind. Mr. Wright, a ſurgeon in the ſame place, ſays, that buying the ſmall-pox is both a common practice, and of long ſtanding in that neighbourhood. He ſays, that in Pembrokeſhire there are two large villages near the harbour of Milford, more famous for this cuſtom than any other, viz. St. Iſhmael's, and Marloes. The old inhabitants of theſe villages ſay, that it hath been a common practice; and that one William Allen of St. Iſhmael's, who in 1722 was ninety years of age, declared to ſome perſons of good ſenſe and integrity, that this practice was uſed all his time; that he well remembered his mother's telling him that it was a common practice all her time, and that ſhe got the ſmall-pox that way; ſo that at leaſt we go back a hundred and ſixty years, or more.

In the Highlands of Scotland, and ſome of the adjacent iſles, Dr. Alexander Monro, ſenior, informs us, that the cuſtom through ages paſt hath been, to put their children to bed with thoſe who laboured under a favourable ſmall-pox, and to tie worſted threads about their children's wriſts, after having drawn them through variolous puſtules.

According to the reſult of Dr. Ruſſel's enquiries, the Arabians aſſert, that the *inoculation* of the ſmall-pox has been the common cuſtom of their anceſtors, and that they have no doubt of its being as ancient as the diſeaſe itſelf. It is remarkable, that buying the ſmall-pox is the name univerſally applied in all countries to the method of procuring the diſeaſe; it is true, that there are other terms; but in Wales and Arabia, as well as many other countries, this is the uſual appellation. From the ſameneſs of the name, and the little diverſity obſervable in the manner of performing the operation, it is probable that the practice of *inoculation* in theſe countries was originally derived from the ſame ſource. From its extenſive ſpread, it is probably of great antiquity too.

In the year 1717, lady Mary Wortley Montagu, wife of the Engliſh ambaſſador at Conſtantinople, had her ſon *inoculated* there at the age of ſix years; he had but few puſtules, and ſoon recovered. In April, 1721, *inoculation* was ſucceſsfully tried on ſeven condemned criminals in London, by permiſſion of his majeſty. In 1722, lady Mary Wortley Montague had a daughter of ſix years old *inoculated* in this iſland; ſoon after which, the children of the royal family, that had not had the ſmall-pox, were *inoculated* with ſucceſs; then followed ſome of the nobility, and the practice ſoon prevailed. And here we date the commencement of *inoculation* under the direction of art.

From the example of the royal family in England, the practice was adopted in Germany, particularly in Hanover, and its adjacent countries.

After Mr. Maitland had ſucceeded with thoſe he had *inoculated* in and about London, he introduced the practice into Scotland, in the year 1726.

Sweden ſoon followed the example of the Engliſh; and Ruſſia at this time is engaging one of our principal promoters and improvers of this art. And now there are not many countries that do not more or leſs engage in it.

Inoculation, *different modes of.* The practice of *inoculation* hath obtained in every part of the world. It may be grateful, at leaſt to curioſity, to be informed of the different modes that are, and have been, of communicating the infection from the ſmall-pox.

Inoculation with the blood of variolous patients hath been tried without effect: the variolous matter only produces the variolous diſeaſe.

The application of the variolous matter takes place in a ſenſible part only; the activity of the virus is ſuch that the ſmalleſt atom, though imperceptible to any of our ſenſes, conveys the diſeaſe as well as the largeſt quantity. Hence, the moſt obvious method is the prick of a needle, or the point of a lancet dipped in the matter of a variolous puſtule.

Cotton, or thread is uſed, that are previouſly rubbed with powdered variolous ſcabs; this thread is drawn with a needle through the cutis, but not left in. This is the method in ſome parts of the Eaſt Indies. The Indians paſs the thread on the outſide of the hand, between any of the fingers, or between the fore-finger and thumb. The Theſſalian women *inoculate* in the forehead and chin.

Some abrade the ſcarf ſkin, and rub in the powdered dry ſcabs which fall from the puſtules of patients with the ſmall-pox.

Many of the Greek women make an oblique puncture with a needle, on the middle of the top of the forehead, on each cheek, the chin, each metacarpus, and each metatarſus;

tatarſus; then drop in each a little of the pus juſt taken warm from a patient, and brought in a ſervant's boſom. Others in Greece make ſeveral little wounds with a needle in one, two, or more places in the ſkin, till ſome drops of blood enſue; then the operator pours a drop of warm pus freſh from a puſtule, and mixes it with the blood as it iſſues out; then the wound is covered by ſome with a bandage, by others with half a walnut-ſhell, placed with its concave ſide over each orifice.

The Chineſe convey a pellet of variolated cotton, with the addition of a little muſk, into the noſtrils of the patient; they collect dry puſtules, and keep them in a porcelain bottle well corked; and when they *inoculate*, they mix a grain of muſk with three or four grains of the dry ſcales, and roll them in cotton. This method may be called *inodoration*.

About Bengal, in the Eaſt Indies, the perſon who intends to be *inoculated*, having found a houſe where there is a good ſort of the ſmall-pox, goes to the bed of the ſick perſon, if he is old enough; or if a child, to one of his relations, and ſpeaks to him as follows: "I am come to "buy the ſmall-pox." The anſwer is, "Buy if you "pleaſe." A ſum of money is accordingly given, and one, three, or five puſtules, for the number muſt always be odd, and not exceeding five, extracted whole, and full of matter. Theſe are immediately rubbed on the ſkin of the outſide of the hand between the fore-finger and the thumb; and this ſuffices to produce the diſeaſe. The ſame cuſtom obtains in Algiers, Tunis, Tripoli, and other countries.

Very ſimilar to the cuſtom amongſt the people about Bengal, &c. is that in Arabia, where, on ſome fleſhy part they make ſeveral punctures with a needle imbrued in variolous matter, taken from a puſtule of a favourable kind. Here they buy the ſmall-pox too, as follows: the child to be *inoculated* carries a few raiſins, dates, ſugar-plums, or ſuch like; and ſhewing them to the child from whom the matter is to be taken, aſks, how many pocks he will give in exchange? The bargain being made, they proceed to the operation; but this buying, though ſtill continued, is not thought neceſſary to the ſucceſs of the operation. The Arabs ſay that any fleſhy part is proper; but generally they inſert the matter between the fore-finger and thumb on the outſide of the hand.

The Georgians inſert the matter on the fore-arm.

The Armenians introduce the matter on the two thighs.

In Wales, the practice may be termed infriction of the ſmall-pox. There, ſome of the dry puſtules are procured by purchaſe, and are rubbed hard upon the naked arm or leg.

The practice in ſome places is to prick the ſkin between ſome of the fingers by means of two ſmall needles joined to one another; and after having rubbed a little of the matter on the ſpot, a circle is made by means of ſeveral punctures of the bigneſs of a common puſtule, and matter is again rubbed over it. The operation is finiſhed by dreſſing the wound with lint.

Another cuſtom is to mix a little of the variolous matter with ſugar, and give it to be drank in any agreeable liquor.

Inciſions have been made in the arms and legs, and thread, cotton, or lint, previouſly dipped in the variolous matter, was lodged in them.

The practice of ſome is to bathe the feet in warm water, and then ſecure lint dipped in the variolous matter, on the inſtep, or other part of the foot, where the ſkin is thin.

Others apply a ſmall bliſtering plaſter; and when the ſcarf ſkin is elevated and ſnipped off, the variolous matter is applied to the ſurface of the true ſkin, and confined there by a little lint or plaſter.

Scratching the ſkin with a pin or needle, and then rubbing the part with lint, previouſly dipped in variolous matter, is the cuſtom in ſome places.

In the Highlands of Scotland they rub ſome part of the ſkin with freſh matter, or dip worſted in variolous matter, and tie it about the children's wriſts. They obſerve, that if freſh matter is applied a few days ſucceſſively, the infection is more certain than by one application.

INOCULATION, *objections to, anſwered*. 1. It is not lawful. In anſwer to this, the Scriptures aſk, Is it lawful to ſave life, or to deſtroy it? Luke vi. 9. And as it is a difficulty with many ſerious people, whether to admit of this practice or not, this objection ſhould be conſidered in a religious view. We ſhould in this caſe remember, that as the fall of man brought the danger of diſeaſes into the world, ſo, to evade, oppoſe, or deſtroy it, is not only his right, but duty, if in his power. And if events imply the cauſe, a long run of uninterrupted ſucceſs implies an efficacious remedy. Though ſome die under this management, it is ſufficient to prove the lawfulneſs of a remedy, that it is proper for, and hath by experience been found in moſt caſes effectual to the end for which it was uſed. When danger ſurrounds us, no conduct is more proper than to enquire into, and purſue the means of eſcape. To neglect our ſafety is to ſink below the brutes, who by inſtinct avoid the evils to which they are expoſed. *Inoculation* is a means of ſaving life in many inſtances, and of moderating the ſeverity of affliction in more. Wilfully then to neglect the means of ſaving life is to be guilty of murder.

2. It is bringing a diſtemper on ourſelves, and ſo uſurping the ſacred prerogative of God.

As to the firſt part of this objection, if by diſtempers are meant ſickneſs and pain, that is practiſed daily in other inſtances, in concurrence with the Scripture dictate, viz. of two evils chuſe the leaſt. But the ſuppoſition of objectors in this inſtance is not altogether true; for, by *inoculation*, a diſeaſe is not properly ſaid to be communicated; it only excites and frees us from one, which, though latent, is already in us: or, which in effect is the ſame, *inoculation*, by an advantageous mode of infecting, &c. frees the patient in *all inſtances* from the uſual difficulties of the diſeaſe; *ſaves the life* of moſt who ſubmit to it; and with the natural ſmall-pox *it deſtroys that diſpoſition* in the body, without which the diſeaſe cannot take place. It is owned that ſome hazard attends it; it is ſometimes mortal, and indeed it is fit it ſhould be ſo; it is generally ſucceſsful, that encourages us to proceed; it ſometimes, though rarely, fails; hence we are cautious and careful, and led to act with a dependence on him, to whom belong the iſſues from death.

Reſpecting the offence given to God; a reliance on Providence does not imply that we are not to prevent or oppoſe the evils which we foreſee, and which we have in our power to guard againſt by prudent precautions. Would theſe objectors, in other inſtances, refuſe the means of leſſening the malignancy and danger of diſeaſe, than which the practice of *inoculation* is no more? Let the aſſerters of the rights of God ſay, whether, when God permits the diſcovery of preſerving ourſelves from an impending evil, he forbids our uſing it? If our Maker offers us a remedy, it is offending him to reject it.

3. The decrees of God have fixed the commiſſion of every diſeaſe, and our precautions cannot prevent what he hath determined.

However true it is, that our days are determined, &c. yet it is God's revealed will, and not his ſecret purpoſes, which we are to regard as the rule of duty. God hath required of us to have a tender regard to our lives; and thoſe who diſobey him herein, are guilty of a degree of ſelf-murder, and will never be acquitted of that guilt, by the ſecret determination of Heaven concerning them. Beſides, God who hath ordained the end, hath alſo determined the means leading to it. St. Paul in his dangerous voyage, had a ſpecial revelation to aſſure him, that all who were with him ſhould eſcape; and yet, when the ſeamen were getting out of the ſhip, he declares, that if they did not ſtay in it, they could not be ſaved. Acts xxvii. 31. God purpoſed to preſerve them in the way whereby they were afterwards delivered.

4. We ſhould not do evil that good may come.

If *inoculation* is in its own nature a moral evil, it certainly ſhould be rejected, however great its advantages may ſeem to be. The proſpect of relief from any calamity in life ſhould not tempt us to offend God. But thoſe who make this objection, proceed on a miſtake. Their principle is true with regard to moral evil, but is not ſo when applied to phyſical. It is certainly lawful to pull down a houſe, to ſave a great number from being burnt; this is a phyſical evil, which can hardly take place without ſome degree of moral evil; and many other inſtances may be pointed out, where for a greater good, a leſſer ill is ſubmitted to. And is the ſmall ill induced by *inoculation* to be compared with all thoſe evils which are tolerated and authorized by all laws?

5. The patient may die; and then his laſt moments are diſtreſſed; and the future reflections of his friends are grievous.

This objection leads many to decline the practice of *inoculation*, even when they allow the theory of it to be reaſonable. They hope to eſcape the diſtemper in the natural way, and they have fears of dying in this, and thus they are prevented from going into it. But they ſhould conſider what grounds they have for either the one or the other, and what is to be advanced to balance the account, by examining the different degrees of probability that attend their hopes and fears, in the uſe or neglect of *inoculation*. Dying is a ſerious thing; but if *inoculation* be a *probable and lawful* means of preſerving life in a time of danger, it is a duty to comply with it; and what more peaceful reflection than to die in the way of duty?

6. Fear is a dangerous paſſion in the ſmall-pox; but *inoculation* increaſes the cauſes of fear, by leſſening our faith and truſt in God.

When the ſmall-pox is left to nature, ſuch are its ravages,

vages, that not to fear, would be to ſink beneath humanity: its conſequences are too grievous to be treated with neglect. But experience manifeſts the ſafety that attends receiving the diſeaſe by *inoculation*; it is therefore ſo far a remedy to that juſt fear, which enhances the danger, when the diſeaſe is left to itſelf. As to faith in God, none is deſirable but that which is agreeable to the Scripture; and a diſregard to calamities and dangers are never the effect of that. *Inoculation* is a means of ſafety; and it is as rational to conclude, that our lives ſhould be preſerved without eating and drinking, as that we ſhall be delivered from danger without a prudent care for our own ſafety. We are to depend on the care of Providence only in the way of duty. To boaſt of courage and truſt in God, while we omit the means of eſcaping danger which ſurrounds us, is not faith, but preſumption.

Thus, when *inoculation* becomes a probable means by which to ſave life, it is a preſumption, and not truſt, to neglect it.

7. *Inoculation* does not exempt from future infection.

If by *inoculation* of the ſmall-pox, the ſame diſeaſe is produced, the ſame effects may be expected from it when artificially produced, as in the natural way. It is inconceivable, that a contagious ſubſtance, the very ſeminal matter of the ſmall-pox, ſhould propagate, inſtead of its own, another diſeaſe. Dr. De Hane is an acute phyſician, and was a violent oppoſer of *inoculating* the ſmall-pox; but he never ſuppoſed that the matter of the ſmall-pox will produce any diſeaſe but itſelf. Obſervation alone determined the opinion, that the natural ſmall-pox does not attack a ſecond time: the ſame ſtands good in favour of the artificial diſeaſe. Add to this, numberleſs trials have been made without effect, to reinfect thoſe in whom the ſmall-pox had taken place by *inoculation*.

8. Other diſeaſes are communicated with the matter of the ſmall-pox, by *inoculating* it.

That careleſſneſs or wilfulneſs in the operator may in ſome inſtances give cauſe for this objection, is true; but, that by the matter of a variolous puſtule, any other diſeaſe hath been conveyed, is yet to be proved. As the confluent and malignant ſmall-pox have not yet been obſerved to produce their own degree and mode of this diſtemper, when infuſed by *inoculation*, it is ſcarcely conceivable that they ſhould tranſmit another diſeaſe, eſſentially different. The venereal diſeaſe is known to be as communicable as any, yet ſeveral have been *inoculated* from patients labouring under conſiderable degrees of the venereal diſeaſe, and no ill conſequences ever yet were known to follow, none to give the leaſt ſuſpicion of the kind. If the variolous matter may convey another diſeaſe in the artificial, it may do the ſame in the natural way; and even then, advantage is attendant on *inoculation*, for we can chuſe a healthy perſon to take the infection from; but no inſtance of the kind hath ever occurred.

9. Perhaps the diſeaſe may never attack in the natural way.

Such objectors ſhould be informed, that this diſtemper cannot be given to one who never would have it; for they only who are ſuſceptible of it can take it by *inoculation*, as is evident from numerous experiments made to verify this fact. Again, the ſmall-pox may be ſaid to be general; ſo few there are who are exempted from it, that they can hardly be conſidered as an exception to the general law; and it is worth while to *inoculate*, firſt, to aſcertain the ſafety of the individual from this diſeaſe; and, ſecondly, on account of the general advantages of this practice, in caſe he ſhould be ſuſceptible of the infection. On this ſubject Dr. Jurin hath inſerted an ingenious paper in the Philoſophical Tranſactions; in which he obſerves, that it is difficult to aſcertain the exact number who die without having the ſmall-pox; but that, of all the children that are born, there will ſome time or other die of the ſmall-pox one in fourteen; and that of perſons of all ages taken ill of the ſmall-pox, there will die thereby two in eleven.

From a table of burials it appears, that in Edinburgh and St. Cuthbert's pariſh, during ten years, about one-tenth of the dead were killed by the ſmall-pox.

Farther, as it cannot be known that any individual is exempted from the ſmall-pox, his hazard of dying of that diſtemper, being made up of the hazard of having it, and the hazard of dying of it if he has it, will be exactly the ſame, viz. that of one in eight or nine (whether the proportion of mankind that eſcape having the ſmall-pox be great or ſmall). In enquiry from houſe to houſe for the number of people with the ſmall-pox, in ſeveral towns, during one year, it appeared that near one in five died who had them; and that of eighty-two perſons who were inoculated in theſe places in the ſame year, not one died.

10. It requires much thought to know what we ſhould do with regard to *inoculation*.

Not to dwell on the abſurdity of this objection, and of complaining that conſideration is a burden, when it is neceſſary for the preſervation of life, it may ſuffice to point out, that a ſacred writer tells us, that a prudent man foreſeeth the evil, and hideth himſelf; but fools paſs on, and are puniſhed.

11. It endangers others.

Since very few of mankind now eſcape the ſmall-pox, it muſt ſooner or later come to every place; therefore, if it is true in fact that a much greater number loſe their lives by the natural than by the artificial infection, it is of more ſervice to introduce the ſmall-pox in a favourable way and ſeaſon, than paſſively to allow them to deſtroy multitudes. As to ſpreading the diſeaſe, by introducing *inoculation*, it is but of little conſequence; for *inoculating* where the diſeaſe does not already exiſt, is differently circumſtanced from this practice, where it already prevails in the natural way; the quantity of the circumambient contagion is leſs, or the ſame extent of atmoſphere is leſs impregnated with the infectious principles from *inoculated* patients, than when it naturally prevails, or the ſame number of people received it in the natural way.

The moſt plauſible objector on this account is Dr. Raſt, of Lyons, in France. From his review of the bills of mortality in and about London, he obſerves, "that more
" have died by the ſmall-pox in London, ſince the in-
" troduction of *inoculation*, than in the ſame time pre-
" ceding that period, in conſequence of the diſeaſe there-
" by being more univerſally extended and propagated."
But to this, Dr. Lettſom moſt ſatisfactorily replies,
" That the late increaſe of burials cannot depend upon
" the practice of *inoculation*, under which, though it is a
" rare thing to hear of a fatal caſe, but rather upon the
" innovation introduced in the treatment of the natural
" ſmall-pox, of expoſing the patients to the open air, and
" a leſs reſerved intercourſe amongſt the community.'
This, with the improvements in medicine in various inſtances, the police of the city, &c. which by preſerving many lives, occaſion more ſubjects for the ſmall-pox, and conſequently a proportional increaſe of deaths by this diſeaſe; many of thoſe who are preſerved by the above named improvements not being favoured with the advantage of *inoculation*. " Beſides the care taken in and about
" London to prevent inconvenience from *inoculation*,
" &c. it ſhould be remembered, that the increaſing ac-
" ceſſion of young perſons to the capital from the coun-
" try, eaſily accounts for the increaſe of 19 deaths in
" 1000, more than formerly happened." See a Defence of *Inoculation*, in Dr. Lettſom's Medical Memoirs.

12. The practice of *inoculation* comes from the devil.

The beſt anſwers to this ſeem to be, firſt, that cavillers will never ceaſe from objecting; and oppoſitions will be made as long as there are men of wit to deviſe, or of ſophiſtry to invent. Secondly, that Job was afflicted by the devil with the ſmall-pox, is not a known fact. Thirdly, that if by what is ſaid, the principal objections are removed, it is hoped that the reaſonable and the religious will be enabled to approve themſelves to God in the practice of *inoculation*. See a diſcuſſion of moſt of the preceding objections in an excellent pamphlet, entitled, *Inoculation* impartially conſidered, and proved to be conſiſtent with Reaſon and Revelation, by the Rev. Mr. David Some, publiſhed by Dr. Doddridge in 1750.

INOCULATION, *advantages of*. Though no diſeaſe after it is formed baffles the powers of medicine more than the ſmall-pox, yet more may be done before-hand to render this diſeaſe favourable than in any other we know. The artificial method of producing the ſmall-pox hath almoſt ſtripped it of its terrors; in general, hath rendered its aſpect mild, its progreſs uniform, and nearly without hazard to the patient.

Mr. Mudge, in his Diſſertation on the inoculated Small-pox, enumerates the following ſources of danger from this diſeaſe, viz. 1. The patient's conſtitution. 2. The propenſity of the patient to be infected. 3. The manner or mode of the infection being communicated. 4. The conſtitution of the air at the time of infection. And, it is the advantage of *inoculation*, if prudently conducted, almoſt totally to exempt its ſubjects from the diſadvantages attendant on theſe ſources.

1. Reſpecting the habit of body, or ſtate of the patient's conſtitution at the time of infection.

Conſtitutional or habitual diſeaſes, in general, do not interfere with the courſe of the ſmall-pox, whether in its natural or its artificial progreſs; ſuch as ſcorbutic eruptions on the ſkin, ſtrumous complaints, itch, ſcabby eruptions, excoriated ears, &c. The variolous poiſon is therefore a thing, ſui generis, and no ways affected by theſe taints of the juices, or what is uſually called a bad habit of body; or at leaſt ſo inconſiderably, as not to deprive ſuch patients of any of the advantages of *inoculation*. But the caſe is much reverſed with reſpect to ſome accidental diſeaſes. E. gr. If on the attack of the ſmall-pox, the habit, or its attending circumſtances, tend to inflammation, or, on the contrary, to a putrid acrimony, the eruptive fever in theſe aggravated ſtates, will load the body with variolous matter, or produce puſtules of a very unfavourable kind; in either of theſe caſes (not to enumerate more) the patient will moſt probably be ſeverely affected.

But *inoculated* ſubjects may be infected when the conſtitution is in the beſt condition to combat with the diſeaſe; if either of theſe indiſpoſitions are attendant, or any other which uſually endangers, they may ſoon be reſtrained or removed.

2. The different degrees of propenſity in the patient at different times, to be infected.

That different quantities of matter are produced in different perſons in the proceſs of the diſeaſe, we find true in fact; and there is the ſtrongeſt reaſon to believe, that previous to infection, the quantity of the variolous matter, or rather that principle in the conſtitution, which eventually produces it, ebbs and flows, is more or leſs vigorous at different times in the ſame ſubject, under various combinations of circumſtances. The inſtances are not uncommon, where the patient who hath withſtood at one time all the ordinary means of infection, nay, who hath induſtriouſly, but ineffectually, ſought it; yet at another hath had a ſmall-pox ſo malignant in appearance and effect, that the whole body hath been converted into an offenſive variolous putreſcence. If the degree of propenſity to receive infection was always the ſame, it would be inconceivable that any one could paſs unaffected, when the ſmall-pox became epidemic. From whatever cauſes, however, this propenſity may ariſe, it is moſt reaſonable to aſſert, that the increaſe or decreaſe of this principle takes place according as the ſmall-pox is epidemic or not. During the continuance of any contagious epidemic diſeaſe, we always find that thoſe conſtitutions which are moſt congenial with that character, are peculiarly obnoxious to the correſpondent diſtemper. And we may reaſonably conclude, that when the conſtitution of a perſon not paſſed the ſmall-pox is moſt ſaturated with the variolous principle, he is then more particularly ſubject to infection. Again, it is not only undoubted, that the variolous principle ſubſiſts in the conſtitutions of perſons not paſſed the ſmall-pox, but is more than probable, that a part of this principle is produced by the eruptive fever, and the reſt of the variolous proceſs. Agreeably to what hath been ſaid, we find, that during the epidemic tendency, thoſe who have not paſſed the diſeaſe, are more open to contagion than in other conſtitutions of air, when the ſmall-pox is not epidemic, and is conſequently a rare diſeaſe. Many who have eſcaped infection from *inoculation*, and other means of contagion, on removal into a ſituation where the ſmall-pox has been epidemic, have preſently after been ſeized with this diſorder. Events of this kind are ſo common, as to have given riſe to the ill grounded opinion, that any change of air is hazardous to thoſe who have not had the ſmall-pox. If at a time when the propenſity to be affected is the greateſt, there ſhould be a concurrence of thoſe ſtates of the conſtitution above noticed, how aggravated will the condition of the patient be.

Reſpecting the evaſion of theſe inconveniences by *inoculation*, it is to be obſerved, that as the propenſity to the diſeaſe differs at different times in the ſame ſubject, it is reaſonable to ſuppoſe that the diſorder is produced by downright violence, when there ſubſiſts in the patient but little of that peculiarity of conſtitution, ſo eſſential to the production of the diſeaſe (and ſo general, when the ſmall-pox is epidemical) or, in other words, when the body is indiſpoſed to be poiſoned. This conſideration, peculiar to the diſeaſe, when artificially produced, appears to be the true cauſe of the ſmall quantity of pocky matter, and that general ſcarcity of puſtules, when compared to the natural ſmall-pox, which has ever accompanied *inoculation*, and is one of the grand advantages of the diſcovery. Farther, as it is very reaſonable to ſuppoſe, that this propenſity is the greateſt when there is an epidemic conſtitution of the air, which favours the production of the diſeaſe; and if it be as probable that the ſeverity or mildneſs of the diſeaſe depends in a good degree upon the greater or leſſer propenſity of the ſubject to be infected, it will certainly be an eligible ſtep not to bring on the diſorder by *inoculation*, during the continuance of an evidently prevailing tendency to the diſeaſe. Prudence in this caſe directs us to take advantage of the abſence of ſuch a prevailing tendency, when all the benefits of *inoculation* may be ſecured, and not delay the operation, till ſuch a conſtitution of air prevails, as at once makes the operation neceſſary, and deprives it of ſome of its advantages. To conclude, we may add to this conſideration, that by the practice of expoſure to cold, the violence of the eruptive fever is ſo far moderated, as to prevent its forming an additional quantity of variolous matter, which, in a violent and unreſtrained ſtate, it would do, by aſſimilating the juices of the conſtitution into the nature of the variolous poiſon.

3. The manner or mode of the infection being communicated.

In the natural ſmall-pox, the diſeaſe may be produced by an accidental contagion, or an epidemic influence. Dr. Mead ſays, that the air of this climate never produces the plague, ſmall-pox, or meaſles; and Dr. Arbuthnot ſays, that the plague itſelf may be generated by ſome quality in the air, without any contagion. Be theſe opinions as they may, it is evident that contagion is ſometimes ſo languid, that it requires the agency of other cauſes to give it activity, ſo as to produce the tribe of diſeaſes to which it belongs, and which without this agency would never be brought forth; and though the ſtrongeſt epidemic tendency may not in Europe create the ſmall-pox, without the concurrence of contagious fomes, yet there is, by the agency of the former, ſuch an alteration made, and propenſity brought on the animal juices, as is eſſentially neceſſary to continue the exiſtence of the diſeaſe.

Variolous contagion produces its effects by the actual application of its poiſon, either externally, through the medium of the ſkin, or internally, to the gullet, ſtomach, and guts, in the act of deglutition; or laſtly, to the lungs, in the act of reſpiration. Though there may be a poſſible admiſſion of the poiſonous miaſmata into the conſtitution through the ſkin, from the principle of abſorption, yet the poiſon very ſeldom, if ever, exerts its influence upon the habit in this manner; poſſibly by a local actual application of the groſs matter lodged in the cloaths, or otherwiſe conveyed, the diſtemper may ſometimes be produced by a kind of *inoculation*, and then the diſorder will probably be favourable. But when the poiſon, in a more dilute ſtate, only floats in, or impregnates the air, it ſeldom enters the pores of the ſkin, and poiſons by way of abſorption; for the degrees of activity in which this power is exerted, are moſt probably in proportion to the aids the conſtitution may ſtand in need of from it. However, it is more than probable that the ordinary mode of infection is by the lungs, which from their ſtructure they are well calculated to receive, to entangle, and to retain. When either the lungs or the ſtomach are firſt infected by the infectious effluvia, it is moſt reaſonable to believe, that theſe noble parts, together with the fauces, glottis, wind-pipe, and gullet, will frequently labour under a greater load of puſtules, than the external ſurface of the body; for it is obſerved that when the patient is infected artificially, that the parts to which the poiſon is applied, ſuffer in a greater degree than the more diſtant; and that the circumjacent ſkin, to ſome extent, is filled with puſtules. From this particular application of the morbid matter to the fauces, &c. it is probable, that the large diſcharge of ſaliva, &c. ariſes, which characterizes the confluent ſmall-pox in adults; and as children ſwallow this ſaliva it excites a diarrhœa, which in them anſwers to the ſpitting in thoſe more aged. When the internal parts are oppreſſed with puſtules, there is no interval between the eruptive and the ſubſequent ſymptomatic fever; and the ſuffering which the patient labours under from a generally inflamed ſkin, heightened by the diſeaſed condition of the nobler parts, perpetuates the firſt fever. This informs us that all is not ſo well within, as otherwiſe the external appearances might have induced us to believe; but that the nobler parts are rendered unfit for the purpoſes of life, at leaſt are labouring and lagging behind in the proceſs, ſo that they have not kept pace with the apparent ſtate of the diſeaſe on the ſurface of the body; this ſome have ſuppoſed to be the true general cauſe of the ſecondary fever, under which the patient, if he ſinks, dies peripneumonic. Theſe conſequences frequently attend the infection received in the natural way, and if, ſuperadded to theſe, the unhappy ſituation of thoſe deſcribed under the firſt and ſecond ſources of danger attends the patient, the diſorder will be proportionably aggravated, and the chance of life leſſened.

But here again *inoculation* relieves; for by this mode the virus is applied to the external ſurface of the body, ſo that the whole conſtitution (excepting the part immediately ſurrounding the wound) being affected uniformly, the proceſs of the diſeaſe is regularly carried on, and the nobler parts not being particularly affected by a partial application of the variolous fomes to their ſurface, have no diſtreſs to proclaim by a ſecondary fever, which is therefore ſcarcely ever ſeen in *inoculated* patients.

4. The conſtitution of the air at the time of infection.

A powerful ſource of difficulty and danger in the habitual ſmall-pox, is, the malignant influence of the air at ſome ſeaſons, and particularly if it happens at the time of receiving the infection. If this concurs with one or more of the other ſources, how dreadful the devaſtation. Whether this conſtitution of the air produces its deleterious effects, by heightening the natural malignity of the infecting poiſon, or acts on the conſtitution itſelf, ſo as to render the effects of contagion more peculiarly fatal, the conſequence of this ſtate of the air is the ſame.

The general characters of a morbid ſtate of the air, are the inflammatory and putrid; and it is uniformly obſerved, that whenever a perſon is attacked with a fever, under either of theſe prevailing diſpoſitions, that it never fails to impreſs its character upon the diſeaſe.

But here alſo *inoculation* affords the moſt benign influence. The judicious practitioner does not expoſe his patient to the pernicious effects of an air that can ſtamp its baneful character on the ſmall-pox; but chuſes the ſeaſon beſt calculated for the ſafety and welfare of his patient; and hence we rarely ſee the influence of this evil ſource attendant on the artificial diſeaſe.

Having ſeen, that from the influence of one or more of theſe four ſources of difficulty and danger, and that from their union will reſult a natural ſmall-pox, complicated with horrors not leſs to be dreaded than the plague, how ineſtimable muſt appear that favour of Providence, by which we are freed from the formidable attendants of this diſeaſe, viz. *inoculation*, by which the diſorder is rendered mild, and in general leſs hazardous than a common cold.

From attention to the above ſources of ill in the natural ſmall-pox, we are led to ſee, with ſufficient ſatisfaction, the many inſtances of relief and ſecurity which generally we avail ourſelves of by *inoculation*; a part of which we have ſeen, and a few others follow.

As already obſerved, it ſaves the lives of moſt who are its ſubjects.

From a general calculation it appears, that in the hoſpitals for ſmall-pox and *inoculation*, 72 die out of 400 patients, having the diſtemper in the natural way, and only one out of this number, when *inoculated*.

It leſſens the affliction from both the degree, and the number of ill ſymptoms, even when it proves fatal.

It leſſens the number of puſtules; and by moderating the virulence of the diſeaſe, the marks on the face are not ſo deep.

It is extremely rare that the ſecondary fever attends it; a ſymptom productive of much ſuffering, if the patient is happy enough to eſcape with life.

It produces the diſeaſe under the feweſt diſadvantages, and favours with foreſight to prevent many ills, not to be guarded againſt in the natural ſmall-pox.

Inſtead of communicating other diſorders with it, many diſorders ſubſequent to the natural, are very rarely obſerved after the artificial ſmall-pox.

It effectually removes all juſt grounds of fear; a paſſion very injurious in this diſeaſe.

Soldiers, ſailors, and all who would appear abroad, or in public offices, are freed from every anxiety and hazard, attendant on the natural ſmall-pox.

Servants, women with children at their breaſts, pregnant women, magiſtrates, phyſicians, &c. are all freed from the moſt diſtreſſing embarraſſment, by conformity to *inoculation*. See *Small*-Pox.

Inoculation, *hoſpital for*. See Hospital.

INORDINATE *proportion* is where three magnitudes being in one rank, and three others proportional to them in another, you compare them in a different order.

E. gr. If there be in one rank theſe three numbers, 2, 3, 9; and in another rank, theſe other three, 8, 24, 36, which are proportional to the precedent, in a different order; ſo that 2 be to 3 as 24 to 36, and 3 to 9 as 8 to 24; then caſting away the mean terms in each rank, you conclude the firſt 2 in the firſt rank to be to the laſt, 9; as 8, the firſt of the other rank, to the laſt, 36.

INOSARCION, in *Natural Hiſtory*, a name given by the old Greek and Roman authors to a peculiar ſpecies of emerald, called alſo by ſome the Chalcedonian emerald.

The great diſtinction of this from all the other kinds of this gem, was its not being of the pure, clear, and unvarying colours of the others, but having thick veins in it, which gave peculiar refractions and reflexions to the light; and though the ſtone was in itſelf wholly green, yet when viewed in ſide lights, theſe veins gave all thoſe changeable colours that ornament the feathers of a peacock's tail, or the neck of a pigeon.

INOSCULATION. See Anastomasis, and Artery.

IN PACE, a Latin term, uſed among monks, to ſignify a priſon, where ſuch of them are ſhut up as have committed any grievous fault.

Formerly, there uſed to be a great deal of ceremony at the putting a religious *in pace*; but now it is not much regarded. Such as are ſhut up in perpetual impriſonment, are alſo ſaid to be *in pace*.

Sometimes, alſo, the words *requieſcat in pace* are uſed by way of alluſion to a cuſtom in the Romiſh church, of praying that the ſoul of the defunct may reſt in peace. The ſame words are alſo frequently ſeen at the bottom of epitaphs, in lieu of thoſe uſed by the ancient Romans, S. T. T. L. i. e. *Sit tibi terra levis*, *Light lie the earth*; or, *Sit humus cineri non oneroſa tuo*.

IN PALE. See Pale.

INPROMPTU, or Impromptu, a Latin word frequently uſed among the French, and ſometimes in Engliſh, to ſignify a piece made off-hand, or extempore, without any previous meditation, by the mere force and vivacity of imagination.

INQUEST, or Enquest. See Enquest, Arrest, and Jury.

INQUIRENDO, an authority given a perſon or perſons, to inquire into ſomething for the king's advantage.

Inquirendo *idiota*. See Idiota.

Ad Inquirendum. See Ad Inquirendum.

Melius Inquirendum. See Melius, &c.

INQUISITION, in the *Civil* and *Canon Law*, a manner of proceeding for the diſcovery of ſome crime by the ſole office of the judge, in the way of ſearch or examination.

Inquisition is alſo uſed, in *Common Law*, for a like proceſs in the king's behalf, for diſcovery of lands, profits, and the like.

In which ſenſe it is alſo confounded with Office.

Inquisition, or the *Holy Office*, denotes an eccleſiaſtical juriſdiction eſtabliſhed in Spain, Portugal, Italy, &c. for the trial and examination of ſuch perſons as are ſuſpected to entertain any religious opinions contrary to thoſe profeſſed in the church of Rome.

It is called *inquiſition*, becauſe the judges by their office take cognizance of crimes on common report, without any legal evidence, except what they themſelves are able to explore.

Some people fancy, they ſee the original of the *inquiſition*, in a conſtitution made by pope Lucius, at the council of Verona, in 1184, where he orders the biſhops to get information, either by themſelves, or by their commiſſaries, of all ſuch perſons as were ſuſpected of hereſy; and diſtinguiſhes the ſeveral degrees of ſuſpected, convicted, penitent, relapſed, &c. However this be, it is generally allowed, that pope Innocent III. laid the firſt foundation of the *Holy Office*; and that the Vaudois, and Albigenſes, were the firſt objects of it. That pontiff, in the beginning of the thirteenth century, ſent Rainier, a Ciſtertian monk, and Pierre de Caſtelnau, archdeacon of Maguelonne, to the country of Thoulouſe, or Narbonne Gaul, in order to blow up a ſpirit of zeal and perſecution amongſt the prelates and princes. Theſe miſſionaries were ſoon followed by others, among whom was the famous Spaniard, Dominic, founder of the order of Preachers, who, returning from Rome in the year 1206, fell in with theſe delegates, embarked in their cauſe, and laboured, both by his exhortations and conduct, in the extirpation of hereſy. Theſe ſpiritual champions were to give an account to the pope of the number of heretics in thoſe parts, and of the behaviour of the princes and perſons in authority to them; and thence they acquired the name of *inquiſitors*: but theſe original *inquiſitors* had not any court, or any authority; they were only a kind of ſpiritual ſpies, who were to make report of their diſcoveries to the pope, and to excite the catholic princes and people to extirpate heretics.

It has been generally ſaid, that the tribunal of the *inquiſition* was the invention of St. Dominic, and firſt erected by him in the city of Thoulouſe; that, conſequently, he was the firſt inquiſitor; and that, although the year of its inſtitution is uncertain, it was undoubtedly confirmed in a ſolemn manner by Innocent III. in the council of the Lateran, in the year 1215. See Limborch's Hiſt. of the *Inquiſition*, by Chandler, book i. chap. 10.

This account is conteſted by Moſheim, who maintains, that St. Dominic was not appointed by the Roman pontiff to proceed judicially againſt heretics, and ſuch as were ſuſpected of hereſy, to pronounce ſentence according to their reſpective caſes, and to deliver over to the ſecular arm ſuch as perſiſted obſtinately in their errors, and therefore, in this ſenſe, was no inquiſitor; though, according to the original meaning of the term, he was inveſted with the commiſſion and authority of the Roman pontiff to extirpate hereſy, and oppoſe its abettors, but without any judicial power: nay, it is farther urged, that the court of *inquiſition* was not erected during the life of St. Dominic. The horrid war, which was excited by Innocent III. againſt the Albigenſes in Narbonne Gaul, and which was carried on by the croſs-bearers with the utmoſt cruelty from the year 1209 to 1229, when a treaty of peace took place between Raymond VIII. earl of Thoulouſe, and Lewis VIII. king of France, which gave a mortal blow to the cauſe of hereſy, prepared the way for the full eſtabliſhment of the *inquiſition*. Inquiſitors of the firſt kind had, in the courſe of this time, been placed in almoſt every city, whoſe inhabitants had the misfortune to be ſuſpected of hereſy, notwithſtanding the reluctance which the people manifeſted to this new inſtitution, and the violence with which they frequently expelled and ſometimes maſſacred theſe bloody officers of the popiſh hierarchy. At length, the council held at Thoulouſe, in the year 1229, by Romanus, cardinal of St. Angelo, and pope's legate, went ſtill farther, and erected in every city a council of inquiſitors, conſiſting of one prieſt, and three laymen. This inſtitution was, however, ſuperſeded in the year 1233, by Gregory IX. who entruſted the Dominicans, or Preaching Friars, with the important commiſſion of diſcovering and bringing to judgment the heretics that were lurking in France; and in a formal epiſtle diſcharged the biſhops of that painful office. Immediately after this, the biſhop of Tournay, who was the pope's legate in France, began to execute this new reſolution, by appointing Pierre Cellan and Guillaume Arnaud, inquiſitors of heretical pravity at Thoulouſe; and afterwards proceeded in every city, where the Dominicans had a convent, to conſtitute officers of the ſame kind, choſen from among the monks of that order. From this period we are to date the commencement of the dreadful tribunal of the *inquiſition*, which in this and the following ages ſubdued ſuch a prodigious multitude of heretics, part of whom were converted to the church by terror, and the reſt committed to the flames without mercy. For the Dominicans erected firſt at Thoulouſe, and afterwards at Carcaſſone, and other places, a tremendous court, before which were ſummoned not only heretics, and perſons ſuſpected of hereſy, but likewiſe all who were accuſed of magic, ſorcery, Judaiſm, witchcraft, and other crimes of that kind. This tribunal, in proceſs of time, was erected in the other countries of Europe, though not every where with the ſame ſucceſs. The method of proceeding in this court of *inquiſition* was at firſt ſimple, and almoſt in every reſpect ſimilar to that which was obſerved in the ordinary courts of juſtice. But the Dominicans modelled it after that of the tribunal, called in the Roman church the tribunal of peace; and hence aroſe that ſtrange ſyſtem of inquiſitorial law, which, in many reſpects, is ſo contrary to the common feelings of humanity, and the plaineſt dictates of equity and juſtice. And that nothing might be wanting to render the ſpiritual court formidable and tremendous, the Roman pontiffs perſuaded the European princes, particularly the emperor Frederic II. and Lewis IX. king of France, not only to enact the moſt barbarous laws againſt heretics, and to commit to the flames thoſe who were pronounced ſuch by the inquiſitors, but alſo to maintain the inquiſitors in their office, and grant them their protection in the moſt open and ſolemn manner. The edicts iſſued to this purpoſe by Frederic II. are well known; edicts every way proper to excite horror, and which rendered the moſt illuſtrious piety and virtue incapable of ſaving from the moſt cruel death ſuch as had the misfortune to be diſagreeable to the inquiſitors. The laws of Frederic, in relation to the inquiſitors, may be ſeen in Limborch's Hiſtory of the *Inquiſition*, book i. chap. 12.

The edict of St. Lewis, in favour of theſe ghoſtly judges, iſſued out in the year 1229, is generally known under the title of *Cupientes*.

After the death of Frederic, who had long before repented the power he had given the churchmen, as having ſeen ſome of the fruits of it, pope Innocent IV. erected a perpetual tribunal of inquiſitors, and deprived the biſhops and ſecular judges of the little power the emperor Frederic had left them. And this juriſdiction, which depended immediately on himſelf, he took care to introduce into moſt of the ſtates of Europe. In 1251 it was eſtabliſhed in Italy; in 1255 Alexander IV. appointed inquiſitors in France, at the requeſt of St. Lewis. But the inquiſitors were ſo fiery hot, and made ſuch horrible butchery among the reputed heretics, that they raiſed an univerſal deteſtation even in ſome catholic countries themſelves. Hence it was that their reign proved very ſhort both in France and Germany; though they were occaſionally exerting themſelves; and their power was eſtabliſhed in many parts of France and Germany about the time of the reformation by Luther; but afterwards gradually declined. Nor was even Spain entirely ſubject to them till the time of Ferdinand and Iſabella, when their power was increaſed, under pretence of clearing the country of Judaiſm and Mohametaniſm.

The *inquiſition* was firſt introduced into Spain in the year 1478; but the firſt inquiſitor general, and the ſupreme council of the *inquiſition*, was not fixed till the year 1483. This tribunal is ariſen to ſuch a height in Spain, that the king of Caſtile before his coronation ſubjects himſelf and all his dominions, by a ſpecial oath, to the moſt holy tribunal of the *inquiſition*. It is under the direction of an inquiſitor general, appointed by the king, and confirmed by the pope; and this *inquiſition* has power to name particular inquiſitors in every place where there is any tribunal of the *inquiſition*.

The *inquiſition* was eſtabliſhed in Portugal, at the preſſing ſolicitation of king John III. about the year 1536; and both the Spaniards and Portugueſe have eſtabliſhed it in their territories in the weſtern continent.

The power of the *inquiſition* is very much limited in ſome countries, particularly at Venice, where it was introduced about the year 1289, and where it is received under ſuch modifications, as prove a great check on its authority; the office conſiſting of ſecular and eccleſiaſtical perſons, though the latter have been long endeavouring to bring it into their own hands, but could never prevail with the Venetian ſenate to agree to it. Indeed at Venice it ſeems rather a political than a religious contrivance; and ſerves rather for the ſecurity of the ſtate, than that of the church. There are appeals from the ſubaltern *inquiſitions* in Italy, to the congregation of the holy office reſiding at Rome.

This CONGREGATION was firſt formed by Paul III. in 1542, but finally eſtabliſhed by Sixtus V. in 1588. The members of it, called ſupreme inquiſitors, aſſemble thrice in the week, and every Thurſday in the preſence of the pope, who preſides in it.

The officers or miniſters of the *inquiſition* are the inquiſitors, who derive their power from the pope, either by word of mouth, or by his apoſtolic letters, and can be removed only by him, or by authority conferred by him on thoſe cardinals who are the inquiſitors general; vicars general, who manage the affairs of the *inquiſition*, during the abſence of the inquiſitors; aſſeſſors and counſellors, who give their advice in points of theology and law; the promoter fiſcal, whoſe office it is to examine the depoſitions of the witneſſes, to give information of criminals to the inquiſitors, and to demand their apprehenſion and impriſonment, and, finally, when apprehended and admoniſhed, to accuſe them; notaries or regiſters, who write down the injunctions, accuſations, and all the pleadings of the cauſes; the judge and receiver of the confiſcated effects; the executor and officials, who apprehend and keep in cuſtody criminals; the attendants or FAMILIARS; the CROSS-*bearers*; and the viſitors, who viſit all the provinces of the inquiſitors, and report to the inquiſitor general and council whatever was proper to be amended. The civil magiſtrate is entirely excluded from the cognizance of hereſy; but the inquiſitors require their aſſiſtance for the puniſhment of heretics, in conſequence of the ſentence which they pronounce; and they are ſeverely threatened with the moſt grievous puniſhment, if they neglect their duty. The puniſhments inflicted by the *inquiſition* on heretics are eccleſiaſtical and civil: the eccleſiaſtical or canonical are EXCOMMUNICATION, deprivation of eccleſiaſtical burial, dignities, benefices, and offices. The civil are confiſcation of goods, which is inflicted on all who are convicted of hereſy, or confeſs, whether they repent or perſiſt in their hereſy, becauſe they are declared to incur the puniſhment, *ipſo jure*, as ſoon as they fall into hereſy; diſinheriting the children, inſomuch that though they are catholics, they can never inherit the eſtates of their fathers who died in hereſy; infamy, which excludes from all public offices, from bearing witneſs, making wills, &c. loſs of all dominion, natural or civil, as power of parents over children, maſters over ſervants, magiſtrates and princes over ſubjects, &c. and the deprivation of all property in every thing they have; impriſonment; bann, which is a kind of ſentence of excommunication, by which any perſon is caſt out of the commonwealth, ſo that he cannot enjoy the public protection, or diſcharge any public offices, or receive any benefit of law; diffidation, which declares heretics to be enemies of their country and of the empire, ſo that any perſon, by his own private authority, may ſeize, plunder, and kill him, as an enemy and robber, even though he be a clergyman; nor is it lawful for any one to undertake their defence when apprehended; and thoſe advocates who favour and plead for them, are pronounced infamous, and ſuſpended from their office; and finally death, which is that of being burnt alive, in ſome caſes heightened by being gagged with an iron inſtrument, ſo that in the midſt of their torments they can utter only an inarticulate ſound.

It is the conſtant practice of the *inquiſition*, to affect, in all their procedures, to inſpire as much terror and amazement as poſſible; every thing is done with the profoundeſt ſilence and ſecrecy, and with the greateſt rigour, and pretended impartiality. When a perſon is ſeized, all the world abandons him; not the neareſt friend dares to ſpeak a word in his defence; that alone would be enough to render them ſuſpected of hereſy, and would bring them within the claws of the *inquiſition*; nay, the neareſt relations are bribed and conſtrained to accuſe one another. The criminals are ſeized, examined, tried, tortured, and, unleſs they recant, are even condemned and executed, without ever ſeeing or knowing their accuſers; whence the revengeful have a fair occaſion of wreaking their malice on their enemies. By the forms of the *inquiſition*, a perſon defamed only for hereſy is obliged to make canonical purgation, i. e. to purge himſelf with ſeven, more or leſs, compurgators; ſo that if he fails in one, two, or three, he is accounted guilty: beſides, every one, though excluded by other courts, is admitted as a witneſs, a mortal enemy only excepted. The names of the witneſſes are not ſhewn to the priſoner; nor is any circumſtance diſcovered, by which he can obtain the knowledge of them. If two unexceptionable witneſſes teſtify of different facts; yea, ſometimes if there be only one, or a mere report, it is thought ſufficient for ordering the torture; the evidence of two unexceptionable witneſſes, who agree, is ſufficient for the conviction and condemnation of any perſon. Thoſe that are informed againſt are conſtrained to become their own accuſers; and various arts are uſed to extort a confeſſion from them. The advocate allowed them is under the direction of the *inquiſition*, and employed chiefly in order to betray them; moreover, when the crimes cannot be proved againſt them, they are only abſolved from proſecution, but their crimes and names are recorded againſt them. The uſe of torture for diſcovering ſecret crimes lying concealed in the mind, is a flagrant inſtance of injuſtice; and perſons are put to the torture upon half full proof of the crime, i. e. faultering, defamation, one witneſs of his own knowledge, or when the tokens are vehement and violent. Theſe tortures are uſed under a pretence of diſcovering the truth, and they are varied and continued with the moſt wanton cruelty. After theſe, and many other ſhocking proceſſes, when the *inquiſition* has done with the criminals, and condemned them to death, they are turned over to the ſecular arm, with much prayer, and pious intreaty, that their lives may not be touched.

Time is no manner of ſecurity in point of hereſy; nor does the grave itſelf ſhelter the accuſed from the purſuits of the *inquiſition*; even the deceaſed have their trials, and they proceed in all their form and ſolemnity againſt the dead carcaſes. The executions are always deferred till the number of the condemned is very great, that the multitude of ſufferers may ſtrike the deeper horror, and make the ſcene more terrible and ſhocking. See Act *of Faith*.

The *inquiſition* is very ſevere in the Indies. It is true, there muſt there be the oaths of ſeven witneſſes to condemn a man; but the depoſitions of ſlaves or children are taken. The perſon is tortured till he condemns himſelf; for his accuſers are never brought to confront him. Perſons are accuſed for the ſlendereſt expreſſion againſt the church; or even for a diſreſpectful word of the *inquiſition*.

The ſtandard of the *inquiſition* in Spain is a piece of red damaſk, on which is painted a croſs, with an olive-branch on one ſide, and a ſword on the other; with theſe words of the pſalm, *Exurge, Domine, & judica cauſam meam.* The ſtandard of the *inquiſition* in Portugal hath their ſuppoſed founder, Dominic's picture on one ſide, and on the other ſide the croſs, betwixt an olive-tree and a ſword, with this motto, *Juſtitia & miſericordia.*

See on the ſubject of this article Limborch's Hiſt. of the *Inquiſition*, by Chandler, paſſim. Moſheim's Eccl. Hiſt. vol. iii. p. 113, &c. 8vo.

INQUISITORS, in *Law*, are ſheriffs, coroners *ſuper viſum corporis*, or the like, who have authority to enquire into certain caſes, *ex officio*.

IN QUO, *Medium in quo*. See Medium.

INROLLMENT, in *Law*, the regiſtering, recording, or entering of any lawful act, or inſtrument, in the records of chancery; as a recognizance acknowledged, or a ſtatute, or a fine levied.

Inrollments are alſo made in the rolls of the exchequer, king's bench, and common pleas; in the huſtings at Guildhall, London; and by the clerk of the peace in any county. See Register.

Inrollments, *clerk of the*. See Clerk.

INSAG, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to one of the ſeveral ſpecies of parrots, common in their woods. The *inſag* is a very beautiful bird; its body is of a very bright green, and its head of a fine florid red.

INSANUM *parliamentum*. See Parliamentum.

INSCHI, or **Inschi** *kna*, in the *Materia Medica*, a name given by ſome authors to the common ginger.

INSCONCED, in the *Military Art*, denotes, that part of an army that have fortified themſelves with a *ſconce*, or ſmall fort, in order to defend ſome paſs, &c. See Sconce.

INSCRIBED, in *Geometry*.—A figure is ſaid to be *inſcribed* in another, when all the angles of the figure *inſcribed* touch either the angles, ſides, or planes of the other.

Inscribed *Hyperbola*, is ſuch an one as lies entirely within the angle of its aſymptotes; as the conical *hyperbola* doth. See Hyperbola and Circumscribing.

INSCRIPTION, a title, or writing, affixed to any thing, to give ſome farther knowledge thereof; or to tranſmit ſome important truth to poſterity.

Antiquaries are very curious in examining ancient *inſcriptions* found on ſtones, and other monuments of antiquity. Sanchoniathon, contemporary, as it is ſaid, with Gideon, drew moſt of the memoirs whereof his hiſtory is compoſed, from *inſcriptions* which he found in temples, and on columns, both among the Heathens, and the Hebrews.

It appears, indeed, that the ancients engraved upon pillars the principles of ſciences, as well as the hiſtory of the world. Thoſe mentioned by Herodotus ſhew, that this was the firſt way of inſtructing people, and of tranſmitting hiſtories, and ſciences, to poſterity. This is confirmed by Plato in his Hippias, wherein he ſays, that Piſiſtratus engraved, on ſtone pillars, precepts uſeful for huſbandmen. Pliny aſſures us, that the firſt public monuments were made of plates of lead; and that the treaties of confederacy concluded between the Romans and the Jews, were written upon plates of braſs; that, ſays he, the Jews might have ſomething to put them in mind of the peace and confederacy concluded with the Romans. The Greeks and Romans were great dealers in *inſcriptions*, and were extremely fond of being mentioned in them: and hence it is, that we find ſo many in thoſe countries of ancient learning, that large volumes have been compoſed; as the collection of Gruter, &c. Since Gruter's collection, Th. Reineſius has compiled another huge volume of *inſcriptions*. M. Fabretty publiſhed another volume at Rome in 1699, wherein he has corrected abundance of errors which had eſcaped Gruter, Reineſius, and other antiquaries, &c. and added a great number of *inſcriptions* omitted by them.—Since all theſe, Grævius has publiſhed a complete collection of *inſcriptions*, in three volumes in folio. In France is an Academy of *inſcriptions* and medals, the members of which are to meet twice a week, and employ themſelves in the examination of medals, and ancient monuments, and other parts of Greek and Roman literature; and to compoſe a hiſtory of the kings of France from medals.—Such was the academy at the time of its inſtitution, or rather reſtauration, in the beginning of this century; but as they are not now wholly employed about medals and *inſcriptions*, they have changed their name for one of a greater latitude, and are called the Academy des Belles Lettres.

Inscriptions, *Notes, or Abbreviations, uſed in*. See Character.

INSCRUTABLE, *Unſearchable*, in *Theology*, is uſually underſtood of the ſecrets of Providence, and the judgments of God, which cannot be ſound out, or into which human reaſon cannot penetrate.

INSECTS, **Insecta**, (the word is originally Latin, formed of *in*, and *ſeco*, I cut; the reaſon of which is, that in ſome of this tribe, as ants, the body ſeems to be cut, or divided into two, or becauſe the bodies of many, as worms, caterpillars, &c. are compoſed of divers circles, or rings, which form a ſort of inciſure), in *Natural Hiſtory*, a ſmaller ſort of animals, commonly ſuppoſed to be exſanguinous; and diſtinguiſhed by certain inciſures, cuttings, or indentings, in their bodies.

Their characters are, that their body is covered with a ſort of bony ſubſtance inſtead of ſkin, and their heads are furniſhed with antennæ, called horns.

All *inſects* have ſix or more feet, which are denominated from the various motions they produce, *curſorii*, or running, *ſaltatorii*, or leaping, the thighs being remarkably large, *natatorii*, or ſwimming, which are flat and edged, with hairs: the *mutici* are ſuch feet as have no claws; the forefeet are enlarged towards their extremities, and each of them is furniſhed with two leſſer claws, acting like a thumb and finger. They reſpire through pores placed on the ſides of their bodies, called *ſpiracula*: the head has no brain, and is furniſhed neither with ears nor noſtrils. Moſt *inſects* have two eyes, but ſome have more, without eye-brows. The antennæ are generally two, placed in the fore part of the head and diſtinguiſhed from the tentacula of worms, in being cruſtaceous: they are of various forms, and ſerve to diſtinguiſh the different kinds of *inſects*: the principal diſtinctions are the following; viz. the *ſetaceæ*, which grow gradually taper towards the extremity; the *filiformes*, which are of the ſame thickneſs throughout; the *moniliformes*, which are filiform, conſiſting of a ſeries of round knobs; the *clavatæ*, which gradually increaſe in ſize towards the extremity; the *capitatæ*, which are clavated with the extremity roundiſh; the *fiſſiles*, which are capitated, with the ſmall head divided longitudinally into three or four parts or laminæ; the *perfoliatæ*, which are capitated with the ſmall head horizontally divided; the *pectinatæ*, ſo called from their ſimilitude to a comb or feather; *ariſtatæ*, which have a lateral hair, that is either naked or furniſhed with leſſer hairs; *breviores*, *longiores*, and *mediocres*, which are reſpectively ſhorter than the body, longer, and of the ſame length with it. Beſides the antennæ, there are the *palpi* or feelers, reſembling filiform, articulated, moveable antennæ, but ſufficiently diſtinguiſhed from antennæ in being naked, ſhort, and always at the mouth: they are commonly four in number, ſometimes ſix. The mouth is generally placed in the anterior part of the head, ſometimes under the breaſt, and ſometimes drawn out to a rigid point called the *roſtrum* or *proboſcis*; the maxillæ or jaws are two, ſometimes four or more, placed horizontally; and the inner edge in ſome *inſects* is inſerrated or furniſhed with little teeth. The tongue is in ſome *inſects* taper and ſpiral, in others fleſhy, reſembling a proboſcis; and tubular, as in the fly. The ſtemmata or crowns are three ſmooth hemiſpheric dots, placed generally on the top of the head. The trunk is ſituated between the head and abdomen, and comprehends the *thorax*, which is the back part of the breaſt, being called dentated when its ſides are armed with points; ſpinoſe, when its ſides are furniſhed with them; and marginated, when its margin is laterally dilated: the *ſcutellum* or eſcutcheon, which is the poſterior part of the thorax, often triangular and divided from the thorax by an intervening ſuture; and the ſternum which is ſituated on the inferior part of the thorax, ſometimes pointed behind, and ſometimes bifid. The abdomen of *inſects* is the poſterior part of their body, compoſed of a number of annular ſegments, which ſerve occaſionally to lengthen or ſhorten it, and to contain the organs of chylifaction, &c. The ſpiracles are ſmall holes placed ſingly on each ſide of every ſegment of the abdomen through which the *inſect* breathes; and if oil be applied ſo as to ſtop them up, it proves fatal to moſt of them. The anus is the poſterior part of the abdomen, perforated for the evacuation of the excrement and frequently containing the organs of generation. The wings of *inſects*, which are commonly four, and ſometimes two, are membranous and almoſt always undivided; and they are called *plicatiles*, when they are folded at the time the *inſect* is at reſt; *planæ*, when they are incapable of being folded; *erutæ*, which have their ſuperior ſurfaces brought into contact when the *inſect* is at reſt; *patentes*, which remain horizontally extended; *incumbentes* when they cover horizontally the ſuperior part of the abdomen; *deflexæ*, which are incumbent, with the outer edges declining towards the ſides; *reverſæ*, which are deflex, with the edge of the inferior wing projecting from below the anterior part of the ſuperior ones; *dentatæ*, which have the edge ſerrated or ſcoloped; *caudatæ*, in which one or more projections in the hinder wings are extended into proceſſes; and *reticulatæ*, when the veſſels of the wings put on the appearance of network. The colours of *inſects* bear different names according to their ſhape; thus there are *puncta* or dots, *maculæ* or ſpots, *faſciæ* or bands, which frequently run acroſs and ſometimes ſurround the edge of the wings; *ſtrigæ* or ſtreaks, which are very ſlender faſciæ; and lineæ or lines, which are longitudinally extended. The *ocellus* is a round ſpot, containing a leſſer ſpot of a different colour in its center: the ſtigmata are the ſpots or anaſtomoſes in the middle of the wing near the anterior margin; and the ſingle or double kidney-ſhaped ſpot, ſituated in the ſame part of the anterior wings, is alſo diſtinguiſhed by the name of ſtigma. The *elytra* are the upper wings, which are of a hard ſubſtance, in ſome degree reſembling leather, and in moſt *inſects* of a very hard texture, but in others flexible: their upper ſurface is generally convex, their lower one concave; they are extended when the *inſect* flies, and ſhut when it reſts, cloſing together and forming a longitudinal ſuture down the middle of the back. They are of various ſhapes, and called accordingly *abbreviata*, when ſhorter than the abdomen; *truncata*, when they alſo terminate in a tranſverſe line; *faſtigiata*, when in the ſame circumſtance they are of equal length with the abdomen or longer; *ſerrata*, when the exterior margin towards the apex is notched or ſerrated; *ſpinoſa*, when their ſurface is covered with ſharp points or prickles; *ſcabra*, when their ſurface is ſo uneven as to grate againſt the fingers; *ſtriata*, when marked with ſlender longitudinal furrows; *porcata*, when they have elevated longitudinal ſulci or ridges; and *ſulcata*, when theſe ridges are concave. When the ſuperior wings are of a middle ſubſtance betwixt leather and membrane they are called *hemelytra*. The *halteres* or poiſers are little heads placed on a ſtalk or peduncle, moſt frequently under a little arched ſcale, and appearing to be nothing more than the rudiments of the hinder wings. The tail in moſt *inſects* is ſimple, capable of being extended, and again drawn back at pleaſure: however, in others it is elongated or lengthened out; briſtle-ſhaped or taper; *triſeta*, compoſed of three briſtles; *furcata*, or forked; *forcipata*, reſembling a forceps; *folioſa*, reſembling a leaf; *telifera*, when armed with a dart or ſting. The *aculeus* is an inſtrument with which *inſects* wound, and at the ſame time inſtil a poiſon. The ſame difference of ſex exiſts in *inſects* as in other animals, and they appear more diſpoſed to increaſe their ſpecies: many of them, when become perfect, ſeeming to be created for no other purpoſe but to propagate their ſpecies. The difference of ſex is with difficulty diſtinguiſhed in many *inſects*; in ſome, however, the difference is ſo great, that the male and female may be miſtaken for *inſects* of different ſpecies. The colour is different in ſome, and in others the male has wings and the female has none. Beſides the ſexes of male and female, there is a third diſtinction in ſome *inſects* called *neuter*, which have not the diſtinguiſhing parts of either ſex. No hermaphrodites have as yet been diſcovered among *inſects*: there is ſomething very ſingular, however, in the propagation of the aphides: a female APHIS, once impregnated, can produce young, which will continue to produce others without any freſh impregnation, even to the fifth progeny; afterwards a new impregnation muſt take place. The male *inſects* are always ſmaller than the females. See Linnæi Syſtema Naturæ, tom. i. pars ii. p. 533, &c. and Fundamenta Entomologiæ apud Linnæi Amænitates Academicæ, vol. vii.

Dr. Hill in his hiſtory of animals ſubdivides *inſects* into three general ſeries, each whereof comprehends under it ſeveral claſſes, and thoſe again many diſtinct genera.

The firſt ſeries of *inſects* is called APTERIA; becauſe under it are comprehended all *inſects* of what kind ſoever, having no wings.

Of this ſeries there are two claſſes, the ANARTHRA and PODARIA.

The ſecond ſeries of *inſects* is called PTERARIA, as comprehending all the winged kinds.

Of this ſeries there are likewiſe two orders or ſubdiviſions: 1. The *pteraria diptera*, or *inſects* with two wings. 2. The *pteraria tetraptera*, or thoſe with four wings.

The third and laſt ſeries of *inſects* is called GYMNARTHRIDIA, and comprehends all thoſe *inſects* which have ſoft and naked bodies, furniſhed with limbs.

Linnæus diſtributes *inſects*, the fifth claſs of animals, into ſeven orders, diſtinguiſhed by their wings, viz. *coleoptera*, *hemiptera*, *lepidoptera*, *neuroptera*, *hymenoptera*, *diptera* and *aptera*, including 86 genera, and 2980 ſpecies.

Inſects, according to Mr. Ray, in his Methodus Inſectorum, are either, firſt, αμεταμορφωτα, ſuch as do not change their form: or, ſecondly, μεταμορφωμενα, ſuch as do really change their form.

INSECTS *which do not change their form*, are either 1. Αποδα, without feet; or, 2. *Pedata*, with feet; and of theſe there are ſome kinds that caſt their ſkins, and others that do not.

INSECTS *without feet* are either *terreſtrial*, i. e. land-*inſects*, or *aquatic*.

INSECTS, *terreſtrial*, are either, firſt, ſuch as are produced on the land: as the lumbrici terreſtres, which are either of the larger ſort, and called *dew-worms*; or of a ſmaller ſize: and of theſe are ſome red, and others green, with yellow tails, which laſt are commonly called *gilt-tails*. Or, ſecondly, ſuch as are found in the bowels of animals.

To the genus of *terreſtrial inſects*, many natural hiſtorians alſo refer ſnails, whether with or without ſhells.

INSECTS, *aquatic*, without feet, not changing their form, are, either, firſt, of the greater ſort, which have a peculiar way of moving, by firſt fixing their head to the ground, and then drawing up their tail towards it, &c. of theſe, ſome are *teretes*, round and ſmooth: or, ſecondly, of the *leſſer ſort*, which have a different way of crawling, or moving from the former.

There is an *inſect* of a very peculiarly amphibious kind, which Mr. Reaumur has accurately deſcribed in the Memoirs of the Paris Academy. Many animals are aquatic for a part of their lives, and paſs the reſt on dry land; but this ſingular creature always contrives to have its head and tail both in the water, and the intermediate part of its body out. To conceive the manner in which this is effected, we muſt conſider its figure: it is compoſed, like many others of theſe ſmall animals, of ſeveral rings or joints; it has eleven of theſe between its head and its tail; they are all roundiſh, and very well reſemble a ſtring of beads. The creature is almoſt always in a bending figure repreſenting a ſyphon; its head and tail are always placed near one and another, while the body is elevated and forms an arch above them, the head, the tail, and the ring joining to the tail, are the parts conſtantly kept in the water; and the nine other rings, or at leaſt ſeven of them, lie upon dry land. The conſtant habitation of the animal is at the edges of ſtanding waters. It conſtantly draws back if more of the body is wetted, and plunges in deeper if leſs than the allotted portion is ſo. The animal is not more than two thirds of an inch long.

Its manner of moving is very particular; for neither the head nor the tail ſeem concerned in it, but the higheſt part or ſixth ring of the body, which in its crooked ſtate makes the ſummit of the arch, is what moves firſt, and draws all the other parts to follow it, the creature continuing in its bended poſture while it moves. It does not move by vermicular progreſſion, as ſome animals do, but has regular feet. Theſe indeed are ſo ſmall as not to be diſtinguiſhable without the aſſiſtance of glaſſes; but when ſeen, they are found to be one of the greateſt ſingularities of the animal. See farther, Mem. Acad. Par. 1714.

INSECTS *not changing form, and having feet*, are either, firſt, *hexapoda*, with ſix feet. Secondly, *octapoda*, with eight feet. Thirdly, *decateſſarapoda*, with fourteen feet. Or, fourthly, *polypoda*, with more numerous feet.

Thoſe that have but ſix feet are either *terreſtrial* or *aquatic*.

INSECTS *which undergo a change of their form* are called, μεταμορφωμενα, though improperly; ſince, as Swammerdam ſhews, there is no real transformation, but only an explication of the parts of the animal, latent before in miniature, like the plant in the ſeed, and an increaſe of all the parts by proper degrees. In theſe the firſt ſpecies of tranſmutation, or change, is inſtantaneous, there being no ſenſible reſt, or ſtop, between the old and the new form. The *inſects* of this order do not loſe their motion at the time they ſhift the pellicula, at leaſt not to appearance.—This is when the vermiculus, leaving the former ſhape of the nympha, with which it appeared in the egg, and ſubſiſted without food, now beginning to feed, has its members, or parts, viſibly increaſed, and ſtretched out, and takes the form of a new nympha, which is not without motion; and from thence becomes a flying *inſect*.

The ſecond ſpecies of tranſmutation includes ſuch *inſects* as undergo a double metamorphoſis, or change of ſhape. 1. Into a *chryſalis*, or ſomething analogous to it. 2. Into a flying *inſect*.

Theſe kinds of *inſects*, a while before they change, lie quite ſtill, without feeding, or changing place: and, in reſpect of their wings, are, firſt, κȣλεοπτερα, or vaginipennia, as the *ſcarabæi*, beetles. Secondly, ανελυτρα, whoſe wings are open and expanded; and the wings of theſe are either farinaceous, as in the *papiliones*, &c. or membranous, as in the *apes*, *muſcæ*, *&c.* and theſe are either διπτερα, with two wings, or τετραπτερα, with four wings.

The *third* ſpecies of tranſmutation is a ſimple change from a vermiculus to a flying *inſect*, but with a ſenſible ἡσυχια, reſt or ſtop, between one form and the other. This exchange Swammerdam thus deſcribes: "The "vermicle excluded from the egg gets nouriſhment by "little and little from without, and under that firſt "ſkin, or covering, has its members increaſed by de"grees: not ſlipping it, or putting it off, as other ver"miculi do when they change into nymphæ, but aſſum"ing the figure of a nympha in it: for a time it is quite "motionleſs, till the ſuperfluous moiſture is evaporated; "and then in a few days, it recovers its motion again, "and caſting off the ſkin, which is, as it were, double, "it becomes a fly." See *Transformation* of INSECTS below.

INSECTS, *eyes of*. See EYES *of Flies*.

INSECTS, *generation of*. The world is now generally convinced, that *inſects* are not bred of corruption, but *ex ovo*; though the contrary was believed by the ancients, becauſe of the vaſt numbers that were ſometimes hatched, as it were, at once, and becauſe they could not diſcern the particular manner of their propagation. See GENERATION.

Malpighi, Swammerdam, and Redi, have abundantly diſproved the doctrine of equivocal generation, as well as the chimerical transformation of the caterpillar into the butterfly, and other the like metamorphoſes; and have ſhewn, that all the members of the butterfly were originally incloſed under the ſkin or nympha of the caterpillar, as the parts of a plant are in the ſeed.

Inſects take particular care to depoſit their eggs, or ſeed, in ſuch places where they may have a ſufficient incubation, and where the young, when hatched, may have the benefit of proper food till they become able to ſhift for themſelves. Thoſe whoſe food is in the water, lay their eggs in the water; thoſe to whom fleſh is a proper food, in fleſh; and thoſe to whom the fruits or leaves of vegetables are food, are accordingly depoſited, ſome in this fruit, ſome in that tree, and ſome in one plant, and ſome in another; but conſtantly the ſame kind in the ſame tree, or plant. As for others, that require a more conſtant and greater degree of warmth, they are provided by the parent animal with ſome place in or about the body of other animals; ſome in the feathers of birds, ſome in the hair of beaſts, ſome in the ſcales of fiſhes, ſome in the noſe, ſome in the fleſh, nay, ſome in the bowels and inmoſt receſſes of man, and other creatures. And as for others, to whom none of thoſe methods are proper, the parents make them neſts by perforation in the earth, in woods, in combs, and the like; carrying in and ſealing up proviſions that ſerve both for the production of their young, and for their food, when produced.

In flies, butterflies, &c. it is obſerved, there is a kind of gluten, by which the female faſtens her eggs to the bearing buds of trees, &c. ſo that the rains cannot waſh them off. Theſe eggs will not be hurt by the greateſt froſt.

Andry, De la Generation de Vers dans le Corps de l'Homme, takes notice, that the ancients were miſtaken in denying that *inſects* did breathe, on the account of their wanting lungs; for modern obſervations convince us that *inſects* have a greater number of lungs than other animals.

The ancients thought, alſo, that *inſects* had no blood, becauſe many of them had no red liquor like our blood; but it is not the colour, but the uſe of that liquor, that is to be regarded.

They believed, alſo, that *inſects* had no hearts; whereas our microſcopes do now diſcover, that when *inſects* have ſeveral lungs, they have alſo ſeveral hearts; and, in particular, it is found, that ſilk-worms have a continued chain of hearts, reaching from the head almoſt to the very extremity of the tail. See HEARTS *of inſects*.

It is this number of hearts and lungs that occaſions thoſe *inſects* to give ſigns of life long after they are divided into ſeveral parts.

Andry obſerves, alſo, that it is wrong to call *inſects* imperfect animals, ſince they want no parts either neceſſary or convenient for their uſe, to render them complete in their kind.—There are ſome who affirm, that the earthworms, and thoſe round-tailed worms which are found in the inteſtines of men and horſes, &c. alſo ſnails and horſe-leeches, are hermaphrodites; but that ſuch worms as become flies, and ſilk-worms, are not ſo; being of no ſex, but only peculiar caſes of real animals, which we ſee, in time, come out with wings.

The moderns have proceeded much farther in the knowlege of *inſects* than the ancients, as having the advantages of the microſcope, which diſtinguiſhes their minute parts, whereof they have publiſhed draughts and deſcriptions. Dr. Hook has publiſhed a Micrography in folio; and Fran. Redi, a phyſician, at Florence, has publiſhed ſeveral figures with new and curious experiments of his own. Sig. Malpighi, Bartholine, and the Philoſophical Tranſactions of London, Paris, and Leipſic, have a great number of fine obſervations and experiments on *inſects*.—Swammerdam has written a general hiſtory of *inſects* in Dutch, and aſſures us, there were, before that, above 400 writers on this ſubject: among others, he ſpeaks well of Wotton, Geſner, Aldrovandus, Mouffet, Harvey, Fabricius ab Aquapendente, Geodart, &c. Hoeſnagel, painter to the emperor Rudolphus, has given very good deſigns of above 300 ſpecies; Geodart has deſcribed above 400, and Mr. Albin has given us a new hiſtory of the Engliſh *inſects*, with beautiful figures; and ſince that the late Mr. Wilks, and many others, have given hiſtories and figures of many kinds.

The principal authors who have written on *inſects*, or *entomologiſts*, beſides thoſe already mentioned, are Liſter, Lady Merian, who failed from Holland to Jamaica, in purſuit of the ſtudy of *inſects*, Leewenhoeck, Petiver, Ray, Friſch, Reaumur, Linnæus, who firſt undertook to determine the genera of *inſects*, and aſſign them their proper characters, in the Syſtema Naturæ, and thus reduced this ſcience to a ſyſtematic form, Roeſel, De Geer, Admiral, Clerk, Ehret, Poda, Scopoli, Sulker, Gronovius, Seba, Geoffroy, Schæffer, Harris, Brunnich, Leeke, Drury, Sep, and Forſter.

INSECTS, *transformation of*. It is well known that flies are not produced in that form, from the eggs of their parent fly, but undergo a change like that of the butterfly, and the like winged inſects; the egg hatching into a worm; a caſe or CATERPILLAR, called by Linnæus *larva*, the inſect being in this ſtate maſked, or having its true appearance concealed; and this, after performing all the operations of animal life for a certain time, enters into a ſtate of reſt, diſtinguiſhed by the name of chryſalis, or AURELIA, and more lately by that of *pupa*: and thence is changed into a fly, or the *imago*, as it is called by Linnæus.

Swammerdam, to whom the world is indebted for the firſt true inſight into the wonders of the inſect-world, has evidently proved, that what had before been called by the pompous and myſterious names of changes and *transformations* of one animal into another, as of a worm into a fly, and the like, is, in reality, no more than a gradual and natural growth and evolution of the parts, not any metamorphoſis of them; and this growth reſembles very well, when judiciouſly conſidered, not only the increaſe of other animals, but alſo the natural budding and increaſe of plants.

The progreſs of theſe changes, as they are called, in inſects, is expreſſed by two different terms in their two moſt remarkable ſtates; the words are the *nymphæ* and the *chryſalis*. See AURELIA and NYMPH.

Swammerdam refers the general changes, as they are called, of the inſect-tribe, into four claſſes, one or other of which occurs in that of every known inſect, a very few excepted, whoſe progreſſions have not yet been ſufficiently inquired into, to aſcertain their nature. The four general claſſes, or ranks of changes, are diſtinguiſhed by four different ways of production, change, and growth.

The firſt rank, which he expreſſes by the name of nymph-animal, hath a little animal fully formed in the egg, which, after the evaporation of the ſuperfluous moiſture, comes forth perfect, and ſo grows up. Such is the louſe, and the like.

The ſecond claſs is diſtinguiſhed by the name of *nympha-vermiculus*. Theſe have the parts of the future inſect imperfectly ſhaped in the egg, and, after hatching, leave the creature to acquire its perfection viſibly by outward food. Of this kind are the graſshopper, the locuſt, the cricket, and many other the like creatures.

The third claſs he diſtinguiſhes by the name of the *nympha-chryſalis*, or *nympha-aurelia*. Theſe, after hatching, obtain their perfection darkly, and not till after the caſting off the laſt ſkin; ſuch are the butterfly and the like. The ſecond and third claſs agree in this, that not a perfect animal, but a worm, is produced from the egg, and precedes the growing of the perfect parts; yet with this difference, that in the ſecond the little creature grows up manifeſtly and obviouſly to the eye; but in the third all in darkneſs and obſcurity under the ſkin, and, as it were, within the body of the creature.

The fourth claſs is diſtinguiſhed by the phraſe *nympha vermiformis*; and the creatures of this claſs remain always ſhut up in the caſe of the worm or maggot, without any poſſibility of diſcerning the parts, till caſting both ſkins at once, it becomes a perfect and free animal, capable of propagating its ſpecies.

Thoſe inſects which come forth perfect, and in their own proper form, out of the egg, ſuffer no future changes, but only the caſting off their ſkins; but thoſe which come forth under the envelopement of a vermicular coat, do, beſide caſting their ſkins, after a proper time of eating and crawling about in that ſtate, become nymphæ: and all inſects, as well thoſe which come out of the egg in the worm ſtate, as thoſe which come forth in their own form, are originally, in the egg, all in the nymph-form; and thoſe which come out of the egg perfect animals, have no other difference in the manner of their productions from the others, but that they have ſuffered in the egg, and out of the way of our inſpection, all thoſe changes which the others do undergo in the chryſalis or nymph-ſtate, in our ſight. The parts of the nymphæ of theſe animals protuberate and expand themſelves by degrees, much in the ſame manner that the buds of flowers of plants do; and the caterpillar is certainly the butterfly itſelf, only covered with a mantle which hides its ſeveral limbs from our eyes till thrown off.

Thus are the general tribes of inſects regularly reduced to theſe four claſſes, in regard to the manner of their production. Thoſe particular ſpecies which ſeem not reducible to theſe, or any other rules, or for which farther obſervation at leaſt is required, are the glow-worm, the ſcolopendra, the julus, the weavil or curculio, the dung-beetle or pilularius ſcarabæus, the ſmalleſt water-beetle, and the ſcorpion. See theſe under their ſeveral heads. Swam. Hiſt. Inſect.

Though the general courſe of nature is the ſame in this reſpect in flies and butterflies, yet the means and manner of it are different; the BUTTERFLY makes its coat for this *transformation*; the fly-worms of many kinds have only a ſhell of their own proper ſkin to undergo this change in.

All the fly-worms of the firſt and ſecond, and many of thoſe of the third claſs, have their caſe thus made only of their own ſkin; the different ſpecies afford indeed ſome varieties in the manner of this, but a general idea of the work may be had from obſerving the worm or maggot of the common fleſh-fly in its ſeveral ſtages.

When this creature has arrived at its full growth, it finds it not convenient any longer to remain among the food it has till then lived upon; it quits it and now goes in ſearch of a place where it may wait for its metamorphoſis. To this purpoſe it creeps into the earth, where it remains two or three days without any change; at the end of this time, inſtead of its pointed figure, its white colour, and ſoft fleſhy ſubſtance, it acquires the figure of an egg, and becomes of a cheſnut colour, or ſomewhat reddiſh, and looks opake and cruſtaceous; it is in this ſtate perfectly ſtiff, and deſtitute of motion, and the creature ſeems not only to have loſt its form, but wholly to have loſt its life alſo. This however is not the caſe, all that is done, is that the creature has abſolutely quitted its ſkin, which is now become hard and of a determinate figure, and is within it completing all its changes.

The manner in which this change of figure is given to the ſkin, is by the creature's drawing its head, and the two or three firſt rings of its body, within the reſt, and by that means making itſelf of this ſhape, ſhort and equally thick at each end. It does this within a few hours after it creeps into the earth, and if taken out after that time is always found of this ſhape, and ſeems to be transformed, only that its ſkin has not yet acquired its brown colour. This however is not at all the caſe, for it can now walk as before, and thruſting out its head and the rings it had drawn in, can again acquire its former figure, which however it loſes afterwards at once, and becomes rigid in a few minutes, and in two or three hours the ſkin it has quitted, and which is now a ſhell, becomes reddiſh, and after a little more time acquires its proper cheſnut colour.

This coat is now no more a ſkin, but a ſhell, and fit to perform all the offices of one; it is no longer connected to the body of the animal, but is become hard, brittle, and rigid. It may however yet be diſtinguiſhed, eſpecially by the help of the microſcope, to be made up of a great number of rings, which may be more diſtinctly counted than they could be in the worm.

The *transformation* in this ſhell is double, before the inſect becomes what it is to be finally, a fly like its parent; the firſt *transformation* is into an oblong maſs of matter, void of all form, either of the worm it was, or of the fly it is to be; but from this it by degrees aſſumes the figure of the nymph, in which all the lineaments of the future fly are diſtinguiſhable. This *transformation* (which is in theſe, and perhaps in all the worms that make a caſe of their own ſkin, prior to their change into the nymph ſtate) may be called the change into the long ball or ſpheroide, or into the ellipſoide. This fly-worm of the blue fly is one of thoſe, which with moſt difficulty ſhews this *transformation*; but on boiling it at a proper time, and afterwards carefully opening the ſhell, it will always be found in this ſtate.

The time required for theſe ſeveral changes often differs a little, and ſometimes conſiderably; but at a medium it ſtands thus: the worms which have been ſeen to creep into the earth on the 21ſt of April, have come out perfect flies on the 16th of May, and that in a cold ſeaſon for the time of the year.

The changes a multitude of other fly-worms undergo, and their ſhells made of their proper ſkin, are the ſame in all eſſential points with thoſe of the flies firſt mentioned. Some ſpecies have their ſhell more deeply annular, others almoſt entirely ſmooth; ſome have the two ends ſomewhat pointed, and others only one of them ſo; and in ſome this larger inflated end is the anterior, and in others the poſterior. Reaumur's Hiſt. Inſ. vol. iv. p. 288, &c.

INSECTS, *Anatomical uſe of*. The *inſect* world affords us numerous uſes, and thoſe many of them ſuch as no one would at firſt thought imagine, and which no other operations or operators could ſo well effect. In the minutiæ of anatomy, where knives cannot be introduced, the maggot or the ant may be employed with great ſucceſs. Skeletons of fœtuſes have been prepared by burying them in an ant-hill, and that in ſo accurate and perfect a manner, that all who have ſeen them, have admired by what means they could be ſo nicely finiſhed; and the ſecret of the great Ruyſch, by which he cleared away the parenchymatous ſubſtance from his vaſcular preparations, was of this kind. After injecting the veſſels of any part with wax, all that remained to the completing theſe preparations, was the taking off the parenchymatous or fleſhy matter from between and among them. Other anatomiſts of his time did this by the knife, or by maceration in water and other liquors; but it appeared a ſort of magic to them, that his were always not only much ſooner executed, but to a greater nicety and perfection than their's ever poſſibly could be. His method was only to put a number of the common fleſh-eating maggots, to the ſubſtance; and theſe regularly eat away all the fleſh, their heads getting into crevices which no inſtrument could reach, and the whole ſubſtance of the injection remained unhurt, as their ſoft bodies could glide between its niceſt parts without injuring them; and the wax being no food for them, was in no danger of being eroded, even in its ſmalleſt pieces. The ſeveral ſizes of the worms or maggots bred from the eggs of different flies were of great uſe in the perfecting the preparations; for while the larger ſort eat the more fleſhy parts, where the veſſels are large and but few in number, the middle-ſized maggots got into the interſtices of the more vaſcular parts, and the moſt minute of all, which are uſually alſo the moſt numerous, kept about the ſurface, and eat away between and among the capillary veſſels.

The maggots produced from flies are not the only animals fit for this kind of buſineſs. There are ſeveral ſpecies of beetles of the ſmaller kinds, whoſe eggs hatch into a ſix-legged worm, which eats as much and as nicely as the fly-maggots. All theſe may be employed very ſucceſsfully to the preparations of the parts of animals.

Theſe nice anatomiſts are not confined to animal ſubſtances: they often exert their power alſo on vegetables. Many of them feed on the leaves and fruits of plants; and ſome ſpecies of theſe work ſo nicely, that they eat away all the outer membrane and internal parenchymatous ſubſtance of the leaves, ſo as only to leave the net-like plexus of veſſels ſtanding. Yet theſe being unhurt ſhew the true figure of the leaf, and are a ſort of vegetable ſkeletons, but very poorly imitated by art in the common way, by long macerations in water; this method uſually deſtroying and waſhing away many of the ſmaller veſſels, which the tender mouths of theſe creatures ſpare. If they exert their ſkill often upon leaves in this manner, they do it alſo ſometimes with equal if not greater ſucceſs upon fruits. As in the leaves, thoſe which have the tendereſt parenchyma and the firmeſt ribs, ſucceed beſt; ſo alſo it is in fruits. The leaves of the ruſcus or butcher's broom, are often found thus beautifully anatomiſed; and of all fruits, none ſucceeds ſo well as that of the ſtramonium, or thorn-apple. Wherever this plant grows in any plenty, the fruit towards autumn, while it is yet full of juice, is attacked by a ſmall worm, which eats away all the parenchyma, and leaves every veſſel ſtanding in its place; and this not only in the outer coat of the fruit, but in the very inner cells of the ſeeds. Theſe veſſels remain exactly in the ſhape of the fruit, and, growing white with the air, exhibit the moſt elegant and beautiful ſkeletons imaginable, while yet ſtanding on the plant. The animal which effects this, is a hexapode worm produced from the egg of a ſmall beetle; and differs very little from ſome of thoſe which ſo elegantly eat away the fleſhy parts from the injected anatomical preparations. Theſe are gregarious animals like ſome ſpecies of the ſmaller caterpillars, and numbers of them are always at work together on the ſame leaf or fruit, ſo that the ſkeleton is ſoon made. They begin by piercing a number of little holes into the ſubſtance of the leaf, and thence burrow under the integument till they meet one another; and this being done all over the leaf, they leave it, and go to work upon another.

Insect, *Muſk*, a term uſed by ſome to expreſs the capricorn, or *muſk*-beetle; but it is too looſe a phraſe for that animal, ſince there are other inſects which ſmell as ſtrongly of that perfume. There is a ſmall kind of bee, very frequent in the paſtures of Lincolnſhire, and ſeveral other parts of England, in April; this frequents the ranunculus and dandelion flowers, and has a very ſtrong and fine ſcent of *muſk*: there is alſo a hexapode worm, which feeds on the *gallium luteum*, or yellow ladies bed-ſtraw, which has the ſame perfumed ſcent in a no leſs degree. Both theſe inſects, and even the capricorn beetle, loſe their perfume when they have been ſome time dead. Phil. Tranſ. Nº 76.

INSERTED *column*. See Column.

INSERTION, a term frequently uſed, in *Anatomy*, to ſignify the implication of one part within another.

Thus we ſay, the *inſertion* of a muſcle.

The *inſertion* of the bones, muſcles, and nerves in the members of an animal, is exceeding artful: the vena cava has its *inſertion* in the right ventricle of the heart.

Insertion is alſo uſed, in *Agriculture*, for the incloſing a graft within the cleft of a tree. See Engrafting.

INSESSUS, or Insessio, in *Medicine*, a kind of half bath, or semicupium, uſually prepared with a decoction of ſeveral herbs proper for the lower parts, wherein the patient ſits down to the navel.

It has ſeveral uſes: as the eaſing of pain, ſoftening the parts, diſpelling a flatulent matter, and frequently promoting the menſes.

INSIDIANT *diſeaſes*, a term uſed by ſome authors, to expreſs ſuch diſeaſes as ſhew no evident ſymptom, but remain latent a long time in the body, and are ready to break forth in an unexpected manner, and as it were by ſurprize.

INSINUATION denotes a cunning, and covert way of creeping into any perſon's favour.

Insinuation *of a will*, among *Civilians*, is the firſt production of it, or the leaving it with the regiſter, in order to its probate. See Will.

INSIPID, *taſteleſs*, that which has nothing in it pungent enough to affect the palate, tongue, &c. and to occaſion that ſenſation we call *taſting*.

INSITION, Insitio, in *Botany*, denotes the ſame with Engrafting; viz. the act of inſerting and uniting a cyon, bud, or the like, in the ſubſtance of the ſtock.

INSOLATION, in *Pharmacy*, a method of preparing certain fruits, drugs, &c. by expoſing them to the heat of the ſun's rays; either to dry, to maturate, or to ſharpen them; as is done in vinegar, figs, &c.

The word comes from the Latin verb *inſolare*, which is uſed by Pliny and Columella; and ſignifies *to expoſe to the ſun*.

INSOLVENT, a term applied to ſuch perſons as have not wherewithal to pay their juſt debts.

A perſon dying, and not leaving eſtate ſufficient to diſcharge theſe, is ſaid to die *inſolvent*.

INSPECTOR, a perſon to whom the care and conduct of any work is committed.

Inspectors, in the *Roman law*, were ſuch perſons as examined the quality and value of lands and effects, in order to the adjuſting or proportioning taxes and impoſitions to every man's eſtate.

The Jews alſo have an officer, in their ſynagogue, whom they call *inſpector*, חזן *hhazen*. His buſineſs conſiſts principally in *inſpecting*, or overlooking the prayers and leſſons, in preparing and ſhewing them to the reader, and in ſtanding by him to ſee he reads right; and, if he makes miſtakes, he is to correct him.

INSPICIENDO *ventre*. See Ventre.

INSPIRATION, among *Divines*, &c. implies the conveying of certain extraordinary and ſupernatural notices, or motions, into the ſoul: or, it denotes any ſupernatural influence of God upon the mind of a rational creature, whereby he is formed to any degree of intellectual improvements, to which he could not, or would not in fact have attained in his preſent circumſtances in a natural way.

Thus the prophets are ſaid to have ſpoken by divine *inſpiration*.

Some authors reduce the *inſpiration* of the ſacred writers to a particular care of Providence, which prevented any thing they had ſaid from failing, or coming to nought; maintaining, that they never were really *inſpired*, either with knowlege, or expreſſion.

According to M. Simon, *inſpiration* is no more than a direction of the Holy Spirit, which never permitted the ſacred writers to be miſtaken.

It is a common opinion, that the *inſpiration* of the Holy Spirit regards only the matter, not the ſtyle, or words; and this ſeems to fall in with M. Simon's doctrine of direction.

Theological writers have enumerated ſeveral kinds of *inſpiration*: ſuch as an *inſpiration* of ſuperintendency, in which God does ſo influence and direct the mind of any perſon, as to keep him more ſecure from error in ſome various and complex diſcourſe, than he would have been merely by the uſe of his natural faculties; plenary ſuperintendent *inſpiration*, which excludes any mixture of error at all from the performance ſo ſuperintended; *inſpiration* of elevation, where the faculties act in a regular, and, as it ſeems, in a common manner, yet are raiſed to an extraordinary degree, ſo that the compoſure ſhall, upon the whole, have more of the true ſublime, or pathetic, than natural genius could have given; and *inſpiration* of ſuggeſtion, when the uſe of the faculties is ſuperſeded, and God does, as it were, ſpeak directly to the mind, making ſuch diſcoveries to it as it could not otherwiſe have obtained, and dictating the very words in which ſuch diſcoveries are to be communicated, if they are deſigned as a meſſage to others.

It is generally allowed that the New Teſtament was written by a ſuperintendent *inſpiration*; for without this the diſcourſes and doctrines of Chriſt could not have been faithfully recorded by the evangeliſts and apoſtles; nor could they have aſſumed the authority of ſpeaking the words of Chriſt, and evinced this authority by the actual exerciſe of miraculous powers: and beſides, the ſacred writings bear many obvious internal marks of their divine original, in the excellence of their doctrines, the ſpirituality and elevation of their deſign, the majeſty and ſimplicity of their ſtyle, the agreement of their various parts, and their efficacy on mankind; to which may be added, that there has been in the Chriſtian church, from its earlieſt ages, a conſtant tradition, that the ſacred books were written by the extraordinary aſſiſtance of the ſpirit, which muſt at leaſt amount to ſuperintendent *inſpiration*. But it has been controverted whether this *inſpiration* extended to every minute circumſtance in their writings, ſo as to be in the moſt abſolute ſenſe plenary. Jerom, Grotius, Eraſmus, Epiſcopius, and many others, maintain that it was not; whilſt others contend, that the emphatical manner in which our Lord ſpeaks of the agency of the ſpirit upon them, and in which they themſelves ſpeak of their own writings, will juſtify our believing that their *inſpiration* was plenary, unleſs there be very convincing evidence brought on the other ſide to prove that it was not: and if we allow, it is ſaid, that there were ſome errors in the New Teſtament, as it came from the hands of the apoſtles, there may be great danger of ſubverting the main purpoſe and deſign of it; ſince there will be endleſs room to debate the importance both of facts and doctrines.

Among the Heathens, the prieſts and prieſteſſes were ſaid to be divinely *inſpired*, when they gave oracles.

The poets, alſo, laid claim to it; and, to this end, they always invoked Apollo and the Muſes, at the beginning of any great work.

Inspiration, in *Phyſic*, is underſtood of that action of the breaſt, by which the air is admitted into the lungs.

In which ſenſe, *inſpiration* is a branch of reſpiration; and ſtands oppoſed to *expiration*.

This admiſſion of the air depends immediately on its ſpring, or elaſticity, at the time when the cavity of the breaſt is enlarged by the elevation of the thorax and abdomen, and particularly by the motion of the diaphragm downwards: ſo that the air does not enter the lungs, becauſe they are dilated; but thoſe dilate, becauſe the air enters within them. Nor is it the dilatation of the breaſt, which draws in the air, as is commonly thought; though this is a condition abſolutely neceſſary to *inſpiration*; but there is an actual intruſion of the air into the lungs.

INSPISSATING, in *Pharmacy*, an operation whereby a liquor is brought to a thicker conſiſtence, by evaporating the thinner parts.

Thus, juices, as that of liquorice, are *inſpiſſated*.

INSTALLMENT, a ſettling or inſtating, a perſon in a dignity.

The word is derived from the Latin *in*, and *ſtallum*, a term uſed for a ſeat in church, in the choir, or a ſeat or bench in a court of juſtice, &c. though Voſſius is of opinion, the word is of German origin.

Inſtallment is chiefly uſed for the induction of a dean, prebendary, or other eccleſiaſtical dignitary, into the poſſeſſion of his ſtall, or proper ſeat, in the cathedral church to which he belongs.

This is ſometimes alſo called *inſtallation*.

Inſtallment is likewiſe uſed for the ceremony, whereby the knights of the GARTER are placed in their rank, in the chapel of St. George, at Windſor; and on many other like occaſions.

INSTANT, ſuch a part of duration, wherein we perceive no ſucceſſion; or it is that which takes up the time of only one idea in our minds.

It is a maxim, in *Mechanics*, that no natural effect can be produced in an *inſtant*.—Hence may appear the reaſon, why a burthen ſeems lighter to a perſon, the faſter he carries it; and why, the faſter a perſon ſlides, or ſcates, on the ice, the leſs liable is the ice to break.

The ſchoolmen diſtinguiſh three kinds of *inſtants*; a *temporary*, a *natural*, and a *rational inſtant*.

Instant, *temporary*, is a part of time immediately preceding another: thus the laſt *inſtant* of a day, precedes immediately and really the firſt *inſtant* of the following day.

Instant, *natural*, is what we otherwiſe call a *priority of nature*, which obtains in things that are ſubordinated in acting: as, firſt and ſecond cauſes; or cauſes and their effects: for the nature of things requires, that if there be a ſecond cauſe, there muſt be a firſt; and that there muſt be a cauſe, if there be an effect.

Instant, *rational*, is not any real *inſtant*, but a point which the underſtanding conceives to have been before ſome other *inſtant*, founded on the nature of the things which occaſions it to be conceived. For inſtance; as God has made ſeveral things voluntarily, which he could otherwiſe have let alone; there is a reaſonable foundation to conceive God, ſuch as he is in himſelf, before he had made any of thoſe voluntary determinations: but as there was no real *inſtant* when God had not formed any determination, this *inſtant* is called a *rational inſtant*, by way of oppoſition to an *inſtant* of time.

INSTANTANEOUS *action*. See Action.

INSTAURATION, the re-eſtabliſhment, or reſtauration, of a religion, a church, or the like, to its former ſtate.

The word is by ſome derived from the old Latin, *inſtaurum*, which ſignified the ſtock of things neceſſary for the tilling and managing of grounds; as cattle, tools, harneſs, &c. The word *inſtaurum* is only of the middle age; but *inſtauratio* is of much greater antiquity, and by ſome is derived from *inſtar, like*; as importing a thing's being brought to its former likeneſs, or appearance.

INSTEP, in the *Manege*, is that part of the hinder leg of a horſe, that correſponds to the ſhank in the fore-leg, extending from the ham to the paſtern joint.

INSTINCT, a natural diſpoſition, or ſagacity, wherewith animals are endued; and by virtue whereof they are enabled to provide for themſelves, and know what is good for them, and are determined to preſerve and propagate their ſpecies.

Inſtinct in brutes, bears ſome analogy to reaſon in men.

There have been many ſyſtems adopted to explain the principles which produce and direct the ſpontaneous actions of brute animals.

Many of the ancient philoſophers aſcribed to brutes an underſtanding, differing only in degree from that of man, and attributed their inferiority to the want of proper and ſufficient bodily organs. This ſyſtem has been lately very ſtrenuouſly ſupported by M. Helvetius, de l'Eſprit, tom. i. p. 2. &c. Among the moderns, the learned Cudworth endeavoured to explain the *inſtinct* of animals, by means of a certain PLASTIC *nature*. Des Cartes thought that all the actions of brute animals might be explained by the ſimple laws of mechaniſm, and conſiders them as machines totally devoid of life and ſentiment, but ſo curiouſly conſtructed by the Creator, that the mere impreſſions of light, ſound, and other external agents, on their organs, produced a ſeries of motions in them, and cauſed them to execute thoſe various operations, which had before been aſcribed to an internal principle of life and ſpontaneity. But the actions and manners of animals, which are totally incompatible with the mere principles and laws of mechaniſm, evince the abſurdity of this opinion. M. Buffon adopts the opinion of Des Cartes in part, but grants them life, and the faculty of diſtinguiſhing between pleaſure and pain, together with a ſtrong inclination to the former, and averſion from the latter. By theſe inclinations and averſions he undertakes to account for all, even the moſt ſtriking operations of animals; affirming, that, in conſequence of impreſſions made on the brain, by means of the ſenſitive organs, and by the re-action of the brain and nerves on the muſcles, theſe machines acquire a motion conformable to the nature of the animal, and of the impreſſions of the different objects which act upon their organs, and excite deſire or averſion. See Brutes.

The *pre-eſtabliſhed* HARMONY of Leibnitz has alſo been applied to explain the actions of brute animals. Others have conſidered the actions of animals as produced by the conſtant and immediate influence of the divine energy, directing all their inclinations and motions: ſuch appears to have been the opinion, however unphiloſophical it muſt appear, of Mr. Addiſon, in the ſecond volume of the Spectator. The late ingenious Hermann Samuel Reimar, profeſſor of philoſophy at Hamburgh, has enumerated and expoſed theſe and other opinions, with regard to the *inſtinct* of animals, in his Obſervations Phyſiques, &c. publiſhed in two vols. 12mo. at Amſterdam and Paris, 1770: and, defining *inſtinct*, in the moſt comprehenſive ſenſe of the word, to be every natural inclination, accompanied with a power, in animals, to perform certain actions, divides *inſtincts* into three heads. The firſt, which he calls *mechanical inſtincts*, belong to the body, conſidered as an organized ſubſtance, and are exerciſed blindly and independently of the will of the animal. Such are thoſe which produce the motion of the heart and lungs, the contraction and dilatation of the pupil, digeſtion, &c. This claſs of *inſtincts* is poſſeſſed in common both by men and brutes, and in ſome meaſure even by vegetables. The ſecond claſs comprehends thoſe which he terms *repreſentative inſtincts*, which conſiſt partly in the power of perceiving external objects by their preſent impreſſion on the ſenſes, and partly in the faculty of rendering the ideas of theſe objects preſent to the mind by the powers of imagination, or of memory, in a lax ſenſe of the word. Theſe are common to men and other animals, excepting that brutes poſſeſs only the faculty of imagination in common with us, and not that of memory, in the ſtrict and proper ſenſe of the word. Indeed this author endeavours to prove, that the knowlege of brutes does not merely differ in degree from that of man, but that it is of a kind entirely different from it; and that they are incapable both of memory and reaſoning: the faculty of imagination ſerving to give them a confuſed idea of events that are paſt, by the view, or other impreſſions of objects that are preſent. The third and principal claſs of *inſtincts* is that which comprehends all thoſe which M. Reimar calls *ſpontaneous*. This ſpecies of *inſtinct* is not attended with any power of reflection, determining the animal to decide freely between two different modes of action preſent to his imagination; nor is it merely corporeal or mechanical. It is put into action by the natural and primitive principle of ſelf-love, implanted in all animated beings; or by a love of pleaſure and averſion to pain, producing a voluntary inclination to perform certain actions which tend to their well-being and preſervation. To the performance of theſe actions they are particularly prompted by their preſent ſenſations, by imagination ſupplying the place of memory, and by other cauſes. The wonderful effects produced by theſe inſtinctive appetites, are farther to be attributed to the exquiſite mechaniſm in their bodily conformation, particularly in the ſtructure of the various organs with which they execute their operations, and to the ſuperior perfection and acuteneſs of their external ſenſes, by which they are quickly and diſtinctly informed of thoſe qualities of objects which moſt materially concern them. In order to account for the more curious and ſurpriſing operations of brute animals, M. Reimar adds two other principles, viz. 1ſt. an internal diſtinct perception of the preciſe power and proper uſe of their various bodily organs, together with an innate knowlege of the qualities of thoſe objects around them in which they are intereſted; and, 2dly, certain innate and determinate powers and inclinations, impreſſed by the Author of Nature, *à priori*, on the ſoul itſelf; by which they are arbitrarily, and without their own knowlege or conſciouſneſs, directed and irreſiſtibly impelled to the performance of theſe various operations which they execute with ſuch unremitting induſtry and art. Theſe determinate forces, which conſtitute the principal part of M. Reimar's ſyſtem, are no where ſo viſible and diſtinguiſhable as in that numerous ſet of *inſtincts* which he claſſes under the title of the *induſtrious inſtincts* of animals. For a farther account of this ſyſtem we muſt refer to the work itſelf, or to an abſtract of it, with ſeveral of the author's illuſtrations, in the Monthly Review, vol. xlv. p. 533, &c.

INSTITA, a word uſed by the chirurgical writers, for a fillet or other bandage of that kind; and by medicinal writers, for that ſort of flat worms bred in the inteſtines, called by many the tape-worm, or flat worm.

INSTITUTES, INSTITUTA, in the *Civil Law*, a book, containing the elements, or principles of the Roman law; and which conſtitutes the laſt part of the *corpus juris civilis*.

The *Inſtitutes* are a compendium, or ſummary of the whole body of civil law, in four books, compoſed by Tribonianus, Theophilus, and Dorotheus, by order of the emperor Juſtinian, for the uſe of young ſtudents; who, having the firſt elements of the whole profeſſion in this little treatiſe, might the ſooner gain a competent knowlege of it, without being diſcouraged by the bulk of the other books. See CIVIL *Law*.

INSTITUTES likewiſe denote a ſyſtem of laws or rules, in any ſcience.

INSTITUTION, in a general ſenſe, the act of ordaining, founding, or eſtabliſhing, any thing.

Thus we ſay Moſes *inſtituted* the ceremonies of the old law; Jeſus Chriſt *inſtituted* the ſacraments of the new.

INSTITUTION, in the *Canon* and *Common Law*, is the act of the biſhop, or of one commiſſioned by him, whereby a clerk is inveſted with the ſpiritualities of a rectory, or vicarage. See PRESENTATION.

The clerk kneels down before the biſhop, whilſt he pronounces theſe words of *inſtitution (Inſtituo te rectorem eccleſiæ de* A. B. *cum cura animarum, & accipe curam tuam & meam)*; and the clerk holds the written inſtrument, with the epiſcopal ſeal annexed, in his hand, during the ceremony.

Before the clerk is inſtituted, he muſt ſubſcribe the thirty-nine articles of religion, in the preſence of the ordinary, or his ſubſtitute; and this ſubſcription muſt be without reſerve, exception, or qualification; elſe his *inſtitution* is, *ipſo facto*, void and null, and the church ſtill vacant. 13. Eliz. c. 12.—At the ſame time the ordinary requires the clerk to ſubſcribe the other two articles mentioned in the 36th canon about the king's ſupremacy, and the lawfulneſs and uſe of the liturgy: the clerk muſt alſo, before *inſtitution*, ſubſcribe to that part of the declaration enjoined by the act of uniformity, 14 Car II. c. 24 viz. *I will conform to the Liturgy of England, as by law eſtabliſhed.*—Before *inſtitution*, he muſt alſo take the oaths mentioned in the firſt ſtatute of William and Mary, c. 8. inſtead of the former oaths of allegiance and ſupremacy, required by ſtat. 1 Eliz. and then he muſt take the oath againſt ſimony, enjoined by the 40th canon, and the oath of canonical obedience; and if it is a vicarage, the oath of perſonal reſidence: and he is to have certificates given him of his ſubſcribing the declaration contained in the act of uniformity, in Engliſh, in a diſtinct inſtrument, under the hand and ſeal of the biſhop; and of his other ſubſcriptions and oaths, in Latin.

The clerk ought by all means to have witneſſes of his *inſtitution*, his taking the oaths, making ſubſcriptions, &c. and therefore he ſhould deſire ſome preſent to write their names on the back of his inſtruments, and make memorandums who they are, and where they live.

The church, by *inſtitution*, is full againſt all perſons but the king; and the clerk by it may enter upon the glebe, and take the tythes; but he cannot let or grant them, nor ſue for them, if they be refuſed to be paid, till he be inducted.

After *inſtitution*, the clerk is to receive a written mandate from the ordinary to the archdeacon, or other proper perſon, in order to his induction; without which he has not a full right to his temporalities, unleſs the benefice be a donative. See INDUCTION.

INSTITUTIONS, in *Literary Matters*, denote a ſyſtem of the elements, or rules, of any art or ſcience. Such are *inſtitutions* of medicine, *inſtitutions* of rhetoric, &c.

INSTITUTORES, in *Botany*, that ſet of authors in this ſcience who have laid down certain ſettled rules, axioms, and inſtitutions in it.

INSTRUCTIVE *column*. See COLUMN.

INSTRUMENT denotes a thing which is ſubſervient to a CAUSE for producing its EFFECT.

A common caſe of mathematical *inſtruments* contains ſeveral compaſſes, a ſector, ſcale, drawing pen, and protractor. A caſe of ſurgeon's *inſtruments* for the pocket contains different ſized lancets, ſciſſars of ſeveral kinds, plain and toothed forceps, ſtrait and crooked inciſion-knives, a ſpatula, probes, needles, &c. Aſtronomical *inſtruments*, are the TELESCOPE, QUADRANT, &c. Chemical *inſtruments*, ſee LABORATORY.

INSTRUMENTS *of ſacrifice*, in the *Antique Architecture*, are ornaments, as vaſes, pateræ, candleſticks, knives, &c. wherewith the victims were killed, &c. inſtances of which we ſee in a Corinthian frieze in the remains of a temple behind the Capitol at Rome, &c.

INSTRUMENT is alſo uſed, in *Law*, to ſignify ſome public ACT, or authentic DEED, by means whereof any truth is made apparent, or any right or title eſtabliſhed, in a court of juſtice.

INSTRUMENT, *wind*. See WIND.

INSTRUMENTAL *arithmetic*. See ARITHMETIC.

INSTRUMENTAL *cauſe*. See CAUSE.

INSTRUMENTUM *ſynodale*. See SYNODALE.

INSUFFLATIO, a term uſed by ſome writers in medicine, to expreſs the blowing into any part, in order to convey the fumes of medicines into it.

INSULATE, or INSULATED, a term applied to a column, or other edifice, which ſtands alone, or free and detached from any contiguous wall, &c. like an iſland in the ſea; whence the denomination is apparently derived.

INSULATED, in *Electricity*, is a term applied to bodies that are ſupported by ELECTRICS or NON-CONDUCTORS; ſo that their communication with the earth, by conducting ſubſtances, is interrupted.

INSULT, in *Law*. See ASSAULT.

INSULT, a military term uſed for the attack of any poſt with open force; without the apparatus of trenches, ſaps, or any regular approaches. See ASSAULT.

INSULTUS, a word uſed by the writers in medicine, to ſignify the acceſs of the paroxyſm in intermittent diſeaſes; or, ſometimes the firſt invaſion of a diſeaſe.

INSUPER, a word uſed by the auditors of the Exchequer. In their accompts they ſay, ſo much remains *inſuper* to ſuch an accomptant; that is, ſo much remains due on his accompt.

INSURANCE, or ASSURANCE, in *Law* and *Commerce*, a contract or agreement whereby one or more perſons, called inſurers, &c. oblige themſelves to anſwer for the loſs of a ſhip, houſe, goods, &c. ſpecified in the policy of *aſſurance* ſubſcribed by them, in conſideration of a premium, of a ſtipulated ſum per cent. paid by the proprietors of the things inſured.

Suetonius conjectures, that the emperor Claudius was the firſt contriver of *inſurances* on ſhips and merchandize. The firſt inſtance recorded in more modern hiſtory of this practice, is in the year 1560, on occaſion of the vaſt woollen commerce between England and the Netherlands, though it was probably in uſe before this time, and is ſaid to have been introduced by the Jews in 1182: and it is treated of in the Sea-laws of Oleron, as early as the year 1194. The firſt Engliſh ſtatute relating to it is the 43d Eliz. c. 12. It is ſuppoſed to have been introduced into England, and ſoon after into Antwerp, by ſome Italian ſettlers from Lombardy. The merchants at this time met in a place, where Lombard-ſtreet now is, called the Pawn-houſe, or Lombard, where they iſſued policies of *inſurance*; to which the ſubſequent practice referred.

Inſurances are of various kinds, as on ſhips or parts of ſhips, on merchandize ſingly, and on ſhips and goods jointly: and theſe are again branched out to run either for a time ſtipulated, or to one ſingle port, or out and home, with liberty to touch at the different places mentioned in the policy. *Inſurances* may likewiſe be made on goods ſent by land, or by hoys, &c. on rivers; and this is frequently done, more eſpecially on jewels, and other things of great value. They may likewiſe be made on ſhips and goods, loſt or not loſt, which is commonly done when a ſhip has been long miſſing; and thoſe words being inſerted in the policy, oblige the under-writers to pay, though the ſhip was loſt at the time of making ſuch *inſurance*, except the aſſured had then certain knowlege of the ſhip's being wrecked; in which caſe the ſubſcription ſhall not oblige, as this is accounted a mere fraud. So likewiſe if a perſon get more inſured than the ſhip is worth, with a villainous deſign to deſtroy her, this fraudulent act will not oblige the inſurers, but expoſe the proprietors to ſuffer death for their knavery. If a ſhip is inſured from the port of London to any foreign port, and before ſhe breaks ground is burnt, the inſurers are not liable; unleſs the words of the *inſurance* are, at and from the port of London; but if ſhe has once broke ground, and after being driven back, takes fire, the inſurers are anſwerable. An *inſurance* made on prohibited goods is not binding, unleſs they were not prohibited till after the *inſurance* was made. Where the policy expreſsly mentions that the ſhip is to depart with convoy, it is intended that ſhe ſhall, if poſſible, keep with the convoy during the voyage, and if ſhe depart wilfully from the convoy, it is a fraud; but if having departed with convoy, ſhe by ſtreſs of weather loſes the convoy, and is taken, the inſurers are liable. If there be thieves on board among themſelves, the maſter of the ſhip is to anſwer for that, and not the inſurers; for though the words of the policy inſure againſt loſſes by thieves, yet aſſailing thieves are only here intended. An *inſurance* made in a foreign country, may be ſued in England by the common law, if the inſurers come here. Where the policy is againſt reſtraint of princes, that does not extend to a navigation carried on againſt the law of nations, or where there ſhall be a ſeizure for not paying of cuſtoms, or the like. If goods be inſured as the goods of an ally, when they are the goods of an enemy, it is a fraud, and the *inſurance* not good. If a man pays money on a policy of *inſurance*, ſuppoſing a loſs where there was none, this ſhall be money received for the uſe of the inſurer, for which he may maintain an action. Damages happening to goods in their own nature periſhable, are not to be borne by the inſurer. A ſuppreſſion of the truth, or a falſe allegation, is ſufficient to diſcharge the policy; for it is a general rule, that the inſured ought to inform the inſurer of all material circumſtances that were come to his knowlege at the time of making the policy, in order that the contract may be fairly adjuſted; which being a contract upon chance, cannot be done, if one party knows more than the other; for equality in contracts, by the law-merchant, is eſſential; but a proof of an intention to make a deviation, will not avoid the policy before the deviation is actually made.

By an act made in 19 Geo. II. c. 37. it is determined, that after the firſt day of Auguſt, 1746, no aſſurance ſhall be made on ſhips or lading by way of gaming or wagering, or without benefit of ſalvage to the inſurer: that it ſhall not be lawful to make re-aſſurance, unleſs the aſſurer ſhall become inſolvent, become a bankrupt, or die; in which caſes ſuch aſſurer, or his executors, &c. may make re-aſſurance to the amount of the ſum before aſſured, provided it be expreſſed in the policy to be a re-aſſurance. That all ſums of money lent on bottomry or at reſpondentia, upon any ſhips belonging to his majeſty's ſubjects, bound to or from the Eaſt Indies, ſhall be lent only on the ſhip or merchandize, laden, or to be laden, on board ſuch ſhip, and ſhall be ſo expreſſed in the condition of the bond; and the benefit of ſalvage ſhall be allowed to the lender, his agent or aſſigns, who alone ſhall have a right to make aſſurance on the money ſo lent; and no borrower of money on bottomry, &c. ſhall recover more on any aſſurance, than the value of his intereſt in the ſhip or merchandize, excluſively of the money ſo borrowed; and in caſe it ſhall appear, that the value of his ſhare in the ſhip and merchandize does not amount to the full ſum borrowed, ſuch borrower ſhall be reſponſible to the lender for ſo much of the money borrowed, as he hath not laid out on the ſhip or merchandize, with lawful intereſt for the ſame, together with the inſurance and all other charges, to the proportion which the money not laid out ſhall bear to the whole money lent, notwithſtanding the ſhip and merchandize be totally loſt.

Whenever advice is received of the loſs of a ſhip or goods inſured, application is to be made to the inſurers, and the vouchers produced; and if they are ſatisfied they will pay the money: but if they have cauſe to ſcruple the doing it, the inſured muſt ſtay till the inſurers can obtain a more ſatisfactory account; but if nothing be heard of the ſhip in any reaſonable time, the inſurers will be obliged to pay the money agreed upon.

The policies made of *inſurances* are to be ſtamped within three days after the ſhip is inſured, on the penalty of paying 100 l. The principal offices for the *inſurance* of ſhips and merchandize in London, are the Royal-exchange *Aſſurance*, and the London *Aſſurance*, both of which are eſtabliſhed by act of parliament, 6 Geo. I. c. 18. anno 1720. Theſe offices alſo inſure houſes and other buildings, goods, wares, and merchandize, from loſs or damage by fire; and they alſo inſure lives.

The Royal-exchange *Inſurance*, on a brick or ſtone building, inſures any ſum not exceeding 200 l. at 5 s. per ann. and any larger ſum not exceeding 1000 l. after the rate of 2 s. 6 d. per cent. per ann. Above 1000 l. and not exceeding 2000 l. at 3s. per cent. Above 2000 l. and not exceeding 3000 l. at 4 s. per cent. On goods and merchandize, the property of the aſſured, within any brick or ſtone building, or on the goods and building together, this office inſures any ſum not exceeding 300 l. for 7 s. 6 d. per ann. and larger ſums after the rates above mentioned: but timber or plaſter-buildings, or goods or merchandize therein pay 8 s. per ann. for 200 l. and after the rate of 4 s. per cent. for any greater ſum not exceeding 1000 l. and 5 s. per cent. for all *inſurances* above 1000 l. and not exceeding 2000 l. On a timber or plaſter building with goods and merchandize together, any ſum not exceeding 300 l. may be inſured for 12 s. per ann. and larger ſums at the above rates. The goods belonging to hazardous trades, as diſtillers, chemiſts, apothecaries, colour-men, tallow-chandlers, oil-men, innholders, &c. depoſited in brick houſes, pay 8 s. per ann. for inſuring 200 l. and after the rate of 4 s. per cent. for any greater ſum not exceeding 1000 l; and above 1000 l. and not exceeding 2000 l. 5 s. per cent. but when the houſes and goods are put together, the price of *inſurance* is 4 s. per cent. per ann. without any other charge except the policies.

The London *Inſurance* as the following annual premiums:

Sums aſſured.	Common inſurances.		Hazardous inſurances.		Double hazardous inſurances.	
Any ſum Not exceeding 200 l.	4 s. per annum.		6 s. per annum.		10 s. per annum.	
From 200 l. to 1000 l.	2 s. per cent.	per an.	3 s. per cent.	per an.	5 s. per cent.	per an.
From 1000 l. to 2000 l.	2 s. 6 d. per cent.		4 s. per cent.		7 s. 6 d. per cent.	
From 2000 l. to 3000 l.	4 s. per cent.		6 s. per cent.		7 s. 6 d. per cent.	

The Hand-in-hand office, erected in 1696, and enrolled in chancery in 1698, inſures for ſeven years at 10 s. depoſit, and 2 s. premium per cent. on brick and ſtone, and double that ſum for timber-houſes, the ſum not exceeding 1500 l. And for any ſum from 1500 l. to 2000 l. 4 s. per cent. on brick or ſtone, and double on timber-houſes, for any term of years not exceeding ſeven. But a ſum exceeding 2000 l. is not to be inſured on any building, without the approbation of a general court; and the office inſures only three fourths of the value of each houſe. To this office belong thirty firemen.

The Sun-fire-office, eſtabliſhed in 1710, beſides 7 s. 6 d. for the policy and mark, has the following annual premiums:

Sums inſured.	Common inſurances.		Hazardous inſurances.		Double hazardous inſurances.	
Any ſum Not exceeding 200 l.	4 s. per annum.		6 s. per annum.		10 s. per annum.	
From 200 l. to 1000 l.	2 s. per cent.	per an.	3 s. per cent.	per an.	5 s. per cent.	per an.
From 1000 l. to 2000 l.	2 s. 6 d per cent.		4 s. per cent.		7 s. 6 d. per cent.	
From 2000 l. to 3000 l.	3 s. 6 d. per cent.		5 s. per cent.		7 s. 6 d. per cent.	

The common *inſurances* comprehend all brick or ſtone buildings not occupied by hazardous trades or goods. The hazardous *inſurances* are on timber-buildings, and goods and merchandizes in them called hazardous. The double hazardous are thatched timber or plaſter buildings, wherein hazardous goods or trades are kept or carried on. The hazardous trades and goods are apothecaries, chemiſts, bakers, ſhip and tallow-chandlers, ſtable-keepers, inn-holders, and malt-houſes; hemp, flax, tallow, pitch, tar, turpentine, hay, ſtraw, fodder of all ſorts, and corn unthraſhed. To this office belong thirty fire-men, and twenty porters.

The Friendly Society *Inſurance*, or Union fire-office, erected in 1714, and enrolled in chancery in 1715, is formed on the ſame model as that of the Hand-in-hand fire-office, excepting that inſtead of houſes this office only inſures goods and merchandizes at the following rates:

Beſides the parliamentary ſtamp-duties, and the charge of policy and mark, which is 9 s. 6 d. for every 100 l. inſured on goods incloſed in brick or ſtone, 10 s. depoſit, and 2 s. premium; if half hazardous, as to ſituation and kind of goods, 15 s. depoſit, and 3 s. premium: if hazardous, 20 s. depoſit, and 4 s. premium: if hazardous and half hazardous, 25 s. depoſit, and 5 3. premium: if hazardous and hazardous, 30 s. depoſit, and 6 s. premium. For every 100 l. inſured on goods incloſed in part brick and part timber, 12 s. 6 d. depoſit, and 2 s. 6 d. premium: if half hazardous, 18 s. 9 d. depoſit, and 3 s. 9 d. premium: if hazardous, 25 s. depoſit, and 5 s. premium: if hazardous and half hazardous, 1 l. 11 s. 3 d. depoſit, and 6 s. 3 d. premium: if hazardous and hazardous, 1 l. 17 s. 6 d. depoſit, and 7 s. 6 d. premium. For every 100 l. inſured on goods incloſed in timber, 15 s. depoſit, and 3 s. premium: if half hazardous, 1 l. 2 s 6 d. depoſit, and 4 s. 6 d. premium: if hazardous, 30 s. depoſit, and 6 s. premium: if hazardous and half hazardous, 1 l. 17 s. 6 d. depoſit, and 7 s. 6 d. premium: if hazardous and hazardous, 2 l. 5 s. depoſit, and 9 s. premium. For every ſum from 1000 l. to 2000 l. the ſociety requires a double premium; and from 2000 l. to 3000 l. a treble premium, to be computed according to the above rates. In this ſociety every one of the aſſured is admitted to an equal ſhare of the profit or loſs in proportion to his *inſurance*. The ſociety has a demand on every member of 10 s per cent. and no more, in caſe of extraordinary loſſes and charges. The twenty-four directors employ as many porters as they think fit: their number is uſually twenty-four.

We have alſo *inſurances* for lives, in virtue of which, when the perſon inſured dies, a ſum of money becomes payable to the perſon on whoſe behalf the policy of *inſurance* was granted. The principal *inſurance* offices of this kind, are thoſe of the Amicable Society for a Perpetual *Aſſurance*, kept in Serjeant's inn, Fleet-ſtreet, London; and the Equitable *Aſſurance*-office, near Black-friars bridge. See ASSURANCE.

INTACTÆ, right lines to which curves do continually approach, and yet can never meet with them; more uſually called ASSYMPTOTES.

INTAGLIOS, precious ſtones, having the heads of great men, inſcriptions, and the like, engraven on them; ſuch as we frequently ſee ſet in rings, ſeals, &c.

IN-TAKER, a name anciently given to certain banditti, or free-booters, who inhabited part of the North of England, and made frequent incurſions into the very middle of Scotland; plundering the inhabitants wherever they came.

Thoſe who made the expeditions, were called *out-parters*; and thoſe who were left behind to receive the booty, *intakers*. 9 Hen. V. c. 7.

INTEGERS, in *Arithmetic*, denote whole numbers; in contradiſtinction to fractions.

Integers may be defined to be, numbers which refer to unity, as a whole to a part.

INTEGRAL, or INTEGRANT, is applied by the ſchoolmen to thoſe parts which are neceſſary to the integrity of a whole. In which ſenſe they ſtand contradiſtinguiſhed from *eſſential* parts.

Thus the arms, legs, &c. are *integral* parts; body and ſoul, eſſential parts of a man.

INTEGRAL *calculus*, in the *New Analyſis*, is the counter part to the differential calculus.

This laſt has been completely explained by the marquis De l'Hoſpital; but the other ſtill remains imperfect, having been yet but little cultivated.

The *integral calculus* of Leibnitz, and other foreigners, anſwers to what the Engliſh call *inverſe method of fluxions*. See FLUXIONS, and CALCULUS.

INTEGRANT *parts*, in *Philoſophy*, the ſimilar parts of a body, or parts of the ſame nature with the whole; as filings of iron are the *integrant* parts of iron, and have the ſame nature and properties with the bar they were filed off from. The chemiſts diſtinguiſh, in their reſolutions of bodies, between the dividing and reſolving them into *integrant* parts like theſe, and what they call conſtituent parts; that is, diſſimilar parts, or the principles of the bodies they work upon. Thus when crude mercury is diſſolved in aqua fortis, though held imperceptibly in the menſtruum; yet when that menſtruum is diluted with water, and a copper-plate is ſuſpended in it, the menſtruum leaves the mercury, to work upon the copper, and the mercury ſubſides unaltered and in its own natural form; the mercury therefore, in this operation, was only divided into its *integrant* parts, or ſmall parcels of the ſame nature and properties of the whole; but when artificial cinnabar is reſolved or divided into crude mercury and ſulphur, neither of theſe are of the ſame nature and properties with the cinnabar, and are not its *integrant* but its conſtituent parts. This therefore is the dividing a body into its conſtituent parts or principles.

INTEGRITY *of the action*. See ACTION.

INTEGRUM *folium*, among *Botaniſts*. See LEAF.

INTEGRUM, *in reſtitutio*. See RESTITUTION.

INTEGUMENTS, formed of *in*, and *tegumentum*, of *tego*, *I cover*, in *Anatomy*, denote the common coverings which inveſt the body; as the cuticula, cutis, and even the paniculus carnoſus, and tunica reticularis, if there be really any ſuch part.

INTEGUMENT is alſo extended to the particular membranes which inveſt certain parts of the body; as the coats or tunics of the eye.

INTELLECT, a term uſed among philoſophers, to ſignify that faculty of the ſoul uſually called the UNDERSTANDING.

The Peripatetics make two kinds of *intellect*; *active*, and *paſſive*. See IDEA.

INTELLECTUAL *thinking*. See THINKING.

INTELLIGIBLE, any thing capable of being underſtood, or conceived, by the mind.

Philoſophers have invented certain beings which are purely *intelligible*, and only ſubſiſt in the underſtanding: ſuch are the *entia rationis*, univerſal ideas, and other chimæras.

The *intelligible*, or intellectual world, is the idea of the world in the divine mind, frequently ſpoken of by Malebranche.

INTENDANT, one who has the conduct, inſpection, and management, of any thing.

This is a title frequent among the French: they have *intendants of the marine*, who are officers in the ſea ports, whoſe buſineſs is to take care the ordinances and regulations relating to ſea-affairs, be obſerved; *intendants of the finances*, who have the direction of the revenues; *intendants of provinces*, who are appointed by the king to take care of the adminiſtration of juſtice, policy, and finances, in the provinces; alſo, *intendants of buildings*, *of houſes*, &c.

INTENDMENT *of law*, the ſenſe, intention, or true meaning, of the law.

The judges ought to judge according to the common *intendment* of the law.

INTENDMENT *of crimes*: in caſes of treaſon, intention proved by circumſtances is puniſhable as if it were put in execution. So likewiſe, if a perſon enter the houſe in the night time, with intent to commit burglary, it is felony: and an aſſault on the high way, with an intent to commit burglary, is felony, and puniſhable with tranſportation, 23 Car. II. c. 1. 7 Geo. II. c. 21.

INTENSIONE, in *Law*, a writ which lies againſt him who enters after the death of the tenant in dower, or tenant for life, and holds out him in the reverſion, or remainder.

INTENSUM *diatonum*. See DIATONIC, and GENUS.

INTENT, in *Civil Law*, ſignifies to begin or commence an action, or proceſs.

INTENTION, or INTENSION, in *Medicine*, that judgment, or method, of cure, which a phyſician forms to himſelf from a due examination of the ſymptoms.

INTENTION, in *Phyſics*, the increaſe of the power, or energy, of any quality; as heat, cold, &c.

By which it ſtands oppoſed to REMISSION; which ſignifies its decreaſe, or diminution.

INTENTION, in *Metaphyſics*, denotes an exertion of the intellectual faculties with more than ordinary vigour; when the mind with earneſtneſs fixes its view on any idea, conſiders it on all ſides, and will not be called off by any ſolicitation.

The ſchoolmen alſo ſpeak of terms of firſt and ſecond *intention*.

A term of firſt INTENTION is that which ſignifies a thing; the primary deſign of men, in eſtabliſhing words, being to expreſs things, or the ideas they have of things.

A term of ſecond INTENTION is that which does not ſignify a thing, but another term, or ſign.

Thus, a tree, a man, &c. are terms of *firſt intention*; and the terms in rhetoric, grammar, &c. as figure, kind, &c. are terms of *ſecond intention*.

INTENTION, *intentio*, επιτασις, in the *Ancient Muſic*, was uſed to denote the paſſage of the voice from grave to acute.

INTENTIONAL *qualities*; ſee QUALITIES.

INTER *canem & lupum*, in *Law*, words uſed formerly in appeals, to ſignify that a crime was committed in the twilight, i. e. *inter diem & noctem*, &c. This part of a day has divers other denominations: thus, in ſome parts of England, they call it *mock-ſhadow*, corruptly *muck-ſhade*; and, in the north, *day light's gate*; others ſay, *betwixt hawk and buzzard*.

INTERCALARY *day*, denotes the odd day inſerted in the leap-year. See BISSEXTILE.

The word is derived from the Latin *intercalaris*, of *calo*, *calare*, which anciently ſignified, *to call with a loud voice*: an *intercalary* day, among the Romans, ſignifying a day inſerted between two other days; which, for that reaſon, was proclaimed by the prieſts with a loud voice.

INTERCALATION; ſee INTERPOLATION.

INTERCAPSULARIA, in *Anatomy*, a name given by ſome writers to the cavities between the ſcapulæ and the vertebræ.

INTERCEPTED *axis*, in *Conic Sections*, is the ſame with what is otherwiſe called the *abſciſſa*.

INTERCESSION, *interceſſio*, was uſed in *ancient Rome*, for the act of a tribune of the people, or other magiſtrate, by which he inhibited the acts of other magiſtrates; or even, in caſe of the tribunes, the decrees of the ſenate. *Veto* was the ſolemn word uſed by the tribunes when they inhibited any decree of the ſenate, or law propoſed to the people. The general law of theſe *interceſſions* was, that any magiſtrate might inhibit the acts of his equal, or inferior; but the tribunes had the ſole prerogative of controlling the acts of every other magiſtrate, yet could not be controuled themſelves by any.

INTERCESSOR, from *inter* and *cedo*, *I go between*; a perſon who prays, expoſtulates, or *intercedes*, in behalf of another.

In the Roman law, *interceſſor* was the name of an officer, whom the governors of provinces appointed principally to raiſe taxes, and other duties.

INTERCESSOR is alſo a term heretofore applied to ſuch biſhops as, during the vacancy of a ſee, adminiſtered the biſhoprick, till a ſucceſſor to the deceaſed biſhop had been elected. See BISHOP.

The third council of Carthage calls theſe *interventors*.

INTERCIDENT *pulſe*, a term uſed by medical writers to expreſs a ſort of pulſe, in which between two regular ſtrokes there is perceived a third irregular.

INTERCOLUMNIATION, or INTERCOLUMNATION, in *Architecture*, ſignifies the ſpace between two columns. See the plan of *fig.* 40, in *Tab. Architecture*.

Vitruvius calls it *intercolumnium*; which, according to that author, is of five kinds; viz. *picnoſtyle*, A, one diameter and a half; *ſiſtyle*, B, two diameters; *euſtyle*, C, two and a quarter diameters, which is the moſt graceful; *diaſtyle*, D, three diameters; and *aræoſtyle*, E, four diameters; which ſee explained under their proper heads: PICNOSTYLE, &c. The *intercolumniation* or ſpace between the columns to the arcade F, is ſeven and a half diameters; and the *intercolumniation* wherein there is a ſpace, G, of only one half a diameter, is called coupling columns, an invention aſcribed to the moderns.

From a medium, ſome authors have laid down the following proportions: in the Tuſcan order, the *intercolumniation* is to be four diameters of the body of the column below; in the Doric, three; in the Ionic, two; in the Corinthian, two one quarter; and in the Compoſite one and a half.

INTERCOMMONING is when the commons of two manors lie together, and the inhabitants of both have, time out of mind, cauſed their cattle to feed promiſcuouſly in each.

INTERCOSTAL, in *Anatomy*, ſignifies any thing between the coſtæ, or ribs.

INTERCOSTAL *arteries*, are of two ſorts; the *upper*, which commonly comes from the lower ſide of the ſubclavian, and diſtributes itſelf within the four ſpaces of the upper ribs, ſending off under each rib a branch, which runs along the lower edge, and ſupplies the *intercoſtal* muſcles, and neighbouring parts of the pleura: ſometimes this artery comes from the cervicalis, and ſometimes from the aorta deſcendens, either by ſmall ſeparate arteries, or by a common trunk, which divides as it runs obliquely up upon the ribs: ſometimes it ariſes from the neareſt bronchialis, or from ſeveral bronchiales together: the *under*, are commonly ſeven or eight on each ſide, and ſometimes ten, and ariſe along the back ſide of the deſcending aorta in pairs, all the way to the diaphragm, and run tranſverſly, towards each ſide, on the bodies of the vertebræ. Thoſe on the right ſide paſs behind the vena azygos, and afterward they all run to the intercoſtal muſcles, along the lower edge of the ribs, all the way to the ſternum, or near it. They ſend branches to the pleura, the vertebral muſcles, and thoſe muſcles which lie on the outſide of the ribs, and to the upper portions of the muſcles of the abdomen; and they communicate with the epigaſtric and lumbar arteries.

INTERCOSTAL *muſcles*, are either external or internal; and are forty-four in number, one of each ſort being between every two ribs.

They ariſe from the lower edges of each ſuperior rib, and are inſerted into the upper edges of each inferior rib. Their fibres croſs one another; thoſe of the external run obliquely from the back part forwards; but thoſe of the internal from the fore-part backwards; they are thin and fleſhy.—See *Tab. Anat. (Myol.) fig.* 1. *n.* 43. *fig.* 2. *n.* 27.

Theſe muſcles are ſo many thin fleſhy plates, two between every two ribs, an external and an internal, cloſely joined together with only a thin cellular web between them. The fibres of the external *intercoſtals* are very oblique near the vertebræ; but this obliquity decreaſes inſenſibly as they approach the anterior extremities of the ribs. Their inſertions begin at the ligaments, by which the ribs are faſtened to the tranſverſe apophyſes. They are a little tendinous, and run a ſmall ſpace beyond the edge, on the outſide of each rib. The fibres of the internal *intercoſtals* are in general ſhorter and leſs oblique than the former; they fill almoſt entirely the interſtices between the cartilaginous portions, and they are covered on the outſide by a ligamentary membrane, the fibres of which running in an oppoſite direction to thoſe of the muſcles, have been miſtaken for continuations of the external *intercoſtals*, over which this membrane is alſo ſpread, only a little diminiſhed in thickneſs.

Any portion of the breaſt of an animal may be boiled ſo much that the fleſh eaſily parting from the bones, the ribs may be drawn out, without diſordering either the muſcles or the membranes; but we are not for this reaſon to conclude, that all the *intercoſtals* on one ſide of the breaſt make but one muſcle; becauſe the ſame reaſoning might prove, that all the muſcles which immediately ſurround the os femoris are but one; ſince by a like experiment, they together with the perioſteum may be entirely ſeparated from the bone, without breaking their fibres. Winſlow's Anatomy, p. 231. For the uſe of theſe in reſpiration, ſee RESPIRATION.

INTERCOSTAL *nerves*, are two nerves ſo called, becauſe in deſcending they paſs near the roots of the ribs.—They are formed in the brain, by three branches of nerves, two whereof come from the ſixth pair, and the third from the fifth. The *intercoſtal* nerves have a great communication with thoſe of the eighth pair, and ſend ſeveral branches to the breaſt and lower belly.

Dr. Walther has given a very minute deſcription of the *intercoſtal nerves*, and eighth pair. See Nov. Act. Erud. Lipſ. 1734. Feb. & ibid. 1736. Sept.

INTERCOSTAL *vein*, is a vein which ariſes from the four ſpaces between the upper ribs, and terminates in the ſubclavian. See *Tab. Anat. (Angeiol.) fig.* 1. *n.* 31. *fig.* 6. *lit. f.* See AZYGOS.

INTERCUS, a word uſed by ſome medical writers, to expreſs that ſort of DROPSY more uſually called an ANASARCA.

INTERDICT, a cenſure inflicted by a pope, or biſhop, ſuſpending the prieſts from their functions, and depriving the people of the uſe of ſacraments, divine ſervice, and Chriſtian burial.

In common law, *interdict* is alſo uſed in the ſame ſenſe as in the canon law; where it is defined to be, *cenſura eccleſiaſtica prohibens adminiſtrationem divinorum*.

INTERDICT is moſt properly underſtood of a general excommunication of a country, or city, as appears by the Decretals. See EXCOMMUNICATION.

There is a *local*, and a *perſonal interdict*: where theſe two are joined, the *interdict* is ſaid to be *mixed*.

This puniſhment, as well as general excommunications, were but little known till the time of pope Gregory VII. In the year 1169, pope Alexander III. put all England under an *interdict*, forbidding the clergy to perform any part of divine ſervice, except the baptizing of infants, taking confeſſion, and giving abſolution to dying penitents.

In excommunicating a prince, all his adherents, that is, his ſubjects who retain their allegiance, are excommunicated, and the whole country is put under an *interdict*.

In the reign of king John, the kingdom of England lay under a papal *interdict* for above ſix years together: it began A. D. 1208.

In imitation of the popes, the biſhops alſo ſoon began to *interdict*; and it became a common thing for a city, or town, to be excommunicated for the ſake of a ſingle perfon whom they undertook to ſhelter: but this ſeverity was found to have ſuch ill effects, that they have been obliged to moderate it.

An *interdict* is denounced, and taken off again, with the ſame formalities as an excommunication.

INTERDICTS, in the *Roman Law*, certain formulæ of words, by which the prætor, when the poſſeſſion of any thing was conteſted between many, ordered or forbid ſomething to be done with it, till the right or property ſhould be legally determined.

Which formulæ were called *interdicts*, becauſe they related to the poſſeſſion of the thing in the interim, or till the right was aſcertained.

They had three kinds of *interdicts: prohibitory, reſtitutory*, and *exhibitory*.

INTERDICTS, *prohibitory*, were thoſe by which the judges forbad any one to vex another in the poſſeſſion of any thing legally belonging to him.

Reſtitutory were thoſe by which the judges appointed any one, who had been expelled out of his eſtate, to be repoſſeſſed, before his right was legally aſcertained; and this was the ſame with what they called the *reintegrant*.

Exhibitory were thoſe by which any thing in diſpute was ordered to be exhibited: as a teſtament, &c.

There was alſo a ſecond diviſion of *interdicts*; viz. into *adipiſcendæ, retinendæ*, and *recuperandæ*: the firſt tending to the acquiring a new poſſeſſion, as the *interdict quorum bonorum*, &c. the ſecond to the keeping an old one till it was farther determined, as the *uti poſſidetis*, &c. the laſt to the recovering one loſt, as *unde vi*, &c.

INTERDICTION *of water and fire*, a ſentence anciently pronounced againſt ſuch as, for ſome crime, were to be baniſhed.

They were not directly adjudged to baniſhment; but by giving order, that nobody ſhould receive them, but deny them *fire and water*, they were condemned, as it were, to a civil death: and this they called *legitimum exilium*. Livy. See EXILE.

INTEREST, a ſum of money, reckoned for the loan and forbearance of ſome other ſum, lent for, or due at, a certain time, according to ſome certain rate.

In reſpect hereof, the ſum lent, or forborn, is called the *principal*, becauſe it is the ſum that procreates the *intereſt*, or from which the *intereſt* is reckoned.

As to the rate of legal *intereſt* in this country, it has varied and decreaſed for 200 years paſt, according as the quantity of ſpecie in the kingdom has increaſed by acceſſions of trade, the introduction of paper credit, and other circumſtances. The ſtat. 37, Hen. VIII. c. 9. confined *intereſt* to 10 *per cent.* and ſo did the ſtat. 13 Eliz. c. 8. But as through the encouragement given in her reign to commerce, the nation grew more wealthy, ſo under her ſucceſſor, the ſtat. 21 Jac. I. c. 17. reduced it to 8 *per cent.* as did the ſtat. 12 Car. II. c. 13 to 6; and, laſtly by the ſtat. 12 Ann. ſt. 2. c. 16. it was brought down to 5 *per cent.* yearly, which is now the extremity of legal *intereſt* that can be taken. But yet, if a contract which carries *intereſt*, be made in a foreign country, our courts will direct the payment of *intereſt* according to the law of that country in which the contract was made. Thus Iriſh, American, Turkiſh and Indian *intereſt* have been allowed to the amount of even 12 *per cent.* Blackſtone's Com. b. ii. p. 463.

Intereſt is either *ſimple*, or *compound*.

INTEREST, *ſimple*, is that counted from the principal only. Let p repreſent the principal, n the number of years or parts of a year, r the rate of 1*l.* *per annum*, and m the amount of the principal p for the time n at the rate r; and ſince the amount of 1*l.* for one year is $1+r$, the amount of 1*l.* for n years, muſt be $1+nr$; the *intereſt* of the principal p at the rate r in n years muſt be pnr; and $1l. : 1+nr :: p : p+pnr = m$ the amount: from this general theorem we can eaſily deduce problems for reſolving all the caſes that occur in ſimple *intereſt*.

Prob. I. Having any principal ſum, and time, and rate of *intereſt* given, to find the amount: as $m = p+pnr = p\times\overline{1+nr}$; we ſhall have this rule: to the product of the rate of 1*l.* *per annum* by the number of years add unit, and multiply the ſum by the given principal. E. g. what ſum will 567 *l.* 10 *s.* amount to in nine years at 5 *per cent. per annum.* Here $p = 567.5$, $n = 9$, and $r = .05$; becauſe $100 : 5 :: 1 : .05$: therefore $m = p\times\overline{1+nr} = 567.5\times\overline{1+.45} = 822.875 =$ 822*l.* 17*s.* 6*d.* Or if it were required to find the amount of one penny at 5 *per cent.* Simple intereſt in 1780 years; $p = 1d.$ $n = 1780$ and $r = .05$, therefore $m = 1\times\overline{1+89} = 90 =$ 7*s.* 6*d.*

If the time given does not conſiſt of whole years, it may be eaſily reduced to decimal parts of a year.

Prob. II. Having the amount of any principal at a given rate in a given time to find the principal; it appears, from the theorem, $m = p\times\overline{1+nr}$, that $p = \frac{m}{1+nr}$ i. e. divide the amount by the product of the time and rate of 1*l.* *per annum*, with unit added to it. E. g. what principal will amount to 822*l.* 17*s.* 6*d.* in nine years at 5 *per cent. per annum*: here $m =$ 822*l.* 17*s.* 6*d.* or 822,875, and n, r as before: therefore $\frac{m}{1+nr} = \frac{822,875}{1+,45} = 567.5$ or 567*l.* 10*s.*

Prob. III. Having the amount of a given principal at a given rate, to find the number of years. From the theorem we eaſily deduce, by tranſpoſition and diviſion, $n = \frac{m-p}{pr}$ viz. ſubtract the principal from the amount and divide the remainder by the product of the principal and rate. E. g. in what time will 567*l.* 10*s.* amount to 822*l.* 17*s.* 6*d.* at 5 *per cent. per annum*? $n = \frac{m-p}{pr} = \frac{822.875-567.5}{28.375} = \frac{255.375}{28.375} = 9.$

Prob. IV. Having the amount of a given principal in a given time to find the rate, and conſequently the *intereſt per cent.* From the theorem we eaſily derive $r = \frac{m-p}{pn}$, i. e. ſubtract the principal from the amount, and divide by the product of the principal into the number of years; e. g. at what rate *per cent.* will 567*l.* 10*s.* amount to 822*l.* 17*s.* 6*d.* in nine years? Here $\frac{m-p}{pn} = \frac{822.875-567.5}{5107.5} = \frac{255.375}{5107.5} = .05$: and, therefore, the *intereſt* is 5 *per cent.*

Prob. V. The annual *intereſt* of any principal p at the rate r, is pr; *i. e.* multiply the principal by the rate: e. g. the *intereſt* of 75*l.* for one year at 3 *per cent.* is $75\times.03 = 2.25 =$ 2*l.* 5*s.* The *intereſt* of 157*l.* 17*s.* 6*d.* at 5 *per cent.* is 157.875 (reducing the 17*s.* 6*d.* to DECIMALS of a pound) $\times.05 = 7.89375 =$ 7l. 17*s.* 10*d.* $\frac{1}{2}$. The *intereſt* of any principal p at the rate r for n years, is prn; obtained by multiplying the principal, rate, and number of years.

The daily *intereſt* is found by dividing the annual *intereſt* by 365; thus .05, being the *intereſt* of one pound for one year at 5 *per cent.* divided by 365, the quotient will be .0001369, &c. which is the *intereſt* of one pound for one day, at the ſame rate. And $\frac{.03}{365} = .0000821$ is the *intereſt* of one pound for one day, at 3 *per cent per annum.* The *intereſt* for one day, at any rate, being thus found, that *intereſt* multiplied by 2, 3, 4, 5, 6, &c. gives the *intereſt* of one pound for any number of days: and thus the following table of ſimple *intereſt* for any number of days is eaſily made.

A TABLE of SIMPLE INTEREST.

The *intereſt* of one pound for any number of days, &c.

Days	3 per cent.	3½ per cent.	4 per cent	4½ per cent.	5 per cent	Days
1	.0000,821	.0000,958	0001,095	.0001,232	.0001,369	1
2	.0001,641	.0001,917	.0002,191	0002,465	.0002,739	2
3	.0002,465	.0002,876	.0003,287	0003,698	0004,109	3
4	.0003,287	.0003,835	.0004,383	.0004,931	0005,479	4
5	.0004,109	0004,794	0005,479	0006,164	.0006,849	5
6	.0004,931	.0005,753	.0006,575	.0007,397	.0008,219	6
7	.0005,753	.0006,712	.0007,671	.0008,630	.0009,589	7
8	.0006,575	.0007,671	.0008,767	.0009,863	.0010 958	8
9	.0007,397	.0008,630	.0009,863	.0011,095	.0012,328	9
10	.0008,219	0009,589	.0010,958	0012,328	.0013,698	10
11	.0009,041	.0010,547	.0012,054	.0013,561	.0015,068	11
12	0009,863	.0011,506	.0013,150	.0014,794	.0016,438	12
13	.0010,684	.0012,465	.0014,246	.0016,027	.0017,808	13
14	.0011,506	.0013,424	.0015,342	.0017,260	.0019,178	14
15	.0012,328	.0014,383	.0016,438	.0018,493	.0020.547	15
16	.0013,150	.0015,342	.0017,534	.0019,726	.0021,917	16
17	.0013,972	.0016,301	.0018,630	0020,958	.0023,287	17
18	.0014,794	.0017,260	.0019,726	.0022,191	.0024,657	18
19	.0015,616	.0018,219	.0020,821	0023,424	.0026,027	19
20	0016,438	.0019,178	.0021,917	0024,657	.0027.397	20
21	.0017,260	.0020,137	.0023,013	0025,890	.0028,767	21
22	.0018,082	.0021,095	.0024,109	.0027,123	.0030,137	22
23	.0018,904	0022,054	.0025,205	.0028,356	0031,506	23
24	.0019,726	.0023,013	0026,301	.0029,589	.0032,876	24
25	.0020,547	0023,972	.0027,397	.0030 821	.0034,246	25
26	.0021,369	0024,931	.0028,493	.0032,054	.0035,616	26
27	.0022,191	.0025,890	.0029,589	.0033,287	.0036,986	27
28	.0023 013	.0026,849	.0030,684	0034,520	0038,356	28
29	.0023,835	0027,808	.0031,780	.0035,753	.0039,726	29
30	0024,657	.0028.767	.0032,876	.0036,986	.0041.095	30
31	.0025,479	0029,726	.0033,972	.0038,219	.0042,465	31
32	.0026,301	.0030,684	.0035,068	0039.452	.0043,835	32
33	.0027.123	0031,643	.0036,164	.0040,684	.0045,205	33
34	.0027,945	0032,602	.0037,260	.0041,917	.0046,575	34
35	.0028,767	.0033,561	0038,356	.0043,150	0047,945	35

Days	3 per cent.	3½ per cent.	4 per cent.	4½ per cent.	5 per cent.	Days
36	.0029,589	.0034,520	.0039,452	.0044,383	.0049,315	36
37	.0030,411	.0035,479	.0040,547	.0045,616	.0050,684	37
38	.0031,232	.0036,438	.0041,643	.0046,849	.0052.054	38
39	.0032,054	.0037,397	.0042,739	.0048,082	.0053,424	39
40	.0032,876	.0038,356	.0043,835	.0049,315	.0054.794	40
41	.0033,698	.0039,315	.0044,931	.0050,547	.0056,164	41
42	.0034,520	.0040,274	.0046,027	.0051,780	.0057,534	42
43	.0035,342	.0041,232	.0047,123	.0053,013	.0058,904	43
44	.0036,164	.0042,191	.0048,219	.0054,246	.0060,274	44
45	.0036,986	.0043,150	.0049,315	.0055,479	.0061,643	45
46	.0037,808	.0044,109	.0050,411	.0056,712	.0063,013	46
47	.0038,630	.0045,068	.0051,506	.0057,945	.0064,383	47
48	.0039,452	.0046,027	.0052,602	.0059,178	.0065,753	48
49	.0040,274	.0046,986	.0053,698	.0060,411	.0067,123	49
50	.0041,095	.0047,945	.0054,794	.0061,643	.0068,493	50
51	.0041,917	.0048,904	.0055,890	.0062,876	.0069,863	51
52	.0042,739	.0049,863	.0056,986	.0064,109	.0071,232	52
53	.0043,561	.0050,821	.0058,082	.0065,342	.0072,602	53
54	.0044,383	.0051,780	.0059,178	.0066,575	.0073,972	54
55	.0045,205	.0052,739	.0060,274	.0067,808	.0075,342	55
56	.0046,027	.0053,698	.0061,369	.0069,041	.0076,712	56
57	.0046,849	.0054,657	.0062,465	.0070,274	.0078,082	57
58	.0047,671	.0055,616	.0063,561	.0071,506	.0079,452	58
59	.0048,493	.0056,575	.0064,657	.0072,739	.0080,821	59
60	.0049,315	.0057,534	.0065,753	.0073,972	.0082,191	60
61	.0050,137	.0058,493	.0066,849	.0075,205	.0083,561	61
62	.0050,958	.0059,452	.0067,945	.0076,438	.0084,931	62
63	.0051,780	.0060,411	.0069,041	.0077,671	.0086,301	63
64	.0052,602	.0061,369	.0070,137	.0078,904	.0087,671	64
65	.0053,424	.0062,328	.0071,232	.0080,137	.0089,041	65
66	.0054,246	.0063,287	.0072,328	.0081,369	.0090,411	66
67	.0055,068	.0064,246	.0073,424	.0082,602	.0091,780	67
68	.0055,890	.0065,205	.0074,520	.0083,835	.0093,150	68
69	.0056,712	.0066,164	.0075,616	.0085,068	.0094,520	69
70	.0057.534	.0067,123	.0076,712	.0086,301	.0095,890	70
71	.0058,356	.0068,082	.0077,808	.0087.534	.0097,260	71
72	.0059,178	.0069,041	.0078,904	.0088,767	.0098,630	72
73	.0060,000	.0070,000	.0080,000	.0090,000	.0100,000	73
74	.0060,821	.0070,958	.0081,095	.0091,232	.0101,369	74
75	.0061.643	.0071,917	.0082,191	.0092,465	.0102,739	75
76	.0062,465	.0072,876	.0083,287	.0093,698	.0104,109	76
77	.0063,287	.0073,835	.0084,383	.0094,931	.0105,479	77
78	.0064,109	.0074,794	.0085,479	.0096,164	.0106,849	78
79	.0064,931	.0075,753	.0086,575	.0097,397	.0108,219	79
80	.0065,753	.0076,712	.0087,671	.0098,630	.0109,580	80
81	.0066,575	.0077,671	.0088,767	.0099,863	.0110,958	81
82	.0067,397	.0078,630	.0089,863	.0101,095	.0112,328	82
83	.0068,219	.0079,589	.0090,958	.0102,328	.0113,698	83
84	.0069,041	.0080,547	.0092,054	.0103,561	.0115,068	84
85	.0069,863	.0081,506	.0093,150	.0104,794	.0116,438	85
86	.0070,684	.0082,465	.0094,246	.0106,027	.0117,808	86
87	.0071,506	.0083,424	.0095,342	.0107,260	.0119,178	87
88	.0072,328	.0084,383	.0096,438	.0108,493	.0120,547	88
89	.0073,150	.0085,342	.0097,534	.0109,726	.0121,917	89
90	.0073,972	.0086,301	.0098,630	.0110,958	.0123,287	90
91	.0074,794	.0087,260	.0099,726	.0112,191	.0124,657	91
92	.0075,616	.0088,219	.0100,821	.0113,424	.0126,027	92
93	.0076,438	.0089,178	.0101,917	.0114,657	.0127,397	93
94	.0077,260	.0090,137	.0103,013	.0115,890	.0128,767	94
95	.0078,082	.0091,095	.0104,109	.0117,123	.0130,137	95
96	.0078,904	.0092,054	.0105,205	.0118,356	.0131,506	96
97	.0079,726	.0093,013	.0106,301	.0119,589	.0132,876	97
98	.0080,547	.0093,972	.0107,397	.0120,821	.0134,246	98
99	.0081,369	.0094,931	.0108,493	.0122,054	.0135,616	99
100	.0082,191	.0095,890	.0109,589	.0123,287	.0136,986	100

A Table of Simple Intereſt.

The intereſt of one pound for a number of years.

Years	At 3 per cent.	3½ per cent.	4 per cent.	4½ per cent.	5 per cent.	Years
1	.03	.035	.04	.045	.05	1
2	.06	.07	.08	.09	.1	2
3	.09	.105	.12	.135	.15	3
4	.12	.14	.16	.18	.2	4
5	.15	.175	.2	.225	.25	5
6	.18	.21	.24	.27	.3	6
7	.21	.245	.28	.315	.35	7
8	.24	.28	.32	.36	.4	8
9	.27	.315	.36	.405	.45	9
10	.3	.35	.4	.45	.5	10
11	.33	.385	.44	.495	.55	11
12	.36	.42	.48	.54	.6	12
13	.39	.455	.52	.585	.65	13
14	.42	.49	.56	.63	.7	14
15	.45	.525	.6	.675	.75	15
16	.48	.56	.64	.72	.8	16
17	.51	.595	.68	.765	.85	17
18	.54	.63	.72	.81	.9	18
19	.57	.665	.76	.855	.95	19
20	.6	.7	.8	.9	.1	20
21	.63	.735	.84	.945	1.05	21
22	.66	.77	.88	.99	1.1	22
23	.69	.805	.92	1.035	1.15	23
24	.72	.84	.96	1.08	1.2	24
25	.75	.875	1.	1.125	1.25	25

The Uſe of the preceding Table.

When the intereſt of any ſum of money is required for any number of days, look in the tables for the number of days, and even with that number, under the given rate of intereſt, will be found the intereſt of one pound, for that time, and at that rate; which intereſt, ſo found, being multiplied by the principal ſum, the product anſwers the queſtion.

EXAMPLE.

What is the intereſt of 462*l.* for 85 days, at 5 per cent. per annum?

In the table, even with 85 days, and under 5 per cent. you find the *intereſt* of 1*l.* to be .0116,438.

Which multiplied by the principal 462, the product will be 5*l.* 7*s.* 7*d.*

N. B. If the principal ſums contain ſhillings and pence, you muſt reduce them into decimal parts, and multiply accordingly.

When the *intereſt* of any ſum is required for a number of years and days together, as it frequently happens upon paying off a bond or mortgage, add the *intereſt* of one pound for the years at the end of the foregoing tables, to the intereſt of one pound for the odd days; multiply that by the principal ſum, and the product will anſwer the queſtion.

The following Table is much more compendious; and ſhews the *intereſt* of any ſum of money, from a million to a pound, for any number of days, at any rate of *intereſt*.

Nº	£.	*s.*	*d.*	*q.*	Nº	£.	*s.*	*d.*	*q.*
1000000	2739	14	6	0.99	1000	2	14	9	2.14
900000	2465	15	0	3.29	900	2	9	3	3.12
800000	2191	15	7	1.59	800	2	3	10	0.11
700000	1917	16	1	3.89	700	1	18	4	1.10
600000	1643	16	8	2.19	600	1	12	10	2.80
500000	1369	17	3	0.49	500	1	7	5	3.70
400000	1095	17	9	2.95	400	1	1	11	0.50
300000	821	18	4	1.09	300	0	16	5	1.40
200000	574	18	10	3.40	200	0	10	11	2.30
100000	273	19	5	1.70	100	0	5	5	3.15
90000	246	11	6	0.96	90	0	4	11	0.71
80000	219	3	6	0.96	80	0	4	4	2.41
70000	191	15	7	1.59	70	0	3	10	0.11
60000	164	7	8	0.22	60	0	3	3	1.81
50000	136	19	8	2.85	50	0	2	8	6.51
40000	109	11	9	1.48	40	0	2	2	1.21
30000	82	3	10	0.11	30	0	1	7	2.90
20000	54	15	10	2.74	20	0	1	1	0.60
10000	27	7	11	1.37	10	0	0	6	2.30
9000	24	13	1	3.23	9	0	0	5	3.67
8000	21	18	4	1.10	8	0	0	5	1.40
7000	19	3	6	2.96	7	0	0	4	2.41
6000	16	8	9	0.82	6	0	0	3	3.76
5000	13	13	11	2.58	5	0	0	3	1.15
4000	10	19	2	0.55	4	0	0	2	2.52
3000	8	4	4	2.41	3	0	0	1	3.80
2000	5	9	7	0.27	2	0	0	1	1.26
1000	2	14	9	2.14	1	0	0	0	2.63

Multiply the ſum by the number of days, and the product thereof by the rate of *intereſt* per cent. then cut off the two laſt figures to the right hand, and enter the table with what remains to the left; againſt which numbers collected, you have the *intereſt* for the given ſum.

EXAMPLE.

What is the *intereſt* of 100*l.* at 5 per cent. for 365 days?

Nº of days	365	{ Then in the table			£.	*s.*	*d.*	*q.*
Mult. by	100	against	1000 is		2	14	9	2.14
Product -	36500		800	-	2	3	10	0.11
Mult. by	- 5	rate per c.	20	-	0	1	1	0.60
	1825|00		5	-	0	0	3	1.15
			1825	anſ.	5	0	0	0.00

the *intereſt* required. Ferguſon's Tracts, p. 274.

For the method of calculating annuities, ſee ANNUITIES.

INTEREST, *compound*, is that which is counted both from the principal, and the *ſimple intereſt* forborne; called alſo *intereſt upon intereſt*.

Compound intereſt ariſes from the principal and its *intereſt* put together, as that *intereſt* becomes due. To find this, it is neceſſary to find the new principal, which is ſtill created by the increaſe of the growing money, at the ſeveral times when the payments of *intereſt* were due.

Although it be not lawful to lend money at compound *intereſt*, yet in purchaſing annuities, penſions, &c. and taking leaſes in reverſion, it is uſual to allow *compound intereſt* to the purchaſer for his ready money; and, therefore, it is very neceſſary to underſtand this ſubject. Let p, r, n, and m, be as before; and let x be equal to $1+r$, or the principal and *intereſt* of 1*l.* for any given time, at any given rate. Then as one pound is to its amount for any given time, ſo is any propoſed principal ſum to its amount for the ſame time: i. e.

$1l. : x :: p : px =$ 1ſt year's amount.
$1l. : x :: px : px^2 =$ 2d year's amount.
$1l. : x :: px^2 : px^3 =$ 3d year's amount, &c.

Therefore $px^n = m$ the amount of the n year; whence we deduce particular theorems for the ſolution of the following problems.

Prob. I. Given the principal p, rate r, and time n, to find the amount: $m = p \times x^n$, or log. p + log. $x \times n$; i. e. multiply the rate of 1*l.* added to unit into itſelf as often as unit is contained in the number of years, or raiſe it to a power whoſe index is n, and multiply this product by the given principal. Or, multiply the logarithm of the rate added to unit, found in tables of logarithms, by the number of years, and add the logarithm of the principal; the number anſwering to the ſum of theſe logarithms will be the required amount. E. g. What ſum will 450*l.* amount to in three years, at 5 *per cent. per annum?* Here $p = 450$, $n = 3$, and $x = 1.05$; and $px^n = 450 \times \overline{1.05}|^{3} = 450 \times 1.157625 = 520l.\ 18s.\ 7d\frac{1}{2}$. Otherwiſe, the log. of 450 = 2.6532125; and the log. of 1.05 = 0.0211893, which multiplied by 3, gives .0635679; and 2.6532125 + 0.0635679 = 2.7167804, the number anſwering to which is 520.93, nearly, = 520*l.* 18*s.* 7*d*½. Farther, what is the amount of one penny at 5 *per cent. compound intereſt*, in 1780 years? Here $p = 1d.$ $x = 1.05$, and $n = 1780$. The logarithm of 1.05, or 0.0211893 × 1780 = 37.7169540, the log. of the number of pence in the amount; and 37.7169540 − 2.3802112, the log. of 240, the number of pence in a pound, will give 35.3367428, the log. of the number of pounds in the amount. But this number is ſo large, that it will be neceſſary to compare it with ſome other meaſure: let this meaſure be the number of pounds ſterling contained in a globe of gold equal in bulk to our earth; which may be eaſily determined by the following calculation.

	3.9014583	the log. of 7970, the diameter of the earth.
	3	multiply by 3 for the cube of the diameter.
	11.7043749	the log. of the cube of the diameter.
Add,	$\bar{1}$.7189996	the log. of .5236. See Simpſon's Geom. p. 186.
	9.7365381	the log. of $\overline{1760}|^{3}$ or number of yards in a cubic mile.
	1.4313638	the log. of 27, the number of cubic feet in a cubic yard.
	3.2375437	the log. of 1728, the numb. of cub. inches in a ſolid foot.
	25.8288201	the log. of the number of cubic inches in the earth.
Add,	1.5616975	the log. of 36.45, the number of pounds in a cubic inch, ſuppoſing 9.36 Troy ounces equal to a cub. inch of Guinea gold (ſee *Specific* GRAVITY), and 3*l.* 17*s.* 10*d*½ = 3.8937, to be an ounce.
	27.3905176	the log. of the number of pounds ſterling in the earth, ſuppoſing that it were ſolid gold.
From	35.3367428	the log. of the amount, above found.
Subtr.	27.3905176	the log. laſt found.
	7 9462252	the log. of 88354000, the number of earths of ſolid gold contained in the amount.

Theſe calculations ſuppoſe that money doubles itſelf at 5 *per cent. compound intereſt*, in 14 years 75 days; but on the ſuppoſition that it doubles itſelf in 14 years, the calculation will be as follows: $\frac{1780}{14} = 127$; and then 2 may be raiſed to the 127th power, thus:

	.3010300	the log. of 2
Mult.	127	
	38.2308100	the amount in pence.
Subtract	2.3802112	the log. of 240.
	35.8505988	the log. of the number of pounds.
Subtract	27.3905176	the log. of the pounds ſterling in an earth of ſolid gold.
	8.4600812	the log of 288490000, the number of earths of ſolid gold contained in the amount.

A ſhilling put out to 6 *per cent. compound intereſt*, would, in the ſame time, have increaſed to a greater ſum in gold than the whole ſolar ſyſtem could hold, ſuppoſing it a ſphere equal in diameter to the diameter of Saturn's orbit; and the earth is to ſuch a ſphere nearly as half a ſquare foot, or a quarto page, to the whole ſurface of the earth. Price on Reverſionary Payments, p. 15. Pref. to firſt edition.

N. B. If the time in this problem is an aliquot part of a year, as $\frac{1}{2}$, ', or univerſally $\frac{1}{n}$-th, take the amount of 1*l.* for one year, or x, and from it extract the nth root, i. e. the ſquare root, if it be half a year, the cube root, if it be $\frac{1}{3}$, the biquadrate if it be $\frac{1}{4}$, &c. and that root is the amount ſought. Thus, the amount of 1*l.* for half a year is $\overline{1.05}|^{\frac{1}{2}} = 1.02469$, &c. The reaſon is obvious; becauſe $1 : \overline{1.05}|^{\frac{1}{2}} :: \overline{1.05}|^{\frac{1}{2}} : 1.05$; conſequently $\overline{1.05}|^{\frac{1}{2}}$, or 1.02469, put out to *intereſt* for half a year, amounts to 1.05, according to the rate allowed for the firſt half year; which is 1.02469, the principal for the ſecond half year. If the time is $\frac{1}{3}$ of a year, we muſt ſuppoſe two geometrical mean proportionals between 1 and x, the firſt of which will be equal to $\overline{x}|^{\frac{1}{3}}$; and in all caſes, whatever number of terms n intervene between 1 and x, the firſt of them is ſuch a root of x, whoſe denominator is the number of terms, as $x\frac{1}{n}$; and $x\frac{1}{n}$ is a principal, which bearing compound *intereſt* at the given rate for the nth part of one year, will amount to x at the year's end. But if the time is not an aliquot part of the year, reduce it to days; and the 365th root of x is the amount for one day, which is eaſily done by logarithms, when queſtions occur that render it neceſſary; then raiſe that amount to a power, whoſe index is the number of days in the queſtion for the amount ſought. In this way, tables of compound *intereſt*, ſhewing the amount of 1*l.* in any number of days and years, are found. See ANNUITIES. See alſo Smart's Tables of *Intereſt*, &c.

Prob. II. From the amount, rate, and time, to find the principal: by equal diviſion from the theorem, $p = \frac{m}{x^n}$, or log. $m - \overline{\log. x \times n}$.

Rule. Divide the amount by the ſum of the rate, and unit raiſed to a power denominated by the number of years, &c. E. gr. What principal will amount to 520*l.* 18*s.* 7*d*½. or 520 93125, in three years, at 5 *per cent.?* Anſ. $\frac{520.93125}{1.157625} = 450l.$

Prob. III. From the principal, amount, and rate, to find the time: $x^n = \frac{m}{p}$, and $n =$ to the number of diviſions of x^n by x, till there be no remainder: or $n = \log. x^n \div \log. x$.

Rule. Divide the amount by the principal, and this quotient by the rate added to unit, and repeat the diviſion of each new quotient till there be no remainder; and the number of diviſions gives the number of years: or divide the logarithm of the rate added to unit, and raiſed to the power expreſſed by the number of years, and divide by the logarithm of the rate added to unit. E. gr. In what time will 450*l.* amount to 520*l.* 18*s.* 7*d*½. or 520.93125, at 5 *per cent. per annum?* $\frac{m}{p} = \frac{520.93125}{450} = 1.157625$, which divided by 1 05, till there be no remainder, will require three diviſions; and, therefore, the number of years is equal to 3.

Prob. IV. From the principal, amount, and time, to find the rate: $x^n = \frac{m}{p}$; therefore $x = \overline{\frac{m}{p}}|^{\frac{1}{n}}$, or $x = \log. m - \log. p \div n$.

Rule. Divide the amount by the principal, and extract that root of the quotient which is denominated by the number of years. E. gr. At what rate *per cent.* will 450*l.* amount to 520*l.* 18*s.* 7*d*½. or 520.93125, in 3 years? $\frac{m}{p} = 1.157625$; and $\overline{1.157625}|^{\frac{1}{3}}$, or $\sqrt[3]{1.157625} = 1.05$: conſequently, the anſwer is 5 *per cent*, See farther on this ſubject, Jones's Synopſis Palmariorum Matheſeos, pars i. § 3. cap. 10. Malcolm's Arithmetic, book vi. ch. 10. Gardiner's Tables of Logarithms, p. 8. Phil. Tranſ. vol. lx. art. 43. p. 508. See alſo ANNUITIES, DISCOUNT, LIFE-*Annuities*, REVERSION, &c.

INTEREST, *Intereſſe*, in *Law*, is commonly taken for a chattel real, as a leaſe for years, &c. and more particularly for a future term; in which caſe it is ſaid in pleading, that one is poſſeſſed *de intereſſe termini:* therefore an eſtate in lands, is better than a right or *intereſt* in them. But in legal underſtanding, an *intereſt* extends to eſtates, rights, and titles, that a man hath in or out of lands, &c. ſo as by grant of his whole *intereſt* in ſuch land, a reverſion therein, as well as poſſeſſion in fee-ſimple, ſhall paſs.

INTEREST *on legacies*. In caſe of a veſted legacy, due immediately, and charged on land or money in the funds, which yield an immediate profit, *intereſt* ſhall be payable thereon from the teſtator's death; but if charged only on the perſonal eſtate, which cannot be immediately got in, it ſhall carry *intereſt* only from the end of the year, after the death of the teſtator. If a legacy be deviſed, and no certain time of payment mentioned, and the legatee be an infant, he ſhall have *intereſt* for the legacy from the expiration of one year after the teſtator's death; but if the legatee be of full age, he ſhall have no *intereſt* but from the time of the demand of the legacy. Where a legacy is payable at a day certain, it muſt be paid with *intereſt* from that day.

INTEREST, *punitory*. See PUNITORY.

INTERFEMINEUM, a word uſed by ſome to expreſs the perinæum.

INTERFERE, in the *Manege*. A horſe *interferes*, when the ſide of one of his ſhoes ſtrikes againſt and hurts one of the fetlocks. See Cutting.

INTERJECTION, in *Grammar*, an expreſſion uſed to denote ſome ſudden motion or paſſion of the mind: as *oh! eh!*

As the greateſt part of the expreſſions uſed on theſe occaſions are taken from nature alone, the real *interjections* in moſt languages are monoſyllables; and as all nations agree in thoſe natural paſſions, ſo do they agree in the ſigns and indications of them; as of love, mirth, &c.

Some deny the *interjection* to be words, or any part of ſpeech; and make them mere natural ſigns of the motions or paſſions of the mind, expreſſed by theſe inarticulate ſounds, ſeveral whereof brutes have in common with us: but as theſe are paſſions, and muſt be repreſented in diſcourſe, the *interjection* has a good foundation in nature, and is a neceſſary part of ſpeech.

Mr. Harris obſerves, that *interjections* coincide with no part of ſpeech, but are either uttered alone, or elſe thrown into a ſentence, without altering its form, either in ſyntax or ſignification; and that they are not ſo properly parts of ſpeech, as adventitious ſounds; certain voices of nature rather than voices of art, expreſſing thoſe paſſions and natural emotions, which ſpontaneouſly ariſe in the human ſoul, upon the view or narration of intereſting events. Hermes, p. 289.

The Greeks confound their *interjections* with *adverbs*, and the Hebrews confound them with their *adverbs* and *prepoſitions*; calling them all by the general name *particle*.

INTERIM, a term borrowed from the Latin, ſignifying *in the mean time*. It was firſt brought into popular uſe by Charles V. in 1548, in order to compoſe the diſturbances of Germany.

The *interim* of that prince was a kind of ordinance, or regulation, to be obſerved in the empire, with regard to the articles of religion then controverted, till ſuch time as they ſhould be determined by a council; and therefore was called *interim*.

It was ſaid to have been drawn up by two catholics and aproteſtant; but as it retained moſt of the doctrines and ceremonies of the Romaniſts, though expreſſed for the moſt part in the ſofteſt words, or in ſcriptural phraſes, or in terms of ſtudied ambiguity, excepting that of marriage, which was allowed to prieſts, and communion, which was adminiſtered to the laity under both kinds, moſt of the proteſtants rejected it. Thoſe who admitted it were nick-named *Interimiſts*, or Adiaphorists. Indeed the *interim* equally diſguſted the generality of both parties, the proteſtants and catholics.

Beſides this, there were two other *interims* made: the one called the *interim* of Leipſic, the other by the divines of Franconia; who, refuſing to accept the two former, made another for themſelves.

INTERIOR. See Internal, and Internus.

Interior *figure*, *angle of*. See Angle.

Interior *polygon*. See Polygon.

Interior *talus* See Talus.

INTERLINEATION, ſomething inſerted between two lines. See Deed.

INTERLOCUTORY *decree*. In a ſuit in equity, if any matter of fact be ſtrongly controverted, the fact is uſually directed to be tried at the bar of the court of king's bench, or at the aſſizes, upon a ſeigned iſſue. If a queſtion of mere law ariſes in the courſe of a cauſe, it is the practice of the court of chancery to refer it to the opinion of the judges of the court of king's bench, upon a caſe ſtated for that purpoſe. In ſuch caſes, *interlocutory* decrees or orders are made.

Interlocutory *judgments* are ſuch as are given in the middle of a cauſe, upon ſome plea, proceeding on default, which is only intermediate, and does not finally determine or complete the ſuit. But the *interlocutory* judgments moſt uſually ſpoken of, are thoſe incomplete judgments, whereby the right of the plaintiff is eſtabliſhed, but the *quantum* of damages ſuſtained by him is not aſcertained, which is the province of a jury. In ſuch a caſe a writ of inquiry iſſues to the ſheriff, who ſummons a jury, enquires of the damages, and returns to the court the inquiſition ſo taken, whereupon the plaintiff's attorney taxes coſts, and ſigns final judgment.

Interlocutory *order*, that which decides not the cauſe, but only ſettles ſome intervening matter relating to the cauſe.

As, where an order is made in chancery, for the plaintiff to have an injunction, to quit poſſeſſion till the hearing of the cauſe; this order, not being final, is called *interlocutory*.

INTERLOPING, the intercepting, or diſturbing, the traffic of a company; or the taking up a new trade or employment, to the prejudice of thoſe who were brought up in it.

INTERLOPERS are properly thoſe, who, without due authority, hinder the trade of a company, or corporation, lawfully eſtabliſhed, by dealing in the ſame way.

INTERLUCATION, in *Huſbandry*, the thinning of a wood, or letting in light between, by lopping or cutting away boughs.

INTERLUDE, an entertainment exhibited on the theatre between the acts of a play; to amuſe the ſpectators while the actors take breath, and ſhift their dreſs; or to give time for changing the ſcenes and decorations.

In the ancient tragedy, the chorus ſung the *interludes*, to ſhew the intervals between the acts

Interludes, among us, uſually conſiſt of ſongs, dances, feats of activity, concerts of muſic, &c.

Ariſtotle and Horace give it for a rule, that the *interludes* ſhould conſiſt of ſongs built on the principal parts of the drama; but ſince the chorus has been laid down, dancers, buffoons, &c. ordinarily furniſh the *interludes*.

INTERLUNIUS *morbus*, a name by which ſome authors have called the epilepsy, a diſeaſe that has been ſaid to be often affected remarkably by the changes of the moon.

INTERMEDIATE is uſually underſtood of the ſpace of time elapſed from any certain point to any other.

In *Chemiſtry*, thoſe ſubſtances are called *intermediate*, by means of which, other ſubſtances, incapable of uniting together of themſelves, may be united.

INTERMEWING, in *Falconry*, is a hawk's *mewing*, from the firſt change of her coat till ſhe turn white.

INTERMITTENT, a thing which ceaſes its action for ſome time; which time is called the *interval*.

Thus fevers which go off, and ſoon return again, are called *intermittents*, in oppoſition to thoſe which are always continued.

So a pulſe which after ſo many ſtrokes ſtops, or loſes one in its due time, is called an *intermitting* pulse.

With regard to this it has been obſerved, that as often as the ſtomach is much inflated with wind, the nerves or plexus cardiacus at its orifice muſt ſuffer a contraction, which, being continued to the heart, will occaſion a twitching; and this, as it is more or leſs violent, will produce either only a ſimple *intermiſſion* of pulſe, or a real palpitation of the heart.

INTERNAL *angles* are all *angles* made by the ſides of any right-lined figure within. See *Internal* Angle.

In a triangle, as KLM (*Tab.* III. *Geometry*, *fig.* 55.) the angles L and M are particularly called *internal* and *oppoſite*, in reſpect of the external angle IKM, which is equal to them both.

Internal *angle* is alſo applied to the two angles formed between two parallels by a line interſecting thoſe parallels, on each ſide the interſecting line.

Such are the angles *z* and *y*, and *x* and *s* (*Tab.* III. *Geometry*, *fig.* 56.) formed between the parallels OP and QR, on each ſide of the interſecting line ST.

The two *internal angles* are always equal to two right angles.

Internal and *oppoſite angle* is alſo applied to the two angles *z* and *x*, formed by a line cutting two parallels.

Theſe are reſpectively equal to A and *u*, called the *external* and *oppoſite angles*.

Internal *affection*, *denomination*, *ear*, *modes*, *orthography*, *place*, *ſenſe*. See the ſubſtantives.

INTERNODIUM, in *Botany*, the ſpace that is between two knots, or joints, of the ſtalk of a plant; e. gr. of the ſtalk or ſtraw of wheat, or other corn.

INTERNUS *brachiæus*, *rectus major capitis*, *rectus minor capitis*, *cubitæus*, *iliacus*, *orbiter*, *pterygoideus*, *vaſtus*. See Brachiæus, Rectus, &c.

Internus *mallei*, in *Anatomy*, a name given by ſome authors to one of the muſcles of the ear. It is the *muſculus internus auris* of Cowper, and is very properly called by Albinus *tenſor tympani*, from its uſe. Spigelius calls it ſimply the *internus*.

INTEROSSEI *manus*, the muſcles which move the fingers: thus called from their ſituation, as being contained *inter oſſa*, between the ſpaces of the bones of the metacarpus. Some reckon ſix of them, and others eight. One half lie between the ſpaces theſe bones leave towards the palm of the hand; theſe are called the *internal interoſſei*, ariſing from the upper part of the bones of the metacarpus next the carpus; and, being inſerted on the internal ſides of the firſt bones of the fingers with the lumbricales, ſerve as adductores digitorum, to bring the fingers to the thumb.

The other half, called *interoſſei externi*, are contained in the ſpaces that the bones of the metacarpus leave on the back of the hand: theſe riſe from the upper part of the bones of the metacarpus next the carpus, and are inſerted on the external ſides of the firſt bones of the fingers: theſe ſerve, as abductores digitum, to draw the fingers from the thumb. See *Tab. Anat.* (*Myol.*) *fig.* 6, *n.* 23. *fig.* 7. *n.* 9. 50.

INTEROSSEI *pedis*, the muſcles which move the toes; in number, uſe, origin, and inſertion, they anſwer exactly to thoſe of the hand.

INTEROSSEOUS *arteries*, are two arteries, derived from the cubital artery, where in its courſe between the heads of the radius and ulna it reaches the INTEROSSEOUS *ligament*: they are the internal and external. The internal artery runs cloſe to the ligament, till it extends below the pronator teres, where it perforates the ligament, and paſſes to the convex ſide of the carpus, and back of the hand, where it communicates with the external *interoſſeous*, the radial, and the cubital arteries. The external *interoſſeous* artery pierces the ligament about three fingers breadth below the articulation, and ſends off a branch towards the external condyle of the os humeri, under the ulnaris externus, and anconæus minimus, to which it is diſtributed, as alſo to the ſupinator brevis. Having reached the lower extremity of the ulna, it unites with a branch of the internal *interoſſeous* artery, and is diſtributed with it on the convex ſide of the carpus and back of the hand, communicating with the radial artery, and with a branch of the cubital. By theſe communications this artery forms an irregular arch, from whence branches are ſent to the external *interoſſeous* muſcles, and to the external lateral parts of the fingers.

INTEROSSEOUS *ligaments* in the fore-arm, are fixed by one edge along the ſharp angle of each ulna, and by the other along that of the radius. They are chiefly made up of two very ſtrong planes of fibres, which croſs each other at oblique angles, and leave holes at different diſtances for the paſſage of blood-veſſels. They ſerve to tie the two bones cloſely together, and the two planes ſerve for the inſertion of ſeveral muſcles. In the ſupination of the hands they are very tight; but in the pronation they are folded a little lengthways.

INTEROSSEUS, in *Anatomy*, a name given by Spigelius, in his account of the muſcles of the foot, to a muſcle called by Albinus the *flexor brevis pollicis pedis*, and by Winſlow the *thenar* and *flexor brevis*.

INTERPLEAD, or ENTERPLEAD. See ENTERPLEADER.

INTERPOLATION, a term uſed by critics in ſpeaking of ancient writings and manuſcripts, in which ſome ſpurious additions or alterations have been ſince made.

To eſtabliſh or aſcertain an *interpolation*, P. Ruinart gives us the five following rules. 1. That the piece ſuppoſed to be *interpolated* appear to have all the antiquity it pretends to. 2. That there be good proofs that it has been *interpolated*. 3. That the ſuppoſed *interpolations* agree to the time of the *interpolator*. 4. That the *interpolations* do not touch the foundation of the work; and that they be not too frequent, nor entirely disfigure the piece. 5. That the reſtitution made agree perfectly to the reſt of the work.

INTERPOLATION, in *Algebra*, is uſed for the finding an intermediate term of a ſeries, its place in the ſeries being given. This is alſo called *intercalation*.

The method of doing this is called the *method of interpolations*, or *intercalations*.

When the algebraic equation of the ſeries is given, the term required, whether it be a primary or intermediate term, may be found by the reſolution of affected equations; but when this equation is not given, as it often happens, the value of the term ſought muſt be exhibited by a converging ſeries, or by the quadrature of curves. See Stirling, Method. Different. p. 86, ſeq. Meyer, in Act. Petrop. tom. ii. p. 180, ſeq.

When the firſt, ſecond, or other ſucceſſive differences of the terms of a ſeries become at laſt equal, the *interpolation* of any term of ſuch a ſeries may be found by Sir Iſaac Newton's DIFFERENTIAL *method*.

The method of *interpolation* was firſt invented by Mr. Briggs, Savilian profeſſor of Geometry at Oxford, and applied by him to the calculation of logarithms. His principles were followed by Reginald and Mouton, in France. Sir Iſaac Newton, in lemma 5. lib. iii. Phil. Princip. Mathem. gave a moſt elegant ſolution of the problem for drawing a curve line through the extremities of any number of given ordinates; and in the ſubſequent propoſition applied the ſolution of this problem to that of finding from certain obſerved places of a comet, the place of it at any given intermediate time. Dr. Waring, who adds, that a ſolution ſtill more elegant, on ſome accounts, has been ſince diſcovered by Meſſ. Nicholi and Stirling, has alſo reſolved the ſame problem, and rendered it more general, without having recourſe to finding the ſucceſſive differences. Phil. Tranſ. vol. lxix. part i. art. 7.

INTERPOSED *attic*. See ATTIC.

INTERPOSITION, the ſituation of a body between two others, ſo as to hide them, or prevent their action.

The eclipſe of the ſun is occaſioned by an *interpoſition* of the moon between the ſun and us; and that of the moon by the *interpoſition* of the earth between the ſun and moon.

INTERPRETER, a perſon who explains the thoughts, words, or writings, of ſome other, which before were unintelligible.

The word *interpres*, according to Iſidore, is compoſed of the prepoſition *inter*, and *partes*, as ſignifying a perſon in the middle betwixt two parties, to make them mutually underſtand each other's thoughts. Others derive it from *inter*, and *præs*, i. e. *fidejuſſor*; q. d. a perſon who ſerves as ſecurity between two others, who do not underſtand one another.

There have been great debates about *interpreting* Scripture. The Romaniſts contend, that it belongs abſolutely to the church; adding, that where ſhe is ſilent, reaſon may be conſulted; but, where ſhe ſpeaks, reaſon is to be diſregarded. The Proteſtants generally allow reaſon to be the ſovereign judge, or *interpreter*, though ſome among them have a ſtrong regard to ſynods, and others to the authority of the primitive fathers. Laſtly, others have recourſe to the ſpirit within every perſon to *interpret* for them; which is what Bochart calls αποδειξις τȣ ϖνευματος.

INTERREGNUM, the time during which a throne is vacant, or a kingdom without a head.

In hereditary kingdoms, as England, there are properly no *interregnums*. In elective kingdoms, the *interregnums* are extremely liable to factions and diſorders. In Germany, the emperors have loſt the greateſt part of their dominions during the *interregnums*.

INTERREX, a magiſtrate who governs during an *interregnum*, or in the interval between the death of a monarch, and the election or inauguration of his ſucceſſor.

This magiſtrate was eſtabliſhed in Old Rome, and was almoſt as ancient as the city itſelf. After the death of Romulus there was an *interregnum* of a year, during which the ſenators were each *interrex* in their turn, five days a-piece.

After the eſtabliſhment of conſuls, and a commonwealth, though there were no kings, yet the name and function of *interrex* was ſtill preſerved; for when the magiſtrates were abſent, or when there was any irregularity in their election, or they had abdicated, ſo that the comitia could not be held, provided they were unwilling to create a dictator, they made an *interrex*, whoſe office and authority were to laſt five days; after which they made another. To the *interrex* was delegated all the regal and conſular authority, and he performed all their functions. He aſſembled the ſenate, held comitia, or courts, and took care the election of magiſtrates was according to the rules. Indeed, at firſt it was not the cuſtom of the *interrex* to hold comitia; at leaſt we have no inſtance of it in the ancient Roman hiſtory.

The patricians alone had the right of electing an *interrex*. This office fell with the republic, when the emperors made themſelves maſters of every thing.

INTERRMENT, INTERMENT, or ENTERMENT, the act of *interring*, i. e. burying, or laying a deceaſed perſon in the ground. See BURIAL.

The excommunicated are not to be *interred* in holy, i. e. in conſecrated, ground. The ancients did not *interr* their dead; they burnt them, as the Indians do at this day. See BURNING.

The Abyſſinians, in lieu of *interring* their dead, ſhut them up in the bodies of trees, dug hollow for this purpoſe.

Gardeners alſo *interr*, or earth up, celery, endive, and lettuce, to blanch, or whiten, and make them the tenderer.

To *interr* wild ſtocks in ditches, is what Columella calls *deponere ſemina ſcrobibus*. There are ſome trees, as willows, olives, &c. which grow very well, by *interring* their truncheons, i. e. cutting a truncheon, or piece, off at both ends, and planting it in the ground; which is what the Latins call *inhumare taleas, taleis ſerere*.

INTERROGATE, a judiciary act, performed by a judge, or commiſſioner deputed to examine or queſtion a party; who firſt gives his oath, that he will anſwer truly to every thing he is *interrogated*.

INTERROGATION, *Eroteſis*, a figure of rhetoric, in which the paſſion of the ſpeaker introduces a thing by way of queſtion, to make its truth more conſpicuous.

The *interrogation* is a kind of apoſtrophe which the ſpeaker makes to himſelf; and it muſt be owned, that this figure is ſuited to expreſs moſt paſſions and emotions of the mind; it ſerves alſo to preſs and bear down an adverſary, and generally adds an uncommon briſkneſs, action, force, and variety, to diſcourſe.

INTERROGATION, in *Grammar*, is a point which ſerves to diſtinguiſh ſuch parts of a diſcourſe, where the author ſpeaks as if he were aſking queſtions. Its form is this (?)

INTERROGATORIES, in *Law*, are particular queſtions demanded of witneſſes brought in to be examined in a cauſe, eſpecially in the court of chancery. And theſe *interrogatories* muſt be exhibited by the parties in ſuit on each ſide; which are either direct for the party that produces them, or counter, on behalf of the adverſe party; and generally both plaintiff and defendant may exhibit, direct, and counter, or croſs *interrogatories*. They are to be pertinent, and only to the points neceſſary; and either drawn or peruſed by counſel, and to be ſigned by them.

INTERRUPTION, in *Matters of Proportion*, denotes the ſame with *disjunction*.

It is noted thus (: :), and ſignifies the breaking off of the ratio in the middle of four disjunct or diſcrete proportionals: as A : B : : C : D; that is, as A is to B ſo is C to D. See RATIO, PROPORTION, &c.

INTERRUPTION is alſo a figure in *Rhetoric*, wherein a perſon breaks off his diſcourſe ſuddenly, to ſhew ſome paſſion.

INTERSCENDENT, in *Algebra*, is applied to quantities, when the exponents of their powers are radical quantities. Thus $Z^{\surd 2}$, $z^{\surd m}$, &c. are *interſcendent* quantities. See FUNCTION.

INTERSECTION, in *Mathematics*, the cutting of one line, or plane, by another; or the point or line wherein two lines, or two planes, cut each other.

The mutual *interſection* of two planes is a right line. The center of a circle is in the *interſection* of two diameters.

The central point of a regular or irregular figure of four ſides, is the point of *interſection* of the two diagonals.

The equinoxes happen when the ſun is in the *interſections* of the equator and ecliptic.

INTERSEPTUM, a word uſed by ſome writers to expreſs the uvula, and by others the ſeptum narium.

INTERSOILING, in *Huſbandry*, the laying one kind of ſoil, or mould, upon another; as clay on ſand, ſand on earth, &c.

INTERSPERSUM *vacuum*. See VACUUM.

INTERSPINALES *colli*, in *Anatomy*, the name of five pair of ſmall muſcles diſcovered by Mr. Cowper; and by him ſo called, from their poſition along the ſpina.

They ariſe from each double proceſs of the ſpine of the neck, and run from the upper one to the next below, into which they are inſerted.

They ſerve to draw together the vertebræ of the neck; and are more eſpecially proper to this part, as having both their origin and inſertion in it.

INTERSPINALES *dorſi*, in *Anatomy*, a name given by Albinus to certain muſcles of the back, not mentioned by the old writers in anatomy, but called by Winſlow, and other of the modern French writers, *les petits epineux du dos*; as the *interſpinales* lumborum of the ſame author, are the *epineux des lombes*.

INTERSPINALES *lumborum*, in *Anatomy*, a name given by Albinus to ſome muſcles not mentioned by the generality of writers, but called by Winſlow the *epineux des lombes*, or *ſpinales lumborum*.

INTERSTELLAR, a word uſed by ſome authors to expreſs thoſe parts of the univerſe that are without, and beyond, the limits of our ſolar ſyſtem.

In the *interſtellar* regions are ſuppoſed to be ſeveral other ſyſtems of planets moving round the fixed ſtars, as the centers of their reſpective motions; and if it be true, as it is not improbable, that each fixed ſtar is thus a ſun to ſome habitable orbs, that move round it, the *interſtellar* world will be infinitely the greateſt part of the univerſe.

INTERTIES, or INTERDUCES, in *Architecture*, thoſe ſmall pieces of timber which lie horizontally betwixt the ſummers, or betwixt them and the ſell, or raiſing plate.

INTERTRANSVERSALES *colli*, certain muſcles between the tranſverſe proceſſes of the vertebræ of the neck; ſerving for divers motions of the head: of the ſame ſize and figure with the *interſpinales*, and obſerved by the ſame author. See Phil. Tranſ. Nº 251. p. 131.

INTERTRANSVERSARII *dorſi*, in *Anatomy*, a name given by Albinus and others of the late anatomiſts, to certain ſmall muſcles of the back, not obſerved by the old writers on theſe ſubjects, but called by the French *les petit tranſverſaires du dos*.

INTERTRANSVERSARII *lumborum*, in *Anatomy*, a name given by Albinus to thoſe muſcles of the loins, which Douglas alſo calls the *intertranſverſales*, and Winſlow, with the other French writers, *tranſverſaires des lombes*.

INTERTWISTED *ſuture*. See SUTURE.

INTERVAL, the diſtance or ſpace between two extremes, either in time or place.

The word comes from the Latin *intervallum*, which, according to Iſidore, ſignifies the ſpace *inter foſſam & murum*, between the ditch and the wall: others note, that the ſtakes or piles, driven into the ground in the ancient Roman bulwarks, were called *valla*, and the interſtices or vacancy between them *intervalla*.

Angle of INTERVAL. See ANGLE.

Lucid INTERVALS. See LUCID.

INTERVAL, in *muſic*, the difference between two ſounds, in reſpect of acute and grave: or that imaginary ſpace terminated with two ſounds differing in acuteneſs or gravity.

When two or more ſounds are compared in this relation, they are either equal or unequal in the degree of tune: ſuch as are equal are called *uniſons*, with regard to each other, as having one tune; the other, being at a diſtance from each other, conſtitute what we call an *interval* in muſic; which is properly the diſtance in tune between two ſounds.

Intervals are diſtinguiſhed into *ſimple* and *compound*.

Simple INTERVAL is that without parts, or diviſion: ſuch are the octave, and all that are within it; as the ſecond, third, fourth, fifth, ſixth, and ſeventh, with their varieties.

Compound INTERVAL conſiſts of ſeveral leſſer *intervals*: ſuch are all thoſe greater than the octave; as the ninth, tenth, eleventh, twelfth, &c. with their varieties. But this diſtinction, it is to be obſerved, regards practice only, becauſe there is really no ſuch thing as a leaſt *interval*. Beſides, by a *ſimple interval* is not meant here the leaſt practiſed, but ſuch as though it were equal to two or more leſſer, which are in uſe, yet when we would make a ſound move ſo far up or down, we always paſs immediately from one of its terms to the other.—What is meant then by a *compound interval*, will be very plain: it is ſuch, whoſe terms are in practice taken either in immediate ſucceſſion, or ſuch where the ſound is made to riſe and fall from the one to the other, by touching ſome intermediate degree; ſo that the whole becomes a compoſition of all the *intervals* from one extreme to the other.

What we here call a *ſimple interval*, the ancients called a *diaſtem*, and the *compound* they called a *ſyſtem*.

Each of theſe had its differences; even of the *ſimple* there are ſome greater, and others leſs: but they are always diſcord; but of the *compound*, or *ſyſtems*, ſome are concord, others diſcord. Uniſons, it is plain, cannot poſſibly have any variety; for where there is no difference, as in uniſonance, which flows from a relation of equality, it is plain there can be no diſtinction: uniſons therefore muſt all be concords. But an *interval* depending on a difference of tune, or a relation of inequality, admits of variety; and ſo the terms of every *interval*, according to their particular relation or difference, make either concord or diſcord. Some indeed have reſtrained the word *concord* to *intervals*, making it include a difference in tune: but this is precarious; for as the word *concord* ſignifies an agreement of ſounds, it is certainly applicable to uniſons in the firſt degree. *Intervals*, it is plain, may differ in magnitude, and there may be an infinite variety, according to the poſſible degrees of tune; for there is no difference ſo great or ſo little, but a greater or a leſs may poſſibly be conceived. It it true, with regard to practice, there are limits, which are the greateſt and leaſt *intervals* our ears are judges of, and which may be actually produced by voice or inſtrument.

The degrees of tune are proportional to the number of vibrations of the ſonorous body in a given time, or the velocity of their courſes and recourſes.—Now theſe differences in tune conſtitute, as has been already ſaid, the *intervals* in muſic; theſe therefore muſt be greater or leſs, as the differences are; and it is the quantity of theſe, which is the ſubject of the mathematical part of muſic.

Thoſe *intervals* are meaſured, not in the ſimple differences, or in arithmetical ratios of the numbers expreſſing the lengths or vibrations, but in their geometric ratio's; ſo that the ſame *interval* depends on the ſame geometrical ratio, and *vice verſa*. It is however to be obſerved, that in comparing the equality of *intervals*, the ratios expreſſing them muſt be all of one ſpecies; otherwiſe this abſurdity will follow, that the ſame two ſounds may make different *intervals*—To deſcribe the particular methods of meaſuring the inequality of *intervals*, would be too tedious: this one rule may be obſerved, that, to determine in general which of two or more *intervals* are the greateſt, take all the ratios as proper fractions, and the leaſt fraction will be the greateſt *interval*.

The ancients were extremely divided about the manner of meaſuring *intervals*.—Pythagoras and his followers meaſured them by the ratios of numbers. They ſuppoſed the differences of gravity and acuteneſs to depend on the different velocities of the motion which cauſes ſound; and therefore concluded, that they could only be accurately meaſured by the ratios of thoſe velocities. Which ratios are ſaid to have been firſt inveſtigated by Pythagoras, on occaſion of his paſſing by a ſmith's ſhop, and obſerving a concordance betwixt the ſounds of hammers ſtriking on the anvil.

Ariſtoxenus oppoſed this. He thought reaſon and mathematics had nothing to do in this caſe, and that ſenſe was the only judge in the diſpute; the other being too ſubtile to be of any uſe. He therefore determined the octave, fifth, and fourth, which are the moſt ſimple concords, by the ear; and by the difference of the fourth and fifth, he found out the tone; which once ſettled as an *interval* the ear could judge of, he pretended to meaſure every *interval* by various additions, and ſubtractions, made of theſe mentioned one with another: but this method is very inaccurate.

Ptolemy keeps a middle courſe betwixt the two: he finds fault with the one for deſpiſing reaſon, and with the other for excluding ſenſe; and ſhews how theſe two may mutually aſſiſt each other in this matter. Malcolm.

Intervals are founded on certain ratios or proportions expreſſible in numbers, which may all be analyſed into the prime numbers 2, 3, and 5. And all *intervals* may be found from the octave, fifth and third major, which reſpectively correſpond to thoſe numbers. Theſe are the muſician's elements, from the various combinations of which all the agreeable variety of relations of ſounds reſults.

This is the modern ſyſtem, and a late author aſſures us, it may be looked on as the ſtandard of truth; and that every *interval* that occurs in muſic is good or bad, as it approaches to, or deviates from what it ought to be, on theſe principles. He obſerves, that the doctrine of ſome of the ancients ſeems different. Ptolemy for inſtance, introduces not only the primes 2, 3, 4, 5, but alſo 7 and 11, &c. Nay, he ſeems to think all fourths good, provided their component *intervals* may be expreſſed by ſuperparticular ratios. But theſe are juſtly exploded conceits; and it ſeems not improbable, that the contradictions of different numerical hypotheſes, even in the age of Ariſtoxenus, and their inconſiſtency with experience, might lead him to reject numbers altogether.—Dr. Pepuſc. ap. Phil. Tranſ. N° 481. p. 267, 268.

Mr. Euler defines an *interval*, the meaſure of the difference of an acute and grave ſound. Tentam. Nov. Theor. Muſic. p. 72. and p. 103.

Suppoſe three ſounds a, b, c, of which c is the acute, a the moſt grave, and b the intermediate ſound. From the preceding definition, it appears that the *interval* between the ſounds a and c, is the aggregate of the *intervals* between a and b, and between b and c. Therefore if the *interval* between a and b, be equal to that between b and c, which happens when $a:b::c:d$, the *interval* between a to c will be double the *interval* a to b, or b to c. This being conſidered, it will appear that *intervals* ought to be expreſſed by the meaſures of the ratios, conſtituting the ſounds forming thoſe *intervals*: But ratios are meaſured by the logarithms of fractions, the numerators of which denote the acute ſounds, and the denominators the grave. Hence the *interval* between the ſounds a and b, will be expreſſed by the logarithm of the fraction $\frac{b}{a}$ which is uſually denoted by $l\frac{b}{a}$, or, which comes to the ſame $lb - la$. The *interval* therefore of equal ſounds, a to a, will be null, as $la - la = 0$. The *interval* called an octave or diapaſon, will be expreſſed by the logarithm of 2; and the *interval* of the fifth or diapente, will be $l3 - l2$. From whence it appears, that theſe *intervals* are incommenſurable; ſo that no *interval*, however ſmall, can be an aliquot part, both of the octave and fifth. The like may be ſaid of the *intervals* $l\frac{3}{2}$ and $l\frac{5}{4}$, and others whoſe logarithms are diſſimilar. But *intervals* expounded by logarithms of numbers, which are powers of the ſame root, may be compared—Thus, the *interval* of the ſounds 27 : 8, will be to the *interval* of the ſounds 9 : 4, as 3 is to 2: For $l\frac{27}{8} = 3l\frac{3}{2}$, and $3l\frac{9}{4} = 2l^3$. Euler, ibid. p. 74.

But though the logarithms of numbers, which are not powers of the ſame root, be incommenſurable, yet an approximating ratio of ſuch may be found. Thus the meaſure of the octave is $l2 = 0.3010300$, and the meaſure of the fifth is $l3 - l2 = 0.1760913$. Hence the *interval* of the octave wil be to that of the fifth, nearly as 3010300 to 1760913; which ratio being reduced to ſmaller terms, in the method explained under the head RATIO, will give us theſe ſimpler expreſſions for the ratio of the octave and fifth, 2 : 1, 3 : 2, 5 : 3, 7 : 4, 12 : 7, 17 : 10, 29 : 17, 41 : 24, 53 : 31, which laſt is very near the truth. Euler, ibid. p. 75.

In like manner *intervals* may be divided into any number of equal parts: for this purpoſe we need only divide the logarithm of the propoſed *interval* into the ſame number of parts, and then find its correſpondent number by the tables. The ratio of the number ſo found, to unity, will give the required ratio of the divided *interval* to its propoſed part. Thus let the third part of an octave be required; its logarithm will be $= 0.1003433 = \frac{1}{3}l2$: The ratio correſponding nearly to this will be 63 : 50, or leſs accurately, 29 : 23, or 5 : 4, which laſt expreſſes the third major; and this is by the leſs knowing taken for the third part of an octave, and ſeems to be ſuch on our harpſichords and organs, where from C to E is a third, from E to G※ another, and from G※ or A^b to *c* another third. But the more intelligent know, that G※ and A^b ought not to be reputed the ſame ſound, ſince they differ by a dieſis enharmonica, which is nearly equal to two commas.

Mr. Euler has inſerted a table of *intervals* in his Tentamen Novæ Theoriæ Muſicæ: he ſuppoſes the logarithm or meaſure of the octave to be 1.000000, whence the logarithm of the fifth will be 0.584962, and the logarithm of the third major will be 0.321928; from theſe the meaſures of all other *intervals* may be found. But as it has been cuſtomary for muſicians to meaſure their *intervals* by commas, whe ſhall here inſert a table of *intervals* with their meaſures in commas; where we ſuppoſe the logarithm or meaſure of the comma $\frac{81}{80}$ to be 1.00000: hence the logarithm of the octave $\frac{2}{1}$ will be 55.79763, that of the fifth 32.63952, and laſtly that of the third major 17.96282. From theſe all the other *intervals* may be found in the manner expreſſed in the table; where the firſt column ſhews the names of the ſeveral *intervals*; the ſecond, the proportions of ſounds forming theſe *intervals*; the third, the compoſition of thoſe proportions from the primes 2, 3, and 5. The ſmaller figures marked above, and ſomewhat to the right of the larger, indicate the power to which the number expreſſed by the larger figures is raiſed. Thus $\frac{2^{17}3}{5^8}$ ſhews that the ſeventeenth power of 2 multiplied by 3, and divided by the eighth power of 5, will produce $\frac{393216}{390625}$ in the ſecond column, and that this is the proportion expreſſing the *interval* called *eſchaton* in the firſt column. The fourth column of the table contains ſome ſimple ſigns of ſome of the *intervals*, as *h* for *hyperoche*, *d* for *dieſis*, &c. and the fifth column ſhews how the *intervals* ariſe from others: Thus, over-againſt ſemitone major, I find in the fourth column *S*, which is here only an arbitrary mark for this ſemitone; and in the fifth column I find $s + d = \text{IV} - \text{III}$, which ſignifies that the ſemitone major is equal to the ſum of of the ſemitone minor and dieſis, or to the difference between the fourth and third major. Obſerve, that the comma is marked by a dot (.); when this is placed over the letter or other ſymbol, it ſignifies that the *interval* is ſuppoſed to be heightened by a comma; and on the contrary, when the point is placed below, it ſignifies that the *interval* muſt be diminiſhed by a comma. Thus $\dot{t} = T$ ſignifies that the tone-minor increaſed by a comma is equal to a tone major, and vice verſa, $\underset{.}{T} = t$ ſhews that the tone-major diminiſhed by a comma is equal to the tone-minor. The ſigns +, −, =, are here taken in the ſame ſenſe, as in algebra, to ſignify addition, ſubſtraction, and equality. So likewiſe the dot placed between two numbers, or between a number and the ſymbol of an *interval*, ſignifies that the *interval* is to be multiplied by the number. Thus 2 . IV ſhews that the fourth is doubled; and thus $7^b = \text{VI} + S = 2 . \text{IV} = \text{VIII} - T$, ſhews, that the leſſer flat ſeventh is equal to the ſixth major and ſemitone-major, or alſo to two fourths, or to the octave when the tone-major has been taken from it. Laſtly, the ſixth column of the table ſhews the meaſures, or logarithms of the ratios in the ſecond column. Theſe are not the common logarithms of the tables where 1.0000000 is the logarithm of 10. But here 1.00000 is aſſumed as the logarithm of $\frac{18}{80}$ or of the comma, as before mentioned. Theſe logarithms are eaſily derived from the common, of the larger tables of Vlacq, or Briggs. Thus the logarithm of 2, or the octave $= 0.3010299957$; the logarithm of $\frac{3}{2}$, or of the fifth $= 0.1760912590$; and laſtly the logarith of $\frac{5}{4}$, or of the third major $= 0.0969100130$. Now theſe logarithms being ſeverally divided by the logarithm of $\frac{81}{80}$, or of the comma $= 0.0053950139$; the quotients will give the number of commas in an octave $= 55.79763$; in a fifth $= 32.63952$; and in a third major $= 17.96282$. Hence all the reſt may be found by addition and ſubſtraction only. Here follows the Table.

A TABLE of the Muſical *Intervals*, with their Meaſures.

Names of the *Intervals*.	Proportions expreſſing the *Intervals*	Compoſition of the proportions from 2, 3, and 5.	Simple Signs.	Complex ſigns to ſhew the Compoſition of *Intervals*.	Meaſures by Commas.
Eſchaton	$\frac{393216}{390625}$	$\frac{2^{17}.3}{5^{8}}$		$l-h=2d-s=3d-S$	0.53222
Diaſchiſma	$\frac{2048}{2025}$	$\frac{2^{11}.5}{3^{4}.5^{2}}$		$\underset{\cdot}{l}$	0.90917
Comma	$\frac{81}{80}$	$\frac{3^{4}}{2^{4}.5}$		$T-t$	1.00000
Comma of Pythagoras	$\frac{531441}{524288}$	$\frac{3^{12}}{2^{19}}$		$6T-VIII$	1.09083
Hyperoche	$\frac{3125}{3072}$	$\frac{5^{5}}{2^{10}.3}$	*h*	$s-d=S-2d$	1.37695
Enharmonic Dieſis, or diminiſhed ſecond	$\frac{128}{125}$	$\frac{2^{7}}{5^{3}}$	*d*	$S-s$	1.90917
Semi-tone Minor, or leaſt Chromatic Dieſis	$\frac{25}{24}$	$\frac{5^{2}}{2^{3}.3}$	*s*	$t-S=d+h=III-3^{b}$	3.28612
Limma of the Greek Scale, or deficient Semi-tone Major	$\frac{256}{243}$	$\frac{2^{8}}{3^{5}}$		$\underset{\cdot}{S}=IV-2\dot{T}$	4.19529
Leſſer Limma, or redundant Semi-tone Minor	$\frac{135}{128}$	$\frac{3^{3}.5}{2^{7}}$		$\dot{s}=T-S$	4.28612
Semi-tone Major	$\frac{16}{15}$	$\frac{2^{4}}{3.5}$	S	$s+d=IV-III$	5.19529
Apotome of the Greek Scale	$\frac{2187}{2048}$	$\frac{3^{7}}{2^{11}}$		$T-S=\underset{\cdot}{\ddot{s}}$	5.28612
Greater Limma, or redundant Semi-tone Major	$\frac{27}{25}$	$\frac{3^{3}}{5^{2}}$		$\dot{S}=T-s$	6.19529
Double Semi-tone Minor	$\frac{625}{576}$	$\frac{5^{4}}{2^{6}.3^{2}}$		$2s=t-\dot{d}$	6.57224
Greateſt Limma, or redundant double Semi-tone Minor	$\frac{1125}{1024}$	$\frac{3^{2}.5^{3}}{2^{10}}$		$s+\dot{s}=T-d$	7.57224
Tone Minor	$\frac{10}{9}$	$\frac{2.5}{3^{2}}$	*t*	$S+s=\underset{\cdot}{T}=IV-3^{b}=III-T$	8.48141
Tone Major	$\frac{9}{8}$	$\frac{3^{2}}{2^{3}}$	T	$\dot{t}=V-IV$	9.48141
Diminiſhed Third	$\frac{256}{225}$	$\frac{2^{8}}{3^{2}.5^{2}}$		$t+d=2S$	10.39058
	$\frac{144}{125}$	$\frac{2^{4}.3^{2}}{5^{3}}$		$T+d=3^{b}-s$	11.39058
Superfluous Second	$\frac{125}{108}$	$\frac{5^{3}}{2^{2}.3^{3}}$		$t+s$	11.76753
	$\frac{75}{64}$	$\frac{3.5^{2}}{2^{6}}$		$T+s=3^{b}-d$	12.76753
Trihemitone of the Greek Scale, or deficient Third Minor	$\frac{32}{27}$	$\frac{2^{5}}{3^{3}}$		$\underset{\cdot}{3}^{b}=t+S=IV-T$	13.67670
Third Minor	$\frac{6}{5}$	$\frac{2.3}{5}$	3^{b}	$T+S=V-III$	14.67670
Trihemitone Major	$\frac{4096}{3375}$	$\frac{2^{12}}{3^{3}.5^{3}}$		$3S=T+S+\underset{\cdot}{d}$	15.58587
Extreme diminiſhed Fourth	$\frac{768}{625}$	$\frac{2^{8}.3}{5^{4}}$		$3^{b}+d=IV-2s$	16.58587
Third Major	$\frac{5}{4}$	$\frac{5}{2^{2}}$	III	$III=V-3^{b}$	17.96282
Ditonus of the Greek Scale, or redundant third Major	$\frac{81}{64}$	$\frac{3^{4}}{2^{6}}$		$\dot{III}=2T$	18.96282
Diminiſhed Fourth	$\frac{32}{25}$	$\frac{2^{5}}{5^{2}}$		$III+d=IV-s$	19.87199
Superfluous Third	$\frac{125}{96}$	$\frac{5^{3}}{2^{5}.3}$		$III+s$	21.24894
Fourth	$\frac{4}{3}$	$\frac{2^{2}}{3}$	IV	$III+S=VIII-V$	23.15811
Redundant Fourth	$\frac{27}{20}$	$\frac{3^{3}}{2^{2}.5}$		$\dot{IV}=3^{b}+T$	24.15811
Superfluous Fourth	$\frac{25}{18}$	$\frac{5^{2}}{2.3^{2}}$		$\underset{\cdot}{IV}+s$	26.44423
Semidiapente of the Greek Scale	$\frac{1024}{729}$	$\frac{2^{10}}{3^{6}}$		$IV+S$	27.35340
Tritonus, or falſe Fourth	$\frac{45}{32}$	$\frac{3^{2}.5}{2^{5}}$		$IV+\dot{s}\pm V-S$	27.44423
Semidiapente, or falſe Fifth	$\frac{64}{45}$	$\frac{2^{6}}{3^{2}.5}$		$IV+S.=V-\dot{s}$	28.35340
Tritonus of the Greek Scale	$\frac{723}{512}$	$\frac{3^{6}}{2^{9}}$		$3T=V-S=IV+\ddot{s}$	28.44423
Diminiſhed Fifth	$\frac{36}{25}$	$\frac{2^{2}.3^{2}}{5^{2}}$		$V-s=2.3^{b}$	29.35340
Deficient Fifth	$\frac{40}{27}$	$\frac{2^{3}.5}{3^{3}}$		$\underset{\cdot}{V}=IV+t$	31.63952
Fifth	$\frac{3}{2}$	$\frac{3}{2}$	V	$IV+T=III+3^{b}$	32.63952

Names of the *Intervals*.	Proportions expreſſing the *Intervals*	Compoſition of the proportions from 2, 3, and 5.	Simple Signs.	Complex ſigns to ſhew the Compoſition of *Intervals*.	Meaſures by Commas.
Superfluous Fifth	$\frac{25}{16}$	$\frac{5^2}{4^2}$		$V+s=2.\ III.$	35.92564
Sixth Minor	$\frac{8}{5}$	$\frac{2^3}{5}$	6^b	$V+S=VIII-III$	37.83481
Sixth Major	$\frac{5}{3}$	$\frac{5}{3}$	VI	$V+t=VIII-3^b$	41.12093
Hexachord of the Greek Scale, or redundant Sixth Major	$\frac{27}{16}$	$\frac{3^3}{2^4}$		$\dot{VI}=V+T=VIII-\underset{\cdot}{3}^b$	42.12093
Leſſer diminiſhed Seventh	$\frac{128}{75}$	$\frac{2^7}{3\cdot5^2}$		$6^b+S=2.IV-s=7^b-s$	43.03010
Greater diminiſhed Seventh	$\frac{216}{125}$	$\frac{2^3\cdot3^3}{5^3}$		$6^b+\dot{S}=\dot{7}^b-s$	44.03010
Leſſer ſuperfluous Sixth	$\frac{125}{72}$	$\frac{5^3}{2^3\cdot3^2}$		$VI+s$	44.40705
Greater ſuperfluous Sixth	$\frac{225}{128}$	$\frac{3^2\cdot5^2}{2^7}$		$VI+\dot{s}=VIII-2S$	45.40705
Leſſer Seventh Minor	$\frac{16}{9}$	$\frac{2^4}{3^2}$	7^b	$VI+S=2.IV=VIII-T$	46.31622
Greater Seventh Minor	$\frac{9}{5}$	$\frac{3^2}{5}$	$\dot{7}^b$	$VI+\dot{S}=V+3^b=VIII-t$	47.31622
Seventh Major	$\frac{15}{8}$	$\frac{3\cdot5}{2^3}$	VII	$VI+T=VIII-S$	50.60234
Diminiſhed Octave	$\frac{48}{25}$	$\frac{2^4\ 3}{5^2}$		$VII+d=VIII-s$	52.51151
Superfluous Seventh	$\frac{125}{64}$	$\frac{5^3}{2^6}$		$VII+s=VIII-d$	53.88846
Octave	$\frac{2}{1}$	$\frac{2}{\cdot}$	VIII	$VIII=V+IV$	55.79763

The limma, apotome, trihemitone, ditonus, ſemidiapente, and tritonus, mentioned in this table, by the names of limma, apotome, &c. of the Greek ſcale, are ſuch as are either mentioned by the ancients, or at leaſt occur in their ſcale, where fourths are divided into two tones and a limma, and where the octave conſiſted of five tones and two limmas.

The term *redundant* in the table, is applied to ſuch *intervals* as exceed the truth by a comma; and ſuch as fall ſhort of the truth by a like quantity, are called *deficient*. *Intervals* that exceed true diatonic *intervals*, by a ſemitone-minor, are ſaid to be *ſuperfluous*; and thoſe which fall ſhort by the ſame quantity are ſaid to be *diminiſhed*. Where an *interval* exceeds a true diatonic *interval* by the quantity of two ſemitones minor, we have called it an *extreme ſuperfluous interval*: And if it falls ſhort by the ſame quantity the appellation of *extreme diminiſhed interval* is given it. Thus, if from A to D aſcending be a true fourth, and from D to *a* a true fifth, then, if D be ſuppoſed raiſed by a comma, from A to Ḋ will be a redundant fourth, and from Ḋ to *a* a deficient fifth. From A to D※ will be a ſuperfluous fourth, and from D※ to *a* will be a dimiſhed fifth. In like manner, from A to D^b, will be a diminiſhed fourth; and from D^b to *a* a ſuperfluous fifth. From A to D※※ (D double ſharp) will be an extreme ſuperfluous fourth, and from A to D^{bb} (D double flat) will be an extreme diminiſhed fourth. In like manner from D※※ to *a* will be an extreme diminiſhed and from D^{bb} to *a*, an extreme ſuperfluous fifth. Such *intervals* are not to be met with in the practice of muſic; but if the diviſion of the octave into 31 parts were once eſtabliſhed, as it ought for the perfection of muſic, ſuch *intervals* as theſe here mentioned will neceſſarily occur in the ſcale. Vide Phil. Tranſ. N° 481. p. 273, 274. See GENUS.

This table, among other uſes, will facilitate the examination of any propoſed ſcale, or *interval*. Suppoſe, for inſtance, it were required to examine ſome of Ptolemy's diviſions of the fourth, as his diatonicum molle, which he makes $\frac{8}{7}+\frac{10}{9}+\frac{21}{20}=\frac{4}{3}$. Take the logarithm of $\frac{8}{7}$ from the common tables and divide it by the logarithm of $\frac{81}{80}$, the quotient will be 10.75, which gives the meaſure or number of commas, and its parts contained in an *interval* expreſſed by $\frac{8}{7}$. Look for the neareſt meaſure of *intervals* to 10.75 in the table, it will be found to be 10.39058, which anſwers to the *interval* of two ſemitones major, or of the diminiſhed third as practitioners call it. But Ptolemy's exceeds this by 0.36, or about $\frac{1}{3}$ of a comma. The next *interval* in Ptolemy's diviſion is $\frac{10}{9}$, which is a true tone-minor. The third is $\frac{21}{20}$, which will be found to be 3.93 commas, that is a ſemi-tone minor and 0.64 of a comma, or a ſemi-tone minor redundant by near $\frac{2}{3}$ of a comma. But this is much out of tune. In the common, and in Huygens's temperatures the ſemitone minor is increaſed only by about $\frac{1}{4}$ of a comma. Vide Ptolemy's Harmon. p. 92. apud Wallis Opera, tom. v.

Concinnous INTERVALS, in *Muſic*. Diſcords are diſtinguiſhed into *concinnous* and *inconcinnous intervals*: the *concinnous* are ſuch as are fit for muſic, next to, and in combination with concords; being neither very agreeable nor diſagreeable in themſelves; but having a good effect, as by their oppoſition they heighten the more eſſential principles of pleaſure; or as by their mixture and combination with them, they produce a variety neceſſary to our being better pleaſed.

The other diſcords that are never uſed in muſic, are called *inconcinnous*.

INTERVAL, *Diminiſhed*. in *muſic*, is a defective *interval* or an interval which is ſhort of its juſt quantity by a leſſer ſemitone. Thus from C ♮ to E being a third minor, if E be lowered by a ſemi-tone minor, we ſhall have E b, and then from C ♮ to E b is called a *diminiſhed* third in the language of practical muſicians, and occurs frequently in their works. But ſtrictly ſpeaking in this caſe, the note E muſt be lowered more than a ſemi-tone minor.

INTERVAL, *Harmonical*, in *Muſic*, is an *interval*, or difference of two ſounds which are agreeable to the ear, whether in conſonance or ſucceſſion.

Harmonical Intervals, therefore are the ſame with *concords*. They are thus called, as being the only eſſential ingredients of harmony.

INTERVALS, in the *New Method of Huſbandry*, denote the wide ſpaces, commonly about five feet, which are left between any two of the double, treble or quadruple rows. See HUSBANDRY.

INTERVALS, in the *Military Art*, are the ſpaces left between each regiment in CAMP, and likewiſe between each tent.

INTERVERTEBRALES *Muſculi*, are muſcles that ariſe from the body of one vertebra laterally, and are inſerted, after an oblique progreſs, into the back part of the other vertebra, immediately above it. They draw the vertebræ nearer to one another, and a little to one ſide.

INTESTATE, a perſon who dies without making a will. An heir *ab-inteſtato*, is a perſon who inherits an eſtate by ſome other right, than that of will or teſtament.

Heretofore, thoſe who died *inteſtate*, were held infamous, and accurſed; in regard, by the canons of ſeveral councils, every perſon was injoined to bequeath a part of his eſtate (and Matthew Paris ſays it was at leaſt to be a tenth part) to the church, for the ſafety of his ſoul; which a perſon who neglected to make a will, and to leave this legacy to the church, was judged to have abandoned.—Several councils took on them to command the prieſts to ſolicit dying perſons to be charitable to the church; and this they did ſo earneſtly, that abſolution and the viaticum were denied to thoſe whom they could not prevail on; ſo that they made no difference between theſe *inteſtates* and ſelf-murderers; and they were alike denied Chriſtian burial.—Du Cange adds, that all who died without abſolution, without receiving the viaticum, and without leaving alms to the church (even though they died ſuddenly), had their effects ſeized, and confiſcated to the uſe of the church, the biſhop, *&c.*

In the Engliſh law there are two kinds of *inteſtates*: the one *de facto*, which are thoſe who make no will at all; the other *de jure*, called alſo *quaſi inteſtati*, which are thoſe who make a will; but ſuch an one as is null and void, either from the executors refuſing to act, or from ſome other cauſe: in which caſe they are judged to die as *inteſtate, quaſi inteſtati*.

And the 22 and 23 Car. II. c. 10. commonly called the ſtatute of diſtribution, appoints a diſtribution of *inteſtate's* eſtates, after debts and funeral expences are paid, among the wife and children of the deceaſed; or for want of ſuch among the next of kin, &c. and the act of parliament doth immediately upon the death of the *inteſtate* veſt an intereſt in the perſons entitled: ſo that if any one dies before the diſtribution, though within the year, his ſhare ſhall go to his executors or adminiſtrators; and not to the ſurvivors or next of kin to the inteſtate. 1 Lill. Abr. 487. See ADMINISTRATION. The brothers and ſiſters of the *inteſtate* ſhall have equal ſhares, with the mother. 1 Jac. II. c. 17. See CUSTOM *of* LONDON. By the ſame ſtatue it is enacted, that one third part of the ſurpluſage of the eſtate of any perſon dying *inteſtate*, ſhall be diſtributed to his wife, and the reſidue amongſt his children by equal portions, or amongſt ſuch perſons as legally repreſent his children, in caſe any of them be then dead, excepting ſuch child or children (not being heir at law) who ſhall have any eſtate by the ſettlement of the *inteſtate*, or ſhall be advanced by the *inteſtate* in his life-time, by portion or portions equal to the ſhare which ſhall by ſuch diſtribution be allotted to the other children, and in caſe their portions have not been equal, they ſhall be made ſo as nearly as poſſible out of the ſaid ſurpluſage. But the heir at law is to have an equal part in the diſtribution with the reſt of the children, without any conſideration of the value of the land which he hath by deſcent or otherwiſe from the *inteſtate*. In caſe there be no children nor legal repreſentatives, one moiety of the ſaid eſtate ſhall be allotted to the wife of the *inteſtate*, and the reſidue diſtributed equally to every of the next kindred of the *inteſtate*, who are in equal degree, and thoſe who legally repreſent them; provided that there be no repreſentations admitted among collaterals, after brothers and ſiſters children: and if there be no wife, the ſaid eſtate ſhall be wholly diſtributed in equal ſhares among the children; or if there be no child, to the next of kindred in equal degree, and their legal repreſentatives. But no ſuch diſtribution of the goods of an *inteſtate* ſhould be made till after one year be fully expired after his death, and thoſe to whom diſtribution is made, are required to give bonds with ſufficient ſureties, to refund in caſe of debts.

INTESTINA, in the *Linnæan Syſtem*, a genus of worms; the characters of which are that they are ſimple naked animals without limbs: ſome are pierced with a lateral hole or a kind of pore; and others are imperforated and have no lateral pore. The ſubordinate genera of this diviſion of worms are the *gordius*, *aſcaris*, *lumbricus*, *faſciola*, *ſipunculus*, *hirudo*, and *myxine*, comprehending twenty-four different ſpecies deſcribed by Linnæus. Syſtem. Nat. tom. i. pars 2. p. 1075, &c. Ed. 1767.

INTESTINE *motion*. See MOTION.

INTESTINE *war*. See WAR.

INTESTINES, INTESTINA, in *anatomy*, the *guts* or *bowels*; thoſe hollow, membranous, cylindrical parts, extended from the right orifice of the ſtomach to the anus; by which the chyle is conveyed to the lacteals, and the excrements are voided.

The *inteſtines* ſeem to be nothing but a continuation of the ſtomach; as conſiſting of the ſame number of coats, and fabricated in the ſame manner; they are protended with various circumvolutions and inflexions to the anus, through which they diſcharge the excrementitious parts of their contents out of the body.

They are, when ſeparated from the meſentery, to which they are all along connected, of a very great length; ordinarily about ſix or ſeven times as long as the perſon's height whoſe they were. And though they ſeem to be but one continued channel or fiſtula, yet becauſe in ſeveral parts their magnitude, figure, and thickneſs, are different, they are in general divided into the *thick* and *ſmall*; and theſe are again each of them ſubvided into three; the three ſmall are called *duodenum*, *jejunum*, and *ileum*; and the thick, *cæcum*, *colon*, and *rectum*. They have all of them, in common, a kind of vermicular motion, which, beginning at the ſtomach, is propagated downwards, and is called the *periſtaltic motion*. To facilitate that, they are generally lubricated with a great deal of fat, eſpecially the thick ones, whoſe ſurface being ſomewhat more uneven, and the contents leſs fluid than thoſe of the ſmall, they need ſomewhat more to make them ſlide eaſy.—See *Tab. Anat. (Splanch.) Fig.* 3. *lit. nn. Fig.* 6. *lit. n, b, c, Fig.* 7. *d, e.* See PERISTALTIC.

INTESTINA *tenuia*, *the ſmall guts*.—The firſt is called *duodenum*, and reaches from the right orifice of the ſtomach, as far as the vertebræ of the back on the left-ſide, where, at the firſt angle made by the *inteſtines*, it ends; which is about twelve inches; from which meaſure it ſeems to have taken its name. This meaſure, however, is far from being very exact, as being much too largely computed. Into this gut the gall-duct and pancreatic duct empty themſelves, and their ſeveral liquors here mix with the chyle. See DUODENUM.

The next *inteſtine* is the *jejunum*, ſo called, becauſe it is generally found more empty than the reſt; which may be occaſioned partly by the fluidity of the chyle, which is greater in this *inteſtine* than in any of thoſe that follow it; and partly by its capacity, being ſomewhat larger than that of the duodenum, and therefore it gives a freer paſſage; and perhaps alſo the irritation of this gut through the acrimony of the bile, which is diſcharged into the *inteſtines* a little before the beginning of this gut, may contribute ſomething towards accelerating the paſſage of the contents. However, it may ſeem ſufficient, that through the great number of lacteals, with which this gut abounds more than any other, the deſcent of the contents, which are here deprived of their moſt fluid parts, ſhould in the reſt be more ſluggiſh, by reaſon of their great conſiſtence.—This *inteſtine* is allowed to poſſeſs almoſt the whole umbilical region, and its length is generally computed to be about twelve or thirteen hands breadth.

The *ileum*, which is the third *inteſtine*, is ſituated below the navel, and fills the ilia with numerous folds and convolutions.—It is much the longeſt of all the *inteſtines*, being eſteemed to be one-and-twenty hands long: but theſe eſtimates are ſomewhat arbitrary, becauſe it is not exactly ſettled among anatomiſts, where the jejunum ends, or the ileum begins; neither is it eaſy or neceſſary to do it.—In both this and the preceding *inteſtine*, the inner tunic is much corrugated, the looſe folds of which have been thought to do, in ſome meaſure, the office of valves, and have therefore by authors been called *valvulæ conniventes*; which are framed, as in the ſtomach, only by the inner coat being larger than the outward.

INTESTINA *craſſa*, the *thick guts*.—The firſt is called the COECUM, which has a lateral inſertion into the upper end of the colon; and is not perforated at its other extremity, but hangs to it like the finger of a glove; and is about three or four inches long. The true uſe of this part is not yet determined, and ſome late anatomiſts have thought, that the name likewiſe is miſtaken, not allowing this to be the *cæcum* of the ancients, which they imagined to be that thick globous part of the colon, which is immediately appended to the ileum; and therefore they have given this part the name of *appendicula vermiformis*. This cœcum, or appendix, is proportionably bigger in infants than in adults, and in many other animals even ſmaller than in men; and is, at the unperforated extremity, ſlightly connected to the right kidney.

The next of the thick *inteſtines* is the COLON, which is much the largeſt and moſt capacious of them all. It has a great many cellulæ, or, as it were, diſtinct cavities, framed by a coarctation of the gut by two ligaments, or bundles of membranous fleſhy fibres, about half a finger broad, each running on either ſide the gut oppoſite to each other, the whole length of it; and as it were girding it in at certain diſtances, thereby making it reſemble a glaſs incorporator, uſed in mixing oil and vinegar.—The laſt of the *inteſtines* is the *rectum*, which reaches from the os ſacrum to the anus, and is plain, without cells. It is faſt tied to the oſſa ſacrum and coccygis, by means of the peritonæum, and in men to the neck of the bladder of urine, in women to the vagina uteri, to which it is ſo ſtrongly connected by a membranous ſubſtance, that the ſubſtance of the vagina and *inteſtine* are hardly diſtinguiſhable from one another. The length of this gut is ordinarily about a hand's breadth and a half, and its capacity about the thickneſs of three fingers; its lower end, the anus, is furniſhed with three muſcles, *viz.* the *ſphincter ani*, and two *levatores ani*, which ſee.

There are alſo in the *inteſtines* a great number of glands, which in the *inteſtina tenuia*, are gathered together in heaps, as it were like bunches of grapes. In theſe *inteſtines* they are very ſmall, and were it not for their coacervations, would be ſcarce viſible. But in the *inteſtina craſſa* they are much larger, not gathered like the others, but diſperſed; and though very numerous, they come under the denomination of *ſolitary glands*. The glands diſcharge a liquor into the *inteſtines*, whether ordinarily for any thing more than the lubrication of the *inteſtines*, and diluting their contents, is not certain; though through theſe ſeems the greateſt part of the diſcharge to be made, which, either upon extraordinary fluxes, or upon the adminiſtration of cathartics, we have frequent occaſions to obſerve.

The *inteſtines*, in general, are furniſhed with blood from the meſenteric arteries, which is returned by the meſeraic veins: but the duodenum receives a branch of an artery from the cœliac, which is called the *duodena*; to which anſwers a vein of the ſame name that likewiſe returns the blood to the porta; the rectum receives others, which are called *hæmorrhoids*; the internal from the inferior meſenteric, and the external from the hypogaſtric, with veins correſponding of the ſame name, that alſo go to the porta. Theſe veſſels ſpread the *inteſtines* with abundance of ramifications, and are frequently diverſified in ſeveral ſubjects of the ſame ſpecies; much leſs are they to be depended upon for an uniform appearance in animals of different kinds. The nerves of the *inteſtines* come ſome of them from thoſe of the ſtomach, and ſome from the great meſenteric plexus, which diſtributes branches to all the *inteſtines*. The remaining veſſels of the *inteſtines* are the lympheducts and venæ lacteæ.

The uſe of the ſmaller guts is to promote the formation of the chyle, to perfect its ſecretions, and to propel the remaining fæces to the larger. The office of the larger guts is to receive and collect the matter of the fæces, and at a proper time to expel it. See Miſcellaneous Remarks on the *Inteſtines*, by Dr. Monro. Edinb. Eſſ. vol. iv. art. 12.

INTESTINES, *Wounds of the*. When a large wound is made in the cavity of the abdomen, which not only lets out the *inteſtines*, but alſo divides ſome part of them; the wounded part of the inteſtines is always to be ſtitched up before they are returned, by which means the wound heals the more readily; and the diſcharge of the chyle and fæces into the cavity of the abdomen is prevented, from which dangerous ſymptoms would otherwiſe have enſued. And although wounds of the *inteſtines*, eſpecially of the ſmall guts, admit of little or no hopes of a cure; yet as the great guts ſometimes admit of the future with advantage, it is beter to uſe a doubtful remedy, than none. Small wounds of the inteſtines, however, or ſuch as do not exceed the diameter of a gooſe-quill, are by no means to be ſtitched, but left to nature; by which means there is much greater hope of ſucceſs than from irritating them with the future; but large wounds of the *inteſtines* though they ſeldom admit of cure, yet this is always to be attempted by means of the glover's ſuture, before the *inteſtine* is returned. To perform this, you are to be provided with a ſmall needle threaded with ſilk; an aſſiſtant ſhould take hold of one part of the gut by a fine piece of linen well aired, while the ſurgeon ſhould hold the other part in his left-hand, and ſew up the whole wound after the glover's manner, leaving very ſmall ſpaces, not more than the twelfth of an inch between each of the ſtitches. The laſt ſtitch in this operation muſt be faſtened with a knot, but the other end muſt hang about a foot out of the abdomen, by means of which the ſilk may be drawn out when the *inteſtine* is healed. After this is performed, the wound of the abdomen is next to be taken care of, and ſtitched up, keeping the lower or depending part of the wound open with a tent, till all the preternatural fluids are diſcharged out of the cavity of the abdomen, and till the union of the wound in the *inteſtine* ſhall give leave to draw away the ſilk with which the future was performed on it.

As the modern ſurgeons, however, have found that few are ſaved who have received any large wound in the *inteſtines*, and that in thoſe few who do recover, the wounded parts from the fineneſs of the coat of the gut do not properly unite, but rather adhere to the inner part of the peritoneum, or to the omentum, or to ſome other of the *inteſtines*, they rather chooſe now to let alone the operation of the future of the gut, and ſubſtitute a gentler method of cure. They paſs a waxed thread through a fine needle, and with this they faſten the wounded part of the *inteſtine* to the internal orifice of the wound in the abdomen. The thread that in this caſe hangs out of the abdomen, is to be ſo firmly fixed by the application of ſticking plaſters to the wound, that the *inteſtine* cannot recede from that part to which it was faſtened, nor can it evacuate any of its contents into the cavity of the abdomen. When this operation is well performed, the *inteſtine* eaſily adheres to the internal part of the abdomen, and the patient ſuffers infinitely leſs pain and hazard than from the former way of making the ſuture. The ſame method of cure alſo is the proper one for wounds of the ſtomach, when they are within the reach of the hand, and it is ſometimes crowned with ſucceſs. Heiſter's Surgery, p. 56. See GASTRORAPHY.

Loſs of ſubſtance in the INTESTINES. Where any part of the *inteſtines* is carried away the caſe is plainly deſperate, and it is indeed wonderful that perſons thus wounded have not all died upon the ſpot, or in the operation of making the ſuture, till ſome of the late eminent ſurgeons obſerved that the lips of the *inteſtines* ſo wounded, would ſometimes unexpectedly adhere to the wound in the abdomen, and took this hint from nature towards a cure in ſuch deſperate caſes. Whenever a ſurgeon therefore is called in a caſe of this kind, after diligently examining the ſtate of the upper part of the *inteſtine* which has ſuffered the loſs of ſubſtance, he ſhould ſtitch it to the external wound; for by this means the patient may not only be ſaved from inſtant death, but there have been inſtances where the wounded *inteſtine* has been ſo far healed, that the fæces which uſed to be voided by the anus, have been voided by the wound in the abdomen. And this, though from the neceſſity of wearing a tin or ſilver pipe, or keeping cloths conſtantly upon the part to receive the excrement, may ſeem to be very troubleſome; yet it is ſurely far better to part with one of the conveniences of life, than to part with life itſelf; beſide the excrements that are voided by this paſſage, are not ſo offenſive in ſmell as thoſe voided per anum.

The ſame method of cure may conveniently alſo be put in practice, where any part of the *inteſtine* is mortified, by having been thruſt out of the abdomen; for in this caſe if you tie up the meſenteric arteries, the corrupted or mortified part of the *inteſtine* may be cut off, and the remaining ſound part made to adhere to the wound of the abdomen. And it is ſurely better to try this method and ſave if it be only a few by it, than to leave all in this unhappy ſituation to periſh without help. Heiſter. p. 65.

We have inſtances of mortified pieces of the *inteſtines* in the HERNIÆ cut away, and a cure made by keeping the extremities of the gut near to each other, and near to the rings of the muſcles, with a ſtitch through the meſentery. The ends of the *inteſtines* grew to the peritoneum, new fleſh was extended along this membrane, and joined the extremities together. The ſoldered part of the gut is always ſtreightned, and therefore thoſe who are cured in this caſe ought to guard againſt too full meals and indigeſtion. See Memoires de l'Academie de Chirurg. tom. i.

INTESTINES, *Falling out of the*. See HERNIA.

INTESTINES, *Inflammation of the*. See ILIAC *Paſſion*.

INTESTINES *of fiſh*. The guts in fiſhes are very different in the ſeveral kinds in length, proportion, and figure; in ſome fiſh the *inteſtine* is ſtraight and ſimple, and is carried directly from the ſtomach to the anus, as in the conger, ſyngnathus and petromyzon; in others it is only once returned upward, as in the cyprini, ſalmons, pearch, and many others. In others it is variouſly contorted and revoluted, in the ſame manner as in land animals: we have inſtances of this in the ſparus, dolphin, mullet, and ſword-fiſh.

In length there are many very eminent differences. In the petromyza, &c. the whole *inteſtinal* canal is not ſo long as the body of the fiſh. In the cyprini of many kinds it is about the ſame length with the body of the fiſh; and in others it is greatly longer, as in the ſpari, mullets, *&c.*

INTESTINAL *Fever*. See FEVER.

INTESTINALIS *Sphincter*, in *Anatomy*, a name given by Winſlow to a muſcle of the anus, called by Albinus *ſphincter internus ani*. It is called by Riolan, and others, *ſphincter cutaneus*, and *ſphincter ſuperficialis*.

INTESTINUM *cæcum*. The fiſh kinds have in general a great number of theſe *cæca*; they are called by the ichthyologiſts *inteſtinula cæca*, and *appendices pylori*. They are always placed about the pylorus, and the beginning of the *inteſtinal* canal, and ſeem by their number and appearance to contribute not a little to the digeſtion of food. They are very different in the ſeveral kinds of fiſh, in number, figure, and proportion. In ſome fiſh there are none of them. The cetaceous fiſhes in general are without them, and the cartilaginous of many kinds alſo want them. In the ammodytes or ſand-eel there is only one *cæcum*, and this ſeems the only fiſh that has it ſingle. In many of the pleuronecti they are two in number, and very ſhort. The pearch, ſpari, *&c.* have five, ſix or ſeven of them, and all conſiderably large ones. In ſome fiſh there are eight, ten, or twelve of them, as in the cotti, and ſome of the ligyri. In the herring and anchovy, there are ſeventeen or eighteen of them. Some, but not many fiſh, have twenty or more, not arriving at thirty. The gadi, and ſome other fiſh have thirty; and the coregones and ſalmons, at leaſt ſixty of them. The clupea or thriſſa of authors has at leaſt eighty of them; and the ſword-fiſh, the tunny, the mackrel, and many others have more than an hundred of them, or have them indeed without number. Their differences in figure are alſo very great. In ſome fiſh they are long and narrow, as in the ſalmons, gadi, and clupeæ. In others, they are very ſhort and thick, as in the pleuronecti, and oſmerus. In the greateſt part of fiſhes they are much ſmaller than the reſt of the guts; but in the mullet and ſand-eel they are nearly as large as the *inteſtine* itſelf. It is remarkable, that theſe appendices to the pylorus, or *inteſtine*, are not only found in fiſhes, but in ſome inſects. Dr. Tyſon found three or four of them in that ſpecies of inſect called the *blatta*.

INTIRE *Tenancy*. See ENTIRE *Tenancy*.

INTRADA, in the *Italian Muſic*, is uſed to denote an *entry*, and is much the ſame as *prelude* or *overture*.

INSTRANSITIVE *Verbs*, in *Grammar*, ſuch whoſe action does not *(tranſire)* paſs on an object, or ſubject. See VERB *Neuter*.

INTRENCHMENT in *the Art of War*, all ſorts of works made to fortify a poſt againſt an enemy. See RETRENCHMENT.

They uſually conſiſt only of a bank of earth and a ditch, and are of two ſorts; ſuch as the trenches carried on in a ſiege, where the bank is between the ditch and the enemy or town; and where the earth is thrown up againſt the town; and ſuch as ſerve to incloſe a town or camp, ſecure a paſs, cover the entrance into a country or other places, &c. In theſe the ditch is between the bank and the enemy. The firſt ſort are uſually called TRENCHES or APPROACHES; and the ſecond are gegenerally called LINES.

It was a maxim amongſt the Romans, that even in their moſt haſty marches they *intrenched* every night.

INTRIGUE, or INTREAGUE, an aſſemblage of events, or circumſtances occurring in an affair, and perplexing the perſons concerned in it.

The word is French, *intrigue*, formed from the Latin *intricare*; which, according to Nonius, comes from *tricæ*, *entanglements*; and that from the Greek τριγεις, *hairs: quod pullos gallinaceos involvant & impediant capili.* Which conjecture is adopted by Tripaud, who will have the word *intrigue* to be primarily and properly underſtood of chickens, which have the feet entangled in hair; and to be derived from the Greek εν, and ϑριξ, *hair*.

INTRIGUE is more particularly uſed to ſignify the plot of a play, or romance; or that point wherein the principal characters are the moſt embaraſſed, through the artifice and oppoſition of certain perſons, of the unfortunate falling out of certain accidents, and circumſtances.

In a tragedy, comedy, or epic poem, there are always two deſigns; the firſt and principal is that of the hero of the piece; the ſecond contains the deſigns of all thoſe who oppoſe him. Theſe oppoſite cauſes produce oppoſite effects, to wit, the efforts of the hero for the execution of his deſign, and the efforts of thoſe who thwart it. As thoſe cauſes and deſigns are the beginning of the action, ſo thoſe efforts are the middle, and there form a knot or difficulty, which we call an *intrigue*, that makes the greateſt part of the poem. It laſts as long as the mind of the reader or hearer is ſuſpended about the event of thoſe oppoſite efforts: the ſolution or cataſtrophe commences when the knot begins to unravel, and the difficulties and doubts begin to clear up.

The *intrigue* or plot of the Iliad is twofold, the firſt comprehends the three days fighting in Achilles's abſence, and conſiſts, on the one ſide, in the reſiſtance of Agamemnon and the Greeks, and on the other, in the inexorable temper of Achilles. The death of Patroclus unravels this *intrigue*, and makes the beginning of a ſecond. Achilles reſolves to be revenged, but Hector oppoſes his deſign; and this forms the ſecond *intrigue*, which is the laſt day's battle.

In the Æneid there are alſo two *intrigues*: the firſt is taken up in the voyage and landing of Æneas in Italy; the ſecond in his eſtabliſhment there. The oppoſition he met with from Juno, in both thoſe undertakings, forms the *intrigue*.

As to the choice of the *intrigue*, and the manner of unravelling it, it is certain they ought both to ſpring naturally from the ground and ſubject of the poem.—Boſſu gives us three manners of forming the *intrigue* of a poem; the firſt is that already mentioned; the ſecond is taken from the fable, and deſign of the poet; in the third, the *intrigue* is ſo laid, as that the ſolution follows from it of courſe.

INTRIGUE in common language is uſed to denote a plot; a private tranſaction in which ſeveral parties are engaged, and uſually an affair of love. Johnſon.

INTRINSIC, a term applied to the inner, real, and genuine values, properties, *&c.* of any thing; in oppoſition to their *extrinſic*, apparent, or popular values, *&c.* See EXTRINSIC.

INTRITA, a name given by ſome authors to the *maltha*, a liquid bitumen uſed by the ancients inſtead of mortar in building.

INTRODUCTION, in *Rhetoric*, is the firſt part of an oration or diſcourſe, deſigned to prepare the minds of the hearers for a ſuitable reception of the ſucceeding parts: and for this purpoſe it is neceſſary that the orator gain the good opinion of his hearers, ſecure their attention, and give them ſome general notion of his ſubject. In order to gain the good opinion of his hearers, the orator, when he introduces his diſcourſe with his own perſon, will be careful to do it with modeſty, and ſeem rather to extenuate his virtues and abilities than to magnify them: when he ſets out with the perſons of thoſe to whom the diſcourſe is addreſſed, it is not unuſual to commend them for their virtues, and thoſe eſpecially which have a more immediate relation to the preſent ſubject. The other topics which are to be inſiſted upon for gaining eſteem, are principally taken from the ſubject, as its juſtice, importance, advantage or pleaſure. In ſpeaking of gaining the attention of hearers, Cicero ſays, we ſhall be heard attentively by one of theſe three things; if we propoſe what is great, neceſſary, or for the intereſt of thoſe to whom the diſcourſe is addreſſed. Some account of the ſubject ſhould always make a part of the *introduction*. As to the compoſition of this part of a diſcourſe, it ſhould appear eaſy and natural, and connected with the reſt of the diſcourſe: it ſhould be ſuited to its length: the language of it ſhould be juſt, eaſy, and pleaſant: it ought neither to be wholly without paſſions, nor too violent and impetuous. It ought not to be too general. The *introduction*, however, is not an eſſential part of a diſcourſe, and is ſometimes omitted by the beſt orators. Ward's Or. vol. i. lect. 12.

INTRODUCTOR, in *Antiquity*, was particularly uſed for an officer, who introduced the athletæ to the ſtadium, or place where they were to contend.

INTRONATI, the name of an academy at Sienna, in Italy.

The members of this academy contented themſelves, at their firſt inſtitution, with eſtabliſhing the following ſix ſhort laws: 1. To pray. 2. To ſtudy. 3. To be merry. 4. To offend nobody. 5. Not to credit too lightly. 6. To let the world talk.

INTRUSION, in the *Canon Law*, ſignifies the enjoyment of a benefice, or exerciſe of an office, without a good title to it. See ENTRUSION.

The word is derived from *intrudere*, to *thruſt in*, or *enter by force*.

Intruſion diſqualifies the party from ever holding the benefice.

INTRUSIONE, a writ brought againſt an *intruder*, by him that hath fee-ſimple, *&c.*

INTUITION, among *Logicians*, the act whereby the mind perceives the agreement or diſagreement of two ideas, immediately by themſelves, without the intervention of any other: in which caſe the mind perceives the truth, as the eye doth the light, only by being directed toward it. Thus the mind perceives that white is not black, that three are more than two, and equal to one and two. See IDEA.

This part of knowledge ſays Mr. Locke is irreſiſtible, and like the ſunſhine forces itſelf immediately to be perceived, as ſoon as the mind turns its view that way. It is on this *intuition* that all the certainty and evidence of our other knowledge depends: this certainty every one finds to be ſo great, that he cannot imagine, and therefore cannot require, a greater. See JUDGMENT, KNOWLEGE, DEMONSTRATION. *&c.*

INTUITIVE *Evidence*, is that which reſults from INTUITION. Dr. Campbell diſtinguiſhes different ſorts of *intuitive* evidence: one reſulting purely from intellection or that faculty which others have called intuition; another kind ariſing from conſciouſneſs; and a third ſort from that new-named faculty *common* SENSE, which this ingenious writer as well as ſeveral others contend to be a diſtinct original ſource of knowlege; whilſt others refer its ſuppoſed office to the *intuitive* power of the underſtanding. Campbell's Rhetoric, vol. i. book i. chap. 5.

IN-TURN, among *Wreſtlers*, is when one puts his thigh between thoſe of his adverſary, and lifts up his thigh.

INVADIATUS, in our *Old Writers*, a perſon accuſed of any crime, which not being fully proved, he was put *ſub debita fide juſſione*, and called *invadiatus*.

INVALID, a perſon wounded, maimed, or diſabled for action by age.

At Chelſea and Greenwich are magnificent HOSPITALS or rather colleges, built for the reception and accommodation of *invalids*, or ſoldiers and ſeamen worn out in the ſervice.

We have alſo twenty independent companies of invalids, diſperſed in the ſeveral forts and garriſons.

At Paris is a college of the ſame kind, called *les Invalides*, which is accounted one of the fineſt buildings in that city.

INVECTED, in *Heraldy*, denotes a thing fluted, or furrowed.

Invected is the juſt reverſe of *engrailed*, in which the points are turned outward to the field: whereas in *invected* they are turned inward to the ordinary. *Tab.* II. *Heraldry*, *fig* 70.

INVECTIVE, in *Rhetoric*, differs from reproof, as the latter proceeds from a friend, and is intended for the good of the perſon reproved; whereas *invective* is the work of an enemy, and entirely deſigned to vex and give uneaſineſs to the perſon againſt whom it is directed.

INVENTION denotes the act of finding any thing new; or even the thing thus found.

Thus we ſay, the *invention* of gunpowder, of printing, &c. The alcove is a modern *invention* owing to the Moors.

The Doric, Ionic, and Corinthian orders are of Greek *invention*; the Tuſcan and Compoſite of Latin *invention*. Janſon ab Almeloveen has written an Onomaſticon of *inventions*, wherein are ſhewn, in an alphabetical order, the names of the inventors, and the time, place, *&c.* where they are made.—Pancirollus has a treatiſe of old *inventions* that are loſt, and new ones that have been made; Polydore Virgil has alſo publiſhed eight books of the *inventors* of things. *De Inventoribus Rerum.*

Invention is alſo uſed for the diſcovery of a thing hidden.

The Romiſh church celebrates a feaſt on the fourth of May, under the title of, *Invention of the Holy Croſs.*

Invention is alſo uſed for ſubtilty of mind, or ſomewhat peculiar to a man's genius, which leads him to a diſcovery of things new.

In which ſenſe we ſay a man of *invention:* Wolfinus has made ſome eſſays towards an art of *invention.*

Invention, in *Painting*, is the choice which the painter makes of the objects that are to enter the compoſition of his piece.

M. Felibien gives the general name *invention* to every thing that depends on the genius of the painter, as the ordonnance, the diſpoſition of the ſubject, and even the ſubject itſelf, when it is new.

In another place that author diſtinguiſhes *invention* into two kinds; to wit, that which ariſes immediately from the mind of the painter, and that which he borrows from ſome other. The firſt is, when he abſolutely invents the ſubject himſelf; and the ſecond, when he borrows it from hiſtory, fable, *&c.*

De Piles obſerves, that *invention* is different from *diſpoſition*, and that theſe two things together form *compoſition:* for after having made a good choice of objects proper for the ſubject, they may be ill-diſpoſed; and then, though the *invention* be ever ſo good, the diſpoſition or ordonnance will be faulty, and the piece will diſpleaſe.

Of all the parts of painting, *invention*, doubtleſs, is that which gives the painter the faireſt occaſions of ſhewing his genius, his imagination, and his good ſenſe.

Invention, in *Poetry*, is applied to whatever the poet adds to the hiſtory of the ſubject he has choſen; as well as to the new turn he gives it.

Invention, in *Rhetoric*, ſignifies the finding out, and chooſing of certain arguments which the orator is to uſe for the proving or illuſtrating his point, moving their paſſions, or conciliating the minds of his hearers.

Invention, according to Cicero, is the principal part of oratory: he wrote four books *De Inventione*, whereof we have but two remaining.

This *invention* of the orators cannot, according to lord Bacon, be properly called *invention:* to *invent*, is to diſcover things not yet known, not to recollect thoſe that are; whereas the uſe and office of this rhetorical *invention*, is only, out of the ſtock of knowledge laid up in the mind, to ſelect ſuch articles as make for the purpoſe.

The ſame author divides this faculty of *invention* into two parts, the one *topical*, the other promptuary: the firſt points out the way in which we are to purſue the argument; the latter only lays up and diſpoſes things, for which we have frequent occaſion, in the mind.

Invention furniſhes the orator with thoſe different kinds of arguments and motives which are adapted to the various purpoſes he has in view. The helps of *invention* are a lively imagination and readineſs of thought, great learning and extenſive knowlege, previous conſideration, and clear enlarged apprehenſions of the ſubject. See ARGUMENTS, COMMON PLACES, and TOPICS, *&c.*

INVENTORY, in *Law*, a catalogue, or ſchedule orderly made, of all a deceaſed perſon's goods and chattels, at the time of his death, with their value appraiſed by indifferent perſons, which every executor or adminiſtrator is obliged to exibit to the ordinary at ſuch time as he ſhall appoint.

By 21 Hen. VIII. c. 5. Executors and adminiſtrators are to deliver in upon oath to the ordinary, indented *inventories*, one part of which is to remain with the ordinary, and the other part with the executor or adminiſtrator; this is required for the benefit of the creditors and legatees, that the executor or adminiſtrator may not conceal any part of the perſonal eſtate from them. The ſtatute ordains that the *inventory* ſhall be exhibited within three months after the perſon's deceaſe; yet it may be done afterwards, for the ordinary may diſpenſe with the time, and even with its being ever exhibited, as in caſes where the creditors are paid, and the will is executed.

The uſe of the *inventory* is borrowed from the civil law: for whereas by the law of the ancient Romans the heir was obliged to anſwer all teſtator's debts; by which means, inheritance ſometimes became rather prejudicial than profitable; to obviate this inconvenience, Juſtinian ordained, that if the heir would firſt exhibit a true *inventory* of all the teſtator's effects, he ſhould be no farther charged than to the value of the *inventory.*

Inventory, in *Trade*, is a liſt or particular valuation of goods, *&c.* See VALUE, APPRAISEMENT, *&c.*

INVERSE, is applied to a manner of working the rule of three, or proportion, which ſeems to go backwards, or contrarily to the order of the common and direct rule.

In the rule of three direct, the firſt term is to the ſecond, as the third is to the fourth; that is, if the ſecond be greater than the third, or leſs than the firſt, in any proportion, the fourth is leſs than the third in the ſame proportion.—But in the *inverſe* rule, the fourth term is as much greater than the third, as the ſecond is leſs than the firſt.

In the *inverſe* rule, therefore, the proportion is not as the firſt is to the ſecond, ſo is the third to the fourth; but as the fourth is to the firſt, ſo is the ſecond to the third. For inſtance, in the direct rule we ſay, If three yards of tapeſtry coſt twenty pounds, how much will ſix coſt? The anſwer is, forty. In the *inverſe* rule we ſay, If twenty working men make ten yards in four days, in how many days will forty do it? The anſwer to this, is in two days. See RULE *of Three.*

Inverse *Method of Fluxions.* See FLUXIONS.

Inverse *Planting.* See PLANTING.

Inverse *Proportion.* See PROPORTION.

INVERSION, the act whereby any thing is inverted, or turned backwards.

Problems in geometry and arithmetic are often proved by *inverſion*; that is, by a contrary rule, or operation.

Inversion, in *Grammar*, is where the words of a phraſe are ranged in a manner not ſo natural as they might be.

For an inſtance: ‘ Of all vices, the moſt abominable, ‘ and that which leaſt becomes a man, is impurity.’—Here is an *inverſion*; the natural order being this: Impurity is the moſt abominable of all vices, and that which leaſt becomes a man.

An *inverſion* is not always diſagreeable, but ſometimes has a good effect.

Inverted *Creſcent*, *Point*, *Volt*. See the ſubſtantives.

INVESTIGATION properly denotes the ſearching or finding any thing out, by the tracks, or prints of the feet. Hence, mathematicians, ſchoolmen, and grammarians, came to uſe them in their reſpective reſearches.

Investigation *of a Theme*, is the art, method, or manner of finding the themes of verbs, that is, the primitive tenſe, mood, and perſon, of any verb, far removed from its ſource. To underſtand a Greek author, it is abſolutely neceſſary to be well acquainted with the method of *inveſtigating* a theme. This theme, in the Greek tongue, is the preſent tenſe of the indicative mood.

Clenard was the firſt who introduced this term into grammar: he gives the title *inveſtigatio thematis* to that part where he teaches the manner of finding whence any perſon, or tenſe, or verb, proceeds, and of reducing it to its primitive word, or finding its indicative.

INVESTING, the act of conferring on any one the right, or property, of a fee, dignity, or office, or of ratifying and confirming what has been obtained elſewhere.

The emperor pretends to a right of *inveſting* ſeveral princes, both in Germany and Italy. There was formerly a particular ceremony for the *inveſting* of biſhops. After the election of a knight of the GARTER, he is *inveſted* by the ſovereign with the two principal enſigns of the order, the Garter and George.—Before his inſtallation he is alſo *inveſted* with the habit of the order.

INVESTING, in the *Military Art*, ſignifies the opening a ſiege, and the encamping of an army round the place; to block up its avenues, and prevent all ingreſs and egreſs.

It is the cavalry that always begins to *inveſt* a place.

INVESTING, in *Common Law*, ſignifies the putting in poſſeſſion. A tenant is *inveſted* by giving him a verge, or rod, into his hands, and adminiſtring an oath.

Others define it thus: *Inveſtire eſt in ſuum jus aliquem introducere*; to give livery of ſeiſin, or poſſeſſion. See LIVERY, and SEISIN.

INVESTITURE is uſed both for the right, and the act, of inveſting a tenant, or vaſſal; that is, of receiving the faith and homage by which a vaſſal becomes ſeiſed, and poſſeſſed of a fee, by his lord.

Inveſtiture was anciently performed by rehearſing a formula of words; afterwards by the delivery of ſuch things as had the neareſt reſemblance to what was transferred. Thus, land paſſed by the delivery of a turf; and to ſhew the trees were transferred at the ſame time, a bough was cut and delivered along with it.

In after-times, the things by which *inveſtitures* were made were not ſo ſtrictly obſerved.—Many were inveſted by the delivery of a ſtaff, a glove, a knife, a piece of a cloak, of a ſtrap, and a girdle: or by pricking the thumb, by giving the keys, a ſpit, a blow, a ring, a turf, a bough, a ſtraw, *&c.* The *inveſtiture* of a kingdom or lordſhip, was performed by a ſtandard, a banner, a cap, a ſword, a bow, arrows, ſpurs, *&c.*

The ſymbols were ſometimes preſerved in the repoſitories of the houſes, and were annexed to the titles.

INVESTITURES were alſo uſed with reſpect to ſpiritual benefices. Theſe were frequently performed by delivering the croſier and paſtoral ring.

The kings of England and France, the emperors of Germany, *&c.* had formerly this right; ſo that on the death of a prelate, his clergy ſent the croſier, *&c.* to their ſovereign, to be uſed at the ceremony of *inveſting* his ſucceſſor. It is not certain when this cuſtom began; Cardinal Humbert places the commencement of it in the reign of Otho the Great: and it appears, that in the ninth century, the greater part of the European princes made no oppoſition to the right of electing the BISHOPS, which was both claimed and exerciſed by the clergy and the people. The firſt who diſputed this privilege with the emperors and ſovereign princes, was Gregory VII. he excommunicated the emperor Henry IV. and forbad all eccleſiaſtics, under pain of *excommunication*, to receive *inveſtiture* at the hands of ſecular princes. This occaſioned a long and bloody war; the civil and eccleſiaſtical powers being divided into two great factions, of which one maintained the rights of the emperor, while the other ſeconded the ambitious views of the pontif. The laws of Gregory for the abolition of *inveſtitures* were confirmed and renewed by Victor III. and Urban II. the laſt of whom not only confirmed the laws and anathemas of Gregory, in a council aſſembled at Placentia in the year 1095; but publiſhed alſo a prohibitory law in the council of Clermont, forbidding the biſhops and the reſt of the clergy to take the oath of allegiance to their reſpective ſovereigns. Paſcal II. in a council aſſembled at Rome, A. D. 1102, renewed the decrees of his predeceſſors againſt *inveſtitures* and the excommunications they had thundered out againſt Henry IV. Paſcal, however, was obliged in 1111, to confirm Henry V. in the right of giving *inveſtitures*; but repenting what he had done, he aſſembled a council in the church at Lateran in 1112, which ſolemnly annulled his treaty with the emperor, who was excommunicated in many ſynods and councils, both in France and Germany. At length, however, Calixtus II. engaged him to renounce *inveſtitures* on certain conditions, and peace was concluded between the emperor and the pope's legates, at a general diet held at Worms, A. D. 1122. This convention was confirmed the following year in the general council of Lateran, and remains ſtill in force.

INULA, in *Botany*. See ELECAMPANE.

INVOCATION, in *Theology*, an act whereby we adore God, and call on him for his aſſiſtance.

The Romaniſts alſo practiſe *invocation* of ſaints, begging them to intercede with God in their behalf. This is one of the grand articles of diſpute between the Romaniſts and the reformed.

INVOCATION, in *Poetry*, an addreſs at the beginning of a poem, wherein the poet calls for the aſſiſtance of ſome god, particularly of his Muſe, or the deity of poetry. See MUSES.

This part is abſolutely neceſſary in an EPIC poem, becauſe the poet relates things which he could not be ſuppoſed to know, unleſs ſome deity inſpired him. Beſides, this ſerves his readers as an example of piety and devotion, which ought to be the foundation of his whole work. To theſe it may be added, that the gods themſelves are to have a part in the action; and it is not decent he ſhould ſet them to work, without firſt aſking them leave.

Indeed, in the courſe of an epic poem there are uſually ſeveral *invocations*; particularly where any thing extraordinary, or miraculous, comes to be related; as that when Virgil deſcribes the metamorphoſis of Æneas's fleet into ſea nymphs: but the firſt *invocation* is always the moſt conſiderable.

In the *invocation* Boſſu conſiders two things: the firſt is, what the poet requeſts; the ſecond, to what deity he addreſſes his requeſt. As to the firſt, Homer has joined the *invocation* ſo cloſely to the propoſition, that he ſeems to *invoke* his muſe for the whole work.—But Virgil, on the contrary, only requeſts his Muſe to furniſh him with a part of his ſubject; and even mentions what particular part it is he deſires.—After propoſing his matter in all its extent, he begs the Muſe to acquaint him with the cauſe of it. See PROPOSITION.

As to the deity *invoked*, the ſame author obſerves, that it muſt always be, either the divinity that preſides over poetry in general, or that which preſides over the particular ſubject of the work. Ovid's *invocation*, in his Metamorphoſes, is of this latter kind; and ſo is that of Lucretius: thoſe of Homer and Virgil are of the former kind; they only invoke the Muſes; and thus they diſtinguiſh between the divinities who preſide over poetry, and thoſe who preſide over the actions of the poem, and have parts in it.

By the way, it may be obſerved, that the deities *invoked* are not looked on, even by the poets themſelves, as divine perſonages from whom they expect any real aſſiſtance. Under the name of Muſe they wiſh for the genius of poetry, and for all the qualities neceſſary for the execution of their deſign. Theſe are mere allegories, or manners of expreſſing themſelves poetically; juſt as when they perſonify and make gods of ſleep, of reſt, fame, and other natural and moral things. And thus the Muſes come to be of all ages, countries, and religions; there are Pagan, Chriſtian, Greek, Latin, and Engliſh Muſes.

INVOICE, or INVOYCE, a liſt, or account, of commodities, with their value, cuſtoms, proviſion, charges, &c. ſent by a merchant to his factor, or correſpondent, in another country.

INVOICE, *book of*. See BOOK.

INVOLUCRUM, among *Botaniſts*, expreſſes that ſort of cup which ſurrounds a number of flowers together, every one of which has beſide this general cup its own particular perianthium. The *involucrum* conſiſts of a multitude of little leaves diſpoſed in a radiated manner. See CALYX.

INVOLUNTARY *motion*. See MOTION.

INVOLUTE *curve*, in the *Higher Geometry*. See EVOLUTE.

INVOLUTION, in *Algebra*, the raiſing any quantity from its root, to any height, or POWER, aſſigned.

Any quantity multiplied by itſelf, the product is the ſquare of that quantity; the ſquare being again multiplied by the quantity, produces its cube. See SQUARE and CUBE.

Thus if $a+b$ were to be raiſed to its ſecond power, it will produce $aa+2ab+bb$.

And if it be *involved* again, or if that ſquare be multiplied by the root, the cube, or third power, will be produced; viz. $aaa+3aab+3bba+abb$, &c. ſo that the *involution* of any compound quantity is performed by a continual multiplication of it by itſelf: if the powers of $a-b$ are required, they will be found the ſame as thoſe of $a+b$, except that the terms in which the exponent of b is an odd number will be negative, becauſe an odd number of multiplications of a negative produce a negative: or, in general, the terms of any power of $a-b$ are poſitive and negative by turns. See BINOMIAL *Theorem*.

If a quantity conſiſting of three or more terms is to be involved, it may be diſtinguiſhed into two parts, which are to be raiſed to any power in the ſame manner as a binomial; and then by the ſame rules, the value of theſe compound parts may be ſubſtituted in their ſtead: thus

$$\overline{a+b+c}^2 = \overline{\overline{a+b}+c}^2 = \overline{a+b}^2 + 2c\times\overline{a+b} + c^2 = a^2+2ab+b^2+2ac+2bc+c^2.$$

And $\overline{a+b+c}^3 = \overline{a+b}^3 + 3c\times\overline{a+b}^2 + 3c^2\times\overline{a+b} + c^3 = a^3+3a^2b+3ab^2+b^3+3a^2c+6abc+3b^2c+3ac^2+3bc^2+c^3$. The reverſe of *involution* is called EVOLUTION. See EXTRACTION of ROOTS, and ROOT.

INWARD *flanking Angle*, in *Fortification*; ſee ANGLE.

JOA *muſchata*, in *Botany*, a name uſed by ſome authors for the chamæpitys, or ground-pine.

JOACHIMITES, in *Eccleſiaſtical Hiſtory*, the name of a ſect, the followers of one Joachim, abbot of Flora, in Calabria, who was eſteemed a prophet while he lived, and left, at his death, ſeveral books of prophecies, contained in his Everlaſting Goſpel, commonly called the Book of Joachim, beſides other works; which were condemned, in 1215, by the council of Lateran; and by the council of Arles, in 1260.

One of the ſpiritual friars, named Gerhard, belonging to the order of FRANCISCANS, undertook to explain the Everlaſting Goſpel of Joachim, in a book publiſhed in 1250, entitled the Introduction to the Everlaſting Goſpel. In this work St. Francis is declared to be the angel mentioned in the Revelation xiv. 6. who had promulgated the true and everlaſting goſpel of God: it is alſo aſſerted, that the goſpel of Chriſt was to be abrogated in 1260, and this new goſpel to be publiſhed in its room; and that the miniſters of this ſignal reformation were to be humble and bare-footed friars, deſtitute of all worldly emolument. This abſurd book was ſuppreſſed by order of pope Alexander IV. in 1255, and at length publicly committed to the flames.

The *Joachimites* were particularly fond of certain ternaries: the Father, ſaid they, operated from the beginning till the coming of the Son; the Son from that time to theirs, viz. the year 1260; and the Holy Spirit then took it up, and was to operate in his turn.—Hence they divided every thing that related to men, time, doctrine, and manner of living, into three claſſes, or ſtates, according to the three perſons in the Trinity; every one of which ſtates either had already, or was hereafter to ſucceed in its turn; and hence they called their diviſions *ternaries*.

The explication given by Joachim, of the Trinity, in oppoſition to Peter Lombard, which was conſidered by many as differing little from the Arian ſyſtem, procured the damnatory ſentence of his doctrine by Innocent III. in the council of Lateran: but, notwithſtanding this papal ſentence, Joachim has ſtill a conſiderable number of adherents and defenders, more eſpecially among thoſe of the Franciſcans, who are called Obſervants, or FRIARS *obſervant*.

JOB, or *the Book of* JOB, a canonical book of the Old Teſtament, containing the narrative of a ſeries of misfortunes, which happened to a man whoſe name was *Job*, as a trial of his virtue and patience; together with the conferences he had with his cruel friends on the ſubject of his misfortunes: and the manner in which he was reſtored to eaſe and happineſs. This book is filled with thoſe noble, bold, and figurative expreſſions, which conſtitute the very ſoul of poetry.

Many of the Jewiſh rabbins pretend, that this relation is altogether a fiction; others think it a ſimple narrative of a matter of fact, juſt as it happened; while a third ſort of critics own the ground-work of the ſtory to be true, but that it is wrote in a poetical ſtrain, and decorated with peculiar circumſtances, to render the narration more profitable and entertaining.

See an expreſs diſſertation on the book of *Job*, in the biſhop of Glouceſter's Divine Legation of Moſes, vol. ii. This biſhop is of opinion that this book is a dramatic poem, written by Ezra, ſome time between the return of the Jews from the captivity of Babylon, and their thorough ſettlement in their own country, and adapted to the circumſtances of theſe times, by being made allegorical as well as dramatic: thus, Job, who is ſuppoſed to have been a real perſon, that lived a generation or two before Moſes, is deſigned to perſonate the Jewiſh people; his three friends, the three great enemies of the Jews, Sanballat, Tobiah, and Geſhem, who, upon their return from the captivity, vexed and obſtructed them in rebuilding their city and temple; Job's wife was intended by the poet to repreſent the idolatrous wives which many of the Jews had taken, contrary to the law, and for which they are reproved by the prophet Nehemiah. Le Clerc alſo ſuppoſes that the book of *Job* was written after the Jews were carried into Babylon, and urges, in proof of this, the frequent Chaldaiſms that occur in it.

The learned Grotius apprehends that this book contains a true hiſtory, treated in a poetical manner; that the events recorded in it happened in Arabia, whilſt the Hebrews wandered in the deſert; and that the writer, who was a Hebrew, lived before the time of Ezekiel, but after David and Solomon; and that it was written for the uſe of the Edomites, tranſported to Babylon, to confirm them in the worſhip of the true God, and to teach them patience in adverſity. Schultens aſcribes the poetical, or dialogue part of this book, the ſtyle of which, he ſays, has all the marks of the moſt venerable and remote antiquity, to *Job* himſelf; the reſt he ſuppoſes to be the work of ſome Hebrew collector. Moſt of the Jewiſh doctors believe, that Moſes was the writer of this book; and M. Huet ſuppoſes that it was written by Moſes in his exile in the land of Midian: nor is it improbable that it was deſigned to prepare the Iſraelites for their exodus from Egypt, and the hardſhips of their future peregrination.

JOB's *tears*, *Coix*, in *Botany*, a genus of the *monoecia triandria* claſs. Its characters are theſe: it hath male and female flowers on the ſame plant, and the male flowers are diſpoſed in a looſe ſpike; the chaff of theſe have valves, incloſing two flowers; the petal has two oval valves, theſe have each three hairy ſtamina, terminated by oblong four-cornered ſummits; there are a few female flowers ſituated at the baſe of the male ſpike in the ſame plant, having a bivalvular chaff; the petal hath two oval valves, and they have a ſmall oval germen, ſupporting a ſtyle divided into two parts, which becomes a hard roundiſh ſmooth ſeed. There are two ſpecies, the firſt of which grows naturally in the iſlands of the Archipelago, and is frequently cultivated in Spain and Portugal, where the poor inhabitants make a coarſe ſort of bread of the grain. Miller.

JOBBER, a perſon who undertakes *jobbs*, or ſmall pieces of work.

In ſome ſtatutes, *jobber* is uſed for a perſon who buys and ſells cattle for others See BROKER.

JOBENT *nails*. See NAILS.

JOCKEY, in the management of horſes; the perſon who trims up, and rides about horſes for ſale.

JOCKLET, or YOCKLET, a term uſed in ſome parts of Kent, for a little farm which requires but one yoke of oxen to till it.

JOEL, or *the Prophecy of* JOEL, a canonical book of the Old Teſtament. *Joel* was the ſon of Pethuel, and the ſecond of the twelve leſſer prophets. The ſtyle of this prophet is figurative, ſtrong, and expreſſive. He upbraids the Iſraelites for their idolatry, and foretels the calamities they ſhould ſuffer as the puniſhment of that ſin: but he endeavours to ſupport them with the comfort that their miſeries ſhould have an end upon their reformation and repentance. Some writers, inferring the order of time in which the minor prophets lived from the order in which they are placed in the Hebrew copies, conclude that *Joel* propheſied before Amos, who was contemporary with Uzziah, king of Judah. Archbiſhop Uſher makes this inference from *Joel's* foretelling that drought, chap. i. which Amos mentions as having happened, chap. iv. 7, 8, 9. If we conſider the main deſign of *Joel's* prophecy, we ſhall be apt to conclude, that it was uttered after the captivity of the ten tribes; for he directs his diſcourſe only to Judah, and ſpeaks diſtinctly of the ſacrifices and oblations that were daily made in the temple. Lowth.

JOGHIS, a ſect of heathen religious in the Eaſt Indies, who never marry, nor hold any thing in private property; but live on alms, and practiſe ſtrange ſeverities on themſelves.

They are ſubject to a general, who ſends them from one country to another to preach: they are, properly, a kind of penitent pilgrims; and are ſuppoſed to be a branch of the ancient Gymnoſophiſts.

They frequent, principally, ſuch places as are conſecrated by the devotion of the people, and pretend to live ſeveral days together without eating or drinking. After having gone through a courſe of diſcipline for a certain time, they look on themſelves as impeccable, and privileged to do any thing; upon which they give a looſe to their paſſions, and run into all manner of debauchery.

JOHN.—*Chriſtians of* ST. JOHN. See CHRISTIAN.

St. JOHN *Baptiſt, hermits of*. See HERMITS.

JOHN, *Preſter*. See PRESTER.

JOHN, or *the Goſpel of St.* JOHN; a canonical book of the New Teſtament, containing a recital of the life, doctrine, and death of our Saviour, Jeſus Chriſt, written by St. JOHN, the apoſtle and evangeliſt. See GOSPEL.

St. John, according to Mill, Fabricius, and Le Clerc, wrote his Goſpel at Epheſus, after his return from the iſle of Patmos, A. D. 97, at the deſire of the Chriſtians of Aſia. Wetſtein thought that this Goſpel might be writ about the year 32, after our Lord's aſcenſion: Balnage and Lampe ſuppoſe that it was writ before the deſtruction of Jeruſalem: Dr. Lardner adopts this opinion, and aſſigns the date of it to the year of Chriſt 68. This period brings it nearer to that of the three other goſpels, which was about the year 64 or 65, and the Goſpel itſelf, the leading deſign of which was to ſhew how inexcuſable the Jews were in not receiving Jeſus as the Chriſt, and to vindicate the providence of God in the calamities already befallen, or now coming upon them, was ſuitable to the circumſtances of the Jews at this period. The ancients aſſign two reaſons for this undertaking: the firſt is, becauſe in the other three Goſpels, there was wanting, the hiſtory of the beginning of Jeſus Chriſt's preaching, until the impriſonment of John the Baptiſt, which therefore he applied himſelf particularly to relate: the ſecond reaſon was, in order to remove the errors of the Cerinthians, Ebionites, and other ſects. But Mr. Lampe and Dr. Lardner have urged ſeveral reaſons to ſhew that St. *John* did not write againſt Cerinthus or any other heretics in his Goſpel. Lamp. Prolegom. in Johan. lib. ii. cap. 3. Lardner's Credibility, vol. xv. ch. 9.

St. JOHN's *bread*, ſee CAROB.

Sweet JOHNS, ſee PINK.

JOHN's *wort*, or *St.* JOHN's *wort*, *hypericum*, in *Botany*, a genus of the *polyadelphia polyandria* claſs. Its characters are theſe: the flower has a permanent empalement, divided into five oval concave ſegments, and has five oblong oval petals, with a great number of hairy ſtamina, joined at their baſe in five diſtinct bodies; it has in the centre a roundiſh germen ſupporting one, three, or five ſtyles; the germen afterward becomes a roundiſh capſule, having the ſame number of cells as there are ſtyles in the flower, which are filled with oblong ſeeds. There are many ſpecies.

Hypericum is a good vulnerary, detergent, and nervous medicine: it is given with ſucceſs in ſpitting of blood, or voiding it by urine; it reſolves coagulated blood, promotes the menſes and urine, deſtroys worms, and ſtands recommended in all nervous caſes. A tincture of the flowers in oil olive, made by macerating four ounces of the full blown flowers, freſh gathered, and freed from the cups, in a quart of oil, till the oil is ſufficiently coloured, is kept for external purpoſes in the ſhops, under the name of *oleum hyperici*, but rarely uſed.

The ſeed of the baſtard *St. John's wort* provokes urine and the menſes; and taken in wine is good againſt the bite of the phalangium (a poiſonous ſpider), and for that ſpecies of convulſion called *opiſthotonous*. Oil alſo impregnated with this plant, is good for the laſt mentioned diſorder, applied externally.

JOHNSONIA, *callicarpa*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the flower has an empalement of one leaf, cut at the brim into four ſhort ſegments; it has one tubulous petal, divided into four parts at the brim, and four ſlender ſtamina, which are longer than the petal. In the centre is ſituated a roundiſh germen, which afterward becomes a ſmooth globular berry, incloſing four hard oblong ſeeds. Miller reckons only one ſpecies, a native of South Carolina; but Linnæus enumerates two. The leaves of the American plant were uſed by Dr. Dale in dropſical caſes with ſucceſs.

JOINDER, or JOYNDER; is the coupling, or joining, two perſons in one action, or ſuit, againſt another.

JOINERY, ſee JOYNERY.

JOINING *of iſſue*, ſee ISSUE.

JOINT, the juncture, articulation, or aſſemblage, of two or more things. See ARTICULATION.

JOINTS, in *Anatomy*. The ſuppleneſs which the *joints* may be brought to by long practice from the time of infancy, is ſurpriſing. Every common poſture-maſter at a country fair ſhews us a great deal of this; but the moſt wonderful inſtance we have ever had of it, was in the perſon famous in London ſeveral years ago, whoſe name was Clark, and commonly called Clark the poſture-maſter. This man had found the way, by long practice, to diſtort many of the bones, which nobody before had ever thought it practicable to alter the poſition of; and had ſuch an abſolute command of the muſcles and *joints*, that he could almoſt disjoint his whole body; ſo that he once impoſed on the famous Mullens by his diſtortions, ſo far that he refuſed to undertake his cure, as ſuppoſing him beyond relief. But, to his amazement, he had no ſooner given him over, than the man reſtored himſelf to the figure and condition of a proper man, with no diſtortion about him. See Phil. Tranſ. Nº. 242. p. 262.

JOINT-*cartilage*, or ARTICULATING-*cartilage*. An *articulating cartilage* is an elaſtic ſubſtance, uniformly compact, of a white colour and ſomewhat diaphanous, having a ſmooth poliſhed ſurface covered with a membrane, harder and more brittle than a ligament, but ſofter and more pliable than a bone.

When a *joint-cartilage* is well prepared by the anatomiſt, it feels ſoft, and yields to the touch; but, as ſoon as the preſſure is taken off, reſtores itſelf to its former equality of ſurface. Its ſuperficies, examined by a glaſs, appears like a piece of velvet. If we endeavour to peel off the matter of the cartilage in ſeveral lamellæ, we find it impracticable; but if we uſe a certain degree of force, it ſeparates from the bone in ſmall pieces, and we never find the edge of the remaining part oblique, but always perpendicular to the ſubjacent ſurface of the bone. If we view this edge through a microſcope, it appears like the edge of a piece of velvet; that is, it is ſeen to be a maſs of ſhort and nearly parallel fibres, riſing from the bone and terminating at the ſurface of the cartilage; and the ſurface of the bone is planed out into a number of ſmall circular dimples, in which the bundles of theſe fibres are fixed. Thus we may very aptly compare the ſubſtance of the cartilage to the pile of velvet, and the ſurface of the bone to the web of ſilk which is the baſis of it.

In both ſubſtances the ſhort threads or filaments ſink in waves on being preſſed, but by the power of elaſticity they both recover their perpendicular direction as ſoon as they are no longer ſubjected to a compreſſing force. Theſe perpendicular fibres, doubtleſs, make the greateſt part of the ſubſtance of the cartilage in its natural ſtate. In the beſt preparations they ſeem to make up the whole; but it is probable, that in the recent ſtate there were a number of tranſverſe fibrils ſerving to connect theſe erect ones together, and form the whole into a ſolid body; and that theſe periſh in making the preparation.

We are told by anatomiſts, that cartilages are covered with a membrane called perichondrium. If they mean the cartilages of the ribs, larynx, ear, &c. there indeed ſuch a membrane is very conſpicuous; but the perichondrium of the ſmooth *articulating cartilages* is ſo delicately thin, and ſo firmly braced upon the ſurface, that there is great room to doubt, whether it has been rightly underſtood, or demonſtrated.

This membrane has, however, been raiſed by ſome late anatomiſts in pretty large pieces, after macerating, and it is found to be a continuation of that fine ſmooth membrane which lines the capſular ligament folded over the end of the bone; for when that ligament is inſerted on the neck of the bone, or between the inſertion of the ligament and the border of the cartilage, it is very conſpicuous, and may be pulled up with a pair of pincers; but where it covers the cartilage, it is connected ſo cloſe, that it is not to be traced while recent, without the greateſt care and delicacy. In this particular it reſembles that membrane which is common to the eye-lids and the fore part of the ball of the eye, and which is looſely connected with the albuginea, but ſtrongly attached to the cornea. From this deſcription it is plain, that every *joint* of the human body is inveſted with a membrane, which forms a complete bag, and gives a covering to every thing within the articulation, in the ſame manner as the peritonæum inveſts not only the parietes but all the contents of the abdomen.

The blood-veſſels of the cartilages are ſo ſmall, that they do not admit the red globules of the blood, and conſequently they remained unknown till they were diſcovered by the modern diſcovery of injections, by which the whole vaſcular ſyſtem is filled with a liquid wax, coloured ſo as to be diſtinguiſhed from all other things: nor even by this method are we able to demonſtrate the veſſels of the true cartilaginous ſubſtance in adult ſubjects. But the fat, the glands, and the ligaments will be red with injected veſſels, while not one coloured ſpeck appears on the cartilage itſelf. Yet it is evident, that there are veſſels there, ſince in very young ſubjects after a ſubtile injection they become ſufficiently obvious. By this means their courſe is alſo diſcovered, and is found to be as follows.

All round the neck of the bone there are a great number of arteries and veins which ramify into ſmaller branches, and communicate with one another by frequent anaſtomoſes like thoſe of the meſentery. This might be called the *circulus articuli vaſculoſus*, the vaſcular body of the *joint*. The ſmall branches of the veſſels divide into ſtill ſmaller ones upon the adjoining ſurface in their progreſs to the center of the cartilage; and we are very ſeldom able to trace them into its ſubſtance, becauſe they terminate abruptly at the edge of the cartilage in the ſame manner with the veſſels of the albuginea of the eye, when they arrive at the cornea. The larger veſſels which compoſe the vaſcular circle plunge in by a great number of holes, and diſperſe themſelves into branches between the cartilage and the bone. From theſe again there ariſes a crop of ſhort twigs, which ſhoot towards the outward ſurface. Whether theſe ſerve for nouriſhment only to the part, or whether they do not pour forth a dewy moiſture, of ſervice to the functions of the part, is not eaſily determined. It is to be obſerved, however, that the diſtribution of the blood-veſſels to the articulating cartilages, is very peculiar, and ſeems calculated for the obviating of great inconveniencies. Had they run to the outer ſurface, the preſſure and motion of the two cartilages muſt infallibly have occaſioned frequent obſtructions and inflammations, which would ſoon have rendered our motions painful, and at laſt have deprived us of them; but by creeping round the cartilaginous brim where there is little friction, or under the cartilage where there is none, they are perfectly well defended from theſe accidents.

It would be very happy, if we could trace the nerves of the cartilages; but in relation to theſe organs we are obliged to be ſatisfied by mere conjecture, as to their exiſtence here, as well as in many other parts of the body. And though from the great inſenſibility of cartilages ſome perſons have ſuppoſed, that they were furniſhed with no nerves at all, yet when we conſider that theſe veſſels ſeem neceſſary to the growth and preſervation of any part, we muſt be forced to acknowledge their exiſtence in this, though we can neither ſee them, nor be ſenſible of their effects.

The articulating cartilages are moſt happily contrived to all the purpoſes of motion in the parts. By their uniform ſurface they move upon one another with eaſe; by their ſoftneſs, ſmoothneſs and ſlipperineſs, their abraſion is prevented, which elſe muſt have happened from ſuch frequent uſe. By their flexibility, the contiguous ſurfaces are always nicely adapted to one another, and the friction diffuſed equally over the whole; by their elaſticity the violence of any ſhock which may happen from running, jumping, or other violent motions, is broken and gradually ſpent; and as the courſe of the cartilaginous fibres appears calculated chiefly for this laſt advantage, we need only, to illuſtrate it, to reflect upon the difference of riding a chamber-horſe of wood, and a real one, whoſe motions are ſoftened in all reſpects by the cartilages placed in the *joints*.

The inſenſibility of the articulating cartilages is wiſely contrived by the great Author of our frame, ſince it is wholly owing to this that the neceſſary motions of the body are performed without pain.

An ulcerated cartilage is generally allowed, by the beſt chirurgical writers from Hippocrates to the preſent time, to be a very troubleſome diſeaſe, and one that is more difficult to cure than a caries of the bones; and that when a cartilage is deſtroyed, it is never to be recovered again, is alſo a generally eſtabliſhed opinion. Hildanus in particular, in treating of the diſeaſes of theſe parts, has obſerved, that where a cartilage is by any means deſtroyed, nature uſually ſupplies its place by a callus thrown out from the bone, and that thus a bony anchyloſis, or immoveable continuity, is produced in the place of a moveable *joint*. In examining the diſeaſed *joints*, either after death or amputation, Mr. Hunter obſerves, that he uſually found, according to the nature and ſtage of the diſeaſe, the cartilages in ſome parts reddiſh and lax, and in others ſoft and ſpongy; or that they were raiſed up in bliſters from the bone, or quite eroded, and perhaps the extremities of the bone carious; and finally, ſometimes a bony anchyloſis formed, as Hildanus reports; but that he never ſaw, or indeed heard of, an exfoliation from the ſurface of the cartilage. Now if we compare the texture of the cartilages, and their morbid appearances together, all theſe diſeaſed ſtates will admit of as rational a ſolution, as thoſe of perhaps any other part of the vitiated œconomy. Phil. Tranſ. N° 469. p. 521.

It appears from macerating of the cartilages, that their tranſverſe fibrils are extremely tender and diſſoluble, and that the coheſion of the parts of the ſtraight fibres is ſtronger than their coheſion with the bone. When a cartilage, therefore, is inflamed, and ſoaked in purulent matter, the tranſverſe, or connecting fibres, will ſooneſt give way, and the cartilage will become more or leſs red and ſoft. If the diſorder goes on a little longer, the cartilage does not throw off a ſlough, but ſeparates from the bone where the force of the coheſion is leaſt, and where the diſeaſe ſoon arrives, by reaſon of the thinneſs of the cartilage. When the bone is thus expoſed, the matter of the ulcer, or motion of the *joint*, corrodes or abrades the bony fibres, and if the conſtitution is good, theſe will ſhoot out a callus, which either cements together the oppoſite bones of the articulation, or fills up the cavity of the *joint*, and for the future prevents all motion: but if unfortunately the patient labours under a bad habit of body at the time, the malignancy having got root in the bone, will gain ground every day, and the caries will ſpread, till at laſt the only relief will be found the cutting off the limb.

Joints, in *Architecture*, denote the ſeparations between the ſtones; which are filled with mortar, plaſter, or cement.

Joint, in *Carpentry*, &c. is applied to ſeveral manners of aſſembling, or fitting, pieces of wood together. Thus we ſay, *a dove-tail joint*, &c. See MORTISE, DOVE-TAIL, &c.

Joint, *univerſal*, in *Mechanics*, an excellent invention of Dr. Hook, adapted to all kinds of motions and flexures; of which he has given a large account in his Cutlerian Lectures, printed in 1678. This ſeems to have given occaſion to the GIMBOLS uſed in ſuſpending the ſea compaſs, the mechaniſm of which is the ſame with that of Deſaguliers's *rolling* LAMP.

Joint-*action*, in *Law*; in perſonal actions ſeveral wrongs may be *joined* in one writ; but actions founded upon a tort, and on a contract, cannot be *joined*; for they require different pleas and different proceſs.

Joint-*battery*. See BATTERY.

Joint-*executors*, in *Law*, are two or more perſons appointed ſuch by will: in which caſe they are accounted but as one ſingle perſon, ſo that the actions done by one of them are taken to be the acts of all, becauſe they all repreſent the perſon of the teſtator: thus, where two *joint*-executors are poſſeſſed of a leaſe for years, in right of their teſtator, one of them may ſell the term without the other's joining: and in like manner, where one *joint*-executor gives a releaſe, the others are bound by it, each having an authority over the whole eſtate; but a *joint*-executor is not charged with the acts of his companion any farther than he is actually poſſeſſed of the goods of the teſtator: however, if *joint*-executors enter into an agreement, that each ſhall intermeddle with particular parts of the teſtator's eſtate, in that caſe each becomes chargeable for the whole by agreement. It has been held, that two *joint*-executors cannot urge ſeparate pleas, becauſe their teſtator, if living, on an action brought againſt him, could have been allowed but one plea; and that if all the executors are not named in any action brought by *joint*-executors, the action will abate. As to legatees, the receipt of one EXECUTOR charges not the other.

Joint-*lives*, in *Law*, denote lives that continue during the ſame time, or that exiſt together. See LIFE-*annuities*.

Joint-*rule*. See *carpenters joint* RULE.

JOINTENANTS, or **Joint-tenants**, in *Law*, thoſe who come to, and hold, lands and tenements by one title, *pro indiviſo*, or without partition.

Theſe are diſtinguiſhed from *ſole*, or ſeveral tenants, from *parceners*, and from *tenants in common*. Anciently they were called *participes*, and not *hæredes*. See SOLE *tenant*.

Joint-tenants muſt jointly plead, and be jointly impleaded and ſued by others; which is common to them and COPARCENERS. But *joint-tenants* have a peculiar quality of ſurvivorſhip, which coparceners have not; ſo that if there be two or three *joint-tenants*, and one hath iſſue, and dies, he, or thoſe *joint-tenants* that ſurvive, ſhall have the whole by ſurvivorſhip.

Joint-*water*, a term uſed by our farriers, for what the old writers in medicine have called hydarthros; a running of a clear ichor from the *joints*, when they are either wounded or ulcerated; it is common in the diſeaſes of horſes.

JOINTEE, in the *Manege*. See HANDFUL.

JOINTRESS, or **Jointeress**, ſhe that hath an eſtate ſettled upon her by the huſband, to hold during her life, if ſhe ſurvives him.

JOINTURE, in *Law*, a covenant whereby the huſband, or ſome friend in his behalf, makes over to his wife, on condition of marriage, certain lands and tenements for term of her life, or otherwiſe, in lieu of DOWER.

Others define *jointure* a bargain and contract of livelihood, adjoined to the contract of marriage; being a competent proviſion of freehold lands or tenements, &c. for the wife, to take effect after the death of the huſband, if ſhe herſelf is not the cauſe of the extermination or forfeiture of it.

And to make a perfect *jointure* within the ſtatute of 27 Hen. VIII. c. 10. to bar dower, ſeveral things are to be obſerved. 1. It muſt be made to take effect for the life of the wife in poſſeſſion or profit, preſently after the deceaſe of her huſband. 2. It muſt be for the term of her own life, or a greater eſtate; but it may be limited to continue no longer than ſhe remains a widow, &c. 3. It muſt be made for herſelf, and to none other, in truſt for her. 4. It is to be expreſſed to be in ſatisfaction of her whole dower, and not a part of it. 5. It may be made before or after marriage: if it be made before, the wife cannot wave it, and claim her dower at common law; but if it be made after marriage, ſhe may, at the huſband's death; unleſs the *jointure* be made by act of parliament. After the death of the huſband, the wife may enter into her *jointure*, and is not driven to a real action, as ſhe is to recover dower by the common law; and upon a lawful eviction of her *jointure*, ſhe ſhall be endowed according to the rate of her huſband's lands, whereof ſhe was dowable at common law.

A wife's *jointure* ſhall not be forfeited by the treaſon of the huſband: but feme-coverts committing treaſon, or felony, may forfeit their *jointures*, and being convict of recuſancy, they ſhall forfeit two parts in three of their *jointures* and dower, by 3 Jac. I. c. 4.

JOISTS, or **JOYSTS**, in *Architecture*, thoſe pieces of timber framed into the girders and ſummers on which the boards of floors are laid.

Joiſts are from ſix to eight inches ſquare, and ought ſeldom to lie at a greater diſtance from each other than ten or twelve inches; nor ought they ever to bear at a greater length than ten feet; or to lie leſs into the wall than eight inches. See CHIMNEY.

Sometimes the carpenters furr their *joiſts*, as they call it; that is, they lay two rows of *joiſts*, one over the other.

JOKES. See JESTING.

JON, in *Natural Hiſtory*, the name of a gem deſcribed by Pliny, and ſaid to be brought from the Eaſt Indies; he deſcribes it as being of a purple or violet colour, but rarely very deep in the tinge. It ſeems to have been a ſpecies of amethyſt.

JONÆ *piſcis*, the *Jonas-fiſh*, a name given by many authors to the common ſhark, the *canis carcharias* of authors.

It has this name from an opinion that it was the fiſh which ſwallowed up the prophet of that name. But there are many objections to ſuch an opinion.

JONAH, or *the Prophecy of* JONAH; a canonical book of the Old Teſtament, in which is related, that *Jonah* was ordered to go and propheſy the deſtruction of the Ninevites; but that diſobediently attempting a voyage another way, he was diſcovered by the riſing of a ſudden tempeſt, and caſt into the ſea, where he was ſwallowed up by a whale. Having lodged three days and three nights in the whale's belly, he was diſgorged upon the ſhore: whereupon, being ſenſible of his paſt danger, and ſurpriſing deliverance, he betook himſelf to the journey and embaſſy to which he was appointed. Arriving at Nineveh, the metropolis of Aſſyria, he, according to his commiſſion, boldly laid open to the inhabitants their ſins and miſcarriages, and proclaimed their ſudden overthrow; upon which the whole city, by prayer and faſting, and a ſpeedy repentance, happily averted the divine vengeance, and eſcaped the threatened ruin. *Jonah* was the moſt ancient of all the prophets whoſe writings are preſerved in the Scripture canon. Some have ſuppoſed that he propheſied in the latter end of Jehu's, or the beginning of Jehoahaz's reign, at which time the kingdom of Iſrael was brought very low by the oppreſſions of Hazael king of Syria. 2 Kings xiii. 22.

JONCTURE, or JOINTURE, the ſame with JOINT.

IONIC, in *Architecture*, the name of one of the five orders of columns. See *Tab. Archit. fig.* 26.

The firſt idea of the *Ionic* was given by the people of Ionia; who, according to Vitruvius, formed it on the model of a young woman, dreſſed in her hair, and of an eaſy, elegant ſhape: whereas, the Doric had been formed on the model of a ſtrong robuſt man.

The *Ionic* column is the third in order, and is diſtinguiſhed from the Compoſite, in that it has none of the leaves of acanthus in its capital; and from the Tuſcan, Doric, and Corinthian, by the volutes, or rams-horns, which adorn its capital; and from the Tuſcan and Doric too, by the channels, or fluting, in its ſhaft.

This column is a medium between the maſſive and the delicate orders, the ſimple and the rich. Its height is eighteen modules, or nine diameters of the column taken at the bottom. When it was firſt invented, its height was but ſixteen modules; but the ancients, to render it ſtill more beautiful than the Doric, augmented its height, by adding a baſe to it, which was unknown in the Doric.

M. le Clerc makes its entablature to be four modules, and ten minutes, and its pedeſtal ſix entire modules; ſo that the whole order makes twenty-eight modules ten minutes.

It is ſaid, the temple of Diana, at Epheſus, the moſt celebrated edifice of all antiquity, was of this order. At preſent, it is properly uſed in churches, and religious houſes, and in courts of juſtice, and other places of tranquility and devotion.

This order has one advantage above any of the reſt; and it conſiſts in this, that the fore and hind parts of its capital are different from the ſides: but this is attended with an inconvenience, when the ordonnance is to turn from the front of the building to the ſide; to obviate which, the capital may be made angular, as is done in the temple of Fortuna Virilis. Scamozzi, and ſome other modern architects, have introduced the upper part of the Compoſite capital, in lieu of the *Ionic*, imitating that of the temple of Concord, whoſe four ſides are alike: to render it more beautiful, the volute may be made a little oval and inclining. For the meaſures of the ſeveral parts of the *Ionic*, ſee COLUMN.

IONIC *architrave, baſe, capital, corniche, entablature, freeze, pedeſtal*. See the Subſtantives.

IONIC *dialect*, in *Grammar*, a manner of ſpeaking peculiar to the people of *Ionia*.

At firſt, it was the ſame with the ancient Attic; but paſſing into Aſia, it did not arrive at that delicacy and perfection to which the Athenians attained: inſtead of that, it rather degenerated in Aſia Minor; being corrupted by the admiſſion of foreign idioms.

In this dialect it was, that Herodotus, Hippocrates, and Galen, wrote.

IONIC *ſect* was the firſt of the ancient ſects of philoſophers.

The founder of this ſect was Thales, who, being a native of Miletus, in Ionia, occaſioned his followers to aſſume the appellation of *Ionic*.

It was the diſtinguiſhing tenet of this ſect, that water was the principle of all natural things.

This is what Pindar alludes to in the beginning of his firſt Olympic Ode.

IONIC *tranſmigration* was heretofore a celebrated epocha, which took its riſe from the retreat of the Athenian colonies; who, upon the death of Codrus, put themſelves under the command of his ſon Neleus, and eſtabliſhed the twelve cities of Ionia in Aſia.

Thoſe colonies, according to Eratoſthenes, were eſtabliſhed fifty years after the return of the Heraclidæ; and, according to Marſham, ſeventy-ſeven years after the taking of Troy.

JONKS, or JONQUES, in *Ship-building*, veſſels very common in the Eaſt Indies, about the bigneſs of our fly-boats, but differing in form of building, according to the various methods of the nations in thoſe parts.

JONQUIL, in *Botany*; ſee NARCISSUS.

JONTHLASPI, in *Botany*; ſee CLYPEOLA.

IOPÆAN, among the ancients, an exclamation uſed on account of a victory, or ſome proſperous event. Hoffman thinks that *Io Pæan* is a contraction of the Hebrew *Jao*, from *Jehovah*, and פנח, *reſpexit*; and was the ſame with *Jehovah Penoch*, i. e. *Dominus reſpiciat in nos.* Something like this exclamation ſtill remains among the Symerones, a people of the Weſt Indies, who on any joyful occaſion frequently cry out *Yo Peho*.

JOSHUA, a canonical book of the Old Teſtament, containing a hiſtory of the wars and tranſactions of the perſon whoſe name it bears. This book may be divided into three parts; the firſt of which is a hiſtory of the conqueſt of the land of Canaan; the ſecond, which begins at the twelfth chapter, is a deſcription of that country, and the diviſion of it among the tribes; and the third, compriſed in the two laſt chapters, contains the renewal of the covenant he cauſed the Iſraelites to make, and the death of their victorious leader and governor. The whole comprehends a term of ſeventeen, or, according to others, of twenty-ſeven years.

JOVIALE *arcanum*. See ARCANUM.

JOVIALE *bezoardicum*. See BEZOARDICUM.

JOURNAL, a day-book, regiſter, or account of what paſſes daily. See DIARY.

JOURNAL, in *Merchants Accounts*, is a book into which every particular article is poſted out of the waſte BOOK, and made debtor. This is to be very clearly worded, and fairly engroſſed. See *Journal* BOOK.

JOURNAL, in *Sea Affairs*, is a regiſter kept by the pilot, and others, wherein notice is taken of every thing that happens to the ſhip, from day to day, and from hour to hour, with regard to the winds, the rhumbs, the rake, ſoundings, &c. in order to enable him to adjuſt the reckoning, and determine the place where the ſhip is.

In all ſea *journals*, the day, or what is called the twenty-four hours, begins at noon, and is counted thence twenty-four hours to the next noon: the firſt twelve hours, from noon to midnight, are marked with P. M. ſignifying after mid-day; and the ſecond twelve hours from midnight to noon are marked with A. M. ſignifying after midnight: ſo that the ſhip account is twelve hours earlier than the ſhore account of time. There are various ways of keeping *journals*, according to the different notions of mariners concerning the articles that are to be entered. Some writers direct the keeping ſuch a kind of *journal* as is only an abſtract of each day's tranſactions, ſpecifying the weather, what ſhips or lands were ſeen, accidents on board, the latitude, longitude, meridional diſtance, courſe, and run. Theſe particulars are to be drawn from the ſhip's LOG-*book*, or from that kept by the perſon himſelf. Other authors recommend the keeping only of one account, including the log-book, and all the work of each day, with the deductions drawn from it. The form of this latter kind of *journal*, with an example of the work of a ſingle day, is as follows:

Abſtract of a *Journal* from England towards Madeira.

LOG-BOARD.

H.	K.	F.	Courſes.	Winds.
2	9	6	N. W. b. W. ½ W.	S. W. ½ W.
4	9	2	Leeway	2 points.
6	9	5	S. ¾ W.	N. E ½ E.
8	8	5	Leeway	0 point.
10	8	7	W. S. W. ¼ W.	S. ¼ W.
12	7	2	Leeway	2 points.
2	8	3	N. N. E. ¼ E.	S. ½ W.
4	8	7	Leeway	0 point.
6	7	6	S W.	S S E.
8	7	2	Leeway	1 ½ point.
10	7	0		
12	6	4		

TRAVERSE TABLE.

Courſes.	D.	N.	S.	E.	W.
N. W. ¾ W.	37	22,0			29,7
S. ½ E.	36		35,8	3,5	
W. b. S.	30		6,6		33,6
N. b. E.	31	33,6		6,6	
S. W. ¼ W.	56		37,6		41,5
		55,6	80,0	10,1	104,8
		D. l.	24.4	Dep.	94,7

Remarks on board.

21. 13th October.

Theſe twenty-four hours hard gales, and cloudy weather, accompanied with hard rains.

Handed fore-top ſails.

At 10 P. M. heard a gun at a diſtance.

At 2 A. M. ſaw to the N N E. ½ E. the flaſh of a gun, and after fifty-ſix beats of the pulſe at the wriſt we heard the ſound, by which we judged the diſtance to be about eleven miles and a ſhip in diſtreſs. Bore away to ſpeak with her.

At ſix, having greatly over-run the diſtance, and finding nothing, concluded ſhe was gone down, ſo hauled our wind, and ſtood to the S W.

No obſervation this day.

Variation 1¼ point weſt.

Departure, latitude = 41° 16 N.
Difference of latitude = 0 24 S.
Preſent latitude = 40 52 N.
Sum of latitudes = 82 08
Middle latitude = 41 04
Departure, longitude = 13 33 W.
Difference of longitude = 2 06 W.
Preſent longitude. = 15 39 W.

M. P.
Lizard's latitude = 49° 57′ N. 3470
Ship's latitude = 40 52 N. 2691

Diff. latitude = 9 05 779
Or = 554 miles.
Lizard's longitude = 5° 14′ W.
Ship's longitude = 15 39 W.

Diff. longitude = 9 25 = 565 m.
Lizard bears N. 37° 45′ E.
Diſtance 685 miles.

M. P.
Madeira's latitude = 32° 38′ N. 2073
Ship's latitude = 40 52 N. 2691

Diff. latitude = 8 14 618
Or = 494 miles.
Madeira's long. = 16° 51′ W.
Ship's longitude = 15 39 W.

Diff. longitude = 1 12 = 72 m.
Madeira bears S. 6° 30′ W.
Diſtant 505 miles.

Journal is now become a common name for news-papers, which detail the daily tranſactions of Europe.

Journal is alſo uſed for the title of ſeveral books which come out at ſtated times; and give abſtracts, accounts, &c. of the new books that are publiſhed, and the new improvements daily made in arts and ſciences.

The firſt *journal* of this kind was, the *Journal* des Sçavans, printed at Paris: the deſign was ſet on foot for the eaſe of ſuch as are too buſy, or too lazy, to read the entire books themſelves. It ſeems an excellent way of ſatisfying a man's curioſity, and becoming learned upon eaſy terms: and ſo uſeful has it been found, that it has been executed in moſt other countries, though under a great variety of titles.

Of this kind are the Acta Eruditorum of Leipſic; the Nouvelles de la Republique des Lettres of Mr. Bayle, &c. the Bibliotheque Univerſelle, Choiſie, et Ancienne et Moderne, of M. le Clerc; the Memoirs de Trevoux, &c. In 1692, Juncker printed in Latin, An Hiſtorical Treatiſe of the Journals of the Learned, publiſhed in the ſeveral parts of Europe; and Wolfius, Struvius, Morhoff, Fabricius, &c. have done ſomething of the ſame kind.

The Philoſophical Tranſactions of London, the Memoirs of the Royal Academy of Sciences; thoſe of the Academy des Belles Lettres; the Miſcellanea Naturæ Curioſorum; the Experiments of the Academy del Cimento; the Acta Philo-exoticorum Naturæ et Artis, which appeared from March 1686, to April 1687, and which are a hiſtory of the academy of Breſſe; the Miſcellanea Berolinenſia, or Memoirs of the Academy of Berlin; the Commentaries of the Academy of Peterſburgh, the Memoirs of the Inſtitute at Bologna, the Acta Literaria Sueciæ, the Memoirs of the Royal Academy of Stockholm, begun in 1740, the Commentarii Societatis Regiæ Gottingenſis, begun in 1750, &c. &c. are not ſo properly *Journals*, though they are frequently ranked in the number.

Juncker and Wolfius give the honour of the firſt invention of *Journals* to Photius. His Bibliotheca, however, is not altogether of the ſame nature with the modern *Journals*; nor was his deſign the ſame. It conſiſts of abridgments, and extracts of books which he had read during his embaſſy in Perſia. M. Salo firſt began the *Journal* des Sçavans at Paris, in 1665, under the name of the Sieur de Hedouville; but his death ſoon after interrupted the work. The abbé Gallois then took it up, and he, in the year 1674, gave way to the abbé de la Roque, who continued it nine years, and was ſucceeded by M. Couſin, who carried it on till the year 1702, when the abbé Bignon inſtituted a new ſociety, and committed the care of continuing the *Journal* to them, who improved and publiſhed it under a new form. This ſociety is ſtill continued, and M. de Voyer has had the inſpection of the *Journal*; which is no longer the work of any ſingle author, but of a great number.

The other French *Journals* are the Memoirs and Conferences of Arts and Sciences, by M. Dennis, during the years 1672, 1673, and 1674; New Diſcoveries in all the parts of Phyſic, by M. de Blegny: the *Journal* of Phyſic, begun in 1684, and ſome others, diſcontinued almoſt as ſoon as begun.

Rozier's *Journal* de Phyſique, begun in July 1771, and continued to the preſent time 1780, in 19 vols. quarto.

The Nouvelles de la Republique des Lettres, news from the republic of Letters, were begun by M. Bayle in 1684, and carried on by him till the year 1687, when M. Bayle being diſabled by ſickneſs, his friends, M. Bernard and M. de la Roque, took them up, and continued them till 1699. After an interruption of nine years, M. Bernard reſumed the work, and continued it till the year 1710. The Hiſtory of the Works of the Learned, by M. Baſnage, was begun in the year 1686, and ended in 1710. The Univerſal Hiſtorical Library, by M. le Clerc, was continued to the year 1693, and contained twenty-five volumes. The Bibliotheque Choiſie of the ſame author, began in 1703. The Mercury of France is one of the moſt ancient *Journals* of that country, and is continued by different hands: the Memoirs of a Hiſtory of Sciences and Arts, uſually called Memoires des Trevoux, from the place where they are printed, began in 1701. The Eſſays of Literature reached but to a twelfth volume in 1702, 1703, and 1704; theſe only take notice of ancient authors. The *Journal* Literaire, by Father Hugo, began and ended in 1705. At Hamburgh, they have made two attempts for a French Journal, but the deſign failed: an Ephemerides Sçavantes has alſo been undertaken, but that ſoon diſappeared. A *Journal* des Sçavans, by M. Dartis, appeared in 1694, and was dropt the year following. That of M. Chauvin, begun at Berlin in 1696, held out three years; and an eſſay of the ſame kind was made at Geneva. To theſe may be added, the *Journal* Literaire, begun at the Hague in 1715, and that of Verdun, and the Memoires Literaires de la Grande Bretagne, by M. de la Roche; the Bibliotheque Angloiſe, and *Journal* Britannique, which are confined to Engliſh books alone. The Italian *Journals* are, that of abbot Nazari, which laſted from 1668, to 1681, and was printed at Rome. That of Venice began in 1671, and ended at the ſame time with the other: the authors were Peter Moretti, and Francis Miletti. The *Journal* of Parma, by Roberti and Father Bacchini, was dropped in 1690, and reſumed again in 1692. The *Journal* of Ferrara, by the abbé de la Torre, began and ended in 1691. La Galerio di Minerva, begun in 1696, is the work of a ſociety of men of letters. Seignior Apoſtolo Zeno, ſecretary to that ſociety, began another *Journal* in 1710, under the protection of the grand duke: it is printed at Venice, and ſeveral perſons of diſtinction have a hand in it. The Faſti Eruditi della Bibliotheca Volante, were publiſhed at Parma. There has appeared ſince, in Italy, the Giornale dei Letterati.

The principal among the Latin *Journals* is that of Leipſic, kept under the title of Acta Eruditorum, begun in 1682: P. P. Manzani began another at Parma. The Nova Literaria Maris Balthici, laſted from 1698, to 1708. The Nova Literaria Germaniæ, collected at Hamburgh, began in 1703. The Acta Literaria ex Manuſcriptis, and the Bibliotheca curioſa, begun in 1705, and ended in 1707, are the work of Struvius. Meſſ. Kuſter and Sike, in 1697, began a Bibliotheca novorum Librorum, and continued it for two years. Since that time there have been many Latin *Journals*; ſuch, beſides others, is the Commentarii de Rebus in Scientia Naturali et Medicina geſtis, by M. Ludwig. The Swiſs *Journal*, called Nova Literaria Helvetiæ, was begun in 1702, by M. Scheuchzer; and the Acta Medica Hafnenſia, publiſhed by T. Bartholin, make five volumes from the year 1671 to 1679.

There are two Low-Dutch *Journals*; the one under the title of Boockzal van Europe; it was begun at Rotterdam in 1692, by Peter Rabbus; and continued from 1702 to 1708, by Sewel and Gavern: the other is done by a phyſician, called Ruiter, who began in 1710.

The German *Journals* of beſt note are, the Monathlichen Unterredungen, which held from 1689 to 1698. The Bibliotheca curioſa, begun in 1704, and ended in 1707, both by M. Tenzel. The Magaſin d' Hambourg, begun in 1748: the Phyſicaliſche Beluſtigunzen, or Philoſophical Amuſements, begun at Berlin in 1751. The *Journal* of Hanover began in 1700, and continued for two years by M. Eccard, under the direction of M. Leibnitz, and afterwards carried on by others. The Theological *Journal*, publiſhed by M. Loeſcher, under the title of Altes & Neues, that is, Old and New. A third at Leipſic and Francfort, the authors Meſſ. Walterck, Krauſe, and Groſchuffius; and a fourth at Hall, by M. Turk.

The Engliſh *Journals* are, the Hiſtory of the Works of the Learned, begun at London in 1699. Cenſura Temporum, in 1708. About the ſame time there appeared two new ones, the one under the title of, Memoirs of Literature, containing little more than an Engliſh tranſlation of ſome articles in the foreign *Journals*, by M. de la Roche; the other a collection of looſe tracts, entitled, Bibliotheca curioſa, or a Miſcellany. Theſe, however, with ſome others, are now no more; but are ſucceeded by the Monthly Review, which began in the year 1749, and gives a character of all Engliſh literary publications, with the moſt conſiderable of the foreign ones: the Critical Review, which began in 1756, and is nearly on the ſame plan: beſides theſe, we have ſeveral monthly pamphlets, called Magazines, which, together with a chronological ſeries of occurrences, contain letters from correſpondents, communicating extraordinary diſcoveries in nature and art, with controverſial pieces on all ſubjects. Of theſe, the principal are thoſe called, the Gentleman's Magazine, and the London Magazine, which both began about the year 1730.

JOURNCHOPPERS, in our *Old Writers*, regrators of yarn; which formerly, perhaps, was called *journ*. They are mentioned in the ſtat. 8 Hen. VI. c. 5.

JOURNEY, *Sabbath Day's*. See SABBATH.

JOURNEY-MAN, formed from the French *journée*, a *day's work*; anciently ſignified a perſon who wrought with another by the day; though now, by the ſtatute, it extends to thoſe likewiſe who covenant to work with another in their occupation or trade by the year.

JOULOPPED, in *Heraldry*, a term applied to the gills of a cock, when borne of a different tincture from his head.

JOY, in *Ethics*, is that paſſion which is produced by love, regarding its object as preſent, either immediately, or in proſpect; in reality, or imagination. This paſſion has been found to increaſe the PERSPIRATION and urine of human bodies. See PLEASURE, and PAIN.

JOYNERS *Preſs*. See PRESS.

JOYNERY, the art of working in wood, and of fitting or joining various parts or members of it together.

The French call it *menuiſerie*, from *minutaria*, ſmall work; by which it is diſtinguiſhed from *carpentry*, which is converſant in the larger and leſs curious work.

JOYNERY, *Column of*. See COLUMN.

JOZO, in *Zoology*, the name of a ſmall ſea-fiſh, of the ſea-gudgeon, or rock-fiſh kind, common in the Mediterranean, and called *gobius albus* by ſome authors. It is brought to market at Rome and Venice.

IPECACUANHA, or IPECACOANHA, in *Pharmacy*, a little wrinkled root, about the thickneſs of a moderate quill, brought hither from ſeveral parts of the Weſt-Indies; much uſed as an emetic, and againſt diarrhœas and dyſenteries.

The firſt European who brought this root into uſe, was an apothecary of Braſil, whoſe name was Michael Triſtaon. The book which this author publiſhed on this ſubject falling into the hands of the Engliſh, is tranſlated into our language, and ſtands, among a number of like accounts, among Purchas's Pilgrims.

He ſays it is an excellent remedy againſt dyſenteries and fluxes of all kinds. He ſays alſo, in its deſcription, that the ſtalks are a quarter of a yard long, and the roots nearly as much; and that the leaves grow only four or five upon a plant.

This agrees very well with all that we have ſince diſcovered of this plant: and the method of uſing it at that time, we find, was not as a vomit; but they bruiſed the freſh root, and ſteeped it about twelve hours in water, at the end of which time, the patient drank the water early in the morning: it operated by ſtool; but after its operation, the natural purging and voiding of blood ceaſed. This ſeems the original account we have of this drug. De Laet from this compiled his account; which is almoſt a literal tranſlation of this into Latin: from his hint Piſo and Marggrave enquired after it more carefully upon the ſpot, and from them came the firſt accurate accounts we had of it; ſo that all ſeems, *ab origine*, deduced from Michael Triſtaon's account of it. Miller apprehends that the plant which furniſhes the true *ipecacuanha* belongs to the genus of *trioſteum*, or *falſe ipecacuanha*.

There are four kinds of *ipecacuanha*; *viz.* a *brown*, a *black*, a *grey*, and a *white* one: though only two, viz. the grey or aſh-coloured and brown are met with in the ſhops. The grey is moſt eſteemed in phyſic; though the brown is that the moſt uſed, as being eaſieſt had:—this latter is firm, twiſted, difficult to break, of a ſharp bitter taſte, and grows plentifully not far from Carthagena.—The root of the grey *ipecacuanha* is longer than any of the other ſorts; it is alſo more violent in its operation: it comes from Peru, by the way of Porto-Bello. The Spaniards call it *bexugillo*.—The white *ipecacuanha* differs from the others, not only in colour but in figure too, being leſs twiſted or rugged than they; and more reſembling the root of white dittany. This grows in Brazil and Martinico.

There are divers falſe ſpecies of *ipecacuanha*, or roots, which, on account of their external appearance, bear the denomination of *ipecacuanha*, and are ſometimes ſold for it. Dr. Douglas mentions two: the one *white*, reſembling the true white, only larger in ſize, ſtraiter, and ſofter to the touch; the other *brown*, of a deeper colour than the true brown, and ſometimes mixed with red, whence it has alſo been called *red ipecacuanha*.—Theſe are both produced in Maryland and Virginia, where they are uſed as vomitives by the lower ſort. Sir Hans Sloane has diſcovered, that the latter is no other than the root of a poiſonous apocynum, deſcribed by him in his Natural Hiſtory of Jamaica. See Phil. Tranſ. No. 410.

The genuine *ipecacuanha* has ſcarcely any ſmell, unleſs during its pulverization or infuſion in liquors, when it emits a faint nauſeous one. Geoffrey obſerves, that in pulverizing conſiderable quantities, the finer powder that flies off, is apt to affect the operator with a difficulty of breathing, a ſpitting of blood, a bleeding at the noſe, or a ſwelling and inflammation of the eyes and face, and ſometimes of the throat; which ſymptoms go off in a few days, ſpontaneouſly, or by the aid of venæſection.

This root is the mildeſt and ſafeſt emetic that has yet been diſcovered. The common doſe is from ten grains to a ſcruple, and upwards; though many inſtances occur of conſtitutions, on which two or three grains operated ſufficiently. Where it fails as an emetic, it commonly purges; and fifteen grains of jalap, with two or three of *ipecacuanha*, have been found to purge more than twice the quantity of jalap by itſelf. This medicine has great efficacy in dyſenteries, not only when uſed as an emetic, but when taken in ſuch ſmall doſes as ſcarce to affect the groſſer emunctories. In common caſes it ſoon performs a cure, by bringing on a free diaphoreſis or plentiful ſweat, after the patient has taken a puke or two, and is covered up warm in bed. In putrid or malignant dyſenteries, it requires to be continued for ſeveral days, and repeated as an evacuant, with the aſſiſtance of rhubarb, cordial antiſeptics, and mild opiates or aſtringents. In caſes requiring plentiful evacuation, or when the offending matter is lodged deep, Sir John Pringle recommends it to be given in ſmall doſes, and repeated at proper intervals, till vomiting or purging comes on. Pref.

The bark of *ipecacuanha* is ſaid to be preferable to its root, as an emetic; acting equally well, and with equal ſafety in a ſmaller doſe, either in powder, or infuſion. Six grains of the bark, infuſed for a night in an ounce and a half of old Rheniſh, proves a good emetic. See Phil. Tranſ. No. 476. ſect. 10.

The brown *ipecacuanha* yields, by diſtillation, a ſmaller quantity of oil than the grey; and the laſt portion of the ſpirit which comes over with the oil, on urging the fire to the greateſt violence, though it be conſiderably acid to the taſte, yet does not ſeem to contain leſs, but rather more volatile particles than the ſpirit drawn in the ſame manner from the grey. On mixing the ſpirits of both kinds alſo with ſalt of tartar, the volatile parts of that from the brown, eſcape with more rapidity than thoſe from the ſpirit of the grey, and affect the noſe more ſenſibly.

It is rational to conclude from hence, that if the brown *ipecacuanha* contains leſs oil than the grey, it alſo contains leſs reſin; and that as this laſt portion of ſpirit contained more volatile parts, it muſt naturally be expected that it ſhould prove more violent in its operation than the grey. This obſervation alſo, which is countenanced by fact, may in ſome degree favour the opinion of thoſe who affirm, that the purgative virtues of medicines are excited by a volatile ſalt, and that they are more or leſs violent, as they contain more or leſs of this ſalt.

The brown *ipecacuanha*, as well as the grey, will afford two ſorts of extracts, a reſinous and a ſaline one; but both theſe are yielded in a ſmaller quantity from the brown than from the grey, and conſequently the reſiduum is always greater from the brown. Eight ounces of the grey *ipecacuanha* yield, with ſpirit of wine, ten drams of the reſinous extract; the ſame quantity of the brown, treated in the ſame manner, yields only ſix drams. From the reſiduum of this quantity of the grey kind, thus diveſted only of its reſin by the ſpirit, there may be procured, by a watery ſolvent, two ounces of a ſaline extract; but the reſidue of the ſame quantity of the brown will yield only five or ſix drams of this extract, by the ſame treatment. The reſidue of the grey, thus diveſted of its reſinous and ſaline parts, will weigh four ounces; and the reſidue of the brown, after the ſame treatment, will weigh near ſix ounces. Hence it is very evident, that the active principles are much more abundant in the grey than in the brown kind of this uſeful root.

Newmann ſays, that ſixteen ounces of good *ipecacuanha*, will yield three ounces of reſinous matter, in which its virtue conſiſts, by means of ſpirit of wine; and from the ſame quantity, by means of water, five ounces of gummy matter were extracted.

If the proceſs of this analyſis be varied, and the watery menſtruum uſed firſt, the proportion of the ſaline extract will be greatly increaſed by it, and that of the reſinous greatly diminiſhed; eight ounces of the grey *ipecacuanha*, thus treated, yielding three ounces and a half of ſaline extract, and only thirty-ſix grains of the reſinous one afterwards by ſpirit of wine; and the ſame quantity of the brown yielding one ounce and three drams of the ſaline extract, and only twenty-four grains of the reſinous one, by means of ſpirit of wine afterwards uſed. From all this it is eaſy to perceive, that the brown *ipecacuanha* contains much leſs of the active parts, and much more of the terreſtrial than the grey; and yet it is equally certain from trial, that the brown is much more violent in its operation than the grey.

This ſeems a perplexing ſort of paradox; but to explain it we muſt remember, that the virtues of medicines are not to be meaſured by their bulk nor their weight, the moſt powerful of all acting in the ſmalleſt quantities. It has been obſerved, that the laſt portion of ſpirit drawn from the brown is more pungent and ſtrong than that from the grey; and probably this part of the root has as much power to irritate the internal parts of the inteſtines as the reſinous parts.

Small doſes of *ipecacuanha* are recommended in diarrhœas of a more ſimple kind, as well as in dyſenteries; and in the fluor albus, we hardly know a better medicine.

The beſt menſtruum for extracting the entire virtue of the root, appears to be a mixture of one part of pure ſpirit, with two or three parts of water. In the ſhops, wine is employed: an ounce of the root is macerated or digeſted in a pint of Canary or mountain, to which ſome add a quarter of an ounce of dried orange peel. Theſe tinctures, in doſes of from half an ounce, or leſs, to an ounce and upwards, prove mildly emetic. Lewis Mat. Med.

IPECACUANHA, *baſtard*, in *Botany*, is a ſpecies of ASCLEPIAS, or SWALLOW-*wort*.

IPECACUANHA, *falſe*, or Dr. Tinkar's weed, *trioſteum*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, cut into five ſegments; it has a tubulous flower of one petal, with a ſhort brim, cut into five parts, which ſtand erect; and five ſlender ſtamina, the length of the tube, terminated by oblong ſummits; with a roundiſh germen, ſupporting a cylindrical ſtyle, crowned by a thick ſtigma; the germen afterward becomes an oval berry with three cells, each including one hard, three-cornered, obtuſe ſeed. There are two ſpecies. Both theſe plants are natives of Virginia, and ſome other northern parts of America, where their roots have been frequently uſed as an emetic, and are commonly called *ipecacuanha*. One of the firſt perſons who brought the roots into uſe was Dr. Tinkar, from whence many of the inhabitants have called them by the name of Dr. Tinkar's weed. The leaves of the firſt ſort greatly reſemble thoſe of the true *ipecacuanha*, but the roots are of a different form. Miller.

IPECA GUACA, in *Ornithology*, the name of a Braſilian ſpecies of duck. It is of a middle ſize between the duck and gooſe, and is kept tame there for breeding and eating. It will fatten as well on dry land as when it has the uſe of water, and lays a vaſt number of eggs.

IPECATI *apoa*, in *Ornithology*, the name of a Braſilian ſpecies of duck, called *pata* by the Portugueſe; the word in that language expreſſing gooſe. It is nearly of the ſize of the gooſe, but is exactly of the ſhape and figure of the common duck. It is very common in the Braſilian rivers, and is fleſhy and well taſted.

IPECU, in *Ornithology*, the name of a Braſilian bird of the wood-pecker kind, called by Mr. Ray, *picus varius Braſilienſis*. It is of the ſize of a common pigeon. Its beak is ſtraight, and very hard and ſharp, and it pierces the back and wood of trees with it, in the ſame manner as the European kinds

IPERAQUIBA, in *Ichthyology*, a name by which ſome have called the *remora*, or ſucking-fiſh, called alſo by the Portugueſe, *piexe pogador*, and *piexe pioltho*.

IPOMOEA, ſee QUAMOCLIT.

IPPO, in *Natural Hiſtory*, See MACASSAR *Poiſon*.

IPPOSELINUM, or HIPPOSELINUM, in *Botany*, a name given by the ancients to the plant from the roots of which the fineſt myrrh was obtained by inciſion. Some alſo have called this plant *ſmyrnium*; but it is evident, that it could not be the ſame with the *hipposelinum* or *ſmyrnium* of our authors, which is the herb Alexanders, ſince the juices of this plant have no reſemblance to myrrh. Dioſcorides calls the plant *ſmyrna*, and diſtinguiſhes it from the *ſmyrnium* of thoſe times; but others have made the *ſmyrna* and *ſmyrnium* the ſame.

IRACUNDUS *muſculus*, in *anatomy*, a name given by ſome authors to one of the muſcles of the eye, called alſo the *rectus exterior* and *abducens*. It is one of the *quatuor recti oculi* of Albinus, and is called by him and Douglas, as well as many others, the ABDUCTOR.

IRASCIBLE, in the *Old Philoſophy*, a term applied to an appetite, or a part of the ſoul, where anger, and the other paſſions, which animate us againſt things difficult, or odious, were ſuppoſed to reſide.

Of the eleven kinds of paſſions attributed to the ſoul, philoſophers aſcribe five to the *iraſcible* appetite; viz. wrath, boldneſs, fear, hope, and deſpair: the other ſix are charged on the concupiſcible appetite; viz. pleaſure, pain, deſire, averſion, love, and hatred.

Plato divided the ſoul into three parts; the reaſonable, *iraſcible*, and concupiſcible parts. The two laſt, according to that philoſopher, are the corporeal and mortal parts of the ſoul, which give riſe to our paſſions.

Plato fixes the ſeat of the *iraſcible* appetite in the heart; and of the concupiſcible in the liver; as the two ſources of blood and ſpirits, which alone affect the mind.

IRENARCHA, ειρηναρχης, compoſed of ειρηνη, *peace*, and αρχος, *prince*, from αρχη, *command*, a military officer in the Greek empire, whoſe buſineſs was to provide for the peace, ſecurity, and tranquility, of the provinces. In Juſtinian's code it is mentioned, that *irenarchæ* are ſent into the provinces to maintain the public peace, by puniſhing crimes, and putting the laws in execution.

Beſides this, there was another *irenarcha* in the cities, to whom belonged the preſerving of peace, and quelling ſedition among the citizens. This officer was ſometimes called *præfectus urbis*.

The emperors Theodoſius and Honorius ſuppreſſed the office of *irenarchæ*, on account of their abuſing their truſt, and diſtreſſing and perſecuting the people, inſtead of maintaining peace among them.

IRINGIUM, a name given by ſome of the old writers on the materia medica, to a root called *ſecacul* by the Arabians, and which, from the ſimilitude of the Latin name with the word *eryngium*, many have ſuppoſed to be the ſame root which was well known to the Greeks and Romans in medicine, and ſtill is in great repute with us on the ſame occaſions.

It is poſſible that the *iringium* may be the ſame with the *ginging* or GINSENG, ſo famous in the Eaſt at this time for the ſame virtues.

IRIS, *rainbow*, in *Phyſiology*. The word is Greek, ιρις, ſuppoſed by ſome to be derived from ειρω, *I ſpeak*, *I tell*; as being a meteor that is ſuppoſed to foretel, or rather to declare, RAIN. See RAINBOW.

IRIS, in *Anatomy*, a ſtriped variegated circle round the pupil of the eye, formed of a duplicature of the uvea.

The *iris*, in different ſubjects, is of ſeveral very different colours, whence the eye is denominated *grey*, *black*, &c. in its middle is a perforation, through which appears a little black ſpeck, called the *ſight*, *pupil*, or *apple of the eye*, round which the *iris* forms a ring.

When the aqueous humour of the eye is evacuated at a wound or ulcer of the cornea, there is danger of the *iris* growing to it. To prevent this, the patient is to be expoſed to the light from time to time, till the cornea is again raiſed by the aqueous humour. The light occaſions a motion in the *iris*, which may prevent its adheſion.

IRIS is alſo applied to thoſe changeable colours which ſometimes appear in the glaſſes of teleſcopes, microſcopes, &c. ſo called from their ſimilitude to a rainbow. The ſame appellation is alſo given to that coloured ſpectrum, which a triangular priſmatic glaſs will project on a wall, when placed at a due angle in the ſun-beams.

IRIS, *the flower de luce*, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are theſe: the flowers are incloſed in ſpathæ (or ſheaths), which are permanent; the flowers are divided into ſix parts, the three outer oblong, obtuſe, and reflected; the three inner erect, and ending in acute points; they have three awl-ſhaped ſtamina, which lie upon the reflexed petals; under the flower is ſituated, an oblong germen, which becomes an oblong angular capſule with three cells, filled with large ſeeds. There are nineteen ſpecies.

The Florentine dry *iris*, or orrice-root, is an expectorant and attenuant. It is given with ſucceſs in aſthmas, and many other diſorders of the breaſt and lungs. The doſe is from ten to fifteen grains in powder. It is uſed alſo in perfumes; in ſternutatory powders, and for communicating a grateful flavour, reſembling that of raſpberries, to wines and ſpirits. The juice of the freſh root of our *iris*, is an excellent medicine in dropſies; and the beſt way of giving it is with white wine, in doſes from one or two drams to three or four ounces, which muſt be taken every two or three days: it is a ſtrong irritating cathartic, works both by vomit and ſtool, and diſcharges a very great quantity of phlegm. The bluiſh expreſſed juice of the flowers changes, with the addition of a little lime-water, into a fine green; and it is thus directed in foreign pharmacopœias for tinging ſome of the unctuous compoſitions called odoriferous or apoplectic balſams.

We have a great many ſpecies of this plant preſerved in gardens, and moſt of them are very beautiful; their roots are tuberous and increaſe very faſt, and all the ſpecies are eaſily propagated by parting them. The beſt ſeaſon for doing which, is in Auguſt, when their flower-leaves are decayed, and the whole plant begins to change colour; but this ſhould always be done when the weather is moiſt, ſo that if the month of Auguſt ſhould prove very dry, it ſhould be deferred till September, though it is beſt to do it ſooner if it can be. They all love a ſhady and moiſt place. If too much dung is uſed to the ground, it rots their roots; and if they ſtand expoſed to the ſun, their flowers are but of very ſhort duration. They ſhould be taken up once in two years, to prevent their extending their roots too far, for they are apt to ſpread, and to harbour all ſorts of vermin.

The curious may raiſe the ſeveral ſpecies from their ſeeds; which if taken from the choiceſt flowers, and cultivated with care, uſually afford a fine variety in the flowers of the plants they produce. They ſhould be ſown ſoon after they are ripe on an eaſt border; they will come up in ſpring, and the year following will flower. Miller.

Bulbous IRIS, *xiphion*, in *Botany*; this is a ſpecies of *Iris* in the Linnæan ſyſtem. Its characters are theſe: the flowers have each a permanent ſpatha or ſheath, and have ſix petals, the three outer broad, obtuſe, and reflexed, and the inner erect, pointed, and joined to the other at their baſe; they have three awl-ſhaped ſtamina, which lie upon the reflexed petals, and are terminated by oblong depreſſed ſummits; and an oblong germen under the flower, ſupporting a ſhort ſtyle, crowned by a tripartite ſtigma. The germen becomes an oblong angular capſula with three cells filled with roundiſh ſeeds.

We have ſeveral ſpecies of this beautiful plant cultivated in our gardens, where they are called *bulbous iriſes*; and beſides theſe, a vaſt number of varieties or new flowers, as the floriſts call them. The culture of theſe being the ſame with that of ſeveral other plants of the ſame ſort, which are much valued for their flowers, it may not be amiſs to give it at large.

There ſhould be great care to ſave the ſeeds of the fineſt and ſtrongeſt flowers, and in September ſome ſhallow pans or boxes muſt be placed with holes at their bottoms to let out the moiſture, and then filled with light and fine earth. On this the ſeeds muſt be ſown pretty thick, and as evenly as may be; half an inch of the ſame earth muſt be ſifted on theſe, and the boxes muſt then be ſet where they may have the morning ſun; and if the weather proves very dry, they muſt be gently watered at times. They muſt remain in this ſituation till October, and then muſt be removed to a place where they may have the benefit of the ſun as great a part of the day as may be; here they muſt ſtand the winter, keeping the boxes very carefully clear from weeds.

In the ſpring the young plants will appear, and they ſhould then be removed to their firſt ſituation, where they may have only the morning ſun; and if the weather be dry, they muſt be watered at times. In June their leaves will decay, and they muſt then have half an inch of freſh earth ſifted over them, and be left in their ſituation till October, when they muſt be removed to the ſame place as before for the winter.

In the ſpring the leaves will appear again, and when they are again periſhed, the earth muſt be taken out of the boxes, and ſifted to ſeparate the roots, which muſt then be planted at three inches diſtance on a bed of the ſame light earth; they muſt be buried three inches deep, and in the ſpring following muſt have about half an inch of freſh earth ſifted over them; the leaves will this year appear and decay as before; and the following year, in June, they will moſt of them flower, when the fineſt flowers ſhould be marked, that their roots may be taken particular care of. The following year the remainder, which did not flower at firſt, will produce their flowers; ſuch of theſe as are finer than the reſt, ſhould be marked in the ſame manner, and the roots of theſe choice kinds be preſerved with particular care. Whatever fine or new flower is thus raiſed from ſeed, may be afterwards propagated by off-ſets from roots, which being planted out, will flower the ſecond year, and often produce even finer flowers than the mother root.

The roots of theſe flowers ſhould be taken out of the earth only every other year; this ſhould be done juſt when the leaves are decayed, and they ſhould not be kept out of the earth above a fortnight.

The earth in which theſe flowers thrive beſt, is a light ſandy loam; and if it be taken up with the turf and the graſs rotted among it before it is uſed, it will be ſo much the better. They do not delight in a rich dunged ſoil, nor ſhould they be placed where they are too much expoſed to the ſun; for beſides that the flowers ſoon fade in theſe places, the roots are alſo always found to decay; but in an eaſt border, where they may have the ſun till eleven o'clock, and where the ground is not too moiſt, nor over dry, they will ſtand a long time in flower, and thrive extremely well.

IRIS *lutea paluſtris*, the *yellow flag-flower*, is a ſpecies of *iris* which grows naturally in ditches and moiſt places, in moſt parts of this country. The common people of Scotland have found out an uſe of this plant, which has eſcaped the moſt accurate writers on botany. In that country the common ink is made of it. They cut ſome of theſe roots into thin ſlices, and either boil or infuſe them in water till the liquor is highly tinged with them; they then pour it clear off; and then putting into it the blade of a knife, or any other piece of iron, they rub it hard with a rough white pebble, common there, and by degrees the liquor becomes black; they continue rubbing it till it is as deep a black as they require, and it is a tolerable good ink. Phil. Tranſ. Nº 117.

The juice of this plant mixed with ſyrup of buckthorn, is reckoned an effectual hydragogue. See Med. Eſſ. Edinb. vol. v. art. 8.

The root of this plant is recommended by Brookes as a remedy for the tooth-ach.

IRIS is alſo a name given by ſome authors to a peculiar ſpecies of ſprig cryſtal, remarkable for its giving the rainbow colours in reflection. This, however, being a property more or leſs found in all the kinds of ſprig cryſtal, and theſe much reſembling one another, it became applied to ſprig cryſtal in general; and *iris*, inſtead of being the name of a peculiar ſpecies, was underſtood as a ſynonymous term for common cryſtal.

IRIS *marina*, the *ſea-rainbow*. This elegant appearance is generally ſeen after a violent ſtorm, in which the ſea-water has been in vaſt emotions. The celeſtial rainbow has great advantage over the marine one in the brightneſs and variety of the colours, and in their diſtinctneſs one from the other; for in the ſea-rainbow there are ſcarce any other colours than a duſky yellow on the part toward the ſun, and a pale green on the oppoſite ſide. The other colours are not ſo bright or ſo diſtinct as to be well determined, but the ſea-rainbows are more frequent and more numerous than the others. It is not uncommon to ſee twenty or thirty of them at a time at noonday. Obſerv. ſur l'Aſie, p. 292.

IRISH *Terms*. See TERMS.

IRON, in *Natural Hiſtory*, an hard, fuſible, and malleable metal, of a greyiſh colour, of great uſe in the affairs of life.

Iron, like other metals, is ſaid to conſiſt of earth, PHLOGISTON, and a metallic or mercurial principle. This metal has, next to GOLD, the greateſt tenacity of parts: an *iron*-wire, the diameter of which is 1-10th of an inch, being capable of ſuſtaining 450 lb. without being broken.

It is the lighteſt of all metals, except tin, being between ſeven and eight times ſpecifically heavier than water. See *Specific* GRAVITY. It is alſo the hardeſt, moſt elaſtic, and, except PLATINA, the moſt difficult to melt, of all metals.

Though *iron* grows red-hot much ſooner than any other metal, it is not fuſible by the heat of ordinary furnaces, nor without an intenſe white heat. When perfectly malleable, it is ſaid not to be fuſible at all, without additions, or the immediate contact of the burning fuel; and when melted, to loſe its malleability: But M. Reaumur found, that forged *iron*, which could not be made to melt in a crucible without addition, was brought into fuſion, by ſurrounding it with GYPSUM or plaſter of Paris: And Dr. Lewis found that *iron*, thus melted, proved very malleable, though ſome have thought that forged *iron*, brought into fuſion, is of the ſame nature with common caſt *iron*. *Iron* expands the leaſt of the metals by heat: and in the act of fuſion, inſtead of continuing to expand, like the other metals, it ſhrinks; and in its return to a conſiſtent ſtate, inſtead of ſhrinking, like the other metals, it expands or dilates into a large volume; and one of the marks of this dilatation is, the convexity of its ſurface, in circumſtances wherein that of other metals is depreſſed. This property of *iron*, firſt diſcovered by M. Reaumur, excellently fits it for receiving impreſſions from moulds: but Dr. Lewis obſerves, that platina ſeems to deſtroy this power in *iron*. He alſo obſerves, that platina, melted with caſt *iron*, contributes to render it tough, probably by throwing out and conſuming that ſulphureous matter, to which the brittleneſs of this kind of *iron* is chiefly owing, and which is ſeparated in the proceſs by which *iron* is made malleable: and, therefore, he conjectures, that platina, for certain purpoſes, may prove a valuable addition to this moſt uſeful metal, to which the workmen cannot communicate the hardneſs that is often required, without imparting at the ſame time brittleneſs and intractability. *Iron*, expoſed to a white heat inſufficient for its fuſion, is calcined firſt into blackiſh ſcales, and afterwards into a dark reddiſh powder, called CROCUS *martis aſtringens*, which is nothing but the proper earth of *iron*, deprived of the greateſt part of its phlogiſton by calcination. When ſtrongly heated, the ſurface of *iron* appears covered with a ſoft vitreous matter, like varniſh; in this ſtate, pieces of it cohere, and on being hammered together, weld or unite without diſcovering a juncture. As *iron* is the only metal which exhibits this appearance in the fire, it is likewiſe the only one capable of being welded. *Iron* heated as much as poſſible, or till it becomes of a ſhining white colour, and is juſt beginning to fuſe, has the appearance of a combuſtible body, penetrated by a bright and vivid flame; and the inflammable principle of this metal thus heated, really burns in a ſenſible manner; a number of ſhining ſparks ſhooting out from it, and burning with a kind of decrepitation. *Iron* appears to be a combuſtible ſubſtance, from the great loſs or waſte of quantity obſervable in it, when expoſed to a red, and eſpecially to a white heat: And this COMBUSTION is excited and maintained like that of other combuſtible ſubſtances, by contact of air. The ſparks produced by the colliſion of ſteel with FLINT, appear to be globular particles of *iron*, which have been fuſed, and imperfectly ſcorified or vitrified. The ignition, light, and fuſion of the ſparks, are occaſioned by the heat excited by the combuſtion of their own inflammable matter, and continued in theſe particles during their paſſage through the air, and not merely by the heat communicated by the colliſion; for by an experiment of Mr. Hawkſbee, it appears, that theſe ſparks ſtruck by colliſion, are not viſible, that is, they are not ignited, and do not deflagrate in an exhauſted receiver; the air being neceſſary to maintain and excite their deflagration and combuſtion. *Iron*, like other calcinable metals, acquires an increaſe of weight by CALCINATION: and, by complete calcination, it is ſaid to receive an augmentation of one third of its weight. *Iron* may be ſoftened by heating it often in the fire, hammering it, and letting it cool of itſelf; and it is hardened by extinguiſhing it in water.

It may be rendered white by cooling it in ſal ammoniac and quicklime. The ſtrongeſt temper of *iron* is ſaid to be that which it takes in the juice of earth-worms.

The ſurface of *iron* is quickly corroſible by moiſt air, and ſoon converted into a reddiſh yellow ruſt, or calx, deprived of all its phlogiſton, and which cannot recover its metallic properties, without being again combined with its inflammable principle. Many methods have been uſed to preſerve *iron* utenſils from ruſt; as animal fats, oils, boiled oil mixed with melted lead, &c. Homberg's ſalve for this purpoſe, conſiſts of two pounds of hog's lard, an ounce of camphor, and as much black lead as will render the mixture of an *iron* colour: when this is uſed, the *iron* muſt be previouſly heated. M. Reaumur has diſcovered a better compoſition for this purpoſe: it is oil, inſpiſſated by being expoſed to the air in flat ſhallow veſſels, ſo as juſt to cover the bottom, mixed with a ſolution of copal in ſpirit of wine; this forms an elegant hard varniſh, which, rubbed on poliſhed *iron*, made a little hotter than the hand can bear, will cover it with a ſolid, thin, tranſparent coat, without any injury to its colour or appearance. *Iron* is ſoluble in all acids, from which it precipitates all the common metallic bodies except zinc, and the ſemi-metals regulus of cobalt and nickel: with the marine acid it yields a yellow; with the nitrous, a dark red, forming with theſe acids, ſeparately or conjointly, ſalts with metallic baſes, of a deliqueſcent nature; and with the vitriolic, a pale green ſolution, that forms a vitriolic ſalt with a metallic baſe, coagulated by evaporation and cooling into green rhomboidal cryſtals, and which is changed to an inky blackneſs, by the addition of a ſmall quantity of galls, and by moſt of the other vegetable aſtringents; and to a reddiſh or purple, by a mixture of aſtringents, with a minute proportion of any alkaline ſalt. Each of theſe acids deprives the *iron*, in the ſolution, of a conſiderable part of its phlogiſton, or inflammable principle. During the ſolution in vitriolic acid, an inflammable vapour ariſes; which is permanent and elaſtic, and which has a great analogy to the inflammable DAMPS in mines. All the ſolutions of *iron*, by whatever acid effected, on the addition of a lixivium of alkaline ſalts that have been calcined and fully impregnated with animal coals, are changed to a deep blue, and on ſtanding depoſit the *iron* in form of a powder of the ſame colour. By theſe characters, a moſt minute portion of *iron* may be diſcovered in liquors. *Iron* has a greater affinity than any other metal with ſulphur; and, therefore, may be employed to ſeparate moſt metals from ſulphur by fuſion; and ſulphur, thus united with *iron*, conſiderably augments its fuſibility. If a bar of *iron* be heated till it becomes white, and a roll of ſulphur be applied to one of its extremities thus heated, the ſulphur, uniting with the *iron*, makes it fuſe ſo as to run down in red-hot drops. See *Artificial* EARTHQUAKES.

Iron has a great conformity with copper; and the two are not eaſily ſeparated, when ſoldered together: whence ariſes that uncommon friendſhip which the poets feign between Mars and Venus.

Gold is alſo particularly diſpoſed to unite with *iron*, of which, if the *iron* be pure, it diſſolves twice or thrice its own weight in a degree of heat far leſs than that in which *iron* melts. In virtue of this property, gold proves an excellent ſolder for the finer kinds of *iron* and ſteel inſtruments; a ſmall thin plate of gold being wrapped round the parts to be joined, the gold is ſoon made to melt by a blow-pipe, and ſtrongly unites the pieces together. *Iron* and ſteel, in very ſmall proportion, render gold hard and eager; ſome of theſe mixtures are of ſuch a degree of hardneſs and cloſeneſs, as adapts them for receiving a fine edge, and it is ſaid they have been formed into razors. For the method of gilding *iron*, ſee GILDING.

Iron is diſſolved by all the metals made fluid by ſufficient heat, except lead, on which it floats diſtinct, as oil upon water. Among the ſemi-metallic bodies, it is averſe to any union with mercury; no method has been hitherto diſcovered of amalgamating *iron*; though quickſilver, in certain circumſtances, ſeems in ſome ſmall degree to act upon it: a plate of tough *iron*, kept immerſed in mercury for ſome days, becomes brittle; and mercury has been obſerved to adhere to, and coat the heads of *iron* peſtles uſed in triturating certain amalgams with ſaline liquors. *Iron* filings may be amalgamated with mercury when the ſolution of green vitriol is added. See AMALGAMATION *of iron*. For the affinities of *iron* with different ſubſtances, ſee Tables of AFFINITY.

It has a great conformity alſo with the loadſtone, being attracted by magnets. Rohault obſerves that it is itſelf an imperfect loadſtone; and that if it be a long time expoſed in a certain ſituation, it becomes a real loadſtone; and mentions the *iron* in the ſteeple of Notre Dame at Chartres as an inſtance.

By this property, it may be diſcovered in mixtures, where by other methods it could ſcarcely be perceived, and may be even ſeparated, when it is only interſperſed betwixt other bodies, and not adherent to them. It preſerves this property, although it be allayed with ſome other metals. However, Gellert affirms, that this quality is deſtroyed by allaying *iron* with regulus of antimony.

It is obſervable, that ſeveral of the hard ores of *iron*, which are not affected in the leaſt by the magnet in their natural ſtate, are vigorouſly attracted by it when moderately roaſted, though without the contact of any inflammable, and without ſeeming to loſe any ſulphureous matter; and that the calces of *iron*, by ſlight roaſting with inflammable additions, are made to obey the loadſtone, and revived into their metallic form, each particle appearing now to be perfect *iron*; whilſt the calces of other metals are in no degree revived without being brought into fuſion.

The ſeveral calces of *iron*, fuſed with large proportions of vitreous matters, impart different ſhades of yellow, reddiſh, green, and blue: and the colour, ſays Dr. Lewis, ſeems to be influenced more by the degree and continuance of the fire, and other circumſtances in the proceſs, than by the particular manner in which the *iron* is prepared.

Moreover, *iron* is capable of being combined either by fuſion, or by cementation, with a more abundant quantity of phlogiſton; and of being thus converted into a more perfect *iron*, called STEEL, which is capable of acquiring, by ſudden cooling or tempering, a very great hardneſs, that renders it uſeful for many neceſſary purpoſes.

It would ſcarce have been believed, till experiments confirmed it, that *iron* makes a part of almoſt all ſorts of ſubſtances. So that it is truly an univerſal metal, being found in all the mineral earths and ſtones that have been examined, in the ores of all other metals, and even in the aſhes of all vegetables and animals. Mr. Geoffroy attempting to produce *iron* by chemiſtry out of ſeveral ingredients, into which it may be decompoſed, wanted firſt to find ſuch as in themſelves contained no *iron*. He found that the aſhes of all vegetable bodies whatever, contained more or leſs of that metal; and Mr. Lemery afterwards, in his analyſis of honey, found *iron* in the calcined caput mortuum of that ſubſtance, many particles of it adhering to a knife that had been touched on a magnet.

This had much puzzled the thoughts of the chemiſts, when Mr. Lemery at length attempted to account for it in this manner. All earth is impregnated with a ferrugineous or vitriolic matter, and this therefore muſt be received into the roots of plants in their growth, and make a part of their ſubſtances. It is however, in too ſmall a quantity, and in particles too much diſſeminated, to ſhew itſelf in the ſtalks or leaves of the plant; but when the whole has been calcined, the fire collecting together its ſeparated particles, they then form ſmall maſſes which act as *iron*, and apply themſelves to the magnet.

Beſides, particles of *Iron* are diſcovered by the magnet, not only in all vegetable aſhes, but in animal ones; the aſhes of caſtor have been found by the younger Lemery to contain alſo *iron* in as large a proportion as thoſe of honey and of vegetables.

To try whether theſe particles attracted by the magnet in the aſhes of vegetables were really *iron*, this author collected a ſmall quantity of them together by means of a knife touched on the magnet, and expoſing them to the focus of the great burning glaſs belonging to the then duke of Orleans, they were found to be melted by that heat in the ſame manner as common *iron*, and to be attended with all the ſame circumſtances in the ſeveral ſtates of fuſion and diſſipation. It ſparkled greatly while ſoft, and finally was reduced to a ferrugineous earth or bole, in all reſpects the ſame with that ſeparated by the ſame means from filings of *iron*, or from the magnet. When this matter is thus proved to be real *iron*, the doubt how it is able to get into the minute veſſels of plants, is cleared, by conſidering that *iron* is not only preſent in all earth, but is alſo very eaſily diſſolved by all ſorts of ſalts, and takes different forms with every one, according to its ſeveral nature. When it is found in earths which contain an acid analogous to that of vitriol, ſulphur, or allum, it becomes converted into a ſalt known by the name of vitriol; and what objection can there be againſt the ſuppoſing that this ſalt, when diſſolved in a ſufficient quantity of water, is received into the veſſels of plants growing in the earth where it abounds; and we cannot doubt the diviſibility of the particles of *iron* in the ſtate of this ſalt, being great enough to make it capable of paſſing even into the moſt minute veſſels of plants, when we conſider that a grain of vitriol diſſolved in nine thouſand times its own weight of water, is capable of giving colour to the whole, and with it a ſenſible taſte of the metal from which it had its origin.

The ſpecific gravity of *iron* has been by ſome ſuppoſed to be a reaſon againſt the believing its aſcent in the veſſels of plants; but this appears of no weight, when we conſider that all flowers are found, on a chemical analyſis, to contain earth, and that earth is heavier than *iron* in the ſtate of vitriol; and that the metals in the ſtate of vitriols, do often riſe in vapour, and that without any great heat, is plain from this experiment, that if blue, green, and white vitriol be put together into a box, and covered down, the natural evaporations of each falling confuſedly on the others, will change the colour of every one on their upper ſurface, while that which touches the bottom of the box remains unaltered. If vitriol be put into an earthen veſſel, and water poured on it in ſmall quantity only to moiſten it, the *iron* loaded with its acids, will be found in a little time to aſcend up the ſides of the pot to the top. This is a ſecond proof that *iron* in the ſtate of vitriol is to be raiſed or ſublimed with great eaſe. There is, however, beſides theſe, yet another more convincing.

When ſpirit of nitre is poured upon filings of *iron*, there ariſes an ebullition attended with ſo great heat that the hand can ſcarcely be held upon the outſide of the veſſel. After the ebullition the liquor becomes red, and greatly loaded with the diſſolved *iron*. If oil of tartar be added to this liquor, there is raiſed a moderate ebullition, and the mixture ſwells greatly. After this there are found a number of branches very beautifully arranged on the ſides of the veſſel, and theſe continue to form themſelves under the eye, while there is no fermentation nor ebullition in the liquor. Theſe curious figures at length cover the whole ſurface of the veſſel, and riſing over the rim of it, fall on the outſide, and cover that alſo. This beautiful vegetation may be varied a great many ways by the different proportions of the ingredients; but in every proceſs it ſhews how very eaſily *iron* may be made to aſcend upwards, and that to great heights; and when we conſider the power of the heat of the ſun, and of the ſuction of the roots of plants, which are in a manner ſo many ſyphons acting together upon the juices of an earth, among which there are particles of *iron* thus diſſolved; we are not to wonder that *iron* is conveyed into the veſſels of the plant, or found afterwards in its aſhes. The wonder would be that there ſhould be any vegetable aſhes which did not afford *iron*, but that does not appear yet to have been found in regard to any. Mem. Acad. Par. 1706.

The qualities of *iron*, with regard to hardneſs, brittleneſs, malleability, &c. are different according to the nature of the ore from which it is obtained, and the operation it has undergone. The *iron* run from ſome of the German ores, when forged only to a certain point, is found to be a good ſteel; whilſt that of many others, taken in the ſame intermediate ſtate, betwixt caſt and completely forged *iron*, cannot be worked either as ſteel or *iron*. The Swediſh, and ſome of our own ores, yield an excellent tough *iron*; whilſt others give a brittle metal, that cannot by any forging be made perfectly malleable, and hence employed only for ſome kinds of nails and heavy works. The inferior ores are ſaid to be meliorated by mixing two or three different ſorts together. The Swediſh *iron* has generally been preferred on many accounts, and particularly for making of ſteel; but the Engliſh *iron*, properly manufactured, has been found not inferior to it. The German *iron*, commonly called among us, *Dort-ſquare*, becauſe it is brought hither from Dort, and wrought into bars of three quarters of an inch ſquare, is a coarſe *iron*, and only fit for ordinary uſes. That ſort which is uſed for making of WIRE, is the ſofteſt and tougheſt of all, and acquires theſe qualities from being refined to a higher degree than is neceſſary for ordinary purpoſes.

Generally ſpeaking, the beſt *iron* is that which is ſofteſt and tougheſt, and which, when it breaks, is of an even greyiſh colour, without any glittering ſpecks, or any flaws or diviſions like thoſe ſeen in broken antimony.

Iron, *bar*. See Bars of *Iron* and Ancony.

Iron, *caſt*, is that which is run from the ore, and which, on account of a mixture of crude earth, not reduced to a metallic form, proves hard, ſo as generally not to yield in the leaſt to the file or chiſſel; and brittle, both whilſt cold and when ignited. When caſt into thin plates, it cracks, on being haſtily cooled, like glaſs; and when broke, appears of a dull white colour, approaching to that of unpoliſhed ſilver, and of a ſmooth uniform texture, compoſed of plates laid ſo cloſe together, as ſcarce to be diſtinguiſhable even by a microſcope. The more impure ſorts are leſs hard to the file, but not leſs brittle under the hammer; their colour is much darker, and their texture often granulated. When they are melted, a quantity of glaſſy ſcoria ariſes on the ſurface, and leaves the remaining metal pure and white like the foregoing ſort. Pure caſt *iron*, ſurrounded with animal aſhes, and expoſed to a fire not ſufficient to melt it, becomes by degrees ſo ſoft, that utenſils or ornaments made of it may be eaſily cut and filed. During this cementation, it undergoes ſeveral remarkable changes, obſerved by M. Reaumur, and recited by Dr. Lewis in his notes to Newmann's Chemiſtry, p. 79.

Iron, *forged* is produced from caſt *iron*, heated till it is ready to melt, and compreſſed by repeated blows of large hammers; by which a quantity of vitreous matter is forced out and thrown off; its parts are more regularly arranged; the plates rendered ſmaller, and more diſtinct, by degrees changed into grains, and at length into fibres. Fine plates regularly arranged, ſmall grains or fibres like thoſe which appear on the fracture of wood, are marks of tough *iron*, provided it be not ſulphurated; but large and irregular plated *iron* is univerſally ſhort and brittle, and the colour of the fracture is uſually whitiſh, and conſiderably bright. Pure well-forged *iron* is malleable both when cold and hot, though not with equal facility: the more it is heated, it extends the more eaſily, and is leſs liable to crack. Some ſorts of *iron*, though malleable when cold, prove entirely brittle if heated red; others are brittle when cold, and malleable only whilſt ignited. The former are called by the workmen, *red-ſhare*, or *red-ſear*, the latter, *cold-ſhare*, or *cold-ſear irons*. The imperfection of the firſt is ſuppoſed to be owing to an admixture of ſulphur; that of the ſecond proceeds wholly from a want of ſufficient forging. Forged *iron* is a little heavier than the caſt, in the proportion of about $7\frac{8}{10}$ to $7\frac{1}{10}$. It ſcorifies much more in the fire, and does not melt without additions, or the immediate contact of the fuel: the ſubſtances, ſays M. Reaumur, that ſoften caſt *iron* by cementation, increaſe the ſoftneſs of the forged to a certain point; but beyond this, the operation renders it harder and more brittle than at firſt. See Dr. Lewis, &c. ubi ſupra.

Square and flat bars of *iron* are ſometimes twiſted, for ornament; the manner of doing which is this: after the bar is ſquare, or flat-forged, they give it a flame-heat, or if the work be ſmall, only a blood-red heat; in which ſtate it is eaſy to twiſt it about as much or as little as they pleaſe, with the tongs, vice, or the like.

The ſeveral heats which ſmiths give their *iron* in work are, 1. A ſparkling or welding heat, which is uſed when they double up their *iron*, or weld two pieces of *iron* together, end to end. 2. A flame or white heat, which is uſed when the *iron* has not its form and ſize, but muſt be forged into both. 3. A blood-red heat, which is uſed when the *iron* has already its form and ſize, but wants a little hammering to ſmooth and fit it for the file.—If the *iron* be made too hot, it will ſometimes red-ſear, i. e. break or crackle under the hammer while it is working between hot and cold.

We have a great number of *iron* works in moſt parts of England, and in Wales; thoſe in the foreſt of Dean, in Glouceſterſhire, are in moſt repute.

The ore is there found in great abundance, differing much in colour, weight, and goodneſs. The beſt, called *bruſh ore*, is of a bluiſh colour, very ponderous, and full of little ſhining ſpecks, like grains of ſilver: this affords the greateſt quantity of *iron*; but, being melted alone, it produces a metal very ſhort and brittle, and therefore not ſo fit for common uſe. For the remedying whereof, the workmen make uſe of another ſort of material, termed *cinder*, which is nothing but the refuſe of the ore, after the metal has been extracted; and which, being mingled with the other, in a due quantity, gives it that excellent temper of toughneſs, which cauſes this *iron* to be preferred before any brought from foreign parts.

It is aſſerted by a perſon converſant with the manufacture of *iron*, that if a ſufficient quantity of this cinder were carried to the *iron*-works in any other part of the kingdom, and made uſe of inſtead of the lime-ſtone, the *iron* produced will be nearly, if not equally, as good as that of the foreſt of Dean. The ſame writer obſerves, that in Staffordſhire, and various parts of Yorkſhire, where their *iron* is but of an indifferent quality, the matter made uſe of by way of flux, was generally unburnt lime-ſtone, which he thinks by no means proper for the purpoſe: in Suſſex they uſe a certain foſſil, compoſed of a congeries of different ſhells of fiſhes, ſlightly bound together by a ſort of reddiſh earth, not unlike ſome kinds of *iron* ore, called greys; which, he ſays, is a good flux, and produces a metal of excellent quality. Horne's Eſſay on *Iron* and Steel, p. 56, &c. But to return to the account of the manfacture of *iron* in the foreſt of Dean, which is ſimilar to that purſued in other parts of the kingdom—After they have provided the ore, their firſt work is to calcine it, which is done in kilns, much after the faſhion of our ordinary lime-kilns: theſe they fill up to the top with coal and ore, ſtratum ſuper ſtratum, that is, one layer upon another: and ſo putting fire to the bottom, they let it burn till the coal be waſted, and then renew the kilns with freſh ore and coal, in the ſame manner as before. This is done without fuſion of the metal, and ſerves to conſume the more droſſy part of the ore, and to make it brittle; ſupplying the beating and waſhing which are uſed in other metals.

From hence they carry it to be ſmelted to their furnaces, which are built of brick or ſtone, and are about twenty-four feet ſquare on the outſide, and near thirty feet in height within; not above eight or ten feet over where wideſt, which is about the middle: the top and bottom having a narrow compaſs, much like the ſhape of an egg. Behind the furnace are fixed two huge pair of bellows, the noſes of which meet at a little hole near the bottom: theſe are compreſſed together by certain buttons, placed on the axis of a very large wheel, which is turned about by water, in the manner of an over-ſhot mill. As ſoon as theſe buttons are ſlid off, the bellows are raiſed again by the counterpoiſe of weights, whereby they are made to play alternately, the one giving its blaſt whilſt the other is riſing.

At firſt they fill the furnace with ore and cinder, intermixed with fuel, which in theſe works is always of charcoal, laying them hollow at the bottom, that they may more eaſily take fire; but after they are once kindled, the materials run together into a hard cake or lump, which is ſuſtained by the faſhion of the furnace: and through this the metal, as it melts, trickles down into the receivers ſet at the bottom, where there is a paſſage open, by which the men take away the ſcum and droſs, and let out the metal as they ſee occaſion. Before the mouth of the furnace there lies a great bed of ſand, wherein they make furrows of the ſhape into which they would have their *iron* caſt. As ſoon as the receivers are full, they let in the metal, which is made ſo very fluid by the violence of the fire, that it not only runs to a conſiderable diſtance, but ſtands afterwards boiling for a good while.

For the backs of chimneys, hearths of ovens, or the like, they take the melted metal out of the receivers in great ladles, and pour it into moulds of fine ſand.

When the furnaces are once at work, they keep them conſtantly employed for many months together, never ſuffering the fire to ſlacken night or day, but ſtill ſupplying the waſting of the fuel, and other materials, with freſh poured in at the top: charcoal is uſed altogether in this work; ſea-coal will ſcarcely do. See Iron-ore and Furnace.

From theſe furnaces the workmen bring their *ſows* and *pigs* of *iron*, as they call them, to their forges, one of which they call the finery, and the other the chafery, where they are wrought into bars. Phil. Tranſ. № 137. Abr. vol. ii. p. 558.

Iron, *duties upon*. Any Spaniſh, Spruce, and Swediſh iron imported in any other ſhip or veſſel than ſuch as is Engliſh built, and of which the maſter, and at leaſt three-fourths of the mariners are Engliſh, pays on importation, 2l. 17s. $10\frac{65}{100}$d. the ton, and draws back on exportation, 2l. 14s. $6\frac{75}{100}$d. the ſame imported in Engliſh-built ſhips, and ſo navigated, to pay on importation, 2l. 8s. $6\frac{15}{100}$d. the ton, and draw back on exportation, 2l. 5s. $2\frac{25}{100}$d. *Iron* ſlit or hammered into rods, commonly known by the name of rod-*iron*, pays on importation, 8s. $6\frac{15}{100}$d. the hundred wt. and draws back on exportation, 8s. $\frac{75}{100}$d. Ditto from Ireland, pays 3s. $10\frac{70}{100}$d. and draws back, 3s. $4\frac{50}{100}$d. *Iron* drawn or hammered, leſs than three-fourths of an inch ſquare, pays on importation, 8s. $6\frac{45}{100}$d. the hundred wt. and draws back on exportation, 8s. $\frac{75}{100}$d. Unwrought *iron* of Ireland, pays on importation, 1l. 6s. $11\frac{40}{100}$d. the ton, and draws back on exportation, 1l. 3s. $7\frac{50}{100}$d. Unwrought *iron* of all other places, not otherwiſe rated, imported in Britiſh ſhips, pays on importation, 2l. 8s. $6\frac{15}{100}$d. the ton, and draws back on exportation, 2l. 5s. $2\frac{25}{100}$d. and in foreign ſhips, pays on importation, 2l. 17s. $10\frac{65}{100}$d. and draws back on exportation, 2l. 14s. $6\frac{75}{100}$d. *Iron*-wares manufactured, not otherwiſe rated, or not prohibited by law, pay per hundred weight on importation, 12s. $4\frac{65}{100}$d. and draw back on exportation 11

11s. $5\frac{25}{100}$d. *Iron*-ore the ton, pays on importation, 2s. $4\frac{72\frac{1}{2}}{100}$d. and draws back on exportation, 2s. $1\frac{87\frac{1}{2}}{100}$d. Old buſhels, broken and caſt iron, pays on importation, the ton, 11s. $11\frac{62\frac{3}{4}}{100}$d. and draws back on exportation, 10s. $9\frac{37\frac{1}{2}}{100}$d. Backs for chimnies, ſmall, the piece, pay on importation, 2s. $4\frac{52\frac{1}{2}}{100}$d. and draw back on exportation 2s. $2\frac{62\frac{1}{2}}{100}$d. Backs for chimnies, large, the piece, pay on importation, 4s. $9\frac{50}{100}$d. and draw back on exportation, 4s. $5\frac{25}{100}$d. Bands for kettles, the hundred wt pay on importation, 12s. $4\frac{65}{100}$d. and draw back on exportation, 11s. $5\frac{25}{100}$d. Fire *irons*, the groce, pay on importation, 1s. $11\frac{12}{100}$d. and draw back on exportation, 1s. $8\frac{25}{100}$d. More for every hundred weight on importation, 4s. $8\frac{25}{100}$d. and draw back on exportation, 4s. $8\frac{25}{100}$d. Hoops the hundred wt. pay on importation, 9s. $9\frac{55}{100}$d. and draw back on exportation, 9s. $2\frac{25}{100}$d. Stoves, the piece, pay on importation, 19s. 3d. and draw back on exportation, 16s. $10\frac{50}{100}$d. More for every hundred weight on importation, 4s. $8\frac{25}{100}$d. and draw back the ſame. *Iron* kettles, the piece, pay 1s. $2\frac{6\frac{1}{4}}{100}$d. and drawn back, on exportation, the ſame; and beſides for every hundred weight on importation, 7s. $8\frac{4}{100}$d. and draw back on exportation, 6s. 9d.

Pig or bar-*iron*, from the Britiſh plantations in America, is imported free; but all ſuch *iron* muſt be ſtamped with a mark, denoting the colony, or place where it was made, and a certificate produced of the oath of the exporter, ſigned by two of the principal officers of ſuch colony; and the maſter, or commanding officer of the ſhip, or veſſel, importing ſuch *iron*, muſt make oath, that the *iron* ſo imported, is the ſame as that mentioned in the certificate. 23 Geo. II. c. 29.

IRON, in *Medicine*, is ſaid to have greater virtues than any of the other metals, which is not to be wondered at, as being the only one that is in a manner ſoluble in the human body. All the other metals, whether hard or ſoft, poiſonous or ſalutary, nay even fluid mercury itſelf, ſwallowed in their crude ſtate, paſs out of the body again unaltered; but this is not the caſe with *iron*, its crude filings are often taken as a medicine, and are always ſo much acted upon by their juices, as to produce conſiderable effects. It is ſo eaſily wrought upon out of the body alſo by fire, and by different menſtruums, that it becomes an aperient or aſtringent, as it is differently treated; and is, under proper management, greatly ſuperior to all other medicines in chronic caſes.

Its virtues internally were not unknown to the ancients: Dioſcorides attributes both an aſtringency and aperiency to it, and preſcribes it in hæmorrhages. He alſo recommends its ruſt, or *crocus martis*, in ſuppreſſions of the menſes; though he on the other hand preſcribes wine or water, in which red-hot *iron* had been quenched, as an aſtringent in dyſenteries, diarrhœas, and weakneſſes of the ſtomach.

The great medicinal virtue of *iron* is cauſed by its tonic and ſtrengthening qualities. It produces a ſlight and gentle irritation of the fibres, the effect of which is to conſtringe the ſenſible organic parts upon which it acts, and to increaſe their force and elaſticity. *Iron* particularly acts upon the fibres, and the veſſels of the ſtomach and inteſtines; hence it produces excellent effects in all diſeaſes which proceed from laxity and inactivity of the digeſtive organs. Such are crudities, bad digeſtion, accompanied with diarrhœa, flatulencies, flatulent colics, &c. &c. in diſeaſes which proceed from the former, as many hyſterical, hypochondriacal, melancholic affections, intermittent fevers, tertians and quartans, &c. In thoſe caſes *iron* quickens the circulation and raiſes the pulſe; renders the blood more florid, and as it were expands and rarifies the juices, promoting, when they are deficient, and reſtraining, when immoderate, the ſecretions that are made from the blood, as perſpiration, urine, and the uterine purgations. By the ſame corroborating power, which renders it ſerviceable in promoting deficient, and reſtraining redundant diſcharges, where the ſuppreſſion or flux ariſes from debility and relaxation, it increaſes on the contrary, fluxes, and confirms obſtructions, when they proceed from tenſion, rigidity, or ſpaſmodic ſtrictures of the veſſels. Where either the circulation is quick, or the habit plethoric, by increaſing the velocity of the blood, and all the plethoric ſymptoms, it produces heavineſs, dulneſs, vague heats and fluſhings, or kindles more dangerous fevers or inflammations, or burſts ſome of the over-diſtended ſmall veſſels. In ſome conſtitutions, where *iron* is proper and ſalutary, particularly in hyſterical and hypochondriacal caſes, and where the ſtomach is very weak, it is apt at firſt to occaſion great ſickneſs and perturbation: to remedy theſe inconveniences, Sydenham adviſes to begin with very ſmall doſes, and to adminiſter it for a while at bed-time, in conjunction with a ſlight opiate. In other circumſtances, it is commonly taken in the morning and afternoon, and moderate exerciſe uſed to promote its action. In all caſes the doſe ſhould be ſmall, and repeated; a grain, or half a grain of the metal, diſſolved or in a ſoluble ſtate, is generally a ſufficient doſe. Its effects are known by nidorous eructations, and by the alvine fæces being tinged of a black colour.

Stahl, and ſeveral other modern chemiſts and phyſicians acknowledge only the tonic and ſtrengthening qualities of *iron*. The caſes in which *iron* has produced a reſolving and aperient effect are thoſe, in which the obſtructions, and the defect of ſecretions and excretions, have proceeded from weakneſs and relaxation of the fibres and of the veſſels rather than from a craſſitude of humours, as in the chloroſis, in ſome kinds of jaundice, and other diſeaſes of the ſame ſort. The preparations of *iron* in more frequent uſe at preſent are, 1. the crude filings reduced to an impalpable powder: this is an excellent form for adminiſtering *iron* in female diſorders, in which the body is weak, languid, and full of acidities: the doſe of the filings is from two or three grains to a ſcruple and more. 2. *Mars ſaccharatus*, which is the filings candied with ſugar, by diſſolving two parts of fine ſugar in water, and boiling it down to a candy conſiſtence, and adding by little and little, one part of the cleanſed filings in a kettle over a gentle fire; the veſſel being continually ſhaken, that the filings may be cruſted over with the ſugar. In order to prevent the mixture from running into lumps, a little ſtarch is previouſly mixed with the ſugar, in the proportion of a dram to a pound. 3. *Limatura Martis præparata*, or *chalybis rubigo præparata*, is formed by moiſtening the filings with vinegar or water, and expoſing them to a moiſt air, or occaſionally moiſtening them afreſh, which ſoon change in great part into ruſt; this ruſt may be ſeparated from the uncorroded part, by grinding and waſhing over the finer powder with water. This is given in the ſame doſe as the crude filings. 4. *Mars ſulphuratus*, prepared by mixing *iron* filings with twice their weight of flower of brimſtone, and as much water as will make them into a paſte, which in a few hours ſwells up, and is then pulverized, put into a heated crucible to deflagrate, and kept conſtantly ſtirring with an *iron* ſpatula, till it falls into a deep black powder: this powder urged longer in the fire, become red, and is called, 5. CROCUS *Martis aperiens et aſtringens*. 6. The ſalt or vitriol of *iron*, called SAL *Martis*. 7. *Tinctura Martis cum ſpiritu ſalis*. 8. FLORES *Martiales*, or flowers of *iron*. Theſe are commonly given in the form of a bolus, from three or four grains to twenty. A tincture made by digeſting four ounces of the flowers in a pint of proof-ſpirit, is a ſufficiently elegant chalybeate, and may be given in doſes of a tea-ſpoonful. 9. LIXIVIUM *Martis*, 10. *Extractum Martis*, is formed by inſpiſſating ſolutions of *iron* in wine, or other vegetable acids, to the conſiſtence of an extract 11 *Mars ſolubilis*, or *chalybs tartarizatus*, is obtained by grinding the filings of *iron*, with an equal weight of cryſtals of tartar, forming the mixture into a maſs with water, then pulverizing, and repeating the humectation and exſiccation alternately, till the whole falls into an impalpable powder. This elegant and uſeful chalybeat is given either in a ſolid or liquid form, from two or three grains, to ten or more. It has been uſually diſtinguiſhed in the ſhops, by the name of its inventor, Dr. Willis. 12. *Mars ſolubilis alkalizatus*, is prepared by calcining a mixture of *iron* filings and tartar in a crucible for ſome time with a red heat, and again calcining ſuch part as cannot eaſily be reduced into fine powder. But alkaline ſolutions of *iron* are ill adapted for medicinal uſe, and are at preſent wholly neglected. Lewis Mat. Med. See CHALYBEAT, and *Mineral* and *Chalybeat* WATERS.

IRON, *for the bluing of*, ſee BLUING.

IRON, *for the expanſion of*, by *heat*, ſee HEAT and PYROMETER.

IRON *Chambers*. See CHAMBERS.

IRON, *for the refining of*. See REFINING.

IRON, *for the converſion of*, *into ſteel*. See STEEL.

IRON *Furnace*. See FURNACE and IRON *ſupra*.

IRON, *Harping*. See HARPING.

IRON-*moulds*, and ſpots of ink in linen, may be taken out by dipping the ſtained part in water, ſprinkling it with a little of the powdered eſſential ſalt of wood-ſorrel, then rubbing on a pewter plate, and waſhing the ſpot out with warm water.

Iron-*moulds*, yellow lumps of earth or ſtone, found in chalk-pits, about the Chiltern, in Oxfordſhire, and elſewhere; being in reality a kind of pyrites, or indigeſted *iron* ore.

Iron-*ore*. No *iron* is found in its metallic ſtate; though a malleable native *iron* is mentioned by Wallerius, Linnæus, and Cartheuſer. Moſt of the minerals called *iron*-ores, have an earthy, ruſty, yellowiſh or browniſh appearance, which proceeds from the facility with which the true *iron*-ores are decompoſed. All earths and ſtones which are naturally yellow or red, and all thoſe which acquire theſe colours by calcination, receive them from the ferruginous earth mixed with them. The yellow and red ochres conſiſt almoſt ſolely of this earth; the black and heavy ſands are alſo generally ferruginous. One of the richeſt *iron*-ores is a heavy ſtone, the ſurface of which, when newly broken, is red and bluiſh, and is exceedingly hard. A quintal of this ore, according to Cramer, affords from ſixty to eighty pounds of the beſt *iron* by a ſingle fuſion The *iron*-ore moſt commonly found, is a ſtone of the colour of ruſt, of an intermediate weight betwixt thoſe of ores in general, and unmetallic ſtones. Blood-ſtone, or hæmatites, ſanguine or red-chalk, and emery, are *iron*-ores: moſt of theſe ſubſtances require little calcination before they become capable of attraction by a magnet and ſolution in aqua fortis; but the *iron* obtained from them is of a bad quality. *Iron*-ores are of various forms: ſometimes they are earths, ſometimes ſtones, ſometimes grains.

Moſt ores require to be roaſted previouſly to their fuſion: ſome more ſlightly, and others with a more violent and long-continued fire; of the latter kind, are thoſe which contain much ſulphur, arſenic, or vitriolic acid; ſuch as the black *iron*-ore, from which the Swediſh *iron* is ſaid to be obtained: of the former kind, are the ores called *bog*-ores, and others which, being in a calcined ſtate, and containing little ſulphureous matter, would, by a farther calcination, be rendered leſs capable of being reduced to a metallic ſtate. Ores differ from one another with regard to the facility of their fuſion: the fuſible ores are thoſe which contain ſulphur, arſenic, or are mixed with ſome fuſible earth: the ores fuſible with difficulty, are thoſe which contain no mixture of other ſubſtance; ſuch are moſt of the ores which contain *iron* in a ſtate nearly metallic, and thoſe which are mixed with ſome very refractory ſubſtance.

In the *iron* works in Staffordſhire, after the ore is dug, before it be fit for the furnace, they burn or calcine it on the open ground with ſmall charcoal, wood, or ſea-coal, to make it break into ſmall pieces, which will be done in three days. This they call annealing or fitting it for the furnace. See Iron *ſupra*.

Iron may be procured from its ore in a cloſe veſſel in the following manner: roaſt for a few minutes in a teſt, placed under a muffle in a pretty ſtrong fire, two centners of *iron*-ore, groſsly powdered, that the volatile particles may be in part diſſipated, and the ore ſoftened in caſe it be too hard. When it has grown cold, beat it to a very fine powder, and roaſt it a ſecond time in a ſtronger fire till it emits no ſmell, then take it out of the fire.

Compoſe a flux of three parts of the common white flux, and one part of powdered glaſs, and add of ſandiver and coal-duſt of each one half part. Add to this flux three times the quantity of the roaſted ore, and mix the whole very well together; then take a good crucible, well luted within, and put into it the ore mixed with the flux; cover it with common ſalt, and ſhut it cloſe with a tile, and with lute applied to the joints. Put the common wind-furnace upon its bottom part, having a bed made of coal-duſt; introduce into the furnace a ſmall grate ſupported on its *iron* bars, and a ſtone upon it whereon the crucible may ſtand; ſurround the whole with hard coals, not very large, and light them at top. Make the fire very ſtrong, and continue to add freſh fuel, that the veſſel may never be naked at top. When the fire has thus been continued in its full ſtrength for an hour, take out the veſſel, and ſtrike on the floor where it ſtands, to collect all the particles of *iron* into a body; and when cold, break the veſſel, and you will find the pure *iron*.

The fuel uſed in moſt parts of Europe for the ſmelting of ores of *iron* is charcoal, which produces an *iron* capable of being rendered malleable by forging, better than any other. However, lately in ſeveral works in England and Scotland, *iron* ore has been ſmelted by means of pit-coal, previouſly reduced to cinders or coaks, by a kind of calcination ſimilar to the operation of converting wood into charcoal, by which the aqueous and ſulphureous parts of the coal are expelled, while only the more fixed bituminous parts are left behind. In France uncalcined pit-coal has been tried, but without ſucceſs. The uſe of *peat*, mixed with charcoal, and likewiſe by itſelf, has been introduced in ſome parts of England. Mr. Maſon informs us, that at Colebrook Dale, in Shropſhire, Mr. Ford makes *iron* brittle or tough as he pleaſes, from *iron*-ore and coal, both got in the ſame dale; there being cannon thus caſt, ſo ſoft as to bear turning like wrought *iron*. Phil. Tranſ. Nº 482. ſect. 6.

Iron-sick, is applied to a ſhip or boat, when her bolts, nails, or ſpikes, are ſo eaten with ruſt, that they make hollows in the planks, whereby the ſhip leaks.

Iron-*wood*, *ſideroxylon*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the empalement of the flower is permanent, and is cut into five ſegments; the flower is bell-ſhaped, divided into five parts at the brim; it has five awl-ſhaped ſtamina, the length of the petal, terminated by ſingle ſummits; and a round germen, ſupporting an awl-ſhaped ſtyle, crowned by a ſingle ſtigma; the germen afterwards becomes a roundiſh berry, having one cell, containing four ſeeds. There are two ſpecies, natives of the Cape of Good Hope. Linnæus enumerates 8.

The wood of theſe trees being very cloſe and ſolid, has given occaſion for this name being applied to them, it being ſo heavy as to ſink in water: and the title of *iron-wood* having been applied to the wood, by the inhabitants of the countries where it grows, has occaſioned the botaniſts to conſtitute a genus by this name. But as the characters of the plants have not been ſo well examined as could be wiſhed, occaſioned by their ſeldom flowering in Europe, it is very probable, that the plants which have been ranged under this genus, do not properly belong to it. Miller.

Iron-*wort*, *ſideritis*, *Cunila*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower has an oblong tubulous empalement, cut into five ſegments at the top; it is of the lip kind, of one petal, almoſt equal; the tube is cylindrical, the chaps oblong and taper; the upper lip is erect, and cut into two acute ſegments; the under lip is cut into three; the two ſide ſegments are acute, the middle round and crenated; it has four ſtamina within the tube, two of which are as long as the tube; the other ſhorter; and a four-pointed germen, ſupporting a ſlender ſtyle, a little longer than the ſtamina, crowned by two ſtigmas, the upper is cylindrical, concave and torn; the lower, ſhort and membranaceous; the germen turns to four ſeeds, which ripen in the empalement. There are eleven ſpecies in the Linnæan ſyſtem.

The common *iron-wort* grows in Germany, Italy, and France; and flowers in June: the herb is uſed; it is ſaid to be good for wounds and ruptures; and to be ſo drying, as to cure a *fluor albus*.

Iron-*work*, in a *Ship*, denotes all the pieces of *iron*, of whatſoever figure or ſize, which are uſed in its conſtruction; as bolts, boom-irons, which are compoſed of two rings nearly reſembling the figure of 8, nails, ſpikes, chains and chain-plates, block-ſtrops, cranks, braces, pintles, and goodgings.

IRONY, derived from ειρωνεια, *diſſimulation*, in *Oratory*, a figure in ſpeech, wherein we plainly intend ſomething very different from what our words expreſs; as when we ſeem to praiſe a perſon at a time when we evidently rally, and diſcommend him.

Quintilian calls this figure *diverſiloquium*, *diſſimulation*, and *illuſion*; and obſerves that it may be known by the manner of the pronunciation, or from the nature of the perſon, or the thing. The ſubjects of *irony* are vices and follies of all kinds: and it has thus been uſed by the moſt grave perſons on proper occaſions. Socrates uſed it ſo much as to acquire the name of ειρων, or the *droll*. It was alſo uſed by the prophet Elijah, 1 Kings, xviii. 27. by Solomon, Eccleſ. xi. 9. and by our Saviour himſelf, Mark vii. 9.

IRRADIATION, ſignifies an emanation, or ſhooting out of rays, or ſubtile effluvia, from any body. See Emanation, Ray, Effluvia, and Quality.

IRRATIONAL *Numbers*, the ſame as *ſurd numbers*. See Surd and Number.

Irrational *Quantities*. See Rational *Quantities*.

Irrational *Soul*. See Soul.

IRREDUCIBLE *caſe*, in *Algebra*, is uſed for that caſe of cubic equations where the root, according to Cardan's rule, appears under an impoſſible or imaginary form, and yet is real. Thus in the equation, $x^3 - 90x - 100 = 0$, the root, according to Cardan's rule will be $x = \sqrt[3]{50 + \sqrt{-24500}} + \sqrt[3]{50 - \sqrt{-24500}}$, which is an impoſſible expreſſion, and yet one root is equal to 10; and the other two roots of the equation are alſo real. Algebraiſts, for two centuries, have in vain endeavoured to reſolve this caſe, and bring it under a real form; and the queſtion is not leſs famous among them, than the ſquaring of the circle is among geometers.

It is to be obſerved, that as in ſome other caſes of cubic equations, the value of the root, though rational, is found under an irrational or ſurd form; becauſe the root in this caſe is compounded of two equal ſurds with contrary ſigns, which deſtroy each other; as if $x=5+\sqrt{5}+5-\sqrt{5}$; then $x=10$. In like manner, in the *irreducible* caſe, when the root is rational, there are two equal imaginary quantities, with contrary ſigns, joined to real quantities; ſo that the imaginary quantities deſtroy each other. Thus the expreſſion: $\sqrt[3]{50+\sqrt{-24500}}=5+\sqrt{-5}$; and $\sqrt[3]{50-\sqrt{-24500}}=5-\sqrt{-5}$. But $5+\sqrt{-5}+5-\sqrt{-5}=10=x$, the root of the propoſed equation.

Dr. Wallis ſeems to have intended to ſhew, that there is no caſe of cubic equations *irreducible*, or *impracticable*, as he calls it, notwithſtanding the common opinion to the contrary. Algebra, chap. 48. p. 179, 180. edit. 1685.

Thus in the equation $r^3-63r=162$, where the value of the root, according to Cardan's rule, is $r=\sqrt{81+\sqrt{-2700}}+\sqrt{81-\sqrt{-2700}}$. The doctor ſays, that the cubic root of $81+\sqrt{-2700}$, may be extracted by another impoſſible binomial, viz. by $\frac{9}{2}+\frac{1}{2}\sqrt{-3}$; and in the ſame manner, that the cubic root of $81-\sqrt{-2700}$ may be extracted, and is equal to $\frac{9}{2}-\frac{1}{2}\sqrt{-3}$; from whence he infers, that $\frac{9}{2}+\frac{1}{2}\sqrt{-3}+\frac{9}{2}-\frac{1}{2}\sqrt{-3}=9$, is one of the roots of the equation propoſed. And this is true. But thoſe who will conſult his Algebra, p. 190, 191, will find that the rule he gives is nothing but a trial, both in determining that part of the root which is without a radical ſign, and that part which is within; and if the original equation had been ſuch as to have its roots irrational, his trial would never have ſucceeded. Beſides, it is certain, that the extracting the cube root of $81+\sqrt{-2700}$, is of the ſame degree of difficulty, as the extracting the root of the original equation $r^3-63r\pm162$; and that both require the triſection of an angle for a perfect ſolution. See Mr. de Moivre in the Appendix to Saunderſon's Algebra, p. 744, &c.

For Cardan's rule, ſee *Cubic* EQUATION.

Mr. Maſeres, curſitor baron of the exchequer, has lately deduced, by a long train of algebraical reaſoning, from Sir Iſaac Newton's celebrated binomial theorem, an infinite ſeries, which will reſolve this caſe, without any mention of either impoſſible, or negative quantities. In a ſcholium, he compares his own ſolution with thoſe of Dr. Wallis and Mr. De Moivre. Phil. Tranſ. vol. lxviii. part i. art. 42.

IRREGULAR, ſomething that deviates from the common forms or rules.

Thus we ſay, an *irregular* fortification, an *irregular* building, &c. See BUILDING, FORTIFICATION, BASTION, and PLACE.

IRREGULAR *Figure*, in *Geometry*, is that whoſe ſides and angles are not equal. See REGULAR.

IRREGULARS, in *Grammar*, are ſuch inflexions of words as vary from the general rule, or pattern.

IRREGULAR, among the *Caſuiſts*, is applied to a perſon who is unqualified for entering into orders, as being a baſtard, maimed, &c. or to an eccleſiaſtic, who is interdicted, ſuſpended, or cenſured, and by that means rendered incapable of holding a benefice, or diſcharging any of the ſacred functions.

IRREGULAR *bodies*, are ſolids not terminated by equal and ſimilar ſurfaces.

IRREGULAR, in the *Art of Building*, is applied not only to the parts of an edifice which deviate from the proportions eſtabliſhed by antique monuments, and confirmed by architects; as when a Doric column is made nine modules high, or a Corinthian eleven; but alſo to the places and figures of buildings, where the angles and ſides are made unequal, as in moſt of the ancient caſtles; where, without any neceſſity or confinement from the ſituation, they affected ſuch irregularity.

A column is alſo ſaid to be *irregular*, not only when it deviates from the proportions of any of the five orders, but when its ornaments, whether in the ſhaft, or the capital, are abſurd and ill choſen.

IRREGULAR *Leap*, in *Muſic*. See LEAP.

IRREGULARITIES *in the Moon's Motion*. See MOON.

IRREPLEVIABILE *Returnum*. See RETURNUM.

IRREPLEVIABLE, or **IRREPLEVISABLE**, in *Common Law*, ſignifies what may not be replevied, or ſet at large upon ſureties.

IRRIGATION, *Irrigatio*, denotes the watering a meadow or garden.

IRRITABILITY, in *Anatomy* and *Medicine*, a term firſt invented by Gliſſon, and adopted by Dr. Haller to denote an eſſential property of all animal bodies; and which, he ſays, exiſts independently of and in contradiſtinction to *ſenſibility*. This ingenious author calls that part of the human body *irritable*, which becomes ſhorter upon being touched; *very irritable*, if it contracts upon a ſlight touch; and the contrary, if by a violent touch it contracts but little. He calls that a ſenſible part of the human body, which upon being touched tranſmits the impreſſion of it to the ſoul; and in brutes, he calls thoſe parts ſenſible, the irritation of which occaſions evident ſigns of pain and diſquiet in the animal. On the contrary, he calls that inſenſible, which being burnt, tore, pricked, or cut till it is quite deſtroyed, occaſions no ſign of pain nor convulſion, nor any ſort of change in the ſituation of the body. From the reſult of many cruel experiments he concludes, that the epidermis is inſenſible; that the ſkin is ſenſible in a greater degree than any other part of the body; that the fat and cellular membrane are inſenſible; and the muſcular fleſh ſenſible, the ſenſibility of which he aſcribes rather to the nerves than to the fleſh itſelf. The tendons, he ſays, having no nerves diſtributed to them, are inſenſible. The ligaments and capſulæ of the articulations are alſo concluded to be inſenſible; whence Dr. Haller infers, that the ſharp pains of the gout are not ſeated in the capſulæ of the joint, but in the ſkin, and in the nerves which creep upon its external ſurface. The bones are all inſenſible, ſays Dr. Haller, except the teeth; and likewiſe the marrow. Under his experiments the perioſteum and pericranium, the dura and pia mater appeared inſenſible; and he infers, that the ſenſibility of the nerves is owing to the medulla, and not to the membranes. The arteries and veins are held ſuſceptible of little or no ſenſation, except the carotid, the lingual, temporal, pharyngal, labial, thyroidal, and the aorta near the heart, the ſenſibility of which is aſcribed to the nerves that accompany them. Senſibility is allowed to the internal membranes of the ſtomach, inteſtines, bladder, ureters, vagina, and womb, on account of their being of the ſame nature with the ſkin: the heart is alſo admitted to be ſenſible: but the lungs, liver, ſpleen and kidneys are poſſeſſed of a very imperfect, if any ſenſation. The glands, having few nerves, are endowed with only an obtuſe ſenſation. Some ſenſibility is allowed to the tunica choroidis and the iris, though in a leſs degree than the retina; but none to the cornea. Dr. Haller concludes, in general, that the nerves alone are ſenſible of themſelves, and that in proportion to the number of nerves apparently diſtributed to particular parts, ſuch parts poſſeſs a greater or leſs degree of ſenſibility.

Irritability, according to Dr. Haller, is ſo different from ſenſibility, that the moſt irritable parts are not at all ſenſible and *vice verſa*. He alledges facts to prove this poſition, and alſo to demonſtrate, that *irritability* does not depend upon the nerves, which are not irritable, but upon the original formation of the parts which are ſuceptible of it. *Irritability*, he ſays, is not proportioned to ſenſibility; in proof of which, he obſerves, that the inteſtines, though rather leſs ſenſible than the ſtomach, are more irritable; and that the heart is very irritable, though it has but a ſmall degree of ſenſation.

Irritability, according to Dr Haller, is the diſtinguiſhing characteriſtic between the muſcular and cellular fibres; whence he determines the ligaments, perioſteum, meninges of the brain, and all the membranes compoſed of the cellular ſubſtance, to be void of *irritability*. The tendons are unirritable; and though he does not abſolutely deny *irritability* to the arteries, yet his experiments on the aorta produced no contraction. The veins and excretory ducts are, in a ſmall degree, irritable; and the gall-bladder, the ductus chole-dochus, the ureters and urethra are only affected by a very acrid corroſive; but the lacteal veſſels are conſiderably irritable. The glands and mucous ſinuſes, the uterus in quadrupeds, the human matrix and the genitals are all irritable; as are alſo the muſcles, particularly the diaphragm. The œſophagus, ſtomach, and inteſtines are irritable: but of all the animal organs the heart is endued with the greateſt *irritability*. In general, there is nothing irrirable in the animal body but the muſcular fibres; and the vital parts are the moſt irritable. This power of motion, ariſing from irritations, is ſuppoſed to be different from all other properties of bodies, and probably reſides in the glutinous mucus of the muſcular fibres, altogether independently of the influence of the ſoul. The *irritability* of the muſcles is ſaid to be deſtroyed by drying of the fibres, congealing of the fat, and more eſpecially by the uſe of opium in living animals. The phyſiological ſyſtem, of which an abſtract has been now given, has been adopted and confirmed by Caſtell and Zimmermann; and alſo by Dr. Brockleſby, who ſuggeſts, that *irritability*, as diſtinguiſhed from ſenſibility, may depend upon a ſeries of nerves different from ſuch as ſerve either for voluntary motion or ſenſation. Haller's Diſſ. on the ſenſible and irritable part of Animals, tranſlated by Tiſſot. paſſim. Phil. Tranſ. vol. xlix. art. 38. p. 240. This ſyſtem has been controverted by Mr. Le Cat, and particularly by Dr. Whytt in his Phyſiological Eſſays. Eſſ. ii.

ISABELLA, in *Conchyliology*, the name given by the French naturaliſts to the beautiful pale-brown voluta, ſo much eſteemed in the Dutch cabinets.

ISAGON, in *Geometry*, is ſometimes uſed for a figure conſiſting of equal angles.

ISAIAH, or *the Propheſy of* Isaiah, a canonical book of the Old Teſtament. *Iſaiah*, is the firſt of the four greater prophets; the other three being Jeremiah, Ezekiel, and Daniel. This prophet was of royal blood, his father Amos being brother to Azariah, king of Judah. The five firſt chapters of his prophecy relate to the reign of Uzziah; the viſion in the ſixth chapter happened in the time of Jotham: the next chapters, to the fifteenth, include his prophecies under the reign of Ahaz; and thoſe that were made under the reigns of Hezekiah and Manaſſeh, are related in the next chapters to the end. *Iſaiah* foretold the deliverance of the Jews from their captivity in Babylon by Cyrus, one hundred years before it came to paſs. But the moſt remarkable of his predictions are thoſe concerning the Meſſiah, which deſcribe not only his deſcent but all the remarkable circumſtances of his life and death. The ſtyle of this prophet is noble, nervous, ſublime, and florid, which he acquired by converſe with men of the greateſt abilities and elocution: Grotius calls him the Demoſthenes of the Hebrews. However the profoundneſs of his thoughts, the loſtineſs of his expreſſions, and the extent of his prophecy, render him one of the moſt difficult of all the prophets; and the commentaries that have been hitherto written on his prophecy fall ſhort of a full explication of it. Biſhop Lowth's new tranſlation, &c. publiſhed in 1778, throws conſiderable light on the compoſition and meaning of *Iſaiah*.

ISAMBLUCIS, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the *ſelenitæ*, but of the columnar, not the rhomboidal kind. See *Tab. of Foſſils, Claſs* 2.

The ſelenitæ of this genus conſiſt of ſix ſides, and two obtuſe or abrupt ends; and all their ſides being very nearly of the ſame breadth, they much reſemble broken pieces of the columns of ſprig-cryſtal.

The bodies of this genus, as well as the reſt of the columnar ſelenitæ, are ſubject to a longitudinal crack, which ſometimes admitting a ſmall quantity of clay, ſhapes it into the figure of an ear of graſs. Hill's Hiſt. of Foſſ. p. 121. See the article Selenites.

ISARUS in *Zoology*, a name given by the ancients to the chamois goat.

ISATIS, in *Botany*. See Woad.

Isatis, in *Zoology*. See Lagopus.

ISATODES, a word uſed by Hippocrates, and ſome other of the old writers, to expreſs a greeniſh colour of the bile diſcovered in the ſtools, which reſemble the colour of the herb *iſatis*, or woad. This was eſteemed an indication of a highly depraved bile.

ISCHÆMON, in *Botany*, a name uſed by many authors for the graſs called *gramen mannæ*, manna-graſs, or Ruſſia-ſeed.

Ischæmon was alſo a word uſed by the ancients to expreſs any thing given as a remedy in hæmorrhages, or other fluxes of blood, whether from wounds or otherwiſe.

ISCHÆMUM, in *Botany*, the name by which Linnæus calls the *ſchænanth*, or camel's hay. This makes a peculiar genus of plants of the *polygamia monœcia* claſs; the characters of which are theſe: it has male and hermaphrodite flowers, diſtinct from one another; the male flower is very ſmall, and always ſtands upon the glume of the cup of the female flower; its cup is a bivalve glume, with no awns, and containing only one flower; the flower is another bivalve glume of the ſize of the cup, and without awns; the ſtamina are three ſhort capillary filaments, and the antheræ ſimple; the hermaphrodite flower is larger; its cup is a large bivalve glume, placed within the common glume, and terminated by a twiſted awn, or beard between each valve; the flower is a ſmall double glume; the piſtil conſiſts of an oblong germen, and two reflex ſtyli; all the glumes of the cup, flower, *&c* continue to ſurround and incloſe the ſeed; and they never drop it out till forced from them, each containing one ſeed.

ISCHAS, in *Botany*, a name given by Cluſius, and ſome others, to thoſe ſpecies of tithymal or spurge, which have tuberous or knobby-roots, and are called by others *apios*.

ISCHENIA, Ισχενια, in *Antiquity*, anniverſary ſports celebrated at Olympia, in memory of Iſchenus, the grandſon of Mercury and Hierea; who, in a time of famine, devoted himſelf to be a ſacrifice for his country, and was honoured with a monument near the Olympian ſtadium.

ISCHIADIC, Ισχιαδικος, derived from ισχιας, or ισχιον, *coxa*, the *hip*, an epithet given by phyſicians to two veins of the foot, which terminate in the crural.

The firſt, called the *great iſchiadic*, is formed by ten little branches, proceeding from the toes, which, uniting together, paſs by the muſcles of the calf of the leg.

The leſſer *iſchiadic* is formed by ſeveral ramifications, proceeding from the ſkin and muſcles, which encompaſs the articulation of the thigh.——They are alſo called *ſciatic veins*.

ISCHIAS, Ischiadica or Ischiatica. See Sciatica.

ISCHIO-CAVERNEUX, in *Anatomy*, a name given by Winſlow, and other of the French anatomiſts, to a muſcle of the penis, called alſo by ſome the *poſterior* and *collateralis penis*, but now generally named, from its office, the erector.

Ischio-caverneux is alſo applied by the ſame authors to a muſcle of the female pudenda, called by ſome the *muſculus clitoridis*, and *clitoridis manifeſtus muſculus*, and by Cowper and Albinus, from its office, the erector *clitoridis*.

ISCHIUM, or Ischion, derived from ισχυς, *robur*, *ſtrength*, in *Anatomy*, the name of one of the bones of the hip; called alſo *coxa* and *coxendix*.

In the *iſchium* is a deep cavity, called *cotyle* or *acetabulum*, which receives the head of the thigh bone. This cavity is encompaſſed with a cartilaginous circle, which ſerves to ſtrengthen the thigh.

The *iſchium* is one of the oſſa innominata of authors.—See *Tab Anat. (Oſteol.) fig.* 3. *lit. S. n.* 19. *fig.* 12. *lit. c.* This is the loweſt portion of the *os innominatum*, as alſo of the whole trunk. It is divided into the body, the tuberoſity, and the ramus or branch.

The body of the *os iſchium* forms the loweſt and greateſt part of the acetabulum, and ſends out an apophyſis backward, called the ſpine of the iſchium. The tuberoſity is very thick, unequal, and turned downward; and it is on this part that the whole body reſts when we ſit. It appears cartilaginous, becauſe of the dried and hardened remains of the tendons. The whole convex portion of it is originally an apophyſis, of which the marks are obliterated ſooner in ſome ſubjects than in others: three muſcular impreſſions may be diſtinguiſhed in it.

The branch of the *iſchium* is a kind of thin flat production, or apophyſis, which aſcends forward from the tuberoſity of the curvature of the os pubis, and it is often covered in part by a continuation of the epiphyſes of the tuberoſity.

Theſe three parts of the *iſchium* taken together, form a large opening, which makes the greateſt part of the foramen ovale. Three other notches are remarkable in this bone; one poſterior, between the tuberoſity and the ſpine, for the paſſage of the internal obturator muſcle, which is a little cartilaginous, and divided into three or four ſuperficial channels; one lateral, between the tuberoſity and the acetabulum, for the paſſage of the external obturator muſcle; and one anterior, at the edge of the acetabulum for ligaments. Winſlow.

ISCHNAMBLUCIS, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the selenitæ, but one of thoſe which are of a columnar form, not of the common rhomboidal one. See *Tab. of Foſſils*, *Claſs* 2.

The word is derived from the Greek, ισχνος, *thin*, αμβλυς, *blunt* or *obtuſe*, and κιων, a *column*; and expreſſes a body in form of a thin or flatted column, with obtuſe ends. The bodies of this genus are of an octohedral figure, conſiſting of ſix long planes and about two broken ends. The top and baſe planes are broader than the reſt. The crack which runs through the whole length of bodies of this genus is often filled with clay, which ſpreads itſelf into the form of an ear of ſome graſſes: of this genus there are only four known ſpecies. Hill.

ISCHNOPHONIA, formed of ισχνος, *thin*, and φωνη, *voice*, a word uſed by ſome authors to expreſs that weakneſs and ſhrilneſs of the voice which attends perſons in ſome diſeaſes; more uſually, however, it is underſtood to expreſs a ſtammering or imperfection in the ſpeech.

ISCHURIA, ισχουρια, formed from ισχω, *I ſtop*; and ουρον, *urine*, in *Phyſic*, a diſeaſe conſiſting in an entire ſuppreſſion of urine.

It is occaſioned by any thing which may obſtruct the paſſages of the reins, ureters, or the neck of the bladder, as ſand, ſtone, mucus, *&c.*—It may alſo ariſe from an obſtruction of the nerves, which paſs to the reins or bladder, as we ſee it does, in a palſy of the parts below the diaphragm.—The too great diſtention of the bladder may alſo produce the ſame effect; for the fibres being much lengthened, and conſequently condenſed, the ſpirits neceſſary for their contraction cannot get admittance; whence it is that perſons, who have retained their urine a long time, find a great deal of difficulty in diſcharging it. See Suppression *of urine*.

ISCUSTOS, a word uſed by the writers of the middle ages as the name of a gem, but ſeeming to be only a corrupt way of ſpelling aſbeſtos. Albertus ſays it was of a yellowiſh colour, and found in Spain, and that its fibrous texture made it capable of being wrought into cloth, which when thrown into the fire, was not conſumed, but only cleaned by burning. See Asbestos.

ISELASTICS, *Iſelaſtica*, kind of games, or combats, celebrated in the cities of Greece and Aſia, in the time of the Roman emperors.

The victors at theſe games had very conſiderable privileges conferred on them; after the example of Auguſtus, and the Athenians, who did the like to the conquerors at the Olympic, Pythian, and Iſthmian games. They were crowned on the ſpot, immediately after their victory; had penſions allowed them; were furniſhed with proviſions at the public coſt; were carried home in triumph, and made to enter their cities through a breach in the walls; whence their appellation, from *εισελαυνειν, to enter*.

ISIA, Ισεια, feaſts and ſacrifices antiently ſolemnized in honour of the goddeſs Iſis.

The *Iſia* were full of the moſt abominable impurities; and for that reaſon, thoſe who were initiated into them were obliged to take an oath of ſecrecy. They held for nine days ſucceſſively, but grew ſo ſcandalous, that the ſenate aboliſhed them at Rome, under the conſulate of Piſo and Gabinius. They were re-eſtabliſhed by Auguſtus, and the emperor Commodus himſelf aſſiſted at them, appearing among the prieſts of that goddeſs with his head ſhaven, and carrying the Anubis.

ISIAC TABLE is one of the moſt conſiderable monuments of antiquity, diſcovered at Rome in 1525, and ſuppoſed by the various figures in baſ-relief upon it, to repreſent the feaſts of Iſis, and other Egyptian deities. There have been various opinions as to the antiquity of this monument: ſome have ſuppoſed that it was engraved long before the time when the Egyptians worſhipped the figures of men and women. Others, among whom is biſhop Warburton, apprehend, that it was made at Rome, by perſons attached to the worſhip of Iſis. Dr. Warburton conſiders it as one of the moſt modern of the Egyptian monuments, on account of the great mixture of hieroglyphic characters which it bears.

ISIACI, prieſt of the goddeſs Iſis.—Dioſcorides tells us, that they bore a branch of ſea-wormwood in their hands inſtead of olive. They ſung the praiſes of the goddeſs twice a day, *viz.* at the riſing of the ſun, when they opened her temple; after which they begged alms the reſt of the day, and returning at night, repeated their oriſons, and ſhut up the temple.

Such was the life and office of the *Iſiaci*; they never covered their feet with any thing but the thin bark of the plant papyrus, which occaſioned Prudentius and others to ſay they went bare-footed. They wore no garments but linen, becauſe Iſis was the firſt who taught mankind the culture of this commodity. See Diodorus Siculus, and Plutarch's Iſis and Oſiris.

ISINGLASS, a name given to Muſcovy talc, and to ICHTHYOCOLLA; which ſee.

A ſtrong glue is made of *iſinglaſs* diſſolved in ſpirit of wine. See GLUE and ICHTHYOCOLLA.

ISINGLASS-*fiſh*, the Engliſh name of the fiſh from which the drug called *ichthyocolla* or *iſinglaſs* is made. It is a ſpecies of the *accipenſer* or ſturgeon, and is diſtinguiſhed by not having any of the tubercles which the body of the common ſturgeon has. See ACCIPENSER and HUSO.

ISIR, or IXIR, a name uſed by ſome of the chemical writers for an elixir.

ISIS, in *Mythology*, a goddeſs of the ancient Egyptians, worſhipped by them and many other nations: *Iſis* is reported by Diodorus Siculus to have invented many excellent medicines: and hence, ſays he, after ſhe was received among the number of the deities, ſhe was applied to for the cure of diſtempers; and frequently indicated remedies by dreams. Galen takes notice of ſome plaſters which bear her name.

ISIS, in *Natural Hiſtory*, a term uſed by Linnæus to expreſs a genus of ZOOPHYTES, comprehending ſix different ſpecies.

ISKA, a name given by the ancients to a light kind of agaric, growing to the old ſtumps of the oak, hazel, and other trees. This being a very light kind of fuel, was uſed by the ancients in the manner of a cautery, as we have learned from the Indians to uſe moxa or the down of mugwort leaves.

ISLAM. See MAHOMETANS.

ISLAND, or ISLE, a tract of dry land encompaſſed with water; either with the ſea, a river or lake. In which ſenſe *iſland* ſtands contradiſtinguiſhed from *continent*, or terra firma.

Some conclude, that *iſlands* are as ancient as the world, and, it is by no means probable, that the large *iſlands*, far remote from the continent, are new, or that they either aroſe out of the ſea, or were torn from the main land. Nor is it leſs certain, that there have been new *iſlands* formed by the caſting up of vaſt heaps of clay, mud, ſand, &c. as that, for inſtance, of Tſongming, in the province of Nanquin in China: or by the violence of the ſea, which has torn off large promontories from the continent, as the ancients imagined Sicily, and even Great Britain to have been formed. It is alſo certain, that ſome have emerged above the waves, as Santorini formerly, and three other *iſles* near it lately; the laſt in 1707, which roſe from the bottom of the ſea, after an earthquake, that was ſuppoſed to have looſened it from its hold.

Several naturaliſts are of opinion, that iſlands were formed at the deluge: others think they have been rent and ſeparated from the continent by violent ſtorms, inundations, and earthquakes. Theſe laſt have obſerved that the Eaſt-Indies, which abound in *iſlands* more than any other part of the world, are likewiſe more annoyed with earthquakes, tempeſts, lightnings, volcanos, &c. than any other part.

Varenius thinks moſt of theſe opinions true in ſome inſtances, and believes that there have been *iſlands* produced each of theſe ways: St. Helena, Aſcenſion, and other ſteep rocky *iſlands*, he ſuppoſes to have become ſo, by the ſea's overflowing their neighbouring champaigns. By the heaping up huge quantities of ſand, and other terreſtrial matters, he thinks the *iſlands* of Zealand, Japan, &c. were formed: Sumatra and Ceylon; and moſt of the Eaſt Indian *iſlands*, he rather thinks were rent off from the main land; and concludes, that the *iſlands* of the Archipelago were formed in the ſame way; imagining it probable, that Deucalion's flood might contribute towards it.

The ancients had a notion, that Delos, and ſome few other *iſlands* roſe from the bottom of the ſea; which, how fabulous ſoever it might appear, agrees very well with ſome later obſervations. Seneca takes notice, that the *iſland* Theraſia roſe out of the Ægean ſea in his time, of which the mariners were eye-witneſſes.

Floating-ISLANDS. Hiſtories are full of accounts of *floating-iſlands*; but the greater part of them are either falſe, or founded on exaggerations. What we generally ſee of this kind is no more than the concretion of the lighter and more viſcous matter floating on the ſurface of water in cakes, and with the roots of plants, forming congeries of different ſizes, which not being fixed to the ſhore in any part, are blown about by the winds, and float on the ſurface. Theſe are generally found in lakes, where they are confined from being carried too far; and from being broken by the agitation of the water. And in proceſs of time ſome of them acquire a very conſiderable ſize. Seneca tells us of many of theſe *floating-iſlands* in Italy; and ſome later writers have deſcribed not a few of them in other places. But however true the hiſtories of theſe might have been at the time when they were wrote, there remain very few proofs of their truth at this time, theſe *iſlands* having either diſappeared again, or been fixed to the ſides, in ſome part, in ſuch a manner as to have made a part of the ſhore. Pliny tells us of a great *iſland* which at one time ſwam about in the lake Cutilia, in the country of Reatinum, which was diſcovered to the old Romans by an oracle: and Pomponius tells us, that in Lydia there were ſeveral *iſlands* ſo looſe in their foundations, that every little accident ſhook and removed them. Herodotus ſpeaks alſo very largely of the lake Chemnis in Ægypt. See ABSORPTIONS *of the Earth*.

Gryphiander has written a Latin treatiſe expreſly on *iſlands*, *de Inſula*.

ISLANDS, *Fortunate*. See FORTUNATE.

ISLAND, *Cryſtal*. See CRYSTAL.

ISLAND-*fiſh*, in the *Fiſh-trade*, a name given to the common COD-FISH when it has been caught and preſerved in *Iceland*.

ISLEBEIANUS *lapis*, in *Natural Hiſtory*, a name given by authors to a kind of blackiſh ſlate, very heavy, not very hard, and eaſily ſplitting into thin flakes. It is dug near *Iſleb* in Thuringia, whence it has its name, and is much of the nature of that ſort of black ſlate which we have common in England, lying over the coal ſtrata.

As our ſlate of this kind contains uſually leaves of fern and other plants, this foreign kind contains the impreſſions of ſeveral kinds of fiſh, ſo exactly delineated in ſhape, and with the fins, ſcales, and all other parts ſo perfect, that the ſpecies are eaſily known. All theſe impreſſions and delineations are, however, ſo flat and thin, and have taken up ſo little room in the ſtone, that they ſeem rather to have been the ſkins and exuviæ of fiſh, than the whole bodies of them; but this is not wonderful when we conſider how eaſily the bodies, and even the bones of fiſhes, may be diſſolved; and that theſe exuviæ are lodged in a ſubſtance which contains a vitriolic ſalt, very capable of effecting ſuch a ſolution. It is eaſy to conceive, that this and other ſuch ſalts, while in a ſtate of ſolution in water, before the concretion of the matter of this ſtone into a hard maſs, might make that water a menſtruum capable of thus diſſolving the bodies and bones of fiſhes, while the outer ſkin and ſcales being much tougher, and of a very different nature, might eſcape the effects of them. It is well known that the fins and ſcales, and other external parts of fiſh, are much more capable of bearing maceration in water, than the internal ſubſtances of them; and it is eaſy to conceive that theſe, after having withſtood that power in the water, would at length ſubſide down among the muddy matter that was to form ſome of the ſtrata of this ſlate: The motion of the water would not fail to expand theſe ſkins, though ever ſo thin, into the true and exact ſhape of the whole fiſh; and when thus laid along upon the ſurface of the new formed ſtratum, the next quantity of the ſame matter that ſubſided would form another ſtratum, which falling evenly upon the former, would cover it, and on the following concretion of both, the figure of the fiſh would be beautifully preſerved between two plates or flakes of a fiſſile ſtone.

It is very remarkable, that as in theſe ſlates of Iſleb preſerving fiſhes, the external parts only are preſerved, the bones and fleſh being waſted; ſo, on the other hand, in thoſe foſſile fiſhes brought from Syria, the ſkins and ſcales are wanting, and the ſkeletons are principally the part preſerved. In ſome of theſe the bones are not clean, ſmall parcels of the fleſh being found petrified among them; but this fleſh is ſtripped of the ſkin. The ſtone in which theſe Syrian fiſhes are preſerved is alſo very different from the Iſleb ſlate, being whitiſh or greyiſh, and very hard. The ſtones of this kind found on mount Libanus, where they are very common, have very fine delineations of the ſtar-fiſh complete. Woodw. Cat. Foſſ. vol. II. p 23, &c.

ISLEBIANS, in *Eccleſiaſtical Hiſtory*, a name given to thoſe who adopted the ſentiments of a Lutheran divine of Saxony, called John Agricola, a diſciple and companion of Luther, a native of *Iſleb*, whence the name; who, interpreting literally ſome of the precepts of St. Paul with regard to the Jewiſh law, declaimed againſt the law and the neceſſity of good works. See ANTINOMIANS.

ISLES, in *Architecture*, the ſides or wings of a building.

ISNARDIA, in the *Linnæan Syſtem of Botany*, the name of a genus of plants, of the *tetrandria monogynia* claſs; the diſtinguiſhing characters of which are theſe: the cup is a perianthium, formed like a bell, ſlightly divided at the extremity into four pointed ſegments; it has no petals; the ſtamina are four filaments, growing out of the middle of the cup; the antheræ are ſimple; the germen of the piſtil is incloſed in the ſubſtance of the cup; the ſtyle is ſimple, and longer than the ſtamina; and the ſtigma is thick and large; the fruit is made out of the baſis of the cup, which is ſquare, and has four cells; the ſeeds are few in number, and of an oblong figure.

ISOCHRONAL, or ISOCHRONOUS, is applied to ſuch VIBRATIONS of a PENDULUM, as are performed in equal times.

Of which kind are all the vibrations or ſwings of the ſame pendulum, whether the arcs it deſcribes be longer or ſhorter; for when it deſcribes a ſhorter arc, it moves ſo much the ſlower; and when a long one, proportionably faſter.

ISOCHRONAL *Line*, is that wherein a heavy body is ſuppoſed to deſcend without any acceleration.

Leibnitz, in the Act. Erud. Lipſ. for April, 1689, has a diſcourſe on the *linea iſochrona*, in which he ſhews, that a heavy body, with a degree of velocity acquired by its deſcent from any height, may deſcend from the ſame point by an infinite number of *iſochronal* curves, which are all of the ſame ſpecies, differing from one another only in the magnitude of their parameters; ſuch as are all the quadratocubical paraboloids, and conſequently ſimilar to one another. He ſhews alſo, how to find a line, in which a heavy body deſcending, ſhall recede uniformly from a given point, or approach uniformly to it. See CYCLOID.

ISOETES, in *Botany*, a genus of the *cryptogamia* claſs of ferns: the characters of which are, that the ſmall flowers form an anthera, within the baſe of the leaf, and the female a double-celled capſule in the ſame ſituation.

ISOMERIA, formed of ισος, *equal*, and μερις, *part*, in *Algebra*, a method of freeing an equation from fractions, by reducing all the fractions to one common denominator, and then multiplying each member of the equation by that common denominator.

This amounts to the ſame with what is otherwiſe called converſion *of equations*.

ISOPERIMETRICAL *Figures*, are ſuch as have equal perimeters, or circumferences.

It is demonſtrated in geometry, that among *iſoperimetrical* figures, that is always the greateſt which contains the moſt ſides or angles.—From whence it follows, that the circle is the moſt capacious of all figures which have the ſame circumference with it.

That of two *iſoperimetrical* triangles, which have the ſame baſe, and one of them two ſides equal, and the other unequal; that is the greater whoſe ſides are equal. That of *iſoperimetrical* figures, whoſe ſides are equal in number, that is the greateſt which is equilateral, and equiangular.

Hence flows the ſolution of that popular problem, To make the hedging or walling, which will fence in one acre, or any other determinate number of acres, a, fence in any other greater number of acres whatever, b.

For, call x one ſide of a parallelogram, whoſe area is the number of acres a; then will $\frac{a}{x}$ be the other ſide, and $2\frac{a}{x} + 2x$, will be the perimeter of the parallelogram; which muſt be equal to four times the ſquare root of b, that is, $2\frac{a}{x} + 2x = 4\sqrt{b}$, whence the value of x will eaſily be had by the ſolution of a quadratic equation; and infinite numbers of ſquares and parallelograms may be made, which ſhall have the ſame perimeter, yet different areas. E. gr. if one ſide of a ſquare be 10, and one ſide of a parallelogram be 19, and the other 1, ſuch ſquare and parallelogram will be *iſoperimetrical*, viz. each 40; yet the area of the ſquare will be 100, and of the parallelogram only 19.

Iſoperimetrical lines and figures have greatly engaged the attention of mathematicians ſince the invention of fluxions. The analyſis of the general problem concerning figures, that, among all, thoſe of the ſame perimeter produce maxima and minima, was given by Mr. James Bernoulli, from computations that involve ſecond and third fluxions. And ſeveral inquiries of this nature have been ſince proſecuted in like manner, but not always with equal ſucceſs. Mr. Mac Laurin, to vindicate the doctrine of fluxions from the imputation of uncertainty, or obſcurity, has illuſtrated this ſubject, which is commonly conſidered as one of the moſt abſtruſe parts of this doctrine, by giving the reſolution and compoſition of theſe problems by firſt fluxions only; and in a manner that ſuggeſts a ſynthetic demonſtration, ſerving to verify the ſolution. Analyſis magni Problematis *iſoperimetrici* Act. Erudit. Lipſ. 1701. p. 213, ſeq. See Mac Laurin's Fluxions, book i. chap. 13. p. 486, ſeq. See alſo Mem. Acad. Scienc. 1706, 1718, and Jo. Bernoulli Oper. tom. i. p. 202, 208, 424, ſeq. tom. ii. p. 235, ſeq.

ISOPSEPHUS, Ισοψηφος, in *Antiquity*, an appellation given to judges, who had equal juriſdiction and authority; it was likewiſe applied to a caſe where the votes were equal on both ſides. Another ſenſe is given to it, *viz.* when the letters of different words made up the ſame ſum, they were ſaid to be ισοψηφα ῥηματα; for the Greeks had no other cyphers to number with, but the letters of their alphabet; ſo that α ſignified one, β two, γ three, *&c.* But beſide words, the ancients had likewiſe whole verſes of this kind; and it is pretended that there are ſeveral ſuch verſes in Homer. Hiſt. Acad. Inſcript. vol. iii. p. 311, ſeq.

ISOPYRUM, in *Botany*, a genus of the *polyandria polygynia* claſs. Its characters are theſe.: the flower has no empalement; but has five oval petals, and five ſhort tubulous nectaria, ſituated within the petals; it has a great number of ſhort hairy ſtamina, and ſeveral oval germina, which afterwards become ſo many recurved capſules with one cell, filled with ſmall ſeeds. There are three ſpecies.

ISORA, in *Botany*, the name given by Plumier to a genus of plants, called by Linnæus, HELICTERES.

ISOSCELES *triangle*, of ισος, *equal*, and σκελος, *leg*, is a triangle which has two equal ſides. In an *iſoſceles* triangle, FDE (*Tab.* III. *Geometry*, *fig.* 57.) the angles y and u, oppoſite to the equal ſides, are equal; and a line drawn from the top or vertex, F, cutting the baſe into two equal parts, is perpendicular to the baſe. The ſame line alſo biſects the vertical angle of the triangle. It appears likewiſe, that if the equal ſides be produced, the angles under the baſe will be equal, the ſum of thoſe above and below reſpectively being equal to two right angles. And if the vertical angles of two *iſoſceles* triangles be equal, the two triangles will be equi-angular. Moreover, every equilateral triangle muſt be equiangular.

ISPIDA. See KING-*Fiſher*.

ISSONG, in *Botany*, a name given by the people of Guinea to a ſpecies of plant, which they infuſe in water, and afterwards boil, and then waſh the head with it, as a cure for all kinds of the head-ach. It is a plant deſcribed by the botanical writers under the name of *piſum veſicarium fructu nigro, alba macula notato*, the bladder-pea, with a black fruit marked with a white ſpot; and called by the people of Malabar, where it alſo grows very plentifully, *ulinga*. It is alſo found in Barbadoes and Jamaica, and is there called *parſley*. Philoſ. Tranſ. Nº 232.

ISSUANT, ISSUING, in *Heraldry*, is underſtood of a lion, or other animal, in a coat of arms, that ſeems juſt coming out from under a chief, feſſe, a houſe, a wood, or the like; and only ſhews half his body.

It is not very eaſy to diſtinguiſh the lion *iſſuant* from the lion naiſſant: ſome ſay the *iſſuant* is that which comes out from the bottom of the chief, ſhewing his head, neck, the tip of his fore-legs, and his tail, againſt the chief of the coat; whereas the naiſſant has its riſe about the middle of the field, and ſhews all his fore-part, with the tip of his tail, as if he were riſing out of the earth.

ISSUE, in *Common Law*, has divers applications; being ſometimes taken for the children begotten between a man and his wife—ſometimes, for profits growing from amercements or fines—ſometimes, for profits of lands and tenements—but more frequently, for the point of matter depending in ſuit, whereupon the parties join, and put their cauſe to the trial of the jury.

In all theſe occaſions, *iſſue* has but one ſignification, which is, an effect of a cauſe preceding; as the children are the effect of the marriage between the parents; the profits growing to the king or lord, from the puniſhment of any man's offence, are the effect of his tranſgreſſion; the point referred to the trial of twelve men, is the effect of pleading, or proceſs.

Iſſues concerning cauſes are of two kinds; that upon matter of fact, and that upon matter of law. An *iſſue* in fact is when the plaintiff and defendant have agreed upon a point to be tried by a jury; and *iſſue* in law is when there is a demurrer to a declaration, plea, &c. and a joinder in demurrer, which is an *iſſue* at law to be determined by the judges. *Iſſues* in fact are either *general* or *ſpecial*.

ISSUE, *General*, ſeems to be that whereby it is referred to the jury to bring in their verdict, whether or no the defendant hath done any ſuch thing as the plaintiff lays to his charge.

For example, if it be an offence againſt any ſtatute, and the defendant plead Not guilty; this being put to the jury, is called the *general iſſue*.—So if a man complains of a private wrong, which the defendant denies, and pleads no wrong, nor diſſeiſin; and this be referred to the jury; it is likewiſe the *general iſſue*.

ISSUE, *Special*, is that, wherein ſpecial matters being alledged by the defendant in his defence, both parties join on this point, and ſo go to a demurrer, if it be *quæſtio juris*; or elſe to a trial by the jury, if it be *quæſtio facti*: as in aſſault and battery, where the defendant pleads that the plaintiff ſtruck firſt.

ISSUE, *Feigned*, in *Chancery*, is uſed when a matter of fact is ſtrongly controverted and the court directs the matter to be tried by a jury: but as no jury can be ſummoned to attend this court, the fact is uſually directed to be tried at the bar of the court of king's bench, or at the aſſiſes upon a *feigned iſſue*. For, in order to bring it there, and have the point in diſpute, and that only put in *iſſue*, an action is feigned to be brought, wherein the pretended plaintiff declares, that he laid a wager of 5 l. with the defendant, that *A* was heir at law to *B*. and then avers that he is ſo, and brings his action for the 5 l. The defendant allows the wager, but avers that *A* is not the heir to *B*.; and thereupon that *iſſue* is joined, which is directed out of chancery to be tried; and thus the verdict of the jurors at law determines the fact in the court of equity. Theſe *feigned iſſues* ſeem to be borrowed from the *ſponſio judicialis* of the Romans; and are alſo frequently uſed in the courts of law, by conſent of the parties, to determine ſome diſputed right without the formality of pleading, and thereby to ſave much time and expence in the deciſion of a cauſe. Blackſt. Com. book iii. p. 452.

ISSUES *on ſheriffs* are for neglects and defaults, by amercement and fine to the king, levied out of the *iſſues* and profits of their lands; and double or treble *iſſues* may be laid on a ſheriff for not returning writs, &c. But they muſt be taken off before they are eſtreated into the exchequer, by rule of court, on good reaſon ſhewn. *Iſſues* ſhall be levied on jurors, for non-appearance; though on reaſonable excuſe proved by two witneſſes, the juſtices may diſcharge the *iſſues*.

ISSUES, in *Phyſic* and *Surgery*, ſmall artificial apertures in a fleſhy part of the body, to drain off ſuperfluous moiſture, or give vent to any noxious humour.

They are uſually made in the arms, legs, or back, either by cauſtics or inciſion. Caution is uſed to place them about the middle of a muſcle, that the neceſſary motion of the part may not incommode them, or pain the patient. There is an eaſy way of making an *iſſue*, which ſucceeds beſt in children; it is done after this manner: having applied a ſmall piece of bliſtering plaiſter, about the bigneſs of a ſmall pea, to the part where you would have an *iſſue*, and letting it lie on for a few hours, it will cauſe a bliſter; the ſkin being raiſed, apply a pea, as uſual; and compreſs it tight with a bandage, till by degrees it ſinks in, and forms an *iſſue*.

The method by inciſion is performed thus: firſt mark the proper place with ink; then elevating the integuments between the thumb and fore-finger of the ſurgeon and an aſſiſtant on each ſide, you next proceed to make an inciſion through them, either with the ſcalpel or lancet, big enough to admit a pea, which being inſerted and covered with a plaſter and compreſs, nothing more than your roller is wanting to complete the operation. Thus by cleaning and dreſſing the wound every morning and evening with a freſh pea, it by degrees, in a day or two, degenerates into a little ulcer, diſcharging daily a quantity of purulent matter, which ſhould be carefully cleanſed or wiped off at every dreſſing.

There is a ſecond method of making *iſſues* by wounding the ſkin with an actual cautery, or red hot iron, which is uſually included in a ſort of capſula, or caſe of iron, to conceal it from terrifying the patient. When the caſe is fixed upon the proper part for the *iſſue*, the red-hot iron is then preſſed down upon the integuments, and the eſchar or burn is next to be dreſſed with freſh butter or baſilicon, till by repeating the dreſſing every day, it ſeparates, and then, the ulcer formed, it is to be filled with a pea, and dreſſed as before.

The third method of making *iſſues* is by the application of potential cauteries, or corroding medicines; in order to which a piece of plaſter is firſt perforated, and then applied, ſo as its aperture may cover the place marked with ink for the *iſſue*: a piece of the cauſtic is then put into the aperture of the plaſter, and retained cloſe down upon the ſkin, with ſome ſcraped lint, a ſmall compreſs, and a large plaſter; and laſtly, with a larger compreſs and bandage. The patient is then to be ordered to reſt for about ſix or eight hours, more or leſs, according to the ſtrength of the cauſtic, which time being elapſed, and the dreſſings removed, the eſchar is to be treated as before directed in an actual cautery.

In whichever of theſe methods the *iſſue* is made, it muſt be dreſſed at leaſt twice every day, eſpecially if it runs well, and in the ſummer ſeaſon: and at each dreſſing you muſt put in a freſh pea, and cover it with a clean plaſter, or a piece of waxed paper or ſilk, or an ivy leaf retained with compreſs and bandage. But the deligation for *iſſues* is much more commodiouſly performed with a leathern ſwathe, faſtened by claſps, than by a circular linen roller. In this manner *iſſues* are to be kept open, till the patient is recovered of the diſorder for which they were made.

Iſſues are chiefly made for various diſorders in the head, eyes, ears, teeth, ſciatica, and other painful diſorders, which are this way frequently relieved or cured. But in ſtubborn diſorders it is frequently neceſſary to make two or more *iſſues* to produce any conſiderable effect, as one in each arm, or in one arm and leg of the ſame ſide. In this caſe proper topical remedies as cantharides, black hellebore, &c. ſhould be ſpeedily applied.

Iſſues above the ſhoulder-blades are good in aſthmatic caſes; and Dr. Mead thinks their benefit, in this and ſome other diſtempers, lies not only in giving vent to the humors, but likewiſe in leſſening the over-great tenſion of the nerves. Monit. et Præcept. Medic. cap. v. The uſe of *iſſues*, or ſetons, made in the ſide on the part moſt affected, is recommended inſtead of bleeding in conſumptive caſes. See CONSUMPTION.

In order to cloſe an *iſſue*, little more is required than to diſcharge the pea, and to refrain from putting in any more, by which means alone it will cloſe up in a ſhort time: but if any proud fleſh ſhould ariſe, it may be amputated, or elſe removed with burnt allum. Laſtly, it is obſervable, that when the *iſſues* of people far advanced in years ceaſe to make their wonted diſcharge, and turn of a livid and blackiſh hue, it is a ſign that they are invaded by ſome deſperate diſorder, and that life is very near its period.

ISTHMIA, Ισθμια, or ISTHMIAN *Games*, *Ludi* ISTHMII were ſolemn ſports, being one of the four ſacred games celebrated in ancient Greece.

They were called *Iſthmian*, becauſe they were celebrated in the Corinthian Iſthmus, a neck of land by which Peloponneſus is joined to the continent.

Plutarch, in the life of Theſeus, tells us, they were inſtituted by that hero to the honour of Neptune; in imitation of Hercules, who had before inſtituted the Olympic games to the honour of Jupiter; but Archias refers their inſtitution to the honour of Melicertes, or Palæmon, ſon of Athamus king of Thebes, whom the Latins call Portumnus. Others ſay, they were inſtituted by Niſis, ſon of Neptune; and others, by Siſyphus, brother of Athamus, king of Corinth, about 1350 years before Chriſt. Others are of opinion that there were two diſtinct ſolemnities obſerved in the Iſthmus, one in honour of Melicertes, and another in honour of Neptune.

Archias and others ſay, the conqueror's prize at theſe games was a crown of parſley.—Plutarch and Strabo ay, it was at firſt a crown of pine; and that this afterwards changed for one of parſley; but that at length the pine was reſumed; and to this was added a reward of one hundred ſilver drachmæ.

Theſe games were held, according to Pindar, every three years, or according to Pliny, every five; and were eſteemed ſo ſacred, that after the deſtruction of Corinth, by Mummius, about 146 years before the Chriſtian æra, the Sicyonians were charged with the keeping them up. They were ſo celebrated, and the concourſe at them was ſo great, that only the prime perſons of the moſt remarkable cities could have place in them.—The Athenians had only as much room allotted them as the ſail of a ſhip, which they ſent yearly to Delos, could cover.

ISTHMUS, Ισθμος, in *Geography*, a narrow neck, or ſlip of ground, which joins two continents; or joins a peninſula to the terra firma, and ſeparates two ſeas.

The moſt celebrated *iſthmuſes* are that of Panama or Darien, which joins North and South America; that of Suez, which connects Aſia and Africa; that of Corinth, or Peloponneſus, in the Morea; that of Crim-Tartary, otherwiſe called Taurica Cherſoneſus; that of the peninſula Romania and Eriſſo, or the *iſthmus* of the Thracian Cherſoneſus, twelve furlongs broad; being that which Xerxes undertook to cut through. The ancients had ſeveral deſigns of cutting the *iſthmus* of Corinth, which is a rocky hillock, about ten miles over; but they were all vain, the invention of ſluices being not then known.—There have been attempts, too, for cutting the *iſthmus* of Suez, to make a communication between the Red-ſea and the Mediterranean.

Isthmus is alſo applied by the anatomiſts to ſeveral parts of the human body, particularly that narrow part of the throat, ſituate betwixt the two tonſils.

Alſo to the ridge that ſeparates the two noſtrils: and to the paſſage in that part of the medulla oblongata of the brain, which lies between the cerebrum and cerebellum, and which reaches from the place called *anus* to the fourth ventricle. The upper part or cover of this conduit, or paſſage, which is betwixt the teſtes and the foremoſt vermicular proceſs of the cerebellum, and to which two it is tied at its two ends, and to the proceſſes which come from the cerebellum to the teſtes at its ſides, is called *valenta major*; it is of a medullary ſubſtance, and its uſe is to keep the lympha from falling out above the nerves in the baſis of the ſkull.

ITAIARA, in *Zoology*, a name by which ſome have called a Braſilian fiſh, of the turdus kind, of great beauty, and a very delicate taſte, more uſually known by the name JURUNCAPEBA.

ITALIAN, the language ſpoken in Italy.

This tongue is derived principally from the Latin, and of all the languages formed from the Latin, there is none which carries with it more viſible marks of its original than the *Italian*.

It is accounted one of the moſt perfect among the modern tongues. It is complained, indeed, that it has too many diminutives and ſuperlatives, or rather augmentatives; but without any great reaſon: for if thoſe words convey nothing farther to the mind than the juſt ideas of things, they are no more faulty than our pleonaſms and hyperboles.

The language correſponds to the genius of the people; they are ſlow and thoughtful; and accordingly, their language runs heavily, though ſmoothly; and many of their words are lengthened out to a great degree.—They have a great taſte for muſic; and, to gratify their paſſion this way, have altered abundance of their primitive words; leaving out conſonants, taking in vowels, ſoftening and lengthening out their terminations, for the ſake of the cadence.

Hence the language is rendered extremely muſical, and ſucceeds better than any other in operas, and ſome parts of poetry: but it fails in ſtrength and nervouſneſs: hence alſo a great part of its words, borrowed from the Latin, become ſo far diſguiſed, that they are not eaſily known again.

The multitude of ſovereign ſtates into which Italy is divided, has given riſe to a great number of different dialects in that language; which, however, are all good in the place where they are uſed.—The Tuſcan is uſually preferred to the other dialects, and the Roman pronunciation to that of the other cities; whence the *Italian* proverb, *Lingua Toſcana in bocca Romana*.

The *Italian* is generally pretty well underſtood throughout Europe, and is frequently ſpoken in Germany, Poland, and Hungary.—At Conſtantinople, in Greece, and in the ports of the Levant, the *Italian* is uſed as commonly as the language of the country; indeed in thoſe places it is not ſpoken ſo pure as in Tuſcany, but is corrupted with many of the proper words and idioms of the place; whence it takes a new name, and is called *Frank Italian*. See Language.

Italian *coins, meaſures, marble, ſilks*. See the ſubſtantives.

ITALIC, or Italian *Hours*, are the twenty-four hours of the natural day, accounted from the ſun ſetting of one day, to the ſame again the next day.

This way of reckoning was uſed by the Jews of old, and is uſed by the Italians to this day.

Italic *character*, in *Printing*. See Letter.

Italic *ſect*, is the name of a party of ancient philoſophers, founded by Pythagoras; ſo called, becauſe that philoſopher taught in Italy, ſpreading his doctrine among the people of Tarentum, Metapontus, Heraclea, Naples, &c.

ITCH, a diſeaſe of the ſkin, wherein it is corrupted by the ouſing out of certain ſharp ſaline humours, which gather into puſtules, and occaſion a pruritus, or itching.

The pſora or *itch* is deſcribed by Celſus as a reddiſh hardneſs and roughneſs of the ſkin, from an eruption of puſtules thereon; ſome drier, other moiſter; and ouzing out a ſanious matter, which occaſions a continual *pruritus*, or itching.

Theſe eruptions are moſt frequent about the junctures of the limbs, and between the fingers: in ſome they ſpread over the whole body; in others they ſoon ceaſe; and in ſome they return at certain ſeaſons of the year.

In youth, this diſeaſe frequently prevents others, or cures them.—But it ſometimes degenerates into a leproſy. There are two kinds of *itch*, a *humid* and a *dry* kind.

Itch, *ſigns of the*. The moſt obvious and general ſigns of the *itch* are the eruptions of pimples, or puſtules, over the whole ſurface of the body, excepting only the head; which contain, in the end, a ſanious and ulcerous matter. Theſe puſtules uſually appear firſt in the hands, and ſuch other parts as are moſt expoſed to the air, and from theſe they gradually ſpread themſelves all over the body; the body is more turgid in thoſe places where the puſtules are ſituated, than in a ſtate of health; and theſe puſtules are attended with a violent itching, eſpecially in the night. After a few days they either break of themſelves, or are opened by ſcratching, and then become ſo many little ulcers; theſe, however, uſually heal of themſelves in a very little time, and leave no ſcar behind them. This kind of benign *itch* occupies no part but the ſkin, and indeed the matter always lies between the cutis and cuticula, whence the cutis not being deeply corroded, the cuticle eaſily heals.

In the *benign moiſt itch*, the puſtules contain a large quantity of matter, and when broken diſcharge a large flow of it; there is alſo round the baſis of the puſtules of this kind an inflammatory red circle; and, in fine, the more plainly that appears, the greater is the ſuppuration. The ulcerations, in this kind, are deeper than in the dry, and the puſtules rather give a ſenſation of pain and burning heat than of itching.

In the *benign dry itch*, the puſtules are much ſmaller than in this caſe, and are full of a limpid water; and they ulcerate the ſkin more ſuperficially, and cauſe a violent itching, rather than any ſoreneſs or heat in the parts.

The *malignant itch*, when of the ferine kind, called alſo by ſome the ſcorbutic *itch*, is dry and ſcaly, and frequently ſhews bloody ſpots under the larger ſcales. The ſkin round about theſe is tinged with the ſtagnating blood, ſometimes to a red, ſometimes to a livid, or bluiſh black colour. The itching from this kind is much more violent than from the benign, and on any ſudden change of the body, either to hotter or colder, becomes almoſt intolerable. When the ſcabs and cuticle are ſcratched off, as is very frequently the caſe, the cutis underneath is ſeen red and bloody, but neither blood nor lymph are diſcharged from the ſcabs in ſome caſes, in others a yellowiſh ſerous liquor runs out, and almoſt immediately hardens into a ſcab or cruſt like that which was pulled off.

Itch, *the venereal or pocky*. This is uſually rather dry than moiſt, and does not ſpread itſelf ſo quickly as the other kinds. It ſometimes occupies the body in general, ſometimes only particular places, as the thighs, the ſcrotum, or the face. At its firſt appearance there are uſually felt certain little tumors under the ſkin; and after this there appears a ſcab which remains on the part a conſiderable time, and will not eaſily be removed or torn off. The pain of this is ſharp and eroſive, eſpecially when it is exaſperated by ſcratching; and while this is fixed to ſome one part, there are pains felt deep within the fleſh in other places, which are moſt intolerable in the night; and in women the fluor albus, or whites, is uſually an attendant on it; and in men ſometimes a gonorrhœa, ſometimes bubos and other tumours; and in infants, who are thus affected, from the diſeaſes of their parents, there are frequent excoriations, and often criſtated and varicoſe excreſcences of fleſh about the anus.

Itch, *the leprous*. In this the head is frequently affected, the pains are very violent, and the hair and ſkin very frequently fall off. There iſſues from the ſcabs white ſanious matter, and the whole texture of the ſkin is altered; the cuticle being beſet with ſmall ſcales, and feeling rough like the ſkin of an elephant, whence the diſeaſe has been called by ſome *elephantiaſis*.

In other reſpects, this complaint is attended with no ſenſation of pain, or uneaſineſs; but the face is inflated, the teeth become black, the breath becomes fœtid, and tumors of the bubo kind appear on ſeveral parts of the body, all which become finally malignant ulcers; and in the progreſs of the diſeaſe, large ſcabs, with portions of the ſkin, fall from different parts of the face.

Perſons ſubject to the itch. Theſe are principally men of a ſanguineous temperament of body and phlegmatic diſpoſition, who moſt eaſily fall into the moiſt *itch* of the ſimple and benign kind, and are of all others moſt difficultly cured of it. Thoſe, on the other hand, who are moſt ſubject to the ſimple dry *itch*, are men of a dry temperament and choleric habit. All perſons who eat coarſe foods, with much ſalt, and drink ſour and decayed liquors, eaſily fall into this kind; as alſo ſuch as live in a damp foggy air, and thoſe who are ſubject to obſtructions of the liver, and who have long been afflicted with quartans. Thoſe who have a ſuppreſſion or diminution of the uſual quantity of urine, and by that means have the ſalt ſeroſities of the blood not duly carried off, are alſo more ſubject than others; as alſo, from the ſame cauſe, are ſuch as have had old ulcers ſuddenly ſtopped, or iſſues dried up; people who have been uſed to cupping, at certain regular times, and afterwards neglect it; and finally, thoſe of an idle and ſedentary courſe of life.

Cauſes of it. The cauſes of the ſimple benign *itch* are a ſtaſis and corruption of the lymphatic humours, and this is often occaſioned by the humid temperament of the air, which in cold ſeaſons prevents the going off of thoſe humours by ſweat, which had been directed to the ſkin by nature for that purpoſe, hence they remain there and corrupt; and there are other things which more or leſs concur to cauſing it; theſe are a change of the food and drink continued for ſome time, and with this a plethoric habit of body. It is ſometimes the criſis of other diſeaſes, as of a quartan, &c. Theſe are the cauſes, and theſe the perſons ſubject to the *itch*, as a primary diſeaſe beginning with them; but its uſual method of propagating itſelf is by contagion; fifty people, at leaſt, having it by this means, for one, on whom it appears of itſelf. A free uſe of ſalted food greatly exaſperates the *itch* in all perſons, but this alone can have but little effect towards the original producing it. The malignant or complicated *itch* owes its origin to other cauſes. The ferine *itch* is always cauſed by the ſcurvy, and the venereal or pocky *itch* owes its origin to the corruption of the lymph in the venereal diſeaſe.

Dr. Bonomo has given another account of the cauſe of this diſtemper, which is adopted by Dr. Mead: he carefully examined ſeveral globules of the matter picked out of the puſtules of itchy perſons with a microſcope, and found them to be minute living creatures, in ſhape reſembling a tortoiſe, of briſk motion, with ſix feet, a ſharp head, and two little horns at the end of the ſnout—Hence he makes no ſcruple to impute this contagious diſeaſe to the continual biting of theſe animalcules in the ſkin; by means of which ſome portion of the ſerum ouſing out through the ſmall apertures of the cutis, little watery bladders are made, within which the inſect continuing to gnaw, the infected are forced to ſcratch, and by ſcratching increaſe the miſchief; breaking not only the little puſtules, but the ſkin too, and ſome little blood-veſſels, and ſo making ſcabs, cruſty ſores, &c. But it has been ſuppoſed by others to be more probable, that the ſmall inſects or ACARI, which are often found in the puſtules of the *itch*, make choice of theſe as a proper nidus, and do not originally occaſion them. See ANIMALCULES.

Hence we perceive how the *itch* comes to be catching; ſince theſe creatures, by ſimple contact, may very eaſily paſs from one body to another; their motion being wonderfully ſwift, and they crawling on the ſurface of the body, as well as under the cuticula.

Hence alſo we learn the reaſon of the cure of this diſeaſe by lixivial waſhes, baths, and ointments made of ſalts, ſulphurs, mercury, &c. theſe being very powerful in killing the vermin lodged in the cavities of the ſkin, which ſcratching will never do; they being too minute to be caught under the nails. And if in practice it is found, that this diſeaſe, after it ſeemed to be cured by unction, frequently returns again; this is eaſily accounted for; ſince, though the ointment may have killed all the living creatures, yet it may not, poſſibly, have deſtroyed all their eggs laid, as it were, in the neſts of the ſkin; from which they afterwards breed again, and renew the diſtemper.

ITCH, *prognoſtics in the.* The ſimple benign *itch*, of the moiſt kind, is the mildeſt of all the kinds, and in general the moſt eaſily cured; but as it is more ſubject to ulcerations than the other kinds, this ſometimes makes the cure in bad habits of body more difficult. The dry *itch* is more troubleſome, and takes more time in the cure than the moiſt, and is more troubleſome to the patient; but in the moiſt, ſanious, and ſuppurating *itch*, when it is raſhly treated by mercurial and ſulphureous ointments, by quickſilver girdles, by aſtringents and reſrigerants, and is driven in, which is a very common caſe, there always ariſe very unhappy ſymptoms, ſuch as anxieties of the præcordia, aſthmas, ſuffocative catarrhs, intermittent fevers, and ſometimes inflammatory acute ones, both which are of a different appearance from thoſe diſtempers in their uſual ſtate; not unfrequently alſo terrible chronic complaints are brought on by this, as cachexies, anaſarcas and œdemas. The *itch*, in general, when newly caught by infection, is always much more eaſily cured, than when i ariſes from a fault in the humours, and is conſequently much more deeply rooted: for the ſame reaſon, the chronic *itch* is of all others the moſt difficult to be cured; and where there concurs with it a defect or fault of ſome of the viſcera, as is too often the caſe, the cure is yet greatly the more difficult. The malignant *itch* is always much more deeply rooted in the patient, and of conſequence is much more difficult of cure than the ſimple; and in particular, the ferine or ſcorbutic *itch* is one of the moſt ſtubborn diſeaſes we know of. In this caſe the food, and other circumſtances, often make the cure much more difficult than it naturally would be: poor people are often infeſted with this; and their diet not being in their choice, are with difficulty cured of it. The venereal *itch*, though generally accounted the moſt terrible of all the kinds, is yet much more eaſily cured than the ſcorbutic, and ſometimes than the ſimple chronic kind, when treated in a proper manner.

Method of cure. The corrupt ſtate of the humours is to be corrected according to the ſeveral kinds. In the benign *itch*, this is effected by alexipharmics and diuretics, ſuch are decoctions of the woods of guaiacum, ſaſſafras, and the like, with elecampane and pimpernel roots, and the common abſorbents ſated with acids, as the crabs-eyes, or oyſter-ſhells, ſaturated with lemon juice, or the like; and the acrimony of the humours is greatly taken off by ſulphur and nitre given in powders, or by the ſimple balſam of ſulphur in oil of almonds. After this, external applications complete the cure; of this kind are the mercurial ointments, and thoſe which contain ſulphur. But mercurial unguents cannot be depended upon for this effect, unleſs in ſlight caſes; as their antipſoric efficacy ſeems to reach no farther than thoſe parts of the ſkin to which they are applied, and as they cannot with ſafety be applied freely, to any great extent of the body, particularly of the trunk. In the dry *itch* fomentations and baths do much more than ointments; and this kind are decoctions of the oxylapathum root, and a lixivium of quick lime and ſulphur, or the general bathing in mineral ſprings.

In the malignant itch, the ferine or ſcorbutic is to be treated as the ſcurvy, to which it owes its origin. The antiſcorbutic juices ſhould be taken for ſome time, and the decoction of tobacco made very ſtrong, is a good external application; mercurial ointments have alſo their uſe here, and the violent heat of the eruptions may be mitigated by camphor, and by the frogs ſpawn plaſter.

In the venereal itch, the method to be uſed for a cure is the ſame with that for the venereal diſeaſe in any other appearance, but in this there muſt be always kept up a gentle perſpiration: mercurial ointments have peculiarly a place here: and when the diſeaſe is ſo rooted as to give way to no other means, recourſe is to be had to a ſalivation: and finally, the cure is to be completed by evacuating the corrected humours by ſtool, in which caſe calomel is a very uſeful ingredient in purges, and the decoctions of the diaphoretic and diuretic vegetables are of great ſervice in completing it, and preventing a return. Junker Conſp. Med. p. 452, &c.

The beſt medicine yet known for the *itch* is ſulphur, which ſhould be uſed both externally and internally. The parts moſt affected may be rubbed with an ointment made of the flowers of ſulphur two ounces, crude ſal ammoniac finely powdered, two drams; hogs lard, or butter, four ounces; to which may be added a ſcruple, or half a dram of the eſſence of lemon, in order to take away the diſagreeable ſmell. About the quantity of a nutmeg of this may be rubbed upon the extremities, at bed-time, twice or thrice a week. Before the patient begins to uſe the ointment; if he be of a full habit, he ought to be bled, or take a purge or two. During the uſe of it, he ſhould alſo take, night and morning, as much of the flower of brimſtone and cream of tartar, in a little treacle or new milk, as will keep the body gently open; and take care of catching cold. The quantity of ointment above directed will generally ſuffice for the cure of one perſon; but if any ſymptoms of the diſeaſe remain, the medicine may be repeated. Mercury is a dangerous, and has often proved a hurtful medicine in this diſeaſe; and ſhould be uſed with great caution. Mercurial girdles have produced many lamentable effects. Thoſe who would avoid this diſeaſe ought to beware of infected perſons, to uſe wholſome food, and ſtudy univerſal cleanlineſs. Buchan.

Itch *animal*, a creature ſaid to be found in the puſtules of the *itch*: it is a ſpecies of **Acarus**.

ITEA, in *Botany*, a name uſed, by the ancients in general, to ſignify the willow; but, by ſome of the Greek writers, it is alſo uſed as a name for the pine.

Itea, in the *Linnæan Syſtem of Botany*, is a genus of the *pentandria monogynia* claſs: the characters are, that the empalement of the flower is ſmall, permanent, and erect, ending in five acute points; the flower has five petals, inſerted in the empalement, and five awl-ſhaped ſtamina as long as the petals, terminated by roundiſh ſummits, and an oval germen ſupporting a cylindrical permanent ſtyle; the germen becomes a long oval capſule, with the ſtyle at the top, having one cell filled with ſmall ſeeds. Miller.

ITHYNTERION, ιθυντηριον, in *Antiquity*, a ſtaff of laurel, which prophets uſually carried in their hands, otherwiſe called *ſceptron*.

ITINERANT *judges*, or *juſtices*, ſuch as were formerly ſent with commiſſions into divers counties, to hear chiefly thoſe cauſes called *pleas of the crown*: the ſame with what are otherwiſe called *juſtices in eyre*. See **Justice**.

ITINERARIUM, in *Surgery*, a name given by Hildanus, and many other writers, to a ſtaff uſed in the operation of cutting for the ſtone.

ITINERARY, the deſcription a traveller gives of the courſe of his journey, and of the curioſities, &c. he obſerved therein.

The *Itinerary* of Antonine ſhews all the grand Roman roads in the empire, and all the ſtations of the Roman army. It was drawn up by order of the emperor Antoninus Pius; but is now very defective, having ſuffered much under the hands of the copiſts and editors.

Itinerary *column*. See **Column**.

ITERATION. See **Reiteration**.

ITING, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to a bird common among them, and ſeeming, by the deſcription, to be of the woodpecker kind. It is of the bigneſs of the ſtarling.

It is a very noiſy bird, but its voice is not diſagreeable. People ſay this bird has but one ſtrait gut.

IVA, in *Botany*, a genus of the *monoecia pentandria* claſs; the characters of which are, that the plants have male and female flowers; the male flowers have a common three-leaved empalement; the flowers that form the diſc have one petal cut into five parts at the brim: the receptacle is diſtinguiſhed by its hairs; the empalement of the female flowers is compoſed of five floſculous radii, which have no corolla; two long ſtyles, and a naked obtuſe ſeed.

IVAHAH is the name of one of the canoes or boats uſed by the iſlanders of the South-ſea, for ſhort excurſions to ſea: it is wall-ſided and flat bottomed. Theſe boats are of different ſizes, their length being from ſeventy-two feet to ten; but their breadth is by no means in proportion: for thoſe of ten feet are about a foot wide, and thoſe of more than ſeventy are ſcarcely two. The fighting *ivahah* is the longeſt, with its head and ſtern conſiderably raiſed above the body, in a ſemicircular form; the ſtern is ſometimes ſeventeen or eighteen feet high. When they go to ſea they are faſtened together ſide by ſide, at the diſtance of about three feet, by ſtrong poles of wood, laid acroſs and laſhed to the gun-whales. On theſe, in the fore part, a ſtage or platform is raiſed, about ten or twelve feet long, ſomewhat wider than the boats, and ſupported by pillars about ſix feet high: on this ſtage are ranged the fighting men, whoſe miſſile weapons are ſlings and ſpears; and below the ſtage the rowers ſit. The fiſhing *ivahahs* are from forty feet long to ten; thoſe of twenty-five feet and upwards occaſionally carry ſail. The travelling *ivahah* is always double, and furniſhed with a ſmall neat houſe about five or ſix feet broad, and ſix or ſeven feet long. Hawkeſworth's Voyages, vol. ii. p. 221.

IVAPECANGA, in *Botany*, a name given by ſome authors to the climbing plant, of which the ſarſaparilla, uſed in medicine, is the root.

JUBILEE, among the *Jews*, denotes every fiftieth year; being that following the revolution of ſeven weeks of years; at which time all the ſlaves were made free, and all lands reverted to their ancient owners. The *jubilees* were not regarded after the Babyloniſh captivity.

The word, according to ſome authors, comes from the Hebrew, *jobel*, which ſignifies *fifty*: but this muſt be a miſtake, for the Hebrew יובל, *jobel*, does not ſignify fifty; neither do its letters, taken as cyphers, or according to their numerical power, make that number; being 10, 6, 2, and 30, that is, 48.—Others ſay, that *jobel* ſignifies a *ram*, and that the *jubilee* was thus called, becauſe proclaimed with a ram's horn, in memory of the ram that appeared to Abraham in the thicket. Maſius chooſes to derive the word from *Jubal*, the firſt inventor of muſical inſtruments, which, for that reaſon, were called by his name; whence the words *jobel* and *jubilee* came to ſignify the year of deliverance and remiſſion, becauſe proclaimed with the ſound of one of thoſe inſtruments which at firſt was no more than the horn of a ram. Others derive *jobel* from יבל, *jabal*, in hiphil הביל, *hobil*, which ſignifies to recall or return; becauſe this year reſtored all ſlaves to their liberty, &c. The inſtitution of this feſtival is in Lev. xxv. 8, 17.

The learned are divided about the year of *jubilee*; ſome maintaining that it was every forty-ninth, and others that it was every fiftieth year. The ground of the former opinion is chiefly this, that the forty-ninth year being of courſe a ſabbatical year, if the *jubilee* had been kept on the fiftieth, the land muſt have had two ſabbaths, or have lain fallow two years, which, without a miracle, would have produced a dearth. On the other hand it is alledged, that the Scripture expreſly declares for the fiftieth year, Lev. xxv. 10. 11. And beſides, if the *jubilee* and ſabbatical year had been the ſame, there would have been no need of a prohibition to ſow, reap, &c. becauſe this kind of labour was prohibited by the law of the ſabbatical year. Lev. xxv. 4. 5. The authors of the Univerſal Hiſtory, book i. chap. 7. note R, endeavour to reconcile theſe opinions, by obſerving, that as the *jubilee* began in the firſt month of the civil year, which was the ſeventh of the eccleſiaſtical, it might be ſaid to be either the forty-ninth or fiftieth, according as one or other of theſe computations were followed. The political deſign of the law of the *jubilee* was to prevent the too great oppreſſions of the poor, as well as their being liable to perpetual ſlavery. By this means a kind of equality was preſerved through all the families of Iſrael, and the diſtinction of tribes was alſo preſerved, that they might be able, when there was occaſion, on the *jubilee* year, to prove their right to the inheritance of their anceſtors. It ſerved alſo, like the Olympiads of the Greeks, and the Luſtra of the Romans, for the readier computation of time. The *jubilee* has alſo been ſuppoſed to be typical of the goſpel ſtate and diſpenſation, deſcribed by Iſaiah, lxi. ver. 1. 2. in reference to this period, as the "acceptable year of the Lord."

Jubilee, in a *more modern ſenſe*, denotes a grand church ſolemnity, or ceremony, celebrated at Rome, wherein the pope grants a plenary indulgence to all ſinners; at leaſt to as many as viſit the churches of St. Peter and St. Paul at Rome.

The *jubilee* was firſt eſtabliſhed by Boniface VIII. in 1300, in favour of thoſe who ſhould go *ad limina apoſtolorum*; and it was only to return every hundred years. But the firſt celebration brought in ſuch ſtore of wealth to Rome, that the Germans called this the golden year; which occaſioned Clement VI. in 1343, to reduce the period of the *jubilee* to fifty years. Urban VI. in 1389, appointed it to be held every thirty-five years, that being the age of our Saviour; and Paul II. and Sixtus IV. in 1475, brought it down to every twenty-five, that every perſon might have the benefit of it once in his life.

Boniface IX. granted the privilege of holding *jubilees* to ſeveral princes, and monaſteries: for inſtance, to the monks of Canterbury, who had a *jubilee* every fifty years; when people flocked from all parts to viſit the tomb of Thomas à Becket. *Jubilees* are now become more frequent, and the pope grants them as often as the church, or himſelf, have occaſion for them. There is uſually one at the inauguration of a new pope.

To be intitled to the privileges of the *jubilee*, the bull injoins faſtings, alms, and prayers. It gives the prieſts a full power to abſolve, in all caſes, even thoſe otherwiſe reſerved to the pope; to make commutations of vows, &c. in which it differs from a *plenary indulgence*. During the time of *jubilee*, all other indulgences are ſuſpended.

One of our kings, viz. Edward III. cauſed his birth-day to be obſerved in manner of a *jubilee*, when he became fifty years of age, in 1362, but never before or after. This he did, by releaſing priſoners, pardoning all offences except treaſon, making good laws, and granting many privileges to the people.

There are particular *jubilees* in certain cities, when ſeveral of their feaſts fall on the ſame day: at Puey en Velay, for inſtance, when the feaſt of the Annunciation happens on Good-Friday; and at Lyons, when the feaſt of St. John Baptiſt concurs with the feaſt of Corpus Chriſti.

In 1640, the Jeſuits celebrated a ſolemn *jubilee* at Rome; that being the centenary, or hundredth year from their inſtitution, and the ſame ceremony was obſerved in all their houſes throughout the world.

JUBILEUS, or Jubilæus, is uſed among the Romaniſts, to ſignify a religious who has been fifty years in a monaſtery, or an eccleſiaſtic who has been in orders fifty years.

Such veteran religious are diſpenſed with in ſome places from attending matins, or a ſtrict obſervation of any other of their rules.

Jubilæus is alſo extended to any man a hundred years old; and to a poſſeſſion, or preſcription for fifty years. *Si ager non invenietur in ſcriptione, inquiratur de ſenioribus, quantum temporis fuit cum altero; & ſi ſub certo* jubilæo *manſit ſine vituperatione, maneat in æternum.*

JUCADICE *arbor*, in *Botany*, a name by which ſome authors have called the *canella alba*, or wild cinnamon-tree.

JUCCA, in *Botany*, the name of a diſtinct genus of plants, otherwiſe called Yucca.

JUCKING, the notes of a cock partridge, inviting the hen to come to him. Theſe ſerve the ſportſman in good ſtead for finding the places where they are.

JUCURUTA, a very beautiful ſpecies of owl, found in the Brazils, and variegated with black and yellow.

JUDÆ *auricula*. See Auricula.

JUDAICUS *lapis*, a ſmall, grey, ſoft, brittle ſtone, in form of an olive, having lines drawn regularly on its ſurface, as if they were formed by art.

It is of ſome uſe in phyſic; being ſuppoſed to be endued with a lithontriptic power; and therefore is given to diſſolve the ſtone in the bladder. It is a kind of extraneous foſſil, being a ſpine of an echinus marinus petrified. This ſtone has by many been ſuppoſed to be a foſſile body in its native figure, but is really the remains of a ſpine of an echinus, filled with a plated ſpar. It is very common in Syria, and is ſometimes found with us. See Spar.

JUDAISM, the religious doctrines and rites of the Jews.

Judaiſm was but a temporary diſpenſation, and was to give way, at leaſt the ceremonial part of it, at the coming of the Meſſias. For a complete ſyſtem of *Judaiſm*, ſee the books of Moſes. *Judaiſm* was anciently divided into ſeveral ſects; the principal whereof were the Phariſees, Sadducees, and Eſſenians.

At preſent there are two ſects among the Jews, viz. the Caraites, who admit of no rule of religion, but the law written by Moſes; and the Rabbiniſts, who add to the law the traditions of the Talmud.

It has been obſerved, that *Judaiſm*, of all religions, is that which is the moſt rarely abjured. In the 18th of Edward I. the parliament granted the king a fifteenth for the expulſion of *Judaiſm*.

In England, formerly, the Jews and all their goods belonged to the chief lord where they lived, and he had ſuch abſolute property in them, that he might ſell them; for they had not liberty to remove to another lord without leave. Mat. Paris tells us, that Henry III. ſold the Jews to earl Richard, his brother, for a term of years, that *quos rex excoriaverat, comes eviſceraret*.

They were diſtinguiſhed from the Chriſtians both living and dying; for they had proper judges and courts wherein their cauſes were tried, and they wore a badge on their breaſt over their cloaths in ſhape of a table; and they were fined, if they ſtirred abroad without ſuch badges. They were never buried in the country, but always brought up to London, and interred without the walls.

JUDAS *tree, cercis*, in *Botany*, a genus of the *decandria monogynia claſs*. Its characters are theſe: the flower has five petals, which are inſerted in the empalement, and greatly reſemble a papilionaceous flower; the ſtandard is of one roundiſh petal, and the keel is compoſed of two petals; it has ten diſtinct ſtamina, four of which are longer than the reſt; it has a long ſlender germen, which becomes an oblong pod, with an oblique point, having one cell, incloſing ſeveral roundiſh compreſſed feeds. There are two ſpecies. Miller.

JUDDOCK, in *Ornithology*, the name commonly given, in England, to a ſmall ſpecies of ſnipe, called by authors, *gallinago minima*, and in ſome places with us, the *ged*, or Jack *ſnipe*.

JUDE, or *the Epiſtle of* Jude, a canonical book of the New Teſtament, written againſt the heretics, who by their impious doctrines and diſorderly lives, corrupted the faith and good morals of the Chriſtians. See Epistle.

In the early ages of Chriſtianity, ſeveral rejected this Epiſtle, becauſe the apocryphal books of Enoch, and the aſcenſion of Moſes, are quoted in it. Neverthleſs it is to be found in all the ancient catalogues of the ſacred writings; and Clement of Alexandria, Tertullian, and Origen, quote it as written by Jude, and reckon it among the books of ſacred Scripture.

JUDGE, an officer appointed by the ſovereign powers of any country, to diſtribute that juſtice to their ſubjects which they cannot adminiſter in perſon.

The character of *judge* is part of the regal authority, whereof the king diveſts himſelf.

The chief function of *judges* is for the trial of cauſes both civil and criminal.

The Engliſh *judges* are choſen out of the ſerjeants at law, and are conſtituted by letters patent. Their commiſſions are bounded with this limitation, *facturi quod ad juſtitiam pertinent ſecundum legem & conſuetudinem Angliæ*: and at their creation they take an oath, that they will indifferently miniſter juſtice to all them that ſhall have any ſuit or plea before them; and this they will not forbear to do, though the king by his letters, or by expreſs word of mouth, ſhould command the contrary: and they are anſwerable in body, land, and goods. 18 Ed. III. c. 1.

By the law of England all *judges* muſt derive their authority from the crown, by ſome commiſſion warranted by law. The *judges* of the king's bench, common pleas, and the barons of the exchequer, are all (excepting the chief juſtice of the king's bench, who is created by writ) appointed by patent. Formerly they held their places only during the king's pleaſure: but now, for the greater ſecurity of the liberty of the ſubject, by ſtatute 13 Will. III c. 2. their commiſſions are to be *quamdiu ſe bene geſſerint*, and their ſalaries are aſcertained and eſtabliſhed: and by 1 Geo III. cap. 23. they are to continue, notwithſtanding the demiſe of the crown; and their full ſalaries are abſolutely ſecured to them during the continuance of their commiſſions. Though upon an addreſs of both houſes of parliament, they may be lawfully removed.

Judges muſt exerciſe their authority in a legal manner, and hold their courts in their proper perſons, for they cannot act by deputy, nor any way transfer their power to another, as the *judges* of eccleſiaſtical courts may. Yet when there are ſeveral judges in a court of record, the act of any one of them is effectual, provided their commiſſions do not require more: ſo likewiſe what is executed by a majority preſent, is the act of the court: but where they are equally divided in opinion, the cauſe is to be removed into the exchequer chamber, and for that purpoſe a rule is to be made, and the record certified, &c. Some things done by *judges* at their chambers, are accounted as done by the court; and that they may be prepared to hear what is to come before them, they are to have a paper of the cauſes to be heard, ſent to them by the attorneys the day before they are ſpoken to; that if, upon reading the record of any cauſe, any ſpecial matter that ariſes ſhould appear doubtful, they may ſatisfy themſelves by conſulting books.

The *judges* are bound by oath to determine according to the known laws and ancient cuſtoms of the realm. Their rule herein muſt be the judicial deciſions, and reſolutions upon the various cauſes that have occurred, and not their own arbitrary will and pleaſure, or that of their prince.

Judges are free from all proſecutions for any thing done by them in court, which appears to have been an error of their judgment. But for wilful corruption, they have been complained of to the ſtar-chamber formerly, and may now be called to an account in parliament.

It has been ſaid, that ſcandalous reflections on the *judges* in Weſtminſter-hall are within the ſtatute of *ſcandalum magnatum*.

Thoſe who uſe threatening or reproachful words to a *judge* ſitting in the courts, are guilty of a high miſpriſion, and have been puniſhed with large fines, impriſonment, and corporal puniſhment. Aſſaulting a *judge*, ſitting in the court, by drawing a weapon, without any blow ſtruck, is puniſhable with the loſs of the right hand, impriſonment for life, and forfeiture of goods and chattels, and of the profits of the perſon's lands during life; and ſlaying the chancellor, treaſurer, or the king's juſtices of either bench, juſtices in eye, or juſtices of aſſize, and all other juſtices aſſigned to hear and determine, being in their places doing their offices, is a ſpecies of treaſon by 25 Edw. III. c. 2. However the barons of the exchequer, as ſuch, are not within the protection of this act.

Judges, who become ſolicitors in a cauſe which they are to judge, and privately and extrajudicially tamper with witneſſes, or labour jurors, may be dealt with according to the ſame capacity to which they baſely degrade themſelves. Bribery in *judges* is puniſhable by loſs of office, fine, and impriſonment; and by the common law, bribery of *judges* in relation to a cauſe depending before them, has been puniſhed as treaſon. If a *judge* ignorantly condemns a man to death for felony, when it is not felony; for this offence he ſhall be fined and impriſoned, and loſe his office. If a *judge*, who hath no juriſdiction of the cauſe, give judgment of death and award execution, which is executed, ſuch *judge* is guilty of felony; and alſo the officer who executes the ſentence. And if juſtices of the peace, on indictments of treſpaſs, arraign a man of felony and judge him to death, and he is executed, it is felony in them. A *judge* ought not to judge in his own cauſe, nor in pleas where he is party. It was formerly enacted, ſtat. 33 Hen. VIII. c. 24. that none ſhould be juſtices of aſſizes within the county where they were born, or do inhabit; but this is repealed by a late ſtatute, 12 Geo. II. c. 27.

It was formerly held, that by a juſtice's acceptance of any new name of dignity, his commiſſion was determined; but this was remedied by ſtatute 1 Edw. VI. c. 7. But it has been doubted, whether the dignity of baronet, created ſince that ſtatute, is within the equity of it.

Judge, *itinerant*. See Itinerant.

Judge, in *Scripture*, is applied to certain eminent perſons choſen by God himſelf to govern the Jews, from the time of Joſhua till the eſtabliſhment of the kings.

The Hebrews were governed by fifteen *judges*, for the ſpace of 340 years; *viz.* from the time of Othniel their firſt to that of Samuel their laſt *judge*.

The *judges* were not ordinary magiſtrates, but were appointed by God on extraordinary occaſions, as, to head the armies, to deliver the people from their enemies, *&c.* — Salian has obſerved that they not only preſided in courts of juſtice, but were alſo at the head of the councils, the armies, and of every thing that concerned the government of the ſtate; though they never aſſumed the title either of princes, governors, or the like.

In ſome reſpects they reſembled kings; *viz.* 1. In that their authority was given them for life, and not for a limited time. 2. They ruled alone, and without any dependency; which occaſioned Joſephus to call their ſtate monarchical.

Salian remarks ſeven points wherein they differed from kings. 1. They were not hereditary. 2. They had no abſolute power of life and death, but only according to the laws, and dependently upon them. 3. They never undertook war at their own pleaſure, but only when they were commanded by God, or called to it by the people. 4. They exacted no tribute. 5. They did not ſucceed each other immediately, but after the death of one there was frequently an interval of ſeveral years before a ſucceſſor was appointed. 6. They did not uſe the enſigns of ſovereignty, the ſceptre or diadem. 7. They had no authority to make any laws, but were only to take care of the obſervation of the laws of Moſes.

Judges, *or book of* Judges, is a canonical book of the Old Teſtament, containing the hiſtory of the Iſraelite *judges*, whereof we have been ſpeaking.

The author is not known; it is probable the work did not come from any ſingle hand, being rather a collection of ſeveral little hiſtories, which at firſt were ſeparate, but were afterwards collected by Eſdras, or Samuel, into a ſingle volume; and in all likelihood, were taken from the ancient journals, annals, or memoirs, compoſed by the ſeveral *judges*.

JUDGMENT, a faculty of the ſoul, by which it perceives the relation between two, or more, ideas.

Thus, when we *judge*, that the ſun is greater than the moon, the underſtanding firſt compares the two ideas of the ſun and the moon; and, finding the idea of the ſun greater than that of the moon, the will perfectly acquieſces in that perception, nor puts the mind upon any farther enquiry.

It is not the underſtanding then that *judges*, as is ordinarily thought; *judgments* and reaſonings on the part of the underſtanding, are but mere perceptions; it is the will alone that *judges*, by acquieſcing in what is repreſented to it by the underſtanding.

The only difference then between *perception*, *judgment*, and *reaſoning*, ſo far as the underſtanding is concerned in them, is this; that it perceives a thing ſimply, without any relation to any other thing, in a ſimple perception; that it perceives the relations between two or more things, in *judgments*; and, laſtly, that it perceives the relations that are between the relations of things in reaſonings; ſo that all the operations of the underſtanding are in effect no more than pure perceptions.

Thus, when we perceive, for inſtance, twice 2, or 4, this is no more than a ſimple perception; when we *judge*, that twice 2 are 4, or that twice 2 are not 5, the underſtanding does no more than barely perceive the relation of equality that is between twice 2 and 4, or of inequality between twice 2 and 5. Farther, reaſon conſiſts in perceiving the relation, not between two or more things, for that would be a *judgment*, but of two or more relations of two or more things: thus, when I conclude, that 4 being leſs than 6, twice 2 being 4, are by conſequence leſs than ſix; I perceive not only the relation of inequality between 2 and 4, and 6 (for this were only a *judgment)*, but alſo the relation of inequality between the relation of twice 2 and 4, and the relation between 4 and 6; which conſtitutes a reaſoning. The underſtanding therefore only perceives, and it is the will that *judges* and reaſons, in aſſenting voluntarily to what the underſtanding repreſents.

Indeed, when the things which we conſider appear clear, and perfectly evident, it ſeems as if it were not voluntarily, that the mind conſents to them; whence we are led to think, that it is not properly the will, but the underſtanding that *judges* of them. — But to clear this point, it muſt be obſerved, that the things which we conſider, never appear entirely evident, till the underſtanding has examined them on all ſides, and has perceived all the relations neceſſary to *judge* of them; whence it happens, that the will, not being able to will any thing without knowlege, cannot act on the underſtanding; that is, cannot deſire it to repreſent any thing new in its object, as having already viewed it on all ſides that have any relation to the queſtion in hand. It is obliged then to reſt in what has been already repreſented, and to ceaſe to agitate and diſturb it any farther; in which ceſſation it is, that *judgment* conſiſts.

This reſt or *judgment*, then, not being free when things are in their laſt evidence, we are apt to imagine, that it is not the effect of the will. So long as there is any thing obſcure in the ſubject that we conſider, or that we are not fully ſatisfied that we have diſcovered every thing neceſſary to reſolve the queſtion, as it happens in moſt of thoſe things that are difficult, and that contain various relations; we remain at liberty not to acquieſce: the will may command the underſtanding to purſue its enquiries farther, and to make new diſcoveries, whence it is, that we are more ready to allow the *judgments* formed on theſe ſubjects to be voluntary.

Moſt philoſophers, however, maintain, that even the *judgments* which we form on obſcure things are not voluntary; and will have our conſenting to the truth to be an action of the underſtandiug, which they call *aſſent*, to diſtinguiſh it from our conſenting to goodneſs, which they attribute to the will, and call it *conſent*.

But their error is owing to this, that in our preſent ſtate we frequently ſee things to be evidently true, without the leaſt reaſon to doubt of them; in which caſe the will is not at liberty either to give or refuſe her aſſent: but it is not ſo in matters of goodneſs; there being nothing, which we do not know ſome reaſon for forbearing to love. So that we here perceive a manifeſt indifference, and are fully convinced, that when we love any thing, even God, for inſtance, we uſe our liberty, and do it voluntarily. But the uſe we make of our liberty is not ſo apparent, when we conſent to the truth, eſpecially when it appears perfectly evident: and this leads us to think, that our conſent to truth, that is, our *judgment*, is not voluntary; as if an action, to be voluntary, muſt be indifferent; as if the bleſſed above did not love God voluntarily, becauſe they cannot be diverted from it by any other thing; nor we conſent freely to this evident propoſition, that twice 2 are 4, becauſe we have no appearance of reaſon to diſſuade us from it.

Judgment, in a *Legal Senſe*, is a ſentence or deciſion pronounced by authority of a king, or other power, either by their own mouth, or by that of their judges, and officers, whom they appoint to adminiſter juſtice in their ſtead.

Of *judgments*, ſome are definitive, others only preparatory, proviſional, or interlocutory. See Definitive, Interlocutory, *&c.*

The ancient words of *judgment* are very ſignificant, *Conſideratum eſt*, &c. becauſe *judgment* is ever given by the court, upon conſideration had of the record and matter before them.—In every *judgment* there ought to be three perſons, *actor*, *reus*, and *judex*; plaintiff or proſecutor, defendant, and judge.

Judgment may be given not only upon the trial of the iſſue, but on a default, confeſſion, demurrer, or an outlawry, which is a *judgment* in itſelf. After iſſue joined in a cauſe, the plaintiff may, if he thinks proper, accept of a *judgment* from the defendant; but on ſuch a *judgment*, a writ of error may be had without putting in bail, which cannot be done on a *judgment* after verdict. All *judgments* given in courts of record muſt be entered; in order to which the plaintiff's attorney, four days after the record is brought into court, may, if the *judgment* is out, enter *judgment* by the uſual courſe of the court; but he cannot do this ſooner, becauſe the defendant muſt have time to bring in a writ of error, or to find out matter for an arreſt of *judgment*. The defendant may oblige the plaintiff to enter his *judgment*, in order that he may plead it to any other action; and *judgment* upon a demurrer to a declaration, *&c.* which does not paſs upon the merits of the cauſe, is no bar to it, though other *judgments* may be pleaded in bar to any action brought again for the ſame thing. *Judgments* are to continue till they are reverſed: but an action of debt will lie on a good *judgment*, as well after a writ of error is brought, as before it. If a plaintiff does not take out an execution within a year and a day after *judgment* is obtained, the *judgment* muſt be revived by a SCIRE FACIAS.

JUDGMENTS *for crimes*, in caſe of treaſon or felony, muſt be by an expreſs ſentence, an out-lawry or abjuration: and no *judgment* can be inflicted contrary to law, or that is not appointed by act of parliament. Theſe *judgments* are of very different kinds; as in high treaſon the offender is ſentenced to be drawn, hanged, his entrails taken out and burnt, his head cut off, and his body quartered, *&c.* In petit treaſon the *judgment* is, to be drawn to the place of execution, and there hanged. But a woman in all caſes of high and petit treaſon, is to be drawn and burnt. All perſons, for felony, are to be hanged by the neck till dead. *Judgment* in miſpriſion of treaſon, is impriſonment for life: and for miſpriſion of felony, the offender is ſubject to a fine and impriſonment; and for crimes of an infamous nature, the *judgments* are diſcretionary in the breaſt of the court, and thoſe guilty are puniſhed by a fine, pillory, *&c.* See EXECUTION *of Criminals*.

JUDGMENTS *for debts*, are acknowledged by a perſon's giving a general warrant of attorney to any attorney of the court in which it is to be acknowledged, to appear for him at the ſuit of the party to whom the ſame is to be done, and to file common bail, receive a declaration, and then to plead, *non ſum informatus*, I am not informed; or to let it paſs by *nihil dicit*, he ſays nothing; upon which *judgment* is entered for want of a plea. Judges that ſign *judgment* of lands, are to ſet down the day of the month and year in which they do it; and they ſhall be good againſt purchaſers only from ſuch ſigning. Where a perſon has acknowledged a *judgment* for the ſecurity of money, and afterwards on borrowing more money of another perſon, mortgages his lands, *&c.* without giving any notice of the *judgment* to the mortgagee; in ſuch caſe, if the mortgager do not within ſix months pay off and diſcharge the *judgment*, he ſhall forfeit his equity of redemption, 4 and 5 Will. and Mary. Acknowledging a *judgment* in the name of another perſon without his privity or conſent, is made felony, by 21 Jac. I. c. 26.

JUDGMENT, *Arreſt of.* See ARREST.

JUDGMENT, *Aſſigning falſe.* See ASSIGNING.

JUDGMENT *of God.* See JUDICIUM *Dei.*

JUDGMENT, *Maſs of.* See MASS.

JUDGMENT, *Villainous.* See VILLAINOUS.

JUDICATURE, the quality, or profeſſion, of thoſe who adminiſter juſtice.

In which ſenſe *judicature* is a kind of prieſthood.—In France, offices of *judicature* are venal.

JUDICATURE is alſo uſed to ſignify the extent of the juriſdiction of the judge, and the court wherein he ſits to render juſtice.

JUDICE.—*Coram non* JUDICE. See CORAM.

JUDICIAL. See EXTRAJUDICIAL.

JUDICIAL *Aſtrology.* See ASTROLOGY.

JUDICIAL *Oratory.* See ORATORY.

JUDICIAL *Writs.* See WRIT.

JUDICIALIS *Lex.* See LEX.

JUDICIARY *Aſtrology.* See ASTROLOGY.

JUDICIARY *Depoſit.* See DEPOSIT.

JUDICIO *Falſo.* See FALSO.

JUDICIUM *Dei*, JUDGMENT of *God*, was a term anciently applied to all extraordinary trials of ſecret crimes; as thoſe by arms, and ſingle combat, and the ordeals; or thoſe by fire, or red-hot plough-ſhares; by plunging the arm in boiling water, or the whole body in cold water; in hopes God would work a miracle, rather than ſuffer truth and innocence to periſh.

Si ſuper defendere non poſſit, judicio Dei, *ſcil. aqua vel ferro, fieret de eo juſtitia.*

Theſe cuſtoms were a long time kept up, even among Chriſtians; and they are ſtill in uſe in ſome nations. See ORDEAL, WATER, COMBAT, DUEL, and CHAMPION.

Trials of this ſort were uſually held in churches, in preſence of the biſhops, prieſts, and ſecular judges; after three days faſting, confeſſion, communion, and many adjurations and ceremonies, deſcribed at large by Du Cange.

JUDICIUM *Aſſiſæ.* See ASSISE.

JUDICIUM *Parium* denotes a trial by a man's equals, i. e. of peers by peers, and of commoners by commoners. In *magna carta* it is more than once inſiſted on as the principal bulwark of our liberties, but eſpecially by chap. 29. that no freeman ſhall be hurt in either his perſon or property, *niſi per legale* judicium *parium ſuorum vel per legem terræ.* And this was ever eſteemed, in all countries, a privilege of the higheſt and moſt beneficial nature.

JUFFERS, among carpenters, a term uſed for pieces of wood about four or five inches ſquare, and of ſeveral lengths.

JUG, an earthen pot or pitcher to hold drink; alſo a term uſed in many parts for a common, paſture, or meadow.

JUGERUM, a Roman meaſure, the double of the *actus quadratus.* It was a ſquare of 120 Roman feet. The *jugerum* was divided into 12 *unciæ*, and the *unciæ* into 24 *ſcrupulæ.* Its proportion to the Engliſh acre is as 10000 to 16097.

JUGLANS, in *Botany.* See WALNUT TREE.

JUGULAR, among *Anatomiſts*, is applied to certain veins of the neck, which terminate in the ſubclavians. See VEIN.

The *jugular veins* are two on each ſide; the one *external*, receiving the blood from the face, and the external parts of the head; the other *internal*, which receives the blood from the brain. See *Tab. Anat. (Angeiol.) fig 6. litt. ii .ll.*

JUGULAR is alſo applied to certain glands in the neck, in the ſpaces between the muſcles.

The *jugular glands* are in number fourteen; they are of different figures, ſome larger, others leſs; they are faſtened to each other by certain membranes and veſſels; and their ſubſtance is like that of the maxillaries.

They ſeparate a lympha, which is conveyed by thoſe veſſels to the adjacent muſcles. It is an obſtruction in thoſe glands which occaſions the king's evil.

JUGULARES, in the *Linnæan Syſtem*, is the name of an order or diviſion of fiſh, the general character of which is, that they have ventral fins before the pectoral fins. This order comprehends five genera, viz. *callionymus*, *uranoſcopus*, *trachinus*, *gadus*, and *blennius*, and thirty-five ſubordinate ſpecies.

JUICE, a liquid ſubſtance, which makes part of the compoſition of plants; being diffuſed among all the ſolid parts, and ſerving for their nutriment and growth.

The *juice*, or ſap, is that to PLANTS, which blood is to animals. See *Juices of* PLANTS.

There are *juices* of divers kinds, *aqueous*, *vinous*, *oleaginous*, *gummous*, *reſinous*, and *bituminous*; and of all taſtes and colours.

JUICE, *Spaniſh.* See LIQUORICE.

JUICE is alſo applied to ſeveral, and even to all, the fluids, or humours, in an animal body.

JUICE, *nervous* and *pancreatic.* See the Adjectives.

JUICE is alſo applied to the vapours and humidities incloſed in the earth.

Thus cryſtal is ſaid to be formed of a lapidific *juice*, and metals to be generated of vapours and *juices* condenſed in the earth.

JUICES, *concrete*, in *Mineralogy*, a name given by many authors, to ſuch ſubſtances found in the bowels of the earth, as have once been in a ſtate of fluidity, and are capable of being rendered fluid again by art, by means of heat, moiſture, or other common agents.

Others apply the word *concrete* to all thoſe ſubſtances which may be ſeparated from fluids by chemical operations, whether they are afterwards ſoluble in them again or not; ſuch are the particles of ſpar, ſeparated from water by a ſlow diſtillation, and remaining at the bottom of the veſſel.

The concrete *juices* of the earth are ſuppoſed to be the principal things which give the virtue to mineral waters; for thoſe which receive no concretion, and are only mingled with the waters in their paſſage through that part of the earth where they are evaporated, on the water's being expoſed to the air, though they may give a briſkneſs to it, while entire in it, yet are not to be ſuppoſed to give the principal virtues. Theſe fluid and volatile *juices* all fly off in the analyſes of the waters, but the concrete *juices* are more permanent, and leave certain ſediments which render them viſible and palpable, after the diſtillation of the waters with which they are mixed. When theſe happen to be ſimple, and of the ſame ſpecies with thoſe known in a ſolid ſtate, it is eaſy to deduce the virtues of the waters from them, and to know what muſt be the effect of ſuch fluids as carry ſpar, ſulphur, vitriol, or other well-known ſubſtances, into the blood; but it ſeldom happens that theſe things are thus contained ſimple and entire in the waters, they are often blended variouſly with one another, and often not the whole of the known body is contained, but the principles that conſtitute ſome part of it, ſuch as the acid of vitriol without its metalline part, the baſis of ſea ſalt without its acid, and ſo of the reſt.

Salts and earths are evidently the moſt ſenſible and the moſt common matters which are mixed with water, and it is from them in general that the medicinal ſprings take up their virtues. There is ſcarce any earth that does not contain ſome ſort of mineral ſalt, capable of being waſhed out by water, though it be generally in imperceptible quantities; but where the earths are richer in theſe ſalts, the waters not only take them up, but carry alſo with them the ſeveral finer particles of the earth itſelf in which they are bedded, and riſing up at ſome ſmall diſtance from the place, they make medicinal ſprings, of virtues anſwerable to the peculiar ſpecies of the ſalt that was lodged there. We are always able to ſeparate, by analyſis, the ſalts and the earths of the mineral waters; but when we have done this, we are not arrived at the end of the taſk, for they are often ſuch mixed ſubſtances, that we can neither know them perfectly as they are, nor ſeparate them.

The four moſt known and frequent of thoſe concrete *juices* which are called ſalts, are alum, nitre, vitriol, and culinary ſalt; but the examination of the waters of different medicinal ſprings ſhews us, that there are in the earth others very different from theſe, and that perhaps in great numbers. There is in Aſia a native alkali ſalt, or natrum, and in all the mineral waters we celebrate, there is a peculiar ſalt ſeparable by evaporation, which is nearer allied to this than to any of the other four, to one or other of which it has been the cuſtom to reduce all ſalts; and yet different even from this in ſome reſpects. Beſide this, thoſe *juices* of the ſaline kind, whoſe diſpoſition to concretion is not yet finiſhed, and whoſe ſtate is, as it were, but in embryo, or the firſt ſtage of being, are not to be known, when ſeparated from the waters to which yet they may have perhaps given virtues greater than the concrete, in what we call its more perfect ſtate, might have given: nay, even thoſe that are more formed, and are already concreted, or in a ſtate capable of concretion, have not ſimple and homogeneous ſubſtances in each of the ſpecies. The ſalt that is called culinary ſalt, is obſerved to have two different portions mixed together; the one is condenſed and cryſtallized by cold and in moiſture, after the evaporation of a part of the water wherein this ſalt hath been diſſolved; and the other will not be cryſtallized nor condenſed, but by a total evaporation of the water. The portion of this ſalt that is cryſtallized by cold and in moiſture, is the moſt ſulphureous, and by its ſulphureity it will mix itſelf with the ſulphureous ſalt of calcined tartar reſolved in a moiſt air, or in common water, without turbidneſs, and without coagulation; but that portion of this common ſalt which is not condenſed but by the total evaporation of the water which had diſſolved it, hath an acidity which inſtantly coagulates the ſalt of tartar diſſolved, and all other ſalts in the ſame ſtate which are ſulphureous and nitrous. It is evident, that while this ſalt is in its embryo ſtate, the one or the other alone of theſe two very different ſubſtances of which it is contained, may be mixed with the waters of a ſpring, and communicate virtues different from thoſe which the whole body of the ſalt would have done. This ſalt alſo being procured by evaporation of the water, or by any other analyſis of it, could not be known or referred to the common ſalts, and much leſs if in the earth, as may very eaſily happen, it ſhould be united with ſome one of the conſtituent parts of ſome other ſalt, in the ſame diſunited or unfaſhioned ſtate.

The vitriol which in a moiſt air yields an efforeſcence upon ſulphureous marcaſites, has likewiſe a juicy portion, condenſible only by a total evaporation of its aqueous humidity; this is of a very acrimonious taſte, of an unctuous ſubſtance, and eaſily runs to water in a moiſt air. This juicy portion of vitriol is very different from that which ſhoots and condenſes in the fluid liquor, by means of the cold. Theſe cryſtals are pure vitriol acid, auſtere, and on being mixed with the ſulphureous and nitrous ſalts, a great quantity of earthy matter precipitates out of them; but the other portion will mix itſelf with theſe ſalts in ſolution, without turbidneſs or emotion, not having, like the former, that acidity upon which the ſulphureous or nitrous ſalts can act; which is exactly contrary to what happens to common ſalt, of which the firſt portion is the moſt ſulphureous, and the latter portion the moſt acid. Nitre is alſo, like the reſt, compoſed of two different ſaline portions, the one more ſulphureous, which cryſtallizes with the cold, and in moiſture, and the other, which remains diſſolved after all the cryſtals are obtained, and which cannot be obtaintained in a dry form, but by the evaporation of all the humidity. This is leſs ſulphureous than the other part obtained in cryſtals, and has ſome acidity which the other has not.

The firſt embryos of mineral ſalts are nothing elſe but vapours or *juices* not concreted, but totally volatile or vaporable; of theſe ſome may be condenſed, and in part fixed by the action of fire, or diſengaged from their matrices, and made capable of concretion by means of the air, as is obſerved in certain nitrous, aluminous, and vitriolic ſalts. The ſulphureous part, which is formed in the lime, made of certain hard ſtones burnt in the fire, which is generally allowed to be a ſpecies of nitre, has certainly its ſeminal being in theſe crude ſtones, and in that ſtate of its being, is very different from that which we find after it has paſſed the fire, which from cold and coagulative, changes into cauſtic and reſolutive. This cold and coagulative quantity of this ſtony ſalt, in its firſt ſtate, manifeſts itſelf ſufficiently in the waters of certain rock ſprings, which are very limpid and cold, and breed cold and ſchirrous tumours under the throats of thoſe people who ordinarily drink them, as in the Alps, &c. See BRONCHOCELE.

The ſeminal matter of this ſalt then is wholly altered in its nature by fire, and is rendered ſulphureous and cauſtic as nitre. Fire is able to exalt and alter the ſtate of being of this ſalt, but it is no more able to produce it in theſe ſtones, than in the ſhells of oyſters, &c. of which alſo a lime is made, which yields a ſalt not more ſulphureous than this. Du Clos, Obſerv. ſur les Eaux Miner.

The ſeminal being of alum and vitriol muſt, in the ſame manner, exiſt in thoſe ſubſtances out of which thoſe ſalts are extracted by water, after they have been calcined by fire, or expoſed to a ſlower calcination in the open air. They are not found in theſe ſtones before theſe proceſſes, yet it is ſufficiently evident that the fire and air could not produce them, but could only exalt them there.

All theſe varieties to which the ſeveral mineral ſalts are liable in the different ſtages, and in which they may be abſorbed together, and united by water under the earth, do not only render the judging of the *mineral* WATERS, which partake of them by analyſes very uncertain, but even, in many caſes, perplex and confound us, by the very means by which we hope to underſtand them.

JUICES, *mineral*. Many countries afford theſe, and give marks by them of treaſures that might be turned to great account, were the proper manner of aſſaying them known, which is by firſt properly reducing them to a dry ſubſtance, ſo as to come at the ſolid matter they contain. With a view to the diſcovery of metallic veins, the erection of ſalt-works, vitriol-works, alum-works, borax-works, and the like, the curious on this ſubject may find many excellent hints for farther diſcoveries in the cloſe of Agricola's work, *De re metallica*; and the view is farther carried on by Boyle, Becher, Stahl, and Homberg. The royal academy of Paris have alſo given ſome hints that may be of uſe, in their memoirs; and ſome practical things are recorded in the Philoſophical Tranſactions. We have accounts in the Philoſophical Tranſactions, of white and thick fluids like cream, found in mines at very great depths, and containing mineral particles. The bottoms of our coal-pits ſometimes afford this liquor in very large quantities. And ſome of the iron mines in Shropſhire, particularly that called the White Mine near Hales in that county, affords a great quantity of this ſort of *juice*. It is thick as cream, white, and of a ſweetiſh taſte, but with a vitriolic twang behind it. This is contained in the nodules of iron ſtone, which are here a ſort of enhydri, very large, compoſed of thick cruſts, and ſome of them holding near a hogſhead of this ſort of liquor. Phil. Tranſ N° 100. See ENHYDROS.

JUJUBE, or JUJUB, *ziziphus*, in *Botany*. Its characters are theſe: the flower has no empalement, but has one funnel-ſhaped petal, which ſpreads open at the top, and is cut into four or five ſegments; it has five awl-ſhaped ſtamina, whoſe baſes are inſerted into the petal, and are terminated by ſmall ſummits: it has an oval germen ſupporting two ſlender ſtyles, crowned by obtuſe ſtigmas, and which becomes an oblong oval berry, incloſing a ſingle nut of the ſame form, which has two cells, each containing an oblong ſeed. There are four ſpecies, natives of the Eaſt, and of the warm parts of Europe, which are preſerved in the gardens of the curious. They are propagated by planting their ſtones in pots of light earth, ſoon after the fruit is ripe, and in winter they ſhould be preſerved under a common hot-bed frame, where they may be defended from the ſeverer froſts, and in ſpring the pots ſhould be plunged into a moderate hot-bed. When the young plants are come up, they ſhould be enured to the open air by degrees, and in June they may be removed out, and placed under the ſhelter of a warm hedge. In this place, they ſhould remain till the beginning of October, when they are to be removed into the green-houſe, or elſe placed under a hot-bed frame, that they may be preſerved from the froſts. During the winter they ſhould have as much air as the ſeaſon will permit, and be watered at times, though this muſt be very cautiouſly done, after they have ſhed their leaves. In the March following, before they begin to ſhoot, they are to be tranſplanted each into a ſeparate pot of light earth, and they ſhould then be plunged into a moderate hot-bed, and watered and ſhaded till they have taken thorough root; and in May they are to be removed thence into the open air. They muſt be houſed in winter till they are about four years old, and then may be tranſplanted into the naked ground, and will ſtand our winters. Miller.

The *zizyphus*, according to Linnæus, is only a ſpecies of rhamnus, with oval leaves, and two ſtyles; the fruit, or nucleus of which, contains two cells, and its corolla has five ſegments. See BUCKTHORN.

Is is a native of Spain and Italy; and the fruit, which is of the bigneſs of an olive, and reddiſh when ripe, was once eſteemed as a pectoral, and ſometimes preſcribed in fevers; but is diſregarded in the preſent practice. In Italy and Spain, this fruit is ſerved up at the table in deſerts, during the winter ſeaſon, as a dry ſweetmeat.

JULEP, or JULAP, JULAPIUM, in *Pharmacy*, and derived, according to Menage, from the Arabic *gieulep*, or rather from the Greek ζȣλαπιον: Olearius derives it from *gulap*, a Perſian word, ſignifying *roſe-water*; is an eaſy, agreeable, extemporaneous potion, preſcribed to ſick perſons; uſually compoſed of common water, or ſimple diſtilled water, with one third or one fourth its quantity of diſtilled ſpirituous water, and ſweetened with ſugar, or proper ſyrups. This is ſharpened with vegetable or mineral acids, or impregnated with other medicines.

Juleps are ſometimes uſed as the ordinary drink in certain diſeaſes, but more uſually as a vehicle for other forms of medicines; ſerving chiefly to dilute, to correct the peccant humours, reſtore the declining force of the heart, and promote ſleep.

In diſpenſatories, we have ſeveral different *juleps*; the principal of which are,

JULEP, *camphor*, *julepum e camphora*, a medicine preſcribed in the late London Diſpenſatory, and ſeeming the beſt calculated of any thing of the kind, to communicate the virtues of camphor to water. It is made thus: take camphor, a dram; fine ſugar, half an ounce; boiling water, a pint: grind the camphor with a little ſpirit of wine till it is ſoftened, then add the ſugar, and by degrees perfectly unite theſe; finally add the water by a little at a time, and when the whole has ſtood in a covered veſſel till it is cold, ſtrain it off.

Others direct the *camphorated julep* to be made by grinding one dram of camphor with a little ſpirit of wine, then adding half an ounce of gum arabic reduced to a mucilage, with an equal quantity of water, and rubbing them together till they are perfectly united. To this mixture, add, by little and little, a pint of vinegar, with an ounce of double-refined ſugar diſſolved in it, ſtill continuing the trituration. This *julep* may be taken in the doſe of a ſpoonful or two, in hyſterical and other complaints where CAMPHOR is proper.

The *cordial julep* is made, by mixing four ounces of ſimple cinnamon-water, two ounces of Jamaica pepper water, volatile aromatic ſpirit, and compound ſpirit of lavender, of each two drams, and an ounce of ſyrup of orange-peel; and is given in the doſe of two ſpoonfuls, three or four times a day, in diſorders accompanied with great weakneſs, and depreſſion of ſpirits.

The *expectorating julep* is formed, by mixing four ounces of the EMULSION of gum ammoniac with two ounces of the ſyrup of ſquills. Two table-ſpoonfuls of this *julep* may be taken every three or four hours in coughs, aſthmas, and obſtructions of the breaſt.

Muſk julep is made, by rubbing half a dram of muſk, and half an ounce of ſugar together, and adding gradually two ounces of ſimple cinnamon-water, and as much of peppermint-water, and alſo two drams of the volatile aromatic ſpirit. Two table-ſpoonfuls of this *julep* may be taken every two or three hours, in the low ſtate of nervous fevers, hiccuping, convulſions, and other ſpaſmodic affections.

The *ſaline julep* is prepared by diſſolving two drams of ſalt of tartar, in three ounces of freſh lemon juice, ſtrained; when the efferveſcence is over, add of mint-water, and common water, each two ounces, and of ſimple ſyrup one ounce. This *julep* removes ſickneſs at the ſtomach, relieves vomiting, promotes perſpiration, and may be of ſervice in fevers, eſpecially of the inflammatory kind.

The *vomiting julep* is made, by diſſolving four grains of emetic tartar in eight ounces of water, and adding to it half an ounce of the ſyrup of clove July-flowers. This *julep* may be given, in the beginning of fevers, in the doſe of one table-ſpoonful every quarter of an hour till it operates. Buchan.

JULIA, in *Ichthyology*, a name given by Salvian and Gaza to the *ioulos* of the Greeks, called *julis* by the Latin writers in general, and by the Italians, *donzellina*. It is a ſpecies of the LABRUS, according to Artedi, and is diſtinguiſhed by that author from the other fiſh of that kind, by the name of the variegated labrus of a palm long, and having two larger teeth in the upper jaw.

JULIAN *calendar*, *epocha*, and *period*, ſee the ſubſtantives.

JULIAN *law*. See PAPIAN POPÆAN *law*.

JULIAN *year*. The *Julian* is the old account of the year, uſed among us in England till 1752. It is ſo called from its founder Julius Cæſar; and by that name is diſtinguiſhed from the new, or Gregorian account, uſed in moſt parts of Europe. See YEAR.

JULIANS, in *Botany*; ſee *Dame's* VIOLET.

IULIS, in *Ichthyology*, the name of a ſmall fiſh, caught principally about Genoa, and ſold in the markets, being a very delicately taſted fiſh. Its uſual ſize is about the length and a little more than the breadth of a finger. The males of this ſpecies are very beautifully painted. Their backs are green, and their heads have variegations of yellow and red. Its ſides have very broad ſerrated lines of a fine gold yellow, and its back-fin has ſeveral large ſpots of blue and red. They are fond of human blood, and will ſeize upon the legs of people who walk naked into the water.

IULUS, Ιȣλος, derived from ȣλος, whence ιȣλός, *a ſheaf*, in *Antiquity*, an ancient hymn ſung by the Greeks, and, after them, by the Romans, during the time of their harveſt, in honour of Ceres and Bacchus, to render thoſe deities propitious.

This hymn was ſometimes alſo called *Demetrulus*, or *Demetriulus*; that is, *Iulus* of Ceres.

IULUS, in *Botany*, is a name given to thoſe worm-like tufts, or palms (as they are called in willows), which, at the beginning of the year, grow out, and hang pendulous down, from hazels, walnut-trees, oaks, cheſnut-trees, mulberry-trees, aſhes, &c. and are by us popularly called CATKINS.

Mr. Ray obſerves, that they are collections of the ſtamina of the flowers of the tree; becauſe in fertile trees and plants, they have abundance of ſeminal apparatus: which opinion is adopted by Bradley, who makes them to be the male bloſſoms, and to ſerve to impregnate the rudiments of the fruit, or female bloſſoms, which appear on the ſame trees, or others of the ſame ſort.

JULIUS, ſee GALLY *worm*.

JULY, in *Chronology*, the ſeventh month of the year, during which the ſun enters the ſign Leo. The word is derived from the Latin *Julius*, the ſurname of C. Cæſar the dictator, who was born in it. Mark Antony firſt gave this month the name *July*, which before was called *Quintilis*, as being the fifth month of the year, in the old Roman calendar eſtabliſhed by Romulus, which began in the month of March. For the ſame reaſon, Auguſt was called *Sextilis*; and September, October, November, and December, ſtill retain the name of their firſt rank.

Quæ ſequitur, numero turba notata ſuo.

On the third day of this month the dog-days are commonly ſuppoſed to begin, and to end on the eleventh day of Auguſt. See CANICULAR *days*.

JULY *flowers*, or GILLYFLOWERS, in *Botany*, ſee PINK.

JULY *flower*, *clove*. See DIANTHUS and PINK.

JULY, *queen's*, *flower*. See *Dame's* VIOLET.

JULY, *ſtock*, *flower*. See STOCK, &c.

JUNCAGO, *ruſh-graſs*, in *Botany*, ſee TRIGLOCHIN.

JUNCI *lapidei*, in *Natural Hiſtory*, the name given by authors to a ſpecies of foſſile coral, of the *tubularia* kind, and compoſed of a congeries of ſmall tubules, which are uſually round and ſtriated within. See *Tab of Foſſils*, *claſs* 7.

JUNCO, in *Zoology*, ſee *Reed* SPARROW.

JUNCO is alſo uſed by Bellonius for a bird, ſeeming, by his deſcription, the ſame with what we call the STINT.

JUNCTURE, any joint, or cloſing, of two bodies. See JOINT.

JUNCTURE, in *Oratory*, is a part of COMPOSITION, particularly recommended by Quintilian, and denotes ſuch an attention to the nature of the vowels, conſonants, and ſyllables in the connection of words, with regard to their ſound, as will render the pronunciation moſt eaſy and pleaſant, and beſt promote the harmony of the ſentence. Thus the coalition of two vowels, occaſioning an hollow and obſcure ſound, and likewiſe of ſome conſonants, rendering it harſh and rough, ſhould be avoided: nor ſhould the ſame ſyllable be repeated at the beginning and end of words, becauſe the ſound becomes hereby harſh and unpleaſant. The following verſe in Virgil's Æneid is an example of *juncture*.

Arma virumque cano, Troja qui primus ab oris.

JUNCUS, in *Botany*, ſee RUSH.

JUNCUS *odoratus*; ſee SCHÆNANTH.

JUNE, the ſixth month of the year, during which the ſun enters the ſign of Cancer. The word comes from the Latin *Junius*, which ſome derive *a Junone*. Ovid, in the 6th of his *Faſti*, makes the goddeſs ſay,

Junius a noſtro nomine nomen habet.

Others rather derive it *a junioribus*, this being for young people, as the month of May was for old ones.

Junius eſt juvenum, qui fuit ante ſenum.

In this month is the ſummer ſolſtice.

JUNGERMANNIA, in *Botany*, the name of a genus of plants of the claſs *cryptogamia algæ*, called by Dillenius, LICHENASTRUM, and ſome of the ſpecies are called by Micheli by this name; others by that of *muſcoides*.

The characters of the *jungermannia* are theſe: it produces both male and female flowers, and theſe are often found both upon the ſame plant; the male flower ſtands upon a long pedicle, which ariſes from a ſort of cup or caſe on the leaf; this has no cup, no petals, nor any ſtamina, but is only one ſingle anthera or apex, which is at firſt of an oval figure, but being compoſed of four valves, it opens when ripe into four ſegments, and remains in this ſtate a long time upon the plant; the female part of fructification, as it may be much more properly called than flower, conſiſts only of ſeeds, ſo far as we are able to obſerve, for there is no appearance of either cup or petals; but the ſeeds are found in ſome ſpecies ſingly, in others in cluſters on different parts of the leaves.

JUNIPA, in *Botany*, the name of a tree of the Caribbee iſlands, and ſome other places, the fruit of which is ſaid to yield a juice as clear as water, yet yields a fine violet-coloured dye, and being rubbed twice on the ſame place, makes it black. This tincture, it is ſaid, cannot be got out by ſoap, or any other method of cleanſing, but after nine or ten days diſappears of itſelf. It is ſaid alſo by the ſame authors, that hogs and parrots, feeding on this fruit, have their fleſh and their fat all tinged throughout of a violet colour.

JUNIPER, *juniperus*, in *Botany*, a genus of the *dioecia monadelphia* claſs. Its characters are theſe: it hath male and female flowers on different plants, and ſometimes at ſeparate diſtances on the ſame plant; the male flowers have a conical catkin; the flowers are placed by threes, oppoſite each other, and terminated by a ſingle one; the ſcales are broad, lying on each other, and fixed to the column by a very ſhort foot-ſtalk; the flower has no petal; but three ſtamina, joined in one body below; the female flowers have a ſmall three-pointed empalement, ſitting upon the germen; and they have three ſtiff, acute, permanent petals, and three ſtyles; the germen ſitting below the empalement, becomes a roundiſh berry, incloſing three ſtony ſeeds, which are oblong, angular on one ſide, but convex on the other. Miller.

The confuſion in names that has ariſen from the calling ſome of the *junipers* by the name of CEDAR, is as old as Theophraſtus. In the days of this author, the Greeks plainly did not diſtinguiſh between the names *juniper* and cedar, but applied them indifferently to the ſame trees; and all the authors ſince have more or leſs given into it. The fruit or berries of the ſhrub *juniperus*, which is common on heaths in different parts of Europe, is much uſed in medicine.

Theſe berries, which are firſt green, and when ripe of a dark purple colour, ripen in the autumn. They are chiefly brought to us from Holland and Italy; and ſhould be choſen freſh, not much ſhirvelled, and free from mouldineſs. The ſweetneſs of theſe berries appears to reſide in the juice, or ſoft pulpy part; the bitterneſs in the ſeeds; and the aromatic flavour in oily veſicles, ſpread throughout the ſubſtance, both of the pulp and of the ſeeds, and diſtinguiſhable even by the eye.

Juniper berries give out nearly all their virtue, both to water and rectified ſpirit, tinging the former of a browniſh yellow, and the latter of a bright orange colour. Diſtilled with water, they yield a yellowiſh eſſential oil, very ſubtile and pungent, reſembling the berries in ſmell, and in quantity, when the berries have been ſufficiently bruiſed, about one ounce from forty. This oil is a very ſtimulating diuretic; the decoction inſpiſſated to the conſiſtence of a rob or extract, has a pleaſant, balſamic, ſweet taſte, with a greater or leſs degree of bitterneſs. This extract may be uſed with advantage in caſes where the more ſtimulating preparations would be improper; as in catarrhs, debilities of the ſtomach and inteſtines, and difficulties of the urinary excretions, in perſons of an advanced age. Among the aromatics that have been tried in compoſition with *juniper* berries, ſweet fennel ſeeds, and caraway ſeeds, ſeem the beſt adapted to improve their flavour. A cordial water is prepared in the ſhops, by drawing off a gallon of proof-ſpirit from a pound of the berries, and an ounce and a half of each of the ſeeds. To this water may be uſefully ſuper-added, a proper quantity of the rob. Lewis.

Etmuller had a vaſt opinion of *juniper berries*: the rob made of the expreſſed juice of the green berries has been called by many, the *theriaca Germanorum*; ſo much are they eſteemed by that nation for their alexipharmic qualities.

They are certainly carminative; but their moſt remarkable properties are, in ſcouring the viſcera, and particularly the reins and urinary paſſages, as all things of the turpentine kind do; for which reaſon they are of great ſervice in aſthmas, cachexies, the jaundice, colic, the ſtone of the bladder and kidnies, as alſo in crudities of the ſtomach.

The wood of this ſhrub is alſo of conſiderable uſe in phyſic, it ſtrengthens the ſtomach, expels wind, clears the lungs, provokes the menſes, and removes obſtructions of the viſcera: it is farther ſaid to be ſudorific, cephalic, and hyſteric. From it they draw a ſpirit, a tincture, an elixir, extract, and a ratafia.

It is ſaid it will laſt a hundred years without corrupting; the chemiſts add, that a coal of *juniper*, covered with aſhes of the ſame kind, will keep on fire an entire year.

From a larger ſpecies of *juniper*, the gum SANDARACHA is obtained.

JUNK, in *Sea-language*, a name given to any remnants or pieces of old cable, which is uſually cut into ſmall portions, for the purpoſe of making points, matts, gaſkets, ſennit, &c.

JUNO, in the *Heathen Mythology*, a goddeſs; the daughter of Saturn and Ops, the ſiſter and wife of Jupiter: ſhe is otherwiſe called Lucina.

Juno, as well as Jupiter, had a great variety of characters among the ancients; but the favourite one of them all, among the Romans, was that of the *Juno matrona*, dreſſed like the Roman matrons in a long robe; which covered her from head to foot. The figures of the Roman empreſſes were often formed under this character of *Juno*. Such is the ſtatue of Sabina, at the Villa Mattei in Rome. This *Juno* was called indifferently, *Juno Matrona* and *Juno Romana*. The *Juno Regina*, and *Juno Moneta*, are always repreſented on the ancient gems and medals, in a very fine and magnificent dreſs. We may obſerve, that Virgil, Æn. i. v. 17. and Æn. ii. v. 614. ſpeaks of *Juno*, not according to the appearance ſhe uſed to make among the Romans, but according to the repreſentations of her in other countries. In one place, where he deſcribes her arms and military chariot, he ſpeaks of the Carthaginian *Juno*; and in the other, he has given her an angry and warlike figure, which belongs to the *Juno Argiva*, or ſome particular *Juno* of the Greeks. However, the *Juno Soſpita* among the Romans, appears on ſeveral medals in a war chariot, and with a ſpear in her hand. There was alſo a mild *Juno*, as well as mild Jupiter, among the Romans; under which character, her face appeared more gentle and good-humoured than uſual: but the moſt obvious and ſtriking character of *Juno*, which we derive from the writings of Homer and Virgil, is that of an imperious and haughty wife. Theſe poets oftener repreſent her ſcolding at Jupiter, than careſſing him. Neverthеleſs, ſhe was anciently conſidered as the great patroneſs of marriage and a wedded life. *Juno*, under the character of preſiding over the air, is repreſented in a light car, drawn by peacocks, and attended by the *Auræ*, or Nymphs of the Air. See JUPITER *infra*.

JUNO, in *Aſtronomy*, a name given by ſome to the ſecond ſatellite of Jupiter.

JUNONES. See GENIUS.

JUNTA, called alſo JUNTO, and JUNCTO, a council, or company, of ſeveral perſons, meeting for the diſpatch of any buſineſs.

The term is particularly uſed in the Spaniſh, and Portugueſe affairs.—On the death of Charles II. king of Spain the kingdom was governed, during the abſence of Philip, V. by a *junta*.

In Portugal they have three conſiderable *juntas*; the *junta* of *commerce*, that of the *three eſtates*, and that of *tobacco*. The firſt was eſtabliſhed by King John IV. this is a council of marine. The ſame king alſo aſſembled the ſtates of his kingdom, to create the tribunal of the *junta* of the three eſtates. King Peter II. created the *junta* of tobacco, in 1675; it conſiſts of a preſident and ſix counſellors.

IVORY, the tooth, or tuſk, of an elephant, growing on each ſide of his trunk, ſomewhat in form of a horn.

Ivory is much eſteemed for its colour, its poliſh, and the fineneſs of its grain when wrought. Dioſcorides ſays, that by boiling it the ſpace of ſix hours with the root of mandragoras, it becomes ſo ſoft and tractable, that any one may manage it as he pleaſes.

In the hiſtory of the French Academy, for the years 1742, and 1743, there is an account that M. Geoffroy produced before the academy, a ſmall *ivory* ſpoon, which, by lying long in muſtard, was become flexible and tranſparent like horn; that M. Fouchy ſaw an *ivory* ſpoon, which, by lying for a conſiderable time in milk, was become ſupple like leather; and that M. Hunauld produced bones which had been ſoftened by ſteeping in vinegar, afterwards hardened to their natural ſtate, by ſteeping in water; and ſoftened a ſecond time by vinegar. Dr. Lewis has obſerved, that the nitrous and marine acids diluted, and the acetous acid, make bones flexible and tough like leather; but that the diluted vitriolic acid, though it ſoftens them to a conſiderable degree, makes them at the ſame time brittle: nor has he found, that the ſoftened bones, whatever acid they were ſoftened by, recovered their hardneſs by ſteeping in water. Slips of ſoftened *ivory*, after lying above a month in water, continued nearly as ſoft as when they were taken out of the acid liquor. *Ivory* may be ſoftened and whitened by boiling red ſage leaves in thrice-diſtilled white wine vinegar, with a little quicklime, and putting in the *ivory* while the liquor is boiling hot: *Ivory* may be alſo whitened and cleaned from ſpots, by laying it in quicklime, and pouring a little water on it: the quantity of water ſhould be ſmall, leſt the heat be too great, and the *ivory* ſcale and become brittle.

The *ivory* of the iſle of Ceylon, and that of the iſland of Achem, have this peculiarity, that they never become yellow, as thoſe of the Terra Firma, and Eaſt Indies do; on which account the former are much dearer.

A green dye may be given to ivory, by ſteeping it in aqua fortis, tinged with copper or verdigris, or in two parts of verdigris, and one of ſal ammoniac, ground well together, with ſtrong white wine vinegar poured on them. And by converting the aqua fortis into aqua regia, by diſſolving a fourth part of its weight of ſal ammoniac in it, *ivory* may be ſtained of a fine purple colour.

Ivory, bone, horn, and other ſolid parts of animals, may be ſtained black, in the ſame manner as WOOD. Theſe ſubſtances may be ſtained yellow, by boiling them firſt in a ſolution of one pound of alum, in two quarts of water; and then, having prepared a tincture of the French berries, by boiling half a pound of the berries, pounded, in a gallon of water, putting them into this tincture, after it has boiled about an hour, and letting them remain there half an hour. Turmeric root may be uſed inſtead of the berries; but in this caſe the *ivory*, &c. muſt be dipt in alum water after it is taken out of the tincture. *Ivory*, &c. may be ſtained blue, by firſt ſtaining it green, and then dipping it in a ſolution of pearl-aſhes made ſtrong, and boiling hot: or it may be otherwiſe boiled in the tincture of indigo, prepared by the dyers; and afterwards in a ſolution of tartar, made by diſſolving three ounces of white tartar, or cream of tartar, in a quart of water. For other proceſſes and colours, ſee DYING *of Bone*, &c. *Colouring* and *Staining* of BONE, and TORTOISE *ſhell*.

Ivory may be prepared as a ground for MINIATURE painting, by cleanſing the *ivory* leaves or tables, and rubbing them over with the juice of garlic. This is ſaid to be more eſſential for taking off the greaſineſs, which prevents the colours from fixing on the ground, than ſoap or gall.

Ivory has the ſame medical virtues with hartſhorn; its ſhavings too, like thoſe of hartſhorn, boil into a jelly with water, and has the ſame reſtorative quality. See HARTSHORN.

IVORY *Black*. See *Ivory* BLACK.

IVORY, *Foſſile*. The abundance of elephants teeth found buried in different parts of the world, and many of thoſe parts ſuch as no elephant is ever known to have lived in, have given great amazement to naturaliſts.

The long tuſks, which are what we call *ivory*, are the only teeth the vulgar are acquainted with in this creature, yet even theſe, in their foſſile ſtate, have often been miſtaken for horns, or other animal parts. The grinders of this animal are ſo enormouſly large, and of ſo ſingular a ſhape, that it requires ſome knowledge in natural hiſtory to diſcover them at ſight, and many have miſtaken them when imperfect, for parts of a petrified ſhell-fiſh of the nautilus kind, their root being hollowed all along, and armed with an indented ridge on each ſide, in the manner of the back parts of ſome ſhells of that and of the cornu Ammonis kind.

We are not to wonder that the teeth of elephants are found more frequently than any other bones of the animal, ſince their uſe in the creature required that they ſhould be harder than any other bone, and that hardneſs has preſerved them in places where the other bones have periſhed. The different ſtate in which theſe teeth are found, is wholly owing to the different juices abounding in the earth in the place where they were depoſited, ſome of thoſe juices being of power to preſerve, others to deſtroy them; ſome eating them inſenſibly away, ſome as it were calcining them by ſlow degrees, and others rendering them greatly more hard and durable than before. Mem. Acad. Par. 1727.

Count Marſigli, and ſome other writers, have thought it an eaſy ſolution of the queſtion of the teeth and bones of elephants being found in countries where elephants are not naturally found, that we owe them to the Romans, who bringing them over for their uſe in war, buried them wherever they happened to die. But Sir Hans Sloane expreſſes himſelf very juſtly againſt this opinion: he obſerves, that of the remains of elephants found in Europe, nothing is ſo common as the *ivory* tuſks. Now, as he well obſerves, the Romans held *ivory* in the higheſt eſteem, and it ſold among them at a great price; wherefore had they been the buriers of theſe elephants, they would certainly have taken away the *ivory* tuſks firſt. It is certain, therefore, that accident, and not deſign, hath buried theſe bones, and that accident can have been no other than ſome prodigious inundation. Woodward is deſirous of making the univerſal deluge to have done all this, but that ſeems not neceſſary to be ſuppoſed in every caſe. Sir Hans Sloane gives an enumeration of the moſt curious of theſe pieces of foſſile *ivory*, which his own cabinet contained, and of ſome others of the moſt remarkable, mentioned by authors; from which we may form a very diſtinct idea both of the nature of the bodies themſelves, and of the places where they are uſually met with. See Philoſ. Tranſ. Nº 403. p. 458.

The power of ſubterranean calcinations to render things of this kind brittle, is remarked by the ſame author from Moreton's Hiſtory of Northamptonſhire, in the inſtance of a foſſile tuſk of an elephant which was in the whole at leaſt ſix foot long, and had preſerved its natural whiteneſs, though rendered ſo brittle as to fall into ſeveral pieces in the digging. This was dug up near Little Bowden, in Northamptonſhire; and the ſtrata of the place where it lay, were as follows: 1. Vegetable mould fourteen inches. 2. Loam a foot and half. 3. Large pebbles, with a ſmall mixture of earth among them, two foot and a half. 4. Blue clay; in the upper part of this laſt ſtratum, the tooth was found.

Sir Hans mentions another elephant's tuſk very entire and ſound, found in Siberia. The like are common in Siberia and many parts of Ruſſia, and are ſo little injured, that they are uſed as *ivory*, and are ſuppoſed to be the teeth of a vaſt animal called the *mammouth*, which they think lives under ground. Phil. Tranſ. Nº 468. See farther on this ſubject, ELEPHANT's *Bones*.

JUPATUMA, in *Zoology*, a name by which ſome call a very remarkable American animal, known among us by the name of the opoſſum.

JUPITER, or JOVE, in the *Heathen Mythology*, the ſovereign god of the heathens; the ſon of Saturn and Ops; born in the iſland of Crete, at the ſame birth with Juno: he married Juno, expelled his father out of his kingdom, and divided the kingdom of the world with his brethren. Under ſeveral ſhapes he is ſaid to have played many wanton pranks; ſo that according to poetic fiction, he filled heaven with his natural children.

As mankind are directed by an internal ſpirit or mind, the univerſe alſo is governed by an over-ruling intelligence; which as the cauſe and preſerver of all animal beings, was called Ζευς ὰ Ζωος. See GOD.

The heathens in general believed that there was but one ſupreme God; but when they conſidered this one great being as influencing the affairs of the world, they gave him as many different names; and hence proceeded their variety of nominal gods. When he thundered or lightned, they called him *Jupiter*; when he calmed the ſea, Neptune; when he guided their councils, Minerva; and when he gave them ſtrength in battle, Mars. In proceſs of time they uſed different repreſentations of this *Jupiter*, &c. and conſidered them, vulgarly at leaſt, as ſo many different perſons. They afterward regarded each of them in different views: e. g. The *Jupiter*, that ſhowered down bleſſings, was called the *Kind Jupiter*; and when puniſhing, the *Terrible Jupiter*. There was alſo one *Jupiter* for Europe, and another for Africa; and in Europe, there was one great *Jupiter* who was the particular friend of the Athenians, and another who was the ſpecial protector of the Romans: nay, there was ſcarce a town or hamlet perhaps, in Italy, that had not a *Jupiter* of its own; and the *Jupiter* of Terracina or *Jupiter* Anxur, repreſented in medals as young and beardleſs, with rays round his head, more reſembled Apollo than the great *Jupiter* at the Capitol. In this way *Jupiter* at length had temples and different characters almoſt every where: at Carthage, he was called Ammon; in Egypt, Serapis; at Athens, the great *Jupiter* was the Olympian *Jupiter*; and at Rome, the greateſt *Jupiter*, was the Capitoline *Jupiter*, who was the guardian and benefactor of the Romans, and whom they called the beſt and greateſt *Jupiter*; *Jupiter optimus maximus*. The figure of this *Jupiter* was repreſented in his chief temple on the Capitoline hill, as ſitting on a curule chair, with the fulmen or thunder, or rather lightning in one hand, and a ſcepter in the other. This fulmen in the figures of the old artiſts was always adapted to the character under which they were to repreſent *Jupiter*. If his appearance was to be mild and calm, they gave him the conic fulmen or bundle of flames wreathed cloſe together, held down in his hand: When puniſhing, he holds up the ſame figure, with two tranſverſe darts of lightning, ſometimes with wings added to each ſide of it, to denote its ſwiftneſs: this was called by the poets, the three-forked bolt of Jove: and when he was going to do ſome exemplary execution, they put in his hand a handful of flames, all let looſe in their utmoſt fury; and ſometimes filled both his hands with flames. The ſuperiority of *Jupiter* was principally manifeſted in that air of majeſty which the ancient artiſts endeavoured to expreſs in his countenance: particular attention was paid to the head of hair, the eye-brows and the beard. There are ſeveral heads of the mild *Jupiter* on ancient ſeals; where his face has a mixture of dignity and eaſe in it, admirably deſcribed by Virgil, Æn. i. v. 256. The ſtatues of the Terrible *Jupiter* were generally of black marble, as thoſe of the former were of white: the one ſitting with an air of tranquility; the other ſtanding, more or leſs diſturbed. The face of the one is pacific and ſerene; of the other angry or clouded. On the heads of the one the hair is regular and compoſed; in the other, it is ſo diſcompoſed, that it falls half-way down the forehead. The face of the *Jupiter Tonans* reſembles that of the Terrible *Jupiter*; he is repreſented on gems and medals as holding up the triple bolt in his right hand, and ſtanding in a chariot, which ſeems to be whirled on impetuouſly by four horſes. Thus he is alſo deſcribed by the poets. Ovid Deian. Herc. v. 28. Horace lib. i. od. 34 v. 8. *Jupiter*, as the intelligence preſiding over a ſingle planet, is repreſented only in a chariot and pair: on all other occaſions, if repreſented in a chariot, he is always drawn by four horſes. *Jupiter* is well known as the chief ruler of the air, whoſe particular province was to direct the rains, the thunders, and the lightnings. As the diſpenſer of rain, he was called *Jupiter Pluvius*; under which character he is exhibited ſeated in the clouds, holding up his right hand, or extending his arms almoſt in a ſtrait line each way, and pouring a ſtream of hail and rain from his right hand on the earth; whilſt the fulmen is held down in his left. The wings that are given to him relate to his character of preſiding over the air: his hair and beard in the Antonine pillar are all ſpread down by the rain, which deſcends in a ſheet from him, and falls for the refreſhment of the Romans; whilſt their enemies are repreſented, as ſtruck with the lightnings and lying dead at their feet. Spence's Polymetis, p. 46, 182, and 210, &c.

JUPITER's *beard*, *barba Jovis*, the name given to a ſpecies of *anthyllis*. See LADY's *Finger*.

American JUPITER's *beard*, is a ſpecies of AMORPHA.

JUPITER's *Diſtaff*, is a ſpecies of *ſalvia* or SAGE.

JUPITER *Fulminans* and *Fulgurator*. See FULMINANT.

JUPITER, *Flamen of*. See FLAMEN and DIALIS.

JUPITER, ♃, in *Aſtronomy*, one of the ſuperior planets, remarkable for its brightneſs; and which, by its proper motion, ſeems to revolve round the earth in about twelve years. See PLANET.

Jupiter is ſituate between Saturn and Mars: it has a rotation round its own axis in 9 hours 56 minutes; and a periodical revolution round the ſun in 4332 days, 12 hours, 20′ 9″.

Jupiter is the biggeſt of all the planets: its diameter to that of the ſun appears, by aſtronomical obſervations, to be as 1056 is to 10000; to that of Saturn, as 1056 to 876; to that of the earth, as 1056 to 89. For the comparative gravities at the ſurface, denſities, quantities of matter, &c. of the Sun, *Jupiter*, Saturn, and the Earth: See PLANETS. For the apparent diameter, See DIAMETER.

The mean diſtance of *Jupiter* from the ſun, is 5201 of thoſe parts whereof the mean diſtance of the earth from the ſun is 1000, though Kepler only makes it 5196 of thoſe parts. See DISTANCE.

M. Caſſini calculates *Jupiter*'s mean diſtance from the earth to be 115,000 ſemidiameters of the earth.—Gregory computes the diſtance of *Jupiter* from the ſun to be above five times as great as that of the earth from the ſun; whence he gathers, that the diameter of the ſun, to an eye placed in *Jupiter*, would not be a fifth part of what it appears to us; and, therefore, his diſk would be twenty-five times leſs, and his light and heat in the ſame proportion. In reality, the ſun appears but $\frac{1}{25}$th ſo big to *Jupiter* as to us, and his light and heat are in the ſame ſmall proportion, but compenſated by the quick returns thereof, and by four moons revolving round him. The true diſtance by the lateſt obſervations is 494,990,976 miles. See PLANETS.

The inclination of *Jupiter*'s orbit, that is, the angle, formed by the plane of its orbit, with the plane of the ecliptic, is 1 deg. 20 min. The place of his aphelion ♎, 9° 10′ and the place of his aſcending node ♋ 7° 29′. For the excentricity of *Jupiter*'s orbit, ſee EXCENTRICITY.

Jupiter is one of the ſuperior planets, that is, of the three which are above the ſun: hence it has no parallax, its diſtance from the earth being too great to have any ſenſible proportion to the diameter of the earth. See PARALLAX.

Though it be the greateſt of the planets, yet its revolution about its axis is the ſwifteſt. Its polar axis is obſerved to be ſhorter than its equatorial diameter; and Sir Iſaac Newton determines the difference to be as 8 to 9. So that its figure is a ſpheroid; and the ſwiftneſs of its rotation occaſions this ſpheroidiſm to be more ſenſible than that of any other of the planets.

Jupiter appears almoſt as large as Venus; but he is not altogether ſo bright: he is eclipſed by the moon, by the ſun, and even by Mars.—Hevelius is ſaid to have once obſerved *Jupiter*'s diameter ſeven inches, having inequalities like the moon.

Jupiter has three appendages, called *zones*, or *belts*, which Sir Iſaac Newton thinks are formed in his atmoſphere.—In theſe are ſeveral *maculæ*, or ſpots; from whoſe motion, the motion of *Jupiter* round its axis is ſaid to have been firſt determined: the diſcovery of which is controverted between Euſtachio, P. Gotignies, Caſſini, and Campani.

The four little ſtars, or moons, which move round *Jupiter*, were firſt diſcovered by Galileo, who called them the *aſtra Medicæa*; but we call them the *ſatellites* of *Jupiter*. For the periods, diſtances, &c. of theſe ſatellites, ſee SATELLITES.

Theſe four moons muſt make an extremely pleaſing ſpectacle to the inhabitants of *Jupiter*; for ſometimes they riſe altogether; ſometimes they are all together in the meridian, ranged one under another; and ſometimes all appear in the horizon. Add, that they frequently undergo ECLIPSES; the obſervations whereof are found of eſpecial uſe in determining the longitude. Caſſini has made tables for calculating the immerſions, and emerſions, of *Jupiter*'s firſt ſatellite. See LONGITUDE.

Comparative Aſtronomy of JUPITER.—The day and night are of the ſame length in *Jupiter* all over his ſurface; *viz.* five hours each; the axis of his diurnal rotation being nearly at right angles to the plane of his annual orbit. And this is a great advantage and wiſely ordered by the Author of nature. For if the axis of this planet were inclined by any conſiderable number of degrees, juſt ſo many degrees round each pole would in their turn be almoſt ſix of our years in darkneſs. And, as each degree of a great circle on *Jupiter* contains ſeven hundred and ſix of our miles at a mean rate, it is eaſy to judge what vaſt tracts of land would be rendered uninhabited by any conſiderable inclination of his axis. Though there be four primary planets below *Jupiter*, yet an eye placed on his ſurface would never perceive any of them; unleſs, perhaps, as ſpots paſſing over the ſun's diſk, when they happen to come between the eye and the ſun.—The parallax of the ſun, viewed from *Jupiter*, will ſcarce be ſenſible, no more than than that of Saturn, neither being much above 20 ſeconds; ſo that the ſun's apparent diameter in *Jupiter* will not be above ſix minutes. The outermoſt of *Jupiter*'s ſatellites will appear almoſt as big as the moon does to us; *viz.* five times the diameter, and 25 times the diſk of the ſun.—Dr. Gregory adds, that an aſtronomer in *Jupiter* would eaſily diſtinguiſh two kinds of planets, four nearer him; *viz.* the *ſatellites*; and two, *viz.* the *ſun*, and *Saturn*; more remote. The former, however, will fall vaſtly ſhort of the ſun in brightneſs, notwithſtanding the great diſproportion in the diſtances and apparent magnitude. From theſe four different moons the inhabitants of *Jupiter* will have four different kinds of months; and the numbers of moons in their year will not be leſs than 4500. Theſe moons are eclipſed as often as, being in oppoſition to the ſun, they fall within the ſhadow of *Jupiter*; and again, as oft as, being in conjunction with the ſun, they project their ſhadows to *Jupiter*, they make an eclipſe of the ſun to an eye placed in that part of *Jupiter* where the ſhadow falls. But in regard the orbits of theſe ſatellites, are in a plane which is inclined to, or makes an angle with *Jupiter*'s orbit, their eclipſes become central, when the ſun is in one of the nodes of theſe ſatellites; and when out of this poſition, the eclipſes may be total, though not central, becauſe the breadth of *Jupiter*'s ſhadow is nearly decuple to that of the breadth of any of the ſatellites; and the apparent diameter of any of theſe moons is nearly quintuple the apparent diameter of the ſun. It is owing to this remarkable inequality of diameters, and the ſmall inclination the plane of the orbits of the ſatellites has to the plane of *Jupiter*'s orbit, that in each revolution there happen eclipſes both of the ſatellites, and of the ſun; though the ſun be at a conſiderable diſtance from the nodes Farther, the inferior among theſe ſatellites, even when the ſun is at its greateſt diſtance from the nodes, will occaſionally eclipſe and be eclipſed by the ſun to an inhabitant of *Jupiter*; though the remoteſt of them, in this caſe, eſcapes falling into *Jupiter*'s ſhadow, and *Jupiter* into his, for two years together. To this it may be added, that one of theſe ſatellites ſometimes eclipſes another; where the phaſis muſt be different, nay frequently oppoſite to that of the ſatellite falling into the ſhadow of *Jupiter* juſt mentioned; for in this the eaſtern limb immerges firſt, and the weſtern emerges laſt; but in the others it is juſt the reverſe.

The ſhadow of *Jupiter*, though it reaches far beyond its ſatellites, yet falls much ſhort of any other planet; nor could any other planet, Saturn alone excepted, be immerged in it, even though it were infinite. Indeed, *Jupiter*'s ſhadow could not reach Saturn, unleſs *Jupiter*'s diameter were half that of the ſun; whereas, in effect, it is not one ninth of it.

The courſes of *Jupiter*'s ſatellites, and their various eclipſes, would render navigation very ſure and eaſy on the globe of *Jupiter* Even we, at this diſtance, can make very good uſe of them; thoſe eclipſes being found one of our beſt means for determining the LONGITUDE at ſea.

JUPITER, among *Alchemiſts*, ſignifies the philoſophers gold. The gentlemen of this profeſſion apply every thing to their art, which the mythologiſts mention of the god *Jupiter*, pretending that the ancient fables are to be underſtood in a figurative ſenſe: for inſtance, *Jupiter* is the maſter of the gods; and gold, ſay they, is the moſt precious of metals. Mercury is the ambaſſador of *Jupiter*; and this ſhews with how much eaſe Mercury inſinuates into every thing. *Jupiter* holds the thunderbolt as his ſceptre; which evidently points out the external ſulphur uſed in projection. *Jupiter* has the heavens for his ordinary habitation; this ſhews him volatile, dry, and hot. The debauches of *Jupiter*, who ſought for pleaſure in the low, but prolific and fruitful earth, diſcover, ſay they, its fecundity, and that gold might be made, were but the way of preparing it diſcovered. In a word, *Jupiter* is the ſon of Saturn, which ſhews ſome reſemblance between the qualities of gold and lead.

JUPITER, in *Chemiſtry*, denotes TIN.

JUPUJUBA, the Braſilian name of a bird of the woodpecker kind, more commonly known by the name JAPU.

JUQUER. This plant is found in Braſil, and is of a poiſonous nature; but if we may credit Piſo, its root is its antidote

JURATAM.—*Aſſiſa cadit in juratum* See ASSISA.

JURATI. See JURATS.

JURATIS, *Non ponendo in*. See NON *ponendo*.

JURATORES, *diſtringas*. See DISTRINGAS.

JURATS, JURATI, magiſtrates in the nature of ALDERMEN, for the government of ſeveral corporations.

Thus we meet with the mayor and *jurats* of Maidſtone, Rye, Winchelſea, &c.—So alſo Jerſey has a bailiff and twelve *jurats*, or ſworn aſſiſtants, to govern the iſland.

JURE.—*De* JURE. See DE *Facto* and POSSESSION.

JURE, *Quo*. See QUO *Jure*.

JURIDICI *dies*. See DIES.

JURIS UTRUM, in *Law*, a writ called the parſon's writ of right, which lies for the parſon of a church, or prebendary, at common law, and for a vicar by ſtat. Ed. III. c. 17. whoſe predeceſſor hath alienated the lands and tenements thereof, by which they may recover lands and tenements belonging to the church, or of which they were diſſeiſed; or which were recovered againſt them by verdict, confeſſion, or default, without praying in aid of the patron and ordinary; or on which any perſon has intruded ſince the predeceſſor's death. But ſince the reſtraining ſtatute of 13 Eliz. c. 10. whereby the alienation of the predeceſſor, or a recovery ſuffered by him of the lands of the church, is declared to be abſolutely void, this remedy is of little uſe, unleſs where the parſon himſelf has been deforced for more than twenty years; for the ſucceſſor, at any competent time after his acceſſion to the benefice may enter, or bring an ejectment.

JURISCONSULTUS, or JURECONSULTUS, ICTUS, among the Romans, was a perſon learned in the law; a maſter of the Roman juriſprudence; who was conſulted on the interpretation of the laws, and cuſtoms, and the difficult points in law-ſuits.

The fifteen books of the DIGEST were compiled wholly from the anſwers, or reports, of the ancient *juriſconſulti*. Tribonianus, in deſtroying the two thouſand volumes from whence the CODE and DIGEST were taken, has deprived the public of many things, which would have given them light into the office of the ancient *juriſconſulti*.

We ſhould ſcarce have known any thing beyond their bare names, had not Pomponius, who lived in the ſecond century, taken care to preſerve ſome circumſtances of their office.

The Roman *juriſconſulti* ſeem to have been the ſame with our chamber-counſellers, who arrived at the honour of being conſulted, through age and experience, but never pleaded at the bar. Their pleading advocates or lawyers, never became *juriſconſulti*.

In the times of the commonwealth, the *advocati* had by much the more honourable employment, as being in the ready way to attain to the higheſt preferments. They then deſpiſed the *juriſconſulti*, calling them in deriſion *formularii* and *leguleii*, as having invented certain forms, and monoſyllables, in order to give their anſwers the greater appearance of gravity and myſtery. But in proceſs of time they became ſo much eſteemed, that they were called *prudentes* and *ſapientes*, and the emperors appointed the judges to follow their advice. Auguſtus at length advanced them to be public officers of the empire; ſo that they were no longer confined to the petty counſels of private perſons.

Bern. Rutilius has written the lives of the moſt famous *juriſconſulti*, who have lived within theſe two thouſand years.

JURISDICTION, a power, or authority, which a man has to do juſtice in caſes of complaint made before him. There are two kinds of *juriſdiction*, the one *eccleſiaſtical* the other *ſecular*.

JURISDICTION, *Secular*, belongs to the king, and his juſtices, or delegates.

The courts and judges at Weſtminſter have *juriſdiction* all over England, and are not reſtrained to any county or place; but all other courts are confined to their particular *juriſdictions*, which if they exceed, whatever they do is erroneous. There are three ſorts of inferior *juriſdictions*; the firſt is *tenere placita*, to hold pleas and the plaintiff may ſue either there or in the king's courts. Another is the conuſance of pleas, where a right is inveſted in the lord of the franchiſe to hold pleas: and he is the only perſon that can take advantage of it, by claiming his franchiſe. The third ſort is an exempt *juriſdiction*, as where the king grants to ſome city, that the inhabitants ſhall be ſued within their city and not elſewhere; though there is no *juriſdiction* that can withſtand a *certiorari* to the ſuperior courts. See JUSTICE, and COURT.

Eccleſiaſtical JURISDICTION belongs to biſhops and their deputies See BISHOP, and OFFICIAL.

Biſhops, &c have two kinds of *juriſdiction*; the one *internal*, which is exerciſed over the conſcience in things purely ſpiritual; and this they are ſuppoſed to hold immediately of God.

The other is *contentious*, which is a privilege ſome princes have given them in terminating diſputes between eccleſiaſtics, and laymen. See CONTENTIOUS.

JURISPRUDENCE, the ſcience of what is juſt and unjuſt, or of the laws, rights, cuſtoms, ſtatutes, &c. neceſſary for the doing of juſtice.

Civil juriſprudence is that of the Roman law; *canonical*, that of the canon law; and *feudal*, that of fees.

JUROR, JURATOR, in a *Legal Senſe*, is one of thoſe twenty-four, or twelve men, who are ſworn to deliver truth upon ſuch evidence as ſhall be given them touching any matter in queſtion.

The puniſhment of petty jurors attainted of giving a verdict contrary to evidence, willingly, is very ſevere. See ATTAINT.

JURORS, *Challenge to the*. See CHALLENGE.

JURUCUA, in *Zoology*, the Braſilian name of a ſpecies of tortoiſe. This has feet almoſt in the ſhape of wings, the fore ones about ſix inches long, the hinder ones conſiderably ſhorter; its tail is ſhort, and of a conic figure; its eyes large and black; its mouth has no teeth, but reſembles the beak of a bird. It frequently grows to four foot long, and about three in width; its ribs are faſtened to the ſhell, and are eight on each ſide; the middle ones of theſe are the longeſt, the fore and hinder ones being the ſhorter. The fleſh and eggs of this ſpecies are very delicately taſted; they lay their eggs in holes on the ſea-ſhore, covering them over with ſand, and leaving them for the ſun to hatch them. There are uſually a great many very odd figures, like geometrical lines, running in various directions on the ſhell; the whole ground of the ſhell is uſually black and very gloſſy, adorned with yellow variegations; but this is no certain character of the ſpecies, the varieties in the colouring of theſe ſhells being very great.

JURUNCAPEBA, in *Ichthyology*, the name of a ſea-fiſh, of the turdus or wraſſe kind, caught about the ſhores of the Braſils, and called alſo *itaiara*. It is uſually about five or ſix inches long, and about a third part of its length in breadth; its mouth is extremely large and wide, and of a ſomewhat triangular figure.

It is caught among the rocks, and is a very delicate fiſh for the table.

JURURA, in *Zoology*, the name of a ſpecies of tortoiſe, common in the Braſils. It is a ſmall kind, ſeldom exceeding ten fingers in breadth, and eight or nine in length, and is of an elliptic figure; its under ſhell is about nine fingers long, and four and a half broad, and is flat; it can at pleaſure hide its whole body in the ſhell, or thruſt out its neck to three fingers breadth diſtance; the head is thick and long, the noſe elevated and pointed; the mouth is large, and the eyes black; it has four long claws on its feet; its tail is ſhort and pointed; and its ſkin is rough and ſcaly. The upper ſhell is brown, the lower yellow; its eggs are white and round, and about half the ſize of a hen's egg, and are very well taſted.

JURY, in *Common Law*, ſignifies twenty-four, or twelve men, ſworn to inquire of a matter of fact, and declare the truth, upon ſuch evidence as ſhall be delivered them touching the matter in queſtion.

The mode of trial by *jury* is very ancient, and ſeems to have been coeval with the civil government of this nation. Traces of *juries* may be found in the laws of all thoſe nations, which adopted the feudal ſyſtem, as in Germany, France, and Italy; and in England we find actual mention of them ſo early as the laws of king Ethelred, and even then not as a new invention. The eſtabliſhment and uſe of this mode of trial in our iſland, though for a time greatly impaired and ſhaken by the introduction of the Norman trial by battle, were ſo highly eſteemed and valued by the people, that no conqueſt, no change of government, could ever prevail to aboliſh it. See Judicium *parium*.

Trials by *jury* in civil cauſes are of two kinds; extraordinary and ordinary. The firſt ſpecies of extraordinary trial by *jury* is that of the grand aſſize. See Assizes.

Another ſpecies of extraordinary *juries*, is the *jury* to try an ATTAINT. With regard to the ordinary trial by *jury* in civil caſes, when an iſſue is joined, the court awards a writ of VENIRE *facias*, which is accordingly iſſued to the ſheriff. Thus the cauſe ſtands for a trial at the bar of the court itſelf, provided it be of conſequence; but all trifling ſuits are ended in the court baron, hundred, or county courts. However, when the uſage began to bring actions of any trifling value in the courts of Weſtminſter-hall, it was found very inconvenient to compel the parties, witneſſes, and jurors, to come from the remoteſt parts of the country to try a trivial action at Weſtminſter; and, therefore, the legiſlature referred matters in iſſue to the JUSTICES *of aſſiſe*. Accordingly it was enacted by 13 Edw. I. cap. 30. that a clauſe of NISI *prius* ſhould be inſerted in all the writs of *venire facias*, by virtue of which the ſheriff returned his jurors to the court of the juſtices of aſſiſe, which was ſure to be held in the vacation before Eaſter and Michaelmas terms, and there the trial was held. But this method was inconvenient, and, therefore, was altered by 42 Edw. III. cap. 11. which ſtatute enacted, that no inqueſt, except of aſſiſe and goal delivery, ſhould be taken by writ of *niſi prius*, till after the ſheriff had returned the names of the jurors to the courts above. It is now the courſe to make the ſheriff's *venire* returnable on the laſt return of the ſame term, wherein iſſue is joined, viz. Hilary or Trinity terms, which are called iſſuable terms; and he returns the name of the jurors in a panel, i. e. little pane, or oblong piece of parchment, annexed to the writ. This *jury* is not ſummoned, and, therefore, not appearing at the day, muſt unavoidably make default: for which reaſon a compulſive proceſs is now awarded againſt the jurors, called in the common pleas a writ of *habeas corpora juratorum*, and in the king's bench a DISTRINGAS. The entry, therefore, on the roll or record is, that the *jury* is reſpited, through defect of the jurors, till the firſt day of the next term, then to appear at Weſtminſter; unleſs before that time, viz. on Wedneſday the fourth of March, the juſtices of our lord the king appointed to take aſſizes in that county ſhall have come to the place aſſigned for holding the aſſiſes, &c. And as the judges are ſure to come and open the circuit commiſſions on the day mentioned in the writ, the ſheriff returns and ſummons this *jury* to appear at the aſſiſes, and there the trial is had before the juſtices of aſſize and *niſi prius*; among whom are uſually two of the judges of the courts at Weſtminſter, the whole kingdom being divided into ſix CIRCUITS for this purpoſe. If the SHERIFF be not an indifferent perſon, or if he be a party in the ſuit, or be related either by blood or affinity to either of the parties, the *venire* ſhall be directed, not to him, but to the CORONERS; and if any exception lies againſt them, to two clerks of the court, or to two perſons named by the court and ſworn, and called *eliſors*, or electors, who ſhall indifferently name the *jury*, and their return is final. In order farther to remove all ſuſpicion of partiality, it is provided by the ſtatutes 4 Edw. III. cap. 2. 8 Ric. II. cap. 2. and 33 Hen. VIII. cap. 24. that no judge of aſſiſe ſhould hold pleas in any county where he was born or inhabits.

When the general day of trials is fixed, the plaintiff, or his attorney, muſt bring down the record to the aſſizes, and enter it with the proper officer, in order to its being called in courſe. If it be not ſo entered, it cannot be tried; therefore it is in the plaintiff's intereſt to delay any trial by not carrying down the record, unleſs the defendant undertakes to bring on the trial by giving proper notice to the plaintiff. This proceeding is called the trial by PROVISO. However, this practice begins to be diſuſed, ſince the ſtatute 14 Geo. II. cap. 17. which enacts, that if, after iſſue joined, the cauſe is not carried down to be tried according to the courſe of the court, the plaintiff ſhall be eſteemed to be non-ſuited, and judgment ſhall be given as in a caſe of NON-*ſuit*. In caſe the plaintiff intends to try the cauſe, he is bound to give the defendant (if he lives within forty miles of London) eight days notice of trial; and if he lives at a greater diſtance, fourteen days notice; and if he changes his mind, and does not countermand the notice ſix days before the trial, he ſhall be liable to pay coſts to the defendant for not proceeding to trial, by the laſt mentioned ſtatute. The defendant, however, or plaintiff, may, upon good cauſe ſhewn to the court above, as upon abſence or ſickneſs of a material witneſs, obtain leave upon motion to defer the trial of the cauſe till the next aſſiſes. But when the cauſe is called on regularly in court, the record is conveyed to the judge, while the *jury* is called and ſworn. To this end the ſheriff returns his compulſive proceſs, the writ of *habeas corpora*, or *diſtringas*, with the panel of jurors annexed, to the judge's officer in court. The jurors contained in the panel are either ſpecial or common jurors. See *Special* Jury.

A common *jury* is one returned by the ſheriff, according to the directions of the ſtatute 3 Geo. II. cap. 25. which appoints, that the ſheriff ſhall not return a ſeparate panel for every ſeparate cauſe, as formerly; but one and the ſame panel for every cauſe to be tried at the ſame aſſizes, containing not leſs than forty-eight, nor more than ſeventy-two jurors; and that their names, being written on tickets, ſhall be put into a box or glaſs; and when each cauſe is called, twelve of theſe perſons, whoſe names ſhall be firſt drawn out of the box, ſhall be ſworn upon the *jury*, unleſs abſent, challenged, or excuſed; and unleſs a previous view of the lands or tenements, or other matters in queſtion, ſhall have been thought neceſſary by the court; in which caſe ſix or more of the jurors returned, to be agreed on by the parties, or named by a judge, or other proper officer of the court, ſhall be appointed to take ſuch a view; and then ſuch of the *jury* as have appeared upon the view, ſhall be ſworn on the inqueſt, previous to any other jurors.

Liſts of jurors qualified according to the acts 4 & 5 W. & M. cap. 24. 7 & 8 W. III. cap. 32. and 3 & 4 Ann. cap. 18 are now to be made from the rates of each pariſh. The juſtices at Midſummer ſeſſions are to iſſue warrants to the high conſtables, who require the petty conſtables to prepare ſuch liſts; and if the high conſtables neglect to iſſue their precepts for this purpoſe, they ſhall forfeit 10*l*. Theſe liſts are to be fixed on the doors of churches, &c. twenty days before Michaelmas, that public notice may be given of perſons omitted who are qualified, and of perſons inſerted, who ought to be omitted. 3 Geo. II. cap 25. And if any perſons are inſerted wrongfully, or omitted for the ſake of reward, &c. the petty conſtable incurs a forfeiture of 20*s*. The liſts ſhall be delivered by the petty conſtables, at Michaelmas ſeſſions, in open court; or when they are ſubſcribed by them, and atteſted on oath, and alſo ſigned by the juſtice, they ſhall be delivered by the petty conſtables to the high conſtables, who ſhall deliver them, upon oath, in open court. The conſtable failing to make ſuch return, ſhall forfeit 5*l*. Perſons not qualified may be diſcharged by the juſtices at the ſeſſions. Theſe liſts ſhall be then fairly entered in a book by the clerk of the peace, on forfeiture of 20*l*. and duplicates of them ſhall, during the ſeſſions, or within ten days after, be delivered by him to the ſheriff, who ſhall cauſe the names, with their additions, &c. to be entered in a book of his own; and if the ſheriff ſhall return any perſon whoſe name is not in the duplicates, he is liable to a fine not exceeding 10*l*. nor leſs than 40*s*. 3 Geo. II. cap. 25. Every ſummons of jurors ſhall be made by the ſheriff, his officer, or lawful deputy, ſix days before the ſeſſions at leaſt, in Wales eight days before, and in the counties palatine fourteen days before; and the penalty of neglect, or of excuſing any perſon for favour or reward, is 20*l*. by 7 & 8 W. cap. 32. or a fine of 10*l*. or under, impoſed by the judge of aſſiſe. 3 Geo. II. cap. 25. No perſon ſhall be ſummoned, who has ſerved within one year before in the county of Rutland, or two years before in any other county, not being a county of a city or town, and except the counties of York and Middleſex, under a fine not exceeding 5*l*. Every perſon who has ſerved, ſhall have a certificate gratis, teſtifying his attendance. 3 Geo. II. cap. 25. In the county of York, jurors ſhall not be returned above once in four years; and the ſheriff neglecting his duty ſhall forfeit 100*l*. and for not diſcharging a juror, who has ſerved within four years, and giving notice to the party ſummoned ſix days before the aſſiſes or ſeſſion, ſhall forfeit 20*l.* to the party, with full coſts. 7 & 8 W. cap. 32. 3 & 4 Ann. cap. 18. & 10 Ann. cap. 14. In the county of Middleſex, no perſon ſhall be returnable to ſerve as a juror, at any ſeſſions of *niſi prius*, who hath been returned in the two terms or vacations next before, on pain of the ſheriff being fined by the judge 5*l.* or under. 4 Geo. II. cap. 7. And by 7 & 8 W. cap. 32. the inhabitants of the city and liberty of Weſtminſter ſhall be exempted from ſerving on any *jury* at the ſeſſions for Middleſex, by reaſon of their attendance at the courts of Weſtminſter. By the common law, jurors returned, and not appearing, ſhall loſe and forfeit the iſſues returned upon them. And if a juryman be called, and, being preſent, refuſe to appear; or having appeared, withdraw before he be ſworn, the court may fine him at their diſcretion. 35 Hen. VIII. cap 6. And by 29 Geo. II. cap. 19. a juror not appearing and ſerving in any court of record within the city of London, or in any other city or town corporate, liberty, or franchiſe, after being openly called three times, &c. ſhall, without reaſonable excuſe, be fined not more than 40*s.* nor leſs than 20*s.* And by 3 Geo. II. cap. 25. in cauſes of *niſi prius*, every perſon whoſe name ſhall be drawn, and who ſhall not appear, without reaſonable excuſe, ſhall forfeit, not exceeding 5*l.* nor leſs than 40*s.* If a juror take a bribe of either party, he ſhall forfeit ten times as much as he hath taken. 5 Ed. III. cap. 10. 34 Ed. III. cap. 8. 38 Ed. III. ſtat. 1. cap. 12. If a man aſſault or threaten a juror for giving a verdict againſt him, he is puniſhable by fine and impriſonment; and if he ſtrike him in the court, in the preſence of the judge of aſſize, he ſhall loſe his hand and his goods, and profits of his lands during life, and ſuffer perpetual impriſonment.

The *jury* is to be choſen of the ſame claſs or rank with the parties; and by the policy of the ancient law, the *jury* was to come *de vicineto*, from the neighbourhood of the villa or place where the cauſe of action was laid in the declaration, and for want of this the array might be challenged for defect of hundreders. However, this practice was entirely aboliſhed by 4 & 5 Ann. cap. 16. upon all civil actions, except upon penal ſtatutes; and upon thoſe alſo by the 24 Geo. II. cap. 18. the *jury* being now only to come, *de corpore comitatus*, from the body of the county at large, and not *de vicineto*, or from the particular neighbourhood. It is alſo enacted by 28 Edw. III. cap. 18. that where either party is an alien born, the *jury* ſhall be one half aliens, and the other denizens, if required, for the more impartial trial. But where both parties are aliens, the whole *jury* are directed to be denizens, by 21 Hen. VI. cap. 4. For other grounds of challenge and qualification of jurors, ſee CHALLENGE. Jurors in London and Weſtminſter muſt not only be houſekeepers, but have land or goods worth one hundred pounds; and they may be examined on oath as to that point. 3 Geo. II. cap. 25. All cities, boroughs, and corporate towns, are excepted out of the act that ſettles the qualification of jurors for county aſſiſes or ſeſſions; and trials of felons in corporations may be by men worth 40*l.* in goods, though they have no freehold. Jurors in the torn ſhall have 20*s.* a year freehold, or 26*s.* 8*d.* copyhold. Any perſon whatſoever is capable of being put upon the *jury* in a court-leet, and upon the coroner's *jury*. Perſons excuſed from ſerving on *juries* are thoſe that are ſick and decrepit; thoſe not commorant in the county, and men above ſeventy years old, by 13 Edw. I. cap. 38. and by 7 & 8 Will. III. cap. 32. infants under twenty-one. This exemption is alſo extended by divers ſtatutes, cuſtoms, and charters, to phyſicians, and other medical perſons, counſel, attornies, officers of the courts, and the like; all of whom, if impanelled, muſt ſhew their ſpecial exemptions. Diſſenting teachers, qualified under the toleration act, are exempted, and alſo quakers. Clergymen are alſo uſually excuſed; but if they are ſeiſed of lands and tenements, they are ſtrictly liable to be impanelled in reſpect of their lay fees, unleſs they be in the ſervice of the king, or of ſome biſhop. If by means of challenges, or other cauſe, a ſufficient number of unexceptionable jurors doth not appear at the trial, either party may pray a TALES. When the legal number of twelve is obtained, they are then ſeparately ſworn, well and truly to try the iſſue between the parties, and a true verdict to give according to the evidence; and hence they are denominated the *jury, jurata*, and jurors, *ſc. juratores*. Pleadings are then opened to them by counſel on that ſide which holds the affirmative of the queſtion in iſſue: the nature of the caſe, and the evidence intended to be produced, are next laid before them by counſel alſo on the ſame ſide; and when their evidence is gone through, the advocate on the other ſide opens the adverſe caſe, and ſupports it by evidence; and then the party which began is heard by way of reply. See EVIDENCE.

As to ſuch evidence as the *jury* may have in their own conſciences, by their private knowledge of facts, it was an ancient doctrine, that this had as much right to ſway their judgment as the written or parol evidence which is delivered in court; and, therefore, it hath been often held, that though no proofs be produced on either ſide, yet the *jury* might bring in a verdict. But this doctrine was gradually exploded, when ATTAINTS began to be diſuſed, and new trials introduced in their ſtead. And if a juror knows any thing of the matter in iſſue, he may be ſworn as a witneſs, and give his evidence publicly in court. When the evidence on both ſides is gone through, the judge in the preſence of the parties, the counſel, and all others, ſums up the whole to the *jury*; who, unleſs the caſe be very clear, withdraw from the bar to conſider of their verdict; and, in order to avoid intemperance and cauſeleſs delay, they are to be kept without meat, drink, fire, or candle, unleſs by permiſſion of the judge, till they are all unanimouſly agreed. And if they eat or drink, or have any eatables about them, without conſent of the court, and before verdict, it is fineable; and if they do ſo at his charge for whom they afterwards find, it will ſet aſide the verdict. Alſo, if they ſpeak with either of the parties or their agents, after they are gone from the bar, or if they receive any freſh evidence in private, or, if to prevent diſputes, they caſt lots for whom they ſhall find, any of theſe circumſtances will entirely vitiate the verdict. And it has been held, that if the jurors do not agree in their verdict before the judges are about to leave the town, though they are not to be threatened or impriſoned, the judges are not bound to wait for them, but may carry them round the circuit from town to town in a cart. When they are all unanimouſly agreed, the *jury* return back to the bar; and before they deliver their verdict, the plaintiff is bound to appear in court, by himſelf, attorney, or counſel, in order to anſwer the AMERCEMENT, to which by the old law he is liable, in caſe he fails in his ſuit, as a puniſhment for his falſe claim; a form which is ſtill continued, though the amercement is diſuſed; and if the plaintiff does not appear, no verdict can be given, but the plaintiff is ſaid to be NON-*ſuit*. But in caſe the plaintiff appears, the *jury* by their foreman deliver in their VERDICT. When the *jury* have delivered in their verdict, and it is recorded in court, they are then diſcharged. Such is the proceſs of trial by *jury* in civil caſes.

In criminal caſes, it is provided by the equity and lenity of the Engliſh laws, that no man ſhould be called to anſwer for any capital crime, unleſs upon the preparatory accuſation of twelve or more of his fellow-ſubjects, called the *grand jury*. This *jury* conſiders all bills of INDICTMENT againſt criminals preferred to the court, which they either approve or find, by writing upon them BILLA *vera*, or diſallow, by indorſing IGNORAMUS, and generally conſiſts of gentlemen that are freeholders of ſuperior quality to thoſe who form the *petit jury*, who try the priſoners indicted by the other jury, and convict them by verdict.

When a priſoner on his arraignment has pleaded not guilty, and for his trial hath put himſelf upon the country, which country the *jury* are, the ſheriff of the county muſt return a panel of jurors that are freeholders, without juſt exception, and of the *viſne* or neighbourhood, i. e. of the county where the fact is committed. If the proceedings are before the court of king's bench, there is time allowed, between the arraignment and the trial, for a *jury* to be impanelled by a writ of VENIRE *facias* to the ſheriff, as in civil cauſes; and the trial in caſe of a miſdemeanor is had at NISI *prius*, unleſs it be of ſuch conſequence as to merit a trial at bar; which is always invariably had, when the priſoner is tried for any capital offence. But, before commiſſioners of *oyer & terminer*, and gaol delivery, the ſheriff, by virtue of a general precept directed to him beforehand, returns to the court a panel of forty-eight jurors, to try all felons that may be called upon their trial at that ſeſſion; and, therefore, it is uſual to try all felons immediately, or ſoon after their arraignment. But perſons, indicted of ſmaller miſdemeanors, uſually give ſecurity to the court to appear, for trial, at the next aſſiſes or ſeſſion. See INDICTMENT.

When the trial is called on, the jurors are to be ſworn, as they appear, to the number of twelve, unleſs they are challenged by the party. See CHALLENGE, & *ſupra*. TALES may be awarded as in civil cauſes, till the number of twelve is ſworn, "well and truly to try, and true de-
"liverance make, between our ſovereign lord the king,
"and the priſoner whom they have in charge; and a
"true verdict to give, according to their evidence."
When the *jury* is ſworn, if it be a cauſe of any conſequence, the indictment is uſually opened, and the evi-

dence ſtated by the counſel for the crown or proſecution. But it is a ſettled rule at common law (inconſiſtent, indeed, with the humane treatment of priſoners by the Engliſh law, but palliated by the declaration of law, that the judge ſhall be counſel for the priſoner, i. e. ſhall ſee that the proceedings againſt him are legal and ſtrictly regular) that no counſel ſhall be allowed a priſoner upon his trial, upon the general iſſue in any capital crime, unleſs ſome point of law ſhall ariſe proper to be debated. However, the judges ſeldom ſcruple to allow a priſoner counſel to ſtand by him at the bar, and inſtruct him what queſtions to aſk, or even to aſk queſtions for him, with reſpect to matters of fact; for as to matters of law, ariſing on the trial, they are entitled to the aſſiſtance of counſel. When the EVIDENCE on both ſides is cloſed, the *jury* cannot be diſcharged till they have given in their verdict; but are to conſider of it and deliver it in, with the ſame forms, as upon civil cauſes; only that they cannot, in a criminal caſe, give a *privy* VERDICT. But an open verdict may be either general, guilty or not guilty; or ſpecial, ſetting forth all the circumſtances of the caſe, and praying the judgment of the court, whether, for inſtance, on the facts ſtated, it be murder, manſlaughter, or no crime at all. If the *jury* find the priſoner not guilty, he is then for ever diſcharged of the accuſation, except he be appealed of felony within the time limited by law. But if they find him guilty, he is ſaid to be convicted of the crime whereof he ſtands indicted. On a conviction for any felony, in general, the reaſonable expences of proſecution are by ſtat. 25 Geo. II. cap. 36. to be allowed to the proſecutor out of the county ſtock, if he petitions the judge for that purpoſe; and by 27 Geo. II. cap. 3. poor perſons bound over to give evidence, are likewiſe entitled to be paid their charges, as well without conviction as with it. Moreover, on a conviction of larceny in particular, the proſecutor ſhall have reſtitution of his goods, by 21 Hen. VIII. cap. 11. which enacts, that if any perſon be convicted of larceny by the evidence of the party robbed, he ſhall have full reſtitution of his money, goods, and chattels; or the value of them out of the offenders goods, if he has any, by a writ to be granted by the juſtices; and this writ ſhall reach the ſtolen goods, though the property of them is transferred to another by ſale in open market. Without ſuch writ of reſtitution, the party may peaceably retake his goods whereſoever he finds them. And if the felon be convicted and pardoned, or allowed his clergy, the party robbed may bring his action of trover againſt him for his goods, and receive a ſatisfaction in damages. Such are the proceedings and conſequences of a trial by *jury* in criminal caſes. See Blackſt. Comm. book iii. p. 349, &c. book iv. p. 342, &c.

JURY, *ſpecial*. Where it is conceived, that an indifferent impartial *jury* will not be returned between party and party by the ſheriff, the court upon motion will order the ſheriff to attend the ſecondary of the king's bench, with his book of freeholders of the county; and the ſecondary, in the preſence of the attornies on both ſides, is to ſtrike a *jury*. And when a cauſe of conſequence is to be tried at the bar, the court of king's bench, on motion and affidavit made, will make a rule for the ſecondary to name forty-eight freeholders; and each party is to ſtrike out twelve, one at a time, the plaintiff or his attorney beginning firſt; and from the remainder the *jury* for the trial are to be drawn. This is called a *ſpecial jury*.

By the ſtat. 3 Geo. II. cap. 25. either party is entitled upon motion to have a *ſpecial jury* ſtruck upon the trial of any iſſue, as well at the aſſizes as at bar; he paying the extraordinary expence, unleſs the judge's writ certify, in purſuance of the ſtat. 24 Geo. II. cap. 18. that the cauſe required ſuch *ſpecial jury*. And no perſon ſerving on a *ſpecial jury* ſhall be allowed more than the ſum which the judge ſhall think reaſonable, not exceeding one guinea, except in caſes where a view is directed. When any *ſpecial jury* ſhall be ordered by rule of the court at Weſtminſter, in any cauſe ariſing in any city, &c. the *jury* is to be taken out of liſts, or books of perſons qualified, which ſhall be produced by the ſheriffs, &c. before the proper officer. The ſame indulgence is granted both to merchants and foreigners; for where two merchants are plaintiff and defendant, a *jury* of merchants may be returned to try the iſſue between them; and if either of the parties in the ſuit be an alien, the *jury*, at the deſire of the party, is to be compoſed of half foreigners and half Engliſh.

JURIES, *clerk of the*. See CLERK.

JURY *of matrons*. See MATRONS.

JURY-MAST, an appellation given by the ſeamen to a temporary or occaſional maſt, patched up of yards, or other pieces of timber, and ſet up in the room of a true maſt, which has been loſt in a fight, or by a ſtorm.

JUS, and **JURA**. See LAW, RIGHT, &c.

JUS *accreſcendi*, in *Law*, is the right of ſurvivorſhip between joint-tenants.

JUS *ad rem*, is an inchoate and imperfect right, ſuch as a parſon promoted to a living acquires by nomination and inſtitution; in contradiſtinction to the *jus in re*, orc omplete and full right, by corporal poſſeſſion.

JUS *Anglorum*, denotes the laws and cuſtoms of the Weſt Saxons, in the time of the heptarchy, by which the people were for a long time governed, and which were preferred before all others.

JUS *coronæ*, *rights of the crown*, is part of the law of England, which differs in many things from the general law concerning the ſubject. Coke on Litt.

The king may purchaſe lands to him and his heirs, but he is ſeiſed thereof, *in jure coronæ*; and all the lands and poſſeſſions, whereof the king is thus ſeiſed, ſhall follow the crown in deſcents, &c. See PREROGATIVE.

JUS *curialitatis Angliæ*. See COURTESY.

JUS *duplicatum*. See RIGHT.

JUS *fiduciarium*, in the *Roman Law*, a right in truſt, for which there was a remedy in conſcience.

JUS *gentium*, is the law by which kingdoms, and ſociety in general, are governed.

JUS *gladii* is mentioned in our Latin authors, and the Norman laws, where it ſignifies a ſupreme juriſdiction. Camd. And hence it is, that at the creation of an earl, he is ſaid to be *gladio-ſuccinctus*, to ſignify that he had a juriſdiction over the county of which he was made earl. See PLEAS *of the ſword*.

JUS *legitimum*, in the *Roman Law*, a legal right, which was remedied by the ordinary courſe of law.

JUS *patronatus*, is a commiſſion granted by the biſhop to ſome perſons to enquire who is the rightful patron of a church. If two patrons preſent their clerks, the biſhop ſhall determine who ſhall be admitted by right of patronage, &c on commiſſion of enquiry by ſix clergymen and ſix laymen, living near to the church; who are to enquire on articles as a jury, whether the church is void? who preſented laſt? who is the rightful patron? &c. But if coparceners ſeverally preſent their clerks, the biſhop is not obliged to award a *jus patronatus*, becauſe they preſent under one title; and are not in like caſes, where two patrons preſent under ſeveral titles. The awarding a *jus patronatus* is not of neceſſity, but at the pleaſure of the ordinary, for his better information, who hath the right of patronage: for if he will at his peril take notice of the right, he may admit the clerk of either of the patrons, without a *jus patronatus*.

JUS *precarium*, in the *Roman Law*, a right in courteſy, for which the remedy was only by intreaty or requeſt.

JUS, *quale*. See QUALE *jus*.

JUS *togæ*. See TOGA.

JUSQUIAMUS, in *Botany*, a name uſed by ſome authors for the hyoſcyamus, or henbane.

JUSSIÆA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: it has a ſmall permanent empalement, divided into five parts, ſitting upon the germen; the flower has five roundiſh petals, and ten ſhort, ſlender, ſtamina; the oblong germen becomes a thick, oblong capſule, crowned by the empalement, which opens lengthways, and is filled with ſmall ſeeds. There are five ſpecies.

JUSSIEVIA, in *Botany*, a name given by Houſton to a genus of plants, deſcribed by Linnæus under the name of JATROPHA.

JUST, a ſportive kind of combat on horſeback; man againſt man, armed with lances.

The word is by ſome derived from the French *jouſte*, of the Latin *juxta*, becauſe the combatants fought near one another. Salmaſius derives it from the modern Greek *zouſtra*, or rather τζαϛρα; which is uſed in this ſenſe by Nicephorus Gregoras. Others derive it from *juſta*; which in the corrupt age of the Latin tongue was uſed for this exerciſe, becauſe it was ſuppoſed a more *juſt* and equal combat than the tournament.

Anciently, *juſts* and tournaments made a part of the entertainment at all ſolemn feaſts and rejoicings. The Spaniards borrowed theſe exerciſes from the Moors, and called them *juego de cannas*, *reed*, or *cane-play*. Some take them to be the ſame with the *ludus Trojanus*, anciently practiſed by the youth of Rome.

The Turks uſe them ſtill, and call them *lancing the gerid*.

The difference between *juſts* and tournaments conſiſts in this, that the latter is the genus, of which the former is only a ſpecies: tournaments included all kinds of military ſports and engagements, which were made out of gallantry and diverſions. *Juſts* were thoſe particular combats where the parties were near each other, and engaged with lance and ſword; add, that the tournament was frequently performed by a number of cavaliers, who fought in a body: the *juſt* was a ſingle combat of one man againſt another. Though the *juſts* were uſually made in tournaments, after a general rencounter of all the cavaliers, yet they were ſometimes ſingly, and independent of any tournament.

He who appeared for the firſt time at a *juſt*, forfeited his helm, or caſque, unleſs he had forfeited before at a tournament.

Just *appui.* See Appui.

JUSTICE, *Juſtitia*, a conſtant deſire, or inclination, to give every one his due; or a habit by which the mind is diſpoſed and determined to give every man his own.

Juſtice may be divided into *diſtributive*, *commutative*, and *legal.*

Justice, *diſtributive*, is concerned in matters of government, and of beneficence; and is either remuneratory, or punitive: it obſerves an equality in dealing rewards and puniſhments, according to each man's condition and merit; for as actions are either good or evil, for the good, rewards muſt be aſſigned; and for the evil, puniſhments; and herein a geometrical proportion is obſerved.

Justice, *commutative*, is converſant in matters of commerce, and in the equal commutation, or changing, of things; and proceeds according to arithmetical equality, without any regard to perſons and circumſtances.

Justice, *legal*, is that which reſides in the ſtate, or monarch, by whoſe power and authority the effects of *commutative* and *diſtributive juſtice* are frequently ſuperſeded, or ſuſpended; as in a dearth of corn, if a perſon that has a ſtock by him will not ſell it, it ſhall be taken from him; and the like.

Justice, *hand of.* See Hand.

Justice, *officers of.* See Officers.

Justice, *poetical.* See Poetical.

Justitiam, *temperamentum ad.* See Temperamentum.

Justice, *Juſtitiarius*, is likewiſe an officer appointed by the king, or commonwealth, to do right by way of judgment.

He is called *juſtice*, not *judge*; anciently *juſtitia*, not *juſtitiarius*, becauſe he has his authority by deputation, as delegate to the king, and not *jure magiſtratus*; ſo that he cannot depute any other in his ſtead, the *juſtice* of the foreſt only excepted.

Of theſe *juſtices* we have various kinds in England; viz.

Chief Justice *of the king's bench*, is the capital *juſtice* of Great Britain, and is a lord by his office. His buſineſs is chiefly to hear and determine all pleas of the crown; that is, ſuch as concern offences againſt the crown, dignity, and peace of the king; as treaſons, felonies, &c.

This officer was formerly not only *chief juſtice*, but alſo chief baron for the exchequer, and maſter of the court of wards. He uſually ſat in the king's palace, and there executed that office, formerly performed *per comitem palatii*; he determined in that place all the differences happening between the barons and other great men.

He had the prerogative of being vicegerent of the kingdom, whenever the king went beyond ſea, and was uſually choſen to that office out of the prime nobility; but his power was reduced by king Richard I. and king Edward I. His office is now divided, and his title changed from *capitalis Angliæ juſtitiarius*, to *capitalis juſtitiarius ad placita, coram rege tenenda*, or *capitalis juſtitiarius banci regii.* See Court *of king's bench.*

Chief Justice *of the common pleas*, he who, with his aſſiſtants, hears and determines all cauſes at the common law; that is to ſay, all civil cauſes, between common perſons, as well perſonal as real; and he is alſo a lord by his office.

Justice *of the foreſt*, is a lord by his office, who has power and authority to determine offences committed in the king's foreſts, &c. which are not to be determined by any other court, or *juſtice.*

Of theſe there are two; whereof one has juriſdiction over all the foreſts on this ſide Trent, and the other beyond it.

By many ancient records, it appears to be a place of great honour and authority, and is never beſtowed but on ſome perſon of great diſtinction. The court where this *juſtice* ſits, is called the *juſtice ſeat of the foreſt*, held once every three years, for hearing and determining all treſpaſſes within the foreſt, and all claims of franchiſes, liberties, and privileges, and all pleas and cauſes whatſoever therein ariſing. This court may fine and impriſon for offences within the foreſt, it being a court of record; and therefore a writ of error lies from hence to the court of king's bench. The laſt court of *juſtice ſeat* of any note was that held in the reign of Charles I. before the earl of Holland. After the Reſtoration another was held, for form ſake, before the earl of Oxford; but ſince the Revolution in 1688, the foreſt laws have fallen into total diſuſe, to the great advantage of the ſubject.

This is the only *juſtice* who may appoint a deputy: he is alſo called *juſtice in eyre of the foreſt.*

Justices *of aſſiſe*, were ſuch as were wont, by ſpecial commiſſion, to be ſent into this or that county, to take aſſiſes, for the eaſe of the ſubjects.

For, whereas theſe actions paſs always by jury, ſo many men might not, without great damage and charge, be brought up to London; and therefore *juſtices*, for this purpoſe, by commiſſions particularly authorized, were ſent down to them.

Theſe continue to paſs the circuit, by two and two, twice every year, through all England, except the four northern counties, where they go only once, diſpatching their ſeveral buſineſſes by ſeveral commiſſions; for they have one commiſſion to take aſſiſes, another to deliver gaols, and another of oyer and terminer. In London and Middleſex a court of general gaol-delivery is held eight times in the year.

All the justices *of peace* of any county wherein the aſſiſes are held, are bound by law to attend them, or elſe are liable to a fine; in order to return recognizances, &c. and to aſſiſt the judges in ſuch matters as lie within their knowledge and juriſdiction, and in which ſome of them have been probably concerned, by way of previous examination. See Assises and Jury.

Justices *in eyre, juſticiarii itinerantes*, or *errantes*, were thoſe who were anciently ſent with commiſſion into divers counties, to hear ſuch cauſes, eſpecially as were termed *pleas of the crown*; and that for the eaſe of the ſubject, who muſt elſe have been hurried to the courts of Weſtminſter, if the cauſe were too high for the county courts.

According to ſome, theſe *juſtices* were ſent once in ſeven years; but others will have them to have been ſent oftener. Camden ſays, they were inſtituted in the reign of king Henry II. A. D. 1184; but they appear to be of an older date.

They were ſomewhat like our *juſtices* of aſſiſe at this day; though for authority, and manner of proceeding, very different.

Justices *of gaol-delivery*, thoſe commiſſioned to hear and determine cauſes appertaining to ſuch as for any offence are caſt into priſon.

Juſtices of gaol-delivery are impowered by the common law to proceed upon indictments of felony, treſpaſs, &c. and to order execution or reprieve; and they have power to diſcharge ſuch priſoners as upon their trials ſhall be acquitted; alſo all ſuch againſt whom, on proclamation made, no evidence appears to indict; which *juſtices* of oyer and terminer, &c. may not do. 2 Hawk. 24, 25.

But theſe *juſtices* have nothing to do with any perſon, not in the cuſtody of the priſon, except in ſome ſpecial caſes; as if ſome of the accomplices to a felony may be in ſuch priſon, and ſome of them out of it, the *juſtices* may receive an appeal againſt thoſe who are out of the priſon, as well as thoſe who are in it; which appeal after the trial of ſuch priſoners, ſhall be removed into B. R. and proceſs iſſue from them againſt the reſt. But if thoſe out of priſon be omitted in the appeal, they can never be put into any other; becauſe there can be but one appeal for one felony.

In this way the gaols are cleared, and all offenders tried, puniſhed, or delivered, in every year.

Their commiſſion is now turned over to the justices *of aſſiſe.*

Justices *of niſi prius* are now the ſame with *juſtices of aſſiſe.* It is a common adjournment of a cauſe in the common pleas, to put it off to ſuch a day, *Niſi prius juſtitiarii venerint ad eas partes ad capiendas aſſiſas:* from which clauſe of adjournment they are called *juſtices of niſi prius*, as well as *juſtices of aſſiſe*, on account of the writ and actions they have to deal in. See Nisi *prius*, and Jury.

Justices *of oyer and terminer*, were *juſtices* deputed on ſome ſpecial occaſions to hear and determine particular cauſes.

The commiſſion of oyer and terminer is directed to certain perſons, upon any inſurrection, heinous demeanour, or treſpaſs committed, who muſt firſt enquire, by means of the *grand* jury or inqueſt, before they are empowered to hear and determine by the help of the *petit* jury.

It was formerly held, that no judge or other lawyer could act in the commiſſion of oyer and terminer, or in that of gaol-delivery, within the county where he was born or inhabited; but it was thought proper by 12 Geo. II. cap. 27. to allow any man to be a *juſtice* of oyer and terminer and general gaol-delivery, within any county of England.

Justices *of the peace* are perſons of intereſt and credit, appointed by the king's commiſſion to keep the peace of the county where they live.

Of theſe, ſome, for ſpecial reſpect, are made of the quorum, ſo as no buſineſs of importance may be diſpatched without the preſence, or aſſent, of them, or one of them. However, every *juſtice* of peace hath a ſeparate power, and his office is to call before him, examine, iſſue warrants for apprehending, and commit to priſon, all thieves, murderers, wandering rogues; thoſe that hold conſpiracies, riots, and almoſt all delinquents which may occaſion the breach of the peace, and quiet of the ſubject; to commit to priſon ſuch as cannot find bail, and to ſee them brought forth in due time to trial; and bind over the proſecutors to the aſſiſes. And if they neglect to certify examinations and informations to the next gaol-delivery, or do not bind over proſecutors, they ſhall be fined. A *juſtice* may commit a perſon that doth a felony in his own view, without warrant; but if on the information of another, he muſt make a warrant under hand and ſeal for that purpoſe. If complaint and oath be made before a *juſtice* of goods ſtolen, and the informer, ſuſpecting that they are in a particular houſe, ſhews the cauſe of his ſuſpicion, the *juſtice* may grant a warrant to the conſtable, &c. to ſearch in the place ſuſpected, to ſeize the goods and perſon in whoſe cuſtody they are ſound, and bring them before him or ſome other *juſtice*. The ſearch on theſe warrants ought to be in the day-time, and doors may be broke open by conſtables to take the goods. *Juſtices* of peace may make and perſuade an agreement in petty quarrels and breaches of the peace, where the king is not entitled to a fine, though they may not compound offences, or take money for making agreements. A *juſtice* hath a diſcretionary power of binding to the good behaviour, and may require a recognizance, with a great penalty, of one, for his keeping of the peace, where the party bound is a dangerous perſon, and likely to break the peace, and do much miſchief; and for default of ſureties, he may be committed to gaol. But a man giving ſecurity for keeping the peace in the king's bench or chancery, may have a *ſuperſedeas* to the *juſtices* in the country not to take ſecurity; and alſo by giving ſurety of the peace to any other *juſtice*. If one make an aſſault upon a *juſtice* of peace, he may apprehend the offender, and commit him to gaol, till he finds ſureties for the peace; and a *juſtice* may record a forcible entry on his own poſſeſſion: in other caſes he cannot judge in his own cauſe. Contempts againſt *juſtices* are puniſhable by indictment and fine at the ſeſſions. *Juſtices* ſhall not be regularly puniſhed for any thing done by them in ſeſſions as judges; and if a *juſtice* be tried for any thing done in his office, he may plead the general iſſue, and give the ſpecial matter in evidence; and if a verdict is given for him, or the plaintiff be nonſuit, he ſhall have double coſts; and ſuch action ſhall only be laid in the county where the offence was committed 7 Jac. cap. 5. 21 Jac. cap. 12. But if they are guilty of any miſdemeanor in office, information lies againſt them in the king's bench, where they ſhall be puniſhed by fine and impriſonment; and all perſons who recover a verdict againſt a *juſtice*, for any wilful or malicious injury, are entitled to double coſts. By 24 Geo. II. cap. 44. no writ ſhall be ſued out againſt any *juſtice* of peace, for any thing done by him in the execution of his office, until notice in writing ſhall be delivered to him one month before the ſuing out of the ſame, containing the cauſe of action, &c. within which month he may tender amends; and if the tender be found ſufficient, he ſhall have a verdict, &c. Nor ſhall any action be brought againſt a *juſtice* for any thing done in the execution of his office, unleſs commenced within ſix months after the act committed.

A *juſtice* is to exerciſe his authority only within the county where he is appointed by his commiſſion, not in any city which is a county of itſelf, or town corporate, having their proper *juſtices*, &c. but in other towns and liberties he may. The power and office of *juſtices* terminate in ſix months after the demiſe of the crown, by an expreſs writ of diſcharge under the great ſeal, by writ of *ſuperſedeas*, by a new commiſſion, and by acceſſion of the office of ſheriff or coroner.

For a farther account of the duty of *juſtices*, ſee QUARTER *ſeſſions*.

The original of *juſtices* of the peace is referred to the fourth year of Edward III. They were firſt called *conſervators*, or *wardens of the peace*, elected by the county, upon a writ directed to the ſheriff; but the power of appointing them was transferred by ſtatutes from the people to the king; and under this appellation appointed by 1 Edw. III. cap. 16. Afterwards the ſtatute 34 Edw. III. cap. 1. gave them the power of trying felonies, and then they acquired the appellation of *juſtices*. They are appointed by the king's ſpecial commiſſion under the great ſeal, the form of which was ſettled by all the judges, A. D. 1590; and the king may appoint as many as he ſhall think fit in every county in England and Wales, though they are generally made at the diſcretion of the lord chancellor, by the king's leave. At firſt the number of *juſtices* was not above two or three in a county, 18 Edw. III. cap. 2. Then it was provided by 34 Ed. III. cap. 1. that one lord, and three or four of the moſt worthy men in the county, with ſome learned in the law, ſhould be made *juſtices* in every county. The number was afterwards reſtrained firſt to ſix, and then to eight, in every county, by 12 Ric. II. cap. 10. and 14 Ric. II. cap. 11. But their number has greatly increaſed ſince their firſt inſtitution. As to their qualifications, the ſtatutes juſt cited direct them to be of the beſt reputation and moſt worthy men in the county; and the ſtat. 13 Ric. II. cap. 7. orders them to be of the moſt ſufficient knights, eſquires, and gentlemen of the law; and by 2 Hen. V. ſtat. 1. cap. 4. and ſtat. 2. cap. 1. they muſt be reſident in their ſeveral counties. And by 18 Hen. VI. cap. 11. no *juſtice* was to be put in commiſſion, if he had not lands to the value of 20*l. per annum*. It is now enacted by 5 Geo. II. cap. 11. that every *juſtice* ſhall have 100*l. per annum*, clear of all deductions; of which he muſt make oath by 18 Geo. II. cap. 20. And if he acts without ſuch qualification, he ſhall forfeit 100*l.* It is alſo provided by 5 Geo. II. that no practiſing attorney, ſolicitor, or proctor, ſhall be capable of acting as a *juſtice* of the peace.

JUSTICES *of peace within liberties*, are *juſtices* of the peace who have the ſame authority in cities, or other corporate towns, as the others have in counties; and their power is the ſame; only that theſe have the aſſiſe of ale and beer, wood and victuals, &c. *Juſtices* of cities and corporations are not within the qualification act, 5 Geo. II. cap. 18.

JUSTICE-*ſeat*. See JUSTICE *of the foreſt*.

JUSTICIA, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the flower has one petal, which is divided into two lips, almoſt to the bottom, which is entire; the upper lip is raiſed archways, and the under is reflexed; it has two awl-ſhaped ſtamina, ſituated under the upper lip, with an oblong germen, which becomes an oblong capſule with two cells, which open with an elaſticity, and caſt out roundiſh ſeeds. The ADHADOTA, or Malabar nut, is a ſpecies of this genus.

JUSTICIAR, in our *Old Laws*, an officer inſtituted by William the Conqueror, as the chief officer of ſtate, and who principally determined all pleas civil and criminal. He was called in Latin, *capitalis juſticiarius totius Angliæ*. See JUSTICE.

JUSTICIARII, in *Church Hiſtory*, an appellation given to heretics who boaſt much of perfect righteouſneſs, and deſpiſe others: ſuch were the Phariſees among the Jews, and the Novatians and Donatiſts among the Chriſtians.

JUSTICIARIUS, *Magiſter*, a judge in the kingdom of Naples, who has ſupreme juriſdiction in all caſes of treaſon, and pleas of the crown, and finally determines all appeals. He has four aſſeſſors.

JUSTICIARY *court*, in Scotland. The court of *juſticiary* has ſupreme juriſdiction in all criminal cauſes. It came in place of that of *juſtice-eyre*, or *juſtice-general*, which was laſt in the perſon of the earl of Argyle, who tranſacted for it with king Charles I. and was made juſtice-general of all the iſlands; which raiſing great debates between him and ſome hereditary ſheriffs there, the juriſdiction was taken away in 1672, and this court of *juſticiary* erected inſtead of it, conſiſting of a juſtice-general, alterable at the king's pleaſure; a *juſtice clerk*, and five other *judges*, who are likewiſe lords of the ſeſſion.

This court commonly ſits on Mondays, and has an ordinary clerk, who has his commiſſion from the juſtice clerk. They have four ordinary macers and a doomſter appointed by the lords of ſeſſion.

The form of proceſs is this: the clerk raiſes a libel or indictment, by a bill paſſed by any of the lords of that court, at the inſtance of the purſuer againſt the defender or criminal, who is committed to priſon immediately after citation. When the party, witneſſes, and great aſſiſe, or jury of forty-five men, are cited, the day of appearance being come, fifteen of the great aſſiſe are choſen to be the aſſiſe upon the pannel, or priſoner at the bar. The aſſiſe ſits with the judges to hear the libel read, witneſſes examined, and the debates on both ſides, which is written verbatim, in the adjournal books. The king's advocate pleads for the purſuer, being the king's cauſe, and other advocates for the pannel. The debates being cloſed, the judges find the libel or indictment either *not relevant*; in which caſe they deſert the diet, and aſſoil or abſolve the party accuſed: or elſe they find the libel *relevant*; in which caſe the aſſiſe or jury of fifteen is removed into a cloſe room, none being allowed to be preſent with them; where they chooſe their own chancellor and clerk, and conſider the libel, depoſitions, and debates,

bates, and bring in their verdict of the pannel ſealed, guilty or not guilty. If not guilty, the lords abſolve; if guilty, they condemn, and order the ſentence of condemnation to be pronounced againſt the criminal by the mouth of the doomſter. It has been ſtrenuouſly maintained by ſome, and as ſtrenuouſly controverted by others, that an appeal lies from this court to the houſe of lords. The lords of *juſticiary* likewiſe go circuits twice a year, viz. in May and October, into the country, which is divided into three circuits, the ſouth, weſt, and north, where aſſiſes are held, and criminals tried, as mentioned above.

JUSTICIES, in *Law*, a writ directed to the ſheriff in ſome ſpecial caſes, by virtue of which he may hold plea of debt in his county-court for a large ſum; whereas otherwiſe, by his ordinary power, he is limited to ſums under forty ſhillings.

JUSTIFIABLE *homicide*. See Homicide.

JUSTIFICATION, in *Law*, ſignifies a maintaining or ſhewing a ſufficient reaſon in court, why the defendant did what he is called to anſwer. Pleas in *juſtification* muſt ſet forth ſome ſpecial matter: thus, on being ſued for a treſpaſs, a perſon may juſtify it by proving, that the land is his own freehold; that he entered a houſe in order to apprehend a felon; or by virtue of a warrant, to levy a forfeiture, or in order to take a diſtreſs; and in an Assault, that he did it out of neceſſity.

Justification, or Justifying, among *Letter Founders*. See *Letter* Foundery.

Among *Printers*, it denotes the proper adjuſtment of the lines and pages.

Justification, in *Theology*, that act of grace which renders a man juſt in the ſight of God, and worthy of eternal happineſs.

The Romaniſts and Reformed are extremely divided about the doctrine of *juſtification*; the latter contending for *juſtification* by faith alone, and the former by good works.

JUSTIFYING *bail*, in *Law*. See Bail *above*.

Justifying *grace*. See Grace.

JUSTITIA, *fiat*, in *Law*. See Fiat.

JUSTNESS, the exactneſs or regularity of any thing.

Juſtneſs is chiefly uſed in ſpeaking of thought, language, and ſentiments. The *juſtneſs* of a thought conſiſts in a certain preciſion or accuracy, by which every part of it is perfectly true, and pertinent to the ſubject.

Juſtneſs of language conſiſts in uſing proper and well choſen terms; in not ſaying either too much, or too little.

M. De Mere, who has written on *juſtneſs* of mind, diſtinguiſhes two kinds of *juſtneſs*; the one ariſing from taſte and genius; the other, from good ſenſe, or right reaſon. There are no certain rules to be laid down for the former, viz. to ſhew the beauty and exactneſs in the turn, or choice of a thought; the latter conſiſts in the juſt relation which things have to one another.

JUTTY-*heads*, in the *Sea Language*, platforms ſtanding on piles, near the docks, and projecting without the wharfs, for the more convenient docking and undocking ſhips.

JUTRA, in *Botany*, a name uſed by ſome authors for the tree whoſe fruit is the tamarind of the ſhops.

JUVENALIA, or Juvenales *ludi*, games, exerciſes of body, and combats, inſtituted by Nero the firſt time his beard was ſhaved.

They were celebrated in private houſes, and even the women had a ſhare in them: probably they were the ſame with what were otherwiſe called *Neroniana*.

JUVENTAS, in *Mythology*, the goddeſs who preſided over youth among the Romans. This goddeſs was long honoured in the Capitol, where Servius Tullius erected her ſtatue. Near the chapel of Minerva there was the altar of *Juventas*, and upon this altar a picture of Proſerpine. The Greeks called the goddeſs of youth Hebe; but it has been generally ſuppoſed that this was not the ſame with the Roman *Juventas*.

IVY, *hedera*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flowers are diſpoſed in form of an umbel; the empalement is cut into five parts, and ſits upon the germen; the flower has five oblong petals, and five awl-ſhaped ſtamina; the germen, which is ſituated below the flower, becomes a globular berry with one cell, incloſing four or five large ſeeds, convex on one ſide, and angular on the other. There are two ſpecies.

While the ſtalks of the common *ivy* trail either on the ground, or upon walls or other ſupports, they ſeldom produce flowers; which has occaſioned its being called ſterile or barren *ivy*; but when the branches get above their ſupport, or grow from it, they produce flowers at the end of every ſhoot; theſe appear in September, and are ſucceeded by berries, which turn black before they are ripe: theſe are formed into round bunches, which are called *corymbi*; and from theſe the epithet *corymbus*, ſo frequently uſed by botaniſts, is taken.

Ivy is a very well known plant; and it is very certain, from all the writings of the ancients, that they, when they wrote with propriety, meant the ſame plant by the word *hedera* that we do at this time. There is, however, in Pliny, a paſſage which has appeared unintelligible to his commentators in general, and ſeemed to point out to ſome other plant as known to the ancients by the name *hedera*, beſides our *ivy*. See Cistus.

The leaves of *ivy* are ſeldom uſed inwardly, but outwardly they are applied to iſſues, to keep them cool, and free from inflammation: as alſo to ſcabs, ſores, and ſcald heads. Mr. Boyle, in his Uſe of Experimental Philoſophy, commends a large doſe of the full ripe berries, as a remedy againſt the plague; and it is ſaid, that in the London plague, the powder of them was given in vinegar, or white wine, with ſucceſs; and they have been recommended in ſmall doſes, as alexipharmic and ſudorific. Schroder ſays, they purge upward and downward. The gum of *ivy* is ſomewhat cauſtic, and commended to take away ſpots and freckles out of the face. This reſinous juice, exuding from the ſtalks of *ivy*, has been recommended as corroborant and reſolvent, in cachexies and uterine obſtructions; but has been rarely uſed, except as an ingredient in plaſters; nor does it appear to poſſeſs any virtues which common reſin has not in an equal degree.

Ivy-reſin is brought from Perſia, and ſome other of the hot countries, where alone it is to be found in any conſiderable quantity. Mr. Ray, indeed, mentions ſome of it having been found on *ivies* in Worceſterſhire, and other authors in other parts of Europe; but theſe are only ſingular inſtances of what may happen, our ſhops being obliged to be ſupplied from the Eaſt.

The ancient Greeks were acquainted with this reſin, which they called *lacryma hederæ*, as ſome alſo do to this day. It is ſaid to be emollient and detergent, and to make a noble balſam for freſh wounds; but is never uſed by us with theſe intentions. The Perſians eſteem it much as an aſtringent.

Ivy-*tree of America*. See Kalmia.

Ivy, *ground*. See Ground-*ivy*.

Ivy, *petrified*. See Petrifaction.

Ivy, *Virginian*. See Moonseed.

JUXTAPOSITION, is uſed by philoſophers to denote that ſpecies of growth, which is performed by the appoſition of new matter to the ſurface, or outſide, of old.

In which ſenſe, it ſtands oppoſed to *intuſ-ſuſception*; where the growth of a body is performed by the reception of a juice within it, diffuſed through its canals. See Nutrition.

IXALOS, in *Natural Hiſtory*, a name given by the Greek writers to the creature which we call the *chamoy*-goat.

IXIA, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are theſe: it has oblong, permanent ſpathæ, or ſheaths, which incloſe the germen; and the flower has ſix petals, which are equal, and three awl-ſhaped ſtamina; it has an oval three-cornered germen, ſituated below the flower, with a ſingle ſtyle; the germen afterward becomes an oval capſule with three cells, filled with roundiſh ſeeds. It has nine ſpecies, natives of the Cape of Good Hope, where the natives greatly eſteem the roots as food. Miller.

IXIAS, in *Botany*, a name given to the chamælean thiſtle of the white kind; and in the materia medica of the ancients, to a poiſon, againſt which they have preſcribed many remedies. See Chamæleon.

IXOPUS, in *Botany*, a name given by Cordus, and ſome other authors, to the chondrilla or ſuccory. Ger. Emac. Ind. 2.

IXORA, in *Botany*, the name of a genus of plants of the *tetrandria monogynia* claſs; the characters of which are, that the calyx is a ſmall erect perianthium, divided into four ſegments, and remaining when the flower is fallen; the flower conſiſts of one petal, which is a ſlender, cylindric, and very long tube, with a flat border, divided into four ſegments, of an oval figure; the ſtamina are four very ſhort and crooked filaments, placed in the notches of the flower; the antheræ are oblong; the germen of the piſtil is roundiſh; the ſtyle is ſlender, and of the length of the tube; and the ſtigma is bifid; the fruit is a roundiſh berry, containing only one cell, in which are four ſeeds, convex on one ſide, and angular on the other.

IYAR, in *Chronology*, the ſecond month of the eccleſiaſtical Jewiſh year, anſwering to part of our April and May.

JYNX. See Wryneck.

IZTICHUILOTLI, in *Natural Hiſtory*, the American name of a ſtone found in New Spain, and ſome other places; it is very hard, of a beautiful black, and takes a fine poliſh. The Americans are very fond of it as a gem, and wear it by way of ornament.

De Laet mentions an American ſtone in his poſſeſſion, which was cut by the Indians into a flat oval plate, and was of a beautiful black, but with two round ſpots of a ſilvery white. He ſuppoſes this to have been the *uterinus lapis*, and probably it was either that ſtone, or of the ſpecies here mentioned.

IZTICPASO-QUERZALIZTLI, in *Natural Hiſtory*, the name given by the natives of ſome parts of America to a ſtone famous for its virtues in curing the colic, and many other diſeaſes, externally applied. It is of a beautiful green colour, and is by Ximenes ſuppoſed a coarſe ſpecies of emerald; but is more properly a very fine kind of *lapis nephriticus*, of a pale green colour, very hard, and more pellucid than the other ſpecies of that ſtone, but yet always ſhewing that greaſy look on being poliſhed, which characterizes all the nephritic ſtones. It is uſually found in large maſſes, and the Indians cut it into flat pieces, which they apply to the navel in the colic, and in other diſeaſes, to the part affected, and ſuppoſe it has great power in promoting a diſcharge of the noxious humours.

IZTLI, in *Natural Hiſtory*, the American name of a ſpecies of ſtone, of which the natives made their weapons of war, &c. before they knew the uſe of iron. It is called by De Laet and other authors, *lapis* NOVACULARUM.

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END OF THE SECOND VOLUME.

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